Appendix A

Community-Based Master Land Use Plan for Molokai Ranch

COMMUNITY-BASED MASTER LAND USE PLAN FOR MOLOKA'I RANCH



FINAL

By:
LAND USE COMMITTEE
MOLOKA'I ENTERPRISE
COMMUNITY

Compiled By:
TOWNSCAPE, INC.

NOVEMBER 14, 2005

Acknowledgements

In a rare display of community initiative, this Community Plan is the result of countless community meetings, long hours of impassioned debate, critical thinking and soul searching. Numerous individuals who, in loving dedication to Molokaʻi-nui-a-Hina, have contributed their time and energy over the course of two years to complete the Community-Based Master Land Use Plan for Molokaʻi Ranch.

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Molokaʻi Media Center
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Photos by Richard A. Cooke III
The Molokaʻi Dispatch
Townscape, Inc.

Tourism Sub-Committee
Co-Chairs: Cheryl Corbiell and Kammy Purdy; Participants: Vannie Ainoa, Lawrence Aki, Billy Akutagawa, George Benda, Cheryl Corbiell, Stacy Crivello, Zhantell Dudoit, Jimmy Duvauchelle, Harold Edwards, DeWitt Jones, David Lunney, Colette Machado, Peter Nicholas, Kuulei Perez, Walter Ritte, John Sabas, DeGray Vanderbilt, Karen Joao, Hazel Kaakimaka, Clare Mawae, Maria Holmes, Bill Kapuni, Kyno Ravelo, Ken Bare, Julia Hoe, Joseph Plocich, Kulia Keliikuli-Peters, Frances Feeter, Teri Waros, Maria Holmes, Dave Dawson, Karen Joao, Tani Smee, Dayna Harris, Tuddie and Kammy Purdy, Donald and Joanna Sunshine, Winnie Lopez, Melody Kahinu, Peter Birnbaum, Pilialoha Kalaiwaa, Deanna Keliihoomalu, Leanda Rawlins, Joseph Pentak, Sandy Beddow, Mahiki Lanford, Joseph Pentals, Cheryl Pritchard, Catherine Aki, Kealoha Peltier, Joe Mawae, Elizabeth Puaoi, Sarah Stricklin, Tanya Mendija, Darlene Toth, Julie Lopez, Damien Place, Marie Place, John Wordin.

Cultural Sub-Committee
Chair: Colette Machado, Kākoʻo: Halona Kaopuiki; Participants: Lawrence Aki, William Akutagawa, Stacy Crivello, Harold Edwards, Moke Kim, Colette Machado, Davianna McGregor, Walter Ritte, Peter Nicholas, Russel Kallstrom, Ghandharva Ross, John Sabas, Claud Sutcliffe, Jimmy Duvauchelle, John Pele, Donald Sunshine, Joanna Sunshine, Pilipo Solatario, Julie Kaupu, Keoni Lindo, Keliipio Mawae, George Pescaia, Roxanne French, Paul Bartram, Loretta Ritte, Kiha Robello, Walter Mendes, Bill Kapuni, Debra Spencer, Catherine Aki, Teri Waros, Mikiala Ayau, Irene Kaahanui, Penny Martin, Patsy Nicholas, Louise Bush, Henry Paleka Sr., Melanie Collins, Liko Mawae, Jasmine Mawae, Dayna Naeole, Joe Mawae, Annette Pauole-Ahakuelo, Vanda Hanakahi, Hano Naehu, Gayla Haliniak, Michael Tancayo, Mahalani Davis, Edward Ayau, Arun Amarsi.

Recreation Sub-Committee
Chair: Zhantell Dudoit; Participants: Jimmy Duvauchelle, Peter Nicholas, Kuulei Perez, John Sabas, Maria Holmes, Melody Kahinu, Ron Kimball, Liko Wallace, Mike Sabas, Hazel Kaakimaka, Tim and Susan Forsberg, Teri Waros, Mike Holmes, Moku Buchanan, Joey Joao, Cliff Kapono, Darrel Relto, Leanda Rawlins, Deanna Keliihoomalu, Clifford Dudoit, Clare Mawae, Bill Feeter.

Environment Sub-Committee
Co-Chairs: Rikki Cooke and Ed Misaki; Participants: George Benda, Stacy Crivello, Jimmy Duvauchelle, Harold Edwards, DeWitt Jones, Barbara Kalipi, Halona Kaopuiki, Colette Machado, Ed Misako, Peter Nicholas, Walter Ritte, John Sabas, DeGray Vanderbilt, George Maioho, Bill Barnett, Kanoho Helm, James Millar, Keoki Pescaia, Ghandarva Ross, Paul Bartram, Loretta Ritte, Valerie Monson, Harvey James, Teri Waros, Ron Kimball, Greg Jenkins, Francis Feeter, Cheryl Pritchard, Ken Bare, Malia Akutagawa, Wilma Grambucsh, Debra Spencer, Annette Pauole-Ahakuelo, Bill Garnett, David Haferman, James Millar, Chris Hammond, Mikal Berrt, Arun Amarsi, Wade Busher, Russel Kalstrom.

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Co-Chairs: Stacy Crivello and DeGray Vanderbilt; Participants: Lawrence Aki, George Benda, Cheryl Corbiell, Jimmy Duvauchelle, Harold Edwards, DeWitt Jones, Barbara Kalipi, Colette Machado, Peter Nicholas, Walter Ritte, John Sabas, Malia Akutagawa, Cathy Barber, Liette Corpus, Mahealani Davis, Ron Kimball, Yolanda Reyes, Debra Spencer, Teri Waros, Greg Jenkins, Ken Bare, Valerie Monson, Harvey James, Frances Feeter, Cheryl Pritchard, Keoni Lindo, Alton Arakaki, Julie Kamakana, Annette Pauole-Ahakuelo, James Sheldon, Donna Paoa, Barbara Haliniak, Pat Kamakana, Elizabeth Puaoi, D. Mele Carroll, Janice Bohanna, Robert Bohanna, Harvey James, Neal Bal, Greg Jenkins, Pat Benda, George Benda.

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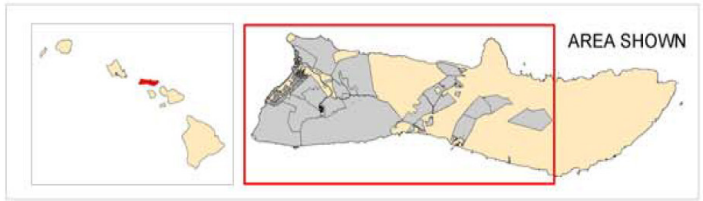
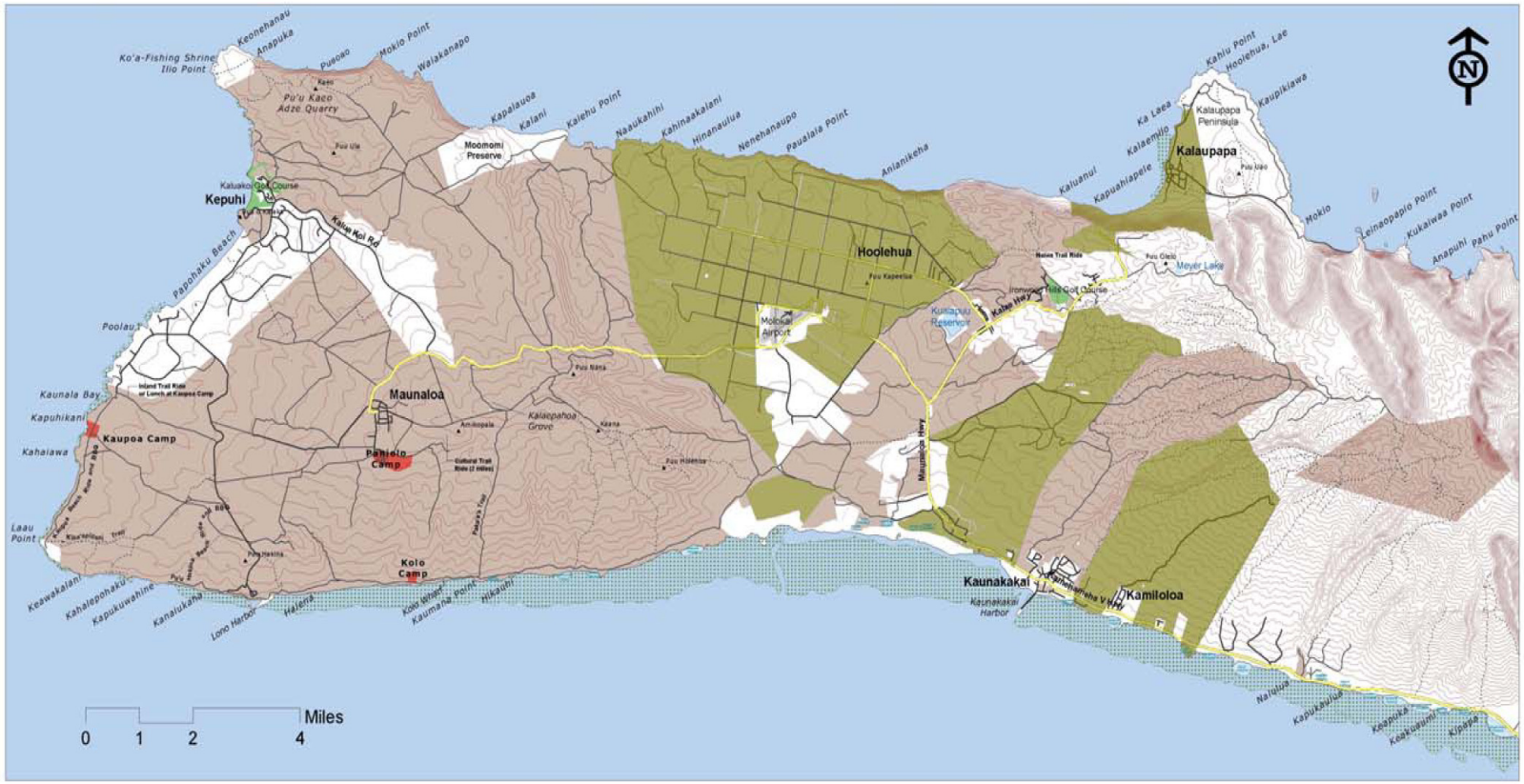
MOLOKA'I RANCH LANDS:
BASE MAP





Molokai Ranch Property
DHHL Land
Coral Reef
Camp
Golf Course
Major Road
Secondary Road
Minor Road
4WD Road
Trail

Prepared by: The Conservation Fund
October 21, 2005

1 EXECUTIVE SUMMARY

1.1 ORIGIN

A vision for the future protection of the land's precious resources, a desire to create a sustainable economy for the community and a strong sense of cultural heritage, were the principal focus of community representatives and Molokaʻi Properties Limited (MPL) when they began discussing a Community-Based Master Land Use Plan for Molokaʻi Ranch in January 2004.

What began almost a year earlier as discussions on the re-opening of the Kaluakoʻi Hotel led to a desire by MPL and The Molokaʻi Enterprise Community, Ke Aupuni Lōkahi (KAL) to create a Plan for MPL's 65,000 acres that would truly be visionary and reflect the wishes of the community.

KAL was formed in 1998, developing a 10-year strategic plan to stimulate the island's economy. Today the KAL has more than 50 projects.

MPL, the largest landowner on the island, had through its decade of ownership by BIL International Limited, isolated itself from the community through a lack of consultation about its future plans.

It was the willingness of these two organizations to come together as equal partners in a planning process which involved representatives of the community that led to the Plan contained within this document.

But the results of the Plan mean more than what is contained on these pages.

The results mean a coming together of the community and a reconciliation of families that had been separated by controversy for more than a decade; a partnership between a company and its island neighbors, and personal growth for all involved.

The planning process was formally launched in August 2003 as a KAL project under Project #47: Community-Based Compatible Development.

In February 2004, the MPL Community-based Master Land Use Plan for Molokaʻi Ranch was included as part of the project.



1.2 GOALS

The goal of the project and the plan was to create new employment and training opportunities for Molokaʻi residents and to provide the Molokaʻi community with

certainty about their future. Its objectives are:

- Develop sustainable economic activities that are compatible with Molokaʻi and the vision of the Molokaʻi Enterprise Community.
- Secure the role of the community in the management of MPL's 65,000 acres.
- Re-open the Kaluakoʻi Hotel and create 100 plus jobs.
- Protect cultural complexes and sites of historic significance on MPL lands.
- Protect environmentally valuable natural resources and agricultural land, pasture and open space.
- Create a land trust with donated lands from MPL.

The Master Land Use Plan provides a framework by which the agreed upon principles serve to guide future land use and management activities for the MPL and Molokaʻi Land Trust lands.

1.3 PROCESS

From March 2004 through May 2004, five committees: Environment, Cultural, Economics, Tourism, and Recreation met for 100 days with a total of 1,000 participants to develop the plan.

The meetings were announced, open to the public, and most of the meetings were aired on the Akaku Channel 53. The Conservation Fund was hired by MPL to plan the process, produce maps, and to guide the formation of a land trust to manage lands that MPL would gift to the Molokaʻi community.

KAL and MPL presented the draft plan to various community organizations and the general public to receive their input. During this time, a Land Use Committee finalized the guidelines for policies and principles for land management, except for the segments on the development at Lāʻau Point and Water Use.

In October 2004, the Alternative to Lāʻau Development Committee (ALDC) was formed to look at alternatives to the proposed development at Lāʻau Point.

On August 1, 2005, the Lāʻau Point and Water Use segments of this plan were adopted by the Land Use Committee.

Final approval of the draft CB Master Land Use plan by the KAL is scheduled for early November. The ALDC report will be considered at the same time.

1.4 VISION STATEMENT

Molokaʻi is the last Hawaiian Island. We who live here choose not to be strangers in our land. The values of ***aloha ʻāina*** *and* ***mālama ʻāina*** *(love and care for the land) guide our stewardship of Molokaʻi's natural resources, which*

nourish our families both physically and spiritually.

*We live by our **kupuna's** (elders') historic legacy of **pule oʻo** (powerful prayer). We honor our island's Hawaiian cultural heritage, no matter what our ethnicity, and that culture is practiced in our everyday lives. Our true wealth is measured by the extent of our generosity.*

*We envision strong **ʻohana** (families) who steadfastly preserve, protect and perpetuate these core Hawaiian values.*

We envision a wise and caring community that takes pride in its resourcefulness, self-sufficiency and resiliency, and is firmly in charge of Molokaʻi's resources and destiny.

*We envision a Molokaʻi that leaves for its children a visible legacy: an island **momona** (abundant) with natural and cultural resources, people who **kōkua** (help) and look after one another, and a community that strives to build an even better future on the **paʻa** (firm) foundation left to us by those whose **iwi** (bones) guard our land.*

1.5 RESOURCE ASSESSMENT

MPL owns approximately 65,000 acres on the island of Molokaʻi. The bulk of these land holdings are located on the west end of the island. There are also three tracts of land located in the central portion of Molokaʻi.

The MPL properties contain a vast array of cultural and archaeological, subsistence, environmental (both terrestrial and aquatic), agricultural, recreational, and economic-based resources.

In order to develop the plan, committees were established to collect and interpret the information necessary to formulate the plan.

Sub-Committee members identified and assessed various resources including terrestrial and aquatic environments, agricultural use areas, physical infrastructure, residential and commercial areas, cultural and archaeological sites and subsistence areas. Various documents and maps were gathered and rendered as follows:

Agriculture: Soil suitability; agricultural lands of importance; current agricultural uses.

Archaeological: Site inventories (west end Molokaʻi) and Lāʻau.

Residential and Commercial: Maunaloa, Kualapuʻu and Kaunakakai towns.

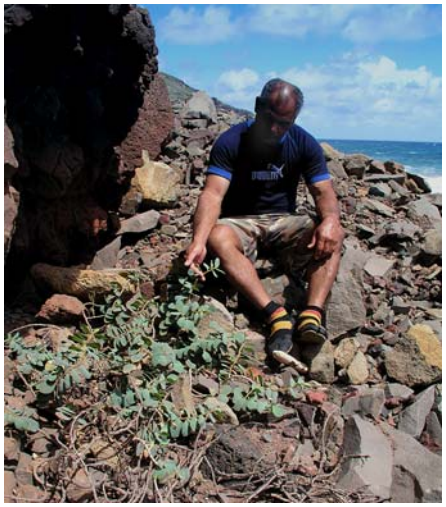
Hunting: Identification of bow and rifle and no hunting safety areas.

Natural Resources:

- Terrestrial: Native dominated landscapes including coastal, lowland and montane, and wet cliff areas;

vertebrate and invertebrate rare species; and non-native plant landscapes.

- Aquatic: Ancient fishponds, wetlands including tidal (marine/coral reef and estaurine areas) and non-tidal, erosion areas, and critical watersheds for reef



protection.

Industrial: Existing Moloka'i Industrial Park.

Recreation: Hiking and bike trails, horse trails, State trails, surfing areas, visible viewsheds, golf courses, and historic Monsarrat trail.

Subsistence Fishing: Ancient fishponds, camp sites, and fishing zones.

1.6 PRECEDENTS

This Plan creates a number of unique precedents:

1.6.1 Community Planning

A Land Use Plan that was initiated, designed and will be implemented by the community of Moloka'i. It is the result of a two-year planning process involving every member of the community who wished to participate.

1.6.2 Land Trust

A total of 26,200 acres or 40% of Moloka'i Ranch lands is donated to a Moloka'i Land Trust that has the unique mission of:

- Protecting historic cultural archeological sites.
- Preserving the precious natural and environmental resources.
- Enhancing indigenous rights through the protection of subsistence gathering.

1.6.3 Easements

A further 24,950 acres (38% of the property) are placed under new Land Trust protective easements, of which:

- 14,390 acres will be protected forever for agriculture use.
- 10,560 acres will remain open space.

1.6.4 Protection from Development

The combination of the donated land, existing and new easements protect more than 85% or 55,000 acres of the property from development.

1.6.5 Subsistence

The recognition of Native Hawaiian subsistence rights, and protecting for the

community, the hunting and fishing resources of the island, by:

- Seeking to establish a subsistence fishing zone from the coast to the outer edge of the reef or where there is no reef, out a quarter mile from the shoreline along the 40 mile perimeter of the property.
- Ending commercial hunting, and allowing only the community to hunt on the property.
- Ensuring access to the shoreline will be available only by foot.

1.6.6 Community Expansion

Only Moloka'i residents will decide future expansion of existing communities in the areas with a total of 200 acres around Kualapu'u and Maunaloa to be made available for community housing, and in the 1,100 acres above Kaunakakai to be donated to the Moloka'i Land Trust for community expansion.

1.6.7 Jobs for the Community

The Kaluako'i Hotel will be re-opened for visitor accommodation creating more than 100 permanent jobs for the local community. By outsourcing various hotel functions such as laundry, gift shop, beach shack and spa, and by committing to use local produce, small business opportunities will be created for the community.

1.6.8 Development

Integral to the development of a 200-lot subdivision at Lā'au Point, the community has ensured it will:

- Be restricted to 500 acres
- Through protective easements to the Land Trust, protect more than 1,000 acres of beachfront, archeological sites and environmental areas, giving the community an important voice in the future of this area.
- Protect the shoreline for subsistence gathering by only allowing foot access for the community.
- Ensure covenants will limit water use, minimize disturbance to the landscape, prevent pollution of the ocean through pesticides and minimize the visual impact of buildings.
- Be the subject of a land use boundary change from agriculture to rural through the Land Use Commission.
- Allow community input.

1.6.9 Land Trust Funding

The community will share in the development returns of the Lā'au Point subdivision by a fee paid to a community entity with every sale transaction, including subsequent re-sales.

Existing communications rents on Land Trust lands of approximately $250,000 will be assigned to the Land Trust for operating funds.

1.6.10 Water

This Plan guarantees the community that there will be no increase in drinking water currently supplied to the west end of the island, and that excess drinking water capacity from Molokaʻi Properties Limited's Well 17 will be made available for the use of the community.

1.7 LAND USE PLAN SUMMARY

The Community-Based Master Land Use Plan establishes five **Land Use Districts:** Cultural, Natural Resources, Rural Landscape Reserve, Agricultural, and Development. These Districts define the primary functions for the 65,000 acres of land under consideration in this Plan. See Proposed Land Trust and Land Use Districts Map on page 9.

In an effort to include all uses and activities for these lands, **Overlay Zones** indicate distinct yet complementary uses within the overall district.

The Districts and Overlays serve a key function of this Master Land Use Plan, namely, **land use activities or management strategies must conform to the requirements of the District or the overlay zone.**

The Plan also proposes new **Ownership and Management** for the 65,000 acres. Significantly, eighty-five percent (85%) of the lands will either be protected by the Molokaʻi Land Trust or will constitute part of a new conservation or agricultural easement in perpetuity. The easement lands will remain in MPL ownership. See Ownership Map on page 11.

Ownership

Molokaʻi Land Trust:	26,200 acres
Conservation/Easements:	24,950 acres
Existing Easements:	4,040 acres
Other MPL Lands:	9,810 acres
Total	**65,000 acres**

1.7.1 Land Use Districts

Cultural: The Cultural District is to protect the historic and cultural sites and resources for current and future spiritual, cultural, and subsistence uses.

Natural Resource: The purpose of this district is to support the protection and restoration of significant natural ecological/biological resources, i.e., sensitive ecosystems, indigenous and endemic species, watersheds, and wildlife habitat, particularly where they have been degraded, but still remain relatively intact.

Rural Landscape Reserve: The principle purpose of this district is the maintenance of the rural landscape – to preserve the traditional Molokaʻi character and to provide scenic viewsheds and open space buffers.

Agricultural: The purpose of this district is to perpetuate the traditional base of Molokaʻi's economy in agriculture. This district includes lands where commercial agriculture and aquaculture

operations are encouraged. These areas are suitable for agriculture and aquaculture cultivation that will not result in degradation of the natural landscapes.

Development: This category applies to areas targeted by MPL for the purpose of revenue-generating development. MPL should work with the community to ensure that development projects are suitable and sensitive to their surroundings, preserve significant ecological and cultural resources, and provide economic benefit to the Molokaʻi community.

1.7.2 Overlay Zones

Hunting: Hunting areas, almost 40,000 acres, will be used for allowable types of community hunting including bird, bow, and rifle. Hunting areas near towns will maintain buffer zones as an added measure of safety.

Subsistence Fishing: This zone encompasses areas from the coast to the outer edge of the reef or where there is no reef, out a quarter mile from the shoreline or to the outer edge of the reef along a 40 mile perimeter of the property including the partnership lands. Areas not under MPL ownership will require collaborative management by other landowners at: Lāʻau Point, Pāpōhaku Beach, ʻĪlio Point, the area between Kapālauoʻa and Kaiehu Point, and the area between Moʻomomi and Nāʻiwa.

Trails (Historic and Recreation): This overlay documents the access routes and existing trails, leaving the decisions regarding use to the land-owner(s). Use of trails should be consistent with the land district or applicable overlays in which they are located and Native Hawaiian rights.

Natural Resource: This overlay supports the sensitive ecological resources that are in need of management, i.e., areas prone to erosion and in need of watershed management. It also protects important ecological areas that support rare species, native ecosystems, and/or coastal habitats.

Cultural: The purpose of this overlay is to identify areas with significant cultural resources regardless of the land use district in which they are found.



1.7.3 Ownership and Management

MPL Lands: Approximately 9,810 acres is retained by MPL for community

expansion, resort, golf course, and residential shoreline development.

- Community Expansion: Future growth of townships in Maunaloa, Kaunakakai, and Kualapuʻu.

- Resort and Golf Course: Retain existing establishments, including refurbishment of the Kaluakoʻi Hotel and existing Golf Course and future development of a 250-acre golf course in place of the current Maunaloa Golf Course shown in the Molokaʻi Community Plan.

- Lāʻau Point Development: Development of a 200-lot subdivision at Lāʻau Point.

Molokaʻi Trust Lands: The Land Trust, approximately 26,200 acres, contains the following features.

- Cultural sites at Kawela Plantation (34.895 acres) and Kaiaka Rock.

- Lands mauka of Kaunakakai for community expansion (1,160 acres).

- The Makahiki Grounds mauka of Kualapuʻu, through to Nāʻiwa.

- A large strip of land from Kawakanui beach, north to ʻĪlio Point, extending to Hoʻolehua and down to Pālāʻau until Hale O Lono Harbor, including the Kāʻana area.

- The fishing village site, 15 acres, adjacent to the north boundary of Kaupoa Camp.

Lands Owned by MPL with Easements to the Molokaʻi Land Trust: The MLT would enforce the use of the specified 24,950 acres for Agricultural and Rural Reserves.

- The Molokaʻi Land Trust would hold easements over the Agricultural Reserve and Rural Reserve Lands, while MPL would retain the title.

- The easement provides permanent dedication of lands for specific uses that are registered on the land title deed.

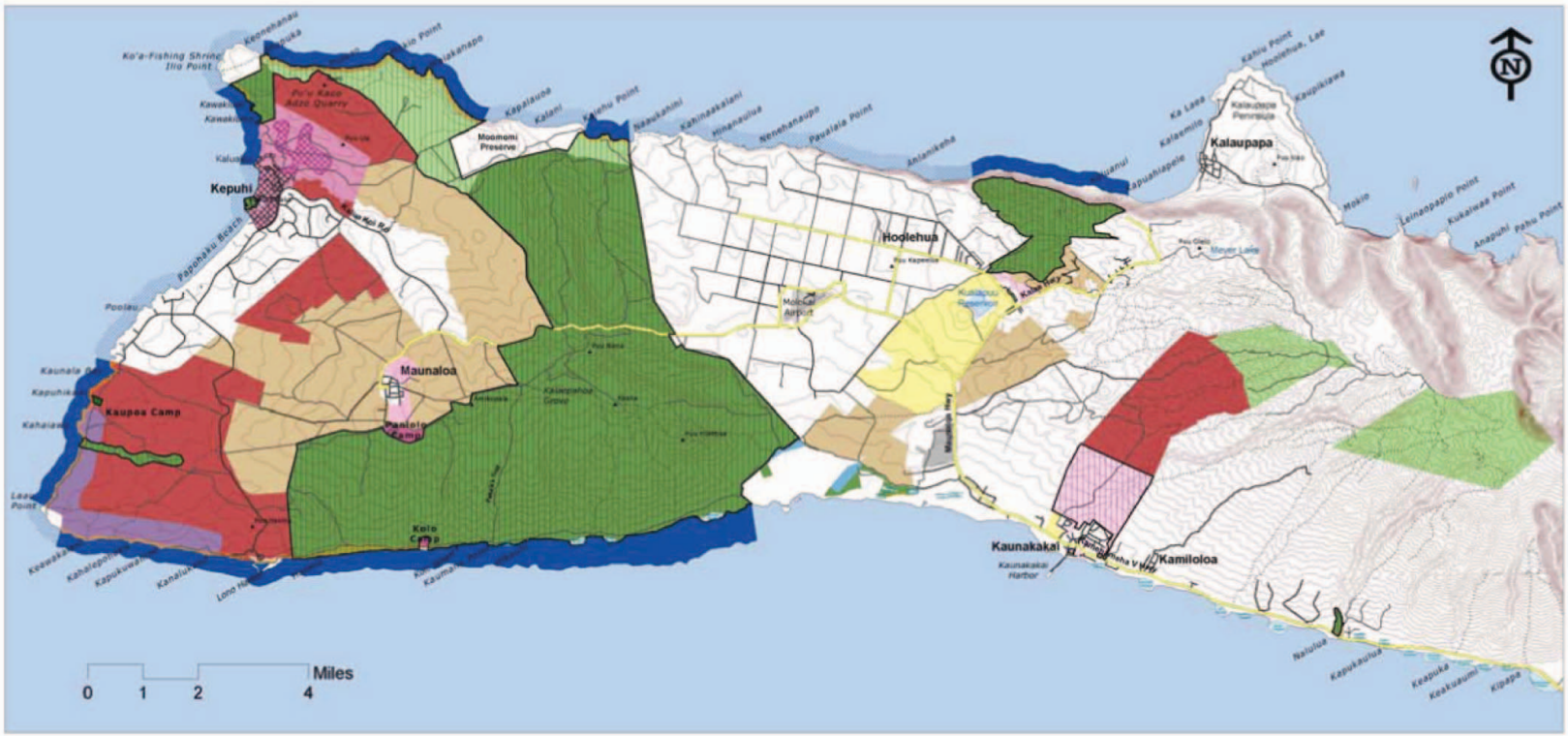
Lands Owned by MPL with Easements to Other Entities: Contains approximately 4,040 acres, which consists of lands owned by MPL, but protected by existing conservation easements.

- These areas are known as the Preserves, i.e. the Molokaʻi Forest Reserve and the Kamakou Preserve.

* Color Map provided at end of report*

MOLOKA'I RANCH MASTER USE PLAN
PROPOSED LAND TRUST & LAND USE DISTRICTS





Potential Land Trust Property (26,400 acres)
Subsistence Fishing Zone
Partnership Subsistence Fishing Zone
Coastal Conservation District (State)
Alternate Golf Course at Kaluakoi
Current Development at Kaluakoi

Major Road
Secondary Road
Minor Road
4WD Road
Trail

LAND USE DISTRICTS
CULTURAL RESOURCE
NATURAL RESOURCE
RURAL LANDSCAPE RESERVE

AGRICULTURE
Hi-Value or Intensive
Aquaculture
Other/Extensive

DEVELOPMENT
Resort
Residential Shoreline
Community Expansion
Industrial

Prepared by:
The Conservation Fund
October 7, 2005

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* Color Map provided at end of report*

MOLOKA'I RANCH MASTER USE PLAN
PROPOPOSED OWNERSHIP AND MANAGEMENT





POTENTIAL FUTURE OWNERSHIP AND MANAGEMENT FOR MOLOKAI RANCH PROPERTY

Proposed Development Districts
(Ownership and Management Retained by MPL)
- Resort
- Residential Shoreline
- Community Expansion
- Industrial

- Proposed Transfer of Ownership to Community Land Trust (26,400 acres)
- MPL-Owned Lands to be Protected by Future Easement (24,950 acres)
- Agricultural Lands (14,400 acres)
- Protected by Existing Conservation Easement (4,040 acres)

Map Prepared By:
The Conservation Fund
October 5, 2005

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1.8 IMPLEMENTATION

In order for the Master Land Use Plan to be implemented, other actions will be required. This section outlines what additional requirements are needed to implement the Plan. A schematic of what is needed and the input from the various parties is presented at the end of this section.

1.8.1 Stakeholder Agreement

This agreement will be between the Ke Aupuni Lōkahi Molokaʻi representing the community, and Molokaʻi Properties Limited. It will cover all aspects of the Plan and provide for a transition to a Molokaʻi Land Trust:

- Donation of lands and easements
- The reopening of the Kaluakoʻi Hotel
- The binding of Native Hawaiian rights on the land titles
- Agreements by the EC to support the regulatory process for entitlements such as the Lāʻau Point development
- The extension of the industrial area
- The community housing expansion areas
- Lāʻau Point development CC&Rs and protection zones

Other issues such as the implementation of the Water Plan will also be covered by agreements in this document.

The timing of implementation of this agreement will be detailed as well.

1.8.2 Molokaʻi Land Trust and A Proposed Community Development Corporation

A community land trust will be formed to own and manage the 26,200 acres that MPL will donate to the Moloka'i community under this plan. The Land Trust will also administer land use policies that permanently protect another 24,950 acres under agricultural and rural landscape reserve easements.

The mission statement, goals, and objectives of the Molokaʻi Land Trust will be detailed in the Trust's formation document.

A Community Development Corporation has been proposed and is being discussed.

Any relationship issues between MPL and the Land Trust or a proposed Community Development Corporation will be spelled

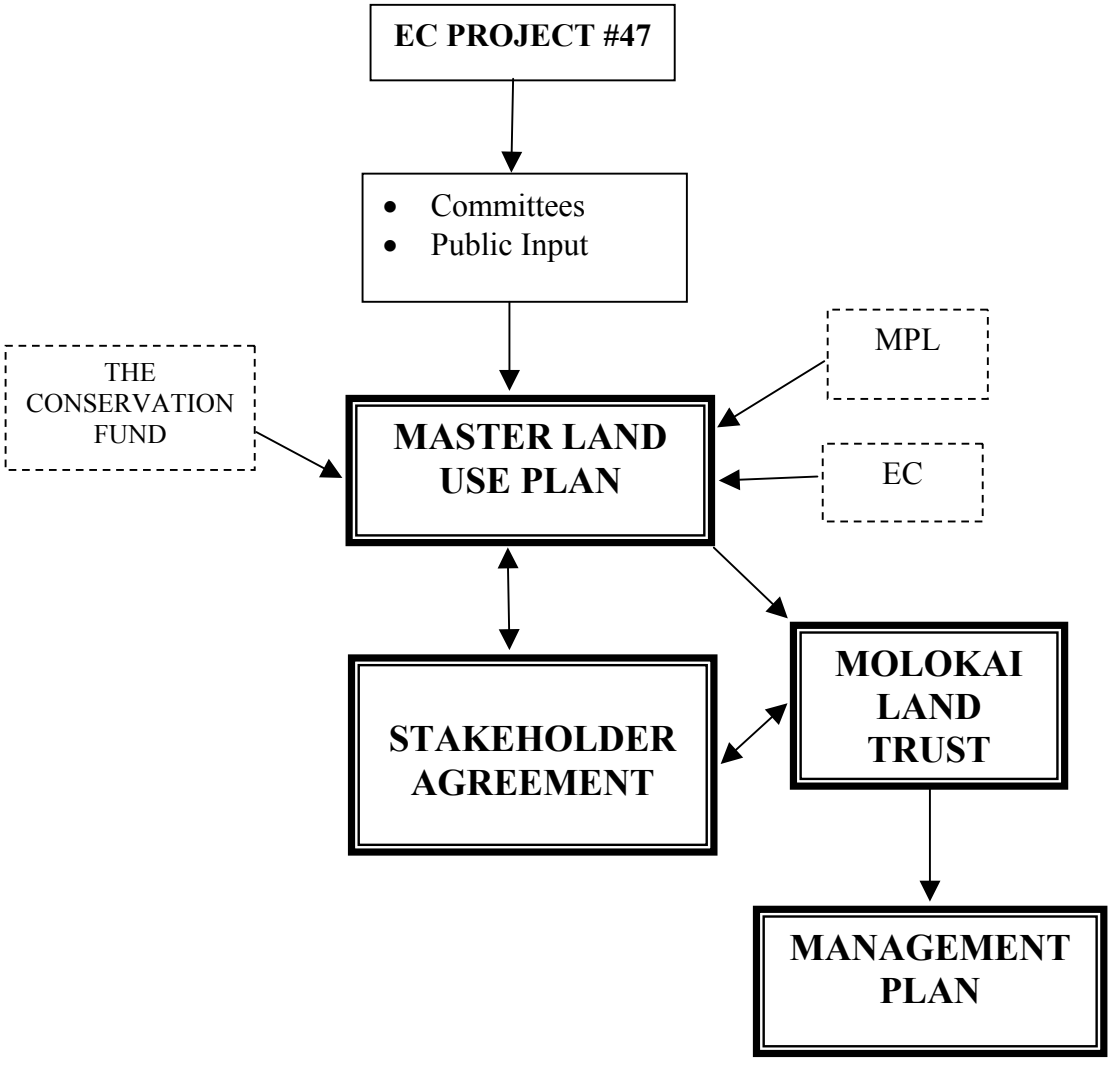


out and agreed to in the aforementioned document.

1.8.3 Management Plan

This document, which outlines how the Land Trust will manage its assets for the benefit of the community, an essential element in retention of its 501c3 status, will be prepared by the Molokaʻi Land Trust immediately after its formation. It will undertake a community input process and rely heavily on the work of the various committees and the Land Use Committee established under Project #47: Community-Based Master Planning Process for Molokaʻi Ranch.

SCHEMATIC OF PROCESS



2 INTRODUCTION

MPL currently owns approximately 65,000 acres, which encompasses over one-third of the total 166,000 acres of the island of Molokaʻi. Most of the property is located on the west end, but there are also three substantial areas of MPL land in the central part of the island (See Appendix 1, Molokaʻi Ranch Lands).

This section provides a brief historical overview of these lands, the Plan vision, overall goals, and the planning process.

2.1 HISTORY

The island of Molokaʻi has long been characterized by its rural-agricultural base that was first established by the early *kānaka maoli* (original people or Native Hawaiians). One of the earliest settlement dates for Hawaiʻi, 500-600 A.D., established by carbon-14 testing, was found on the Hālawa Valley shoreline along the windward coast of Molokaʻi.

Early inhabitants subsisted on fish, as evidenced by the archaeological sites of stoned fishponds and abundant *koʻa* (fishing shrines). Many ancient *heiau* (temples) sites demonstrate a strong sense of tradition, culture, and spirituality (Molokaʻi Community Plan, 2001).

Like all the Hawaiian Islands, Molokaʻi has a windward side that receives a significant amount of rainfall, and a leeward side that is typically hot and dry. Subsequently, the island has generally had a higher concentration of settlement and agriculture on the more lush east side.

Despite its dry climate, the western end



of Molokaʻi is rich in natural and cultural resources, which attracted people there. The areas on the leeward side with the most resources and use by the kānaka maoli were the coasts and the summit area surrounding Maunaloa.

2.1.1 Western Molokaʻi Coastal Areas

The North, West, and South coasts of western Molokaʻi vary dramatically in their topography, and therefore in their settlement patterns. The North Coast tended to be devoid of permanent settlement due to the sea cliffs and its exposure to strong winds and big north swells.

Moʻomomi is the only exception. Composed mostly of sand dunes and low

coastal vegetation, Moʻomomi was used as a fishing station. Located near this area is the *Kalaina Wāwae* (carved footprints), which are a series of oblong depressions that are said to represent human footprints. These footprints were made as a prophecy of the arrival of the boot-wearing Caucasian. In addition, the sand dunes of Moʻomomi were used for burials (Pāpōhaku Dunes Draft Preservation Plan, 2005).

One *moʻolelo* (legend/history), associated with ʻĪlio Point, the northwest corner of the island, is told about a Red Dog. In brief, the shark god of Kainalu had an ancestor whose bones washed ashore on this end of Molokaʻi. The people there gathered the bones and made a shrine. To visit his ancestor on land, the shark god took the form of a red dog. Every fifth year, he trotted to his ancestor's shrine, paid homage, and then slipped into the water. This moʻolelo represents the important Hawaiian values of respect and homage to ancestors.

The West Coast was also exposed to strong winds and big North swells, but protected embayments along it served as safe places for landing canoes and shelter. Residential clusters were concentrated near these bays, generally below the 50-foot elevation in order to access marine resources.

There are also mouths of gulches strewn up and down the West and South Coasts, unlike the North Coast. They served as shelter and had sources of fresh water. There is evidence of habitation near these gulches, and fishing villages in the areas of Pāpōhaku, Kepuhi, and Kawākui Iki.

The West Coast has a very high concentration of cultural sites and its historical uses are well known. Koʻa, were found in abundance along the entire coastline, indicating the rich ocean resources found here. It was possible for the kānaka maoli of Kaluakoʻi to access the coastline due to the *Ke alapupu i Molokaʻi* (the shell road at Molokaʻi), which was constructed by the Maui *aliʻi* (royalty) Kiha-a-Piʻilani. This coastal trail connected the important fishing places. (See Appendix 8, Recreation/Trails Map.)

Pāpōhaku Beach and the area surrounding it are historically significant. North of the beach is Kaiaka Rock. This major outcropping is home to a heiau facing Pāpōhaku Beach, which was used as an observation tower for fishing and scouting purposes.

Just below Kaiaka Rock is a canoe heiau, which is a rare type of shrine. Its existence indicates the importance of this area for canoe launching and landing.

Pāpōhaku Beach still serves as a major canoe access point for the West Coast. In addition to fishing and canoe access, the beach maintains a spiritual use. The dunes along Pāpōhaku Beach served as burial grounds, as did the sandy areas and dunes of Moʻomomi and *Keonelele* (Flying Sands). Keonelele is the sandy, inland area that connects the two coastal

dune systems. Lastly, to the south of Pāpōhaku is Puʻu Koʻai, the area where bodies were prepared for burial.

The name Pāpōhaku, meaning stone wall, comes from the story of a chief from east Molokaʻi who boarded canoes with some of his people and set off around the island. When they reached the southwest coast of Molokaʻi, they met some fishermen who had a large catch of ʻōpelu. They started to eat the ʻōpelu until another group of fishermen came by and told them to stop because it was the season of ʻōpelu kapu. However, since the visiting chief only had a kapu for eating turtle, they continued to eat. The fishermen became angry and attacked the visiting chief and his men.

Overpowered, they were brought before the kahuna. The visiting chief became very ill, and it was decided that a human sacrifice was needed to save the chief from death. One of his men offered himself as a sacrifice and the chief recovered. The kahuna ordered a tree to be planted on the grave of the willing victim. The chief was afraid the waves would wash the sand from the grave, and so ordered his men to build a stone wall in respect and remembrance. Over two hundred feet long when it was created, the wall represented the Hawaiian values of preserving that which is sacred or scarce (kapu of the ʻōpelu) and respect for deeds of unselfishness.

The South Coast generally had calmer waters and shallow reef systems that were not found on the West and North Coasts. The shallow reef area off of Lāʻau Point, called "Penguin Banks," was well known to be a rich fishing area. Along the boulder coastline were habitats for edible mollusks such as ʻopihi, pūpūʻawa, pipipi, and aʻama crab, while the nearshore area had an abundance of algae and edible seaweed such as limu kohu.

Several fishponds were constructed on the eastern portion of the South Coast, along with two important fishing villages, located at Kapukawahine and Kanalukaha. Situated in the upland area of Lāʻau Point are bell stones, which the kānaka maoli would ring to announce to the village of Kanalukaha the arrival of aliʻi by canoe. Also, the area around Hale o Lono has been noted as the fourth extensive burial locality on the west end of the island.

The name Lāʻau Point comes from another moʻolelo involving the shark god of Kainalu. This time, the shark god left his home off of Molokaʻi and traveled to Kauaʻi. Romping in the ocean with the shark god of Kauaʻi, a large floating branch from a hau tree got stuck on the Molokaʻi shark's back. As he swam back towards Molokaʻi, the branch came loose and washed ashore off of the southwest point. The people on the beach saw it float ashore and took the branch to a fertile bit of land and planted it. Their chief, Kuama, said they should call the place *Ka Lae O Ka Lāʻau* (the Point of the Branch). The tree is short and sprawls

close to the ground. The beautiful blossoms were offered by the people of Molokaʻi to their gods (Pāpōhaku Dunes Draft Preservation Plan, 2005).

2.1.2 Maunaloa Summit Region

This summit region extends from Maunaloa town on the west, along the ridge, to Puʻu Nānā on the east; all above 900 feet in elevation. Traditional dryland agriculture thrived in this area with the cooler temperatures that resulted from the elevation and strong winds.

There was also believed to be a native forest of kukui, hala, ʻieʻie, ʻiwa ferns, ginger, and hau, which served to break the winds that today blow unabated across Kaluakoʻi. Crops grown there included sweet potato, dryland taro, sugarcane, and banana.

This area was home to numerous adze quarries and adze manufacturing sites. The adzes were used by the kānaka maoli of Kaluakoʻi and east Molokaʻi. Site surveys have found shop refuse, such as adze chips, and adzes in all stages of finish. Both the adze manufacturing and agricultural areas were intermingled with house sites and rows of stone walls. These archaeological sites indicate significant levels of settlement in the Maunaloa region.

The summit zone, generally thought of as being the most sacred, is also where the head of major gulches are located. This



area is known for its association with gods and *ʻanāʻanā* (sorcery).

Approximately one mile northeast of ʻAmikopala is a hill with an outcropping of rock. The largest of these rocks is the piko stone, where newborns' umbilical cords would be placed. The Maunaloa summit plateau was also the location for games and aliʻi recreation.

One important *wahi pana* (sacred place) on the summit region is Kāʻana. It was revered by many hula practitioners as the birthplace of the hula, or *ka hula piko* (the navel or center of hula). Kapoʻulakīnaʻu lived at Maʻohelaia on Maunaloa, and originated the hula, enlisting the aid of her younger sister Laka to help teach others. She decided to never to leave the mountain, so she remained there in the form of a rock.

West of Kāʻana is Pakaʻaʻs Trail. It begins near the beach on the west side of Kolo Gulch and runs inland (mauka) for approximately 2 miles to the slopes below ʻAmikopala. The trail is paved

with large stones and has a width of 6 feet. There are chunks of sandstone or coral placed alongside of the trail, at intervals of roughly 20 feet, presumably as guides for using the trail at night. Pakaʻa was the servant of Keawenuiaʻumi, the king of Hawaiʻi (1525). After his enemies conspired against him, Pakaʻa left the island of Hawaiʻi and sailed to the southwest side of Molokaʻi, where he lived in disguise. There he married the daughter of the high chiefs of that section, built several houses and planted fields of crops. Pakaʻa used this trail to go from his home near Kolo Wharf to his sweet potato fields (Summers, 1971).

2.1.3 Formation of Molokaʻi Ranch

Molokaʻi Ranch's beginnings were as a cattle ranch belonging to the High Chief Kapuāiwa who later became Kamehameha V. Bernice Pauahi Bishop, daughter of Paki and Konia, the last descendant of the Kamehameha dynasty, inherited title to these lands from those to whom these lands were given in 1848 at the time of the great Mahele, among them Princess Ruth or Keʻelikolanu. Mrs. Bishop did not inherit the land of Kaluakoʻi on the west end of Molokaʻi, for this had been granted to her husband Charles R. Bishop, in 1875. When American Sugar Company was formed, most of these lands were acquired from her estate and Kaluakoʻi was acquired from Mr. Bishop. Subsequently, small holdings were purchased and sold.

In 1897, Molokaʻi Ranch was formed by a hui (group) of men including Judge Alfred S. Hartwell, Alfred W. Carter, and A.D. McClellan. They had purchased seventy thousand acres of land in fee simple from the Bishop interests. With an additional thirty thousand acres leased from the Government, stock-raising became their principal enterprise.

Early in 1898 the American Sugar Company Limited took over the land (that now belongs to the Molokaʻi Ranch) and leaseholds of large tracts of government land lying between the ranch lands.

American Sugar Company was unsuccessful in its cane sugar cultivation due to saline water in its well, and the company was purchased in 1908 by Charles M. Cooke, son of the early missionary teacher, Amos Starr Cooke. He established the Molokaʻi Ranch, which his son George P. Cooke subsequently managed.

By 1923, the Libby, McNeill and Libby Company had begun raising pineapple in the Maunaloa area on lands leased from Molokaʻi Ranch. They continued operations until selling to the Dole Corporation in 1972. Del Monte, then known as California Packing Corporation, arrived in 1927 and made their headquarters at Kualapuʻu. They soon commenced their large-scale pineapple cultivation, mostly on land leased from Molokaʻi Ranch. Dole ceased its Molokaʻi operations on January 1, 1976. Del Monte phased out its operations in the mid-1980s.

In the early 1970s Molokaʻi Ranch entered into a partnership with Louisiana

Land and Exploration Company for the development of the Kaluakoʻi Resort. It subsequently sold its interest in the undertaking when it was unable to fund the required cash calls. The Ranch later tried diversification into mainland commercial property. After initial success, the cash requirements of these investments led to the eventual sale of Molokaʻi Ranch stock to Brierly Investments, Limited who became its sole stockholder in 1987. At that time, Molokaʻi Ranch consisted of approximately 52,000 acres.

In October 2001, Molokaʻi Ranch re-acquired 6,300 acres on the southwest corner of Molokaʻi then known as the Alpha parcel; in December 2001 Molokaʻi Ranch acquired the land holdings of Kukui (Molokaʻi), Inc. that had acquired the Kaluakoʻi Hotel and the undeveloped lands of the resort area from Kaluakoʻi Corporation.

2.1.4 MPL Lands in Central Molokaʻi

From west to east, the first tract of MPL land begins mauka of the Pālāʻau Homesteads and runs north around Kualapuʻu and the Reservoir, up to and including Nāʻiwa.

Nāʻiwa has numerous cultural sites such as petroglyphs, heiau, caves, and makahiki sites. One site contains large, upright, weathered stones. Several of these stones have figures carved or scratched in them, appearing to represent humans (Summers, 1971).

Another significant site is called *Na Imu Kalua Ua* (the ovens to bake rain) Heiau. It consists of a series of open compartments formed by flat stones placed on edge at right angles to one another. Local tradition says that these stones would catch and retain the large "lumps" of rain that fell in the area. The rain would then be cooked to dissipate it (Summers, 1971).

South of Nāʻiwa, on the south and west slopes of Kualapuʻu hill, there used to be many sweet potato patches, which were defined by rows of stones. One moʻolelo claims that the name of Kualapuʻu used to be *Ka ʻUala Puʻu* (The Sweet Potato Hill) (Summers, 1971).

Further east, the next tract of MPL land begins in the south, around Kaunakakai. From town it continues north up to and including the Molokaʻi Forest Reserve. The old name for Kaunakakai was *Kaunakahakai* (Resting-on-the-beach).

It was a place for canoe landings and for fishing. West of the Kaunakakai wharf is a platform that was part of Kamehameha V's home, Malama. The beach in front of this site was used exclusively by the aliʻi for sun bathing.



To the west of Kaunakakai was once a site used to make salt. Sea water was run into salt pans at high tide, and retained there when the tide ebbed. Lastly, Kaunakakai and the area mauka of it had numerous heiau and petroglyphs (Summers, 1971).

The third area of MPL land in central Molokaʻi is actually composed of two tracts of land from the same ahupuaʻa: Kawela, a 34-acre parcel with cultural significance, and Kamakou Preserve, an ecologically important 2,774-acre parcel. Kawela was the site of famous ancient battles and contains the remains of many fallen warriors. One of the most destructive battles of Kamehameha I was fought here.

Another, earlier battle was fought between Kapiʻiohokalani of Oʻahu and the Molokaʻi chiefs, who were allied with Alapaʻinui of Hawaiʻi. The main archaeological sites at Kawela are petroglyphs and burial mounds. Kamakou Preserve is located mauka of Kawela. Though it has less cultural sites, it continues to be a healthy, native-dominated, montane wet forest ecosystem today.

The island as a whole has gone through numerous population shifts and economic changes. The population began to increase dramatically in the early 1920s, from approximately 1,000 to 4,427 people by 1930. The first change occurred when the Government passed the Hawaiian Homes Commission Act in 1921, resulting in the settlement of Kalamaʻula, Hoʻolehua, Pālāʻau, and Kapaʻakea.

The establishment of two pineapple plantations, Libby, McNeil and Libby (later Dole Pineapple) at Maunaloa in 1923, and California Packing Corporation (Del Monte) in 1927 at Kualapuʻu, further encouraged the gradual population shift west from the more populated eastern areas of the island.

These plantations both closed down during the 1970s and 1980s, leaving the island again dependent on diversified agriculture, primarily vegetable farming, and cattle ranching. In the late 1970s, resort development at the west end of the island at Kaluakoʻi became an influence on the island's economy. The population increased during this period to 6,049. With a very gradual increase since then, the current population remains relatively stable at approximately 7,000 (Molokaʻi Community Plan, 2001).

2.2 VISION STATEMENT

This vision statement projects the long-term future for Molokaʻi, its environment, spirit, culture, and people.

> *Molokaʻi is the last Hawaiian Island. We who live here choose not to be strangers in our land. The values of* ***aloha ʻāina*** *and* ***mālama ʻāina*** *(love and care for the land) guide our stewardship of Molokaʻi's natural*

resources, which nourish our families both physically and spiritually.

*We live by our **kupuna's** (elders') historic legacy of **pule o'o** (powerful prayer). We honor our island's Hawaiian cultural heritage, no matter what our ethnicity, and that culture is practiced in our everyday lives. Our true wealth is measured by the extent of our generosity.*

*We envision strong **'ohana** (families) who steadfastly preserve, protect and perpetuate these core Hawaiian values.*

We envision a wise and caring community that takes pride in its resourcefulness, self-sufficiency and resiliency, and is firmly in charge of Moloka'i's resources and destiny.

*We envision a Moloka'i that leaves for its children a visible legacy: an island **momona** (abundant) with natural and cultural resources, people who **kōkua** (help) and look after one another, and a community that strives to build an even better future on the **pa'a** (firm) foundation left to us by those whose **iwi** (bones) guard our land.*

2.3 GOALS AND OBJECTIVES

The management of Moloka'i Ranch and the members of the EC have worked hard through this process in order to define and achieve their primary goals of conserving the cultural and natural resources of Moloka'i and stimulating the local economy. The following are the objectives of the Plan:

- Develop sustainable economic activities that are compatible with Moloka'i and the vision of the Moloka'i Enterprise Community.
- Secure the role of the community in the management of MPL's 65,000 acres.
- Re-open the Kaluako'i Hotel and create 100 plus jobs.
- Protect cultural complexes and sites of historic significance on MPL lands.
- Protect environmentally valuable natural resources and agricultural land, pasture and open space.
- Create a land trust with donated lands from MPL.



2.4 PLANNING PROCESS

The process followed this general outline and timeframe:

August 2003: Molokaʻi EC creates EC Project #47 for Compatible Community-Based Development.

January 2004: Community-Based Master Use Planning begins with a two-day planning seminar with The Conservation Fund ("TCF"), a renowned Washington-based land planning organization.

February 2004: EC approves the Community-Based Master Use Plan for Molokaʻi Ranch as part of EC Project #47.

March 2004: Committees meet and develop Principles and Policies, and map Land Use Districts (Cultural, Recreation, Environment, Economics, and Tourism Committees).

May 2004: Committees complete work. Land Use Committee forms and begins to compile and approve "Guidelines for Principles and Policies of Land Use," except for Lāʻau Point and Water.

August 2004 – March 2005: Community presentations outline the Community-Based Master Use Plan for Molokaʻi Ranch.

October 2004: Alternative to Lāʻau Development Committee forms.

January 2005: Panel of Water Experts holds Community Forum; the MPL Water Plan is presented.

April 2005: Seminar on Molokaʻi Land Trust, and formation of a Land Trust Steering Committee.

May/June/July 2005: Land Use Committee meetings focus on Lāʻau Development proposal.

August 1, 2005: Decision on Motions for Lāʻau Development and Land Use Planning.

September – December 2005: Compilation of Community-Based Master Land use Plan for Molokaʻi Ranch.

2.4.1 Committee Process: Cultural, Environmental, Recreation, Tourism, and Economics

The idea to create five committees came at the conclusion of the 2-day planning seminar with TCF in January of 2004. The group proposed a committee-based process to efficiently and thoroughly collect, synthesize, and interpret the information necessary to formulate the Plan.

The committees were comprised of individuals with knowledge and expertise in the specific areas of culture, environment, recreation, tourism, and economics. The Committees were charged with the following:

- **Goals & Objectives**: Formulate goals and objectives for the Plan by devising clear statements that can guide its development. What specifically should the Plan seek to achieve?

- **Data/Information Collection**: Assemble information relevant to each topic's specific issues through document research, site analysis, and/or expert consultations. The information was then reported on maps and/or provided in written form, as appropriate.

- **Analysis & Interpretation**: Each committee then began to evaluate, synthesize the data, and identify the most important resources and develop guidelines for prioritization. Committees were asked to concentrate on capturing the spectrum of opinions, perspectives and ideas, rather than deriving a consensus.

The committees' work had the following functions and methods for data collection and analysis:

- **Environment Committee:** Research opportunities to conserve natural resources where they still exist and restore native communities and/or landscapes where they have been eliminated. Collect and map the information pertaining to biological significance, environmental quality, and community interests.

- **Economics Committee:** Provide input and research facts on issues dealing with the creation of incoming-generating activities that will provide job opportunities for Moloka'i residents. Research issues connected to agriculture, aquaculture, commercial development, and residential development. Review and assess the accuracy of maps of productive agricultural and aquaculture lands, along with economic statistics, market studies, and physical and regulatory infrastructure.

- **Recreation Committee:** Collect information on existing recreation sites and activities, and map them. Provide data on use and potential conflicts created by use between residents and visitors.

- **Tourism Committee:** Develop guidelines and criteria to direct future recommendations on tourism that does not compromise the lifestyles and traditional activities of islanders.

- **Cultural Committee:** Collect and map locations and significance of archaeological sites. Identify areas of traditional use, such as

hunting, fishing, gathering, and ongoing cultural activity.

2.4.2 Formation of the Land Use Committee

In May 2004, representatives of the five committees formed the Land Use Committee. This committee received the recommendations of the committees, recommended Land Use Districts reflecting primary uses and worked to produce a Land Use Plan and Policies and Principles for land use on the property.

2.4.3 Public Input and Review

Throughout the process, Project #47 solicited public input and review. Between August 2004 and March 2005, there were12 community meetings and 24 community and focus group presentations regarding the Community-Based Master Land Use Plan for Molokaʻi Ranch.

The meetings were held island wide, in Kaunakakai, Kualapuʻu, Manaʻe, Maunaloa, and Hoʻolehua, with over 1,000 participants. Community feedback was taken into account during the development of the Plan.

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3 RESOURCES

3.1 BACKGROUND OF PROJECT AREA

The island of Molokaʻi is comprised of approximately 260 square miles. Formed by a series of three volcanoes, it has an elongated shape with diverse topography and rainfall patterns. According to its physical characteristics, the island is divided into three main sections – West Molokaʻi, East Molokaʻi, and Central Molokaʻi.

The west end makes up about 30 percent of the total area, and is relatively dry with gentle slopes. The eastern half of the island is mostly comprised of mountains and gulches that are covered in rainforests and mixed mesic forests, which are vegetation zones found in wet climates.

The only perennial streams that reach the sea are on East Molokaʻi. The remaining 20 percent of the land mass makes up Central Molokaʻi, which is relatively level and has soil suitable for cultivation. The southern coast is lined almost entirely with coral reef, except where it has been removed for the Kaunakakai Harbor. In contrast, the northern coastline is mostly sheer sea cliffs, making it largely inaccessible, except for the peninsula of Kalaupapa.

The current (2005) population of Molokaʻi is approximately 7,000. Kaunakakai, located about midway along the south coast, is the island's primary population and commercial center. There are also the small plantation communities of Maunaloa and Kualapuʻu, as well as the less compact, rural Hawaiian homestead settlements, Hoʻolehua and Kalamaʻula. The southeast coast contains a settlement pattern along Kamehameha V Highway, which becomes more rural and scattered as it extends from Kaunakakai to Hālawa Valley. The peninsula of Kalaupapa and some of the surrounding area on the northern coast constitute the County of Kalawao.

Molokaʻi Ranch Land

The property of Molokaʻi Ranch is located primarily on the west end of the island, though there are also three tracts of land in Central Molokaʻi. The boundary of the western property extends eastward from the west coast; from ʻIlio Point to Moʻomomi in the north, and from Lāʻau Point to the Pālāʻau Homesteads in the south.

The land on the west end of Molokaʻi is relatively dry, supporting mostly dryland forest and shrub vegetative zones that are now overrun with non-native species. There is also a substantial amount of erosion caused by years of agricultural and ranch use. (See Appendix 1. Molokaʻi Ranch Lands.)

Generally, the most important resources in the west end are subsistence food sources and cultural sites. Many residents hunt and fish in various places

within this region. They also come to important cultural sites for traditional and spiritual practices. The Moʻomomi Preserve along the north coast is managed by a partnership of organizations and supports a native dominated lowland dry forest and shrub landscape and a carefully managed subsistence fishing zone. On the west coast lies Pāpōhaku beach and dunes, one of the longest, mostly intact coastal dune systems in the state. To the south, Lāʻau Point is a pristine coastal environment, mostly used for subsistence fishing and hunting.

The main population center in West Molokaʻi is the small town of Maunaloa, where MPL is headquartered. Along the shores south of Maunaloa is Hale o Lono and Kolo Wharf. Maunaloa Highway connects the west end to the Molokaʻi Airport, Kaunakakai, and the rest of the island.

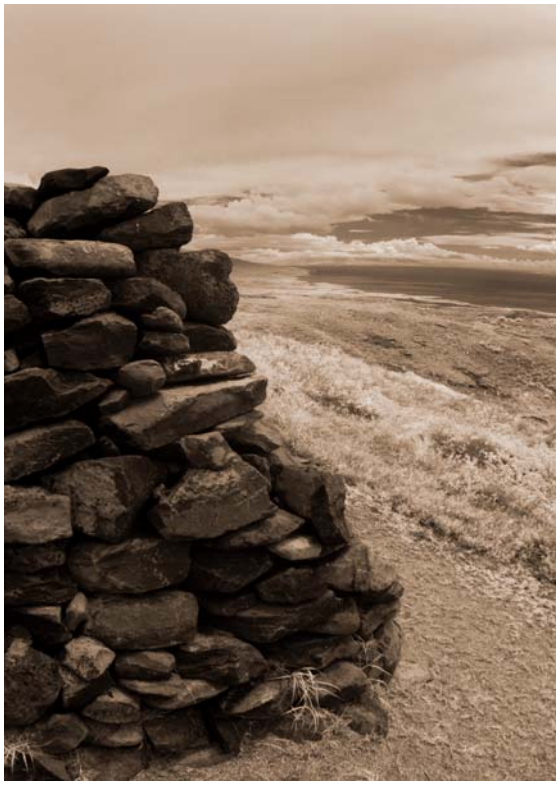
MPL also owns three large tracts of land in Central Molokaʻi. From west to east, the first tract encompasses Nāʻiwa, Pālāʻau State Park, the area surrounding Kualapuʻu town and Reservoir, and continues south to the Pālāʻau Homesteads.

The second tract includes land immediately surrounding Kaunakakai and a large area mauka of town, including the Molokaʻi Forest Reserve.

The third tract is the Kamakou Preserve, which consists of 2,774 acres of an important native rainforest ecosystem with a conservation easement to and managed by The Nature Conservancy. In addition to these large tracts of land, MPL also owns a 34-acre parcel located south (and makai) of the Kamakou Preserve, at Kawela. This parcel is significant for its cultural history and archaeological sites.

3.2 CULTURAL AND ARCHAEOLOGICAL RESOURCES

The cultural maps, "Cultural Sites of Kaluakoʻi, Molokaʻi" and "Lāʻau Cultural Sites" located in Appendix 2, identify the archaeological sites within the MPL property located on the west end. (The central properties also contain important cultural sites but they are not graphically represented in these maps.)



There are various cultural sites, including burials throughout the property, though some areas have higher concentrations. Archaeological maps, coupled with oral history interviews provide insight as to the types of sites, hence cultural land uses that may be found on the Ranch lands.

Evidence suggests that Moʻomomi, to the north, was an ancient fishing station and burial ground. The area is also noted for the presence of the Kalaina Wāwae, which prophesized the arrival of the boot-wearing Caucasian.

The area along the west coastline, between ʻĪlio Point and Pāpōhaku Beach, has a high concentration of remnant shelters, caves, and mounds. This area includes the Kawākiu Iki Complex and the Kawākiu Nui North that are believed to have been utilized for habitation.

Oral history accounts confirm that this area was used for temporary fishing villages, which explains the remnants of ancient homes and fishing shrines along the coast. A historical trail, Ke alapūpūkea Molokaʻi (the shell road at Molokaʻi), runs from Moʻomomi, around ʻĪlio Point, and to the south, through Pāpōhaku Beach, to Lāʻau Point, east to Iloli in the south.

This coastal trail was constructed with white shells (pūpūkea) to ensure safe nighttime travel under the direction of Maui Island Chief Kiha-a-Piʻilani. Poʻolau, the area immediately south of Pāpōhaku, is an area rich with habitation, agricultural and natural communities, and bunker sites. This was also the location of a Naval Reservation and a gunnery range for the U.S. military.

Another area with a high concentration of cultural sites is located to the east of Maunaloa. Along the southeast edge of the abandoned pineapple fields are numerous koʻa, heiau, and petroglyphs, as well as remnants of enclosures and platforms that were once used for agriculture and habitation.

This area also has evidence of adze quarries and adze manufacturing. This summit zone is the location of the head of major gulches, which explains its association with the gods and sorcery. It is also where Kāʻana is situated, which is believed to be the birthplace of hula.

The entire property is dotted with burials, especially those areas composed of sand, since this was a common material in which burials were placed. The main burial sites include the dunes of Moʻomomi and Pāpōhaku, and Keonelele, the area where sand is believed to blow southwest from Moʻomomi towards Pāpōhaku.

The “Lāʻau Cultural Sites” map illustrates the numerous archaeological sites located in the Lāʻau Point area. The majority of sites in this region are of fishing villages and koʻa.

Lastly, the central properties contain important archaeological sites and complexes as well, though they are not included on these maps. The area furthest north in the first tract of central MPL land is Nāʻiwa. It is rich with petroglyphs, heiau, caves, and other sites, such as the area that contains large, upright, weathered stones with figures carved into them.

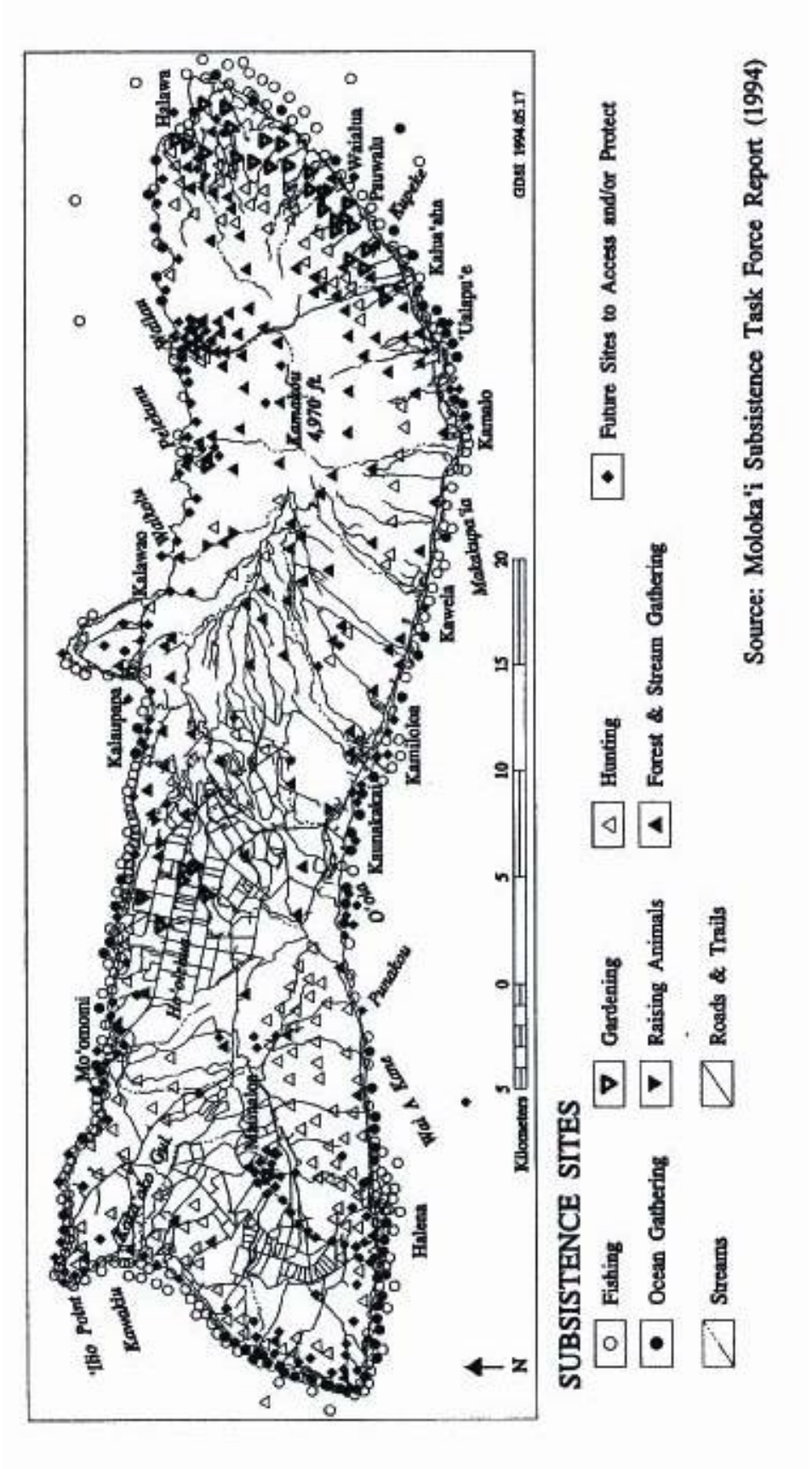
The other main areas with archaeological sites include the region mauka of Kaunakakai and Kawela. Numerous petroglyphs and heiau have been identified in the gulches mauka of Kaunakakai, while the Kawela Cultural Complex is well known to contain burial mounds and the remains of fallen warriors from ancient battles.

3.3 SUBSISTENCE RESOURCES

In summer 1993, the Governor's Moloka'i Subsistence Task Force met with subsistence practitioners in focus groups to map sites important for fishing, ocean gathering, hunting, forest and stream gathering, gardening, raising animals, and trails to access the resources.

This map was published in the final report of the Task Force. Practitioners identified sites that had been used in the past, were currently used, and sites where they would want to go if access were opened.

The map shows that the entire coastline of the MPL lands is important for subsistence fishing and ocean gathering. It also indicates that the MPL lands are very important for subsistence hunting. Forested areas on MPL lands are also accessed for subsistence gathering.



Source: Moloka'i Subsistence Task Force Report (1994)

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3.4 ENVIRONMENTAL RESOURCES: TERRESTRIAL AND AQUATIC

The terrestrial and aquatic natural resources are illustrated on the following three maps, which are located in Appendix 3:

- "Molokaʻi Resource Assessment: Natural Resources – Terrestrial"
- "Molokaʻi Resource Assessment: Natural Resources – Aquatic"
- "Molokaʻi Ranch Resource Summary: Natural Resources"

The "Natural Resources – Terrestrial" map shows that the Ranch property is dominated by non-native species (shown in gray). The topography and rainfall patterns of West Molokaʻi indicate that the area, at one time, was lowland dry forest and shrub. The vegetation of this landscape includes mostly grasses and shrubs, with few species of trees. Such coastal and lowland dry forest and shrublands occur on the lower leeward slopes of the higher Hawaiian Islands.

However, over 90 percent of the Hawaiian low shrublands have been lost to development or displacement by alien vegetation. On the Ranch land, these native ecosystems were permanently altered by cattle grazing, followed by the cultivation of sugarcane and pineapple. These activities caused severe degradation and erosion of the west end. The area is now dominated by invasive species such as the kiawe tree and Christmas berry, which have spread throughout the property.

The northwestern edge of the island has a few remaining pockets of native dominated landscape communities. The Moʻomomi Preserve (on the "Natural Resources – Terrestrial" map), which is managed by The Nature Conservancy, is one of these native lowland dry forest and shrubland communities that still exists in the state.

The preserve is 921 acres and harbors more than 22 native Hawaiian plant species, four of which are globally rare or endangered. These rare plants, like ʻakoko and ʻenaʻena, thrive in the dry, windy, salt-sprayed environment. The preserve is also an important nesting site for the endangered green sea turtle.

There are a few small areas of the native dominated coastal dry shrubland and grassland communities along the northwestern corner (shown in purple on the "Natural Resources – Terrestrial" map). This landscape community is similar to the Moʻomomi Preserve community, but has less species diversity.

The west end also has some occurrences of Natural Heritage rare vertebrates and plant species, such as the ʻakoko. The endangered Hawaiian monk seal frequents the beaches of the west end.

The Ranch property in the Forest Reserves of the island contains some occurrences of rare plant species as well as an important native dominated montane mesic forest and wet forest.

Erosion

Eroding lands are one of the most significant problems that need immediate attention. A substantial portion of MPL's Maunaloa lands have bare soils that erode during seasonal storms. The worst problems occur along the south shore from Punakou to Halena as the inner reef waters are red from land-based sedimentation. (See Soil Erosion Aerial Photo on page 37.)

Similar problems occur elsewhere along the coast, but the western and northern coastal waters have huge winter surf that help flush away the seasonal sedimentation.

Therefore, where possible, hunting could keep deer herds from denuding the landscape. It is also important to preserve Puu Nānā (top of Maunaloa mountain) forested areas and increase forestry plantings to retain and improve moisture cycle. Access, use and construction plans should also prevent erosion of dirt road ways and trails.

The Moʻomomi to ʻĪlio Point coastal section is is the most important biological resource on Molokaʻi Ranch's lands. This area is not only important biologically, but is a very rugged and beautiful coastline. The terrestrial native coastal beach strand is some of the best strand left in the main Hawaiian Islands. Many rare plants like ʻakoko and ʻenaʻena still exist in healthy numbers as do common species like hina hina, nehe, ʻakiʻaki, pau o hiʻiaka, and nama. The coastal dunes and rocky cliffs also provide nesting sites for several sea bird species including; wedge-tailed shearwater (ʻuaʻu kani), Great frigatebird (iwa), and tropic birds (white- tailed – koaʻe kea and red-tailed – koaʻe ʻula).

Erosion is the main environmental concern in the ʻĪlio Point to Kawakiu and Kepuhi area where human impact will cause problems.



There is severe sedimentation of the inshore reef between Punakou and Halena. With the exception of Pālāʻau, it would not be possible to do sedimentation ponds as there is not much flat land along that coastline and therefore, re-vegetation of the adjacent slopes would be the primary solution for that area.

The Pālāʻau inshore waters have significantly less sedimentation due to the thick mangrove growth along the shoreline. Although the mangroves are acting as a filter to flood waters and provide nursery sites for inshore marine species, there are concerns that

eventually the mangroves will infringe on the fringing coral reef systems.

The "Natural Resources – Aquatic" map illustrates the substantial coral reef protection area that runs along the south shore of the Ranch property. It begins at Hale o Lono and extends east along much of the southern shore of the island. The protected area includes numerous fishponds.

The fringing reef along this coastline is a treasured resource of Molokaʻi. The inshore areas along this area are also important hatcheries/breeding grounds for many key subsistence marine fish species. This is confirmed by the many koʻa locations.

Inshore marine species still are abundant along the rugged coastline and tidal pool systems. The limited access is the main reason why this northwest coastline has remained unchanged the past few decades.

At the very tip of the northwest corner is ʻĪlio point, an abandoned US Coast Guard station site, which is owned by the State of Hawaiʻi. Although not part of the Ranch lands, this area needed to be clean of old metal debris, and possible live ordinance. This Plan seeks that the State portion of ʻĪlio Point should also be put in conservation protection as it contains very high quality native coastal beach strand, inshore tidal pools and fisheries.

In the Kepuhi to Lāʻau Point area where MPL is planning development, there are several pockets of beach strand or terrestrial systems of note. It is important that any development plans require an erosion plan, recognizes and enhances pockets of native beach strand/vegetation, and includes no incompatible beach activities (i.e. motorized vehicles on the beach, harvesting of sand, and military exercises).

Beginning at Hale o Lono and extending east is an area of land mauka of the coral reef protection area, which is marked for reclamation and erosion control. Protection of this land is critical for continued health of the coral reef and marine ecosystem, which are sensitive to excessive run-off.

It is important to note the absence of perennial streams on the Ranch property. There are numerous intermittent streams, which generally only have flows during or immediately following heavy rainfalls. The entire west end is relatively dry, and in need of erosion control measures.

The "Molokaʻi Ranch Resource Summary: Natural Resources" map shows those regions prone to erosion, which have been identified as "Priority Areas" for Watershed/Aquatic Resource Protection. That map also illustrates the Priority Areas for Rare Species/Native Ecosystem Preservation and Coastal Habitat Management Protection.

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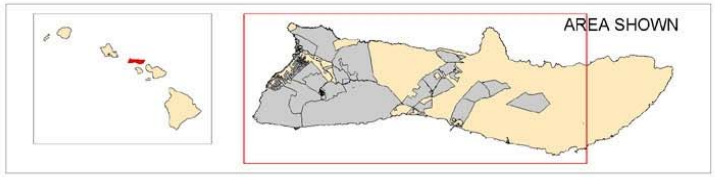
ISLAND OF MOLOKA'I
AERIAL PHOTOGRAPH - 1998



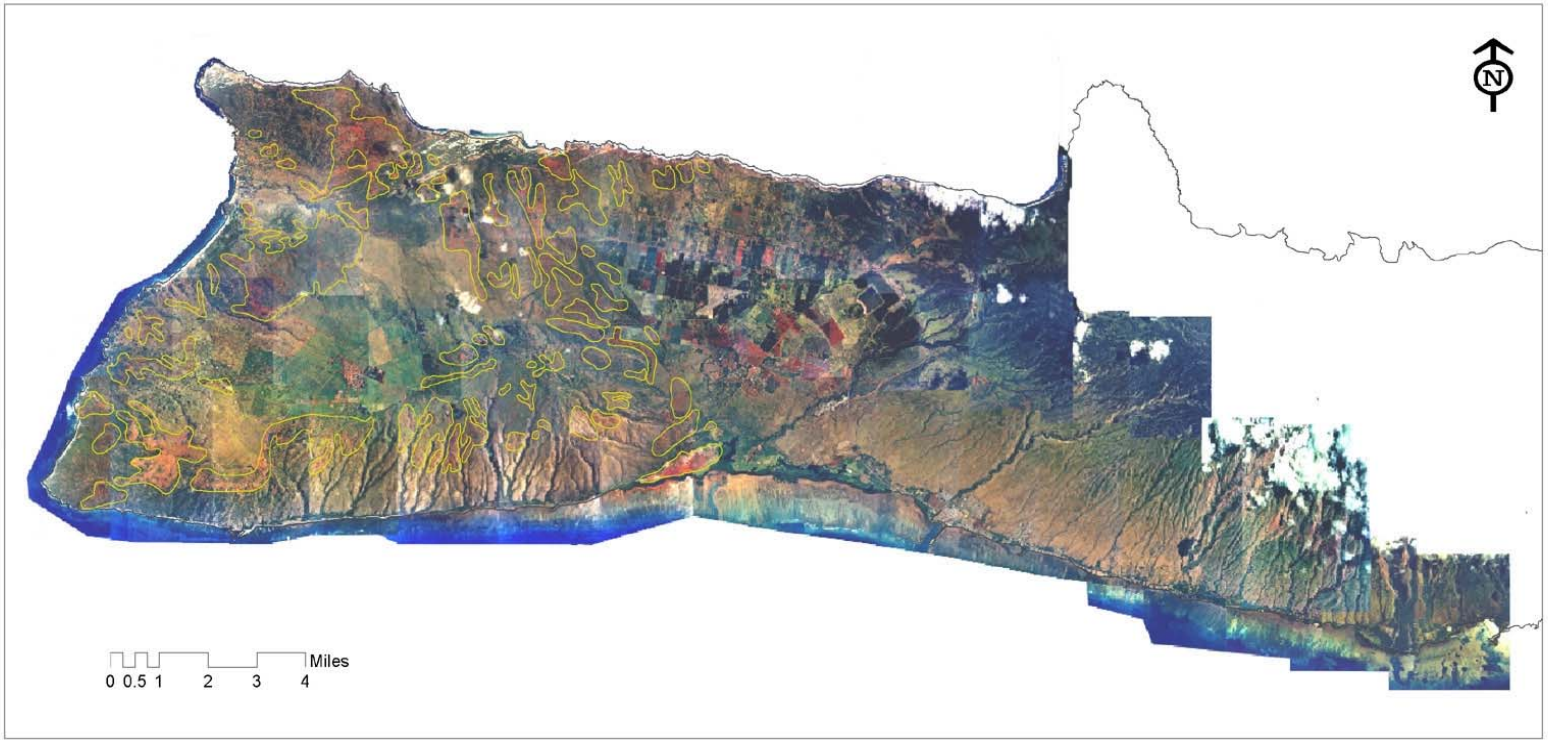


Photo Courtesy of: Air Survey Hawaii, Inc.

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3.5 AGRICULTURAL RESOURCES

The "Agricultural Suitability Classification & Proposed Agricultural Easement Lands" map is in Appendix 4. It illustrates the agricultural resources of the project area and the proposed agricultural lands. The dotted black lines encircle the areas proposed for the agricultural easements, a total of 14,390 acres. The ag lands in Central Molokaʻi are located near numerous water sources for irrigation. The ag lands in Western Molokaʻi are serviced by water lines that vary from ¾ inches to 8 inches in diameter.



The Agricultural Lands of Importance generally overlap with the areas defined for ag easements. They consist of substantial areas of dark green on the suitability map, which indicates Class I: 0 – 2.99% slope, signifying that the land is suitable for cultivation.

The ag lands in West Molokaʻi are composed of the Molokaʻi-Lahaina soil association, i.e. deep, nearly level to moderately steep, well-drained soils that have a moderately fine textured or fine textured subsoil. Molokaʻi soils are suitable for pineapple, pasture, truck crops, and wildlife habitat.

To the north, near Puʻu Ula, and to the west, ag lands are classified as very stony land-rock land association, indicating gently sloping to very steep, rocky and stony land types on uplands and in gulches and valleys.

The ag lands located in Central Molokaʻi are also largely composed of the Molokaʻi-Lahaina association. Within these soil associations there are two main soil types found within the ag easements:

Molokaʻi silty clay loam (MuB): Slopes range from 3 to 7 percent. Runoff is slow to medium, and the erosion hazard is slight to moderate. Included in mapping were a few small areas that are eroded to soft, weathered rock.

Hoolehua silty clay (HzC): Slopes range from 7 to 15 percent. Runoff is slow to medium, and the erosion hazard is moderate.

Referring again to the "Agricultural Suitability Classification & Proposed Agricultural Easement Lands", the ag parcel furthest east also contains significant amounts steeper slopes. It is composed of similar soil associations, but also contains areas of Rough broken land-Oli association, which indicates

shallow to deep, very steep to precipitous soils in gulches and moderately deep to deep, gently sloping to steep, well-drained soils that have a medium textured and moderately fine textured subsoil. That land is suitable for pasture, woodland, orchard, recreation, and wildlife.

3.6 RECREATIONAL RESOURCES

The Molokaʻi Ranch lands contain various recreational activities for both residential and visitor recreational activities. The west and south coasts of the ranchlands contain stunning and relatively undeveloped beaches.



However, the rip currents and shorebreaks on the west end make entering the water extremely dangerous in the winter months and during certain weather patterns. Nonetheless, the beach and nearshore areas are used at various times for sunbathing, picnicking, swimming, fishing, snorkeling, scuba diving, whale watching, surfing, and paddling by residents and visitors.

There are a significant number of trails throughout the property for hiking, biking, and horse-riding, that are popular with residents and tourists alike. There are cultural trails and the Historic Trail mapped by Monsarrat, which runs along the west coast. There is a proposed Na Ala Hele State Trail to be located on the central property.

The Ranch provides access to numerous activities, such as kayaking, mountain biking, horse riding, as well as a paniolo cultural museum and workshop in Maunaloa town. It also maintains camping facilities at Kaupoa Camp. Maui County maintains camping sites at Pāpōhaku Beach Park, located on the north end of Pāpōhaku Beach.

Currently, there is an 18-hole golf course at Kaluakoʻi and 9-holes at the Ironwoods Golf Course. In the future, MPL may open another golf course north of the Kaluakoʻi resort area. Lastly, there are areas set aside for public bow and rifle hunting, which are differentiated from the subsistence hunting areas.

3.7 MPL URBAN AND COMMERCIAL RESOURCES AND EXISTING ZONING

Although the majority of MPL land is undeveloped, it is zoned for agricultural, urban, and commercial uses.

3.7.1 Maunaloa

Designated "Country Town Business District", Maunaloa's main thoroughfares have 13 MPL commercial sites located along them. This County designation allows for quaint country-town commercial properties, which would suit a wide range of activities including retail businesses, arts or culture outlets or professional offices. These sites range in size from 8,700 sq ft to 31,500 sq ft and are competitively priced at approximately $14-16 per sq ft.

3.7.2 Kaunakakai

Kaunakakai serves as the main population center on the island. It is home to the majority of grocery stores, restaurants, and general services for island residents. The Kaunakakai Wharf is still used for transporting goods between Molokaʻi and the rest of the Hawaiian Islands.

This Plan maintains that the old ball park retain its existing use. The Community Plan's recommendation for this area is to redesignate it from "Public/Quasi Public" to "Park," so that the current uses as rodeo, fairgrounds, and park are maintained. MPL owns parcels within the town center and a large area mauka of town, including areas to be considered for Community Expansion.

3.7.3 Kualapuʻu

Kualapuʻu is a small plantation community located between Kaunakakai and Maunaloa, just north of the Maunaloa Highway and east of the Molokaʻi Airport.

3.7.4 Kaluakoʻi

This resort zoned area just north of Pāpōhaku Beach contains three condominium projects, the golf course and the Kaluakoʻi Hotel, which is currently shut down. One of the goals of this Plan is to generate the investment revenue to re-open the Hotel. All three condo projects are privately owned; some of the 300 plus units are included in a rental pool and are rented out. The Ted Robinson designed golf course has been restored and improved but needs further renovation.

3.7.5 Pāpōhaku

Located along white, sandy Pāpōhaku Beach, is the Pāpōhaku Ranchlands Subdivision. It contains 273 lots, a few of which are currently for sale. Less than 100 of the lots have been built upon, and of those, less than half of the owners live there full-time. This means that the Pāpōhaku area remains relatively quiet for most of the year (Pāpōhaku Dunes Draft Preservation Plan, 2005).

3.7.6 The Lodge at Maunaloa

A member of the *Small Luxury Hotels of the World,* The Lodge contains 22 guest rooms. The Lodge's main building features a living room with a two-story stone fireplace, an upstairs library & TV room, the Maunaloa Room for dining, the Paniolo Lounge for lite dining, a TV sitting area and billiards room, the Lodge den with computer and wireless internet access, the Lōkahi meeting room, a heated outdoor infinity pool, and a fitness center offering spa treatments with separate saunas, workout room, shower and lockers.

3.7.7 Beach Village

A 40-tent platform visitor accommodation operation located at Kaupoa Beach on a 31-acre parcel.

3.7.8 Industrial Park

Centrally located to Molokaʻi's main town of Kaunakakai, commercial harbor and the Hoʻolehua airport, the Molokaʻi Industrial Park consists of 22 improved lots.

All lots have prepared building pads and are accessed from paved roads with curbs, gutters, and sidewalks. These lots range in size from 22,000 sq ft to 55,000 sq ft and are fully serviced with water, underground electricity, and phone connections. Lot prices begin at $200,000.

MPL owns this only industrial park on the island. The first increment was developed in the late 1990's to meet the island's long term needs for both heavy and light industrial users.

4 COMMUNITY GUIDELINES FOR LAND USE PRINCIPLES AND POLICIES

These guidelines are intended to guide Molokaʻi Properties Ltd. and the Molokaʻi Land Trust in setting policies for the implementation of the Molokaʻi Ranch Community-Based Master Land Use Plan and the establishment of the Molokaʻi Land Trust.



4.1 MANAGEMENT POLICIES

The wisdom of our kupuna and their relationship to the land and sea has proven well with centuries of managing and living in a manner that caused the land and sea to flourish abundantly. It provided future generations with more than enough for their continued survival without destroying their fragile, island environment and precious resources for over two thousand years.

A single, most important and vital principle of our kupuna and their relationship to their land comes from the word "Mālama ʻĀina" or "Care for the land". To "mālama" not only means to care for the land physically, it also means to care for the land spiritually. It also means to regulate the use of land and ocean resources to ensure the continuance of those resources for future generations. *(Written by John Kaimikaua, March 30, 2004)*

What distinguishes Hawaiian custom and practice is the honor and respect for traditional ʻohana cultural values and customs to guide subsistence harvesting of natural resources. Such ʻohana values and customs include but are not limited to the following:

- Only take what is needed.
- Don't waste natural resources.
- Gather according to the life cycle of the resources. Allow the resources to reproduce. Don't fish during their spawning seasons.
- Alternate areas to gather, fish, and hunt. Don't keep going back to the same place. Allow the resource to replenish itself.
- If an area has declining resources, observe a kapu on harvesting until it comes back. Replant if appropriate.
- Share what is gathered with family and neighbors.
- Take care of the kupuna who passed on the knowledge and experience of what to do and are now too old to go out on their own.

- Don't talk openly about plans for going out to subsistence hunt, gather or fish.
- Respect the resources. Respect the spirits of the land, forest and ocean. Don't get loud and boisterous.

(Native Hawaiian Access Rights/McGregor/2/12/04)

Hawaiian Subsistence, Cultural and Religious Beliefs, Customs and Practices

Hawaiian custom and practice encompasses the full range of traditional, subsistence, cultural, and religious activities Hawaiian 'ohana or extended families have engaged in for many centuries to live as a people and survive in a unique island environment. There are customs and practices related to each major aspect of Hawaiian lifestyle and livelihood including:

- Community life
- Family
- Human well-being and spirituality
- Stewardship and use of natural and cultural resources
- Rights
- Economics

The Governor's Task Force on Moloka'i Fishpond Restoration and the Governor's Moloka'i Subsistence Task Force developed a useful definition of subsistence. According to these task forces:

Subsistence is the customary and traditional uses of wild and cultivated renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, transportation, culture, religion, and medicine; for barter, or sharing, for personal or family consumption and for customary trade.

Land and Natural Elements – The Foundation of Hawaiian Subsistence, Culture and Religion

TO HAWAIIANS, THE LAND AND NATURAL ELEMENTS ARE THE FOUNDATION OF SUBSISTENCE, CULTURAL, AND RELIGIOUS BELIEFS, CUSTOMS, AND PRACTICES.
The land and the natural environment are alive, respected, treasured, praised, and even worshipped. The land has provided for generations of Hawaiians, and will provide for those yet to come.

Hawaiian subsistence practitioners speak of their cultural and spiritual relation to the lands of their region and their commitment to take care of it and protect it for future generations. The land is not viewed as a commodity; it is the foundation of their cultural and spiritual identity as Hawaiians. The land is a part of their 'ohana and they care for it as they do the other living members of their families.

Hawaiian Stewardship and Use of Natural and Cultural Resources

The ahupua'a is the basic unit of Hawaiian natural and cultural resource management. An ahupua'a runs from the sea to the mountains and contains a sea fishery and beach, a stretch of kula or open cultivable land and higher up, the forest.

A land should run from the sea to the mountains, thus affording to the chief and his people a fishery residence at the warm seaside, together with products of the high lands, such as fuel, canoe timber, mountain birds, and the right of way to the same, and all the varied products of the intermediate land as might be suitable to the soil and climate of the different altitudes from sea soil to mountainside or top.

Hawaiians consider the land and ocean to be integrally united and that these land sections also include the shoreline as well as inshore and offshore ocean areas such as fishponds, reefs, channels, and deep sea fishing grounds. Coastal shrines called fishing ko'a were constructed and maintained as markers for the offshore fishing grounds that were part of that ahupua'a.

Fresh water is the most important thing for life and needs to be considered in every aspect of land use and planning. The Hawaiian word for water is wai and the Hawaiian word for wealth is waiwai, indicating that water is the source of well-being and wealth.

Insights about the natural and cultural resources inform those who use the land about how to locate and construct structure and infrastructure so as to have the least negative impact upon the land.

The practitioners are sensitive to the condition of the landscape and resources and their changes due to seasonal and life cycle transformations. This orientation is critical to the preservation of the natural and cultural landscape.

An inherent aspect of Hawaiian stewardship and use of cultural and natural resources is the practice of Mālama 'āina or conservation to ensure the sustainability of natural resources for present and future generations.

These rules of behavior are tied to cultural beliefs and values regarding respect of the 'āina, the virtue of sharing and not taking too much, and a holistic perspective of organisms and ecosystems that emphasizes balance and coexistence. Maintaining spiritual, cultural, and natural balance with the elemental life forces of nature.

Hawaiian families who rely upon subsistence as a primary part of their diet respect and care for their surrounding natural resources. They only use and take what is needed in order to allow the natural resources to reproduce. They share what is gathered with family and

neighbors. Through understanding the life cycle of the various natural resources, how changes in the moon phase and the wet and dry seasons affect the abundance and distribution of the resources, the subsistence practitioners are able to plan and adjust their activities and keep the resources healthy.

Hawaiian Fishing Responsibilities and Rights

If subsistence fishing is disrupted, the lifestyle of the families who rely upon the fishing for their diet will be negatively impacted. This will precipitate a chain of negative impacts for those families. Systemic change is likely to occur such as disruption of the ʻohana system of exchange and sharing of foods caught and gathered.

The diet of the families would worsen. The standard of living would be negatively impacted by the increased cost of purchasing food, due to the lack of fish, seaweed, and other marine foods which are part of their regular diet. The inability to fish and gather marine foods regularly relied upon might impair the ability of the ʻohana (extended family) to celebrate life cycle events – baby lūʻau, weddings, or birthdays.

In ancient Hawaiʻi the right to fish in any given area of the sea depended upon rank. The "aliʻi nui" or high chief of the island owned all the land and its adjacent fishing areas in his personal and sovereign capacity. He gave the chiefs under him, or "konohiki", the ahupuaʻa and their adjacent fisheries to manage. In return, the konohiki paid tribute to the aliʻi nui by giving him their oaths of allegiance and portions of bounties that the ahupuaʻa tenants under them harvested from the land and sea.



The konohiki fishing area extended from the shoreline to the edge of the reef. Where there was no reef, the konohiki had a private fishing right that extended one mile seaward of the shore. Traditionally, the tenants of an ahupuaʻa shared the use of fisheries that were adjacent to the ahupuaʻa with the konohiki. Duty required them to reserve portions of their catch and certain species of marine life for the konohiki and aliʻi nui *(Externalities Workbook/Native Hawaiian Impacts/ 12/17/96).*

According to Native Hawaiian Rights Handbook by Melody K. Mackenzie, "within the boundaries of the ahupuaʻa, the makaʻainana also had liberal rights to use the ahupuaʻa resources. These

included the right to hunt, gather wild plants and herbs, fish offshore, and use parcels of land for taro cultivation together with sufficient water for irrigation. All these activities were regulated by an intricate system of rules designed to conserve natural resources and provide for all ahupua'a residents."

"Implicit in ancient Hawaiian regulations regarding water and land is the concept of mutual benefit and sharing," D. Malo Hawaiian Antiquities (1951 ed).

Access along the shore, between ahupua'a or districts, to the mountains and sea, and to small areas of land cultivated by native tenants, was a necessary part of early Hawaiian life. Use of Hawai'i's trails was open to all classes of people and was governed by *Mamalahoe Kanawai, the Law of the Splintered Paddle.* This first law of Kamehameha, punishable by death, "guaranteed the safety of those using the highway trail of old."

In early Native Hawaiian life, gathering activities served to supplement the everyday food, religion, clothing, housing, and medicinal supplies of the people. They gathered both cultivated and non-cultivated items from the mountains and into the sea, including hunting and fishing.

Tenants of the ahupua'a also had a right to take fish, subject to the right of the Konohiki to manage and conserve the fisheries.

The legal basis for Traditional Hawaiian Access is founded on *Native Hawaiian Ahupua'a Tenant Rights*, and are derived from three sources: *(1) The Common Law of England: Section 1-1 Common Law and Hawaiian Usage; (2) The State of Hawai'i Revised Statutes: HRS 7-1; (3) The Hawai'i State Constitution: Article XII Sec. 7.*

This plan recognizes and reaffirms all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes by descendants of Native Hawaiians who inhabited the Hawaiian Islands prior to 1778. These rights will be the foundation upon which we build our Management Plan for West Moloka'i.

Relative Importance of Management Area

Subsistence fishing reduces dependence on purchased seafood. The availability of an alternative food source gives residents a sense of self-sufficiency and freedom.

Subsistence fishing provides other, less definable benefits. Time spent in subsistence fishing cultivates intimacy and harmony with the ocean, reinforcing a strong sense of kinship with nature that is the foundation of Hawaiian spirituality and religion. While engaged in fishing and gathering activities, practitioners share experiences and gain knowledge that provides continuity between the past

and the present and that builds trust and cooperation.

These shared experiences reinforce beliefs and values that are critical for perpetuation of Hawaiian cultural identity. Subsistence fishing emphasizes group identity and relationships rather than individual economic accomplishment. Food obtained through subsistence fishing is distributed within the community and is consumed at family and community gatherings.

The prevalence and economic and social importance of subsistence activities on Molokaʻi is well documented (Governor's Molokaʻi Subsistence Task Force, 1994). A survey commissioned by the Task Force concluded that, without subsistence as a major means of providing food and supplementing income, Molokaʻi families would have a greatly reduced standard of living.

Subsistence is an essential and viable sector of the overall island economy. Subsistence fishing not only provides food, but contributes to a healthy diet. Obtaining equivalent food items, such as fish, from stores can be costly and families on fixed incomes are known to purchase cheaper, less healthy foods. Subsistence activities require physical exertion and provide opportunities for relatively inexpensive recreation that contributes to better health.

Beyond the immediate economic and health advantages of subsistence fishing are other benefits that serve to enhance family identity and community cohesion and to perpetuate traditional values. Subsistence resources have allowed Molokaʻi to endure economic hardship without major social disruption (Governor's Molokaʻi Subsistence Task Force, 1994).

Molokaʻi is unlikely to experience economic growth or social dislocation on a scale that would change the underlying lifestyle. Subsistence fishing on Molokaʻi will continue to be an integral part of the island's economy. In fact, the subsistence lifestyle so prevalent on Molokaʻi is viewed by many on the more urbanized islands as a preferred lifestyle, which protects against downturns in the cash economy (Proposal to Designate Moʻomomi Community-Based Subsistence Fishing Area/Northwest Coast of Molokaʻi/Hui Mālama O Moʻomomi/April 1995).

Many families on Molokaʻi, particularly Hawaiian families, continue to rely upon subsistence fishing, hunting, gathering, or cultivation for a significant portion of their food. Availability of the natural resources needed for subsistence is essential to Molokaʻi households where the unemployment rate is consistently higher than on other islands and a significant portion of the population depend upon public assistance.

Without subsistence as a major means for providing food, Molokaʻi families would be in a dire situation. Subsistence

provides families with the essential resources that compensate for low incomes and a means for obtaining food items that may be prohibitively costly under a strict cash economy.

Food items like fish, limu, and deer meat, which are normally obtained through subsistence are generally unavailable or are very costly in stores. If families on fixed incomes were required to purchase these items, they would probably opt for cheaper, less healthy foods that would predispose them to disease and other health problems. In this respect, subsistence not only provides food, it also ensures a healthy diet that is critical to the prevention of disease.

Subsistence on Molokaʻi will continue to be essential to the lifestyle of the people. Community-based management of the resources, rooted in traditional values of aloha ʻāina and mālama ʻāina and empowered with the responsibility for monitoring of the resources will be critical in assuring a subsistence lifestyle for future generations on Molokaʻi. The other major facet to the perpetuation of subsistence activities and the protection of the necessary natural resources will be the recognition of subsistence as an essential and viable sector of the overall economy and balancing future economic development and growth on the island to assure its continuation.

Molokaʻi provides a rare example of how residents adapted to changing economic circumstances without massive external intervention. Historical accounts have indicated that when agribusiness closed on Molokaʻi, subsistence became a more vital aspect of the economy. Through community-based efforts, residents organized to successfully stave-off tourism development while promoting values related to community and family integrity. Subsistence and other community-based endeavors are considered the forces that bind together the social elements necessary for cultural perpetuation. Subsistence should not be viewed as a replacement economy per se, but as a tradition that has survived after macroeconomic strategies (i.e., plantations, ranches) failed.



Any economic recovery strategy that is selected should allow for subsistence to continue to play a significant role. This is especially critical on Molokaʻi where natural resources are available and subsistence is an integral part of lifestyle. Community planning is a proactive strategy that should encourage a functional coexistence and balance between subsistence, the market economy, and government.

As the natural and cultural resources of Molokaʻi are no longer as abundant as the current generation of adults remembers them to be in their childhood, management of the resources traditionally used by the people of Molokaʻi for subsistence has become more urgent.

Beyond the immediate economic and health advantages that come with subsistence are other qualities that serve to enhance family and community cohesion and perpetuate culture and spirituality. Subsistence is an activity that provides prescribed roles for its members. Family members of all ages feel that they contribute to family welfare through their involvement in subsistence. Subsistence activities are a central part of camping trips or family outings and parents and children alike are involved in catching fish and gathering marine resources. Older children are oriented towards subsistence by their elders who teach them about techniques and the behaviors of various species.

On another level, subsistence provides a basis for sharing and gift giving within the community. Residents generally ascribe to a process of reciprocity and sharing with those who are unable to obtain resources on their own. Families and neighbors exchange resources when they are abundant and available, and the elderly are often the beneficiaries of resources shared by younger, more able-bodied practitioners. Some practitioners believe that they must share their catch with others even when it is meager, because generosity is rewarded by better luck in the future.

Resources obtained through subsistence are used for a variety of special occasions that bond families and communities. Resources such as fish, limu, ʻopihi, deer meat, etc. are foods served at birthdays, lūʻau, graduations, and holiday celebrations. ʻOhana and community residents participate in these affairs that cultivate a sense of communal identity and enhance social networks.

Time spent in nature cultivates a strong sense of environmental kinship that is a foundation to Hawaiian spirituality. Subsistence practitioners commune with nature, honor the deities that represent natural elements and life forces, learn how to mālama or take care of the land, and develop an understanding about patterns and habits of flora and fauna.

An inherent aspect of traditional subsistence is the practice of conservation. Traditional subsistence

practitioners are governed by particular codes of conduct that are intended to ensure for the future availability of natural resources. Rules that guide behavior are often tied to spiritual beliefs concerning respect for ʻāina, the virtues of sharing and not taking too much, and a holistic perspective of organisms and ecosystems that emphasizes balance and coexistence.

Hawaiians engage in subsistence and related practices more than other ethnic groups. This finding reflects the importance of subsistence to this group and the perpetuation of culture through subsistence activities. As mentioned previously, subsistence also plays in important economic role, and this may be especially true for Hawaiians who generally have lower incomes.



The fact that Hawaiians engage more in subsistence than others also points to how these activities are embedded in the culture and can be explained through a history of adaptation, the development of an indigenous economy, and the maintenance of cultural traditions despite the influx of foreign lifeways. It is important to note that the other groups (e.g. Filipinos, Japanese) engaged in subsistence, although not at the same level as Hawaiians (Governor's Molokaʻi Subsistence Task Force, 1994).

Problems Addressed by Plan

In recent decades, there has been a notable decline in nearshore fishery resources in the main Hawaiian Islands (Shomura, 1987). Resource condition varies considerably from area to area (Smith, 1993), depending on several factors: population size, degree of economic development, extent of nearshore habitat alteration and intensity of fishing. The persistence of subsistence fishing on Molokaʻi is an indication that customary fishing practices have not depleted inshore fisheries resources.

Sustainability of subsistence fisheries resources was assured in ancient Hawaiʻi. The fishing methods and practices of that time generally promoted the sustainable use of fisheries resources within the limited nearshore areas that were exploited. The commercialization of fishing has changed the way resources are perceived and are utilized. Fishing decisions are made with considerable uncertainty about how fishermen will behave collectively. Such uncertainty tends to shorten planning horizons and places a premium on short-term catches over future catches.

Customary fishing practices are increasingly beset by pressures from outside the community. Commercial harvesting by off-island fishermen and new residents is causing some Molokaʻi fishermen to question traditional values (sharing of seafood resources and conservation for future generations) and rules of conduct, which are the foundation of the subsistence culture. An alarming number of fishermen are using improper harvesting methods, taking undersized animals or ignoring seasonal prohibitions. The sustainability of the subsistence fishery and its benefits to the community is threatened by encroachment of commercial fishing values and methods.
The ancient Hawaiians depended on the ocean for survival and existence and they accumulated a sophisticated knowledge of marine fisheries. This knowledge involved not only how and where to fish but also a code of conduct about how fishing should be practiced so that it would be sustainable. Cautions against wanton harvest are part of Hawaiian mythology and kinship with marine creatures is part of Hawaiian spirituality.

While the force of these beliefs has been muted in modern times, perpetuation and application of this body of knowledge is relevant to some of Hawaiʻi's present day fishery problems, particularly the sustainable use of nearshore fisheries (*Proposal to Designate Moʻomomi Community-Based Subsistence Fishing Area/Northwest Coast of Moloka'i/Hui Malama O Moʻomomi/April 1995*).

Over the years, a number of activities contributed to the degradation of the natural environment of Molokaʻi. Offshore reefs and oceans were impacted by pollution, erosion and soil run-off from tourist, residential development, and ranching. Sand from the West End of Molokaʻi was mined and shipped to Oʻahu to make cement to build the freeways and hotels and to replace lost sand at Waikīkī Beach.

Gravel and rocks from East Molokaʻi were used in freeway construction on Oʻahu. Ranching on the East End contributed to deforestation, erosion and run-off. Once productive fishponds were allowed to fill with silt and the walls fell to disrepair following tsunamis and storms. Over-harvesting of marine resources relied upon for subsistence is a growing problem. Traditional resources such as the turtle cannot be used for subsistence under new federal regulations. Wildlife such as deer, goats, pigs, and birds are abundant on privately owned lands but are too scarce to be hunted on public lands.

Within the lifetime of those who are now adults on Molokaʻi, ocean resources have significantly declined. Commercial gathering of crab and ʻopihi have seriously diminished these particular resources. There are more and more boats from Oʻahu and Maui, especially backside. In 1993, all the ʻopihi from Kalaupapa to Hālawa was wiped out in 7 days of the zero tides in March and April. There was no ʻopihi to be gathered

during the summer. ʻOpihi on the West End is gone. Off island boats take massive quantities of ʻopihi from Dixie to the Northwest side.

Moemoe gill nets left in too long without being checked are negatively impacting fishing resources. Gill nets, lobster nets and bullpen traps seriously diminish the resources. Gill nets are the main problem for the fishing resources. Limu is not being gathered properly. Undersized marine resources are being harvested. Kaunakakai to Makakupaʻia is over fished. With 50% of high school graduates having lūʻau which commonly provide raw fish, raw crab, tako, limu, etc., the negative impact on these marine resources are tremendous. Restrictions should apply equally to commercial and subsistence users (Governor's Molokaʻi Subsistence Task Force, 1994).



4.1.1 Cultural Principles and Policies

Cultural Conservation and Management Zone

Establish a Cultural Conservation and Management Zone to include the Historic Cultural Sites and the Complexes of Nāʻiwa (Manawainui-Kahanui), Kaluakoʻi-Kāʻana-Puʻu Nānā (Kalaipahoa-ʻAmikopala), Kaunakakai, and Kawela Cultural Complexes; Cultural and Subsistence use and resource areas; a subsistence fishing zone of one-quarter (1/4) mile offshore on the North and West Shore and to the outside of the reef surrounding the remainder of the property (South shore). (See Cultural Resource Protection Map, page 59.)

Subsistence Fishing

Subsistence is defined as the customary and traditional uses of wild and cultivated renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, transportation, culture, religion, and medicine; for barter, or sharing, for personal or family consumption and for customary trade.

Permitted activities (activities to be allowed)

Persons who receive permission to access Molokaʻi Ranch lands or Trust lands can engage in the following subsistence fishing activities:

- Hook and line fishing for pelagic species.
- Hook and line fishing for deep sea bottom fish species.

- Hook and line net fishing for akule.
- Fishing with SCUBA gear permitted only for akule and ta'ape or for research.
- Trap fishing for deep sea shrimp.
- Trap and net fishing for kona crab and kuhonu crab.
- Throw netting permitted only for subsistence.
- Hook and line fishing from shore permitted only for subsistence (no competitions are permitted).
- Diving with spears permitted only in the daytime and only for subsistence (no spearing competitions are permitted).
- Diving for hand harvesting permitted only in the daytime and only for subsistence.
- Hand harvesting of a'ama crab is permitted at night and only for subsistence.
- Hand harvesting of ala'eke and kuhonu for subsistence only.
- 'Opihi collecting permitted from shore only (no diving) and only for subsistence.
- Harvesting of spiny lobster and slipper lobster permitted only by hand (no netting, no spearing) and only for subsistence.
- Harvesting of mana-moi (7-12 inch) throughout the year for subsistence only.
- For rescue, monitoring, religious, management, and research purposes only, use of equipment otherwise prohibited in this section is allowed.



Hunting

- Hunting will be for subsistence use only. The golden rule is "take only what you need for your family".
- MPL has a contractual obligation for commercial hunting and wildlife management on parts of MPL property until December 2007. The contractor has agreed that at the conclusion of that contract he will no longer seek to conduct commercial hunting on the property and will be agreeable to work for the Land Trust and/or MPL as a Wildlife or Subsistence Hunting Manager.
- As a goal of this management plan, the Land Trust and MPL will seek to reach a mutually acceptable agreement with the contractor to cease commercial hunting prior to December 2007. MPL acknowledges that it, alone, has a moral obligation to this contractor that may extend beyond 2007.

- MPL employees and Native Hawaiian residents of the Kaluakoʻi ahupuaʻa have seniority for hunting in accordance with traditional subsistence management custom and practice. MPL employees assume responsibilities to sustain the natural and cultural resources of the ahupuaʻa.
- Management Options include the following: The decision about when and how to implement a selected option would be made by Molokaʻi Ranch and Trust resource managers. The Hunting Resource Manager would need to work hand in hand with MPL's Livestock Manager so that the pasture lands remain healthy enough to support the livestock. This is especially critical in times of drought when the deer can intrude into the pasture lands, compete with the livestock, and create erosion problems.
- Kapu on Activities such as "No Hunting for Periods of Time"
- Kapu on Animals "No Hunting of Does"
- Kapu on Areas "No Hunting in Certain Districts"
- Kapu on Seasons "No Hunting During Certain Months"
- Kapu on Times "No Night Hunting"
- Kapu on Equipment "No Dogs for Deer Hunting", "Only Bow Zones"
- Education on Conservation and Preservation
- Education on Cultural History and Practices
- Education on Management Areas
- Education on Safety and Responsibilities

Access for Subsistence Fishing and Hunting

- In order to protect the cultural and natural resources, access on both MPL and Molokaʻi Land Trust lands will be managed.
- Hawaiian Access Rights be enshrined on the property titles for both MPL lands and Land Trust lands.
- Non-Hawaiian access will be determined by the landowner.
- Hunting methods (rifle or bow) and game seasons are as confirmed on the Hunting Map.
- Subsistence Fishing: Each year, an experienced Resource Group will recommend open areas for subsistence fishing based on protecting and not depleting the resources**.**

Stewardship of Cultural Sites

- Designate Kahu for complexes and sites including: Nāʻiwa(Manawainui-Kahanui); Kāʻana; Puʻu Nānā (Kalaipahoa-ʻAmikopala); Kawakiu, Kamakaipo-Lāʻau; Hale O Lono; Punakou. Designated Kahu for complexes and sites shall be

consulted prior to decisions being made affecting those areas.
- Involve cultural resource persons, as needed, in a cultural sites stewardship role for all other protected sites and areas.

Responsibility of Kahu and stewardship resource persons

- Ongoing Monitoring of Sites - annual assessment during the dry season
- Identify and prioritize sites for stabilization
- Develop resources for site stabilization and restoration
- Develop any interpretive signage, markers and trails of access
- Identify and prioritize sites for rededication
- Train stewards in mo'olelo, protocols and responsibilities of stewardship for each site
- Implement Management Plan
- Manage research requests

Access and Use of Cultural Sites

- Sites can be accessed to fulfill traditional and customary Native Hawaiian responsibilities for cultural, religious, and subsistence purposes.
- Education and training activities can be organized through the kahu or the resource manager.
- In some cases access may be seasonal, such as during the non-hunting season, rainy/muddy season.
- Use of sites and related protocols will vary according to use of the particular site, including but not limited to:
  - Monitoring its condition - integrity, boundary and buffer, setting access routes, relation



to overall complex or nearby sites and resources. Sites should be assessed once a year during the dry season.
  - Work to stabilize and restore sites. A plan for the stabilization and restoration of selected sites should be developed and approved by the State Historic Preservation Office.
  - Rededicated for specific spiritual and cultural purposes. Identify sites which have been in continuous use, those which have been rededicated and those which shall be rededicated.
  - Access and use of sites should follow protocols established by the Kahu and resource manager.

- Protocols should address manner of approach, entry, use, and exit of site; chants seeking entry and granting entry to sites; appropriate hoʻokupu; chants and procedures to stabilize sites.
- Kahu and stewardship resource persons should train stewards in moʻolelo, protocols and responsibilities of stewardship for each site.
- There will be no commercial tours within the boundaries of Nāʻiwa (Manawainui-Kahanui) and Kāʻana-Puʻu Nānā (Kalaipahoa-ʻAmikopala) wahi pana.

Nāʻiwa

- An area to be defined by the attached maps inclusive of selected areas within Nāʻiwa and Kahanui ahupuaʻa be protected in perpetuity.
- Known sites be GPS'd (Global Positioning System) and marked on maps.
- Certain sites be limited (kapu) to use only by practitioners of traditional Native Hawaiian religion and culture (Puʻu Ano Ano, Nenewa, Kawahuna, mau Ana, mau Puʻu).
- Residents of Hina (Molokaʻi) be given preferred status for access and practice.
- Youth groups be encouraged to prepare, visit, and be groomed to assume kuleana to mālama these sites and related activities.
- Everyone, regardless of rank or status, be part of the (volunteer) task force.
- Any huakaʻi be accompanied by someone who has been trained and certified in the halau naʻauao for Nāʻiwa.
- Cultural and religious sites be identified, blessed, constructed, and staffed accordingly.
- Fences be reinforced, keys limited, and a schedule of access be developed.

This list does not limit or restrict future recommendations, as may be necessary.

Kaluakoʻi Cultural District

The Kaluakoʻi Cultural District is to protect the historic and cultural sites and resources for current and future spiritual, cultural practices and subsistence uses. It includes the following sites and complexes:

- Punakou which is inclusive of Kāʻana, Puʻu Nānā, and Hoʻolehua
- Pakaʻa trail which is located in the entire Kolo Gulch
- Pakaʻa cultivation fields in the uplands of Kopala
- Kalaipahoa-ʻAmikopala and Kukui adze quarry sites
- Kamākaʻipō complex of sites in the entire gulch
- Kahualewa Heiau, mauka of Waikāne Gulch

- Heiau, mauka of Halena Road and between Kāhinawai and Oneohilo gulches
- Kawākiu Iki and Kawākiu Nui village sites and burials
- Dunes of Keonelele
- Various fishing koʻa along the shoreline
- Burial Site located west of Kaluakoʻi water tank in Kakaʻako Gulch
- All sites identified on the Maurice Majors maps

* Color Map provided at end of report*

MOLOKA'I RANCH MASTER USE PLAN
CULTURAL RESOURCE PROTECTION



Data Sources:

USGS Hawaii Data Clearinghouse
Roads, Homesteads

Hawaii Office of Planning
Contours, Molokai Ranch Property, Place Names, Fish Ponds

Maurice Major, Archaeologist
West End Archaeological Survey Data

Cultural and Land Use Committees
Other Archaeological Sites, Makahiki Grounds, Land Use Districts and Overlay Zones

Prepared By: The Conservation Fund
October 7, 2005

- Molokai Ranch Property
- Homestead
- Major Road
- Secondary Road
- Minor Road
- 4WD Road
- Trail

Proposed Land Use Districts
- Cultural Resource District
- Cultural Resource Protection Overlay Zone
- Subsistence Fishing Zone
- Partnership Subsistence Fishing Zone

- West End Arch. Sites (M. Major)
- Additional Archaeological Sites
- Kualapu'u Makahiki Grounds
- Ancient Fishponds
- Camp

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4.1.2 Environmental Principles and Policies

Erosion Control Measures

- Support the efforts of the Northwest Erosion Project that is currently working with various partners and landowners to remedy the erosion rate of the Kakaʻaʻaukuʻu Gulch, Kawaʻaloa and Moʻomomi Areas. Take the lessons learned from this project and apply to other areas of West Molokaʻi and develop erosion plans for specific priority areas.
- Keep domestic livestock from denuding the landscape through best management practices.
- Establish fire prevention and suppression plans for the West End properties.
- Augment vegetation recovering through reforestation/reseeding of denuded areas and develop revegetation plan/strategies.
- Preserve all puʻu and forested areas and increase forestry plantings to retain and improve moisture cycle.



"Limited Access"

Develop access use and construction plan that prevents erosion of dirt road ways and trails. The plan should limit any off road/trail (or on beach) activities with wheeled vehicles. "Limited Access" is defined as "providing access with a system of accountability (pass-key), no further development of road systems, and providing walking trail systems. Allow foot access for subsistence purposes, provided a waiver is signed.

Subsistence Fishing Zone

- To preserve inshore fishing/subsistence resources, create a subsistence fishing zone in the coastal waters along all of the Ranch's coastline property modeled after the Hui Mālama O Moʻomomi Subsistence Fishing Zone.
- Establish no commercial take zone 1/4 mile from the shoreline (north and west shore) and from the beach to the reef edge/breaker line (south shore).
- Establish demonstration fishing nurseries/kapu sites to insure reproduction of key subsistence food species (e.g. ʻopihi, moi, mullet, limu, lobster, ulua, uhu heʻe).
- Support protection for Penguin Banks from overfishing.

Moʻomomi to ʻĪlio Point

- Allow subsistence gathering on a limited access system.

- Develop a system of accountability and enforcement to limit the overtaking of resources.
- Manage the terrestrial coastal beach strand (use TNC Moʻomomi Preserve Management as a model).
- Explore management options - Land Trust and/or TNC extension of the Moʻomomi Preserve.

ʻĪlio to Kawākiu to Kepuhi

- Develop erosion plan for Kawākiu.
- Develop plan to preserve areas with pockets of native coastal vegetation.
- Develop a Kahu watch program.
- Install railing system to prevent motorized ingress into sensitive areas or on the beach.
- Restrict private permanent camp sites.
- Develop a camping management plan.
- No night diving or night gill netting.

All (current and future) MPL and/or Land Trust Development Areas

- MPL and/or the Land Trust will implement erosion plans for any future development.
- MPL and/or the Land Trust will recognize, preserve and enhance pockets of native vegetation (i.e. establish parks at these sites).
- No incompatible nearshore or beach activities (i.e. motorized vehicles on the beach, harvesting of sand, military exercises, jet skis).
- MPL and/or the Land Trust will recommend that the water company apply for conservation rate structures for individual owners.
- Any future harvesting or pumping of the water source, should not have adverse affects on the natural resources or deplete the source.

Kepuhi to Pālā'au

- Conduct an erosion study comparing the stream/sediment output between a managed and an unmanaged gulch system.
- Control present extent of mangrove forest with strategies that integrate mangrove control and reduction of sedimentation.
- Maintain limited access to these areas.
- Develop wetland/fishpond restoration strategies.

Nāʻiwa/Manawainui/Kahanui

- MPL and/or the Land Trust will implement sustainable agricultural practices to minimize non-point source pollution.
- Keep watershed vegetated - both canopy and understory (except for cultural and agricultural sites).
- Use water conserving irrigation methods (e.g. drip irrigation)
- All dirt road construction and maintenance be done in a way to limit erosion.

Kaunakakai

- MPL and/or the Land Trust will work with the County Fire Department to implement fire suppression management.

Kamakou Preserve

- Recognize the Conservation Easement and maintain the management plans that The Nature Conservancy is mandated to implement.



4.1.3 Recreation Principles and Policies

The general structure or creation of recreational policies and procedures for specific areas on MPL land would be in accordance with the policies designed to protect the cultural and natural resources on the MPL lands. Any and all activities and recreational opportunities offered to visitors or tourists should also be available to residents of the island.

Community Advisors

To maintain the longevity and integrity of the recreational plan, cultural and natural resource persons who would be willing to advise the land owners on recreational activities should be identified and asked to provide advice, as needed. Areas of expertise for these advisors should include: natural resource preservation; Hawaiian culture and traditional Hawaiian practices; native indigenous plants and animals; subsistence and gathering; ocean safety and resource management; tourism; business management; agriculture; water management; and lāʻau lapaʻau.

Quality Activities

Recreational activities on MPL lands should emphasize quality not quantity and should be offered to visitors and residents alike. Culturally based activities that have an educational component, practice preservation of the island's natural resources, and are respectful of culturally and environmentally sensitive areas and sites should be promoted. These should include ocean activities that are sensitive to reef systems and committed to the preservation of all native ocean life. Cultural activities should be as authentic as possible, unpretentious and not created merely as a visitor attraction.

Activities such as community team sports and those which promote strong family and community relations should be encouraged. New attractions and recreational activities can include: Hula lessons; Makahiki games; lei making classes; cultural or educational hikes to replant indigenous Hawaiian plants;

cultural water activities that teach ocean resource preservation; ukulele lessons; regular story telling sessions about Hawaiian or Molokaʻi Moʻolelo (legends/history); Paniolo Cultural Center and Museum.

Horseback Riding
While horseback riding outside of pastures should be on designated trails, recreational riding on the beaches and in conservation resource areas will be restricted and regulated. In order to maintain safety on horse rides, trail systems need to be established and maintained. The constant treading of these animals has a devastating effect on plant life along designated trail systems. Trail rides alone are not economical. Trail rides should be offered as part of a larger experience that includes story telling and visits to culturally significant sites, lunch or dinner on the beach, and educational/cultural information or music.

Hiking
Cultural or educational hikes that limit the amount of people on each tour can be positive if strict guidelines are established and followed. The number of people on a hike should be no more than 10 at a time. Hikes have a low environmental impact. Hikes should contain a strong cultural and educational component and offer a "Molokaʻi style" - warm personal – experience. No commercial hikes should be conducted within the boundaries of the wahi pana of Nāʻiwa/Mimimo and Kāʻana/Puʻu Nānā.

Fishing
Reef fishing should be primarily for subsistence. No recreational provider on island is currently, nor should in the future, offer reef fishing as a visitor or tourist activity. Off shore or deep sea sport fishing in which charter boat providers practice "tag and release" does not deplete ocean resources and can in fact educate and give positive benefit to ocean research and study.

Hunting
Hunting on island should be managed carefully. Hunting should be permitted for the community in coordination with the MPL game manager for the deer and wild game population to be sustainable. A map of the water system used for cattle and wild game should be made available to guide the hunting and recreational management plan.

Camping
Encourage weekend camping no earlier than Friday or later than Sunday, unless Monday is a holiday. Longer than weekend camping can be considered but there should be some guidelines for such exceptions. The criteria for camping and for any exceptions should be created later in accordance with a management plan providing accountability, a permitting process, and a protocol for users with established consequences for non-compliance.

It should be based upon an assessment for each area of carrying capacity; how well the site is equipped for sanitation purposes; sustainability of the available resources, seasonal changes. Areas for Primitive and Modern camping should be designated (like the old Halena Boy Scout camp).

Campers should be conscious of the special Moloka'i camping culture. Quiet hours for campers are between 10:00pm and 7:00am. "Primitive" camping (camping without pre-constructed facilities or structures/electricity) should primarily be a residential recreation as opposed to a visitor activity.

Pōhaku māuliuli (Make Horse) should be limited to day use only. Overnight camping should be prohibited (liability issue from the golf course). The landowner needs to provide signage so that the community knows of this policy.

Items or structures that are not permitted include: any and all permanent foundations dug or set in the ground and RV's or non-working vehicles. No firearms or fireworks are allowed when camping. As a general rule, "whatever is brought into a camping area should be taken out when you leave." Only temporary structures and items may be used such as: EZ Ups, tents, temporary structures with canvas tops, portable toilets or showers and gas generators.

Fire rings should be installed in designated camping areas. Campfires should only be constructed in designated fire rings set up by MPL and/or the Land Trust. Campers must always practice fire safety and adhere to all fire codes, standards and regulations.

A booking system should be designed for weekend camping on MPL and/or the Land Trust property. A fee for campers should be assessed when utilizing MPL and/or the Land Trust camping areas. The fee would include a security deposit which campers would get back upon inspection of the facility after use and a minimal fee that is put towards maintenance of camping sites (example: portable bathrooms, labor for cleaning and security, environmental safety, preservation and education, emergency response plan).

An emergency response/evacuation plan should be designed. Policies taking liability into account will be developed regarding: alcohol consumption, illegal drug usage on property, a fee structure (from other properties with camping areas), sanitation, and health problems. Also there should be signage for water, road and general safety when camping.

4-Wheel /ATV

The landowner should decide about 4-wheel drive vehicles. ATV vehicles should not be allowed on beaches and dunes. Recreational use of ATV should be discouraged on all lands.

Kayaking
Kayaking near or on the reef system is an islandwide issue that is not particular to the West End. It needs to be discussed in the context of the whole island.

Biking (Bicycle)
It is important to include biking as a recreational activity on MPL and Trust lands. Biking events have the potential of bringing worldwide exposure and financial benefit to Molokaʻi and MPL. A map of approved bicycle trails should developed.

Recreation Infrastructure
The paniolo heritage is important and should be exhibited with pride on MPL property through rodeo, workshops, riding lessons and a Paniolo Cultural Center.

A community recreational center and gymnasium should be rebuilt in Maunaloa for West End residents. Youth sports should receive strong support from the community and MPL, including inter-community team sports and events. The Maunaloa Little League baseball field and weight center should be renovated and improved. MPL and the Land Trust should partner with the County of Maui and organize youth playoffs or community league playoffs in Maunaloa.

The county should build a gymnasium next to the College as designated on the Molokaʻi Community Plan.

Recreational Providers and Fees
The landowner should decide if there should be just one provider of activities on Molokaʻi Ranch property for tourists and for the same activities desired by the local community. The landowner should also decide if community members should pay for designated activities on MPL property recognizing the need for insurance coverage, supervision of some activities, the cost of equipment and clean-up. Non-complying service providers and large groups of tours can deplete natural/cultural resources and should be discouraged.

4.1.4 Economic Development Principles and Policies

Goals
Molokaʻi has a diversified economy and efforts should continue to balance that diversity. Tourism should not be the main economic driver, but is recognized as an important component of a balanced diversified island economy. The expansion of the economy should be encouraged in places where existing infrastructure is under-utilized, e.g. Kaluakoʻi Hotel. Molokaʻi's natural resources needs recovery and enhancement.

Lands suitable for agriculture production and animal grazing should be protected now even if those lands are not currently in production, and the water resources needed to service these lands in the future should also be protected and reserved.



It is recognized that Molokaʻi will be in a very powerful economic position if it preserves its agricultural lands and the water resources needed to make those lands productive in the future. Further study needs to be undertaken to determine how much more suitable agriculture land can be put into production.

Molokaʻi needs further housing for the elderly as the population is aging. Land and housing (both rental and for purchase) should also be made available for current and future generations of Molokaʻi families in need of housing that is affordable, based on Molokaʻi incomes.

Molokaʻi needs a better-trained workforce. Communication needs to improve between the community and the County of Maui on long-term infrastructure needs for Molokaʻi.

Objectives and Strategies

- There is consensus agreement that The Kaluakoʻi Hotel should be re-opened.
- Focus on finding products and/or services that people want from Molokaʻi.
- Understand and overcome the identified problem that exists whereby many good ideas for economic stimuli are unable to be turned into actual jobs (e.g. slaughterhouse, ice house and coolstore projects).
- There is consensus that an economist, who understands the community's aspirations and the inherent opportunities and limitations of an island economy, be engaged to report further on what are likely economic drivers to stimulate the Molokaʻi economy and how to build capacity from within the community.
- The growth of Kaunakakai, Kualapuʻu and Maunaloa should be community-planned and should be allowed to happen naturally as community-driven demands require.

Rural Community Economic Development

- Achieve environmentally and culturally compatible economic development through rural community economic development strategies, i.e. sensitivity to scale, low population

density, and historic reliance on natural resources as the basis for economic activity.
- Develop and maintain a diverse and stable economic base and employment opportunities while preserving rural character and open space.

Agriculture
- The land suitability classifications should be the basis for agriculture land preservation.
- Farming of organic crops and crops to support traditional Hawaiian diets have proven to be economically viable on Molokaʻi and these activities should be expanded. The development of value-added products made from Molokaʻi-grown crops/livestock should be encouraged.
- Develop and implement a plan for the Molokaʻi Irrigation System.
- Agricultural methods should protect indigenous species and the public's health.

Tourism
- An economic objective is to fill the existing hotel rooms on the island.
- The local kamaʻāina market is important.

Jobs
- Immediate expansion of the island's employment base and the creation of family-support jobs, which Molokaʻi residents are qualified for (e.g. construction where up to 100 jobs have been identified for construction associated with the re-opening of the Kaluakoʻi hotel, to construct the Maunaloa Community Center, and to build new housing units).
- Other skills needed on Molokaʻi include marketing, health care, farming/ranching, accounting, teaching and middle management supervisory.

Community Development Objectives
- Preserve and improve the quality of life.
- Provide adequate educational opportunities.
- Maintain and improve community infrastructure.
- Provide affordable housing and daycare services.
- Maintain age and income diversity.
- Insure adequate job opportunities and commercial services within the community.
- Build the institutional educational and physical infrastructure needed to sustain long-term economic growth, i.e. Maui Community College, high school voc ed, NARA, learning centers.
- Expand entrepreneurial opportunities and create "value-added" development opportunities tied to natural resource base.
- Make each town friendly for walking and biking between destinations, especially for older

residents and physically challenged.

Housing

- There will be a continuing need in the future for more housing for Molokaʻi families at prices they can afford based on their respective incomes. Molokaʻi Ranch, the EC and others in the community, such as Habitat for Humanity, can coordinate the planning and implementation of future affordable housing projects. Molokaʻi Ranch can reserve lands at realistic prices around Kaunakakai, Kualapuʻu and Maunaloa to ensure the development of these for future affordable housing projects.
- Identify up to 100 acres around each of the towns of Kaunakakai, Kualapuʻu and Maunaloa for the future development of ʻOhana Neighborhood Communities to be developed by partnering various community resources such as Habitat for Humanities, Self-Help Housing and others, such as Department of Hawaiian Homelands (reference policy handout). Housing projects may be developed and managed by the Molokaʻi Land Trust and/or MPL or other appropriate housing entities. Lands above Kaunakakai for housing will be deleted to avoid impact on archaeological sites and natural barriers.
- Affordable housing and other community-facilities should be linked to each of the three communities to insure that they develop as balanced communities. The community does not support a large affordable housing project in one area only.



Kaunakakai

<u>Makai Proposal</u>

- Subject to environmental assessment and clean up, historic Kaunakakai Town should be linked to the sea on the makai side of Kamehameha highway with a series of parks, recreational activities, canoe club hale and cultural/educational facilities such as Mālama Park.
- Pedestrian friendly pathways and bikeways should be continuously linked throughout the Kaunakakai Town planned development area.
- Should be aware of the toxic waste. There is a lot of oil on the property. Testing of

contamination and ongoing monitoring is being conducted to hold Chevron accountable. A cleanup might be conducted as a Brownfields EC project.

Expansion Proposal

- Future development in Kaunakakai should protect the integrity of the town core. Expand Kaunakakai town to avoid archaeological sites and other natural barriers such as ocean, hills, and streams.
- Develop the gymnasium and swimming pool complex as part of the Community College complex. It would be part of the Community College.
- The area between the current landfill and the Industrial Park be designated as light industrial, including the area currently designated as agriculture, subject to an environmental and archaeological assessment (approximately 60 acres). There is concern that there is major drainage in that area. Light industrial can include recycling as well as retail.
- Have commercial development in and around Kaunakakai Town, while maintaining rural/agricultural character of the surrounding areas and respecting the unique effort to establish Kaunakakai as a special destination area for residents and visitors alike. There is also a need to establish and perpetuate affordable commercial space in Kaunakakai for local small business operators.

Fire Department

Ask the EC, on behalf of the Land Use Committee, to send a letter to MPL to continue its negotiations with the Fire Department for the sale of a 5-acre site with the sale subject to the following 6 conditions:

- It will be located on 5 acres mauka of the Community College (the old slaughterhouse site).
- Escrow will be set up to pay either the Molokaʻi Land Trust or MPL depending on the future ownership and completion of the Molokaʻi Ranch Community-Based Master Land Use Plan.
- County will mitigate drainage impacts and consult with Molokaʻi Enterprise Community, DHHL, Molokaʻi Education Center, and the Molokaʻi Planning Commission on the Environmental Assessment.
- The County agrees that the site will not be used as a County base-yard.
- The County will hold a community informational meeting on the proposed design and related improvements, including landscaping scheme, prior to finalizing the design work.
- The County agrees to do an archaeological assessment of the

site which should include the entire puʻu.

Kualapuʻu
Organic papaya, asparagus and other high value crops have been identified as suitable for the land above Kualapuʻu.

Maunaloa
Build a community center for Maunaloa.

Second Golf Course
Transfer the current designation for the Maunaloa 18-hole golf course over to the state-designated rural land at Kaluako'i.

Kaluakoʻi Development
Re-open Kaluakoʻi Hotel. MPL will provide an opportunity for the Molokaʻi Land Trust to exercise a "put option" for a yet to be negotiated proportion of the shares in the Kaluakoʻi Hotel.

North of Kaluakoʻi Hotel, there are a number of zoned hotel lots, multi-family lots, and commercial lots. There is also a zoned hotel lot on Kaiaka Rock. Molokaʻi Ranch has said it wishes to retain this zoning, but does not intend to develop these properties in the foreseeable future. These lands will be owned as follows:

- The Kaiaka Rock zoned site will be placed in the Molokaʻi Land trust
- The Kawākiu multi-family site (TMK 5-1-03: Por. 1) and a portion of the hotel zoned site (TMK 5-1-03: Por. 14) which includes the archaeological sites at Kawākiu Nui will be placed in the Molokaʻi Land Trust.
- Future development of other entitled lots in the north Kaluakoʻi area will occur to complement and support the present Kaluakoʻi Resort.



Hale O Lono
We recommend and support the provision of a comfort station and small boat marine support and small boat storage and trailer parking. We recommend and support partnership opportunities between the Molokaʻi Land Trust and MPL to facilitate management of the Cultural Conservation Management Zone, including the provision of a resources management center. A full archaeological survey to identify and preserve the cultural and archaeological sites, including burial sites and adequate buffers, should be conducted to determine the appropriate location of these facilities.

Kaupoa, Kolo, Paniolo

Encourage the quarterly opening of Kaupoa to the community. Given the proximity of the Molokaʻi Land Trust to Kolo and Paniolo camps, we recommend and support the exploration of collaborative opportunities by MPL with the Molokaʻi Land Trust regarding future plans for their use.

4.1.5 Tourism Principles and Policies

Recommended Principles to Guide Tourism

- Hawaiian culture, both traditional and how it is lived on Molokaʻi today, is the foundation for activities including tourism.
- Education is fundamental for all aspects of tourism for the community, service providers, property owners, and visitors.
- Development for tourism must be kept to a more intimate scale for quality experiences for both community and visitors.
- Molokaʻi events and activities should have a strong community component.
- Advertising and marketing should reflect the authentic Hawaiian culture as well as Molokaʻi's rural life style and its people.
- The visitor industry and the community share a commitment to respect, protect, promote and perpetuate authentic Hawaiian culture in visitor sites and visitor activities on Molokaʻi.
- On Molokaʻi we want to share our authentic Hawaiian culture not sell it. We do not want to commercialize Hawaiian culture.
- Exposure to the Molokaʻi rural lifestyle and "rubbing shoulders" with the local community can enrich the visitors' experience.
- Conservation and protection of cultural sites on Molokaʻi is essential. Any use of these significant sites needs to be dealt with under the community process which is being developed and not determined by what visitors and vendors want to do.
- Community input and participation is important on major Molokaʻi Ranch visitor attractions and facilities changes.
- Kaluakoʻi resort redevelopment is essential to the island's tourism economy, including small meetings, conferences kamaʻāina travel, sporting events etc.
- Tourism on Molokaʻi Ranch should complement other Molokaʻi businesses.
- Tourism on Molokaʻi should target niche and special markets, including kamaʻāina.
- The Molokaʻi kupuna play an essential role in keeping the integrity of the Hawaiian culture.
- Molokaʻi Ranch should support Molokaʻi businesses and products as feasible and affordable.
- Islandwide, employees involved in tourism need cultural education specific to this island to assist in maintaining the authenticity of the Molokaʻi experience.

- Encourage personal and interactive modes of communication and education with visitors.
- When landscaping and designing tourist facilities, think in terms of the local environment, ecology and culture.
- Molokaʻi can offer Hawaiian culture in a modern day setting based on the past.
- Tourist activities should have authentic Hawaiian essence and an educational component for resource protection.
- Study to determine the tourism carrying capacity of Molokaʻi should continue at an island wide level.
- Future development of tourist facilities on Molokaʻi should make use of the work done by this Community-Based Land Use Planning Process.
- It is the hope of this committee that appropriate agencies and organizations (MVA, Chamber of Commerce, etc.) will take note of the recommendations of this committee when planning future strategy for this island.

4.1.6 Lāʻau Point Development Principles and Policies

The Lāʻau Point development will be the subject of a change of zoning application from the current Agricultural zoning to a Rural zoning designation, made to the Land Use Commission. The Land Use committee and the Enterprise Community will support that application.

- The development will be no more than 200 2-acre lots. When roads are added, the development will cover no more than approximately 500 acres of the Lāʻau Point TMK parcel.

- The attached archaeological and environmental protection map indicates the areas that are protected from subdivision. Other areas may be protected, depending on a further archaeological survey.

- To this end, MPL will guarantee:
    - The application to the LUC will show the subdivision lots lines at least 50 feet behind the State Conservation Zone.
    - Lot titles that are a minimum of 50 feet from the Conservation zone will have covenants preventing the building of houses less than 50 feet from the closest ocean frontage of the lot.

Other restrictions will be contained in the CC&Rs that are an addendum to this document.

- MPL will get legal advice to ensure potential or future landowners within the subdivision cannot change these CC&Rs.

- MPL's application to the Land Use Commission will promote the importance of subsistence activities in the Conservation Zone areas and other protected areas.

To this end, the following will be incorporated in the subdivision planning:

- Access to the protected areas will be by walking access only, with vehicular parking provided at both ends of the subdivision.
- The perpetual right to subsistence gathering will be noted on the titles of the areas to be preserved.

Other protections to subsistence gathering are contained in the attached CC&Rs, including the joint control of the protected areas by both the Land Trust and the future lot owners.

- MPL will encumber the lot titles on the 200 Lā'au Point lots so that a percentage of the lot sale revenue is paid to either the Moloka'i Land Trust or a Community Development Corporation. The percentage of lot sale revenue the first time the lots are offered for sale will be 5% of the net income after the deduction of real estate commissions and other charges such as Legacy Land taxes.

The percentage of re-sale revenue, following the initial sale, to be encumbered to either the Land Trust or the CDC, will be decided between the Land Trust/CDC and MPL.

- Sales Strategy: MPL will attempt to attract buyers to the Lā'au point subdivision who reflect the hopes and aspirations of the community. Brochures, sales material and other promotional documents will be vetted by the Land Trust or the EC for accuracy and adherence to their principles.

4.1.7 Water Plan Principles and Policies

- MPL will adhere to the principles and statements outlined in the attached Molokaʻi Properties Limited, EC Project #47 Water Plan, published in December 2004 and amended in July 2005.

- The critical principle agreed to by MPL in this document is that it will not, at any time in the future, seek permits for additional drinking water permits, other than the allocation under its permits existing at July 2005, from the Water Commission.

- MPL proposes to develop 1,000,000 GPD from the abandoned Kākalahale Well in the Kamiloloa aquifer for future non-potable needs to meet the demands for non-potable water this Plan proposes.

- The maximum water allocation available for the Lāʻau Point subdivision is set out in the Water Plan, as is future allocations for the growth of the Kualapuʻu and Maunaloa townships.

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5 LAND USE PLAN

The **Community-Based Master Use Plan for Molokaʻi Ranch** establishes five Land Use Districts: Cultural, Natural Resources, Rural Landscape Reserve, Agricultural, and Development. These districts define primary functions for the 65,000 acres of land under consideration in this Plan. (See Proposed Land Trust and Land Use Districts Map on page 9.)

In an effort to include all uses and activities for these lands, Overlay Zones indicate distinct yet complementary uses within the overall district. The Districts and Overlays serve a key function of this Master Land Use Plan, namely, **land use activities or management strategies must conform to the requirements of the District or the Overlay Zone.**

The Plan also proposes **new Ownership and Management for the 65,000 acres.** Significantly, eighty-five percent (85%) of the lands will either be protected by the Molokaʻi Land Trust, or will constitute part of a new conservation or agricultural easement in perpetuity. The easement lands will remain in MPL ownership. (See Land Ownership map on page 11.)

Ownership

Molokaʻi Land Trust:	26,200 acres
Conservation/Easements:	24,950 acres
Existing Easements:	4,040 acres
Other MPL Lands:	9,810 acres
Total	**65,000 acres**

5.1 OVERVIEW OF LAND USE DISTRICTS

The Land Use Districts describe the location, type and intensities of land uses that would be most appropriate on MPL land. Based on input gathered during the community-based planning process, the following Land Use Districts were decided upon:

- Cultural
- Natural Resource
- Rural Landscape Reserve
- Agricultural
- Development

The purpose and use of these districts is described below.

5.1.1 Cultural District

Purpose: The Cultural District is to protect the historic and cultural sites and resources for current and future spiritual, cultural, and subsistence uses. This district includes:

- Historic cultural sites and complexes.
- Nāʻiwa (Manawainui-Kahanui) and Kāʻana-Puʻu Nānā (Kalaipahoa-ʻAmikopala) and Kawela Cultural Complexes, and Kamākaʻipō Gulch.
- Cultural and subsistence use and resource areas.
- A subsistence fishing zone of a ¼ mile on the North and West Shore and to the outside of the reef surrounding the remainder of the property.

Use: Appropriate activities in the Cultural District include:

- The preservation and management of cultural and/or natural resources,
- Traditional non-commercial subsistence practices (i.e., hunting, fishing, gathering), and
- Cultural uses (e.g., religious ceremonies) regulated by traditions, customs, and community-based protocols and other appropriate rules and regulations.
- Tourism activities are deemed appropriate provided they are controlled by local Moloka'i residents in accordance with the approved management plan for the area.

MOLOKA'I RANCH MASTER USE PLAN
CULTURAL RESOURCE DISTRICT



Data Sources:

USGS Hawaii Data Clearinghouse
Roads, Homesteads

Hawaii Office of Planning
Contours, Molokai Ranch Property, Place Names, Fish Ponds

Maurice Major, Archaeologist
West End Archaeological Survey Data

Cultural and Land Use Committees
Other Archaeological Sites, Makahiki Grounds, Land Use Districts and Overlay Zones

Prepared By: The Conservation Fund
October 7, 2005

- Molokai Ranch Property
- Homestead
- Major Road
- Secondary Road
- Minor Road
- 4WD Road
- Trail

Proposed Land Use Districts
- Cultural Resource District
- Subsistence Fishing Zone
- Partnership Subsistence Fishing Zone

- West End Arch. Sites (M. Major)
- Additional Archaeological Sites
- Kualapu'u Makahiki Grounds
- Ancient Fishponds
- Camp

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5.1.2 Natural Resource District

Purpose: This category applies to lands prioritized as having the greatest ecological value (for example, rarity and/or quality) for the island of Molokaʻi while facing the most imminent threats to their ecological integrity. This is illustrated on the "Molokaʻi Ranch Resource Summary: Natural Resources" map in Appendix 3.

The purpose of this district is to support the protection and restoration of significant natural ecological/biological resources, i.e., sensitive ecosystems, indigenous and endemic species, watersheds, and wildlife habitat, particularly where they have been degraded, but still remain relatively intact.



Use: Activities are consistent with the preservation of sensitive and threatened natural systems, habitats, and species. Management regimes in the Natural Resource District focus on:

- Restoration and erosion-control
- Native plant re-introduction
- Critical habitat protection
- Fire suppression
- Non-native invasive species control or eradication
- Revegetation or related efforts to bolster watershed health and groundwater and stream recharge

Management plans consistent with the overall guidance of the Master Plan for these districts will be developed to guide resource users of these areas and to ensure that the resources are not threatened. Natural resources will be monitored on a regular basis to assess its status and ensure its sustainability. See Natural Resource Protection Map on following page.

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* Color Map provided at end of report*

MOLOKA'I RANCH MASTER USE PLAN
NATURAL RESOURCE PROTECTION





Data Sources:

<bol>USGS Hawaii Data Clearinghouse</bol>
Roads, Homestead

<bol>Hawaii Office of Planning</bol>
Coral Reefs, Contours, Molokai Ranch Property, Place Names, Fish Ponds, Protected Reserves

<bol>Hawaii Natural Heritage Program</bol>
NHP Rare Species, Native Dominated Landscape

<bol>Natural Resource and Land Use Committee </bol>
Land Use Districts & Overlay Zones

- Molokai Ranch Property
- Major Road
- Secondary Road
- Minor Road
- 4WD Road
- Trail
- Na Ale Hele State Trail
- Protected Reserves
- USFWS Critical Habitat
- Coral Reefs
- Perennial Streams

Proposed Land Use Districts
- Natural Resource District
- Natural Resource Overlay Zone

Native Dominated Landscape
Plant Community Type
- Coastal Dry Shrubland & Grassland
- Coastal Mesic Forest & Shrubland
- Dry Cliff
- Lowland Dry Forest & Shrubland
- Lowland Mesic Forest & Shrubland
- Lowland Wet Forest & Shrubland
- Montane Mesic Forest & Shrubland
- Montane Wet Forest & Shrubland
- Wet Cliff
- Nonnative
- Eucalyptus / Pine Non-native Forest

Natural Heritage Program Rare Species
Element Occurrences* (1980 - 2004)
- Vertebrate
- Invertebrate
- Plant
- Natural Community
- Plant (recorded habitat range)
- Natural Community

*An Element Occurrence represents an observed location that sustains one to several rare individuals. EOs shown here constitute all documented sightings within the past 25 years; present existence is not verified. More detailed information on taxon status and accuracy of sightings is available. NHP data are for planning purposes only; they are not confirmed and should not be regarded as final statements or substituted for surveys required for environmental assessments

Prepared by: The Conservation Fund
August 25, 2005

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5.1.3 Rural Landscape Reserve

Purpose: Maintenance of the rural landscape – to preserve the traditional Moloka'i character and to provide scenic viewsheds and open space buffers – is a principle objective. This designation applies to areas where multiple uses (e.g., traditional, recreational, scenic) are appropriate. Areas identified for this district should include those lands where various types of land use may be suitable, but that contain neither high-value development potential nor critical or highly sensitive resources. (See "Land Use Districts" on page 9.)

Use: Appropriate activities using best management practices include:

- Sustainable ranching, landscape enhancement, traditional/cultural practices, recreational use, resource protection, public parks and open space preservation.
- Development should be limited to discrete areas to support the management and operations of parks and recreation areas.
- Residential use will be limited to those areas or activities necessary to support ongoing agricultural activity or other specific uses of this land.
- Infrastructure (e.g., roads) provided to support this development should be minimal.
- Construction/development standards could be used to restrict the building envelope, location of allowable structures, and lot size.

5.1.4 Agricultural District

Purpose: Perpetuating the traditional agricultural base of Moloka'i's economy is the purpose of this district. Areas in this category include resource lands where commercial agriculture and aquaculture operations should be encouraged. Areas most appropriate for this category are prime, productive, and potentially productive lands with topography, soil type, and other special characteristics, which create suitable conditions for agriculture and aquaculture cultivation that will not result in degradation of the natural landscapes. (See map "Agricultural Easement Land" in Appendix 4.)

Use: Agricultural activities focus on benefits to the Moloka'i economy as well as generating revenues for the landowner or lessee. In addition, the management plan should be developed with established best management practices (e.g., protection of groundwater, streams, and reef systems; control of erosion and sedimentation; encouragement of water conservation practices; minimized pesticide use and fertilizer; and encouragement of sustainable agriculture practices) and provide financial support to minimize these impacts. Appropriate uses are distinguished among three types of agricultural lands and lands for aquaculture:

- Hi-value agriculture – This category consists of the most productive lands, in particular those that receive natural water inputs/irrigation, have appropriate

soil types, and are at appropriate elevations, the State classes 1-4. Appropriate activities include the cultivation of diversified, specialty, high-value agriculture (e.g., seed corn). Niche markets, specialty crops (e.g., herbs, asparagus, persimmons, organics).

- Intensive agriculture – This category consists of productive lands that are high density but not necessarily high value. Agriculture in this area is labor, capital, or resource intensive, requires access to water (through rainfall or irrigation), and uses a lot of resources (e.g., water, pesticides, cultivation). Examples include higher density, row crops (e.g., corn, dry land taro). Usually State of Hawai'i classes 1-4.
- Extensive agriculture – Appropriate activities include crop cultivation (e.g., hay) and ranching/grazing and raising livestock. Residential use will be limited to low-density farm dwellings, and limited to those areas and activities necessary to support ongoing agricultural activity. Provisions in favor of agricultural activity should be applied to this zone to adequately accommodate and safeguard the agricultural environment (e.g., nuisance and right-to-farm laws). Usually State of Hawai'i classes 5-7.
- Aquaculture – This category of land supports the production and harvesting of aquatic plant and animal life in ponds and other bodies of water.

5.1.5 Development District

Purpose: The purpose of this district is to generate revenues necessary to stimulate employment and economic benefits for the community and to sustain MPL operations. This category applies to areas targeted by MPL for the purpose of revenue-generating development. MPL should work with the community to ensure that development projects are suitable and sensitive to their surroundings, preserve significant ecological and cultural resources, and provide economic benefit to the Moloka'i community.

Use: This broad designation is classified into 6 categories of use and activity based on the nature/character of the development types (See "Proposed Development Areas" Map, page 13):



- Visitor accommodation development—Areas zoned for the development or refurbishment of multi-family units and hotel-type accommodations for island visitors and associated structures/facilities/amenities (e.g., golf courses, restaurants) to support tourism. This includes the Paniolo Camp near Maunaloa and the resort and golf course expansion area north of the Kaluakoʻi Hotel.

- Residential shoreline development—Land that may be subdivided and sold for construction of homes. Development standards will likely include ocean setbacks consistent with the conservation zone.

- Community/Village expansion—Consists of land surrounding existing towns/population centers (Maunaloa, Kaunakakai, Kualapuʻu) set aside for the purpose of accommodating future urban (residential, commercial and/or industrial) growth and setting boundaries. (Refer to Community Expansion maps in Appendix 5.)

- Industrial/Office—This category includes lands currently zoned or appropriate for industrial use. Namely, this is the Industrial Zone shown in gray, located west of Kaunakakai, along Maunaloa Highway.

- Housing—Land in and around existing towns/population centers that will be provided to qualifying Molokaʻi residents at affordable prices for "traditional" and/or conventional housing. Exact locations to be decided.

- Public/Quasi-Public—Areas that include parks, schools, public safety facilities, health facilities, and landfills; for example the Kaunakakai Fire Station relocation and the Maui Community College expansion.

The potential for ancillary uses, including commercial retail, public cultural or educational facilities, exists in each of the above development categories. Small business activity should be focused within the Community/Village expansion zone.

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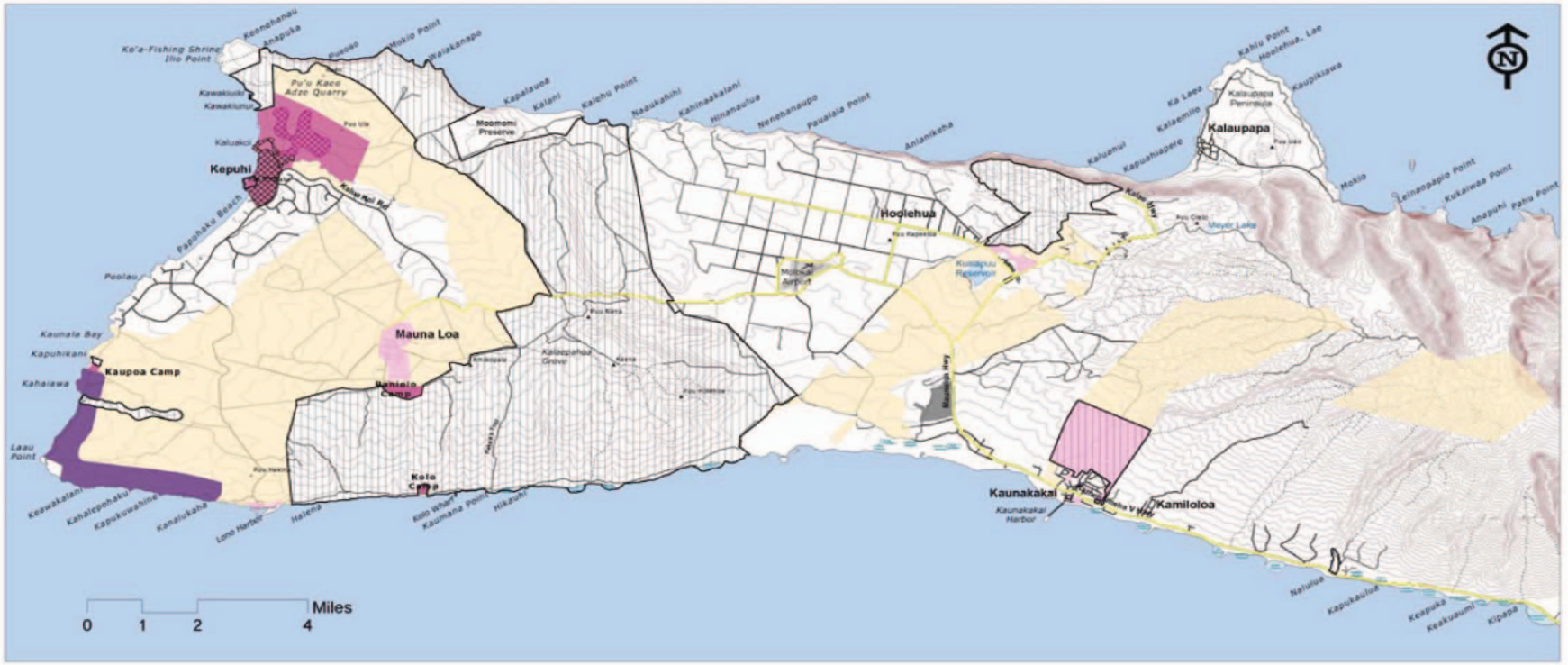
* Color Map provided at end of report*

MOLOKA'I RANCH MASTER USE PLAN
PROPOSED DEVELOPMENT AREAS





PROPOSED DEVELOPMENT DISTRICTS
- Resort
- Residential Shoreline
- Community Expansion
- Industrial

- Other MPL-Retained Lands
- Potential Land Trust Property (26,400 acres)
- Alternate Golf Course at Kaluakoi
- Current Development at Kaluakoi

- Major Road
- Secondary Road
- Minor Road
- 4WD Road
- Trail

Prepared by:
The Conservation Fund
October 5, 2005

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5.1.5.1 Projected MPL Developments

MPL's proposed developments are categorized as short-term and long-term.

Short-term Developments

- The re-opening of the Kaluakoʻi Hotel and associated facilities.
- The upgrading of the Kaluakoʻi Golf Course and the building of a new Maintenance Workshop on adjacent land.
- A 200-lot subdivision on 2-acre parcels at Lāʻau Point with its associated roads and sewage treatment facility.

Long-term Developments

- The designation of additional land adjacent to the existing Industrial Park for industrial use.
- A Community Plan designation and later zoning of 100 acres around each of the towns of Maunaloa and Kualapuʻu for community housing.
- The removal of the Community Plan designation for the 18-hole golf course on 500 acres of land below the Molokaʻi Ranch Lodge in Maunaloa, and replacement of it with a designation for a smaller 250-acre golf course on State zoned rural land north of the Kaluakoʻi Resort.

Other proposals to be noted

- The need to keep land set aside for the potential expansion of the Kaluakoʻi Hotel from the planned 152-room facility. No land is available on the existing site.
- The need to set land set aside for facilities that complement and support the existing hotel, such as staff housing and a cultural center.

5.1.5.1.1 Hotel

A major focus of this Land Use Plan is to re-open the Kaluakoʻi Hotel, built in the 1970s and abandoned by the previous owners in January 2001.

The current hotel has 144 rooms and a block of former staff accommodation that will be transformed into a 152-room hotel, eight more than when the hotel was operating.

The market focus will be a mid-range kamaʻāina hotel with a range of price points which will appeal to the local community desiring to experience the property, and to visitors who are prepared to pay rates equivalent to a 3-Star experience.

The hotel is to become a focal point for the local community for its functions and gathering, as well as the major focus for visitors, particularly the kamaʻāina market.

Elsewhere in this report it is concluded that the Kaluakoʻi Resort redevelopment (which includes the upgrading of the Kaluakoʻi Golf Course) is essential to the island's tourism economy, including small meetings, conferences, kamaʻāina travel, sporting events and the like.

The hotel renovation will reflect Hawaiian culture in a modern day setting but based on the past history of the area and the island. A visioning group will recommend interior design fittings of cultural significance and outdoor plants representing the island.



The Kaluakoʻi area has a rich cultural history and the aim is to ensure the hotel reflects this.

Activities for hotel guests will have an authentic Hawaiian essence and an educational component for resource protection. It will also give exposure to Molokaʻi's rural lifestyle.

A major factor in the community's desire to re-open the hotel is the job creation and the downstream impact on the Molokaʻi economy.

Design Considerations

Preliminary design, the process by which it is decided how the interior and exterior spaces are used, was completed during the Land Use Committee phase of Project #47.

Key changes from the current hotel layout are:

- Restaurant: Open lānais are created on three sides of the restaurant, overcoming the "cavern-like" feeling of the former restaurant.
- Banquet/Meeting Room: The former Paniolo Grill is converted to a meeting/ banquet room that will seat more than 200 people.
- New Coffee Shop/ Internet Café and redesigned Snack Bar are created on the north side of the grass courtyard.
- Pool: The pool and courtyard area have been redesigned for more functionality and better views of the ocean.
- Lobby/Administration Building: This has been redesigned so guests can enter from the roadway roundabout.
- Spa: The small meeting room to the north of the administration building to be converted to a Spa/ Lomi Lomi Massage building.
- Golf Pro Shop: The former large meeting room to the south of the Administration Building will become the Golf Pro-Shop. Golf cart storage to be available adjacent to this building.
- Current Golf Starter Shack: This building will be converted to a "19th–hole bar that will be open

during daylight hours. A Lūʻau area will be sited where the current practice tee is located.

- Golfers' Car Park: This area will be extended to accommodate double the amount of vehicles it can currently fit.
- Beach Cabana: This building, which will principally be used by the local community, will be moved and has been redesigned. It is now shown to the north of the hotel adjacent to a new picnic area.
- Hotel Units: These are redesigned to improve internal space by enclosing the lānai and adding a new outdoor deck to all units. The units will range in size from small studio to double units with linking doors.

An artist's impression of the design development is on the next page.

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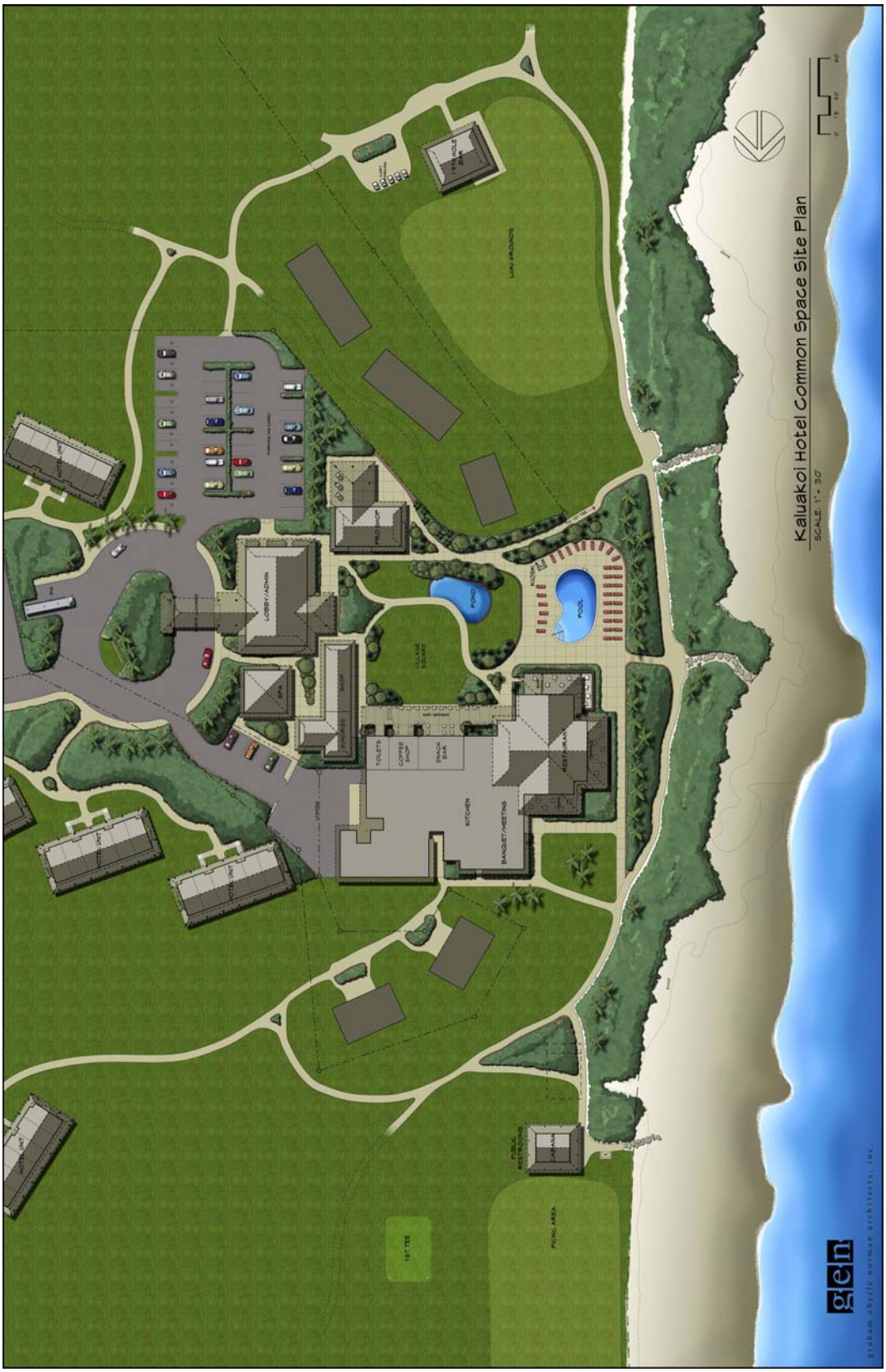
Kaluakoi Hotel Common Space Site Plan
SCALE: 1" = 30'
LOBBY/ADMIN
POOL
KITCHEN
BANQUET/MEETING
TOILETS
COFFEE SHOP
SNACK BAR
RESTAURANT
PICNIC AREA
1ST TEE
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Further steps in the process leading towards the re-opening of the hotel are:

- Obsolete Exterior Fixtures

Demolish obsolete exterior fixtures and clearing the site of overgrown trees and bushes. The old gazebo in the courtyard, the pergola around the building and other surplus fittings have been removed and dumped. Site clearing around the hotel units has been completed.

- Shoreline and Building Survey

Surveyors have completed a shoreline and hotel buildings survey to determine whether the plans match the exact location of the hotel buildings. This determines the accuracy of the plans.

- Mature Trees

Mature trees and shrubs that may be damaged during construction must be moved to new locations or bagged and stored in MPL's native plant nursery adjacent to the Kaluakoʻi Golf Course.

- Costings

Preliminary design drawings have been submitted to contractors throughout the State and the mainland for construction estimates.

These estimates will give MPL further insight into the likely cost of demolition and construction and a timetable for this part of the process.

- Molokaʻi Planning Commission

The Kaluakoʻi Hotel is sited within the Special Management Area (SMA) zone and any construction plans need the approval of the Commission.

Important aspects such as the relocation of the Beach Shack, the provision of additional parking adjacent to the new golf pro shop and the addition of lānais to the accommodation units will need the approval of the Commission.

- Construction Drawings and Interior Design

In late 2005, architect Rod Graham will begin to work on detailed construction drawings for the Hotel. This involves engineering work, mechanical, lighting consultants and a kitchen specialist who has already given his input into the preliminary design of the hotel kitchen.

An interior designer will also work with the architect to reflect the work of the visioning group in the hotel's interior design.

- Permitting and Regulatory

Once completed, construction drawings need to be submitted to the Planning Commission and the County for permits.

Business Creation And Community Support:

The Tourism committee of Project #47 determined that Molokaʻi Properties Limited, where feasible and affordable, should support Molokaʻi businesses and products.

The EC and Molokaʻi Properties Limited want to create a positive downstream impact from the re-opening of the Kaluakoʻi Hotel.

The EC's Project #47 is aimed at compatible development on Molokaʻi and much of the focus for this benchmark project is to create sustainable economic benefit from the project.

The current focus in relation to the hotel re-opening is the establishment of entrepreneurial small businesses associated with the Hotel.

The outsourcing of hotel operations includes:

- A laundry business that would contract hotel laundry and offer a cleaning service to other residents and accommodation establishments on the island.
- A specialist hotel cleaning business that would contract cleaning services to the hotel.
- A hairdressing and spa/massage business that will contract these services to guests on site at the hotel.
- A gift shop and sundry store that will be open to hotel guests, adjacent condominium owners and the community.
- A retail outlet offering ancillary golf equipment and Kaluakoʻi logo wear to golfers and hotel guests.
- The operation of the Beach Shack that will offer water equipment and sundry items to hotel guests and to the community who use the hotel beaches.
- Contracting services such as cultural tours, lūʻau events and the opportunity for visitors to learn about authentic Native Hawaiian practices such as net and pole fishing.

A key component to the hotel's success will be to ensure local labor is trained to assist in the construction of the hotel and once built to ensure that it is possible for the Kaluakoʻi Hotel to use locally-grown produce and protein products.

The key to this opportunity is to ensure that farmers are geared to maintain the quantity of quality of products needed. This will be a key focus of Project #47 in 2006.

5.1.5.1.2 Shoreline Residential

The Lāʻau Point subdivision proposal has been the most controversial of this Land Use Plan, with residents from all aspects of community life concerned about the threats posed from newcomers, the potential for desecration of cultural sites and the pristine nature of the area, and

the potential threat to subsistence gathering that takes place in the waters off Lā‘au Point.

MPL has continued to say that it needs an economic engine to this Plan; the ability to make a profit from a venture, which will give it the funds to open the Kaluako‘i Hotel and to attract an investor to share in the capital, needed for many ventures under this Plan.

For many members of the Land Use Committee, the decision to support the Lā‘au development was an extremely difficult one.

The fact that large areas of the foreshore are to be put aside for resource protection, the lot Covenants, Conditions and Restrictions (CC&Rs) have been strengthened to protect the resources, and MPL will seek a Land Use reclassification from Agricultural to Rural has lessened the pain for many concerning this development.

The Land Use Committee went to extraordinary lengths to ensure that a subdivision development at Lā‘au Point will be set apart from typical subdivisions completed in Hawai‘i.

The committee has structured subdivision covenants and reviewed protection zones for archaeological and environmental areas, studying how the 1,200 acres of protected shoreline can be maintained for all-time for subsistence gathering.

The aim is that people who buy lots in the subdivision will have to support conservation, cultural site protection and subsistence.

Many Land Use Committee members made at least two site visits to Lā‘au Point reviewing MPL’s plans and giving their input.

PBR Hawaii Inc., planners for the Lā‘au Point development, were at the table with Land Use Committee members planning protection zones and designing setbacks to reflect the importance of the area for subsistence gathering.



The Subdivision

The Lā‘au Point development will be the subject of a change of zoning application from the current Agricultural zoning to a Rural zoning designation, made to the Land Use Commission. The community will have an opportunity to appear before the Commission, which will come to Moloka‘i to hear the application.

The development will be no more than 200, 2-acre lots. When roads are added, the development will cover no more than approximately 500 acres of the Lāʻau Point TMK parcel.

The "Lāʻau Cultural Sites" map (see Appendix 2) indicates the areas that are protected from subdivision. Other areas may be protected, depending on a further archaeological survey.

To this end, agreement documents between MPL and the EC will guarantee:

- The application to the LUC will show the subdivision lots lines at least 50 ft behind the State Conservation Zone.
- Lot titles that are a minimum of 50 ft from the Conservation zone will have covenants preventing the building of houses less than 50 ft from the closest ocean frontage of the lot.

MPL's application to the Land Use Commission will promote the importance of subsistence activities in the Conservation Zone areas and other protected areas.

To this end, the following will be incorporated in the subdivision planning:

- Access to the protected areas will be by walking access only, with vehicular parking provided at both ends of the subdivision.
- The perpetual right to Subsistence gathering will be noted on the titles of the areas to be preserved.

Other protections to subsistence gathering are contained in the attached covenants, including the joint control of the protected areas by both the Land Trust and the future lot owners.

Protected Areas

"Lāʻau Point must be the most environmentally planned, designed and implemented large lot community in the State. The residents would be educated and informed about the environment and culture, and taught to "Mālama ʻāina," take care of the land and sea."

This statement precedes the covenant document determined by the Land Use Committee that will place many restrictions on lot owners at Lāʻau Point, in order to attract only those who are concerned about conservation.

As an example, the Conservation Zone and other areas to be protected (approximately 1,200 acres) within the subdivision will be the subject of an easement held by the Land Trust, with guidelines for these uses to be determined prior to the construction of the subdivision and reflecting the importance of the area archaeologically and to subsistence gathering.

These protected lands will be part of an entity that is controlled equally by the

homeowners and the Land Trust. All decisions relating to this area: maintenance, subsistence protection, archaeological site protection, personnel, etc., will be the shared responsibility between the Trust and the homeowners, who will share equally in the costs.

MPL will attempt to attract buyers to the Lā'au point subdivision who reflect the hopes and aspirations of the community. Brochures, sales material and other promotional documents will be vetted by the Land Trust or the EC for accuracy and adherence to their principles.

Covenants

The following are some of the key design restrictions and other covenants that will be implemented at Lā'au Point.

Enforcement and substantial penalties will be put in place to ensure that the covenants are respected and upheld.

Restrictions to Prevent a Gated Community

- Ensure CC&R's reflect prohibition of gates across roads and access roads.
- Ensure no traffic lights be permitted on the roads.
- Ensure maximum two lanes, with one lane in each direction only.
- No street-facing walls or other barriers to be higher than four feet.

Further Subdivision

- Restrictions forever preventing the further subdivision of lots.

Restrict area of lot that can be disturbed for use

- Define a buildable area for each lot based on the site features that should be protected (i.e. unique rock features, arch. sites, etc.). Allow disturbance of no more than 30% of the lot. (For 2 acre Lot = +/-26,000 s.f. or about 1/2 acre).
- Require some level of maintenance of lot area to reduce fire hazard (remove dead wood).
- Building must be at least 50 ft in from the oceanfront property line.

Building restrictions to prevent erosion

- No building allowed on slopes of more than 50%.

Building Code

- Restrict building heights to 25' (same as for Conservation District) and designs to a "kama'āina style" so that the homes will blend with the landscape.
- Restrict building height to one-story buildings. This is important in order to make the buildings discrete, or blended into the environment.
- Restrict building materials, colors and roof materials (non-reflective).

Solar Power

- Require that all buildings make use of solar panels for electric power.
- All houses shall be equipped with a primary hot water system comprised of a conventional solar panel hot water system, sized to meet at least 80% of the hot water demand of the respective houses.

General Energy

- All energy systems for residences shall be designed and constructed to meet conservation standards established by the Climate Protection Division of the United States Environmental Protection Agency.

Pesticide Restrictions

- Because of the proximity to the ocean, pesticide use will be prohibited.

Water Quality Monitoring

- Water quality parameters in storm water drains and in the ocean shall be monitored for the following:

  Temperature, salinity, total suspended solids, total nitrogen, ammonia nitrogen, nitrate and nitrite, total phosphorus, chlorophyll A and silicate.

Lighting – General

- All exterior lighting shall be shielded from adjacent properties and from the ocean.

Restrict water use for irrigation (*landscaping)*

- Require re-use and collection/storage systems for catchments.
- Only drip systems permitted for irrigation.

Storage Tank

- Require all houses to have at least a 5,000-gallon storage tank for water captured from roofs. Could be used for drinking water or for irrigation.

Covenants on drinking water use

- Designed to ensure an overall maximum drinking water daily use of 500-600 gals per day.

Type of drinking water covenants

- Double flush toilets.
- Specially designed showerheads assisted with water conservation.
- Must use dual water system split into potable and non-potable.

Landscaping

- Restrict landscaping to appropriate native and Polynesian introduced species that are drought tolerant and suitable for coastal locations
- Prohibit use of noxious or invasive species.

- Look to Arizona ordinances where plant type and xeriscaping is aimed at dramatically reducing water use.

Green architecture

- Require "green" architecture that incorporates recycled materials, energy efficient equipment, natural ventilation, solar and photovoltaic systems, etc.
- Study for appropriateness, energy efficient codes such as the LEED building design system.

Drainage systems

- Require drainage systems that retain any run-off within the disturbed area of the lot.
- Maximize recharge into the ground.
- Restore land areas that have eroded by re-establishing vegetative cover.
- Minimize impervious (paved) surfaces on the Lot.

Soil erosion

- Manage open space common areas to reduce/eliminate soil erosion by controlling deer and goats and restoring the vegetative cover.
- Put deer fence at the rear of the subdivision.

Restrict building coverage and size

- Establish a maximum allowable size of a dwelling. The most restrictive example is DLNR's restriction for homes constructed in the Conservation District; the maximum developable area of 5,000 s.f. defined as follows: The total floor area in square feet allowed under the approved land use. The floor area computation shall include: all enclosed (on three sides minimum, with floor or roof structure above) living areas; above grade decks in excess on 4'-0" in width; garage or carport; swimming pools (*if allowed),* saunas or other developed water features (excluding naturally existing ponds, tidepools, etc---*if allowed.);* or any other standing structures, which are accessory to the approved land use. Site characteristics and the degree of pre-existing site disturbance may be further limiting factor in the calculation of maximum developable area.



Design Committee

- Require Strict Design Review and Approval Process.

Building Lines

- Will set restrictions on building lines in relation to the front of lots, or to minimize distance between houses and visual impact.

Fences/Barriers

- Will prevent any barriers at front of lots in order to minimize visual disturbance to the land.

Inability to Change CC&Rs

- Ensure that the final CC&Rs are unable to be changed.

Land Trust Representation

- As the Conservation Zone, flood areas, archaeological sites etc are subject to easements from the Land Trust; ensure that representatives of the Land Trust have adequate representation on the homeowners' association.

Property Renting

- Renting properties to third parties will be prohibited in the property covenants.

Lā'au Community Education

- Every person whose name is on the property title of a Lā'au point lot must commit to undergo a certain amount of education about the Moloka'i community and its desires and aspirations. Suggested courses by Kupuna and others from the Maunaloa community.

Land management – Run-off

- Need to ensure that all current run-off from the land is stopped forever so the ocean is not polluted from tailings.

Conservation zone and "protected land"

- Unlike most other subdivisions, control of the conservation zones, archaeological sites, trails and native plant ecosystems would be an easement, but control would rest jointly with the Land Trust and the lot owners. Both will share the responsibility and cost to mālama (care for) the area. Kamāka'ipō Gulch and other areas identified as exceptional will be transferred to ownership of the Land Trust.

Archaeological sites and historic trails

- Protection and restrictions are to be written into CC&Rs as a result of a Cultural Plan, which shall have two major components- archaeological and cultural. The Plan will follow the community guidelines for Policies and Principles adopted for this Master Land Use Plan.

Native Species Plan

- Develop a preservation plan of identified endemic and indigenous species in co-ordination with qualified government agencies in consultation with qualified Moloka'i experts.

Subsistence Plan

- Seek an ordinance for a non-commercial zone in order to support a designated subsistence management area.
- The Land Trust in consultation with the Maunaloa community will develop a subsistence plan. This plan will follow the community guidelines for Policies and Principles adopted for this Master Land Use Plan.

Access Plan

- Design a measure to restrict access to foot only between Dixie Maru and Hale O Lono in order to conserve resources, with an acknowledgement of Native Hawaiian gathering rights as defined by law for subsistence purposes, in a designated subsistence management area.
- CC&Rs to reflect community-driven access plan. Walking access only from each end of the subdivision to restrict area for subsistence. No access from road above subdivision in order to restrict for subsistence gathering to ensure that resources are not depleted.
- No parking all through the roads, to prevent parking and access other than at each end which will enhance the subsistence nature of access.

'Ohana Housing

- Must fit within the 5,000 square foot limit. Cannot subdivide this away from the primary lot. Cannot be a short term rental. Water restrictions will apply.

5.1.5.1.3 Industrial Expansion Area

The Industrial Expansion Area is to accommodate the island's long-term needs for industrial zoned lands. This area is located off of Maunaloa Highway and consists of approximately 180 acres surrounding the Moloka'i Industrial Park and the Landfill.

It is anticipated that area would be developed by the expansion of the existing Industrial Park in a mauka or northward direction as demand warranted.

The cul-de-sacs in the existing Industrial Park were designed to allow those roads to be extended which would eliminate the need to add additional connections to the Maunaloa Highway, connections that would be undesirable from a traffic flow perspective. (See map "Proposed Industrial Zoning Change" on following page.)

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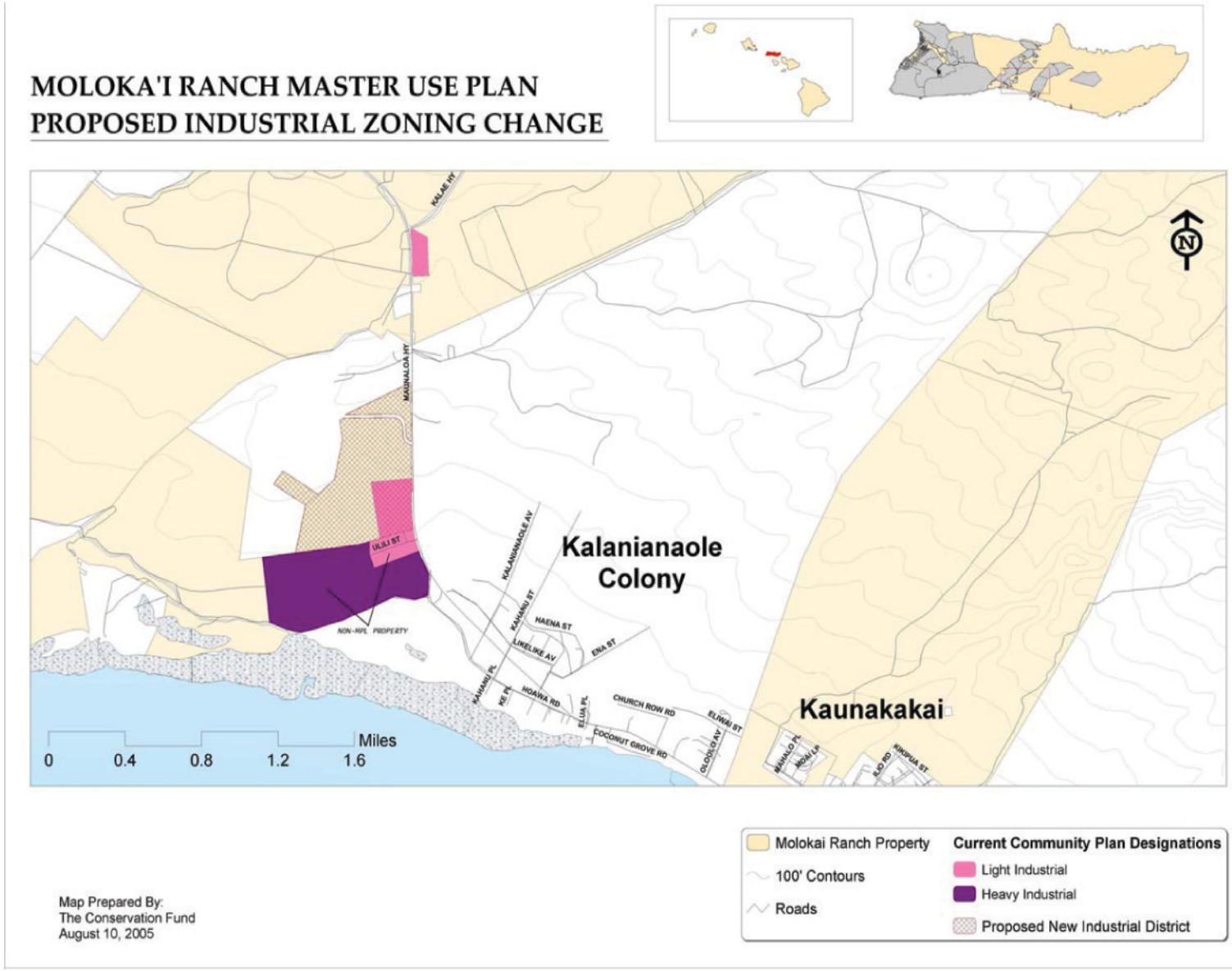
MOLOKA'I RANCH MASTER USE PLAN
PROPOSED INDUSTRIAL ZONING CHANGE
KALAE HY
MAUNALOA HY
ULILI ST
NON-MPL PROPERTY
KALANIANAOLE AV
KAHANU ST
HAENA ST
LIKELIKE AV
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HOAWA RD
ELUA PL
CHURCH ROW RD
ELIWAI ST
COCONUT GROVE RD
OLOOLO AV
MAHALO PL
MOAI LP
ILIO RD
KIKIPUA ST
Kalanianaole Colony
Kaunakakai
N
0
0.4
0.8
1.2
1.6
Miles
Molokai Ranch Property
100' Contours
Roads
Current Community Plan Designations
Light Industrial
Heavy Industrial
Proposed New Industrial District
Map Prepared By:
The Conservation Fund
August 10, 2005

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5.1.5.2 Community Housing

- The Molokaʻi community will know the development plans for and growth of all MPL properties and continue to have input on future plans and development.
- MPL sets aside 200 acres for the following "Future Community Expansion" that will be decided upon by Molokaʻi residents.
  - A total of 100 acres each around Kualapuʻu and Maunaloa will be made available for community housing.
  - More than 1,000 acres above Kaunakakai will be donated to the Land Trust for future community expansion.

5.1.5.3 Projected Land Trust Urban Sites

The following sections describe the urban sites that are located within the Land Trust. (See Kaunakakai Map in Appendix 5.)

5.1.5.3.1 Junior Roping Club Site

This 5-acre parcel (approximate) is located in Kaunakakai on the west side of Mohala Street between Kamehameha V Highway and the Ocean. The land is currently zoned light industrial; a Maui County designation that allows for a wide range of uses including commercial operations.

A mapped, but unimproved road running east-west abuts the mauka boundary of the site. Future development of this site will likely trigger roadway improvement requirements. Currently, the Molokaʻi Junior Roping club has a lease on the site for a nominal consideration that runs to December 4, 2006.

They also have a 5-year option that would extend the lease date to December 4, 2011. The site is an assemblage of several smaller parcels. The conveyance of the parcel to the Land Trust will be subject to the Roping Club lease.

5.1.5.3.2 Community College

This 3.213 acre parcel fronting Kamehameha V Highway lies immediately west of the existing 2-acre campus. The parcel was included in the original master planning for the campus and was slated for additional classrooms, parking and a theater. The University was given a 10-year option to acquire the parcel at fair market value running from the date of the original parcel donation together with an additional 10-year right of first refusal thereafter.

5.1.5.3.3 Kaunakakai Fire Station

The existing Kaunakakai Fire Station is subject to flooding and is no longer large enough to accommodate the needs of the community. Accordingly, the County approached Molokaʻi Properties in 2003 about acquiring a suitable replacement site. Subsequently, in the course of the master planning effort, Molokaʻi Properties committed to the community that it would not sell lands in the Kaunakakai area without community

input while the planning process continued.

As the County was desirous of moving forward with the planning and acquisition of a replacement site, they brought their plans to the Land Use Committee. Over the course of a few months and several meetings, an acceptable 5-acre site was agreed upon which could satisfy the Fire Department's needs for a central location, good access and drainage, as well as address the community concerns that were raised.

The site is located on lands scheduled to go to the Land Trust on the east side of Ala Nui Kaʻimiʻiki Street near Kākalahale Street. The purchase price has been established at $100,000. If the transaction closes before the Land Trust is established the proceeds will be held in escrow for the Trust's benefit. The County, which is responsible for the needed zoning change and subdivision, is currently undertaking soils testing and other preliminary planning activities.

5.2 OVERLAY ZONES

The Overlay Zones provide additional policies and controls to areas that have unique characteristics. The Overlay Zones consist of the following:

- Hunting
- Subsistence Fishing
- Trails – Historic and Recreation
- Natural Resource
- Recreation
- Cultural

Also, note that traditional rights of access and use – for subsistence-based hunting, gathering, fishing and performance of important cultural and spiritual activities – were considered with other District uses. Respecting these rights, managing access, enforcing rules, and monitoring adherence to established policies and protocols are an important part of the Community-Based Master Plan.

5.2.1 Hunting

The "Molokaʻi Ranch Resource Summary: Hunting Map" in Appendix 6 shows the areas that are to be used for each type of hunting. These zones have a combined area of almost 40,000 acres. A safety buffer surrounds Maunaloa town and other populated areas. The rules guiding subsistence hunting are in the Management Policies.

Bow hunting is designated in two regions in the southwest corner of MPL property, near Lāʻau Point. The Kaupoa Hunting Area 11 has an area of about 6,000 acres and the Ka Ihu Loa Hunting Area 5 consists of 4,000 acres, for a total of approximately 10,000 acres.

The areas established for rifle hunting are located in the northwest corner of the MPL property, near ʻĪlio Point and in the south, near the Pālāʻau Homesteads. The combined area is approximately 17,000 acres.

Lastly, there are hunting areas in the central properties that have other

management: the Kākalahale and Kamakou Hunting Areas.

5.2.2 Subsistence Fishing

The Subsistence Fishing Zone surrounds most of the western Ranch lands. This fishing zone includes areas from the coast to the outer edge of the reef or where there's no reef, out a quarter mile from the shoreline along the 40 mile perimeter of the property, including the partnership lands.

The rules guiding subsistence fishing are also in the Management Policies in Section 4.1.1. Although the areas indicated on the map by hatch marks are not owned by MPL, they are still included in the subsistence fishing zone. They are Lā'au Point, Pāpōhaku Beach, 'Īlio Point, the area between Ka pālauo'a and Kaiehu Point, and the area between Mo'omomi and Nā'iwa.

Proper management will depend on cooperation by these other landowners: The Nature Conservancy, DHHL, Pāpōhaku lot-owners, and the Park Service, State of Hawai'i DLNR and the U.S. Coast Guard. (See Subsistence Fishing Management Zone Map in Appendix 7.)

5.2.3 Recreation and Trails

The Moloka'i Ranch lands have a significant number of trails, both for recreational activities, such as biking, hiking and horse riding, as well as for cultural practices, such as walking the Historic Trail mapped by Monsarrat for subsistence fishing and gathering. Recreational uses should be in accordance with policies designed to protect cultural and natural resources. This section documents the access routes and existing trails. The decisions regarding use are hereby deferred to the land-owner(s). Use for the trails is to be consistent with the land district or applicable overlays in which they are located. (See Recreation/Trails Map in Appendix 8.)

- **Hiking and Biking Trails**

The trails map shows that many of the recreational trails for hiking and biking begin near Maunaloa town and lead hikers and riders towards the coast. However, most of them are currently inactive and in need of maintenance. There are also two Na Ale Hele State Trails that lead hikers through central Moloka'i Properties Limited land.

- **Horse Trails**

The horse trails shown are distinguished as Active, Active/Seasonal, and Less Active trails by their respectively colored dotted lines. The primary active trail is a loop near the Paniolo Camp in Maunaloa.

- **Historic Trails**

The Historic Trail, as documented on the Monsarrat map shows that it is a cultural trail. It runs along the west coastline around ʻĪlio Point and then along the north coast to the Moʻomomi Preserve. There is also a 2-mile cultural trail that runs from just east of Maunaloa down to Kolo Wharf, called Pakaʻa's Trail. The Government Road from Kaunakakai to Kolo, mapped by Summers in "Sites of Molokaʻi" is also shown.

5.2.4 Natural Resource

The purpose of this Overlay Zone is to indicate the sensitive ecological resources that are in need of management. Large areas are especially prone to erosion, and in need of watershed management. The protection of these areas is critical to the preservation of the coral reef to the south of the area, as well as to the continued health of the Moʻomomi Preserve to the north. Both shades of green on the map illustrate important ecological areas that support rare species, native ecosystems, and/or coastal habitats. (See Natural Resource Protection map on page 83.)

5.2.5 Cultural

The purpose of the Cultural Resource Overlay Zone is to identify areas with significant cultural resources regardless of the land use district in which they are found. This overlay zone will be subject to management policies that ensure the protection and appropriate interpretation of the cultural resources found there. (See Cultural Resource Overlay in Appendix 9.)

The Cultural Overlay Zone includes the Kaunakakai Cultural District, which is bounded by the Kaunakakai Gulch on the east and the Kaunakakai-Kalamaʻula ahupuaʻa boundary on the west. This area is important to the preservation of the unique Molokaʻi petroglyphs, extensive agricultural sites, house sites, and heiau found in this district.

This zone includes the 2,774-acre Kamakou Preserve, which is managed by The Nature Conservancy under a conservation easement from MPL. Lastly, it includes the area designated for the future Lāʻau Subdivision. This area is rich in sites, but is included in the Cultural Resource Overlay instead of the Cultural District because the sites are spread out and less dense in concentration than most areas within the district.

5.3 OWNERSHIP/MANAGEMENT

This section outlines the division of MPL land according to ownership and management. The Land Use Plan concentrates MPL's economic development in a limited area, and conserves as much land as possible for the citizens of Molokaʻi. Thus, with approval of this plan, 85% of the land will be protected by the Land Trust, or as part of a conservation/agricultural easement, in perpetuity. The remaining 15% will continue to be owned and managed by MPL. The following maps and narrative demonstrate the land

distribution and use under this ownership and management arrangement. (See map "Proposed Land Ownership and Management" on page 11.)

5.3.1 MPL Lands

The 10,000 acres (approximate) retained by MPL/Molokaʻi Ranch are depicted in gray and include: community expansion zones, visitor accommodations, golf courses, and residential shoreline development. The community expansion zones are demonstrated in the smaller town maps by diagonal black lines. These are the areas set aside for the future growth of these townships. In the case of Maunaloa, it includes the land to the north and to the south. Kaunakakai and Kualapuʻu are focusing their growth mauka of town, instead of allowing sprawl from east to west.

The land designated with visitor accommodations includes the existing establishments:

- The Lodge at Maunaloa
- The Beach Village at Kaupoa
- The Kaulakoʻi Hotel
- Paniolo Camp
- Kolo Camp

The Kaluakoʻi Golf Course is located near the Hotel. It will continue to be owned and managed by MPL. A future golf course is proposed for the land north of Kaluakoʻi as a substitute for the golf course at Maunaloa designated in the community plan.

The residential shoreline development component of MPL lands consists of a maximum 200-lot subdivision at Lāʻau Point. While this development has been the controversial aspect to the Plan, MPL will target development to finance the restoration of the Kaluakoʻi Hotel and the renovation of the Kaluakoʻi Golf course. The planning process has guaranteed that the Lāʻau project will mean no increase in the Ranch's potable water use; it will follow strict cultural and environmental guidelines, and will protect traditional subsistence gathering in the area.

5.3.2 Community Trust Lands

The community will control the Molokaʻi Land Trust, which consists of 26,200 acres. Going from east to west, the Trust lands include:

- Cultural sites at the base of the Kawela Plantation (34.895 acres)
- Lands mauka of Kaunakakai for community expansion (1,160 acres)
- The Makahiki Grounds mauka of Kualapuʻu and up through and including the cliffs of Nāʻiwa
- A large strip of land from Kawakanui beach, north to ʻĪlio Point, stretching around to the Molokaʻi Ranch boundary with Department of Hawaiian Homes Lands in Hoʻolehua and down to Pālāʻau and over to Hale O Lono Harbor and including the Kāʻana area

- The fishing village 15-acre site adjacent to the north boundary of Kaupoa Camp
- Kaiaka Rock
- Plus other sites as shown on the Land Trust map

5.3.3 Lands Owned by MPL with Easements to Land Trust

A third ownership category of lands illustrated on this map are those that belong to a partnership of MPL and Molokaʻi Land Trust. The Molokaʻi Land Trust would hold easements over these Agricultural Reserve and Rural Landscape Reserve Lands, while MPL would retain the title.

An easement provides permanent dedication of lands for specific uses that are registered on the land title deed. In this case, the Molokaʻi Land Trust would enforce the dedicated use of the specified 24,950 acres for Agricultural and Rural Landscape Reserves.

The Agricultural Easement Lands are located around Kualapuʻu and south of the town to the southern shore, as well as lands at the western end of the property that were formally used for pineapple cultivation. These lands will be dedicated for agriculture and only single farm dwellings can be built there. These 14,118 acres are depicted with diagonally striped lines on the "Proposed Land Ownership/Management" map.

The Rural Landscape Reserve was created to protect views and the rural character of the island, and to forever prevent development from happening on these lands. Five large parcels are dedicated for a Rural Landscape Reserve Easement, totaling 10,832 acres. These areas are located:

- North of the currently zoned land at Kaluakoʻi,
- Surrounding the Pāpōhaku Subdivision,
- North of the community expansion zone at Kaunakakai, and
- One large parcel adjacent to the proposed development at Lāʻau Point.

5.3.4 Lands Owned by MPL with Easements to Other Entities

The final ownership category consists of those lands owned by MPL, but protected by existing conservation easements. There are two parcels of land with this status. These areas are known as the Preserves, i.e. the Molokaʻi Forest Reserve and the Kamakou Preserve. Molokaʻi Ranch, Ltd. granted a perpetual conservation easement to The Nature Conservancy to protect the Kamakou Preserve and the Molokaʻi Forest Reserve is leased by DLNR on a monthly basis. Both contain important water resources. These two properties have a combined area of 4,040 acres.

6 WATER PLAN

6.1 MOLOKA'I PROPERTIES, LIMITED EXISTING WATER SYSTEMS

Moloka'i Properties, Limited (MPL) operates 3 water systems, two of which are subject to State Public Utilities Commission (PUC) regulation. All three systems are subject to regulation by the State's Commission on Water Resource Management (CWRM).

6.2 KALUAKO'I SYSTEM (MOLOKA'I PUBLIC UTILITIES, INC. (MPU)

MPU services the existing Kaluako'i Development. Its source is Well 17 in Kualapu'u which has a water use allocation of 1,018,000 gallons per day (GPD). The following is the permitted allocation established by the Water Commission based on the then existing uses:

Kaluako'i Hotel	67,000
Condos	186,000
Residential	51,000
Golf Course	400,000
Beach Park	26,000
Nursery	18,000
Filter Backwash	100,000
Moloka'i Ranch	0
System loss	0
Kaluako'i Total	**848,000**
MIS System Use Charge	94,000
Kualapu'u Town	76,000
Total	**1,018,000**

In this paper "current use" is defined as the average daily use over a one-year period. Current use of the MPU system, with the Kaluako'i Hotel closed is approximately 800,000 GPD.

At the time the Kaluako'i System was acquired by MPL in December 2001 it had been out of full compliance with Department of Health Drinking Water Standards since 1993. Those standards, which went into effect nation-wide, required drinking water systems using surface water or systems using groundwater under the influence of surface water to meet higher water quality standards to provide a greater margin of safety to their customers.

That non-compliance led to a Consent Order that MPL inherited from the previous owners of Kaluako'i. At the time of acquisition, the compliance deadline was extended to September 15, 2004. A one-year extension was subsequently requested and approved. MPL could have satisfied the Consent Order by either using a dedicated pipeline from Well 17 (an alternative that was abandoned) or by installing new treatment facilities that could meet the current standards. New filtration equipment was installed and became operational on September 14, 2005.

Essentially, MPU starts with clean, compliant water as it leaves Well 17. However, use of the Moloka'i Irrigation System (MIS) to convey this water to the west end mixes in surface water creating

the need for treatment to again make it safe for drinking water purposes.

6.3 EXISTING SYSTEM LOSSES

Much has been said about MPU's system losses and MPL acknowledges that the system it inherited had losses of approximately 200,000 gallons per day.

Prior to the upgrade, the largest water loss was the approximate 100,000 gallons per day consumed in backwashing the sand filters at Puu Okoli that were part of the system MPL inherited. The old Ag lines and the open reservoir between Mahana and the entrance to Kaluakoi were also historically large water wasters. Completion of the system upgrade allowed 17,500 lineal feet of this old pipeline to be removed from service.

All systems have some level of loss. Most systems aim for losses of about 10% -- a reasonable target for the Kaluakoi System at build-out.

6.4 WAIOLA O MOLOKA'I, INC. SYSTEMS

Waiola Waiola is the Public Utilities Commission regulated entity that supplies drinking water to the remaining communities on Moloka'i Ranch land.

The Ranch has been in the water business for more than 100 years. Its role in this area expanded significantly when it inherited the drinking water systems for Maunaloa and Kualapuu when their lessees abandoned those plantation towns.

Waiola also supplies water to Kalae/Kipu and the Moloka'i Industrial Park/Manawainui areas. Prior to 1993, all of this water was supplied from the Ranch's surface water system. With the imposition of more stringent standards, these systems shifted from surface water to purchased well water.

The Kipu/Kalae system (approximately 20,000 gallons per day) is supplied with well water purchased from the Department of Hawaiian Homelands (DHHL).

The Kualapuu system (76,000 gallons per day as noted above) is supplied from Well 17 via a bulk water purchase agreement with MPU.

Initially, Maunaloa and the Industrial Park were supplied with water purchased from the County Board of Water Supply, from its well in Kualapuu. When that agreement came to an end in May 1998, MRL built a new treatment facility that meets the new standards.

6.5 MOLOKA'I RANCH MOUNTAIN (AG) SYSTEM

The initial water system of the Ranch is more 100 years old and moves surface water approximately 20 miles from the central mountains of Moloka'i to the far corners of MPL's holdings through a combination of six and eight inch pipelines. Currently, the surface water system has 3 primary uses:

1. Feed water for the Puʻu Nānā water treatment plant that provides potable water for Maunaloa and the Industrial Park.
2. Irrigation water for landscaping of Maunaloa Village, the Lodge and Kaupoa camp.
3. Water for the Ranch's livestock operations.

The system has an average yield of approximately 500,000 gallons per day, but as with all surface water systems, its yield is highly weather dependent. Seasonal flows of 1,300,000 gallons per day can be achieved during winter storms, while summer drought lows of 65,000 gallons per day have occurred.

In many ways the Ranch's surface water system is like its much larger counterpart on Molokaʻi, the MIS, which is also a surface water system.

While numbers vary, one estimate of the average yield of the MIS is 3,500,000 GPD making it about seven times larger than the ranch system in terms of yield. In terms of storage, the Ranch's 44,000,000 gallons of storage pales in comparison to the MIS's 1.4 billion gallons, which is more than 30 times greater.

Both are highly dependent on the weather and rely heavily on winter rains to sustain demand during the drier summer months. One area of difference between the two systems is the MIS's ability to pump high-level ground water to supplement gravity surface water flows while the Ranch system relies totally on surface water delivered by gravity. Surface water is the basis for our agricultural industry on Molokaʻi as it is much cheaper to deliver to customers.



The typical energy costs for MPU to raise water 1,000 feet to the surface (the elevation of the Kualapuʻu Wells) is $1.00 per 1,000 gallons. Without high energy costs, water from Molokaʻi's existing surface water systems can be kept affordable which is a critical factor to the future of farming on Molokaʻi. Inexpensive water is the key to expanding agriculture on Molokaʻi and Molokaʻi Ranch supports this wholeheartedly.

6.6 MPL AND THE MIS

Since the first days of the Kaluakoʻi development, transmission of Well 17 water to the Resort utilized the MIS distribution system and the old Libby, McNeill & Libby irrigation pumps, pipelines, and reservoirs. From the MIS reservoir to beyond the Kaluakoʻi reservoir at Puʻu Nānā.

Currently MPU leases MIS transmission capacity for $135,000 per year. Based on current usage, that is equivalent to about 51 cents per 1,000 gallons for the right to use a portion of the excess capacity of the existing infrastructure. Other users pay 31.5 cents per 1,000 gallons, plus an acreage assessment. To MPL's knowledge, the Ranch is the largest financial contributor to the system.

In addition MPU "pays" the MIS "a systems loss" equal to 10% of the water it transmits.

MPU does not use MIS water. It puts in 1,111,111 gallons of water for every 1,000,000 gallons it takes out at its Mahana pump station. Over the course of a year, this additional input amounts to about 30,000,000 gallons.

When MPL acquired the assets of Kukui (Molokaʻi), Inc. and MPU in December 2001, Kukui had a pumping deficit of 30,000,000 gallons. MPL made up this deficit by mid-February 2002.

Since then MPL has been in arrears only once between April 5th to August 19, 2004. It was the result of the change-out of the old Detroit diesel engine with a new Caterpillar four-stroke diesel that is expected to be a more reliable power unit to drive the Well 17 pump. In hindsight, MPL should have built up greater reserves prior to taking the Well 17 motor out of commission.

This breakdown has, quite rightly, raised concern from homesteaders that a future breakdown could lead to a similar occurrence. MPL proposes that it advances the MIS system 100 million gallons and retains that surplus in the system at all times. That amount of water would equate to about 4 feet of depth out of the 52 feet of usable storage capacity. In the event of any future breakdown at Well 17, this surplus would more than cover any conceivable repair time. MPL also proposes that Preference farmers are able to use this surplus in the event of a drought emergency.

6.7 WATER NEEDS GOING FORWARD

MPL has stated that it **DOES NOT** need any more drinking water than currently allocated for the proposed Master Use Plan. Under this Plan, MPL will abandon the Waiola Well application. If this Plan is approved, MPL will sign covenants preventing it from ever seeking further water permits from the Water Commission. This Master Use Plan is proposing:

Potable Water:
MPL retains its 1.5 million gallons per day of water currently allocated:

- 1,018,000 GPD from Well 17
- 500,000 GPD from the Mountain System.

Non-Potable Water:
It is proposing to develop 1,000,000 GPD from the abandoned Kākalahale brackish water well in the Kamiloloa aquifer sector for future non-potable needs.

By gradually moving current non-potable uses such as the golf course, irrigation of the hotel, condos and large lots to non-potable water, MPL believes its existing 1.5 MGD potable allocation from a combination of Well 17 and the mountain system will meet all of MPL's long-term potable demand.

Non-potable needs can be supplied by a combination of use of MPL's existing mountain system and the unused Kākalahale Well.

MPL has proposed that the remaining 1,000,000 MGD be drawn from the Kākalahale brackish water well. This well which was built by Kaluakoʻi Corporation in 1969, has been pump tested and demonstrated capable of providing 1,000,000 GPD of good quality brackish water (chlorides at 500 ppm, or twice the drinking water standards).

MPL's advice is that drawing water from the Kākalahale well will have no impact on the yield of the Kualapuʻu aquifer. While concerns have been raised about its use by the MIS or on DHHL lands, MPL believes it is a good source for west end irrigation needs.

MPL WILL NOT propose transmission of the Kākalahale brackish water to the West End by the MIS system.

MPL is currently investigating transmission alternatives.

This Plan is different from previous West End water proposals because, previously, three separate large land owners, Molokaʻi Ranch, Alpha USA and Kukui (Molokaʻi), Inc. all had or were developing massive comprehensive development plans that would have required as much as a total of 20,000,000 gallons of water per day to support.

Because the proposed Master Plan limits development, proposed water use is subsequently dramatically reduced as the table below shows.

6.8 LĀʻAU POINT WATER USE

The proposed Lāʻau Point project, like the Pāpōhaku Ranchlands subdivision, is expected to comprise second and third homes for owners who spend a limited amount of time on island. At Pāpōhaku, 60% of those who have built houses are not permanent residents.

Also like Pāpōhaku, MPL would expect actual dwelling construction to lag lot sales by several years. To date, about 20% of lots in Kaluakoʻi have been built on. After more than twenty years, the build-out rate is less than one percent per year as an average. MPL believes a combination of low occupancy, water conservation education, xeriscaping and tiered water rates will moderate water consumption by these homeowners.

While MPL expects home construction to be slow, water demands during the construction period are expected to be in the order of 50,000-150,000 gallons per day. Initial erosion protection and control measures would likely require an additional 50,000-100,000 gallons per day as well. The construction phase is projected to be 2 years. The initial erosion control phase would be expected to continue well after construction ranging from 5 to 10 years.

The public park(s) would require potable water and non-potable water for irrigation concurrent with the completion of site construction.

MPL anticipates it would be several years into the sales of the project before wastewater recycling would be a significant contribution to the supply of irrigation water for landscaping features, erosion etc. In the interim, non-potable water not required for unbuilt house lots would support these uses.

In summary, MPL expects that water use for the project would start out as a significant percentage of total demand then drop after completion of construction and then slowly rise again as home construction proceeded.

6.9 WATER USAGE UNDER PROPOSED MASTER PLAN

(In Gallons Per Day)

CURRENT WATER USE

DESCRIPTION	Potable	Potable Irrigation	Non-Potable
Kaluakoi Hotel & Golf Course	2,000	405,120	
Kaluakoi Condos	116,250	70,880	
Kaluakoi Residential	70,500	143,825	
Maunaloa/Industrial Park	136,370		25,480
Ranch Operations/ Misc.	41,500		150,000
Kualapuu	76,000		
Subtotal	**442,620**	**619,825**	**175,480**
TOTAL POTABLE		**1,062,445**	
Total Potable & Non-Potable Categories			**1,237,925**

FULLY DEVELOPED WATER USE

DESCRIPTION	Potable		Non-Potable
Current and Future Changes (within 50 years)			
Kaluakoi Hotel & Golf Course	33,400		273,240
Golf Course Wastewater Reuse			-100,000
Kaluakoi Condos	116,250		70,880
Kaluakoi Residential	228,500		633,825
Maunaloa/Industrial Park	296,870		25,480
Ranch Operations/Misc.	41,500		150,000
Laau Point Lots	96,000		300,000
Laau Point Parks	1,000		40,000
TOTALS	**889,250**		**1,393,425**
Long term growth > than 50 yrs			
Community directed growth in Kualapuu and Maunaloa	200,000		
TOTALS	**1,089,520**		**1,393,425**
TOTAL ALL USES			**2,482,945**

MPL has stated that the projected West End water use will not exceed the existing permits plus 1.0 MGD of brackish water from the Kākalahale Well. Current use is grouped into 3 types of water; potable, potable irrigation, and non-potable. Currently 619,825 GPD of irrigation demand is met with potable water. This use will be shifted to non-potable sources over time, freeing up this water for new potable uses. Renovation of the golf course (130 acres of turf down to 80 acres of turf) will reduce water consumption and reopening of the Hotel and higher condo occupancies will provide more wastewater. This is reflected in the much-reduced demand for golf course and hotel irrigation. The Lā'au potable allocation is based on 600 GPD for 200 lots at 80% occupancy. The non-potable water is based on 1,500 GDP for 200 lots.

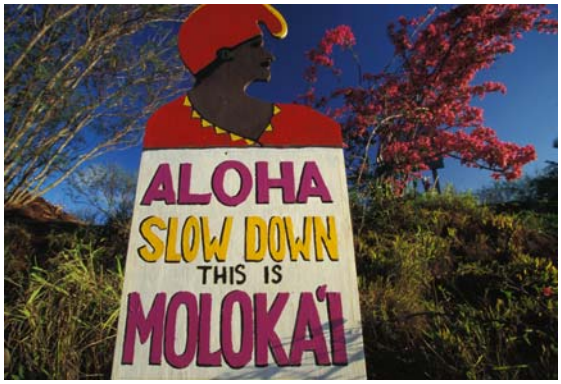
6.10 THE ROLE OF WATER CONSERVATION

At the time of the Kaluakoʻi acquisition, MPL understood that water conservation would play an important role in managing the West End's water usage.

The Water Commission reinforced that understanding in its water use permit for Well 17 that was issued after MPL took title to the Kaluakoʻi assets.

The Commission required MPU to report on its progress in controlling water waste, to conduct an educational campaign on water conservation with its customers, and to investigate a non-potable source for the golf course to allow potable water being used for non-potable uses to be available for other potable purposes.

MPL immediately identified and corrected several long-term water waste issues. MPL conducted a water conservation campaign over 12 months. However the most important action undertaken to date has been to restructure MPU's water rates to properly reflect the true cost of providing this service and to implement tiered water conservation rates that provide a financial incentive to customers to conserve water.



MPL approached its rate structure by using the Water Commission allocation amounts by user type as the base rate. All water use above that amount would be billed at a much higher "conservation rate". MPL proposed that the base rate be $3.18 per 1000 gallons and the conservation rate be twice as much or $6.36 per thousand gallons.

As an example, the Water Commission used 560 gallons per unit for the Condos plus 2,000 gallons per day per acre for irrigation. A 50-unit condo on a 4-acre site would have 36,000 gallons per day in its base rate (560 gallons X 50 units plus 2,000 gallons X 4 acres for irrigation). Any water used above this amount would be sold at the higher conservation rate.

As the permit allocation amount was 1,000 gallons per day for all residential uses (even though the existing usage in the Pāpōhaku Ranchlands was noted in the permit to be 5,308 gallons per day per residence), MPL proposed that the conservation rate begin at 1,000 gallons per day for residential customers.

Because of a concern the Consumer Advocate termed "rate shock," MPL agreed to reduce the conservation rate to $4.70 per 1,000 gallons and phase-in the conservation rate for residential

customers. For residential customers the conservation rate applies to all water used in excess of 5,000 gallons per day.

However the Consumer Advocate and the Public Utilities Commission agreed that MPL could telegraph that its next rate increase – then anticipated to be two to three years away-- would likely see the conservation rate take effect for all residential water use in excess of 1,000 gallons per day.

For the most part, Kaluakoʻi residents have adjusted their water use. Consumption has dropped by 45% in the Ranchlands and the condos have shown reduced water consumption as well since the rate hike in September 2003. The most notable change is that customers now respond to rainfall and shut off their irrigation systems. Previously MPL saw very little reduction in water use after a good rain. Now a passing shower will cause water consumption to drop dramatically.

6.11 CONTINGENCY PLANNING

MPL has stated that the 2.5 million gallons of water per day is the maximum this community-based Master Plan will require; 1.0 million gallons of existing drinking water from Well 17, and 0.5 MGD from the Mountain System, and one million gallons of brackish water from the Kākalahale Well.

The question has been posed: what if the Plan needs more water? What if there is increased demand for agriculture, particularly on MPL lands designated for agriculture, or on lands to be donated to the land trust?

MPL will never go back to the community and seek more drinking water.

If more non-potable water is needed for agriculture in particular, MPL still has two options:

- The brackish water available to MPL from the Prawn Farm at Palaʻau, which is currently permitted for 864,000 gallons per day of which 500,000 gallons per day could be available for reuse.
- Desalination.

The Prawn Farm water is very brackish; 1300 parts per million as chlorides (drinking water must have no more than 250 parts per million), and it would three times as expensive to remove the salts to bring it to an acceptable level for use as agricultural water as compared to obtaining water from the Kākalahale Well.

But it is an option for the future and particularly for non-potable uses. Currently, desalting is still about 4 times more expensive on Molokaʻi than developing an operating deep groundwater well. While it is not a viable economic alternative today, this technology continues to improve and its costs are declining as a result.

As this technology continues to improve, the cost of producing water will come down. As the conservation rates go up, at some point the two lines will cross, and MPL will find the balance between demand and supply. MPL has talked about the ability to have multiple rate blocks for both potable and non-potable water.

Structured properly, these rates would, in effect, subsidize prudent or thrifty water users and penalize excessive water use. At the higher rate blocks, the cost of desalination can be recovered. Because of this, there would be no pressure to pursue additional groundwater or surface water sources from the central or east end of the island.

6.12 WATER AND HAWAIIAN RIGHTS

Every water use permit issued by the Water Commission contains a provision that the allocation will be reduced if it interferes with the rights of the Department of Hawaiian Homelands.

The water code states that each County's Water Use and Development Plan, and the State's Water Project Plan, "shall incorporate the current and foreseeable needs of DHHL".

Hawai'i revised statutes provides that the Hawaiian Homes Commission and its lessees have a prior right to 2/3 of the water in the MIS. Supreme Court rulings have affirmed that the priority uses of water include Native Hawaiian and traditional and customary rights.

For Moloka'i Properties Limited, the issue of Hawaiian Water Rights is very clear: the existing allocations are subject to reduction if they interfere with DHHL's rights to water in the future and due consideration must be given to DHHL's projected needs with any proposed new allocations.

Essentially MPL has proposed in its Master Plan to forever limit the withdrawals of potable groundwater to that which has already been permitted and seek only one million gallons per day of non-potable water from the existing proven brackish Kākalahale well in the Kamiloloa aquifer sector.

In essence, MPL is requesting 2 million gallons of groundwater out of the estimated developable 33.5 million gallon estimated sustainable yield of the island (about 6%), in the knowledge that it could be reduced in the future if necessary for DHHL's needs to be met. As MPL sees it, it's a matter of law.

So MPL believes that if DHHL used every reasonable effort to develop its 2.905 MGD allocation in Kualapu'u and wasn't successful, the Water Commission would then be obligated to reduce the allocation as necessary so that DHHL would get the full benefit of their allocation at the time it was needed.

MPL does not believe that scenario will eventuate because:

- MPL believes the work done by the USGS supports that the estimates of water availability will be realized.

- There is a strong consensus on island to limit development that will limit total water demand.

- Large quantities of groundwater for agriculture will be cost prohibitive.

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7 IMPLEMENTATION

7.1 LAND TRUST

The Molokaʻi Land Trust will be formed to own and manage the 26,200 acres that MPL will donate to the Moloka'i community under this plan. The Land Trust will also administer land use policies that permanently protect another 24,950 acres under agricultural and rural landscape reserve easements.

The initial land to be donated to the land trust is an approximate 1,000 acre piece lying between the State's parcel at ʻIlio Point and the Nature Conservancy's parcel at Moʻomomi. It is a portion of Tax Map Key parcel 5-1-02: 01. Approximately half of ARINC's facilities are located on the parcel and the transfer will include a partial assignment of rents that will provide about $50,000 of annual income to the Land Trust.

As noted above, the eastern boundary of the parcel is The Nature Conservancy's parcel and the existing jeep road that intersects the western corner of The Nature Conservancy's parcel. The northern boundary is the shoreline. The western boundary is the north/south leg of the State's eastern boundary at ʻIlio Point. The southern boundary runs from the southern point of the parcel's western boundary to the jeep road paralleling the northern shoreline running east to the junction of the eastern boundary at the "corral".

A Land Trust steering committee has been meeting since July 2005 planning the implementation of the proposed Land Trust, reviewing its mission statement, goals and objectives and vision in order that documentation can be prepared to establish the Trust.

The committee is:

- Researching organizational documents.
- In the process of engaging an attorney.
- Preparing the Articles of Incorporation, its By-laws.
- Preparing for application for Federal Tax Exempt status.

It is planned that the Land trust will be incorporated by December 2005. The proposed mission of the Land Trust is:

> **To protect and restore the land and natural resources of Moloka'i, and to perpetuate the unique Native Hawaiian traditions and character of the island, for the benefit of the future generations of all Moloka'i.**

Among the proposed activities of the Land Trust to implement the Master Land Use Plan are:

Moloka'i Nui A Hina (Moloka'i, Great Child of Hina) – Resource Protection

- Conduct a base line survey, assessment and mapping of the natural and cultural resources of the trust lands.

- Identify, record and map cultural, archaeological and other important sites on the trust lands.
- Conduct oral history interviews to document the cultural, archaeological and other



important sites on the trust lands.
- Develop a cultural resources restoration and management plan for the trust lands.
- Develop and conduct public education about the cultural, archaeological and related sites on the trust lands, including cultural protocols for their proper use.
- Develop a natural resources restoration and management plan to control erosion, protect native beach strand and marine resources, protect the dune systems and overall improve the watershed and ground water resources.
- Develop a community-based subsistence fishing plan in partnership with adjacent landowners and government agencies for approval by the Department of Land and Natural Resources.
- Develop a sustained/yield hunting plan that doesn't erode the land and is based on a determination of the carrying capacity for the feral deer and other game.
- Develop an access management plan to protect natural and cultural resources and respect Native Hawaiian rights.
- Develop policies to guide recreation and tourism activities on trust lands in accordance with the policies designed to protect the trust's cultural and natural resources.

Moloka'i 'Aina Momona (Moloka'i, Land of Plenty) – Use and Productivity

- Implement the guidelines for land use principles and policies developed for the Moloka'i Ranch Community-Based Master Plan.
- Provide stewardship of the Trust's lands and resources, mauka to makai, guided by best management practices and lessons from our kupuna.
- Develop partnership agreements to protect and enhance precious natural resources of the ahupua'a where the trust lands are located, mauka to makai.

Moloka'i Pule O'o (Moloka'i, Land of Powerful Prayer) – Perpetuation of Culture and Education

- Develop curriculum for environmental and cultural

education in partnership with educational and cultural groups and institutions.
- Communicate effectively with the community about the Trust's work.
- Design enforcement of rural landscape and agriculture easements under the control of the land trust.
- Halau (facilities and sites) are established for the training, practice, and research in la'au lapa'au (medical healing), ho'oponopono (conflict resolution), lomilomi (massage), hula, hoe wa'a, etc.

Moloka'i No Ka Heke (Moloka'i is the Greatest) – Sustainability and Organization

- Develop an organizational and financial plan for long-term sustainability of the land trust.
- Develop a training program for staff and interns in cooperation with community agencies and institutions.
- Organize a mechanism to receive public participation and input on the trust's management plans and policies.
- Provide ongoing training for members of the land trust board.

7.2 ZONING AND OTHER REGULATORY APPROVALS

The purpose of this section is to outline the potential State and County permit processes that may be needed to accomplish the overall goals of the Community Based Land Use Plan for Molokaʻi Ranch. It is important to note that any development or plan proposal may require a variety of Federal, State and County permits. Identifying and obtaining the necessary permits can be fairly complicated depending on the complexity, impacts, location and sensitivities associated with projects. Requirements change as laws and regulations are amended. Only by contacting the appropriate regulatory agency, can a project have accurate information on permits required for specific projects.

7.2.1 Land Use Designations and County Zoning

State Land Use Designations

All lands in the State of Hawaiʻi are classified into one of four Districts: Urban, Rural, Agricultural and Conservation. Most of Molokaʻi Ranch's Lands are designated as Agricultural according to the Land Use Commission Districts.

The towns of Kaunakakai, Kualapuʻu and Maunaloa are designated as Urban. The Kaluakoʻi area has all four designations. The Urban District extends from Kawakiuiki south to Puʻu O Kaiaka, from the shore to about 2000 feet inland; behind the northern portion of that area is Rural; the balance is in the Agricultural District with the exception of the a strip of land running along the shoreline starting at Puʻu O Kaiaka running south which is Conservation District land.

Maui County Community Plans

Maui County has 9 Community Plan areas. The current Moloka'i Community Plan was adopted in December of 2001. Community Plans provide Policy Guidance on Land Use within their respective areas. They also include maps which classify land into one of 17 use categories; requests to change zoning cannot be processed unless there is consistency with the Community Plan. Additionally, Special Management Area permits cannot be approved unless the application is consistent with the Community Plan.

Maui County Zoning Districts

Title 19, Maui County Code, is the County's zoning ordinance. Zoning classifies the way land maybe used and regulates the types of activities that may occur. Maui County has 25 different Zoning Districts ranging from open space to high density development districts for varying uses including Residential, Hotels and Commercial uses.

State and County Regulatory Approvals

The information below briefly describes the most appropriate County and State permits that may be required to implement portions of the Community Based Master Plan for Moloka'i Ranch. It is important to note that in certain instances Federal permits may be applicable as well. This section only indicates whether or not a Federal approval may be necessary.

- Change in Zoning: A zoning change is required when a land use is desired that is not allowed under the current zoning of that parcel of land. Zoning changes must be in conformance with the State Land Use District and the Moloka'i Community Plan. Zoning changes are processed through the Planning Department and Moloka'i Planning Commission and adopted via ordinance by the County Council and Mayor.

- Community Plan Amendments: A Community Plan Amendment is required if a use is in a Special Management Area and is not consistent with the Community Plan, or if a proposed zoning change is not consistent with the Community Plan Designation. Amendments require the submittal of a Draft Environmental Assessment, in accordance with Chapter 343, Hawai'i Revised Statutes. Community Plan Amendments are processed through the Moloka'i Planning Commission which provides their recommendation which is acted on by ordinance by the County Council and Mayor.

- State Land Use Commission District Boundary Amendment (SLUCDBA): A District Boundary Amendment is required when a proposed use is not allowed under

the State land use district as outlined in Chapter 205, Hawai'i Revised Statutes (HRS). For properties greater than 15 acres or involving conservation lands, District Boundary Amendments applications are processed by the State Land Use Commission. Applications for less than 15 acres are processed by the Maui County Planning Department and the Moloka'i Planning Commission.

- State Land Use Commission Special Permit: Special permits are required for uses not explicitly permitted under State land use, but may be permitted as an "unusual and reasonable" use within the State Agricultural and Rural Districts. Projects involving 15 acres or more are processed by the County through the Moloka'i Planning Commission and referred to the State Land Use Commission for final action.

- Special Management Area (SMA) Permit: SMA boundaries are designed to protect the County's coastal environment and resources. Proposals involving developments within the SMA boundary requires an application reporting assessment and determination. The assessment must include the anticipated impacts of the proposed action in the SMA. The Director of Planning will determine if the project is exempt or requires a permit. The Moloka'i Planning Commission is currently reviewing rule changes in this area. A SMA Minor Use Permit is required for projects involving less than $125,000. A SMA Major Use Permit requires a more comprehensive environmental review and applies to projects valued above $125,000. Both are granted by the Moloka'i Planning Commission.

7.2.2 Applicable Permits

This section discusses the various Land Use Plan activities that may require County and State permits. It does not contemplate the various land ownership transfers.

Development Districts

1) Visitor Accommodation:
The hotel will require a special management area permit as well as building permits. The refurbishment of the golf course may or may not require a special management permit; however, the new maintenance building for the golf course will require a SMA permit. Building and grading permits will also be required.

The proposed relocation of the second west end golf course currently in the Community Plan from just below Maunaloa to the resort area in the Rural

district would require a Community Plan amendment and a zoning change to Park PK-4 zoning.

2) Residential Shoreline Development at Lā‘au Point:
The 200-lot subdivision of 2-acre parcels at Lā‘au Point will need infrastructure such as associated roads and sewage treatment facility. This development will require a State LUC District Boundary Amendment, Community Plan Amendment, Zoning Change, SMA application and EIS.

3) Community Village Expansion**:**
Consists of land surrounding existing towns and population centers of Kaunakakai, Maunaloa and Kualapu‘u. Lands are set aside for future residential expansion for Maunaloa and Kualapu‘u while some commercial expansion may be appropriate as well for Kaunakakai. Future implementation will require a State Land Use District Boundary amendment, Community Plan Change and a Zoning Change(s). Kaunakakai expansion, depending on location may also require a SMA permit.
Land in and around existing towns/population centers that will be available to qualifying Moloka‘i residents at affordable prices for “traditional” and/or conventional housing.

4) Industrial: Expansion of the Moloka‘i industrial Park will require a State Land Use District Boundary Amendment, Community Plan Amendment and Zoning changes.

5) Public/Quasi Public: Includes park, schools, public safety type facilities and uses such as Kaunakakai Fire Station relocation, Junior Roping Club and Maui Community College expansion.

- **Kaunakakai Fire Station Relocation:** Includes a 5-acre site located on lands to the east of Alanui Ka’imi’ike Street near Kakalahale Street. The site is zoned Agriculture. The County will be responsible for redistricting the land to Urban, and changing the Community Plan designation and zoning to Public/Quasi-Public. Other County approvals will be required for construction and grading. The property is located within the SMA boundary.

- **Junior Roping Club Site:** This 5-acre parcel is located in Kaunakakai on the west side of Mohala Street. It is zoned Light Industrial. The area is located within the SMA boundary. Possible Community Plan Amendment may apply depending on the intended-long term use of the property.

- **Community College Expansion:** This parcel fronts Kamehameha V Highway and is located west of

the existing 2-acre campus. The property is currently zoned Public/Quasi public. The area is located within the SMA boundary and Other County permits may be required.

Remaining Districts and Overlays

The remaining Districts and Overlay Zones as well as the Subsistence Fishing Zone will require consultation with the County and State in order to verify which jurisdiction is appropriate to adopt or enact the Districts and associated Overlays.

Certain Districts and Overlays, for example may be adopted as policy by the "Moloka'i Community Plan" produced by the County of Maui and adopted by the County Council and Mayor. In other instances, State Legislative acts may be needed to adopt the Subsistence Fishing zone for example, as policy or to enable enforcement powers.

Applicable Permits						
Proposal (Future Ownership)	**State LUC District Boundary Amendment**	**Comunity Plan Amendment**	**Change in Zoning**	**Special Management Area Permit**	**Other County Permits, e.g. building, grading**	**State Land Use Commission Special Permit**
Development District						
1) Resort						
Reopen Kaluakoi Hotel (MPL)				X	X	
Upgrade Kaluakoi Golf Course and Workshop (MPL)				X	X	
18 Hole Golf Course transfer to Kaluakoi from Maunaloa Site (MPL)		X	X	X	X	
2) Residential Shoreline Development						
La'au Development (MPL)	X	X	X	X	X	
3) Community Village Expansion						
Kua'alapu'u (MPL)	X	X	X		X	
Maunaloa (MPL)	X	X	X		X	
Kaunakakai (MLT)	X	X	X	X	X	
4) Industrial Expansion (MPL)	X	X	X		X	
6) Public/Quasi Public						
Kaunakakai Fire Station (MLT)				X	X	X
Junior Roping Club (MLT)		X		X	X	
Community College Expansion				X	X	X
Other Districts and Overlays		X				

7.2.3 Lā‘au Point Implementation Schedule

The following is the estimated schedule to obtain the various land use approvals from the State and County for the Lā‘au Point development. This schedule assumes plan approval by the EC Board by January 2006.

Environmental Impact Statement (EIS)
It is assumed that a complete EIS will be required for the project. The technical environmental, engineering, and socioeconomic studies required to complete the EIS are currently being undertaken and the EIS Preparation Notice will be submitted and published for public comment after the EC Board approval of as noted above. The schedule to complete the EIS is as follows:

EIS Preparation Notice (EISPN)	January 2006
Complete Draft EIS/Publish	April 2006*
Public Comment Period (45 Days)	May 2006
Prepare Final EIS/Acceptance	July 2006

*Subject to technical studies being completed by end of February

State Land Use District Boundary Amendment (SLUDBA)
The areas of Lā‘au Point to be included in the subdivision lots are proposed to be re-classified by the State Land Use Commission (LUC) from Agricultural to Rural. Utilizing the EIS as the informational document to the LUC petition, the schedule is anticipated to be as follows:

LUC Petition Submitted (w/EISPN)	January 2006
Petition Hearings (after EIS Accepted)	August/September 2006
Decision and Order	October/November 2006

County Land Use Approvals
The project area requires a Community Plan Amendment, Change in Zoning, and Special Management Area permit prior to obtaining final subdivision approval. It is assumed that these approvals will be sought concurrent with the SLUDBA, utilizing the Draft EIS as the technical supporting document to the submittals. The schedule is anticipated as follows:

Applications Submitted (w/DEIS)	April 2006
Planning Commission Hearings/Recommendations	August/ September 2006
Council Hearings/Approval	November December 2006*
Mayor Approval	January 2007*
Planning Commission Approval (SMA)	March 2007

*Could be delayed due to elections

County Subdivision Approval
The preliminary and final subdivision plans would be reviewed concurrent with the above County Land Use Approvals with final subdivision approval being granted following obtaining all of the above approvals.

Preliminary Plat Submitted	April 2006
Preliminary Plat Approved/Comments	October/ November 2006
Final Plat Map Reviewed/Approved	April 2007
Bond Improvements/Construct Improvements	May 2007 – May 2009 ±

7.2.4 Land Trust Zoning Issues

Currently under the Maui County Plan and the Molokaʻi Community Plan, there is no zoning applicable to the proposed special activities of the Land Trust, namely cultural protection, subsistence protection and land restoration.

The current agricultural zoning of the vast majority of the land is not adequate to reflect the nature of activities on the Land Trust property.

The Land Trust may seek to have the majority of its land designated a "Special Project District" or seek to create a Cultural Area Resource designation.

Special Project Districts are normally reserved for development areas, but there is no reason why this designation cannot apply to the special needs of the Land Trust.

Further work with the County of Maui needs to be undertaken so that the Land Trust land designation is correctly reflected in zoning for all time.

In terms of the proposed easements, the current agricultural zoning, along with strict easement documentation, will be adequate to protect the "open space" designated areas.

7.3 PHASING

The phasing of the implementation of this Land Use Plan will take place over many years, with some aspects of its implementation not taking place in the lifetime of those responsible for its preparation.

Key components of the Plan are the phasing relating to the agreement between Molokaʻi Properties Limited and the EC on the Plan's agreements, the donation of land to the Molokaʻi Land Trust and the establishment of the protective easements, the re-opening of the Kaluakoʻi Hotel, the established of a Community Development Corporation and the regulatory aspects of the Lāʻau Point approval and implementation.

Other aspects such as land put aside for future housing for the community, the extension of the industrial park and the application relating to the transfer of second golf course from Maunaloa to north of the Kaluakoʻi Hotel will be phased over many decades, but covered in the initial agreement between the EC and MPL.

A brief timetable for the Plan's implementation is as follows:

Community Based Master Land Use Plan for Molokaʻi Ranch Implementation Timetable

TIME	TASK
December 2005	(1) Master Land Use Plan finalized. (2) Molokaʻi Land Trust established and operating. (3) Kaluakoʻi Hotel redevelopment costs finalized. (4) Land boundaries for initial donation of North Shore land to Land Trust finalized.
January 2006	(1) EIS Prep Notice for Lāʻau Point filed. (2) LUC petition for State Land Use District Boundary/ Amendment submitted. (3) Draft agreement between EC and Molokaʻi Ranch re Land Use Plan submitted to EC and its legal advisors for consideration.
March 2006	(1) Agreement between EC and Molokaʻi Properties Limited re Land Use Plan agreed and signed by the EC on behalf of the community and MPL. (2) Initial land donation (as specified at the beginning of Section 7.1) transferred to Molokaʻi Land Trust. (3) Molokaʻi Land Trust hires executive director.
May 2006	(1) Working drawings for Kaluakoʻi Hotel finalized.
August/September 2006	(1) Molokaʻi Planning Commission hearings on SMA permit for Renovation of Kaluakoʻi Hotel. (2) Planning Commission Hearings on Lāʻau Point Subdivision.
October 2006	(1) Decision by LUC on State Land Use District Boundary Amendment. (2) Proposed Community Development Corporation established. (3) Molokaʻi Land Trust applies to Maui County for Land Trust lands to become "Special Project District."

Implementation Table cont.	
January 2007	(1) Council hearings on Lāʻau Point zoning change. (2) Surveys of land to be transferred to Molokaʻi Land Trust and survey and photographs of land under easement, completed and agreed between the parties. (3) Construction company for Kaluakoʻi Hotel chosen and contract signed.
April 2007	(1) County approval of subdivision. (2) Construction on Kaluakoʻi Hotel begins.
May 2007	(1) Remaining 20,000 plus acres transferred to Molokaʻi Land Trust and easement agreements signed between the parties. (2) Land assigned to Community Development Corporation transferred and agreements signed between CDC and MPL on Lāʻau Point revenue percentage. (3) MPL implements covenants on its property relating to perpetual rights for access for subsistence gathering. (4) Rental agreements relating to Land Trust lands assigned to Land Trust.
August 2007	(1) Molokaʻi Land Trust publishes Management Plan for the property. (2) Lāʻau Point lot construction commences.
September 2007	(1) Kaluakoʻi Hotel re-opens.

7.4 WATER IMPLEMENTATION

The agreement relating to Molokaʻi Properties Limited's Water Plan will form part of the agreement between the EC and MPL on the Master Land Use Plan.

The main implementation of the Water Plan relates to the permitting of the Kākalahale brackish well and the transmission of the water to the west end.

Early in 2006, testing of the well will commence with an expected application to the Water Commission for well permitting in mid to late 2006. In the intervening period, MPL will submit to the EC its proposal for transmitting the brackish water to the west end for future irrigation needs.

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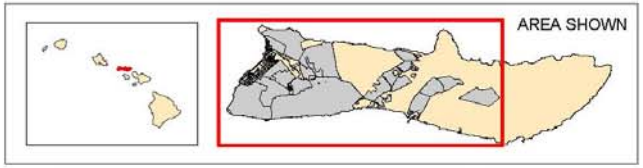
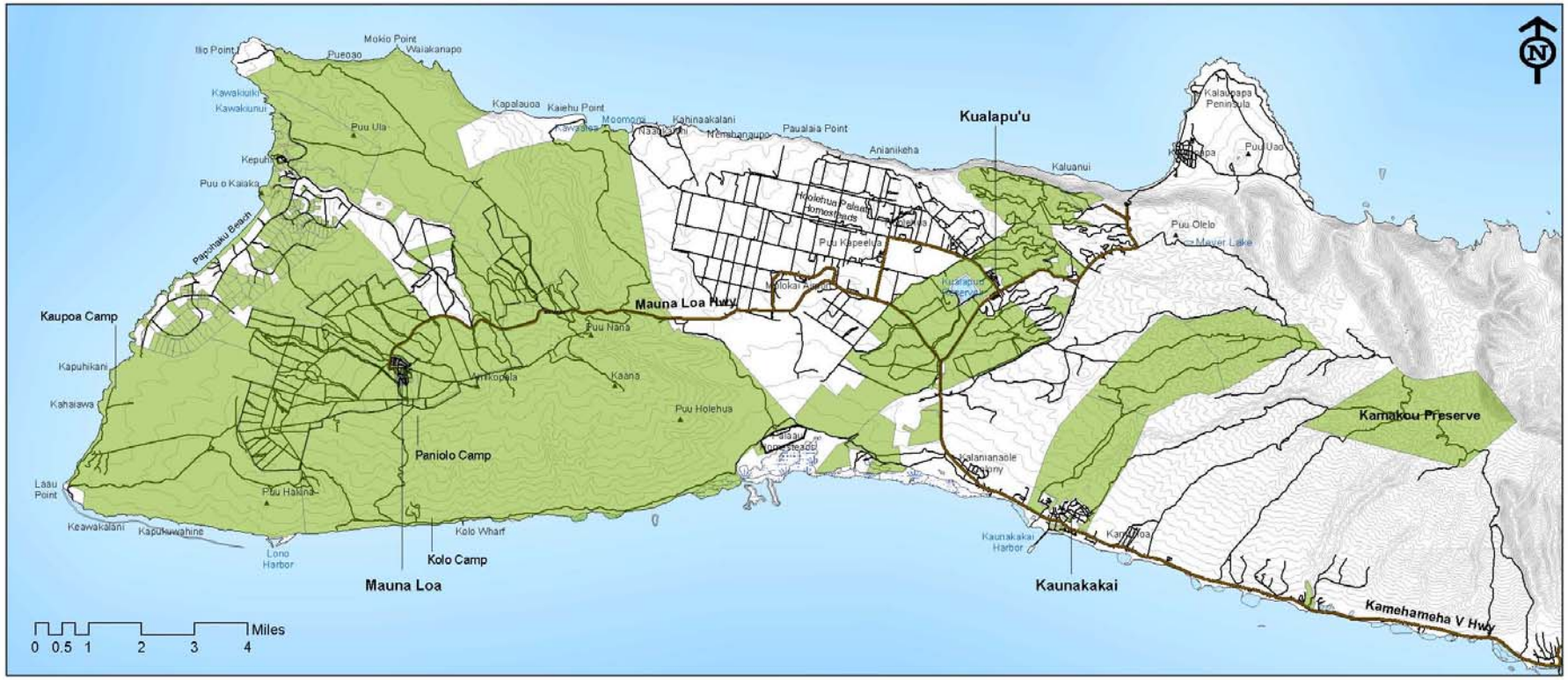
APPENDIX 1: MOLOKA'I RANCH LANDS MAP

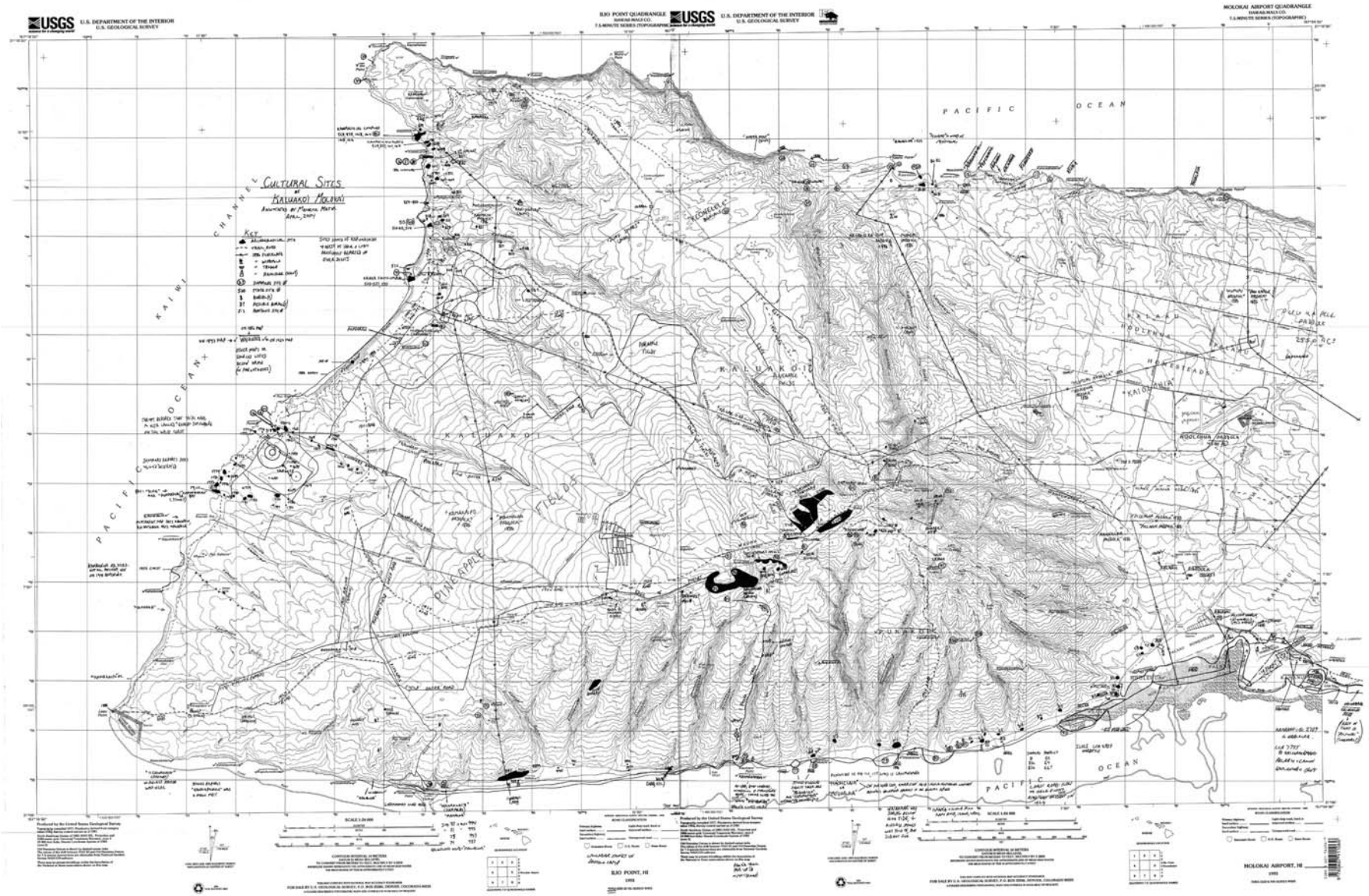
MOLOKA'I RANCH LANDS

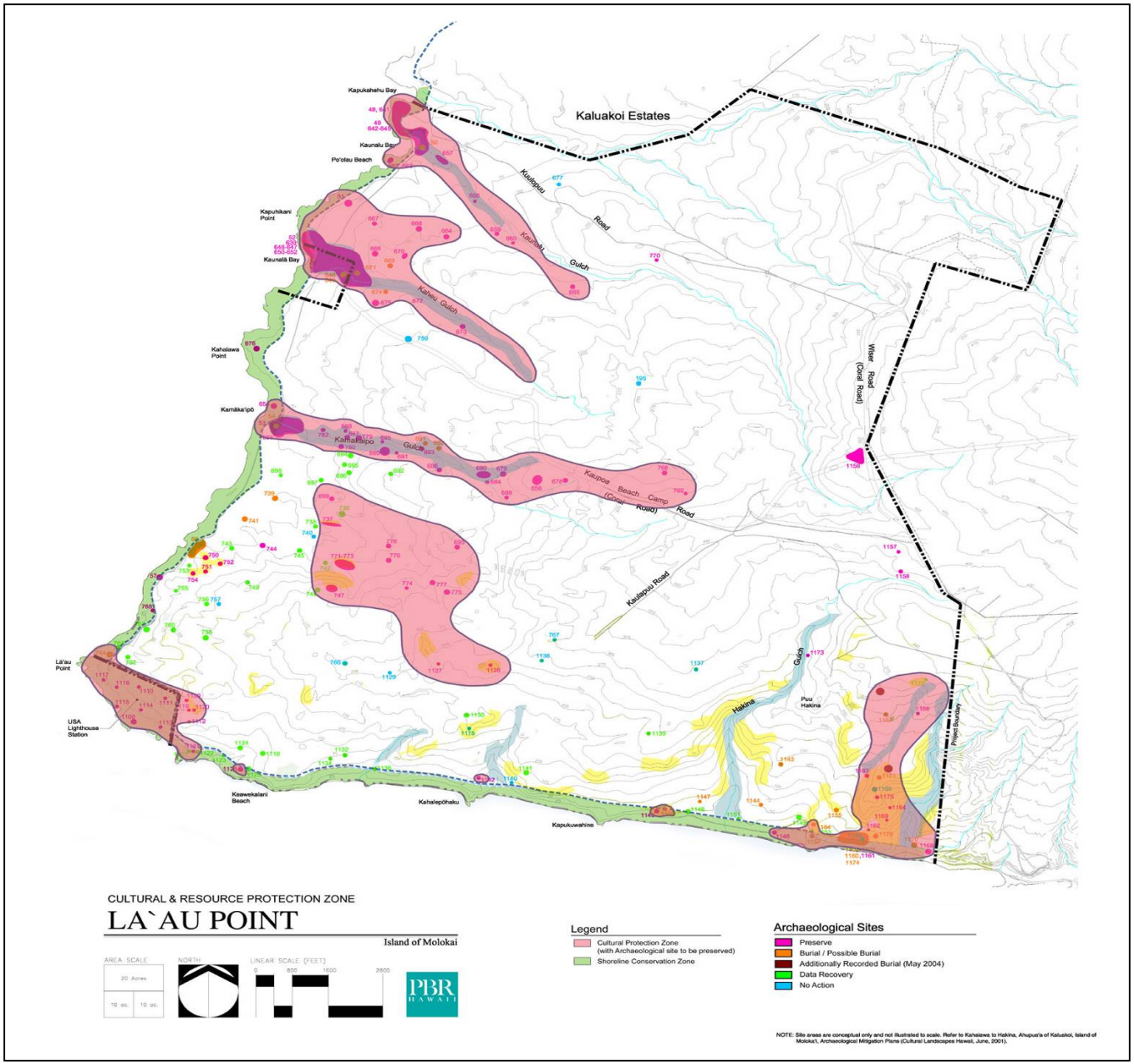




Map Prepared By:
The Conservation Fund
October 21, 2004

APPENDIX 2: CULTURAL SITES OF KALUAKOʻI MAP AND LĀʻAU POINT CULTURAL & RESOURCE PROTECTION ZONE MAP

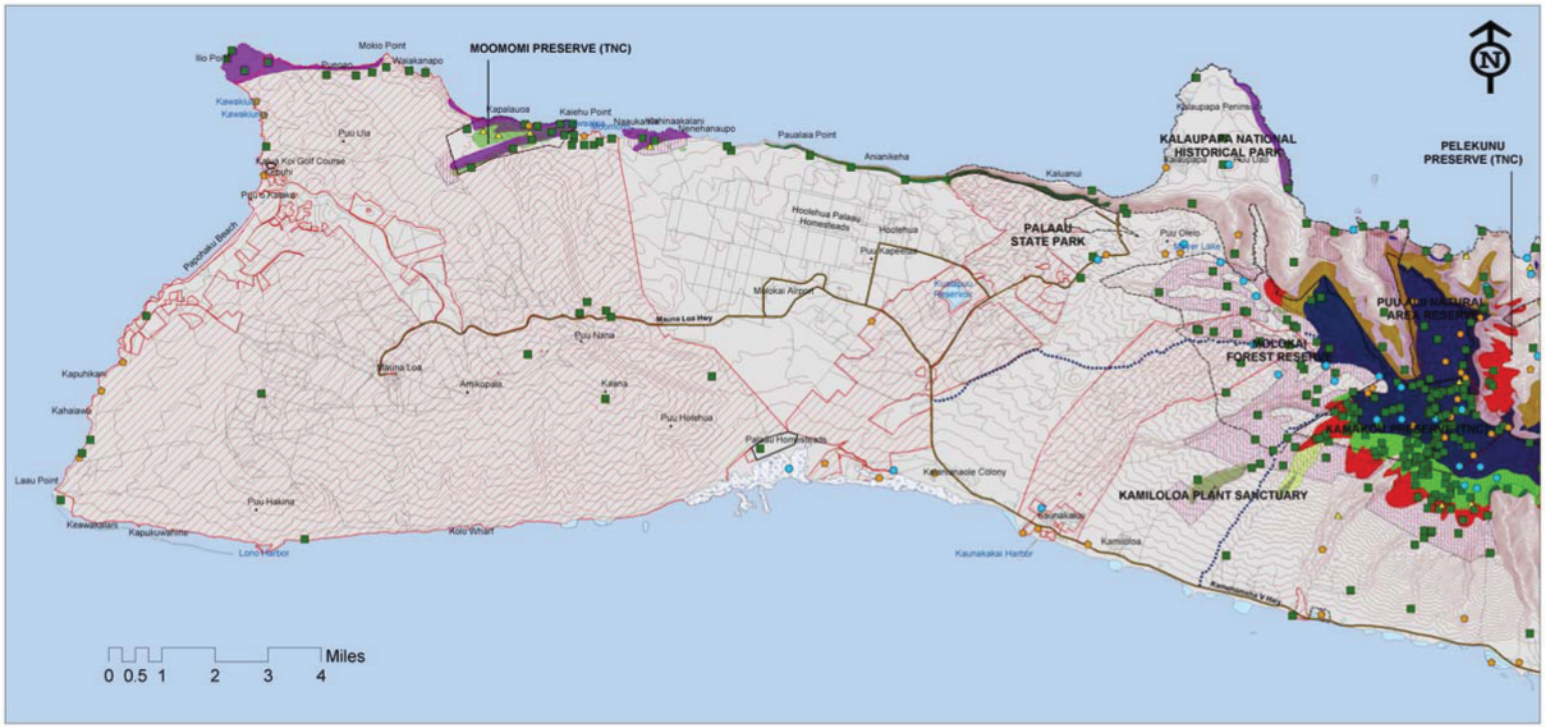

USGS U.S. DEPARTMENT OF THE INTERIOR U.S. GEOLOGICAL SURVEY
KAUAKOI HAWAIIANS
Cultural Sites
at
Kalaukoi Molokai
Assistance by Monica Mata
April 2001
Key
PACIFIC OCEAN
KAIWI CHANNEL
KALAUKOI
KALAUKOI HOMESTEAD
PINEAPPLE FIELDS
PUU HA PELL PASTURE
KAMAKOU
KAMAKOU
PACIFIC OCEAN
PACIFIC OCEAN
KAUNAKAKAI
KAUNAKAKAI
KAUNAKAKAI


Kaluakoi Estates
Kapukahehu Bay
Kaunalu Bay
Po'olau Beach
Kapuhikani Point
Kaunalā Bay
Kahalawa Point
Kamāka'ipō
Kamakaipo Gulch
Kaupoa Beach Camp Road (Coral Road)
Kaulapuu Road
Kaulopuu Road
Kaunalu Gulch
Kaheu Gulch
Wiser Road (Coral Road)
Hakina Gulch
Puu Hakina
Project Boundary
Lā'au Point
USA Lighthouse Station
Keawekalani Beach
Kahalepōhaku
Kapukuwahine
CULTURAL & RESOURCE PROTECTION ZONE
LA`AU POINT
Island of Molokai
AREA SCALE
20 Acres
10 ac.
10 ac.
NORTH
LINEAR SCALE (FEET)
0
800
1600
2800
PBR HAWAII
Legend
Cultural Protection Zone (with Archaeological site to be preserved)
Shoreline Conservation Zone
Archaeological Sites
Preserve
Burial / Possible Burial
Additionally Recorded Burial (May 2004)
Data Recovery
No Action
NOTE: Site areas are conceptual only and not illustrated to scale. Refer to Kahalawa to Hakina, Ahupua'a of Kaluakoi, Island of Moloka'i, Archaeological Mitigation Plans (Cultural Landscapes Hawaii, June, 2001).

APPENDIX 3: NATURAL RESOURCES: TERRESTRIAL MAP, AQUATIC MAP, AND SUMMARY MAP

MOLOKA'I RESOURCE ASSESSMENT: NATURAL RESOURCES - TERRESTRIAL





Data Sources:

Natural Heritage Rare Species Occurrences - Hawaii Natural Heritage Program (TNC of Hawaii)
USFWS Critical Habitat - USFWS
Native Dominated Landscape Vegetation - HI NHP
Protected Reserves - Hawaii Office of State Planning (OSP)
Na Ale Hele State Trails & Access - Hawaii Department of Land and Natural Resources

Prepared By: The Conservation Fund
May 19, 2004

- Molokai Ranch Property
- Major Roads
- 100' Contours
- Protected Reserves
- Na Ale Hele State Trails
- USFWS Critical Habitat

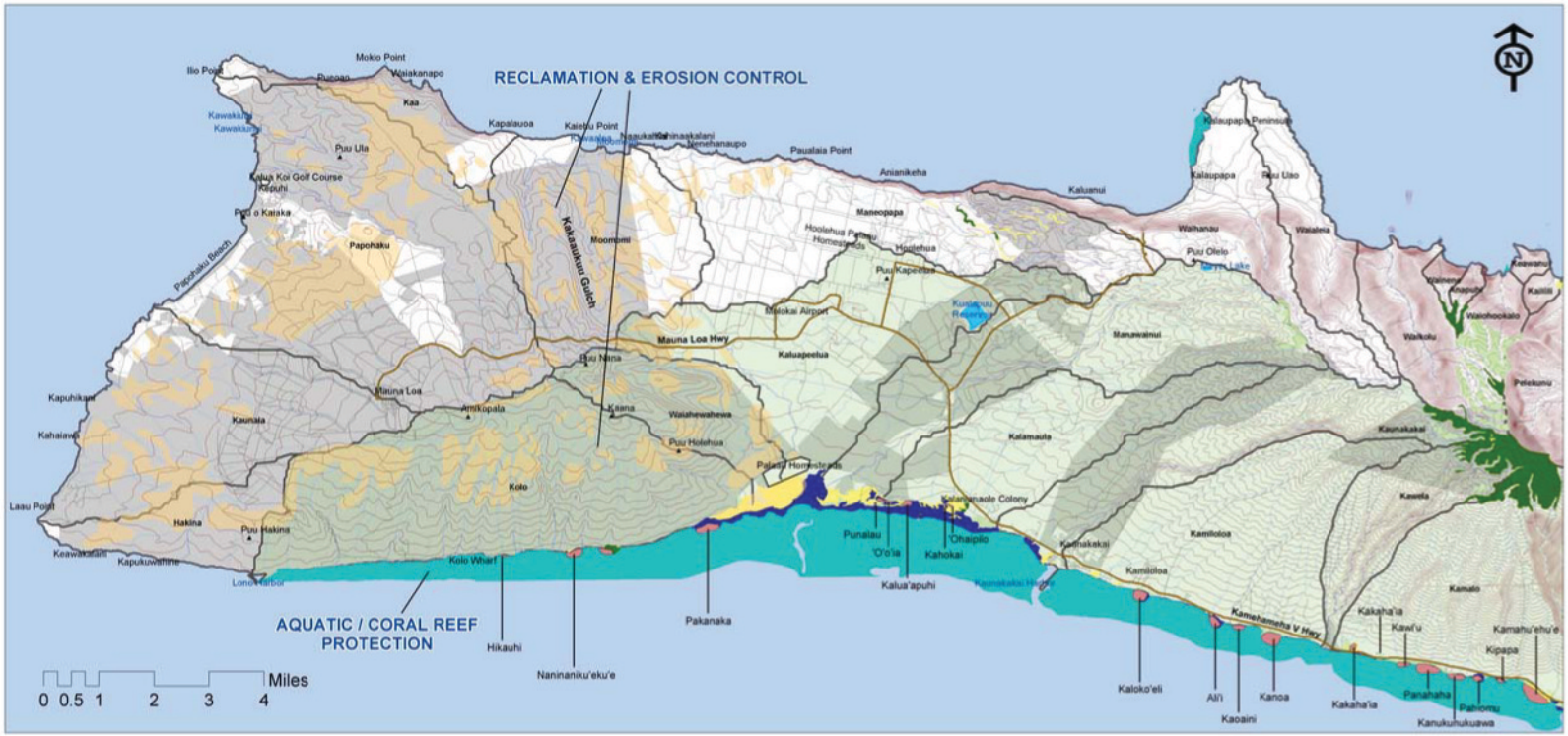
Native Dominated Landscape
Community Type
- Coastal Dry Shrubland & Grassland
- Coastal Mesic Forest & Shrubland
- Dry Cliff
- Lowland Dry Forest & Shrubland
- Lowland Mesic Forest & Shrubland
- Lowland Wet Forest & Shrubland
- Montane Mesic Forest & Shrubland
- Montane Wet Forest & Shrubland
- Wet Cliff
- Nonnative

Natural Heritage Rare Species
Element Occurrence
- Vertebrate
- Invertebrate
- Plant
- Natural Community

Polygons
- Natural Community
- Plant

MOLOKA'I RESOURCE ASSESSMENT: NATURAL RESOURCES - AQUATIC





Data Sources:

Hydrography - Perennial and intermittent streams and water bodies (USGS, 1983)
Wetlands and Coral Reefs - USFWS / National Wetlands Inventory (WSI)
Watersheds - Hawaii Department of Land and Natural Resources
Erosion - Identified from Air Survey Hawaii, Inc. aerial photo (1998)
Fishponds - HOSP

Prepared By: The Conservation Fund
May 20, 2004

- Molokai Ranch Property
- Major Roads
- 100' Contours
- Perennial Streams
- Intermittent Streams
- Watersheds
- Critical Watersheds for Coral Reef Protection
- Erosion
- Fishponds

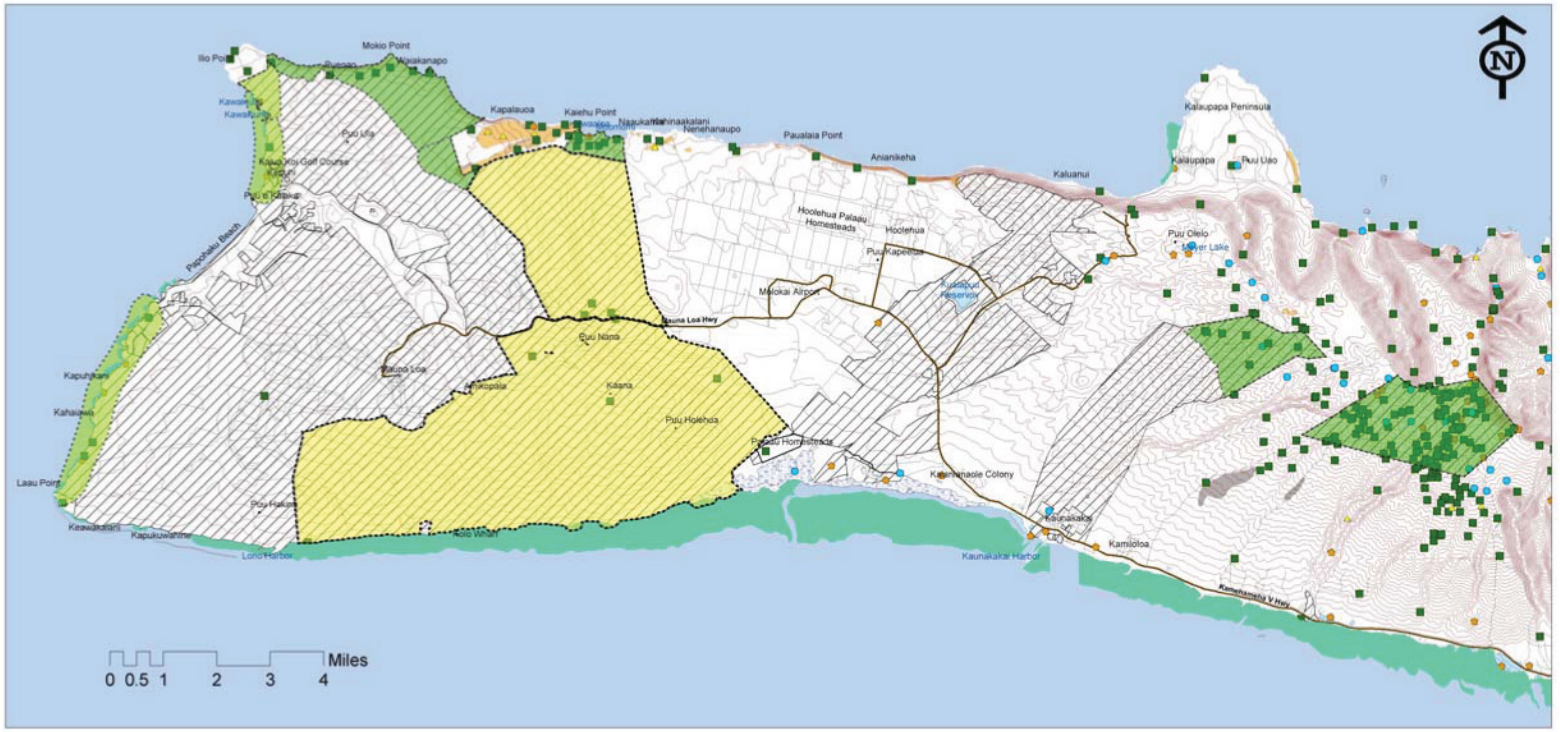
Wetland Type

Tidal
- Marine / Coral Reef
- Estuarine

Non-tidal
- Riverine
- Lacustrine
- Palustrine - Emergent
- Palustrine - Scrub/Shrub
- Palustrine - Forested

MOLOKA'I RANCH RESOURCE SUMMARY: NATURAL RESOURCES





- Molokai Ranch Property
- Major Roads
- 100' Contours
- Coral Reefs

Natural Heritage Rare Species

Element Occurrence
- Vertebrate
- Invertebrate
- Plant
- Natural Community

Polygons
- Natural Community
- Plant

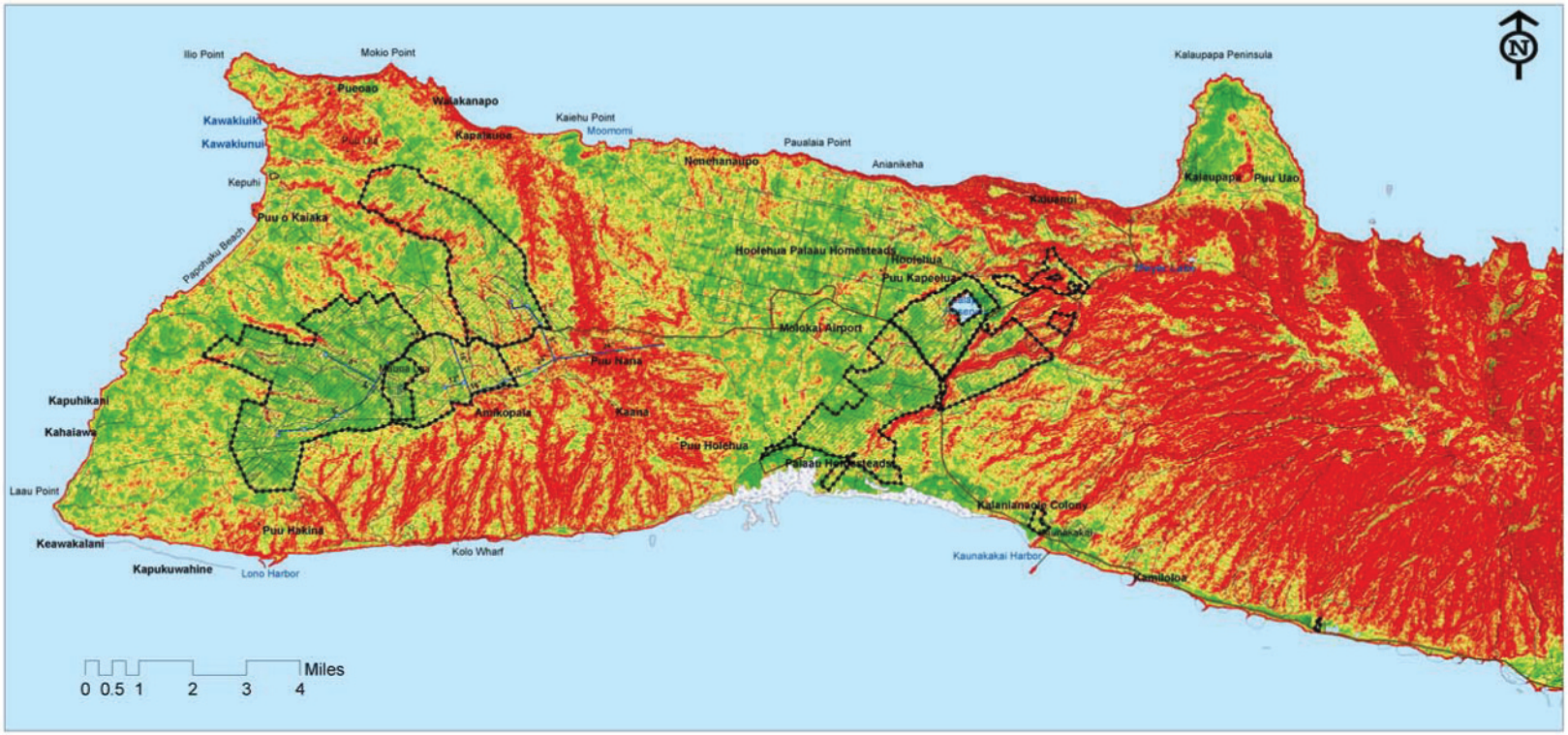
PriorityAreas (from Environment Committee)
- Rare Species / Nativel Ecosystem Preservation
- Coastal Habitat Management Protection
- Watershed / Aquatic Resource Protection

Prepared By: The Conservation Fund
August 6, 2004

APPENDIX 4: AGRICULTURAL SUITABILITY CLASSIFICATION & PROPOSED AGRICULTURAL EASEMENT LANDS MAP AND AGRICULTURAL EASEMENT LAND MAP

MOLOKA`I RANCH MASTER USE PLAN
AGRICULTURAL SUITABILITY CLASSIFICATION & PROPOSED AGRICULTURAL EASEMENT LANDS





Data Sources:

Slopes derived from 10-meter USGS DEM
Water Infrastructure - Moloka`i Ranch
Land Capability Classification - Alton Arakaki, University of Hawaii
Proposed Agricultural Easements - Land Use Committee

Prepared By: The Conservation Fund
August 10, 2005

Agricultural Easements (14,390 acres)
Irrigation Pipeline
Valve

Suitability Class (% Slope)

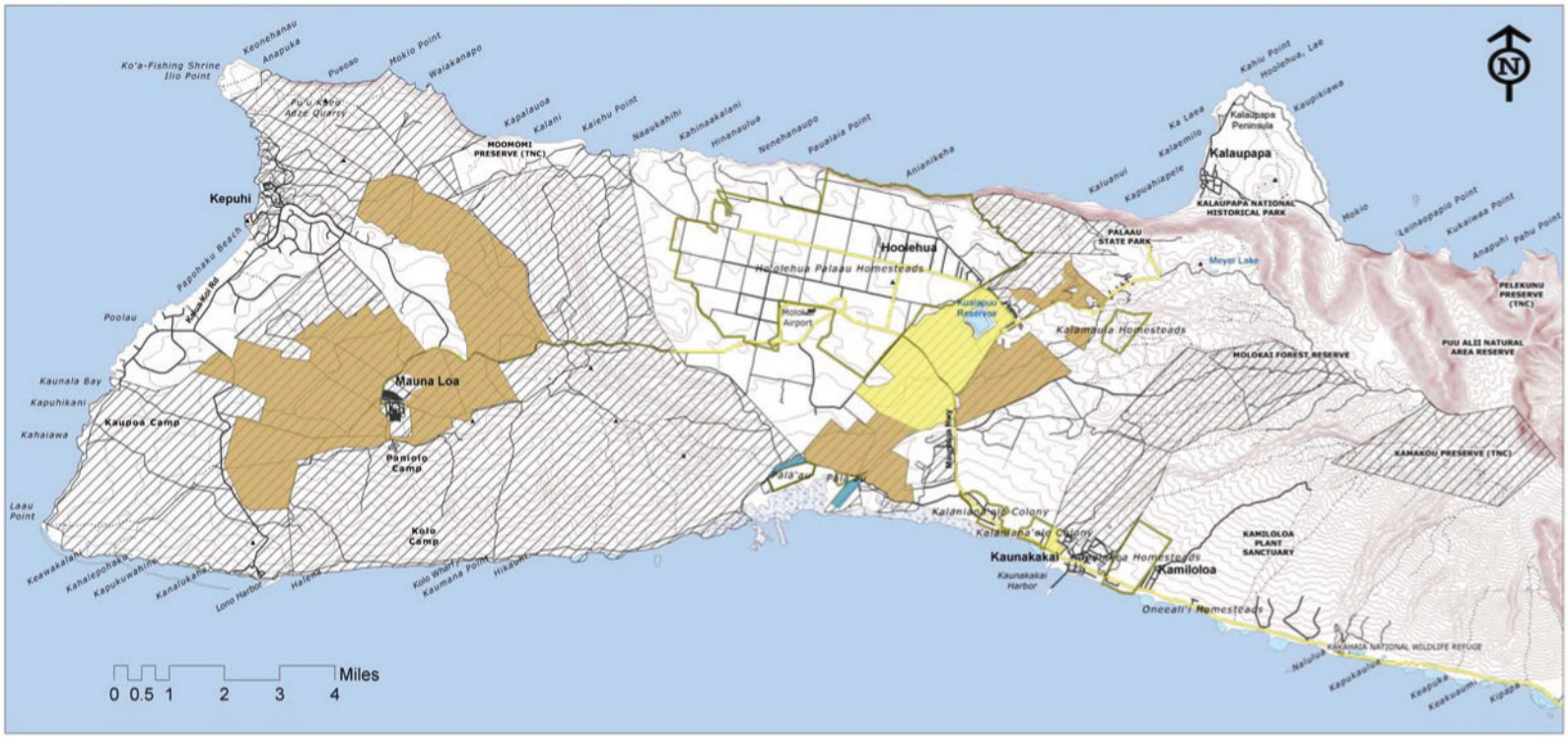
- Class I: 0 - 2.99%
- Class II: 3 - 7.99%
- Class III: 8 - 14.99%
- Class IV: 15 - 24.99%
- Class VI: 25- 39.99%
- Class VII: 40 - 69.99%
- Class VIII: 70 - 100%

Land Capability Classification

Class	Slope	Use
Class I	0 to 2 percent	Suitable for cultivation
Class II	3 to 7 percent	
Class III	8 to 14 percent	
Class IV	15 to 24 percent	
Class V	0 to 2 percent, water table	Grass production, grazing, forestry, wildlife
Class VI	25 to 39 percent	Pasture, orchard, woodland, wildlife, recreation
Class VII	40 to 69 percent	Pasture, woodland, wildlife
Class VIII	70 or more percent	Recreation, wildlife

MOLOKA'I RANCH MASTER USE PLAN: AGRICULTURAL EASEMENT LAND





Molokai Ranch Property
Major Road
Secondary Road
Minor Road
4WD Road
Trail
100' Contours

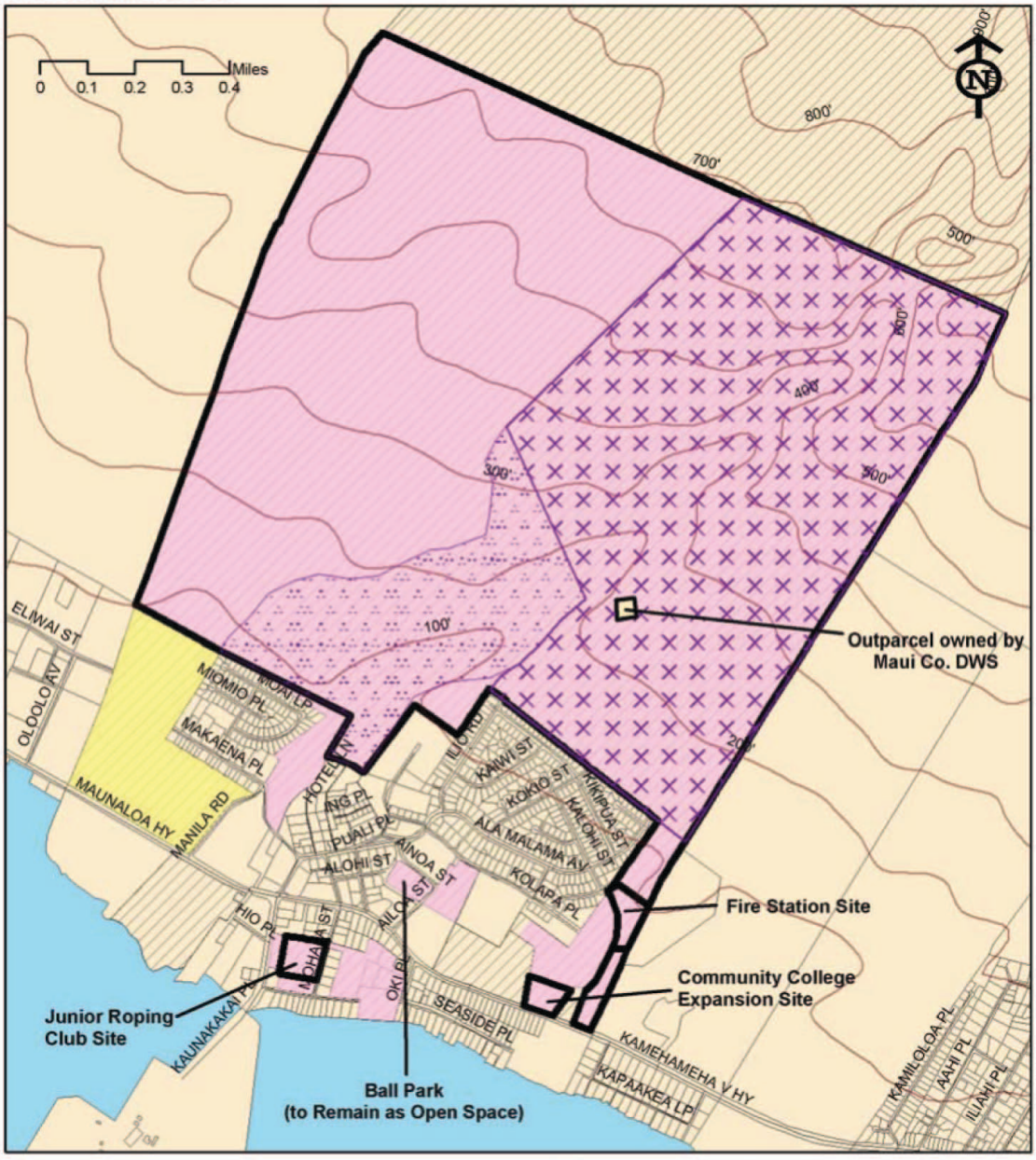
Proposed Agricultural Districts
Hi-Value or Intensive Agriculture
Aquaculture
Other/Extensive Agriculture

Prepared By: The Conservation Fund
October 10, 2005

APPENDIX 5: COMMUNITY EXPANSION: KAUNAKAKAI MAP, MAUNALOA AND KUALAPU‘U MAPS

* Color Map provided at end of report*

MOLOKA`I RANCH MASTER USE PLAN - KAUNAKAKAI

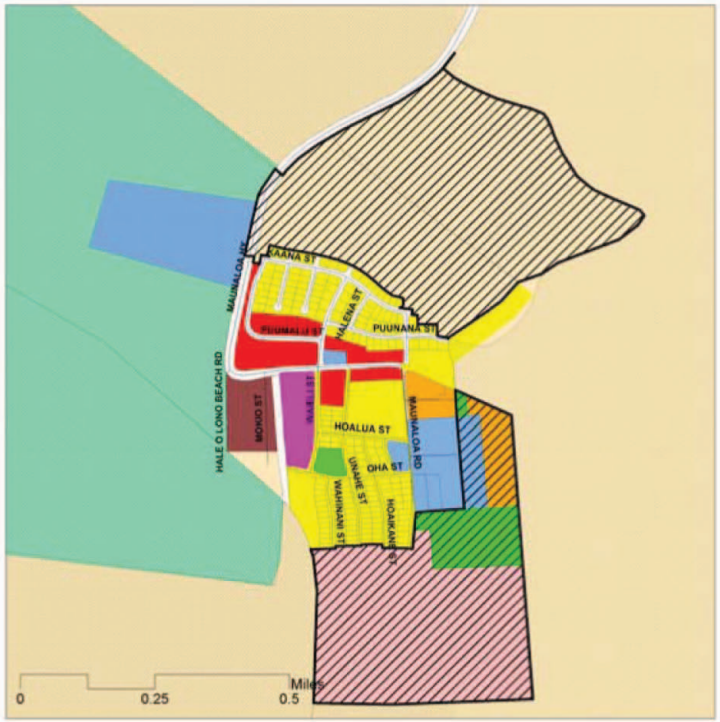


Prepared By: The Conservation Fund
October 5, 2005

MOLOKA`I RANCH MASTER USE PLAN
COMMUNITY EXPANSION

* Color Map provided at end of report*

Maunaloa



Kualapu`u



Prepared By: The Conservation Fund
October 10, 2005

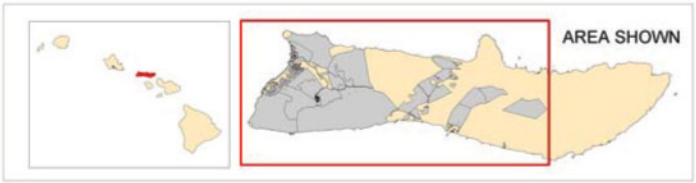
Maui Co. Tax Parcels
Roads

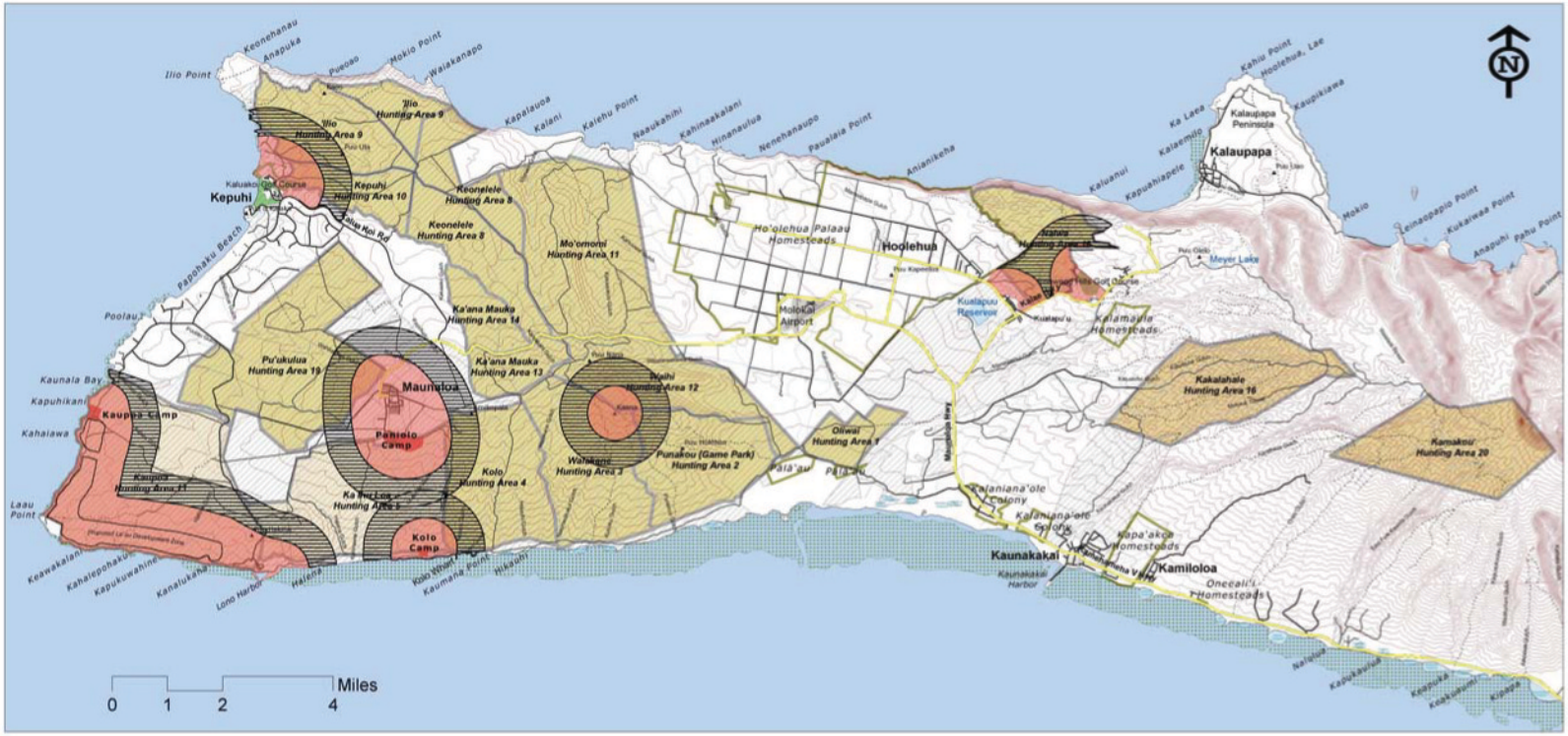
Proposed Land Use Districts
Community Expansion
Cultural Resource
Agriculture

Community Plan Designations
Single Family
Multi-family
Hotel
Commercial
Light Industrial
Heavy Industrial
Airport
Agriculture
Rural
Project District
Open Space
Conservation
Public/Quasi-public
Park
Park/Golf Course
Roads

APPENDIX 6: HUNTING MAP

MOLOKA'I RANCH RESOURCE SUMMARY: HUNTING MAP





Data Sources:

USGS Hawaii Data Clearinghouse
Roads, Homestead

Hawaii Office of Planning
Coral Reefs, Contours, Molokai Ranch Property, Place Names

Moloka'i Ranch Community-based Master Plan - Land Use Committee
Hunting Areas, Safety Buffer

Prepared by: The Conservation Fund
October 10, 2005

- Molokai Ranch Property
- Homestead
- Coral Reefs
- 100' Contours
- Major Road
- Secondary Road
- Minor Road
- 4WD Road
- Trail

Hunting Areas

- Bow
- Rifle
- Other Management
- 1/2-mile safety zones (around populated areas)
- 1-mile transition zones (Bow Hunting ONLY)

APPENDIX 7: SUBSISTENCE FISHING MANAGEMENT ZONE MAP

MOLOKA'I RANCH MASTER USE PLAN
SUBSISTENCE FISHING MANAGEMENT ZONE





Community-Based Subsistence Fishing Zone
- Adjacent to MPL and Trust-Owned Lands
- Contingent on Partnership Agreements

- Molokai Ranch Property
- Homestead
- Camp
- Ancient Fishpond

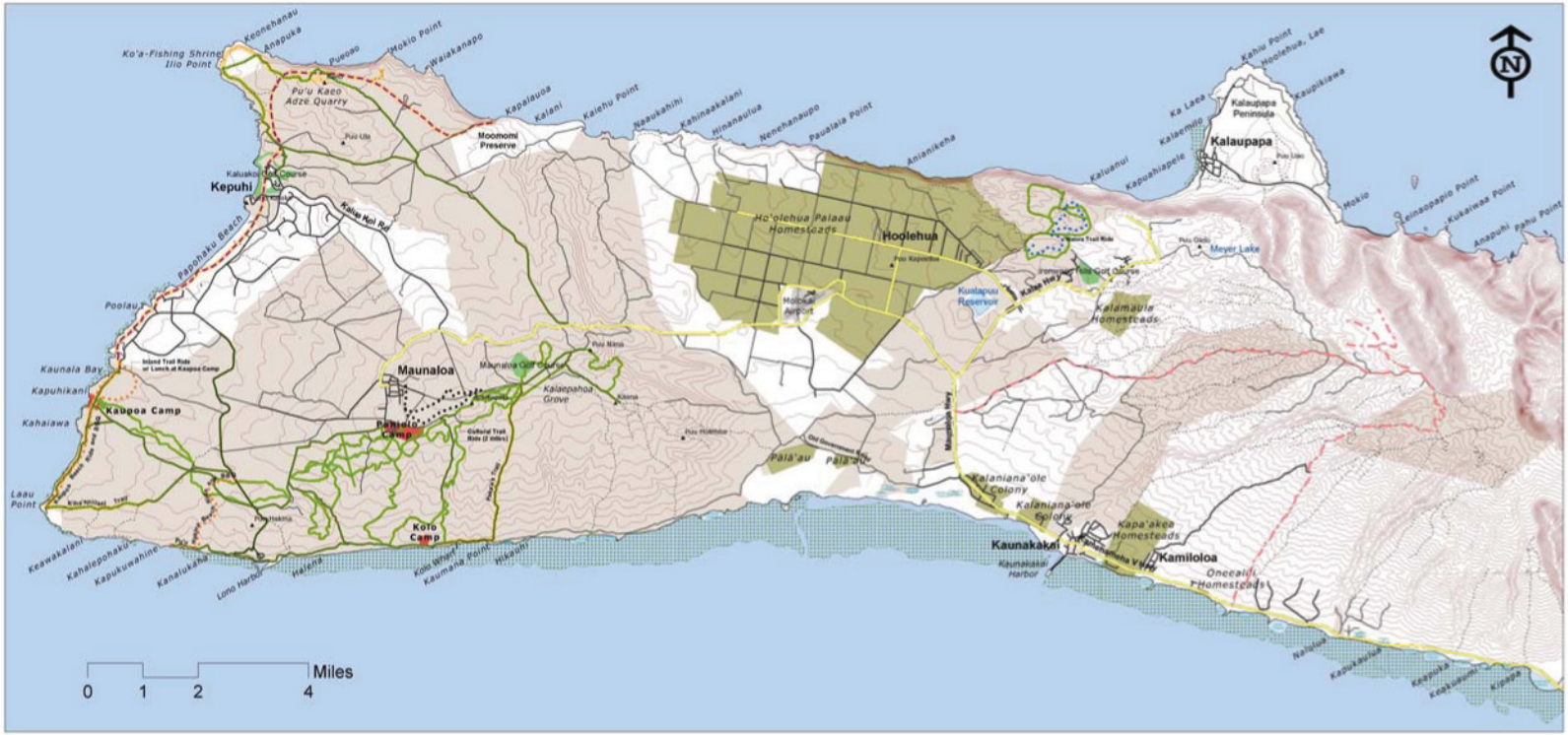
- Major Road
- Secondary Road
- Minor Road
- 4WD Road
- Trail
- 100' Contours

Map Prepared By:
The Conservation Fund
October 7, 2005

APPENDIX 8: RECREATION/TRAILS MAP

MOLOKA'I RANCH RESOURCE SUMMARY: RECREATION / TRAILS




Kepuhi
Maunaloa
Kaupoa Camp
Hoolehua
Kalaupapa
Kaunakakai
Kamiloloa
Meyer Lake
Ho'olehua Palaau Homesteads
Kalamaula Homesteads
Kapa'akea Homesteads
Kalaniana'ole Colony
Kalaniana'ole Estates
Oneali'i Homesteads
Moomomi Preserve
Pu'u Kaeo Adze Quarry
Kaluako'i Golf Course
Kaluako'i Resort
Papohaku Beach
Kaiaka Nui Rd
Kaunala Bay
Kapuhikani
Kahaiawa
Laau Point
Poolau
Kalaepahoa Grove
Maunaloa Golf Course
Pala'au
Kaunakakai Harbor
Kuolapuu Reservoir
Molokai Airport
Kaiaka Rd
Kamehameha Hwy
Kaupiakiawa
Kahiu Point
Hoolehua Lae
Ka Laea
Kalaemoo
Kaluanui
Kapuahiapele
Anianikeha
Pauolaia Point
Nennehanaupo
Hinanaulua
Kahinaakalani
Naaukahihi
Kalehu Point
Kalani
Kapalauoa
Walakanapo
Mokio Point
Pueoeo
Anapuka
Keonehanau
Ko'a-Fishing Shrine
Ilio Point
Kaluanui Point
Kaupiakiawa
Mokio
Keinaopapio Point
Kukaiwaa Point
Anapuhi Pahu Point
Kaiaka Point
Kaiaka Bay
Kaiaka Bay Beach Park
Kaiaka Bay Beach
Kaiaka Bay Beach Park
Kaiaka Bay Beach
Kaiaka Bay Beach Park
Kaiaka Bay Beach

APPENDIX 9: CULTURAL RESOURCE OVERLAY ZONE MAP

MOLOKA'I RANCH MASTER USE PLAN
CULTURAL RESOURCE OVERLAY ZONE





Data Sources:

USGS Hawaii Data Clearinghouse
Roads, Homesteads

Hawaii Office of Planning
Contours, Molokai Ranch Property, Place Names, Fish Ponds

Maurice Major, Archaeologist
West End Archaeological Survey Data

Cultural and Land Use Committees
Other Archaeological Sites, Makahiki Grounds, Land Use Districts and Overlay Zones

Molokai Ranch Property
Homestead
Major Road
Secondary Road
Minor Road
4WD Road
Trail

Cultural Resource Protection Overlay
Subsistence Fishing Zone
Partnership Subsistence Fishing Zone

West End Arch. Sites (M. Major)
Additional Archaeological Sites
Kualapu'u Makahiki Grounds
Ancient Fishponds
Camp

Prepared By: The Conservation Fund
October 7, 2005

APPENDIX 10: REFERENCES

REFERENCES

Maui County. Department of Planning. "Molokaʻi Community Plan" (2001). <http://www.co.maui.hi.us/departments/Planning/pdf/molokai.pdf>

Nature Conservancy, The (2005). "Kamakou Preserve" and "Moʻomomi Preserve". <http://nature.org>

Summers, Catherine C. (1971). "Molokai: A Site Survey". Department of Anthropology, Bernice P. Bishop Museum. Honolulu, Hawaii.

University of Hawaii, Department of Urban & Regional Planning (2005). "Pāpōhaku Dunes Draft Preservation Plan." Planning Practicum Spring 2005.

Appendix B

Botanical Survey

LA'AU POINT PLANT SURVEY
November 2005 – June 2006

Prepared by: Bill Garnett
Revised: 9 Sept 2006

1. Introduction

La'au Point is the southwest corner of the island of Moloka'i. The study area includes lands along the coastline from Kaunala Bay in the north to Hale o Lono Point in the east. The Coast Guard Reservation that includes La'au Point is not included. Low annual rainfall is a defining characteristic of this region. Historical use of this area for grazing and wild land fires have left few native plants, except for those that grow on the sandy beaches. Even there, Axis deer have significantly reduced the abundance and diversity of native plants.

This botanical survey of La'au Point was contracted by Molokai Properties Limited (MPL) in September 2005 to provide information on native and rare plants and natural communities within the La'au Point area. The study area was defined by the "project boundary" provided by MPL (see Map 1).

This report summarizes the findings from a combination of ground and aerial surveys. It includes:

- Brief descriptions, plant checklist and map for the seven plant communities currently found on La'au Point – from the coastline to inland areas.
- Location & relevant natural history for three rare Hawaiian plant species observed during the survey
- List of eight additional rare Hawaiian plant species known historically from the area but not observed during this survey
- Brief vegetation management options for future consideration.

Photographs, sample field forms and additional information are included as appendices on the report CD.

2. Survey methods

A total of five person-days were spent surveying La'au Point from 28 November 2005 through 6 June 2006. Ground surveys were conducted on foot covering the varying terrain and the areas that promised the highest native plant species diversity. A GPS was used to log the survey routes and record significant features. On 15 May 2006, a helicopter was used to conduct an aerial photographic survey and spot any unique areas that were not previously visited on the ground.

The survey period was extended to allow for adequate observations after the winter rains, which came in late March 2006. This was necessary to detect rare and native plants that only come up in the wet season, including species historically known from the area.

3. Results

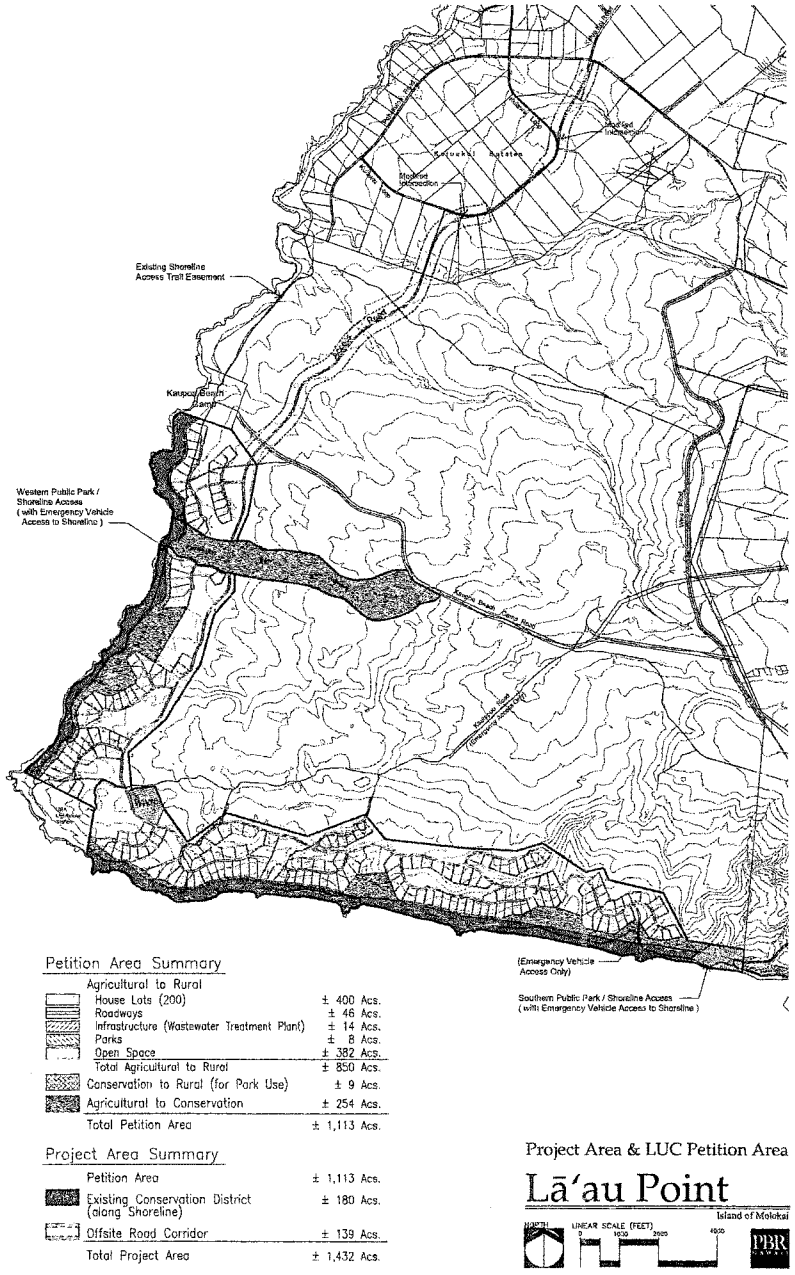
Healthy native plant communities are still found in the sandy beach habitat of La'au Point, including the most extensive example of *Cressa* herbland in the main Hawaiian islands. In addition to *Cressa*, which is considered rare in Hawaii, localized populations of two rare Hawaiian plant species were found in areas dominated by non-native species. The federally endangered `ihi`ihilauakea (*Marsilea villosa*) was found near one of the seasonal wetlands, and a population of the endemic Hawaiian cotton or ma'o (*Gossypium tomentosum)* was found where the Kamakaipo drainage meets the coast. Otherwise, the vast majority of La'au Point is vegetated by non-native plants.

The location of each major habitat/plant community and rare plant population are indicated on Maps 2 and 3. A complete checklist of both native and non-native plant species observed in each habitat is provided in Table 1.

Plant Communities Found in Study Area

Sandy Beach
The sandy beach strand habitat contains examples of three native plant communities, including the best, most extensive example of a seasonal herb-land dominated by *Cressa truxillensis* in the main Hawaiian islands. The strand also includes scattered surviving patches of 'aki 'aki *(Sporobolus virginicus)* grasslands along the west facing beaches, and small patches of 'akulikuli (*Sesuvium portulacastrum*) herbland are found spreading onto the beach in areas that have seasonal streams. Other native plants found growing on the beach include: pohuehue or beach morning glory (*Ipomoea pes-caprae),* the sedge *Fimbristylis cymosa,* and pohinahina *(Vitex rotundifolia).* Kiawe and animal grazing have been the main pressures on these plant communities.

Rocky Shoreline Shrubland/Grassland
Only 10% of this habitat currently has native plant cover, but it contains the highest number of native plant species including: naupaka (*Scaevola sericea),* uhaloa *(Waltheria indica),* ma'o or Hawaiian cotton (*Gossypium tomentosum),* 'ilima (*Sida fallax),* alena (*Boerhavia diffusa),* pau o Hi'iaka (*Jacquemontia ovalifolia ssp. sandwicensis),* 'ihi (*Portulaca lutea),* akulikuli (*Sesuvium portulacastrum),* the grass *Panicum fauriei var. latius,* aki'aki (*Fimbristylis cymosa ssp. umbellato-capitata),* and kakonakona (*Panicum torridum).* The non-native components that dominate this community are golden crown beard *(Verbesina enceliodes),* Australian salt bush (*Atriplex semibaccata),* dog fennel (*Dessodia tenuiloba*) and kiawe (*Prosopis pallida).* Endangered plants historically known from this community are *Lipochaeta degeneri, Sesbania tomentosa* and *Portulaca vilosa.*



Seasonal Wetlands

This community is found in mud flats that are flooded when consistent seasonal rains saturate the soil. Under drought situations, the community is dominated by several dryland weed species, including cocklebur (*Xanthium saccharatum*), bristly foxtail (*Setaria verticilata*), finger grass (*Chloris barbata*) and the vine *Merremia aegyptica.* The perimeter of the seasonal wetlands is dominated by kiawe trees (*Prosopis pallida*) and in some areas guinea grass (*Panicum maximum*). The population of endangered `ihi`ihilauakea (*Marsilea villosa*) is found 50 meters from one of the seasonal wetlands and most likely occurred in that community before, as this is the plant's preferred habitat. Seasonal wetlands are natural settling basins which can reduce soil loss and near shore siltation.

Kiawe Lowland Dry Forest

Kiawe forests are the most widespread plant community in the study area. In many areas, these forests stretch up to the high tide line due to the trees' ability to utilize brackish groundwater. The kiawe forest is most developed in areas where groundwater is available, just inland of the coastal strand and in the drainages. The native components of this community are 'ilima, *Abutilon incanum,* and pili grass (*Heteropogon contortus)* which is currently rare in the study area. Historically, 'ilima and pili grass along with *Chamaesyce skottsbergei and* ohai (*Sesbania tomentosa)* would have been the dominant plant community in the inland areas of the study area before grazing, fire and weeds dramatically changed the community structure. Historic native components of the drainages in this zone would have included wiliwili *(Erythrina sandwicensis),* ohe makai (*Reynoldsia sandwicensis*)and ma'o (*Gossypium tomentosum).* Endangered species historically known from this kiawe-dominated zone of the study area include Hawaii's state flower, ma'o hau hele (*Hibiscus brackenridgei ssp. molokaianus).*

Lowland dry mixed shrub and grasslands

This plant community occupies the inland areas where rocky terrain, erosion and lack of water have created gaps in or slowed the ingress of the kiawe forest community. Lantana is a dominant species in these dry exposed nutrient poor areas.

Map 2.

2006 La'au Point Vegetation Survey
Vegetation Communities

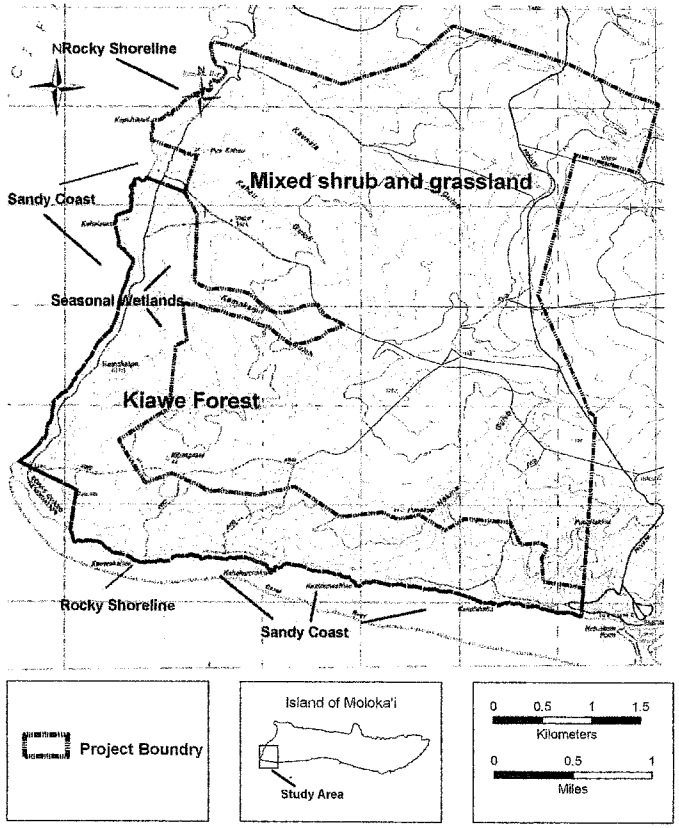


Table 1

LA'AU POINT PLANT CHECKLIST

November 2005 – June 2006

STATUS	SCIENTIFIC NAME	COMMON NAME	Beach	Coastal Strand	Shrubland	Kiawe Forest	Seasonal Wetland
A	*Abutilon grandifolium*	Hairy abutilon, ma`o			X	X	
I	*Abutilon incanum*	Ma'o		X	X	X	X
A	*Acacia farnesiana*	Klu, kolu		X	X	X	
A	*Amaranthus spinosus*	spiny amaranth			X		X
A	*Ageratum conyzoides*	Maile hohono					
A	*Anagallis arvensis*	Scarlet pimpernel					
A	*Arenaria serpyllifolia*	Thyme-leaved sandwort					
I	*Artemisia australis*	Hinahina kuahiwi					
A	*Atriplex semibaccata*	Australian saltbush					X
A	*Bidens pilosa*	Spanish needle					
I	*Boerhavia repens*	Alena					
A	*Bothriochloa barbinodis*	Fuzzy top		X	X		
A	*Bothriochloa pertusa*	Pitted beardgrass			X		
A	*Bromus rigidus*	Ripgut grass		X	X		
A	*Cenchrus ciliaris*	Buffelgrass		X	X	X	
A	*Centaurium erythraea ssp. erythraea*	Bitter herb, European centaury		X	X		
A	*Chamaecrista nictitans ssp. patellaria var. glabrata*	Partridge pea, lauki		X	X	X	X
E	*Chamaesyce degeneri*	`Akoko, koko, kokomalei		X			
A	*Chamaesyce hirta*	Hairy/garden spurge, koko kahiki	X	X	X	X	X
A	*Chamaesyce prostrata*	Prostrate spurge	X	X	X	X	
A	*Chenopodium carinatum*	Tasamnian goosefoot	X	X	X		
A	*Chenopodium murale*	Lambs quarters		X			
A	*Chloris virgata*	Feather fingergrass			X	X	
A	*Conyza bonariensis*	Hairy horseweed				X	
A	*Coronopus didymus*	Swinecress		X	X	X	
I	*Cressa truxillense*						
E	*Cuscuta sandwichiana*	Dodder, kauna`oa, kauna`oa lei				X	
A	*Cynodon dactylon*	Bermuda grass, manienie		X			
A	*Dactyloctenium aegyptium*	Beach wiregrass	X				
A	*Datura stramonium*	Jimsom weed,		X	X		
A	*Dichanthium annulatum*	Blue stem			X		
A	*Digitaria ciliaris*	Henry's crabgrass, kukaepua`a			X		
A	*Digitaria insularis*	Sourgrass			X	X	
A	*Doryopteris decipiens*	Kumuniu			X	X	

STATUS	SCIENTIFIC NAME	COMMON NAME	Beach	Coastal Strand	Shrubland	Kiawe Forest	Seasonal Wetland
A	*Dyssodia tenuiloba*	Dog fennel	X	X	X	X	
A	*Emilia fosbergii*	Pua lele, sow thistle		X	X	X	
A	*Eragrostis tenella*	Japanese lovegrass			X		
A	*Erodium cicutarium*	Alfilaria, pin clover			X		
I	*Fimbristylis cymosa ssp. umbellato-capitata*	Aki'aki	X				
E	*Gnaphalium sandwicensium var. sandwicensium*	`Ena`ena		X			
E	*Gossypium tomentosum*	Ma'o		X			
E	*Heliotropium anomalum var. argenteum*	Hinahina, hinahina ku kahakai	X	X			
I	*Heliotropium curassavicum*	Seaside heliotrope, nena	X	X			
I	*Heteropogon contortus*	Pili grass			X		
A	*Hypochoeris radicata*	Gosmore, Hairy cat's ear		X			
A	*Indigofera suffruticosa*	Indigo		X	X	X	
I	*Ipomoea pes-caprae ssp. brasiliensis*	Beach morning glory, pohuehue	X	X			
E	*Ipomoea tuboides*	Hawaiian moonflower, koali pehu					
E	*Jacquemontia ovalifolia ssp. Sandwicensis*	Pa`u-o-Hi`iaka		X			
A	*Lantana camara*	Lantana		X	X	X	X
A	*Lepidium oblongum*	Pepper grass			X		
A	*Lepidium virginicum*	Garden pepper grass			X	X	
A	*Leucaena leucocephala*	Haole koa, koa haole, ekoa		X	X	X	
I	*Lipochaeta integrifolia*	Nehe		X			
I	*Lycium sandwicense*	`Ohelo kai, `ae`ae		X			
A	*Lycopersicon pimpinellifolium*	Currant tomato			X	X	
A	*Macroptilium lathyroides*	Wild bean, cow pea				X	
A	*Malvastrum coromandelianum ssp. Coromandelianum*	False mallow		X	X	X	
LE	*Marsilea villosa*	`ihi`ihi, `ihi`ihilauakea					X
A	*Medicago polymorpha*	Bur clover					
I?	*Merremia aegyptia*	Hairy merremia					
A	*Nicotiana Glauca*	tree tobacco		X	X		
A	*Oxalis corniculata*	Yellow wood sorrel, `ihi makole				X	
E	*Panicum fauriei var. latius*	Faurie's panicgrass	X				
A	*Panicum maximum*	Guinea grass		X			
E	*Panicum torridum*	Kakonakona					
A	*Plantago lanceolata*	Narrow-leaved plantain					
A	*Pluchea symphytifolia*	Sourbush					

STATUS	SCIENTIFIC NAME	COMMON NAME	Beach	Coastal Strand	Shrubland	Kiawe Forest	Seasonal Wetland
A	*Polycarpon tetraphyllum*	fourleaf manyseed					
I	*Portulaca lutea*	`Ihi		X			
A	*Portulaca oleracea*	Pigweed, `ihi		X			
A	*Prosopis pallida*	Algaroba, kiawe					
A	*Reichardia tingitana*	False sow thistle					
A	*Rhynchelytrum repens*	Natal redtop					
I	*Scaevola sericea*	Naupaka kahakai					
A	*Schinus terebinthifolius*	Christmas berry, wilelaiki				X	
I	*Sesuvium portulacastrum*	Sea purslane, `akulikuli	X				
A	*Setaria verticillata*	Bristly foxtail		X			
I	*Sida fallax*	`Ilima					
A	*Silene gallica*	Pink		X	X		
I	*Solanum americanum*	Glossy nightshade, popolo					
A	*Sonchus oleraceus*	Sow thistle, pualele					
A	*Sporobolus africanus*	Smutgrass, African dropseed					
I	*Sporobolus virginicus*	`Aki`aki	X	X			
A	*Stachytarpheta jamaicensis*	Jamaica vervain, oi		X	X	X	
A	*Tournefortia argentea*	Tree heliotrope		X			
I	*Tribulus cistoides*	Nohu					
A	*Tridax procumbens*	Coat buttons					
A	*Turnera ulmifolia*	Yellow alder				X	
A	*Verbesina encelioides*	Golden crown-beard		X	X	X	X
I	*Waltheria indica*	`Uhaloa, hi`aloa		X	X	X	X

Key to status column: A-alien, I-indigenous, E.-endemic,
L.E.-federally listed endangered species

Rare Plant Species Found in Study Area

`Ihi`ihilauakea (*Marsilea villosa)*

`Ihi`ihilauakea is an endangered, endemic water fern found only in the Hawaiian islands, restricted to areas with irregular flooding regimes. Currently, it is known from three populations on O`ahu and two populations on Moloka'i. Many of the historic populations on O`ahu were destroyed by drainage of ponding areas, habitat degradation, competition from alien plants, off road vehicles and development.

This unique fern resembles a four-leaf clover, with four leaflets borne at the end of a leaf stalk. The plant occurs either in scattered clumps or as a dense interwoven mat, depending on the competition with other species for limited habitat resources. Marsilea villosa requires periodic flooding for spore release and fertilization, followed by a decrease in water levels for the young plants to establish, and finally dry soil for the plants to mature. For *Marsilea villosa*, flooding and sexual reproduction may occur as

infrequently as once every ten or more years, due to the infrequency of sufficiently heavy rains in the lowland areas of Hawai'i. Hence this plant can remain dormant and undetected for many years, yet continue to have viable sporocarps in the soil.

A few details on the sexual reproduction of *Marsilea villosa* may be useful. It is initiated through the production of a hard sporocarp borne on the rhizome leaf pair node. The sporocarp will mature only if the soil dries below threshold levels for leaf growth. The sporocarp remains in the soil for an extended period of time and must be scarified before it will open. It is not known how the sporocarp is scarified in *Marsilea villosa,* but bacterial action is thought to erode the wall of the sporocarp to the point that water can be absorbed and force the sporocarp to open. Standing water is necessary for the sporocarp to open and release the male and female spores. Standing water also is needed for the sperm to swim to the female spore containing the egg. The method of dispersal of *Marsilea villosa* sporocarps is unknown, although in other species, water birds have been known to disperse either internally or externally (USFWS 1996).

Cressa truxillensis

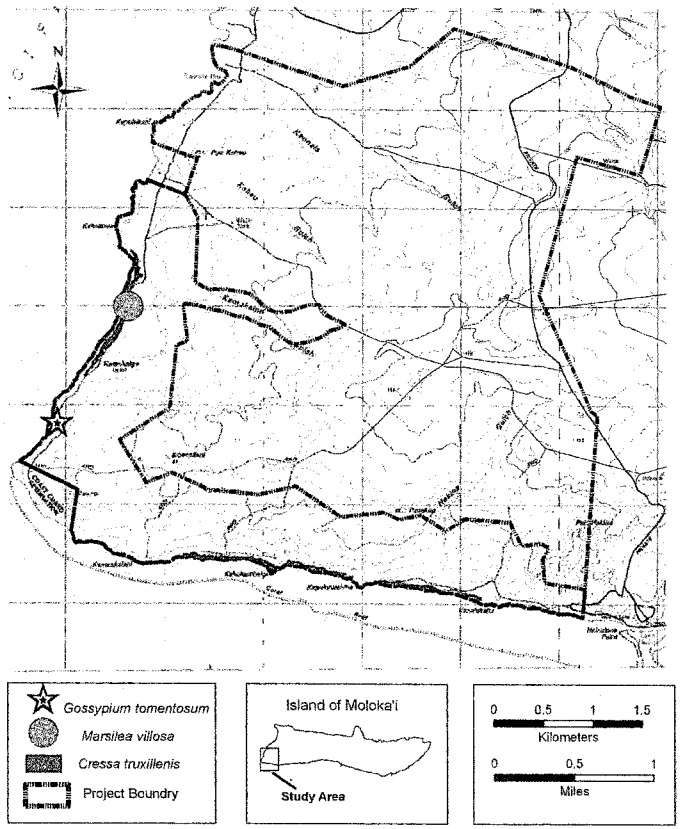
Cressa truxillensis is indigenous to Hawaii, where it is considered rare. The populations scattered along Molokai's sandy coasts from Ilio point to Kaunakakai are considered to be the best in the main Hawaiian islands. The next best known population is on Kahoolawe. As with many native plants found in dry coastal locations, *Cressa* is most abundant during the wet season.

Ma'o *(Gossypium tomentosum)*

Hawaii's endemic cotton was probably a dominant species in the rocky areas and clay flats of the study area before grazing and fires degraded the habitat. On this survey, a stand of ma'o was found only where the Kamakaipo drainage meets the coast. Individual plants may occur elsewhere off the survey routes. Ma'o populations are declining on Moloka'i and throughout the Hawaiian islands. *Gossypium tomentosum* is a shrub with yellow flowers. The short brownish fibers on the seeds of the Hawaiian cotton are not commercially useful, but the Hawaiian plants have been used in cotton breeding programs in attempts to improve disease resistance in commercial cotton.

Map 3.

2006 La'au Point Vegetation Survey
Significant Plants



Historic Rare Plant Occurrences

A literature review revealed eight rare or endangered Hawaiian plant species that were recorded from West Molokai in the past but were not observed during this survey.

Rare Plant Species	Observer & Last Date Observed
Achyranthes splendens	Hillebrand 1850
Hibiscus brackenridgei molokaianus	Caum 1930
Lipochaeta degeneri	Degener1928
Portulaca villosa	Munro 1920's
Sesbania tomentosa	Hillebrand 1850
Solanum nelsonii	Forbes 1880's
Tetramolopium conyzoides	Munro 1920's
Chamaesyce skottsbergei	Degener 1938

4. Conclusions

According to the Petition Area Summary map provided, none of the significant plant populations are found within the areas indicated for the 200 house lots or rezoning from Agriculture to Rural. The *Cressa truxillensis*, Hawaiian cotton (*Gossypium tomentosum*) and *Marsilea villosa* populations are all found within the existing or proposed Conservation Districts and Public Park/Shoreline Accesses shown on the map. The Marsilea population occurs on both sides of the existing unimproved road near where it crosses the Western Public Park/Shoreline Access and will require consideration in the new road. The seasonal wetlands are potential habitat for additional *Marsilea villosa* populations and also appear to be in the areas proposed to be re-zoned from Agriculture to Conservation.

While the native vegetation in the study area has been severely impacted by historical fire, grazing and non-native competitors, the remaining native elements, slopes and seasonal wetlands are worthy of stabilizing and will enhance the site. The high deer population in the watershed above the study area keeps all ground cover species (native and non-native) from developing and retaining rainfall. The lack of protective groundcover has resulted in erosion scars and excessive runoff, which causes siltation of the near shore waters after even minor rain events.

Management options for the rare and native plants and communities found in the study area should be considered. The *Marsilea villosa* population is located within the coastal set back zone and could be protected from impacts. A simple management plan could be developed to manage this significant population, including possible opportunities to use private land owner "safe harbor" conservation programs. Marsilea might also benefit from habitat created by any settling ponds planned for the site. Removal of kiawe from the beaches will improve the habitat for the surviving coastal plant communities and would restore the sandy beach areas to their original width. Finally, any landscaping in the study area should utilize the drought resistant native species that have persisted at La'au Point and should not utilize any invasive plant species.

5. References

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6. Appendices (on CD)

- Checklist of Historic Plants from West Molokai
- Sample Field Forms
- Aerial Photos

Appendix C

Avifaunal and Feral Mammal Field Survey

AVIFAUNAL AND FERAL MAMMAL FIELD SURVEY OF MOLOKAI RANCH, LA'AU POINT PROPERTY, MOLOKAI

Prepared for:

Molokai Properties Limited

Prepared by:

Phillip L. Bruner
Environmental Consultant
Faunal (Bird & Mammal) Surveys
#1775 BYUH
55-220 Kulanui Street
Laie, Hawaii 96762

17 August 2006

INTRODUCTION

This report presents the findings of a two day (21, 22 December 2005) field survey of approximately 1500 acres of Molokai Ranch at La'au Point, Molokai. In addition to the field data this report also notes pertinent published and unpublished sources of birds and mammals to provide a broader view of the potential species known from this region of Molokai. The two objectives of the field survey were to:

1-Document the birds and mammals presently found on or near the property.

2-Locate and examine all habitats on the site and note their importance, if any, for native and migratory birds.

SITE DESCRIPTION

This site runs along the coast on either side of La'au Point (Fig.1). The topography is generally flat with some ravines and cliffs along the shoreline. The vegetation is dominated by Kiawe (*Prosopis pallida*) with an understory of alien weeds and grass. Some small patches of native, dry land plants, such as Ma'o (*Gossypium sandwicense*) and 'Ilima (*Sida fallax*), can also be found scattered throughout the property. No wetland habitat was found, however, ephemeral streams occur in the ravines following periods of extended, heavy rain. The shoreline contains a mixture of wave swept sandy beaches and rocky cliffs.

METHODS OF THE FIELD SURVEY

The survey was conducted by walking the site. Observations were focused during early morning, late afternoon and early evening hours when birds and mammals are most active and observable. All habitats (Kiawe thickets and shoreline) on the property were investigated. All birds seen and heard were tallied. Census stations were established approximately 100-200m apart throughout the site and eight minute counts of all birds seen or heard were tallied. These data were used to estimate the relative abundance of each bird species on the property. Rare or infrequently seen species were tallied whenever they were observed, not just on the census stations. Data on mammals were obtained by visual observations only. No trapping of mammals was conducted. The duration and nature of the field survey did not warrant trapping. A Petterssson Elecktronik AB Ultrasound Detector D-100 was used on the evening survey (21 December) to listen for the echolocation calls of the endangered Hawaiian Hoary Bat (*Lasiurus cinereus semotus*). The weather during the survey period was generally fair with some cloud cover late in the day. The winds were light. Large swells generated by storms north of Hawaii produced strong surf on both days of the survey.

Scientific and common (vernacular) names of birds and mammals referred to in this report follow the taxonomy of Pyle (2002) and Honacki et al. (1982). Plant names are those given by Pratt (1998).

RESULTS OF THE FIELD SURVEY

Native Land Birds:

No native land birds were recorded on the survey. The only likely species that is known to forage in this area is the Hawaiian Owl or Pueo (*Asio flammeus sandwichensis*). This species is listed by the State of Hawaii as endangered on Oahu but not elsewhere in the State. They hunt in grasslands, agricultural fields and forests (Pratt et al. 1987, Hawaii Audubon Society 2005. This species nests on the ground in habitats with tall grass. I recorded Pueo during an earlier survey (Bruner 1989) of a 7000 acre parcel that included this site.

Native Waterbirds:

No native waterbirds were recorded nor were any expected on this property due to an absence of wetland habitat. I recorded Hawaiian Coot (*Fulica alai*) at a man-made pond at Kalua Koi golf course during my 1989 field survey (Bruner 1989).

Seabirds:

No seabirds were recorded on the survey. None would be expected to nest at this site due to the presence of ground predators and human disturbance. Some species on occasion may fly over the property.

Migratory Birds:

Four species of migratory shorebirds were observed on the survey: Pacific Golden-Plover or Kolea (*Pluvialis fulva*); Ruddy Turnstone or 'Akekeke (*Arenaria interpres*); Wandering Tattler or 'Ulili (*Heteroscelus incanus*); and Sanderling or Hunakai (*Calidris alba*). A total of four Kolea, three 'Akekeke, two 'Ulili, and one Hunakai were tallied over the duration of the survey. The most common migratory shorebird in Hawaii is the Pacific Golden-Plover. They forage on lawns, pastures and in agricultural fields as well as along shorelines. Kolea have been extensively studied both here in Hawaii and on their breeding grounds in western Alaska (Johnson et al. 1981, 1989, 1993, 2001a, 2001b). None of these migratory shorebirds are listed as threatened or endangered.

Introduced (Alien) Birds:

Thirteen species of alien birds were tallied on the survey. Table One gives the names and relative abundance of these birds recorded on the survey along with those found on the Bruner 1989 survey. None of these species are listed as threatened or endangered. The array of alien birds at this location is typical of the lowlands on Molokai (Hawaii Audubon Society 2005).

Mammals:

Four cats (*Felis catus*), six Small Indian Mongoose (*Herpestes auropunctatus*), and eleven Axis Deer (*Axis axis*) were observed over the duration of the survey. Two endangered Hawaiian Monk Seals (*Monachus schawinslandi*) were observed resting on Sam Wights Beach north of La'au Point on 21 December. Monk Seals haul out to rest on beaches as deserted as this beach or as heavily used as public beaches on Oahu. They have even given birth and raised their pups. The most recent example was June – July 2006 at Turtle Bay Resort on the North Shore of Oahu. Mice (*Mus musculus*) and rats *(Rattus spp.*) undoubtedly occur on the site but were not observed. The native endangered Hawaiian Hoary Bat was not detected. This finding was not unexpected given the low numbers of bats reported to occur on Molokai (Tomich 1986, Kepler and Scott 1990). This species forages in a wide variety of habitats including: forests, agricultural lands, and urban areas. They are most abundant on Kauai and the Big Island.

Jacobs (1991, 1993) and Reynolds et al. (1998) provide information on the occurrence and natural history of this species on the Big Island.

SUMMARY AND CONCLUSIONS

The purpose of this report was to present the findings of a bird and feral mammal field survey. No native land birds were recorded but the endangered Hawaiian Owl (Pueo) has been seen foraging on the property. No native water birds were recorded due to an absence of suitable habitat. No seabirds were seen. The four common migratory shorebirds that winter in Hawaii were observed along the shoreline. The array of alien birds recorded was typical of this region. No unexpected species were recorded. The presence of feral mammals (cats, mongoose, Axis Deer) was expected at this site. The absence of the endangered Hawaiian Hoary Bat was not unexpected given the low numbers of bats reported to occur on Molokai. The endangered Hawaiian Monk Seal has been seen on the beaches of the main Hawaiian Islands with increasing frequency in the last ten years (pers. observ.). The appropriate protocol if one encounters a monk seal on the beach is to notify National Marine Fisheries so they can check to see if the animal is injured or entangled. They will then put tape around the site to keep people from approaching too close. If a birth is occurring or the female has a pup volunteers will watch over the site as was done at Turtle Bay Resort, Oahu this past June – July (2006).

The La'au Point project should not significantly impact alien bird and mammal populations in this region. The expanded protection area along the shoreline will help minimize effects upon migratory shorebirds and the Hawaiian Monk Seal. The proposed residential lots will be setback a minimum of 200 feet from the shoreline (average 385 feet) and the closest building construction will be an additional 50 feet into the lot.

TABLE 1

Relative abundance estimates in appropriate habitat: A=abundant (ave. 10+ on census stations; C=common (ave. 5-9 on census stations); U=uncommon (ave. 1-4 on census stations); R=recorded but not on census stations (number which follows is total found on the survey). A dash indicates this species was not recorded on that survey.

Common Name	Scientific Name	2005	1989
Barn Owl	*Tyto alba*	-	R=3
Cattle Egret	*Bubulcus ibis*	-	R=2
Red Junglefowl	*Gallus gallus*	R=6	-
Wild Turkey	*Meleagris gallopavo*	R=9	R=37
Ring-necked Pheasant	*Phasianus colchicus*	-	R=1
Gray Francolin	*Francolinus pondicerianus*	U=2	C=8
Black Francolin	*Francolinus francolinus*	C=6	A=14
Spotted Dove	*Streptopelis chinensis*	U=2	U=5
Zebra Dove	*Geopelia striata*	A=10	A=12
Common Myna	*Acridotheres tristis*	U=2	U=2
Japanese White-eye	*Zosterops japonicus*	C=5	C=9
Northern Cardinal	*Cardinalis cardinalis*	C=9	C=6
Red-crested Cardinal	*Paroaria coronata*	C=7	A=13
Northern Mockingbird	*Mimus polyglottos*	C=8	A=12
Skylark	*Alauda arvensis*	R=3	U=4
House Finch	*Carpodacus mexicanus*	C=8	A=15
Nutmeg Mannikin	*Lonchura punctulata*	-	C=8
Warbling Silverbill	*Lonchura malabarica*	-	C=6

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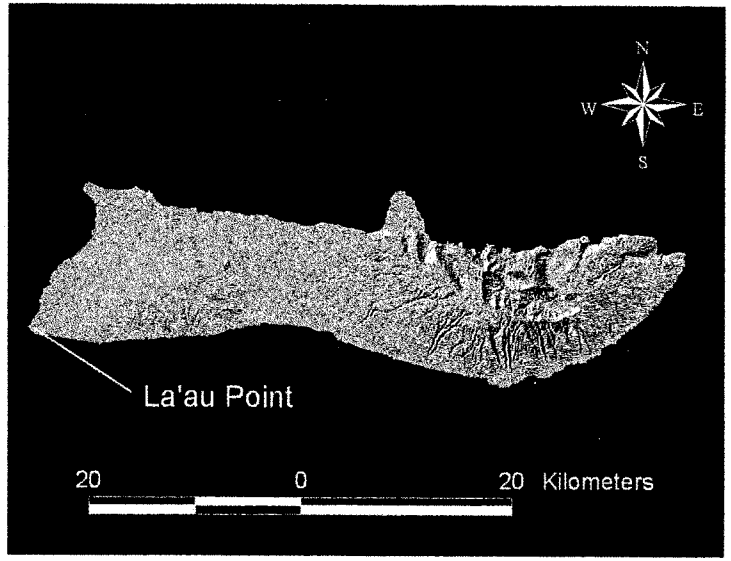
Appendix D

Marine Biological and Water Quality Baseline Surveys

Marine Biological and Water Quality Baseline Surveys
La'au Point, Moloka'i



Prepared for:
Moloka'i Properties, Ltd.
745 Fort Street
Suite 600
Honolulu, Hawai'i 96813

Prepared by:
TEC Inc.
1001 Bishop St., Suite 1400
American Saving Bank Tower
Honolulu, Hawai'i 96813

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1. Marine Biological Baseline

1.1 Introduction

These survey results are to be used to support a description of the existing environment in an environmental impact statement being prepared for the La'au Point residential community proposed by Moloka'i Properties Limited, and to provide a baseline for comparison with the results of future similar surveys. La'au Point is on the southwest point of the island of Moloka'i, 30 km west of Kaunakakai Harbor and 65 km east of Honolulu.

Background Information

From *Moloka'i Island Coastal Resource Inventory* (US Army Corps of Engineers, Pacific Division, unpublished report; 1984):

> ***"Physiography***
>
> *The inshore area consists of irregular basalt formations and boulders of moderate size and relief. A fairly steep profile extends to a depth of 6 m and is cut with deep grooves and channels. Live corals here are diverse, but have less than 10% coverage. A base made up of older dead coral rock encrusts the surfaces of many of the basalt boulders. Extending seaward to depths of 11-12 m and beyond is a wide, gently sloping basalt terrace which exhibits little relief. Occasional platforms, 5 to 8 m wide and 2 m high, break up the otherwise flat substrate and support substantially more coral cover than the surrounding plain. Some cracks and crevices are etched into the basalt floor and oriented perpendicular to the shoreline. Occasional boulders or knolls protrude from the flat surface. Other than a few small sand patches, little sediment is evident.*
>
> *South of La'au Point -- The inshore area near the rocky, lava headlands consists of a steep talus boulder slope at the cliff (shoreline) base that descends to a depth of 6 to 10 feet. Beyond the talus is found a very irregular high relief terrace upon which rests 2-4 m diameter basaltic boulders. The terrace slopes gradually to deeper water seaward. Live coral cover is less than 5%, with occasional small sand patches existing between the large boulders. Approximately 90 m offshore, in 4-5 m of water, the solid basalt substrate is covered with algal turf and some sand channels. Nearshore areas fronting the sandy beaches exhibit sand flats extending from shore to 8 m deep and beyond. Further offshore, in depths of 9-11 m, scoured basalt rock projections form dome-like tables 2 m above wide sand channels. The network of sand channels interconnect and undercut the worn basalt formations."*
>
> ***Marine flora and fauna***
>
> ***Inshore***
>
> *Algae are quite diverse in this area. Several species of edible algae found in abundance include limu lipoa (*Dictyopteris australis*), limu kohu (*Asparagopsis taxiformis*), and limu alani (*Dictyota acutiloba*). Live coral coverage is approximately 10% in this area, generally growing atop dead coral on a boulder base. The bottom*

profile is quite dramatic with the encrusting coral Pavona varians *concentrated on vertical surfaces and the encrusting corals* Montipora capitata *and* M. flabellata *growing on the upper surfaces. Twenty meters offshore, the branching reef corals* Pocillopora meandrina *and* P. damicornis *and the rounded or encrusting reef coral* Porites lobata *grow in abundance.*

*The other invertebrates observed during surveys consisted of purple octocoral (*Anthelia edmondsoni*) and the soft zoanthid coral* Palythoa tuberculosa *both in large quantities. A variety of mollusks were found including an abundance of top shell (*Trochus intexus*), an occasionsl leopard cone (*Conus leopardus*) and the rare humpback cowry (*Cypraea mauritiana*). A few sea cucumbers,* Actinopyga mauritiana *and* Holothuria atra, *and sea urchins, the black rock-boring urchin (*Echinometra oblonga*), may also be seen in this area. The fish population, in general, is rather diverse and fairly abundant. Surgeonfish are the most abundant group, especially large schools of the Achilles tang (*Acanthurus achilles*), manini or convict tang (*A. triostegus*) and maikoiko or Jenkin's surgeon (*A. leucopareius*), and also the nenue or rudder fish (*Kyphosus sp.*). Several species of commonly-caught food fish here consist of uhu or parrotfish (Scaridae), the goatfish weke and moano (Mullidae), and small jack or papio (Carangidae). A few damselfish (Pomacentridae) and wrasses (Labridae) also exist here.*

Offshore

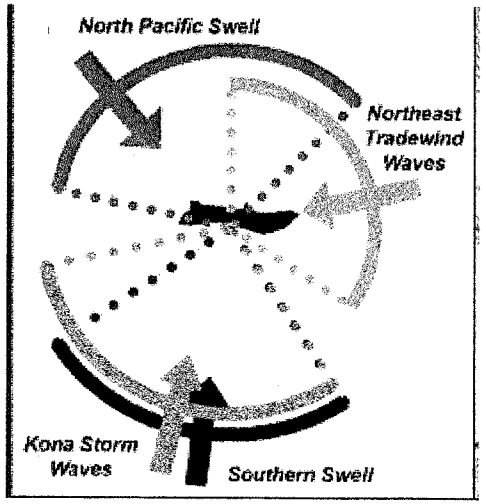
Six species of algae were found in the area, but only edible alga Dictyopteris australis *(limu lipoa) and the red alga* Liagora *sp. are dominant, covering a good portion of the bottom. The sand producing green algae* Halimeda opuntia *and* Neomeris annulata *are abundant as well. In waters of 11-12 m depth, very little live coral grows on the gently sloping basalt floor. Small coral heads, 10-15 cm in diameter, of the branching reef corals* Pocillopora meandrina *and* P. damicornis *are the most abundant. The only other invertebrates offshore are sponges and hydroids. Since the substrate is mainly flat, the fish population was very small. In general, the surgeonfish and damselfish are the most abundant with a few humuhumu or triggerfish (Balistidae), uhu or parrotfish (Scaridae) and aawa or table boss (*Bodianus bilunulatus*) inhabiting this area.*

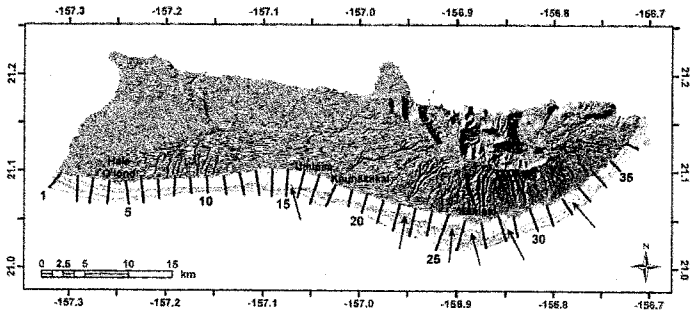
Human Uses

La'au Point and the surrounding coastal areas can be accessed only by four-wheel drive vehicle. One-half square mile of the point area was administered by the U.S. Coast Guard which maintains a lighthouse there. The coastal area may occasionally be closed-off to visitors by Moloka'i Ranch, owners of the adjacent property. Some of the Coast Guard land not required for lighthouse operation at La'au is in the process of being sold off by the Federal government.

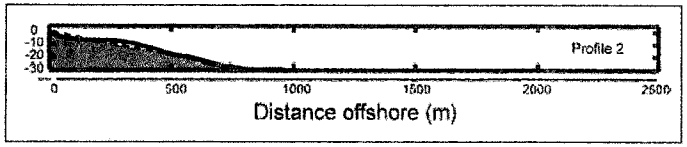
Strong rip currents, high waves, and rough conditions persist at La'au Point throughout the year except on rare occasions when kona conditions prevail. Pole and line fishing is done from the point and adjacent beaches. Fishing boats may troll the waters for aku, ahi, and ulua. Because of rough conditions of the inshore zone, entering the water to dive or spearfish should be considered quite dangerous."

Recent work (Storlazzi et al. 2005; figures below) provide further context for the wave climate and reef morphology for the island of Moloka'i.





Morphology of the reef and insular shelf off southern Molokai from the SHOALS and National Ocean Service bathymetric data overlaid with the locations of the 36 shore-normal transects used for analysis. The shore-normal transects were spaced roughly every 1.5 km along shore; the isobaths are every 10 m from the shoreline out to 40 m. Arrows denote the location of some prominent "blue holes" on reef flat; note their correlation to onshore drainages. (From Storlazzi et al. 2005)



Selected shore-normal reef profiles showing the variation in the development of the reef complex along shore. The dashed lines are a projection of the slopes of the volcanic cone (dark gray) through the reef profiles to provide some insight to the likely crosssectional area of the reef complex (light gray). Note that the reef is almost nonexistent at the ends of the island (profiles #2 and #36) and extends more than 1500 m offshore of the island's central portion (profiles #13 though #27). (From Storlazzi et al. 2005)

1.2 Methods—Present Study

1.2.1 Benthic Habitat Mapping

The National Oceanic and Atmospheric Administration (NOAA) acquired and visually interpreted orthorectified aerial photography for the near-shore waters (to 25 meters depth) of parts of the main Hawaiian Islands (Coyne et al. 2003, NOAA/NOS 2003). Features visible in the aerial photographs were mapped directly into a geographic information system (GIS). Visual interpretation of the photographs was guided by a hierarchical classification scheme that defined and delineated benthic polygon types based on insular-shelf zones and habitat structures of the benthic community. Zones describe the insular-shelf location (inner lagoon, outer lagoon, bank-shelf), whereas habitat structure (hereafter "structure") includes the cover type (reef, submerged vegetation, unconsolidated sediments, etc.) of the benthic community. The major product of this effort is a series of GIS-based benthic habitat maps that are characterized by a high degree of spatial and thematic accuracy. The hierarchical spatial structure underlying the habitat classifications were explicitly designed to include ecologically-relevant locational (backreef, forereef, lagoon, etc.) and typological (patch reef, spur and groove, colonized pavement, etc) strata, thereby creating an analytical construct within which nuances of community structure, such as resource distribution, abundance, and habitat utilization can be tested and resolved.

1.2.2 Benthic Methods

Monitoring methods for coral reef habitats were based on those of the Global Coral Reef Monitoring Network (GCRMN; http://coral.aoml.noaa.gov) and Green (2002). These methods were aimed at providing a baseline for detection of significant changes in reef habitat as a result of land-based development activities. Assessment methods included:

Line intercept surveys to identify and estimate relative abundance of benthic substratum type (by genus, species, growth form, or other bottom type).

Visual censuses of fishes to quantify numerical abundance, biomass, diversity, and species richness).

1.2.3 Monitoring Site Locations

Information from the Moloka'i Island Coastal Resource Inventory and NOAA's marine benthic habitat maps were used to determine approximate locations for sampling sites. GPS points were generated in ArcView. Six sites, three north and three east of La'au Point, were surveyed over a 2-day period (Table 1, Figure 1). Sites were identified relative to estimated location for the proposed development. Baseline surveys were conducted on November 19-20, 2005. Transects were located along a depth profile where coral density was highest—approximately 8-11 m--with consideration of adjacent coastline features and reef structure at each site.

1.2.4 Sample Design

Three 25 x 5 m transects, each separated by ca. 5 m were conducted at each sampling location. Transects were "permanently" marked using heavy cable ties. Transects were orientated along bathymetry contours and conducted within homogeneous microhabitat types.

1.2.5 Quantitative Benthic Surveys and Analysis

Surveys assessed the biological diversity and abundance of algae, coral and other macroinvertebrates at each reef site (Sites 2-5). Surveys were also conducted at control sites (Sites 1 and 6), away from the zone of anticipated impact yet close enough to represent similar reef environments.

Three 25 m long transects were surveyed along a single depth gradient (8-11 m depth) parallel to the shoreline at each site, with 1-3 m between the end of one transect and the start of the next. The substratum type (coral, algae, invertebrate, sand, etc) was recorded at one meter intervals directly under the transect tape and at one meter to each side of the tape, giving a total of 225 points per site (3 transects x 25 meters/transect x 3 points/meter interval). The relative percentages of each substratum type were calculated as the mean (± S.E.) of three replicates for the three transects (n=9).

1.2.6 Fish Sampling Methodology

Fish assemblages at each location were assessed using standard underwater visual belt transect survey methods (Brock 1954, Brock 1982). A SCUBA diver swam each 25m x 5m transect at a constant speed (~ 15 min/transect) and identified to the lowest possible taxon, all fishes visible within 2.5 m to either side of the centerline (125 m^2 transect area). Nomenclature followed Randall (1996). Total length (TL) of fish was estimated to the nearest centimeter. Length estimates of fishes from visual censuses were converted to weight using the following length-weight conversion: $W = aSL^b$ - the parameters a and b are constants for the allometric growth equation where SL is standard length in mm and W is weight in grams. Total length was converted to standard length (SL) by multiplying standard length to total length-fitting parameters obtained from FishBase (www.fishbase.org). Length-weight fitting parameters were available for 150 species commonly observed on visual fish transects in Hawaii (Hawaii Cooperative Fishery Research Unit unpublished data). These data were supplemented by information from other published and web-based sources. In the cases where length-weight information did not exist for a given species, the parameters from similar bodied congeners were used. All biomass estimates were converted to metric tons per hectare (t/ha) to facilitate comparisons with other studies in Hawaii. Finally, fish

taxa were categorized into three trophic categories (herbivores, secondary consumers, and apex predators) according to various published sources and FishBase (www.fishbase.org).

1.2.7 Statistical Methods

Because transects within sites were spatially autocorrelated, mean values for all transects at each site were used in all analyses. Species diversity was calculated from the Shannon-Weaver Diversity Index (Ludwig and Reynolds 1988): H'=S (pi ln pi), where pi is the proportion of all individuals counted that were of species i. The evenness component of diversity was expressed as: J = H'/ln(S), where S is the total number of species present (Pielow 1977).

Table 1: Site locations and associated meta-data around La'au Point. Lat. = latitude, Long. = longitude. Latitude and longitude are in WGS 84. X and Y UTM coordinates are for UTM Zone 4.

Date	Site	Lat.	Long.	Y	X	Depth (ft)	Habitat Descriptions
19-Nov-05	1	21.14	-157.29	2338656	677251	24	Flat reef pavement; scattered *P. meandrina, P. lobata, Asparagopsis*; abundant branching/encrustin g calc. algae; green sponge
19-Nov-05	2	21.13	-157.30	2337355	676511	33	Spur and groove reef pavement; abundant *P. meandrina, Asparagopsis;* scattered *P. lobata, P. evermanni*
19-Nov-05	3	21.11	-157.31	2335644	676050	24	Flat reef pavement;scattered small *P. lobata, P. meandrina*; abundant branching coralline algae
20-Nov-05	4	21.09	-157.30	2333093	676873	36	Flat, sand covered reef pavement; scattered small *P. lobata, P. meandrina, P. eydouxi;* abundant *Halimeda*
20-Nov-05	5	21.09	-157.28	2332962	678897	24	Flat reef pavement, spur and groove to south; some sand; scattered *P. meandrina, P. lobata*, green sponge
20-Nov-05	6	21.09	-157.26	2332748	680444	24	Flat, sand-covered reef pavement; abundant small *P. lobata, M. capitata;* abundant *Asparagopsis, Halimeda*

1.3 Results—Present Study

1.3.1 Large-scale Habitat Features

The shelf zone accounted for 84% of the total study area (<60 feet), followed by reef flat (8%), forereef (6%), and shoreline intertidal (2%) (Table 2). Large-scale habitat types within the study area (<60 feet) were dominated by uncolonized volcanic rock/boulder (45%), followed by uncolonized pavement (24%), sand (7%), linear reef (7%), colonized pavement (6%), aggregated coral (6%), and macroalgae (5%).

1.3.2 Benthic Flora and Fauna

Turf algae dominated benthic cover at all locations, accounting for a grand mean of 57%, followed by sand (22%), and macroalgae (10%) (Tables 2, 3 and Figure 2). Hard coral cover was slightly more than 6% overall (range 3.56-11.56%). Table 4 provides more detail on the relative abundance of the most common taxa and Figures 3 and 4 illustrate the relative percentages of coral and macroalgae at each site.

There was an inverse relationship between coral and macroalgae at all sites, as seen in comparison of Figures 3 and 4. Macroalgae were dominant on exposed areas; percent coral and sand cover were more abundant at lee sites, protected from northwest swells. Algae and coral species were qualitatively similar in both the 1975 and 2005 surveys.

Octocorals, molluscs and echinoderms noted in a previous study (AECOS 1975) were not seen during the November, 2005 surveys. Rather, the collector urchin, *Tripneustes gratilla*, was the most abundant macroinvertebrate. Density of this urchin at the six sites is summarized in Table 5.

Figure 1: Sampling locations and NOAA benthic habitat map.

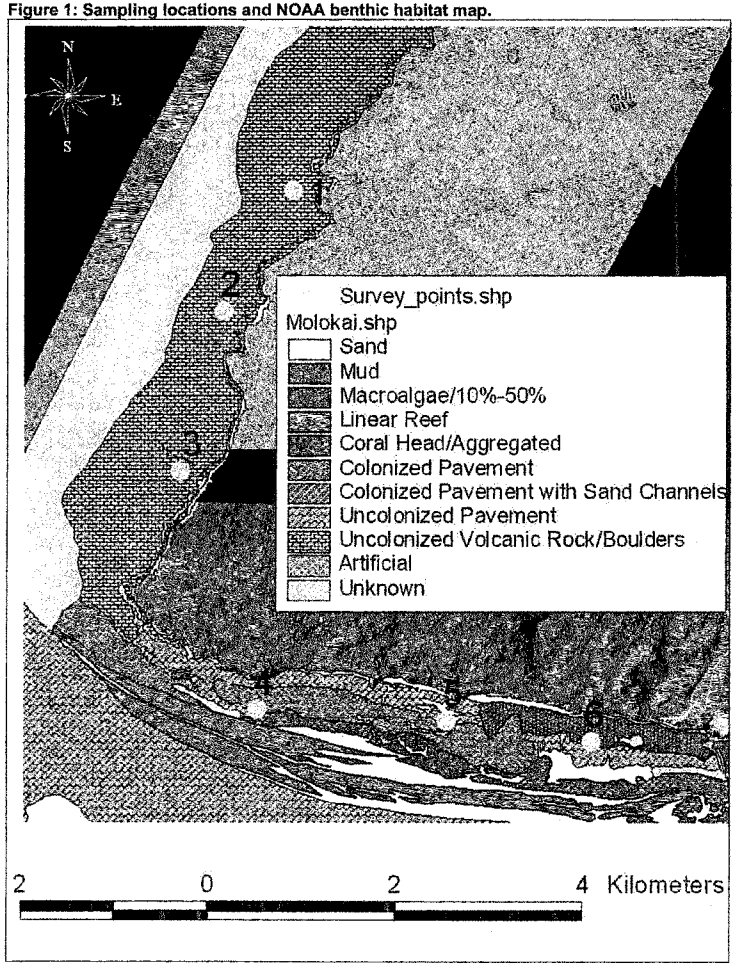


Table 2: Zone and habitat types within the general study area to a depth of ca. 60 feet. Zone and habitat classifications based on NOAA benthic habitat maps (Coyne et al. 2003, NOAA/NOS 2003)

Zone	Habitat	Acres	Percent
Forereef	Hardbottom/Uncolonized Pavement	85.85	1.36%
	Reef/Colonized Pavement	256.78	4.05%
	Sand	61.13	0.97%
Reef Flat	Hardbottom/Uncolonized Pavement	168.10	2.65%
	Hardbottom/Uncolonized Volcanic Rock/Boulders	1.08	0.02%
	Macroalgae/10-50%	309.78	4.89%
	Sand	12.75	0.20%
Shelf	Hardbottom/Uncolonized Pavement	1275.68	20.14%
	Hardbottom/Uncolonized Volcanic Rock/Boulders	2726.41	43.05%
	Reef/Aggregate Coral	387.97	6.13%
	Reef/Colonized Pavement	131.33	2.07%
	Reef/Linear Reef	429.12	6.78%
	Sand	330.78	5.22%
Shoreline Intertidal	Hardbottom/Uncolonized Volcanic Rock/Boulders	96.37	1.52%
	Sand	60.18	0.95%
Total		6333.31	100.00%

Table 3: Percent cover of major benthic groups.Values are means of three transects with standard deviation of the mean in parentheses. Groups ranked from high to lower grand mean cover.

Groups	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Grand mean
Turf algae	44.89 (14.64)	53.33 (11.71)	83.56 (24.14)	30.67 (12.23)	75.66 (12.65)	56.00 (9.85)	57.33 (14.21)
Sand	20.00 (8.90)	21.78 (8.55)	0.89 (1.54)	54.22 (15.30)	11.56 (5.39)	22.67 (6.43)	21.85 (7.69)
Macroalgae	14.67 (10.09)	17.33 (13.91)	9.78 (15.86)	6.67 (7.92)	1.33 (1.54)	8.00 (5.89)	9.63 (9.20)
Hard Coral	4.00 (6.16)	4.00 (5.39)	3.56 (6.16)	4.89 (6.62)	9.78 (12.80)	11.56 (12.11)	6.30 (8.21)
Calcareous algae	16.00 (8.88)	3.11 (3.55)	1.33 (2.31)	1.78 (2.31)	1.33 (2.31)	0.89 (1.54)	4.07 (3.48)
Sponge	0.44 (0.77)	0.44 (0.77)	0.89 (1.54)	3.11 (4.62)	1.78 (2.10)	0.89 (0.77)	1.26 (1.76)

Table 4: Mean percent cover (sd) at each site around La'au Point. Taxon ranked from highest to lowest grand mean cover.

Benthic Group	Taxon	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Grand mean
Turf algae	Turf algae	44.89 (14.64)	53.33 (11.71)	83.56 (24.14)	30.67 (12.23)	75.56 (12.65)	56.00 (9.85)	57.33 (14.21)
Sand	Sand	20.00 (8.9)	21.78 (8.55)	0.89 (1.54)	54.22 (15.30)	11.56 (5.39)	22.67 (6.43)	21.8 (7.69)
Macroalgae	*Lobophora variegata*	7.56 (4.35)	8.44 (5.85)	6.22 (10.78)	2.67 (3.08)	1.33 (1.54)	4.00 (1.54)	5.04 (4.52)
Calcareous algae	Calcareous algae	16.00 (8.88)	3.11 (3.55)	1.33 (2.31)	1.78 (2.31)	1.33 (2.31)	0.89 (1.54)	4.07 (3.48)
Macroalgae	*Halimeda opuntia*	4.89 (3.64)	4.44 (3.44)	3.56 (5.08)	4.00 (4.84)	0.00 (-)	3.11 (3.58)	3.33 (3.43)
Hard Coral	*Pocillopora meandrina*	0.89 (1.54)	1.33 (1.54)	1.33 (2.31)	2.67 (3.55)	5.78 (6.85)	1.78 (2.31)	2.3 (3.02)
Hard Coral	*Porites lobata*	0.89 (0.77)	1.33 (1.54)	1.78 (3.08)	0.89 (1.54)	1.33 (2.31)	5.33 (4.62)	1.93 (2.31)
Macroalgae	*Asparagopsis taxifolia*	2.22 (2.10)	4.44 (4.62)	0.00 (-)	0.00 (-)	0.00 (-)	0.89 (0.77)	1.26 (1.25)
Sponge	Green sponge	0.44 (0.77)	0.44 (0.77)	0.89 (1.54)	1.78 (3.08)	0.44 (0.77)	0.89 (0.77)	0.81 (1.28)
Hard Coral	*Montipora patula*	0.44 (0.77)	0.00 (-)	0.44 (0.77)	0.00 (-)	0.44 (0.77)	2.22 (2.87)	0.59 (0.86)
Hard Coral	*Montipora capitata*	0.44 (0.77)	0.44 (0.77)	0.00 (-)	0.00 (-)	0.00 (-)	1.78 (1.54)	0.44 (0.51)
Sponge	Orange sponge	0.00 (-)	0.00 (-)	0.00 (-)	1.33 (1.54)	1.33 (1.33)	0.00 (-)	0.44 (0.48)
Hard Coral	*Porites evermanni*	0.89 (1.54)	0.89 (1.54)	0.00 (-)	0.00 (-)	0.00 (-)	0.00 (-)	0.30 (0.51)
Hard Coral	*Pocillopora ligulata*	0.00 (-)	0.00 (-)	0.00 (-)	0.00 (-)	0.44 (0.77)	0.44 (0.77)	0.15 (0.26)
Hydroid	*Pennaria disticha*	0.00 (-)	0.00 (-)	0.00 (-)	0.00 (-)	0.44 0.77)	0.00 (-)	0.07 (0.13)
Hard Coral	*Pocillopora eydouxi*	0.44 (0.77)	0.00 (-)	0.00 (-)	0.00 (-)	0.00 (-)	0.00 (-)	0.07 (0.13)

Table 5: Sea Urchin (Tripneustes gratilla) density

Site	Number (per 150 m^2)	Density (no. m^{-2})
1	20	0.1333
2	5	0.0333
3	1	0.0067
4	0	0.0000
5	0	0.0000
6	0	0.0000
Mean	4.33	0.0289

Figure 2: Percent cover of major benthic groups at the six survey sites around La'au Point. Mean represents values of three transects at each site.

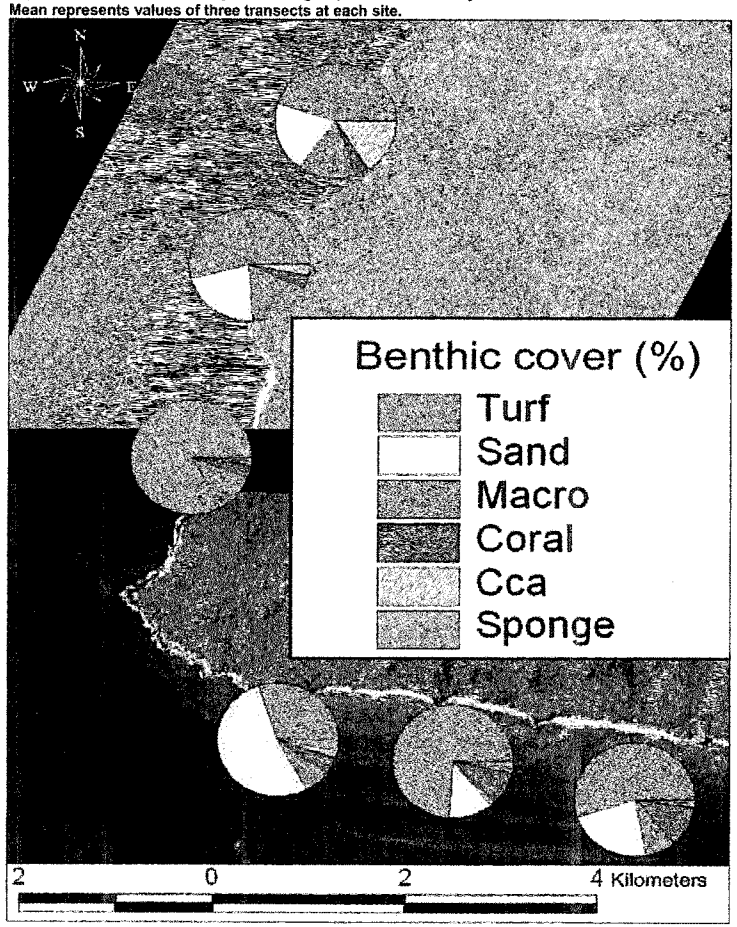


Figure 3: Percent live hard coral cover at the six survey sites around La'au Point. Mean represents values of three transects at each site.

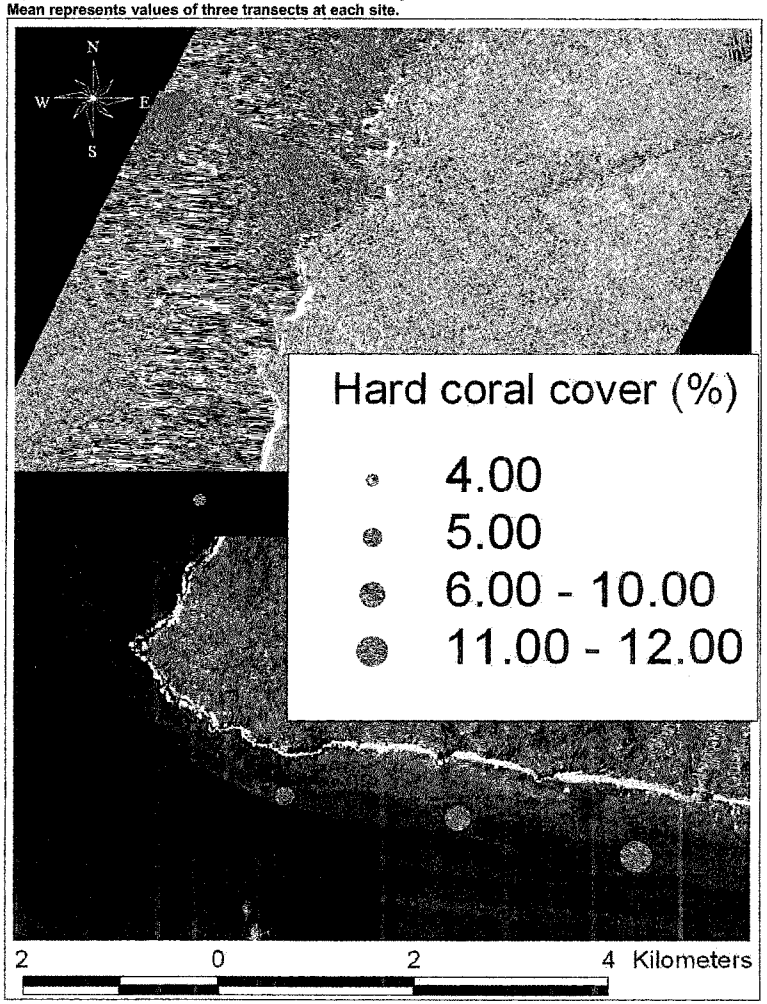
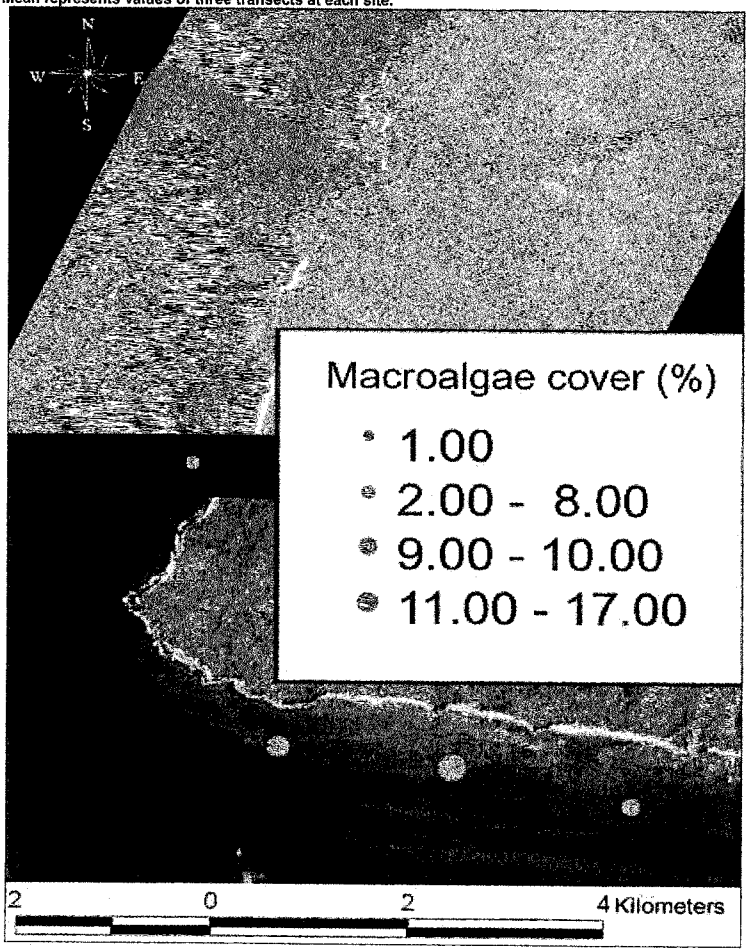


Figure 4: Percent macroalgae cover at the six survey sites around La'au Point. Mean represents values of three transects at each site.



1.3.3 Fish Assemblage Characteristics

Numbers of individual fishes per transect were 20% higher north than east of La'au Point (Table 5, Figure 6). Diversity, evenness, and species richness were 59%, 55%, and 9% higher, respectively, north of the point as well (Table 5, Figure 5). Biomass, however, was more than 130% higher east of La'au Point (Table 5, Figure 7). Site 3 had the lowest rank for all assemblage characteristics pooled while sites 5, 4, 2, and 1 had similarly high total rankings (Table 6).

Overall fish biomass was low. Small schools of surgeonfishes (manini – *Acanthurus triostegus, kala lolo – Naso brevirostris*, na'ena'e – *A. olivaceus)* comprised much of the weight of the assemblages. Secondary consumers (planktivores and triggerfishes) accounted for 50% of the fish biomass overall, followed by herbivores (43%), and apex predators (7%). Three of the six sites had no apex predators present. More than 30% of the biomass at site 1 consisted of apex predators, primarily a single island jack (ulua – *Carangoides orthgrammus*) and two individuals of the introduced peacock grouper (roi – *Cephalopholis argus*).

Table 6: Fish assemblage characteristics. Means (S.D.)

Site	Species	Number ha^{-1} (÷ 1000)	Biomass ($t\ ha^{-1}$)	Diversity	Evenness
1	13.33 (3.79)	4.43 (2.54)	0.11 (0.11)	1.90 (0.61)	0.73 (0.17)
2	15.00 (5.57)	5.92 (2.70)	0.24 (0.18)	1.82 (0.67)	0.67 (0.17)
3	10.00 (1.73)	4.16 (0.56)	0.05 (0.01)	1.58 (0.11)	0.69 (0.02)
4	13.00 (4.00)	3.55 (1.45)	0.20 (0.15)	2.21 (0.27)	0.87 (0.01)
5	13.33 (4.04)	4.72 (2.00)	0.79 (0.50)	1.86 (0.16)	0.73 (0.04)
6	11.00 (2.00)	2.29 (1.17)	0.08 (0.06)	2.02 (0.14)	0.85 (0.12)
Grand mean	12.61 (3.52)	4.18 (1.74)	0.24 (0.17)	1.90 (0.33)	0.76 (0.09)

Table 7: Ranking of fish assemblage characteristics among sampling sites. Highest rank represents highest values for assemblage characteristics.

Site	Number	Biomass	Diversity	Evenness	Species Richness	Total rank
5	5	6	3	3	4	21
4	2	4	6	6	3	21
2	6	5	2	1	6	20
1	4	3	4	4	5	20
6	1	2	5	5	2	15
3	3	1	1	2	1	8

Figure 5: Fish species richness at the six survey sites around La'au Point.
Values = mean of three transects at each site.

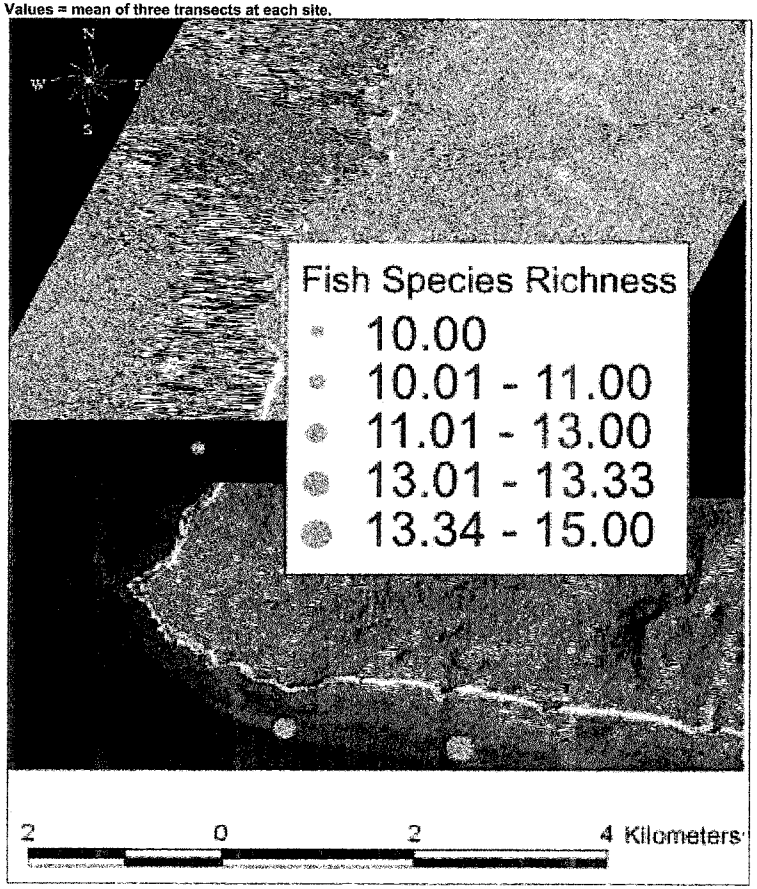


Figure 6: Fish numerical abundance at the six survey sites around La'au Point.
Values = mean of three transects at each site. Values are number of individuals (+ 1000) ha^{-1}.

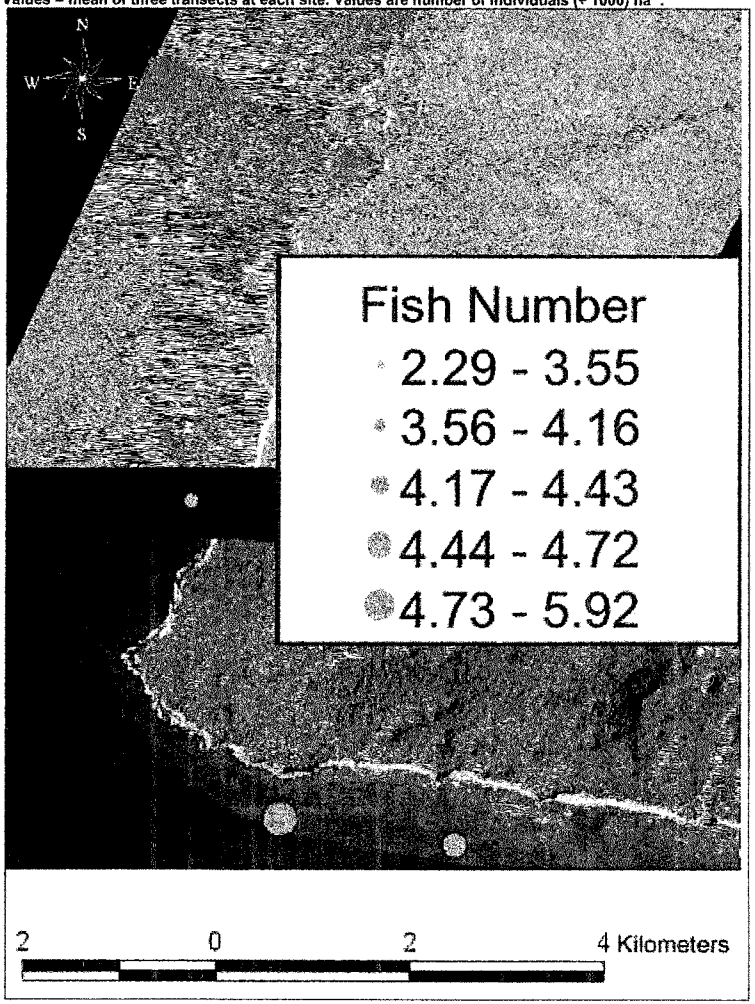


Figure 7: Fish biomass (t ha-1) at the six survey sites around La'au Point.
Values = mean of three transects at each site. Values are number of individuals (÷ 1000) ha^{-1}.

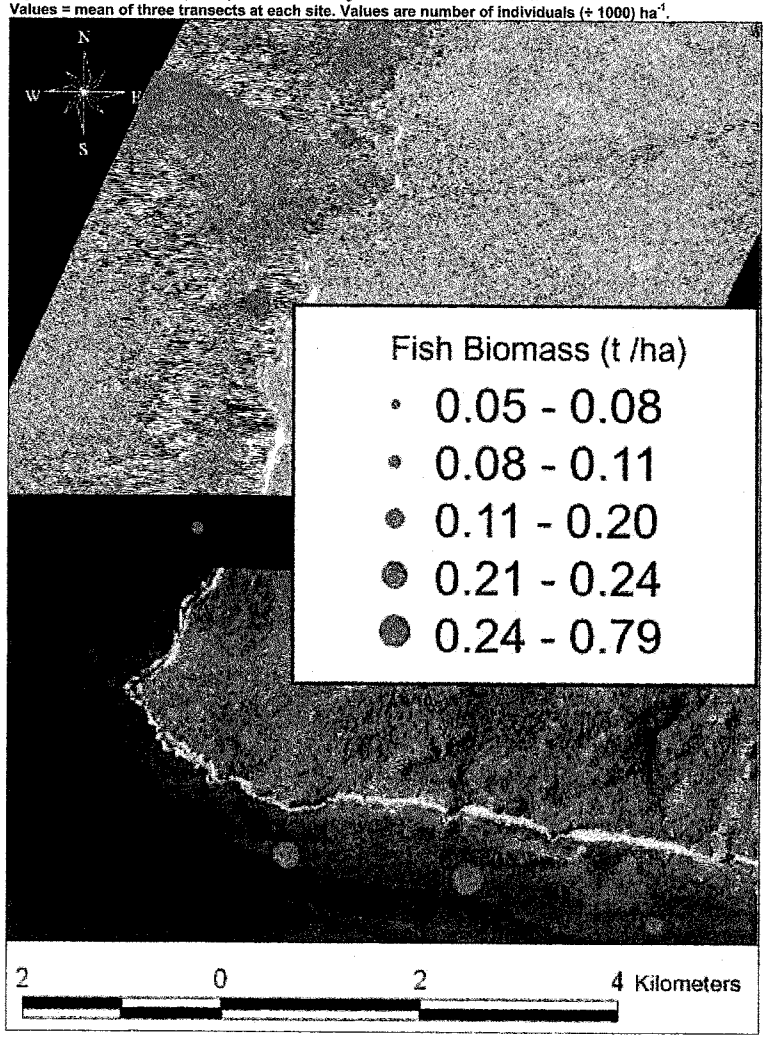


Figure 8: Mean fish diversity at the six survey sites around La'au Point.
Values = mean of three transects at each site.

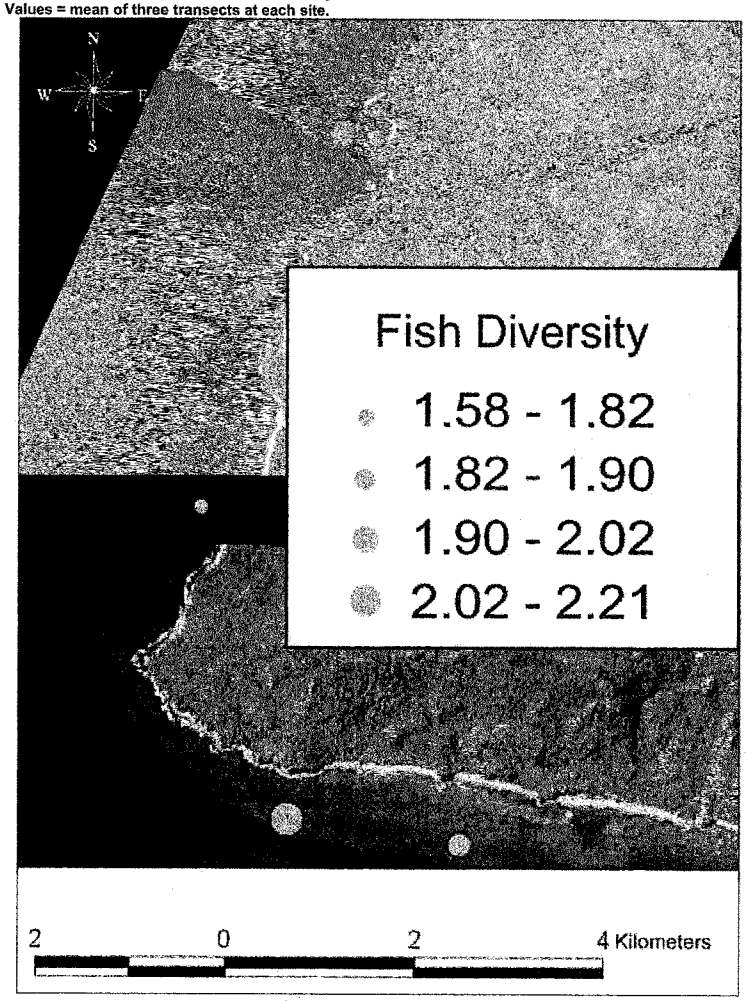
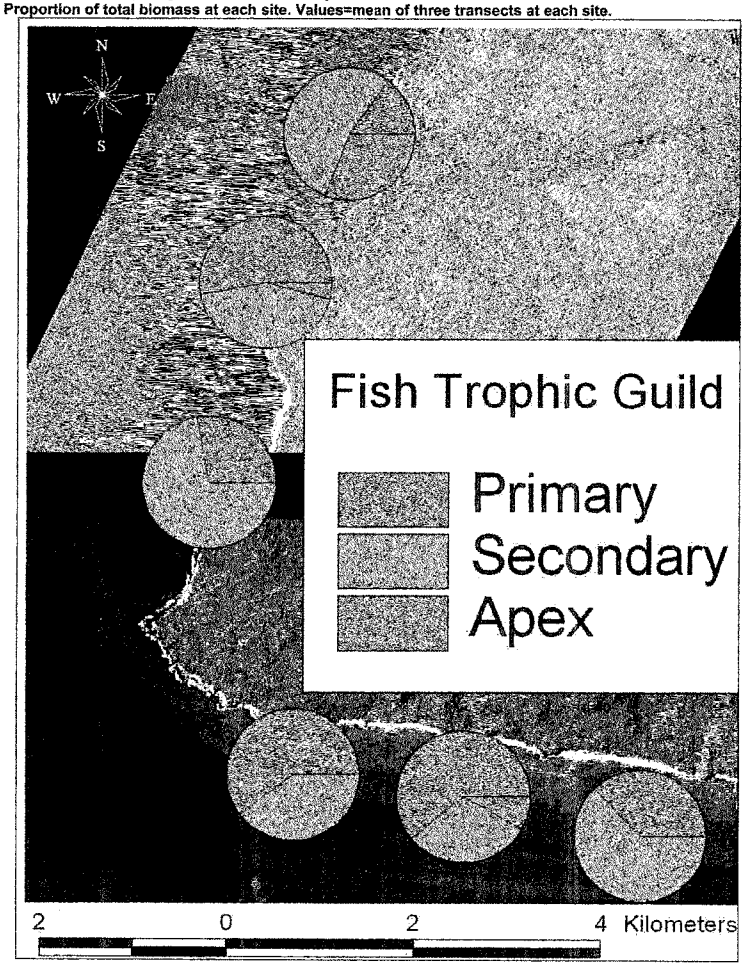


Figure 9: Fish trophic guilds at the six survey sites around La'au Point. Proportion of total biomass at each site. Values=mean of three transects at each site.



1.3.4 Comparisons with Other Locations Around Hawaii

Benthic habitat characteristics described a typical wave-exposed, low-relief reef with generally low coral cover.

Table 8: Benthic components

Site	Coral cover (%)	Macroalgae cover	Source
La'au Point	6.30 (8.21 sd)	9.63 (9.20 sd)	This study
60 sites statewide	25.07% (21.8 sd)		Jokiel et al. 2004
30 sites in wave exposed habitats	20.67% (16.4 sd0		Jokiel et al. 2004

Fish assemblage characteristics at La'au Point were generally lower than average values reported from large-scale studies statewide (Table 8). Biomass was more than four times lower at La'au compared to no-take Marine Life Conservation Districts (MLCDs) and 42% lower than open access areas across multiple habitat types statewide. Diversity and evenness were the only assemblage metrics that showed similar or greater values at La'au.

Anecdotal information from fishermen (including our dive charter boat captain) report that the westernmost tip of La'au Point harbors lobster populations and serves as productive fishing ground for ulua (giant trevally; *Caranx ignobilis*). However, strong currents and swell conditions during this baseline survey period precluded our diving in this area.

Table 9: Comparison of fish assemblage characteristics between La'au Point and recent large-scale surveys conducted around the main Hawaiian Islands. Means with standard deviations in parentheses.

Site	Species	Number ha^{-1} (÷ 1000)	Biomass ($t\ ha^{-1}$)	Diversity	Evenness	Source
La'au Point	12.61 (3.52)	4.18 (1.74)	0.24 (0.17)	1.90 (0.33)	0.76 (0.09)	This study
All MLCDs	19.10 (7.44)	9.70 (6.42)	0.87 (0.91)	2.11 (0.50)	0.75 (0.12)	Statewide MLCDs Friedlander et al. 2006
Open areas adjacent to all MLCDs	13.84 (7.94)	7.22 (6.53)	0.34 (0.38)	1.77 (0.68)	0.72 (0.22)	Statewide MLCDs Friedlander et al. 2006
No-take MLCDs	24.98 (4.65)	11.70 (4.81)	1.27 (0.42)	2.52 (0.25)		Friedlander et al. 2003
Open areas	17.60 (4.65)	8.98 (4.68)	0.57 (0.10)	2.15 (0.25)		Friedlander et al. 2003
Wave exposed open areas	17.75 (5.65)	10.73 (5.74)	0.	2.15 (0.35)		Friedlander et al. 2003

Note:
Friedlander et al. 2003 = 56 sampling locations (239 transects) on Kauai, O'ahu, Maui, Moloka'i, Lanai, Kahoolawe, and Hawai'i.
Friedlander et al. 2006 = 973 transects along the coasts of O'ahu, Maui, Lanai, and Hawai'i

1.3.5 Summary

Six representative sites offshore of the vicinity of the proposed residential community at La'au Point, southwest Molokai'i, were characterized to serve as a baseline for comparison with future surveys.

At the time of these surveys (November, 2005), fish diversity and biomass, and coral diversity and cover, were fairly low at the selected sites, reflecting a generally typical, low-relief, wave-structured, shallow water habitat. These sites are exposed to high wave energy, moderate sand movement/scour, and fairly low fishing pressure relative to other nearshore areas in the main Hawaiian Islands.

2. Water Quality Baseline

2.1 Methods

Baseline water quality measurements were made on November 19 and 20, 2005 in conjunction with the marine biological surveys at six stations around La'au Point, three south of the point and three west of the point. *In situ* measurements were made at five-foot intervals through the water column with a YSI Model 85 water quality meter. Parameters measured included temperature, salinity, dissolved oxygen concentration, percent oxygen saturation, conductivity, and specific conductance. Conductivity and specific conductance were used to post-calibrate the conductivity sensor against a YSI secondary standard solution of 50,000 microsiemens/cm ±1% at 25°C. Salinity values were corrected as necessary, based on the conductivity calibration.

At each station, discrete water samples were collected on replicate casts with a horizontal Van Dorn bottle from a depth of approximately 15 feet. The collection depth varied somewhat between stations because variable water currents caused some differences in the line angle at different stations. The lack of vertical stratification in water quality parameters through the water column, however, rendered inconsequential any resulting minor differences in sampling depth. Water samples were stored on ice until delivery to Hawaii Food and Water Testing for analysis of turbidity, pH and total suspended solids concentrations.

2.2 Results

The water column at every station was clear; the bottom was visible at our anchorages in 25-35 feet of water. Winds were light and from the south to southwest on both days, with the second day being somewhat calmer. Swells were generally small and the tide was ebbing throughout sampling. Water quality results are shown in Table 10.

No significant stratification of the water column was seen in the temperature or salinity data. Water temperature varied over a narrow range from 25.7 °C to 26.4 °C over all stations and depths, with surface temperatures rising slightly over the sampling period. The applicable State standard is that "temperature shall not vary more than one degree Celsius from ambient conditions." This standard is really intended to limit the thermal impacts of discharges; the natural ambient temperature, whatever that may be, is the standard, so by definition natural baseline conditions cannot be in violation of the standard.

Salinity varied even less, generally being in the 34.4 ppt to 35.0 ppt range. With the single exception of Station 1 at the surface, all sampling points were within the very narrow range 34.8 ppt to 35.0 ppt. The applicable State standard is that "salinity shall not vary more than ten percent from natural or seasonal changes considering hydrologic input and oceanographic factors. Like the temperature standard, the salinity standard is defined in terms of natural ambient conditions, and baseline conditions cannot be in violation of the standard, by definition.

Dissolved oxygen (DO) concentrations were generally slightly higher at the surface, but sometimes showed a near-bottom maxima, presumably due to algal production. DO concentrations averaged around 90% saturated. The applicable State standard for dissolved oxygen is "not less than seventy-five per cent saturation," and was not violated at any sampling location.

Table 10: Baseline Water Quality Data, La'au Point, Moloka'i

Station No.	Date	Start Time	Depth (ft)	Temperature (°C)	Salinity (ppt)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (% Saturation)	Total Suspended Solids (mg/l)	Turbidity (NTU)	pH
1	11/20/05	1020	0	25.8	34.4	5.91	89.2			
			5	25.8	34.8	5.82	86.5			
			10	25.7	34.9	5.81	86.0			
			15	25.7	34.9	5.89	88.1	1.3	0.39	8.2
			20	25.7	35.0	5.92	87.7			
2	11/20/05	1145	0	25.8	34.9	5.85	89.5			
			5	25.8	34.9	5.90	88.6			
			10	25.7	35.0	5.94	88.6			
			15	25.7	35.0	5.98	88.7	1.0	0.35	8.2
			20	25.7	35.0	6.08	88.3			
3	11/20/05	1330	0	26.0	34.7	6.65	97.7			
			5	25.9	35.0	6.09	90.6			
			10	25.9	35.0	6.21	92.5			
			15	25.9	35.0	6.22	92.4	1.0	0.33	8.2
			20	25.9	35.0	6.27	94.2			
4	11/19/05	1030	0	26.0	34.9	6.04	88.7			
			5	26.1	34.9	5.93	88.9			
			10	26.1	34.9	5.99	88.6			
			15	26.1	34.9	6.07	90.3	1.3	0.36	8.2
			20	26.1	34.9	6.09	90.4			
			25	26.1	35.0	6.01	91.3			
5	11/19/05	1250	0	26.2	35.0	6.06	92.0			
			5	26.2	35.0	5.95	88.3			
			10	26.2	35.0	5.91	87.8			
			15	26.2	35.0	5.88	87.1	1.5	0.36	8.1
			20	26.1	35.0	5.90	87.0			
6	11/19/05	1445	0	26.4	34.9	6.20	94.1			
			5	26.3	35.0	6.16	91.6			
			10	26.3	35.0	6.10	92.0			
			15	26.3	35.0	6.08	88.7	1.5	0.37	8.1
			20	26.3	35.0	6.09	91.5			

Total suspended solids concentrations were low, varying between 1.0 and 1.5 mg/l. Turbidity values varied over a narrow range, 0.33-0.39 NTU. The geometric mean of all samples is 0.36 NTU. These values are low, but they would exceed the State standard for "dry" open coastal waters – which is that the geometric mean is not to exceed 0.20 NTU.

pH values ranged from 8.1-8.2. The limit of detection of the instrument used is ±0.1 unit, so these values are essentially constant. The applicable State water quality standard is that "pH units shall not deviate more than 0.5 units from a value of 8.1, except at coastal locations where and when freshwater from stream, storm drain or groundwater discharge may depress the pH to a minimum level of 7.0." Values were thus within the State standard.

3. Post-Storm Event Water Quality

3.1 Background

The following excerpts from the National Weather Service Forecast Office report entitled "Unprecedented Extended Wet Period Across Hawaii,"[1] summarize conditions preceding the post-storm sampling:

> *Normally during March, Hawaii will see several strong trade wind events and shear line passages with considerable rainfall over the windward, or north- and east-facing slopes of the islands. Instead, March 2006 brought only 5 days of low level winds from a trade direction with the remainder being from the southeast through southwest due to the persistent pattern of low pressure to our west. It was not a single low that persisted for nearly 7 weeks, but rather a series. A particular low would last for a few days and weaken and then give way to a developing new low as a shortwave would drop into the persistent upper level trough and provide additional energy to the system and create another "Kona Storm." When this occurred, strong southwest winds aloft would extend as far south as 5 degrees north latitude, tap into the deep tropical moisture and transport it over the state. This moisture, combined with the instability in the atmosphere would produce another round of thunderstorms and heavy rains. …*
>
> *March 19. A strong shortwave embedded within the upper level trough swept across the state. This system hit Oahu the hardest with strong thunderstorms dumping 3 to 5 inches of rain, mostly in a 6-hour period between 8 AM and 2 PM.*
>
> *March 21-25. Several more shortwaves. This latest round of unpleasant weather featured strong dynamics and instability, very similar to those found in the Midwestern U.S. during tornado season…heavy rains did continue with flash flood warnings issued daily from March 21 through 24. On the night of March 22, an area of thunderstorms moved over Honolulu from the southwest resulting in flash flooding…Thunderstorm activity shifted eastward and impacted Molokai on the morning of March 23. These storms dropped over 2 inches of rain within a 3-hour period…. Another round of fast-moving thunderstorms swept over Honolulu and east Oahu during the evening of March 23….*

Preliminary National Weather Service climatological data for station "Molokai" (21° 8'N; 157° 6'W)[2] show 4.52 inches of rain in the five days preceding sampling, with half of that received on the day before sampling. Prior to these events, most of the unusual March rainfall over the state occurred on Kauai and Oahu. With the shift of heavy rain eastward to Moloka'i, we quickly mobilized to conduct the post-storm sampling event. Subsequent days produced even more rainfall over Moloka'i, and coastal water quality may have deteriorated further from what is reported here.

[1] http://www.prh.noaa.gov/hnl/pages/events/weeksrain/weeksrainsummary.php
[2] http://www.nws.noaa.gov/climate/getclimate_nonjs.php?wfo=hnl

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3.2 Methods

Water quality measurements were made on March 24, 2006 at the same six stations around La'au Point that were sampled earlier. Once again, *in situ* measurements were made at five-foot intervals through the water column with a YSI Model 85 water quality meter. Parameters measured included temperature, salinity, dissolved oxygen concentration, percent oxygen saturation, conductivity, and specific conductance. Conductivity and specific conductance were used to post-calibrate the conductivity sensor against a YSI secondary standard solution of 50,000 microsiemens/cm ±1% at 25°C. Salinity values were corrected as necessary, based on the conductivity calibration.

At each station, discrete water samples were collected on replicate casts with a horizontal Van Dorn bottle from depths of approximately 5 and 15 feet. The collection depth varied somewhat between stations because variable water currents caused some differences in the line angle at different stations. The somewhat surprising lack of vertical stratification in water quality parameters through the water column, however, rendered inconsequential any resulting minor differences in sampling depth. Water samples were stored on ice until delivery to Hawaii Food and Water Testing for analysis of turbidity, pH and total suspended solids concentrations. Nutrient samples (phosphate, total phosphorus, nitrate plus nitrite nitrogen, ammonia nitrogen and total nitrogen) were processed by Marine Analytical Specialists.

3.3 Results

Winds were light and from the southeast. Swells were generally small and the tide was rising to a very low high (~0.5 feet) at about 1 PM. Along the west coast of Moloka'i, north of La'au Point, fingers of "red water" extended away from gulch mouths and were interspersed with areas of visibly cleaner water. Nearer to shore the red water was nearly continuous. East of La'au Point, a fairly narrow (on the order of 100 yards wide) plume of red water was being held against the shore and pushed westward by the southeast winds. The plume was deflected offshore by the Hale o Lono Harbor breakwater, creating a fairly clean area in the wake of the breakwater west of the harbor. Once past the harbor, the plume returned to the shoreline. At Station 5, however, there were two bands of red water, one at the shoreline and one about 200 yards offshore, separated by a band of visibly cleaner water. This general pattern of red water distribution was confirmed from the air on the flight back to Honolulu.

Water quality results are shown in Table 11. Despite the influx of runoff through the various gulches along the study area, only a very slight indication of stratification of the water column was seen in the temperature and salinity data, and this was mostly at Station 1. Water temperature varied over a narrow range from 24.4 °C to 25.2 °C over all stations and depths, with surface temperatures rising slightly over the sampling period. As explained in the previous section, the State standard for temperature is "ambient," so by definition, there were no violations.

Salinity throughout the study area varied from 34.1 ppt to 35.0 ppt, with the lowest value again being recorded at the surface at Station 1. The maximum salinity dilution seen at the surface (Station 1) was about 1.5% of the value at depth. The applicable State standard is that "salinity shall not vary more than ten percent from natural or seasonal changes considering hydrologic input and oceanographic factors. Like the temperature standard, the salinity standard is defined in terms of natural ambient conditions, and there were no violations.

Dissolved oxygen (DO) concentrations were generally slightly higher at the surface, but sometimes showed an increase near the bottom, presumably due to algal production. This was especially true at Station 5, where slight super-saturation was observed at depth. DO concentrations ranged from about 91% to about 101% saturated. The applicable State standard for dissolved oxygen is "not less than seventy-five per cent saturation," and was not violated at any sampling location.

Total suspended solids concentrations were on the order of twenty times greater in the post-storm samples than in the baseline samples. Mean values of two samples per depth ranged from 19.4-30.2 mg/l. The highest values were recorded at Station 1, but there were no consistent trends with depth or station location.

Turbidity values varied from 0.43 to 1.27 NTU at Stations 2-6, but were more than an order of magnitude greater at Station 1 (29.9-30.2 NTU). The geometric mean (which decreases the influence of extreme values compared with an arithmetic mean) of all samples is 1.19 NTU. These values would exceed all nominal State criteria for "dry" open coastal waters, however, the criteria are presented in terms of the percentage of time the criterion is exceeded. For example, turbidity is not to exceed a value of 1.00 NTU more than two per cent of the time.

pH values ranged from 8.1 to 8.3, well within the applicable State water quality standard.

Concentrations of nutrients at the six stations for shallow (5 feet) and deep (15 feet) casts are shown in Table 12, along with the applicable water quality criteria. The water quality criteria are based on geometric mean values, and three values are given for each criterion: not to be exceeded by the geometric mean, not to be exceeded more than ten per cent of the time, and not to be exceeded more than two percent of the time. Geometric means were calculated by station and depth, and by parameter using all stations and depths. There is no standard for phosphate-phosphorus in open coastal waters; this parameter is included for reference only.

Values for total phosphorus were fairly constant over the study area, ranging from a low of 10.85 µg/l to a high of 12.09 µg/l. There were no apparent trends with depth or station location. These values are within the range expected for open coastal waters in Hawaii. Geometric means by station varied from 11.31 µg/l at Station 6 to 12.09 µg/l at Station 4. The geometric mean for all stations and depths combined was 11.75 µg/l. None of these geometric mean values exceeded the total phosphorus criterion of 16.00 µg/l.

Values for nitrate plus nitrite nitrogen were relatively more variable than those for phosphate and there was a consistent pattern of higher values in the shallow sample than the deep sample at every station. The geometric mean value by station was highest at Station 6 and lowest at Station 4, with no consistent trend through the study area. Geometric means exceeded the criterion of 3.50 µg/l at all stations except 4 and 5. The overall combined geometric mean of 3.58 slightly exceeded the criterion. Typical baseline values in open coastal waters around Hawaii are in the range 1.2-1.7 µg/l.

Ammonia values were relative high. There was no consistent trend with depth, but there was a geographic trend. The highest geometric mean value was seen at Station 4, and values decreased with distance from this station. The overall geometric mean value of 4.28 µg/l was more than double the criterion of 2.00 µg/l. By station, only Station 6 had a geometric

Table 11: Post-Storm Water Quality Data, La'au Point, Moloka'i

Station No.	Date	Start Time	Depth (ft)	Temperature (°C)	Salinity (ppt)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (% Saturation)	Total Suspended Solids (mg/l)	Turbidity (NTU)	pH
1	3/24/06	0925	0	24.6	34.1	6.44	94.9			
			5	24.5	34.3	6.34	91.3	29.9	16.4	8.2
			10	24.5	34.4	6.35	92.2			
			15	24.4	34.5	6.35	92.1	30.2	15.3	8.2
			20	24.5	34.6	6.27	90.7			
2	3/24/06	1015	0	24.5	34.7	6.85	99.4			
			5	24.5	34.9	6.72	97.5	22.5	1.27	8.3
			10	24.5	34.9	6.65	95.5			
			15	24.5	34.9	6.62	95.1	21.7	1.17	8.3
			20	24.5	34.8	6.63	95.5			
3	3/24/06	1048	0	24.7	35.0	6.68	97.2			
			5	24.7	35.0	6.50	94.1	22.2	1.09	8.3
			10	24.6	35.0	6.75	98.6			
			15	24.5	35.0	6.82	98.8	19.4	0.55	8.3
4	3/24/06	1135	0	25.0	34.8	6.96	100.3			
			5	24.8	34.8	6.87	99.8	19.5	0.43	8.3
			10	24.8	34.8	6.85	99.5			
			15	24.8	34.8	6.84	99.3	19.5	0.48	8.3
			20	24.8	34.8	6.86	99.3			
5	3/24/06	1210	0	25.2	34.5	6.88	99.5			
			5	25.1	34.6	6.79	98.4	20.7	0.73	8.3
			10	24.9	34.6	6.92	101.3			
			15	24.9	34.6	6.87	100.8	26.9	0.58	8.3
			20	24.9	34.8	6.92	100.9			
6	3/24/06	1245	0	25.1	34.5	6.75	99.2			
			5	25.1	34.5	6.65	97.2	21.4	0.58	8.3
			10	25.1	34.5	6.68	97.6			
			15	25.1	34.7	6.72	98.9	20.9	0.68	8.3
			20	24.7	34.9	6.76	99.2			

mean below the criterion. That resulted from a very low value in the shallow sample. Typical baseline values in open coastal waters around Hawaii are in the range 1.8-2.1 µg/l.

Total nitrogen concentrations at every station showed the same trend with depth as did the nitrate plus nitrite values, lower concentrations in the deep samples, but no geographic trend was apparent. Geometric means by station and the combined geometric mean all exceeded the criterion of 110.00 µg/l, with the single exception of that at Station 5, which was just 0.12 µg/l below the criterion. However, the absolute concentrations of total nitrogen were not atypical of those found in open coastal waters around Hawaii, which are generally in the range 120-125 µg/l.

In summary, the waters around La'au Point after a period of heavy rainfall showed relatively high concentrations of nitrate plus nitrite nitrogen and ammonia nitrogen. Concentrations of total phosphorus and total nitrogen, however, were not atypically high, although the latter did exceed the applicable state water quality criterion.

The following conclusions may be drawn with respect to the potential water quality impacts of the La'au Point development. The marine waters surrounding La'au Point experience episodic "red water" events following periods of heavy rainfall. Turbidity, suspended solids and nutrient concentrations may be significantly elevated during these events. Sediment delivery to coastal waters is exacerbated by soil loosened by natural causes, including the effects of deer and livestock transiting and foraging in upland areas. The return to baseline conditions after a storm event is aided by turbulent mixing from waves and advection by currents along this exposed coast. The coastal marine communities are adapted to this periodic influx of runoff as well as to occasional high surf and the resulting scour from moving sand and rocks. Coral cover in particular is low and the low relief of the substratum provides limited fish habitat.

It is likely that sediment discharge from runoff to the ocean will be significantly less with the La'au Point development compared with existing conditions. This is because the Master Plan for the La'au Point Residential Community contains several elements that will protect nearshore waters from increased degradation of water quality. These include drainage control systems, CC&Rs to regulate the use of fertilizers and pesticides, re-vegetation as a means of permanent erosion control measures throughout the developed areas, and livestock fencing to keep deer and livestock from disturbing the soil near the community. Therefore, it is likely that the long-term water quality in adjacent coastal waters will be improved by these measures.

Potential short-term impacts of construction on marine waters can be mitigated by implementation of best management practices to control drainage and mitigate erosion from grading.

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Table 12: Post-Storm Nutrient Concentrations, La'au Point, Moloka'i

Station No.	Phosphate (µg/L)	Total Phosphorus (µg/L)	Nitrate+Nitrite Nitrogen (µg/L)	Ammonia Nitrogen (µg/L)	Total Nitrogen (µg/L)
1S	2.48	11.78	5.04	3.78	124.46
1D	2.17	12.09	3.92	4.48	120.26
Geometric Mean		11.93	**4.44**	**4.12**	**122.34**
2S	2.48	11.78	4.90	5.18	132.44
2D	2.48	11.47	4.34	4.06	121.80
Geometric Mean		11.62	**4.61**	**4.59**	**127.01**
3S	2.48	12.09	4.76	5.88	143.64
3D	1.86	11.47	2.94	3.64	123.48
Geometric Mean		11.78	**3.74**	**4.63**	**133.18**
4S	2.17	12.09	2.52	5.60	126.56
4D	2.17	12.09	1.40	7.00	121.38
Geometric Mean		12.09	1.88	**6.26**	**123.94**
5S	2.79	11.47	4.48	5.74	115.92
5D	2.48	12.09	2.10	6.44	104.16
Geometric Mean		11.62	3.07	**6.08**	109.88
6S	3.10	11.78	5.04	0.84	123.06
6D	2.48	10.85	4.48	4.06	108.08
Geometric Mean		11.31	**4.75**	1.85	**115.33**
Combined Geo Mean		11.75	**3.58**	**4.28**	**121.71**
Criteria		16.00	3.50	2.00	110.00

Shaded values exceed State water quality criteria.

Appendix E

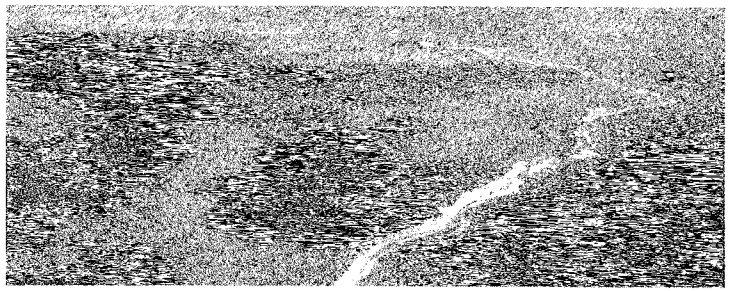
Archaeological Plan

Papohaku to Hakina, Ahupua'a o Kaluako'i, Island o Moloka'i

(Portions of TMK 5-1-02-030, 5-1-08-4 through 15, -19, and -23)

Revised Archaeological Mitigation Plans

Preservation
Data Recovery
Monitoring
Burial Treatment



Prepared for Molokai Ranch
by
Maurice Major, MA

Cultural Landscapes Hawai`i
9712 Overhill Road
Richmond, Virginia, 23229

www.culturallandscapes.net

May, 2006

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LĀ'AU ARCHAEOLOGICAL PLAN SUMMARY

The archaeological plans for Lā'au include four sections for cultural resource needs that will arise in relation to 196 sites within the proposed development and preserves.[1] The plans are:

Preservation – Procedures for protecting and preserving 160 cultural sites. Actions range from the immediate to the perpetual, and include site condition evaluation, stabilization, short and long-term protection, protocol education, periodic field checks, and data collection. The focus is on conservation of cultural landscapes, rather than isolated sites.

Data Recovery – Procedures and research issues for mapping and excavation of 21-24 sites within the road/infrastructure corridor and proposed subdivision lots. Since the most significant sites are being preserved, data recovery sites mostly consist of very simple agricultural modifications, lithic scatters, and more recent historical sites. All sites will undergo data recovery or, more likely, preservation, and samples within sites will be more robust than minimal SHPD requirements.

Monitoring – Procedures and responsibilities for archaeological maka 'ala of development activity. In addition to ensuring that preservation areas are not damaged, monitoring detects previously unknown cultural deposits, and halts work in an area, to evaluate finds, and if necessary consult with SHPD and interested parties to establish a preservation buffer or recover data.

Burial Treatment – Procedures for dealing with known, suspected, and inadvertently discovered burial sites (with no revisions to the accepted 2001 plan). All burials will be preserved in place, and all sites of unknown function for which burial is a possibility will be preserved. Newly found burials trigger consultation with the Moloka'i Island Burial Council.

Because the plans are interrelated, and important part of the general approach is to define the **process and sequence**. The past two years of community meetings can be considered the first phase, and with ongoing consultation helps define what happens next. The Ranch has committed to planning for the entire project area, to maintain or expand upon previous preservation commitments, and to have this revision include plans for all of the affected parcels including proposed subdivision lots, whose future owners must also abide by the plans. The process continues:

- Re-survey the road corridor to verify and augment site records, and search for new sites. Unexpectedly significant finds may cause re-routing. Also, the Papohaku Ranchlands section of the corridor will be described and reported at inventory level for SHPD review.
- Next, short-term preservation measures will be implemented, such as establishing protective buffers and emergency stabilization.
- Next, data recovery will be implemented. At the same time, implementation of long-term preservation measures will begin.
- During the course of construction, monitoring will occur.
- Final reports for each plan will be submitted for community feedback and submitted to SHPD for review as required by rules and statutes.

[1] 197 sites appear in Table I-1 because Sites 53 and 655 refer to the same site. 12 of the 196 lack integrity and significance and are not included in these plans.

The original version of this plan (*Kahaiawa to Hakina, Ahupua'a of Kaluako'i, Island of Moloka'i*, Major 2001) dealt with the former "Alpha USA" parcel (TMK 5-1-2-030). Since then, changes in the project area and the size and location of proposed subdivision lots have necessitated some revisions. More fundamentally, the Ranch's decision to engage the community in master planning has resulted in a scaled-back development with a more conservation-oriented approach, and the proposed land trust, resource management staff, and cultural protection zones have required that the preservation and data recovery plans be augmented and revised. For the most part, the archaeological plans closely resemble the 2001 version, which was accepted by SHPD. Changes in the revised version include:

- Re-assignment of several Data Recovery sites to Preservation.
- Shift from defining buffers around individual or clustered sites to instead establishing a confined development corridor.
- Increased emphasis on active cultural resource management, anticipating as a neighbor a community land trust employing a cultural resource staff person.

Recommendation to collect some data from preservation sites to provide a better baseline for monitoring and help expand our understanding of the chronology and nature of settlement in the area, and specifically to guide environmental restoration.

Maurice Major is an archaeologist who has worked on Moloka'i since 1991. In addition to working on the archaeological inventory of Lā'au and writing the 2001-2002 archaeological plans for the area, he has worked in many parts of the ahupua'a of Kaluako'i and Pālā'au. He earned a masters degree in anthropology at University of Hawai'i in 1995, and has run numerous archaeological projects since, mostly in Moloka'i, Kaua'i, and Kona. He worked for Bishop Museum and Hawai'i State Parks, and started Cultural Landscapes in 1997, the name of which reflects a philosophy of dealing with the whole landscape and the Hawaiians who occupied it in the past and have aloha for it today. For the past decade, the focus of his work has been preservation planning and working with Hawaiian groups who *mālama* their cultural places. Despite having had to move to the mainland, he continues to return to Moloka'i, and has a deep aloha for the island and her people.

INTRODUCTION

Background

The cultural resource management plans contained in this volume represent the culmination of a process that has evolved over several years as the landowner's plans have altered, as the scope of planning has grown to encompass most of western Moloka'i, and as the community has become more deeply involved in the process. Despite this recent history of change, many elements of the plans remain as they were in 2001: preservation continues to be the most common treatment for archaeological sites, a process of verification and augmentation of existing inventory survey data precedes development activity, and procedures for preservation, data recovery, monitoring, and burial treatment remain much as they were in the original plans. And while the landowner and the community have engaged in far-reaching discussions about land use and resource management across a large portion of the island, this document focuses only on the southwest corner of the island in a portion of the *ahupua'a* of Kaluako'i.

A brief history of cultural resource management in this area clarifies some of the changes that have happened with regard to this set of plans (archaeological findings of previous studies appear in the following **History and Archaeology** section). Although information about sites had been reported sporadically during the 20th Century, and Catherine Summers (1971) had compiled this information along with her own field observations and research, explicit focus on sites as "cultural resources" to be preserved and otherwise managed did not occur until the 1980s, when Marshall Weisler (1984) undertook the systematic survey, recording, and evaluation of sites in portions of Kaluako'i. This work led to the establishment of the Southwest Moloka'i Archaeological District (Site 50-60-01-803, also referred to as the "SMAD"), a series of well-defined areas that were listed on the State and National Registers of Historic Places, and therefore afforded some protection against future development and alteration.

Several years later (in 1991), after the Japanese real estate company Alpha USA had purchased a 6,350-acre section of southwest Kaluako'i intending extensive development there, Bishop Museum performed archaeological survey of the parcel, producing an inventory extending in scope beyond the major sites recorded by Weisler, as well as significance evaluations and treatment recommendations for each site (Dixon and Major 1993). The majority of the nearly 600 recorded sites deserved further investigation or data recovery in the case of development plans that would have caused damage, a small number (due to more recent origin or very poor site integrity) were considered not significant, and 46 sites were recommended for permanent preservation. The inventory, evaluations, and recommendations were reviewed and accepted by the State Historic Preservation Division (SHPD) at that time.

A decade after the Bishop Museum survey, Alpha USA had sold the property and Cultural Landscapes was retained by the new owner to create a set of management plans for the property, including a Preservation Plan, a Data Recovery Plan, a Monitoring Plan, and a Burial Treatment Plan (Major 2001). These plans provided detailed procedures and site treatments for sites covered by the 1993 inventory report, and were intended to minimize and mitigate any impacts that a smaller subdivision would have on sites. Although the 1993 report recommendations served as the starting point, the new plans emphasized avoiding rather than mitigating impacts, and so the number of sites slated for preservation grew from 46

to 138, including all of the sites outside the proposed subdivision as well as those between the new lots and the ocean, a large preserve encompassing a settlement system from the shore to an inland quarry, and sites within the proposed subdivision amounting to an estimated 10 – 15% of the area within subdivision parcels.

Shortly after SHPD had reviewed and accepted the 2001 plan, the landowner decided to change the subdivision plan by altering the proposed access road alignment, in response to which Cultural Landscapes produced an addendum to the plans (Major 2002). Rather than having the road meet up with the existing road from Maunaloa town to Hale o Lono Harbor on the eastern edge of the parcel, there would be a single entry to the subdivision from the north, from an old subdivision known as Papohaku Ranchlands. (Of that subdivision, the affected lots would be TMK 5-1-08-4, -5, and -14). At that time, an archaeological reconnaissance had been carried out in the Papohaku subdivision for the Army, since the area had been a target range during and after WW II. Although this project produced some good maps and site descriptions (Burtchard and Athens 2000), its authors believed it would not meet inventory standards, and the client had not released the report or submitted it for SHPD review at the time of the Lā'au addendum. On the basis of a draft report recording 27 sites, five of which were in or near the proposed Lā'au subdivision access road, the 2002 addendum proposed inventory survey within 30 m of either side of the propose road centerline. These sites included one with habitation and agricultural features (Site 50-60-01-520), one habitation (Site 1784), one agricultural site (Site 1758), an isolated lithic artifact (Site 1760), and a possible burial (Site 1761); all except for 1760 had been deemed significant for their information content and recommended for inventory survey by Burtchard and Athens (2000). The 2002 addendum to the Lā'au plans suggested that all of these sites could be preserved in place, and recommended that fieldwork be done that would bring the records up to inventory standards, but also begin implementation of site preservation measures such as establishing protective buffers, avoidance, and stabilization (Major 2002). This plan has been integrated into the current revision.

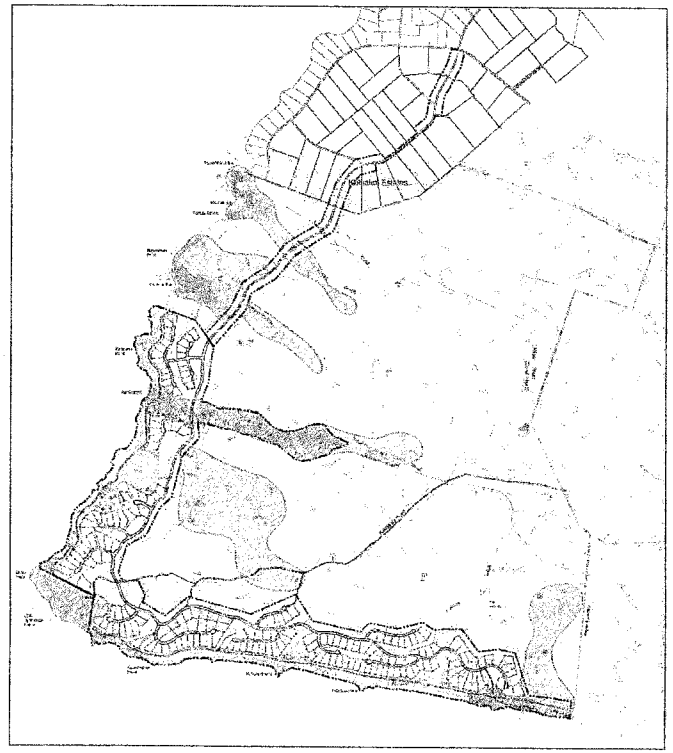
The most recent period of cultural resource management has witnessed a new willingness on the part of the landowner to engage in master planning for all of their holdings and a greatly increased role for the community. In the past two years, a series of meetings with both the general public and of smaller committees composed of Molokai Ranch staff, representatives of various Hawaiian organizations, and interested members of the public have worked on plans to conserve and manage not just cultural resources, but biological and other natural resources as well. The Cultural Committee called on Cultural Landscapes to provide information regarding sites on Ranch lands, archaeological and regulatory concerns regarding cultural resources, and planning for a much-expanded preservation program. Besides further reducing the scope and potential impacts of development, this process sought to increase preservation as a cultural resource management goal by establishing a community land trust tasked with preserving natural and cultural resources within lands deeded to it, by creating conservation easements and cultural overlay districts on privately held land, and by writing codes, covenants, and restrictions for the proposed subdivision that would help preserve sites therein and establish procedures for a management partnership between the new population of subdivision dwellers and Hawaiians who have been on Moloka'i for generations.

The proposed changes in land use, a reduced footprint for the subdivision, and the new approach toward managing cultural resources necessitated this revision of the 2001 plans and the 2002 addendum. Many elements of the existing plans remain the same, and this set of plans simply adjusts the plans to fit the current situation. So while most of the procedures for archaeological measures remain the same, reconfigured boundaries make the status of some sites different; for example, the most recent subdivision plan, being smaller than before, changes the status of some sites from data recovery to preservation, and others from the more protection-oriented preservation of sites within subdivision lots to the avoidance-oriented preservation measures associated with sites outside of development areas. Responsibilities for implementation of some preservation measures have changed with the advent of greater community participation and the proposed establishment of a land trust employing a cultural resource staff person.

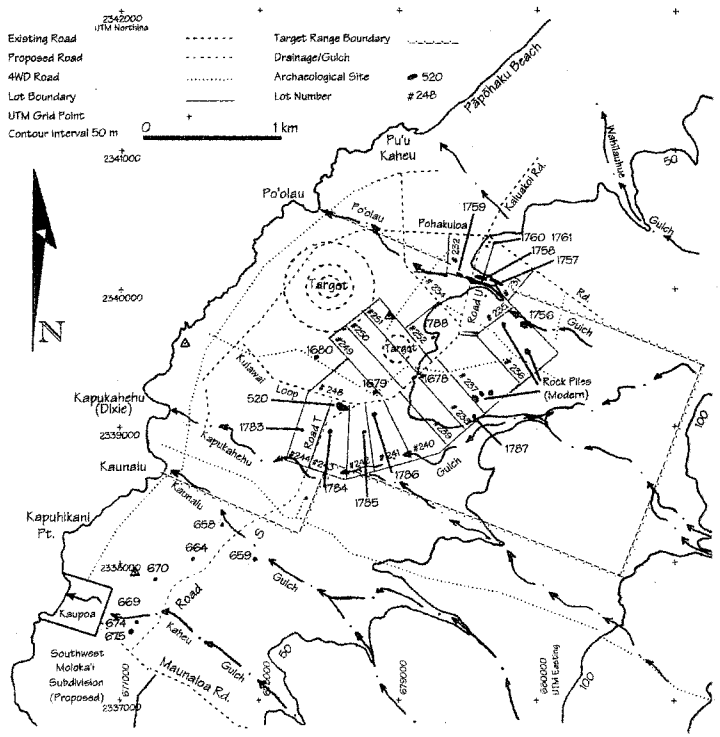
Given the more robust management program envisioned by the landowner and community, some measures have been added or augmented, such as: re-survey of development areas, use of GPS to increase site location accuracy, and an increased effort to identify and mark ancient trails. In response to community concerns, the landowner has committed to additional archaeological fieldwork in advance of the road corridor construction, leading to a reorganization of the work-flow envisioned in the 2001 plans. Namely, re-survey of the road corridor will be completed prior to fieldwork done strictly in relation to preservation and data recovery plans. Because the 1993 report (Dixon and Major, for TMK 5-1-02-030) completed the inventory, evaluation, and treatment recommendations for the subdivision parcel, and were approved by SHPD, road corridor fieldwork may be best considered as a "supplemental data collection," a type of archaeological investigation that exceeds the regulatory requirement, but which serves the landowner's and community's desire that final engineering and construction be based on an enhanced understanding of the archaeological sites in the proposed development corridor. Although this does not fit within the usual SHPD review process, a report will be prepared in case of any significant sites located during the new fieldwork, or if new information leads to revised significance evaluations or treatment recommendations. If, however, a known site is encountered during the supplemental survey, but the description does not change substantially, and does not lead to a re-evaluation of significance or different treatment recommendation, then whatever new information is collected will be reported in the preservation or data recovery report that follows those phases, depending on the status of the site.

For the parcels north of the parcel being subdivided (TMK 5-1-08-4, -5, and -14), road corridor survey will in fact constitute an inventory survey, and the data collected from those areas will be prepared as a normal inventory report with site significance evaluations and treatment recommendations, all of which will be submitted to SHPD for review according to the Hawaii Administrative Rules, section 13-13-276.

Perhaps the most profound change embodied in this revision, though, is change in outlook from the traditional practice of defining a site and surrounding it with a protective buffer to defining a development area and enclosing it within what the Cultural Committee came to call a "bubble." By reversing the approach from "Keep out of the fenced sites" to "Do not stray beyond the development corridor," the current plans should result in two major benefits: reduction of inadvertent archaeological finds, and increased preservation of cultural landscapes rather than site "islands" in a sea of development.



Above: Lā'au Subdivision Project area, Sites, and Cultural Protection Zones



Map based on Burtchard 2000, USGS 1983 Molokai West, and Molokai Ranch maps
Project Corridor is 30 m on either side of centerline of Roads S, T and U, and the intervening section of Kulawai Loop.

Above: Papohaku Ranchlands portion of Project Area

The physical scope of the cultural resource management plans in this volume remains limited to those portions of Kaluako'i *ahupua'a* that could be directly affected by the proposed subdivision (hereafter referred to as the "Lā'au Subdivision"), rather than all of the lands affected by the recent community planning process. Specifically, the revised cultural resource plans focus on the 1,492-acre project area described in the Ranch's petition to the State Land Use Commission, which requests a 613-acre area to be changed from Agricultural to Rural designation, 10 acres from Conservation to Rural (for a park), and 252 acres from Agricultural to Conservation. In addition, this plan covers the "Lā'au Mauka" Rural Landscape Reserve, which corresponds to the remainder of the 6,350-acre

parcel surveyed in 1991. All of the proposed Lā'au Subdivision lots and most of the infrastructure derive from that original parcel (TMK 5-1-02-030), although development activity will affect only a limited portion—400 acres of house lots and 153 acres of roads, infrastructure and parks, or less than 10% of the original parcel area. Finally, the total acreage for the road and utility corridor leading into the Lā'au Subdivision includes several lots in the older Papohaku Ranchlands subdivision. This volume proposes treatments for each of those subdivision lots where potential effects could occur (a total of approximately 15 acres), but does not encompass the entirety of Papohaku Ranchlands.

Because they concern separate actions in the State Historic Preservation Division administrative rules (the general process being described in Hawaii Administrative Rules 13-13-275), this volume presents Preservation (detailed in HAR 13-13-277), Data Recovery (HAR 13-13-278), Monitoring (HAR 13-13-279), and Burial Treatment (HAR 13-13-300) plans as separate sections. A single Introduction and set of appendices serve all of these sections to reduce repetition and save paper.

A final note regarding figures. The original and addendum plans included numerous reproductions of site sketches and maps from the Dixon and Major 1993 and Nurtchard and Athens 2000 reports. As these are now available in at least two documents, paper conservation wins out in this revised plan.

Environmental Setting

Southwest Kaluako'i lies on the flanks of Mauna Loa, the extinct shield volcano that formed the west side of Moloka'i prior to the eastern (Ko'olau) volcano. Mauna Loa, like most other Hawaiian volcanoes, formed through a series of bedded basaltic lava flows MacDonald et. al. 1983:412). The project area includes portions of the western and southern slopes of Mauna Loa, as well as traversing the southwest rift zone, a line of greater activity where vents and flows created a ridge between the summit and Ka Lae o Lā'au (Lā'au Point, the southwest tip of Moloka'i).

Although Mauna Loa is older, the drier conditions have produced less topographic variation than on the Ko'olau side of Moloka'i, where heavier rainfall has cut spectacular valleys. The gulches of Mauna Loa are relatively shallow, interspersed with broad, relatively undissected landscapes. Many of the smaller gullies between and feeding into the larger gulches are very young, the result of drought and overgrazing that denuded surface vegetation in the 19th and 20th Centuries, leaving it vulnerable to violent erosion during occasional downpours. Other consequences of this period of erosion have been exposure of hardpan subsoils on high ground and accumulation of wind and water-borne silt in leeward low areas and gulch bottoms.

Rainfall is concentrated during the winter months, but has amounted to an average of only 15 inches per year in modern times; on the lower slopes of the southwest region, that figure is lower (Baker et. al. 1968). One aspect of the local climate not mentioned in rainfall data is the typical cloud cover, which consists of a line of clouds parallel to and directly above the island. In dry periods, it barely extends past the high Ko'olau mountains, but often extends past the west coast. During wetter periods, this line of clouds brings rainfall that seems to be concentrated over the gulches of Kamāka'ipō, Kaheu, and Kaunalā. The tradewinds that cause these clouds to pile up over the island dominate, but on the south shore there is frequently little or no wind. When tradewinds are absent, land and sea breezes are more noticeable, and convection clouds (with occasional rain) may occur if

humidity is sufficient. A traditional name for a wind of Kaluako'i is "Haleolono," which is also a place name for the land just east of the project area (Nakuina 1992:68).

Although there were reportedly a few springs in the past (Summers 1971, Kaimikaua personal communication 1999), there is no reported evidence of perennial streams that would support typical wetland taro agriculture. Another indication of the aridity of the project area is that there are no traces of traditional coastal fishponds, which generally were constructed where some fresh water input fostered plant growth. However, the wetland just behind the dunes at Site 1146 shows that at least brackish water is present at some coastal locations.

The general soil types of the project area are low humic latosols interspersed with lithosols (Foote et. al. 1972). Soil series represented in the project area are dominated by very stony eroded soil in the north and the interior, Kapuhikani along the southern shore to just south of Kamāka'ipō, and Mala silty clay in the Kamāka'ipō Gulch bottom (ibid.). Both Baker and Foote mention deep soils on the west end, but field experience shows that the project area generally has a very shallow soil cover, with rocky and hardpan areas exposed rather frequently, and substantial accumulation of sediments occurring only in the lower reaches of gulches. The 1991 excavations rarely went more than 50 cm in depth before reaching extremely hard clay.

The soil classifications interpret the project area as having very low productivity Baker et. al. 1968, Foote et. al. 1972). This may be true for modern forms of agriculture and animal husbandry, but it is likely that higher rainfall occurred prior to upland deforestation, providing enough moisture and could cover to grow the less thirsty Polynesian crops such as *'uala* (sweet potato, *Ipomoea batatas*), *'ipu* (gourd, *Lagenaria siceraria*), and the thatching grass *pili* (*Heteropogon contortus*). George Cooke (1949), who managed Molokai Ranch in the first half of the 20th Century, saw Hawaiian *kō* (sugar cane, *Saccharum officinum*) growing in an old household garden at Kamāka'ipō. Terraces, planting circles, and areas cleared of stones show that Hawaiians once practiced agriculture within the gulches, and to a more limited extent, on the sloping lands. Monitoring at Kaupoa, then old ranch house on the outskirts of an ancient village at Kaheu gulch, revealed deposits of loamy soil sometimes exceeding 30 cm in depth, soil that appeared to have a relatively high organic content and held onto moisture for weeks after rainfall—attributes that would have been attractive to ancient farmers.

Currently, vegetation is dominated by *kiawe* (*Prosopis pallida*) forest, which sometimes forms dense thickets, but may also be open. *Lantana* (*Lantana camara*) forms an understory in the forested areas, and also occurs in the open areas. There are occasional grasslands, with various pasture and weedy species that have become naturalized. Chili peppers (*Capsicum frutescens*), bittermelon (*Momordica* species), and basil (*Ocimum* species) are also naturalized, representing historic household garden introductions, but possibly from elsewhere on Moloka'i, since birds readily disperse each. The native flora are much diminished, although hardier shrubs that are adapted to dry and disturbed conditions are still present; these include: *'uhaloa* (*Waltheria indica*), *'ilima* (*Sida fallax*), and *ma'o* (native cotton, *Gossypium sandvicense*).

Insects and other arthropods dominate fauna of southwest Kaluako'i, and it is beyond the expertise of the archaeologists to list or evaluate these. Bird life includes game species introduced by Kamehameha V, and later by the territory and state, as well as exotic songbirds such as cardinals, mockingbirds, and mynahs.

Herds of Axis deer, another of the king's introductions, wander Moloka'i's west end, and along with the other introduced ungulates (cattle, sheep, and goats—only the former of which is still present) have affected the ecology significantly. More important to the human inhabitants of old was the marine fauna, from pelagic species at the offshore Penguin Banks, to reef fish, to shellfish and echinoderms found on the coast, and even the turtles that hauled up on shore.

The character of the southwest Moloka'i shoreline merits attention, not least because this is where ancient and historical people settled. Sand beaches cover most of the coastline, although basaltic ridges do extend to the shore in a few locations, with those at Lā'au Point and along the south shore being highest. Low dunes occur as well, although sand mining depleted those at the eastern end of the project area's south coast. Sandstone and limestone underlie the sand and are visible in many locations. Slabs of this material appear in ancient and historic construction, but the more consistently important aspect of such stone is that the shoreline and shallow waters where it occurs are riddled with holes and cracks that form excellent habitat for fish, lobsters, and other food. Because canoes formed the backbone of the ancient transportation system, the presence of numerous channels through the reef and sandy beach landings would have been an attractive trait of this shoreline in ancient times. The waters of Lā'au Point, however, remain notorious to this day, as currents traveling down each coast collide in a choppy, swirling mix that makes paddling dangerous.

In the reconnaissance of the gunnery range, Burtchard noted highly eroded areas and charcoal indicative of wildfire (2000). It is no great stretch to infer that live fire practice could have ignited vegetation in this parched landscape, and an aerial photo from 1965 shows what appears to be a recent burn area in the range. The reconnaissance also noted several graded and bulldozed areas, piles of stone, and military dumps. In an analysis of Burtchard's report; Dixon and Major's 1993 report; 1955, 1964, 1965, and 1969 aerial photos; Molokai Ranch color aerial photos from the 1990s; the publication *Detailed Land Classification – Island of Molokai* (Baker et. al., 1968); and USGS quad sheets from 1924 and 1983, Cultural Landscapes has been able to estimate the minimum extent of disturbance in and around the new corridor.

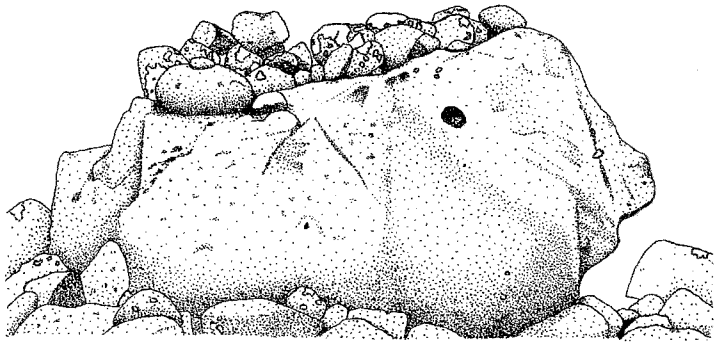
Between Po'olau and Wahīlauhue Gulches, only a small, unnamed gulch appears to have escaped disturbance prior to the mid-1960s. Between about 100 and 250 feet in elevation, numerous dirt roads criss-cross the landscape here. Po'olau Gulch itself appears to have escaped much direct impact, except where roads crossed it—Burtchard's discovery of intact agricultural sites in the gulch is consistent with this. (His Site 1760, a single adze preform in "an erosional scar" that may in fact be in a dirt road visible on aerial photographs.) South of Po'olau Gulch, almost everything inland of the old coastal road, north of where the south arm of Kulawai Loop meets Pohakuloa Road, and below about 250 feet in elevation has been heavily disturbed. Grading to clear the target areas, construct roads, and build observation towers and bunkers has obliterated nearly everything inside of Kulawai Loop, and as far east as the rock piles recorded as Sites 1683-1687. The single contra-indication to this situation may be Site 1788, a concentration of boulders including a slab that was interpreted as a fallen upright from a shrine (Burtchard 2000). Low, seasonably wet ground nearby (interpreted as a spring with which the shrine would have been associated) may have saved this area from grading, and is visible on air photos due to the vegetation.

South of Kulawai Loop, the situation changes markedly, and several sites were present beginning between the road and Kapukahehu Gulch. Sites have been recorded in and between Kapukahehu and Kaunalu Gulches, with a few *mauka-makai* roads being the only disturbance to the intervening ridge. The ridge south of Kaunalu Gulch, however, has been disturbed as far down as 100 feet in elevation, and the 1965 aerial photograph shows a series of lines following the contours from this elevation up to nearly 200 feet. It is uncertain what these are, although they appear to have a few intact trees, and may represent grubbing of pasture, an attempt at erosion control, or both. Kaheu Gulch and south appears to be far less disturbed, except for the road down the ridge to Kaupoa.

History and Archaeology

To achieve a more comprehensible and holistic understanding of southwest Kaluako'i's past, this document combines historical and archaeological background. This discussion summarizes what is currently known about the project area, and then offers a brief regional overview as a framework for the research plan. Site particulars appear with the detailed site mitigation plans below, to avoid redundancy and the need to flip pages constantly. A more developed discussion of overall patterns will be included in the final data recovery report.

The name of the *ahupua'a* containing all of these places, Kaluako'i, refers to the pits or quarries ("lua") from which adzes ("ko'i") were made. Kumu Hula John Kaimikaua notes that the largest quarries were inland at "Amikopala, Kahinawai, Koholalele, and Kamakahi," and that the best types of stone were named "Awalau...Awali'i, and Awauli" (Kaimikaua 1997:4). He also relates that when the Maui *ali'i* (chief) Kiha-a-Pi'ilani ruled over Moloka'i, he stationed his men in all of the coastal villages of Kaluako'i "to secure the mining rights of the valuable ko'i as an added wealth for the high chief," and that access to and security over the quarries was the reason he built his famed trail ("KealapūpūoKihaaPi'ilani, See Summers 1971:12-13) around the west end (Kaimikaua 1997:4).



Above: Trail marker at North Kamāka'ipō

One of the Moloka'i chiefs who provided labor for the trail, Kamāka'ipō, was immortalized in the name of the gulch and bay north of Lā'au Point. Kamāka'ipō

was also the name of an owl who lived at the place, and whose droppings appeared as a type of gray clay found there. Two Kamāka'ipō places known from traditional oral history that may have identifiable archaeological sites associated with them are a *heiau* dedicated to Hina that is supposed to be small and circular, and a hill named Ahoaho, a small hill where chiefs were buried (Kaimikaua 2001, personal communication).

By the time Europeans found the Hawaiian Islands, western Moloka'i was not heavily populated, although both the Cook and Vancouver expeditions noted that a small population was present prior to AD 1800 (see Dixon and Major 1993:9). Moloka'i also became a battleground in the struggles between Maui, Hawai'i, and O'ahu, and during the latter 18th Century lost much of its population due to warfare; a Hawaiian told the surgeon of the Vancouver expedition that Kamehameha had decimated the island (Menzies 1920:115, 118). Another source indicates that a generation earlier, the O'ahu chief Peleioholani raided and burned Moloka'i in revenge for his daughter being killed on the island (Fornander, cited in Summers 1971:18). Ash exists widely on the west end, observed in buried layers from at least Po'olau (Burtchard and Athens 1999) to Kaheu (also known as Kaupoa, Major 2000). An older explanation of the barrenness and low population may be found in the story of 'Amī'ikopalā, which said that the wells dug by that supernatural crab dried up when he was killed (Kaimikaua, personal communication 1999). Another *mo'olelo* told that other water sources dried up when people carelessly, and later maliciously, poisoned springs with pieces of the Kālaipāhoa gods (Kaimikaua 1988).

Regardless of the causes, the view that Kaluako'i was a dry, thinly populated area found its way into archaeological literature, and is accepted today. Stokes (1909) stated that "inhabitants of the western end of Molokai deserted or were removed from their homes nearly half a century ago" (Stokes 1909:30), a period when Kamehameha V had begun ranching operations on the island. Stokes concentrated on religious features, and near the current project area recorded *ko'a* (fishing shrines) on the coast at Kamākaipō (Sites 53 and 55), Lā'au (Site 58, destroyed by lighthouse construction before 1909), Keawakalai (probably Keawakalani, Site 59), Kahalepohaku (Site 61), and Pu'u Hakina (Site 62). At the latter place, he also recorded Kalalua Heiau (Site 67), which had an unusual reef rock slab construction, and was reportedly used for human sacrifice (ibid:31-32). Stokes further reported that local people identified Kahalepohaku as the place where Kiha-a-Pi'ilani had been raised.

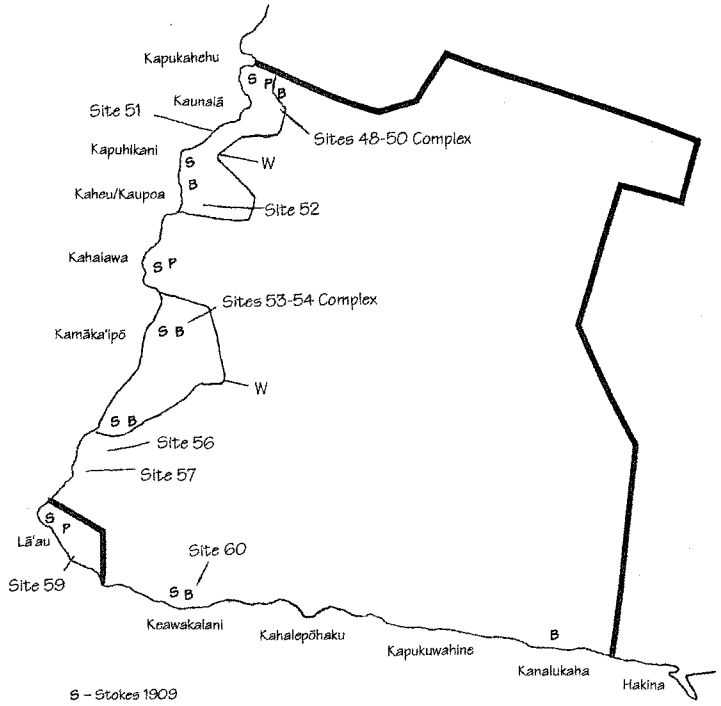
During the 1920s and 1930s, most Moloka'i archaeology was done by visiting scholars such as Fowke (who wrote a brief paper for the Bureau of American Ethnology in 1922), and Phelps (who produced a monograph on Moloka'i archaeology in 1941). The Phelps paper is more interesting for its consideration of environmental variables than its site recording. He divided the island into ecological regions, of which the western was the driest; Phelps highlighted this aspect by repeating a Hawaiian newspaper story about the 18th Century *ali'i* Kaiakea, who ordered a well dug with adzes near Ka Lae o Lā'au (Phelps 1941:57). He stated that the advantages of Kaluako'i were its namesake adze quarries and its fine fishing grounds (ibid:55-60). He used the *ahupua'a* of Kaluako'i to support his conclusion that land divisions with the greatest area had the least population, and that the absence of valleys to provide natural divisions was what made Kaluako'i the largest *ahupua'a* (ibid:75-76).

Few new sites were recorded prior to the 1950s, when the Bishop Museum and University of Hawai'i began working together on Hawaiian archaeology, and on educating a new generation of scientists. One of these students, William Bonk, reiterated the conventional wisdom in his master thesis, which included the lines, "this was a decidedly marginal land for the inhabitants of Molokai. Fishing and the quest for adze stone brought people into the area, and fighting probably sent refugees into it, but temporarily" (1954:139). His excavation of a house site at Kamāka'ipō (Site 54) revealed less than 10 inches of midden, leading him to conclude that the intensity of habitation had perhaps increased over time, but that the site represented a fisherman's house, and that the area had little more in the way of permanent habitation (ibid:51-52).

Catherine Summers compiled historical and archaeological documentation over the next two decades, and published the results in 1971. Few of the sites are within the current project area, but the book is notable as the first and last attempt to bring together knowledge about sites island-wide. *Molokai: A Site Survey* includes notes made by Stokes and other early site recorders, as well as Hawaiian myths and oral histories, unpublished accounts, and historical documents. Based on all of this information, Summers concurs with the portrayal of Kaluako'i as a land blessed with excellent adze stone and fishing grounds, but also where habitation was limited by aridity (1971:39-40). Also implicit in her maps and descriptions is a settlement pattern in which the most heavily used areas are clustered at the bays and high in the uplands. The current project area occasionally reaches the margins of the coastal settlements, but is largely in the "empty" middle elevations. The Statewide Inventory of historical properties began shortly after the publication of Summers, but consisted more of an effort to relocate previously recorded sites than to discover new ones, and added no new information.

The same year that *Molokai: A Site Survey* was published, a University of Hawai'i student named Hal Strong documented some of the Kamāka'ipō habitations. He described and photographed four house sites and a variety of associated features, including: *ahu* (stone mounds), shrines, *ko'a*, a stone pile, and scatters of midden and artifacts strewn on the surface (Strong 1971).

In the early 1980s, Marshall Weisler surveyed coastal southwest Moloka`i, relocating and discovering eleven sites (State Sites 50-60-01-53 through -56, -655, 1118, and -1134) in or near what has become current project area. He reiterated an aspect of Phelps' settlement pattern in which topography was key—sites were concentrated in gulches and the bays where they met the sea—and added that there was a correlation between the size of the bay and the quantity and diversity of features (Weisler 1984:27). Another pertinent outcome of Weisler's work, creation of the Southwest Moloka`i Archaeological District (hereafter SMAD, Site 50-60-01-803) included some sites (53, 54, and 56), in or near the project area. This district is now on the State of Hawai'i and National Registers of Historic Places, meaning that sites within it are afforded additional protection.

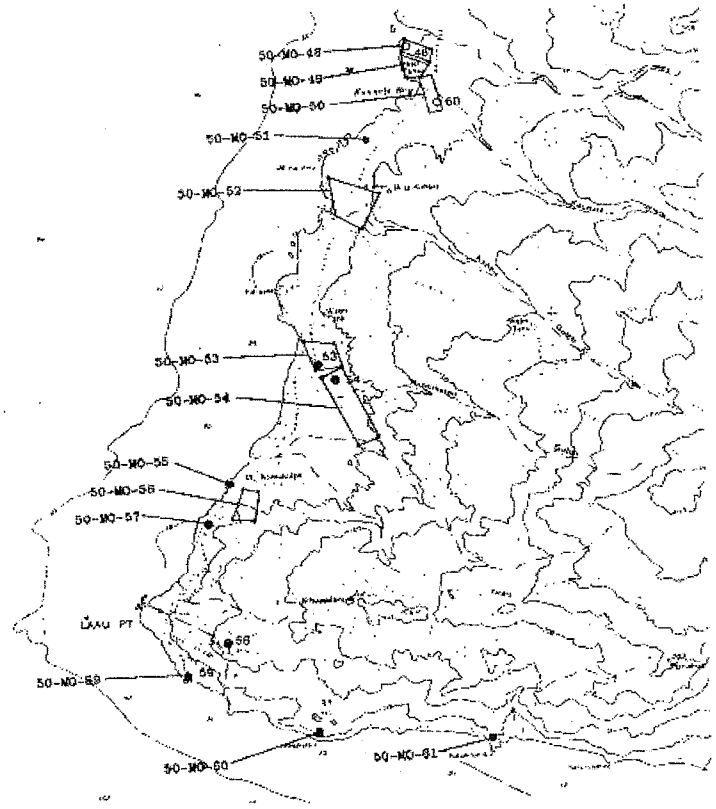


Above: Previous archaeological study areas. (Note: Burtchard and Athens project area is north of this, and is shown in the Papohaku Ranchland map earlier in this report.)

In 1991, a survey of 6,350 acres of southwest Moloka'i done by Bishop Museum encountered features throughout southwest Moloka'i, including the current project area (Dixon and Major 1993, referred to in this report as the "1991 inventory" and the "1993 report"). This survey provided the most complete coverage of southwestern Kaluako`i to date, and the settlement pattern model that emerged from the inventory reinforces the main pattern mentioned above, that sites cluster around bays and gulches (Dixon and Major 1993:337). However, having a survey area that extended well inland from the coast, it was possible to refine the model. For example, although the inland margins of sites had the expected agricultural

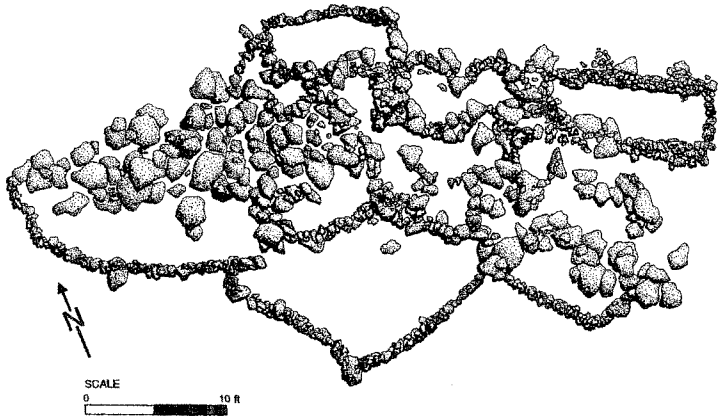
areas and lithic work stations, they had a surprising number of "temporary and semi-permanent residential compounds" (ibid:337).

Discovery of large, multi-roomed enclosures near the 100 foot elevation also went against conventional wisdom that inland features were marginal and ephemeral. Two such enclosures occur in the Site 771-773 complex, each with six or more rooms, some of which display massive, well-built walls. Excavation revealed evidence of lithic manufacture (over 3,000 flakes from a single 100 by 50-cm excavation unit), while presence of a metal pick-ax head suggests that this could be a site that transcends the era of contact between Hawaiians and Europeans. These sites remain enigmatic, but seem to suggest a degree of permanence or intensity previously not recognized on the west coast, and certainly not at that elevation.



Above: Southwest Molokai Archaeological District sites and areas.

The 1991 project also documented variation between west coast settlements (where features clustered at the bays and stretched inland to gardening or quarrying areas) and south coast settlements (where habitations were spread laterally along the coast), indicating that the causes again related to topography (ibid:337-338). Analyses of subsistence strategies and lithic production, paired with the form and distribution of features, suggested that rather than a temporarily occupied, culturally peripheral area, southwest Kaluako'i was probably permanently occupied late in prehistory, and that its access to fishing grounds and adze quarries meant that it was integrated into island-wide society (ibid:240-344). A more recent study including part of the north end of the current project area concluded that coastal habitations must have been permanent (Burtchard and Athens 1999). Presence of extensive occupations in the uplands (Summers 1971, Major 2000) and of major specialized features such as *heiau* (temples) and *holua* (sledding courses) in the lowlands (Summers 1971) provide evidence that the Kaluako'i area had permanent, perhaps socially stratified, occupants.



Above: Site 771, a multi-room enclosure on a ridge above Kamāka'ipō

Traditional wisdom among archaeologists has also concluded that this region would have been settled only after sweet potato was available, and after population densities had risen in the wetter areas, probably no earlier than about AD 1500 (Kirch 1985). Radiocarbon dates suggest somewhat earlier occupation may be possible, although the limited data make it hard to discern sporadic early use from a stable early habitation. An inland quarry yielded a radiocarbon date of AD 1260-1440, and the south Kamāka'ipō coastal site was dated between AD1410-1955. A subsequent, unpublished date from the 1991 excavations at Site 654, in a coastal *imu* that Weisler originally recommended dating, provided an even earlier date of

AD 1019-1211, confirming the suspicion that coastal areas were used much earlier than they were permanently settled.

The condition of Site 654, eroding from an exposed dune face, may be a result of the 1946 tsunami. The Cookes (1948, 1961) both wrote of the effect that this wave had on the west coast, impacting Kawakiu heavily and working its way a half mile inland at Pāpōhaku beach; it could easily have come well inland at Kamāka'ipō, where the alluvial flat is severely eroded. Even without tsunami, however, many sites at Kaluako'i have been damaged by erosion, itself catalyzed by cattle and deer grazing since the mid-Nineteenth Century and several periods of severe drought.

Because the archaeology of Kaluako'i is relatively well known, mitigation plans may be based not only on particular knowledge of the sites, but on the patterns evident in southwest Kaluako'i. Because the current project area mostly runs *mauka* of the sites, the data that will be recovered will be skewed toward traces of peripheral activities and agriculture. In the Data Recovery Plan, the effect of this on the techniques of data recovery and the research issues will be evident.

Papohaku Ranchlands Section

Then Papohaku Ranchland section of the project area is discussed separately here for two reasons. First, the presence of an aerial gunnery target range had a profound effects on the environmental setting and on the integrity of archaeological sites. Second, the fact that a formal inventory survey has not been reviewed by SHPD means that the preservation process in this portion of the project area is less advanced than elsewhere.

In 1998, under contract with the Army Corps of Engineers, archaeologists from the International Archaeological Research Institute, Inc, (IARII) attempted an inventory survey of the former gunnery range (Burtchard 2000). Unfortunately, funding was inadequate, and IARII was unable to do more than a reconnaissance of the area, meaning that coverage was not intense enough to guarantee location of all sites, and that excavation to determine age and function of sites was not performed. However, recording of the sites that were located is good, GPS locations make them easy to relocate, and the report is in fact better than some inventory surveys done on Moloka'i in earlier years. Age, function, and significance were estimated for all sites located during the reconnaissance, and will form the basis for treatments proposed in this plan.

Before describing sites in or near the corridor, however, some historical background specific to this new project area deserves attention. The target range mentioned above appeared on maps as early as 1952 (USGS Ilio Point Quad) as a "Bombing Range," and was apparently leased by the US Government from Molokai Ranch between 1944 and 1965 (Burtchard 2000). Documentation of what exactly occurred has not been located, but a combination of physical remains, recollections of residents, and photographs allows some reconstruction. An aerial photograph taken in 1955 shows that the largest feature of the range, a huge (about 600 m in diameter) circular target comprised of three concentric earth and rock rings, had not yet been constructed, although a smaller (about 200 m) one of similar plan was clearly visible. By 1965, facilities included the targets, three cement observation bunkers, a range control tower, a munitions dump, and another possible communication or observation tower. Grading for target and infrastructure development, as well as the direct effects of the munitions, have cleared large areas beyond the constructed features themselves, and the archaeological reconnaissance found several piles of disturbed stone *mauka* of the

active range. Local residents recall the area being used for ground troop training in the 1950s and 1960s, and the abundant munitions on the ground confirm that aerial bombardment occurred as well. It is possible that other portions of the project corridor may have been used for training, since a retired marine recalls participating in amphibious and land-based exercises around Kaupoa. Besides the impacts from thousands of men and heavy machinery being moved around, he noted specifically that they constructed C-shaped shelters (Dixon and Major 1993)

Subsequent to the military training era, the land was not heavily used, although it may have reverted to cattle pasture until the 1970s and 80s, when subdivision for residential development was planned. It was during this period that Hal Hammatt recorded four sites in an archaeological reconnaissance of 3,200 acres subsuming the current project area, and William Barrera recorded five more sites along proposed roads (Hammatt 1980 and Barerra 1982a, both cited in Burtchard 2000). Development of the subdivision resulted in construction of several roads, which also served as corridors for water and electrical infrastructure, which was all installed below ground. However, few of the lots have actually been developed. Near the coast (adjacent to the Po'olau beach access), grading has damaged archaeological features believed to be part of Site 45, a settlement with habitation, religious, and probably agricultural features. Sand dunes at the south end of Pāpōhaku Beach have also been surreptitiously mined during the 1970s through the 1990s. The extent of impacts resulting from development of the residential lots is undetermined.

The Hawaiian place names near the project area extension shed some light on the cultural landscape. Po'olau, the name for a gulch and the bay where it terminates, is left un-translated in *Place Names of Hawai'i*, but the word means "leaf base; butt end of a leaf" (Pukui and Elbert 1986). Many of the long time residents of Maunaloa, however, know it by the name "shit creek," apparently because it once received waste from the town. However, it should be noted that Po'olau Gulch terminates well below Maunaloa Town, and instead it is Wahīlauhue Gulch that descends from Maunaloa to the coast, where it ends about one-third of the way from the south end of Pāpōhaku Beach. It appears that extension of that name to the entire beach may be a fairly recent phenomenon, since Monsarrat (who made the first Moloka'i map in1886) was careful to find knowledgeable Hawaiians, and applied the name to a structure at the beach; Pāpohaku means "stone enclosure." Another name near the project area that appeared on the 1886 map was Pu'u Koai, which Pukui, Elbert and Mo'okini considered to be Pu'u Koa'e, or "tropicbird hill" (1974).

South of Po'olau, Kapukahehu Bay (whose origin and meaning are uncertain) is more commonly known now as "Dixie," and does not appear in either form on the old maps. "Dixie Maru," was a boat that crashed there, and the coastline is known for shipwrecks. In a less drastic way, Dixie is also the end of the road for cars, and locals and tourists alike frequent the sandy bay. Continuing south less than half a kilometer, the next gulch and bay are now called Kaunalā ("placing sun" Pukui, Elbert and Mo'okini 1974), although maps until 1924 used Kaunalu, or "placing wave" (ibid). Further south is Kapuhikani, or "sounding eel" (ibid), a point of land that has appeared on all maps beginning in 1886. Next is Kaheu, a gulch and bay whose name first appeared on the 1924 USGS map, and is thought to mean "the fuzz" (ibid). Kaheu is better known as Kaupoa, a name that first appeared as a mapping station on the 1897 map (which was made after the overthrow of the monarchy, and is suspect due to its omission of many Hawaiian place names or

replacement with English names). The name was popularized by the Cooke family, who in 1925 built a house by the bay and named it Kaupoa.

Archaeologically, the action is at the bays, and the current project corridor is in the hinterlands. The general settlement pattern of the west coast is for habitations to cluster around the bays, and for the traces of human presence to diminish rapidly with increased elevation and distance from the bay. On the coast, *ko'a* (fishing shrines) and dispersed temporary habitations may occur between bays, and it is likely that dunes contain human burials. Heading inland from the bays, gulches contain terraces and stone piles indicative of attempts to retain freshet moisture and soil, and to clear the stony soil for planting, respectively. Aside from the agricultural features and temporary shelters (both C-shapes and pavements) associated with them, stone mounds that appear to be burials are the most common features at the margins of coastal settlements. Of the features occurring above 50 feet in elevation, few are outside of gulches.

Further inland (generally over 150 feet in elevation), the presence of temporary habitations (usually C-shapes) and concentrations of lithic debris present traces of traditional quarrying and stone tool manufacture sites. Quarries usually occur on gulch margins or ridges where a stratum of fine-grained basalt was accessible, and could be removed with relative ease. Primary reduction into cores and roughly formed adzes was done at the quarry, after which finer flaking and polishing at the coastal habitations resulted in finished tools. Between the quarries and the coastal habitations, stone cairns mark the trails and occasional concentrations of basalt flakes suggest limited lithic work, although the latter usually represent single episodes rather than the sustained or repeated behavior that happened in quarries.

Because it is inland of the coastal settlements, but not far enough in to be a part of the quarry activity, the current project corridor has few archaeological features. Only in Po'olau Gulch, where the corridor will cross an area of stone piles interpreted as agricultural clearing piles (Site 1758), does it directly encounter sites. However, a few sites are known to be relatively near the corridor, and will be described here.

Site 520. Located by Kulawai Loop near the beginning of Road T, this site consists of numerous features on the crest and in the lee of a ridge. Features atop the ridge include three C-shapes, three walls, a pit, and two platforms, forming a probable habitation site. Barrera (1982) excavated one C-shape, uncovering a large fire pit feature and cultural deposition extending to 60 cm in depth. Whereas Barrera only recorded five of the habitation features, Burtchard's crew spotted the additional features on the ridge, as well as a minimum of 23 small stone mounds extending down the southwest slope. He considered the mounds to be agricultural without specifying whether they were clearing or planting features, but wondered whether the windswept ridge crest would be an undesirable place for habitation, and suggested a possible religious function (Burtchard 2000). However, the walls and C-shapes are very typical of windbreak features, and the form of these and the platform-terrace is commonly associated with habitations in the region. Part of the religious interpretation appears to rest on the presence of a "rough basalt upright" near the pit, but religious uprights tend to be smooth (often waterworn) or have worked surfaces, which this apparently did not. Despite the good view from this location (an attribute of shrines in Kaluako'i), the C-shapes are not open toward the sea, as would be expected, and lack the typical stone platform/pavement interior or coral offerings. Although it is possible that the free standing platform could be a burial, the overall function of the site appears to have been habitation and

agriculture. Site 520 covers an area of 6,750 m^2 at an elevation of about 100 feet. [2] Site 520 has been evaluated as significant under Criterion D.

Site 658. This small, isolated stone mound appears to be one of the infrequent agricultural modifications to Kaheu Gulch, along with Site 659. It is significant under criterion D, and covers 4 m^2 at an elevation of 60 feet.

Site 659. About 200 m up Kaheu Gulch from Site 658, this consists of a single alignment of boulders on the south slope, forming a rough terrace. It is significant under criterion D, and covers 30 m^2 at an elevation of 90 feet.

Site 664. This site consists of five small cobble mounds, apparently associated with agricultural clearing in a small gulch north of Pu'u Kaheu. The site is significant under criterion D, and covers about 100 m^2 at an elevation of 60 feet.

Site 669. This site is on the north slope of Kaheu Gulch inland of the main settlement there. The components include a possible burial (a mound), and possibly areas of temporary habitation associated with agriculture (a C-shape, a terrace, an enclosure alignment, and a possible hearth). The site is unusually situated, being in the middle of a small gulch. A test excavation here in the enclosure yielded no cultural materials, and hit hardpan subsoil in only 10 cm (Dixon and Major 1993). The site was listed as significant under criterion D, but will be treated as possibly significant under criterion E due to the possible burial. The site covers about 2400 m^2 at an elevation of 85 feet.

Site 670. This site includes low, oblong mounds interpreted as agricultural features, a substantial C-shape with a cupboard interpreted as a shrine, and an unusual C-shape open toward the northeast tradewinds. Testing in the latter revealed a single, shallow layer with cultural materials including ash, hammerstones, basalt flakes, and a grindstone. Presence of a possible shrine among the other features led to positive significance evaluations including criteria D and E. The site covers and area of 1500 m^2 at an elevation of about 90 feet.

Site 674. This single stone mound was interpreted as a possible burial, and was assigned significance under criteria D and E. It covers 1m^2 at an elevation of 80 feet.

Site 675. This site appears to be an agricultural area with associated temporary habitation. It consists of an enclosure with a possible hearth, and several small stone rings interpreted as planting circles, and was listed as significant under criterion D. The site covers 1000 m^2 at an elevation of 70 feet.

Sites 1678-1680. These sites each consist of a single concrete bunker for observation of the nearby targets. None have been judged significant, and they probably do not meet the 50-year age requirement. Site 1680 is not in a potentially affected lot.

Sites 1683-1687. These were recorded by Burtchard (2000) as a series of rock piles made by the military. They probably represent stockpiles of stone used for target construction, or surface material pushed aside during construction of the target range. None have been judged significant, and they probably do not meet the 50-year age requirement. On the project area map, they are simply marked as "Rock Piles (Modern)."

[2] Burtchard (2000) reported an elevation of 30 feet, but his map and UTM locations place the site much higher. Apparently due to a GPS error, many sites in the IARII report have this problem. This report estimates elevations based on map and UTM locations, written descriptions, and USGS and Molokai Ranch topographic maps.

Site 1756. This site, well *mauka* of the corridor, lies on the opposite (south) side of Po'olau Gulch about 200 m up from Sites 1757-1759 and just inside Lot 236. Burtchard reported a terrace platform on an outcrop, but noted that more features could be expected in the high grass. This feature was described as having two "chambers" (2000). A fence post and 55-gallon drum were interpreted as ranching activity, and the overall site area was estimated to be 1500 m^2 at an elevation of about 200 feet.

Site 1757. Located in Po'olau Gulch, this site consists of 8 small piles of cobbles placed on low boulders on the first natural terrace above the gulch bottom. Because they are in a tight cluster and are rather low to the ground, they do not appear to be trail markers, such as those found in Kamāka'ipō Gulch. Instead, they have been interpreted as agricultural clearing mounds (piles of stone removed from the soil and put on boulders where nothing could be planted). These differ from so-called "sweet potato mounds," which were planting features in which soil or compost was covered with a mantle of cobbles that acted to conserved moisture. Presence of oblong cobbles on one mound caused Burchard to speculate that it could conceivably have been a shrine. This site covers nearly 6,000 m^2 at an elevation of 150 feet, and is *mauka* of the proposed corridor

Site 1758. This is a larger set of 36 stone mounds like those found in Site 1757. These, too, are stacked on boulders and are interpreted as clearing piles. This site occurs in the flood plain of Po'olau Gulch, covering approximately 3,150 m^2 at an elevation of about 140 feet, just down the gulch from Site 1757. Burtchard speculated that these may actually be part of a single site, and noted that a few oblong stones were also present here. The proposed corridor traverses this site.

Site 1759. A third cluster of small clearing mounds (11 in number), this site occurs in a smaller area, also on the flood plain of Po'olau Gulch. This site covers about 800 m^2 at an elevation of approximately 130 feet, and is located down the gulch from 1758, and *makai* of the proposed corridor.

Site 1760. This consists of a single basalt adze preform, broken into two pieces. Because it was visible in an eroded area amid grass, Burchard speculated that it might be part of a larger deposit. Analysis of aerial photographs shows several dirt roads in the area, and it is possible that the erosional scar is one of these roads. This artifact is about 80 m north of Site 1761 at an elevation of about 150 feet, and is just *mauka* of the proposed corridor.

Site 1761. The size (2.9 x 2.5 x .55 m and 1.3 x .75 x .35 m), shape (elongate), and stacked edges of these two stone mounds, as well as their placement on a small knoll, suggests that they are human burials, rather than agricultural features. However, this is rather far inland for burials (which are more often found at the inalnd margin of settlement complexes), and proximity to roads means that these could conceivably be historic features. They are located *mauka* of the northern end of the project corridor. The site covers 100 m^2 at an elevation of 150 feet.

Site 1783. This site consisted of some cobbles piled on a boulder. Burtchard speculated that they may simply have been cleared to provide a sitting area, and there was no evidence of formal construction. The site reportedly covers 400 m^2 at an elevation of 100 feet.

Site 1784. A rectangular platform and a small hearth comprise this site, which Burtchard (2000) interpreted as a habitation. The platform, measures more than 7 m in length, and is raised about 30 cm above the surrounding surface. The hearth, a small ring of stone is described as being 25 m southeast of the platform, but is

shown 25 m northeast on the site map. The site covers an area of 1050 m^2 at an elevation of approximately 110 feet.

Site 1785. This site on a flat area up-slope of Kapukahehu bay consists of a possible hearth, an alignment, and a stone slab interpreted as a shrine based on the presence of traditionally worked surfaces and its oblong shape. Site covers 300m^2 at an elevation of about 125 feet.

Site 1786. This site, north of 1785, occupies a small ridge and consists of a series of modifications to an outcrop, atop which appears to be an artificially set boulder upright. The modifications include low walls, alignments, and terraces, as well as what appears to be a trail leading up toward the upright. The immediate area around the boulder is defined by a rectangular platform incorporating natural boulders and set cobbles, and is the high point before the ridge descends toward the sea. Site 1786 covers about 875 m^2 at an elevation of about 150 feet.

Site 1787. This site consists of two large boulders, each with a small pile of cobbles on top. The absence of historical debris led to an estimation that the site is pre-Contact in origin (Burtchard 2000), and the feature type is similar to many found in southwest Moloka'i that have been interpreted as trail markers, based on their visibility and distribution in the landscape (Dixon and Major 1993). The site is reported as covering approximately 150 m^2 at an elevation of close to 190 feet.

Site 1788. This site is located in a low area near a seasonally wet depression interpreted by Burtchard as a possible spring (2000). Because of this proximity and the presence of an oblong boulder slab, the site was interpreted as a shrine. Although the concentration of stone here suggests that this is indeed a feature, the existing records are unclear, since the accompanying sketch depicts a smaller, more amorphous feature than the rectangular one described as retaining its integrity. Proximity to the heavily disturbed target range area warrants consideration that this may be a later feature, and the records fail to note attributes (phallic shape, smooth or worked surface) known to be associated with sacred stones, and the photograph seems to show a fractured, angular stone not commonly associated with that function. Site 1788 is near the 150 foot contour, and is said to have an area of 100 m^2, although the map shows less than 20 m^2, even if the spring is included.

Supplemental Data Collection

Two types of archaeological investigation that are not required by the regulatory historic preservation process will be done in association with the Lā'au subdivision. While elements of each have been part of the plans from the outset, the recent period of community consultation have made it clear that they are a priority to many community members and most Hawaiians on Moloka'i, and their importance is highlighted here. First, because construction of a new road and utility corridor represents the greatest single potential for impact, and is the initial step in construction for the new subdivision, the landowner has committed to re-survey the corridor, most of which as already been through the official review process. The character and methods for this are described beginning in the following paragraph.

The second form of data collection relates to preservation sites within and close to proposed subdivision lots, where the process will amount to a thorough re-survey of sites that are to be protected within or in close proximity to new house lots. Because this type of work is to be done as part of the **Preservation Plan**

implementation, it will be described in more detail thete, but it is important to note that it will be done well in advance of any house construction, and therefore any new or augmented finds may be considered in the design and construction process, so that new houses need not damage old sites. An overview for this process is included below.

Road Corridor Re-Survey

As described in the **Introduction**, the first fieldwork associated with these plans will be to re-examine the road corridor and verify descriptions of known sites, gather additional data if possible, and search for unrecorded archaeological deposits or features now obervable due to changes in surface visibility. A preliminary plan for the road corridor has been prepared by engineers, the centerline of which will be staked on the ground by surveyors prior to commencement of archaeological fieldwork. The proposed road begins at the end of Kaluakoi Road, connects to an portion of Kulawai Loop (an existing road in the Papohaku Ranchlands subdivision), and then runs roughly southwest to a point just south of the Kaupoa House lot, and then more or less follows the shoreline down the west coast and along the south coast to the vicinity of Site 1155, south of Pu'u Hakina (see map). Along the way, 12 short spur roads depart from the main corridor, providing access to subdivision lots. No connections to the Hale-o-Lono harbor road or other existing roads are planned, and the old coastal road—a roughly graded, unpaved jeep trail—will be abandoned as part of the development plan due to its alignment through several archaeological sites and erosion-prone environments.

As noted above, the portion of the road corridor north of TMK 5-01-02-030 has not been officially inventoried, and a report for that portion of the road corridor survey will in fact be submitted to SHPD for review as an archaeological inventory with significance evaluations and treatment recommendations. Despite this procedural difference, survey techniques will remains the same throughout the road corridor.

The area for data collection consists of a 30 m wide swath on either side of the centerlines for the main and spur roads, and a 50 m radius surrounding each end point, where turn-arounds have been planned. The eventual impact of road construction and utility trenching will be less than the resulting 60 m wide corridor, but that width has been chosen both to provide the best archaeological understanding of the road and its context, and to provide intensive coverage that may be used to avoid additional survey or unexpected impacts should presence of sensitive sites within the corridor cause a need to adjust the alignment.

The survey team will consist of Moloka'i residents with archaeological experience and training led by the Principal Investigator, with additional archaeologists hired from off-island if necessary. The corridor will be divided into segments, and the crew will perform sweeps in each segment with a 5 m interval. Where grass is thick enough to obscure surface visibility, gas-powered string trimmers will be used to expose the surface within 10 m of the centerline, so that low-relief features such as pavements and lithic scatters will not escape notice. Vegetation will also be cleared around the periphery of any visible surface features found within the corridor (regardless of distance from the centerline) to allow their accurate documentation and to search for additional features or deposits.

Any finds within the corridor will be documented with scaled surface planviews, cross-sections and profiles as necessary, photographs, and descriptive notes. Where sediments occur that could contain buried cultural deposits, transects of probes will be employed to determine site boundaries and characterize site stratigraphy. Each

probe is to be excavated with a shovel, by stratigraphic layer as far as practicable, with the entire volume screened through $^1/_4$-inch mesh. For each probe a representative profile will be drawn, referenced to the current ground surface. Any features encountered will be drawn and photographed in plan and profile and excavated as a separate stratigraphic context. All cultural materials will be collected, described, and recorded in a project inventory. Probe intervals will range from 1 to 5 m, depending on the area of sediment where buried features could occur, as well as the nature and density of the surface features and visible deposits. Probes will begin at the outer edge of surface features and radiate outward in at least two directions along grids established for each site (the orientation of which will be decided in the field by the PI according to topography and local conditions). Where probe intervals are greater than 2 m, follow-up probes will be used at tighter intervals to better determine the horizontal extent of the site.

For each site, a minimum of one datum point will be flagged and marked on site planviews to facilitate location on large maps. Initially, a GPS device will be used at each of these to provide a location; consumer-grade Garmin units used on property by Ranch staff have achieved accuracy to within 2-m of the UTM coordinates provided by survey grade GPS, and will be used during the re-survey to provide interim site locations. Subsequent to the initial fieldwork and prior to construction, these points will be plotted lot surveys to provide accurate, precise control points for site and buffer locations. Each datum point will be integrated into the engineering consultant's CADD system, along with either an appropriately-sized point buffer or a polygon derived from the site planview.

Sites that have been previously recorded will be reported in the Data Recovery or Preservation report, according to its status, including any newly-located features or artifacts found within 10 m of the know features. Features not associated with known sites will be reported in a Supplemental Inventory Survey report, submitted to SHPD along with significance evaluations and treatment recommendations. This report will also cover sites located north of TMK 5-1-02-030 in the Papohaku Ranchlands subdivision.

In a few cases where the site is minimal, Data Recovery measures proposed in the accompanying Data Recovery Plan may be done in conjunction with this phase of fieldwork. For example, Site 697 consists of lithic artifacts on a deflated hardpan surface, for which the proposed data recovery method is surface collection; rather than draw a planview (for the supplemental data collection) and return later to collect the artifacts (for data recovery), a single period of fieldwork will be done to satisfy both phases.

Subdivision Lot and Coastal Zone Re-Survey

Sites within proposed subdivision lots have reasonably accurate locations due to their proximity to coastal reference points, and many have been previously documented in detail by archaeologists. In order to ensure that all sites have been adequately recorded and those slated for preservation receive timely and effective preservation, land within and in close proximity to the subdivision lots will be re-surveyed as well. As with the road corridor, the aim is to verify extant site records, augment them as necessary, and search for any previously unrecorded sites.

Methods for investigating and recording sites will be the same as well, although the project area differs. Rather than a corridor defined by the road centerline, this survey area consists of the proposed private lots and the lands makai of them. Inclusion of the coastal land (most of it already zoned Conservation, and the

remainder to be so if the Ranch's petition to change some near-shore land from Agriculture is approved) in this phase stems from two facts. First, some sites straddle the boundary between Conservation land and lots. Second, as lots are occupied and coastal parks are opened, foot traffic through coastal sites will increase, subjecting them to a greater potential for impact than in recent decades.

Because so many sites have been recorded near the shoreline, this phase will begin with the known and work outward, annotating and augmenting site documentation as necessary, firmly establishing site boundaries. Areas between sites will be surveyed at 5-m intervals to search for any unrecorded features or deposits.

Vegetation clearing in this phase will focus on sites, exposing surface features and visible deposits to allow for mapping. However, clearing in Conservation lands will be limited to cutting grasses and vines, and close attention will be paid to any native plants, preserving them. A sampling of high probability landforms (ridge-tops, natural terraces within gulches, and level ground above slopes) will be cleared to check for unrecorded features in the private lots, but not within the coastal strip. In all cases, clearing will proceed with an awareness of soil, slope, and groundcover, to avoid exacerbating erosion.

In addition to the use of shovel probes to define site boundaries, some excavation will be done in this phase to help further the general conservation goals of the master plan and to better understand chronological and functional issues regarding the sites. Wherever hearths or *imu* are at risk from erosion, they will be excavated to reveal the stratigraphic relationship to other site components, and to collect charcoal for taxonomic identification, providing a basis for future re-vegetation efforts. Likewise, eroding deposits will be cleaned up to provide a representative vertical face for profile illustration, and a charcoal or other materials may be collected at this time.

Proposed Site Mitigation Measures

Sites will be dealt with differently depending on their significance, their position in the cultural landscape, and their location relative to private parcels, the proposed land trust, and conservation overlays. Options for site treatment include preservation, data recovery, and no action. Monitoring may be done in addition to other actions, and will also occur throughout the road corridor. Sites for which no action is planned are those that were deemed not significant in the 1993 inventory report, typically because they were recent hunting blinds or had been so badly damaged as to eliminate the possibility of determining their original form or salvaging meaningful data. **Table I-1** lists the categories of mitigation actions generally; the subsequent Preservation and Data Recovery plans will add more detailed information regarding specific practices.

The forms of mitigation dealt with in these plans derive from the process outlined in HAR 13-13-275, which describes the historic preservation review process in Hawai'i. Preservation, obviously, means avoiding damage to the site, although there are different degrees of this measure that will be described in the appropriate section. **Data Recovery** pertains to sites that are significant for their information only, and covers actions such as mapping, excavation, and surface collection that adequately gather that information. The objective is to collect information prior to construction, so that any damage during development is offset by gains in knowledge. Once data recovery has occurred and the report approved by SHPD, the site is officially considered "no longer significant," although the approach in this project is to monitor any unexcavated portion in hopes of gathering further

data that may be unearthed. **Monitoring** means having an archaeologist present during ground-disturbing activities that could potentially have an adverse impact on a significant site, and to gather data from inadvertently encountered sites. The objectives are twofold: to prevent incursion into preservation areas and damage to sites being preserved, and to collect data from any sites or deposits encountered outside of preservation areas. In some cases, monitoring may result in discovery of previously unknown features or deposits, leading to an expedited inventory and evaluation, and potentially to data recovery or even preservation. This will occur wherever activity with potential to impact sites occurs, and therefore is not listed at the site-specific level. **Preservation** differs from the other treatments in that sites are protected, and there is no impact to mitigate. Options within this treatment revolve around the degree and type of protective measures to be implemented, and whether the preservation is to be passive (avoidance) or active (stabilization, interpretation, and other measures). **Burial treatment** concerns not only the actions taken for sites that have documented or possible burial sites, but also measures that will be followed should an inadvertent discovery of human remains occur. Like monitoring, the procedures for burial treatment apply throughout the project area.

Because of uncertainty regarding some site locations and the fact that the final alignment of the proposed road corridor has not yet been designated, some treatments may change later pending community and SHPD approval. (All such changes will be from Data Recovery to Preservation, and no objections are anticipated.) Any site thought to be near the road or within a proposed subdivision lot has a detailed mitigation plan. At least 14 sites recommended for data recovery in the 2001 plan are now slated for preservation due to the road realignment and the revised approach to subdivision, and as many as 8 more appear likely to do the same. SHPD will be consulted regarding such changes. As mentioned above, the preliminary road corridor will be resurveyed prior to finalizing the plan, and every effort will be made to realign it around significant sites.

A few sites listed in 1993 lack specific mitigation measures described in this plan. Some of these are sites recorded prior to 1991 that could not be located or were destroyed by that time (State Sites 55, 653, 1108, and Bishop Museum Sites B5-58 and B5-61). However, most consist of recorded sites that lacked cultural or archaeological significance. Other gaps in the site numbers—653, 1133, 59-638, 700-735 and 783-1099—have been assigned to sites elsewhere on Moloka'i, and do not actually denote gaps in the 1993 site records.

Table I-1. Site Conversions and Mitigation Treatments

State Number (50-60-01-)	Bishop Museum Number (50-Mo-)	Inventory	Preserve	Data Recovery	No Action
48	B6-61		X		
49	B6-62		X		
50	B6-63		X		
50	B6-64		X		
51	B6-65		X		
52	B6-66		X		
53	B6-68 and -97		X		
54	B6-69 to -73		X		
56	B6-76 and -77		X		
57	B6-78		X		
520	N/A	X	X		
639	B6-67		X		
640	B6-74		X		
641	B6-83		X		
642	B6-84		X		
643	B6-85		X		
644	B6-86		X		
645	B6-87		X		
646	B6-88		X		
647	B6-89		X		
648	B6-90		X		
649	B6-91		X		
650	B6-92		X		
651	B6-93		X		
652	B6-94		X		
654	B6-96		X		
655 (aka 53)	B6-97		X		
656	B6-98		X		
657	B6-107		X		
658	B6-108		X		
659	B6-109		X		
660	B6-110		X		
661	B6-111				X
662	B6-112		X		
663	B6-113		X		
664	B6-114		X		
665	B6-115		X		
666	B6-116		X		
667	B6-117		X		
668	B6-118		X		
669	B6-119		X		
670	B6-120		X		
671	B6-121		X		

State Number (50-60-01-)	Bishop Museum Number (50-Mo-)	Inventory	Preserve	Data Recovery	No Action
672	B6-122		X		
673	B6-123		X		
674	B6-124		X		
675	B6-125		X		
676	B6-126		X		
677	B6-127				X
678	B6-128		X		
679	B6-129		X		
680	B6-130		X		
681	B6-131		X		
682	B6-132		X		
683	B6-133		X		
684	B6-134		X		
685	B6-135		X		
686	B6-136		X		
687	B6-137		X		
688	B6-138		X		
689	B6-139		X		
690	B6-140		X		
691	B6-141		X		
692	B6-142		X		
693	B6-143		X		
694	B6-144		X		
695	B6-145		X		
696	B6-146		X		
697	B6-147			X	
698	B6-148			X	
699	B6-149		X		
736	B6-150		X		
737	B6-151		X		
738	B6-152			X	
739	B6-153		X		
740	B6-154				X
741	B6-155		X		
742	B6-156		X		
743	B6-157			X	
744	B6-158		X		
745	B6-159			X	
746	B6-160			X	
747	B6-161		X		
748	B6-162		X		
749	B6-163			X	
750	B6-164		X		
751	B6-165		X		

State Number (50-60-01-)	Bishop Museum Number (50-Mo-)	Inventory	Preserve	Data Recovery	No Action
752	B6-166		X		
753	B6-167		X		
754	B6-168		X		
755	B6-169			X	
756	B6-170			X	
757	B6-171				X
758	B6-172			X	
759	B6-173				X
760	B6-174			X	
761	B6-175		?	?	
762	B6-176			X	
763	B6-177		X		
764	B6-178		X		
765	B6-179		X		
766	B6-180				X
767	B6-181				X
768	B6-182		X		
769	B6-183		X		
770	B6-184		X		
771	B6-185		X		
772	B6-186		X		
773	B6-187		X		
774	B6-188		X		
775	B6-189		X		
776	B6-190		X		
777	B6-191		X		
778	B6-192		X		
779	B6-193		X		
780	B6-194		X		
781	B6-195		X		
782	B6-196		X		
1100	B5-59		X		
1101	B5-60		X		
1102	B5-62		X		
1103	B5-63		X		
1104	B5-64		X		
1105	B5-65		X		
1106	B5-66		X		
1107	B5-67		X		
1109	B5-69		X		
1110	B5-70		X		
1111	B5-71		X		
1112	B5-72		X		
1113	B5-73		X		
1114	B5-74		X		

State Number (50-60-01-)	Bishop Museum Number (50-Mo-)	Inventory	Preserve	Data Recovery	No Action
1115	B5-75		X		
1116	B5-76		X		
1117	B5-77		X		
1118	B5-78		X		
1119	B5-79		X		
1120	B5-80		X		
1121	B5-81			X	
1122	B5-82		X		
1123	B5-83		X		
1124	B5-84			X	
1125	B5-85		?	?	
1126	B5-86		X		
1127	B5-87		X		
1128	B5-88		X		
1129	B5-89				X
1130	B5-90			X	
1131	B5-91			X	
1132	B5-92			X	
1134	B5-93			X	
1135	B5-94				X
1136	B5-95		?	?	
1137	B5-96				X
1138	B5-97				X
1139	B5-98		X		
1140	B5-99				X
1141	B5-100			X	
1142	B5-101		X		
1143	B5-102		X		
1144	B5-103		X		
1145	B5-104			X	
1146	B5-105		X		
1147	B5-106		X		
1148	B5-107		X		
1149	B5-108		X		
1150	B5-109		X		
1151	B5-110		X		

State Number (50-60-01-)	Bishop Museum Number (50-Mo-)	Inventory	Preserve	Data Recovery	No Action
1152	B5-111		X		
1153	B5-112		X		
1154	B5-113		X		
1155	B5-114		X		
1156	B5-115		X		
1157	B5-116		X		
1158	B5-117		X		
1159	B5-118				X
1160	B5-119		X		
1161	B5-120		X		
1162	B5-121		X		
1163	B5-122		X		
1164	B5-123		X		
1165	B5-124				X
1166	B5-125		X		
1167	B5-126		X		
1168	B5-127		X		
1169	B5-128		X		
1170	B5-129		X		
1171	B5-130		X		
1172	B5-131		X		
1173	B5-132		X		
1174	B5-133		X		
1175	B5-134		X		
1176	B5-135		X		
1758	N/A	X	X		
1760	N/A	X	X		
1761	N/A	X	X		
1784	N/A	X	X		

NOTE: Treatments with an outlined X signal changes in status from Data Recovery to Preservation status. Sites slated for Inventory will all be recommended for Preservation. Question marks (?) indicate sites currently recommended for Data Recovery that may change to Preservation, pending precise site location.

PRESERVATION PLAN

Introduction

This plan has been written as part of a comprehensive mitigation plan for the southwestern portion of the *ahupua'a* (traditional land district) of Kaluako'i (TMK 5-1-02-030). Background information about the proposed subdivision, the project area environment, and previous historical and archaeological study has been presented in the **Introduction** section, and will not be repeated here.

Most sites within the project area will be preserved—160 compared to 138 in the 2001 plan and 46 originally recommended in the 1993 inventory report, an increase of 333%. Because of the nature of the proposed subdivision, they may be divided into five groups. First are those sites in the large, undivided portion of the original parcel for which development is not being planned. Sites here, which are to the north, east, and inland of the subdivision will simply be left as they are. Several Cultural Protection Zones are being proposed in this nearly 1000-acre area that will include all but a few of the archaeological sites, and the entire parcel has been slated for a rural landscape reserve in which the likelihood for potential impacts will be very low.

Second are sites between the subdivision and the ocean, which create special preservation issues due to their physical environment and their accessibility to the public. If the Land Use Commission grants the Ranch's petition to reassign some Agricultural Land to Conservation, the Shoreline Conservation Zone will comprise about 465 acres, or about 7.3% of the original parcel, an area slightly larger than the proposed subdivision and—more importantly—adjacent to it. Archaeological sites along the shoreline may transcend state land under multiple jurisdictions, portions of the proposed cultural land trust, and private land, so all parties must be clear regarding responsibilities for implementing preservation measures. Preservation measures must be communicated and adapted to the different jurisdictions and ownerships. Although coastal sites occur in a narrow strip of land, their importance looms large for several reasons: coastal sites are most at risk due to shorelines being both publicly accessible and subject to wave erosion, archaeological sites are most numerous along the coast, and most of the known habitation and religious sites lie near the shoreline.

The third category is within the proposed subdivision lots, which encompass approximately 400 acres as planned, or about 6.3% of the original parcel size. Total acreage of preservation sites has not yet been determined, but is estimated at 10 – 15% of the total subdivision area. Some of this total simply sits outside the area of likely impacts, but many sites will be intentionally and actively protected due to their archaeological and cultural significance. Because of the variability of sites and preservation issues, specific actions will be described at the site and feature level.

The fourth group includes sites cross-cutting the first three in Kamāka'ipō Gulch, where preservation of a gulch and bayside settlement system is being proposed in the north, along with a smaller enclave of particularly significant sites in the south. The choice to set aside an approximately 140-acre group of sites from the coast to an inland stone quarry at North Kamāka'ipō reflects the cultural landscape's *mauka-makai* orientation, and opts for preservation of a system integrated by physical and cultural factors, rather than bits and pieces of several systems. The smaller complex of sites at South Kamāka'ipō goes from coast to ridge-top in a

shorter span, and includes several structures that would be outstanding on architectural merit alone, but gains greater significance from the presence of *ko'a* and what may be a high status burial area; this is among the Agricultural lands being changed to Conservation in the Ranch petition.

The final group of preservation sites occurs in the old Papohaku Ranchlands subdivision north of the proposed Lā'au subdivsion. Vehicle access to the Lā'au Subdivision will be via a paved road cutting through several Papohaku lots and utilizing a portion of the existing Kulawai Loop road. Archaeological reconnaissance there previously located archaeological sites in or near to the proposed road corridor (Burtchard and Athens 2000), and although they have not yet been subject to inventory level investigation, enough is known that Molokai Ranch, which owns the lots in question, has decided to preserve the majority. (Site 1760, a single stone artifact, was apparently collected during the reconnaissance, and In terms of preservation issues, this group of sites resembles the Lā'au subdivision.

One clear message from the community has been that prior preservation commitments must be honored. Both the original and revised plans actually commit to more extensive preservation than originally recommended, and no site previously slated for preservation will be removed from that status. Most changes result from the decisions that possible burial mounds will be preserved, rather than tested, and that many sites will be avoided and preserved rather than undergo data recovery. The Southwest Moloka'i Archaeological District (hereafter SMAD, Site 50-60-01-803), a discontinuous set of sites listed on the National Register of Historic Places (NRHP) in 1986 will continue to be indicated on plats and deeds, and will continue to be preserved, but within a larger preservation landscape. Being listed on the NRHP distinguishes sites with formal recognition of their significance, but does not provide site-specific treatment plans, which are therefore included here.

Consultation

As mentioned previously, the current revised plan reflects priorities expressed in hundreds of hours of community-side meetings, as well as mediated discussions between the landowners and community leaders (some for, and some opposed to the proposed subdivision) and conclusions of a Cultural Committee chaired by Collette Machado, the Moloka'i representative to OHA (Office for Hawaiian Affairs). While there are many similarities between this revised plan and the original, this version can be understood as an expression of community preferences regarding preservation than as a cultural resource management document which happened to be commented upon. In addition to the "official" meetings and discussions, the author has solicited comments and opinions informally from Native Hawaiian residents of Moloka'i.

As part of its master planning process, Molokai Ranch engaged the Conservation Fund (a land conservation organization) to assess natural and cultural resources on their land and to mediate a series of community meetings and task-oriented discussion groups. The Cultural Committee, chaired by OHA trustee Collette Machado assisted by Hālona Ka'opuiki, focused on issues regarding cultural aspects of the landscape, particularly with regard to the effects of proposed development and conservation areas. In addition to recommending that the Ranch donate large tracts to a community-based land trust, the Committee advised the creation of cultural conservation zones that would overlay lands regardless of their

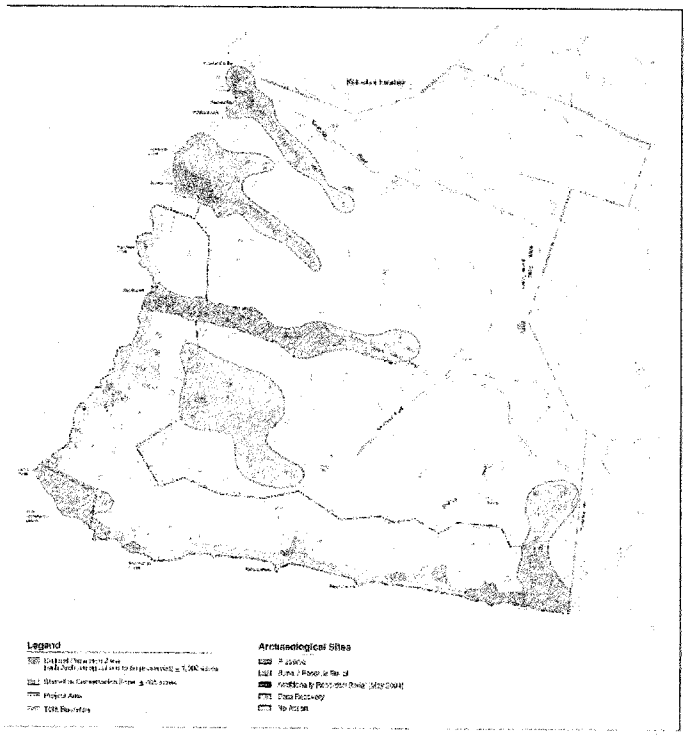
eventual ownership. Because this plan deals primarily with the proposed subdivision rather than the proposed land trust, it is these cultural overlay zones that pertain most closely. After consulting with a wide array of community members, the Cultural Committee advised that the revised preservation plan increase the level of data collection associated with preservation, leading to the commitment to re-survey the road corridor, to salvage and in some cases excavate data from fire features to help learn about former vegetation, and to more clearly identify roles and responsibilities relative to sites in the Cultural Protection Zone where it either overlays or abuts the subdivision project area. In addition, community and Cultural Committee input led to redesign of the infrastructure corridor and the subdivision boundaries, decreasing the number and total extent of lots proposed.

Through the Cultural Committee members and meetings, several organizations have contributed their *mana'o* (thoughts) regarding preservation at Lā'au. These include OHA, the Moloka'i Archaeological Society, Hui Aloha. The author apologizes for not having a complete list of organizations that may have been represented officially or informally by members. The original plan was also submitted for review by the Moloka'i Island Burial Council and a Kūpuna Advisory Committee. (None of the Burial Treatment Plan has changed since that time.)

Several individuals living on Moloka'i have offered opinions, proposed measures, and spoken with the author regarding preservation at Lā'au during the past decade. Most frequent among these has been Hālona Ka'opuiki, a Moloka'i kama'āina ("child of the land," born on the island to a family that has been there for generations) who has taken a strong, sustained interest in the well-being of cultural sites in central and west Moloka'i. Members of the Aki *'ohana* (Harry, Lawrence and his wife Catherine) also shared their *mana'o* regarding southwest Kaluako'i in the late 1990s and supported cautious methodologies such as the use of string trimmers to achieve more thorough survey and preservation of possible burials rather than testing. Another long-term contributor to the discussion of preservation in Lā'au and elsewhere has been Walter Ritte, who spoke with the author directly and indirectly. More recently, a face-to-face talk story session with OHA trustee Collette Machado and Billy Akutigawa helped clarify issues regarding access to sites, coastal preservation, and more. Also at that session was Alvin Burrows, a descendant of the original lighthouse keeper at Lā'au, whose opinion about this place holds a unique value. Though not always speaking directly to the Lā'au landscape, John Kaimikaua and Opualani Albino have both been gracious enough to speak with the *haole* boy regarding the cultural significance of land and cultural places. Finally, though not directly commenting on the project, Davianna McGregor reviewed the most recent draft of the plans, and elicited further public opinion.

In addition to the Moloka'i community, the author sought advice from preservation professionals in an effort to ensure that the current plan is at the forefront of cultural preservation in Hawai'i. *Mahalo* to Myra Tomonari-Tuggle for general advice and a model of excellence. Sara Collins provided thoughtful review comments on the 2001-2002 plans in her capacity as the Moloka'i Island archaeologist at the State historic Preservation Division and since her departure from that position has responded to additional queries on a personal level. Alan Carpenter, an archaeologist at State Parks and long-time supporter of community-based preservation and cultural resource management efforts, offered reactions to the provisions of this plan and can be credited with "reversing the polarity" and

advocating for circumscribed development areas rather than buffering numerous individual sites.



Above: Cultural Protection and Shoreline Conservation Zones at Lā'au. Sites within these zones depicted in green on this version have been changed to Preservation Status.

In the final analysis, the revised draft has become a more robust outgrowth of the original principals due to consultation with these groups and individuals. Many preservation actions far exceed the minimal standards expressed by the state rules for preservation (HAR 13-13-277) because of the willingness of Moloka'i Hawaiians to stand up and express their *mana'o*. Consultation resulted in a plan that protects places and landscapes rather than site numbers, and which represents a great advance not just in acreage, but in the diversity and intensity of preservation actions proposed relative to the recommendations of 15 years ago, not to mention other islands to this day. Admittedly, a persistent minority opinion on

Moloka'i—that no development ever occur on this island—could not be accommodated, but the desire to minimize the effects of development at every step has been a guiding principle for this plan. Another opinion—that cultural sites should be much more fully opened to cash-driven cultural tourism—was rejected after the majority objected strongly.

Preservation Goals

Before delving into the sequence and details of preservation measures, discussing the goals may help place the particulars in context. Ongoing broad-based community consultation and focused Culture Committee meetings have yielded a consensus that site preservation serves the larger community goal of offsetting change with a renewed attention to Moloka'i heritage and culture. The Hawaiian renaissance of language, arts, agriculture, and culture in general has grown for more than a generation now, and to *mālama* (protect) the sites is to protect a physical link between the modern and ancient culture. At the same time, a Preservation Plan fits within regulatory and scientific frameworks (HAR 13-13-277), and some goals stem from those aspects as well. Whether an individual is most interested in preserving a place for its *mana* (spiritual power) or its data, however, the goals listed here serve the interest of preservation.

- **Hana Like / Consult the Community** – Through the ongoing discussions of the past year, the process of consulting with Hawaiians and other interested parties is already well under way. As events move from generalities and plans to details and implementation of cultural resource preservation, however, it is important that community input be integrated with the archaeological viewpoint.
- **Ho'omau / Perpetuate** – Preservation of archaeological sites allows future generations of Hawaiians a link to their forebears. A preserved site may be a place to feel the *mana*, to appreciate the heritage, or to learn in ways that disembodied awareness and knowledge do not; *places* are important.
- **Ho'opa'a / Stabilize** – For sites subject to erosion, traffic, or other ongoing threats, stop the immediate damage and avert future impacts.
- **Kapu / Protect** – Protection of sites within or adjacent to development or high traffic areas means erecting barriers in the field and clearly marking sites on construction plans and deed maps.
- **Noho Pono / Behave** – Basic rules for what can and cannot be allowed within preservation areas need to be established clearly. Although they should apply generally, it is especially important that protocols be supplied to subdivision lot owners and the conservation staff. Protocols should be consistent with (and perhaps simplified versions of) management plans devised for the overall conservation areas.
- **Maka Ala / Monitor** – Archaeological monitoring is necessary for ground-disturbing activity adjacent to preserves or in data recovery areas. A second type of monitoring is the annual field-check of site conditions in public use areas and for particularly sensitive sites.
- **Respect Preservation Commitments** – The 2001/2002 plans, like the 1991 inventory, carry through with the preservation commitment made when the SMAD was listed on the State and National Registers of Historic Places. Additional recommendations made to preserve sites since then, although not formalized through listing on the National Register, should continue to be respected and implemented.
- **Management-oriented Evaluation** – Rather than static site significance assessments, management evaluation aims to identify old or ongoing preservation problems such as erosion or damage from animal or human traffic, as well as to evaluate opportunities for protective measures and data collection. This mode of evaluation should be continued into the future to maintain a preservation program that does not fall behind developing issues and problems.
- **Data Collection** – As opposed to data recovery done in a regulatory context, the preservation process is guided by a desire to not let information about the past disappear. Implementation of the preservation plans will involve salvage of data during stabilization, as well as mapping or excavation done to better interpret sites of interest to the Hawaiian community, to provide re-vegetation plans with information about the ancient environment, or other bona fide management purposes.

Preservation Phases

Preservation of sites representing the long past of Lā'au itself represents a long-range effort, responding not just to immediate issues, but perpetuating the protection and *mālama* for generations. Historic preservation rules acknowledge this in the requirement to state both short and long-term measures in a Preservation Plan (and as this plan does in the next section), but Moloka'i residents have moved beyond this simple two-part approach in cultural resource planning. This section presents a sequence according to which preservation measures will be implemented.

Ongoing – Communication and Evaluation

During each of the phases listed below, it is important to continue to keep lines of communication open with Hawaiians and other interested parties in the community. Having Moloka'i people as resource staff is a major step in this direction, as is answering public queries and making the process as transparent as possible.

Ongoing evaluation is important to good resource management. Inevitably, unforeseen circumstances, field conditions, and other factors lead to situations in which strict adherence to plans does not serve preservation goals. Field personnel should be allowed some flexibility as long as changes or alterations are minor and are reported to supervisors. Should a larger problem arise (such as, operational changes that would require a new permit), evaluation and discussion among staff and relevant experts should precede any change in procedures. Periodic monitoring should also feed into evaluation, so that the preservation and conservation programs continue to achieve their goals over the long run.

At the present time, a Cultural Committee chaired by Collette Machado and Hālona Ka'opuiki has taken the lead role in advising the landowners regarding cultural sites. In previous projects, such as the Kaupoa Camp re-survey and monitoring, a Kūpuna Advisory Council was consulted regarding cultural resources. Both groups have functioned well, providing archaeologists with the cultural perspective and wisdom necessary to protect cultural sites. Experience on Kaua'i involved a combination of the two, a group of people with cultural expertise

to oversee normal operations, and a council of küpuna to consider broader issues and provide the benefit of experience and wisdom.

Phase I – Relocate and Verify Archaeological Sites

The 1991 inventory occurred with limited vegetation clearing and almost no excavation, and it is possible that cultural deposits or small features may have escaped notice. Additionally, GPS technology was unavailable at that time, and site locations were based on tape and compass readings. To avoid misunderstandings and unforeseen impacts, verification should be done during the planning process, before final design and construction have begun.

A qualified archaeologist should relocate known sites thought to be in proximity to proposed subdivision lots. Once located, vegetation should be cleared 5-m beyond structures and the vicinity examined thoroughly to determine whether additional features are present. If sediments merit, transects of shovel tests may be done to determine whether buried deposits or features occur beyond the surface features. (This means digging holes at 1 to 10-meter intervals as appropriate, screening the soil, and determining whether cultural deposits are present beyond the limit of surface features, which typically represent only the most recent phase of activity at a site.) If there are features without planview drawings, un-described deposits, or other elements missing from inventory records, they should be completed at this time. In addition, all surface features, visible deposits, and site settings should be photographed. Finally, verification requires that site boundaries should be clearly flagged with their State inventory numbers, and GPS used to determine the location.

An additional area of verification will be the re-survey of any proposed road or utility corridor(s) associated with the subdivision. Archaeological investigation of the corridor(s) will occur during the planning process, so that any archaeological sites, if present, may be avoided. Because roads and utilities necessitate excavation and grading, the entire corridor will be surveyed, rather than just known sites. Wherever the proposed route enters a site, alternative routes will be investigated as well, to ensure the rerouting does not cause other impacts. Methods for verifying sites near the road (or recording any new discoveries) will be the same as those described in the previous paragraph.

Phase II – Evaluate Sites and Prioritize Actions

Sites in and adjacent to proposed infrastructure corridors and subdivision lots should now be evaluated with regard to general mitigation and specific treatments. The sites proposed for data recovery in 2001 mostly consist of 20th Century sites, small areas of basalt flakes, possible planting areas, modified outcrops, and the like; they were assigned to this category only if they appeared very marginal in importance, lacked integrity due to previous damage or erosion, or were relatively recent. This point in the process is when subdivision planners must decide whether to retain data recovery as an option (to be implemented later) or simply move the site to preservation status.

Within the general realm of preservation, this is also the time to decide on particular treatments, such as stabilization, establishing permanent barriers, or data collection. Also sites should be prioritized so that those most at risk of erosion or other impact will be dealt with first.

Phase III – Stabilization and Protection

This is the time to erect fences or other barriers for interim protection of sites, to mark site boundaries (as surrounded by the buffers specified in the 2001 plan, unless the Cultural Committee deems otherwise) and restrictions on construction plans, parcel maps and deeds. Also, stabilization measures should be implemented so that sites at risk do not continue to degrade. Some data collection may be best accomplished in conjunction with these activities.

Phase IV – Data Collection and Permanent Barriers

Once sites have been verified, stabilized, and protected, further data collection may be done. Rather than the salvage of information that may occur during construction of a retaining wall, for example, this phase would consist of controlled excavations done to recover data from features or deposits not at immediate risk, but subject to long-term degradation (for example, cultural deposits at risk from unusually high surf). Also, some excavation may be done to aid in renewal of native vegetation or animals (fire pits contain charcoal and animal remains which can be identified, providing a glimpse at past flora and fauna in an area dominated by exotic species today) or better understanding of long-term environmental conditions. Finally, any loose ends or lingering questions identified during previous phases can be filled in at this time, such as excavation done to determine the relative or absolute age of a structure.

Also during this time, permanent fences or other buffers should be installed. Wherever such buffers require ground disturbance, an archaeologist must be present to monitor the activity, recommend alterations to protect sites, and salvage data as necessary.

Phase V – Management Plan

Building on the experience of the initial phases and the evaluations of those involved, the Management Plan can now be produced. The two main components of this document will be a report of all the findings and activities thus far, and a manual for the continued management of the archaeological preservation areas (North Kamāka'ipō Gulch, Shoreline, Sites in Subdivision Lots, Sites Straddling Lot/Conservation Boundaries, and Outliers).

Explanation of Preservation Actions

Preservation often means more than simply leaving a site alone. Between simple avoidance and interpretive restoration lie numerous preservation measures. Choosing which of these to apply requires consideration of the site's basic characteristics, its significance, its physical surroundings, and its context within landowner plans. These actions comprise both short and long-term measures that will protect sites during the subdivision process and for years to come.

Establishing Site Buffers

Currently, the boundary of each known site is a perimeter enclosing all of the features and intact cultural deposits, constituting the site as recorded in 1991. State Historic Preservation rules (HAR 13-13-277-4) specify that a buffer zone must be established to surround and protect significant sites. This will be the initial task of preservation, and will be all that is done for sites that are not being interpreted or that are far from potential impact areas.

For some sites (primarily those near the road corridor and those being interpreted), the first action will be to verify site boundaries. This is an extra safeguard to ensure that site components that may have been hidden by vegetation in 1991 are included, and will consist of intensive field checks of site boundaries, and possibly some additional vegetation clearing.

Once the boundaries have been verified, buffers will be established. For the majority of sites, buffers will consist of a 7 m strip extending radially out from the boundaries. In the case of single-feature sites, the buffer will be a 7 m radius extending from the feature edges. For burials and shrines, the radius will extend to 9 m; in the case of *ko'a* shrines, an additional aspect of the buffer will be a requirement to keep an open view plane toward the ocean. Another exception is the *Mauka-Makai* preserve at Kamāka'ipō, where the entire area will be a buffer, so that the overall character of the cultural landscape can be preserved. This preserve will be traversed by the subdivision access road at a single location; archaeological survey will be done prior to identify a corridor where no features will be impacted, and the corridor will be fenced to prevent any further encroachment into the preserve; this corridor will be narrower than the 100-m survey corridor. In cases where a site buffer radius extends into an old road grade or eroded area which has cut down to the culturally sterile substrate, the buffer may be moved closer to site boundaries. This will not only avoid the unnecessary "protection" of what has already been lost, but will also minimize overall project impacts by allowing use of existing roads. However, a minimum 2 m buffer from remaining features will be retained even where damage has reached all the way to site boundaries. Construction plans need to consider all buffers and avoid ground alteration that could cause erosion to cut into them.

Generally, no vehicles or ground altering activities will be allowed within buffers. In certain cases, such as developing an interpretive walking trail or stabilizing sediments, it may be useful to enter the buffers for the benefit of site preservation. Installation of signs and/or fencing around buffers will also involve ground disturbance. For all of these activities, written plans shall be submitted to the Kūpuna Advisory Committee and SHPD for review, and an archaeologist shall monitor implementation. For sites within the subdivision lots (the large common lot excepted) that are not near any planned construction, buffers will be marked with bright-colored flagging tape on which the site number is included. For sites near areas of potential impact, temporary fencing will be used as described below and in Table P-1. The table also shows which sites will have permanent buffer markings as described below.

Short Term Measures

Temporary Fencing and Protection. For sites that are in the area of potential impacts during construction, temporary buffers will be established. These will consist of brightly-colored construction fencing erected on the permanent site buffer boundary. Construction personnel will be alerted to their presence and significance, and will not be allowed to encroach. Once buffer zone markers are placed in the field, field personnel will be alerted to their presence and their meaning; no construction, ground-disturbing activity, traversing by vehicle, or stockpiling will be allowed within them. Buffers of this type differ from site boundaries, and extend 7 m or more beyond the outermost features of a site. An archaeologist will be present during ground-disturbing work in such locations to maintain the protective buffer, and to evaluate any inadvertent discoveries that may

occur nearby. The archaeologist will follow the procedures outlined below in **Monitoring: Methods**.

Evaluate Stability. Sites are part of a changing environment, and in Kaluako'i a widespread agent of environmental change is erosion; long dry periods and occasional downpours mean that many sites are vulnerable to sudden erosion. Generally, sites are at risk either from soil deflation or by more damaging collapses as gullies advance up-slope; in fact several previously buried cultural deposits were initially recorded because erosion had exposed them. More rarely, low-lying sites may be covered with silt washed down from above. For these reasons, sites where erosion appears to be a factor will be evaluated with regard to the damage that has already occurred and the risk of further adverse impacts from erosion. In addition to the sediments, stone features will be evaluated to determine the degree to which collapse has occurred and may be expected to continue. Recommendations for stabilizing sediments and structures will be made.

Recover Eroded Data. As stability is being evaluated, eroded data will be found at some sites. Unless they appear to be in imminent danger of erosion, intact deposits will not be excavated. Midden, artifacts, and charcoal that have eroded from formerly buried deposits will be collected for analysis. Because such data have lost their depositional integrity, controlled excavation techniques will not be used, although sediments will be screened. In cases where findings are limited, or original context cannot be reasonably inferred, data will be recorded in the field without collection. Other cases where data will be recorded but not collected include culturally sensitive features and deflated (but horizontally stable) deposits. Sites where data will be recorded in situ are marked "I" on the **Preservation Measures Table P-1**. A report summarizing findings will be produced.

Long Term Measures

As-Is Preservation. For sites that are outside the subdivision, as well as some within that can easily be planned around, the primary treatment will be simple avoidance. These are sites that have no construction or ground-disturbing activities planned nearby. Sites preserved in this manner will have 7 m buffers unless otherwise noted, but because they are usually remote, will not have physical boundary markers. Instead, these sites will be marked on topographic maps (see attached), and current and future landowners will be notified of their presence, and of the buffer zones.

Mapping. Many sites, especially those where public access or frequent use may be expected, would benefit from accurate mapping. The inventory survey included plane table and alidade mapping of some sites, but most were only sketched. Mapping techniques for structural features will conform to those described in **Data Recovery: Methods**. Maps will become baseline illustrations of sites, allowing landowners to re-identify them and evaluate their condition in the future, as well as to recognize site buffers, which will be depicted on parcel plats. Copies of each map will be submitted to the SHPD office as part of a Preservation Report.

Physical Stabilization. For sites where erosion or historic development has resulted in an unstable deposit, measures may be taken to prevent further impacts. Physical stabilization refers to actions that replenish eroded sediments or create barriers preventing further erosion. Soil from upland pineapple fields may be introduced at some locations to cover deflated surfaces or fill in erosional gullies. No fill will be taken from archaeological sites. For features, previously toppled stones may be re-stacked to repair collapsed sections, but only to the degree that it prevents further

degradation; complete restoration of walls or other features will be done only after SHPD has reviewed and accepted a site specific restoration plan. In a few cases, imminent damage may require use of retaining structures. These will consist of alignments or stacked stone facings, and will incorporate natural materials erected in traditional mortarless construction; to avoid confusion of stabilizing features with older sites, they will generally make use of a different type of stone so that they can be readily distinguished. Kiawe or other logs may also be used. Prior to implementation, specific treatments involving alteration of site landscapes will be submitted in writing for SHPD review. Subsequent to implementation, all forms of physical stabilization will be annotated on site maps, described specifically in a letter to SHPD, and identified in any educational materials that are developed for stabilized sites.

Vegetative Stabilization. In sites where soil and water availability make it possible, plants will be used to stabilize damaged sites and prevent erosion of intact sites. In some cases where it is being recommended, it may not be practical to plant vegetation, due to hardpan surfaces or lack of water. In such cases, the appraoch will be to encourage growth of extant plants, particularly native plants and grasses that have become naturalized and help bind the soil. The technique will be to allow low-growing varieties to stay, rather than introducing them. Vegetation that is brought in and planted will consist of native and Polynesian introduced shrubs and groundcovers that are well suited to the dry environment. Shrubs may include species common in the project area, such as *ma'o, 'ilima,* and *'uhaloa,* as well as others that would have been expected prior to historic changes, such as *'akoko, 'auhuhu, 'āweoweo, maiapilo, naupaka,* and *'ūlei.* Ground covers will also include known and likely former species, such as *'ākulikuli, hinahina, 'ihi, 'ili'e'e, nanea, pōhuehue,* and *pōhinahina.* Choices of species for particular sites will depend on the availability of the varieties, physical environment, and consultation with ethnobotanical and botanical specialists.

Permanent Boundary. For some sites where public use is expected to be relatively high, permanent boundaries around site buffers are appropriate. Although some especially sensitive sites may have boundaries preventing access except by bona fide cultural practitioners or descendants, they will more often be visual reminders of site boundaries. At some, openings will allow public access, and boundary markers will serve to direct foot traffic rather than prevent it. Before making boundaries, the Kūpuna Advisory Committee will be consulted, but the intent is to use wood or other natural materials that will be visible, yet not too distracting. Stone walls will not be used, to avoid confusion with the sites themselves. Access to and around boundaries will be planned on a site-by-site basis to minimize the potential for impacts. Signs at buffers will identify sites and advise visitors regarding protocol. (See Appendix.)

Interpretation. Because it is not immediately obvious to many people what a site is, selected sites will be interpreted, particularly in the North Kamāka'ipō area. To the extent that available data and contextual knowledge allow, a site will be interpreted regarding its function, age, and cultural significance. Representatives of households, *ko'a,* agricultural areas, and stone tool manufacturing sites will be included among the interpreted sites. The overall theme will be that ancient Hawaiians developed cultural adaptations to the dry leeward landscape, including a *mauka-makai* settlement pattern that made use of ocean, gulch, and ridge environments and resources. Because of the number of sites and the predominance of thorny vegetation between them, only certain accessible sites are being chosen for interpretation, but an effort has been made to represent the range of site types in

the project area, including several sites in the Southwest Moloka'i Archaeological District. North Kamāka'ipō will be the main interpretive area, since it is being preserved as a *mauka-makai* system. Because the North Kamāka'ipō *ko'a* is not representative of others in the project area, South Kamāka'ipō examples (Site 56) have been identified for interpretation.

An important consideration for interpretation is that not all sites should be presented to the public. Some, such as burials, will not be publicly accessible, although descendants may of course visit their *kūpuna.* Others, such as the *ko'a* mentioned above, are also sensitive, although community input suggested that Hawaiians and perhaps other fishermen should be allowed to visit them freely, and that a sample should be made known to visitors since they are such a strong aspect of the culture, but that not all should be known to outsiders. The *ko'a* being interpreted will restrict access beyond a respectable distance and include signage that asks visitors to respect the sanctity of the place.

In addition to brochures and other off-site interpretation, signs will be used at sites both for protection and interpretation (See Appendix A for examples). The exception is for burials—other than those present in the North Kamāka'ipō area, where they are amid other sites being interpreted, they will not be subject to interpretation. Currently, cultural tours are available on adjacent lands owned by Molokai Ranch. Should organized activities such as this occur in this parcel, tour organizers must follow the cultural protocol and minimize the potential for adverse effects. This includes consultation with *kūpuna* and cultural experts regarding proper behavior, not using vehicles (including mountain bikes), and educating visitors regarding the importance of appropriate behavior and penalties for damaging sites.

To protect sites that are publicly accessible (ie., adjacent to roads or in public areas), signs will be posted at or outside of buffer perimeters identifying sites as significant and warning that damage to sites is punishable under Hawaii Revised Statutes Chapter 6E-11. Placement will be determined by accessibility and visibility, and may occur at sites not otherwise interpreted. Printed interpretive materials will also include the legal message.

Protocol Education. All sites being preserved have significance at least for the information they can offer to our understanding of Moloka'i history. In some cases they also represent of a unique function or style, and many are valued for their cultural significance to *kanaka maoli* (indigenous Hawaiians) and other groups. For these reasons and the fact that they show the last physical traces left by former inhabitants, it is important to communicate new residents the importance of helping protect and respect ancient sites. As interpretive materials are developed, therefore, information on how to properly behave in sites will be included on printed materials and signs. From an archaeological perspective, this means leaving things as they are and avoiding actions that could damage or destabilize sites. Hawaiian cultural protocol builds on this to include other behaviors, especially with regard to *ko'a* and burial sites, and therefore the Kūpuna Advisors and cultural experts will be consulted. It is anticipated that protocol education will consists of two parts: a general notice for people to respect sites and leave them as they find them, and more detailed information about sites with religious or burial features.

Preservation Report. Following completion of preservation measures, a report will describe their implementation, present data collected at preservation sites, and refine the long-term preservation measures. Interpretive themes and messages

based on consultation with cultural experts, other research, and data recovery results will also be detailed in the final Preservation Report.

Site-Specific Plans

This section provides details of preservation actions being recommended for each site. The total population of archaeological sites has been broken down into groups reflecting the categories mentioned in the **Introduction** to this plan, so that sites with similar locations and levels of potential for impact may be dealt with together, and needless repetition may be avoided.

Table P-1. Site Preservation Measures

(I denotes recording data in the field without collection)

Site (50-60-01-)	Avoidance	Temporary Buffers	Mapping	Evaluate Stability	Recover Eroded Data	Physical Stabilization	Vegetative Stabilization	Permanent Boundary	Interpretation	Protocol Education
48	X									X
49	X									X
50	X									X
51	X									X
52	X									X
53		X	X	X	X	X	X	X	X	X
54		X	X	X	X	X	X	X	X	X
56			X	X		X		X	X	X
57			X	X		X		X		X
520	X	X	X	X		X	X	X		X
639	X									X
640	X									X
641	X									X
642	X									X
643	X									X
644	X									X
645	X									X
646	X									X
647	X									X
648	X									X
649	X									X
650	X									X
651	X									X
652	X									X
654			X	X	X	X	X	X	X	X
655		X	X	X	X	X		X	X	X

Site (50-60-01-)	Avoidance	Temporary Buffers	Mapping	Evaluate Stability	Recover Eroded Data	Physical Stabilization	Vegetative Stabilization	Permanent Boundary	Interpretation	Protocol Education
656			X	X		X			X	X
657	X									X
658	X									X
659	X									X
660	X									X
662	X									X
663	X									X
664	X									X
665	X									X
666	X									X
667	X									X
668	X									X
669	X									X
670	X									X
671	X									X
672	X									X
673	X									X
674	X									X
675	X									X
676			X	X		X	X	X	X	X
678	X									X
679			X	X		X		X	X	X
680			X	X		X		X	X	X
681			X	X		X		X	X	X
682			X	X		X		X	X	X
683			X	X		X		X	X	X
684			X	X		X		X	X	X
685			X	X		X		X	X	X
686			X	X		X		X	X	X
687			X	X		X		X	X	X

Site (50-60-01-)	Avoidance	Temporary Buffers	Mapping	Evaluate Stability	Recover Eroded Data	Physical Stabilization	Vegetative Stabilization	Permanent Boundary	Interpretation	Protocol Education
688			X	X		X		X	X	X
689			X	X		X		X	X	X
690			X	X		X		X	X	X
691			X	X		X		X	X	X
692			X	X	X					X
693	X									X
694	X		X							X
695	X									X
696	X									X
699			X	X	X	X				X
736	X		X							X
737			X	X					X	X
738	X									X
739			X	X		X		X		X
741			X	X	X	X		X	X	X
742	X									X
744			X	X					X	X
747	X									X
748	X		X							X
750		X	X	X				X	X	X
751		X	X	X				X		X
752		X	X	X				X	X	X
753		X	X	X				X		X
754		X	X	X				X		X
761	X	X	X							X
763	X	X	X							X
764		X	X	X	I	X	X	X	X	X
765			X	X						X
768	X									X
769	X									X
770	X									X
771	X									X
772	X									X
773	X									X
774	X									X
775	X									X
776	X									X
777	X									X
778	X									X
779			X	X	X	X		X	X	X
780			X	X	X	X		X	X	X
781	X									X
782		X	X	X	X	X		X	X	X
1100	X									X

Site (50-60-01-)	Avoidance	Temporary Buffers	Mapping	Evaluate Stability	Recover Eroded Data	Physical Stabilization	Vegetative Stabilization	Permanent Boundary	Interpretation	Protocol Education
1101		X		X	I	X	X	X	X	X
1102	X									X
1103	X									X
1104	X									X
1105	X									X
1106	X									X
1107	X									X
1109	X									X
1110	X									X
1111	X									X
1112		X		X	I	X				X
1113	X									X
1114	X									X
1115	X									X
1116	X									X
1117	X									X
1118	X									X
1119			X	X	I	X		X		X
1120			X	X				X		X
1122			X	X						X
1123			X	X						X
1125	X		X							X
1126	X		X	X						X
1127	X									X
1128	X									X
1136	X		X							X
1139	X		X							X
1142			X	X	I	X		X		X
1143			X	X				X		X
1144		X	X	X	X			X		X
1146	X								X	X
1147			X	X	I	X	X	X		X
1148		X	X	X				X		X
1149				X	I	X		X		X
1150			X	X		X		X		X
1151			X	X						X
1152			X	X	X	X		X		X
1153		X	X							X
1154			X	X	I			X		X
1155	X									X
1156	X									X
1157	X									X
1158	X									X
1160	X									X

Site (50-60-01-)	Avoidance	Temporary Buffers	Mapping	Evaluate Stability	Recover Eroded Data	Physical Stabilization	Vegetative Stabilization	Permanent Boundary	Interpretation	Protocol Education
1161	X									X
1162	X									X
1163	X									X
1164	X									X
1166	X									X
1167	X									X
1168	X									X
1169	X									X
1170	X									X
1171	X									X
1172	X									X
1173	X									X
1174	X									X
1175	X									X
1176	X									X
1758		X	X	X		X				X
1760	X	X	X							X
1761	X	X	X							X
1784	X	X	X					X		X

Sites Outside the Subdivision

Many of the sites encountered during 1991 lie not only outside the potential impact area for the proposed road, but also outside the subdivision lots, in the large *mauka* portion of the original parcel. Sites are thinly distributed, consisting mostly of lithic work sites, temporary camps, and a few agricultural areas in the gulches. Other than a few sites in North Kamāka'ipō Gulch, which will be covered in the *Mauka-Makai* preservation area below, these will receive be preserved as is.

Table P-2. Preservation Sites Outside of Subdivision Lots

Site Number 50-60-01-								
48	644	658	669	768	778	1110	1156	1168
49	645	659	670	769	781	1111	1157	1169
50	646	660	671	770	1100	1113	1158	1170
51	647	662	672	771	1102	1114	1160	1171
52	648	663	673	772	1103	1115	1161	1173
639	649	664	674	773	1104	1116	1162	1174
640	650	665	675	774	1105	1117	1163	1175
641	651	666	678	775	1106	1127	1164	1176
642	652	667	693	776	1107	1128	1166	--
643	657	668	747	777	1109	1155	1167	--

SITES ADDED TO PRESERVATION IN 2006 REVISION								
692	694	695	696	736	738	742	748	1119
1139	1153	1172						

This means that vehicles may not traverse sites (unless by existing road) and no ground disturbing activities may occur within 7 m of features. The 1993 inventory recommendations will not be changed, and these sites will not be reevaluated at this time. Future activity in site areas should be preceded by data verification and augmentation to provide more precise information about significant sites. Until more precise locations are reported for features, caution should be exercised in planning any ground disturbing activity in the vicinity—point locations on the 1993 map should be understood as approximate. If impacts are possible in site areas, an updated detailed mitigation plan will be submitted for SHPD review. Otherwise, no action beyond avoidance will occur.

The following sites do not have the standard 7 m boundary:

48-52 is 10 m excepting previous grading and erosion, with a clear view to the ocean unless obscured by existing vegetation
639 is 7 m north and south, but otherwise goes from the road to the coast
641 is 9 m in all directions except *makai*, where it extends to the coast
645 is 7 m north and south, but otherwise goes from the road to the coast
648 is 9 m with an open view to the coast (excepting existing vegetation)
649 is 9 m with an open view to the coast (excepting existing vegetation)
651 is 7 m except for a 9 m radius around the shrine (Feature 18)
670 is 7 m except for a 9 m radius around the shrine (Feature 1)
671 is 9 m on all sides
674 is 9 m on all sides
1104 is 9 m to the east and west, and between the road and the coast
1105 is 9 m to the east and west, and between the road and the coast
1106 is 9 m with an open view to the coast (excepting existing vegetation)
1107 is 9 m with an open view to the coast (excepting existing vegetation)
1128 is 9 m except where the existing road encroaches within 9 m

Makai Sites

Sites along the coastal strip have unique preservation issues both physically and in terms of management. Although outside of the subdivision parcels, these sites will be subject to increased potential for damage as the number of beach users increases. Site protection measures cannot include barriers that prevent normal public access along the beach, but because the sites are above the high water mark, they are not on State of Hawai'i land and will be dealt with here.

Table P-3. Preservation Sites Makai of Subdivision Lots

Site Number 50-60-01-							
676	753	765	1101	1126	1146	1148	1152

First, the stability of a site and its surrounding soil will be evaluated, so erosion hazards can be identified. Where deposits are at risk of erosional damage, they will

be stabilized. If there are active gullies heading into a deposit, they will be filled with soil from the old pineapple field in the uplands (where the soil is silty clay) or sand from the beach (where the soil is sandy). (Other sites will not be disturbed to provide fill. The decision to fill an eroded site will be based on the feasibility of doing so in terms of practicality and any applicable permitting process, and the potential for adverse impacts.) If necessary, landscaping fabric or small retaining terraces using traditional mortarless stacking will be employed to halt erosion. Any such terraces will be identified as new on site records and in interpretive materials, so that they are not confused with the older site. Where possible, a distinct, but natural, type of materials will be used for such terraces; for example, use of coral or sandstone slabs would differentiate new retaining walls from most sites, which are made of basalt stone.

Both the newly filled and existing surface will be stabilized. Although some use may be made organic landscape fabric for areas prone to severe erosion, the preference will be to encourage existing vegetation and plant additional vegetation. Because of the arid nature of the project area and the difficulty in obtaining water for irrigation, native xeriphytic groundcover and shrub species will be used. Choices on which plants to use will depend on their availability, access to water, and consultation with the cultural advisors.

Once the stability of a *makai* site is not at risk, boundaries of a permanent buffer will be marked for those where foot traffic is likely. Unlike buffers used during monitoring, these will be relatively unobtrusive. Wooden post and rail fencing such as that employed at sites near Kaupoa Camp (Major 1997) may be used, although other options are being considered. One is a rail fence of stacked natural logs, and another is a simple perimeter marking of *kiawe* logs laid on the ground. The advantage of these over the post and rail form is that no potholes need to be dug, and therefore the potential to encounter buried deposits is averted. In some cases, existing or new shrubs may also function as part of the buffer. Because many of the coastal sites are religious in nature and Native Hawaiians' access to them is protected by law, they will not be shut off completely. For the typical beach user, however, an access route around the site—rather than into it—should be the focus. For the sites that are not perched at the edge of the rocky shoreline, access routes will go on the *makai* side of the sites. This will be the case for Sites 654, 676, 1126, 1146, and 1152. Site 1101, a *ko'a* on Keawakalani Point, may not have an accessible route on the beach side. (Site 654 will be dealt with in a subsequent section, but is also included here due to its accessibility and location on the beach.)

Interpretation will focus on the coastal portion of the North Kamāka'ipō preserve, showing how the early date of Site 654 likely represents early temporary use of the Kaluako'i coastline by fishermen, and the habitation and religious sites show a later intensification to the point that there were several permanent residences. Just to the north, Site 676 will be identified as a fishing shrine; because it was in use when it was recorded in 1991, it will be maintained as an active, accessible site. Another feature in the North Kamāka'ipō preserve (B6-68, part of Site 53) has been identified in previous archaeological studies as a *ko'a*, but the form is atypical and that evaluation derives from the presence of coral alone; interpretive materials developed for this project will identify the feature and communicate this uncertainty. Site 1101, another *ko'a*, is close to a planned public access on the south coast, and will also be identified as a shrine and cleared for viewing. (Clearing the *makai* side of *ko'a* is appropriate regardless of interpretive goals because an open line of site to and from the sea was an integral part of how such

shrines functioned. Such clearing will be done for other *ko'a* unless it is likely to increase exposure to impact, but they will not be identified and made accessible to the public.) The final coastal site (1146) being considered for interpretation is actually a natural wetland feature that was used by the old lighthouse keeper as a fishpond. In a more general sense, coastal habitation and religious sites will figure into interpretive material that covers the project area.

The following sites do not have the standard 7 m boundary:

676 is 9 m with a clear view to the ocean unless obscured by existing vegetation
1101 is 9 m with a clear view to the ocean unless obscured by existing vegetation
1146 is 9 m east and west, and between the road and the coast
1157 is 9 m with a clear view to the ocean unless obscured by existing vegetation

Subdivision Sites

Because of the minimum 2-acre lot size and the practical and regulatory limitations that will apply to development within any lot, it should not be difficult to plan around sites within the subdivision. In fact, sites in the data recovery category are there primarily because they are either eroded (hence of limited integrity and difficult to preserve) or consist of small, temporary use areas (hence difficult for non-archaeologists to identify, and most significant for their lithic data). Data verification and augmentation (See **Data Recovery**) will establish accurate site locations, the most valuable preservation tool for subdivision lots, since it provides owners and architects with a preservation zone to avoid. In practice the preservation areas will consist of features plus a 7 m buffer. Any future plans that could impinge on sites or their buffers must include notification of SHPD and, if required by that agency, a revised treatment plan. Even if direct impacts are not likely, future planners should consider and minimize sources of secondary effects, such as erosion, changes in drainage patterns, and traffic.

Table P-4. Preservation Sites within Subdivision Lots

Site Number 50-60-01-							
56	737	744	752	765	1120	1143	1149
57	739	750	754	1112	1123	1144	1150
699	741	751	764	1119	1142	1147	1154

In addition to getting a precise location, it will be necessary for most subdivision sites to produce an accurate map (since most sites currently have only sketches, which is inadequate for preservation), to aid in both identifying them and monitoring their condition. Mapping will also provide an opportunity to evaluate the stability of a site, and identify areas damaged by erosion. If warranted, sites may be stabilized and data collected or recorded at this time.

For sites that are agricultural fields, temporary camps or workshops, and modified outcrops, permanent fencing will not be erected, and their preservation zones will be identified on maps and with site tags and flagging in the field. For sites with a

known or suspected burial, and for religious features, permanent boundaries will be marked 9 m from the outer walls or edges. In some cases, entire sites may be marked. In addition, Sites 764 (a multi-roomed enclosure) and 1119 (terraces and a modified outcrop) will have permanent boundaries marked due to their excellence as type specimens. For sites without permanent boundary markers, temporary markers should be placed 7 m from any feature during any construction activities. The form that permanent markers take will depend on consultation with the kūpuna, but will probably consist of a wooden fence of some sort.

The following sites do not have the standard 7 m boundary:

56 is 9 m to the north and south, and between the road and 9 m *mauka* of the most inland cairn feature.
741 7 m except 9 m from Features 3 and 4
764 7 m except 9 m from Feature 2
1119-1120 7 m (possible shrines present, but not intact)
1142 is 9 m with a clear view to the ocean unless obscured by existing vegetation
1143-1144 is 9 m in all directions
1147 is 9 m in all directions
1149-1150 is 9 m with a clear view to the ocean unless obscured by existing vegetation
1154 is 9 m in all directions

For the purposes of this report, the subdivision also includes the road and infrastructure corridor. In a few cases, preservation sites may fall within the 60 m wide re-survey corridor, but are thought to be far enough from the road alignment to allow preservation. Such sites will have temporary fencing erected at buffer perimeters during construction; the 150-foot setback in which construction cannot occur will prevent impacts by lot construction, although fencing may be left in place to avoid impacts from driveway grading. (This would be a precautionary measure, since all preservation sites and buffers will be marked on parcel plats and future owners will be bound to maintain preservation commitments.) If the road encroaches on a buffer in its proposed alignment, it will be realigned unless it is clear that previous disturbance has compromised the integrity of sediments and potential cultural deposits, as described previously in this plan.

The proposed road traverses Cultural Protection Zones in four locations where it crosses gulches: Kaunala, Kaheu, North Kamāka'ipō, and near the back of the Kamāka'ipō flood plane. Because each of these zones extends well inland, rerouting around them would require several miles of additional road, the potential environmental impacts of which, not to mention the certain visual impacts, would exceed carefully planned and monitored traverses of the protection zones. Sites which may be in or near the 60 m road survey corridor are 664 (5 small agricultural mounds), 687 (habitation), 689 (L-shaped wall, possible temporary habitation), 780 (lithic tool-manufacture debris), and 782 (lithic tool-manufacture debris). Most of these appear to be outside of the 60 m corridor, but lingering uncertainty about their location at this time mean that their relocation will be an important mission of the re-survey. If they end up within 7m of the proposed road edge, the road will be rerouted.

Where the road cuts through Cultural Protection Zones, several efforts will be made to minimize its physical and visual impacts. First, no turn-arounds, stockpiles, or other construction support features will be allowed within these zones—the intent is to make the affected area as narrow as possible, limiting impacts to the road and shoulder. Likewise, utilities buried in these zones should be as close to the road

center as possible to avoid having multiple impact corridors. Once project engineers and field personnel have come to an agreement with the archaeologist on the narrowest possible development corridor, the edges will be clearly marked to prevent encroachment beyond. Because of the preservation intent and the fact that most of the traverses occur in gulches, road design and construction shall take into account the potential effects to run-off and drainage. Given the past history of erosion, it should be possible to construct roadways that not only cause no adverse effects, but actually slow down runoff and stabilize nearby sediments. Finally, design and construction in the Cultural Protection Zones shall strive to minimize the visual impact of the road by avoiding an unnecessarily obtrusive roadbed and signs, and above-ground utilities. If roadside landscaping is planned, historic and modern introductions should be avoided, and viewplanes from traditional features should be maintained; in some cases vegetation may be useful as a visual screen to decrease the sense that a site is near a road. As the road enters a Cultural Protection Area, a sign should identify the place by its Hawaiian name. Where it crosses the Kamāka'ipō preserve, the road should provide a means for people hiking the interpretive trail to cross safely, preferably with means such as speed bumps or other signals on the road itself, with a minimum of signs.

Kamāka'ipō Mauka-Makai System

Up to this point, preservation treatments have referred to specific sites. In this section, the focus will widen to the level of a gulch system. On the west coast of Moloka'i, gulches are the natural foundations for settlement systems, and therefore have more meaning than any particular feature or cluster of features; gulches are important units of analysis when considering how people adapted to and changed the environment. In the northern part of Kamāka'ipō, one such gulch exemplifies this type of system; because it has a good array of sites that remain relatively undisturbed, this has been chosen for preservation. By preserving not just obvious archaeological features, but also the landscape connecting them (approximately 130 acres), this *mauka-makai* area will preserve the overall cultural landscape, valuable not just for study, but for seeing and experiencing a Hawaiian settlement.

The *ahupua'a* of Kaluako'i appears to be ancient, and appears as the land unit in the first historic documents that were cognizant of Hawaiian land divisions, such as the mid-nineteenth century Mahele land claims. It does include—as far as is possible on the relatively low and dry mountain of Mauna Loa—the classic cross section of ecological and resource zones from the mountain to the sea, but Kaluako'i covers the entire mountain and is not divided into the pie-shaped wedges associated with *ahupua'a*. This anomaly is usually attributed in archaeological literature to the absence of valleys and the presumed low population density of west Moloka'i (Kirch 1985, Summers 1971).

However, when looking at the settlement patterns of the west end, it is clear that Kaluako'i was divided. Although not recognized historically as distinct land units, the gulches of Kaluako'i are the foci of *mauka-makai* oriented landscape use. From north to south, the gulches and bays of Kawākiu, Kaka'ako, Pāpōhaku, Wahīlauhue, Po'olau, Kapukahehu, Kaunalā, Kaheu, and Kamāka'ipō are where sites cluster. Between these gulches, the ridges and flat lands have relatively few traces of human presence.

Although not all of these gulch systems have been surveyed, there appears to be a general pattern, which will provide the basis for interpretation. Beginning at the coast, there are sites beginning at the high water mark. At least some probably reflect very early visits by residents of other areas landing during fishing trips, but

the most obvious aspect of coastal sites is that they became fairly well developed. For example, there are often multiple permanent habitations, fishing shrines, and abundant cultural deposits clustering around the bays. Inland of these, the lower gulches have a mixture of agricultural fields, temporary (or perhaps lower status) habitations, and work areas. Further inland, sites become more sporadic, and multi-function sites are less common—small planting areas, lithic work areas, and trail markers are most common. The complete *makai-mauka* system ends up in the summit region where there are again rather numerous religious, habitation, agricultural, lithic, and other types of sites, but here the peaks and plateaus provide the foci for settlement, and gulches are less relevant. The *mauka* end of the gulch settlement system is often a source of stone quarried to make adzes and other tools. Beyond this there are few sites until the summit, although it is possible that the land was cultivated or otherwise used so that traces were minimal and easily obscured by historic pineapple cultivation.

Kamāka'ipō is one of the better-known gulch systems archaeologically, and can actually be divided into north and south sections. South Kamāka'ipō becomes narrow more quickly, and has few sites further than a kilometer in from the coast. Its *mauka* end is also atypical of the known Kaluako'i gulch systems, in that there are several large, multi-roomed enclosures (Sites 771-773, all *mauka* of the proposed subdivision). At the *makai* end, sites on the coastal flat have been altered by historic era activities, or occur on a more steeply sloping section that is also atypical. Although sites will also be saved in the southern branch, North Kamāka'ipō sites are more representative of a gulch system, and have fewer traces of historic era impacts.

Table P-5. Mauka-Makai Preserve Sites

Site Number 50-60-01-						
53	655	680	683	686	689	779
54	656	681	684	687	690	780
654	679	682	685	688	691	782

The North Kamāka'ipō preservation area will be marked on maps, but will also require some form of identification in the field. Metal tags with site numbers will be placed in sites, but boundaries of the area will also be marked. Because of the large size, markers such as those discussed in **Permanent Boundaries** are not feasible, although they may be used at the *makai* sites (53-54) near the public access. For the rest of the preserve, the boundary will be marked with signs located at the north and south edges of the gulch near site areas. Precise locations for these will be determined after sites have been visited and mapped, but the north edge will be approximately from Site 654 to 680 to 678, and the south edge from Site 655 to 690 to 686 to 684 to 688 to 678.

Although several of the most impressive sites in the North Kamāka'ipō preserve have been mapped quite well, many have only been sketched, and more accurate maps are required for adequate preservation. Mapping will be done with tape and compass for simple sites, and with plane table and alidade for those which are more complex. In conjunction with mapping, the condition and stability of each site will be evaluated. For some (654, 655, 779, 780, and 782), it is already clear

that enough erosion has already occurred that data should be collected as described in **Recovering Eroded Data** above. This is also true for sites 53 and 54, although they were already mapped.

It is anticipated that most sites need stabilization of some type, but for most it should consist of minor re-stacking and setting retaining alignments. Because filling all of the deflated and eroded surfaces in sites like 53, 54, and 656 would require enormous (and impractical) amounts of fill, stabilization will focus more on preventing further damage than repairing past damage. For example, eroding banks where artifacts are being washed out may be covered with landscaping fabric or some other means of preventing further loss of sediment. Should parts of the site be opened for educational purposes, foot traffic would be routed to avoid any areas where it could cause erosion or collapse of features and deposits.

Interpretation in the North Kamāka'ipō preserve will consider particular sites within the context of the gulch system from the coast (Sites 53, 54, and 654) up to the quarry (Site 656). The coastal sites, being on either side of the public access to the beach, will be the primary focus of interpretation, with signs identifying various features and relating what is known of them. Information recovered during the current project will be synthesized with previous archaeological work from the project area and Kaluako'i, with Hawaiian oral traditions, and with other relevant research and information. Existence of a traditional trail up to the quarry provides an opportunity for an interpretive trail that can be used to better explain ancient adaptation to the *mauka-makai* continuum of habitats and resources.

Pending Kūpuna advisor and SHPD approval of specifics, an interpretive trail will wend its way through this preserve. Although the precise routing will depend on field inspections, site boundary verification, and consultation, the approximate route will go from Site 656 to 679 and 680 descending the north slope of the gulch, across to Site 686 and 691, back across to Site 685 and to the coast at Site 54. These sites are a series of basalt tool-making sites, shelters, and trail markers. The original trail will be followed to the extent that it can be identified and followed safely and without causing erosion. Features will not be traversed or breached, vehicles and bicycles will not be allowed, and clearing will be limited to opening sight lines without stripping the landscape. Parking at the top will be north and inland of Site 656 in a disturbed area. Access and parking at the lower end can occur at multiple locations without causing adverse impacts, since Site 54 is in fact a broad alluvial fan that consists of feature clusters interspersed with heavily eroded areas. Any development will occur outside of a 7 m buffer from features (9 m for shrines and burials).

Additional vegetation clearing may be done to increase visibility of sites without actually walking through features, but complete removal of canopy and surface vegetation will be avoided so that erosion risk is not increased. Because of the lack of water, plantings will be unfeasible or very limited, and is not anticipated beyond parts of Sites 654, 53, and 54. At other features, string trimmers will be used to get rid of tall grasses and encourage groundcover grasses as described in the Kaupoa Preservation Plan (Major 1997). Throughout the preserve, native species will be encouraged to maintain and spread their coverage. Some sites that are not part of the interpretive program will not be cleared.

Papohaku Ranchland Subdivision Sites

Sites in this section must first be formally inventoried and evaluated for SHPD review, but are included in this preservation plan so that their eventual status will

be known. The previous archaeological report (Burtchard and Athens 2000) located additional sites in existing lots, but the majority of them lie outside of the Lā'au Subdivision access road's 60-m wide project area. Should re-survey of the proposed road extensions show that additional sites occur within that corridor, supplemental preservation plans will be developed for them.

In October, 2005, Molokai Ranch declared a 150-foot setback for then new road, in which no structures or stockpiles may be placed. This restriction greatly aids the preservation of sites in the road corridor. Because construction is planned, additional preservation measures are proposed for sites in this category. Mapping and data augmentation, while listed in this plan, should be completed during the supplemental inventory survey of the corridor, and therefore the main actions will be to establish buffers and erect fencing around them during construction.

Table P-6. Papohaku Ranchland Subdivision Sites

Site Number 50-60-01-						
520	1760	1761	1784			

Sites 520 and 1760 may have less than a 7 m buffer on one side, an issue that will be resolved during the road corridor re-survey. Site 520 appears to extend all the way to the current road, precluding the 7 m buffer, and Site 1760 may no longer exist and lacked integrity. If vegetation clearing indicates that components of 1760 do exist, then the buffer will be set according to the procedures mentioned above.

Sites in the road corridor project area through Papohaku Ranchlands will be verified and then avoided. Temporary fencing may be necessary during construction, but permanent barriers will not be used unless it would likely help the stability, Because Site 520 may have been affected when Kauluwai Loop road was built, special attention will be given to its stability. Site 1761, consisting of two possible burials, will also be protected and avoided, maintaining a buffer exceeding the minimum if at all possible. Site 1784 may also require protective fencing, and the reconnaissance report depicts an area of uncleared vegetation surrounding it. Because this site consists of a platform over 7 m in length and a hearth whose precise location remains ambiguous, and both are at a similar elevation to the more extensive Site 520, re-survey in this area will include vegetation clearing. The tentative road alignment threads between Sites 520 and 1784, and may require realignment to maintain adequate protective buffers around each. These sites, which appear to have elements of habitation, may also be selected for data collection.

Examination of the reconnaissance report indicated the presence of the following sites that are outside the corridor or were considered not significant, since they appear to be less than 50 years old, and in several cases are simply bulldozed piles of stone: 658 (agriculture), 659 (agriculture), 664 (agriculture), 669 (agriculture, habitation, possible burial), 670 (agriculture, habitation, shrine), 674 (possible burial), 675 (agriculture, habitation), 1678-1679 (observation bunkers), 1683-1687 (bulldozed rock piles), 1756-1759 (agriculture), 1783 (possible agriculture), 1785-1788 (shrines, habitation, trail marker). The interpretations provided are tentative, and will be evaluated for the inventory.

DETAILED DATA RECOVERY PLAN, GENERAL

Site-specific data recovery actions will be presented in a subsequent section, but there are several aspects of data recovery that will be practiced at all sites. ***First***, all sites near the development corridor (which consists of the road and infrastructure as well as construction in house lots)—including those that will be preserved rather than mitigated—will be checked to verify extant data. ***Second***, any gaps in the existing data will be filled. In several cases, for example, without replacing the existing sketch maps with tape and compass or plane table maps, most site records are inadequate for management purposes. ***Third***, because it is possible that the inventory survey missed some small but significant feature or artifact hidden beneath vegetation, vegetation clearing and intensive searches will extend out from data recovery site areas prior to construction. These actions augment the road and infrastructure corridor re-survey described in the **Introduction** of the revised plans.

Data Collection at Previously Recorded Sites

Verification

The first step in this phase of investigations will be to verify the existing data for known sites within the road corridor. This process will consist of examining the sites, comparing dimensions and descriptions to those contained in the 1993 report, and either affirming the inventory or adding corrected data. The inventory was reviewed and accepted by SHPD, but the fact that any site facing data recovery also faces construction impacts underscores the importance of having accurate site records.

Augmentation

The first action in augmentation will be to ensure that all features have been documented. It is possible that vegetation obscured smaller features or scatters or isolated artifacts, or that erosion since the survey has exposed additional deposits. Therefore, the road and infrastructure corridor will be resurveyed as described in the **Introduction** to search for such instances. Special attention will be focussed on known sites in or adjacent to the corridor, with intensive survey and clearing of the vicinity to guarantee 100% documentation of features and deposits within the area of potential impact. Eventually, as lots are sold and houses are planned, this process will be repeated in proposed construction areas within individual subdivision lots.

The second action will be to accurately place each site in space. Reference points for each site will be marked on the ground and site maps, located using a GPS receiver, and wherever possible recorded again by surveyors when the road corridor is laid out. These points will be identified by their UTM coordinates.

Another aspect of data augmentation is that while sites were documented, not all were mapped, and many were mapped only approximately. The nature of sites within the corridor is that they generally are not complex or large, and therefore tape and compass maps will be adequate to accurately record site plans. If the size and complexity of any un-mapped sites merits, plane table and alidade maps will be produced. Generally, 1:100 metric scale maps will be adequate, although 1:200 or higher may be appropriate for agricultural mound complexes, and 1:50 may be used for particularly interesting architecture.

Finally, if there is any information to add to that held in the 1993 report, it will be recorded at this time. For example, more detailed descriptions of architecture, lists of species present in midden, and other such details may be added.

New Data Collection

Once verification and augmentation have been completed, excavations can begin. The most basic goal of excavation will be to document the site stratigraphy, including natural and cultural components. Beyond this basic description and relative chronology, several research questions will provide the framework for interpretation of excavated assemblages; these revolve around cultural use of the lands located outside the nuclei of coastal settlements, and integration or contrasts between coastal and inland resource use. It is also anticipated that charcoal will be recovered that can be identified to provide environmental data, and dated to improve the local chronology. Research questions pertaining only to particular sites may also be investigated, and will be described later in the section on site-specific data recovery plans.

Documentation of Stratigraphic Sequence

The first goal of excavation is to establish the stratigraphic history of each site. Therefore excavations will be placed such that the depositional sequence(s) are exposed inside and outside of features. Underlying substrate and post-abandonment deposition will be distinguished from cultural deposits. Stratigraphy of particular features will be placed in the context of their sites, and sites will be placed within the context of the project area. Based on past work, it is anticipated that stratigraphy will be similar and simple throughout most of the project area, with potential for small areas of more complex layering within some heavily used features.

Documentation of Feature Chronology

Sites with surface features will be subject to excavation to determine the stratigraphic association of feature foundations, so that at least a relative chronology can be established. Likewise, subsurface features will be placed within the stratigraphic sequence. Although the expectation is that most excavations will encounter a lone cultural layer, any more complex stratigraphy will be placed in a Harris matrix system (Harris 1989), which will include all identifiable stages of surface feature construction, addition, and dismantling. This work will help construct a relative chronology, and radiocarbon dating will be used on at least a sample of features to provide absolute dates.

Documentation of Site and Feature Assemblages

Beginning with each minimum collection provenience (grid units for surface collections, and strata within excavation units for subsurface collections), the next basic task will be to create an inventory and basic description of cultural materials. Midden will be classified by taxa and weighed. Artifacts will be classified by material and type, measured, and weighed; samples of different types will be photographed and in some cases illustrated. Lithic debitage will be counted and weighed, the range of dimensions recorded for each lot, classified according to the degrees of decortication and modification, and finally described in terms of material, form, and any other salient attributes. Following these descriptive tasks, the assemblages of particular grid or stratigraphic units will be considered in

context of features and sites in an attempt to identify any systematic variation or patterning.

Research Questions

Although SHPD standards state that an inventory survey needs to go no further than documenting the resources present, the 1993 report did pose several research-oriented questions regarding southwest Kaluako'i, following topics suggested for the area by Weisler (1984). The nature of the project area forces revision of the research questions for this stage of investigation. Work will occur mostly within a corridor running approximately parallel to the coast, *mauka* of site concentrations. In addition, the project area includes several spurs leading to public beach accesses and to subdivision parcels; these are planned to avoid site complexes, and therefore will also relate more to peripheral areas than to core sites. Finally, data recovery is proposed for a limited number of sites within the subdivision lots, sites that mostly represent temporary habitation or workshops areas and are significant for their information only. Habitation in the data recovery sites is mostly limited to marginal features, with agriculture and lithic work sites being better represented, so the unbiased examination of settlement patterns attempted in 1993 will not be possible. Likewise, distance from the coast vastly reduces the amount of marine midden present, and therefore consideration of subsistence strategies will focus on agriculture. The earlier focus on lithic resources must be shifted to later stages of tool production, since few, if any sources of stone will occur within the project corridor. Finally, the consideration of sociopolitical complexity, difficult enough with the inventory data, would be presumptuous given the thin slice of the overall site spectrum that will be encountered.

The archaeological marginality of the data recovery sites makes them of limited use for considering the broad questions posed previously, but also creates its own opportunities. The margins of settlements clustering around the small bays of west and the coastal flats of the south may also be considered as frontiers, something akin to the high water mark of the culture that colonized these shores, where the modified and built landscape met the wild country. This kind of area has the potential to inform on land use in interesting ways, providing data that may reflect the Hawaiian zoning of the landscape into different types of use and degrees of human permanence (Malo 1951, Kamakau 1992, Handy and Handy 1972). On a different level, the sites may inform on central place theory, or core-periphery systems. As well as being the agricultural outlier of a coastal settlement, however, it is important to consider that the middle elevations also held the access routes between the more heavily used coastal and upland zones. The 1993 report showed that this was the case in Kāmaka'ipō, where a specific type of cairn marked *mauka-makai* trails. It was also evident that activities upon which coastal settlements depended, especially agriculture and stone tool manufacture, occurred primarily on the margins of habitation complexes. The irony of this is that the main road corridor, following a more or less unvarying elevation, becomes an important way of understanding the older *mauka-makai* trail corridors, since it will cross-cut the old trail networks and highlight patterns of where they occur and where they do not.

Land Use on the Settlement Margins

To the degree that the project area includes the peripheries of the major coastal settlements, it is useful in investigating the ways in which ancient residents of

Moloka'i used their frontier. Known sites suggest that agriculture was the dominant use, but this project will also attempt to evaluate the importance of lithic and temporary habitation sites by excavating samples at most such sites in the area of potential effect. Did these other functions occur independently, or may they be better understood as agriculturally related activities? Data recovery may occur primarily at the margins of coastal settlements, but by no means in inaccessible and remote land, and therefore it will be interesting to see the degree to which artifacts, midden, and feature styles prevalent at the bay settlements are also found here. In other words, how much does the cultural assemblage of the outlying sites conform to that of the coastal centers? Also, the permanence of the inland margin sites is worth investigation. Do they represent repeated, long-term use of this area, or were they short-lived frontier sites?

Sites that may be excavated regarding settlement margins will include: 520, 692, 694, 698, 743, 745, 746, 749, 753, 755, 756, 758, 1118, 1121, 1122, 1124, 1125, 1131, 1132, 1136, 1153, 1172, and 1784. Many of these sites will be outside the refined area of potential effect, and will therefore not be excavated. Unless a large number cannot be avoided, it is likely that all sites will at least have sample excavations.

Traditional Dryland Agricultural Features and Soils

Moving on from the issue of margins and frontiers, a narrower but crucial focus may be brought upon the practice of agriculture. This subject seems to have captivated archaeologists only where irrigation or vast field systems are involved, but as the basis for survival of Hawaiians it is of the utmost importance. Two types of features—planting circles and mounds—reflect the primitive state of archaeological understanding, since both tend to be interpreted with reference to archaeological folklore or occasionally to a few indigenous accounts. Excavation of these types of features will be directed toward understanding their agronomic benefits. Do they appear to aid in soil or moisture conservation? Does their construction involve use of organic or sediment fill? In the case of mounds, specific identification of planting versus clearing mounds will be sought, based on the types of stone present and the depth of topsoil present beneath the stones. Another class of agricultural features was the modified stone outcrop. These will be mapped and a sample excavated with the goal of understanding why such features may have been agriculturally useful.

After features, the second major source of data will be the soils. Traditional dryland agricultural practices by no means required features, and the presence of agriculturally viable soils will be tracked throughout the corridor, particularly with regard to their association with gulches or ridges. Soil samples from a variety of contexts will be sent for analysis to evaluate and compare their mineral nutrients, fertility, and acidity. Where it is available, charcoal will be collected for identification and dating. This data will inform on flora cleared from cultivation areas, and perhaps on the flora associated with cultivation. This approach is being used rather than pollen analysis because the scale being considered is more immediate (being wind-borne, pollen is more informative of regional than of local flora), and because comparative data are available for upland Kaluako'i sites. Erosion will be noted and possible links to agriculture will be considered, and features or modifications will be analyzed as to their potential to promote or retard erosion.

Sites that may address this topic include: 694, 736, 742, 745, 1130, and 1148. Many of these sites will be outside the refined area of potential effect, and will therefore not be excavated. Unless a large number cannot be avoided, it is likely that all sites will at least have sample excavations.

Lithic Production

Previous data have suggested that sources of tool-grade basalt occurred at higher elevations than most of the project area will include, and an obvious goal of this project is to verify this conclusion. Should any sources be found, the extent of their use will be evaluated, the suspicion being that any sources within the area of potential effect were probably relatively poor grade and were used briefly, perhaps only once, to supply blades rather than adzes or other more formal tools. If sources are not found, lithic work areas will be analyzed to determine the type(s) of materials present, type(s) of tools being made, and the stage(s) of production represented. In light of recent work near the Kukui Peak area (Major 2000), where evidence suggests that workshops were occupied by tool manufacturing specialists, lithics will be evaluated for evidence of the expertise involved, as reflected by regularity of technique, uniformity of production stage, quality of work, presence of specialized tools, and diversity of raw material.

Sites likely to address this research topic include: 692, 695-697, 738, 748, 1122, 1132, 1134, 1139, 1145, and 1151. Many of these sites will be outside the refined area of potential effect, and will therefore not be excavated. Unless a large number cannot be avoided, it is likely that all sites will at least have sample excavations.

Mauka-Makai Routes

The possibility that some of the data recovery sites could be nodes along travel or trade routes between the upland and coastal centers of occupation was raised earlier, and this presents an alternative to the wholesale conclusion that these sites are simply outliers to coastal settlements. In order to determine whether sites may be along *mauka-makai* trails, other sites beyond the project area must be considered first. This reveals *mauka-makai* oriented strings of sites in gulches (North and South Kamāka'ipō, as well as Kaheu and Kaunalā outside the area of potential effect), and atop ridges at Hakina and the southwest rift ridge extending northeast from Lā'au. (Interestingly, all of these converge in and area called "Pookohola" in Emory's 1922 notebook, itself a ridge on the southwest rift zone that provides a geologically convenient travel route toward Mauna Loa. This area has several lithic work areas and shelters—Site 1156-1158—and is also the route of the old lighthouse road, suggesting that it has been an important node in *mauka-makai* travel for centuries. Gentler, less rocky terrain and historical pineapple cultivation above this point make Pookohola the uppermost intact remain of the route.)

It is proposed that certain types of features—primarily cairns to mark routes and shelters for travelers to rest—are reflective of travel between the coast and the mountain, and therefore their locations will be carefully plotted. Assemblages of cultural materials found during surface collection and excavation may also indicate *mauka-makai* travel, since lithics from upland quarries or marine midden would have to be introduced. It is anticipated that charcoal identification may also help here.

Sites that are likely to address this research topic include: 692, 694, 738, 742, 743, 745, 748, 749, 756, 758, 760, 1130, 1139, 1141, and 1172. Many of these sites

will be outside the refined area of potential effect, and will therefore not be excavated. Unless a large number cannot be avoided, it is likely that all sites will at least have sample excavations.

Methods

Generally accepted archaeological practices and the draft SHPD rules for data recovery (HAR 13-13-278) will dictate the actions taken during this project. The initial step in fieldwork will be the relocation and verification of existing sites and search for additional surface sites within the project corridor. The entire area subject to impact, including the road corridor, turn-arounds, and staging areas, will be resurveyed to accomplish total documentation of surface sites and concentrations prior to excavation.

Locating Sites

Site locations will be fixed using a declination-adjusted compass in conjunction with aerial photographs with a topographic map overlay (using vegetation, landforms, eroded areas, and surveyed points serving for reference). In the case of artifacts observed without any formal features, the assemblage will be described and collections made. Artifact concentrations will be located on the topographic map in the same way as features. A GPS receiver may also be used to suuplement ground surveys.

Excavation

Excavation of sites will employ three techniques that accommodate different purposes and accomplish varying degrees of control over vertical and horizontal control. What follows is a general discussion of excavation techniques and how they will be employed to optimize data recovery. Anticipated departures from these generic types will be mentioned in the site-specific data recovery plans later in this report; should field conditions dictate a modification of procedures, this will be reflected in the final report.

1 - Trenching (ST-#): Trenches are dug with picks, shovel, and when the deposit warrants, by trowel. Excavation is by stratigraphic unit, meaning any perceivable subdivision of the excavated volume, such as lithostratigraphic layers, depositional units, erosional faces, soil horizons, and features. Where trenching is used to expose a long profile in an area where burials or dense cultural deposits are unlikely, a backhoe may be used. Although backdirt is examined for cultural materials, only a limited sample of the matrix is screened in this type of excavation, since it is to be used primarily in agricultural features where the goal is to expose the stratigraphy and the feature's position within it. Profiles are drawn of all features and of at least representative portions of each cultural layer. Where features or particularly dense or complex deposits are encountered, controlled excavation techniques will be employed, and possible artifacts will be point provenienced relative to the trench datum.

2 - Probing (P-#): Done with shovels and/or trowels, these 30-40 cm circular units provide quick data regarding stratigraphy and cultural materials in known cultural deposits and features. Because of the likelihood of finding artifacts and midden, all sediment is screened through 1/4 inch mesh. Excavation is by stratigraphic unit, and

profiles are drawn of all features and of at least representative portions of each cultural layer. These will most often be employed in transect or grid formations to establish the boundaries of a cultural deposit and gain some understanding of its constituents.

3 - Controlled Testing (TU-#): Excavation by trowel and brush will be used in situations where more precise control is warranted, such as recovery of data from pit features. A combination of stratigraphic units and arbitrary levels within each are used for vertical control, and all matrix is screened through 1/4 inch mesh, or possibly 1/8 inch where conditions merit. Profiles and plan views will be drawn of each layer, all features, and of at least representative portions of each cultural layer. Features, tools and other significant attributes of stratigraphy or material culture are point-provenienced with reference to the unit datum. For units exceeding 1 m in length, collections for each 1 m portion are recorded and collected separately.

Sampling Strategy

In general, the type of excavation done depends on the type of deposits and data anticipated, as well as the degree of control necessary to interpret the site. Therefore probes will typically be an initial stage of excavation, in which the general stratigraphy is exposed and the vertical and horizontal extent of a site is defined. Probes may be followed by trenching in agricultural terraces, mounds, or planting circles so that a longer continuous exposure of stratigraphy can be recorded. If any of these types of features appears more complex, or has a noticeably denser cultural deposit, then a controlled test unit may be excavated to recover data with greater precision. Test units will also be used in C-shapes, enclosures, and pavements. Placement of excavation units will be determined by the type of feature being investigated, and sometimes by prior knowledge of the cultural deposits in a site.

C-shapes, for example, will be tested with controlled units laid out with a long axis extending from the opening through the back wall, recovering the majority of interior deposits and exposing a sectional view of the feature wall and its stratigraphic association. This placement generally results in discovery of any associated fire features within, but units may be extended.

Planting circles and **mounds** will typically be excavated with a trench or test unit placed over half of the feature so that a 50% sample of the fill will be screened and a cross-sectional profile will result; if warranted, the other half may then be excavated.

Terraces will likewise be excavated with trenches or test units, placed perpendicular to the terrace facing to reveal a sectional profile. The perpendicular orientation will show the type of terrace construction, amount of fill, and relationship between the built and natural strata. If there are relatively abundant cultural deposits indicating something more than agricultural use, probes will be used to determine the extents of the deposits, followed by controlled excavation; the procedure will follow that described below for sampling deposits.

Enclosures and **pavements** will be excavated using test units of various sizes and arrangements. A 50% sample of the interior of enclosures or the surface of pavements will be excavated, including central portions where fire features are commonly found. For features with interior or pavement areas exceeding 10 m^2,

less than 50% may be excavated. In such cases, 5 m^2 of controlled units will be followed by removal of the contemporary horizon overburden to reveal any subsurface features, all of which will subsequently be excavated to recover at least 50% of their contents. Additional test units or stratigraphic trenches will be used to section one or more representative portions of any walls to provide a view of the foundations and its stratigraphic association.

Deposits of midden and **lithics** are documented or suspected in many of the project area sites, and a major task of data recovery is to delineate the boundaries of these and recover samples adequate for site interpretation. In many cases, complete excavation would be an immense task, and would go well beyond a point of diminishing returns for information. Once the extent and nature of a deposit has been determined, and the distribution of its component materials described and interpreted adequately, collection of redundant information is not necessary for data recovery purposes. The approach will be to collect a sample through the use of probes and controlled units.

The first step of this process will be to define the area that may be impacted, and create a grid covering it. Using a sample interval of 2 m (1 m where refinement is needed), the edges of a deposit will be defined, and a sample of the entire deposit collected. If the deposit is no more than 10 m^2, then it will be excavated with 1 m^2 units in a checkerboard arrangement to provide a minimum 50% sample. If the area is over 10 m^2 and less than 100 m^2, any post-abandonment overburden will be stripped away, and a 5-10% sample of the overall deposit excavated, with the potential for additional units if more are needed to cover the apparent range of variation. Subsurface features revealed will be excavated to provide a minimum 50% sample of the fill in each, regardless of whether they fall within a excavated grid square. When this has been done, machinery will be used to remove the cultural deposit to its average bottom depth, so that any deeper features penetrating the substrate may be seen and excavated as well. If machines are not available, a fraction of the area will be stripped with the same goal. If the deposit exceeds 100 m^2, the extra portion will be stripped by machine, to allow recovery of a minimum 50% sample from each feature fill.

Because the data recovery features will be impacted by construction, 50% controlled excavation is to be done first, so that a profile can be recorded. Following this, the remainder of the fill may be collected. In such instances, only the cultural fill will be recovered and not all materials may be collected.

Archaeological Presence During Construction

By definition, data recovery sites have already undergone mitigation, and therefore no longer retain integrity or significance. However, monitoring may be done in and near such sites, in part to be aware of any unexpected components to known deposits. Because data recovery excavations for this project will involve large, representative samples, it is not considered likely that anomalous or non-redundant information will be encountered near data recovery sites. However, since construction may be the last chance to collect information about sites before they lose integrity, monitoring will be done in many cases. For the most part, monitoring will consist of watching machine excavation and grading in order to search for undiscovered buried features. Any such features will be recorded and mitigated through controlled excavation. In addition, excavated sediments will be inspected visually, and in some cases sifted through quarter-inch mesh. Artifacts will be collected, whereas midden will be described. Discovery of relatively abundant

artifacts, midden, or charcoal will trigger a temporary work stoppage to determine if an intact remnant of the source deposit is still present; if so, it will be recorded and mitigated as appropriate. Because the sites where data recovery has been verified by SHPD are considered no longer significant, judgement of how much archaeological recovery to be done will be a matter for the field archaeologist to decide, although guidance of the Kūpuna Advisors will be sought in advance to determine their preference.

Lab Analyses and Collection Treatment

Materials collected during data recovery will be analyzed in Hawai'i. Artifacts and midden will be sorted by material and function, then measured and weighed, and described. This information will be recorded along with illustrations and/or photographs of representative specimens to form a complete catalog of cultural materials that will be included in the final report.

Charcoal identification will be performed in Honolulu by International Archaeological Institute, Inc., and radiocarbon dating by Beta Analytic in Florida. All collections, except for charcoal consumed during the dating procedure, will be returned to the landowner for storage on Moloka'i. Field notes, excavation forms, photographs, negatives, and unpublished documents will be retained by the consultant. Copies of the final report will be provided to the client, SHPD, and the Moloka'i Public Library upon acceptance by SHPD.

DETAILED DATA RECOVERY PLAN, BY SITE

Table D-1. Data Recovery Actions, by Site
(For Research Topics: M = Marginal land use, A = Agriculture, L = Lithics, R = Routes Mauka-Makai)

Site Number	Research Topic	Mapping	Grid Probes	Probes	Strat. Trench	Test Unit	C-shape Test Unit	Surface Collection
697	L	X						X
698	M	X	X		X			
743	M	X	X		X			
745	AM	X	X		X	X		
746	M	X	X		X			
749	M	X	X			X		
755	M	X	X		X			X
756	M	X	X					
758	M							
760	M			X				
761	*M*			X				
762	M	X	X					
1118	M	X		X		X		
1121	M	X	X					X
1124	AM	X	X			X		
1125	*M*	X	X			X		
1130	A	X	X		X		X	
1131	M	X	X		X			
1132	ML	X	X			X		
1134	ML	X	X			X		
1136	*M*	X	X					
1141	T	X	X			X		
1145	L	X	X			X		

NOTE: Sites in *italics* (761, 1125, and 1136) are likely to be outside of the subdivision, and if so will be preserved rather than subjected to data recovery. Their inclusion here covers the possibility that they may be within subdivision lots.

Site 697

This site consists of a 10 by 20 m area of lithic debris on hardpan. Data recovery will consist of surface collection.

Site 698

This site contains a wooden water tank and a trough, both built on stone platforms, which are probably older than 50 years based on a 1947 map which marks a "well" in this location. However, the main object of data recovery is to explore a stone wall remnant and determine if any intact cultural deposit remains at this location, since midden and lithics were observed on the surface.

Data recovery will begin with mapping of the surface features, which should suffice as data recovery for the historic features. This will be followed by excavation of a trench through the wall remnant to determine its age and stratigraphic association, as well as evaluate the likelihood of an intact cultural deposit. Should such a deposit appear likely, grid probe excavation will be done following the procedures outlined in **Sampling**.

Site 743

This site consists of a single stone alignment, where a 1929 bottle was fund during the 1991 inventory.

Data recovery will begin with mapping, followed by excavation of a single trench through the feature to explore its stratigraphic association and determine the likelihood of a buried cultural deposit. If no buried materials are found, there will be no further data recovery. Otherwise, a grid and shovel probes will be used to determine the horizontal and vertical extent of any buried deposit and recover data following the procedure outlined in **Sampling**.

Site 745

This site consists of an outcrop with two small enclosures attached, and what was interpreted as a fire hearth a few meters away. Together, these minimal modifications were interpreted as a possible planting area and temporary habitation.

Data recovery will begin with mapping the three features and the outcrop. In addition, controlled excavation will be done at the three features, so that precise data regarding their cultural assemblages and their stratigraphic association can be gathered. A 1.0 by 1.0 m unit will be placed halfway across Feature 1 (the suspected hearth), providing a cross-section profile; after this is recorded, any remaining feature fill will be excavated within a second unit of the same size. Each of the planting circles will be similarly sectioned along axes perpendicular to the rock outcrop; if there are cultural materials suggestive of something more than planting soil, the remainder of the feature's fills will also be excavated. Following this, shovel probes along a grid will be used to determine the horizontal and vertical extent of the site, and recover data according to the procedures outlined in **Sampling**.

Site 746

This site consists of an outcrop with a stacked stone wall extending outward to form an enclosure, as well as two small stone mounds. Although it was interpreted as a ranching feature in the 1993 report, it is possible that it may have served a different function, and further investigation is warranted.

Data recovery will begin with mapping to more accurately record the surface features. This will be followed by trenches sectioning the mounds and going through part of the enclosure wall. If trenching confirms that the features are rather recent and there is no significant cultural deposit associated with them, data recovery will cease. If, however, trenches reveal a buried deposit, then probes will be excavated on a grid system, according to the procedures outlined in **Sampling**.

Site 749

This site consists of a boulder outcrop with a natural overhang shelter and several areas of stacked stone creating small enclosed areas. A single test excavation done here in 1991 demonstrated the presence of a thin cultural layer containing both traditional (basalt debitage and shell midden) and historically introduced (ungulate bones and teeth) materials. Although it is possible that a deeper or more discretely stratified cultural deposit exists at this site, it is not likely.

Data recovery will begin with mapping, followed by controlled excavations in each of the enclosed areas. The controlled units within modified areas are to augment results from the earlier (1991) excavations. These units will explore both the interior deposits and the stratigraphic associations of the walls. It is anticipated that excavation of 2 1.0 by 1.0 m units within each enclosed area will result in recovery of 50% or more of the available deposits, as well as reveal the stratigraphic associations of the architectural elements. It is also likely, however, that with slightly more effort nearly 100% of the deposits can be recovered, and an attempt will be made to do a larger excavation covering most or all of the overhang deposits.

Following controlled excavation, shovel probes will cover the area outside of defined features on a 2 m grid, determining the extent of buried deposits and recovering additional data according to the procedures detailed in **Sampling.**

Site 755

This site is a pair of adjacent enclosure walls utilizing a natural outcrop.

Data recovery will begin with mapping, followed by trenching through the shared wall and at least one of the enclosures' outer walls. Matrix will be screened, and if a rich or complex cultural deposit is found, excavation will proceed as a controlled test unit. Unless a buried deposit is absent, the next step will be excavation of probes along a grid, as described in the procedures for deposits in **Sampling.** Finally, the stone mortar used in the feature 1 wall will be collected.

Site 756

This site consists of a boulder outcrop with modifications that create a large enclosure, within which are several natural overhang shelters.

Data recovery will begin with mapping, after which the interior will be marked in a grid and probed according to the procedures outlined for deposits in **Sampling.**

Site 758

This site consists of a natural boulder concentration with a piled stone wall extending outward from it and creating an enclosure. Although midden was not observed, this feature was interpreted as a temporary habitation in the 1993 report.

Data recovery will begin with the production of a map of this site, since none was included in the inventory survey report. One or more trenches will be excavated through the pile stone wall to reveal its stratigraphic association. Subsequently, a grid of shovel probes will be excavated in order to determine the extent and nature of any cultural deposits following the procedures outlined for deposits in **Sampling.**

Site 760

This site consists of two enclosure walls attached to a large outcrop, and was interpreted in 1993 as a military feature, based on the style of construction and absence of traditional cultural materials.

Military training occurred on Moloka'i during WWII and in the mid-1950s, but was not well documented, and therefore it is not likely that the age (and thus eligibility under NRHP criteria) can be determined historically. Since a major criterion is that sites be more than 50 years old, the potential significance of WWII sites would have changed since the 1991 survey. This, plus the uncertainty of wall style as an indicator of age, means that at least some testing should occur here. Given the expectation that the features are in fact temporary historic structures, it is likely that testing will indicate a lack of significance, and will end in an evaluation of no significance, or discovery of poor deposits that can be mitigated immediately. The planned treatment for this site will be to excavate it in a way that will satisfy data recovery requirements.

Shovel probes will be placed on two transects parallel to the southwest walls. Should cultural deposits be encountered, the follow-up will consist of controlled excavation of all features, and of up to 5 m^2 of a general deposit. A trench will section one of the walls.

Site 761

This is another enclosure formed of a stacked wall attached to a boulder outcrop. Like Site 760, it appears to be historic based on the construction style.

Data recovery will consist of mapping and of shovel probes along a northeast-southwest transect, covering the interior and leeward exterior of the feature. In line with this transect, a small trench will be excavated through the wall to provide a cross-sectional view of its construction and stratigraphic association. If the probes indicate a buried cultural deposit, excavation of probes on a grid as described in **Sampling** will follow.

Uncertainty about the exact location of this site relative to the proposed subdivision boundary remains at the time of writing, and it may be that Site 761 is within the Shoreline Conservation Zone, in which the site treatment will change to preservation.

Site 762

This is another enclosure formed of a stacked wall attached to a boulder outcrop. Like Site 761 and 762, it appears to be historic based on the construction style.

Data recovery will consist of mapping and of shovel probes along a north-south transect, covering the interior and exterior of the feature. In line with this transect, a small trench will be excavated through a wall to provide a cross-sectional view of its construction and stratigraphic association. If the probes indicate a buried cultural deposit, excavation of probes on a grid as described in **Sampling** will follow.

Site 1118

This site consists of an outcrop with several natural overhang shelters, three of which have signs of temporary occupation.

Data recovery will begin with a more detailed map, followed by excavation of each shelter interior. The initial task would be to better document the site's surface attributes, producing a detailed map and defining the boundaries more precisely. Data recovery would focus on Feature 2, doing 100% excavation (approximately 1.5 m^2) of that shelter. Each remaining shelter would be sectioned to excavate a 50% sample of the overall volume (less than 1 m^2 each), and reveal the stratigraphic sequence. The remaining cultural deposit would then be recovered to provide 100% recovery of its contents. Excavation of probes on a grid as described in **Sampling** will follow to determine the extent of midden and artifacts beyond the shelters.

Site 1121

This site has no constructed features, and instead consists of a small concentration of cowry shells amid natural boulders.

Data recovery will begin by establishing a grid centered on the shells, and measuring 6 to 8 m on a side. This will be used to map the distribution of midden, after which surface collection will be done. Probes will be placed at grid intersections to determine the presence or absence and extent of any subsurface deposit, and follow-up excavations may occur according to the procedures described in **Sampling**.

Site 1124

This site is another boulder outcrop with several small overhangs, one of which has midden. A short section of stacked stones at the south end is the only modification.

Data recovery will begin with a map. Next, a controlled excavation unit will be placed halfway across the overhang shelter, recovering 50% of the deposit and exposing a profile view. After this, the remaining cultural deposit will be recovered. Data recovery will be completed with a grid of shovel probes excavated to test and recover data from the deposit as described in **Sampling**.

Site 1125

This site is another boulder outcrop, this time with just one small overhang.

Data recovery will begin with a map. Next, a controlled excavation unit will be placed halfway across the overhang shelter, recovering 50% of the deposit and exposing a profile view. After this, the remaining cultural deposit will be recovered. Data recovery will be completed with a grid of shovel probes excavated to test and recover data from the deposit as described in **Sampling**.

Uncertainty about the exact location of this site relative to the proposed subdivision boundary remains at the time of writing, and it may be that Site 1125 is within the Shoreline Conservation Zone, in which the site treatment will change to preservation.

Site 1130

This site consists of five small enclosures built around a concentration of larger boulders and interpreted as a planting area. Features 1-4 are a cluster of similarly sized enclosures at the north end of the concentration, and Feature 5 is alone, but twice the size of the others.

Because of their small size, juxtaposition, and similarity, the Feature 1-4 set will be considered as one focus of data recovery excavation. A 1.0 by 1.5 m unit will be centered on Feature 2, exposing the walls dividing Feature 2 from 1, 3, and 4. The unit will also expose the exterior walls of Features 1-3, and some of the soil outside of the features for comparison. By excavating all but one wall of this set of enclosures, this unit will address issues of relative chronology: Do the features appear to be contemporaneous, or were some added later? Do the interior divisions separating these features appear to have been made originally, or could this have once been a larger enclosure (like Feature 5) that was later subdivided? In addition to these questions, sediments, stratigraphy, and cultural materials will be used to critically evaluate the existing interpretation of these features as planting areas.

Feature 5 will be excavated with a minimum 1.0 by 1.0 m unit, exposing 67% or more of the internal area. Although the enclosure wall will be at least partially excavated, the issues of relative chronology will not be pertinent to this enclosure, and the research focus will instead be on using data to evaluate the interpretation.

Following the controlled excavation units, a grid of shovel probes will be excavated to establish whether a cultural deposit is present, and if so, recover data from the deposit as described in **Sampling**.

There were no indications during the inventory survey that Site B5-90 went beyond the boulder concentration. Shovel probes may be used to test for deposits outside of features 1-5 should the known features yield assemblages indicating activity beyond agriculture, or if a field check turns up evidence of additional features or deposits.

Site 1131

This site consists of a single utilized overhang shelter, outside of which is a short section of stacked stone wall.

Data recovery will begin with a map, followed by controlled excavation of half of the shelter interior. After the resulting profile is recorded, any remaining cultural deposit within the shelter will be excavated. Depending on the content and extent of the deposit, either a trench or another controlled unit will extend to the southwest through the stacked wall, so that its foundation can be exposed in cross section. Finally, a grid of shovel probes will be excavated to test for and recover data from the deposit as described in **Sampling**.

Site 1132

Although this is another small overhang shelter associated with a natural outcrop, the quantity of midden and lithics is greater than at others, and the inventory reported that a fire pit was present.

Data recovery will begin with a map, followed by controlled excavation of half of the fire pit; after recording the resulting profile, any remaining cultural fill will be excavated. It is anticipated that a 1.0 by 1.0 m unit will provide complete coverage. Depending on the contents and density of any cultural deposit outside of the pit, controlled excavation will extend outward from the first unit, probably adding another two or three square meters of excavation. The outer boundaries of the deposit will be established using a grid of shovel probes (and possibly additional controlled excavation) as described in **Sampling**.

Site 1134

This is another rock overhang shelter used for temporary habitation, and an additional modification in the form of a short alignment of stones just outside the overhang. Basalt flakes and midden are present.

Data recovery will begin with a detailed map. Subsurface data recovery will begin with a 1.0 by 1.5 m excavation bounded by the back of the shelter on the east and extending through the alignment on the north reveal the stratigraphic associations of the alignment and the cultural deposit. This will also recover nearly 100% of the overhang interior as well as some of the exterior; if warranted by the contents and extent of the subsurface deposit, additional 1.0 by 1.0 m units will be excavated to the south and west. The next step would be to dig shovel probes on a grid to determine the total extent of the subsurface deposit and recover data as described in **Sampling**.

Site 1136

This site is a 1 m section of stacked stone wall, with no other features or cultural remains visible.

Data recovery will consist of a single trench through the wall, revealing a cross section profile and testing for the presence of a buried cultural deposit. If no deposit is present, data recovery will end, but if one if found, a grid of probes as described in **Sampling** will be used to determine its extent and recover data.

Uncertainty about the exact location of this site relative to the proposed subdivision boundary remains at the time of writing, and it may be that Site 1136 is within the Shoreline Conservation Zone, in which the site treatment will change to preservation.

Site 1141

Because this site consists of just two boulders with cobble stacking on top and a seemingly natural, unutilized shelter beneath, data recovery will focus on surface attributes. A more detailed map will be produced, and the area will be resurveyed to determine if other similar features are present, indicating a traditional trail. Shovel probes will be excavated on a grid to determine if there is a buried cultural deposit, and if so, recovery will proceed according to the procedures for deposits described in **Sampling**.

Site 1145

This site is another boulder outcrop with a small overhang shelter beneath. Atop one boulder is a small lithic scatter.

Data recovery will begin with a map, followed by excavation of shovel probes along a grid according to the procedures for deposits described in **Sampling**. The grid will also serve for surface collection of the lithics on top of the boulder. A single controlled excavation unit will be placed halfway across the shelter to determine whether there is a cultural deposit within and expose a profile. If cultural materials are present, the excavation will be extended to recover additional data; the total area of these excavations is expected to be between 1.0 and 2.0 m^2.

MONITORING PLAN

This monitoring plan is art of an overall mitigation plan for parcels covering much of southwest Moloka'i (See Figure I-1) The proposed Lā'au subdivision will involve grading and other ground-breaking activities that have the potential to disturb cultural deposits. In the Data Recovery Plan, treatments were recommended for sites within the area of potential impact that cannot be avoided. This plan puts forth actions pertaining to areas that have no known sites, but have a likelihood of inadvertent discoveries of cultural deposits or buried features. Monitoring is a way to evaluate and potentially mitigate any significant sites discovered during development. Monitoring intended to maintain protective buffers and avoid damage to known sites has been described under protective measures for preservation sites in the preceding Preservation Plan. At the conclusion of monitoring, a Monitoring Report will be submitted for SHPD review.

Methode

Prior to construction commencing, the archaeologist will meet with field personnel and the project manager to clarify the monitor's role and responsibility. As the person present on site responsible for maintaining the integrity of protected areas and to evaluate (and if necessary, mitigate) new discoveries, the archaeological monitor will have the authority to call temporary work stoppages in specified areas. He will also serve as a liaison with SHPD and/or the Burial Council if they need to be consulted.

Should construction activities involve simultaneous ground disturbance in multiple areas having sediments with the potential to contain cultural deposits or features, additional monitors will be brought on site. It is the client's responsibility to notify the primary monitor (designated by the consulting archaeologist) with enough lead-time to bring in additional monitors.

Monitoring means that an archaeologist will be present during all construction activity in areas with potential to have sites to observe ground disturbing activity, in case of any inadvertent discoveries of cultural materials. If intact cultural deposits or buried features are inadvertently discovered, work will stop there while the monitor evaluates them. The archaeological monitor has the authority to propose mitigation measures, including data recovery excavation, site recording, or preservation and avoidance. The SHPD will be called upon discovery of significant sites, and will review site records, significance evaluations, and treatment recommendations.

The monitor will examine excavated sediments, as well as the profiles and bases of excavated and graded areas. The excavated volume will be sorted through as much as possible by hand, with trowels and shovels, and (where known deposits are being impacted, or the likelihood for undiscovered deposits is particularly high) sifted through one-quarter inch screens. Previous excavations in southwest Moloka'i this far from the coast have yielded mostly lithic artifacts and occasional shell, which does not require smaller mesh.

Mitigation excavations will consist of controlled hand digging by natural and cultural layers, with screening of all matrix through 1/4 inch mesh, until the culturally sterile subsoil had been excavated at least 10 cm. In settings where apparently sterile sediment could have been deposited over a buried cultural deposit or surface horizon, a shovel probe will be dug as deep as is required to demonstrate that deeper cultural deposits are not present. The total area of

excavation will be determined by the size of the buried feature or deposit. Because such excavation will constitute the final chance for controlled data recovery, large samples will be preferred, but excavation need not be done for 100% of all deposits, and the upper threshold will be determined in terms of the usefulness or redundancy of data.

Should human remains be encountered, construction in the vicinity will be stopped while the SHPD Burials Program and the Moloka'i Island Burial Council are notified and consulted. The preferred treatment for burials will be to preserve them in place and divert development around them. It is not likely that burials will be encountered during this project, but if they are, the general Burial Treatment Plan will be amended to reflect the specifics of each case.

Monitoring will occur where there is a reasonable possibility of finding previously unrecorded cultural deposits. Generally, this kind of area is either near a known site, or is in an area with relatively deep, intact sediments that could cover an archaeological deposit. For the road corridor, such sediments are most likely in the alluvial fan of Kamāka'ipō, and on some of the spurs extending *makai* of the main road. It is unlikely that coastal sand will be encountered, and instead the deeper sediments consist primarily of re-deposited silt and clay loams. Areas where erosion has stripped away upper sediments to bedrock or clay subsoil will not be monitored. In some cases, monitoring zones will also be determined by the landform, such as the interior or margins of a gulch or the level areas below and above slopes, all of which have yielded archaeological sites in Kaluako'i and could reasonably be expected to have cultural remains. Finally, monitoring will occur on any activity within the large buffer of the Kamāka'ipō preserve. All areas monitored will be marked clearly on maps in the Monitoring Report.

BURIAL TREATMENT PLAN

Within the project area are several sites with known or suspected burial features. These will be preserved in place, as described previously in the **Preservation Plan**. This Burial Treatment Plan does not propose specific actions on a feature by feature basis, since the plan is to avoid all burials and possible burials.

Prior to any construction, the SHPD Burials Program will be consulted to determine if any individuals or groups have registered as lineal or cultural descendants with a bona fide interest in southwest Kaluako'i burials. Construction will be planned to avoid any burials or suspected burials recorded in previous studies and during the supplemental road corridor survey. Therefore, it is very unlikely that any burials will be disturbed, but awareness of descendants will help resolve any issues that arise in a timely manner.

Should it prove extremely difficult to plan around a *possible* burial, then (as a last resort) that feature may be tested to determine its actual function. If it is in fact a human burial, then it will be covered, and preserved in place. Human remains encountered during such a test will not be removed, photographed, or collected. If testing does not encounter human remains, the feature will be subject to data recovery according to the procedures and standards described in the **Data Recovery Plan**.

If, during the course of the project, and human burials are inadvertently discovered, work in the vicinity will be halted while the archaeologist determines if they are likely to have been in place for more than 50 years. If not, the matter comes under the jurisdiction of local police, who will be notified. If so, then any registered descendants, the Moloka'i Island Burial Council, and the SHPD Burials Program will be consulted. The preferred treatment will be to leave any burials in the location they were found, and avoid any further disturbance.

Lineal or cultural descendants who have registered their interest with SHPD have a right to visit known burials, and future landowners will be notified by the current landowners that human burials in Hawai'i are held in public trust, and are not their property. It will be up to landowners and descendants to arrange for access as the need arises.

The following is a list of burials and possible burials. Features were designated as burials due to their form (generally mounds and small platforms), their size (between 1 and 3 meters in length), and their location relative to other features (burials often occur in and near habitations, and in the *mauka* land behind settlements). The interpretations are fairly certain; test excavation is not considered necessary for management purposes. Possible burials, on the other hand, may have matched only one of these criteria, or simply lacked an obvious alternative interpretation. Undoubtedly, some possible burials do contain human remains, but others may be agricultural clearing mounds or other types of features. Although this project will err on the side of caution by avoiding possible burials, it is important for future students of the cultural landscape, for landowners, and for cultural descendants to understand the distinction. Possible burials, for example, do not enjoy the same public trust status that actual burials do. Rather than conduct test excavations, which in the case of an actual burial would cause a temporary exposure of human remains, the landowner has chosen the more culturally sensitive option of avoidance.

Table B-1. Burials and Possible Burials, by Site

Site Number	Burial	Possible Burial
50		X
54	X	
56	X	
520		X
648		X
649		X
669	X	
671	X	
674	X	
681	X	
682	X	
739		X
741		X
764		X
1102		X
1107	X	
1143		X
1144		X
1147		X
1150		X
1152		X
1154		X
1155		X
1160		X
1167		X
1170		X
1171		X
1174		X
1176		X
1761	X	

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Revised Southwest Kaluako'i Mitigation Plan: Reference and Appendix

APPENDIX A

Sample Text For Signs

Example A: Buffer Marker

This is a traditional site built and used centuries ago by Hawaiians. Please help preserve this place by staying on marked trails and by not moving rocks. Damage to sites is punishable under Hawai'i law (Chapter 6E-11). Take with you memories and photos, but please remove no objects from this site. Aloha

Example B: Interpretive Sign

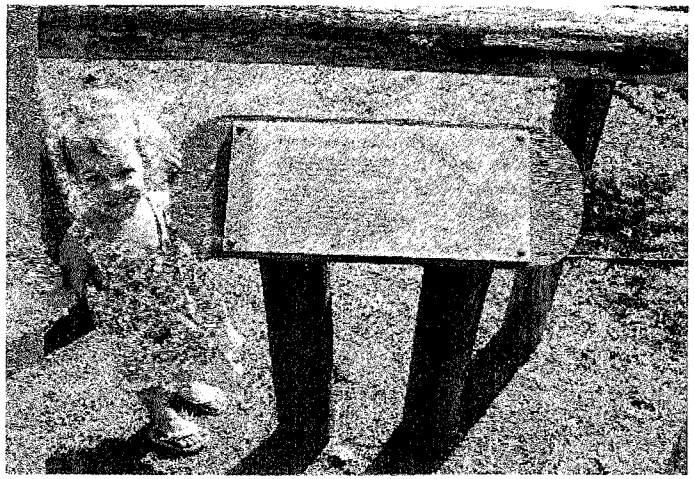
SITE 656 – STONE TOOL QUARRY

By about 1400 AD, Hawaiians often ventured inland from their coastal settlements to quarry dense-grained basalt that was used to make adzes and other tools. This became so common that the name of the land district in west Moloka'i came to be "Kaluako'i" meaning "the adze pit."

Hawaiians used other stones to strike this fine basalt, chipping away flakes until the rough shape of an adze emerged. Some of this work occurred here, where workers would camp. Polished adzes are uncommon here, but are more so at the coast, leading archaeologists to believe that final stages of manufacture occurred at the more permanent settlements by the ocean.

[Illustration showing hammerstone and adze preform, and perhaps map of quarry location.]

Example C: Photo of Kaupoa Sign and Fencing



Appendix F

Cultural Impact Assessment

Cultural Impact Assessment for the



Kamāka'ipō Gulch meets the ocean between Kaupoa and Lā'au Point in West Moloka'i.

Lā'au Point Rural-Residential Development

Kaluako'i, Island of Moloka'i

of Moloka'i Properties Limited dba Moloka'i Ranch

November 15, 2006

by
Davianna Pōmaika'i McGregor, PhD

Professor, Ethnic Studies Department
University of Hawai'i, Manoa

assisted by
Sean McNamara

Dept. of Urban & Regional
Planning, UH Manoa

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Regarding Hawaiian orthography, the 'okina is marked by a single quotation mark (') and the kahako is marked by an "underline" above the letter (_) in the narrative and informant quotations. Quotes from documents preserve the original spelling.

Contribution

Dr. Davianna Pōmaika'i McGregor has conducted this cultural impact assessment on a pro bono basis so that the fee she would have received can be contributed to the Moloka'i Land Trust to support its mission which is:

> *To protect and restore the land, natural and cultural resources of Moloka'i, and to perpetuate the unique Native Hawaiian traditions and character of the island for the benefit of the future generations of all Moloka'i, particularly Native Hawaiians.*

Qualifications and Role

The primary author, Davianna Pomaika'i McGregor is a Professor of Ethnic Studies at the University of Hawai'i Manoa. Her ongoing research endeavors have focused on documenting the persistence of traditional Hawaiian cultural customs, beliefs, and practices in rural Hawaiian communities including Moloka'i, Puna, Ka'u, Ke'anae-Wailuanui, and Waiahole-Waikane. The findings yielded from her ongoing research endeavors are published in a forthcoming book by UH Press, Kua'aina: Living Hawaiian Culture.

Dr. McGregor is a part-time resident of Ho'olehua, Moloka'i. In 1993 she helped to conduct the Moloka'i Subsistence Study which was completed in 1994. In 1998, she helped write the community grant which received funding for the Moloka'i Enterprise Community. In 1998, she served as an expert witness on behalf of the subsistence practitioners in the Wai Ola Water case. In 2004-2005, she participated in the culture and land use committees which helped develop the Community-Based Master Land Use Plan for Moloka'i Ranch. In 2006 she completed a community-based responsible tourism plan for the Ke Aupuni Lokahi-Moloka'i Enterprise Community and cultural impact assessments for The Nature Conservancy preserves at Kamakou and Mo'omomi on the island of Moloka'i. In 2006 she also helped incorporate the Moloka'i Land Trust and currently serves as a member of its Board of Directors.

In 1993, Dr. McGregor, together with Dr. Jon Matsuoka of the UH-Manoa School of Social Work and and Dr. Luciano Minerbi ofthe Department of Urban and Regional Planning, conducted the "Native Hawaiian Ethnographic Study for the Hawai'i Geothermal Project Envirionmental Impact Study" which serves as the template for cultural impact studies for Hawai'i.

Sean McNamara, has a Master of Arts degree from the UH-Manoa Department of Urban and Regional Planning and is currently a doctoral student in that department. In Spring 2005 he helped research and write the Papohaku Dunes Cultural and Natural Resource Preservation Plan, Kaluako'i, Moloka'i, Hawai'i as one of eleven students in a planning practicum taught by Professor Luciano Minerbi. Sean researched ethnographic documents and oral history sources for the Kaluako'i ahupua'a and wrote the ethnographic section of this report. He also reviewed the Waiola Case testimonies and developed the subsistence flow chart to illustrate the information provided in those testimonies.

Mahalo Nui Loa To:

KAL-EC Project #47 members for their critical and exhaustive work on the Community-Based Master Land Use Plan for Moloka'i Ranch which I used as a foundation for this cultural assessment report.

Ke Aupuni Lokahi Moloka'i Enterprise Community executive director Abbey Meyer and the staff for community outreach support.

Moloka'i Land Trust for their dedication and courage and the support the offered with community outreach.

Office of Hawaiian Affairs Trustee Colette Y. Machado and staff members Irene Kaahanui and Halona Kaopuiki for community outreach and co-sponsorship of the community meetings to ensure input from the Native Hawaiian community.

Peter Nicholas, Harold Edwards and John Sabas of Moloka'i Properties Limited for their assistance with community outreach.

Professor Luciano Minerbi of the UH Manoa Department of Urban and Regional Planning for assistance in the design of the report, the consideration of alternatives to La'au and permission to include ethnographic information gathered by graduate students in his planning practicum for the Papohaku Dunes Cultural and Natural Resource Preservation Plan, Kaluako'i, Moloka'i, Hawai'i Study.

Note takers for the community meetings - Loretta Sherwood, Sean McNamara, Blake La Benz.

Summary Cultural Assessment

This Cultural Impact Assessment Report has been prepared as part of the Environmental Impact Statement (EIS) for the proposed La'au Point Development in compliance with Chapter 343, Hawai'i Revised Statutes and Title 11, Department of Health, Chapter 200, Environmental Impact Rules, State of Hawai'i.

This report has especially been designed to fulfill the mandate to the Land Use Commission from the Hawai'i State Supreme Court in its ruling, Ka Pa'akai O Ka 'Aina v. Land use Commission, State of Hawai'i / 94 Haw. 31 (2000). The specific section of the ruling that served to guide the development of the report is as follows:

> "In order for the rights of native Hawaiians to be meaningfully preserved and protected, an appropriate analytical framework for enforcement is needed. Such an analytical framework must endeavor to accommodate the competing interests of protecting native Hawaiian culture and rights on the one hand, and economic development and security, on the other . . .
>
> In order to fulfill its duty to preserve and protect customary and traditional native Hawaiian rights to the extent feasible, the LUC, in its review of a petition for reclassification of district boundaries, must – at a minimum – make specific findings and conclusions as to the following: (1) the identity and scope of 'valued cultural, historical, or natural resources' n27 in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area; (2) the extent to which those resources, including traditional and customary native Hawaiian rights will be affected or impaired by the proposed action; and (3) the feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian rights if they are found to exist. n28

This summary, addresses the three key findings required of the Land Use Commission and government agencies empowered to make decisions affecting land use in Hawai'i under the ruling of the Hawai'i State Supreme Court in its ruling in Ka Pa'akai O Ka 'Aina in 2000.

Valued Cultural, Historical or Natural Resources and Traditional and Customary Native Hawaiian Rights Exercised in the Petition Area

The La'au Subdivision Archaeological Preservation and Mitigation Plan prepared by Cultural Landscapes in May 2006 documents valued cultural and historical resources in the petition area. This report focuses on valued natural resources utilized for cultural, subsistence and spiritual purposes.

A large part of the significance of the La'au Point area is that it is raw and untouched. It is so isolated that most of the residents of Moloka'i have never even been there and have no direct experience with the place. This factor gives La'au an almost mythical quality. La'au Point has become an icon of what Moloka'i represents - a rural stronghold and reserve of Native Hawaiian culture, a cultural kipuka. If Moloka'i is "The Last Hawaiian Island" then La'au is one of the last untouched Native Hawaiian places on "The Last Hawaiian Island."

In Hawaiian tradition, La'au Point represents a point of no return. For those traveling by canoe from O'ahu to Moloka'i across the Kaiwi Channel, once La'au Point is sighted, there is not turning back to O'ahu. This concept has been applied to the issue of the development of the La'au Point Rural-Residential Subdivision. Many Moloka'i residents feel that if the west and south shores adjacent to La'au Point are developed, as proposed, that this will open up Moloka'i to new residents unfamiliar with the culture and way of life on Moloka'i and lead to irreversible cultural change.

Everyone interviewed and those who came to community meetings had reservations about the proposed development. No one was an enthusiastic advocate, many were reluctant supporters and those most vocal were opposed to the development.

The Maunaloa kupuna and larger community and longtime employees of Moloka'i Ranch have the most direct and longtime experience with the area proposed for development. What is striking is that while they are very concerned and reluctant about the development, they are also willing to acknowledge and support the right and the need of the Ranch to seek the development. They feel that the negative impacts could be managed if the development would conform to the strict covenants, conditions and restrictions outlined in the Community-Based Master Land Use Plan for Moloka'i Ranch. They are confident that their community can work together with the project's resource managers to provide stewardship over the marine resources that they rely upon for subsistence. They also felt that the negative impacts would be offset with the gifting of important legacy lands to the community.

In addition, many longtime adversaries of Moloka'i Ranch engaged in the development of the Community-Based Master Land Use Plan for Moloka'i Ranch, which includes the proposed La'au development, over the course of two and a half years throughout countless community meetings, long hours of impassioned debate, critical thinking and soul searching. For them it was a process of negotiating a lasting settlement of a thirty year struggle with Moloka'i Ranch over extravagant development schemes and the extractive use of millions gallons of the island's precious and limited water resource. The proposed La'au development was difficult for them to accept and at that point some withdrew their support. However the majority of the planning group persisted in their support for the overall Community-Based Master Land Use Plan as a reasonable and balanced approach that empowers the community to manage premier Native Hawaiian legacy lands, control population growth and land speculation and monitor the one last major development on Moloka'i Ranch lands. Moreover, the plan revolves around the management of natural resources for subsistence, cultural and spiritual purposes.

Participants in community meetings and the key informants speak of the south and west coasts adjoining La'au point and its nearshore waters as reserve of marine resources which serve as their "icebox." It is a place where fishermen usually go to get fish, 'opihi and crab for parties and gatherings of their large extended families.

The southwest shore also factors into the life cycle of the mullet, serving as a hatchery area from which they move east to Mana'e or East Moloka'i.

Along the south shore, informants identified the various fishing and gathering areas by points that they referred to as first point (Kanalukaha), second point (Kapukuwahine), third point (Kahalepohaku) and fourth point ('Opihi Road). The south shore is best known for moi, aholehole, 'a'ama crab and 'opihi. The 'opihi starts at Kapukuwahine on the south shore and out on the cliffs along what they refer to as 'Opihi road. The west shore is best known for moi, aholehole and lobster. Due to the seasonal ocean swells, the south shore is usually harvested in the winter time when there are north swells and the west shore is usually harvested in the summer time when there are south swells. They also speak of the ocean as being very treacherous and not safe for swimming. Off of La'au Point itself, informants spoke of a very strong current which has swept even the best divers out to the open ocean.

Traditionally, it is not a place that was fished on a regular basis because it is isolated and difficult to reach. However, the increased use of boats on Moloka'i and O'ahu has changed this. Informants noted that the resources have declined in the area with heavy seasonal harvesting by boaters from O'ahu and the opening of Hale O Lono harbor and Kaluako'i as closer launching points for Moloka'i boaters.

In addition to natural resources utilized for subsistence, informants spoke of other natural resources which have cultural significance such as native plants, native species of turtles and monk seals, and the simple unspoiled natural beauty of the undeveloped seascape.

The Lā'au area is generally regarded as a special place of spiritual mana and power. Community participants and key informants spoke of specific burials, fishing ko'a, and heiau. Such specific sites are documented and described in the La'au Subdivision Archaeological Preservation and Mitigation Plan by Cultural Landscapes that is part of this EIS.

The overall spiritual quality of the Lā'au area as a wahi pana and wahi kapu cannot be quantified and deserves recognition and respect.

Informants identified the following coastal cultural and subsistence resources in the proposed development area.

Coastal Cultural and Subsistence Resources

x	streams	x	ponds
____	'auwai (taro irrigation ditches)	____	lo'i kalo
x	springs	x	caves
x	trails	x	wahi pana (named places)
x	sacred places	____	dunes
x	landings	____	bridges
x	surfing sites	x	sandy beach
x	fishing area	x	fishpond
x	fish trap	x	fish house
x	hunting areas	x	kilo i'a (fish sighting)
x	muliwai (brackish pond)	x	anchialine pond
x	trails	x	salt ponds
x	wells	x	turtle nesting area
x	historic walls	x	basalt veins for tools
____	alae vein	x	salt pans
x	shrines	x	salt gathering areas
x	ko'a (fishing shrines)	x	heiau (temples)
x	historic sites	x	cultural use areas
x	ho'ailona (natural signs)	x	sighting place
____	lele (cliff jumping spots)	x	native plants
x	pu'uhonua (places of refuge)	____	holua slides
____	cultivation area	____	leina (jumping off point
x	archaeological sites	for souls to cross over)	
x	burials	x	kupe'e
____	o'opu	____	hihiwai/wi
x	aholehole	x	'anae
____	steam bath areas	x	bathing pools
x	limu gathering areas	x	lava tubes
x	subterranean water course	x	petroglyphs
x	kapu kai/hi'u wai areas	x	paddling areas
x	artifacts	x	view plane
x	seasonal residential sites	x	burial markers
x	water caves	x	birthing stones
____	phallic stones	x	Pohaku Kane
x	coral reef	____	estuary
x	spawning grounds	x	house sites
x	po kane routes (night marchers	____	dams
x	'aumakua (ancestral deities) domain		

They added the following additional resources:

monk seals, water catchments, bell stones, ahu stones, Hawaiian moth, chamomile type flower for clearing liver, shells on shore.

Extent to which Valued Resources and Traditional and Customary Native Hawaiian Rights will be Affected or Impaired by the Proposed Action

Participants in the community meetings expressed concern that the proposed development will change the demographics of Moloka'i forever. They believe that La'au will contribute to the increase of land values and prices and property taxes on Moloka'i.

The community expressed concern that 200 new millionaires will change the make up of the Moloka'i community and lead to changes in the Hawaiian way of life. With more outsiders, Moloka'i will no longer be "The Last Hawaiian Island." The proposed development will bring in new residents unfamiliar with the culture and way of life on Moloka'i and lead to irreversible cultural change.

The community doesn't want Moloka'i to turn into Maui or O'ahu with a large population off-island people. They expressed regret that if the development occurs, La'au will never be the same.

In balance, the Maunaloa kupuna shared that no matter what happens, the population will increase and the land will be limited. While Moloka'i has been preserved it is gradually being developed. They acknowledged that progress cannot be stopped but that it can be controlled. The Maunaloa kupuna felt that the overall community plan of which La'au is a part provides for the community to manage and monitor the proposed development.

Access and Trails

Community members were concerned that the subdivision might be a gated community, and were relieved that this is not part of the plan.

Native Hawaiians and the general public will have access from two points - one on the south shore at the southeast entry and one on the west shore at the northwest entry. In the process to develop the Community-Based Master Land Use Plan for Moloka'i Ranch, subsistence fishers and gatherers were very concerned that opening up the south and west shores to public access at every 1500 feet as the County of Maui provides will deplete the marine resources. They regretted that the opening of Hale O Lono harbor to public access had severely decreased the marine resources there and they do not want to see that happen in the area proposed for development. Opening up access points every 1500 feet would have a severe impact on the subsistence resources along the west and south coasts adjacent to La'au Point.

Community members were concerned that subdivision lot owners and their friends will have preferential access to the coast. There will be nothing to stop the home owners from going down to the beach. Those who live on the shoreline will be able to access their home and the beach by vehicle. Homeowners can create a trail to the beach and let their friends have access to the beach. Affording only two access points for the general public, while the rich people in the subdivisions will have access from their homes seems unequal. Informants also expressed concern that landowners might call police if they see the general public walking on the beach, as this has happened at Papohaku.

Participants in community meetings and informants felt it was important to provide emergency access through the subdivision to the shoreline for emergencies. They were also concerned that access should be afforded for kupuna and persons with special needs. Some pointed out that the areas closest to the access points will be heavily impacted, while spreading out the access points might spread out the impact. It was also noted that the road down to Hale O Lono harbor would need to be maintained in order to keep access to the area open.

Subsistence Fishing and Gathering

Informants feel that the development will spoil the experience of fishing in what is now an isolated, pristine and spiritual area. They are concerned that instead of La'au being a place to get food, it will be a place with haole in their back yards. Many informants felt that the proposed development will greatly hinder, if not abolish altogether, ongoing traditional gathering activities currently enjoyed by Moloka'i islanders at La'au. Fishermen will lack privacy if the development goes through. Yet, throw net subsistence fishers require an undisturbed beach that allows fish to forage closer inshore in order to succeed. Gatherers of 'a'ama crabs require dark silent nights to ensnare their nocturnal prey. Commotion emanating from noisy and brightly lit beach homes will negatively impact crabbers' efforts to capture their already skittish prey. Gatherers of limu and pupu will very likely be met with kayakers in the water, people sunbathing on the beach, and pet animals running up and down the shoreline. If experiences elsewhere in Hawai'i hold true, it is not likely that owners of multi-million dollar beach homes will greet shoreline subsistence gatherers with open arms. It is more probable that subsistence practitioners will be confronted by insensitive newcomers intolerable of extractive activities in what they will perceive to be their front yards.

While the new landowners will probably want to go out and fish when they see the lobsters in the area, most informants felt that the new residents will probably not directly damage the fishing grounds because they don't know how to fish. The real impact on the fishing resources is from the Honolulu boaters. When the outboard motor and twin outboards came out at an affordable prices, the Honolulu boats came fishing all along the west end and south shore. These fishermen have taken everything, even the eggs. The lobster area is wiped out. The Moloka'i residents fish for the family and perhaps get an extra cooler of fish to sell. The outside commercial fishermen fish out the grounds of lobster and fish. They do not plan for the future.

Community participants and key informants were concerned that pesticides and fertilizers will contaminate the ocean and kill the marine resources. Fertilizer run off will kill the small organisms that support all of the marine life offshore. Runoff from the development will contaminate the ocean. Grading can increase erosion which will result in sediment flowing into the ocean and destroy marine resources. Some informants from the East End felt that the development would impact the mullet run and thus impact the resources on their end of the island. However, longtime fishermen who have regularly fished the south shore as members of Ranch families noted that the mullet spawn at Hale O Lono, Halena and Kolo, rather than close to La'au. Hale O Lono is on the eastern border of the project area. Halena and Kolo are outside of the project area.

Community members wanted to be assured that the rules outlined for access and for subsistence and gathering cannot be changed by the subdivision lot owners. MPL clarified that the lot owners will be required to uphold the Covenants, Conditions and Restrictions (CC&Rs) that include these rules as part of the homeowner contract.

Providing parking areas at either end of the proposed project area and limiting access along the shoreline to foot access will open up access sufficiently that it might impact the resources, as the entry points will be closer for those who now walk and must either enter from Hale O Lono or Dixie Maru. The conservation rules might affect fishing, but if the access is easier there will be more fishing.

Subsistence Hunting

Hunters are concerned that the new landowners from outside of rural Moloka'i will not want to hear shooting and may be protective of the deer and oppose even bow hunting. Deer hunting could become an animal rights issue. Bullets can travel 4 miles and 10 year kids can get a license. Need to have a sufficient buffer zone. It will only take one accident to close down hunting in the area. The overall hunting area will be reduced by the no hunting zone in the subdivision and buffer zone and the safety zone.

The plan to put in a deer fence and remove deer within the proposed subdivision will effectively close off hunting in the southwest corner of Moloka'i. It will have to be a very high fence. The deer will keep going back. The deer will get hurt.

Cultural Resources and Practices

Informants are concerned that cultural sites will be destroyed once start to bulldoze and grade and clear the land for development. At Papohaku, homeowners have graded and damaged dune system and destroyed cultural sites and burials located in the dunes. They have extended their household area into the conservation zone, treated it like their own private property and tried to exclude Moloka'i residents from the public beach area fronting their homes. The same process can occur in the proposed subdivision.

Informants expressed concern that future generations may not have a concept of how to do subsistence and only going to catch what can be carried. Future generations should be

able to be in an environment where it's just them and mother nature. They should know what it feels like.

Concern was expressed about the impact of the proposed development on the monk seals who frequent the remote beaches of the west and south shores. Monk seals might be disturbed during the grading and construction phase. New residents may have dogs who would disturb the monk seals.

Many of the informants commented that the development will require a lot of expensive landscaping because the land is rough and rocky with a lot of boulders.

Spiritual Resources and Practices

Can destroy ko'a fishing shrines and cultural sites, unless monitored. Informants are also concerned that once the grading starts there will be erosion when it rains and the mud will cover the ko'a, the sand and the reef.

Can disturb iwi kupuna burials unless monitored.

The overall general concern is that the development of the area will destroy the special quality of La'au as a special place of spiritual mana and power.

Feasible Action by the LUC to Reasonably Protect Native Hawaiian Rights

The Community-Based Master Land Use Plan for Moloka'i Ranch provides measures to mitigate the overall impacts of the proposed development at La'au which set unique precedents for the development of large landholdings by offshore corporations. These precedents are related to community planning, the creation of a land trust for the community, the donation of legacy lands to the land trust, the donation of easements to the land trust, the protection of subsistence fishing, gathering and hunting, reserving lands for community housing, and the creation of economic opportunities for the community through the re-opening of the Kaluako'i Hotel. The plan also provides for covenants, conditions and restrictions that landowners in the La'au Point rural residential development will need to accept and agree to uphold in order to purchase a lot.

The Land Use Commission can review the Community-Based Master Land Use Plan for Moloka'i Ranch, especially the Covenants, Conditions and Restrictions (CC & Rs). The Commission can endorse the guidelines and CC & Rs which provide mitigation of the identified impacts to the cultural and natural resources utilized for subsistence, cultural and spiritual practices and customs. The Land Use Commission can assist in the enforcement of the CC & Rs by making these part of the conditions of the rezoning of the lands from the agricultural to the rural classification.

La'au Point must be the most environmentally planned, designed and implemented large lot community in the State. The residents would be educated and informed about the environment and culture, and taught to "Malama 'aina," take care of the land and sea."

This statement precedes the covenant document determined by the Land Use Committee that will place many restrictions on lot owners at La'au Point, in order to attract only those who are concerned about conservation.

As an example, the Conservation Zone and other areas to be protected (approximately 1,200 acres) within the subdivision will be the subject of an easement held by the Land Trust, with guidelines for these uses to be determined prior to the construction of the subdivision and reflecting the importance of the area archaeologically and to subsistence gathering.

These protected lands will be part of an entity that is controlled equally by the homeowners and the Land Trust. All decisions relating to this area: maintenance, subsistence protection, archaeological site protection, personnel, etc., will be the shared responsibility between the Trust and the homeowners, who will share equally in the costs.

MPL will attempt to attract buyers to the La'au point subdivision who reflect the hopes and aspirations of the community. Brochures, sales material and other promotional documents will be vetted by the Land Trust or the EC for accuracy and adherence to their principles.

One of the unique features of the CC &Rs is the condition that every person whose name is on the property title must commit to undergo a certain amount of education about the Moloka'i community and its desires and aspirations with kupuna and the Maunaloa community.

Measures will be taken to assure that these CC & Rs cannot be changed in the future. These CC & Rs include the following:

- prevent a gated community
- restrict the further subdivision of lots
- restrict the area that can be disturbed for use
- prevent construction on slopes of more that 50%
- restrict building height
- require the use of alternative energy
- prohibit the use of pesticides
- require that exterior lighting be shielded from the ocean
- require water catchments and 5,000-gallon storage tanks
- restrict landscaping to native and Polynesian introduced species suitable for dry coastal locations
- prohibit the use of noxious or invasive species; require green architecture
- manages erosion with vegetative cover
- puts a deer fence at the rear of the subdivision

The covenants, Conditions and Restrictions that landowners will need to uphold are described on pages 101 - 105 of the Community-Based Land Use Plan for Moloka'i Ranch that is part of the EIS.

Additional Recommended Guidelines:
Informants recommend the following additional provisions to mitigate the impact of the development on subsistence practices:

- ***Fence to demarcate private property from public access area***

All of the informants felt that it is important to have a clear physical demarcation, such as a log fence, running along the individual property lines to distinguish between private property and the public access area. By putting in a fence of some kind the public will know the boundary so that they won't trespass. Another suggestion was to use a round wire fence, called a New Zealand fence.

- ***Location of Access Trail***

Informants suggested that there be a physical demarcation between the property line and the ocean, along which the trail would run. The trail would follow the contour, following the old traditional trail as much as possible. Then the existing kiawe would serve as a buffer between the trail and the sand and ocean. This can help reduce impact of the trail on the beach and ocean. The kiawe can be pruned. It is a nitrogen fixing plan and will help other plants to grow around it. The trail should be placed back from the ocean so that it won't wash out. The trail will only be for walking and not for atv's or even bicycles. The trail should not be paved but kept clear and maintained.

- ***Emergency access to shoreline through subdivision***

Access through the subdivision should be provided for emergency rescue

- ***Document Existing Trails and Roads***

Document and map existing trails and roads for access.

- ***Kupuna Access***

To accommodate kupuna and those with special needs, have a golf cart available to assist their access.

- ***Landscaping***

Need to prevent landowners from landscaping the area of the setback which ranges from 250 to 1,000 feet.

- ***Support for the Maunaloa Community***

Have monies generated go into the community to support the school. Include the Maunaloa 'Ohana I Lokahi Association needs to be involved in the decisions about La'au.

- ***Regulate Fertilizers***

The use of fertilizers will be regulated.

- ***Involve Maunaloa Community in Stewardship***

Longtime fishers and gatherers from the Maunaloa community will be involved in the monitoring and protection of the marine resources in the development area.

- ***Cultural Monitoring***

Provide onsite monitoring of sites and potential erosion areas during clearing, grading and construction. Should have the resource management plan up and running when the grading and constructions starts.

- ***Hunting***

Have the buyers accept that hunting occurs in the broader surrounding area.

- ***Kama'aina residents of the Maunaloa community have seniority***

The seniority for hunting in accordance with traditional subsistence should be for kama'aina residents of the Kaluako'i ahupua'a and MPL employees.

• ***Papohaku Preservation Plan***
Apply relevant recommendations from the Papohaku Dunes Cultural and Natural Resource Preservation Plan, Kaluako'i, Moloka'i, Hawai'i Study.

• ***Kamaka'ipo Buffer***
The buffer area for Kamaka'ipo Gulch may need to be expanded. Due to the potential for erosion during grading and construction, the houses close to Kamaka'ipo Gulch should be moved further away from the gulch.

• ***Monk Seals***
Provide education and enforce laws protecting monk seals

• **Community-Based Subsistence Fishing Management Area**
It is a good idea to establish the community-based subsistence fishing management area that was demonstrated in a pilot project at Mo'omomi. Should also coordinate efforts with the communities of Miloli'i, Hawai'i and Ha'ena, Kaua'i who are also establishing community-based fishing zones. Also respect the Kalaupapa people and their grounds. The rights of the Kalapana people to fish in the Volcano National Park is another model.

• ***Restock moi***
The Land Trust should use some of the money to restock moi if they diminish. Restocking should be part of the management plan.

Conclusion

The overall Community-Based Master Land Use Plan for Moloka'i Ranch is not a perfect plan because it requires the development of the relatively pristine south and west shorelines of Moloka'i adjacent to La'au Point. Nevertheless, it is truly a grassroots community plan which represents a historic good faith effort on the part of Moloka'i Properties Limited and Ke Aupuni Lokahi-Moloka'i Enterprise Community to create sustainable economic solutions that will protect the cultural integrity of a unique Hawaiian island community. This monumental effort deserves serious reflection, deliberation and endorsement.

Ke Aupuni Lokahi-Moloka'i Enterprise Community is the steward of a plan that was designed by a broad cross section of the Moloka'i community. From May through September 1998, a planning group of the Moloka'i community formed seven subcommittees on Health, Education, the Environment, the Economy, Recreation, Youth and Leadership, and Culture to develop a comprehensive grant proposal to the U.S. Department of Agriculture to receive designation as a Rural Economic Empowerment Zone. They sent out newsletters to every postal service customer on the island and held two well-attended community meetings to receive input on the grant proposal. The final proposal contained a statement of the community's vision for Moloka'i; a description of strengths and weaknesses in the island's economy and natural environment and a strategy for sustainable community economic development. Although the Moloka'i community was not designated as an Empowerment Zone, they succeeded in attaining the status of a Rural Enterprise Community eligible to receive federal funds totaling $2.5 million over ten years in increments of $250,000 a year to attract additional funds that would launch sustainable economic development projects. The Community-Based Master Land Use Plan for Moloka'i Ranch is Project #47 of the Ke Aupuni Lokahi-Moloka'i Enterprise Community.

Ke Aupuni Lokahi-Moloka'i Enterprise Community continues to be guided by its vision statement that also serves as the vision statement for the Community-Based Master Land Use Plan for Moloka'i Ranch. It is as follows:

> *Moloka'i is the last Hawaiian island. We who live here choose not to be strangers in our own land. The values of aloha 'aina and malama 'aina (love and care for the land) guide our stewardship of Moloka'i's natural resources, which nourish our families both physically and spiritually. We live by our kupuna's (elders') historic legacy of pule o'o (powerful prayer). We honor our island's Hawaiian cultural heritage, no matter what our ethnicity, and that culture is practiced in our everyday lives. Our true wealth is measured by the extent of our generosity.*
>
> *We envision strong 'ohana (families) who steadfastly preserve, protect and perpetuate these core Hawaiian values.*

We envision a wise and caring community that takes pride in its resourcefulness, self-sufficiency and resiliency, and is firmly in charge of Moloka'i's resources and destiny.

We envision a Moloka'i that leaves for its children a visible legacy: an island momona (abundant) with natural and cultural resources, people who kokua (help) and look after one another, and a community that strives to build an even better future on the pa'a (firm) foundation left to us by those whose iwi (bones) guard our land.

In the final analysis, the government agencies responsible for decisions about the future of the land and natural resources of Moloka'i must weigh the cultural impacts and benefits of the proposal to develop the west and south shorelines of the island of Moloka'i in consultation with the people of Moloka'i who depend upon these resources for subsistence, cultural and spiritual purposes. In particular, the kama'aina families who have lived in Maunaloa and the Kaluako'i ahupua'a for generations and the longtime employees of Moloka'i Ranch and their relatives have been the primary users of these resources and will be the most directly affected by the proposed development.

There is also the critical issue of Water. Is there enough water to provide for all of the island's major uses and yet allow this development to draw out 1,000,000 gpd of brackish water from Kakalahale? The Hawaiian homesteaders have a special claim and particular interest in this issue. MPL is actively working with all of the major managers and current users of the island's water resources to develop a solution.

There are clearly profound and unprecedented features in the overall Community-Based Master Land Use Plan for Moloka'i Ranch that will benefit future generations of the island as a whole. The gifting of fee title ownership of 26,200 acres to the Moloka'i Land Trust and dedication of 24,950 acres in conservation easements in perpetuity by Moloka'i Properties Limited (MPL) is clearly in the tradition of "Aloha Mai, Aloha Aku," "When aloha is given, aloha should be returned." Such an outstanding and magnanimous gesture deserves recognition as a model for offshore owners of Hawaiian lands on Moloka'i and other islands. Moreover, it is not just the quantity, but the quality of the lands that are being turned over that is significant. The ancient burial grounds of Kawa'aloa, the birthplace of the hula at Ka'ana and the Hula Piko at Maunaloa, the Makahiki grounds of Na'iwa, the fishing village of Kawakiu, the fishing grounds of Halena and Mokio are premier Native Hawaiian legacy lands of great significance to Native Hawaiians throughout the islands.

As with any groundbreaking work that is seeking to create innovative solutions to time worn problems, this plan takes risks. While the plan protects significant subsistence resources on the northeast shoreline of Moloka'i from Kalaupapa to 'Ilio Point and around to Kepuhi from development, the southwest shoreline from Kaupoa to Hale O Lono will be ringed by luxury residential homes. Extraordinary measures are incorporated into the plan to buffer and protect the subsistence and cultural resources from the negative impacts that such a development can generate.

These include:

- Upholding and assuring Native Hawaiian rights of access for cultural, subsistence and spiritual purposes.
- Creating sizeable conservation zones and buffer areas to protect the cultural sites and shoreline area.
- Ending commercial hunting so that Moloka'i kama'aina can legally engage in subsistence hunting on Ranch lands.
- Hiring two community cultural and natural resource managers who will work with the community to monitor every phase of the project, from clearing and grading, to construction and the moving in and residence of new homeowners.
- Orienting homeowners to appreciate and support the unique and special way of life on Moloka'i as the "Last Hawaiian Island."
- Limiting shoreline access to a foot trail.

Are these measures provided within the Community-Based Master Land Use Plan sufficient to protect these resources for future generations? The kupuna advise us that after all is said and done, it is La'au itself that will determine what will be acceptable and who will be accepted.

Section 1 Introduction: Proposed Development at La'au Point

1.1 Purpose

Moloka'i Properties Limited proposes to develop 200 two-acre rural-residential lots on the west and southwest shores of Moloka'i adjacent to La'au Point in the ahupua'a of Kaluako'i (portions of TMK (2)5-1-02:30). The total project area includes roads, infrastructure, an expansion of the State Conservation District, cultural and environmental preservation zones, and two beach parks on 1,492 acres of vacant land, although the actual area for which rezoning is being petitioned is 875 acres.

This Cultural Impact Assessment Report is being prepared as part of the Environmental Impact Statement (EIS) for the proposed La'au Point Development in compliance with Chapter 343, Hawai'i Revised Statutes and Title 11, Department of Health, Chapter 200, Environmental Impact Rules, State of Hawai'i.

This Cultural Impact Assessment Report is also designed to fulfill the mandate to the Land Use Commission from the Hawai'i State Supreme Court in its ruling, Ka Pa'akai O Ka 'Aina v. Land use Commission, State of Hawai'i / 94 Haw. 31 (2000). The specific section of the ruling that served to guide the development of the report is as follows:

> "In order for the rights of native Hawaiians to be meaningfully preserved and protected, an appropriate analytical framework for enforcement is needed. Such an analytical framework must endeavor to accommodate the competing interests of protecting native Hawaiian culture and rights on the one hand, and economic development and security, on the other . . .
>
> In order to fulfill its duty to preserve and protect customary and traditional native Hawaiian rights to the extent feasible, the LUC, in its review of a petition for reclassification of district boundaries, must – at a minimum – make specific findings and conclusions as to the following: (1) the identity and scope of 'valued cultural, historical, or natural resources' n27 in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area; (2) the extent to which those resources, including traditional and customary native Hawaiian rights will be affected or impaired by the proposed action; and (3) the feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian rights if they are found to exist. n28

In summary, the purpose of this Cultural Impact Assessment report is to:

> (1) document Native Hawaiian and Local subsistence, cultural and spiritual resources and practices that are located in the proposed development area;
>
> (2) assess the benefits and impacts of the planned development on the identified subsistence, cultural, and spiritual resources and practices; and
>
> (3) affirm and recommend strategies and actions that can mitigate these impacts in order to protect Native Hawaiian customs and practices.

In addition to Native Hawaiians, "Local" residents of Maunaloa and employees of Moloka'i Ranch are primary users of the natural and cultural resources in the proposed development area, for subsistence and cultural purposes. Community meetings and interviews were inclusive of both Native Hawaiians and "Locals." Moreover, Chapter 343 requires an assessment of the affects of a proposed development on cultural practices in general, not limited to Native Hawaiian cultural practices.

1.2 Scope of Work

1. Conduct an examination of historical documents, Land Commission awards and historic maps to identify traditional and customary Hawaiian and "Local" subsistence, cultural and spiritual resources and activities that exist, or may have existed in the area of the proposed development adjacent to La'au Point.

2. Conduct community meetings for the sharing of concerns about the impact of the proposed La'au development upon subsistence and cultural resources in the project area.

3. Identify primary persons who engage in subsistence activities in the area of the proposed La'au Point Development and interview them in order to gather knowledge about their historic and traditional subsistence practices there. Collect insights into the benefits and impacts of the planned management actions on the cultural practices and features identified. Identify and recommend mitigation ideas for any identified impacts.

4. Prepare a report documenting the results of the review of literature, maps, and historic documents, and the results of the interviews related to traditional practices and land use. The report will assess the benefits and impacts of the planned development on the cultural practices and features identified and affirm and recommend strategies and actions that can mitigate any identified impacts.

1.3 Summary of Proposed La'au Point Rural-Residential Development

Project Name:	La'au Point
Location:	Kaluako'i, Moloka'i
Judicial District:	Moloka'i
Landowner:	Moloka'i Properties Limited
Applicant:	Moloka'i Properties Limited
Tax Map Key:	(2) 5-1-02:30; 5-1-06; 5-1-08: 04, 03, 06, 07, 13, 14, 15, 21, and 25
Project Area:	Approximately 1,492 acres
SLUDBA Petition Area:	875 acres
Existing Uses:	Vacant
Proposed Use:	Single-family rural-residential lots, cultural preserves, trails, and public shoreline access.
Land Use Designations:	State Land Use: Agricultural and Conservation Conservation District Subzones: General and Limited Community Plan: Agricultural and Conservation County Zoning: Agricultural Special Management Area (SMA): within the SMA
Permits/Approvals Required:	Compliance with Chapter 343, Hawaii Revised Statutes Community Plan Amendment Special Management Area Use Permit State Land Use District Boundary Amendment Conservation District Use Permit Change in Zoning Grading/Building Permit NPDES permit
Accepting Authority:	State Land Use Commission

It should be noted that while the development is called La'au Point Rural-Residential Subdivision, that La'au Point itself, is not part of the development. It is not owned by Moloka'i Properties Limited but by the U.S. federal government which owns and manages a lighthouse for navigational safety within a 51 acre parcel.

1.4 Water Plan and Kakalahale Brackish Well

As noted above, the purpose of this Cultural Impact Assessment Report is to document subsistence and cultural resources and practices that may be impacted by the proposed La'au development. Many of the participants in the community meetings, especially the Ho'olehua Native Hawaiian Homesteaders, stated that the greatest cultural impact of the proposed La'au Point Development is the impact of the water plan on the future expansion of agriculture and residences on Hawaiian Homelands and on subsistence and cultural resources makai of the well. Many voiced opposition to the proposed development because of the proposal to draw out 1,000,000 gallons per day from the abandoned Kakalahale brackish water well.

This cultural impact assessment report also documents the cultural concerns about the Kakalahale Well. It includes concerns expressed in community meetings as well as findings about cultural impacts from the testimonies provided to the Hawai'i State Commission on Water Resource Management for the contested case hearing for the Waiola Well Water Use Permit Application. Since the Kakalahale well is located in the general vicinity of the proposed Waiola Well, in the Kamiloloa aquifer sector, the community and MPL agree that the testimonies about cultural impacts in that case would be relevant to the Kakalahale Well.

1.5 Community-Based Master Land Use Plan for Moloka'i Ranch

The larger context of the proposed La'au Point Development project is the Community-Based Master Land Use Plan for Moloka'i Ranch. Initiated in 2003 by the Ke Aupuni Lokahi Molokai Enterprise Community (KAL-EC) and MPL, this Land Use Plan, of which the La'au application is a key piece, was designed and will be implemented by the community of Moloka'i.

On one hand, the community faced the prospect of Molokai Ranch lands being split up and sold off and the potential loss of Moloka'i Ranch employee jobs with continuing deficits in Ranch operations. On the other hand, the Moloka'i community wanted to protect existing Ranch jobs, create new economic opportunities by re-opening the Kaluako'i Hotel, while at the same time conserve its rural way of life. These complementary interests, combined, made the urgency of agreeing to the La'au Point Development project of critical importance to both the local MPL staff and the KAL-EC.

The planning process, involving more than 1,000 Moloka'i residents, was unique, complicated and exhaustive. It sets an important precedent and model of community-based planning.

The La'au Point Development project is integral in the implementation of the Community-Based Master Land Use Plan for Moloka'i Ranch. In this report, the overall plan will be considered in the assessment of benefits, impacts and mitigation measures of the development project.

Section 2 Framework and Methodology

2.1 Framework For This Cultural Assessment

2.1.1 La'au Subdivision Archaeological Preservation and Mitigation Plan

The La'au Subdivision Archaeological Preservation and Mitigation Plan was prepared by Cultural Landscapes in May 2006. For this reason, this cultural impact assessment report will not address the cultural historical sites and features, but focus on the impacts of the proposed La'au development on subsistence and cultural resources and practices. The lead anthropologist in Cultural Landscapes is Maurice Major. Mr. Major has worked on Moloka'i since 1991. In addition to working on the archaeological inventory of La'au and writing the 2001-2002 archaeological plan for the area, he has worked in many parts of the ahupua'a of Kaluako'i and Pala'au. The following summary was prepared by Cultural Landscapes for distribution to the community in meetings held to receive input about the impacts of the proposed development on subsistence and cultural resources and practices.

"La'au Subdivision Archaeological Plan Summary:
The original version of this plan (*Kahaiawa to Hakina, Ahupua'a of Kaluako'i, Island of Moloka'i*, Major 2001) dealt with the former "Alpha USA" parcel (TMK 5- 1-2-030). Since then, changes in the project area and the size and location of proposed subdivision lots have necessitated some revisions. More fundamentally, the Ranch's decision to engage the community in master planning has resulted in a scaled-back development with a more conservation-oriented approach, and the proposed land trust, resource management staff, and cultural protection zones have required that the preservation and data recovery plans be augmented and revised. For the most part, the archaeological plans closely resemble the 2001 version, which was accepted by SHPD. Changes in the revised version include:

- Re-assignment of several Data Recovery sites to Preservation.
- Shift from defining buffers around individual or clustered sites to instead establishing a confined development corridor.
- Increased emphasis on active cultural resource management, anticipating as a neighbor a community land trust employing a cultural resource staff person.
- Recommendation to collect some data from preservation sites to provide a better baseline for monitoring and help expand our understanding of the chronology and nature of settlement in the area, and specifically to guide environmental restoration.

The archaeological plans for La'au include four sections that cover the various cultural resource needs that will arise in relation to 201 sites within the proposed development and preserves. They are:

> **Preservation** – Describes procedures for protecting and preserving cultural sites. Actions range from the immediate to the perpetual, and include site condition evaluation, stabilization, short and long-term protection, protocol education, periodic field checks, and data collection. The focus is on conservation of cultural landscapes, rather than isolated sites.
>
> **Data Recovery** – Describes the procedures and research issues for mapping and excavation of some sites within the road/infrastructure corridor and proposed subdivision lots. Since the most significant sites are being preserved, data recovery sites mostly consist of very simple agricultural modifications, lithic scatters, and more recent historical sites. All sites will undergo data recovery or, more likely, preservation, and samples within sites will be more robust than minimal SHPD requirements.
>
> **Monitoring** – Describes the procedures and responsibilities for archaeological maka'ala of development activity. In addition to ensuring that preservation areas are not damaged, monitoring detects previously unknown cultural deposits, and if they are found, stops work in the area, evaluates the find, and if necessary consults with SHPD and interested parties to establish a preservation buffer or recover data.
>
> **Burial Treatment** – Describes the procedures for dealing with known, suspected, and inadvertently discovered burial sites (with no revisions to the accepted 2001 plan). All burials will be preserved in place, and all sites of unknown function for which burial is a possibility will be preserved. Newly found burials trigger consultation with the Moloka'i Island Burial Council.

Because the plans are interrelated, and important part of the general approach is to define the **process and sequence**. The past two years of community meetings can be considered the first phase, and with ongoing consultation helps define what happens next. The Ranch has committed to planning for the entire project area, to maintain or expand upon previous preservation commitments, and to have this revision include plans for all of the affected parcels including proposed subdivision lots, whose future owners must also abide by the plans. The process continues:

> • Re-survey the road corridor to verify sites, augment their descriptions, and search for new sites. Finds more significant than previous records indicate will cause re-routing. Also at this time, the Papohaku Ranchlands section of the corridor will be described and reported at inventory level for SHPD review.

> • Next, short-term preservation measures will be implemented, such as establishing protective buffers and emergency stabilization.
>
> • Next, data recovery will be implemented. At the same time, implementation of long-term preservation measures will begin.
>
> • During the course of construction, monitoring will occur.
>
> • Final reports for each plan will be submitted for community feedback and submitted to SHPD for review as required by rules and statutes."

2.1.2 Focus On Subsistence and Cultural Resources and Practices

Subsistence and cultural resources and practices are usually examined in relation to a particular island, district and ahupua'a. An ahupua'a runs from the sea to the mountains and contains a sea fishery and sea beach, a stretch of kula or open cultivable land and higher up its forest. The court of the Hawaiian Kingdom described the ahupua'a principle of land use in the case of In Re Boundaries of Pulehunui, 4 Haw. 239, 241 (1879) as follows:

> A principle very largely obtaining in these divisions of territory [ahupua'a] was that a land should run from the sea to the mountains, thus affording to the chief and his people a fishery residence at the warm seaside, together with the products of the high lands, such as fuel, canoe timber, mountain birds, and the right of way to the same, and all the varied products of the intermediate land as might be suitable to the soil and climate of the different altitudes from sea soil to mountainside or top.

In this study, the island is Moloka'i, the district is Kona and the ahupua'a is Kaluoko'i in West Moloka'i and includes the nearshore resources out to one-quarter mile from the shoreline or to the outer edge of the reef.

Hawaiians consider the land and ocean to be integrally united and that these land sections also include the shoreline as well as inshore and offshore ocean areas such as fishponds, reefs, channels, and deep sea fishing grounds. Coastal shrines called fishing ko'a were constructed and maintained as markers for the offshore fishing grounds that were part of that ahupua'a.

It should be noted that the methods and techniques of accessing, acquiring or utilizing traditional natural resources may have changed over time but this does not detract from the fact that it is used and prepared for Hawaiian custom and practice relating to subsistence, culture or religion.

For example, Hawaiian fishermen may use motor boats rather than canoes to get to their ancestral fishing ground. They may use a nylon net rather than one sewn out of native plant materials to surround the fish and pa'ipa'i or to entangle them in the overnight tide. In most cases they are still utilizing ancestral knowledge of ocean tides, currents and reefs to locate and catch the fish. Their catch is used to honor family 'aumakua and to feed their extended families and neighbors.

What distinguishes Hawaiian custom and practice is the honor and respect for traditional 'ohana cultural values and customs to guide subsistence harvesting of natural resources. Such 'ohana values and customs include but are not limited to the following:

1. Only take what is needed.
2. Don't waste natural resources.
3. Gather according to the life cycle of the resources. Allow the resources to reproduce. Don't fish during their spawning seasons.
4. Alternate areas to gather, fish and hunt. Don't keep going back to the same place. Allow the resource to replenish itself.
5. If an area has a declining resource, observe a kapu on harvesting until it comes back. Weed, replant and water if appropriate.
6. Resources are always abundant and accessible to those who possess the knowledge about their location and have the skill to obtain them. There is no need to overuse a more accessible area.
7. Respect and protect the knowledge which has been passed down intergenerationally, from one generation to the next. Do not carelessly give it away to outsiders.
8. Respect each other's areas. Families usually fish, hunt, and gather in the areas traditionally used by their ancestors. If they go into an area outside their own for some specific purpose, they usually go with people from that area.
9. Throughout the expedition keep focused on the purpose and goal for which you set out to fish, hunt, or gather.
10. Be aware of the natural elements and stay alert to natural signs, e.g. falling boulders as a sign of flash flooding.
11. Share what is gathered with family and neighbors.
12. Take care of the kupuna who passed on the knowledge and experience of what to do and are now too old to go out on their own.
13. Don't talk openly about plans for going out to subsistence hunt, gather, or fish.
14. Respect the resources. Respect the spirits of the land, forest, ocean. Don't get loud and boisterous.
15. Respect family 'aumakua. Don't gather the resources sacred to them.

On Moloka'i, the community has identified subsistence as essential to their way of life. They have participated in studies to document the importance of subsistence and to better protect the natural resources upon which they subsist. In one such study, the Governor's Task Force on Moloka'i Fishpond Restoration came up with a definition of subsistence that has been generally accepted. It is as follows:

On Moloka'i, subsistence is the customary and traditional uses of wild and cultivated renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, transportation, culture, religion, and medicine; for barter, or sharing, for personal or family consumption and for customary trade. (Governor's Task Force On Moloka'i Fishpond Restoration)

In addition to the above principles, subsistence and cultural practices are also defined by traditional responsibilities and rights of the 'ohana or extended families of Moloka'i.

2.1.3 'Ohana Responsibilities and Rights

Traditional and customary rights of ahupua'a tenants are rooted in the customs, practices and rights of the original and still primary social unit of the Hawaiian people, the 'Ohana. Custom and practice encompasses the full range of traditional, cultural, religious, and subsistence activities Native Hawaiian 'ohana have engaged in for many centuries to live as a people and survive in a unique island environment. There are customs and practices related to each major aspect of Hawaiian lifestyle and livelihood including:
(1) community life; (2) family; (3) human well-being and spirituality; (4) natural environment, cultural and ecological resources; (5) rights; and (6) economics.

Throughout the islands of Hawai'i, we find subsistence thriving in particular rural Hawaiian communities. Surrounding these communities, are pristine and abundant natural resources in the ocean, the streams, and the forest. This is largely due to the continued practices of aloha 'aina/kai (cherish the land and ocean) and malama 'aina/kai (care for the land and ocean). These rural communities were bypassed by the mainstream of economic, political, and social development and the Hawaiians living in these communities continued, as their ancestors before them, to practice subsistence cultivation, gathering, fishing and hunting for survival. Thus, we find in these areas that the natural resources sustained a subsistence lifestyle and a subsistence lifestyle, in return, sustained the natural resources. Moloka'i offers the premier examples of such communities. (Matsuoka, McGregor, Minerbi, 1994; McGregor, Matsuoka, Minerbi, 1997)

The quality and abundance of the natural resources of these rural Hawaiian communities such as on Moloka'i can also be attributed to the persistence of 'ohana values and practices in the conduct of subsistence activities. An inherent aspect of these 'ohana values is the practice of conservation to ensure availability of natural resources for present and future generations. These rules of behavior are tied to cultural beliefs and values regarding respect of the 'aina, the virtue of sharing and not taking too much, and a holistic perspective of organisms and ecosystems that emphasizes balance and coexistence. The Hawaiian outlook which shapes these customs and practices is lokahi or maintaining spiritual, cultural and natural balance with the elemental life forces.

In communities such as on Moloka'i where traditional Hawaiian customs and practices have continued to be practiced the 'ohana respect and care for the surrounding natural resources. They only use and take what is needed. They allow the natural resources to reproduce. They share what is gathered with family and neighbors. Through understanding the life cycle of the various natural resources, how changes in the moon phase and the wet and dry seasons affect the abundance and distribution of the resources, the subsistence practitioners are able to plan and adjust their activities and keep the resources healthy. Such knowledge has been passed down from generation to generation through working side-by-side with their kupuna or elders.

This ancestral knowledge about the land and its resources is reinforced through continued subsistence practices. While traveling to the various 'ili of the traditional cultural practices region through dirt roads and trails, and along spring fed streams, and the shoreline, practitioners continuously renew their cultural knowledge and understanding of the landscape, the place names, names of the winds and the rains, traditional legends, wahi pana, historical cultural sites, and the location of various native plants and animals. The practitioners stay alert to the condition of the landscape and the resources and their changes due to seasonal and life cycle transformations. This orientation is critical to the preservation of the natural and cultural landscape. The land is not a commodity to them. It is the foundation of their cultural and spiritual identity as Hawaiians. They proudly trace their lineage to the lands in the region as being originally settled by their ancestors. The land is a part of their 'ohana and they care for it as they do the other living members of their families.

Reflecting and summarizing the stewardship responsibilities for the land that have been passed on from one generation to the following on Moloka'i is the mana'o of kupuna Daniel Pahupu shared in a 1961 interview with Mary Kawena Pukui:

> ***Ke ha'awi nei au iā 'oe. Mālama 'oe i kēia mau mea. 'A'ohe mālama, pau ka pono o ka Hawai'i.***
> ***I pass on to you. Take care of these things. If you don't take care, the well-being of the Hawaiian people will end.***
> *Daniel Pahupu, in interview with Mary Kawena Pukui, Mana'e, Moloka'i, March 9, 1961.*

The community guidelines for land use principles and policies in the Community-Based Master Land Use Plan for Moloka'i Ranch and the interviews with Moloka'i kupuna and subsistence practitioners which are summarized in this report reflect the ongoing stewardship responsibilities for the marine resources of the Mo'omomi Preserve which have been assumed by contemporary generations of Moloka'i residents.

2.1.4 The Importance of Subsistence on Moloka'i

Traditionally, Moloka'i, with its extensive protected reefs and fishponds gained the reputation of a land of "fat fish and kukui nut relish." Moloka'i Hawaiians obtained marine resources from the shallow offshore reefs; the deep sea channels between Moloka'i and Maui, O'ahu, and Lana'i (Pailolo, Kaiwi, and Kalohi); the deeper ocean off of the island's north shore; and from an extensive network of human constructed fishponds.

Moloka'i is known as the "Last Hawaiian Island." According to the 2000 U.S. Census, the total population of Moloka'i was 7,257. Of this total population, 4,442 or 61 percent were Native Hawaiians. Among the eight major islands, Moloka'i has the highest concentration of Native Hawaiians outside of Ni'ihau.

Many families on Moloka'i, particularly Hawaiian families rely upon subsistence fishing, hunting, gathering, or cultivation for a significant portion of their food. Even families who may not engage in such activities benefit through sharing and exchange among family members and neighbors.

The traditional Hawaiian diet study conducted on Moloka'i in 1982 by Na Pu'uwai, a community-based Native Hawaiian health organization proved that a diet consisting of traditional Hawaiian foods - fish, taro, breadfruit, sweet potato, etc. reduces weight and the risk of heart disease, high blood pressure and diabetes Thus, the availability of traditional foods, most of which is acquired through subsistence fishing, hunting, gathering or cultivation, is a critical component for improving Native Hawaiian health.

The Governor's Moloka'i Subsistence Task Force Study, completed in 1994 (Subsistence Study), concluded that many families on Moloka'i, particularly Hawaiian families,

continued to rely upon subsistence fishing, hunting, gathering, or cultivation for a significant portion of their food. A random sample survey of the families on Moloka'i revealed that twenty-eight(28%) percent of their food was acquired through subsistence activities. Among Native Hawaiian families the survey found that thirty-eight(38%) percent of their food was derived from subsistence activities. The families reported receiving food through subsistence activities at least once a week. Virtually every person surveyed believed that subsistence was important to the lifestyle of Moloka'i. (Matsuoka, McGregor, Minerbi, 1994, see Appendix 18)

Availability of the natural resources needed for subsistence was essential to Moloka'i households where the unemployment rate was consistently higher than on other islands and a significant portion of the population depended upon public assistance. In March 1993, the unemployment rate of 8.1% on Moloka'i was higher than the statewide rate of 4.7%. With regard to public assistance, in 1990, 24.4% of the Moloka'i population received food stamps; 12% received AFDC and 32.5% received Medicaid. According to the U.S. census for 1990 21% of the families on Moloka'i had incomes that fell below the poverty level of $12,674 for a family of four. The ability to supplement meager incomes through subsistence was very important to maintaining the quality of life of families on the island through 1994.

Subsistence has also contributed to the persistence of traditional Hawaiian cultural values, customs, and practices. Cultural knowledge, such as about place names; fishing ko'a; methods of fishing and gathering; or the reproductive cycles of marine and land resources were passed down from one generation to the next through training in subsistence skills. The sharing of foods gathered through subsistence activities continued to reinforce good relations among members of extended families and with neighbors.

The Subsistence Study also documented the growing concerns of the Moloka'i community about diminishing resources. While the natural resources of Moloka'i and its surrounding waters were still abundant enough to support both subsistence and commercial harvesting, the resources were not as plentiful as adult subsistence practitioners remembered them to be when they were growing up. The subsistence practitioners were faced with challenges from tourism, commercial harvesting, offisland fishermen and hunters, and newcomers from continental U.S. and the Philippines. Hawaiian conservation practices that were customarily passed down from one generation to the next were being set aside in light of increasing competition from off-island fishermen and hunters and new residents. There was a growing feeling that "if you don't take everything when you see it, then someone will take it before you come back the next time." Thus, rather than taking only what was needed, more was being harvested and wasted. The widespread use of large freezers also contributed to overharvesting. Before the use of freezers, the ocean was "the icebox" and one only gathered enough for the 'ohana, close neighbors and kupuna to eat. Subsistence practitioners had started to gather more than what their families could immediately eat and the surplus was being stored in freezers.

In 1993, Moloka'i subsistence practitioners who participated in the Subsistence Study realized that they had arrived at a crucial juncture. They were concerned that if something was not done to reverse the trend of overharvesting and diminishing resources there would be nothing left for future generations. They felt that community wide acceptance of traditional Hawaiian values and practices of aloha 'aina would be key to restoring the balance between subsistence fishing, gathering and hunting and the sustainability of the island's natural resources. They recognized the need for everyone in the community to make a commitment to manage the natural resources of Moloka'i not just to benefit the current generation, but for the benefit and well-being of six and seven generations into the future. Conservation education through the schools, DLNR hunter education and education about fishing rules and regulations were seen as important elements in the effort to sustain Moloka'i's natural resources. A series of recommendations for the management of resources were generated. (see report - Appendix 18)

Below is the map of subsistence activities indicated by practitioners on Moloka'i in focus group meetings throughout the island in 1993.

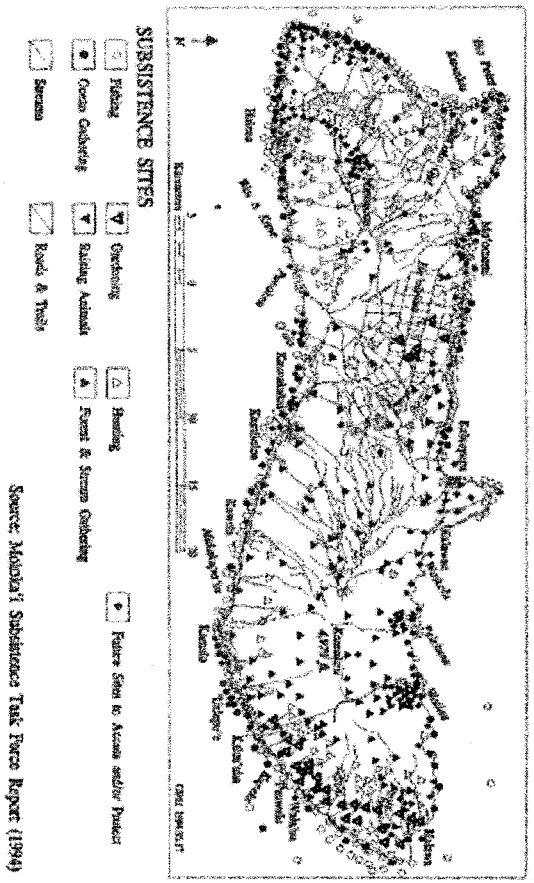


Figure 1. Map of subsistence activities indicated by Moloka'i practitioners in 1993.

This 1993 Subsistence Sites map indicates intensive fishing and ocean gathering in the area where the La'au Point Development is proposed. It also indicates that subsistence practitioners who participate in the 1993 survey hunted in the vicinity of La'au Point.

Interviews with key informants that were conducted for this report in 2006 indicate that the area is primarily a accessed by land for subsistence resources by families of Ranch employees and families who have lived in the Maunaloa community for more than one generation. By ocean access, the marine resources are also extensively harvested by subsistence and commercial boaters from both O'ahu and Moloka'i. Unless one has a key to take a vehicle out to La'au, it is a long, hot, dry walk. For this reason, the primary users are those who can get a key to the gate and enter with a vehicle, that is, Ranch employees and their families and friends. In addition, especially since the road to Hale O Lono harbor was opened, Moloka'i residents with boats access the area by launching out of Hale O Lono, Pala'au or Kaunakakai. Boaters from O'ahu also frequently fish and dive along the West and south coastlines adjacent to La'au Point. Hunting also extends into the La'au area.

The Subsistence Study recommended the establishment of a "Community-Based Subsistence Fishing Management Area" from Nihoa Flats and west through Mo'omomi and over to 'Ilio Point. In 1994, the Hawai'i State Legislature passed a bill which gave the Hawai'i State Department of Land and Natural Resources the authority to designate community-based subsistence fishing management areas and to carry out fishery management strategies through administrative rules for the purpose of reaffirming and protecting fishing practices customarily and traditionally exercised for purposes of Native Hawaiian subsistence, culture, and religion. The bill also established a pilot demonstration project for the fisheries and adjacent coastline between Nihoa Flats and 'Ilio Point. The demonstration area was eventually designated between Nahihikina'u and Kaiehu points. The demonstration pilot project expired July 1, 1997. Under the Community-Based Master Land Use Plan for Moloka'i Ranch, the Moloka'i Land Trust, the KAL-EC , MPL and the broader community would seek to institute a community-based subsistence fishing management area in the nearshore area from Dixie Maru, south to La'au Point and east to Pala'au.

With regard to the area of the Kakalahale Well that is part of the MPL water plan, the 1993 Subsistence Sites map indicates that the Kamiloloa shoreline and nearshore waters are used extensively for fishing and ocean gathering and that the mauka area is used for hunting and gathering of forest and stream resources. Given that there is still a high concentration of Native Hawaiians in the Kapa'akea-Kamiloloa-Makakupaia area, it is reasonable to assume that these activities are ongoing in 2006.

2.1.5 Coastal Cultural Resources

The proposed La'au Point Development runs along the west shore from Kaupoa to La'au Point and east from La'au Point to Hale O Lono. The primary subsistence and cultural resources are coastal and marine resources and deer. The following identifies the coastal resources which are essential for the conduct of Hawaiian subsistence customs, beliefs

and practices. Participants in community meetings and the key informants were asked to identify which of these resources are located and utilized in the area proposed for the La'au Development.

Coastal Cultural and Subsistence Resources

____ streams
____ 'auwai (taro irrigation ditches)
____ springs
____ trails
____ sacred places
____ landings
____ surfing sites
____ fishing area
____ fish trap
____ hunting areas
____ muliwai (brackish pond)
____ trails
____ wells
____ historic walls
____ alae vein
____ shrines
____ ko'a (fishing shrines)
____ historic sites
____ ho'ailona (natural signs)
____ lele (cliff jumping spots)
____ pu'uhonua (places of refuge)
____ cultivation area
____ archaeological sites
____ burials
____ o'opu
____ aholehole
____ steam bath areas
____ limu gathering areas
____ subterranean water course
____ kapu kai/hi'u wai areas
____ artifacts
____ seasonal residential sites
____ water caves
____ phallic stones
____ coral reef
____ spawning grounds
____ po kane routes (night marchers
____ 'aumakua (ancestral deities) domain
____ ponds
____ lo'i kalo
____ caves
____ wahi pana (named places)
____ dunes
____ bridges
____ sandy beach
____ fishpond
____ fish house
____ kilo i'a (fish sighting)
____ anchialine pond
____ salt ponds
____ turtle nesting area
____ basalt veins for tools
____ salt pans
____ salt gathering areas
____ heiau (temples)
____ cultural use areas
____ sighting place
____ native plants
____ holua slides
____ leina (jumping off point for souls to cross over)
____ kupe'e
____ hihiwai/wi
____ 'anae
____ bathing pools
____ lava tubes
____ petroglyphs
____ paddling areas
____ view plane
____ burial markers
____ birthing stones
____ Pohaku Kane
____ estuary
____ house sites
____ dams

2.1.6 The Water Plan and Waiola Contested Case Testimonies

The Water Plan is integral to the La'au Point development proposal. Hawaiian homesteaders, especially those with lots in Ho'olehua, feel that the greatest cultural impact of the proposed La'au Development is the MPL water plan. They feel that the withdrawal of an additional 1,000,000 gallons per day of brackish water from the Kakalahale well will take away water that the Department of Hawaiian Homelands(DHHL) will need to support future expansion of agriculture and residential lots on their Moloka'i lands.

The Water Plan was discussed in the key informant interviews. In addition to information gathered for this report, testimonies from the Waiola Water Permit contested case have been reviewed and analyzed. Issues raised in the Waiola contested case about the impact of the proposed well on subsistence resources and activities makai of the Kakalahale well are summarized and discussed in this report.

2.1.7 Broader Indirect Impacts

Community meetings and interviews focused on the impact to subsistence and cultural resources and activities in the area directly affected by the proposed La'au Residential Development, the pumping of brackish water from the Kakalahale well.

Indirect affects of the development on subsistence and cultural activities outside of the project area and water development that were raised in community meetings and interviews are summarized and generally addressed in this report. Details of the affect of the proposed development on the overall way of life on Moloka'i as "The Last Hawaiian Island" is fully addressed in the Social Impact Assessment that is part of this EIS.

2.1.8 Community-Based Master Land Use Plan for Moloka'i Ranch

The larger Community-Based Master Land Use Plan for Moloka'i Ranch will be considered in this report with regard to mitigation measures and alternate options to the proposed La'au Point Development.

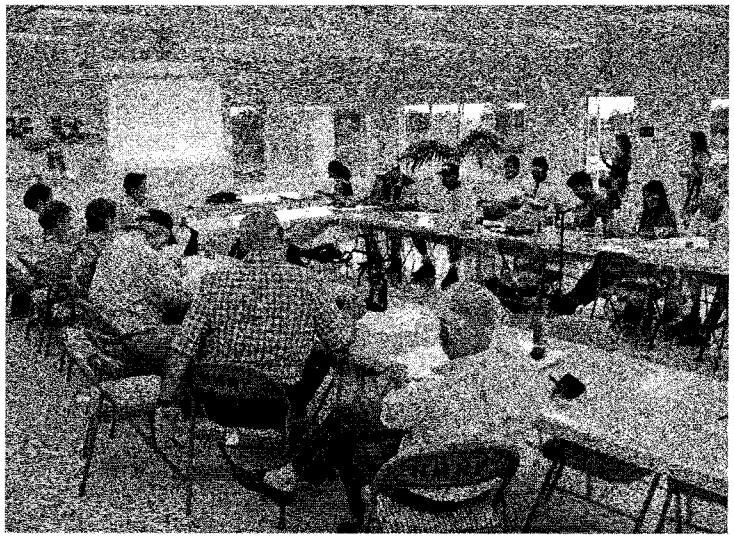
In as much as issues were raised in community meetings and interviews about the overall affect of the proposed development on the way of life and lifestyle of Moloka'i, general reference is made in this report as to how the Community-Based Master Land use Plan for Moloka'i Ranch can help to mitigate these broader social impacts.

2.2 Methodology and Process

2.2.1 KAL-EC, MPL and Community Planning Process

The two-year process to develop the Community-Based Master Land Use Plan for Moloka'i Ranch was an extended process of identifying cultural and subsistence resources and practices throughout Moloka'i Ranch lands, including the lands proposed for development adjacent to La'au Point. The process included a site visit to the south and west coastline where the development is proposed. Key cultural resources, sites and complexes were visited and subsistence access routes and setbacks were discussed with MPL and its planning consultant, Frank Brandt of PBR.

Figure 2. Meeting of the EC Project #47 Land Use Committee at Hale Pumehana in August 2004.



Professor McGregor participated in the planning process as a member of the Culture Committee and the Land Use Committee. The Culture Committee identified cultural resources which should be protected under a "Cultural Conservation and Management Zone" which was defined as follows:

> Establish a Cultural Conservation and Management Zone to include the Historic Cultural Sites and the Complexes of Na'iwa (Manawainui-Kahanui), Kaluako'i-Ka'ana-Pu'u Nana (Kalaipahoa-'Amikopala), Kaunakakai, and Kawela Cultural Complexes; Cultural and Subsistence use and resource areas; a subsistence fishing zone of one-quarter (1/4) mile offshore on the North and West Shore and to the outside of the reef surrounding the remainder of the property (South shore).

For Kaluako'i, the cultural district was defined as follows:

> The Kaluako'i Cultural District is to protect the historic and cultural sites and resources for current and future spiritual, cultural practices and subsistence uses. It includes the following sites and complexes:
>
> - Punakou which is inclusive of Ka'ana, Pu'u Nana, and Ho'olehua
> - Paka'a trail which is located in the entire Kolo Gulch
> - Paka'a cultivation fields in the uplands of Kopala
> - Kalaipahoa-'Amikopala and Kukui adze quarry sites
> - Kamaka'ipo complex of sites in the entire gulch
> - Kahualewa Heiau, mauka of Waikane Gulch
> - Heiau, mauka of Halena Road and between Kahinawai and Oneohilo gulches
> - Kawakiu Iki and Kawakiu Nui village sites and burials
> - Dunes of Keonelele
> - Various fishing ko'a along the shoreline
> - Burial Site located west of Kaluako'i water tank in Kaka'ako Gulch
> - All sites identified on the Maurice Majors maps

The Cultural Committee discussed the importance of the cultural sites and resources in the area proposed for development adjacent to La'au Point. The members had reservations about placing the residential development in the proposed area and discussed alternative sites along the south and west shore of Moloka'i and in the area mauka of La'au Point and below Maunaloa Town. Alternative coastal areas were more sensitive to development because of the cultural resources or the terrain. Development mauka of La'au would not produce the revenue necessary to re-open the Kaluako'i Hotel and develop the residential infrastructure. These alternatives are discussed below.

In the end, through joint discussions with MPL, the Cultural Committee recommended a minimum setback of 250 feet from the designated property line along the entire shoreline; the establishment of a public access walking trail along the entire shoreline, with parking, a public park, and a comfort station at either end of the west and south shore; the creation of cultural and resource protection zones on approximately 1,000 acres; the maintenance of streams, gulches and floodways as open space; and the creation of an archaeological

preserve of approximately 116 acres at Kamaka'ipo Gulch. The MPL, the KAL-EC, and the Moloka'i Land Trust will work with the community to establish a subsistence fishing zone of one-quarter (1/4) mile offshore on the North and West Shore and to the outside of the reef surrounding the remainder of the property (South shore).

2.2.2 Community Meetings

Announcements inviting the community to meetings to share concerns about on the subsistence and cultural impacts of the La'au Development Proposal were posted in two of the local Moloka'i newspapers - The Moloka'i Dispatch and the Moloka'i Island Times and flyers were posted throughout the island. The posted agenda included (1) Review plans and maps of conservation shoreline setback; cultural sites protected areas; subsistence fishing, gathering and hunting zones in relation to the proposed development; (2) Identify additional resources and protection measures; (3) Discuss water plan.

The announced community meetings, co-sponsored by the Office of Hawaiian Affairs, were held from 6pm to 8pm on:

- May 31, 2006 at the Maunaloa Elementary School Cafeteria for the Maunaloa, Kaluako'i and Papohaku communities;
- June 1, 2006 at Kulana 'Oiwi Halau in Kalama'ula for the Kalama'ula and Kaunakakai communities;
- June 5, 2006 for a focus on fishing and ocean gathering at the OHA/DHHL Conference Room;
- June 6, 2006 at Kualapu'u Elementary School Cafeteria for the Ho'olehua and Kala'e communities;
- June 7, 2006 at the Kilohana Recreational Center for the Mana'e or East End communities; and
- June 8, 2006 at the Mitchell Pauole Conference Room for a focus on hunting and land gathering.

A total of 250 persons attended the meetings and signed in as participants. Additional participants chose not to sign-in, concerned that their presence might be interpreted in this report as implied support for the plan. The input received in the community meetings are summarized below.

A special meeting with the Maunaloa kupuna was held to discuss the social impacts of the proposed development with the consultant conducting the social impact study. Input relevant to cultural impacts were noted and are included in the summary below.

Community meetings to discuss the water plan were held in Maunaloa and Ho'olehua. Input relevant to cultural impacts were noted and are included in the summary below.

2.2.3 In-depth Semi-structured Interviews

Between June 8, 2006 and August 15, 2006 eighteen kama'aina were interviewed about their experience in the proposed development area; their knowledge of natural and cultural resources in the area; their subsistence and cultural activities there; the impact of the proposed development on the identified natural resources and their described activities; concerns about the water plan; and their overall assessment of the proposed project.

Mayson "Pono" Asano, Jr. -born and raised on Moloka'i. As a member of Hana Kupono when he was young, he camped near Hale o Lono during the men's Moloka'i Hoe went fishing, gathering and picking 'opihi along the south shore.

Malu Burrows - born and raised on Moloka'i. His great-grandfather built the La'au Point Lighthouse and his grandfather and father manned the lighthouse after him. Mr. Burrows is a meat inspector.

Rikke Cooke- descendant of the Cooke family who owned Moloka'i Ranch which included the ahupua'a of Kaluako'i, including the area proposed for development. He is a professional photographer, educator.

Guy Espaniola - born and raised on Moloka'i. The Ranch evicted him from Maunaoloa town when the plantation houses were razed to build the new houses.

Mercedes Espaniola - born at the Hula Piko near Maunaloa town. Raised her family in Maunaloa and continues to live there.

Joseph Espaniola - moved to Moloka'i to work for the plantation until he retired.

Pepe Espaniola - Son of Joseph Espaniola. Born and raised in Maunaloa.

Shige Inouye - born and raised on Moloka'i. He worked for Moloka'i Ranch when it was the wholesale distributor for Standard Oil and later managed the Ranch's water system.

Kalapana Kealiihoomalu - born and raised in Kalapana on the island of Hawai'i, he married into the Duvauchelle family and works for the Ranch.

Dennis Kamakana - born and raised on Moloka'i, former part-time commercial fishermen, currently works for GASPRO. Mr. Kamakana's relatives were cowboys for Moloka'i Ranch and camped on the West End with his uncles and their families.

Halona Kaopuiki - born and raised on Moloka'i, Ho'olehua Homesteader, subsistence fisher, gatherer, hunter and experienced in Moloka'i field archaeology. His father and uncles worked for Moloka'i Ranch.

Rheno Lapinid - born and raised on Moloka'i. He lived in Maunaloa and Kualapu'u and worked for Libby & McNeil and Moloka'i Ranch.

Keali'i Mawae - born and raised on Moloka'i. His grandfather worked for Moloka'i Ranch. Mr. Mawae is a homesteader in Ho'olehua and is a commercial fisherman.

Henry Paleka - born and raised on Moloka'i. Worked for the plantation, the Department of Education, the power plant, and Department of Hawaiian Homes. Has been in charge of security for Moloka'i Ranch since 1995.

Josh Pastrana - born and raised on Moloka'i. His grandmother lived in a Ranch house near Kaupoa. He works with Akaku Media Center.

John Quintura - born and raised in Maunaloa, worked for the State Department of Transportation at the airport.

Junior Rawlins - born and raised on Moloka'i. Third generation working for Moloka'i Ranch. He worked for B & C Trucking.

Bernie Santiago - has lived on Moloka'i since 1955. He worked for the plantation and in construction. He was evicted from Maunaloa by Moloka'i Ranch when the company razed the plantation town and built new homes.

Information provided by the key informants are summarized in the findings section of this report and kept anonymous. Notes of the interviews will be kept on file by Professor McGregor. The information was shared generously by the informants and provides important insights into subsistence and cultural customs and practices in the area proposed for development.

2.2.4 Site Visit and Ethnographic Sources

Professor McGregor and colleague Sean McNamara went on a site visit of the area proposed for development on Moloka'i's West coast from Kaupoa to La'au Point on June 8, 2006. Photos from this site visit are included in the report.

General historical and ethnographic documents and maps were located, reviewed and analyzed by colleague Sean McNamara and his fellow students when they developed the Papohaku Dunes Cultural and Natural Resource Preservation Plan. These had been located at the Bernice Pauahi Bishop Museum archives and library, Hamilton Library, the Hawai'i State Archives, and the Survey Office of the Department of Accounting and General Services. Archaeology studies relevant to the Kaluako'i ahupua'a at the State

Historic Preservation Division (SHPD) were also gathered and reviewed for relevant information. In addition, McNamara and the planning students conducted oral history interviews about the Kaluako'i ahupua'a with Halona Kaopuiki, Kelson "Mac" Poepoe, Jimmy Duvauchelle, Billy Akutagawa, Noa Emmett Aluli, and Walter Ritte. The information gathered from the studies and interviews are summarized below in the section on the Mo'olelo and Wahi Pana of Kaluako'i.

Sections from Catherine Summers Molokai: A Site Survey, (1971) relevant to the Kaluako'i ahupua'a were reviewed for general historical information but the information relating to specific sites are included in the archaeological preservation and mitigation plan by Major. Additional ethnographic sources on the Kaluako'i ahupua'a that were relied upon for this report are listed in the bibliography. Of special note are videotaped interviews and programs with Kumu Hula John Kaimikaua in the UH Sinclair Library Wong Audiovisual Collection and an interview with John Kaimikaua by Phillip Spalding III.

Land records at the Bureau of Conveyances were also examined to reconstruct the history of ownership of the Kaluako'i ahupua'a.

Professor McGregor also reviewed ethnographic information contained in letters of "Notice of Intent to Intervene." As described above, both McGregor and McNamara reviewed testimonies in the Waiola Contested Case Hearings for information about subsistence and cultural resources and activities in the Kamiloloa area. Relevant information is included in the summary of resources and practices and the discussion of impacts of the proposed development on these resources and practices.

Section 3 Cultural and Subsistence Resources and Activities

3.1 Origin of Ownership of the Kaluako'i Ahupua'a

Tax Map Key: (2) 5-1-02:30; 5-1-06; 5-1-08: 04, 03, 06, 07, 13, 14, 15, 21, and 25

These parcels are all located in Land Grant 3146 which was sold to Charles Reed Bishop by King Kalakaua as a Royal Patent in 1875 for the sum of $5,000. A copy of this Royal Patent deed is below as Figure 3. It shows that Charles Reed Bishop purchased the ahupua'a of Kaluako'i, consisting of 46,500 acres for $5,000 or approximately 11 cents an acre. A map of Land Grant 3146 acquired from the Survey Office of the Department of Accounting and General Services is attached to this report as Attachment #1.

The area proposed for development is located within the Kaluako'i ahupua'a. Summers describes the boundaries of the Kaluako'i ahupua'a as follows:

> "According to Alexander, Kaluako'i was a "district of itself" (1903:390). In *Indices of Awards* . . . it was also referred to as a district and as having the ahupua'a of Kaluako'i 1 and 2 (1929: 16). King said that Kaluako'i was a kalana that had the two ahupua'a, Kaluako'i 1 and 2 (Coulter, 1935:215). The boundaries of these two ahupua'a are not defined, and Kaluako'i is now considered an ahupua'a; it is the largest on the island, having an area of 46,500 acres."

Summers states that Kaluako'i was designated as government land in the 1848 Māhele. The Indices of Awards Made by the Board of Commissioners To Quiet Land Titles In The Hawaiian Islands which provides a record of the disposition of lands under the 1848 Mahele lists the ahupua'a of Kaluako'i 1 and Kaluako'i 2 as Government Lands.

As noted above, in his official capacity as ruling monarch, King Kalākaua, in 1875, granted the ahupua'a of Kaluako'i to Charles Reed Bishop for the payment of $5,000 as Royal Patent Grant 3146.

In the Bureau of Conveyances, the Book of Grantors for 1893 records the transfer of ownership of lands, leaseholds and livestock of Royal Patent Grant 3146 of Kaluako'i, Moloka'i from Charles Reed Bishop to the Trustees of Bernice P. Bishop Estate on November 14, 1893, (Book 146, p. 12, January 2, 1894).

The Book of Grantors for 1898 records the transfer of ownership of lands, leaseholds, livestock and brand of Royal Patent Grant 3146 of Kaluako'i, Moloka'i from the Trustees of Bernice P. Bishop Estate to Molokai Ranch Co. Ltd. on February 5, 1898, (Book 177, p. 170 February 9, 1898).

From February 5, 1898 to present, Royal Patent Grant 3146 of Kaluako'i has continued to be owned by Moloka'i Ranch, although the ownership of the Moloka'i Ranch, itself, has transferred several times, as described below.

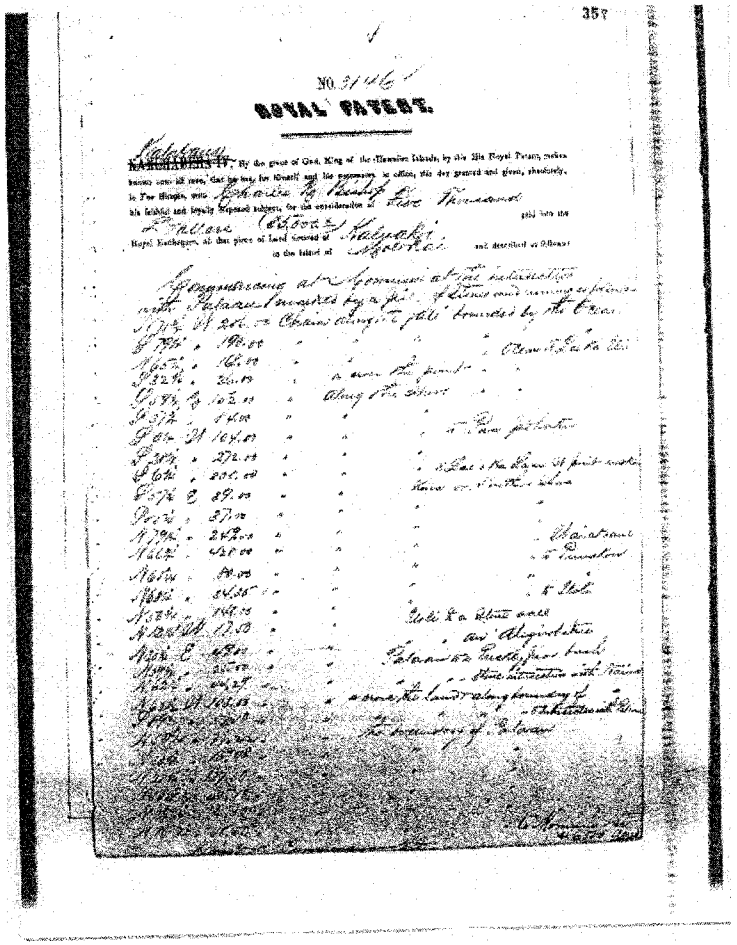
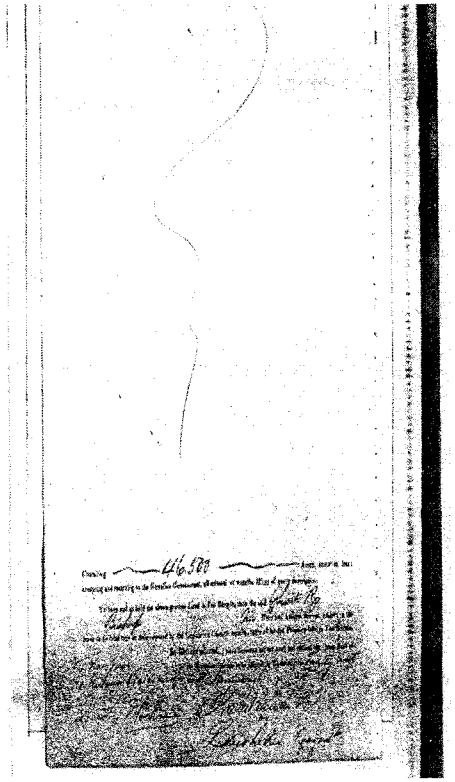


Figure 3. Royal Patent deed from Mō'ī Kalākaua to Charles Reed Bishop in 1875.



3.2 Ownership of Moloka'i Ranch and Use of Kaluako'i Lands

George Paul Cooke became the manager of Moloka'i Ranch in 1908 after his father, Charles M. Cooke bought Moloka'i Ranch. In his book, Mo'olelo O Molokai, George P. Cooke described how Moloka'i Ranch was formed. According to Cooke, Moloka'i Ranch was formed in 1897 by a hui of men including Judge Alfred S. Hartwell, Alfred W. Carter, and A.D. McClellan. In 1898, the American Sugar Company Limited was incorporated by Judge Alfred S. Hartwell and Alfred Carter (who were partners in the Moloka'i Ranch), and Charles M. Cooke, George H. Robertson and George R. Carter. At this point, the Moloka'i Ranch stockholders exchanged their stock for shares in the new American Sugar Company. According to George P. Cooke, the sugar cane company failed when the pumps installed in surface wells to irrigate the cane fields depleted the fresh water and started to pump salt water. In December 1908, Charles M. Cooke bought out the interests in the Moloka'i Ranch. (*Mo'olelo O Moloka'i*, 1949, pp. 1 - 8)

In 1991, Marshall Weisler reviewed the history of the ownership of Moloka'i Ranch in his 1991 study of the Mo'omomi dune system. According to Weisler:

> "In 1875, some 30 years after the Great Mahele, Charles R. Bishop purchased, by royal patent, the lands of Kaluako'i. Responding to a query by E.O. Hall, the Minister of the Interior, R.W. Meyer, who made a rough survey of the lands of Kaluako'i in the 1850s, valued the lands - - both 'good and bad . . . at 12 1/2 cents per acre or about 5000 dollars.' (Meyer 1873:2).
>
> Bishop transferred the property to the Bishop Estate in 1893. Five years later, three men formed Moloka'i Ranch and bought 46,500 acres of Kaluako'i from the Bishop Estate. Shortly thereafter, the American Sugar Company was formed by a group including Charles M. Cooke, George Robertson, George Carter, and two judges named Hartwell and Carter (Cooke, 1949). C. M. Cooke bought out his partners in 1908, 10 years after the establishment of American Sugar Company." (Weisler, *The Archaeology of a Hawaiian Dune System: The Nature Conservancy's Mo'omomi Preserve, Moloka'i.* Honolulu: The Nature Conservancy, 1991p. 10)

The Cooke family owned Molokai Ranch for almost 80 years until the late 1980s. It was operated as a family corporation separate, from Castle and Cooke. George Cooke served as manager of the Ranch for 35 years, from 1908 through 1943. Under his tenure it became the second largest cattle ranch in Hawai'i and a major producer of beef.

Libby, McNeill & Libby Company acquired a lease from Moloka'i Ranch Co., Ltd. to establish a pineapple plantation on any lands of Kaluako'i above the five hundred foot level. In February 1923, the first field of 977 acres was planted. Due to the distance to Kaunakakai over undeveloped roads, Libby decided to construct camp buildings and houses on Ranch land in the Maunaloa area. Libby built a cable landing on Pu'u Kaiaka and shipped in materials which were hauled from ship to shore using a winch to construct Maunaloa Town, as well as fertilizer, weed control paper, and pulapula (plantings). (Cooke, 1949, 90-91).

Within a few years Libby dredged a channel through the reef at Kaumanamana and built a wooden wharf that they named Kolo, the name of an adjacent area. The Kaiaka cable landing was abandoned. Ranch shipments of supplies into Moloka'i and of pineapples to the Libby Honolulu cannery shifted to Kolo. (Cooke, 1949, 91)

A pavilion was constructed neat the beach at Halena for the boy scouts. Libby plantation also built cabins for use by their workers. Informants fondly remember camping at Halena and holding large parties for weddings, birthdays and other family gatherings. They also recalled camping at Halena as boy scouts. Boy scouts also came from other islands and camped at Halena.

The Ranch reorganized as Moloka'i Ranch Co., Ltd. under a new charter in1939.

During World War II, on July 17, 1944, Moloka'i Ranch Co., Ltd. leased 1,500 acres to the U.S. military to use for training exercises and target practice. An small installation was constructed at 'Ilio Point. In 1949, the lease was extended through June 1965. According to a 1993 report by Maurice Major, an informant then living on Maui recalled participating in a Marine Corps amphibious exercise at Kaupoa Bay which involved 7,000 men who fired heavy artillery for more than a week. Spent bombs were also found during the survey of Northwest Moloka'i conducted by Marshall Weisler in 1987. A site at the extreme southwest portion of what is now the Papohakua Ranchlands Subdivision was used for a target range for gunnery and practice exercises, a bombing area, bunkers, and a control house. (UH DURP Planning Practicum, 2005, 74)

According to an informant, in the 1950s, a harbor was dredged and a wharf constructed at Hale O Lono by B & C (Brown and Clewitt) Trucking to ship out sand from Papohaku and cinders from the top of Halena hill. A 1957 contract between Moloka'i Ranch Co., Ltd. and HC & D (Honolulu Construction and Draying Company, Ltd.) allowed for sand to be removed from a 297 acre southern parcel of Papohaku Beach. (UH DURP Planning Practicum, 2005, 74). The cinders were taken out of a pit in a hill near Halena. The sand was transported to Honolulu to rejuvenate Waikiki Beach and cinders were used for highway construction. After over twenty years, the sand mining operation was exposed as illegal and terminated in the 1970s. The sand was drawn from below the high water mark which was public land and required a government permit and at some point a dredge bucket even drew the sand out of the ocean. According to Rikki Cooke the Ranch was fined and traded land at Ala Malama in Kaunakakai in lieu of the million dollar fine. Mr. Cooke provided the following information:

B & C trucking took sand from Papohaku for over 20 years. It was said that Waikiki was really Papohaku. When took shipment out they took a whole barge at a time. All day long, every day, had trucks going back and forth from Papohaku to Hale O Lono. Had a dredge at some point and went into the ocean.

They had a million dollar settlement. Traded the Ala Malama site in lieu of the fine, to the county. Moloka'i Ranch gave the Ala Malama site for the fine.

B&C Trucking also owned Seaside Inn and Pau Hana Inn.

In 1968, Moloka'i Ranch Co., Ltd. formed the Kaluako'i Corporation as a joint venture with The Louisiana Land and Exploration Company (LLL). LLL was provided a contingency for the Ranch's West End lands.

In 1972 Dole Corporation acquired Libby, McNeill and Libby and closed the Maunaloa pineapple plantation in 1975.

The Kaluako'i Resort opened in 1977 and included a hotel, a golf course, and condominiums. In 1978, the Moloka'i Ranch Wildlife Park opened for safari-like tours on the ranch lands.

In 1980 LLL separated it's interests from Moloka'i Ranch Co., Ltd. and exercised its option over the West End lands from Kaluako'i to Kawakiu. These lands were sold to Tokyo Kosan in 1987. Operating as Kukui (Moloka'i), Inc. the company subdivided its property and developed the Papohaku Ranchland Subdivision.

The Ranch diversified its investments into mainland commercial property. It also sold the lands from Hale O Lono to Kaupoa to an individual investor from Las Vegas for $21 million. Within a week this investor sold the lands to Alpha U.S.A. for $35 million. Alpha U.S.A. hired Henry Ayau as its representative, Walter Ritte as a consultant, and Groups 70 as its planner. They developed a plan to develop the La'au parcel that involved Hawaiian villages.

When the investments made by Moloka'i Ranch Co., Ltd. failed, its stock was bought by Brierly Investments, Limited who became its sole stockholder in 1987.

In 1991, when Tokyo Kosan went bankrupt, it sold Kukui (Moloka'i), Inc. which owned the closed the Kaluako'i Resort and Golf Course and the adjacent lands over to Kawakiu, back to the Ranch, or its parent company, Brierly Investments, Limited. In 1993, Alpha U.S.A. also sold the lands it had purchased back to the Ranch or Brierly Investments, Limited) for $12 million. It is the shoreline area of this parcel that had been owned by Alpha U.S.A. that is now being proposed for rezoning for the La'au Point Rural-Residential Development.

Brierly Investments, Limited, itself was totally reorganized in 2000 when the Far Eastern stock markets collapsed. It is now a smaller operations-based company that is registered in Bermuda, has its headquarters in Singapore and is listed on the stock exchanges in London, New Zealand and Singapore. Its largest asset is the Thistle Hotel chain in Great Britain and it's second largest asset is Moloka'i Ranch. In December 2002, seeing that Moloka'i Ranch had operations that went beyond ranching, the corporation's name was changed to Moloka'i Properties Limited (MPL). Around the same time, the parent corporation changed its name to BIL International.

3.3 History of Kalauako'i

Kaluako'i means "The stone adz quarry," according to Catherine Summers in Molokai: A Site Survey. There are numerous quarry sites within Kaluako'i. The Kumuma'oma'o and the Haleolono are the winds of the ahupua'a.

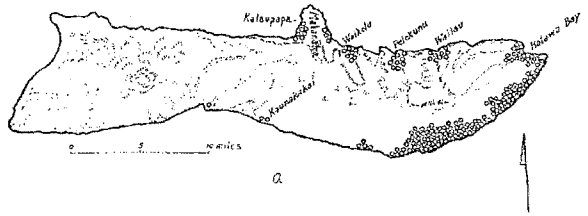
According to Summers, Kamakau described the ahupua'a of Kaluako'i in which Mo'omomi is situated as a desolate land of famine.

George Cooke notes that according to the logs of Captain James Cook, when he came by Moloka'i in the winter, he saw red water from the gulches out half mile from shore. Erosion is not just in modern times, but it got worse with cattle and pineapple culture. Even in ancient times there was soil run off.

Stokes, after his 1909 survey stated, "This part of the island [Kaluako'i] does not give any evidence of a dense population . . . It is probable that formerly, as now, coasts were periodically visited by the inhabitants of the rest of the island for the purpose of fishing, the waters there yielding very abundantly."(cited in Summers, p.40)

According to John Wesley Coulter in Population and Utilization of Land and Sea in Hawaii, 1853 (1931), "Nearly all the western half of the island was uninhabited. There the semi-arid climate precluded successful agriculture." His map, shown below, illustrates the distribution of the population on Moloka'i in 1853. It depicts Kaluako'i as an area without any inhabitants.

Figure 4. In Coulter's map of the 1853 Moloka'i population Kaluako'i was uninhabited.



William Bonk conducted archaeological excavations in West Moloka'i for his 1954 M.A. Thesis, "Archaeological Excavations on West Molokai." He excavated 9 archaeological sites on West Moloka'i that were either adjacent to the shoreline or less than one mile from the ocean. Based upon his excavations, Bonk concluded that the Kaluako'i ahupua'a was of significance to early Native Hawaiians for its adze quarries and extensive fishing resources. He writes:

> "A conclusion which comes to the fore, as a result of this investigation of west Molokai, is that the contents of the sites excavated bear out what we had every reason to expect, that this was a decidedly marginal land for the inhabitants of Molokai. Fishing and the quest for adze stone brought people into the area, and fighting probably sent refugees into it, but temporarily. The small population of Molokai must have found ample room on the richly watered and larger land of east Molokai. Only a few fishermen families seem to have found it worth while to build homes on west Molokai. Being a distant, bare region, except for fishing, the wanderers into it would go lightly burdened and would not tarry longer than to obtain their fish or stone. They therefore would have a strong incentive not to loose(sp?) the few, vital things they took with them, and would not be much concerned with the manufacture of articles while camping in the shelters. Hence the relatively few artifacts, in number or kind, as compared with sites on Oahu and Hawaii. " (p. 139)

Bonk also provided a review of observations about West Moloka'i by early explorers and ethnographers which reinforce his conclusion that West Moloka'i was a dry, marginal, sparsely populated area of the island. The following are excerpts from these observations cited by Bonk.

> Captain George Vancouver:
> "The country had the same dreary and barren appearance, as that noticed on the south side, and I was informed it was equally destitute of water." (p. 16)
>
> Archibald Menzies, naturalist on Vancouver Voyage:
> "presents a naked dreary waste without either habitation or cultivation; its only covering is a kind of think withered grass, which, in many parts, is scarcely sufficient to hide its surface apparently composed of dry rocky and sandy soil." (p.16)
>
> Fornander in History of Kuali'i:
> "The cause of all the trouble was this: The chiefs on the Koolau side of Molokai were anxious to get possession of Kekaha, a stretch of country from Kawela to Maamomi (sp); and the reason why these chiefs were so desirous of getting possession of this section of country was on account of the fishing. But the chiefs of Kekaha, know the value of these fishing grounds, were determined to hold on to them, so this determination on their part caused a general internal conflict at this time. . ." (p. 17)

Although sparsely inhabited, Kaluako'i has several significant natural and cultural resources which the Moloka'i residents utilized on a seasonal basis or for specific purposes, as described below.

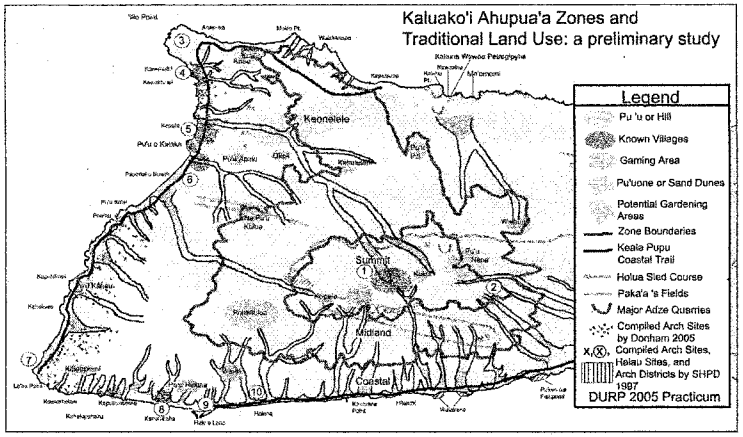
3.4 Cultural Zones of Kaluako'i

During the time of early Western contact in the Hawaiian archipelago, Westerners viewed Kaluako'i as an arid and sparsely inhabited land. Few were the Native Hawaiians spotted living in this ahupua'a. Therefore, Westerners often regarded the valleys and streams of Mana'e with the utmost importance. Beyond their grasp was that *"Moloka'i pule o'o* (Moloka'i of the potent prayers)," a "figurative reference to Moloka'i's fame in sorcery" (Pukui and Elbert, 1957:266; cited in Summers:15) was a spiritual island, an island of mana. Halona Kaopuiki shares with us the mana of Molokai.

> *"... when you look at Molokai, when you look at the island, it's a mo'o, it's a mama lizard, and all the valleys is the babies, that she is carrying on her back, of Molokai. My father use to tell us, where the mana stay, where's the defense of the lizard, the mo'o? The tail, the West End!" (Enos et.al., 2005:24)*

Without the mo'olelo (traditional story), the place names, and an understanding of the cultural uses and practices of Kaluako'i, the mana of Kaluako'i would have remained displaced by these Westerner's first impressions. The following text describes the three zones of the Kaluako'i ahupua'a based on the natural resources and the cultural uses and practices found within each zone. The mo'olelo of these areas are numbered to show the location on the previous map and the place names of SW Kaluako'i can be found in Figure 6.

Figure 5. Kaluako'i Cultural Zones Map



3.4.1 Maunaloa Summit Zone

Topography

The Maunaloa summit area extends from Pu'u Nana on the east to Maunaloa town on the west, basically the land above 900 feet elevation (Major 2000:8). A ridge extending southwest from Pu'u Nana forms a somewhat level plateau between gulches draining to the south and north. Due to elevation, winds with precipitation cause cooler temperatures. These temperatures, coupled with native forest of kukui, hala, 'ie'ie, 'iwa ferns, ginger, and hau (Summers 1971) thought to be present in the summit region prior to human impacts, lead to soil and climate conditions advantageous to traditional dry land agriculture. Such a forest would also have served to break the force of strong winds that today blow unabated across Kaluako'i.

Settlement

Extending across the top of the Maunaloa volcano, the summit zone habitation complex includes a range of sites indicative of cultivation and habitation. In regards to the area south of Pu'u Kukui, Fowke states:

> The surface over hundreds of acres around these ruins is covered with house sites, long straight rows of stones, and garden lots surrounded by stone walls. Shop refuse, mostly chips and spalls from adz making, sea shells broken to obtain mollusks, coral for abrading, adzes in all stages of finish, and many "olomaikis" (chunkey stones) [*ulu maika*] are found. (Fowke 1922:180; cited in Major 2000:8)

Kukui Village, whose name according to John Kaimikaua refers to "light", rather than the tree of the same name, was also located in the summit region. In this village grew large groves of the Iholena variety of banana. The underside of Iholena leaves is particularly silvery, and reflected the light of the fires so that it was visible as far away as O'ahu; this light led to the name of the village. This variety was prized not only for its flavor, but also for the stout trunks that were good for cultivating in windy areas.

Natural Resources

Adze quarries in the summit zone were used both for the kanaka maoli of Kaluako'i and east Moloka'i due to regional intensification of agriculture, thereby increasing the demand for finished adzes from west Moloka'i sources. Sinoto described the distribution of adze quarry remains on 'Amikopala hill as follows:

There are 13 localities on Amikopala Hill where there is evidence of adz manufacture on or in close proximity to basalt outcrops. The outcrops occur mainly on the western portions of the hill, with 2 major areas that cover an area of c. 500 sq m and consist of several boulders with flakes, spalls, and occasional blanks strewn around their bases. (Sinoto 1974; cited in Dye et. al. 1985:4)

Cultural Sites and Practices

The summit zone is where the head of major gulches are located, generally thought of as the source and the most sacred. The summit zone of Kaluako'i was known for its association with the gods and 'ana'ana (sorcery). This locality helped establish the saying amongst the kanaka maoli of the time throughout the archipelago, *"Moloka'i pule o'o*. Noted Kumu Hula John Kaimikaua describes this area is also esteemed as the birth of hula on the island of Molokai (Alu Like, 1985; Thompson, 1977). Here, a woman named Kapo ulakina'u was sought by the people of Molokai to teach the hula. However, overwhelmed by the amount of people who wanted to learn, she decided to teach and train her younger sister to be their instructor. The name of the first hula halau located at Ka'ana was *Ho'okuhi 'iu'iu*. This name derived from the expression that the dancers were to mimic or imitate the dripping of water in the caves of Mauna Loa . In time, this younger sister, who taught hula under the name Laka traveled the Hawaiian archipelago to spread this new dance. As Laka's fame grew, Kapo'ulakina'u's jealousy led her to leave the hula and learn sorcery in order to disrupt and distort the teachings of Laka. Consequently, Kapo'ulakina'u turned herself into stone where she remains at Ka'ana till this day. For this reason, in ancient days, if students forgot a step or made a mistake they would attribute it to Kapo'ulakina'u. As Laka's life came to an end, she returned to Ka'ana where she died and her body was buried under Pu'u Nana. At this time Molokai was praised as *Molokai Ka Hula Piko*, and subsequent generations would elevate Laka to a goddess. Kaimikaua further expresses his thoughts on this 'aina:

> *A lot of the past is still present here. If this place is used as a spiritual sanctuary a lot of the people would come especially for the "hula". There's not too many actual historical sites, you know of a "halau", where the "hula" was done. (Spalding, 1988:4)*

Lying approximately a mile ENE of 'Amikopala there is a hill with an outcrops of rock. The largest of these rocks is the *piko* stone, where newborns' umbilical cords would be placed. The Mauna Loa summit plateau was also the location for games and ali'i recreation. According to Kamakau:

> Here there was a maika playing ground just above Kaluako'i, to which all the players of Moloka'i, chiefs and people from Waikolu, Kalaupapa, Kala'e, and all the other places resorted to roll maika stones, slide pahe'e (torpedo shaped sticks used in another game), and play all kinds of other sports. (Kamakau 1991:129; cited in Major 2000:6)

Agriculture

The summit zone had the highest rainfall on the west end, along with well-drained soils. It was a good area for 'uala (sweet potato), a staple that allowed kanaka maoli to settle in drier climates. The heads of the gulches near the summit often times were good sources of water via springs, and served as sponges, thus leading to gardening activities beyond 'uala such as dryland kalo (taro), ko (sugarcane), and mai'a (banana). Although stone planting mounds or walls may be present in some areas, it is thought that many fields existed without durable physical traces.

Wahi Pana: Sacred Places and Their Mo'olelo

#1 Kalaipahoa

Moloka'i's great renown outside of the island is for its potent kahuna class, especially in the fields of 'ana'ana (sorcery). One of the greatest aids to a kahuna 'ana'ana (sorcerer) was in the ki'i (idols) that were made with wood made from trees said to be inhabited by poisonous spirits called kalaipahoa. These sacred trees were found in the uplands of Kaluako'i at the head of Kaka'ako Gulch. According to oral history, these kalaipahoa were instrumental in repelling an invading army from Kahiki; a group of warriors stationed on Pu'u o Kaiaka spied an army of canoes making for the bay. These warriors, daunted by the size of this army, called out for assistance from a kahuna who lived on a hill further back on the hill side. This kahuna advised the warriors to meet the invading army onshore while he chanted on the hillside. Indeed, so potent was the spell he created using the kalaipahoa, as soon as the aggressors landed they fell dead to a man. (Ka'opuiki, 2005) It is said that Kamehameha I, when landing on Moloka'i claimed one of these ki'i as his own, so great was his respect for its mana.(Kaopuiki, 2005)

#2 Ka'ana

Revered by many hula practitioners as the birthplace of the hula, or "ka hula piko" (the navel or center of hula). Kapo'ulakina'u lived at Ma'ohelaia on Mauna Loa, and originated the hula, enlisting the aid of her younger sister Laka to help teach others; she also remained there in the form of a rock, deciding never to leave the mountain.

3.4.2 Midland Zone

Topography

The midland zone extends just below the Mauna Loa summit zone (below 900ft) and extends to the coastal zone. The elevations near the coastal zones differ from the North, West, and South coasts due to various typologies of the three coasts. The midlands of the North and West coasts are exposed to winds with little or minimal rainfall. The midlands of the South coasts however were shielded from strong winds, and due to their typology and location near the summit zone, they enjoyed greater occurrence of precipitation.

Settlement

The midland zone bears few signs of human presence besides the trails that connected mauka with makai (from the mountain to the sea) and temporary transient shelters.

Cultural Sites and Practices

Along with various heiau, burial caves, and ko'a, many times located in this zone were shrines or ahu created for farming and fishing communities to exchange their goods. On the North Coast is the desert strip of the West End also known as Keonelele, "the flying sand." This desert strip connects Mo'omomi on the North Coast to Papohaku on the West Coast.

> Keonelele was said to have been a "large burial place" (Hawai'i Holomua, 1893). Emory removed 14 complete and four incomplete Hawaiian skulls (Bishop Museum Accession No. 94) from "... the lee side of a large sand hills on the north" (Emory, n.d.b:Mar 2). He estimated that there were at least 60 burials located here and, on the slopes of the hill to the N, at least 25 burials (Summers 1971:45)

Located in this zone on the West Coast are three Hōlua Sleds on Na Pu'u Kūlua;

> Two hōlua are on the W side of the hill, running downward in a westerly direction. They are 6 ft apart and each is 3 ft wide. Traces of paving for the northern one extended 24 ft in 1954, and for the southern one, 27ft. The third holua runs down the hill in an easterly direction. On top of the hill is a paved platform measuring 12 by 18ft, on which the survey station "Heiau" has been built (Summers 1971:51).

Located on the Eastern portion of the midland zone is Waihuna (Sacred Water), which is connected to Na'iwa on the makahiki grounds and serves as a paliuli (divine place of spiritual essence). According to Kaopuiki, "Waihuna is just like the heart of this area, very sacred grounds, if you walk up to the top you going see the whole nine yards" (Enos, et al. 2005).

Agriculture

This zone was not predominantly known for agriculture. Mainly dry land farming would take place in this zone, especially near where springs could be found. The major exception to this is Paka'a's fields located in both the southern portions of the summit and midland zones.

> Cooke (1949:119) was told that these were Pāka'a's fields, which he planted in sweet potatoes and sugarcane in order to be able to feed the king, Keawenuia'umi (Appendix A). Tradition locates the fields in "the uplands" from Paka'a's house (Site 75). Described as being six in number, they are said to have stretched "farther than the eye could reach." "Each field was shaped after each of the six districts of Hawai'i" (Fornander, 1918-1919:74). Kamakau said that the fields "...lay in a straight line from the upland of Punahou [Punakou] to the summit of the west side of the disk-(maika) playing site [Site 89] of Maunaloa" (1961:42;cited in Summers 1971:66).
>
> The sweet potato and sugar-cane patches were about a mile long and half a mild wide. Paka'a did his farming in the winter months when there was an abundance of rain. The plains were made fertile when the rain fell, and sweet potatoes and sugar cane flourished. His production was great (Kamakau 1992:42; cited in Major 2000:13).
>
> When the six overseers of the six districts of Hawai'i went with him to the patches, they found huge patches of sweet potato and sugar cane. One could run along the fields until his limbs wearied, that was how large each overseer found his patch [Paka'a had planted six fields for the six districts of Hawai'i] (Kamakau 1992:44-45; cited in Major 2000:13).

It is here that Handy had noted the presence of kuaiwi (1972:516;cited in Major 2000:9), a term that is most often referring to ridges of stone that marked field boundaries parallel to the slope and served as planting areas for perennial crops and famine food.

3.4.3 Coastal Zone

Topography

The North, West, and South coasts vary rather differently in their topography. Due to the sea cliffs of the North Coast (between 'Ilio Point and Mo'omomi), and its exposure to strong winds and big north swells, the North Coast tended to be void of permanent settlement. The exception to this is Mo'omomi, which was used as a fishing station. This area is mostly sand and pu'uone (sand dunes). Although strong winds and big north swells affect the West Coast, protected embayments along the West Coast served as safe places for landing canoes and shelter. The mouths of gulches are also strewn up and down the West and South Coasts, unlike the North Coast. They served as shelter and natural sponges of moisture. Papohaku Beach serves as a major canoe access point for the West Coast. The South Coast had access to generally calmer waters and shallow reef systems that were not found on the West and North Coasts.

Settlement

The North Coast tended to be devoid of permanent settlements mainly because of difficult access to the coastline and a lack of precipitation. Sheltered caves served as transient dwellings. As mentioned earlier, Mo'omomi was the major fishing station along this coast and would have served as the most logical locality to settle. The West

and South Coast differ rather dramatically from the North Coast in terms of settlement. Residential clusters were concentrated near protected embayments, generally below the 50 ft elevation (Athens et al. 1998:16) in order to access marine resources. They were also located near the mouths of gulches that served as gardening areas and potential areas for springs. Caves were also inhabited on the South Coast. As a result, the West and

South Coasts were able to sustain fishing villages in areas such as Kawākui'iki, Kepuhi, Papohaku, Kapukuwahine, and Kanalukaha (Kaopuiki 2005; Ne 1992). Also, constructed on the eastern portion of the South Coast are several fishponds that may be a clue that the South Coast of Kaluako'i had a somewhat large population.

Natural Resources

The ahupua'a of Kaluako'i has, and still is well known today, for its vast marine resources, especially Penguin Banks located on the eastern portion of the South Coast, off of Kapukuwahine. Along the boulder coastline were habitats for edible mollusks such as 'opihi, pupu'awa, pipipi, and a'ama crab, while in the near shore area algae were abundant with a variety of species, including the edible seaweed, limu kohu (Army Corps of Engineers 1984;cited in Weisler 1987b:9). The ranges of sea life found off the coasts of Kaluako'i follow different water zones (see Minerbi, McGregor, Matsuoka, 1993, pages 89 – 90), with favorites being moi, kumu, uhu, 'opelu, 'ono, akule, 'ulua, and 'ahi to name a few. Also found in this zone are the stratified limestone ('unu'unu pa'akea) of Hale O Lonono and various adze quarries or stations, mainly found on the North Coast, such as the Mo'omomi Quarry Complex and the Kaeo cone quarry.

Cultural Sites and Practices

Due to the importance of fishing and the marine resources found on and off the shores of Kaluako'i, ko'a or fishing shrines were abundantly found up and down the entire coastline along with a myriad of heiau and burials. It was possible for the kanaka maoli of Kaluako'i to access the coastline thanks to the Maui ali'i Kiha'a Pi'ilani who constructed a coastal trail, "Kealapupu i Moloka'i" (The shell road at Moloka'i). This trail was lined with shells to ensure safe travels at nighttime, thus further alluding to the vital significance of the marine resources. On the North Coast, Mo'omomi, in conjunction with Keonelele, served as burials in the sandy areas as well as Papohaku Beach in the pu'uone on the West Coast. Mo'omomi was said to have been "the place for the dead" (Ka Nupepa Ku'oko'a, 1921c; cited in Summers:41). Also located near this area is the Kalaina Wawae (carved footprints), which are a series of oblong depressions that are said to represent human footprints. These footprints were made as a prophecy of the arrival of the boot-wearing Caucasian (Summers 1971:44). In the Kawakiu area, the northern portion of the West Coast, Emmet Aluli (2005) explains a ko'a that was found there:

> ... and there was, kinda like, uh, a ko'a, a fishing ko'a that they pulled out 37 beautiful fishing hooks... but the more important thing was that the hooks were associated with the bones of the fish, ah. So, for the first time we thought, you could figure out what hook was used to catch what fish.

Further down the coast, a Wahi Pana located on the West Coast is Kaiaka Rock. This major outcropping between Kepuhi and Papohaku is home to a heiau facing Papohaku Beach and was used as an observation tower for fishing and scouting purposes. Just

below Kaiaka Rock, facing Papohaku Beach is a canoe heiau (Kaopuiki, 2005). Kaopuiki though is not sure of the name nor of any other such site located on the island. To the south of Papohaku Beach is Pu'u Koa'e, this area was used to strip the flesh of bodies prior to burial.

As mentioned earlier, on the eastern portion of the South Coast is Penguin Banks. Kaopuiki (2005) explains the function and significance of the area:

> Every finger on top here, we have fishing shrines. And if you do one survey of all these fingers, connected to the Penguin Bank. Moloka'i Nui A Hina owns the Penguin Bank. This is ours we want to save it for our generations. But every finger, where I pointing, get one heiau on top, a fishing shrine. Yeah, and were the ko'a stay, the finger stay. You going throw for moi. Next step in the ocean, the 'ulua, same finger, next step the 'ahi, and the deep water fishes, connected to the Banks. So we have ko'a's right through.

Also located in this area above Kanalukaha on Pu'u Hakina are bell stones, Kaopuiki (2005) recalls working with the Bishop Museum:

> Oh yeah, here, right here, Kanalukaha. Inside here, you know this place, I love this place because, this village over here, on top the village on top the mountain, we have bell stones, you guys know what is bell stones ah? On top there, get bell stones that I like save, that's the only bell stones I know now. So we found the bell stone, 3 on top there.

These bell stones are significant because when struck they would kani (ring), and would alarm the fishing village of Kanalukaha the arrival of an ali'i in his canoe. Just east of Kanalukaha is Hale o Lono. Following the pattern of Mo'omomi, Keonelele, and Papohaku Beach, Hale o Lono has also been noted as an extensive burial locality (Ka'opuiki, 2005).

#3 The Red Dog of ʻIlio Point

Geographic Location: ʻIlio Point, or "the Point of the Dog."
Characters: Shark god of Kainalu who takes the form of a dog when traveling on land.
Hawaiian Values: A desire to respect and pay homage to ancestors.

Summary
The shark god of Kainalu had an ancestor whose bones washed ashore on the NW end of Molokaʻi, and the people there gathered the bones and made a shrine. When the Kainalu shark wished to pay his respects to his dead ancestor, he could not go by water. He could not swim there and back between sunset and sunrise; and during the day, the shark gods of the other areas would be about. He found a solution; his mother was a dog worshiper, so he went on land and took the form of a dog. Every fifth year, he trotted to his ancestor's shrine at ʻIlio Point, did homage, and then slipped into the sea. Harriet Ne has seen the red dog sniffing along the roadside toward the NW point of Molokaʻi. There she has seen the dog sniff about the heiau, stand on a large slab of stone, and lift his head to howl. Then she saw him walk into the ocean and disappear.

#4 Pueokea, the Owl Daughter

Geographic Location: Kawākiu Iki
Main Character: Pueokea, a beautiful daughter who was born to a poor family who at dusk becomes a pale yellow owl.
Food Items: ʻUala, Fish
Makana: A wristlet of which their village of Kawākiu Iki was known. Such wristlets were three inches wide and made of the mother-of-pearl that washed up on the beaches during winter storms. The mother in the story made one for her daughter, Pueokea, and one for the son of the chief of a new village just south of theirs, because they were invited to attend a luʻau for his twentieth birthday.

Summary

Fearful of the people of the village, Pueokea's parents took their daughter to a secret cave. On the day that Pueokea was one year old, her mother went to her in the cave and gave her a beautiful yellow paʻu (skirt), some baked sweet potato, and the wristlet of mother-of-pearl. As night came on this day, Pueokea took the form of an owl, and flew southward never to return. As twenty years passed the parents received an invitation to attend a luʻau for the chief's son of a nearby village. Making a wristlet as a gift for the chief's son, the mother forgot her gift and did not remember it until they reached the luʻau. Ashamed they lingered in the background until a group of dancers, all wearing red paʻu, came out. One of them, a short, very fair and beautiful girl, was wearing on her arm a wide mother-of-pearl wristlet. Instantly her mom knew that it was Pueokea. After dinner the guests were to present their gifts. Pueokea's parents were to be flogged for not bringing a gift. Pueokea ran forward and offered her wristlet as a gift. Because of her beauty the chief's son pleaded with his father to let her parents go, and so they were

released. The chief's son soon fell in love with Pueokea. However, as night came, she turned into an owl and flew to the north. Knowing where she would go, her parents told the chief's son how to find the secret cave. He left at once, arriving at dawn. Pueokea greeted the chief's son with an exclamation of joy, and they were married soon after. Each time a child was born to them, a yellow owl appeared on the plains mauka of Kawakiu. It was kapu to kill an owl, especially a pale yellow one.

To this day, one who is driving along the highway to Maunaloa and to the hotel at Kepuhi may see an owl at night flying across the roadway. Pueo have been known to be helpful to motorists stranded at night.

#5 Kepuhi, Village of the Eel

Geographic Location: Kepuhi, a small village in Kaluakoʻi on West Molokaʻi
Characters: Lono Nuʻuhiwa- last chief, Keao- fish spotter, Anuhea- girl from Makapuʻu, Oʻahu.
Deities: Moray Eel, guardian god, ʻaumakua of Kepuhi.

Summary

For generations Kepuhi was ruled by the Nuʻuhiwa family, and their last chief was Lono Nuʻuhiwa. On his sixtieth birthday, even though there was a great feast, he was sad for he had not named a successor. He was fond of Keao but knew that Keao was too soft to be a leader.

One day Keao saw a canoe floating in the ocean. As it came closer, he noticed that there was a beautiful girl in the canoe. The girl was unconscious; when she awoke she mentioned that she was from Makapuʻu, Oʻahu and that she was fishing with her brother when they were attacked by a large eel at Makapuʻu. The chief was in wonder as the guardian god of Kepuhi was a giant moray eel.

Auhea and Keao fell in love, and soon Auhea became pregnant. One night, the kahuna dreamed that the chief of the village to succeed Lono would have the mark of the eel on his body. A few nights later, the chief died.

Three months later, Auhea gave birth to a husky boy. As Auhea lifted the baby to the kahuna, he saw three white marks running down the right side of the baby's face from his ear to his mouth. Instantly, the kahuna broke into a joyful chant: "Behold the mark of the eel. Behold the high chief of Kepuhi." And so life was lived, in harmony and balance, in the village of Kepuhi.

#6 Papohaku, the Stone Wall

Geographic Location: Papohaku Beach
Characters: Chief and his people from East Moloka'i, Kahuna of Papohaku Village.
Hawaiian Values: Preserving that which is sacred or scarce (Kapu of the fish 'opelu); respect and homage for deeds of unselfishness.

Summary

A chief from east Moloka'i and a few of his people boarded canoes and set off around the island. They found themselves on the southwest coast of Moloka'i. They paddled up to some fishermen who had a large catch of 'opelu. Hungry, they began to eat. As they were all eating with great satisfaction, another group of fishermen came by and cried: "Stop. Do not eat the 'opelu. This is the season of 'opelu kapu." However, the visiting chief only had a kapu for eating turtle, so they continued eating.

Mad with outrage and fear, the fishermen attacked the visiting chief and his men. Overpowered, they were brought before the kahuna. The visiting chief became very ill, and the only way to make things right was a human sacrifice to save the chief from death. One of his men offered himself as a sacrifice and the chief recovered.

The kahuna ordered a tree planted on the grave of the willing victim. The grave was on shore; when the tide was high, the waves would wash sand from the grave. Thus, in a very short time, the body would be exposed. In respect and remembrance, the chief ordered his men to build a stone wall about fifty feet long. All with gratitude of their fellow, the chief ordered the wall to continue for another two hundred feet. The chief himself put the last stone on the wall, saying as he did so, "I call this place Papohaku, 'Stone Wall.'"

#7 Ka Lae o ka La'au, the Point of the Branch

There are three versions of the naming of La'au. The first comes from Harriet Ne, a kupuna of Molokai who was the source for *Tales of Molokai*. The subsequent versions can be found in Summers (1971:54) who compiled and provided a complete listing of known sites for *A Site Survey of Molokai*.

Version 1

Geographic Location: La'au Point
Characters: Shark god of Kainalu, shark god of Kaua'i.
Natural Resource: Hau branch, seen as a gift from strange canoes cruising offshore.

Summary

More than two hundred years ago, the shark god of Kainalu left his home off Moloka'i and traveled to Kaua'i. Romping in the ocean with the shark god of Kaua'i, a floating large branch of the hau tree became stuck on the back of the Moloka'i shark. As he swam back towards Moloka'i, there, off the SW point, the hau branch came loose and was washed ashore. As the people on the beach saw it float ashore they took the branch and carried it inland to a fertile bit of land where some wild 'Ilima grew. There they planted it and their chief, Kuamu, said, "We shall call this place Ka Lae o ka La'au, or 'the Point of the Branch.'" This hau is not like the Hawaiian variety; it is short and sprawls close to the earth, bending like a vine before the winds, but its blossoms are beautiful, so beautiful that the people of Moloka'i offered them to their gods.

Version 2

Geographic Location: La'au Point
Characters: Palila

Summary

Subsequent to leaving Kahului, Palila found himself on the rise of Hanauma [O'ahu] looking at the heat rise from the pili grass of Kaunakakai, Moloka'i. He then thrust his

war club [la'au palau, spear-club] ahead of him, which flew through the air and landed at Kaluako'i. Here he discarded a portion of his person, which turned into the point of Kalaeokala'au. However, at this place was a large stick of wood named Ho'one'enu'u. Thereby causing Palila to dislike Molokai and once again thrust his war club into the air landing at Kaunolu, Lanai.

Version 3

Geographic Location: La'au Point
Characters: Palila

Summary

A hero from Kaua'i, and feared with the kapu of the gods, Palila was blessed by the gods of Manokalanipo and he received a short spear [la'au palau] that allowed him to fly anywhere. With an appetite for women, Palila came to dwell on O'ahu. Not long after, Palila heard the fame of Moloka'i and flew to Kaluako'i near pu'u KihaaPi'ilani. At first, the women were greatly attracted to him. However, when they began to know him better, the women kept their distance. Nonetheless, the young men of Moloka'i went to consult a kahuna. Due to the mana of the gods of Moloka'i, Palila's spear lost its mana. Upset, Palila threw it away till it fell and landed on the cape [Kalaeokala'au].

#8 and #9 Kanalukaha and Hale o Lono, Villages of the Two Brothers

Geographic Location: Beginning in Kona, Big Island and ending in Southwest Moloka'i
Characters: Two brothers and their sons, Kepa Kepelino (Farmer) and Keao Kepelino (canoe builder)
Hale o Lono: 'House of Lono'; named by Kepa in honor of Lono (God of Harvest/Agriculture, Health, and Weather)
Kanalukaha: 'Fourth Wave'; named so because of the fourth wave that was used to help push the canoe out into the ocean from the canoe pit.
Food Items: pig, poi (Kona, Big Island); dried fish, 'uala, moi, (Southwest Moloka'i)
Resources from Big Island: taro, sugarcane, banana seedlings planted in ravines near water holes.

Resources Found in Southwest Moloka'i:

1. Kukui Tree- all parts of the tree are useful.
2. 'Ulu Tree- used as food and used to make a gum out of the sap to plug canoe.
3. Spring- discovered by watching birds flying overhead dive down and come up again.
4. Milo Tree- used to carve the image of Lono.
5. 'Aiea Tree- used to build a canoe, took four days to find a tree big enough for a canoe.
6. Uliuli- stone used to make small adzes.
7. Ehuehu- stone to make axes.
8. Kumumoe- sandstone, used to smooth rough spots on canoe.

Deities: Lono (God of Harvest/Agriculture, Health, and Weather)

1. When paddling up the SW shore of Moloka'i, Kepa saw a cliff with "impressive black stones" forming the entrance to a cave. He was inspired to build a temple for the worship of Lono on the face of that cliff. After inspecting the cave, the brothers were impressed with the view of the ocean, beautiful and mysterious from that height. Kepa and Keao decided to spend their first night in the cave. They also decided to settle and start a village. Moving out of the cave, they consecrated the cave as a heiau and named it 'Hale o Lono'
2. A heiau was built with offerings of 'ulu and moi to have Lono's blessing on the newly planted cane and seedlings. If crops were improved, they would offer Lono products of the garden every night of the new moon.

Ku (God of War and Canoes)

1. Keao calls upon Ku by chanting a prayer in the ritual of canoe launching; thanking him for helping build the canoe in a place where material was so scarce.
2. Keao builds a ko'a (fishing shrine), offering one small moi, one kumu, one large moi, and sugarcane to Ku.

Summary

Two brothers, Kepa Kepelino and Keao Kepelino are told by their father that they must go to another island and find a place to settle and raise their families. They set off with their sons to find a new home. First stopping at Ma'alaea Bay on Maui, then Keawa Nui on SE Moloka'i, they finally make their home in SW Moloka'i. With the discovery of water they soon find the place livable. Their subsistence is based on simple agriculture and fishing. Soon the two brothers separated, Kepa to the gulch where he had planted his crops near the shrine to Lono, and Keao to the north of the halau wa'a (canoe house). The two families lived peacefully thereafter, sharing their crops and their fish catch like good brothers. Together they performed the ceremonies for good harvests and abundant fish catches.

As the sons grew older they married women from Punakua, the nearest village. When the families were too large for the amount of water, it became clear that some of the people would have to move- but so loving were they that they preferred to abandon their villages and move together to a new location than to separate.

#10 Halena, the Yellowing

Geographic Location: Halena, Southwest Moloka'i
Characters: Kahekili, ruling chief of Maui and a lesser chief of Southwest Moloka'i.
Hawaiian Values: Humility, Hospitality, and Ho'ailona (use of signs).

Summary

Kahekili, the ruling chief of Moloka'i who lived on Maui, had made plans to invade O'ahu. Stopping on Moloka'i to get supplies, he and his men paddled to the southwest coast of Moloka'i to find drinking water. As they landed, Kahekili sent his men to explore the land. He then heard a large wail of a newborn, and he and his men discovered a large cave containing several people. Recognizing that Kahekili was an ali'i nui, the father of the infant welcomed him according to royal traditions and introduced his wife and baby son.

Subsequently, Kahekili offered white tapa as his gift to the newborn son of this lesser chief. As custom, Kahekili breathed upon the tapa, as did the lesser chief. As the lesser chief did so, the white tapa turned yellow, a sign that he was sickly. The lesser chief offered hospitality of his cave and a meal to Kahekili and his men for the night.

In the morning, when Kahekili asked the name of the place the lesser chief responded, "There is no name for this place." Kahekili responded, "Then I shall call it Halena because of the sign of the yellowish tapa."

#11 Weke Pueo

Geographic Location: West End coastline, especially near Kolo
Characters: mano,weke pueo
Marine Resources: mano, weke pueo
Hawaiian Values: dreams have a source and meaning

Summary

An injured mano (shark) was swimming from Maui to Molokai and the weke pueo followed it to the southwest shore of Moloka'i, drinking the blood that was flowing from its wounds. Because the weke drank the blood of the mano, it was poisoned forever. People who eat the head of this weke will be cursed by nightmares.

3.5 Wahi Pana

Figure 6. Wahi Pana Table

Name	Suggested Translation and Tale of Naming	Desc.	Cultural Sites and Information
ʻAmikopala	Waving Ripe Sugar Cane	Adze Quarry	Heiau located on the eastern spur of ʻAmikopala and to the ENE of ʻAmikopala is a piko stone. Formerly, the location of adze quarries, maika playing ground, the "Sisters of Kalaipahoa", and to the south, were Paka'a's fields for sweet potato.
Hakina	A Remnant, broken piece	Gulch/Hill	Ko'a facing south on the rising ground N of the beach and road. Kalalua heiau located on the flat land at beach level. Emory believed that this heiau was probably used to mark the seasons due to the exact N and S positions on opposite sides of the platform. Here, on a low rocky hillock are three stones standing in line with petroglyphs.
Halena	Yellow Trough	Gulch	
Hale o Lono	Lono's House	Land	Described as "... a fishing station formerly quite a village below 'Maunaloa,' Molokai" (*Saturday Press*, 1883. The Malualua is its wind. Burials in the sand dunes were noted in 1952. Ko'a located in the shelter of the Hale o Lono cliff and on the headland to the E of Hale o Lono cliff.
Hikauhi	Name of the daughter of Chief Hoʻolehua and his wife ʻ(I)loli. She became the wife of P(a)kaʻa and mother of the famous K(u)aP(a)kaʻa. She was lost during labor pains and her husband searched vainly for her, hence the saying applied to fruitless endeavors, Hikauhi i Kaumanamana	Land/Gulch	Formerly a fishpond here to the E of Hikauhi Gulch.

Wahi Pana Table p.2

Ka Lae o Ka La)'au	1. Cape of the trees or the Point of the Branch. In reference to when the shark god of Kainalu traveled to Kaua'i. There, a branch of the hau tree became stuck on the back of the shark god. Returning back to Molokai, off the Southwest point, the hau branch came loose and was washed ashore. The people on the beach took the branch and planted it amongst 'ilima. Their chief, Kuamu, said, "We shall call this place Ka Lae o ka La'au, or 'the Point of the Branch.' (Relates to Harriet Ne's Mo'olelo) 2. Named for the famous club of Palila, the Kaua'i hero who, with a spear given him by the gods, leapt to Kiha a Pi'ilani, a Moloka'i hill, and there attracted all the women; the angry and jealous Moloka'i men fought him. His club lost its mana to the gods of Moloka'i, and so he threw it away; it landed on this cape. (Ka Nupepa Kuokoa, July 6, 1922.)	Cape	Ko'a once located at the site of the lighthouse. According to Kamakau (1869a), Kalaeokala'au was one place where "... where stone-cutters made adzes. The stone there were the ho'okele and the makai'a, also called the mahikihiki."
K(a)'ana	Division	Land	According to Emerson (UL 45), a rock here is the body of Kapo, a hula goddess and sister of Pele. The hill is said to be the site of the original school where the ancients learned hula dancing of every kind. Above the hill lived K(u)aP(a)ka'a, the punster and hero; he taught men to farm, build houses, and fish. (Ka Nupepa Kuokoa, September 14, 1922.)
K(a)haiawa Kahai'awa Kaha'iawa Kaha'i'awa K(a)ha'iawa K(a)ha'i'awa	The sacrifice [in a] bay The sacrifice [of the] bay The breaking [by the] bay The breaking [of the] kava plant The bay belonging to someone else The kava plant [or drink] belonging to someone else	Land	
Kahalep(o)haku	The stone house	Land	Heiau 10ft from the edge of a high cliff overhanging the sea. Believed to be the site where Kihapiilani was brought up.
Kaheu	Gourd?	Gulch/Hill	
Kahinawai0	Hina's water	Gulch	
Kaluakanaka0	Oven-baking man	Headland	
Kaluakau	The elevated pit	Headland	Heiau to the E of Kukuku Gulch
Kaluako'i	The adze pit	Ahupua'a	

Wahi Pana Table p.3

Kaluaokawahine	The pit of the woman		
Kam(a)ka'ip(o)	The night guard	Gulch/Point	Ko'a on the northern side of the gulch, 200 ft E of the beach. A number of house sites S and E of the ko'a in the gulch. In addition there is a trail and two structures similar to a ko'a. Ko'a also located at Kamakaipo Point.
Kamanakai	The sea power or the sea branch	Gulch	
Kanalukaha	The fourth wave	Beach/Point	Canoe Halau, located E of Kanalukaha Point. NE of the point is located a heiau and a house site on a bluff to the east of the heiau.
Kapalik(o)(i)	The sliding cliff	Cliff	
Kapuhikani	The sounding eel	Point	Heiau to the N of Kapuhikani Point and a Ko'a to the SE portion of the Point.
Kapukuwahine	The gathering place [of] females	Coastal Area	
Kaumanamana	Place branching out	Bay, Reef, former fish pond	Broken wall of old fishpond here at the mouth of the gulch between Kolo and Hikauhi Gulches.
Kaunal(a)	Placing sun	Bay/Gulch	Ko'a located on the bluff north of the bay and to the S of the stream of Kaunala Gulch with house sites in the vicinity.
Kaupoa			
Keanaka'iole	The cave of the rat	Gulch	
Keawakalani	The channel of the royal chief	Beach	Ko'a, SE of the former wireless station at the edge of the rocky beach as well as to the W at the edge of the cliff.
Kihaapiilani	Kiha [child] of Pi'ilani, name for ancient Maui chief.	Hill	Eastern side of the hill there was once a spring from which barren women drank and were then able to conceive.
Kolo	Crawl or Pull	Land	Foundations of Paka'a's house site found on the flat land E of the stream bed of Kolo Gulch. Trail from beach to the slopes below 'Amikopala on the W side of Kolo Gulch.
Kopala	Below was a trail leading to P(a)ka'a's sweet potato patches. (Cooke 119).	Hill	
Ku)k(u)k(u)		Gulch	2 heiau on crest of gulch at head on eastern side; fishpond was located here
Mauna Loa	Long Mountain; Occupies whole western end of island	Mountain Mass	
Naninanikukui		Gulch	Fishpond located between Naninanikukui and Keanaka'iole Gulches.
Oneohilo	Sand of Hilo	Gulch	
Onopalani		Gulch	
P(o)hakuloa	Long stone	Hill	
Pu'u Ho'olehua	Hill of Ho 'olehua	Hill	Here, after the death of Laka, when travelers would like to visit Ka'ana they would have to pay homeage facing Ka'ana while on Pu'u Ho'olehua.
Pu'u N(a)n(a)	Observation Hill	Elevation	On summit of Mauna Loa
Pun(a)kua	Spring [of the] gods		

Wahi pana table p. 4

Punakou	Kou tree spring. The god K(a)ne brought forth fresh water here (HM 64)	Land/Gulch	
Waiahewahewa	Water of Hewahewa	Gulch	From crest of Mauna Loa to Palaau#1. On cliffs at east side of its head is heiau.
Waiak(a)ne	Water [made] by K(a)ne.	Gulch	Heiau or possibly housesites at its head, broken walls of large fish pond at SE entrance probably modern? Kamakau mentions a spring at Waiakane: "Kane and Kanaloa also broke stones, allowing cool, refreshing water to gush forth... at Waiakane, at Punakou on Moloka'I" (1867).
Waiaooli		Gulch	
Wai'eli	Dug water	Hill	Heiau on crest. A burial located in a small gulch W of Wai'eli Hill.
Waihi'i	Lifted water	Gulch	

3.6 Subsistence, Cultural and Spiritual Resources and Practices

3.6.1 Overall Cultural Significance of La'au Point

La'au Point and the western and southern coastlines of Moloka'i which converge there have always been remote and isolated. As noted above, it was sparsely populated prior to contact. At the time of the Mahele in 1848 no claims were filed by maka'ainana to the area and it was designated as government land of the Kingdom of Hawai'i. Beginning in 1875, the La'au Point area was part of a ranch that was operated in the Kaluako'i ahupua'a by Charles Reed Bishop who had purchased Kaluako'i from the government of King Kalakaua. In 1893 Charles Reed Bishop transferred ownership of Kaluako'i to the Bishop Estate. In 1898 the Bishop Estate sold Kaluako'i to Moloka'i Ranch. Throughout the twentieth century the western and southern coasts adjacent to La'au Point continued to be part of Moloka'i Ranch and access was a privilege reserved for stockholders and employees of Moloka'i Ranch. Even during the years that the area was owned by Alpha U.S.A., this area was never developed and access was restricted.

According to John Clark's Hawai'i Place Names: Shores, Beaches, and Surf Sites, a light to guide navigators was established at La'au by the monarchy in 1881 and automated in 1912. When the lighthouse was manned, a small inlet on the north side of the point was used to service the lighthouse and it was called La'au landing. A boom extended over the inlet to unload the lighters that were brought ashore from the interisland steamers. Only a few concrete foundation blocks remain. (Clark, 2002, p. 205)

George Cooke, in his history of Moloka'i gives the following description of the Burrows family who lived at La'au Point:

> John Burrows was a haole who kept the lighthouse on the west point of Molokai, at Kalae o ka Laau, in the days when kerosene furnished the lights. John had been a retainer of the King, and as he was subject to an over-indulgence in liquor, he was sent to this isolated spot, the idea being that he might be helped to overcome his weakness. John married a Hawaiian woman, Koa by name, and raised a large family at the west end. It was a familiar sight to see him with them all in an open cart drawn by mules, coming across the wide plains to Kaunakakai for their supply of provisions. One of his sons, David, is purported to be the inventor of the "steel guitar.' Several sons have worked for the ranch.
>
> Sam Burrows, Sr., a present employee and son of John, tells of being sent by his father, to swim out from the west point to meet a steamer to deliver a letter corked tightly in a bottle which he carried with him. This letter contained an order for more kerosene for the lighthouse. (p. 132)

A Burrows descendant confirmed that there was a road from La'au to Kolo and all the way into Kaunakakai. His grandfather would drive into Kauanakakai to replenish oil for the lighthouse lamp. There was also a road from La'au to Mo'omomi. The Burrows family would go along this road and catch fish and salt it and put it in the barrel and then go with a wagon to pick it up. At the time that Burrows family first lived at La'au Point there was no kiawe, it was all pili grass. They would have to go up to Maunaloa to get wood. The family also placed white coral all around the outside of the lighthouse so that when it rained they wouldn't track mud into the lighthouse. Sam Burrows, who was described by George Cooke above, was also an excellent fisherman. The story is told that he would ask his wife to start the fire as he headed to the ocean. He would then jump in the water and when he came back the fire was just right for him to grill the enenue that he had caught.

At present, La'au Point itself, as mentioned above, is owned by the U.S. federal government which maintains a "lighthouse" as a navigational aide. A total of 51 acres at La'au Point is managed by the U.S. Coast Guard and will remain vacant and undeveloped land. According to Clark, the 20-foot steel pole supporting the light stands approximately 132 feet above sea level.

In Hawaiian tradition, lae or points of land into the ocean are culturally significant. As a feature, the lae includes not only the point itself, which can be visualized as a nose on a face, but also the forehead, the land formation from which the point juts out into the ocean.

A large part of the significance of the La'au Point area is that it is raw and untouched. It is so isolated that most of the residents of Moloka'i have never even been there and have no direct experience with the place. This factor gives La'au an almost mythical quality. La'au Point has become an icon of what Moloka'i represents - a rural stronghold and reserve of Native Hawaiian culture, a cultural kipuka. If Moloka'i is "The Last Hawaiian Island" then La'au is one of the last untouched Hawaiian places on "The Last Hawaiian Island."

In Hawaiian tradition, La'au Point represents a point of no return. For those traveling by canoe from O'ahu to Moloka'i across the Kaiwi Channel, once La'au Point is sighted, there is not turning back to O'ahu. This concept has been applied to the issue of the development of the La'au Point Rural-Residential Subdivision. Many Moloka'i residents feel that if the west and south shores adjacent to La'au Point is developed, as proposed, that this will open up Moloka'i to new residents unfamiliar with the culture and way of life on Moloka'i and lead to irreversible cultural change.

Everyone interviewed and those who came to community meetings had reservations about the proposed development. No one was an enthusiastic advocate and the most vocal were opposed to the development. The Maunaloa kupuna and larger community and longtime employees of Moloka'i Ranch have the most direct and longtime experience with the area proposed for development. While they are concerned and reluctant about

the development, they are also willing to acknowledge and support the right and the need of the Ranch to seek the development. They felt that the negative impacts could be managed if the development would conform to the strict covenants, conditions and restrictions outlined in the Community-Based Master Land Use Plan for Moloka'i Ranch. They also felt that the negative impacts would be offset with the gifting of important legacy lands to the community. In addition, many longtime adversaries of Moloka'i Ranch who were involved in developing the land use plan were willing to allow the development to proceed under guidelines and conditions agreed to over the course of a two year planning process.

Mana'o:

Nobody in this room wants to see La'au developed, but if it is developed, we should do it our way.

3.6.2 Access and Trails

An essential aspect of Native Hawaiian cultural and subsistence practices are access routes to reach subsistence and cultural resources. Informants shared the following information about trails and roads through which they access resources in Kaluako'i.

• Trail on 1886 and 1897 Monsarrat Map
Maps produced by M.D. Monsarrat for the Hawaiian Government Survey in 1886 and 1897 clearly show a trail going from Kapalauoa near Mo'omomi to 'Ilio Point and from 'Ilio Point along the west coast to La'au Point.

• Ranch Access Policies
When the Cooke's owned Moloka'i Ranch, access to the west and south coastlines adjacent to La'au point was limited to the Cooke family and the Ranch stockholders. According to Rikki Cooke, his extended family frequented the Kaupoa House. There was also a cabin at what is now Kaluako'i Hotel.. Mr. Joao took care of the cabin near Kaluako'i which was rented for $5 a night. The Egusa's took care of the Kaupoa house which was rented out for $10 a night.

The Cooke family did not camp on the south shore. Ranch employees, mostly cowboys camped on the south shore. Some of the cowboy families camped at certain spots so often that it became know by their name, such as Joao camp site. The camp sites were well-cared for. If a camp site was left with litter, one would not be allowed to get a pass to camp again.

According to Cooke, members of the Recreation Club of Ranch stockholders could rent Kaupoa up until the Cooke family sold the Ranch. Toward the end of the era when the Ranch was owned by the Cooke family, the stock went public. If you had one share you could rent out Kaupoa House for fishing and hunting. According to Rikki Cooke, the Recreation Club of stockholders made $100,000 a year on hunting and fishing. The Kaupoa house was booked every weekend of the year, mostly by offisland Kama'aina.

The Libby Plantation workers were not ranch employees. The plantation employees were allowed access to Hale O Lono, Halena and Kolo or to the Del Monte cabin at Kawa'aloa. When the pineapple operations closed in the 1970s, access was discouraged and finally closed in 1975 after the bridge burned down. After the plantation closed and the resort operations opened, Ranch employees and resort guests were permitted access.

Ranch employees could go hunting and fishing the whole West End under a pass system that was initiated by Aka Hodges when he was the manager and honored by successive managers. Ranch employees could sign up for an area to go hunting and fishing on a first come, first serve basis. The designated areas were spaced sufficiently apart to allow enough space for fishing. Each group was supposed to stay within the designated area that they were assigned. At one time retirees were extended privileges of fishing and hunting, but under the Hodges pass system to present, once employees retired they had to turn in their keys. They were no longer extended the privileges of hunting and fishing that they had enjoyed while employed by the Ranch. The Kaupoa pasture was reserved for the Cooke family and the stockholders Recreation Club.

The rest of the island could only access the Ranch's West End lands with a Ranch or plantation employee.

Currently, a subsistence committee of the Maunaloa community manages permitted access by Ranch employees. Guided access is also provided to hotel guests and guests of out-sourced commercial contractors who offer a range of recreational activities on the Ranch. Employees and their families usually camp out on weekends. However, employees who are off on week days can go during the week. The north portion of the Ranch lands have hunting so its closed to hunting in July, August and September. A $50 deposit is required. They are limited to two or three vehicles and ten adults. ATV's and motorcycles are not allowed. Families can go only once a month to give everyone a chance. Gathering is allowed for parties, and there is a 3 gallon limit on 'opihi.

• Access for Plantation Workers
During the period of the pineapple plantation the Maunaloa community had ready access via a road from Maunaloa through the pineapple fields, to Hale O Lono and as far as Halena. When the pineapple operations closed in the 1970s, access was discouraged and finally, around 1975 the pineapple bridge along the road was burned down and access to Halena from Maunaloa through the fields was cut off.

• Hale O Lono
From the 1960s to present, Hale O Lono is the launching point for the annual Moloka'i Hoe Men's and Women's races.

Those who fish and hunt in the area get dropped off at Hale O Lono and go on foot along the south shore. Some do fishing with bamboo.

The opening of public access to Hale O Lono increased access to the south shore out to La'au point - both by foot and by boat. While it is still a long walk from Hale O Lono along the south coastline to La'au, it is closer than what it had been. Hale O Lono also provides a closer point for boats from Moloka'i to launch and get to the fishing grounds and 'opihi covered rocks of the south coastline.

• Hui Ala Loa
Hui Ala Loa opened access from Pala'au to Kolo in 1975. According to an informant the access was closed when people left rubbish and poached deer on Ranch property.

• Native Hawaiian Access
Native Hawaiian access rights protected under law and are guaranteed under the Community-Based Master Land Use Plan for Moloka'i Ranch.

• Access Patterns
Informants who fish in the area and did not have a key would be taken by jeep to the fence line and walk in from there - about an hour.

The opening of Kaluako'i and Papapohaku afforded closer access points to the western coast south to La'au Point - both by foot and by boat. Fishermen could begin at Kaunalu bay or what the community calls "Dixie" to walk south to La'au. Boaters can launch from Kaunalu bay and even an area off Kaluako'i Resort.

3.6.3 Identified Coastal Resources

A dozen persons filled out the survey forms. They identified the following as cultural resources in the area proposed for development.

Coastal Cultural and Subsistence Resources

x	streams	x	ponds
____	'auwai (taro irrigation ditches)	____	lo'i kalo
x	springs	x	caves
x	trails	x	wahi pana (named places)
x	sacred places	____	dunes
x	landings	____	bridges
x	surfing sites	x	sandy beach
x	fishing area	x	fishpond
x	fish trap	x	fish house
x	hunting areas	x	kilo i'a (fish sighting)
x	muliwai (brackish pond)	x	anchialine pond
x	trails	x	salt ponds
x	wells	x	turtle nesting area
x	historic walls	x	basalt veins for tools
____	alae vein	x	salt pans
x	shrines	x	salt gathering areas
x	ko'a (fishing shrines)	x	heiau (temples)
x	historic sites	x	cultural use areas
x	ho'ailona (natural signs)	x	sighting place
____	lele (cliff jumping spots)	x	native plants
x	pu'uhonua (places of refuge)	____	holua slides
____	cultivation area	____	leina (jumping off point
x	archaeological sites	for souls to cross over)	
x	burials	x	kupe'e
____	o'opu	____	hihiwai/wi
x	aholehole	x	'anae
____	steam bath areas	x	bathing pools
x	limu gathering areas	x	lava tubes
x	subterranean water course	x	petroglyphs
x	kapu kai/hi'u wai areas	x	paddling areas
x	artifacts	x	view plane
x	seasonal residential sites	x	burial markers
x	water caves	x	birthing stones
____	phallic stones	x	Pohaku Kane
x	coral reef	____	estuary
x	spawning grounds	x	house sites
x	po kane routes (night marchers	____	dams
x	'aumakua (ancestral deities) domain		

They added the following additional resources:

monk seals, Hawaiian moth, water catchments, bell stones, ahu stones, chamomile type flower for clearing liver, shells on shore.

Along the south shore, informants identified the various fishing and gathering areas by points that they referred to as first point (Kanalukaha), second point (Kapukuwahine), third point (Kahalepohaku) and fourth point ('Opihi Road). According to informants there's moi and aholehole 'opihi and 'a'ama crab on the south shore. The 'opihi starts at Kapukuwahine on the south shore and out on the cliffs along what they refer to as 'Opihi road. The western shore is known for moi, aholehole and lobster.

3.6.4 Subsistence Fishing and Gathering

Participants in community meetings and the key informants speak of the south and west coasts adjoining La'au point and its nearshore waters as reserve of marine resources which serve as their "icebox." It is a place where fishermen usually go to get fish, 'opihi and crab for parties and gatherings of their large extended families.

The southwest shore also factors into the life cycle of the mullet, serving as a hatchery area from which they move east to Mana'e or East Moloka'i.

Due to the seasonal ocean swells, the south shore is usually harvested in the winter time when there are north swells and the west shore is usually harvested in the summer time when there are south swells. They also speak of the ocean as being very treacherous and not safe for swimming. Off of La'au Point itself, informants spoke of a very strong current which has swept even the best divers out to the open ocean.

Traditionally, it is not a place that was fished on a regular basis because it is isolated and difficult to reach. However, the increased use of boats on Moloka'i and O'ahu has changed this. Informants noted that the resources have declined in the area with heavy seasonal harvesting by boaters from O'ahu and the opening of Hale O Lono harbor and Kaluako'i as closer launching points for Moloka'i boaters.

• Last Protected Area
A lot of gathering and subsistence activities take place at La'au because it is the last area on the West End that is protected from general public access.

• The "Icebox"
La'au is a reserve for marine resources where families go together as a group to fish and gather resources for family parties. When there is a large family gathering, informants said that they go down to southwest shore to get crab and 'opihi.

• Treacherous Ocean
Fishing and diving along in the ocean in front of the proposed development is unsafe. There are not too many sandy beaches. The current is very strong. Fishermen say the current is mean - it can huki or pull one out to the deep.

• Seasonal Fishing
In the summer the south shore gets more swells and those who fish near La'au usually fish on the West shore. In the winter time the north shore gets the swell and so the fishing is usually on the south shore. Informants fish on both sides of La'au Point. There's a lot of fishing after winter and before summer when the graduation and wedding parties come up.

• Camp Out
Because they would walk out to La'au, they would have to camp overnight. They would go in the evening, stay overnight, fish overnight and during the day and then go back. When camping overnight and fishing they would just bring cooked rise. They would also bring salt, because sometimes the salt on the rocks wasn't clean. They would eat what they catch. They could cook the fish right on top of the kiawe coals and peel the skin. They did not carry ice because it is too heavy. Whatever fish they caught early, they would eat down there and then they would catch more fish and go home.

• Hatcheries
The shoreline provides a hatchery for young fish.

According to intervenor Vanda Hanakahi, La'au is the place where the fish gather to begin their eastward journey along the Molokai coast to spawn at Pala'au, and then move on toward the eastern shores of the island. An old 'olelo (saying) about Molokai is: "Moloka'i Kai po'olo'olo'u" meaning the ocean is turbulent along the shoreline. In olden days, the coastal waters were teeming with fish and their movement created the turbulence. This showed the wealth of Moloka'i because of the abundance of food.

According to intervenor William Kalipi, Sr., mullet feed along the La'au coast. At the beginning of winter, when they are fat and the November storms start, they travel East along Moloka'i's southern shoreline to spend the winter months in Mana'e (the East End of Moloka'i). People on the East End catch the mullet to eat. Longtime fishermen of Ranch and Maunaloa families said that the mullet area is at Hale O Lono and from Halena to Kolo.

• Abundant Marine Life
The ocean is rich with lobster, uhu, enenue, moi aholehole, squid, 'opihi, loli (sea cucumber), leho (cowry shell), pipipi, wana, papa'i,

• Lobster
There have always been a lot of lobsters on the south and west shores. There are still a lot of lobsters. Informants note that conservation is important. Lobsters with eggs or out of season should be thrown back.

An informant said that Kamaka'ipo is probably one of the best lobster grounds with sandstone shelves that go out into the ocean.

• 'Opihi
From Kapukuwahine and along the coastal cliffs out to La'au and around to Sam White is where 'opihi is gathered. It used be accessed through what was called 'opihi road. Informants talk about walking out there to get bags of 'opihi for parties. Used to be guaranteed to get 2 gallons of 'opihi.

Those who go to get 'opihi usually go by boat, although a few hard core guys walk out there. They put the 'opihi and moi in the shade or in the water.

Whenever the water is nice, somebody is out on the rocks. In winter, gatherers go to the south side of the point and during the summer they go to the west side.

'Opihi Road has the most 'opihi but there is also some by the lighthouse.

• Crabbing
The south shore is known to have 'a'ama crab and families go there to get crab for parties.

There are two types of crab - 'a'ama and the brown fury one that lives on the reef and eats the limu.

Along the south shore there is 'a'ama and kuhono crab. In the mangrove there is kalahiki. There area also sand crabs. Kolo had Samoan crab.

• Abundant Limu (seaweed)
According to intervenor William Kalipi, Sr., the area has limu kohu, limu, lipoa, limu lipe'epe'e, limu kala.

An informant said that Halena has limu kohu, chop-chop and wawae'iole. He also said that near Pu'u Hakina there is 'ele'ele and limu kohu.

• Springs
According to intervenor William Kalipi, Sr., there are hidden freshwater springs along the coastline and as he used to walk the coastline to fish he would scoop drinking water from some of these springs. Other informants confirm that there are spots of fresh water that enabled fishermen to make it through their day.

One informant described an old well and windmill that was at Pu'u Hakina.

• Fishing
Families use La'au for subsistence and love the area. It is not a beautiful beach, but they consider it the ultimate fishing area. Informants expressed concern about interference by the residents in subsistence fishing. Conservation of the resources is important. Fishing is primarily provide food for their families. What they catch is also shared with relatives and neighbors. A group of Maunaloa fishermen still go out every two or three months to fish and share with everyone, especially with the kupuna. They also go fishing and gathering for occasions such as funerals, graduations, weddings, and baby lu'au.

There are moi holes and aholehole all along the shoreline. One of the main forms of fishing in the ocean in front of the proposed development is throw net for moi and aholehole. The area is considered a choice place for throwing net for moi. There are also kala, palani. While the area is heavily fished by local fishermen there is still a lot of moi. During the summer months moi is kapu.

Informants also spoke of pole fishing by the lighthouse, Kapukuwahine and Kaupoa. They also throw net in these areas.

Ranch employees would feed their families with what they got at La'au - moi, lobster, 'opihi, 'a'ama crab, aholehole, menpachi, kumu, uhu, enenue.

There are moi, manini, palani, and kala.

An informant said that there while there is mostly moi and aholehole, that it is mostly white fish grounds - moi, 'o'io, aholehole, manini and kala.

Some informants from Maunaloa would walk from Hale O Lono to La'au and even as far as Kaluako'i. They would carry gallons of water and bury it and then find it on the way back.

Another informant described how his father would start out by Kaluako'i early in the morning and walk south to La'au and around and meet the family at Hale O Lono and Halena.

According to Rikki Cooke, the Cooke family used it mostly for throw net, diving and shore casting. They mostly shore cast for oio. When they caught moi it was by the big burlap bag fill.

Maunaloa plantation families used to camp at Halena and hike from there straight out to the lighthouse and then catch fish as they walk back. They also carried water in glass containers and buried them in the sand. Even a week later, the water in glass containers would still be good. One informant said that he used to walk from Halena to the lighthouse with the old folks as their bag boy. They would throw net, and bury the fish that they caught, near the edge of the ocean to keep it cool, since they did not have coolers and ice. On the way back from La'au they would get the fish that they had buried. This would take them the whole day.

Before there were freezers, fishermen would fish for what they needed for the day and would dry the rest and thus, there was more fish.

La'au has a cross wave. Informants said that the old folks would go out casting at La'au but didn't dive. They would mostly dive by Halena camp.

• Salt

Once in a while informants gathered salt along the shoreline, however, the primary place for salt was at 'Ilio.

• Pu'u Hakina

Pu'u Hakina was another area known for fish and lobsters. Ranch families would go and camp there. They used to just bring rice and eat everything else fresh from the ocean. In the days of their grandparents, the Ranch families would catch 'o'io by the tons with a hukilau net. There might be as much as 10,000 pounds. There was so much, everyone would take home fish. George Cooke, in his book Mo'olelo O Moloka'i, has photos of the Ranch hukilau in 1926 and in 1932. It shows hundreds of people pulling in the hukilau nets. (Cooke, 1949, p. 79)

• Boats

The area is heavily accessed by those who own boats on Moloka'i as well as O'ahu. Fishers fish by net, pole, and dive from the boats. It is especially popular for fishing during lobster season, net fishing for lobster. If fishermen go to the area by boat, they only go for the day. If they walk out they are more likely to camp overnight.

Deep sea fishing extends for more than a mile out. La'au connects to the Penguin Banks, underwater.

Informants described how they launch from Hale O Lono and drive by boat to Kapukuwahine, then walk around the Lighthouse. They throw net for moi and aholehole and dive for lobster, uhu and enenue.

Boats come over for fishing, especially when the canoe races are scheduled. They come with their boats and clean out the whole area. They use the GPS to mark the lobster and ulua grounds.

With the heavy impact from boaters, there is no enenue, no kala according to some informants. Some informants say that it isn't worth their time to go fishing out by La'au. While they still go, takes a longer time to find fish and they have learned to be satisfied with less.

Informants noted that there is a strong current off of La'au point and it is risky offshore. Diving offshore is risky.

• Hale O Lono

Informants speak of fishing in the reef by Hale O Lono before it was dredged.

Hale O Lono used to have squid, mullet and lobster but when it was dredged it disappeared. The water got all milky after Hale O Lono was dredged.

Hale O Lono still has fish. Community members have caught a lot of fish at Hale O Lono a few months prior to the meetings.

Some informants would walk down to Hale O Lono with an inner tube and then swim/float toward Halena on the current.

• Halena

The Maunaloa community would camp and fish at Halena where there are a lot of lobsters, fish and marine resources, a sandy beach, and safe swimming.

The Filipino plantation families would walk to La'au from Halena camp and pick 'opihi, and 'a'ama crab. They would go with gallons of water and bury it at each point.. On the way back they would retrieve the water they had buried. If the Ranch employees see them walking they would pick them up.

Halena is protected by reef and safer for the children to play in the ocean. La'au is almost direct ocean and rough except for only a few months in the summer.

• Kaluako'i / Papohaku

Informants used to do a lot of fishing and diving in front of the Kaluako'i Hotel. They continued to fish there after the development of the resort. Some of the informants still throw net and dive in front of Kaluako'i and Papohaku.

An informant spoke of fishing near Papohaku. They used to walk to the end of the pineapple field and then walk down to Papohaku. The fish were tame, right under a nearsore shelf.

• Impact on the Resources from Boats, Previous Development and Hale O Lono Access

The resources have already been diminished from what the longtime Maunaloa residents and Ranch employees remember - from O'ahu boaters, Moloka'i boaters, and the opening of Papapohaku and Hale O Lono. At one time Moloka'i boaters could only launch from Kolo and Kaunakakai Wharves. After the hotel opened they could launch by Kaiaka Rock near the hotel. After Hale O Lono opened up they could launch from Lono. Some of the boaters launch from Lono and go to La'au where they drop guys off to get 'opihi, mostly on the south shore. Before Hale O Lono, most boaters would launch from Kaunakakai and fish for akule along the shore as far as Hale O Lono. Longtime fishermen said the resources are not like before where you are guaranteed to get a lot of fish. TV has shown all the secret places, such as where to get Samoan crab. Can easily wipe out the crab.

Informants note that the resources were fished out when the Kaluako'i hotel opened up.

At Papohaku, turtles used lay eggs but they don't go there anymore.

Informants are concerned about the changes they have seen in their lifetime and are concerned that the kids will have nothing to see and experience.

Mana'o

Fishing

Used to hike down here with my dad and he would carry loads of 'opihi and fish. We would walk from mauka to beach, fish, pick 'opihi and walk back with the load.

We had the pain of going down and carry the fish and 'opihi back. My father would hike and we follow, get the 60 to 70 pounds of fish. Go to Kapukuwahine and to La'au. I'd be carrying fish. That's the pain that we go through to bring out this treasure for our family. The joy of bringing out the resources. WE like that pain, it's good pain. We are born with that, it's normal to get that kind of difficulty.

Depends on the purpose - might risk going out even in rough weather. Like if funeral, even if rough need to go. We do a lot of praying on the beach prior and it opens up for us. We go anyway because of the purpose is for the family. The purpose has to be clear before we go awana or holoholo. When it's clear, we pray before we go and the ocean subsides and it opens up for us. Granted we had some times when it goes against all logic, with the elements up against your back.

Go for self gratification. All about the rush. We wanted to go, because we wanted to go.

When there is a purpose, flows little bit more. If moving for the community and the family then nothing can be in the way. It is there for us and we use it in the most appropriate way, then the good stuff flows and the laughter gets loud.

Making the people that will live here and their children live here, feel respected and have a sense of ownership. Our ownership is the beach and the ocean, we want to maintain that ownership. If people come and the fish get untame, we lose that ownership. Want it there for the younger ones and their children. We want everyone to be happy. . . happy.

The act of fishing and hunting have more significance - family and friends and 'ohana and culture. Not only fish because we going to fish because we are hungry. If no fish, the throw net will disappear. Do you want it to disappear in your generation? Lay net disappear. The crab net disappear.

I like to dive. But there's certain people who just like to throw net. Throw net for me is a good couple rushes. My children have that experience, but they are going to schools and running around and partying. If they are not ono for deer meat, no need. Manini was such a valuable asset for us, now manini ??? Even the Hawaiian pallette is changing. Fish?? 'opihi?? different palette.

Did a lot of fishing - diving, pick 'opihi, cook for lot of parties . . . I used to dive out that area. Fishing and swimming is very unsafe, it takes you out, its very dangerous. Once McGuire, known as one of the best divers, went fishing and the current took him into the middle of the channel between O'ahu and Moloka'i.

Pole fishing is okay. Diving is very dangerous, not too much sandy beaches and the current is very strong. From third point over to La'au the current is very strong. The worst portion is in the corner. Once we went out, my friend was sleeping on the boat, we got taken out. Good thing .

Throw net for moi and aholehole . . . by boat do net and when lobster season is open . . . Did from La'au to Pu'u Hakina, all the way to Kaunakakai . . . Pu'u Hakina, net fishing for lobster . . . Not many commercial fishermen here. I was a part time then . . . Not very much now, mostly people from offisland, because of lack of access . . . When I was fishing it was a lot of offshore fishermen from O'ahu.

There are some people who walk the shoreline and do throw net and do fishing.

People that live up Maunaloa used to walk. Younger not want to do it .

Throw net - casting overnight with the line and catch big ulua. I had a boat, when used to have Kolo Wharf down there. I had a boat. That was during the war time, for few years, then I went in the army and the wave bust up my boat. This used to be a wonderful place, now it gets crowded.

Go down and bury water - bury one here and one there. Just put the fish in the pack - Go in the morning and come back some time after lunch. Nice place to fish, go diving for uhu, manini. Squid. Throw net for moi. Get mullet too - Australian mullet - not the regular mullet - used to have plenty down by Halena side.

Moi - throw net for moi - just choice. Sometimes we used to throw net and there would be the small hammer head sharks caught in the fish nets - 2 or 3 of them and you throw them back. Fish used to always be in abundance, no one used to sell. Tutu man always say, you take enough to feed the family - you go back and you get again. Take and share, not take, take, take. Not just take and sell it.

Used to walk from Halena and to lighthouse, throw net. Plenty fish that time, I would go with the old folks and be bag boy. Throw net, catch fish, bury the fish, right where the ocean comes up. Even if the ocean buries the fish, old folks had marked it. On the way back get the fish that had been buried. One day fishing.

Our family depended on this place for food. This is our icebox. Just like Mo'omomi, a safe haven for fishes - moi in particular. Go both sides - all walk. You go down to get your food you got to walk. We have good 'ano down there, good vibe, good feeling. Know our tutu folks used to live down there - walking is all part of it. Make you feel good. Make sure your intentions are pure, your heart is pure and you always going to get because your heart is pure and you only going to take what you need.

This place is the last place, an ice box for food. Have all the historic sites that go all the way down.

I fish this place how many times. This place is abundant. I never seen moi like this in my life. The moi is mean down there. People been pounding them. Moi is abundant down there - it's awesome. People say no more, get. Lot of the holes are rough, deep and the waves crash over there. Usually they tell that's the mama - the big one's carry the eggs. The smaller is preferred to catch. Moi get season. Summer months is supposed to be closed.

Used to fish down at Papohaku side, We used to walk at the end of the pineapple field and the Ranch and walk down to where Papohaku are. The fish were real tame, just look under the shelf and they were right there.

Still have lobster . . . Deep sea fishing is more out there, a mile out. For the shoreline, moi, aholehole, 'a'ama crab.

Lot of 'opihi, lot of fish and lot of deer.

My dad go early in the morning from Kaluako'i and we meet them at Hale O Lono and Halena. From Kaluako'i around La'au to Hale O Lono - once or twice a month, throw net when moi was running. They throw net and walk. Was hard, but they knew how to survive. WE were never starving. We were basically raised on deer meat, lobsters and fish. My dad and his brothers would go down and bring out lobsters and give to everybody and in turn the other guys give us vegetables.

I go every once in a while. Before I had more access. I go with my cousins who work for the Ranch. We used to go down there constantly. More on the south side - Halena, Pu'u Hakina. Main thing moi and 'opihi, still lobsters. Get uhu if you going to dive. Down there is kept for the party. Every time we get party - we get all of our cousins and we walk. We go down and get enough for the party. Not like we going every weekend.

'Opihi and Crab

For parties - go down for crabbing. 'opihi more on the northshore . . . Used to have 'opihi on the south side and 'a'ama crab . . . South and west side - season for moi and lobster.

I used to get 'opihi - more by the point - 'opihi road. Honolulu guys used to always come and clean it out and they sell over there. The Honolulu guys come and clean it all out - lately they don't come cause no more too much now. It's coming back. I don't know why they got to sell them. Fish yeah - but 'opihi is raw food, if you take care and have good size, can get a good lu'au. 7 piece opihi for $7 - I don't blame them, money is money. They make a law and cause trouble. Law is what causes all the trouble.

There's a lot of 'opihi - abundance because not too many people go there. They used to walk far and carry bags of 'opihi.

'Opihi road - get 'opihi and out to Lighthouse. Kapukuwahine get, but no more that much rocks. From 'Opihi road to Lighthouse the majority, and then over to Sam White. Shipwreck is more sand. Not as abundant there, because the guys go pound over there. Not many go to 'Opihi road, mostly by boat. A few hard core guys who walk it. Just put the 'opihi in the shade. Moi - put in the sand, shade or the water.

Lobster

Kids realize when they move away, that the lobster is expensive. When we were young my dad would catch a lot of lobster, we were spoiled.

Used to go down there with Hana Kupono - camp at Hale O Lono and walk the beach all the way to La'au - only take cracker, get 'opihi, fish, plenty lobsters . . . went diving and we brought back enough lobster for each person to have one and then some - fed everybody . . . That was the best dinner - sometimes only this fish or that, and we made it work.

Boats

I am against the project, period. But if going through, may as well say something. I'm subsistence and these are our hunting and fishing grounds. We've reaped the benefits of the pristine fishing grounds. We would launch from Dixie at night and go into the bays. and from Hale O Lono side and come in. Feel like at one with the place. We bartered and shared with family.

Declining Resources
Times have changed - they are getting the young fish, the young crab. Kolo used to have abundance of Samoan crab. Used to just lay our net, wait, sit in the car and then just get an abundance.

Outside boats do the diving. Outsiders are not throw netters. Moi take gas from the locals more than the outsiders. As far as the diving part, the outsiders, get plenty air in their lungs. A few lay lobster net - don't want to lay over there, the current is mean. If you get a running tide- just huki - good bye over there and you don't have a boat out there and you are gone. If you have a boat, the guy can pick you up. The current is mean. It's not a swimming beach. Both ways it goes. Huki up, huki down, oh it huki.

If go fishing now, not like before. Lucky if you get anything. Not like before. Lot of times went diving and cannot find anything. If we come home with one squid, we lucky.

Ever since opened Papohaku and Hale O Lono opened, it's all fished out already. Now go with boats from Moloka'i and O'ahu. Before, would launch from Kolo. There were only the Maunaloa people and there were only 4 boats. We would tie up from the sand - to the Kolo pier, when Kolo was operating during the pineapple.

Used to have a nice papa by Lono - dredged the papa. When we were young, take Model A, have a long single rod, make a barb, take fishing. Take the tubes from the trucks and tie around the bamboo and use as a sling. Used to go dive by the papa by Lono. After the dredged, the water came milky. The water used to be clean, even at Lono. Early or late part of 60's dredged Lono. Sand for the freeways near the airport came from Moloka'i - when stopped the dredging made it out of asphalt.

Used to have plenty fish before, used to go fish only for today. Before there was a freezer. Just get what we need today and the rest we just dry them.

Moi, manini, palani, kala - all down that side. Before was good. It was closed by the Ranch. No one want to go past the Ranch. we walk across and get what we need in a day. Only the ranch boys When the hotel opened, out fished the place. The place has changed from the time the hotel opened and then Lono opened up.

3.6.5 Subsistence Hunting

The area proposed for development is reserved for commercial hunting and closed to subsistence hunting. Informants acknowledge that there is poaching of deer, but not as far out as the areas proposed for development except by illegal trophy hunters for prize money. The areas proposed for development are thick with kiawe and lantana and inaccessible by land. While deer find refuge there, it is not a regularly hunted area. The closing of commercial hunting by the end of 2007 will open the premier areas on Moloka'i Ranch lands for subsistence hunting that are currently reserved and inaccessible.

- **Commercial Hunting**

The major hunting areas on Ranch lands are currently reserved for commercial hunting - Waikane, Kolo, Sekada Hill on top of Pu'u Hakina, and Kaupoa. Commercial hunting will cease at the end of 2007. At that point all of the Ranch lands, including these best areas will be open for subsistence hunting by permit. The closure of commercial hunting and the opening of community hunting by permit will reduce poaching.

- **Pu'u Hakina Gulch**

There are huge herds of deer in the Pu'u Hakina Gulch which will continue to be outside of the area to be fenced in for the proposed development.

- Increasing Number of Hunters

There are a lot of younger hunters. Trophy hunting for prize money is also a factor increasing the number of deer killed. A lot of this hunting is done by poaching. Among the old time hunters, if they poached deer it was like a Robin Hood gesture, they would always share it with family and neighbors. It was part of subsistence. Just hunting for the thrill of the kill or for prize money is outside of subsistence.

- **Cattle Troughs**

The deer follow the cattle. Troughs are only kept full where the cattle to where the cattle are shifted.

• **Fencing**
MPL should also fence off the whole of the Papohaku area. The deer already congregate there where they cannot be easily hunted because it is a residential area.

Given the experience in trying to control deer at Kalaupapa, informants feel that it will be difficult to take the deer out of the area that will be fenced in and that it will also be difficult to keep the deer out.

• **Hunting Areas Diminishing on Moloka'i**
Overall, the areas for game to roam on Moloka'i are diminishing with the impacts on the watershed from pigs and invasive species such as clidemia and the fence closure areas, Need to manage the game hunting areas.

• **Hunting and Fishing**
Informants described how they could go hunt and then go down the trail to get to the beach and go fishing. This makes the area a prime.

• **La'au Hunting Area**
An informant described La'au as an overgrown, inaccessible, flat, lantana infested area where it is very difficult to hunt. Occasionally the employees would do a drive hunt where a whole bunch of guys would walk through and push the deer to the other side where the hunters would wait for them. It was an area that deer congregated because they were protected by an inaccessible impenetrable forest.

The informants don't usually hunt out by La'au. They usually hunt in areas closer to the public access roads and fence. Those who are hunting for meat to feed their families not interested in going that far to hunt. Those looking for big bucks for trophies might go out as far as La'au since it is an area that is not regularly hunted.

Game
Informants have hunted turkeys, guinea hens, pheasants and fracolins on ranch lands in Kaluako'i. At Kolo they used to hunt pigs.

Mana'o

20 years I hunted, when my kids were growing up - from Waikane all the way to Kolo and in the pineapple fields. Those days all illegal but when you hunt for food, not illegal. That's how I feed by 7 kids. Hunt around Maunaloa and Kolo back to Waikane.

Hunters who walk down from mauka to 'opihi road and then they hike to Hale O Lono.

Hunt down, get to beach, get 'opihi, jump in and freshen up and when go home have some pupu to go with the beer.

3.6.6 Cultural Resources and Practices

In addition to natural resources utilized for subsistence, informants spoke of other natural resources which have cultural significance such as native plants, native species of turtles and monk seals, and the simple unspoiled natural beauty of the undeveloped seascape. Informants also shared names that were given to places after the persons who lived in the area or features of the area.

• Native Plants
There is a beautiful stand of ma'o or native cotton at La'au Point. There is also Pohinahina, 'aki'aki and cressa.

• Turtles
The West End is home to many turtles. There are also many sharks who feed on the turtles. At Shipwreck when the river comes down the turtles come in there.

Monk Seals
There are monk seals along the West shore at Kaupoa, Egusa's, and at the sandy area by the lighthouse and on the south shore by 'Opihi Road.

• Natural Beauty
Enjoy the natural wonder, beauty, place of habitat for sea life, swimming, diving, fishing and hunting

Pu'u Hakina
Informants said that there are very significant and important cultural sites in the Pu'u Hakina area.

• Community Names for Places
Egusas - the Egusa family lived near Kaupoa and took care of the bees and cleaned Kaupoa. They raised a lot of chickens. They also took care of the turkeys and checked the water troughs. He was the cook for the cowboys. Every Thursday they would go into town to buy rice and can goods.

Kamakaipo is called fishpond.

Sam White is where the Hawaiian cotton is growing.

Lighthouse - the point was referred to as Lighthouse instead of La'au Point.

Hole is where there is a shipwreck.

Cowboy House, Shit Creek, first gulch, second gulch - these are names the cowboys gave for some of the places. They knew what it referred to.

The community refers to the lae or points along the south shore using numbers - first point (Kanalukaha), second point (Kapukuwahine), third point (Kahalepohaku) and fourth point ('Opihi Road).

Mana'o

I know of Hawaiian stones. One time I even found a skull close to Hale O Lono, I put it by a rock and when I came back I couldn't find it.



Figure 7. Ma'o, the native cotton on federal land near La'au Point.



Figure 8. A monk seal on the western shore fronting the proposed development area.

3.6.7 Spiritual Resources and Practices

The La'au area is generally regarded as a special place of spiritual mana and power. Community participants and key informants spoke of specific burials, fishing ko'a, and heiau. Such specific sites are documented and described in the La'au Subdivision Archaeological Preservation and Mitigation Plan by Cultural Landscapes that is part of this EIS.

The overall spiritual quality of the La'au area as a wahi pana and wahi kapu cannot be quantified and deserves recognition and respect.

• Fishing Ko'a or Shrines
There are fishing ko'a or shrines at each point.

• Turtle Ko'a or Shrine
There was a turtle ko'a (shrine) above Hale O Lono until it was destroyed in the 1960s. Turtles are a favorite food of the sharks and there are also many sharks.

• Iwi Kupuna or Burial Sites
There are many burials throughout Moloka'i's southern coastal areas, including La'au. There are iwi kupuna burial sites in the proposed development area on both the West and south shores. One informant said that her father used to go fishing at Kolo and at Kaupoa and one day he brought home a skull that was possibly from the La'au point area. Her uncle eventually took the skull to the museum.

• Burrows Family Grave Sites
The Burrows family has 16 graves down by La'au Point.

• Caves
There are caves in the area. The Burrows family knew of nine caves, some with ipu and kahili and one that was under water.

• Hale o Lono
According to intervenor Vanda Hanakahi, Hale O Lono is named for the akua Lono of the Makahiki traditions, who used to rest in the harbor area. In ancient times, at the rising of the Makali'i (Plaeides Constellation) kahuna gathered at Kapu'upo'i, the easternmost tip of Moloka'i in an opening ceremony. They would then travel along the coastline to La'au where they closed their ceremony and then Makahiki with its games and other practices began. This meant that La'au was a special and sacred place for our Hawaiian ancestors.

There is a graveyard in the sand by Hale O Lono, going in the direction of Halena on the beach side. If one goes to Hale O Lono, one would come home before dark.

Heiau at La'au

Informants describe a heiau at La'au by the lighthouse at the end of 'opihi road. This is located on federal land and will not be affected by the development.

• Underwater Heiau
According to intervenor Vanda Hanakahi, La'au is an important place for fishing. In ancient times, every ahupua'a (district)had an underwater heiau (temple) constructed in the ocean outside the ahupua'a. The first heiau along Molokai's southern coastline is located at La'au. Again, this meant La'au had great significance for our ancestors, who depended on the ocean for their survival.

• La'au is a Wahi Kapu Where Kahuna Gathered
According to intervenor Vanda Hanakahi, Kahuna (expert teachers and practitioners) did not gather at just any place. But they gathered at La'au, which means that they regarded it as sacred. La'au is a wahi kapu (sacred place). Places that are sacred should be revered and left alone. La'au is a sacred place that should never be desecrated. Some families don't go down there because it is a kapu or sacred area. 'Ohana has mele about these places.

• Place of Mana
Informants spoke of La'au being a place of mana or spiritual power. They said that when they go to fish in the La'au area that there is a spiritual quality. There are ho'ailona or spiritual signs that guide them.

• Sightings
One informant said that at night, while camping near Kaupoa, she saw fireballs. She has also seen menehune through the trees at night in the same area. Another informant spoke of seeing an island offshore when they were camping overnight and fishing on the south coast at La'au Point. It was close enough to swim to.

Kolo and Pala'au
Informants provided information about petroglyphs at Kolo and a cave with an old canoe in Pala'au.

Mana'o

Got lot of mana inside that area - start clearing, they don't know

Can't do the houses and protect this and protect that- when bulldoze going to destroy everything - it's a chain effect. Those that work the tractors, and feel guilty. People building the houses will be from different islands. It's just a bad vibe. The 'ano is not pure. They going to feel it - They are not welcome down there - you go down at night - voices, drums, you know get heavy stuff down there. The only way you come out and get food is because your intentions are pure - e kala mai ia'u, it's just for food - you bond

with your family - you always pule. always no worries, you go down there, you going to get kaukau - no more the attittude of taking too much because someone else going to take it.

It's hard for me to go for this because this is where we get to run away from - dealing with day to day - take yourself out of one element - knowing that those who came before you did the same thing.

Section 4 Assessment of Impacts of Proposed Development

4.1 Overall Impact on Moloka'i Hawaiian Way of Life

Participants in the community meetings expressed concern that the proposed development will change the demographics of Moloka'i forever. They believe that La'au will contribute to the increase of land values and prices and property taxes on Moloka'i.

The community expressed concern that 200 new millionaires will change the make up of the Moloka'i community and lead to changes in the Hawaiian way of life. With more outsiders, Moloka'i will no longer be "The Last Hawaiian Island." The proposed development will bring in new residents unfamiliar with the culture and way of life on Moloka'i and lead to irreversible cultural change.

The community doesn't want Moloka'i to turn into Maui or O'ahu with a large population off-island people. They expressed regret that if the development occurs, La'au will never be the same.

In balance, the Maunaloa kupuna shared that no matter what happens, the population will increase and the land will be limited. While Moloka'i has been preserved it is gradually being developed. They acknowledged that progress cannot be stopped but that it can be controlled. The Maunaloa kupuna felt that the overall community plan of which La'au is a part provides for the community to manage and monitor the proposed development.

The longtime Maunaloa residents described the years of segregation that they experienced working for the pineapple plantation. The workers lived in simple plantation houses divided into Japanese camp and Filipino camp. The supervisors and managers lived in the better homes on managers' row which they called "snob hill". They fear that the new subdivision will also create a segregated community. If the residents and the community were both limited to 2 points of access, it would be more equal.

When the old Maunaloa town was demolished, a lot of the families moved out. Some of the families were evicted and this left a scar on some people. The way of life in Maunaloa changed with the development of new homes.

Development on one part of the island will affect the whole island. However, more than one informant recalled that in the past there was a tacit agreement to allow the West End to develop, while controlling population growth on the East End. Many had the attitude that the West End could be developed if the East End was protected.

All of these concerns address overall social and economic impacts of the proposed development and are addressed in the social impact study and economic impact study of this EIS. To the extent that the impacts also have ramifications for the Native Hawaiian culture that defines the way of life of all the residents of Moloka'i, these concerns are relevant and noted in this report.

Mana'o

The proposed development of 200 homes along the shore at La'au Point will greatly diminish, if not eliminate altogether, the solitude currently offered by this isolated corner of the island. The invasion of hundreds of new homes coupled with outsiders and their material commodities can only diminish the sanctity La'au currently provides.

Others waltz right in and don't feel the pain. We are the people of poverty who will always be kept out.

No matter how many houses they build, I will still go. I would walk and the land was still owned by someone else, and I would still go there.

Going delete my life.

It will be a major change down there. Take Kihei and Lahaina, used to be sugar cane fields and kiawe, now it's a jungle.

If the reopening will help the economy, that's good. But anything to do with the Ranch, I don't like because of what they did to me. In the long run, it will go through, you cannot fight people with money. Even though fought against the development at Maunaloa, not able to sustain the fight against the big money.

I don't want people down there - and going to be all millionaires down here.
Moloka'i is not going to be what it used be . . . I say development is good, but Moloka'i is small. Look at Maui, what a horrible place it is. I've been here since 1937 and loved every bit of it and gradually getting sick of it.

Maunaloa - before that was a real plantation type looking place. We were just one family. Someone get a party, that's the whole plantation. Everyone get together. Today, right now, I barely know some of my neighbors, everyone to each his own now. And I notice - I want to get better stuff than you got. competition. no more love like it used to be. Before everyone love one another. That's the olden days.

The development will provide jobs, but for how long? Many of our children have to go to Maui and every where. What sort of community are they looking at - not live here all the time. How much money can they generate from that? Would like to see more interaction with Papohaku and Maunaloa - the only interaction is with the church members. They have their own association and we have our own association. WE need to be a community. Some would volunteer at the school. Need more interaction.

I don't know about this development. I just have to wait and see. There's something inside me that it's not ready yet. I just have to step aside and observe, something is going to show up, but when? It has something to do with the ownership of the land. If everything is nice and legal, then go ahead.

La'au is a beautiful place, got to malama pono over there.

Social impact - no one wants to go down to the beach and see them leaving rubbish or taking rocks home. Or the attitude that they own the beach frontage and that the public should not be here . . . that they have their own little community of rich haole people.

Moloka'i will never be Moloka'i for long. Once you let them in. I liike Moloka'i to be Moloka'i - place to hunt, fish, relax. Don't want us to lay gill net, run boats in front their property.

For me, I'm not for development, but will it stop because I don't like it. Just sore seeing the changes. 200 lots - that's a lot, but what can I say. It's all in the process of development. The good part is that they will give this to the trust. I hope I could lease some land to raise cattle. The good part is that they came out to the community and offered their mana'o.

Overall, not a good thing for the development [to go through], will be like the hotel down at the West End. Since I'm born and raised on Moloka'i - like how Mac was taking care of Mo'omomi - I see the changes, lot of places I see are fished out, if we don't have control we will come like Maui. Moloka'i is the best place to preserve our island. If we don't stop it now, we will lose our culture. A lot of stuff that we are losing already. When we became a state, all one time. We didn't have time to think about being a state. The state controls everything. When was Territorial was easier. The living then was more hard now that before - we eat what we can get, now we got to buy it.

I sense in our youth that they are coming more belligerent toward development. Hawaiians used to go in a shell and say no make trouble. These kids wild, mad. They want their own island the way they are used. Going to bring influx of outside influence and these guys are going to get pushed on side . . . What disturbs me is after all is said and done, I don't really know what the impact will be. It's that unknown factor. You cannot hold back progress. Maybe you can curtail it.

My father used to have his nets here. We walked from Kaunakakai to here and not one car would pass us that whole time. Now you stay here and look out the window, that's progress. I don't know what the progress will be. You go to downtown and sit in the car and look at the market and you don't know anyone going into the market. That's progress. I don't know what the impact will be and if it's negative and there's no reversing all that, it's there, and you go on with life.

I'm not against it, but if they would be more relaxed about taking care of the island instead of just thinking of making money . . . if they will acknowledge the lifestyle of the people, I support this. Human beings are born every day, but land doesn't increase. So land is very important.

I hate to see the island change like this. I want them to take care of our kids first before they look outside. Who knows, they might build 200 lots and then they cannot develop it again. At Kaluako'i - saying the county will come in and take care of the roads. Who is in charge of water, maintenance, sewer - home owners, condo owners and hotel. Get a group of people together and they want to make changes. They come here because they love Moloka'i. Keep Moloka'i Moloka'i. And then a few years, they change and they want Moloka'i to change.

4.2 Access and Trails

Community members were concerned that the subdivision might be a gated community, and were relieved that this is not part of the plan.

Native Hawaiians and the general public will have access from two points - one on the south shore at the southeast entry and one on the west shore at the northwest entry. In the process to develop the Community-Based Master Land Use Plan for Moloka'i Ranch, subsistence fishers and gatherers were very concerned that opening up the south and west shores to public access at every 1500 feet as the County of Maui provides will deplete the marine resources. They regretted that the opening of Hale O Lono harbor to public access had severely decreased the marine resources there and they do not want to see that happen in the area proposed for development. Opening up access points every 1500 feet would have a severe impact on the subsistence resources along the west and south coasts adjacent to La'au Point.

Community members were concerned that subdivision lot owners and their friends will have preferential access to the coast. There will be nothing to stop the home owners from going down to the beach. Those who live on the shoreline will be able to access their home and the beach by vehicle. Homeowners can create a trail to the beach and let their friends have access to the beach. Affording only two access points for the general public, while the rich people in the subdivisions will have access from their homes seems unequal. Informants also expressed concern that landowners might call police if they see the general public walking on the beach, as this has happened at Papohaku.

Participants in community meetings and informants felt it was important to provide emergency access through the subdivision to the shoreline for emergencies. They were also concerned that access should be afforded for kupuna and persons with special needs. Some pointed out that the areas closest to the access points will be heavily impacted, while spreading out hte access points might spread out the impact. It was also noted that the road down to Hale O Lono harbor would need to be maintained in order to keep access to the area open.

4.3 Subsistence Fishing and Gathering

Informants feel that the development will spoil the experience of fishing in what is now an isolated, pristine and spiritual area. They are concerned that instead of La'au being a place to get food, it will be a place with haole in their back yards. Many informants felt that the proposed development will greatly hinder, if not abolish altogether, ongoing traditional gathering activities currently enjoyed by Moloka'i islanders at La'au. Fishermen will lack privacy if the development goes through. Yet, throw net subsistence fishers require an undisturbed beach that allows fish to forage closer inshore in order to succeed. Gatherers of 'a'ama crabs require dark silent nights to ensnare their nocturnal prey. Commotion emanating from noisy and brightly lit beach homes will negatively impact crabbers' efforts to capture their already skittish prey. Gatherers of limu and pupu will very likely be met with kayakers in the water, people sunbathing on the beach, and pet animals running up and down the shoreline. If experiences elsewhere in Hawai'i hold true, it is not likely that owners of multi-million dollar beach homes will greet shoreline subsistence gatherers with open arms. It is more probable that subsistence practitioners will be confronted by insensitive newcomers intolerable of extractive activities in what they will perceive to be their front yards.

While the new landowners will probably want to go out and fish when they see the lobsters in the area, most informants felt that the new residents will probably not directly damage the fishing grounds because they don't know how to fish. The real impact on the fishing resources is from the Honolulu boaters. When the outboard motor and twin outboards came out at an affordable prices, the Honolulu boats came fishing all along the west end and south shore. These fishermen have taken everything, even the eggs. The lobster area is wiped out. The Moloka'i residents fish for the family and perhaps get an extra cooler of fish to sell. The outside commercial fishermen fish out the grounds of lobster and fish. They do not plan for the future.

Community participants and key informants were concerned that pesticides and fertilizers will contaminate the ocean and kill the marine resources. Fertilizer run off will kill the small organisms that support all of the marine life offshore. Runoff from the development will contaminate the ocean. Grading can increase erosion which will result in sediment flowing into the ocean and destroy marine resources. Some informants from the East End felt that the development would impact the mullet run and thus impact the resources on their end of the island. However, longtime fishermen who have regularly fished the south shore as members of Ranch families noted that the mullet spawn at Hale O Lono, Halena and Kolo, rather than close to La'au. Hale O Lono is on the eastern border of the project area. Halena and Kolo are outside of the project area.

Community members wanted to be assured that the rules outlined for access and for subsistence and gathering cannot be changed by the subdivision lot owners. MPL clarified that the lot owners will be required to uphold the Covenants, Conditions and Restrictions (CC&Rs) that include these rules as part of the homeowner contract.

Providing parking areas at either end of the proposed project area and limiting access along the shoreline to foot access will open up access sufficiently that it might impact the resources, as the entry points will be closer for those who now walk and must either enter from Hale O Lono or Dixie Maru. The conservation rules might affect fishing, but if the access is easier there will be more fishing.

Mana'o

Once its developed, kiss it goodbye.

Bummer to walk along and the owner is out there sunbathing or swimming. Want to go to the beach when no one is there. You can walk 20 minutes to half an hour and someone is there and has already scared the fish away.

Look at Dixie and see what that house did to the ocean - runoff. John Burell built a house and graded. Til he graded, never saw such runoff at Dixie.

Big concerns about runoff.

Conservation is very important. Why want people to drive in and go fishing Take what you need, not take all you can get when you want it.

I don't think it will have a big impact. I was a young boy when I was down there, it's sitting there. I don't think it will impact the shoreline. I still go fishing down at Kaluako'i side, no problem down there. If people come down, I'll give them. If you give to people, have more good luck. Always have something come back to you . . . No general concerns about the development. I've been living here since I was born and I see how people are here.

Who will stop the Honolulu guys from wiping out the place - they get the opihi, the akule nets, go diving? Who would pay for the caretakers? If landowners have same access as the public, how assess them? Who will own the access land area?

Wow - I didn't know it was going to be this bad. This goes up there goes the last chance for the guys who live on Moloka'i and are dependent on the ocean. This goes through that's a big project . . . the moi holes, the lobster - all that will be gone . . . Everybody knew this was going to happen, the only thing was when.

The Hawaiians not going to afford this. They going to make restrictions where you cannot go in there. They going to keep us out. They going to monitor us. Some guys come out and say what you doing on my beach. They say this is your beach, I say this is our beach.

For our family that's our ice box down there. That will be hard to swallow

Fish - the haole never damage it, they don't know how to fish When outboard motors come out, twin outboards they could afford. They come from Honolulu. Then use the chemicals. Not the haole, they don't fish. The Honolulu boats.

With all these houses coming up - this end is history Fertilizer run off will kill off all the small stuff that keeps things breeding. Like about 1965 - started to decline, get wiped out. The people have more access to the area. Before only us could go by car only. Now every tom, dick and harry got boat. They take everything, take the eggs too. Not think about the future. What this going to do to Moloka'i - they going leave us with a mess and then move on to the next paradise. They taking away what makes Moloka'i, Moloka'i. I don't think you can stop - too much money over here.

All the houses over there, the people not going to damage the fishing. Only thing will damage is the chemicals. They not going to damage the fish. That area where they put up the houses - always rough, always ugly. They might damage other ways. They don't know how eat 'Opihi. From one end to the other, not going to eat 'opihi Why grumbling is because they don't want La'au to change.

Although my health prevents me from fishing now, I still eat the fish from our ocean. What happens at La'au will affect those in the East End if the fisheries are hurt by the proposed new subdivision, such as the mullet run.

Protecting by foot is good, but how they going to control those coming by boat.
The fish are below high water mark. As far as controlling that, I don't know how. Not going really be a negative impact. Might be because of the access. All this time no more really access - go by boat or walk in. If have the road and allow us to park, now closer. Again conservation method - how it will impact the locals.

I don't care for development down there. Through generations will have a chance to walk the beach. When I was young I walked from Halena to down there. Going to come like Papohaku Beach. If you walk on the beach, those who own the land, call the police.

Those who buy the property, they will all have to have money in order to buy. We fishing because we need that to survive. These who come in and buy these properties, they don't need to fish to survive.

4.4 Subsistence Hunting

Hunters are concerned that the new landowners from outside of rural Moloka'i will not want to hear shooting and may be protective of the deer and oppose even bow hunting. Deer hunting could become an animal rights issue. Bullets can travel 4 miles and 10 year kids can get a license. Need to have a sufficient buffer zone. It will only take one accident to close down hunting in the area. The overall hunting area will be reduced by the no hunting zone in the subdivision and buffer zone and the safety zone.

The plan to put in a deer fence and remove deer within the proposed subdivision will effectively close off hunting in the southwest corner of Moloka'i. It will have to be a very high fence. The deer will keep going back. The deer will get hurt.

Mana'o

I can hardly move around and cannot hunt, but my kids can hunt, they all love the hunting. I've been hunting since 1937,- no such thing as license. The deer come in the pineapple field, we had permission to hunt. What I think is, after the rich people come here, lot of Hawaiians going to end up in jail - they going hunting, get arrested. Everyone in my family loves to hunt - to get deer meat. Now law to close it up and put all the homes over there - already all loaded up on the West End.

4.5 Cultural Resources and Practices

Informants are concerned that cultural sites will be destroyed once start to bulldoze and grade and clear the land for development. At Papohaku, homeowners have graded and damaged dune system and destroyed cultural sites and burials located in the dunes. They have extended their household area into the conservation zone, treated it like their own private property and tried to exclude Moloka'i residents from the public beach area fronting their homes. The same process can occur in the proposed subdivision.

Iinformants expressed concern that future generations may not have a concept of how to do subsistence and only going to catch what can be carried. Future generations should be able to be in an environment where it's just them and mother nature. They should know what it feels like.

Concern was expressed about the impact of the proposed development on the monk seals who frequent the remote beaches of the west and south shores. Monk seals might be disturbed during the grading and construction phase. New residents may have dogs who would disturb the monk seals.

Many of the informants commented that the development will require a lot of expensive landscaping because the land is rough and rocky with a lot of boulders.

Mana'o

The kids will never have a concept of how to do subsistence - only going to catch what you can carry. To be in an environment with you, mother nature and tutu them, not know what it feels like.

At Papohaku, clearing the trees even where they are not supposed to. They are not respecting the land. They say all this stuff but turn around and do something else. Just like I rent a house, I say I'm a good guy, they come back and the screens are torn and the house is bust up. Can you trust what they say?

4.6 Spiritual Resources and Practices

Can destroy ko'a fishing shrines and cultural sites, unless monitored. Informants are also concerned that once the grading starts there will be erosion when it rains and the mud will cover the ko'a, the sand and the reef.

Can disturb iwi kupuna burials unless monitored.

The overall general concern is that the development of the area will destroy the special quality of La'au as a special place of spiritual mana and power.

Section 5 Proposed and Recommended Mitigation Measures

5.1 Overall Impact on Moloka'i Hawaiian Way of Life

The Community-Based Master Land Use Plan for Moloka'i Ranch provides measures to mitigate the overall impacts of the proposed development at La'au which set unique precedents for the development of large landholdings by offshore corporations. These precedents are related to community planning, the creation of a land trust for the community, the donation of legacy lands to the land trust, the donation of easements to the land trust, the protection of subsistence fishing, gathering and hunting, reserving lands for community housing, and the creation of economic opportunities for the community through the re-opening of the Kaluako'i Hotel. The plan also provides for covenants, conditions and restrictions that landowners in the La'au Point rural residential development will need to accept and agree to uphold in order to purchase a lot. These are summarized below:

Community Planning
The Community-Based Master Land Use Plan Land was initiated, designed and will be implemented by the community of Moloka'i. It is the result of a two-year planning process involving every member of the community who wished to participate.

Land Trust
A total of 26,200 acres or 40% of Moloka'i Ranch lands is donated to a Moloka'i Land Trust that has the unique mission of:

- Protecting historic cultural archeological sites.
- Preserving the precious natural and environmental resources.
- Enhancing indigenous rights through the protection of subsistence gathering.

The donated lands include premier Native Hawaiian legacy lands:

- The ancient burial ground in the sand dunes at Kawa'aloa Bay. This is one of the most famous and largest burial grounds in all of the islands. At one time the Ranch allowed the mining of sand here and disturbed the burials. The Ranch also planned to develop a resort here. Now these sacred grounds will be permanently protected under the Land Trust.

- Kā'ana, the birthplace of the hula that originated on Moloka'i and spread to other islands. This sacred site will never be destroyed or commercialized.

- Nāiwa, the only traditional makahiki grounds that remain intact in the islands. This extensive area was once threatened by the development of a golf course. It will now be protected forever.

- Village sites at Kawākiu, which would be destroyed under current zoning in the Moloka'i Community Plan, will now be permanently protected.

- Burial mounds at Kawela which at one time were threatened by development will be protected under the Land Trust.

- Key subsistence fishing grounds from Keonelele to 'Ilio Point and from Pala'au over to Hale O Lono, including Halena and Kolo.

- The historic Pākaʻa house sites, upland sweet potato gardens and connecting trails.

- Kaiaka Rock which was saved from development

- Kamaka'ipo Gulch will be conserved.

- the fishing village north of Kaupoa Camp will be protect under the Land Trust.

Under the Community-based Master Land Use Plan the following development projects over which the Ranch and the community had fought are permanently abandoned.

- A 375 room hotel on Kaiaka Rock
- A 150 unit condominium at Kawakiu
- The Highlands Golf Course and Club House at Naiwa
- The Waiola Well and Pipeline

Outside of the Kaluako'i resort, the proposed La'au development will be the last major development on Moloka'i Ranch lands in the Kaluako'i ahupua'a.

Easements
A further 24,950 acres (38% of the property) are placed under new Land Trust protective easements, of which:

- 14,390 acres will be protected forever for agriculture use.
- 10,560 acres will remain open space.

Protection from Development
The combination of the donated land, existing and new easements protect more than 85% or 55,000 acres of the property from development.

Subsistence Fishing and Hunting

The recognition of Native Hawaiian subsistence rights, and protecting for the community, the hunting and fishing resources of the island, by:

- Seeking to establish a subsistence fishing zone from the coast to the outer edge of the reef or where there is no reef, out a quarter mile from the shoreline along the 40 mile perimeter of the property.
- Ending commercial hunting, and allowing only the community to hunt on the property.
- Ensuring access to the shoreline will be available only by foot.

Community Housing

Only Moloka'i residents will decide future expansion of existing communities in the areas with a total of 200 acres around Kualapu'u and Maunaloa to be made available for community housing, and in the 1,100 acres above Kaunakakai to be donated to the Moloka'i Land Trust for community expansion.

Economic Opportunities for the Community

The Kaluako'i Hotel will be re-opened for visitor accommodation creating more than 100 permanent jobs for the local community. By outsourcing various hotel functions such as laundry, gift shop, beach shack and spa, and by committing to use local produce, small business opportunities will be created for the community.

Covenants, Conditions and Restrictions (CC & Rs)

Covenants, Conditions and Restrictions that landowners will need to uphold are described on pages 101 - 105 of the Community-Based Land Use Plan for Moloka'i Ranch that is part of the EIS.

These conditions provide that every person whose name is on the property title must commit to undergo a certain amount of education about the Moloka'i community and its desires and aspirations with kupuna and the Maunaloa community.

La'au Point must be the most environmentally planned, designed and implemented large lot community in the State. The residents would be educated and informed about the environment and culture, and taught to "Malama 'aina," take care of the land and sea."

This statement precedes the covenant document determined by the Land Use Committee that will place many restrictions on lot owners at La'au Point, in order to attract only those who are concerned about conservation.

As an example, the Conservation Zone and other areas to be protected (approximately 1,200 acres) within the subdivision will be the subject of an easement held by the Land Trust, with guidelines for these uses to be determined prior to the construction of the subdivision and reflecting the importance of the area archaeologically and to subsistence gathering.

These protected lands will be part of an entity that is controlled equally by the homeowners and the Land Trust. All decisions relating to this area: maintenance, subsistence protection, archaeological site protection, personnel, etc., will be the shared responsibility between the Trust and the homeowners, who will share equally in the costs.

MPL will attempt to attract buyers to the La'au point subdivision who reflect the hopes and aspirations of the community. Brochures, sales material and other promotional documents will be vetted by the Land Trust or the EC for accuracy and adherence to their principles.

Measures will be taken to assure that these CC & Rs cannot be changed in the future. These CC & Rs include the following:

- prevent a gated community
- restrict the further subdivision of lots
- restrict the area that can be disturbed for use
- prevent construction on slopes of more that 50%
- restrict building height
- require the use of alternative energy
- prohibit the use of pesticides
- require that exterior lighting be shielded from the ocean
- require water catchments and 5,000-gallon storage tanks
- restrict landscaping to native and Polynesian introduced species suitable for dry coastal locations
- prohibit the use of noxious or invasive species; require green architecture
- manages erosion with vegetative cover
- puts a deer fence at the rear of the subdivision

Additional Recommended Guidelines:

Informants recommend the following additional provisions to mitigate the impact of the development on subsistence practices:

- ***Fence to demarcate private property from public access area***

All of the informants felt that it is important to have a clear physical demarcation, such as a log fence, running along the individual property lines to distinguish between private property and the public access area. By putting in a fence of some kind the public will know the boundary so that they won't trespass. Another suggestion was to use a round wire fence, called a New Zealand fence.

- ***Location of Access Trail***

Informants suggested that there be a physical demarcation between the property line and the ocean, along which the trail would run. The trail would follow the contour, following the old traditional trail as much as possible. Then the existing kiawe would serve as a buffer between the trail and the sand and ocean. This can help reduce impact of the trail on the beach and ocean. The kiawe can be pruned. It is a nitrogen fixing plan and will

help other plants to grow around it. The trail should be placed back from the ocean so that it won't wash out. The trail will only be for walking and not for atv's or even bicycles. The trail should not be paved but kept clear and maintained.

• ***Landscaping***
Need to prevent landowners from landscaping the area of the setback which ranges from 250 to 1,000 feet.

• ***Support the Maunaloa Community***
Have monies generated go into the community to support the school. Include the Maunaloa 'Ohana I Lokahi Association needs to be involved in the decisions about La'au.

Mana'o

My first response was that I was really against the development. Now we are holding so many more ingredients. I can live with the development and I can live with the exchange. End. I forsee this development becoming the benchmark for conscious development in the future of the state of Hawai'i. I see it in the use of water, landscape, planning with the ecosystem, and using as much as possible native Hawaiian Plants where each participant in this development has a conscious participation in a partnership with the Land Trust for managing the shore. This will be , in my opinion, the model that honors the resources and ultimately improves the care for this whole corner of the island.

An informant gave his genealogy back to the land on West End. His ancestors are at Kepuhi beach, it is everyone's kuleana but his iwi is there. For the past 30 years he was on the sidelines, watching his leaders. His biggest kuleana right now is his aina his family. He knows where everything is on that end. He put down his shield and listened to this guy from NZ. He wants his lands back and he will give them back. For your children 7 generations down where are they going. Down the line the mo'opuna are going to manage the land and malama. He wants his land back. His kuleana is greater because this is his land.

I don't want to deal with the next ranch owner, we should make a deal. The opponents want to fight for ever.

The fence makes sense. If you don't put fence, the guy living there will complain that that is my lot, as long as it's open they will complain about people going down there.

Definitely need a demarcation between the private lands and the public lots.

I think it's a bad idea. Those that are for the process, I aloha them anyway because they just trying to do what they can for the community. We all trying to find the best way, just different roads. They are asking a lot even though they think they are not asking a lot. So it's a tough one either way - if they really paid attention to the community we would find a way much sooner to help out the ranch but their mind was set already.

I think a fence would be acceptable - wire fence - round wire fence. Called New Zealand fend - more like a pasture fence. I agree to having a delineation would benefit both ways. Development of a walking and access trail would be very important. Trail should follow the contour, with beautiful vistas. Kiawe will stay. Can be augmented with native plants. Prune kiawe - it is a nitrogen fixing and will help other plants to grow around it. Land Trust will put in the trail - not for 3 wheelers, strictly walking, not even bicycles. Bicycles not allowed, as these contribute to erosion. Not a paved trail, but a maintained trail - clear path and maintain. Old traditional trail - parts of it will find the old trail. It is very rocky.

5.2 Access and Trails

Subsistence fishermen and gatherers felt very strongly that opening access to the general public would lead to the depletion of marine resources. They observed that when Hale O Lono was opened the lobsters went. Subsistence fishers and gatherers involved in developing the master land use plan and the informants interviewed for this report were concerned if the area is opened up, that the community will keep going into the area until there is nothing left. They honestly believe that if access to the area is opened up every 1500 feet, the resources will be gone. More people are fishing now than before. There are more fishermen with better equipment. It will be ruined if vehicles are allowed to access the area every 1500 feet. The subsistence fishers and gatherers felt that the walk will be and important measure to better protect the area. They also felt that the provision of two access points and parking at either end of the development will afford sufficient access for subsistence fishers and gatherers.

Informants felt that overnight surf casting and pole fishing could be allowed but that camping should not be allowed in the reserve area. This is the policy implemented by The Nature Conservancy at their Mo'omomi Preserve.

Guidelines in the Community-Based Master Land Use Plan for Moloka'i Ranch
General Access
- Access on both MPL and Moloka'i Land Trust lands will be managed.
- Hawaiian Access Rights be enshrined on the property titles for both MPL lands and Land Trust lands.
- Non-Hawaiian access will be determined by the landowner.
- Hunting methods (rifle or bow) and game seasons are as confirmed on the Hunting Map.

Access and Use of Cultural Sites
- Sites can be accessed to fulfill traditional and customary Native Hawaiian responsibilities for cultural, religious, and subsistence purposes.
- Education and training activities can be organized through the kahu or the resource manager.
- In some cases access may be seasonal, such as during the non-hunting season, rainy/muddy season.

- Use of sites and related protocols will vary according to use of the particular site, including but not limited to:
- Monitoring its condition - integrity, boundary and buffer, setting access routes, relation to overall complex or nearby sites and resources. Sites should be assessed once a year during the dry season.
- Work to stabilize and restore sites. A plan for the stabilization and restoration of selected sites should be developed and approved by the State Historic Preservation Office.
- Rededicated for specific spiritual and cultural purposes. Identify sites which have been in continuous use, those which have been rededicated and those which shall be rededicated.
- 'Access and use of sites should follow protocols established by the Kahu and resource manager.
- Protocols should address manner of approach, entry, use, and exit of site; chants seeking entry and granting entry to sites; appropriate ho'okupu; chants and procedures to stabilize sites.
- Kahu and stewardship resource persons should train stewards in mo'olelo, protocols and responsibilities of stewardship for each site.
- There will be no commercial tours within the boundaries of Na'iwa (Manawainui-Kahanui) and Ka'ana-Pu'u Nana (Kalaipahoa-'Amikopala) wahi pana.

CC & Rs

- Design a measure to restrict access to foot only between Dixie Maru and Hale O Lono in order to conserve resources, with an acknowledgement of Native Hawaiian gathering rights as defined by law for subsistence purposes, in a designated subsistence management area.

- CC&Rs to reflect community-driven access plan. Walking access only from each end of the subdivision to restrict area for subsistence. No access from road above subdivision in order to restrict for subsistence gathering to ensure that resources are not depleted.

- No parking all through the roads, to prevent parking and access other than at each end which will enhance the subsistence nature of access.

Additional Recommended Guidelines:
Community participants and informants reaffirmed that the Maunaloa community shall be integrally involved in the management and monitoring of access within the Kaluako'i ahupua'a. They also suggest the following additional guidelines.

- Emergency access to the shoreline through the rural-residential subdivision can be afforded for ocean rescues.

- To accommodate kupuna and those with a disability, have a golf cart available to assist their access.

- Do not allow camping in the public access and park area, although access for overnight fishing and surf casting should be allowed. The Nature Conservancy policy which allows overnight fishing can serve as a guideline.

Mana'o

If want to go somewhere should hike it.

Put a fence so know how far can go, so don't trespass. Put the trail back from the ocean, so don't wash out. Don't have a say on this. It's a long walk, old people cannot make it. That's walk is kind of rough. Resources would be walked out if open it up. Lot of people go from Dixie - some from Pu'u Hakina. More than half gone after Papohaku. Offisland people, from O'ahu take the resources. Now summer, north shore is flat and O'ahu people come and get opihi. When opened Hale O Lono - the lobsters went If you give them privilege - they go every day, until there's nothing left.

I don't care if you have only walking access, guys going to do it. In 10 to 15 years you want to see the ocean. Put in kupuna road - golf carts for kupuna? I like roam over there. Now I can walk. Getting more tired and tired to walk. Even when they built Kaluako'i my dad was happy because they have the access to the beach.

The conservation is good. I'd rather drive in there, but if we need to walk that's okay.

5.3 Subsistence Fishing and Gathering

The primary mitigation measure proposed in the Community-Based Master Land Use Plan is to work with the community, the county and the State Department of Land and Natural Resources to create a nearshore Community-Based Subsistence Fishing Management Zone. It will prohibit commercial harvesting, but unlike a marine protection no-take zone such as at Hanauma Bay, it will provide for subsistence harvesting. Under the plan, the MPL, the Moloka'i Land Trust, the landowners and the broader community will work together as follows:

- To preserve inshore fishing/subsistence resources, create a subsistence fishing zone in the coastal waters along all of the Ranch's coastline property modeled after the Hui Malama O Mo'omomi Subsistence Fishing Zone.

- Establish no commercial take zone 1/4 mile from the shoreline (north and west shore) and from the beach to the reef edge/breaker line (south shore).

- Establish demonstration fishing nurseries/kapu sites to insure reproduction of key subsistence food species (e.g. ʻopihi, moi, mullet, limu, lobster, ulua, uhu heʻe).

- Support protection for Penguin Banks from overfishing.

Guidelines in the Community-Based Master Land Use Plan for Moloka'i Ranch

- Each year, an experienced Resource Group will recommend open areas for subsistence fishing based on protecting and not depleting the resources.

- The community-based subsistence fishing zone will allow subsistence fishing and gathering but not allow commercial fishing out to the reef or out to 1/4 mile where there is no reef. There will be 2 residential cultural monitors to oversee and enforce protection of the marine resources - one who will live along the south shore at the southeast entry point and one who will live along the west shore, at the northwest entry point.

- Those provided access to fish and gather once the community-based subsistence fishing management zone is established will be asked to take an educational course on traditional fishing methods, practices and conservation measures that will be offered by the resource managers, with guidance by the Maunaloa residents.

- Persons who receive permission to access Molokaʻi Ranch lands or Trust lands can engage in the following subsistence fishing activities:
  - Hook and line fishing for pelagic species.
  - Hook and line fishing for deep sea bottom fish species.
  - Hook and line net fishing for akule.
  - Fishing with SCUBA gear permitted only for akule and taʻape or for research.
  - Trap fishing for deep sea shrimp.
  - Trap and net fishing for kona crab and kuhonu crab.
  - Throw netting permitted only for subsistence.
  - Hook and line fishing from shore permitted only for subsistence (no competitions are permitted).
  - Diving with spears permitted only in the daytime and only for subsistence (no spearing competitions are permitted).
  - Diving for hand harvesting permitted only in the daytime and only for subsistence.
  - Hand harvesting of aʻama crab is permitted at night and only for subsistence.
  - Hand harvesting of alaʻeke and kuhonu for subsistence only.
  - ʻOpihi collecting permitted from shore only (no diving) and only for subsistence.
  - Harvesting of spiny lobster and slipper lobster permitted only by hand (no netting, no spearing) and only for subsistence.
  - Harvesting of mana-moi (7-12 inch) throughout the year for subsistence only.

  - For rescue, monitoring, religious, management, and research purposes only, use of equipment otherwise prohibited in this section is allowed.

The establishment of a community-based fishing management zone off of La'au will involve a rule-making process with the Department of Land and Natural Resources. Should coordinate efforts with the communities of Miloli'i, Hawai'i and Ha'ena, Kaua'i who are also establishing community-based fishing zones. Also respect the Kalaupapa people and their grounds. The rights of the Kalapana people to fish in the Volcano National Park is another model.

Informants noted that they support the quarter mile subsistence fishing zone as most commercial fishermen are from O'ahu. According to the informants, there are only three commercial fishermen on Moloka'i.

Informants also noted that protecting the marine resources by limited shoreline access to foot access is good. However, they are also concerned about managing those coming to the area by boat, since a lot of those who fish the area mainly come by boat.

CC & Rs

The CC &Rs are designed to prevent erosion and the pollution of the ocean by pesticides.

- No building allowed on slopes of 50% or more.
- Pesticide use is prohibited.
- Won't develop in natural run off areas.

- Water quality parameters in storm water drains and in the ocean will be monitored for temperature, salinity, total suspended soils, total nitrogen, ammonia nitrogen, nitrate and nitrite, total phosphorus, chlorophyll A and silicate.

- Require drainage systems that retain any run-off within the disturbed area of the lot.

- Maximize recharge into the ground.

- Restore land areas that have been eroded by re-establishing vegetative cover.

- Minimize impervious surfaces on the lot.

- Ensure that all current run-off from the land is stopped forever.

Additional Recommended Guidelines:

Informants offered the following additional regulations to protect the fishing and marine resources.

- The use of fertilizers will be regulated.

- Longtime fishers and gatherers from the Maunaloa community will be involved in the monitoring and protection of the marine resources in the development area.

- Should have the resource management plan up and running when the grading and constructions starts

5.4 Subsistence Hunting

Community participants and key informants recommended that the buyers be asked to accept and guarantee that hunting will continue to occur in the broader surrounding area.

Although the area of the proposed development will be fenced off and the deer within the fenced area removed, the large deer herds are already in areas outside of the area that will be fenced in. While these best hunting areas are now reserved for commercial deer hunting, the plan provides for commercial hunting to cease at the end of 2007 at which time these areas will be open for subsistence hunting.

Guidelines in the Community-Based Master Land Use Plan for Moloka'i Ranch

- Those provided access to hunt and gather will be asked to take an educational course on traditional subsistence hunting methods, practices and conservation measures that will be offered by the resource managers, with guidance by the Maunaloa residents.
- Hunting will be for subsistence use only. The golden rule is "take only what you need for your family".
- MPL has a contractual obligation for commercial hunting and wildlife management on parts of MPL property until December 2007. The contractor has agreed that at the conclusion of that contract he will no longer seek to conduct commercial hunting on the property and will be agreeable to work for the Land Trust and/or MPL as a Wildlife or Subsistence Hunting Manager.
- As a goal of this management plan, the Land Trust and MPL will seek to reach a mutually acceptable agreement with the contractor to cease commercial hunting prior to December 2007. MPL acknowledges that it, alone, has a moral obligation to this contractor that may extend beyond 2007.
- MPL employees and Native Hawaiian residents of the Kaluako'i ahupua'a have seniority for hunting in accordance with traditional subsistence management custom and practice. MPL employees assume responsibilities to sustain the natural and cultural resources of the ahupua'a.
- Management Options include the following: The decision about when and how to implement a selected option would be made by Moloka'i Ranch and Trust resource managers. The Hunting Resource Manager would need to work hand in hand with MPL's Livestock Manager so that the pasture lands remain healthy enough to support the livestock. This is especially critical in times of drought when the deer can intrude into the pasture lands, compete with the livestock, and create erosion problems.
- Kapu on Activities such as "No Hunting for Periods of Time"

- Kapu on Animals "No Hunting of Does"
- Kapu on Areas "No Hunting in Certain Districts"
- Kapu on Seasons "No Hunting During Certain Months"
- Kapu on Times "No Night Hunting"
- Kapu on Equipment "No Dogs for Deer Hunting", "Only Bow Zones"
- Education on Conservation and Preservation
- Education on Cultural History and Practices
- Education on Management Areas
- Education on Safety and Responsibilities

Additional Recommended Guidelines

The Maunaloa community asked that the seniority for hunting be inclusive of all of the kama'aina residents.

- The seniority for hunting in accordance with traditional subsistence should be for kama'aina residents of the Kaluako'i ahupua'a and MPL employees.

5.5 Cultural Resources and Practices

Archaeology Preservation and Mitigation Plan provides for archaeological maka'ala or monitoring of the development. The archaeology preservation and mitigation plan will provide for the monitoring of the bulldozing and construction to protect fishing ko'a, shrines and cultural sites. The plan also provides for the protection of iwi kupuna within protected areas that include appropriate buffers.

Guidelines in the Community-Based Master Land Use Plan for Moloka'i Ranch

Kaluako'i Cultural District

The Kaluako'i Cultural District is to protect the historic and cultural sites and resources for current and future spiritual, cultural practices and subsistence uses. It includes the following sites and complexes:

- Punakou which is inclusive of Ka'ana, Pu'u Nana, and Ho'olehua
- Paka'a trail which is located in the entire Kolo Gulch
- Paka'a cultivation fields in the uplands of Kopala
- Kalaipahoa-'Amikopala and Kukui adze quarry sites
- Kamaka'ipo complex of sites in the entire gulch
- Kahualewa Heiau, mauka of Waikane Gulch
- Heiau, mauka of Halena Road and between Kahinawai and Oneohilo gulches
- Kawakiu Iki and Kawakiu Nui village sites and burials
- Dunes of Keonelele
- Various fishing ko'a along the shoreline
- Burial Site located west of Kaluako'i water tank in Kaka'ako Gulch
- All sites identified on the Maurice Majors maps

- Stewardship of Cultural Sites
- Designate Kahu for complexes and sites including: Na'iwa(Manawainui-Kahanui); Ka'ana; Pu'u Nana (Kalaipahoa-'Amikopala); Kawakiu, Kamakaipo-La'au; Hale O Lono; Punakou. Designated Kahu for complexes and sites shall be consulted prior to decisions being made affecting those areas.
- Involve cultural resource persons, as needed, in a cultural sites stewardship role for all other protected sites and areas.
- Responsibility of Kahu and stewardship resource persons
- Ongoing Monitoring of Sites - annual assessment during the dry season
- Identify and prioritize sites for stabilization
- Develop resources for site stabilization and restoration
- Develop any interpretive signage, markers and trails of access
- Identify and prioritize sites for rededication
- Train stewards in mo'olelo, protocols and responsibilities of stewardship for each site
- Implement Management Plan
- Manage research requests

CC & Rs

Protection and restrictions are to be written into CC&Rs as a result of a Cultural Plan, which shall have two major components-archaeological and cultural. The Plan will follow the community guidelines for Policies and Principles adopted for this Master Land Use Plan.

Additional Recommended Guidelines:

The informants offered the following additional recommendations to protect the cultural and natural resources of the area.

- Apply relevant recommendations from the Papohaku Dunes Cultural and Natural Resource Preservation Plan, Kaluako'i, Moloka'i, Hawai'i Study.
- Provide education and enforce laws protecting monk seals
- Need to enforce the covenants, conditions and restrictions and include substantial penalties.
- The buffer area for Kamakaipo Gulch may need to be expanded. Due to the potential for erosion during grading and construction, the houses close to Kamakaipo Gulch should be moved further away from the gulch.

Mana'o

The $2000 fine is nothing to them. Not going to have someone there all the time to make sure that they won't damage the conservation. Should lose their land. They have to realize that the conservancy area is put there for a reason. If we damage their property they arrest us and put us in jail.

5.6 Spiritual Resources and Practices

Cultural sites used for spiritual customs and practices such as fishing ko'a and heiau, as well as iwi kupun or burials will be protected as discussed in the previous section on cultural resources.

Perhaps there is no way to mitigate the impact upon the solitude that can now be enjoyed at La'au. It offers the opportunity to experience ho'ailona spiritual signs and the overall mana of La'au as a wahi kapu. Limiting access to a walking trail that is set back behind a row of kiawe and providing a clear demarcation between the private lots and the general public access areas can help protect the integrity of the shoreline and mitigate the impact of the houselots. Conservation zones provided for in the CC & Rs will protect the spiritual quality of important complexes such as Kamaka'ipo.

CC & Rs

Conservation zone and "protected land"

Unlike most other subdivisions, control of the conservation zones, archaeological sites, trails and native plant ecosystems would be an easement, but control would rest jointly with the Land Trust and the lot owners. Both will share the responsibility and cost to malama (care for) the area. Kamaka'ipo Gulch and other areas identified as exceptional will be transferred to ownership of the Land Trust.

Section 6 Water Plan - Kākalahale Brackish Well

6.1 Proposed Plan

The MPL Water Plan for the proposed development can be summarized as follows:

- MPL will not, at any time in the future, seek permits for additional drinking water, other than the allocation under its permits existing at July 2005, from the Water Commission. MPL will seek a Water Use Permit amendment to expand the area of use for Well 17 water to include all of the areas its PUC regulated water companies serve including expansion to service La'au Point. This will allow a shift away from using potable water on non-potable uses (e.g. the golf course) which will minimize the use of potable water from the Kualapu'u aquifer sector.

- MPL proposes to develop 1,000,000 GPD from the abandoned Kākalahale Brackish Well in the Kamiloloa Aquifer for future non-potable needs to meet the demands for non-potable uses the Master Plan proposes. This will require a Water Use Permit from the Commission on Water Resource Management.

- The maximum water allocation for the La'au Point subdivision is as follows:
  1. Potable Water: 600 gallons of potable water per day for 200 lots at 80% occupancy.
  2. Non-Potable Water: 1,500 gallons per day for 200 lots.
  3. La'au Point Parks: 1,000 GPD potable and 40,000 GPD non-potable.

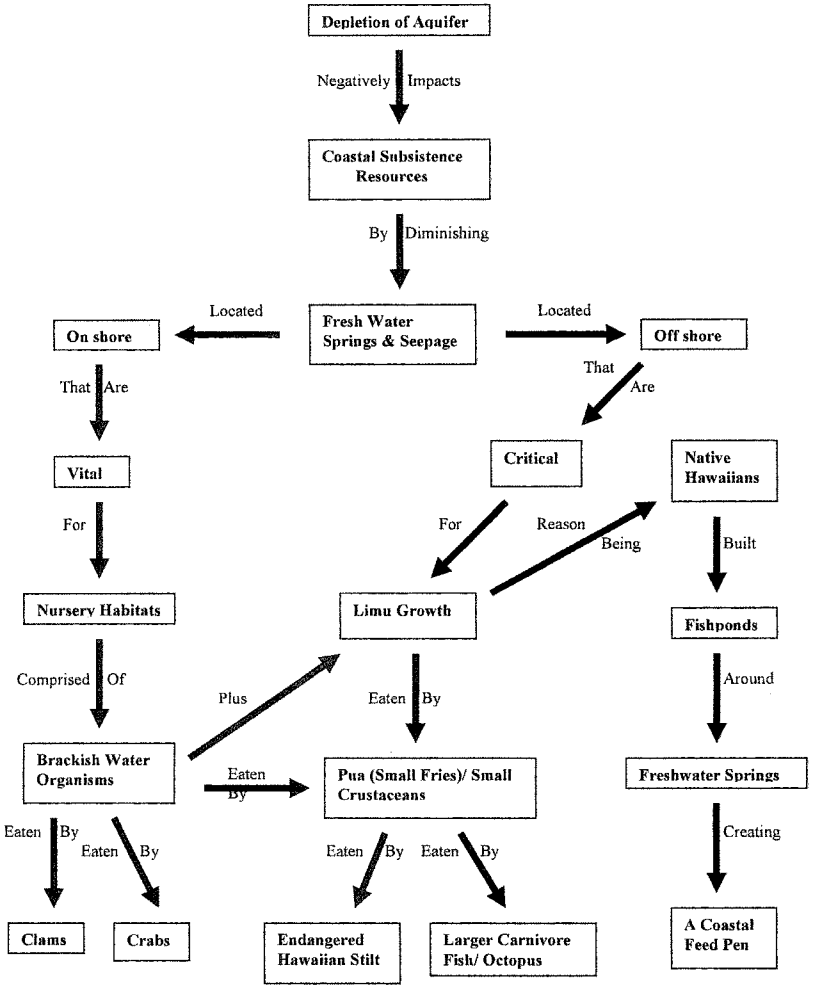
A Water Plan Analysis by Ishikawa, Morihara, Lau & Fong LLP is part of this Environmental Impact Study and includes estimates of the amount of water needed for the proposed development, potential sources, potential impacts and mitigation measures.

6.2 Primary Cultural Concerns in Wai Ola Case Applicable to Kākalahale

A review of the testimonies presented in the Wai Ola Case can be summarized in the following flow chart and explained as follows:

On the island of Molokai, the struggle over water is longstanding and rooted in a cultural way of life that is dependent upon subsistence. This subsistence lifestyle is threatened when coastal resources that thrive in brackish water environments are negatively impacted due to a diminishing aquifer. These brackish water environments, located on shore as well as off shore, are ideal nursing and hatchery grounds for pua or small fries as they feed on photo plankton, brackish water organisms, and limu. Furthermore, these environments are also the breeding grounds of crabs, clams, and other small crustaceans. Together these brackish water environments serve as the foundation for the coastal food chain, as the larger carnivorous fish and octopus are able to then feed on pua and smaller crustaceans. Traditionally, Native Hawaiians recognized these relationships and built fishponds in this environment to create a coastal feeding arena. This knowledge and understanding of the interdependence of the marine environment upon infusions of fresh water which sustains a subsistence lifestyle for the people of Moloka'i, elevates the struggle over the use and distribution of fresh water from a struggle to perpetuate the culture and a way of life, to a struggle to protect life itself.

Figure 9. Fresh Water Aquifer Linkage to Coastal Subsistence Resources



Professor McGregor filed testimony in the Wai Ola Case and the following are excerpts which expand upon the importance of the flow of fresh water from the Kamiloloa aquifer into the coastline of Kapa'akea-Kamiloloa-Makakupaia which lay makai of Kakalahale:

"The GIS maps revealed a high concentration of Hawaiian in the Kapa'akea-Kamiloloa-Makakupaia area. These Hawaiians would be engaged in subsistence activities in the neighboring areas. These same areas showed a high concentration of known historic sites. Conservation lands are located in the mauka area of Kamiloloa and rare and endangered species have been identified in this area. The prevalence of subsistence on Moloka'i was reflected in the amount of food that was derived from these practices and feelings about its overall importance to families. The fact that families were highly dependent on subsistence for survival, especially Hawaiians, points to the value of subsistence as a sector of the economy.

Q: Have you had the opportunity to review the testimonies of Louise K. Bush, Sheldon Hamakua, Walter Mendes, Wayde Lee, Martin Kahae, and Judy Caparida?
A: Yes.

Q: Are the activities they describe consistent with the traditional and customary activities in which ancient Hawaiians engaged?
A: Yes, they describe the gathering of a variety of limu including ogo, 'ele'ele, wawae'iole, manauea, and huluhuluwaena; a variety of fish including weke, mullet, uhu, manini, kole, oio, papio and palani; as well as he'e, ulupapa, lole, wana and a variety of crab including kuhonu, 'alamihi, and ala'eke from the neashore waters. They also describe the gathering of opae from the Kaunakakai stream and the springs in the area. From the mauka forest they describe the gathering of mamaki for tea, as well as lehua, 'a'ali'i, palapalai fern, 'ie'ie, and pukiawe for hula.

Q: How would you characterize the impact of interfering with the continuation of these traditional and customary cultural activities?
A: Interference with the continuation of these traditional customs and practices would reduce the amount of natural marine and forest resources available for subsistence activities. This would impact the diet of the families who have relied on these natural resources for food. This would negatively impact the health and well-being of these families. It would also affect the ability of the families of the extended 'ohana to continue their practices of sharing and exchange and gathering and bonding during critical life cycle events.
Q: Is there a cultural reason for assuring that any water withdrawal from the shoreline does not interfere with the type of practices enumerated in HRS ß 174C-101?
A: The continued gathering of marine and forest resources in the Kamiloloa area is integral to the cultural life ways, health and well-being of the families who have relied upon these resources for subsistence. It is of critical significance to the diet of these families. The ability to alternate gathering areas in accordance with seasonal variations and level of use is essential to having resources available all year round. The sharing of foods gathered through subsistence activities reinforces good relations among members of extended families and with neighbors. Subsistence is integral to the life ways of the

Hawaiians of Moloka'i, popularly referred to as the "Last Hawaiian Island." Hawaiians comprise close to 50 percent of the population. Moreover, the persistence of subsistence on Moloka'i is of critical significance to the persistence of Hawaiian culture throughout our islands. The island of Moloka'i serves as a cultural kipuka for Hawaiian culture throughout Hawai'i. Bypassed by the mainstream of political and economic change in Hawai'i until the 1970's, it serves as a preserve of Hawaiian culture from which the contemporary generation of Hawaiians continue to draw strength and inspiration in the perpetuation of Hawaiian language, culture, and spirituality."

Section 7 Assessment of Impact of Proposed Water Plan on Cultural Resources

• Water is the Primary Cultural Resource

For many participants in the community meetings, water is the primary cultural resource. They feel that drawing brackish water out of the Kakalahale well will have a huge impact on the culture and way of life on Moloka'i.

• Impact on Aquifer

Moloka'i water resources are limited and drawn primarily from the eastern mountain system of the island. For many Moloka'i residents, water is the main issue in the proposed development. They expressed concern that the additional water proposed to be drawn out of the Kakalahale well, even if it is brackish, will strain and diminish the water table on Moloka'i, increasing salinity levels. Residents are concerned that pumping brackish water from Kakalahale could raise the salinity level in neighboring wells.

Taking all of the drinking water from one area is problematic. The wells are already showing signs of elevated levels of salinity. Got to spread out source.

Community participants and key informants expressed concern about the impact of pumping brackish water on the transition zone. They are concerned that drawing water out of the transition zone might increase the salinity levels of ocean discharge as well as neighboring wells.

• Impact on Hawaiian Homesteaders

For Moloka'i homesteaders, the primary issue with the proposed development is water. Hawaiian Homesteaders have the first preference for water from the Moloka'i aquifer. If MPL is given a permit for an additional 1,000,000 gallons a day this may prevent the homesteaders from being able to draw out the water that they need for future agriculture and residences. Homesteaders believe that 1,000,000 gallons a day is too much. It will hamper the rehabilitation of Native Hawaiians on Hawaiian Homelands.

The DHHL 20 year strategic plan projects 400 more residences, but water is the limitation on the development of these homes. Homestead farmers will be affected by water taken to La'au. Homesteaders need water to keep the plants in their garden and fruit trees on their homestead growing and producing. If there's no water, thousands of acres of DHHL land may not be usable. In addition, the homesteaders won't be able to water their food plants - ulu, papaya

• Keep Water Within Ahupua'a

Idea of moving water from one ahupua'a to another is hard to accept. It is not a Hawaiian concept to move water from one ahupua'a to another.

• Impact on the Ocean

Marine resources need infusion of fresh water to spawn. The findings in the Wai Ola Case provide relevant information on the potential impact of the pumping of 1,000,000

gallons of brackish water a day can have on the marine resources makai of Kakalahale. The findings were based on the pumping of 1.25 mgd of ground water and thus the impact would be less than that projected in the Wai Ola Case.

"Ground-water models showed that pumping 1.25 mgd of ground water would reduce ground-water flux to the nearshore area by about 3% to 15%. At that magnitude, the resultant change in salinity in the fishponds would be virtually indistinguishable from the initial values.

Native Hawaiians gather limu and other marine resources all along the southern and eastern coastline of Molokai, including the shoreline area of the Kamiloloa Aquifer. They do not confine their gathering activities to areas within their ahupua'a of residence.

Nearshore Environment

122. The coastal boundary of the Kamiloloa aquifer comprises approximately 6 kilometers of shoreline, extending just west of Kaunakakai Gulch to just east of Ali'i Fishpond, and includes Kaunakakai Harbor channel and two large fishponds (Ali'i and Kaloko'eli fishponds).

123. No perennial stream exist within the Kamiloloa aquifer and surface runoff reaches the ocean only after significant rainfall events.

124. The coastal area off the Kamiloloa aquifer is fairly homogenous. The shoreline consists of very shallow sand and mud flats that extend offshore several hundred meters.

125. Groundwater enters the nearshore zone from seepage at the shoreline and from offshore springs. In some areas, seeps are actually visible at low tide and offshore springs are also visibly evident.

126. Freshwater springs enter the reef at numerous points along Molokai's south sore creating brackish conditions that favor seaweed growth nearshore, especially in many of the fishponds, which tend to trap fresh water.

127. Groundwater discharge into the ocean is reduced by the amount that is pumped from the ground whether it is pumped from the Kualapu'u or Kamiloloa aquifer.

128. The McNulty model predicts that if 1.25 mgd of groundwater is pumped from the proposed well, the flux of groundwater at the Kamiloloa shoreline will be reduce by about 15%. The USGS Study indicates that the coastal discharge is reduced by 3 percent over a 13-mile stretch of coastline.

129. The USGS Study predicts that pumping 0.3 mgd from the proposed well [Wai Ola] will result in a reduction in groundwater discharge of 0.8 percent over a 13-mile stretch of coastline (which extends further than the boundaries of the Kamiloloa aquifer). The

largest effects occur in areas nearest the well and effects diminish with distance from the well.

Fish

133. Several important species of fish, including mullet, aholehole, and milkfish, depend upon brackish environment along Moloka'i's south shore.

134. The brackish water environment is necessary for the primary productivity that is the basis of the food chain for milkfish, mullet, aholehole, and other animals found along Moloka'i's south shore.

135. Mullet need brackish water with salinity ranging from 13 to 20 ppt. for proper maturation of their eggs.

136. After mullet, ama'ama, awa or milkfish spawn in the open ocean, the fry, up to one month old, are predators, eating zooplankton in the open ocean. Then they move to nearshore areas where they switch to an omnivore diet, and feed on diatoms, a benthic plant usually found on the bottom of estuaries where brackish water and sunlight mix to allow for their growth. They stay on this diet for the rest of their lives, reaching sexual maturity, and feeding in estuaries and stream mouth areas which are conducive to this plant. Fishermen often know these locations in their areas.

137. Brackish water environments, which Dr. Tamaru defined as having salinities of less than 30 ppt, are essential for the maturation of striped mullet from the juvenile stage to maturation. For oocyte maturation, salinities in the range of 13 to 20 ppt is important. However, salinities along the nearshore area fronting the Kamiloloa aquifer consistently exceed 30 ppt.

Limu

145. Native Hawaiians gather limu and other marine resources all along the southern and eastern coastline of Molokai, including the shoreline area of the Kamiloloa aquifer. They do not confine their gathering activities to area within their ahupua'a of residence.

149. Limu is more productive in brackish water than in pure seawater.

Mana'o

Hear that the Homesteaders don't have enough water, but when want to build a project like this, all of a sudden then get water. All of a sudden we get water? Who are we kidding? This is water that is being diverted to something that won't benefit the island.

Main concern - will they have enough water for the community, not starving the rest of the island.

Eventually the drawing out of brackish water from Kakalahale will affect us. It's not about us any more - it will affect my grandchildren. A lot of people don't realize this. Our stake is not money our stake is our family and the people. I always thinking about the island.

Section 8 Proposed Mitigation Measures for Water Plan

MPL will retain its 1.5 million gpd of potable water: 1,018,000 gpd from Well 17 and 500,000 gpd from the Molokai Ranch Mountain System. MPL proposes to develop 1,000,000 gpd from the abandoned Kakalahale brackish water well in the Kamiloloa aquifer sector for future non-potable water needs. MPL will not transmit bracksih water from the Kakalahale well to the West End by the Moloka'i Irrigation System (MIS) system. MPL will use transmission alternatives. MPL will also make its excess potable water capacity available for the use of communities outside its property. MPL will be required to measure chloride levels every month to protect against unacceptable salinity levels.

Upon approval of the Community-Based Master Land Use Plan, MPL will sign covenants preventing it from ever seeking further water permits from the Commission on Water Resources Management. MPL will also abandon the Waiola Well application.

MPL will continue its water conservation campaign to Kaluako'i residents and future residents in the proposed development by reducing consumption, shutting off irrigation systems during rainfall, and restructuring water rates.

MPL continues to work with the major managers of Moloka'i's water resources to meet the needs of the community now and in the future while protecting this precious resource. had a four party meeting with the following in September As a first step in finding solutions to sustainable use of water on Molokai MPL met in September 2006 with the other major water managers - Department of Hawaiian Homelands (DHHL), the County of Maui, Kawela Plantation Homeowners - and the United States Geological Services and the Commission on Water Resource Management. The meeting was aimed at looking to USGS to model the needs for all parties.

In that meeting, MPL offered both DHHL and the County access to further drinking water from its Well 17 in the Kualapu'u aquifer, saying that if necessary it would put Well 17 into a Water Trust to ensure continuity of supply for all parties. MPL has stated that it requires no further drinking water under its Master Plan. Furthermore, MPL also believes that Well 17 has the capacity to pump an additional 500,000 gallons a day, average, without affecting the sustainable yield of the aquifer. This water can be made available to both the County and DHHL.

MPL extended this offer in order to alleviate the need for Maui County to build a new well to replace its current well in the aquifer. This measure would also enable DHHL to access some of its 2.905 million gallon reservation without the added cost of additional well infrastructure. Before another meeting of the parties is convened, DHHL plans to consult with the county and review its needs under its Molokai Island Plan.

Concurrent with the LUC rezoning application, MPL is seeking permission from the Commission on Water Resources Management for its Water Plan.

Alternate Sources
Informants spoke of efforts by Alpha U.S.A. to find water - from hiring Blackhorn who used a willow to the use of modern techniques with electromagnetic waves and a computer. An informant said that there's a well by the corn field - by Amazon trail - brackish water that was used to irrigate the hay with brackish water. He also said that there were old wells at Pala'au and at Punakou that he used to maintain by pumping out the mud. Eleven exploratory wells and boreholes were drilled on the West end between 1945 and 1991. None produced water of usable quality. There is not sufficient rainfall in Kaluako'i to sustain a viable year round rainwater catchment system.

Mana'o

Worked with Dr. Nightingale - in 1954-55 - I was the laborer - he was the water specialist. He said it was divided into 2 pieces - right by the corn field. Billy Buchanan - he has a big well, if he has water on his property - the ranch should look there.

Section 9 Assessment of Alternatives to the Proposed Development

Section 6 of the EIS addresses alternatives to the proposed development, as required under HAR, Title 11, Chapter 200 Environmental Impact Statement Rules, Section 11-200-10(6).

In the report, the criteria for evaluating alternatives included those defined in the HAR, i.e. "those that would allow the objectives of the project to be met, while minimizing potential adverse environmental impacts," in addition to the following criteria:

- Reasonable financial returns must be generated from the funds invested.
- No expanded use of precious drinking water currently available to the company.
- No use of vast amounts of land and population increase beyond what was conceived as acceptable to the island.
- No destruction of land designated for agriculture or open space.
- No development use of potentially productive Agricultural lands versus poorly rated Agricultural land.

From a cultural standpoint, limiting the amount of water to be consumed by any development was the primary consideration in the assessment of alternatives. The impact of population increase is another important issue that was considered in the assessment.

As a part of this cultural impact assessment report the proposed alternatives are discussed below relative to the impact upon cultural, subsistence and spiritual resources and related practices.

9.1 No Action Alternative

The "no action" alternative would not involve any changes to the La'au Point project site, and the property would remain vacant of any additional improved uses. If the La'au Point community were not developed, lands would remain as fallow agricultural land and underutilized due to the poor soils and lack of irrigation water. The conservation zones would not be established at Kamaka'ipo Gulch or along the shoreline.

The Community-Based Master Land Use Plan would not be implemented. While 1,600 along the northeast coast of Moloka'i from Keonelele to 'Ilio would be donated to the Moloka'i Land Trust the remaining 24,600 acres would continue to be owned by Moloka'i Ranch. This would include the legacy lands discussed above - Ka'ana, the birthplace of the hula; the makahiki grounds of Naiwa; the ancient burial grounds of Kawa'aloa; village sites at Kawakiu; burial mounds at Kawela; the historic Paka'a house sites and gardens; Kaiaka Rock; Kamaka'ipo Gulch; and the fishing village at Kaupoa Camp.

The "no action" alternative would ultimately lead MPL to close down its ranch operations and either land bank the property for the future or put the lands up for sale, as discussed as the next and interrelated section. Employment would have to be reduced, tourist expenditures would be lost, and local businesses at Maunaloa Town and elsewhere would be affected. These losses in local jobs and probable business failures would also in turn increase the need for County and State social services.

While the "No Action" alternative would reduce the immediate demand on water resources, in the long run it would increase, because it would be combined with the second alternative of bulk or "Piece-Meal" sale of MPL lands to potentially eight times the number of landowners or to an investment corporation which could develop the land beyond the limited 200 two acre lots. The impact to cultural sites and natural resources utilized for subsistence, cultural and spiritual purposes would be far greater than what is projected in the proposed development.

9.2 Bulk or 'Piece-Meal" Sale of Other MPL Land Inventory

MPL land holdings are comprised of 101 lots that could be sold within Papohaku Ranchlands, Maunaloa (both Residential and Commercial), and the Industrial Park.

In addition, an existing allowable lot density analysis conducted by MPL shows that the west end Agricultural-zoned parcels comprising approximately 43,000 acres could be subdivided into more than 1,500 lots.

This "land-banking," or individual parcel sales, would essentially close down ranch operations and reduce MPL's employment to only 10 full-time staff as the company sells its properties to potentially 101 new owners/residents.

A proposal was made to MPL by the U.S. Marine Corps to stage amphibious and air landing exercises on the west coast of Moloka'i between Kaupoa and La'au Point in the area proposed for development. If the proposed development plan fails, the U.S. Marine Corps might renew their effort to have the lands leased out for these purposes. Such use would have tremendous negative impact on the marine and natural resources utilized for subsistence, cultural and spiritual purposes in that area.

In this alternative, the 24,600 acres that would otherwise have been donated to the Land Trust under the La'au Point proposed action would instead be sold off as separate parcels. If these lots were sold off without the benefit of a master plan, the impact would include a greater number of new land owners/residents, less community control of development (i.e. design controls and CC&Rs), no land trust, and less financial support to the County and State.

As discussed above, this alternative would lead to greater overall impacts on cultural sites; natural resources utilized for cultural, subsistence and spiritual purposes; water

resources; and the overall Hawaiian way of life on Moloka'i. This scenario would result in uncontrolled growth and unmonitored utilization of lands and natural resources. It is the worst case scenario.

9.3 Maunaloa to La'au, Kaunakakai and Kaluako'i

In its review of possible alternatives to the La'au development, MPL developed models to compare alternative scenarios ranging among different agricultural and residential projects of between 27 lots/units and 1,000 lots. units.

MPL initially looked at large Agricultural lot developments conforming to existing State land use designations, the Moloka'i Community Plan, and County Zoning at Maunaloa Town and above Kaunakakai. MPL also looked at an affordable residential expansion at Kualapu'u as part of the first round of possible alternatives and at various rural and condo alternatives for Kaluako'i. MPL examined DeGray Vanderbilt's La'au Point alternative (Kaluako'i Rural Subdivision and Golf Course).

In efforts to avoid development specific to the La'au Point project area, MPL examined nine options in detail on other Ranch lands outside of the La'au Point project site. Financial models were created to examine the alternatives' ability to generate the necessary revenue in order to make the Community-Based Master Land Use Plan work economically.

The community and key informants felt that there would be less impact upon subsistence resources if these alternate sites were developed. While archaeological surveys would need to be conducted in these areas, most of the historical sites are within half a mile to one mile of the coastline given the traditional reliance of Native Hawaiians upon the marine resources of Kaluako'i. These areas area less likely to have cultural sites.

In looking at develping the mauka lands in place of the coastal areas, one of the informants suggested that Wai'eli would be a more suitable location for the development. If the houses are located at a mauka area, such as Wai'eli, the landowners would purchase a lot where they could build a house with magnificent views of O'ahu, Lana'i and Maui and enjoy the cool breezes. In addition, the landowners would also acquire a ownership of commonly-owned lands at the coast located at safe beaches where a park could be developed for the special use by the landowners.

The primary cultural impact of these development models are greater overall population increases and demand for precious water resources.

9.4 Hale O Lono to Pala'au

MPL was also asked to look at the area from Hale O Lono to Pala'au There are several issues with this area, not the least of which is the proposed inclusion of this land in the Land Trust and the importance of the Ka'ana area, from mauka to makai to Kumu John Kaimikaua. In the community planning process, his input was to exclude the area from any development.

With respect to historic cultural sites, the area has had only limited survey work to date, and where archaeological surveys have been conducted, sites have always been found. Based on the limited work, it is likely that extensive archaeological surveys would identify several large important cultural complexes such as the Paka'a house sites, cultivation fields and trail. The topography of the site is that of sloping ridges divided by deep, steep gullies. To access development along the more desirable coastal areas. MPL estimated that 24 miles of roads would be needed to service the area. This would not only be costly, but would severely impact the ability of the region to be used for subsistence hunting as currently proposed by the Plan and require the development of hundreds of lots to offset their construction costs.

According to key informants, this area has been used more intensively for subsistence fishing and gathering than the area proposed for development. Hale O Lono, Halena and Kolo were identified as the key spawning areas for mullet. Each of these areas were traditionally accessed by the Maunaloa families throughout the plantation era and they continue to be important areas for fishing and gathering. Key informants experienced spiritual phenomena in the area and observed burials and iwi kupuna. The most favored hunting grounds are also located in this area of the MPL lands.

9.5 Alternative to La'au Development

The Alternative to La'au Development Committee (ALDC) efforts to find an alternative to the La'au Point development involved the hiring of consultant Clark Stevens (New West Land Company) by the Moloka'i Enterprise Community (EC).

This alternative proposed 50 view-shed lots at La'au Point, located between 0.5 mile and 1.5 miles from the La'au shoreline, and another 100 small residential lots, which would represent a new "town" similar to Maunaloa.

The cultural impact of this proposal would depend upon the placement of this lots. Placement .5 to 1.5 miles from the shoreline reduces the impact to coastal cultural sites and to the natural coastal and marine resources utilized for subsistence, cultural and spiritual purposes. However, some of the inland sites in the particular design that was submitted are situated in areas that informants identified as extremely significant and highly sensitive from a cultural and spiritual standpoint. It is similar in concept to the models considered by MPL and discussed above in 9.3, although this particular model would have less population and demand for water than the proposed La'au Development. The infrastructure cost, according to MPL is prohibitive.

The ALDC also suggested the pursuit of a conservation "philanthropic" buyer to purchase the entire 6,348-acre parcel, or a buyer who could use the tax incentives and develop mauka of the shoreline with less density. The ALDC asserted that in order for them to move forward with finding potential purchasers, MPL must be willing to keep this alternative open and determine a purchase price for the parcel.

MPL has stated the following in regard to this purchase alternative:

> If a purchaser offers the company a price for the La'au parcel that is equivalent to its development return, protects areas for subsistence as proposed and provides an endowment income to the Land Trust/CDC as proposed under the La'au development plan, it will seriously consider the offer. Should a serious buyer emerge, MPL will enter meaningful negotiations with that party or parties.

The option to pursue this alternative will remain open.

Section 10 Summary and Conclusion

This Cultural Impact Assessment Report has been prepared as part of the Environmental Impact Statement (EIS) for the proposed La'au Point Development in compliance with Chapter 343, Hawai'i Revised Statutes and Title 11, Department of Health, Chapter 200, Environmental Impact Rules, State of Hawai'i.

This report has especially been designed to fulfill the mandate to the Land Use Commission from the Hawai'i State Supreme Court in its ruling, Ka Pa'akai O Ka 'Aina v. Land use Commission, State of Hawai'i / 94 Haw. 31 (2000). The specific section of the ruling that served to guide the development of the report is as follows:

> "In order for the rights of native Hawaiians to be meaningfully preserved and protected, an appropriate analytical framework for enforcement is needed. Such an analytical framework must endeavor to accommodate the competing interests of protecting native Hawaiian culture and rights on the one hand, and economic development and security, on the other . . .
>
> In order to fulfill its duty to preserve and protect customary and traditional native Hawaiian rights to the extent feasible, the LUC, in its review of a petition for reclassification of district boundaries, must – at a minimum – make specific findings and conclusions as to the following: (1) the identity and scope of 'valued cultural, historical, or natural resources' n27 in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area; (2) the extent to which those resources, including traditional and customary native Hawaiian rights will be affected or impaired by the proposed action; and (3) the feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian rights if they are found to exist. n28

This summary, addresses the three key findings required of the Land Use Commission and government agencies empowered to make decisions affecting land use in Hawai'i under the ruling of the Hawai'i State Supreme Court in its ruling in Ka Pa'akai O Ka 'Aina in 2000.

10.1 Valued Cultural, Historical or Natural Resources and Traditional and Customary Native Hawaiian Rights Exercised in the Petition Area

The La'au Subdivision Archaeological Preservation and Mitigation Plan prepared by Cultural Landscapes in May 2006 documents valued cultural and historical resources in the petition area. This report focuses on valued natural resources utilized for cultural, subsistence and spiritual purposes.

A large part of the significance of the La'au Point area is that it is raw and untouched. It is so isolated that most of the residents of Moloka'i have never even been there and have no direct experience with the place. This factor gives La'au an almost mythical quality. La'au Point has become an icon of what Moloka'i represents - a rural stronghold and reserve of Native Hawaiian culture, a cultural kipuka. If Moloka'i is "The Last Hawaiian Island" then La'au is one of the last untouched Native Hawaiian places on "The Last Hawaiian Island."

In Hawaiian tradition, La'au Point represents a point of no return. For those traveling by canoe from O'ahu to Moloka'i across the Kaiwi Channel, once La'au Point is sighted, there is not turning back to O'ahu. This concept has been applied to the issue of the development of the La'au Point Rural-Residential Subdivision. Many Moloka'i residents feel that if the west and south shores adjacent to La'au Point are developed, as proposed, that this will open up Moloka'i to new residents unfamiliar with the culture and way of life on Moloka'i and lead to irreversible cultural change.

Everyone interviewed and those who came to community meetings had reservations about the proposed development. No one was an enthusiastic advocate, many were reluctant supporters and those most vocal were opposed to the development.

The Maunaloa kupuna and larger community and longtime employees of Moloka'i Ranch have the most direct and longtime experience with the area proposed for development. What is striking is that while they are very concerned and reluctant about the development, they are also willing to acknowledge and support the right and the need of the Ranch to seek the development. They feel that the negative impacts could be managed if the development would conform to the strict covenants, conditions and restrictions outlined in the Community-Based Master Land Use Plan for Moloka'i Ranch. They are confident that their community can work together with the project's resource managers to provide stewardship over the marine resources that they rely upon for subsistence. They also felt that the negative impacts would be offset with the gifting of important legacy lands to the community.

In addition, many longtime adversaries of Moloka'i Ranch engaged in the development of the Community-Based Master Land Use Plan for Moloka'i Ranch, which includes the proposed La'au development, over the course of two and a half years throughout countless community meetings, long hours of impassioned debate, critical thinking and soul searching. For them it was a process of negotiating a lasting settlement of a thirty year struggle with Moloka'i Ranch over extravagant development schemes and the extractive use of millions gallons of the island's precious and limited water resource. The proposed La'au development was difficult for them to accept and at that point some withdrew their support. However the majority of the planning group persisted in their support for the overall Community-Based Master Land Use Plan as a reasonable and balanced approach that empowers the community to manage premier Native Hawaiian legacy lands, control population growth and land speculation and monitor the one last major development on Moloka'i Ranch lands. Moreover, the plan revolves around the management of natural resources for subsistence, cultural and spiritual purposes.

Participants in community meetings and the key informants speak of the south and west coasts adjoining La'au point and its nearshore waters as reserve of marine resources which serve as their "icebox." It is a place where fishermen usually go to get fish, 'opihi and crab for parties and gatherings of their large extended families.

The southwest shore also factors into the life cycle of the mullet, serving as a hatchery area from which they move east to Mana'e or East Moloka'i.

Along the south shore, informants identified the various fishing and gathering areas by points that they referred to as first point (Kanalukaha), second point (Kapukuwahine), third point (Kahalepohaku) and fourth point ('Opihi Road). The south shore is best known for moi, aholehole, 'a'ama crab and 'opihi. The 'opihi starts at Kapukuwahine on the south shore and out on the cliffs along what they refer to as 'Opihi road. The west shore is best known for moi, aholehole and lobster. Due to the seasonal ocean swells, the south shore is usually harvested in the winter time when there are north swells and the west shore is usually harvested in the summer time when there are south swells. They also speak of the ocean as being very treacherous and not safe for swimming. Off of La'au Point itself, informants spoke of a very strong current which has swept even the best divers out to the open ocean.

Traditionally, it is not a place that was fished on a regular basis because it is isolated and difficult to reach. However, the increased use of boats on Moloka'i and O'ahu has changed this. Informants noted that the resources have declined in the area with heavy seasonal harvesting by boaters from O'ahu and the opening of Hale O Lono harbor and Kaluako'i as closer launching points for Moloka'i boaters.

In addition to natural resources utilized for subsistence, informants spoke of other natural resources which have cultural significance such as native plants, native species of turtles and monk seals, and the simple unspoiled natural beauty of the undeveloped seascape.

The Lā'au area is generally regarded as a special place of spiritual mana and power. Community participants and key informants spoke of specific burials, fishing ko'a, and heiau. Such specific sites are documented and described in the La'au Subdivision Archaeological Preservation and Mitigation Plan by Cultural Landscapes that is part of this EIS.

The overall spiritual quality of the Lā'au area as a wahi pana and wahi kapu cannot be quantified and deserves recognition and respect.

Informants identified the following coastal cultural and subsistence resources in the proposed development area.

Coastal Cultural and Subsistence Resources

x	streams	x	ponds
____	'auwai (taro irrigation ditches)	____	lo'i kalo
x	springs	x	caves
x	trails	x	wahi pana (named places)
x	sacred places	____	dunes
x	landings	____	bridges
x	surfing sites	x	sandy beach
x	fishing area	x	fishpond
x	fish trap	x	fish house
x	hunting areas	x	kilo i'a (fish sighting)
x	muliwai (brackish pond)	x	anchialine pond
x	trails	x	salt ponds
x	wells	x	turtle nesting area
x	historic walls	x	basalt veins for tools
____	alae vein	x	salt pans
x	shrines	x	salt gathering areas
x	ko'a (fishing shrines)	x	heiau (temples)
x	historic sites	x	cultural use areas
x	ho'ailona (natural signs)	x	sighting place
____	lele (cliff jumping spots)	x	native plants
x	pu'uhonua (places of refuge)	____	holua slides
____	cultivation area	____	leina (jumping off point
x	archaeological sites	for souls to cross over)	
x	burials	x	kupe'e
____	o'opu	____	hihiwai/wi
x	aholehole	x	'anae
____	steam bath areas	x	bathing pools
x	limu gathering areas	x	lava tubes
x	subterranean water course	x	petroglyphs
x	kapu kai/hi'u wai areas	x	paddling areas
x	artifacts	x	view plane
x	seasonal residential sites	x	burial markers
x	water caves	x	birthing stones
____	phallic stones	x	Pohaku Kane
x	coral reef	____	estuary
x	spawning grounds	x	house sites
x	po kane routes (night marchers	____	dams
x	'aumakua (ancestral deities) domain		

They added the following additional resources:

monk seals, water catchments, bell stones, ahu stones, Hawaiian moth, chamomile type flower for clearing liver, shells on shore.

10.2 Extent to which Valued Resources and Traditional and Customary Native Hawaiian Rights will be Affected or Impaired by the Proposed Action

Participants in the community meetings expressed concern that the proposed development will change the demographics of Moloka'i forever. They believe that La'au will contribute to the increase of land values and prices and property taxes on Moloka'i.

The community expressed concern that 200 new millionaires will change the make up of the Moloka'i community and lead to changes in the Hawaiian way of life. With more outsiders, Moloka'i will no longer be "The Last Hawaiian Island." The proposed development will bring in new residents unfamiliar with the culture and way of life on Moloka'i and lead to irreversible cultural change.

The community doesn't want Moloka'i to turn into Maui or O'ahu with a large population off-island people. They expressed regret that if the development occurs, La'au will never be the same.

In balance, the Maunaloa kupuna shared that no matter what happens, the population will increase and the land will be limited. While Moloka'i has been preserved it is gradually being developed. They acknowledged that progress cannot be stopped but that it can be controlled. The Maunaloa kupuna felt that the overall community plan of which La'au is a part provides for the community to manage and monitor the proposed development.

Access and Trails

Community members were concerned that the subdivision might be a gated community, and were relieved that this is not part of the plan.

Native Hawaiians and the general public will have access from two points - one on the south shore at the southeast entry and one on the west shore at the northwest entry. In the process to develop the Community-Based Master Land Use Plan for Moloka'i Ranch, subsistence fishers and gatherers were very concerned that opening up the south and west shores to public access at every 1500 feet as the County of Maui provides will deplete the marine resources. They regretted that the opening of Hale O Lono harbor to public access had severely decreased the marine resources there and they do not want to see that happen in the area proposed for development. Opening up access points every 1500 feet would have a severe impact on the subsistence resources along the west and south coasts adjacent to La'au Point.

Community members were concerned that subdivision lot owners and their friends will have preferential access to the coast. There will be nothing to stop the home owners from going down to the beach. Those who live on the shoreline will be able to access their home and the beach by vehicle. Homeowners can create a trail to the beach and let their friends have access to the beach. Affording only two access points for the general public, while the rich people in the subdivisions will have access from their homes seems unequal. Informants also expressed concern that landowners might call police if they see the general public walking on the beach, as this has happened at Papohaku.

Participants in community meetings and informants felt it was important to provide emergency access through the subdivision to the shoreline for emergencies. They were also concerned that access should be afforded for kupuna and persons with special needs. Some pointed out that the areas closest to the access points will be heavily impacted, while spreading out the access points might spread out the impact. It was also noted that the road down to Hale O Lono harbor would need to be maintained in order to keep access to the area open.

Subsistence Fishing and Gathering

Informants feel that the development will spoil the experience of fishing in what is now an isolated, pristine and spiritual area. They are concerned that instead of La'au being a place to get food, it will be a place with haole in their back yards. Many informants felt that the proposed development will greatly hinder, if not abolish altogether, ongoing traditional gathering activities currently enjoyed by Moloka'i islanders at La'au. Fishermen will lack privacy if the development goes through. Yet, throw net subsistence fishers require an undisturbed beach that allows fish to forage closer inshore in order to succeed. Gatherers of 'a'ama crabs require dark silent nights to ensnare their nocturnal prey. Commotion emanating from noisy and brightly lit beach homes will negatively impact crabbers' efforts to capture their already skittish prey. Gatherers of limu and pupu will very likely be met with kayakers in the water, people sunbathing on the beach, and pet animals running up and down the shoreline. If experiences elsewhere in Hawai'i hold true, it is not likely that owners of multi-million dollar beach homes will greet shoreline subsistence gatherers with open arms. It is more probable that subsistence practitioners will be confronted by insensitive newcomers intolerable of extractive activities in what they will perceive to be their front yards.

While the new landowners will probably want to go out and fish when they see the lobsters in the area, most informants felt that the new residents will probably not directly damage the fishing grounds because they don't know how to fish. The real impact on the fishing resources is from the Honolulu boaters. When the outboard motor and twin outboards came out at an affordable prices, the Honolulu boats came fishing all along the west end and south shore. These fishermen have taken everything, even the eggs. The lobster area is wiped out. The Moloka'i residents fish for the family and perhaps get an extra cooler of fish to sell. The outside commercial fishermen fish out the grounds of lobster and fish. They do not plan for the future.

Community participants and key informants were concerned that pesticides and fertilizers will contaminate the ocean and kill the marine resources. Fertilizer run off will kill the small organisms that support all of the marine life offshore. Runoff from the development will contaminate the ocean. Grading can increase erosion which will result in sediment flowing into the ocean and destroy marine resources. Some informants from the East End felt that the development would impact the mullet run and thus impact the resources on their end of the island. However, longtime fishermen who have regularly fished the south shore as members of Ranch families noted that the mullet spawn at Hale O Lono, Halena and Kolo, rather than close to La'au. Hale O Lono is on the eastern border of the project area. Halena and Kolo are outside of the project area.

Community members wanted to be assured that the rules outlined for access and for subsistence and gathering cannot be changed by the subdivision lot owners. MPL clarified that the lot owners will be required to uphold the Covenants, Conditions and Restrictions (CC&Rs) that include these rules as part of the homeowner contract.

Providing parking areas at either end of the proposed project area and limiting access along the shoreline to foot access will open up access sufficiently that it might impact the resources, as the entry points will be closer for those who now walk and must either enter from Hale O Lono or Dixie Maru. The conservation rules might affect fishing, but if the access is easier there will be more fishing.

Subsistence Hunting

Hunters are concerned that the new landowners from outside of rural Moloka'i will not want to hear shooting and may be protective of the deer and oppose even bow hunting. Deer hunting could become an animal rights issue. Bullets can travel 4 miles and 10 year kids can get a license. Need to have a sufficient buffer zone. It will only take one accident to close down hunting in the area. The overall hunting area will be reduced by the no hunting zone in the subdivision and buffer zone and the safety zone.

The plan to put in a deer fence and remove deer within the proposed subdivision will effectively close off hunting in the southwest corner of Moloka'i. It will have to be a very high fence. The deer will keep going back. The deer will get hurt.

Cultural Resources and Practices

Informants are concerned that cultural sites will be destroyed once start to bulldoze and grade and clear the land for development. At Papohaku, homeowners have graded and damaged dune system and destroyed cultural sites and burials located in the dunes. They have extended their household area into the conservation zone, treated it like their own private property and tried to exclude Moloka'i residents from the public beach area fronting their homes. The same process can occur in the proposed subdivision.

Informants expressed concern that future generations may not have a concept of how to do subsistence and only going to catch what can be carried. Future generations should be

able to be in an environment where it's just them and mother nature. They should know what it feels like.

Concern was expressed about the impact of the proposed development on the monk seals who frequent the remote beaches of the west and south shores. Monk seals might be disturbed during the grading and construction phase. New residents may have dogs who would disturb the monk seals.

Many of the informants commented that the development will require a lot of expensive landscaping because the land is rough and rocky with a lot of boulders.

Spiritual Resources and Practices

Can destroy ko'a fishing shrines and cultural sites, unless monitored. Informants are also concerned that once the grading starts there will be erosion when it rains and the mud will cover the ko'a, the sand and the reef.

Can disturb iwi kupuna burials unless monitored.

The overall general concern is that the development of the area will destroy the special quality of La'au as a special place of spiritual mana and power.

10.3 Feasible Action by the LUC to Reasonably Protect Native Hawaiian Rights

The Community-Based Master Land Use Plan for Moloka'i Ranch provides measures to mitigate the overall impacts of the proposed development at La'au which set unique precedents for the development of large landholdings by offshore corporations. These precedents are related to community planning, the creation of a land trust for the community, the donation of legacy lands to the land trust, the donation of easements to the land trust, the protection of subsistence fishing, gathering and hunting, reserving lands for community housing, and the creation of economic opportunities for the community through the re-opening of the Kaluako'i Hotel. The plan also provides for covenants, conditions and restrictions that landowners in the La'au Point rural residential development will need to accept and agree to uphold in order to purchase a lot.

The Land Use Commission can review the Community-Based Master Land Use Plan for Moloka'i Ranch, especially the Covenants, Conditions and Restrictions (CC & Rs). The Commission can endorse the guidelines and CC & Rs which provide mitigation of the identified impacts to the cultural and natural resources utilized for subsistence, cultural and spiritual practices and customs. The Land Use Commission can assist in the enforcement of the CC & Rs by making these part of the conditions of the rezoning of the lands from the agricultural to the rural classification.

La'au Point must be the most environmentally planned, designed and implemented large lot community in the State. The residents would be educated and informed about the environment and culture, and taught to "Malama 'aina," take care of the land and sea."

This statement precedes the covenant document determined by the Land Use Committee that will place many restrictions on lot owners at La'au Point, in order to attract only those who are concerned about conservation.

As an example, the Conservation Zone and other areas to be protected (approximately 1,200 acres) within the subdivision will be the subject of an easement held by the Land Trust, with guidelines for these uses to be determined prior to the construction of the subdivision and reflecting the importance of the area archaeologically and to subsistence gathering.

These protected lands will be part of an entity that is controlled equally by the homeowners and the Land Trust. All decisions relating to this area: maintenance, subsistence protection, archaeological site protection, personnel, etc., will be the shared responsibility between the Trust and the homeowners, who will share equally in the costs.

MPL will attempt to attract buyers to the La'au point subdivision who reflect the hopes and aspirations of the community. Brochures, sales material and other promotional documents will be vetted by the Land Trust or the EC for accuracy and adherence to their principles.

One of the unique features of the CC &Rs is the condition that every person whose name is on the property title must commit to undergo a certain amount of education about the Moloka'i community and its desires and aspirations with kupuna and the Maunaloa community.

Measures will be taken to assure that these CC & Rs cannot be changed in the future. These CC & Rs include the following:

- prevent a gated community
- restrict the further subdivision of lots
- restrict the area that can be disturbed for use
- prevent construction on slopes of more that 50%
- restrict building height
- require the use of alternative energy
- prohibit the use of pesticides
- require that exterior lighting be shielded from the ocean
- require water catchments and 5,000-gallon storage tanks
- restrict landscaping to native and Polynesian introduced species suitable for dry coastal locations
- prohibit the use of noxious or invasive species; require green architecture
- manages erosion with vegetative cover
- puts a deer fence at the rear of the subdivision

The covenants, Conditions and Restrictions that landowners will need to uphold are described on pages 101 - 105 of the Community-Based Land Use Plan for Moloka'i Ranch that is part of the EIS.

Additional Recommended Guidelines:
Informants recommend the following additional provisions to mitigate the impact of the development on subsistence practices:

- ***Fence to demarcate private property from public access area***

All of the informants felt that it is important to have a clear physical demarcation, such as a log fence, running along the individual property lines to distinguish between private property and the public access area. By putting in a fence of some kind the public will know the boundary so that they won't trespass. Another suggestion was to use a round wire fence, called a New Zealand fence.

- ***Location of Access Trail***

Informants suggested that there be a physical demarcation between the property line and the ocean, along which the trail would run. The trail would follow the contour, following the old traditional trail as much as possible. Then the existing kiawe would serve as a buffer between the trail and the sand and ocean. This can help reduce impact of the trail on the beach and ocean. The kiawe can be pruned. It is a nitrogen fixing plan and will help other plants to grow around it. The trail should be placed back from the ocean so that it won't wash out. The trail will only be for walking and not for atv's or even bicycles. The trail should not be paved but kept clear and maintained.

- ***Emergency access to shoreline through subdivision***

Access through the subdivision should be provided for emergency rescue

- ***Document Existing Trails and Roads***

Document and map existing trails and roads for access.

- ***Kupuna Access***

To accommodate kupuna and those with special needs, have a golf cart available to assist their access.

- ***Landscaping***

Need to prevent landowners from landscaping the area of the setback which ranges from 250 to 1,000 feet.

- ***Support for the Maunaloa Community***

Have monies generated go into the community to support the school. Include the Maunaloa 'Ohana I Lokahi Association needs to be involved in the decisions about La'au.

- ***Regulate Fertilizers***

The use of fertilizers will be regulated.

- ***Involve Maunaloa Community in Stewardship***

Longtime fishers and gatherers from the Maunaloa community will be involved in the monitoring and protection of the marine resources in the development area.

- ***Cultural Monitoring***

Provide onsite monitoring of sites and potential erosion areas during clearing, grading and construction. Should have the resource management plan up and running when the grading and constructions starts.

- ***Hunting***

Have the buyers accept that hunting occurs in the broader surrounding area.

- ***Kama'aina residents of the Maunaloa community have seniority***

The seniority for hunting in accordance with traditional subsistence should be for kama'aina residents of the Kaluako'i ahupua'a and MPL employees.

- ***Papohaku Preservation Plan***

Apply relevant recommendations from the Papohaku Dunes Cultural and Natural Resource Preservation Plan, Kaluako'i, Moloka'i, Hawai'i Study.

- ***Kamaka'ipo Buffer***

The buffer area for Kamaka'ipo Gulch may need to be expanded. Due to the potential for erosion during grading and construction, the houses close to Kamaka'ipo Gulch should be moved further away from the gulch.

- ***Monk Seals***

Provide education and enforce laws protecting monk seals

- **Community-Based Subsistence Fishing Management Area**

It is a good idea to establish the community-based subsistence fishing management area that was demonstrated in a pilot project at Mo'omomi. Should also coordinate efforts with the communities of Miloli'i, Hawai'i and Ha'ena, Kaua'i who are also establishing community-based fishing zones. Also respect the Kalaupapa people and their grounds. The rights of the Kalapana people to fish in the Volcano National Park is another model.

- ***Restock moi***

The Land Trust should use some of the money to restock moi if they diminish. Restocking should be part of the management plan.

10.4 Conclusion

The overall Community-Based Master Land Use Plan for Moloka'i Ranch is not a perfect plan because it requires the development of the relatively pristine south and west shorelines of Moloka'i adjacent to La'au Point. Nevertheless, it is truly a grassroots community plan which represents a historic good faith effort on the part of Moloka'i Properties Limited and Ke Aupuni Lokahi-Moloka'i Enterprise Community to create sustainable economic solutions that will protect the cultural integrity of a unique Hawaiian island community. This monumental effort deserves serious reflection, deliberation and endorsement.

Ke Aupuni Lokahi-Moloka'i Enterprise Community is the steward of a plan that was designed by a broad cross section of the Moloka'i community. From May through September 1998, a planning group of the Moloka'i community formed seven subcommittees on Health, Education, the Environment, the Economy, Recreation, Youth and Leadership, and Culture to develop a comprehensive grant proposal to the U.S. Department of Agriculture to receive designation as a Rural Economic Empowerment Zone. They sent out newsletters to every postal service customer on the island and held two well-attended community meetings to receive input on the grant proposal. The final proposal contained a statement of the community's vision for Moloka'i; a description of strengths and weaknesses in the island's economy and natural environment and a strategy for sustainable community economic development. Although the Moloka'i community was not designated as an Empowerment Zone, they succeeded in attaining the status of a Rural Enterprise Community eligible to receive federal funds totaling $2.5 million over ten years in increments of $250,000 a year to attract additional funds that would launch sustainable economic development projects. The Community-Based Master Land Use Plan for Moloka'i Ranch is Project #47 of the Ke Aupuni Lokahi-Moloka'i Enterprise Community.

Ke Aupuni Lokahi-Moloka'i Enterprise Community continues to be guided by its vision statement that also serves as the vision statement for the Community-Based Master Land Use Plan for Moloka'i Ranch. It is as follows:

> *Moloka'i is the last Hawaiian island. We who live here choose not to be strangers in our own land. The values of aloha ' aina and malama 'aina (love and care for the land) guide our stewardship of Moloka'i's natural resources, which nourish our families both physically and spiritually. We live by our kupuna's (elders') historic legacy of pule o'o (powerful prayer). We honor our island's Hawaiian cultural heritage, no matter what our ethnicity, and thatculture is practiced in our everyday lives. Our true wealth is measured by the extent of our generosity.*
>
> *We envision strong 'ohana (families) who steadfastly preserve, protect and perpetuate these core Hawaiian values.*

We envision a wise and caring community that takes pride in its resourcefulness, self-sufficiency and resiliency, and is firmly in charge of Moloka'i's resources and destiny.

We envision a Moloka'i that leaves for its children a visible legacy: an island momona (abundant) with natural and cultural resources, people who kokua (help) and look after one another, and a community that strives to build an even better future on the pa'a (firm) foundation left to us by those whose iwi (bones) guard our land.

In the final analysis, the government agencies responsible for decisions about the future of the land and natural resources of Moloka'i must weigh the cultural impacts and benefits of the proposal to develop the west and south shorelines of the island of Moloka'i in consultation with the people of Moloka'i who depend upon these resources for subsistence, cultural and spiritual purposes. In particular, the kama'aina families who have lived in Maunaloa and the Kaluako'i ahupua'a for generations and the longtime employees of Moloka'i Ranch and their relatives have been the primary users of these resources and will be the most directly affected by the proposed development.

There is also the critical issue of Water. Is there enough water to provide for all of the island's major uses and yet allow this development to draw out 1,000,000 gpd of brackish water from Kakalahale? The Hawaiian homesteaders have a special claim and particular interest in this issue. MPL is actively working with all of the major managers and current users of the island's water resources to develop a solution.

There are clearly profound and unprecedented features in the overall Community-Based Master Land Use Plan for Moloka'i Ranch that will benefit future generations of the island as a whole. The gifting of fee title ownership of 26,200 acres to the Moloka'i Land Trust and dedication of 24,950 acres in conservation easements in perpetuity by Moloka'i Properties Limited (MPL) is clearly in the tradition of "Aloha Mai, Aloha Aku," "When aloha is given, aloha should be returned." Such an outstanding and magnanimous gesture deserves recognition as a model for offshore owners of Hawaiian lands on Moloka'i and other islands. Moreover, it is not just the quantity, but the quality of the lands that are being turned over that is significant. The ancient burial grounds of Kawa'aloa, the birthplace of the hula at Ka'ana and the Hula Piko at Maunaloa, the Makahiki grounds of Na'iwa, the fishing village of Kawakiu, the fishing grounds of Halena and Mokio are premier Native Hawaiian legacy lands of great significance to Native Hawaiians throughout the islands.

As with any groundbreaking work that is seeking to create innovative solutions to time worn problems, this plan takes risks. While the plan protects significant subsistence resources on the northeast shoreline of Moloka'i from Kalaupapa to 'Ilio Point and around to Kepuhi from development, the southwest shoreline from Kaupoa to Hale O Lono will be ringed by luxury residential homes. Extraordinary measures are incorporated into the plan to buffer and protect the subsistence and cultural resources from the negative impacts that such a development can generate.

These include:

- Upholding and assuring Native Hawaiian rights of access for cultural, subsistence and spiritual purposes.
- Creating sizeable conservation zones and buffer areas to protect the cultural sites and shoreline area.
- Ending commercial hunting so that Moloka'i kama'aina can legally engage in subsistence hunting on Ranch lands.
- Hiring two community cultural and natural resource managers who will work with the community to monitor every phase of the project, from clearing and grading, to construction and the moving in and residence of new homeowners.
- Orienting homeowners to appreciate and support the unique and special way of life on Moloka'i as the "Last Hawaiian Island."
- Limiting shoreline access to a foot trail.

Are these measures provided within the Community-Based Master Land Use Plan sufficient to protect these resources for future generations? The kupuna advise us that after all is said and done, it is La'au itself that will determine what will be acceptable and who will be accepted.

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Appendix G

Traffic Impact Assessment Report

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

November 17, 2006

Molokai Properties, Limited
Amfac Center, Hawaii Tower
745 Fort Street, Suite 600
Honolulu, Hawaii 96813

Attention: Mr. Peter Nicholas

Re: **Traffic Impact Assessment Report**
La'au Point Subdivision
Molokai, Hawaii

Dear Mr. Nicholas:

Phillip Rowell and Associates are pleased to submit this Traffic Impact Assessment Report (TIAR) for the proposed La'au Point Subdivision. The report is presented in the following format:

A. Project Location and Description
B. Purpose and Objective of Study
C. Methodology
D. Description of Existing Streets and Intersection Controls
E. Existing Peak Hour Traffic Volumes
F. Level-of-Service Concept
G. Existing Levels-of-Service
H. 2011 Background Traffic Projections
I. Project Trip Generation
J. Traffic Assessment of Future Conditions
K. Summary and Conclusions

A. Project Description

The proposed project is located on the southwest area of the Island of Molokai. Based on the subdivision plan provided, the subdivision will consist of approximately 200 lots. See Attachments A and B. It is our understanding that these lots will be for single-family units that will be either recreational, retirement or second homes.

In addition to the single-family dwelling units shown on the subdivision plan, there is a small public park on the western edge of the project with six parking spaces and the Kaupoa Beach Camp with 40 camp sites immediately north of the project boundary.

Access to the subdivision will be via Kaluakoi Road, referred to a "Access Road" on the map. Kaluakoi Road will connect the proposed project with Maunaloa Highway (SR 460). There are additional minor roads in the area but these are unpaved and it was assumed that these roadways will not be used by traffic to and from the subdivision. It was assumed that project traffic will use the paved roadways only.

B. Purpose and Objectives of Study

The objectives of this study are:

1. Estimate the amount of traffic that the proposed subdivision will generate.
2. Assess traffic levels-of-service along the roadway providing access to and egress from the project.
3. Assess the operating conditions of the intersections within the subdivision.
4. If required, identify and evaluate traffic related improvements required to provide adequate access to and egress from the proposed project at an acceptable level-of-service.

C. Methodology

1. *Define the Study Area*

The first step in defining the study area was to estimate the number of peak hour trips that the proposed project will generate. It was estimated that the project will generate a maximum of 125 trips during the morning peak hour and a maximum of 140 trips during the afternoon peak hour. The study area is limited to the major intersections that project trips will use to access the main highway, Maunaloa Highway (SR 460) at Kaluakoi Road and the intersections within the project boundary (See Attachment B).

2. *Analyze Existing Traffic Conditions.*

Existing traffic volumes at the study intersections were obtained from traffic counts completed Monday, August 28, 2006. The traffic volumes obtained from the traffic counts were validated by comparing the approach volumes to the most recent traffic count data available from State of Hawaii Department of Transportation.

The intersection configurations and right-of-way controls were verified at the time of the surveys. Existing traffic operating conditions were assessed using the methodology described in the 2000 *Highway Capacity Manual* (HCM)[1].

3. *Estimate Horizon Year Background Traffic Projections*

Background traffic conditions are defined as future traffic conditions without the proposed project and were estimated by superimposing background growth and traffic generated by related projects in the vicinity onto existing traffic volumes.

The year 2023 was used as the horizon year. This does not necessarily represent the project completion date. It represents a date for which future background traffic projections were estimated. The year 2023 is also consistent with recent direction from the Maui County Department of Public Works and Environmental Management and the Environmental Impact Statement.

[1] Institute of Transportation Engineers, *Highway Capacity Manual*, Washington, D.C., 2000

4. *Estimate Project-Related Traffic Characteristics*

The number of peak-hour trips that the proposed project will generate was estimated using standard trip generation procedures outlined in the *Trip Generation Handbook*[2] and data provided in *Trip Generation*[3]. These trips were distributed and assigned based on the available approach and departure routes and existing approach and departure patterns as determined from the traffic counts.

5. *Analyze Project Related Traffic Impacts*

The project-related traffic was then superimposed on 2023 background traffic volumes at the study intersections. The traffic impacts of the project were assessed by estimating the future levels-of-service at the study intersections. The purpose of this analysis was to identify potential operational deficiencies within the project, along the approach and departure roads and at the intersection of Kaluakoi Road at Maunaloa Highway (SR 460).

D. Description of Existing Streets and Intersection Controls

The only existing intersection analyzed is the intersection of Maunaloa Highway at Kaluakoi Road. A schematic diagram indicating the existing lane configurations and right-of-way controls at this intersection is presented as Attachment C.

Maunaloa Highway and Kaluakoi Road are both two-lane, two-way roadways. Maunaloa Highway has an east-west orientation and Kaluakoi Road has a north-south orientation. The intersection of these two roads is an unsignalized, T-intersection. All approaches are one-lane. There are no separate turn lanes along any approach.

E. Existing Peak Hour Traffic Volumes

The existing traffic volumes are based on traffic counts completed Monday, August 28, 2006. The morning and afternoon peak hour traffic volumes are also summarized on Attachment C.

1. The traffic counts include buses, trucks and other large vehicles. Mopeds and bicycles were not counted.

2. All intersections were counted from 6:30 AM to 8:30 AM and from 2:30 PM to 5:00 PM on weekdays. There hours were determined from SDOT traffic count data for this specific intersection.

3. The traffic volumes shown are the peak hourly volume of each movement rather than the peak sum of all approach volumes.

4. All volumes are rounded to nearest five (5).

5. Pedestrian activity was negligible.

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

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

F. Level-of-Service Concept

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

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

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

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

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

G. Existing Levels-of-Service

The existing levels-of-service were assessed using the methodology described in the *Highway Capacity Manual*. The results of the level-of-service analysis of existing conditions are summarized in Table 2.

Table 2 Existing (2006) Levels-of-Service

Intersection and Movement	AM Peak Hour Delay [1]	AM Peak Hour LOS [2]	PM Peak Hour Delay	PM Peak Hour LOS
Maunaloa Highway at Kaluakoi Road				
Eastbound Left & Thru	7.3	A	7.3	A
Southbound Left & Right	9.2	A	9.1	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.

The conclusion of the level-of-service analysis is that traffic currently operates at acceptable conditions at the study intersections as all movements operate at Level-of-Service A. Traffic along Maunaloa Highway operates at Level-of-Service A which implies that traffic turning from Maunaloa Highway onto Kaluakoi Road and traffic turning onto Maunaloa Highway has a negligible impact on traffic operations along Maunaloa Highway.

H. 2023 Background Traffic Projections

2023 background traffic projections are defined as future background traffic conditions 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. This growth factor also accounts for smaller development projects in the area for which a traffic impact study is not available or are not identified as a related project during the data collection process. The second component is estimated traffic that will be generated by other development projects (related projects) in the vicinity of the proposed project.

Background Traffic Growth

The background growth rate is typically determined from historical traffic data obtained from SDOT or from data contained in a long-range land transportation plan. For this study, the most current data available is the SDOT data. Therefore, the data provided in the SDOT data was used to estimate the background growth rate. Historical traffic counts at the intersection of Maunaloa Highway at Kaluakoi Road indicate that the approach volumes decreased from 1993 to 2003. Therefore, we assumed that there would be no additional background growth between 2006 and 2023.

The decrease in approach volumes at the intersection of Kaluakoi Road at Maunaloa Highway may be explained by the closure of part of the Kaluakoi Resort. As explained in the following section, this has been accounted for by including as estimate of the total traffic generated by the resort when fully developed.

Related Projects

The second component in estimating background traffic volumes is traffic generated by other proposed projects in the vicinity. Based on discussions with Molokai Properties, it was determined that all the undeveloped property between the north project boundary and Maunaloa Highway is controlled by Molokai Properties. The only development project between the proposed project and Maunaloa Highway is the remainder of Kaluakoi Resort.

The remainder of the Kaluakoi Resort will be 238 Ag lots, 15 single-family lots and 348 condominium units. Trip generation data for single-family residential units was used to estimate the trips generated by the agricultural lots. Trip generation data for condominiums was used to estimate the trips generated by the condominiums.

The existing 152 room hotel will re-open. Trip generation data for resort hotels was used to estimate the trips generated by these hotel rooms.

A trip generation analysis for the Kaluakoi Resort was performed and the traffic assigned to the intersection of Maunaloa Highway at Kaluakoi Road. It was assumed that 85% of the peak hour traffic would enter and exit the study area via this intersection. The remaining 15% was assumed between the reosrt and La'au Point. The turning movements then were estimated using the distribution calculated from the turning volumes obtained from the August 2006 counts.

I. Project Trip Generation

Traffic volumes generated by the project were estimated using the methodology described in the *Trip Generation Handbook*[4] and *Trip Generation*.[5] This method uses trip generation rates and equations provided in *Trip Generation* to estimate the number of trips that the proposed project will generate during the weekday peak hours. The are three components of the project considered in the trip generation analysis.

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

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

Single-Family

Based on the project description provided, the proposed single-family units would be recreational or second homes. However, Maui County Department of Public Works and Environmental Management directed that a previous traffic analysis for this project be performed using trip generation rates for single family housing provided in *Trip Generation*. Use of trip generation rates for single-family housing units will result of an overestimate of the number of trips into and out of the project because the data represents a typical suburban subdivision with residents that commute to and from work during the weekday peak hours. As the units in this subdivision will be recreational or second homes, there will be no commute trips.

It was decided that a trip generation study should be performed to establish trip generation rates for the specific development proposed. This procedure is consistent with the procedures described by the Institute of Transportation Engineers in the *Trip Generation Handbook*.

The first step was to identify a comparable development and perform counts of the number of trips into and out of the development. Based on the project description of the proposed project and consultation with the developer, the most comparable development for which traffic generation counts could be performed accurately is the Kahana Ridge development in West Maui. Accordingly, counts were performed along and access and egress routes to the project on four weekdays (one Tuesday, one Thursday and two Fridays) during October 2006 and averaged. The number of inbound and outbound trips and the inbound/outbound distribution was then calculated. The results are summarized in Table 3 and compared to the rates provided in *Trip Generation*.

Table 3 Comparison of Trip Generation Rates

Time Period	Direction	Trp Generation Rates		
		Single Family (1)	Recreational Homes (1)	Trip Generation Survey
AM Peak Hour	Total	0.75	0	0.62
	In	25%	49%	28%
	Out	75%	51%	72%
PM Peak Hour	Total	1.01	0.31	0.71
	In	63%	44%	61%
	Out	37%	56%	39%

NOTES:
(1) Institute of Transportation Engineers, *Trip Generation*, 7th Edition, 2003.

The trip generation rates for single-family housing are based on the number of dwelling units, which is 198 units per the subdivision plan provided and the trip generation data obtained from the trip generation surveys. The trip generation calculations are summarized in Table 4.

Table 4 Trip Generation Calculations for Single-Family Units

Time Period	Direction	Single-Family Units		
		Rate or %(1)	Units	Totals (2)
AM Peak Hour	Total	0.62	200	125
	In	28%		35
	Out	72%		90
PM Peak Hour	Total	0.71		140
	In	61%		85
	Out	39%		55

NOTES:
(1) Institute of Transportation Engineers, *Trip Generation*, 7th Edition, 2003.
(2) All numbers rounded to nearest five (5).

Public Parks

In addition to the housing units, there is one public park within the subdivision. This park will have six parking stalls. The subdivision plan indicates that the total area of the park will be 8 acres. The trip generation data for parks provided in *Trip Generation* indicates that county parks will generate 0.01 and 0.06 trips per acre[6] during the morning and afternoon peak hours, respectively. This translates into less that one trip per hour. Because this is such a small number and a majority of the trips will have origins within the subdivision, trips generated by the park were considered negligible.

Kaupoa Beach Park

Kaupoa Beach Park is located along the north boundary of the project between the ocean and Kaluakoi Road. The camp consists of approximately 40 platforms.

Trip generation rates for campground/RV parks were used to estimated the trip generated by the Camp. These rates are based on the number of campsites or pads. The trip generation analysis is summarized in Table 5.

Table 5 Trip Generation Calculations for Kaupoa Beach Park

Time Period	Direction	Rate or %(1)	Campsites	Trips (2)
AM Peak Hour	Total	0.22	40	10
	In	42%		5
	Out	58%		5
PM Peak Hour	Total	0.41		15
	In	62%		10
	Out	38%		5

NOTES:
(1) Institute of Transportation Engineers, *Trip Generation*, Seventh Edition, 2003.
(2) All numbers rounded to nearest five (5).

Summary

The total trips generated by the single-family units and Kaupoa Beach Camp are summarized in Table 6.

Table 6 Trip Generation Analysis

Period & Direction		Single-Family Trips	Kaupoa Beach Camp Trips	Totals (1)
AM Peak Hour	Total	125	10	135
	Inbound	35	5	40
	Outbound	90	5	95
PM Peak Hour	Total	140	15	155
	Inbound	85	10	95
	Outbound	55	5	60

Note:
(1) All numbers rounded to nearest five (5)

[6] Ibid, pages 635 & 636

The project will generate 40 inbound trips and 95 outbound trips during the morning peak hour. During the afternoon peak hour, the project will generate 95 inbound trips and 60 outbound trips.

The project generated trips were distributed and assigned to the proposed street network based on the available approach and departure routes. The trips were distributed as if the residents commute to and from the project during the peak hours. This results are conservative traffic projections as the residents within the project will not be commuters as discussed in the project description. Also, there is no major employment or shopping center that would attract commuter type trips from the subdivision.

The morning and afternoon peak hour traffic volumes along the study streets are shown schematically in Attachments D and E, respectively.

J. Traffic Assessment of Future Conditions

A level-of-service analysis was performed to identify traffic operating conditions at the proposed intersections within the subdivision. The Level-of-Service analysis was performed using the following assumptions:

1. All intersections will be unsignalized.

2. All intersection approaches will be one-lane. There will be no separate left turn or right turn lanes.

The results of the Level-of-Service analysis for future conditions are summarized graphically in Attachments F and G. Shown are the control delays and levels-of-service of all controlled movements. Controlled movements are those that must yield to other movements.

As shown, all controlled traffic movements within the project will operate at Level-of-Service A, which is the highest level-of-service. This means that all the intersections are expected to operate at a high level-of-service during the peak periods and that none of the intersections require widening to accommodate anticipated traffic volumes.

A level-of-service analysis was also performed for the roadway segment of Kaluakoi Road north of the project boundary. All project traffic is concentrated along this section of roadway. The conclusion of this level-of-service analysis is that the roadway segment will operate at Level-of-Service A or B.

Lastly, a level-of-service analysis was performed for the intersection of Maunaloa Highway at Kaluakoi Road. The results are summarized in Table 7. Traffic along Maunaloa Highway will operate at Level-of-Service A. Traffic along Kaluakoi Road will operate at Level-of-Service C. As the minimum acceptable Level-of-Service is D and the level-of-service analysis concluded that the lowest Level-of-Service will be C for 2011 background plus project conditions, no improvements are recommended.

Table 7 2023 Levels-of-Service for Maunaloa Highway at Kaluakoi Road

Intersection and Movement	AM Peak Hour		PM Peak Hour	
	Delay [1]	LOS [2]	Delay	LOS
Maunaloa Highway at Kaluakoi Road				
Eastbound Left & Thru	7.7	A	8.3	A
Southbound Left & Right	15.8	C	22.0	C

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.

K. Summary and Conclusions

The conclusions of the traffic impact assessment are:

1. The proposed project will consists of approximately 200 second home and recreational lots. However, in response to previous comments for County of Maui Department of Public Works and Environmental Management, the traffic study is based on trip generation data for single-family detached housing units.

2. Based on trip generation data for a comparable development, the project will generate 125 trips during the morning peak hour and 140 trip during the afternoon peak hour.

3. Based on the findings of the level-of-service analysis, the intersections within the subdivision do not require widening for separate turn lanes or signalization to accommodate project generated traffic for single-family housing. It is anticipated that all intersections will operate at Level-of-Service A, which is the highest level-of-service.

4. Based on the findings of the level-of-service analysis for the intersection of Maunaloa Highway at Kaluakoi Road, which is the access and egress location for project traffic along Maunaloa Highway, the minimum Level-of-Service is C, which is above the minimum acceptable Level-of-Service D. Therefore, no improvements are recommended.

Respectfully submitted,
PHILLIP ROWELL AND ASSOCIATES

Phillip J. Rowell, P.E.
Principal

List of Attachments

A. Subdivision Plan

B. Study Area and Study Intersections

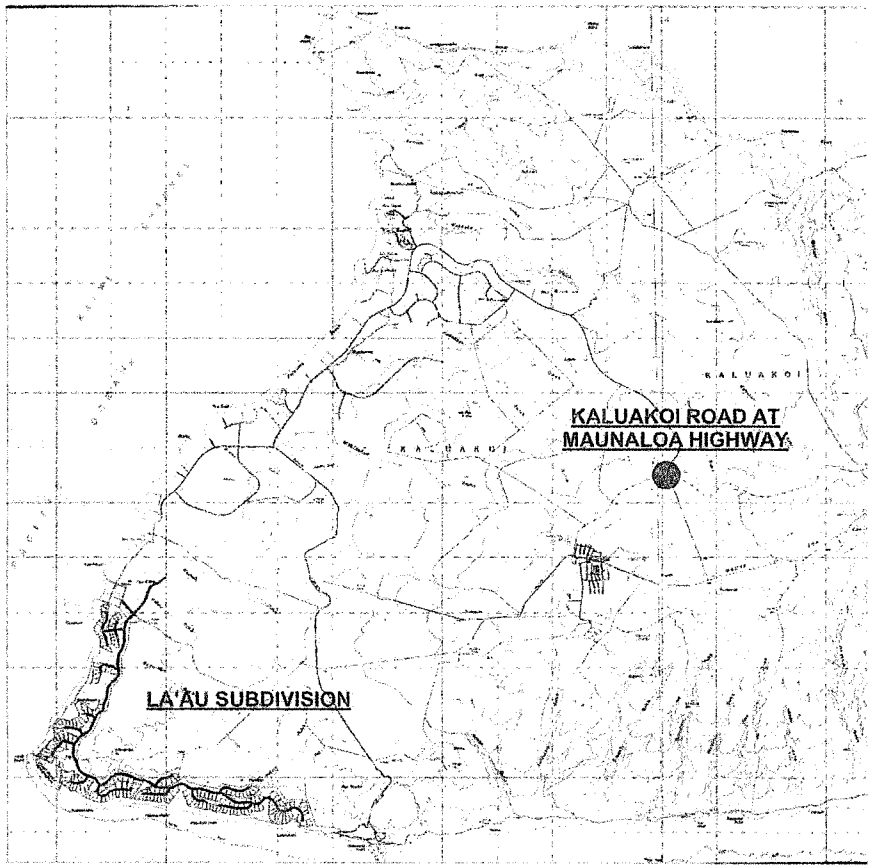
C. Existing Lane Configuration and Peak Hour Traffic Volumes for Maunaloa Highway at Kaluakoi Road

D. AM Peak Hour Traffic Projections

E. PM Peak Hour Traffic Projections

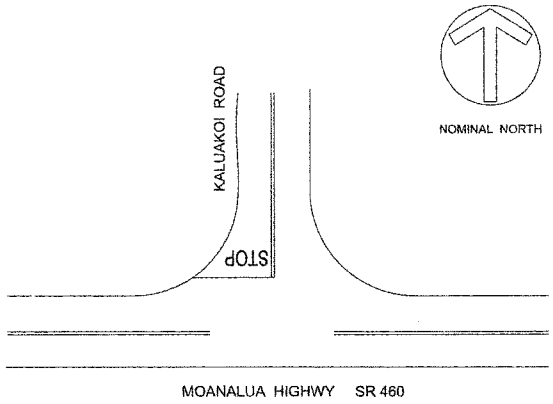
F. AM Peak Hour Levels-of-Service

G. PM Peak Hour Levels-of-Service



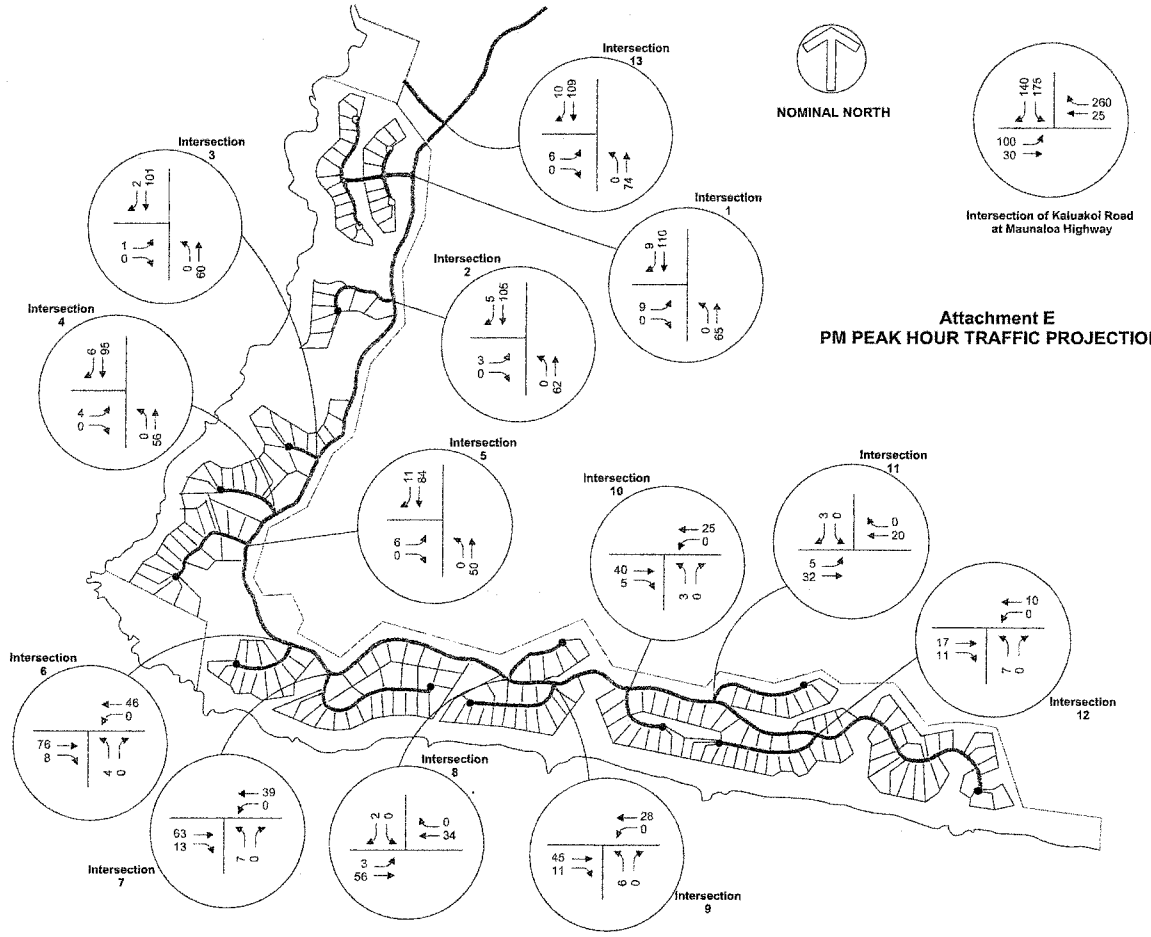
SOURCE OF MAP: USGS

Attachment B
STUDY AREA AND STUDY INTERSECTIONS

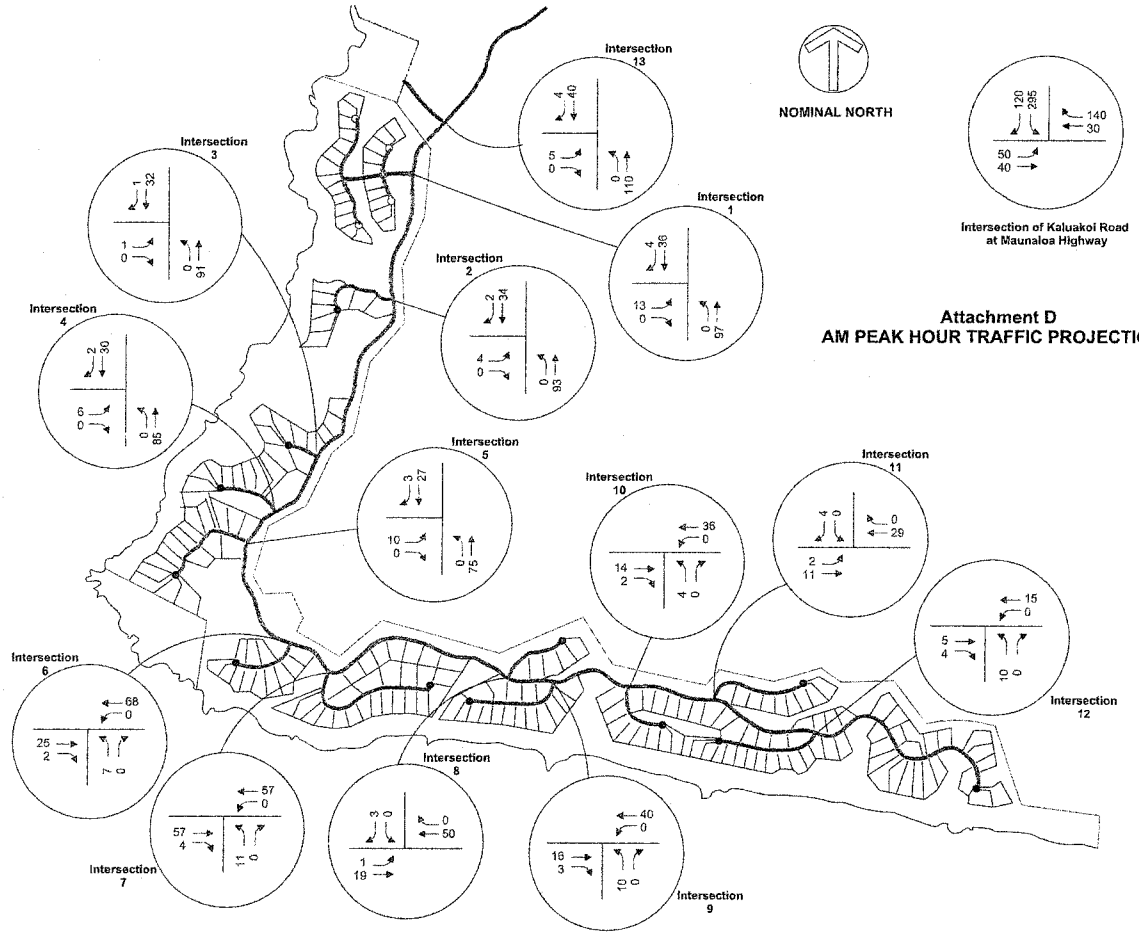


NOTES:
1. COUNTS WERE PERFORMED MONDAY, AUGUST 28, 2006.
2. VOLUMES ARE ROUNDED TO NEARESR FIVE (5).

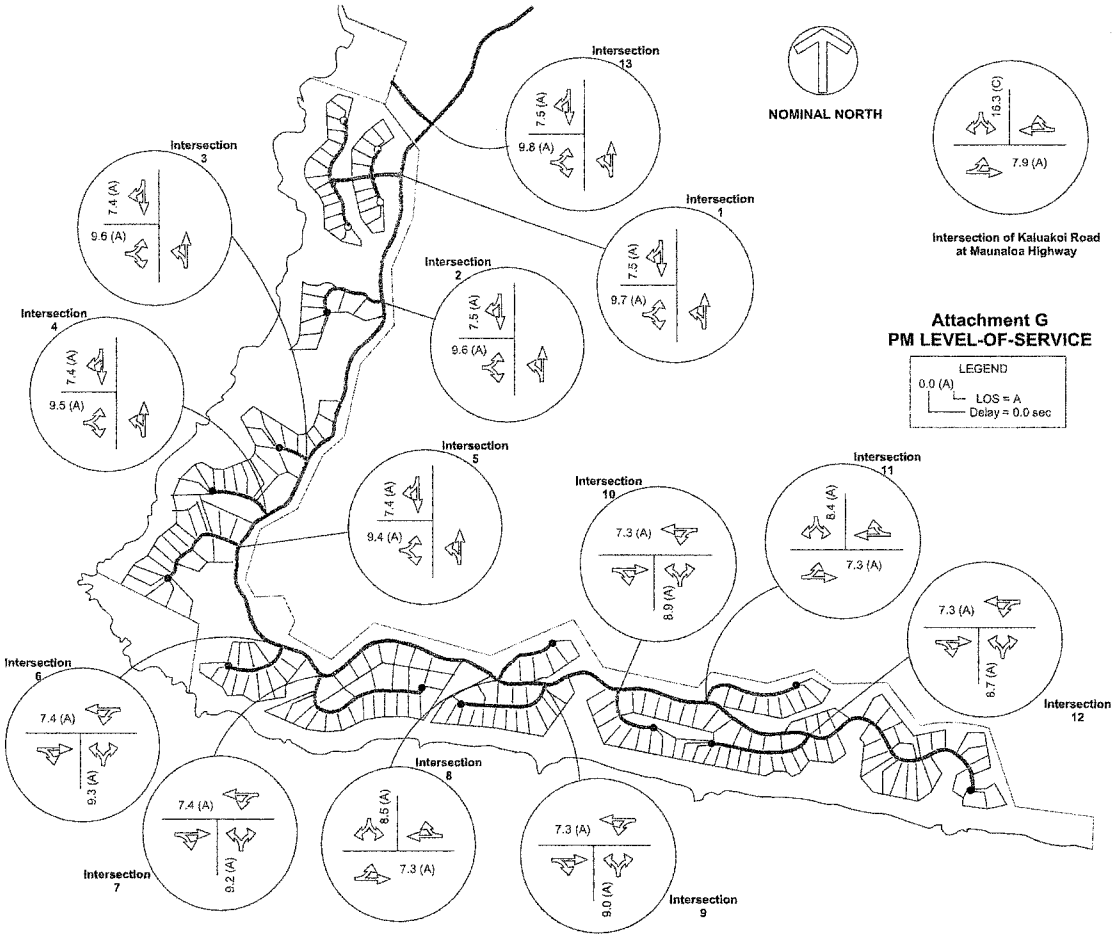
Attachment C
EXISTING LANE CONFIGURATION AND PEAKHOUR TRAFFIC VOLUMES FOR MAUNALOA HIGHWAY AT KALUAKOI ROAD

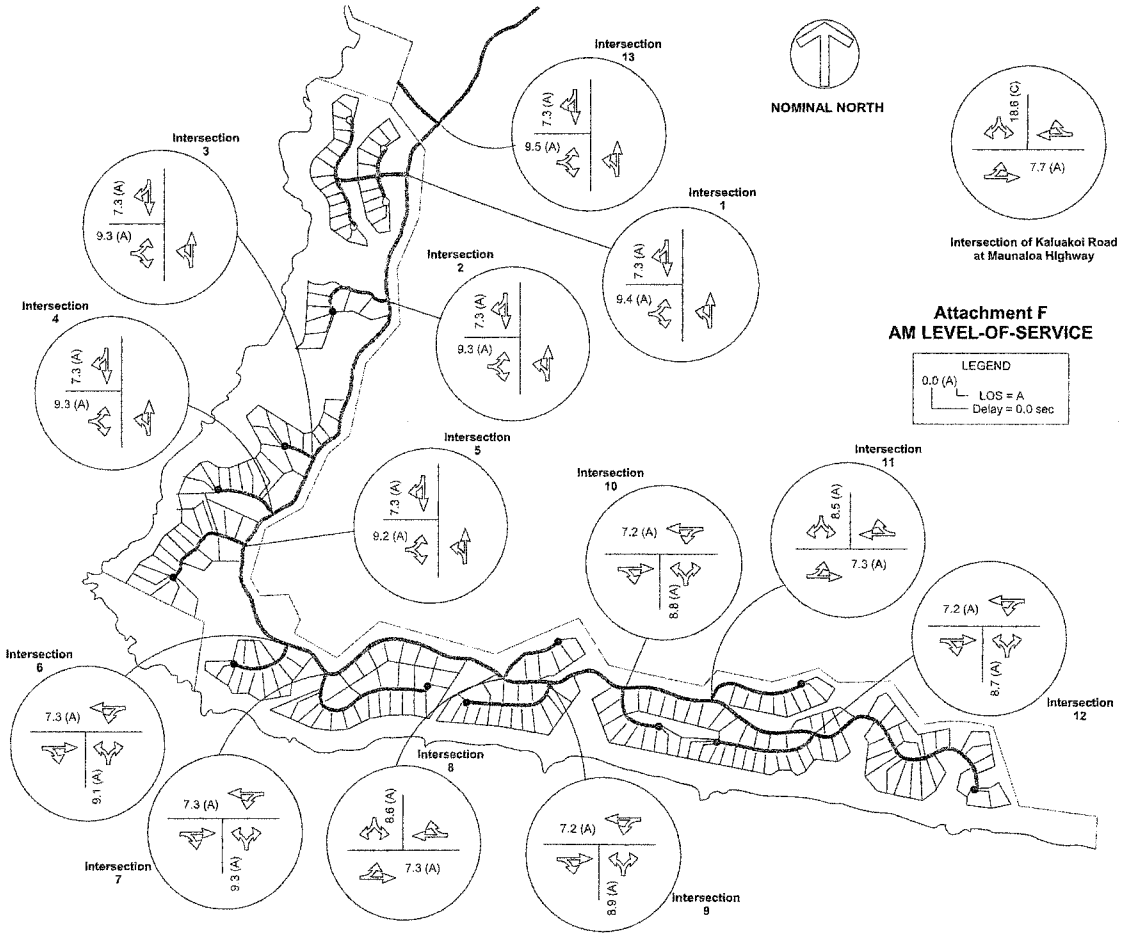


Attachment E
PM PEAK HOUR TRAFFIC PROJECTIONS



Attachment D
AM PEAK HOUR TRAFFIC PROJECTIONS


NOMINAL NORTH
Intersection 13
7.5 (A)
9.8 (A)
Intersection 3
7.4 (A)
9.6 (A)
Intersection 1
7.5 (A)
9.7 (A)
Intersection 2
7.5 (A)
9.6 (A)
Intersection 4
7.4 (A)
9.5 (A)
Intersection 5
7.4 (A)
9.4 (A)
Intersection 10
7.3 (A)
8.9 (A)
Intersection 11
8.4 (A)
7.3 (A)
7.3 (A)
8.7 (A)
Intersection 12
Intersection 6
7.4 (A)
9.3 (A)
Intersection 8
8.5 (A)
7.3 (A)
7.4 (A)
9.2 (A)
Intersection 7
7.3 (A)
9.0 (A)
Intersection 9
16.3 (C)
7.9 (A)
Intersection of Kaluakoi Road at Maunaloa Highway
Attachment G
PM LEVEL-OF-SERVICE
LEGEND
0.0 (A)
LOS = A
Delay = 0.0 sec


NOMINAL NORTH
Intersection 13
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7.3 (A)
9.3 (A)
Intersection 7
7.2 (A)
8.9 (A)
Intersection 9
18.6 (C)
7.7 (A)
Intersection of Kaluakoi Road at Maunaloa Highway
Attachment F
AM LEVEL-OF-SERVICE
LEGEND
0.0 (A)
LOS = A
Delay = 0.0 sec

Appendix H

Noise Assessment Report

D. L. ADAMS ASSOCIATES, LTD.
Consultants in Acoustics and Performing Arts Technologies

Environmental Noise Assessment Report
La'au Point
Molokai, Hawaii

September 2006

DLAA Project No. 05-80

Prepared for:
Molokai Properties Limited
Honolulu, Hawaii

970 N. KALAHEO AVE. • SUITE A311 • KAILUA, HAWAII 96734
808/254-3318 • FAX 808/254-5295
www.dlaa.com • hawaii@dlaa.com

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Appendix A Acoustic Terminology.

1.0 EXECUTIVE SUMMARY

1.1 La'au Point is located on the south western corner of Molokai, Hawaii. The development consists of 200 lots where one story, single family recreational homes are proposed for development. The project site is located in an undeveloped area with one unpaved roadway leading to the project site.

1.2 The dominant noise sources during the project construction phase will probably be earth moving equipment, such as bulldozers and diesel powered trucks. Noise from construction activities will occur on the project site. Noise from construction vehicles en route to the project site may impact existing homes located along Kaluakoi Road. However, construction equipment noise must comply with the State DOH noise regulations.

1.3 The existing acoustical environment was not measured. The proposed project site is located in an undeveloped area where sound levels are caused by the natural environment (i.e., wind, birds, and ocean) and are typical of a rural environment.

1.4 An extension of Kaluakoi Road is planned and will provide access to the proposed project site. In addition to the low traffic volume predicted for the future, vehicles will travel at speeds typical of a residential environment. Traffic noise levels are not expected to create a significant noise impact on the project or the surrounding areas.

1.5 Although aircraft may be heard at the proposed project area, it is expected to be well outside the 55 dBA (L_{dn}) noise contour.

2.0 PROJECT DESCRIPTION

La'au Point is located on the south western corner of Molokai, Hawaii as shown in Figure 1. The development consists of 200 lots where one story, single family recreational homes are proposed for development. The project site is located in an undeveloped area with only one unpaved roadway leading to the project site.

3.0 NOISE STANDARDS

Various local and federal agencies have established guidelines and standards for assessing environmental noise impacts and set noise limits as a function of land use. A brief description of common acoustic terminology used in these guidelines and standards is presented in Appendix A.

3.1 State of Hawaii, Community Noise Control

The State of Hawaii Community Noise Control Rule [Reference 1] defines three classes of zoning districts and specifies corresponding maximum permissible sound levels due to *stationary* noise sources such as air-conditioning units, exhaust systems, generators, compressors, pumps, etc. The Community Noise Control Rule does not specifically address most *moving* sources, such as vehicular traffic noise, air traffic noise, or rail traffic noise. However, the Community Noise Control Rule does include equipment related to agricultural, construction, and industrial activities, which may not be stationary.

These maximum permissible noise levels are enforced by the State Department of Health (DOH) for any location at or beyond the property line and shall not be exceeded for more than 10% of the time during any 20-minute period. The specified noise limits which apply are a function of the zoning and time of day as shown in Figure 2. With respect to mixed zoning districts, the rule specifies that the primary land use designation shall be used to determine the applicable zoning district class and the maximum permissible sound level. In determining the maximum permissible sound level, the background noise level is taken into account by the DOH.

3.2 Federal Aviation Administration (FAA)

Airport noise and noise contour maps are not available for Molokai Airport. The FAA addresses guidelines for compatible land uses that surround airports [Reference 2]. Noise contour maps are expressed in terms of yearly day-night average sound levels, L_{dn}, due to aircraft operations. The FAA states that residences outside of the 65 L_{dn} noise contour are compatible without restrictions.

3.3 State Department of Transportation (HDOT), Airports Division

The State of Hawaii, Department of Transportation, Airports Division [Reference 3] has adopted noise restrictions that are more strict than the FAA. In most cases, the DOT states maximum noise limits that are 5 dB lower than the FAA. For example, the DOT states that residences outside of the 60 L_{dn} noise contour are compatible.

In addition to the land use guidelines, the State of Hawaii has adopted a buyer notification requirement for residential properties with noise exposure (L_{dn}) over 55 dB. This buyer notification requirement is intended to ensure that prospective buyers of properties near airports are aware of aircraft noise and potential annoyance due to aircraft noise in vicinity of that property.

3.4 U.S. Environmental Protection Agency (EPA)

The U.S. EPA has identified a range of yearly day-night equivalent sound levels, L_{dn}, sufficient to protect public health and welfare from the effects of environmental noise [Reference 4]. The EPA has established a goal to reduce exterior environmental noise to an L_{dn} not exceeding 65 dBA and a future goal to further reduce exterior environmental noise to an L_{dn} not exceeding 55 dBA. Additionally, the EPA states that these goals are not intended as regulations as it has no authority to regulate noise levels, but rather they are intended to be viewed as levels below which the general population will not be at risk from any of the identified effects of noise.

3.5 U.S. Federal Highway Administration (FHWA)

Although only applicable to federally funded projects, the traffic noise design limits of the FHWA can serve as design goals for most projects. The FHWA defines four land use categories and assigns corresponding maximum hourly equivalent sound levels, $L_{eq(h)}$, for traffic noise exposure [Reference 5], which are listed in Figure 3. For example, Category B, defined as picnic and recreation areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals, has a corresponding maximum exterior L_{eq} of 67dBA and a maximum interior L_{eq} of 52 dBA. These limits are viewed as design goals, and all projects meeting these limits are deemed in conformance with FHWA noise standards.

3.6 Hawaii Department of Transportation (HDOT)

Although only applicable to government funded projects, the HDOT's traffic noise policy can serve as a design goal for most projects. The HDOT has adopted FHWA's design goals for traffic noise exposure in its noise analysis and abatement policy [Reference 6]. According to the policy, a traffic noise impact occurs when the predicted traffic noise levels "approach" or exceed FHWA's design goals or when the predicted traffic noise levels "substantially exceed the existing noise levels." The policy also states that "approach" means at least 1 dB less than FHWA's design goals and "substantially exceed the existing noise levels" means an increase of at least 15 dB.

4.0 EXISTING ACOUSTICAL ENVIRONMENT

Sound level measurements were not taken to assess the existing acoustical environment at the proposed project site on Molokai. The site is located in an undeveloped area where sound levels are caused by the natural environment (i.e., wind, birds, and ocean), typical of a rural environment, and aircraft flyovers. Currently, an unpaved road is the only access to the project site entrance, and access is limited to off-road vehicles. Aircraft are

routed over the northern portion of the project area to the Molokai airport, located approximately 15 miles to the east. Aircraft are clearly audible when they fly over the project site. However, flyovers occur infrequently and only during the daytime hours. It is not expected that these flyovers create an L_{dn} greater than 55 dBA.

5.0 POTENTIAL NOISE IMPACTS DUE TO THE PROJECT

5.1 Project Construction Noise

Development of project areas will involve excavation, grading, and other typical construction activities during construction. The various construction phases of the project may generate significant amounts of noise. The actual noise levels produced during construction will be a function of the methods employed during each stage of the construction process. Typical ranges of construction equipment noise are shown in Figure 5. Earthmoving equipment, e.g., bulldozers and diesel-powered trucks, will probably be the loudest equipment used during construction, assuming that pile driving will not be required. As the proposed project site is in an undeveloped area and the nearest residential property is more than a mile away, there will be no noise impact due to construction generated noise in the vicinity of the project site. However, a noise impact is expected for residences located along the Kolua Koi Road to the north of the proposed development due to the large trucks en route to the project site.

5.2 Project Generated Noise

The new homes may incorporate stationary mechanical equipment that is typical for residential housing. Expected mechanical equipment may include air handling equipment, condensing units, etc. Noise from this mechanical equipment and other equipment must meet the State DOH noise rules, which stipulate maximum permissible noise limits at the property line. These noise limits are 55 dBA during the daytime hours (7:00 am to 10:00 pm) and 45 dBA during the night time hours (10:00 pm to 7:00 am) for single-family housing.

5.3 Projection of Vehicular Traffic Noise

An extension of Kaluakoi Road is planned and will provide access to the proposed project site. Future residents of La'au Point will drive through an existing residential area, located approximately one mile to the north, in order to access the subdivision. Vehicles are expected to travel at speeds typical of a residential environment. The future traffic volume projections provided by Phillip Rowell and Associates [Reference 7] are based on typical single family housing units and may be an overestimate of actual traffic volumes due to the recreational or second home nature of the La'au Point subdivision. Based on the nature of the project, we do not expect a significant traffic noise increase in the existing residential area due to the project. Furthermore, traffic noise levels are expected to be below the FHWA/HDOT maximum noise limit of 67 dBA for the properties at the proposed La'au Point development. Thus, a significant noise impact due to vehicular traffic noise on the project and the surrounding area is not expected.

5.4 Projection of Aircraft Noise

Currently, there are approximately 20 flights per day to/from the Molokai Airport. Flights are usually routed over the northern portion of the project area, located approximately 15 miles from the airport. The aircraft are primarily propeller driven. Day-Night Noise Level (L_{dn}) contours for the Molokai airport are not available from the HDOT Airports Division. Noise contours greater than 55 dBA for airports similar in size are generally located within a couple of miles from the airport. Although aircraft will be heard at the proposed project area, it is expected to be well outside the 55 dBA (L_{dn}) noise contour and a significant noise impact is not expected.

5.5 Compliance with EPA Noise Guidelines

The noise levels at the proposed La'au Point Development are expected to satisfy the EPA existing design goal of $L_{dn} \leq 65$ dBA and a future design goal $L_{dn} \leq 55$ dBA for exterior noise levels. It is important to note that EPA noise guidelines are design goals and not enforceable regulations. However, these guidelines and design goals are useful tools for assessing the noise environment.

6.0 NOISE IMPACT MITIGATION

6.1 Mitigation of Project Construction Noise

Project construction noise will be intermittent and short term. Construction vehicle noise will be the main noise source. Construction vehicles should all be equipped with mufflers and should be limited to use during the daytime hours. Construction equipment noise must comply with the State of Hawaii *Community Noise Control* noise regulations [Reference 1].

6.2 Mitigation of Project Generated Mechanical Noise

The design of the new La'au Point development should give consideration to controlling the noise emanating from stationary mechanical equipment, such as chillers, compressors, air conditioning units, etc. so as to comply with the State of Hawaii *Community Noise Control* rules [Reference 1]. Noisy equipment should be located away from neighbors and residential units, as much as is practical. Enclosed mechanical rooms may be required for some equipment.

6.3 Mitigation of Vehicular Traffic Noise

There is expected to be no significant noise impacts due to traffic on the proposed project or the surrounding area. Therefore, noise mitigation for vehicular traffic noise should not be required.

6.4 Mitigation of Aircraft Noise

The proposed project area is expected to be well outside the 55 dBA (L_{dn}) noise contour. Therefore, a disclosure statement to potential home buyers should not be required for the La'au Point development.

REFERENCES

1. Chapter 46, *Community Noise Control*, Department of Health, State of Hawaii, Administrative Rules, Title 11, September 23, 1996.

2. *FAA Regulations on Airport Noise Compatibility Planning Programs,* Code of Federal Regulations, Title 14, Chapter 1, Subchapter 1, Part 150; Issued by 49 FR 49269, December 18, 1984; corrected by 50 FR 5063, February 6, 1985; amended by 53 FR 8723, March 16, 1988; corrected by 53 FR 9726, March 24, 1988.

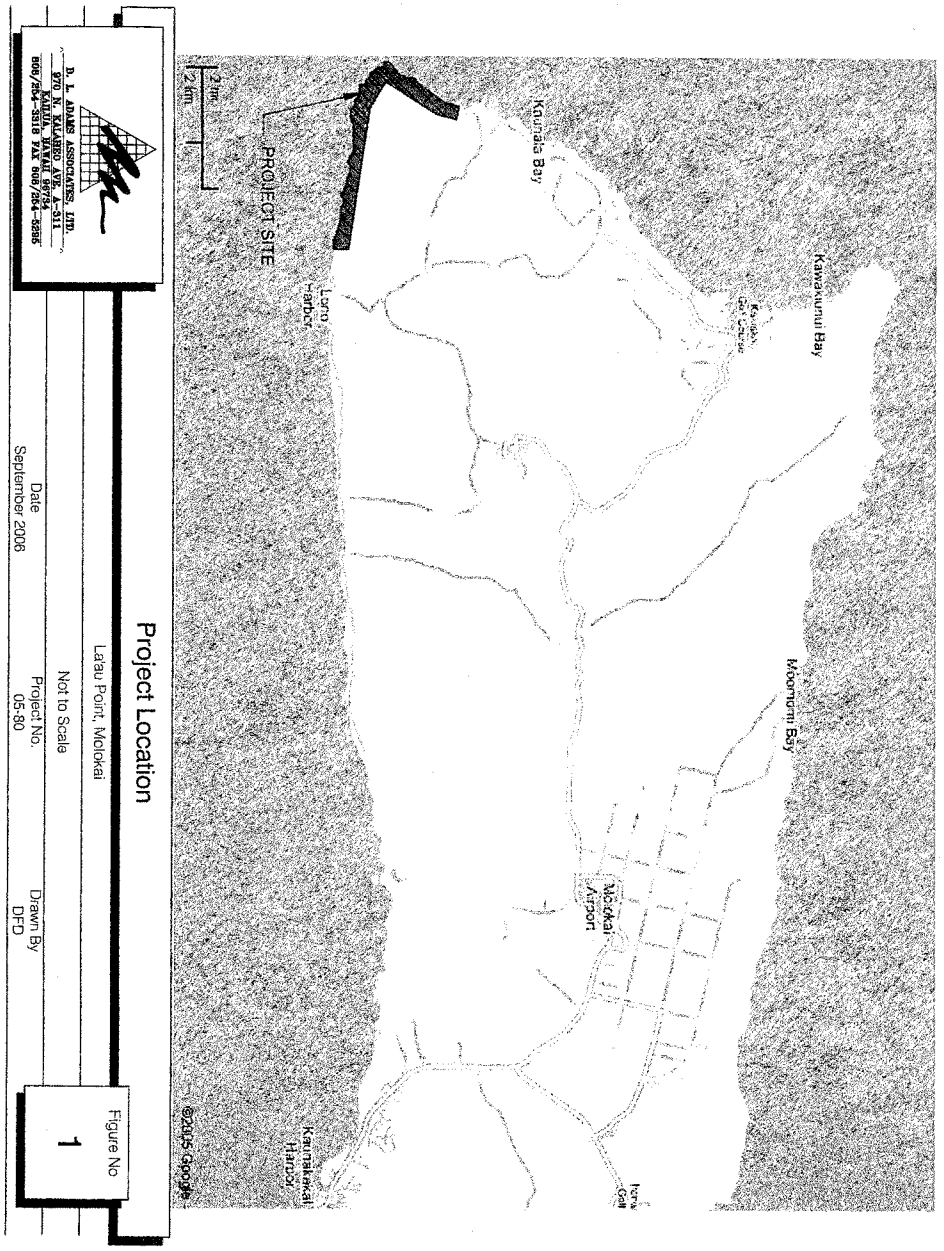
3. *Honolulu International Airport Master Plan Update and Noise Compatibility Program,* State of Hawaii Department of Transportation, Airports Division, Vol. 2, December 1989.

4. *Toward a National Strategy for Noise Control*, U.S. Environmental Protection Agency, April 1977.

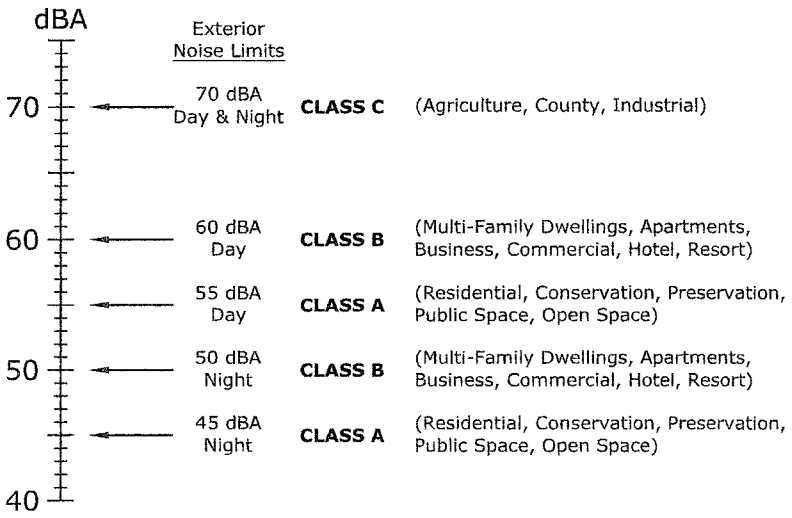
5. *Department of Transportation, Federal Highway Administration Procedures for Abatement of Highway Traffic Noise*, Title 23, CFR, Chapter 1, Subchapter J, Part 772, 38 FR 15953, June 19, 1973; Revised at 47 FR 29654, July 8, 1982.

6. *Noise Analysis and Abatement Policy*, Department of Transportation, Highways Division, State of Hawaii, June 1977.

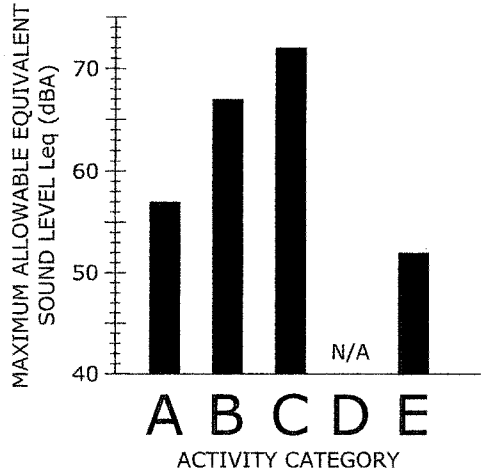
7. *Traffic Noise Assessment Report - La'au Point Subdivision,* Phillip Rowell and Associates, September 11, 2006.



Zoning District	Day Hours (7 AM to 10 PM)	Night Hours (10 PM to 7 AM)
CLASS A Residential, Conservation, Preservation, Public Space, Open Space	55 dBA (Exterior)	45 dBA (Exterior)
CLASS B Multi-Family Dwellings, Apartments, Business, Commercial, Hotel, Resort	60 dBA (Exterior)	50 dBA (Exterior)
CLASS C Agriculture, Country, Industrial	70 dBA (Exterior)	70 dBA (Exterior)



ACTIVITY CATEGORY	ACTIVITY CATEGORY DESCRIPTION	MAXIMUM EQUIVALENT SOUND LEVEL $L_{eq(h)}$
A	LANDS ON WHICH SERENITY AND QUIET ARE OF EXTRAORDINARY SIGNIFICANCE AND SERVE AN IMPORTANT PUBLIC NEED AND WHERE THE PRESERVATION OF THOSE QUALITIES IS ESSENTIAL IF THE AREA IS TO CONTINUE TO SERVE ITS INTENDED PURPOSE.	57 dBA (EXTERIOR)
B	PICNIC AREAS, RECREATION AREAS, PLAYGROUNDS, ACTIVE SPORT AREAS, PARKS, RESIDENCES, MOTELS, HOTELS, SCHOOLS, CHURCHES, LIBRARIES, AND HOSPITALS.	67 dBA (EXTERIOR)
C	DEVELOPED LANDS, PROPERTIES, OR ACTIVITIES NOT INCLUDED IN ACTIVITY CATEGORIES A OR B ABOVE.	72 dBA (EXTERIOR)
D	UNDEVELOPED LAND	N/A
E	RESIDENCES, MOTELS, HOTELS, PUBLIC MEETING ROOMS, SCHOOLS, CHURCHES, LIBRARIES, HOSPITALS, AND AUDITORIUMS.	52 dBA (INTERIOR)



D. L. ADAMS ASSOCIATES, LTD.
970 N. KALAHEO AVE, A-311
KAILUA, HAWAII 96734
808/254-3318 FAX 808/254-5295

Hawaii Maximum Permissible Sound Levels for Various Zoning Districts

La'au Point, Molokai

Not to Scale

Date	Project No.	Drawn By
September 2006	05-80	TRB

Figure No 2

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KAILUA, HAWAII 96734
808/254-3318 FAX 808/254-5295

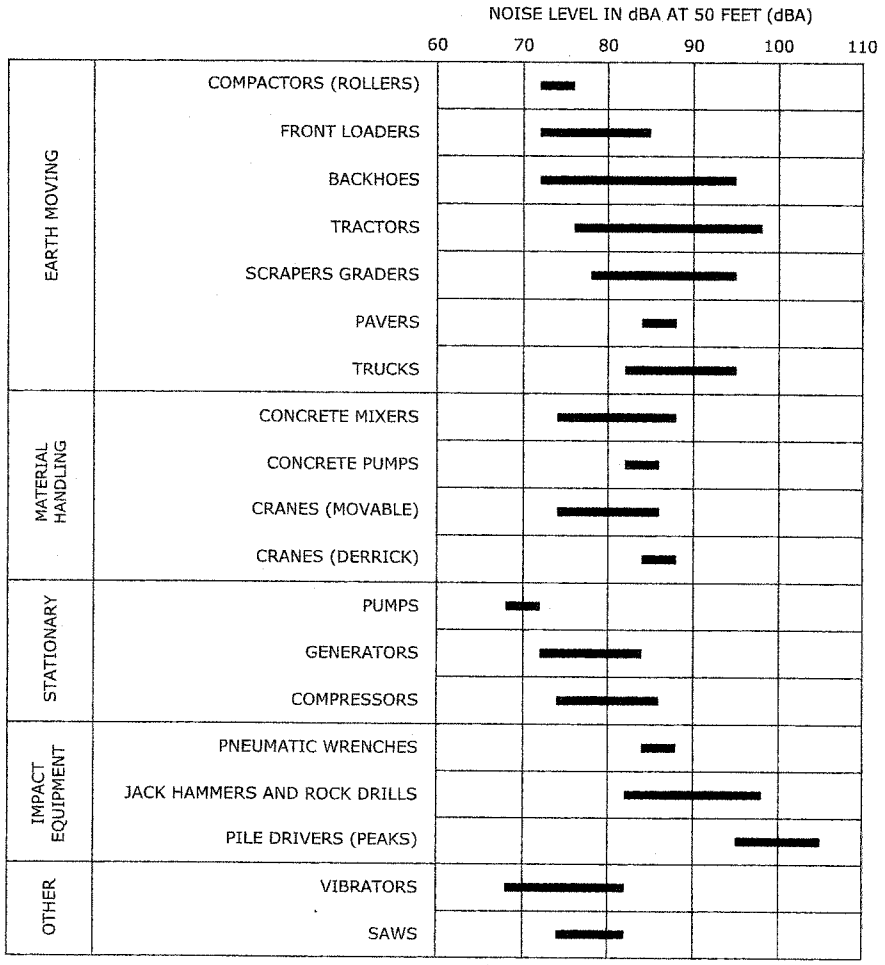
Federal Highways Administration Recommended Equivalent Hourly Sound Levels Based on Land Use

La'au Point, Molokai

Not to Scale

Date	Project No.	Drawn By
September 2006	05-80	TRB

Figure No 3



NOTE: BASED ON LIMITED AVAILABLE DATA SAMPLES

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808/254-3318 FAX 808/254-5295

Typical Sound Levels from Construction Equipment

La'au Point, Molokai

Not to Scale

Figure No 4

Date	Project No.	Drawn By
September 2006	05-80	TRB

APPENDIX A

Acoustic Terminology

Acoustic Terminology

Sound Pressure Level

Sound, or noise, is the term given to variations in air pressure that are capable of being detected by the human ear. Small fluctuations in atmospheric pressure (sound pressure) constitute the physical property measured with a sound pressure level meter. Because the human ear can detect variations in atmospheric pressure over such a large range of magnitudes, sound pressure is expressed on a logarithmic scale in units called decibels (dB). Noise is defined as "unwanted" sound.

Technically, sound pressure level (SPL) is defined as:

$$SPL = 20 \log (P/P_{ref}) \text{ dB}$$

where P is the sound pressure fluctuation (above or below atmospheric pressure) and P_{ref} is the reference pressure, 20 μPa, which is approximately the lowest sound pressure that can be detected by the human ear. For example:

If P = 20 μPa, then SPL = 0 dB
If P = 200 μPa, then SPL = 20 dB
If P = 2000 μPa, then SPL = 40 dB

The sound pressure level that results from a combination of noise sources is not the arithmetic sum of the individual sound sources, but rather the logarithmic sum. For example, two sound levels of 50 dB produce a combined sound level of 53 dB, not 100 dB. Two sound levels of 40 and 50 dB produce a combined level of 50.4 dB.

Human sensitivity to changes in sound pressure level is highly individualized. Sensitivity to sound depends on frequency content, time of occurrence, duration, and psychological factors such as emotions and expectations. However, in general, a change of 1 or 2 dB in the level of sound is difficult for most people to detect. A 3 dB change is commonly taken as the smallest perceptible change and a 6 dB change corresponds to a noticeable change in loudness. A 10 dB increase or decrease in sound level corresponds to an approximate doubling or halving of loudness, respectively.

A-Weighted Sound Level

Studies have shown conclusively that at equal sound pressure levels, people are generally more sensitive to certain higher frequency sounds (such as made by speech, horns, and whistles) than most lower frequency sounds (such as made by motors and engines)[1] at the same level. To address this preferential response to frequency, the A-weighted scale was developed. The A-weighted scale adjusts the sound level in each frequency band in much the same manner that the human auditory system does. Thus the A-weighted sound level (read as "dBA") becomes a single number that defines the level of a sound and has some correlation with the sensitivity of the human ear to that sound. Different sounds with the same A-weighted sound level are perceived as being equally loud. The A-weighted noise level is commonly used today in environmental noise analysis and in noise regulations. Typical values of the A-weighted sound level of various noise sources are shown in Figure A-1.

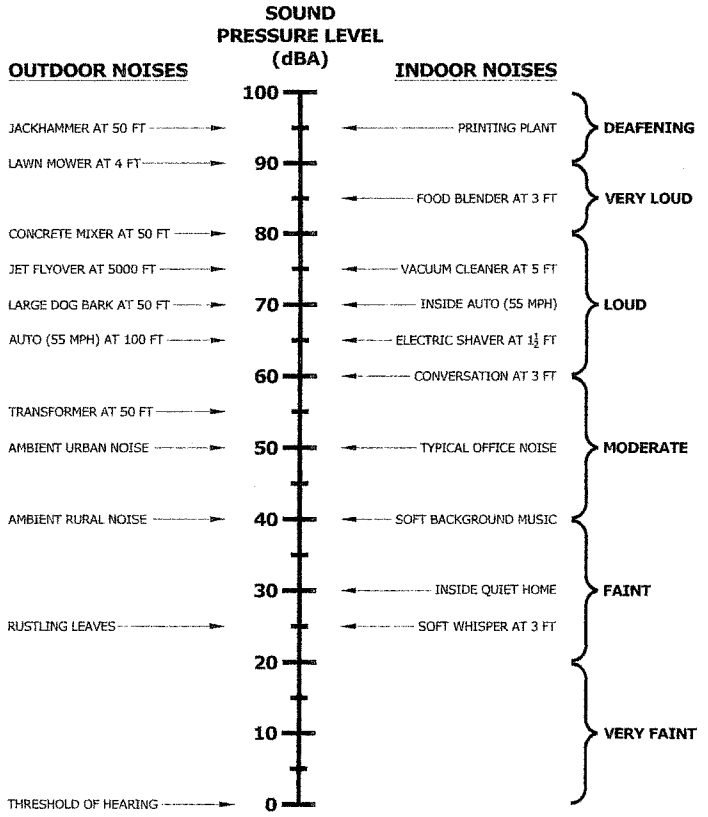


Figure A-1. Common Outdoor/Indoor Sound Levels

[1] D.W. Robinson and R.S. Dadson, "A Re-Determination of the Equal-Loudness Relations for Pure Tones," *British Journal of Applied Physics*, vol. 7, pp. 166 - 181, 1956. (Adopted by the International Standards Organization as Recommendation R-226.

Equivalent Sound Level

The Equivalent Sound Level (L_{eq}) is a type of average which represents the steady level that, integrated over a time period, would produce the same energy as the actual signal. The actual *instantaneous* noise levels typically fluctuate above and below the measured L_{eq} during the measurement period. The A-weighted L_{eq} is a common index for measuring environmental noise. A graphical description of the equivalent sound level is shown in Figure A-2.

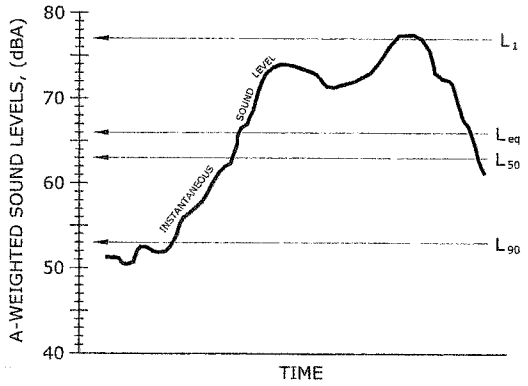


Figure A-2. Example Graph of Equivalent and Statistical Sound Levels

Statistical Sound Level

The sound levels of long-term noise producing activities such as traffic movement, aircraft operations, etc., can vary considerably with time. In order to obtain a single number rating of such a noise source, a statistically-based method of expressing sound or noise levels has been developed. It is known as the Exceedence Level, L_n. The L_n represents the sound level that is exceeded for n% of the measurement time period. For example, L_{10} = 60 dBA indicates that for the duration of the measurement period, the sound level exceeded 60 dBA 10% of the time. Typically, in noise regulations and standards, the specified time period is one hour. Commonly used Exceedence Levels include L_{01}, L_{10}, L_{50}, and L_{90}, which are widely used to assess community and environmental noise. A graphical description of the equivalent sound level is shown in Figure A-2.

Day-Night Equivalent Sound Level

The Day-Night Equivalent Sound Level, L_{dn}, is the Equivalent Sound Level, L_{eq}, measured over a 24-hour period. However, a 10 dB penalty is added to the noise levels recorded between 10 p.m. and 7 a.m. to account for people's higher sensitivity to noise at night when the background noise level is typically lower. The L_{dn} is a commonly used noise descriptor in assessing land use compatibility, and is widely used by federal and local agencies and standards organizations.

Appendix I

Air Quality Impact Assessment

B.D. NEAL & ASSOCIATES
Applied Meteorology • Air Quality • Computer Science
P.O. BOX 1808 • KAILUA-KONA, HAWAII 96745 • TELPHONE (808) 329-1627 • FAX (808) 325-6739
EMAIL: bdneal@bdneal.com

June 6, 2006

Mr. Harold Edwards
Molokai Properties, Limited
Amfac Center, Hawaii Tower
745 Fort Street, Suite 600
Honolulu, Hawaii 96813

Subject: La'au Point Subdivision Project
Air Quality Impact Assessment

Dear Mr. Edwards:

In response to your request, we have examined the potential air quality impacts related to the proposed La'au Point Subdivision Project located on Molokai. The results of this examination along with background information related to this issue and recommended mitigation measures are summarized below.

Project Description

Molokai Properties, Limited proposing to develop the La'au Point Subdivision project on the island of Molokai. The project includes 1492 acres of land along the southwestern coast which will be subdivided into approximately 200 residential lots for single-family homes. It is expected that the homes will primarily be used for recreation and second residences with a 30 percent occupancy rate on an annual basis. Full project build out will likely occur over a 20-year period.

Ambient Air Quality Standards

Both federal and state standards have been established to maintain ambient air quality. At the present time, seven parameters are regulated including: particulate matter, sulfur dioxide, hydrogen sulfide, nitrogen dioxide, carbon monoxide, ozone and lead. Hawaii air quality standards are comparable to the national standards except those for nitrogen dioxide and carbon monoxide which are more stringent than the national standards.

Regional and Local Climatology

Regional and local climate together with the amount and type of human activity generally dictate the air quality of a given location. The climate of the La'au Point area is very much affected by its near coastal situation and by nearby mountains. Winds are variable but are often trade winds from the north or northeast. Wind speeds typically vary between about 5 and 15 miles per hour. Temperatures in the La'au Point area are generally very consistent and moderate with an average daily temperature range of about 65°F to 85°F. Average annual rainfall in the area amounts to only about 15 inches.

Existing Air Quality Conditions

No ambient air quality data for the La'au Point area on Molokai has been reported by the state Department of Health. However, except for periodic impacts from distant volcanic emissions (vog), the present air quality of the La'au Point area is believed to be good.

Air Quality Impacts of Project

Short-term direct and indirect impacts on air quality could potentially occur during project construction. For a project of this nature, there are two potential types of air pollution emissions that could directly result in short-term air quality impacts during project construction: (1) fugitive dust from soil excavation and vehicle movement; and (2) exhaust emissions from on-site construction equipment. Indirectly, there also could be short-term air quality impacts from the disruption of traffic on nearby roadways, from slow-moving construction equipment traveling to and from the project site and from a temporary increase in local traffic caused by commuting construction workers.

Fugitive dust emissions from construction activities are difficult to estimate accurately because of their elusive nature of emission and because the potential for dust generation varies greatly depending upon the type of soil at the construction site, the amount and type of dirt-disturbing activity taking place, the moisture content of exposed soil in work areas, and the wind speed. The U.S. EPA has provided a rough estimate for uncontrolled fugitive dust emissions from construction activity of 1.2 tons per acre per month under conditions of "medium"

activity, moderate soil silt content (30%), and precipitation/evaporation (P/E) index of 50. Uncontrolled fugitive dust emissions from project construction would likely be somewhere near this level. In any case, State of Hawaii Air Pollution Control Regulations prohibit visible emissions of fugitive dust from construction activities at the property line. Thus, an effective dust control plan for the project construction phase should be prepared.

Adequate fugitive dust control can usually be accomplished by the establishment of a frequent watering program to keep bare-dirt surfaces in active construction areas from becoming significant sources of dust. On days without rainfall, construction areas should be watered at least twice during the workday to help keep dust to a minimum. Control regulations further stipulate that open-bodied trucks be covered at all times when in motion if they are transporting materials likely to give rise to airborne dust. Haul trucks tracking dirt onto paved streets from unpaved areas are oftentimes a significant source of dust in construction areas. Some means to alleviate this problem, such as tire washing or road cleaning, may be appropriate. Dust monitoring could be considered as a means to quantitatively evaluate the effectiveness of dust control measures.

On-site mobile and stationary construction equipment also will emit air pollutants from engine exhausts. The largest of this equipment is usually diesel-powered. Nitrogen oxides emissions from diesel engines can be relatively high compared to gasoline-powered equipment, but the standard for nitrogen dioxide is set on an annual basis and is not likely to be violated by short-term construction equipment emissions. Carbon monoxide emissions from diesel engines, on the other hand, are low and should be relatively insignificant compared to vehicular emissions on nearby roadways.

Indirectly, slow-moving construction vehicles on roadways leading to and from the project site could obstruct the normal flow of traffic to such an extent that overall vehicular emissions are increased. This impact can be mitigated by moving heavy construction equipment during periods of low traffic volume. Likewise, the schedules of commuting construction workers can be adjusted to avoid peak hours in the project vicinity.

After the period of construction, long-term impacts on air quality from motor vehicle exhausts can potentially occur at or near any project that attracts large volumes of motor vehicle traffic. Carbon monoxide emissions are usually the primary issue, and public areas near traffic-congested intersections are the main concern. Traffic associated with the proposed project will likely use Kalua Koi Road and several intersecting project access roads. The project traffic study indicates that with the project at full build-out peak-hour traffic approach volumes at these intersections will be less than about 200 vehicles per hour and that all intersections in the vicinity of the project will have very good level-of-service conditions.

Based on extensive experience in assessing traffic-related air quality impacts, traffic volume increases of less than about 5 percent or about 100 vehicles per hour and traffic approach volumes of less than about 1,000 vehicles per hour do not cause any significant impacts on air quality if adequate traffic level-of-service is provided. Considering the relatively small volumes of traffic that are expected and the very good level-of-service at nearby intersections that is forecast, traffic from the proposed project should have no significant long-term impacts on maximum air pollution levels in the project area. Although a detailed air quality modeling study could be performed to predict project impacts, such an analysis is probably unwarranted.

Depending on the demand levels, long-term impacts on air quality are also possible due to indirect emissions associated with a development's electrical power and solid waste disposal requirements. Electrical power will likely be provided by diesel-fired power plants operated by the electric utility, which would result in offsite emissions of particulate, sulfur dioxide, nitrogen oxides and other combustion byproducts. Solid waste will likely be landfilled, and any air pollution emissions would probably be limited mostly to fugitive dust. The project's electrical demand is expected to reach about 2 million kilowatt-hours per year, and the solid waste disposal demand is estimated to reach about 330 tons per year. Quantitative estimates of the potential air quality impacts were not made, but based on the estimated demand levels and the emission rates involved, any impacts will likely be negligible. Nevertheless, incorporating energy conservation design features and promoting conservation and recycling programs within the proposed development could serve to further reduce any associated impacts.

In summary, any long-term impacts on air quality from this project will likely be negligible. Short-term impacts from fugitive dust during project construction may occur, particularly due to the dry climate in the area. Because of this, an effective dust control plan should be prepared and implemented.

Please call me if you have any questions concerning the information presented herein or if you wish to discuss this matter further.

Very truly yours,

Barry D. Neal

Barry D. Neal
Certified Consulting
Meteorologist

Appendix J

Economic & Fiscal Impacts

KNOWLEDGE BASED CONSULTING GROUP

19 Holly Ave.
Larkspur, CA 94939
(415) 924-6577
clivej@sbcglobal.net

ECONOMIC AND FISCAL IMPACTS OF THE PROPOSED LA'AU POINT RESIDENCES ON MOLOKAI

Prepared for

Molokai Properties Limited

Prepared by

Knowledge Based Consulting Group

June 2006

EXECUTIVE SUMMARY

Knowledge Based Consulting Group (KBCG) prepared the following fiscal impact analysis for the La'au Point development project located on the island of Molokai in the County of Maui, Hawaii.

PROJECT SITE

The La'au Point property is a proposed residential development within a 1,492-acre project area within the Molokai Ranch. The development program will be comprised of approximately 200 2-acre lots and associated infrastructure. As part of the overall program, an additional 18 acres will be dedicated as County parks, 130 acres will be in a land trust, 280 acres of land use buffer will be dedicated to the La'au Point homeowners association, and 450 acres will be under homeowner and land trust joint ownership. It is anticipated that the La'au Point property will be developed and built out over a 15-year timeframe and should commence development in 2007.

PRICING STRUCTURE

The La'au Point concept plan seeks to provide a mix of residential lots, which will include oceanfront home sites, ocean view homesites, and inland sites with more distant ocean views. The proposed prices for the lots range from $450,000 to $1,900,000 depending upon size of lot, view quality, and distance to the ocean.

ECONOMIC AND FISCAL IMPACTS

At final build out in 2023, approximately 174 permanent residents will reside in the La'au Point community. In addition, there will be a non-resident population of some 325 people who will occupy their residences during peak seasons. The annual average population at buildout is expected to be just over 230 persons. Expenditures by these new residents as well as maintenance, landscaping, security and other services required by the La'au Point community will support about 60 new local jobs. In addition, total development and residential construction costs are approximately $247 million, creating over 1,350 person-years of construction and related employment.

The County of Maui could receive surplus revenues of approximately $30.0 million over the development period (2007 to 2023), after receiving all revenues from property taxes and other sources (includes revenues from fuel taxes, utility taxes, license fees, permits, and state and federal grants) and incurring all expenses to serve the community.

The State of Hawaii could receive surplus revenues of $4.7 million over the development period from a combination of excise taxes, property transfer taxes, utility taxes, and income taxes on permanent residents. In addition to these on going revenues, there will be state taxes on construction materials and services. State revenues from excise taxes and income taxes on construction workers and businesses should amount to $17.7 million over the buildout period.

Finally, Molokai Properties Limited has agreed to allocate 5% of land sales to support the land trust. This commitment will provide just over $10.2 million for preservation and enhancement of the dedicated lands.

INTRODUCTION

This assessment has been prepared by Knowledge Based Consulting Group (KBCG) in response to the need to evaluate the impact on community services and facilities to the County of Maui and other service providers that would result from the development of the La'au Point project.

PROPOSED ACTION

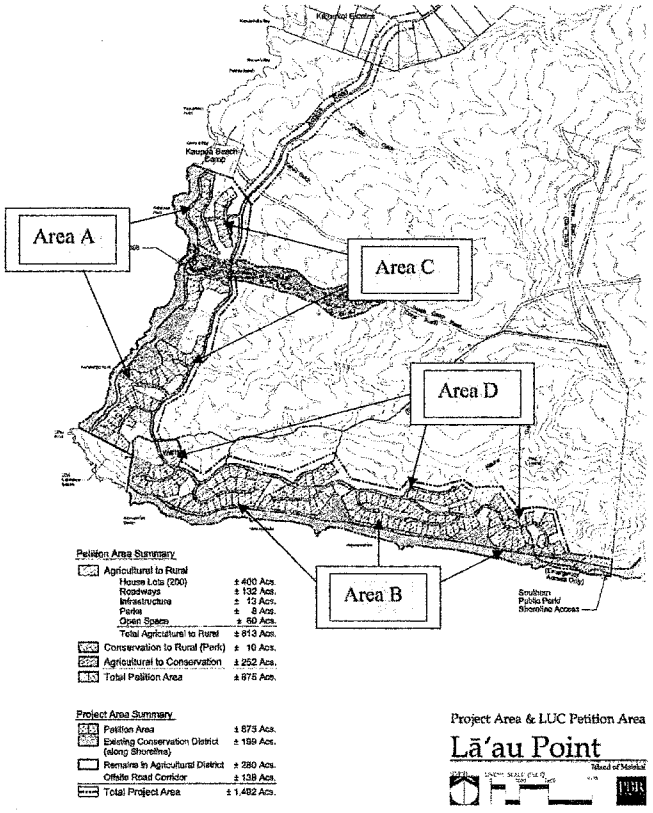
Molokai Properties Limited proposes to develop 200 residential lots at La'au Point as part of an overall development and preservation plan for some 65,000 acres within the Molokai Ranch. The La'au Point site slopes from an elevation of sea level to 150 feet, providing good to excellent ocean and countryside views from nearly all development parcels.

The La'au Point development project is proposed for three general lot type areas:

A	West Facing Ocean Front Home Sites	40
B	South Facing Ocean Front Home Sites	58
C	Inland West Facing Ocean View Home Sites	28
D	Inland South Facing Ocean View Home Sites	74
Total Lots and Residences		200

Molokai Properties Limited would construct roadway improvements servicing the site, major electrical improvements, water and sewage treatment facilities, drainage, and other improvements. Total infrastructure investment is estimated at approximately $72 million.

A project description, along with development assumptions is provided in Table 1, and an illustrative development plan is shown below:



It is anticipated that the La'au Point lots will be developed and sold over a 5-year time frame. Construction of roads and infrastructure should commence in 2007 and lot sales will begin in 2008. Following initial lot sales, the first houses should be built around 2010 and residential construction should continue through at least 2023. This relatively slow build out of La'au Point residences should provide a steady source of construction employment for nearly the next 20 years.

Based on current housing trends and taking into account the CC&R's of the La'au Point project which limit the overall residence size as well as allowable building envelopes within each lot, we

estimate that the average residence will be 3,500 square feet. At a current construction allowance of $225 per square foot for a good quality residence, the average construction cost per residence would be $787,500. Over the life of the project, total residential construction investment will be approximately $158 million.

By applying the appropriate tax rates, the ensuing analysis develops estimates of real estate, excise, and other tax revenues and fees to be received over time by the County of Maui and State of Hawai'i. Comparing these revenues to service costs then determines net impact.

At final build out in 2023, approximately 174 permanent residents will reside in the La'au Point community. In addition, there will be a non-resident population of some 325 people who will occupy their residences on a seasonal basis. Expenditures by these new residents will support about 49 local jobs and another 11 jobs will be created for maintenance, landscaping, security and other services within the La'au Point community.

FISCAL ANALYSIS

The program for real estate development at La'au Point is based on a phased infrastructure development and preservation plan for the La'au Point property as prepared by PBR Hawaii. The expected production schedule of lots is illustrated in Table 2, which shows the mix of product and absorption schedule by year. It is estimated that the lots will be sold over a five-year period at a rate of 35 to 50 per year, starting in 2008. The residential build out of these lots is projected to start in 2010 and continue at a rate of 10% per year such that full residential build out will not be completed until at least 2023.

Residential Sales and Build Out

The residential development program for La'au Point includes a mix of low density oceanfront and near ocean lots in a setting of unspoiled seclusion and natural beauty. It will be a unique product in the state and should attract buyers who appreciate privacy and the natural values of the land and Molokai community rather than the resort environment prevalent on the more developed islands. Based on market data from comparable non resort settings, the limited availability of low density oceanfront and near ocean property anywhere in the state, and the special conditions and requirements associated with ownership at La'au Point, KBCG anticipates annual demand for residential lots at La'au Point to range from 35 to 50 units a year.

We expect that the residential build out will stretch over at least ten years after the end of lot sales and that the community will be primarily be used for seasonal residences. In other communities with relatively expensive homes, we see that the average occupancy is relatively low. As shown below, less than 20% of the units are occupied full time and the average overall occupancy is less than 30%.

Resort Community Occupancy Patterns

Days Occupied			Weighted Days	
Category	Average Days	% of Households	All	Seasonal Only
Less than 60	40.2	35%	14.2	14.2
60 to 90	67.1	17%	11.5	11.5
90 to 120	93.3	11%	10.2	10.2
120 to 150	124.2	7%	9.1	9.1
150 to 180	157.6	12%	19.2	19.2
180 and over	250.9	17%	42.8	
Average Days Occupied			107.1	64.2
Resident Occupancy Rate			29%	18%
Rentals			0%	0%
Total Occupancy Rate			29%	18%

Similar occupancy patterns should be observed at La'au Point. These low occupancy rates should serve to minimize the need for county services to residents and lessen any impacts of residential build out on the unspoiled and uncrowded character of the Molokai coast. At build out, we anticipate that permanent residents (persons staying at La'au Point 180 or more days per year) will occupy up to 60 of the homes (30%) and seasonal residents would occasionally occupy the remainder. Upon agreement with the community, the La'au Point CC&R's will severely limit any rentals of the residences.

School Age Population

As the La'au Point project moves forward, it is appropriate to evaluate the impact of the project upon the Hawaii Department of Education (DOE) and determine how this might relate to the DOE "Fair Share" exaction for the project. We understand that the DOE has a formula, which calculates for each type of residential unit (SF, MF, etc.) the number of students expected. Then a dollar figure is applied per student. This exaction can range from $3,000 to $5,000 per unit. Considering the unique character of the La'au Point project and the expectation that seasonal residents and retirees will occupy a substantial share of the project, it is appropriate to examine the probable school age population to see if adjustments to the DOE formula may be justified.

The following factors should be considered:

- Only about 30% of La'au Point residents are expected to be permanent residents.
- La'au Point residents will be somewhat older than the general population.
- About 25% of permanent residents at La'au Point are expected to have children under 18 living at home. Another 10% will have family members over 18 living at home.
- The expected school age population of La'au Point permanent residents will probably include:
    - Less than 10 children ages 5 through 12
    - Less than 15 young adults ages 13 through 17
- The expected La'au Point population of school children is less than 25% of what would be expected on a pro rata basis.
- It is likely that some of the La'au Point residents will home school or send their children to private school off island.

Under these conditions, it would appear that a reduction in Department of Education impact fees would be appropriate and warranted.

MARKET AND ASSESSED VALUE

The proposed La'au Point development project is planned for 200 2-acre lots along the Molokai Coast. Approximately 98 of these lots will be front row (with no other private property between them and the coast), while the remaining 102 inland lots will be set further back. The average prices for the oceanfront lots will be about $1,750,000 for the west (sunset) facing home sites and $1,495,000 for the south facing sites, although there will be a relatively wide range in prices depending upon views and nearby oceanfront qualities. The more inland Ocean View Estates, still with expansive ocean views, will average around $470,000, but will vary in price from $425,000 to $800,000. This analysis assumes that the residential build out of the lots will be at the rate of 10% per year, starting two years after lot purchase. We have not applied an inflation factor or real estate appreciation rate to either lot prices or residential values, although both of these are likely and would add to Maui County tax revenues.

Residential Values

As shown in Table 3, residential market values for the project will be $34.9 million in the first year of lot sales (2008) and increase to $222.2 million when lot sales are completed and the first 22 homes have been built (2012). From that point on, the residential values increase by about $16 million per year as additional residences are constructed for both seasonal and permanent residents. Upon the eventual build out of all residences by the end of 2023, the residential market value will increase to $362 million.

IMPACT ON THE COUNTY OF MAUI

Table 4 illustrates the projected population for the La'au Point development project as well as estimates of tax revenues and Maui County expenses through 2023.

Population

Based upon the demographic patterns at other seasonal communities in Hawaii and what we have observed at Kaluakoi, we expect that most residents will be empty nesters and in pre retirement or retirement. The average number of persons per household at La'au Point is expected to be 2.9 as shown below:

Household Size Distribution for La'au Point

Family Size	%
2	66%
3	10%
4	16%
5	7%
6	1%
Average family members per household	2.65
% with caretaker/ caregiver	25%
Average persons per household	2.90

At the end of the lot sales period in 2012, there should be 12 new permanent residents in the La'au Point community. At final build out in 2023, approximately 174 permanent residents will reside in the La'au Point community at least 180 days per year. In addition, there will be a non-resident population that will occupy their residences on a seasonal basis. We anticipate that up to 80% of the seasonal residences may be occupied during peak seasons resulting in a maximum seasonal population of 325 part time residents. This leads to a peak population of permanent and seasonal residents of just under 500 persons and an average population of just over 230 persons.

County Tax Revenues

Below is a listing of tax rates that effect residents and commercial entities in Maui County.

Maui Property Tax Rates	
Improved Residential	$5.86
Apartment	$5.86
Commercial	$6.75
Industrial	$6.75
Agricultural	$4.93
Conservation	$4.93
Hotel & Resort	$8.30
Unimproved Residential	$5.86
Homeowner	$3.50
Time Share	$14.00

Unlike in Hawaii County, there is no differentiation in Maui County in the property tax rates applied to permanent and seasonal residents or to vacant land.

KBCG estimates that the County of Maui can expect to receive approximately $1.3 million in annual real estate tax revenues at the end of the lot sales period in 2012. These property tax revenues will increase at a rate of about $90,000 each year until they reach $2.1 million at residential build-out in 2023. In addition to real estate taxes, other County revenues are received in proportion to population and economic activity. These other revenues include fuel taxes, utility taxes, license fees, permits, and state and federal grants. After deducting for bond revenues, intergovernmental transfers, and transient occupancy tax, these other county revenue sources have historically represented 74% of property tax revenues. This ratio has been assumed to be constant in this model. It is estimated that the total annual tax revenue after residential build-out in 2023 will be $3.7 million, and that total taxes of $40.6 million will have been paid to that point.

County Expenditures

The County of Maui provides essential services to residents and businesses throughout the islands of Maui, Lanai, and Molokai. The overall budget for the County of Maui was $404.8 million for fiscal 2005, broken down as shown below:

Maui County Expenditures by Function

Function	2005 Estimate	2006 Budget	% of total	Increase (Decrease)	% Increase (% Decrease)
Capital Improvement Projects	$ 64,198,120	$ 82,428,150	20.4%	$ 18,230,030	28.4%
Public Safety	$ 49,843,278	$ 56,376,512	13.9%	$ 6,533,234	13.1%
Solid Waste and Wastewater	$ 35,879,049	$ 40,831,028	10.1%	$ 4,951,979	13.8%
Finance, Countywide, Personnel, Legal	$ 18,700,179	$ 26,554,441	6.6%	$ 7,854,262	42.0%
Employee Benefits	$ 35,674,695	$ 42,306,400	10.5%	$ 6,631,705	18.6%
Bond Issuance/ Debt Service	$ 33,510,559	$ 34,917,309	8.6%	$ 1,406,750	4.2%
Parks and Recreation	$ 20,508,129	$ 22,265,799	5.5%	$ 1,757,670	8.6%
Highways	$ 11,554,655	$ 10,107,128	2.5%	$ (1,447,527)	-12.5%
Social Concerns	$ 13,208,956	$ 14,573,568	3.6%	$ 1,364,612	10.3%
Management	$ 10,605,771	$ 13,528,030	3.3%	$ 2,922,259	27.6%
Planning/ Community Development	$ 8,647,488	$ 10,653,819	2.6%	$ 2,006,331	23.2%
Legislative	$ 4,875,268	$ 5,145,689	1.3%	$ 270,421	5.5%
Transportation	$ 5,703,227	$ 12,463,498	3.1%	$ 6,760,271	118.5%
Water	$ 31,149,302	$ 32,656,417	8.1%	$ 1,507,115	4.8%
Total	**$ 344,058,676**	**$ 404,807,788**	**100.0%**	**$ 60,749,112**	17.7%
Total Less Debt Service	$ 310,548,117	$ 369,890,479			
Resident Population	137,000	138,000			
Expenditures Per Resident	$ 2,267	$ 2,933			
Daily Tourist Population	44,500	45,000			
Total Population	181,500	183,000			
Expenditure per Person	$ 1,896	$ 2,212			

Subtracting out debt service, this budget represents current expenditures in 2006 of approximately $2,933 per person, including law enforcement. Applying this full cost allocation to the projected peak population at La'au Point, the potential cost to the County of Maui to serve the La'au Point development project will be $157,000 in 2012 at the end of lot sales, rising to $1.5 million by 2023 at full build out. These expenses are projected on a conservative basis of peak occupancy whereas in actuality most residents will be seasonal occupants.

It should also be noted that the La'au Point development will provide significant infrastructure improvements that will serve the entire community, and many of the on site improvements will not require county maintenance. These lower costs are due to the following:

- Molokai Properties Ltd. will fund most or all of the building costs for infrastructure improvements (roads, water, wastewater systems, etc.), and recreational facilities.
- The La'au Point community association dues will cover the cost of:
  - Maintaining local roads
  - Operating and maintaining wastewater systems
  - Operating and maintaining recreational facilities
  - Providing on-site security
- The comparatively low occupancy rates for seasonal residences at La'au Point will result in a lower demand for County services.
- Most residents are expected to be comparatively wealthy, so they will require little government assistance.
- Most occupants will be retirees and visitors who are less likely to travel offsite during heavy traffic periods (such as they are on Molokai), and so are less likely to add to the demand for additional road capacity.
- Fewer government services are required for empty lots.

Therefore, actual county costs could be substantially less than the amounts shown in this model.

Comparison of Revenues and Expenses

Comparing revenues and costs, there is an annual surplus ranging from $355,000 at the end of the first year of lot sales to $2.1 million at the end of lot sales. Moreover, Maui County will have a cumulative surplus of just under $30.0 million by project buildout in 2023.

IMPACT ON THE STATE OF HAWAI'I

The State of Hawaii provides a wide range of services to meet the transportation, education, social service, and other vital needs of its population.

State Tax Revenues

Revenues to the State of Hawai'i from the La'au Point project will be generated from excise taxes, transfer taxes, utility taxes, and income taxes on individuals and businesses. These revenues go directly to the State General Fund.

Whereas there are no direct excise taxes from commercial businesses at La'au Point, resident expenditures will be subject to a 4% excise tax. Other state taxes include a 0.1% to 0.35% graduated levy on the transfer of fee interest, including leases of five years or greater, individual income taxes on permanent residents at a rate up to 8.25%, state utility taxes, and liquor taxes.

As shown in Table 5, annual state revenues from taxes on residents and their expenditures are expected to reach $276,000 at the end of lot sales in 2012 and climb to $1.3 million by 2023 as the project becomes more occupied by permanent and seasonal residents. State variable expenditures for permanent residents are estimated at $4,071 per permanent resident. Comparing state revenues to costs over the life of the project, state revenues should exceed expenditures by $4.7 million.

In addition to these on going revenues, there are state excise taxes on construction businesses and materials as well as income taxes on construction labor, which are discussed later.

JOB CREATION AND LAND TRUST SUPPORT

Resident and Visitor Spending

Spending by permanent and seasonal residents as well as the maintenance, landscaping, security and other services required by the community will create substantial permanent job support within the local Molokai community. Annual spending by new residents should be about $806,000 per year at the end of lot sales and then climb to about $6.8 million at build out. Approximately 65% of these expenditures are expected to be on Molokai, with the remainder spent elsewhere in the State of Hawaii. The annual expenditures on Molokai at build out are about $4.4 million, which represents about $22,000 in on island spending per residence.

Supportable Commercial Space

The on island resident expenditures will support existing businesses and commercial space on Molokai as well as encourage some expansion.

Permanent Jobs

As shown in Table 6, direct ongoing employment supported by new resident and lot owner spending will be about 6 jobs at the end of lot sales and then increase year by year to about 49 jobs when the project is built out in 2023. In addition, the La'au Point Community Association will provide employment for community services in maintenance, landscaping, security, and other association functions. Together, resident spending and the community association requirements will support 12 on going jobs at the end of lot sales and some 60 on going jobs upon full build out in 2023.

Land Trust Support

Molokai Properties Limited has agreed to allocate 5% of land sales to support the land trust. This commitment will provide just over $10.2 million for the preservation and enhancement of the dedicated lands.

CONSTRUCTION IMPACT

Construction Spending and Employment

As shown in Table 7, the total development and construction investment at La'au Point is expected to be about $246 million. As shown in Table 8, this investment supports over 1,350 person years of construction and service related employment over the life of the project.

Construction Excise and Other Taxes

In addition to the creation of construction jobs, the State of Hawaii will receive excise tax revenue on finished development and building materials and income taxes on construction wages. As shown in Table 9, these will amount to an additional $17.7 million in State of Hawaii revenue over the life of the project.

INDIRECT IMPACT

In 2000, the Hawaii Department of Business, Economic Development, & Tourism (DBEDT) developed a model of the impact of construction on the Hawaii economy. On the basis of the factors developed in that model, the construction expenditures of $246 million on the La'au Point project will result in an increase in total output of $302 million, an additional 2,970 person years of employment, and an additional $141 million in household income (See Table 10).

NO DEVELOPMENT ALTERNATIVE

Whereas the proposed development plan for La'au Point has been prepared with extensive input from the community, the issue of a no development alternative at La'au Point has come up in community meetings focusing on the social impact of the project. The following is an analysis of the no development alternative.

Loss of Project Benefits

Of course, the economic and fiscal benefits outlined in the preceding economic impact analysis would be lost without the development. To summarize these included:

- A residential development program of approximately 200 2-acre lots and associated infrastructure. At full buildout in 2023 this community will include174 permanent residents as well as a non-resident population of some 325 people who will occupy their residences on an occasional basis. The annual average population at buildout is expected to be just over 230 persons.
- A program of land dedication and preservation that includes 18 acres as County parks, 130 acres in a community administered land trust, 280 acres of land use buffer that will be dedicated to the La'au Point homeowners association, and 450 acres that will be under homeowner and land trust joint ownership.
- Expenditures by these new residents as well as maintenance, landscaping, security and other services required by the La'au Pont community will support about 60 new local jobs.
- Total development and residential construction costs of approximately $247 million create over 1,350 person-years of construction and related employment.
- The County of Maui could receive surplus revenues of approximately $30.0 million over the development period.
- The State of Hawaii could receive surplus revenues of $4.7 million over the development period as well as $17.7 million in excise taxes and income taxes on construction workers and businesses.
- Finally, Molokai Properties Limited has agreed to allocate 5% of land sales to support the land trust. This commitment will provide just over $10.2 million for preservation and enhancement of the dedicated lands.

The above are substantial benefits that provide government revenues, community jobs, and preserve large areas of the land as permanent open space.

Effect of No Development

The principal issue of the no development alternative would be the effect of no development on the viability of ongoing operations of the Molokai Ranch Company and its employees. In evaluating this impact, we evaluated the economic health of the current operation and considered what alternatives may be available to assure ongoing sustainability of the Ranch. To do this, we

evaluated the record of current and historical operating losses as well as other potential land sales that could deliver supporting revenues. Each of these is discussed below:

Economic History of Molokai Ranch Operations

Table 11 presents a summary of Operating Cash Flow for Molokai Properties Limited from 2001 through 2006. It is not a pretty picture. As shown, the net loss from operations over those six years has been approximately $31.6 million. Whereas often painful cost cutting has reduced operating losses from $8.6 million in 2001 to a range of $3.6 to $3.8 million in the last three years, the increasing costs of water, energy, and insurance make it difficult to expect profitable operations in the future.

In addition to operating losses, annual capital expenditures are another drain on cash flow, averaging over $800,000 per year over the past five years. Taken in total, MPL has subsidized the continuing operations and upkeep of the Molokai Ranch to the tune of $4.7 million to $10.2 million per year. The cumulative subsidy over the past six years has been $36.9 million. Clearly this is not a sustainable business model.

Alternatives Without the La'au Point Development Program

Without the La'au Point development program, we expect that MPL will have to make some difficult choices in terms of further cutting back on ranch operations and/ or breaking up the property and selling already entitled lands on a piecemeal basis. Each of these is discussed below:

Sale of Other Land Inventory

The Guocco Group, MPL's ultimate parent, recently had Hallstrom and Associates prepare a valuation of the property on a breakup basis.

According to tax records, MPL has 101 lots that it could sell exclusive of Lot inventory within Papohaku Ranchlands, Maunaloa (both Residential and Commercial) and the Industrial Park. 23 are held by a Kaluakoi LLC, 70 by MPL and 8 by Cooke Land Company. The golf course is actually held in 6 separate TMKs but is only counted as one, as it would be impractical to sell it to more than one buyer. Each of the lots in Kaunakakai are counted as separate lots as they could be sold to different buyers although it would be unlikely that there wouldn't be a fair amount of aggregation of those small industrial or business lots.

In addition, a density analysis conducted by MPL shows that the west end AG parcels could be subdivided into more than 1500 legal lots. This does not take into consideration any of the parcels held outside of the Kaluakoi ahupua'a. If these lots were sold off without the benefit of a master plan such as prepared for La'au Point, the impact would probably include a greater number of new land owners/ residents, less control of development, no land trust, and less financial support to the County and State.

Further Reductions in Operations

Without the increase in support for golf and hotel operations that will come from the La'au Point development, it is likely that MPL will be forced to reduce operations and perhaps close those facilities. In addition, they would likely be forced to reduce or eliminate other subsidized operations such as maintenance, nursery, gas station, and other services. The impacts of these

Table 1

Development Program for La'au Point, Molokai Ranch

	Total Units	Lot Size (SF)	Size of Average Residence (SF)	Land Area (acres)	% of Total	Lot Sales Price/ SF	Average Lot Price	Sales Value ($000)	SF of Residential Construction	Const. Cost/SF	Construction Cost per Residence	Total Residential Construction Cost ($000)
Single Family Residential (lots)												
A West Facing Ocean Front Estates	40	87,120	3,500	80	5.4%	$ 20.09	$ 1,750,000	$ 70,000	140,000	$ 225	$ 787,500	$ 31,500
C South Facing Ocean Front Estates	58	87,120	3,500	116	7.8%	$ 17.16	$ 1,495,000	$ 86,710	203,000	$ 225	$ 787,500	$ 45,675
B Inland West Facing Ocean View Sites	28	87,120	3,500	56	3.8%	$ 5.74	$ 500,000	$ 14,000	98,000	$ 225	$ 787,500	$ 22,050
D Inland South Facing Ocean View Sites	74	87,120	3,500	148	9.9%	$ 5.28	$ 460,000	$ 34,040	259,000	$ 225	$ 787,500	$ 58,275
Subtotal Single Family	**200**			**400**	26.8%		**$ 1,023,750**	**$ 204,750**				**$ 157,500**
Multi Family Residential					0.0%							
Total La'au Point Residential	**200**			**400**	26.8%		**$ 1,023,750**	**$ 204,750**	**700,000**			**$ 157,500**
Commercial				-	0.0%				-			
Roadways and Utility Easements				80	5.4%							
Home Owner/ Land Trust Joint Ownership				414	27.7%							
Home Owner Association				450	30.2%							
Land Trust				130	8.7%							
County Parks				18	1.2%							
Open Space & Preservation				1,012	67.8%							
TOTAL UNITS AND ACREAGE	**200**			**1,492**	100.0%							

Phasing:

Lot sales over 5 years

Residential buildout over 15 years

reductions would significantly affect existing employment at the Molokai Ranch and in Maunaloa. Under this doomsday scenario, MPL essentially closes down ranch operations and land banks the property for the future. Employment could be reduced by over 100 persons to around 10 full time staff, and payroll will be reduced by at least $3.5 million annually. These reductions, along with lost tourist expenditures, will in turn severely affect local businesses at Maunaloa and elsewhere. These losses in local jobs and probable business failures will in turn increase the need for County and State social services.

Table 3

Estimated Assessed Values for La'au Point ($000)

Inflation 0.0%

			Lot Sales					Residential Buildout		
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
West Facing Ocean Front Estates										
Average Lot Value	$ 1,750	$ 1,750	$ 1,750	$ 1,750	$ 1,750	$ 1,750	$ 1,750	$ 1,750	$ 1,750	$ 1,750
Average Improvement Value	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788
Lot Sales			$ 10,500	$ 14,000	$ 14,000	$ 14,000	$ 17,500	$ -	$ -	$ -
Residential Buildout			$ -	$ -	$ 567	$ 1,166	$ 1,764	$ 2,363	$ 3,150	$ 3,150
Cumulative	$ -	$ -	$ 10,500	$ 24,500	$ 39,067	$ 54,233	$ 73,497	$ 75,859	$ 79,009	$ 82,159
South Facing Ocean Front Estates									-	
Average Lot Value	$ 1,495	$ 1,495	$ 1,495	$ 1,495	$ 1,495	$ 1,495	$ 1,495	$ 1,495	$ 1,495	$ 1,495
Average Improvement Value	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788
Lot Sales			$ 14,950	$ 14,950	$ 14,950	$ 14,950	$ 26,910	$ -	$ -	$ -
Residential Buildout			$ -	$ -	$ 822	$ 1,690	$ 2,558	$ 3,426	$ 4,568	$ 4,568
Cumulative	$ -	$ -	$ 14,950	$ 29,900	$ 45,672	$ 62,312	$ 91,780	$ 95,206	$ 99,773	$ 104,341
Inland West Facing Ocean View Sites										
Average Lot Value	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
Average Improvement Value	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788
Lot Sales			$ 2,500	$ 2,500	$ 2,500	$ 2,500	$ 4,000	$ -	$ -	$ -
Residential Buildout			$ -	$ -	$ 397	$ 816	$ 1,235	$ 1,654	$ 2,205	$ 2,205
Cumulative	$ -	$ -	$ 2,500	$ 5,000	$ 7,897	$ 11,213	$ 16,448	$ 18,101	$ 20,306	$ 22,511
Inland South Facing Ocean View Sites										
Average Lot Value	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460
Average Improvement Value	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788
Lot Sales			$ 6,900	$ 6,900	$ 6,900	$ 6,900	$ 6,440	$ -	$ -	$ -
Residential Buildout			$ -	$ -	$ 1,049	$ 2,156	$ 3,263	$ 4,371	$ 5,828	$ 5,828
Cumulative	$ -	$ -	$ 6,900	$ 13,800	$ 21,749	$ 30,805	$ 40,509	$ 44,879	$ 50,707	$ 56,534
Annual Lot value	$ -	$ -	$ 34,850	$ 38,350	$ 38,350	$ 38,350	$ 54,850	$ -	$ -	$ -
Annual Improved Value	$ -	$ -	$ -	$ -	$ 2,835	$ 5,828	$ 8,820	$ 11,813	$ 15,750	$ 15,750
Total Residential Value	**$ -**	**$ -**	**$ 34,850**	**$ 73,200**	**$ 114,385**	**$ 158,563**	**$ 222,233**	**$ 234,045**	**$ 249,795**	**$ 265,545**

	Residential Buildout							
	2016	2017	2018	2019	2020	2021	2022	2023
West Facing Ocean Front Estates								
Average Lot Value	$ 1,750	$ 1,750	$ 1,750	$ 1,750	$ 1,750	$ 1,750	$ 1,750	$ 1,750
Average Improvement Value	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788
Residential Buildout	$ 3,150	$ 3,150	$ 3,150	$ 3,150	$ 2,583	$ 1,985	$ 1,386	$ 788
Cumulative	$ 85,309	$ 88,459	$ 91,609	$ 94,759	$ 97,342	$ 99,327	$ 100,713	$ 101,500
South Facing Ocean Front Estates								
Average Lot Value	$ 1,495	$ 1,495	$ 1,495	$ 1,495	$ 1,495	$ 1,495	$ 1,495	$ 1,495
Average Improvement Value	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788
Residential Buildout	$ 4,568	$ 4,568	$ 4,568	$ 4,568	$ 3,745	$ 2,878	$ 2,010	$ 1,142
Cumulative	$ 108,908	$ 113,476	$ 118,043	$ 122,611	$ 126,356	$ 129,233	$ 131,243	$ 132,385
Inland West Facing Ocean View Sites								
Average Lot Value	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
Average Improvement Value	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788
Residential Buildout	$ 2,205	$ 2,205	$ 2,205	$ 2,205	$ 1,808	$ 1,389	$ 970	$ 551
Cumulative	$ 24,716	$ 26,921	$ 29,126	$ 31,331	$ 33,139	$ 34,529	$ 35,499	$ 36,050
Inland South Facing Ocean View Sites								
Average Lot Value	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460
Average Improvement Value	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788	$ 788
Residential Buildout	$ 5,828	$ 5,828	$ 5,828	$ 5,828	$ 4,779	$ 3,671	$ 2,564	$ 1,457
Cumulative	$ 62,362	$ 68,189	$ 74,017	$ 79,844	$ 84,623	$ 88,294	$ 90,858	$ 92,315
Annual Improved Value	$ 15,750	$ 15,750	$ 15,750	$ 15,750	$ 12,915	$ 9,923	$ 6,930	$ 3,938
Total Residential Value	**$ 281,295**	**$ 297,045**	**$ 312,795**	**$ 328,545**	**$ 341,460**	**$ 351,383**	**$ 358,313**	**$ 362,250**

Assume residential buildout rate of 10% per year, with completions starting 2 years after initial lot sale

Table 2

Absorption Schedule at La'au Point, Molokai Ranch

			Lot Sales					Residential Buildout										
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	TOTAL
Lot Sales																			
West Facing Ocean Front Estates																			
Annual			6	8	8	8	10												40
Cumulative			6	14	22	30	40	40	40	40	40	40	40	40	40	40	40		
South Facing Ocean Front Estates																			
Annual			10	10	10	10	18												58
Cumulative			10	20	30	40	58	58	58	58	58	58	58	58	58	58	58		
Inland West Facing Ocean View Sites																			
Annual			5	5	5	5	8												28
Cumulative			5	10	15	20	28	28	28	28	28	28	28	28	28	28	28		
Inland South Facing Ocean View Sites																			
Annual			15	15	15	15	14												74
Cumulative			15	30	45	60	74	74	74	74	74	74	74	74	74	74	74		
Subtotal Lot Sales																			
Annual			36	38	38	38	50	0	0	0	0	0	0	0	0	0	0	0	172
Cumulative			**36**	**74**	**112**	**150**	**200**	**200**	**200**	**200**	**200**	**200**	**200**	**200**	**200**	**200**	**200**		
Residential Units																			
Annual		10%			4	7	11	15	20	20	20	20	20	20	16	13	9	5	200
Cumulative					4	11	22	37	57	77	97	117	137	157	174	186	195	200	
Residency																			
Percent																			
Seasonal					85%	84%	83%	82%	80%	79%	78%	77%	76%	75%	73%	72%	71%	70%	
Permanent (180 days or more per year)					15%	16%	17%	18%	20%	21%	22%	23%	24%	25%	27%	28%	29%	30%	
Units																			
Seasonal					3	9	18	30	46	61	76	90	104	117	128	135	139	140	
Permanent (180 days or more per year)					1	2	4	7	11	16	21	27	33	40	46	51	56	60	

TABLE 5
ONGOING REVENUES AND COSTS TO THE STATE OF HAWAII

Inflation 0.0%

		Lot Sales					Residential Buildout		
	2007	2008	2009	2010	2011	2012	2013	2014	2015
Revenues From Residents									
Household Income ($000)	$ -	$ -	$ -	$ 382	$ 896	$ 1,792	$ 3,070	$ 4,773	$ 6,683
Excise Tax	-	$ -	$ -	$ 6,111	$ 14,334	$ 28,668	$ 49,114	$ 76,374	$ 106,931
Income Tax		$ -	$ -	$ 16,000	$ 32,000	$ 64,000	$ 112,000	$ 176,000	$ 256,000
Conveyance Taxes		$ 106,325	$ 118,575	$ 120,487	$ 124,416	$ 183,324	$ 19,754	$ 30,375	$ 40,995
Subtotal	$ -	$ 106,325	$ 118,575	$ 142,598	$ 170,750	$ 275,992	$ 180,868	$ 282,749	$ 403,926
Total State Revenues	$ -	$ 106,325	$ 118,575	$ 142,598	$ 170,750	$ 275,992	$ 180,868	$ 282,749	$ 403,926
Total Permanent Population	-	-	-	3	6	12	20	32	46
Cost to Serve (per person)	$ 4,071	$ 4,071	$ 4,071	$ 4,071	$ 4,071	$ 4,071	$ 4,071	$ 4,071	$ 4,071
Total Expenditure	$ -	$ -	$ -	$ 11,806	$ 23,612	$ 47,224	$ 82,641	$ 129,865	$ 188,894
Net Surplus (Deficit)	$ -	$ 106,325	$ 118,575	$ 130,792	$ 147,139	$ 228,768	$ 98,226	$ 152,884	$ 215,032
Cumulative	$ -	$ 106,325	$ 224,900	$ 355,692	$ 502,831	$ 731,599	$ 829,825	$ 982,709	$ 1,197,741

	Residential Buildout								
	2016	2017	2018	2019	2020	2021	2022	2023	Total
Revenues From Residents									
Household Income ($000)	$ 8,593	$ 6,750	$ 8,250	$ 10,000	$ 11,500	$ 12,750	$ 14,000	$ 15,000	
Excise Tax	$ 137,488	$ 108,000	$ 132,000	$ 160,000	$ 184,000	$ 204,000	$ 224,000	$ 240,000	$ 1,671,021
Income Tax	$ 336,000	$ 432,000	$ 528,000	$ 640,000	$ 736,000	$ 816,000	$ 896,000	$ 960,000	$ 6,000,000
Conveyance Taxes	$ 51,615	$ 62,236	$ 72,856	$ 83,477	$ 92,186	$ 98,877	$ 103,550	$ 106,205	$ 1,415,251
Subtotal	$ 525,103	$ 602,236	$ 732,856	$ 883,477	$ 1,012,186	$ 1,118,877	$ 1,223,550	$ 1,306,205	$ 9,086,272
Total State Revenues	$ 525,103	$ 602,236	$ 732,856	$ 883,477	$ 1,012,186	$ 1,118,877	$ 1,223,550	$ 1,306,205	$ 9,086,272
Total Permanent Population	61	78	96	116	133	148	162	174	
Cost to Serve (per person)	$ 4,071	$ 4,071	$ 4,071	$ 4,071	$ 4,071	$ 4,071	$ 4,071	$ 4,071	
Total Expenditure	$ 247,924	$ 318,759	$ 389,595	$ 472,236	$ 543,071	$ 602,101	$ 661,130	$ 708,354	$ 4,427,213
Net Surplus (Deficit)	$ 277,180	$ 283,477	$ 343,262	$ 411,241	$ 469,114	$ 516,776	$ 562,419	$ 597,851	$ 4,659,059
Cumulative	$ 1,474,921	$ 1,758,397	$ 2,101,659	$ 2,512,900	$ 2,982,014	$ 3,498,790	$ 4,061,209	$ 4,659,059	

Table 4
REVENUES AND COSTS TO MAUI COUNTY

			Lot Sales					Residential Buildout		
	Rates	2007	2008	2009	2010	2011	2012	2013	2014	2015
Real Estate Taxes										
Residential										
Lots and Residences	$5.86	$ -	$ 204,221	$ 428,952	$ 670,296	$ 929,176	$ 1,302,282	$ 1,371,504	$ 1,463,799	$ 1,556,094
Total Real Estate Taxes		$ -	$ 204,221	$ 428,952	$ 670,296	$ 929,176	$ 1,302,282	$ 1,371,504	$ 1,463,799	$ 1,556,094
Other Revenue	74%	$ -	$ 150,805	$ 316,756	$ 494,975	$ 686,143	$ 961,660	$ 1,012,776	$ 1,080,930	$ 1,149,085
Total Revenue		$ -	$ 355,026	$ 745,708	$ 1,165,271	$ 1,615,319	$ 2,263,942	$ 2,384,279	$ 2,544,729	$ 2,705,178
Estimated Population	Persons Per Household									
Seasonal	2.9		-	-						
Peak Occupancy	80%				7	21	42	70	107	142
Permanent	2.9		-	-	3	6	12	20	32	46
Peak Population		-	-	-	10	27	53	90	139	188
Average Occupancy					38%	33%	33%	33%	33%	35%
Average Population					4	9	17	30	46	65
Cost to Serve (per person, peak occupancy)		$ 2,933	$ 2,933	$ 2,933	$ 2,933	$ 2,933	$ 2,933	$ 2,933	$ 2,933	$ 2,933
Total Expenditure		$ -	$ -	$ -	$ 28,923	$ 78,263	$ 156,526	$ 263,712	$ 406,626	$ 551,243
Surplus or Deficit										
Annual		$ -	$ 355,026	$ 745,708	$ 1,136,347	$ 1,537,056	$ 2,107,416	$ 2,120,568	$ 2,138,102	$ 2,153,936
Cumulative		$ -	$ 355,026	$ 1,100,734	$ 2,237,082	$ 3,774,138	$ 5,881,554	$ 8,002,122	$ 10,140,224	$ 12,294,160

		Residential Buildout								
	Rates	2016	2017	2018	2019	2020	2021	2022	2023	TOTAL
Real Estate Taxes										
Residential										
Lots and Residence	$5.86	$ 1,648,389	$ 1,740,684	$ 1,832,979	$ 1,925,274	$ 2,000,956	$ 2,059,101	$ 2,099,711	$ 2,122,785	$ 23,356,202
Total Real Estate Taxes		$ 1,648,389	$ 1,740,684	$ 1,832,979	$ 1,925,274	$ 2,000,956	$ 2,059,101	$ 2,099,711	$ 2,122,785	$ 23,356,202
Other Revenue	74%	$ 1,217,239	$ 1,285,394	$ 1,353,548	$ 1,421,702	$ 1,477,589	$ 1,520,526	$ 1,550,514	$ 1,567,553	$ 17,247,195
Total Revenue		$ 2,865,628	$ 3,026,077	$ 3,186,527	$ 3,346,976	$ 3,478,545	$ 3,579,628	$ 3,650,226	$ 3,690,338	$ 40,603,397
Estimated Population	Persons Per Household									
Seasonal	2.9									
Peak Occupancy	80%	176	209	241	271	297	313	322	325	
Permanent	2.9	61	78	96	116	133	148	162	174	
Peak Population		237	287	337	387	430	461	485	499	
Average Occupancy		39%	40%	41%	42%	43%	44%	45%	46%	
Average Population		92	115	138	164	186	203	219	231	
Cost to Serve (per person, peak occupancy)		$ 2,933	$ 2,933	$ 2,933	$ 2,933	$ 2,933	$ 2,933	$ 2,933	$ 2,933	
Total Expenditure		$ 695,859	$ 842,176	$ 988,494	$ 1,136,513	$ 1,262,414	$ 1,352,586	$ 1,422,342	$ 1,463,175	$ 10,648,850
Surplus or Deficit										
Annual		$ 2,169,769	$ 2,183,901	$ 2,198,033	$ 2,210,464	$ 2,216,131	$ 2,227,042	$ 2,227,884	$ 2,227,163	$ 29,954,546
Cumulative		$ 14,463,929	$ 16,647,830	$ 18,845,863	$ 21,056,326	$ 23,272,458	$ 25,499,499	$ 27,727,383	$ 29,954,546	

Table 7

SUMMARY OF PROJECT COSTS FOR LA'AU POINT ($000)

	Assumptions	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Infrastructure & Development Costs												
Offsite Electrical			$ 350	$ 350	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 700
Land Restoration/ Erosion Control			$ 1,445	$ 1,445	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,890
Sewer System			$ 2,408	$ 2,408	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,815
Potable Water System			$ 1,580	$ 1,580	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,160
Nonpotable Water System			$ 2,955	$ 2,955	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,910
Subtotal:			$ 8,865	$ 8,865	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 17,730
Onsite Costs												
Roadways			$ 128	$ 1,667	$ 1,540	$ 1,540	$ 1,540	$ 1,540	$ -	$ -	$ -	$ 7,955
Drainage Improvements			$ -	$ 400	$ 400	$ 400	$ 400	$ 400	$ -	$ -	$ -	$ 2,000
Housepads			$ -	$ 1,188	$ 1,188	$ 1,188	$ 1,188	$ 1,188	$ -	$ -	$ -	$ 5,940
Potable Water System			$ -	$ 1,097	$ 1,097	$ 1,097	$ 1,097	$ 1,097	$ -	$ -	$ -	$ 5,483
Non-potable Water System			$ -	$ 1,023	$ 1,023	$ 1,023	$ 1,023	$ 1,023	$ -	$ -	$ -	$ 5,117
Electrical/Comm (Underground-Main Road)			$ -	$ 1,600	$ 1,600	$ 1,600	$ 1,600	$ 1,600	$ -	$ -	$ -	$ 8,000
Electrical/Comm (Underground-Minor Roads)			$ -	$ 999	$ 999	$ 999	$ 999	$ 999	$ -	$ -	$ -	$ 4,995
Subtotal:			$ -	$ 7,847	$ 7,847	$ 7,847	$ 7,847	$ 7,847	$ -	$ -	$ -	$ 39,234
Amenities												
Amenity Construction			$ -	$ 1,175	$ 1,175	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,350
Total Hard Construction Costs		$ -	$ 8,865	$ 17,887	$ 9,022	$ 7,847	$ 7,847	$ 7,847	$ -	$ -	$ -	$ 59,314
Contingency	15%	$ -	$ 1,330	$ 2,683	$ 1,353	$ 1,177	$ 1,177	$ 1,177	$ -	$ -	$ -	$ 8,897
Planning, Arch., Eng'g and Other		$ 1,262	$ 1,262	$ 1,262	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,786
Total Design & Construction Costs		$ 1,262	$ 11,457	$ 21,832	$ 10,375	$ 9,024	$ 9,024	$ 9,024	$ -	$ -	$ -	$ 71,997
On-Going Maintenance, Operations, and Management Costs												
General & Administration		$ 200	$ 400	$ 800	$ 800	$ 600	$ 500	$ 400	$ 300	$ 200	$ 100	$ 4,300
Common Area / Security/		$ -	$ -	$ 272	$ 196	$ 120	$ 44	$ (56)	$ (56)	$ (56)	$ (56)	$ 408
Sales and Marketing	6%	$ -	$ -	$ 1,941	$ 2,151	$ 2,151	$ 2,151	$ 3,051	$ -	$ -	$ -	$ 11,445
Total On-Going Costs:		$ 200	$ 400	$ 3,013	$ 3,147	$ 2,871	$ 2,695	$ 3,395	$ 244	$ 144	$ 44	$ 16,153
PROJECT COSTS:		$ 1,462	$ 11,857	$ 24,845	$ 13,522	$ 11,895	$ 11,719	$ 12,419	$ 244	$ 144	$ 44	$ 88,150
Residential Construction												
West Facing Ocean Front Estates				$ -	$ -	$ 567	$ 1,166	$ 1,764	$ 2,363	$ 3,150	$ 3,150	
South Facing Ocean Front Estates				$ -	$ -	$ 822	$ 1,690	$ 2,558	$ 3,426	$ 4,568	$ 4,568	
Inland West Facing Ocean View Sites				$ -	$ -	$ 397	$ 816	$ 1,235	$ 1,654	$ 2,205	$ 2,205	
Inland South Facing Ocean View Sites				$ -	$ -	$ 1,049	$ 2,156	$ 3,263	$ 4,371	$ 5,828	$ 5,828	
Total Residential Construction				$ -	$ -	$ 2,835	$ 5,828	$ 8,820	$ 11,813	$ 15,750	$ 15,750	
All Costs		$ 1,462	$ 11,857	$ 24,845	$ 13,522	$ 14,730	$ 17,546	$ 21,239	$ 12,057	$ 15,894	$ 15,794	

	2016	2017	2018	2019	2020	2021	2022	2023	Total
Residential Construction									
West Facing Ocean Front Estates	$ 3,150	$ 3,150	$ 3,150	$ 3,150	$ 2,583	$ 1,985	$ 1,386	$ 788	$ 31,500
South Facing Ocean Front Estates	$ 4,568	$ 4,568	$ 4,568	$ 4,568	$ 3,745	$ 2,878	$ 2,010	$ 1,142	$ 45,675
Inland West Facing Ocean View Sites	$ 2,205	$ 2,205	$ 2,205	$ 2,205	$ 1,808	$ 1,389	$ 970	$ 551	$ 22,050
Inland South Facing Ocean View Sites	$ 5,828	$ 5,828	$ 5,828	$ 5,828	$ 4,779	$ 3,671	$ 2,564	$ 1,457	$ 58,275
Total Residential Construction	$ 15,750	$ 15,750	$ 15,750	$ 15,750	$ 12,915	$ 9,923	$ 6,930	$ 3,938	$ 157,500
All Costs	$ 15,750	$ 15,750	$ 15,750	$ 15,750	$ 12,915	$ 9,923	$ 6,930	$ 3,938	$ 245,650

Source: Molokai Ranch; Knowledge Based Consulting Group

Table 6

Employment and Land Trust Support at La'au Point

		Total	Lot Sales 2008	2009	2010	2011	2012	Residential Buildout 2013	2014	2015
New Resident Spending for Goods and Services					$ 171,882	$ 403,147	$ 806,293	$ 1,381,322	$ 2,148,027	$ 3,007,438
% on Molokai	65%				$ 111,723	$ 262,045	$ 524,091	$ 897,859	$ 1,396,217	$ 1,954,835
Total Local Spending					$ 111,723	$ 262,045	$ 524,091	$ 897,859	$ 1,396,217	$ 1,954,835
JOB CREATION										
Labor Component	50%				$ 55,862	$ 131,023	$ 262,045	$ 448,930	$ 698,109	$ 977,417
Average Wage	$ 45,000									
Total Direct Employment From Resident Spending				0	1	3	6	10	16	22
Direct La'au Point Community Association Employment										
Community Maintenance, Administration, and Services			5	5	5	5	6	6	7	7
Total Local Employment			**5**	**5**	**6**	**8**	**12**	**16**	**23**	**29**
Land Trust Funds ($000)										
At 5% of Land Sales		$10,238	$ 1,743	$ 1,918	$ 1,918	$ 1,918	$ 2,743			

		Residential Buildout 2016	2017	2018	2019	2020	2021	2022	2023
New Resident Spending for Goods and Services		$ 3,866,849	$ 3,037,500	$ 3,712,500	$ 4,500,000	$ 5,175,000	$ 5,737,500	$ 6,300,000	$ 6,750,000
% on Molokai	65%	$ 2,513,452	$ 1,974,375	$ 2,413,125	$ 2,925,000	$ 3,363,750	$ 3,729,375	$ 4,095,000	$ 4,387,500
Total Local Spending		$ 2,513,452	$ 1,974,375	$ 2,413,125	$ 2,925,000	$ 3,363,750	$ 3,729,375	$ 4,095,000	$ 4,387,500
JOB CREATION									
Labor Component	50%	$ 1,256,726	$ 987,188	$ 1,206,563	$ 1,462,500	$ 1,681,875	$ 1,864,688	$ 2,047,500	$ 2,193,750
Average Wage	$ 45,000								
Total Direct Employment From Resident Spending		28	22	27	33	37	41	46	49
Direct La'au Point Community Association Employment									
Community Maintenance, Administration, and Services		8	9	9	10	10	11	11	11
Total Local Employment		**36**	**31**	**36**	**43**	**47**	**52**	**57**	**60**
Land Trust Funds ($000)									
At 5% of Land Sales									

Source: Knowledge Based Consulting Group

TABLE 9

Construction and Project Development Tax ($000)

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Developer and Residential Construction												
Total Infrastructure Costs:		$ 1,262	$ 11,457	$ 21,832	$ 10,375	$ 9,024	$ 9,024	$ 9,024	$ -	$ -	$ -	$ 71,997
Non Labor Costs as % of Const Cost	58%	$ 732	$ 6,645	$ 12,662	$ 6,018	$ 5,234	$ 5,234	$ 5,234	$ -	$ -	$ -	$ 41,758
Excise Tax on Finished Development	4.0%	$ 50	$ 458	$ 873	$ 415	$ 361	$ 361	$ 361	$ -	$ -	$ -	$ 2,880
Excise Tax on Building Materials	0.5%	$ 4	$ 33	$ 63	$ 30	$ 26	$ 26	$ 26	$ -	$ -	$ -	$ 209
Total Residential Costs		$ -	$ -	$ -	$ -	$ 2,835	$ 5,828	$ 8,820	$ 11,813	$ 15,750	$ 15,750	
Non Labor Costs as % of Const Cost	40%	$ -	$ -	$ -	$ -	$ 1,134	$ 2,331	$ 3,528	$ 4,725	$ 6,300	$ 6,300	
Excise Tax on Finished Development	4.0%	$ -	$ -	$ -	$ -	$ 113	$ 233	$ 353	$ 473	$ 630	$ 630	
Excise Tax on Building Materials	0.5%	$ -	$ -	$ -	$ -	$ 6	$ 12	$ 18	$ 24	$ 32	$ 32	
On-Going Developer Costs:		$ 200	$ 400	$ 3,013	$ 3,147	$ 2,871	$ 2,695	$ 3,395	$ 244	$ 144		
Material as % of Ongoing Cost	50%	$ 100	$ 200	$ 1,507	$ 1,574	$ 1,436	$ 1,348	$ 1,698	$ 122	$ 72	$ -	
Excise Tax on Materials	0.5%	$ 1	$ 1	$ 8	$ 8	$ 7	$ 7	$ 8	$ 1	$ 0	$ -	
Summary												
Excise Tax on Finished Development	4.0%	$ 50	$ 458	$ 873	$ 415	$ 474	$ 594	$ 714	$ 473	$ 630	$ 630	
Excise Tax on Building Materials	0.5%	$ 4	$ 34	$ 71	$ 38	$ 39	$ 45	$ 52	$ 24	$ 32	$ 32	
Income Taxes on Construction Wages	6.0%	$ 38	$ 301	$ 641	$ 356	$ 416	$ 518	$ 647	$ 433	$ 571	$ 567	
Total Taxes on Construction		**$ 92**	**$ 793**	**$ 1,585**	**$ 809**	**$ 929**	**$ 1,157**	**$ 1,413**	**$ 929**	**$ 1,233**	**$ 1,229**	

		2016	2017	2018	2019	2020	2021	2022	2023	Total
Total Residential Costs		$ 15,750	$ 15,750	$ 15,750	$ 15,750	$ 12,915	$ 9,923	$ 6,930	$ 3,938	$ 157,500
Non Labor Costs as % of Const Cost	40%	$ 6,300	$ 6,300	$ 6,300	$ 6,300	$ 5,166	$ 3,969	$ 2,772	$ 1,575	$ 63,000
Excise Tax on Finished Development	4.0%	$ 630	$ 630	$ 630	$ 630	$ 517	$ 397	$ 277	$ 158	$ 6,300
Excise Tax on Building Materials	0.5%	$ 32	$ 32	$ 32	$ 32	$ 26	$ 20	$ 14	$ 8	$ 315
On-Going Developer Costs:		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 16,109
Material as % of Ongoing Cost	50%	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 8,055
Excise Tax on Materials	0.5%	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 40
Summary										
Excise Tax on Finished Development	4.0%	$ 630	$ 630	$ 630	$ 630	$ 517	$ 397	$ 277	$ 158	$ 9,180
Excise Tax on Building Materials	0.5%	$ 32	$ 32	$ 32	$ 32	$ 26	$ 20	$ 14	$ 8	$ 564
Income Taxes on Construction Wages	6.0%	$ 567	$ 567	$ 567	$ 567	$ 465	$ 357	$ 249	$ 142	$ 7,968
Total Taxes on Construction		**$ 1,229**	**$ 1,229**	**$ 1,229**	**$ 1,229**	**$ 1,007**	**$ 774**	**$ 541**	**$ 307**	**$ 17,712**

TABLE 8

CONSTRUCTION AND PROJECT DEVELOPMENT EMPLOYMENT AT LA'AU POINT

Developer Construction		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Infrastructure Costs:		**$ 1,262**	**$ 11,457**	**$ 21,832**	**$ 10,375**	**$ 9,024**	**$ 9,024**	**$ 9,024**	**$ -**	**$ -**	**$ -**
Labor as % of Const Cost	42%	$ 530	$ 4,812	$ 9,169	$ 4,358	$ 3,790	$ 3,790	$ 3,790	$ -	$ -	$ -
Jobs at Average Wage of	$ 75,000	7	64	122	58	51	51	51	-	-	-
Total Residential Construction Costs		**$ -**	**$ -**	**$ -**	**$ -**	**$ 2,835**	**$ 5,828**	**$ 8,820**	**$ 11,813**	**$ 15,750**	**$ 15,750**
Labor as % of Const Cost	40%	$ -	$ -	$ -	$ -	$ 1,134	$ 2,331	$ 3,528	$ 4,725	$ 6,300	$ 6,300
Jobs at Average Wage of	$ 75,000	-	-	-	-	15	31	47	63	84	84
Total Construction Jobs		**7**	**64**	**122**	**58**	**66**	**82**	**98**	**63**	**84**	**84**
On-Going Developer Costs:		**$ 200**	**$ 400**	**$ 3,013**	**$ 3,147**	**$ 2,871**	**$ 2,695**	**$ 3,395**	**$ 244**	**$ 144**	**$ 44**
Labor as % of Ongoing Cost	40%	$ 80	$ 160	$ 1,205	$ 1,259	$ 1,148	$ 1,078	$ 1,358	$ 98	$ 58	$ 18
Jobs at Average Wage of	$ 60,000	1	3	20	21	19	18	23	2	1	0
Total Construction and Developer Employment		**8**	**67**	**142**	**79**	**85**	**100**	**120**	**65**	**85**	**84**
Total Construction Value		**$ 1,462**	**$ 11,857**	**$ 24,845**	**$ 13,522**	**$ 14,730**	**$ 17,546**	**$ 21,239**	**$ 12,057**	**$ 15,894**	**$ 15,794**

Developer Construction		2016	2017	2018	2019	2020	2021	2022	2023	Total
Total Infrastructure Costs:										**$ 71,997**
Labor as % of Const Cost	42%									**$ 30,239**
Jobs at Average Wage of	$ 75,000									**$ 403**
Total Residential Construction Costs		**$ 15,750**	**$ 15,750**	**$ 15,750**	**$ 15,750**	**$ 12,915**	**$ 9,923**	**$ 6,930**	**$ 3,938**	**$ 157,500**
Labor as % of Const Cost	40%	$ 6,300	$ 6,300	$ 6,300	$ 6,300	$ 5,166	$ 3,969	$ 2,772	$ 1,575	**$ 63,000**
Jobs at Average Wage of	$ 75,000	84	84	84	84	69	53	37	21	**$ 840**
Total Construction Jobs		**84**	**84**	**84**	**84**	**69**	**53**	**37**	**21**	**$ 1,243**
On-Going Developer Costs:										**$ 16,153**
Labor as % of Ongoing Cost	40%									**$ 6,461**
Jobs at Average Wage of	$ 60,000									**$ 108**
Total Construction and Developer Employment		**84**	**84**	**84**	**84**	**69**	**53**	**37**	**21**	**1,351**
Total Construction Value		**$ 15,750**	**$ 15,750**	**$ 15,750**	**$ 15,750**	**$ 12,915**	**$ 9,923**	**$ 6,930**	**$ 3,938**	**$ 245,650**

Table 11
Statement of Operating Cash Flow for Molokai Properties Limited

In $(000)

	Actual						Cumulative	Forecast
	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2001 - 06	FY 2007
Net Cash Flow from Operations								
Hotel		$ (3,150)	$ (2,285)	$ (2,173)	$ (1,039)	$ (828)	$ (9,475)	$ (791)
Golf Course		$ -	$ -	$ (292)	$ (480)	$ (394)	$ (1,166)	$ (329)
Water Operations		$ (341)	$ (455)	$ (177)	$ (200)	$ (366)	$ (1,539)	$ (331)
Minor Operations (1)		$ (79)	$ (291)	$ (491)	$ (582)	$ (340)	$ (1,783)	$ (603)
Support Costs (2)		$ (2,139)	$ (1,329)	$ (1,506)	$ (1,638)	$ (1,292)	$ (7,904)	$ (1,616)
Subtotal	$ (8,707)	$ (5,709)	$ (4,360)	$ (4,639)	$ (3,939)	$ (3,220)	$ (30,574)	$ (3,670)
Changes in Assets and Liabilities	$ (881)	$ (115)	$ (117)	$ 368	$ 349	$ (590)	$ (986)	$ 13
Cash Flow from Operations	**$ (9,588)**	**$ (5,824)**	**$ (4,477)**	**$ (4,271)**	**$ (3,590)**	**$ (3,810)**	**$ (31,560)**	**$ (3,657)**
Capital Spending							$ -	
Work in Progress		$ (547)	$ (830)	$ (292)	$ (425)	$ (718)	$ (2,812)	$ -
Fixed Assets	(597)	$ (150)	$ (47)	$ (577)	$ (502)	$ (126)	$ (1,999)	$ (248)
Capital Spending	**$ (597)**	**$ (697)**	**$ (877)**	**$ (869)**	**$ (927)**	**$ (844)**	**$ (4,811)**	**$ (248)**
Work on Master Plan		$ -	$ -	$ -	$ (152)	$ (405)	$ (557)	$ (1,005)
Net Cash Flow	**$ (10,185)**	**$ (6,521)**	**$ (5,354)**	**$ (5,140)**	**$ (4,669)**	**$ (5,059)**	**$ (36,928)**	**$ (4,910)**

Notes:

(1) Minor Operations include Rentals, Cattle, Repair and Maintenance Shop, Nursery, Theaters, Gas Station, Kauluakoi Hotel, and Roads

(2) Includes Professional fees, Legal expenses, Insurance, Real Property taxes, Partnership operations, etc.

TABLE 10
Indirect Impacts of La'au Point Construction

Value of Construction ($millions)		**$ 246**						
Output			**Employment**			**Household Income ($millions)**		
Sector	**Multiplier**	**($millions)**	**Sector**	**Multiplier**	**Person Years of employment**	**Sector**	**Multiplier**	**($millions)**
Construction	1.000	$ 246	Construction	0.942	2,314	Construction	0.484	$ 119
Manufacturing	0.070	$ 17	Retail Trade	0.059	145	Engineering and Arch	0.018	$ 4
Engineering and Arch	0.032	$ 8	Engineering and Arcl	0.041	101	Manufacturing	0.015	$ 4
Communications	0.030	$ 7	Other Services	0.034	83	Retail Trade	0.013	$ 3
Retail Trade	0.028	$ 7	Manufacturing	0.033	82	Wholesale Trade	0.011	$ 3
Wholesale Trade	0.026	$ 6	Wholesale Trade	0.032	79	Communications	0.010	$ 2
Other Services	0.014	$ 3	Business Services	0.028	68	Other Services	0.008	$ 2
Business Services	0.011	$ 3	Communications	0.018	45	Business Services	0.007	$ 2
Other Transportation	0.011	$ 3	Other Transportation	0.016	39	Other Transportation	0.004	$ 1
Finance	0.008	$ 2	Finance	0.007	17	Finance	0.003	$ 1
Total		**$ 302**	**Total**		**2,973**			**$ 141**

Appendix K

Market Support for Real Estate Development

KNOWLEDGE BASED CONSULTING GROUP

19 Holly Ave.
Larkspur, CA 94939
(415) 924-6577
clivej@sbcglobal.net

MARKET SUPPORT FOR REAL ESTATE DEVELOPMENT AT LA'AU POINT, MOLOKAI

Prepared for

Molokai Properties Limited

Prepared by

Knowledge Based Consulting Group

June 2006

SECTION I
INTRODUCTION

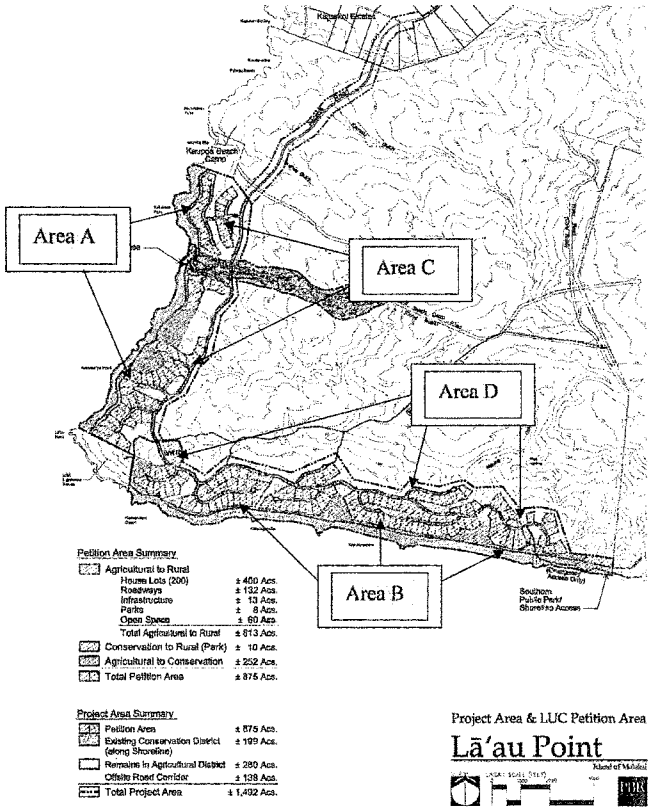
Knowledge Based Consulting Group (KBCG) was retained by Molokai Properties Limited to address the market opportunities for lot sales and residential development at its La'au Point property on Molokai.

Molokai Properties Limited proposes to develop 200 residential lots at La'au Point as part of an overall development and preservation plan for some 1,492 acres within the Molokai Ranch. The La'au Point site slopes from an elevation of sea level to 150 feet, providing good to excellent ocean and countryside views from nearly all development parcels.

The La'au Point development project includes four general lot type areas:

A	West Facing Ocean Front Home Sites	40
B	South Facing Ocean Front Home Sites	58
C	West Facing Ocean View Home Sites	28
D	South Facing Ocean View Home Sites	74
Total Lots and Residences		200

Molokai Properties Limited would construct roadway improvements servicing the site, major electrical improvements, water and sewage treatment facilities, drainage, and other improvements to service the development. An illustrative development plan is shown below:



KBCG recognizes that Molokai Properties has a unique opportunity to develop and deliver a real estate product that builds on the natural character of the land and its uncrowded oceanfront setting. During the course of the assignment we worked with the management team and land planner PBR HAWAII to refine a land plan that is designed to provide oceanfront and near ocean lots with views, privacy, and Hawaiian authenticity not easily found elsewhere in Hawaii.

In conducting the assignment, KBCG reviewed the overall real estate market in Hawaii, the development programs at other oceanfront developments in the region, current site opportunities, and overall market strength. The site is at a preferred location fronting unspoiled beaches of remarkable strength and beauty. On the western side, the property is near to the Kaluakoi resort and golf course and the lots have beautiful sunset views and distant Oahu vistas. The south facing lots also have excellent ocean views and access to large areas of open space and recreation opportunities.

In conducting our analysis, KBCG began by examining the base land use plan that had been developed by PBR and Molokai Properties. This plan reflects the constraints and opportunities inherent in the land as well as a program of covenants and conditions that are acceptable to the Molokai community. We understand that the plan and its conditions reflect extensive community involvement. Within this context we addressed the following issues:

- What is the expected market demand for a low density, natural environment lot program at La'au Point?
- What design features and amenities will be particularly appropriate for the La'au Point market?
- What is a responsible pricing strategy for the La'au Point lots?
- What are the CC and R's that are appropriate for the La'au Point market and how will they affect value?

In particular, the KBCG work program included the following tasks:

- Evaluate site opportunities and constraints in terms of oceanfront proximity and setbacks, view orientation, infrastructure development, land planning options, potential building envelopes, and design considerations.
- Analyze existing supply and projected future demand for oceanfront and ocean view lots in Hawaii and at the subject site.
- Review the projected supply and performance of comparable ocean oriented lots within selected Hawaii resorts and land sales projects. Particular attention was given as to how the uncrowded, natural character, and protective CC and R's of the La'au Point project relate to other alternatives in the market.
- Evaluate the market of buyers who by their purchase behavior indicate that they could be candidates for La'au Point real estate. Accordingly, we analyzed assessor records to evaluate buyer origin, occupancy patterns, turnover, and sales price history for individual properties within projects that offer ocean oriented estate lots.
- Recommend a development program, pricing structure and absorption schedule for La'au Point.

Following this Introduction, Section II presents a summary of target markets and market support as well as recent overall market performance and specifics of comparable and competitive projects. The recommended development program is summarized in Section III. Appendices A, B, and C provide summary information on selected oceanfront real estate projects within Wailea, Kaananpali, and Kapalua respectively, and Appendix D summarizes real estate activity on Molokai since 2000. This assignment was conducted by Clive B. Jones, Principal, with administrative support from Megan Jones. KBCG appreciates the fine support and cooperation from Molokai Properties executives and line personnel throughout the assignment.

KNOWLEDGE BASED CONSULTING GROUP

19 Holly Ave.
Larkspur, CA 94939
(415) 924-6577
clivej@sbcglobal.net

GENERAL LIMITING CONDITIONS

Every reasonable effort has been made to ensure that the data contained in this study reflect the most accurate and timely information possible, and they are believed to be reliable. This study is based on estimates, assumptions and other information developed by Knowledge Based Consulting Group from its independent research effort, general knowledge of the industry and consultations with the client and the client's representatives. No responsibility is assumed for inaccuracies in reporting by the client, the client's agent and representatives or any other data source used in preparing or presenting this study.

This report is based on information that was current as of April 2006 and Knowledge Based Consulting Group has not undertaken any update of its research effort since such date.

No warranty or representation is made by Knowledge Based Consulting Group that any of the projected values or results contained in this study will actually be achieved.

Possession of this study does not carry with it the right of publication thereof or to use the name of "Knowledge Based Consulting Group" in any manner without first obtaining the prior written consent of Knowledge Based Consulting Group. No abstracting, excerpting or summarization of this study may be made without first obtaining the prior written consent of Knowledge Based Consulting Group. This report is not to be used in conjunction with any public or private offering of securities or other similar purpose where it may be relied upon to any degree by any person other than the client without first obtaining the prior written consent of Knowledge Based Consulting Group. This study may not be used for purposes other than that for which it is prepared or for which prior written consent has first been obtained from Knowledge Based Consulting Group.

This study is qualified in its entirety by, and should be considered in light of, these limitations, conditions and considerations.

SECTION II

MARKET ENVIRONMENT FOR LA'AU POINT REAL ESTATE

This section of the report summarizes current market conditions for resort real estate on Molokai and at the principal West Maui resort communities of Wailea, Kaanapali, and Kapalua

Overall Market Environment

The market for real estate at La'au Point will be comprised of households that recognize the value of an unspoiled oceanfront environment in Hawaii and have the resources to afford it. For the ocean view lots, this would generally require a net worth of at least $1 million, and for the ocean front properties the market for real estate at La'au Point comes from the premium pentamillionaire ($5 million) market and above

- Nationwide, the number of households with more than $1 million in net worth (not including primary residence) tapered from its peak of 7.1 million households in 1999 to 5.5 million at the end of 2002.
- Since March 2003, equity markets have regained earlier strength such that substantial gains have been realized in the equity markets, and real estate assets have continued to climb. The number of millionaire households has now reached 8.3 million and is increasing at the rate of 700,000 per year.
- Notwithstanding short term influences, the assets of high net worth individuals should substantially exceed worldwide economic growth and grow at an average of 7% a year during the next 3 years, reaching approximately $38 trillion by 2008.
- As stock market gains evaporated in the early part of this decade, consumers began to look at housing with a renewed appreciation, making real estate and other assets a safe haven for money. They also learned to appreciate that another form of safe haven is a desirable location for themselves and their real estate when they retire. Hawaii fits this profile ideally, and anecdotal discussions with real estate brokers indicate that this safe haven motivation is already quite strong in the Hawaii market.
- The average HNW individual has about 15% of his assets in real estate, not counting the primary home.
- The pentamillionaire market has pulled back about 20% since the heady days of the late '90's, but is regaining forward momentum in 2006.
- The number of pentamillionaire households is currently about 500,000 and increasing at a rate of about 20,000 to 25,000 per year. By 2020, there should be nearly 1 million pentamillionaire households in the United States
- An increasing share of the pentamillionaire market will be represented by inherited wealth being transferred to the Baby Boomer generation.

Conclusion: There is sufficient depth of market for La'au Point and that market is growing at a healthy rate.

Key Market Segments

- Transfer Market. This market includes existing owners at Kaluakoi, other Molokai seasonal home owners, owners at the principal Maui resorts, and owners at premium Neighbor Island projects
    - Interest in the real estate market and looking at new real estate products is a popular activity with existing owners of Hawaii resort homes and lots. This transfer market represents qualified and interested resort real estate owners who have already made a purchase decision to own a home in Hawaii. Some of these owners are looking to change projects for the following reasons:
        - Congestion and crowding at key amenities
        - Homes or condominium units are too small
        - Views are compromised
        - Too far from beach
        - Decline in quality of service
        - Or, they are looking for additional investment opportunities
    - Prior KBCG surveys of owners at West Maui and Big Island resorts indicate that there could be a significant opportunity to draw buyers to an uncrowded oceanfront experience at La'au Point from the Wailea, Kapalua, and Kaanapali resorts and (to a lesser extent) from the Big Island.
- On –going Market
    - Frequent Visitors to Molokai and Maui
    - Single family home, luxury condominium, and other hotel suite renters
    - Friends and relatives of existing second home owners
    - The Baby Boomer Market should sustain growth in the Hawaii real estate market
        - Relocation in retirement is on the horizon for many baby boomers with nearly 6 out of 10 likely to move to a new home for retirement.
        - Of those planning to move, 31% plan to move more than three hours away from their current location.
        - Hawaii is the preferred destination of 4% of the prospective Baby Boomer retirees. Whereas this may be considered a small percentage, the potential numbers are impressive. If they fulfilled their dreams, these goals represent 20,000 to 40,000 baby boomer households relocating to Hawaii per year.
        - Health, fitness, family, and safety are on point messages to the resettling Baby Boomers.
        - Nearly all boomers (90%) believe they will be happier if they remain physically active during retirement. Their principal activities include walking, swimming, and using exercise facilities.

        - Most boomers (91%) expect that the U.S. fight against terrorism is not expected to subside any time soon, as most boomers feel the war will continue into their retirement.
        - Hawaii's position as a probable safe haven from future terrorism events should continue to appeal to these semi-retiring baby boomers and help real estate sales.
        - They are also looking forward to spending more time with spouse, children, and grandchildren.
        - An approach to framing a healthy, self improvement lifestyle through a clean and unspoiled environment with supporting amenities and community services is well targeted to the needs of semi-retiring Baby Boomers
- And, Hawaii is Tax Friendly to Retirees
    - Hawaii is the most friendly State for retirement assets. – Bloomberg Wealth Management
    - The average annual tax bill for a reasonably well off retiree in Hawaii is $4,049, lowest in the country. Some comparisons: Florida: $9,351; Arizona: $8,308; New York: $14,571; California: $11,250
    - Also, Hawaii is the second friendliest state for wealth held in real assets. The average annual tax bill is $11,124, just behind Wyoming. Some comparisons: Florida: $20,869; Arizona: $15,008; New York: $31,837; California: $19,597
    - This message can be a positive counter to the prevailing impression of Hawaii as a high cost of living state.

Maui County Real Estate

Over the past several years there has been a dramatic increase in real estate activity throughout Hawaii. This is particularly true for resort destinations in Maui, and Molokai itself has seen substantial sales growth and price appreciation. Each of these areas are discussed below.

Maui resort condominiums reached their previous peak prices in 1990/1991, the last two years of the Japanese "Bubble" economy. From 1991 to 1997, prices declined some 30% to 40% from those peaks. However, all South Maui luxury condominiums have seen very substantial price rises the past few years, especially in the past 24 months, to the point that all prices have now risen far beyond those 1990/1991 peaks, to new all-time highs. The luxury complexes in Wailea, Makena, Kaanapali, and Kapalua have seen especially good price appreciation over the past 24 months. Inventories are very low, and in some complexes are continuing to decline further, indicating that the boom is not yet over. However, in late 2005 and early 2006, the market has leveled off indicating that price increases may have overshot demand. This will most likely result in a slight pullback in the overall market in the short term as speculative activity subsides. However, for the long term the basic market drivers outlined above should sustain the market for well located and unique oceanfront properties well into the future.

Overall Performance (Table 1)

- Total real estate sales in the three principal West Maui resorts (Kapalua, Kaanapali, and Wailea) was about $711.1 million in 2005, up from $645.2 million in 2004.
- In terms of units, the resort market is about 2/3 condominiums, 11% lots, and 22% single family residences.
- In terms of value, the mix is led by villas/ condominiums (49% of resort real estate sales) followed by single family residences (38%).
- Lots are a relatively small part of the Maui resort real estate market (11% of units and 13% of sales). In most cases, this reflects a lack of well positioned lot inventory.
- This distribution of real estate sales on Maui is very different than that on the Big Island resorts, where lots are 45% of sales and residences are a relatively small share of the market.

By Resort

- Wailea/ Makena had the highest number of sales, 237 in 2005. Wailea also captured the most value, $374.6 million for a 53% market share.
- Kaanapali had 221 sales distributed across condominiums ($142 million), lots ($14.9 million), and residences ($50.8 million) for a total of $207.7 million.
- Kapalua had 69 sales for $128.7 million.
- The top resorts across Hawaii in terms of real estate sales in 2005 were Wailea ($374.6 million), Kukio ($340.6 million), Mauna Lani ($252.6 million), Kaanapali ($207.7 million), Waikoloa ($173.4 million), Hualalai ($143.2 million), Kapalua ($128.7 million), and Mauna Kea ($43.7 million).

By Product within Maui Resorts

- There were 355 villa and condominium sales for a value of $347.5 million. The average unit was 1,162 square feet priced at $979,000 ($859/sq. ft.). This average condominium size is significantly lower than at the Big Island resorts where the average is 1,640 square feet.
- There were 56 lot sales for a value of $91.4 million. The average lot was about 47,000 square feet priced at $1.6 million ($34/sq. ft.).
- There were 116 residence sales for a value of $272.3 million. The average residence was about 3,250 square feet priced at $2.35 million (722/sq. ft.).

Absorption (Tables 2 and 3)

- There were 44 closings per month at the Maui resorts in 2005, down slightly from the hectic pace of 54 units per month seen in 2004

Absorption and Pricing Comparison for 2005 and 2004 (Tables 4 and 5)

- Resort price increases continued at a remarkable pace. Compared to 2004, the price increases in 2005 were:
  - Condominiums. Average prices increased 17% to nearly $980,000 ($859/SF). Range of $756/SF (Kaanapali) to $959/SF (Kapalua).

  - Single Family Lots. Average prices increased 38% to $1.6 million ($34/SF). Range of $14/SF (Kapalua) to $61/SF (Kaanapali and Wailea)
  - Residences. Average prices increased a remarkable 52% to $2.35 million ($722/SF). Range of $589/SF (Kaanapali) to $837/SF (Kapalua)
- Overall price appreciation was highest at Kaanapali and Kapalua (+35%), followed by Wailea (+31%).
- Combining changes in absorption and price, overall real estate sales volume for the three resorts increased to about $59.3 million per month in 2005, compared to $53.8 million per month in 2004.
- Average unit sizes stayed about the same for condominiums, but increased 9% over 2004 for residences.

Competitive Environment

- The competitive environment for the La'au Point lots residences will be shaped by an extreme shortage of available oceanfront property within Hawaii. This shortage has contributed to rapidly escalating prices. For example, the oceanfront units at the Wailea Beach Villas are reselling in the $6.5 million to $7.5 million range and the two Wailea Point resales in 2005 sold for an average of $4.4 million. This price escalation is also seen on the Big Island with several oceanfront homes at Hualalai and Kukio selling for $10 million and up.
- Most of the new resort real estate inventory on Maui will be in relatively moderate priced products that will not be within comfortable walking distance of the ocean. Recent and projected additions to the West Maui resort inventory include:

Property	Location	# of Units	Completion Date
Planned condominium/timeshare conversions:			
Maui Marriott Resort	Kaanapali	311	October 2005
Kapalua Bay Hotel	Kapalua	155	Spring 2008
Planned additions:			
Westin Ocean Villas	Kaanapali	177	Partially Completed
Intrawest-Honua Kai	Kaanapali	700	Beginning Sales

These projects generally target the condominium and vacation ownership buyer and have little overlap with the La'au Point target market

- La'au Point's competitive advantage lies in delivering its own core values (unobstructed beach and ocean frontage, environmental sensitivity, residential privacy, uncrowded amenities, and the cultural/ family values synonymous with Molokai) with quality and precision.

Price Performance for Oceanfront Condominiums/ Villas in West Maui Resorts

Since the La'au Point lots and residences will be one of the few oceanfront properties available in Hawaii, KBCG examined the sales history of selected oceanfront properties on Maui since 2000. These included front row units at the following projects.

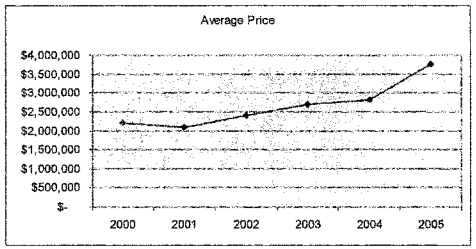
Wailea/ Makena	**Kaanapali**	**Kapalua**
Wailea Point	Ali'i	Ironwoods
Makena Surf	Whaler	Coconut Grove

Each of these oceanfront projects is described in Appendices A, B, and C along with site plans and recent sales history by unit.

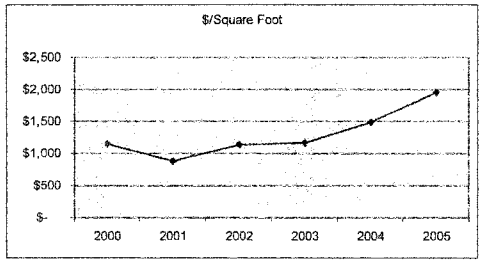
Price History for West Maui Oceanfront Villas

	$/Square Foot	Average Price
2000	$1,158	$2,194,538
2001	$884	$2,096,671
2002	$1,131	$2,396,250
2003	$1,163	$2,693,358
2004	$1,489	$2,810,345
2005	$1,957	$3,766,500

Average prices have risen from just over $2 million in 2000/01 to over $3.7 million

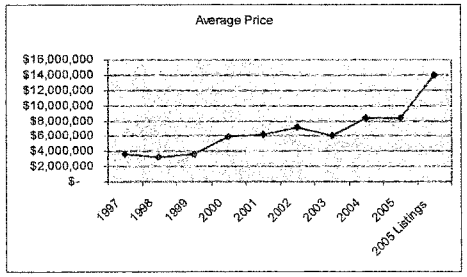


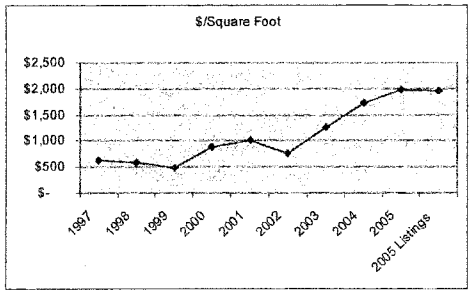
In terms of price per square foot, the average has essentially doubled in five years and now runs around $2,000 per square foot.

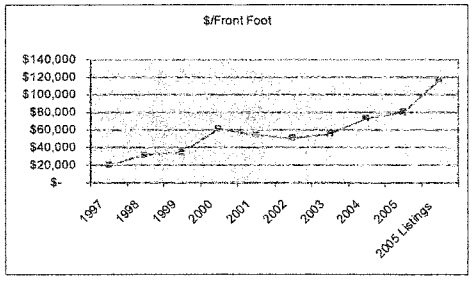


Price Performance for Oceanfront Residences in West Maui Resorts

Since 1997, prices for oceanfront single family homes have essentially tripled in terms of total price and $ per square foot, and quadrupled in terms of value per front foot of ocean exposure.







Theses levels of price appreciation for both condominiums and residences demonstrate very strong market awareness and appreciation of the scarcity and value of oceanfront property.

Molokai Real Estate (Tables 6 and 7)

Whereas Molokai does not have the high density resort products of Maui, it has also seen strong growth in its real estate markets, particularly since the reopening of the Kaluakoi golf course.

- Total real estate sales in Molokai were about $83 million in 2005, up slightly from a record $79.8 million in 2004
- In terms of units, the market is fairly evenly split between condominium resales (69), lot sales (106), and residences (77).
- In terms of value, residences represent $37.8 million, lots represent $27.4 million, and condominiums account for $18.0 million.
- Lots are a major part of the Molokai real estate market (40% of units and 35% of sales).
- This distribution of real estate sales on Molokai is similar to that on the Big Island resorts, where lots are 45% of sales.

For Kaluakoi

- Kaluakoi had 65 sales or resales for $34.1million in 2005. These included 32 condominiums ($9.3 million), 25 lots ($12.6 million), and 8 residences ($12.2 million)
- Kaluakoi sales prices are substantially higher than elsewhere on Molokai. The average price for a lot at Kaluakoi in 2005 was $503,000, compared to $182,000 elsewhere on the island. Residence prices reflect this land value with the average price for a Kaluakoi residence surpassing $1.5 million in 2005.
- Sales volume has increased substantially in the past three years.

Average Number of Sales per Year

Period	Condos	Lots	Residences	Total
2000 to 2002	23	8	2	33 per year
2003 to 2005	40	41	8	87 per year

- In addition to the increased volume of sales, average prices and prices per square foot at Kaluakoi in 2005 were also substantially higher than in 2000:

Percent Increase Over 2000

	Condos	Lots	Residences	Total
# of Sales	-3%	+127%	+167%	+38%
Sales Volume	+172%	+348%	+919%	+358%
Average Price	+180%	+97%	+282%	
Price/ SF	+153%	+103%	+350%	

Origin of Hawaii and Molokai Real Estate Buyers (Table 8)

- The United States represents nearly 90% of the buyers of resort real estate in Hawaii, followed by Japan at 8%, and Canada at 2%. The large majority of U.S. buyers (74%) are from the Pacific States. The market distributions for Maui, the Big Island, and Molokai are as follows:

Region	Maui	Hawaii	Molokai
East Coast (0-399)	6.1%	6.3%	7.4%
Midwest & South (400-699)	6.9%	6.6%	5.7%
Mountain (700-899)	9.9%	8.1%	9.4%
Southern California (900-938)	13.4%	11.7%	19.1%
Northern California (939-966)	14.1%	21.5%	18.1%
Pacific Northwest (967-969)	25.4%	25.1%	11.7%
Alaska & Hawaii (970-995)	13.2%	9.6%	24.1%

As shown, the islands have reasonably similar origin patterns with Maui doing a little better in Southern California, while Hawaii has a greater proportion of Northern California owners, and Molokai has more owners from within Hawaii

- For individual resorts, the differences in origin patterns are quite substantial:

Resort	First	Second	Third
Maui			
Makena	Northwest (25%)	Alaska/Hawaii (19%)	N. California (16%)
Kapalua	Northwest (20%)	N. California (16%)	S. California (14%)
Kaanapali	Northwest (21%)	S. California (21%)	N. California (18%)
Wailea	Northwest (32%)	Alaska/Hawaii (17%)	N. California (9%)
Hawaii			
Hualalai	N. California (56%)	Alaska/Hawaii (13%)	Midwest/ South (7%)
Keahou	Northwest (27%)	Japan (22%)	Alaska/Hawaii (13%)
Kohala	Northwest (40 %)	N. California (17%)	S. California (14%)
Mauna Kea	Northwest (44 %)	N. California (19%)	Midwest/South (10%)
Mauna Lani	Northwest (20%)	N. California (18%)	S. California (16%)
Molokai			
Kaluakoi	Hawaii/ Alaska (22%)	S. California (19%)	N. California (18%)

- The owners of Kaluakoi real estate reside in a wide geographic region, including other Hawaiian islands. The largest source market is California (37%), followed by Hawaii (22%) and the Pacific Northwest and Alaska (15%). About 10% are Molokai residents. About 5% of the Kaluakoi condo owners live in Canada and there is very little other foreign ownership. For Molokai in general, and La'au Point and Kaluakoi in particular, there appears to be a substantial opportunity for expansion into the Northwest market.

MARKET DEPTH FOR REAL ESTATE AT LA'AU POINT

There is a wide range of resort real estate products in the state of Hawaii, but the consistently highest values are obtained for those properties that have direct access to the ocean and/or unobstructed ocean views. Walking distance to a beach adds an additional lot sales premium.

The principal markets for La'au Point include the opportunity to relocate existing Kaluakoi and Molokai property owners (Local Transfer Market) as well as attract buyers who currently own property elsewhere in Hawaii (Interisland Transfer Market) and bring in new buyers from qualified markets (Ongoing Market). Being able to successfully penetrate the transfer market will be a key factor in La'au Point's initial success. Our market research shows that there is significant potential from this market. The approximate size of the transfer and ongoing markets are shown below:

Depth of Local and Interisland Transfer Market for La'au Point Lots

There are over 500 owners at Kaluakoi and over 6,400 condominiums and single family residences in the principal West Maui resorts. Many of these units were built 15 to 20 years ago and besides being older, they are often smaller than what owners now desire as they spend more time at their seasonal home, and their views may have been compromised as new projects have been developed. Any or all of these factors support the potential for a strong transfer market out of existing resort home properties to the uncrowded natural oceanfront environment that will be preserved at La'au Pont. The potential demand from this transfer market is outlined below: Note that these figures do not include potential buyers from the owners of vacation ownership property on West Maui or owners that have property outside of the master planned resorts.

Depth of Molokai Transfer Market for La'au Point Lots and Residences

	Number of Residences				
	Condominiums		Single Family		Total
Resort	%	Units	%	Units	Units
Kaluakoi		299		225	524
Income and/or Net Worth Qualified Kaluakoi	75%	224	80%	180	404
Number Looking to Switch or Add Real Estate	40%	90	50%	90	180
Percent Looking to Switch from Condo to Single Family	30%	27			
Percent That Would Consider Molokai	80%	22	80%	72	94
Penetration Rate for La'au Point Lots and Residences	60%	15	60%	43	58

Depth of Interisland Transfer Market for La'au Point Lots and Residences

	Number of Residences				
	Condominiums		Single Family		Total
Resort	%	Units	%	Units	Units
Wailea/ Makena		1,642		1,182	2,824
Kaanapali		2,413		376	2,789
Kapalua		564		238	802
		4,619		1,796	6,415
Income and/or Net Worth Qualified					
Wailea/ Makena	75%	1,232	80%	946	2,177
Kaanapali	55%	1,327	70%	263	1,590
Kapalua	90%	508	90%	214	722
		3,066		1,423	4,489
Number Looking to Switch or Add Real Estate					
Wailea/ Makena	52%	640	50%	473	1,113
Kaanapali	49%	650	50%	132	782
Kapalua	75%	381	50%	107	488
		1,671		712	2,383
Percent Looking to Switch from Condo to Single Family	20%	334			
Percent That Would Consider Molokai					
Wailea/ Makena	10%	33	15%	71	104
Kaanapali	8%	27	10%	13	40
Kapalua	10%	33	50%	54	87
		94		138	231
Penetration Rate for La'au Point Lots and Residences	60%	15	60%	83	98

This transfer demand, on its own, seems sufficient to support about 3/4 of the units that are planned be developed at La'au Point

On-going Mainland Market

The size of the Ongoing Market for luxury second or seasonal homes in the price range anticipated for the La'au Point Lots and Residences is based on the number of U.S. households with a net worth of $2.5 million or more including home equity. The size of the market with net worth of $2.5 million+ is

	Number of Households
Northeast States	230,000
Southern States	360,000
Midwestern States	310,000
Western States	300,000
Total Market	1,200,000

This market potential is then adjusted to account for its proximity to Hawaii and the buyer origin distribution at Hawaii resort projects:

	Number of Households
Northeast States (@ 10%)	23,000
Southern States (@ 10%)	36,000
Midwestern States (@ 20%)	62,000
Western States (@ 100%)	300,000
Geographic Market	421,000

Although there is an overall market potential of 421,000 households, not all of them are in the market for additional second home or seasonal home properties.

Available market to purchase new/additional seasonal home (@ 20%)	85,000
Penetration rate for the State of Hawaii (@ 10%)	8,500
Add: Foreign buyers (@ 15% of mainland)	1,275
Add: Local Hawaii Buyers (@ 10% of mainland)	850
Total Depth of Ongoing Demand	10,625
Market Share for Single Family Lots (@20%)	2,125

This demand for luxury properties will have a limited number of oceanfront options to choose from in Hawaii. We expect that the La'au Point Lots and Residences' market share will therefore be quite strong and affected mainly by additional resales that come on the market rather than new oceanfront development.

Molokai Market Share (@15%)	318
Penetration Rate for La'au Point Lots and Residences (@60%)	192

In addition, this market is increasing at about 7% per year.

Resort Guest Conversion

In addition to the ongoing market and transfer market potential, there is the opportunity to convert frequent Molokai hotel guests to real estate buyers. Prior research shows that 50% of frequent Hawaii visitors who do not have a home in Hawaii have a significant interest in owning Hawaii real estate. Of those that annually stayed two weeks or more in Hawaii, 70% are interested. Whereas we do not know the number of frequent Molokai visitors staying at the

Table 1

Summary of West Maui Resort Real Estate Sales, 2004

Resort	Number of Sales	Sales Value	Average Sales Price	Market Share (#)	Market Share ($)	Share of Total (#)	Share of Total ($)
Condos							
Wailea	144	$ 147,226,414	$ 1,022,406	33.5%	41.1%		
Kaanapali	221	$ 140,714,434	$ 636,717	51.4%	39.3%		
Kapalua	65	$ 70,401,000	$ 1,083,092	15.1%	19.6%		
Total	430	$ 358,341,848	$ 833,353			67.5%	55.5%
Lots							
Wailea	48	$ 62,847,990	$ 1,309,333	55.2%	61.9%		
Kaanapali	26	$ 16,730,000	$ 643,462	29.9%	16.5%		
Kapalua	13	$ 21,898,980	$ 1,684,537	14.9%	21.6%		
Total	87	$ 101,476,970	$ 1,166,402			13.7%	15.7%
Residences							
Wailea	82	$ 121,860,800	$ 1,486,107	68.3%	65.7%		
Kaanapali	27	$ 33,035,991	$ 1,223,555	22.5%	17.8%		
Kapalua	11	$ 30,515,000	$ 2,774,091	9.2%	16.5%		
Total	120	$ 185,411,791	$ 1,545,098			18.8%	28.7%
All Resort Real Estate							
Wailea	274	$ 331,935,204	$ 1,211,442	43.0%	51.4%		
Kaanapali	274	$ 190,480,425	$ 695,184	43.0%	29.5%		
Kapalua	89	$ 122,814,980	$ 1,379,944	14.0%	19.0%		
Total	637	$ 645,230,609	$ 1,012,921				

Summary of West Maui Resort Real Estate Sales, 2005

Resort	Number of Sales	Sales Value	Average Sales Price	Market Share (#)	Market Share ($)	Share of Total (#)	Share of Total ($)
Condos							
Wailea	131	$ 148,864,575	$ 1,136,371	36.9%	42.8%		
Kaanapali	178	$ 142,019,454	$ 797,862	50.1%	40.9%		
Kapalua	46	$ 56,572,517	$ 1,229,837	13.0%	16.3%		
Total	355	$ 347,456,546	$ 978,751			67.4%	48.9%
Lots							
Wailea	29	$ 55,355,500	$ 1,908,810	51.8%	60.6%		
Kaanapali	16	$ 14,932,000	$ 933,250	28.6%	16.3%		
Kapalua	11	$ 21,080,000	$ 1,916,364	19.6%	23.1%		
Total	56	$ 91,367,500	$ 1,631,563			10.6%	12.8%
Residences							
Wailea	77	$ 170,467,000	$ 2,213,857	66.4%	62.6%		
Kaanapali	27	$ 50,788,328	$ 1,881,049	23.3%	18.7%		
Kapalua	12	$ 51,015,000	$ 4,251,250	10.3%	18.7%		
Total	116	$ 272,270,328	$ 2,347,158			22.0%	38.3%
All Resort Real Estate							
Wailea	237	$ 374,687,075	$ 1,580,958	45.0%	52.7%		
Kaanapali	221	$ 207,739,782	$ 939,999	41.9%	29.2%		
Kapalua	69	$ 128,667,517	$ 1,864,747	13.1%	18.1%		
Total	527	$ 711,094,374	$ 1,349,325				

Source: KBCG

ranch, it is certainly worth checking as a source of potential buyers who have already expressed their appreciation for the island and the desire to return on a regular basis.

TOTAL MARKET POTENTIAL FOR LA'AU POINT LOTS AND RESIDENCES

	Number of Lots and Residences
From Molokai Transfer Market	58
From Interisland Transfer Market	98
Ongoing Market	192
Total	348

As discussed, the transfer market on its own is sufficient to provide initial support for the La'au Point Lots and Residences project and that is a strong comfort level for moving forward. The ongoing market is also quite strong but it is typically more difficult to reach and it requires more education and longer to develop. However, the location of La'au Point at an increasingly difficult to find beachfront location in Hawaii provides strong differentiation for the project site to both mainland and foreign visitors.

Table 4

Summary of Maui Resort Real Estate Sales by Active Project and Resales, 2004 and 2005

		2004 sales			2005 sales			
Land Use	Subdivision	#	$	Average Price	#	$	Average Price	% change
Wailea								
Villa	Polo Beach Club	1	$ 1,550,000	$ 1,550,000	1	$ 3,000,000	$ 3,000,000	94%
Villa	Polo Beachfront	1	$ 4,019,445	$ 4,019,445	0	$ -		
Villa	Wailea Alanui	4	$ 7,125,000	$ 1,781,250	0	$ -		
Villa	Wailea Point Village	1	$ 4,700,000	$ 4,700,000	3	$ 13,775,000	$ 4,591,667	-2%
Villa	Na Hale O Makena	9	$ 14,885,000	$ 1,653,889	9	$ 16,511,500	$ 1,834,611	11%
Villa	Makena Surf	13	$ 28,886,450	$ 2,222,035	4	$ 9,664,000	$ 2,416,000	9%
Villa	Grand Champion	32	$ 18,092,500	$ 565,391	25	$ 18,088,500	$ 723,540	28%
Villa	Wailea Fairway	15	$ 10,268,000	$ 684,533	18	$ 16,455,700	$ 914,206	34%
Villa	Wailea Ekahi I	5	$ 3,680,000	$ 736,000	6	$ 6,323,300	$ 1,053,883	43%
Villa	Wailea Ekahi II	6	$ 4,982,000	$ 830,333	6	$ 7,680,000	$ 1,280,000	54%
Villa	Wailea Ekahi III	7	$ 4,350,000	$ 621,429	8	$ 7,997,000	$ 999,625	61%
Villa	Wailea Elua I	5	$ 7,609,989	$ 1,521,998	4	$ 6,200,000	$ 1,550,000	2%
Villa	Wailea Elua II	7	$ 9,700,000	$ 1,385,714	4	$ 6,525,000	$ 1,631,250	18%
Villa	Wailea Ekolu	14	$ 8,693,250	$ 620,946	24	$ 18,559,525	$ 773,314	25%
Villa	Palms at Wailea	12	$ 8,392,000	$ 699,333	9	$ 7,748,550	$ 860,950	23%
Villa	Palms at Wailea II	12	$ 10,292,780	$ 857,732	10	$ 10,336,500	$ 1,033,650	21%
	Subtotal	144	$ 147,226,414	$ 1,022,406	131	$ 148,864,575	$ 1,136,371	11%
Land	Maui Meadows	3	$ 1,575,000	$ 525,000	1	$ 758,000	$ 758,000	44%
Land	Kaimanu Estates	1	$ 1,250,000	$ 1,250,000	0	$ -		
Land	Wailea Golf Estates	1	$ 465,490	$ 465,490	0	$ -		
Land	Wailea Highlands				2	3275000	$ 1,637,500	
Land	Palau'ea				8	18590000	$ 2,323,750	
Land	Wailea Kialoa	2	$ 655,000	$ 327,500	2	$ 1,145,000	$ 572,500	75%
Land	Wailea Golf Vistas	26	$ 22,367,500	$ 860,288	7	$ 7,257,500	$ 1,036,786	21%
Land	Wailea Pualani	6	$ 3,085,000	$ 514,167	4	$ 3,030,000	$ 757,500	47%
Land	Makena	7	$ 23,950,000	$ 3,421,429	4	$ 18,200,000	$ 4,550,000	33%
Land	Maluhia	2	$ 9,500,000	$ 4,750,000				
	Subtotal	48	$ 62,847,990	$ 1,309,333	28	$ 52,255,500	$ 1,866,268	43%
Residence	Palau'ea				1	$ 8,000,000	$ 8,000,000	
Residence	Wailea Highlands				2	$ 13,500,000	$ 6,750,000	
Residence	Wailea	1	$ 9,900,000	$ 9,900,000				
Residence	Maui Meadows	41	$ 40,098,900	$ 978,022	34	$ 40,595,000	$ 1,193,971	22%
Residence	Kaimanu Estates				2	$ 6,300,000	$ 3,150,000	
Residence	Wailea Fairways	3	$ 2,726,000	$ 908,667	3	$ 4,964,500	$ 1,654,833	82%
Residence	Wailea Kai	10	$ 10,680,000	$ 1,068,000	8	$ 10,067,500	$ 1,258,438	18%
Residence	Wailea Golf Estates	5	$ 10,725,000	$ 2,145,000	7	$ 16,813,500	$ 2,401,929	12%
Residence	Wailea Kialoa	7	$ 12,904,200	$ 1,843,457	7	$ 16,175,000	$ 2,310,714	25%
Residence	Wailea Golf Vistas	3	$ 4,700,000	$ 1,566,667	2	$ 5,807,500	$ 2,903,750	85%
Residence	Wailea Pualani	6	$ 8,389,000	$ 1,398,167	7	$ 10,594,000	$ 1,513,429	8%
Residence	Makena	4	$ 8,937,700	$ 2,234,425	1	$ 3,100,000		
Residence	Makena Place	2	$ 12,800,000	$ 6,400,000	1	$ 7,500,000	$ 7,500,000	17%
Residence	Maluhia				3	$ 30,150,000	$ 10,050,000	
	Subtotal	82	$ 121,860,800	$ 1,486,107	78	$ 173,567,000	$ 2,225,218	50%
Total		**274**	**$ 331,935,204**	**$ 1,211,442**	**237**	**$ 374,687,075**	**$ 1,580,958**	**31%**

Table 2

Summary of Resort Real Estate Sales on Maui, 2005

	Condos/ Villas				Lots				Residences				Total					
Resort	Jan - Mar	Apr - June	Jul - Sep	Oct - Dec	Jan - Mar	Apr - June	Jul - Sep	Oct - Dec	Jan - Mar	Apr - June	Jul - Sep	Oct - Dec	Jan - Mar	Apr - June	Jul - Sep	Oct - Dec	2005	Monthly Average
Wailea	32	39	31	29	9	10	3	7	17	27	17	16	58	76	51	52	237	19.8
Kaanapali	40	43	51	44	1	3	9	3	9	7	5	6	50	53	65	53	221	18.4
Kapalua	9	16	13	8	2	3	5	1	3	3	3	3	14	22	21	12	69	5.8
Total	81	98	95	81	12	16	17	11	29	37	25	25	122	151	137	117	527	43.9

Source: Knowledge Based Consulting Group, Hawaii Information Service

Table 3

Monthly Distribution of Maui Resort Real Estate Sales

	Wailea			Kaanapali			Kapalua			Total			
2005	Condo	Lots	Res.	Condo	Lots	Res.	Condo	Lots	Res.	Condo	Lots	Res.	Total Sales
January	9	5	8	9	0	3	2	1	1	20	6	12	38
February	13	4	4	16	0	1	3	0	1	32	4	6	42
March	10		5	15	1	5	4	1	1	29	2	11	42
April	8	1	5	6	1	1	7	1	2	21	3	8	32
May	12	4	9	15	1	4	3	1		30	6	13	49
June	19	5	13	22	1	2	6	1	1	47	7	16	70
July	12	1	7	17	3	2	6	2	2	35	6	11	52
August	11	1	6	14	3		4	2		29	6	6	41
September	8	1	4	20	3	3	3	1	1	31	5	8	44
October	10	4	7	15	2	2			2	25	6	11	42
November	11	2	4	17	1	3	6	1	1	34	4	8	46
December	8	1	5	12		1	2			22	1	6	29
Closed YTD	131	29	77	178	16	27	46	11	12	355	56	116	527

Source: Knowledge Based Consulting Group, Hawaii Information Service

Table 4
Summary of Maui Resort Real Estate Sales by Active Project and Resales, 2004 and 2005

		2004 sales			2005 sales			
Land Use	Subdivision	#	$	Average Price	#	$	Average Price	% change
Kapalua								
Villa	Bay Villas	20	$ 17,458,000	$ 872,900	16	$ 19,681,417	$ 1,230,089	41%
Villa	Golf Villas	20	$ 12,263,000	$ 613,150	6	$ 4,864,000	$ 810,667	32%
Villa	Ironwoods	6	$ 16,152,500	$ 2,692,083	2	$ 5,125,000	$ 2,562,500	-5%
Villa	Ridge	15	$ 11,560,000	$ 770,667	19	$ 17,340,800	$ 912,674	18%
Villa	Coconut Grove	4	$ 12,967,500	$ 3,241,875	3	$ 9,561,300	$ 3,187,100	-2%
	Subtotal	65	$ 70,401,000	$ 1,083,092	46	$ 56,572,517	$ 1,229,837	14%
Land	Pineapple Hill	2	$ 1,724,800	$ 862,400	4	$ 7,030,000	$ 1,757,500	104%
Land	Kapalua	1	$ 4,794,180	$ 4,794,180	0	$ -		
Land	Plantation Estates	7	$ 11,820,000	$ 1,688,571	3	$ 7,600,000	$ 2,533,333	50%
Land	Pineapple Hill at Kapalua PH 2	3	$ 3,560,000	$ 1,186,667	1	$ 1,300,000	$ 1,300,000	10%
Land	Honolua Ridge				3	$ 5,150,000	$ 1,716,667	
	Subtotal	13	$ 21,898,980	$ 1,684,537	11	$ 21,080,000	$ 1,916,364	14%
Residence	Pineapple Hill	7	$ 16,765,000	$ 2,395,000	8	$ 22,195,000	$ 2,774,375	16%
Residence	Kapalua Place	1	$ 4,470,000	$ 4,470,000	1	$ 8,000,000	$ 8,000,000	79%
Residence	Pineapple Hill at Kapalua PH 2	3	$ 9,280,000	$ 3,093,333	1	$ 4,900,000		
Residence	Plantation Estates				2	$ 15,920,000	$ 7,960,000	
	Subtotal	11	$ 30,515,000	$ 2,774,091	12	$ 51,015,000	$ 4,251,250	53%
Total		**89**	**$ 122,814,980**	$ 1,379,944	**69**	**$ 128,667,517**	**$ 1,864,747**	**35%**
Total		**637**	**$ 645,230,609**	**$ 1,012,921**	**527**	**$ 711,094,374**	**$ 1,349,325**	**33%**
Monthly Average		53	$ 53,769,217		44	$ 59,257,865		

Source: Knowledge Based Consulting Group

Table 4
Summary of Maui Resort Real Estate Sales by Active Project and Resales, 2004 and 2005

		2004 sales			2005 sales			
Land Use	Subdivision	#	$	Average Price	#	$	Average Price	% change
Kaanapali								
Villa	Maui Kai	8	$ 2,853,000	$ 356,625	4	$ 1,991,330	$ 497,833	40%
Villa	Papakea				4	$ 2,227,000	$ 556,750	
Villa	Kaanapali Shores	56	$ 26,484,958	$ 472,946	40	$ 22,763,950	$ 569,099	20%
Villa	Mahana	27	$ 16,974,826	$ 628,697	10	$ 9,258,000	$ 925,800	47%
Villa	Hale Kaanapali	10	$ 3,395,000	$ 339,500	17	$ 8,100,600	$ 476,506	40%
Villa	Kaanapali Plantation	7	$ 3,264,000	$ 466,286	3	$ 2,247,000	$ 749,000	61%
Villa	Masters @ Kaanapali Hillside	29	$ 21,674,300	$ 747,390	24	$ 24,954,100	$ 1,039,754	39%
Villa	Vintage	11	$ 10,860,750	$ 987,341	10	$ 11,295,000	$ 1,129,500	14%
Villa	International Colony Club	7	$ 3,071,000	$ 438,714	8	$ 4,880,400	$ 610,050	39%
Villa	Maui Eldorado	14	$ 4,320,600	$ 308,614	17	$ 8,678,159	$ 510,480	65%
Villa	Kaanapali Alii	11	$ 16,080,000	$ 1,461,818	9	$ 13,755,000	$ 1,528,333	5%
Villa	Kaanapali Royal	11	$ 6,874,000	$ 624,909	9	$ 6,716,000	$ 746,222	19%
Villa	Whaler	27	$ 20,764,500	$ 769,056	20	$ 20,057,915	$ 1,002,896	30%
Villa	Summit	3	$ 4,097,500	$ 1,365,833	3	$ 5,095,000	$ 1,698,333	24%
	Subtotal	221	$ 140,714,434	$ 636,717	178	$ 142,019,454	$ 797,862	25%
Land	Royal Kaanapali Estates	1	$555,000	$ 555,000	0	$ -		
Land	Ke Alii S/D I Ph IIA	3	$1,680,000	$ 560,000	3	$ 3,530,000	$ 1,176,667	110%
Land	Pinnacle at Kaanapali	16	$10,745,000	$ 671,563	2	$ 2,190,000	$ 1,095,000	63%
Land	Kaanapali Hillside	2	$1,100,000	$ 550,000	3	$ 1,920,000	$ 640,000	16%
Land	Kaanapali Golf Estates	2	$1,275,000	$ 637,500	2	$ 1,435,000	$ 717,500	13%
Land	Ke Alii S/D I	2	$1,375,000	$ 687,500	6	$ 5,857,000		
	Subtotal	26	$ 16,730,000	$ 643,462	16	$ 14,932,000	$ 933,250	45%
Residence	Ke Alii S/D III				1	$ 3,523,328	$ 3,523,328	
Residence	Kaanapali Vista	1	$ 825,000	$ 825,000	3	$ 3,592,000	$ 1,197,333	45%
Residence	Kaanapali Hillside	16	$ 17,862,500	$ 1,116,406	13	$ 21,893,000	$ 1,684,077	51%
Residence	Kaanapali Golf Estates	7	$ 10,297,000	$ 1,471,000	5	$ 10,550,000	$ 2,110,000	43%
Residence	Ke Alii S/D I	3	$ 4,051,491	$ 1,350,497	4	$ 8,930,000	$ 2,232,500	65%
Residence	Royal Kaanapali Estates				1	$ 2,300,000	$ 2,300,000	
	Subtotal	27	$ 33,035,991	$ 1,223,555	27	$ 50,788,328	$ 1,881,049	54%
Total		**274**	**$ 190,480,425**	**$ 695,184**	**221**	**$ 207,739,782**	**$ 939,999**	**35%**

Table 6
Molokai Sales History

	2006 (2 months)		2005		2004		2003		2002		2001		2000		% Change (00 to 05)	
	Sales	Sales Volume	Sales	Sales Volume	Sales	Sales Volume	Sales	Sales Volume	Sales	Sales Volume	Sales	Sales Volume	Sales	Sales Volume	Sales	Sales Volume
Condos																
Paniolo Hale	3	$ 1,380,000	3	$ 1,200,000	9	$ 2,725,000	6	$ 1,010,000	6	$ 1,499,551	3	$ 440,000	6	$ 1,636,500		
Ke Nani Kai	6	$ 1,830,200	19	$ 5,710,250	16	$ 3,120,100	13	$ 1,814,250	8	$ 971,500	6	$ 638,500	3	$ 424,500		
West Molokai Resort	1	$ 305,000	10	$ 2,433,500	22	$ 3,703,110	21	$ 2,117,000	8	$ 767,000	5	$ 443,000	22	$ 1,380,000		
Kaluakoi Subtotal	10	$ 3,515,200	32	$ 9,343,750	47	$ 9,548,210	40	$ 4,941,250	22	$ 3,238,051	14	$ 1,521,500	33	$ 3,441,000	-3%	172%
Molokai Shores	2	$ 441,500	5	$ 1,268,000	6	$ 666,000	3	$ 324,000	2	$ 233,000	4	$ 389,900	5	$ 435,000		
Hotel Molokai			2	$ 217,000	6	$ 449,000					1	$ 38,000				
Molokai Beach Cottages	1	$ 180,000	3	$ 540,000									1	$ 83,000		
Kilohana Kai Subdivision			5	$ 975,000	5	$ 615,000	2	$ 280,000	1	$ 140,000	4	$ 542,000	1	$ 140,000		
Wavecrest I	4	$ 1,242,000	22	$ 5,643,000	24	$ 4,229,705	19	$ 1,807,400	12	$ 1,068,500	3	$ 227,000	4	$ 383,000		
Total	17	$ 5,378,700	69	$ 17,986,750	88	$15,507,915	64	$ 7,352,650	37	$ 4,679,551	26	$ 2,718,400	44	$ 4,482,000	57%	301%
Lots																
Kaluakoi	6	$ 3,218,000	25	$ 12,586,500	65	$19,086,919	33	$ 10,425,870	2	$ 630,000	10	$ 3,125,000	11	$ 2,809,000	127%	348%
Other	8	$ 1,715,500	81	$ 14,771,014	147	$17,401,939	57	$ 7,207,120	21	$ 2,479,800	11	$ 1,401,000	9	$ 905,000	800%	1532%
Total	14	$ 4,933,500	106	$ 27,357,514	212	$36,488,858	90	$ 17,632,990	23	$ 3,109,800	21	$ 4,526,000	20	$ 3,714,000	430%	637%
Residences																
Kaluakoi	0	$ -	8	$ 12,224,600	5	$ 4,688,000	5	$ 5,808,500	0	$ -	4	$ 2,394,500	3	$ 1,200,000	167%	919%
Others	7	$ 2,122,000	69	$ 25,616,340	77	$23,102,373	54	$ 11,685,230	46	$ 7,596,450	45	$ 5,787,300	32	$ 6,057,000	116%	323%
Total	7	$ 2,122,000	77	$ 37,840,940	82	$27,790,373	59	$ 17,493,730	46	$ 7,596,450	49	$ 8,181,800	35	$ 7,257,000	120%	421%
Total	38	$ 12,434,200	252	$ 83,185,204	382	$79,787,146	213	$ 42,479,370	106	$ 15,385,801	96	$15,426,200	99	$ 15,453,000	155%	438%

Table 5
Comparison of West Maui Resort Community Real Estate Sales, 2005 to 2004

	2005				2004				Price Changes		Average Size (SF)		
Resort	Number of Sales	Total Sales	Average Sales Price	$/SF	Number of Sales	Total Sales	Average Sales Price	$/SF	Average Price	$/ SF	2005	2004	% Change
Condos													
Wailea	131	$148,864,575	$1,136,371	$945	144	147,226,414	$ 1,022,406	$ 820	11%	15%	1,202	1,247	-3.6%
Kaanapali	178	$142,019,454	$797,862	$756	221	140,714,434	$ 636,717	$ 610	25%	24%	1,055	1,043	1.1%
Kapalua	46	$56,572,517	$1,229,837	$959	65	70,401,000	$ 1,083,092	$ 784	14%	22%	1,283	1,382	-7.2%
Total	355	$347,456,546	$978,751	$ 859	430	$358,341,848	$ 833,353	$ 717	17%	20%	1,139	1,162	-2.0%
Lots													
Wailea	28	$ 52,255,500	$1,866,268	$61	48	62,847,990	$ 1,309,333	$ 46	43%	34%	30,379	28,612	6.2%
Kaanapali	16	$ 14,932,000	$933,250	$61	26	16,730,000	$ 643,462	$ 38	45%	61%	15,385	17,124	-10.2%
Kapalua	11	$ 21,080,000	$1,916,364	$14	13	21,898,980	$ 1,684,537	$ 23	14%	-37%	133,634	74,366	79.7%
Total	55	$88,267,500	$1,604,864	$34	87	$101,476,970	$ 1,166,402	$ 36	38%	-6%	46,668	32,016	45.8%
Residences													
Wailea	78	$173,567,000	$2,225,218	$ 741	82	121,860,800	$ 1,486,107	$ 526	50%	41%	3,001	2,827	6.2%
Kaanapali	27	$ 50,788,328	$1,881,049	$ 589	27	33,035,991	$ 1,223,555	$ 399	54%	48%	3,194	3,066	4.2%
Kapalua	12	$ 51,015,000	$4,251,250	$ 837	11	30,515,000	$ 2,774,091	$ 712	53%	18%	5,080	3,896	30.4%
Total	117	$275,370,328	$2,353,593	$ 722	120	$185,411,791	$ 1,545,098	$ 519	52%	39%	3,259	2,979	9.4%
All Real Estate													
Wailea	237	$374,687,075	$1,580,958		274	$331,935,204	$ 1,211,442		31%				
Kaanapali	221	$207,739,782	$939,999		274	$190,480,425	$ 695,184		35%				
Kapalua	69	$128,667,517	$1,864,747		89	$122,814,980	$ 1,379,944		35%				
	527	$711,094,374	$1,349,325		637	$645,230,609	$ 1,012,921		33%				

Source: KBCG

Table 8
Origin of Property Owners at Kaluakoi, Molokai

Zip Code Range		States	Localities	Lot or Residence		Condominium		Total	
0	10000	MA to NJ		7	3.1%	8	2.7%	15	2.9%
10000	20000	NY to DE		3	1.3%	4	1.3%	7	1.3%
20000	30000	DC to SC		6	2.7%	3	1.0%	9	1.7%
30000	40000	GA to MS		5	2.2%	3	1.0%	8	1.5%
40000	50000	KY to MI		5	2.2%	9	3.0%	14	2.7%
50000	60000	IA to MN		0	0.0%	7	2.3%	7	1.3%
60000	70000	IL to Ne		2	0.9%	7	2.3%	9	1.7%
70000	80000	LA to TX		2	0.9%	3	1.0%	5	1.0%
80000	90000	CO to NV		15	6.7%	29	9.7%	44	8.4%
90000	91000	CA	Los Angeles, Long Beach	13	5.8%	9	3.0%	22	4.2%
91000	92000	CA	Pasadena, Glendale, Ontario	7	3.1%	10	3.3%	17	3.2%
92000	93000	CA	San Diego, Orange County	24	10.7%	24	8.0%	48	9.2%
93000	94000	CA	Ventura, Fresno, Monterey	10	4.4%	16	5.4%	26	5.0%
94000	95000	CA	San Francisco, Palo Alto, Marin	23	10.2%	23	7.7%	46	8.8%
95000	96000	CA	San Jose, Santa Cruz, Sacramento	9	4.0%	26	8.7%	35	6.7%
96000	96200	CA	Redding, Eureka, Lake Tahoe	0	0.0%	1	0.3%	1	0.2%
96700	96900	HI							
		Molokai		31	13.8%	21	7.0%	52	9.9%
		Maui		15	6.7%	2	0.7%	17	3.2%
		Oahu		15	6.7%	24	8.0%	39	7.4%
		Kauai		4	1.8%	1	0.3%	5	1.0%
		Hawaii		1	0.4%	1	0.3%	2	0.4%
97000	98000	OR		9	4.0%	15	5.0%	24	4.6%
98000	99500	WA		9	4.0%	28	9.4%	37	7.1%
99500	99999	AK		9	4.0%	8	2.7%	17	3.2%
90000	99999			0	0.0%		0.0%	0	0.0%
		Canada		1	0.4%	15	5.0%	16	3.1%
		Japan		0	0.0%	1	0.3%	1	0.2%
		Other Foreign		0	0.0%	1	0.3%	1	0.2%
Total				225	100.0%	299	100.0%	524	100.0%
	California Total			86	38.2%	109	36.5%	195	37.2%
	Hawaii Total			66	29.3%	49	16.4%	115	21.9%

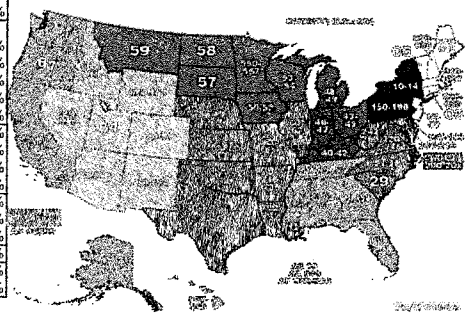


Table 7
Molokai Real Estate Pricing History

	2006 (2 months)		2005		2004		2003		2002		2001		2000		% Change (00 to 05)	
	Average Price	Price/ SF	Average Price	Price/ SF	Average Price	Price/ SF	Average Price	Price/ SF	Average Price	Price/ SF	Average Price	Price/ SF	Average Price	Price/ SF	Average Price	Price/ SF
Condos																
Paniolo Hale	$ 460,000	$ 697	$ 400,000	$ 403	$ 302,778	$ 261	$ 168,333	$ 203	$ 249,925	$ 235	$ 146,667	$ 132	$ 204,563	$ 173		
Ke Nani Kai	$ 305,033	$ 389	$ 300,539	$ 349	$ 195,006	$ 227	$ 139,558	$ 175	$ 121,438	$ 135	$ 106,417	$ 126	$ 141,500	$ 147		
West Molokai Resort	$ 305,000	$ 807	$ 243,350	$ 585	$ 168,323	$ 432	$ 100,810	$ 267	$ 95,875	$ 220	$ 88,600	$ 208	$ 62,727	$ 145		
Subtotal Kaluakoi	$ 351,520	$ 498	$ 291,992	$ 397	$ 203,153	$ 292	$ 123,531	$ 212	$ 147,184	$ 189	$ 108,679	$ 144	$ 104,273	$ 157	180%	153%
Molokai Shores	$ 220,750	$ 393	$ 253,600	$ 415	$ 111,000	$ 198	$ 108,000	$ 192	$ 116,500	$ 175	$ 97,475	$ 159	$ 87,000	$ 155		
Hotel Molokai			$ 108,500	$ 337	$ 74,833	$ 144					$ 38,000	$ 93				
Molokai Beach Cottages	$ 180,000	$ 222	$ 180,000	$ 222									$ 83,000	$ 102		
Kilohana Kai Subdivision			$ 195,000	$ 226	$ 123,000	$ 142	$ 140,000	$ 142	$ 140,000	$ 162	$ 135,500	$ 144	$ 140,000	$ 162		
Wavecrest I	$ 310,500	$ 514	$ 256,500	$ 418	$ 176,238	$ 292	$ 95,126	$ 152	$ 89,042	$ 135	$ 75,667	$ 125	$ 95,750	$ 125		
Total	$ 316,394	$ 471	$ 260,678	$ 379	$ 176,226	$ 267	$ 114,886	$ 189	$ 126,474	$ 172	$ 104,554	$ 143	$ 101,864	$ 152	156%	149%
Lots																
Kaluakoi	$ 536,333	$0.66	$ 503,460	$ 1.12	$ 293,645	$ 0.68	$ 315,935	$ 0.83	$ 315,000	$ 1.21	$ 312,500	$0.93	$ 255,364	$ 0.55	97%	103%
Other	$ 214,438	$7.81	$ 182,358	$ 2.04	$ 118,381	$ 1.33	$ 126,441	$ 1.38	$ 118,086	$ 1.46	$ 127,364	$2.11	$ 100,556	$ 1.70	81%	20%
Total	$ 352,393	$0.97	$ 258,090	$ 1.48	$ 172,117	$ 0.89	$ 195,922	$ 0.99	$ 135,209	$ 1.40	$ 215,524	$1.13	$ 185,700	$ 0.66	39%	124%
Residences																
Kaluakoi			$ 1,528,075	$ 587	$ 937,600	$ 635	$ 1,161,700	$ 433			$ 598,625	$ 190	$ 400,000	$ 130	282%	350%
Others	$ 303,143	$ 213	$ 371,251	$ 264	$ 300,031	$ 201	$ 216,393	$ 167	$ 165,140	$ 109	$ 128,607	$ 102	$ 189,281	$ 147	96%	80%
Total	$ 303,143	$ 213	$ 491,441	$ 322	$ 338,907	$ 227	$ 296,504	$ 210	$ 165,140	$ 109	$ 166,976	$ 118	$ 207,343	$ 144	137%	124%

SECTION III

MARKET SUPPORTABLE REAL ESTATE PRODUCTS AT LA'AU POINT

The market research for La'au Point Lots and Residences indicates that there is a sufficient market that has the income, net worth, and product interest to qualify for a lot at La'au Point. The challenge for Molokai Properties Limited is to create a real estate product that appeals to this market and an operations and amenity program that delivers buyer satisfaction. A highly targeted database marketing and image program will also be critical components for project success. KBCG's market research recommends that the development program should follow some basic product criteria and strategies. These criteria include:

DEVELOPMENT FEATURES

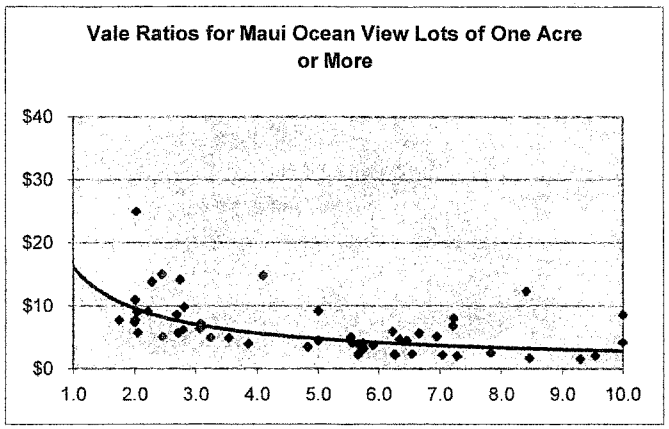
- Oceanfront Premiums. The scarcity and premiums for ocean front, and particularly beach front, property are substantial and these opportunities are reflected in the site plan.
- Privacy. There should be concern for owner privacy and exclusivity reflected throughout the project. This is particularly important with respect to sight lines from and toward the building envelopes/ residences.
- Residential Activity. Since La'au Point will not have any built product, it will be important to demonstrate some momentum for community development through incentives for early home building to spec builders and others. It would also be advisable to have an assistance program to guide/ manage the approval and construction process for individual lot buyers who are trying to build a home.
- Protected ocean views from second row and inland units. This commitment must be easily communicated to the market.
- Attractive landscaping. Special landscaping treatments using native plants should differentiate La'au Point from Kaluakoi, particularly at the entrance to La'au Point residential areas and at focal points of owner activity.
- Project character. The project should make a special effort to appreciate and incorporate Hawaiian culture, graciousness and service. This is an inherent strength of the people of the island of Molokai and one in which they should be extremely proud. This pride and graciousness should continue to be expressed in the nature and quality of improvements, sensitivity to the land, and other appropriate ways

Pricing Considerations

Prices for oceanfront and unobstructed ocean view lots, condominiums, and residences are at a premium throughout the Hawaiian Islands. As seen in the following price comparison for lots of between 1 acre and 10 acres, the price per square foot begins to accelerate as lot sizes reach two acres or less.

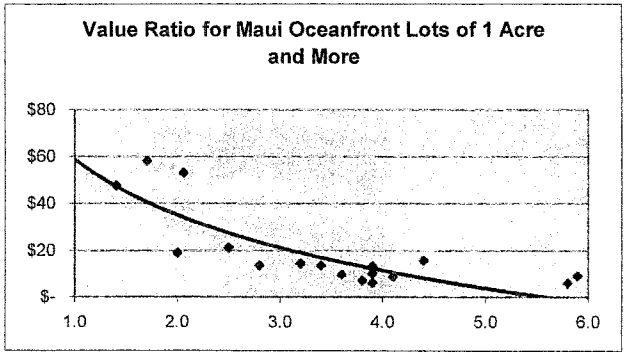
Ocean View Lots

Two acre lots with good ocean views have value ratios between $5 per square foot and $25 per square foot depending upon location. The average is $10 per square foot



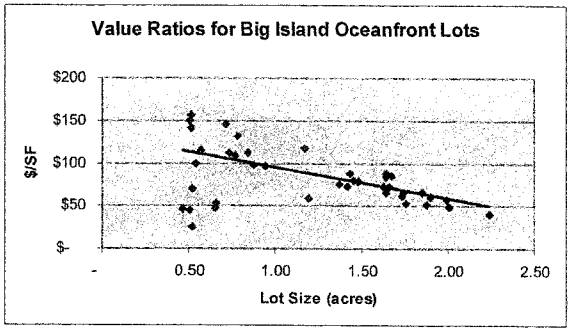
Ocean Front Lots

The value ratio for Ocean Front lots also begins to increase at the two acre size mark (indicating that there is relatively little value in a larger lot sales product for this market). The average value ratio for a two acre ocean front lot is around $37 per square foot. Hence the proposed 2-acre lot program for La'au Point is both cost efficient and market efficient when compared to a larger lot program.



Big Island Comparison

The Big Island has a more active oceanfront lot market and the below chart shows a relatively linear relationship between lot size and value ratio. On the Big Island, 2 acre ocean front lots in the master planned resorts achieve prices in the $4 million range.



Beachfront lots such as those recently sold at Black Sand Beach and Pauoa Beach at Mauna Lani and at Kukio range from $6 million to about $20 million.

Local Conditions

The sales prices and absorption rates for oceanfront and ocean view property at La'au Point will also be influenced by the sales experience and inventory available at Kaluakoi. The recent sales history for lots and residences at Kaluakoi is presented in Appendix D. Currently, ocean view lots are selling at prices of around $400,000 to $500,000 for 5 acres and $600,000 to $700,000 for 20 acres, with view quality being the principal variable. As discussed in Section II, prices have accelerated rapidly in recent years.

There have been relatively few ocean front property sales at Kaluakoi, so we analyzed both raw land sales and residence sales to estimate residual land value. For the 5 acre oceanfront parcels, lot prices are in the $1.25 million range, while the residual value approach yields land values of $800,000 to $2.1 million (3 sales).

Competitive Environment

In terms of future competition, there are a number of projects on the Big Island that are targeted at the luxury market, and there may be some oversupply of ocean view properties in the near term. On the other hand there is very little upcoming inventory of first row beachfront or beach access property. Kukio is just starting sales of its Lot 4 program north of Kona Village, with initial sales at occurring at around $6.5 million. The Kohanaiki project just south of the airport will have some 40 front row lots, but they are set well back from the ocean. Nevertheless, the developer plans to put these on the market in the $4 to $6 million range. On Maui, there are a few new lot developments selling at Kapalua, Kaanapali, and Wailea but they are generally golf and ocean view products mauka of the highway. The only ocean front products currently available are high density condominium and fractional ownership products that are not really competitive with La'au Point. The Royal Lahaina is currently going through the approval process for a more low density condominium product in association with its renovation program. Whereas these will be very attractive units, there will be relatively few and at substantial prices.

Market Pricing and Absorption for La'au Point

Considering the strength of underlying demand for oceanfront and quality ocean view property on Hawaii, lot prices should remain at a premium due to limited supply. Whereas Molokai has traditionally lagged the other islands in terms of real estate development and tourism activity, it is becoming better known and recognized as a low density and uncrowded alternative to the resort islands. It is also not trying to capture the ultra premium market that is targeted by the Kohala Coast of the Big Island, the West Maui resorts, and Lanai. Under these conditions, we expect that there will be a significant tradeoff between pricing and absorption rates at La'au Point. An accelerated absorption rate can be achieved through holding prices at a benchmark substantially below the other islands. The greatest value can be achieved by spreading out the development period to capture the premiums associated with the increasing scarcity of oceanfront and prime oceanview real estate in Hawaii. The basic price structure for the La'au Point lot program is shown below. The west facing properties have higher base prices due to their sunset views and proximity to the resort amenities of Kaluakoi.

Market Driven Pricing Structure for La'au Point Home Sites

Unit Type	Number	Premium	Unit Price	Lot Size	$/SF	Sales Value
West/ Sunset Facing						
A Oceanfront	40	250%	$ 1,750,000	87,120	$ 20.09	$ 70,000,000
C Premium Ocean View	28	25%	$ 500,000	87,120	$ 5.74	$ 14,000,000
South Facing						
B Oceanfront	58	225%	$ 1,495,000	87,120	$ 17.16	$ 86,710,000
D Premium Ocean View	74	15%	$ 460,000	87,120	$ 5.28	$ 34,040,000
Total	200		$ 1,023,750	17,424,000	$ 11.75	$ 204,750,000

With this pricing program the project could achieve an absorption rate of around 40 units per year, yielding a total sales value of $205 million, before appreciation and inflation.

Appendix L

Hallstrom Letter

THE HALLSTROM GROUP INC.
REAL ESTATE
CONSULTANTS
& APPRAISERS

IMPACT OF LA'AU POINT DEVELOPMENT ON REAL PROPERTY TAXES

We have been asked to comment on the potential increases to real property tax on existing property in the areas of Maunaloa, Kualapu'u, Kaunakakai and beyond on Molokai as a result of the development of La'au Point, a 200 one-acre high-end lot development on the extreme southwest end of the island. Specifically, "Will the sale of the proposed estate lots cause real property taxes to increase in these areas?"

The question is a valid one. The simple answer is that the assessments of existing property that is not adjacent (and thus not competing in the same market or market area), and/or that has different highest and best use potentials, will not be directly affected.

This finding is based on our analyses of paired assessment trends over time between expanding developments and non-adjacent land holdings, an understanding of value trends and influences, and discussion with the Maui County and Oahu tax offices concerning this specific matter. Of particular note has been the historic lack of 'cause and effect' between changes in market prices in Kaluakoi and assessed values elsewhere on the island.

Although not the case with La'au Point, significant market activity on property that has similar use potentials on adjacent lands may cause a change in market value and hence assessment -- but, this is for similar kinds of property, such as lots in the same subdivision or agricultural parcels that have near identical characteristics, where potential purchasers would consider them as alternatives.

The fact is the La'au Point lots are physically separated from the rest of Molokai by hundreds of acres of ranch land, and will be a unique market unto itself. Secondary impacts, if any, might only be potentially possible among the makai portions of the Kaluakoi Ranch lots; however even this inventory already has an established dataset of its own comparable market activity. The creation of the proposed 26,400 acre Land Trust, and another 24,000 acres in either protective or agricultural easements, isolates and distinguishes La'au Point from the rest of urban Molokai.

Changes in assessments are the result of *comparable* market transactions, fueled by new economic activity or a scarce amenity. La'au Point is not a comparable to the existing real estate.

Only to the extent there is new worker in-migration to the island to support or sustain the development and its residents, could there be some modest indirect impact on selected real estate activity and prices. Offsetting, is the moratorium on further Molokai Ranch Land development as a result of the Land Trust, and protective and agricultural easements, which will reinforce the status quo and limit further development.

ARBITRATION
VALUATION AND
MARKET STUDIES

PAUAHI TOWER
SUITE 1130
1001 BISHOP STREET
HONOLULU
HAWAII 96813

(808) 526-0444
FAX (808) 533-0347
email@hallstromgroup.com
www.hallstromgroup.com

James E. Hallstrom, Jr., MAI, CRE
Dated: November 14, 2006

Appendix M

Social Impact Assessment

Lā'au Point

Social Impact Assessment

Prepared for Molokai Properties, Ltd.
By Earthplan
August 2006

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1. Background and Introduction

Molokai Properties Ltd., also known as Molokai Ranch, has prepared the Community Based Master Land Use Plan, herein referred to as the Plan, for its land holdings in Moloka'i, Hawaii. The Plan area encompasses over 60,000 acres. Prepared in conjunction with the Moloka'i community, the plan includes various actions, including transferal of land to a new Land Trust and renovation of an existing hotel.

To implement a portion of the Plan, amendments to the State Land Use Map are required for proposed actions at Lā'au Point, herein referred to as the Project. An Environmental Impact Statement, or EIS, is being prepared for uses requiring these amendments. This report is summarized in and appended to the EIS that accompanies the State Land Use Boundary petition.

The proposed Project is an integral part of a Community-Based Master Plan, which is described in this report. The relationship between the Project and the Plan is symbiotic in that realization of the Plan requires Project implementation. Further, the Project's scope and characteristics were based on the overall Plan and its conditions.

This report therefore incorporates discussion and analysis of the Plan as appropriate to analyzing the social impacts of the Project.

1.1. Report Preparation and Description

This social impact assessment was prepared by Earthplan, whose principal Berna Cabacungan managed the project and served as primary interviewer, researcher, analyst and writer. Independent contractor Michael P. Mays assisted in interviews and research related to community issues, public services and facilities and projects with similar characteristics. Nalani Dahl of Community Planning and Engineering assisted with interviews and research related to census information and major forces independent of the proposed action.

The remaining portions of Section 1 present the role and purpose of social impact assessments and describe the Plan and proposed changes that require amendments to the State Land Use Map.

Section 2 establishes social context with a historic overview, population and housing trends, and demographic information. Section 3 extends the baseline information by examining the major forces for change that would influence Moloka'i with or without the Plan or proposed changes.

Section 4 presents preliminary community issues based on interviews held in the course of this study. Section 5 identifies potential social impacts in terms of population impacts, relationship to public and community plans, impacts on the social environment, and impacts on public services and facilities.

1.2. The Role and Purpose of Social Impact Assessments

Social impact assessment is a study of how a proposed action or plan affects the human environment. While there are many facets to the human environment, the social context is basically framed by relationships. The social aspects of an area relate to people living and interacting with other people. Social impact analysis explores changes in the physical environment of a community or neighborhood caused by a proposed land development may affect the neighborhood as a social environment. [1]

Social impact assessment, hereafter referred to as SIA, became a recognized subfield of research and policy application, with the passage of the U.S. National Environmental Policy Act (NEPA) legislation in 1969. [2] It is an interdisciplinary, inter-professional field of social science knowledge and application. SIA draws sometimes from social science, but other times from organizational development, political analysis, or journalism. Its primary function has to do with the development and disclosure of social information relevant to informing the decision-making process and/or designing management actions to deal with problematic social outcomes of a proposed project.

The goal of SIA is to predict the social effects of a policy, program or project while still in the planning stage, before those effects have occurred. The overall framework for SIA is anticipatory research, which seeks to place the expectation and attainment of desired outcomes on a rational and reliable basis.

Commonly identified uses of SIA include:

[1] *Kathleen Christiansen,* ***Social Impacts of Land Development: An Initial Approach to Estimating Impacts on Neighborhood Usages and Perceptions*** *(1976)*

[2] *Rabel Burdge and Frank Vanclay, "Social Impact Assessment,"* ***Environmental and Social Impact Assessment,*** *ed. Frank Vanclay and Daniel A. Bronstein (1996), 34.*

Understanding the ability of a community or group to adapt to changing conditions - In identifying social consequences of a proposed action, cause- and-effect relationships are complex. Different people and different communities react differently to similar events. An important function of SIAs is therefore to obtain and analyze the necessary information about community organization and likely responses to changing conditions. As such, the non-project social scenario is as important as the with-project scenario because it provides the analyst with a realistic social context for the proposed action.

Defining the problems or clarifying the issues involved in a proposed change Frequently, opposition to or support for a proposed project can only be understood and addressed when the proponent is aware of cultural tendencies, underlying issues, vested interests, and misperceptions. The SIA is the basis for defining and clarifying project or program issues in a systematic approach within the EIS framework.

Illuminating the meaning and importance of anticipated change - An important objective of SIA is to determine what meaning a probable impact would have for a community and its residents. Whereas a certain impact may have relatively low social significance in some communities, it may be given more import or significance in other settings or communities.

Identifying mitigation opportunities or requirements - Another function of SIA is to explore how a proposed action can cause the least adverse and most beneficial impacts, and to identify responses from the community and affected persons. SIA information can be crucial in determining what mitigation is necessary, what mitigation alternatives exist, and which mitigation strategies are most likely to work.

1.3. Description of the Plan and the Project

1.3.1. The Community-Based Master Land Use Plan

As noted earlier, social impact assessment is a study of relationships. In that the proposed Project is an integral part of a Community-Based Master Plan, an overview of the Plan is hereby presented.

Molokai Ranch owns over 60,000 acres or about 35 percent of the island of Moloka'i. Most of its property is located at the west end of the island. Molokai Ranch worked with the Moloka'i community to develop a plan that designates future uses for all of its land holdings. Highlights of the Plan are as follows:

Protection of land holdings and resources from future development

The Plan protects 55,000 acres, or 85 percent of Molokai Ranch's land holdings, from development in perpetuity through Land Trust donations and Protective Easement restrictions.

Formation of Moloka'i Land Trust

A key component in the protection from future development is the formation of the Moloka'i Land Trust. Molokai Ranch would donate 26,200 acres, or 40 percent of its land holdings, to the Land Trust. The Land Trust's ownership and management of these lands will:

- Protect historic and cultural sites;
- Preserve natural and environmental resources; and
- Protect subsistence gathering

The land donation includes two hotel-zoned sites at Kaluako'i and several culturally significant sites. Of the total land gift, 14,390 acres would be protected in perpetuity for agricultural use and 10,560 acres agriculturally zoned lands would be protected as Open Space, thereby prohibiting structural development.

Part of the land donation includes the site of existing communications facilities that operate under a rental agreement with Molokai Ranch. The income generated by these rentals, which currently total more than $250,000 per annum with a capitalized value exceeding $2.5 million, will support the Land Trust in its administrative costs.

Formation of Moloka'i Community Development Corporation

The Plan calls for the formation of the Moloka'i Community Development Corporation, hereafter referred to as CDC, to develop affordable housing, expand educational opportunities and assist Land Trust with project funding,

To help the CDC initiate its operations, Molokai Ranch would provide a 1,300 acre land base for future development of affordable housing. This land base includes:

- Conveyance of 1,100 acres above Kaunakakai, some of which could be used for affordable housing, and
- Reservation of 200 acres around Kualapu'u and Maunaloa for future development of affordable housing in partnership with Molokai Ranch.

In addition, Molokai Ranch would gift several resources to the CDC that would support community development, including:

- 5 acres in Kaunakakai zoned light industrial and available for development in 2011
- 3.2 acres adjacent to Maui Community College (MCC) that will be sold to MCC at market value
- $100,000 from a sale of five acres to Maui County for a new Kaunakakai Fire Station

Renovation of Kaluako'i Hotel and upgrade of the golf course

In discussions related to the formation of the Plan, community participants expressed a strong desire to reopen Kaluako'i Hotel and upgrade the Kaluako'i Golf Course. The Plan therefore includes this component.

1.3.2. Proposed Changes at Lā'au Point

The Lā'au Point Project site is part of a 6,348-acre identified as Tax Map Key (2)5-1-02, parcel 30. Previously used for agricultural and ranch operations, the land is currently vacant. The Project site is relatively dry, supporting mostly kiawe forest and shrub vegetative zones.

The Project site encompasses almost 1,500 acres, as shown in Table 1.

Table 1: Proposed Lā'au Point Project Land Use

Land Use	Acreage
200 Rural Residential House lots	400
Conservation and preservation	433
Rural open space	145
Parks	17
Agricultural land	301
On-site roadways and infrastructure	60
Off-site road corridor	136
Total	1,492

Of the total Project site, required amendments to the State Land Use Map are presented in Table 2.

Table 2: Acreage in State Land Use Commission Petition

Proposed Use	Acreage	Existing Designation	Proposed Designation
200 Rural Residential House lots	400	Agriculture	Rural
Rural open space	145	Agriculture	Rural
Parks	8	Agriculture	Rural
On-site roadways and infrastructure	60	Agriculture	Rural
Conservation and preservation	253	Agriculture	Conservation
County park *	9	Conservation	Rural
Total acreage in petition to the State Land Use Commission			**875 acres**

** Land will revert to Conservation District after all project improvements are completed.*

The Project features the sale of 200 rural residential lots ranging from 1.5 to two acres. The proposed access road corridor will run north to south from Pōhakuloa Road to Kaupoa Beach Camp Road, connecting with Kaluako'i Road and Kulawai Loop. An open space buffer will surround the residential lots.

The Project conservation land will include existing such designated lands and proposed lands for re-designation. It would include coastline, gulches and cultural preserves. Lot lines will be at least 50 feet mauka of current Conservation District boundary. The makai boundary for the community will be determined by current Conservation District or SMA boundary, whichever is greater.

The Moloka'i Land Trust will have ownership of all Conservation District land, including those within the Project site. It would solely own and manage the 116-acre Kamāka'ipō Gulch, and jointly own and manage the 335 acres of Conservation District land in the Project site with the Lā'au Point community homeowners association. The homeowners association will own and manage 280 acres of Agricultural District land in the Project site. This land contains common areas between lot clusters and the mauka buffer zone.

The Project is intended to reduce significant operations deficits that have been borne by Molokai Ranch since the company has acquired the property. Because of this projection of financial viability, Molokai Ranch would then be in a position to proceed with commitments to on-site resource protection and land and other donations included in the Plan.

Hence, implementation of the proposed Project would be the springboard, or starting point, in implementing the overall Plan. The Land Trust and CDC would be enabled to undertake their missions that have been outlined by the community and Molokai Ranch.

Also, proceeds generated by Project implementation would fund renovations and upgrading of Kaluako'i Hotel and Golf Course. Proceeds would fund endowment to CDC that would include five percent of the net sales of lots, plus yet-undetermined percentage of subsequent resale.

2. Profile of the Existing Community

This section establishes the social context for this project. Section 2.1 provides a historic overview. Section 2.2 describes the Study Area. In Section 2.3, population and demographic information is presented.

2.1. Historic Overview

At the time of western contact in 1778, Moloka'i's estimated population was 10,500 persons. In 1859, the Hawaiian government combined Moloka'i's Ko'olau and Kona Districts into one district due to a significant population decrease from 6,000 persons in 1832 to 2,864 persons in 1859. It was felt that such consolidation would allow for efficient administration.

Lands that eventually were part of Molokai Ranch were assigned in 1848 as part of the Great Mahele, and title to these lands was subsequently inherited by Bernice Pauahi Bishop, the last descendant of the Kamehameha dynasty. In 1859, Kamehameha IV established a sheep ranch on the west end at Kaluako'i. His brother, High Chief Kapuaiwa who became Kamehameha V, expanded this holding through acquisition of more land and addition of other types of livestock.

Princess Pauahi's inheritance excluded the land of Kaluako'i in west Moloka'i, as these were granted to her husband Charles Bishop in 1875. A group of Honolulu business owners purchased these lands and formed Molokai Ranch in 1897.

Molokai Ranch's principal enterprise was cattle raising, and their lands included 70,000 acres acquired from Bishop interests and 30,000 acres of leased land. American Sugar Company took over those lands in 1898, and leaseholds of large tracts of government land between the ranch lands.

In 1908 Moloka'i was incorporated into the newly formed Maui County. The Kalaupapa Settlement was administratively separated and became Kalawao County. It was to be managed by the State Department of Health. Moloka'i, not including Kalawao County, encompasses 53 ahupua'a. By 1910, the population had significantly declined to 1,006.

Charles Cooke purchased American Sugar Company in 1908 after unsuccessful attempts at cane sugar cultivation due to saline well water. Cooke established Molokai Ranch, and his son George Cooke managed the company.

In the early 1920s, the population increased significantly. By 1930, the number of island residents quadrupled from the 1910 count; approximately 4,400 people lived on Moloka'i. A major influence was passage of the Hawaiian Homes Act in 1921, resulting in the settlement of Kalama'ula, Ho'olehua, Pālā'au and Kapakea.

Agriculture was another major influence in population growth and settlement patterns. Pineapple was raised on Maunaloa lands leased from Molokai Ranch from 1923 to 1976 by Libby, McNeill & Libby Company, which later became Dole Pineapple. California Packing Corporation, or Del Monte, operated a pineapple plantation at Kualapu'u. These activities attracted new residents and also a gradual population shift west from the more populated eastern areas.

In the late 1970s, resort development added to the island's economy when Molokai Ranch and Louisiana Land and Exploration Company formed a partnership to develop the Kaluako'i Resort. Molokai Ranch eventually sold its interest in that venture.

By the 1980s, the plantations closed, leaving the island dependent on diversified agriculture, primarily vegetable farming and cattle ranching.

In 1987, Brierly Investments, Limited, or BIL, became the sole stockholder of Molokai Ranch, whose land holdings comprised 52,000 acres. BIL reacquired 6,300 acres in southwest Moloka'i in 2001. These lands included the abandoned Kaluako'i Hotel, the Kaluako'i Golf Course and undeveloped resort lands.

2.2. Study Area Definition

The Study Area of this social impact assessment is the West Moloka'i region, which is coterminous with Census Tract 318. With Lā'au Point as the starting point and heading northeast, physical landmarks in the Study Area include Kaupoa Beach, Pāpōhaku Beach, Wahīlauhue, 'Īlio Point, Mokio Point, Kaiehu Point, Kawa'aloa Bay, Momomi, Nēnēhānaupō, Pālā'au State Park, Ka Ule o Nānāhoa look out, Mokomoko Gulch, Manawainui Gulch, Paia'au Fishpond, Pākanaka fishpond, Kikauhi coast, Kolo Wharf, Halena, and Hale o Lono Harbor.

Study Area communities include Pāpōhaku Ranch, Kaluako'i, Maunaloa Town, Ho'olehua, Ma'ālehu, Kala'e, and Kualapu'u. Kaluako'i Hotel and Golf Course and Molokai Ranch Lodge and Beach Villas are located in the Study Area, as well as Moloka'i Airport. Figure A illustrates the Study Area for this analysis.

For comparative purposes, information is provided for Moloka'i Island, which includes the Census Tracts 318 and 319, the latter of which is East Moloka'i. East Moloka'i includes the town of Kaunakakai. Census Tract 319, which is Kalaupapa and part of Kalawao County, is not included this analysis. Reportedly 147 persons live in this census tract in 2000, and related population and demographic statistics from this tract are insignificant to this analysis.

Figure A: Study Area for this Report



2.3. Population and Housing Trends

2.3.1. Population Trends

Moloka'i's population increased from 5,089 persons in 1970 to 7,257 persons in 2000, which represents an overall 43 percent increase. As Table 3 indicates, the rate of growth during this 30-year period was highest in the 1970s, when the population increased an average of 1.5 percent a year.

Table 3: Moloka'i Population and Housing Trend, 1970 to 2000

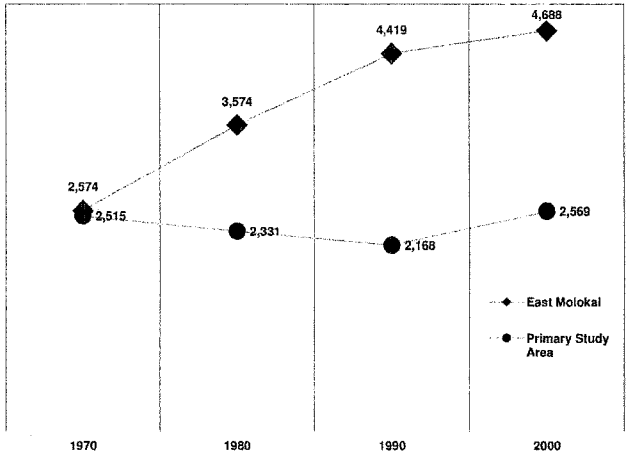
	1970	1980	*1970 - 1980 growth rate*	1990	*1980 - 1990 growth rate*	2000	*1990 - 2000 growth rate*
Population	5,089	5,905	***1.5%***	6,587	***1.1%***	7,257	***1.0%***
Housing	1,449	2,334	***4.9%***	2,731	***1.6%***	3,013	***1.0%***

Source: Census 1990, Summary Tape File 1; Census 2000 Summary Tape File 1; The State of Hawaii Data Book 2000; The State of Hawaii Data Book 1977; The State of Hawaii Data Book 1986; U.S. Bureau of the Census, Census of Housing 1980: General Housing Characteristics Hawaii; and U.S. Bureau of the CensusCensus of Population and Housing 1980: Census Tracts Hawaii, Selected Areas

As Figure B shows, most of Moloka'i's population growth occurred in East Moloka'i in this 30 year period. East Moloka'i's population increased from 2,574 in 1970 to 4,688 in 2000, which represents a significant 82 percent increase. The highest rate of growth occurred in the 1970s, when the East Moloka'i population increased an average of 3.3 percent a year.

In contrast, the Study Area population increased only two percent over 30 years. West Molokai's population decreased from 1970 to 1990 due to plantation closures. Further, the Study Area experienced only a 1.7 annual growth rate in the 1990s. In 2000, the Primary Study Area population of 2,569 persons accounted for 35 percent of Moloka'i's total resident population.

Figure B: Population Trend for Study Area and East Moloka'i, 1970 to 2000



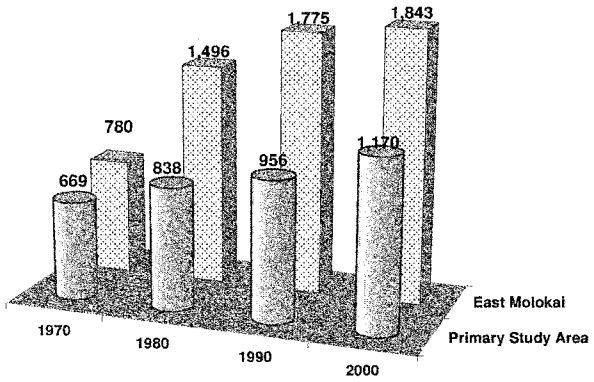
Source: Census 1990, Summary Tape File 1; Census 2000 Summary Tape File 1; The State of Hawaii Data Book 2000; The State of Hawaii Data Book 1977; The State of Hawaii Data Book 1986; U.S. Bureau of the Census, Census of Housing 1980: General Housing Characteristics Hawaii; and U.S. Bureau of the CensusCensus of Population and Housing 1980: Census Tracts Hawaii, Selected Areas

2.3.2. Housing Trends

Between 1970 and 2000, Moloka'i's supply of housing units more than doubled, from 1,449 units in 1970 to 3,013 units in 2000. Most of this increase occurred in the 1970s, when housing units increased an average of 4.5 percent a year.

Further, most of the increase in housing unit supply occurred in East Moloka'i. As Figure C shows, East Moloka'i's housing unit supply increased 136 percent from 780 units in 1970 to 1,843 units in 2000. Most of this increase occurred in the 1970s, when the housing unit supply increased an average of 6.7 percent a year.

Figure C: Housing Trend for Study Area and East Moloka'i, 1970 to 2000



Source: Census 1990, Summary Tape File 1; Census 2000 Summary Tape File 1; The State of Hawaii Data Book 2000; The State of Hawaii Data Book 1977; The State of Hawaii Data Book 1986; U.S. Bureau of the Census, Census of Housing 1980: General Housing Characteristics Hawaii; and U.S. Bureau of the CensusCensus of Population and Housing 1980: Census Tracts Hawaii, Selected Areas

The Study Area's housing unit supply increased 75 percent from 669 units in 1970 to 1,170 units 2000. In 2000, the Study Area's housing supply accounted for 39 percent of the island's housing units.

2.4. Demographics

2.4.1. Age and Ethnicity

Moloka'i's resident population tends to be younger than the State as a whole. In 1990 and 2000, the State's median age was 32.6 years and 36.2 years, respectively. As Table 4 shows, Moloka'i's median age was 30.6 years in 1990 and 34.25 years in 2000.

Table 4: Study Area Age and Ethnicity, 1990 and 2000

	1990				2000			
	State of Hawaii	Molokai	Primary Study Area CT 318	East Molokai CT 317	State of Hawaii	Molokai	Primary Study Area CT 318	East Molokai CT 317
Population								
Resident Population	1,108,229	6,587	2,168	4,419	1,211,537	7,257	2,569	4,688
Age								
Under 5 years	7.5%	10.4%	9.6%	10.8%	6.5%	7.4%	7.9%	7.1%
5 to 17 years	20.5%	27.5%	28.5%	27.0%	20.6%	25.5%	26.5%	24.9%
18 to 44 years	42.4%	31.8%	31.6%	31.9%	36.8%	30.9%	31.8%	30.5%
45 to 64 years	18.3%	18.1%	19.3%	17.4%	22.9%	22.7%	21.0%	23.7%
65 or older	11.3%	12.3%	11.0%	12.9%	13.3%	13.5%	12.8%	13.8%
Median Age	32.6 years	30.6 years	30.4 years	30.8 years	36.2 years	34.25 years	32.9 years	35.6 years
Ethnicity								
Caucasian*	33.4%	17.5%	18.4%	17.0%	24.3%	13.8%	12.6%	14.4%
Chinese*	6.2%	1.2%	1.1%	1.3%	4.7%	0.6%	0.5%	0.7%
Filipino*	15.2%	20.6%	20.8%	20.5%	14.1%	12.6%	9.8%	14.1%
Japanese*	22.3%	8.7%	6.2%	10.0%	16.7%	4.4%	3.5%	4.8%
Hawaiian*	12.5%	49.0%	50.7%	48.2%	6.6%	34.1%	39.6%	31.1%
Part Hawaiian**	n/a	n/a	n/a	n/a	13.9%	18.3%	18.0%	18.4%
Other	10.4%	2.9%	2.8%	3.0%	19.8%	16.3%	15.9%	16.5%

** indicates that the 2000 numbers identify those who claim one race only.*

*** indicates that the 2000 numbers identify those who claim two or more races, one of which is Native Hawaiian. The State data includes up to five races, Moloka'i up to three races only.*

**** indicates that the 2000 number identifies those who claim one or more races.*

Source: Census 1990, Summary Tape File 1; Census 2000 Summary Tape File 1; The State of Hawaii Data Book 2000; and The Maui County Data Book 1998

In terms of specific age groups, Moloka'i had a larger minor population (17 years and younger) and a smaller working age population (18 years to 64 years) compared to the State age profile. Moloka'i's minor population accounted for one-third of the total population, compared to the State's 27 percent. Moloka'i's working age population accounted for 54 percent of the total population, compared to the State's 60 percent.

Mirroring the island's aging trend, the Study Area and East Moloka'i experienced higher median ages in 2000, with 32.9 years and 35.6 years, respectively. The Study Area tended to be younger than East Moloka'i, however. Over 34 percent of West Moloka'i was 17 years old or younger, compared to 32 percent in East Molokai. Also, 12.8 percent of West Moloka'i was 65 years and older, which was lower than 13.8 percent in East Moloka'i in the same category.

A detailed analysis of ethnic trends is not possible due to the methodology differences in gathering information between the 1990 and 2000 census taking. In 1990, census respondents were required to select a single ethnic category. In 2000, multi-ethnic respondents were allowed to select the appropriate number of categories. Ethnicity statistics from the two periods are not comparable, and analysis is confined to same year statistics.

In 1990, the largest ethnic categories in the State were Caucasian (33 percent), Japanese (22 percent), and Filipino (15 percent). Hawaiians made of 12.5 percent of the State population. In Moloka'i, Hawaiians accounted for 49 percent of the 1990 population. Filipinos made up the second largest category (21 percent), followed by Caucasians (17 percent). The 1990 ethnic profiles in the Study Area and East Moloka'i are similar in terms of largest ethnic groups.

In 2000, the State's largest ethnic categories continued to be Caucasian (24 percent), Japanese (17 percent) and Filipino (14 percent). Hawaiians and part Hawaiians made up 20 percent of the State population.

Moloka'i's Hawaiian population continued to be the largest group in 2000, making up 52 percent of the total population. Thirty-four percent reported being a single race, and 18 percent reported being part Hawaiian. The Study Area had a higher proportion of Hawaiians (58 percent) than East Moloka'i (50 percent).

In both the Study Area and East Moloka'i, Caucasians made up the second largest ethnic category, at 13 and 14 percent, respectively. The third largest group, Filipinos accounted for ten percent of the Study Area and 14 percent of East Moloka'i.

2.4.2. Housing and Households

In 1990, the housing vacancy rate in Moloka'i was significantly high. As indicated in Table 5, 26 percent of the housing units were vacant, compared to nine percent in the State housing supply.

In terms of types of housing occupancy in 1990, when compared to the State, Moloka'i had proportionally more owner occupied homes. Moloka'i's 1990 median value of owner-occupied units at $100,250 was significantly lower than the State median of $245,300. Moloka'i's median rent was also lower at $279, compared to the State's median rent of $599.

Table 5: Study Area Housing Units and Households, 1990 and 2000

	1990				2000			
	State of Hawaii	Molokai	Primary Study Area CT 318	East Molokai CT 317	State of Hawaii	Molokai	Primary Study Area CT 318	East Molokai CT 317
Housing Units								
Number	388,810	2,731	956	1,775	460,542	3,013	1,170	1,843
Occupied	91.4%	74.2%	64.7%	79.3%	87.6%	76.5%	66.5%	82.9%
By Owner	*53.9%*	*63.0%*	*61.4%*	*63.7%*	*56.5%*	*64.1%*	*67.1%*	*62.6%*
By Renter	*46.1%*	*37.0%*	*38.6%*	*36.3%*	*43.5%*	*35.8%*	*32.4%*	*37.6%*
Vacant	8.6%	25.8%	35.3%	20.7%	12.4%	23.5%	33.5%	17.1%
Median Value of Owner Occupied Units	$245,300	$100,250	$84,600	$115,900	$272,700	$143,150	$131,400	$154,900
Median Value of Renter Occupied Units*	$599	$316	$279	$353	$721	$518	$503	$533
Households								
Number	356,748	2,013	678	1,335	403,572	2,309	779	1,530
Average Size	3.01	3.31	3.50	3.12	2.92	3.18	3.30	3.06
Families	266,439	1,584	571	1,013	289,012	1,760	634	1,126
Average Size	3.48	3.77	3.84	3.69	3.42	3.63	3.67	3.58
Nonfamily/Individual	90,309	429	107	322	114,560	549	145	404

Source: Census 1990, Summary Tape File 1; Census 2000 Summary Tape File 1; The State of Hawaii Data Book 2000; and The Maui County Data Book 1998

In 2000, the State's housing vacancy rate increased to twelve percent, and the housing vacancy rate in Moloka'i continued to be high at 24 percent. The proportion of owner-occupied homes in both the State and Moloka'i increased slightly. Moloka'i's median value of owner-occupied homes was $143,150, which was lower than the State median value of $272,700. The island's median rent of $518 was lower than the State median rent of $721.

The Study Area had a significantly high housing vacancy rate in 2000 at 34 percent, which was almost double East Moloka'i's vacancy rate. Of the Study Area's occupied units, 32 percent were rentals, which is lower than the 38 percent rentals in East Moloka'i.

The median value of owner-occupied homes in the Study Area was $131,400, which was lower than East Moloka'i's median of $154,900.

Moloka'i's households have been and continue to be larger than State averages. In 1990, the State average household size was 3.01 persons, while Moloka'i had an average of 3.31 persons. The Study Area average household size was a high 3.5 persons.

Family sizes were correspondingly high. The 1990 State average family size was 3.48 persons; in Moloka'i, 3.77 persons.

These trends continued in 2000. While the State average household size was 2.92 persons, Molokai's average was 3.18 persons. The Study Area average household size was 3.3 persons. Family sizes in Molokai and the Study Area also significantly exceeded the State average.

2.4.3. Education and Labor Force

Both the State and Moloka'i educational profiles improved from 1990 to 2000. In 1990, 20 percent of those 25 years and older did not graduate from high school, as shown in Table 6. In Moloka'i, 34 percent did not complete high school as of 1990.

By 2000, only 15 percent of the State population 25 years and older did not complete high school, and 56 percent had attended college.

By 2000, the Moloka'i non-graduation rate decreased to 22 percent and the Study Area and East Moloka'i rates decreased as well. Forty percent of the Study Area residents had graduated from high school as of 2000, and another 36 percent attended college. College attendance was higher in East Moloka'i, at 42 percent.

Table 6: Study Area Education and Labor Force, 1990 and 2000

	1990				2000			
	State of Hawaii	Molokai	Primary Study Area CT 318	East Molokai CT 317	State of Hawaii	Molokai	Primary Study Area CT 318	East Molokai CT 317
Persons 25 years and older								
Less than 9th grade education	10.1%	14.7%	16.7%	13.7%	7.2%	9.9%	10.2%	9.7%
High school education, no graduation	9.8%	19.7%	17.3%	20.8%	8.2%	12.0%	14.0%	11.0%
High school education, includes equivalency	28.7%	32.1%	32.9%	31.7%	28.5%	38.0%	40.0%	37.0%
Some college, no degree	20.1%	14.3%	14.4%	14.3%	21.8%	20.4%	18.7%	21.4%
College degree, Associates	8.3%	6.8%	9.5%	5.5%	8.1%	5.9%	6.2%	5.7%
College degree, Bachelors	15.8%	8.7%	7.0%	9.4%	17.8%	9.5%	6.7%	10.9%
College degree with masters, graduate or professional degree	7.1%	3.7%	2.2%	4.5%	8.4%	4.3%	4.2%	4.4%
Persons 16 years and older								
Civilian Labor Force	61.8%	60.6%	64.6%	58.6%	56.6%	50.8%	49.1%	51.7%
Armed Forces	6.3%	0.0%	0.0%	0.0%	4.1%	0.0%	0.0%	0.1%
Not in Labor Force *	29.6%	35.7%	32.1%	37.6%	35.5%	42.6%	44.6%	41.6%
Unemployed **	2.3%	3.6%	3.3%	3.8%	3.8%	6.5%	6.3%	6.6%
Occupations - Civilian Labor Force								
Management and professional	26.4%	23.0%	19.8%	24.8%	32.2%	28.5%	27.9%	28.8%
Service	17.6%	25.0%	26.8%	24.0%	20.9%	27.8%	26.0%	28.7%
Sales & Office	32.6%	21.8%	17.5%	24.3%	28.1%	18.3%	19.0%	17.9%
Farming, fishing and forestry	2.9%	11.4%	15.4%	9.2%	1.3%	7.6%	7.6%	7.6%
Production, transportation and material moving	10.5%	6.7%	7.5%	6.2%	8.9%	8.7%	10.1%	8.1%
Construction, extraction, and maintenance	10.0%	12.1%	13.1%	11.5%	8.6%	9.1%	9.4%	9.0%

** Not in Labor Force includes all people 16 years old and over who are not classified as members of the labor force. Consisting mainly of students, housewives, retired workers, people not looking for work, etc.*

*** Unemployed includes all civilians 16 years old or over who are neither "at work" nor "with a job but not at work" during the reference week, and who were looking for work during the last 4 weeks, and were available to start a job.*

For Native Hawaiians on Moloka'i, the high school graduation rate was a high 50 percent and another 30 percent attended college. [3]

In 1990, the labor participation profile was similar in the State and Moloka'i island, but there were differences between the Study Area and East Moloka'i. Respectively, 61 percent and 60 percent of the State and Moloka'i labor population participated in the civilian labor force in 1990. The Study Area had a higher participation rate (65 percent) than East Moloka'i (59 percent).

[3] *Office of Hawaiian Affairs,* ***Native Hawaiian Data Book, 2006,*** *page 50.*

In 1990, 36 percent of Moloka'i's working population was not in the labor force, and non-participation was particularly high in East Moloka'i at 38 percent. 1990 unemployment was also high in East Molokai at 3.8 percent, compared to 3.6 percent island wide.

By 2000, proportionally more Moloka'i residents did not participate in the labor force or were unemployed. While over 50 percent of Moloka`i residents were in the civilian labor force, another 43 percent did not participate in the labor force. Further the 2000 unemployment rate was high at 6.5 percent. Census statistics for the Study Area and East Moloka'i were similar.

For Native Hawaiians on Moloka'i, the civilian labor force participation was higher at 59 percent, and 41 percent were not in the labor force. Another 8.5 percent was unemployed. [4]

The unemployment rate for Moloka'i has increased to 8.5 percent by June 2006. The State unemployment rate at that time was 3.7 percent. [5]

In terms of occupations, the largest category of occupation in 1990 in the State was sales and office (33 percent). For Moloka'i in 1990, the largest category was service (25 percent), followed by management and professional (23 percent). Service occupations comprised the largest category in the Study Area in 1990.

In 2000, the largest occupational category in the State and Moloka'i shifted to management and professional, with 32 percent and 29 percent, respectively. Service occupations comprised the second largest occupation in Moloka'i; in the State, sales and office occupations were second.

In the Study Area, management and professional and service occupations accounted for the two largest groups of occupations. There was a significant decrease in farming, fishing and forestry occupations in the Study Area. In 1990, 15 percent were in this category, and this decreased to eight percent in 2000.

2.4.4. Income and Poverty

In 1990 and 2000, Moloka'i's median household and family incomes have been consistently and significantly lower than statewide medians. Census information indicates some improvement in terms of dependence on public assistance income from 1990 to 2000.

[4] *Ibid, page 143.*

[5] *Personal Communication with Robin Komoto from the State of Hawaii Department of Labor and Industrial Relations, August 1, 2006.*

As indicated in Table 7, Moloka'i's 1990 median household income of $25,923 was $12,906 less than the State's median household income of $38,829. The differential was similar for family income. In 1990, Moloka'i's median family income of $29,973 was $13,000 less than the State's median family income of $43,156.

Table 7: Study Area Income and Poverty, 1990 and 2000

	1990*				2000*			
	State of Hawaii	Molokai	Primary Study Area CT 318	East Molokai CT 317	State of Hawaii	Molokai	Primary Study Area CT 318	East Molokai CT 317
Median Household Income	$38,829	$25,923	$26,522	$25,324	$49,820	$34,184	$33,999	$34,398
Households w/ Public Assistance Income	7%	20%	19%	20%	7%	14%	12%	15%
Median Family Income	$43,176	$29,973	$31,895	$29,051	$56,961	$36,973	$34,907	$39,038
Median Nonfamily/Individual Income	$24,376	$10,591	$10,764	$10,417	$30,272	$18,367	$20,795	$15,938
Per Capita Income	$15,770	$9,622	$10,075	$9,169	$21,525	$15,355	$15,715	$14,994
	Percent Below Poverty Levels**							
Households	14.3%	35.4%	19.4%	43.8%	18.3%	37.0%	35.0%	38.2%
Families	6.0%	15.1%	8.9%	18.6%	7.6%	16.0%	15.5%	16.3%
Nonfamily/Individual	8.3%	20.3%	10.4%	25.2%	10.7%	21.0%	19.5%	21.9%

** Poverty status data reflects only the year prior to the census (1990 uses data from 1989; 2000 uses data from 1999)*

*** Poverty level of a person is measured by comparing one's total family income in the last 12 months with the poverty threshold appropriate for that person's family size and composition. If the total income of that person's family is less than the threshold appropriate for that family, then the person is considered poor or "below poverty level". The thresholds (income cutoffs) are arranged in a matrix that takes into account family size and the presence and number of children under 18.*

Sources: Census 1990, Summary Tape File 3; Census 2000 Summary File 4; The State of Hawaii Data Book 2000; and American Coomunity Survey 2004 Subject Definitions

In 2000, the difference between the State and Moloka'i median household incomes increased to $15,636. For median family incomes, the difference was more pronounced at almost $20,000.

While statewide households with public assistance remained steady between 1990 and 2000, Molokai's proportion decreased from 20 percent in 1990 to 14 percent in 2000. Both the Study Area and East Moloka'i followed this decrease in public assistance for households.

Note that income pattern in the Study Area and East Moloka'i changed from 1990 and 2000. In 1990, the Study Area's median household, family and individual incomes were higher than East Moloka'i. In 2000, the situation reversed, although the per capita income in the Study Area remained higher.

In terms of poverty levels, Moloka'i had consistently higher levels that the State. In both 1990 and 2000, Moloka'i's proportion of households, families and individuals with incomes below poverty level was more than double those of the State.

While Moloka'i's proportion of households with incomes below poverty level increased by less than two percent between 1990 and 2000 (compared to the State's four percent increase), there were significant changes in the two census tracts. In the Study Area, the household poverty category almost doubled, from 19 percent to 35 percent. In East Moloka'i, the household category decreased from 44 percent in 1990 to 38 percent in 2000.

3. Major Forces for Change

This section identifies forces for change in the Study Area that are independent of the proposed project. The information extends the baseline information on the social environment by exploring the type of change directed by public policy, plans, and relevant public improvement projects.

Section 3.1 presents public plans and forecasts. Section 3.2 discusses the Ten-Year Strategic Plan prepared by the Moloka'i Enterprise Community, and Section 3.3 highlights the Moloka'i Island Plan prepared by the State Department of Hawaiian Home Lands. Public improvements are presented in Section 3.4.

3.1. Public Plans and Forecasts

3.1.1. Maui County General Plan

The Maui County Charter requires that its General Plan recognize and state the major problems and opportunities concerning the needs and the development of the county and the social, economic and environmental effects of such development. The General Plan sets forth the desired sequence, patterns and characteristics of future development. Formation of the 1990 General Plan included eight regional citizen teams from Moloka'i, Lana'i and Maui. The goals of the participation program included broad-based community participation and the development of objectives and strategies to address challenges facing the County as a whole.

Five themes form the framework for the Maui County General Plan, as follows:

- Protect Maui county's agricultural land and rural identity
- Prepare a directed and managed growth plan
- Protect Maui county's shoreline and limit visitor industry growth
- Maintain a viable economy that offers diverse employment opportunities for residents
- Provide for needed resident housing

The General Plan's objective for Moloka'i is to encourage the independent economic revitalization. Policies for Moloka'i include:

- Encourage diversified industries to locate to Moloka'i that will form a stable employment base,
- Ensure that necessary infrastructure and social services are available to support new development,
- Promote alternate agricultural and aquacultural pursuits consistent with the human resources available on the island of Moloka'i,
- Discourage lengthening of the existing Moloka'i Airport runway, and discourage the State's efforts to relocate Moloka'i Airport's facilities to the west end of the island, and
- Support constructive efforts by the Moloka'i community to evaluate the feasibility of Moloka'i becoming its own County. [6]

An update of the General Plan is currently underway.

3.1.2. Moloka'i Community Plan

Maui County prepared nine Community Plans that reflect current and anticipated conditions, and advance planning goals, objectives, policies and implementation considerations of the General Plan. The Moloka'i Community Plan provides specific direction to address these components within Moloka'i's values and unique attributes. The Moloka'i Community Plan was first adopted by Ordinance No. 1357 in 1984, and was updated in 2001.

The Moloka'i Community Plan identified key problems that provided the underlying basis for the planning goals, objectives and policies. These problems included:

- Limited economic opportunity, which is the most significant problem facing the community,
- Need to upgrade infrastructure,
- Lack of community control over local decisions,
- Lack of social and recreational facilities and public services,
- High cost of housing, and
- Lack of sufficient water resources.

[6] *Maui County General Plan 1990 Update, available online at www.co.maui.hi.us/departments/Planning/generalPlan1990.htm*

The Plan then identified goals as broad statements that identify a preferred future condition. Each goal was accompanied by objectives and policies, as well as implementing actions. Goals that are particularly relevant to this SIA are as follows:

- Land Use: Enhance the unique qualities of the island of Moloka'i to provide future generations the opportunity to experience rural and traditional lifestyles.
- Subsistence: The continued practice of subsistence as part of the Moloka'i lifestyle which incorporates and fosters the traditional and cultural values of conservation, mālama 'aina and 'auwana.
- Environment: Preserve, protect and manage Moloka'i's exceptional natural land and water resources to ensure that future generations may continue to enjoy and protect the island environment.
- Cultural Resources: Preservation, enhancement and appropriate use of cultural resources, cultural practices and historic sites that provide a sense of history and define a sense of place for the island of Moloka'i.
- Economic Activity: A balanced local economy which provides preferred employment levels, long-term viability and sustainability while meeting residents' needs, respecting cultural and natural resources, and is in harmony with Moloka'i's rural quasi-subsistence lifestyle.
- Housing: Housing opportunities which are affordable, safe and environmentally and culturally compatible for the residents of Moloka'i.
- Social Infrastructure: An efficient and responsive system of people-oriented public services which enable residents to live a safe, healthy and enjoyable lifestyle.

Goals related to indigenous architecture, design, infrastructure, government and the Department of Hawaiian Home Lands are also contained in the Moloka'i Community Plan.

In the Study Area, various amendments to the Land Use Map were made in the 2001 update in the Study Area. The largest revision was to redesignate approximately 593 acres in Maunaloa to Park (Golf Course).

The Moloka'i Community Plan designates specific areas in the Project site Agriculture and Conservation. Molokai Ranch will seek to amend the Community Plan to change the area of the proposed houselots from Agriculture to Rural.

3.1.3. Socio-Economic Forecasts

The Maui County Planning Department developed a socio-economic forecast in preparation for the 2006 General Plan Update. The forecast serves as a planning tool to predict future growth scenarios, and is based on projections developed by the State Department of Business, Economic Development and Tourism.

The model in this forecast is not designed to predict short-term economic cycles. Rather, it provides estimates of long-term trends. Actual conditions will diverge on a short term basis within the long-term time frame.

The baseline forecast for Moloka'i incorporates historical information and forecasts growth in population and jobs. Unemployment is projected as declining over time as the local economy becomes more similar to that of other Maui County islands. Table 8 contains socio-economic forecasts.

Table 8: Socio-economic forecasts for Moloka'i, 2005 to 2030

	Historical	Historical	Projected					
	1990	2000	2005	2010	2015	2020	2025	2030
Population	6,717	7,407	7,127	7,276	7,542	7,772	8,068	8,395
Households	2,088	2,420	2,382	2,475	2,603	2,722	2,862	3,006
Housing Demand	2,198	2,547	2,507	2,605	2,740	2,865	3,013	3,164
New Resident Demand	n/a	n/a	131	137	148	132	144	145
New Non-Resident Demand	n/a	n/a	-51	124	169	157	186	190
Visitor Units	559	429	429	429	429	429	429	429
Labor Demand *	2,519	2,746	2,764	3,057	3,342	3,588	3,792	3,997
Unemployment	10.3%	14.0%	12.5%	9.0%	6.5%	4.0%	4.0%	4.0%

** Labor demand is estimated as total employment plus assumed market level of unemployment (4% of Civilian Labor Force). Figure for 1990 not comparable as it uses lower estimate of self-employed persons.*

Source: Maui County Planning Department, ***Socio-Economic Forecast: The Economic Projections for the Maui County General Plan 2030,*** *Exhibits I-3, I-6, I-11, I-15, I-16, I-20*

In terms of population growth, the forecast projects an 18 percent increase by 2030, from a projected 2005 population of 7,127 to a 2030 population of 8,395. This increase is the lowest in Maui County. The overall Maui County population is projected to grow by 42 percent.

3.2. Ke 'Aupuni Lōkāhi – Moloka'i Enterprise Community

The Molōka'i Enterprise Community, or EC, is part of the federal U.S. Department of Agriculture Enterprise Community (EC) /Empowerment Zone (EZ) Program. The EC process in the U.S. began in 1998, which included the participation from the Moloka'i community. The EC process on Moloka'i involved thousands of community members in hundreds of meetings. The result is a ten-year strategic plan for Moloka'i. The U.S. Department of Agriculture designated the entire island of Moloka'i as an Enterprise Community. To date the EC has included and supported over 40 projects in its ten-year strategic plan. Hence, this effort has significant influence over the forces for Moloka'i's future.

This EC prepared a Community Strategic Plan with broad-based community participation. The vision statement of this plan embodies the fundamental values that provide the framework for the plan, as follows:

> *Moloka'i is the last Hawaiian Island. We who live here choose not to be strangers in our own land. The values of aloha 'aina and mālama 'aina (love and care for the land) guide our stewardship of Moloka'i's natural resources, which nourish our families both physically and spiritually. We live by our kūpuna's (elders) historic legacy of pule o o (powerful prayer). We honor our island's Hawaiian cultural heritage, no matter what our ethnicity, and that culture is practiced in our everyday lives. Our true wealth is measured by the extent of our generosity.*
>
> - *We envision strong 'ohana (families) who steadfastly preserve, protect and perpetuate these core Hawaiian values.*
> - *We are wise and caring community that takes pride in its resourcefulness, self-sufficiency and resiliency, and is firmly in charge of Moloka'i's resources and destiny.*
> - *We envision a Moloka'i that leaves for its children a visible legacy: an island momona (abundant) with natural and cultural resources, people who kōkua (help) and look after one another, and a community that strives to build an even better future on the pa's (firm) foundation left to us by those whose iwi (bones) guard our land.*[7][8]

[7] *Molokai Enterprise Community, Vision Statement, available online at http://molokaiec.org/aboutus/vision.htm*

Priorities and strategic focus for the next five years are summarized as follows:

- Compatible Community Development Process: Work with Molokai Ranch to create compatible development strategies as part of the Molokai Ranch Community-Based Master Plan.
- Community Land Trust: Create and implement a community land trust to help make the vision of Moloka'i community a reality.
- Economic Base: Create an economic base that preserves the preferred Moloka'i lifestyle, uses traditional Hawaiian culture as the foundation, and uses all the island's resources in a pono way.
- Financial Stability: Establish financial strength and stability to carry out long term goals and sustain the long term viability of Ke 'Aupuni Lōkāhi.
- Organizational Stability and Capacity: Build Ke 'Aupuni Lōkāhi's technical, management, leadership and adaptive capabilities.

The Strategic Plan identifies two goals expected to build momentum and leverage Ke 'Aupuni Lōkāhi's resources, as follows:

1. Develop Moloka'i's economic base in ways that 1) maintain Moloka'i's preferred lifestyle; 2) builds on Native Hawaiian culture; 3) protects Moloka'i's natural resources for future generations; 4) generates employment and economic opportunities for local residents; and 5) are community driven.
2. Strengthen Ke 'Aupuni Lōkahi's technical, management, leadership and adaptive capacities to effectively support its ongoing programs, projects, and initiatives.

Collectively, the goals have seven action areas which are related in some way to the Community-Based Master Land Use Plan. In general, the action areas strengthen the community's ability to carry out the strategies, and specifically call for the establishment of a community land trust and the creation of employment and economic opportunities as related to the reopening of Kaluako'i. [9]

[8] *This vision statement was subsequently used in the 2001 Moloka'i Community Plan.*

[9] *Ke 'Aupuni Lōkāhi – Leaders Working Together, Strategic Plan Summary (undated).*

The EC also prepared a community-based visitor plan for the island. Community tourism is defined as a process by which a community is empowered to share its greatness while preserving its dignity. It is small in scale and driven by a genuine desire of the community to share itself, its history, traditions, and customs with strangers, as a means by which to support economic growth.

This Moloka'i initiative is a process-oriented tourism that differs from the tourist destination areas approach used to sell "culture" to visitors. Community Tourism allows the participating residents to share their living culture in a natural setting with small, manageable groups of visitors. The types of cultural settings, community events, cylindrical festivities and sports gatherings offered will depend on residents' willingness and breadth of sharing a rural and cultural lifestyle.

Community Tourism is activity oriented with the community making decisions on what is shared, breadth of cultural activities to be shared to promote greater understanding and appreciation of the island's heritage. An intimate interaction between host and guests benefits both. The activity shared with guests exists for its own sake and is not artificial, something created to entertain.

Community Tourism places limitations on the numbers of tourists an area or activity can sustain so that the island will not be overwhelmed by masses of visitors distracting daily rural living. The Community Tourism travel initiatives and offerings are operated by local, indigenous, traditional populations to promote their lifestyle, preserve their traditions, environment and cultural assets. Engaging visitors on the community's terms empowers the host culture, preserving a sense of place and dignity.

The Community Tourism Plan was conceived as a five-year implementation process involving community participation in gathering data on promotional activities, scheduling events, resident activity participants and requiring a Visitor Coordinator and Committee oversight.

The important initial step upon which the plan rests is establishing an agreement on the tourism carrying-capacity for the island. A monthly calendar of events for each year will be created such as geo-tours, rodeo, Makahiki, and many others for families with keiki. [10]

[10] *Davianna Pōmaika'i McGregor, PhD,* ***Moloka'i Responsible Tourism Initiative: A Community-Based Visitor Plan for Moloka'i"*** *(February 2006).*

3.3. Department of Hawaiian Home Lands

Development of State Department of Hawaiian Home Lands, or DHHL, properties has been and is a major force for change in Moloka'i. Moloka'i DHHL lands are situated in 'Ualapu'e, Kapa'akea, Makakupa'ia, Kamiloloa, Kalama'ula, Kalaupapa, Pālā'au, and Ho'olehua. These holdings comprise 25,899 acres, or 16 percent of the island's total acreage.

DHHL prepared the Moloka'i Island Plan, or MIP, in June 2005. The MIP provides recommendations for the future use its land holdings and identifies priority areas for homestead development. Highlights of the MIP recommendations are as follows:

- Residential Homesteads: The MIP proposes 417 new residential homesteads, with priorities focusing on 'Ualapu'e, Kapa'akea, Makakupa'ia and Kamiloloa. A target of 361 units is identified as priorities. Currently, DHHL residential areas encompass 742 acres.
- Agriculture Homesteads: The MIP calls for completion of 58 Naiwa agricultural lots in Ho'olehua that were previously awarded. In addition, the MIP includes the subdivision of Ho'olehua lands that could yield 544 agriculture lots. Currently, 2,350 acres are designated for Subsistence Agriculture; for Supplemental Agriculture, 5,862 acres.
- Pastoral Homesteads: Currently, 1,927 acres are designated for pastoral use.
- General Agriculture: This designation preserves land for future use, and makes it available for farming and ranching leases. Currently, over 8,498 acres are designated for general agriculture.
- Special District: Areas that are environmentally or culturally sensitive are in this designation. Comprising 5,558 acres, lands in this category are to be protected, and are made available for certain community and community uses.
- Community Use: Community Use designated areas are located in residential communities and accommodate schools, park sites and community use areas. Currently 224 acres are in this category.
- Conservation: Environmentally sensitive areas in Kalaupapa and Ho'olehua comprise the 655 acres in this category.
- Commercial: These lands are designated for DHHL income generation and encompass 58 acres in Kalama'ula and Ho'olehua.

- Industrial: Sixteen acres in Kapa'akea are in this category. [11]

3.4. Public Improvements

In general, most of the public improvements in Maui County's Fiscal Year 2006, 6-Year Capital Improvement Program are related to relatively minor upgrades and improvements. County projects related to socially-relevant public services and facilities are as follows:

- New Kaunakakai Fire Station, Government Facilities
  Fire and Public Safety Department: Design and construction of a new station.
- New Moloka'i Baseyard, Government Facilities
  Public Works and Environmental Management – Engineering Division: Buy six contiguous lots at the Moloka'i Industrial Park, design and build new baseyard.
- New Moloka'i Police Station, Government Facilities
  Police Department: A new station will bring a sense of pride and importance not only to the employees of the Police Department, but also to the residents of Moloka'i.
- New Pukoo Fire Station, Government Facilities
  Fire and Public Safety: Construction of a new fire station in Puko'o.

In terms of State projects, planned improvements are mostly minor improvements and upgrades. The Department of Transportation, Airports Division, prepared a master plan for Ho'olehua Airport. Highlights of the two phases of improvements are as follows:

Phase 1 (1998 – 2005)

- Resolve impacts for Runway 5-23 improvements on Hawaiian Homestead land
- Mass grade approximately 360,000 cubic yards of excavation northeast of Runway 5-23

Phase 2 (2006 – 2020)

- Resolve impacts for Runway 5-23 improvements on Hawaiian Homestead land for Runway 5-23 extension and other improvements needed to satisfy FAA regulations and design criteria.

[11] *Group 70 International,* ***Moloka'i Island Plan: Executive Summary****, prepared for the State Department of Hawaiian Home Lands (June 2005), pages ES2 to ES4.*

- Extend Runway 5-23 by 500 feet to the southwest
- Construct new passenger terminal building, new aircraft parking apron and new cargo building
- Develop new general aviation hangars, new helicopter apron, new passenger terminal roadways, and new parking lot.[12]

Implementation of this master plan is undetermined.

[12] *Engineering Concepts, etal.,* ***Moloka'i Airport Master Plan Final Report,*** *Prepared for the State of Hawaii Department of Transportation, Airports Division (May 1999), pages 6-5 to 6-11.*

4. Preliminary Community Issues

Impacts are changes that may occur as a result of a proposed action, plan or policy. Issues are reactions and opinions. Issues can change over time, as people's priorities and values change.

Issues analysis helps decision-makers identify and analyze community concerns about a proposed action. To ensure that a proposed action is reviewed in the full social context in which the project is proposed, feelings and concerns about the existing community need to be considered as well. For example, it is helpful to understand if a project is unique in terms of its issues, or if reactions are consistent with other proposed changes.

Issues analysis differs from statistical surveys, the latter of which is designed to focus on frequency of reactions. Polls are valuable because they tell us about the opinions of the majority or the minority. The survey instrument is not conducive to dialogue, however, and the personalized reasons for these opinions are not evident, or need to be inferred from the responses.

In contrast, the only time we make reference to the quantity of opinion in issues analysis is where there is significant difference of number or a distinct trend.

Section 4.1 discusses the approach for the issues analysis, and describes the three sources of community input. Section 4.2 presents findings related to feelings about respondents' relationships to Moloka'i and their definition of "Moloka'i Style." Section 4.3 presents reactions to the Plan, and reactions to the Project are summarized in Section 4.4. Section 4.5 presents community suggestions, and Section 4.6 presents our analysis.

4.1. Approach and Participants

This issues analysis is crucial in understanding the full context of issues important to a broad cross section of people. Given the high-profile nature of both the Plan and the Project, there has been much publicized opinion both for and against the Plan and the Project. For a thorough issues analysis, it is important to identify not just issues important to vocal individuals, but also issues important to those whose opinions have not been featured in the media or expressed in public meetings.

Hence, a major objective of this analysis was to capture the opinions of a broad cross section of the community, regardless of previous media coverage, publicized opinion, public testimony or any other venue for taking a public stance. We made every effort to reach both prominent community members, as well as the "silent majority" to understand the full breadth of public opinion on the Plan and the Project.

Although the venues and participants varied, there was a common line of questions that followed a basic approach.

- *What is Moloka'i Style?* In our research and experience in other meetings, there was an underlying theme of a Moloka'i identity. People often assessed activities behavior and attitudes based on whether or not it was reflective of a Moloka'i value or behavior. There seemed to be a common understanding shared by residents of what constitutes a Moloka'i identity. To understand issues related to the Plan and the Project, it was therefore necessary to place these in the context of "Moloka'i style."
- *The Community Based Master Land Use Plan and Lā'au Point:* As discussed in Section 1, the Project has an integral relationship with the Plan. Hence, after we asked questions about Moloka'i style, we described the Plan and the Lā'au Point project that is the subject of the Land Use Commission petition. We then asked for reactions to both.
- *Relationship of the Plan and Project to Moloka'i Style:* Participants were then asked to relate their feelings about the Plan and Project to their perspective on Moloka'i Style. They were also asked to share suggestions.

Three sources of information were used, including 1) a public information meeting, 2) several focus groups and 3) community interviews. Subsequent sections describe the venue and participants of each source.

4.1.1. Public Information Meeting

A public meeting was held to discuss social impacts related to the Community Based Master Land Use Plan and the proposed project at Lā'au Point. The meeting was held at Kaunakakai Elementary School cafeteria on July 26, 2006, 6:00 PM. It was publicized in local newspapers.

Approximately 32 people attended, and Table 9 lists the 27 participants who signed in.

Table 9: List of People Who Signed In at the Public Meeting

Marcia Allison	Cummins K Mahoe III
Bob Boylan	Michael Martin
Marilyn Burgin	Abbey Mayer
Cheryl Corbiell	Steve Morgan
Harold Edwards	Guy Hanohano Naehu
Tom Holloman	Peter Nicholas
Illona Honig	Josh Pestrana
Elizabeth Johnson	Brennan Purtzer
William Kaholoaa, Sr.	Kalaniula Ritte
Bill Kapuni	Yogesh Simpson
Victoria Kapuni	Glenn Teves
Sol Kawai, Jr.	Bree Ullman
Cynthia Luafalemana	Matt Yamashita
Uya-Justina Luafalemana	

At least five people chose to not to add their names to the sign-in sheet. At the meeting, they said they did not want their names to be used in a way that might construe support of the Plan or Project.

Although the agenda was loosely followed, and some people objected to the questions and presentation of the Plan, participants generally discussed relevant topics. Participants who spoke at the meeting were adamant in their opposition to the Plan and Project.

Not all participants voiced their opinion, and it is not assumed that the spoken opinions were unanimous. It was clear, however, that all who spoke were in opposition. One person submitted written comments and it is presented in Appendix A. Input from this meeting is incorporated in the overall analysis.

4.1.2. Focus Groups

Focus groups are essentially meetings that serve as focused interviews of a group of people. While individual interviews provoke thought and elicit personal views, focus groups add another dimension with group exchange and dynamics. In this analysis, focus groups were selected as another avenue for input to optimize the number of contacts within a limited time frame.

Also, focus group meetings provide an opportunity for group exchange outside the typical public meeting. In our review of media coverage of public meetings on controversial subjects in Moloka'i, discussions tend to be confrontational and heated. The focus groups sessions for this issues analysis were designed to provide non-confrontational settings. The groups were generally homogenous in that participants shared a common background or common position regarding the Plan and Project.

The format for the focus group sessions was similar to that of the public meeting. Earthplan contacted a member of the group, and that individual was responsible for extending invitation to his or her peers. Each group had a unique perspective and participants and general characteristics are hereby described.

- Maunaloa residents

  Maunaloa is the town closest to the Project site. A focus group session was held with a group of these residents on July 25, 2006 in the Lōkahi Room at the Molokai Lodge. Table 10 lists the ten participants.

Table 10: Participants in Maunaloa Residents Focus Group Session

Zhantell Dudoit	Janice Pele
Raymond Hiro	John Pele
Roxanne Hiro	Bo Perez
Kalapana Kelihoomalu	Brennan Purtzer
Davianna McGregor	C. Kehau Pule

  One person lived outside Maunaloa on the West End and was invited by a participant. One lived elsewhere but worked in Maunaloa, and another person attended as an observer.

  In general, participants were supportive of the Plan and the Project. They were hopeful that the Project would improve economic conditions and that the Plan would preserve cultural and environmental resources. Further, they expressed a desire for effective implementation that avoids mismanagement and unfair personal gain. Input from this session is incorporated in the overall analysis.

- West End residents

  Residents of Kaluako'i and Pāpōhaku Ranch are in close proximity to the Project and would have direct contact with Project activities and residents. A focus group session was held with a group of these residents on July 31, 2006 in the Lōkahi Room at the Molokai Lodge. Table 11 lists the ten participants.

Table 11: Participants in West End Residents Focus Group Session

George Benda	Keith Rasmussen
Pat Benda	Carol Tahmoush
Bob Dreyer	Mike Tahmoush
Joseph Pentak	Raymond Tensfeldt
Barbara Rasmussen	Yvonne Wheeler

Some of these people participated in the preparation of the Plan, and are active in community efforts. In general, they felt that the Plan was acceptable. Their primary reaction to the Project was its effect on their community in terms of infrastructure and public services. They envisioned opportunities to improve these facilities with the development of the project and several suggestions were offered. Input from this session is incorporated in the overall analysis. Two people submitted written comments and these are contained in Appendix B.

- Filipino residents

  Our initial research indicates that while people of Filipino ancestry comprise the third largest ethnic group in Moloka'i, they tended to avoid public meetings and controversial settings. This group was therefore considered part of the silent majority. A focus group session was held with a group of these residents at a private residence on July 27, 2006. Table 12 lists the 24 participants.

Table 12: Participants in Filipino Focus Group Session

Estefonia Acoba	Erlinda Oasary
Cresencia Befitel	Sylvia Pabalan
Sara Bongolan	Benny Piros
Tess Bongolan	Fely Piros
Adelina Cera	Leo Piza
Stanley Cera	Catalina Rabara
Annabelle Clemente	Ben Ragonton
Jerry Clemente	Perlita Ragonton
Debbie Davis	Elena Ragonton
Rudy Lat	Navario Ragonton
Francisco Mercado	Lawrence Reyes
Leonida Molina	Yolanda Reyes

These participants tended to be supportive of both the Plan and the Project due to perceived low negative impacts and the benefits of the Project's employment generation. They appreciated the reopening of Kaluako'i Resort, affordable housing and resource conservation. Input from this session is incorporated in the overall analysis. Two people submitted written comments and these are contained in Appendix C.

- Alternatives to Lā'au Point Committee

During the formation of the Plan, the Alternative to Lā'au Point Development Committee, hereafter referred to as ALDC, was formed to:

> Create an alternative document that speaks to sustainable economic models that encompasses MPL lands, particularly Ke Lae Lā'au
>
> To ensure the establishment of a sustainable community land trust which serves as the mechanism for responsible land management
>
> To develop viable fundraising strategies to support the implementation and sustainability of those efforts. [13]

A focus group session with people who were active in the ALDC was held on July 28, 2006 in a private office. Table 13 lists the five participants.

Table 13: Participants in Alternatives to Lā'au Development Committee Focus Group Session

Mahealani Davis
Kekama Helm
Josh Pestrana
Mikiala Pescaia
Matt Yamashita

All were participants in both the formation of the Plan and the ALDC report. This group was critical of the community-based process in the development of the Plan; they believed that the report on alternatives was not genuinely considered in the decision-making process. Further, as may be surmised by the name of the committee, this group disapproved of the Project. Input from this session is incorporated in the overall analysis.

[13] *New West Land Company, etal.,* ***Report to the Ke 'Aupuni Lōkāhi, Inc., Moloka'i Enterprise Community (EC)*** *(October 8, 2005), page 3.*

4.1.3. Community Interviews

The most extensive effort in this issues analysis focused on interviews of community members. Three interviewers conducted most of the interviews over a one and a half-week period. Most of the interviews were held in person; a few telephone interviews were conducted as requested.

Our primary objective was to learn about the existing community and how the Plan and Project would relate to people's feelings and community values. Hence, though the interview questions were standard, we also allowed for flexibility so that those interviewed could converse, or "talk story," in a manner that was comfortable for them.

Interviewees were informed that their names and affiliations would be listed in this report. We noted that the affiliations and organizational information was solicited to provide the readers an indication of the interest base of those interviewed. People spoke as individuals, and did not represent or speak for their organizations.

They were further informed that their individual conversations were confidential, and that their comments would be collectively analyzed. Confidentiality was very important for those who were concerned that their individualized views may be publicized and that they would be criticized by people who oppose the Plan or Project.

Because of the interviews afforded more personal interaction than group meetings, we expanded the areas of questions as follows:

- Relationship with Moloka'i
- Description of Moloka'i Style
- Hopes for the future of Moloka'i, for their children and grandchildren
- Reactions to the overall Plan (not just the Lā'au Point portion)
- Reactions to the Project as part of the Plan and by itself
- Relationship of the Plan and Project to Moloka'i Style
- Suggestions

As previously discussed, an understanding of the full range of feelings and concerns about a proposed project needs a broad cross-section of people. Every effort was made to contact people who are active in their community through their participation in social, educational, cultural, and economic development activities and organizations, as well as people who might not be active, but were referred to us by those interviewed.

A few people chose to participate in more than one aspect of this study. They were interviewed and also chose to attend the public meeting or a focus group. No one participated in all three activities.

Five people declined to be interviewed. Two did not want to participate because of the high profile of this project and did not want to take any kind of position. Two were concerned about being part of a study that was part of the petition to the State Land Use Commission; they did not want their participation to be construed as support. Both attended the public meeting. One person had agreed to be interviewed, but was busy at the agreed upon time.

In all, 62 people were interviewed. Those interviewed were asked to identify their organizational and other affiliations so that the reader would have an idea as to the cross section of interests reflected in this analysis. Interviewees shared their opinions as individuals, however, and were not asked to take a position for their organization. Further, individuals selected the affiliations that would be listed in this report. The list of names is provided in Table 14.

Table 14: List of People Interviewed

Name	Affiliation and Residence
Vivian "Vani" Ainoa	President of Na Pu'uwai - Native Hawaiian Health System for Moloka'i Member of Ka'ahumanu Society Kamiloloa, One Ali'i resident
Billy Akutagawa	Executive Director of Na Pu'uwai – Native Hawaiian Health System for Moloka'i Certified gun safety trainer on Moloka'i (works with the State Department of Land and Natural Resources as volunteer) Member of the Board of Directors of Moloka'i Community Health Center Past member of Moloka'i Burial Council Kaunakakai resident
Zesseca Apiki	Moloka'i Branch Manager of Maui Economic Opportunity Member of Moloka'i Chamber of Commerce Member of General Advisory Committee of Local Advisory Charter School Kaunakakai resident
Kahu Anna L. Arakaki	Kupuna Kahu of Ka Hale La'a O Ierusalem Ho'olehua Homestead resident

Name	Affiliation and Residence
Kuulei Arce	Loan Manager in Business Development Corporation, Maui Economic Opportunity Member of 4-H Club Ho'olehua resident
George Benda	Co-founder of Aka'ula School Pāpōhaku Ranchlands resident
Pat Benda	Pāpōhaku Ranchlands resident
Julie-Ann Bicoy	Director of Moloka'i Visitors Association Past elementary school teacher Kaunakakai resident
Lori Buchanan	Former Commissioner of the Moloka'i Planning Commission Owner of Moloka'i Mortuary Field Technician of Moloka'i / Maui Invasive Species Committee Ho'olehua resident
Louise Malulani Bush	Vice President of Ho'olehua Homestead Association Administrative Assistant of Kamehameha Schools Ho'olehua resident
Judy Caparida	Kupuna in Manae
Stacy Crivello	President of Board of Directors of Moloka'i Enterprise Community Ho'olehua resident
Nani Duvauchelle	Case Manager in Community Services, Maui Economic Opportunity Kaunakakai resident
Jojo Espaniolo	Kupuna Maunaloa resident
Lisa Esteron	Case Manager in Community Services, Maui Economic Opportunity Maunaloa resident
Ray Foster	Hawaiian Research, Site Manager of Monsanto President of Kawela Home Owners Association Kawela resident
Ruby Guerra	Camp Host at Kaupoa Beach Villas Shop Kualapu'u steward and secretary for ILWU unit Kualapu'u resident

Name	Affiliation and Residence
Carol Harms	Owner of Budget Car Rentals at Ho'olehua Airport West end resident
Dayna Harris	Realtor Kaunakakai resident
Donna Haytko-Paoa	Professor / Coordinator at Maui Community College in Moloka'i East end resident
Kekama Helm	Canoe club coach with Kukui O Moloka'i Hui malama o moopuni (subsistence) Works with youth project development for QLCC Ho'olehua and Kalama'ula Homestead resident
Zachary Helm	President of Kalama'ula Homestead Association Organizes and supports community recreation activities at the Maui County Parks and Recreation Department Entertainer Kalama'ula resident
Raymond Hiro	Member of Executive Board of Maunaloa 'Ohana I Lōkāhi Assocation Maintenance Foreman at the Molokai Lodge and Beach Villas Maunaloa resident
Pearl Hodgins	Executive Secretary of the Moloka'i Chamber of Commerce Vice President of Moloka'i Main Street President of Moloka'i Museum and Cultural Center Kipu resident
Karen Holt	Executive Director of Moloka'i Community Services Council Kaunakakai resident
Irene Kaahanui	Kupuna Ho'olehua Homestead resident
Jule Kamakana	Owner of Bamboo Pantry Member of Moloka'i Visitors Association Member of Moloka'i Camber of Commerce Member of Board of Directors of Aka'ula School Kalama'ula Homestead resident

Name	Affiliation and Residence
Deldrine "Kauinohea" Kapuni	Kupuna program with Alu Like Kawela resident
Halona Kaopuiki	Ho'olehua homesteader
Irene Lam	Manager of Community Development, Moloka'i, US Department of Agriculture Kaunakakai resident
Jina Lee	Administrator at Moloka'i Community Health Center Kaunakakai resident
Justine Luafalamana	Student at Moloka'i High School East end resident
Collette Machado	Ho'olehua Homestead resident
Ruth"Manu	East End resident
Captain Dan Matsuura	Captain in Maui County Police Department, Moloka'i Kaunakakai resident
Ed Misaki	Director of Nature Conservancy Kaualapu'u resident
Paul Mordasini	President of the West Moloka'i Association President of Pāpōhaku Ranchlands West end resident
Steve Morgan	Founder of West Moloka'i Citizens Committee Head deacon at Seventh Day Adventist Church West end resident
Hanohano Naehu	Co-founder of Hemowai Productions Hawaiian activist East end resident
Uala Napolean	Ho'olehua Homestead resident
Vicki Newberry	Head and founding partner of Aka'ula School Kaunakakai resident
Alberta K. Patchen	State of Hawaii Managed Work Force Development Volunteer with Na Pu'uwai Health Care system Kamalo resident
Annette Pauole-Ahakuelo	Facilitator at Moloka'i Kūha'o Business Center Member of Moloka'i Chamber of Commerce Kaunakakai resident

Name	Affiliation and Residence
Beverly Pauole-Moore	Member of Moloka'i Board of Realtors Members of Moloka'i Chamber of Commerce Member of Moloka'i Main Street Association Members of Moloka'i Filipino Association Kaunakakai resident
John Pele	Part owner of Maunaloa General Store Rooms manager at the Molokai Lodge and Beach Villas Board member of Moloka'i Enterprise Community Maunaloa resident
Christie Pentak	Secretary of West Moloka'i Association Former member of the Board of Directors of Ke Nani Kai (Kaluako'i condominium) Chair of Read to Me International (literacy program) Head of Athletics for Special Olympics Kaluako'i resident
Kuulei Perez	Kupuna with Native Hawaiian Education Member of Ho'olehua Homesteaders Association Part time Maunaloa resident
Julia Keli'ikuli Peter	Employee of gallery Ho'olehua resident
Maile Pidot	Kapuna of Maunaloa 'Ohana I Lōkāhi Assocation Maunaloa resident
Marlene Kamuela Purdy	President of Ho'olehua Homestead Association Operates family agriculture business Ho'olehua resident
Eliza "Aunty Kauila" Reyes	Member of Board of Directors of Aka'ula School Board Member of Ka'ahumanu Association Kupuna at Kaunakakai School Kalama'ula resident
Kalanilua Ritte	Co-founder of Hemowai Productions Ho'olehua Homestead resident
Walter Ritte	Administrator of Hawaiian Learning Center Ho'olehua resident

Name	Affiliation and Residence
Carl Brito	Airports Operations and Maintenance Supervisor, Maui District (Ho'olehua Airport), Airports Division, State Department of Transportation Kualapu'u resident
Moomoi Seasio	Fisherman Ho'olehua Homestead resident
Dr. Dan Shuman	Clinic Director and Family Physician Kaunakakai resident
Penelope Spiller	Retired State of Hawaii employee Ho'olehua resident
April Torres	Kawela resident
John Torres	Kawela resident
Elizabeth West	Employee of Maunaloa business Maunaloa resident
Captain Wren Westcoatt	Captain of Kaunakakai Fire Station
Sonya Yuen	Owner of Kualapu'u Market Kualapu'u resident

The following highlights characteristics of those interviewed:

- Place of residence

  Ho'olehua was home to the largest group of interviewees, at 26 percent. The second largest group comprised residents of Maunaloa / West End, at 20 percent, followed by Kaunakakai, at 19 percent.

- Length of residence

  Interviewees tended to have strong roots in Moloka'i. Over half of those interviewed were born and raised on Moloka'i. Regardless of whether they had left for school or other reason, those who were born on Moloka'i considered themselves born and raised on the island; 32 people established their Moloka'i roots at birth. Another four people described themselves as "long-time residents,' and another two lived on Moloka'i for more than 40 years. Twelve interviewees had lived on Moloka'i between ten and 30 years, and ten people lived on Moloka'i less than ten years. Information on length of residence was unknown for two people.

4.2. Comments about Relationship to Moloka'i and Moloka'i Style

4.2.1. Relationship to Moloka'i

In interviews, people were asked to describe their relationship to Moloka'i. They defined this relationship from several perspectives, the most common of which were home and family. The following summarizes their comments:

- Home

  Those interviewed typically consider Moloka'i their home in the most fundamental sense. It is their birthplace, their origin, the "soil in which my roots are planted." A common explanation of this relationship was "I was born here and will die here." It was felt that, regardless of whether one had moved away for school, marriage or employment, the island's welcome was always understood. Moloka'i was always safe haven and those interviewed knew that eventually they would move back.

  Interviewees who were born and raised on Moloka'i felt that being from Moloka'i is their #1 identity. More recent residents felt that moving to Moloka'i was "coming home."

- 'Ohana

  Another common type of relationship was family, and this relationship was described through several lenses:

  A place to raise a family: Moloka'i is safe place to raise children, and everyone looks out for each other's children. The rural and natural environments provide a rich learning ground, and there are fewer distractions that plague urban environments.

  My family's roots: Families are typically multi-generational, and ancestors can be traced and linked to various parts of the island.

  One big family: People are typically related to each other. They either had direct blood relationship, or were part of each other's extended family. Hānai relationships were common. The bottom line was that these family relationships transcended differing views, walks of life, politics, religious affiliations and other potential divisions.

  Kupuna and mother: Moloka'i is considered a kupuna and mother to her residents. She feeds, shelters and nurtures her people.

- Protective environment

  For those interviewed, their relationship with Moloka'i is also defined by a mutually protective environment. There is a sense of protection among the residents and between the people and the island. Interviewees noted that they would sacrifice for Moloka'i "without a second thought." One person described this relationship as a love affair; he has a responsibility to take care of and protect the island.

- A provider

  Interviewees appreciate a relationship with Moloka'i the provider. They feel that the island provides everything they need, including food, comfort, spiritual strength and stability.

- A destination that became home

  For more recent residents, Moloka'i is a destination that became home. They had moved to Moloka'i for employment or as a second home, and felt drawn to call the island home.

4.2.2. Moloka'i Style

Interviewees and participants in the public meeting and focus group sessions were asked to describe what is unique to Moloka'i. The term "Molokai Style" helps to define the social context for the Plan and the Project.

- Foundation of Hawaiian values

  Moloka'i is termed the last Hawaiian island, and people noted that the foundation for Moloka'i Style is Hawaiian culture and values. 'Ohana, mālama 'aina and aloha 'aina form the bases for the various facets of Moloka'i Style. As one person said, "We don't talk Hawaiian. We do Hawaiian. When there's a luau, we don't go to Safeway. We go to the ocean and the mountains." Building upon this Hawaiian foundation are the contributions of other cultures.

- Laid back

  A common attribute of Moloka'i Style is "laid back," which reflects both attitude and behavior. Being laid back was described as being patient and accepting. It means waiting patiently in your car when the driver in front of you stops in the middle of the road to chat with the driver of an oncoming car. It means keeping the speed limit and tolerating long lines at the gas station and in stores.

- Social Interaction

  Also common was a clear pattern of social interaction. People noted that, not only did "everyone know each other," they also took care of each other. They talked about generosity and stopping to help someone with car trouble. People would find fruit on their doorstep with no note from the giver. Extra catch from fishing would be shared around the neighborhood. It was noted that even though there may be controversy and conflict, "when push comes to shove," people will help each other. Homelessness is virtually non-existent because people look out for those in need.

  Friendliness is best reflected in the tendency to wave as you pass other drivers "even if you don't know them."

  Moloka'i Style also means respecting and accepting each other. It was noted that newcomers are welcomed and families stick together even though they may be on different sides of an issue.

- Survival

  Moloka'i Style is a tradition of survival. People were comfortable, if not dependent, on outdoor living, and the island's natural resources provide for subsistence living. It is expected that people take only what they need to maintain sustainability.

  Survival also depends on maintaining good relationships with each other. People trust and depend on each other and bartering and trading are still practiced.

- Self-identity

  According to participants, Moloka'i Style means knowing who you are and your inherent value, and not depending on class or status for identification. Moloka'i Style is being comfortable with yourself regardless of your economic situation, and respecting others unconditionally. Hence, while those with low incomes should not be ashamed of being poor, the affluent should be satisfied with a modest house. As one person said, "When I was a child, we didn't know we were poor."

- Undesirable transitions and contradictions

  While Moloka'i Style meant mostly positive attributes, there were also some characteristics that were considered negative, and it was feared that these are becoming increasingly evident.

  A common problem was the increasing antagonism associated with controversial matters. It was felt that Moloka'i is becoming known for its controversy and confrontation and that this is not reflective of the Friendly Isle.

  Kūpuna noted they that did not teach people rudeness and name-calling and that this type of behavior is becoming more common at public meetings. It hurt them to see such behavior from their own Moloka'i people. They and others felt that this confrontational attitude is intimidating and causes a loss of aloha, respect and friendliness.

  It was also felt that there is a continuing contradiction related to subsistence living. People said that while some pride themselves in their subsistence lifestyle, they are also willing to supplement their income with public assistance funds. That is not true subsistence but dependence on government.

Values and behavior that are not Moloka'i Style are those that disrupt or lessen the positive attributes. Hence, rudeness, impatience, road rage, pushiness and confrontation are considered counter to the laid back nature of Moloka'i Style. Further, conditions associated with urban settings, such as high density development, traffic congestion, social anonymity, high crime rate, homelessness, shopping centers and large box stores, are not Moloka'i Style. People stressed that they did not want to become like Maui, Oahu or Princeville on Kauai.

From a social perspective, being egocentric or selfish is not Moloka'i Style. It was also felt that excluding or insulting different ethnic groups is not Moloka'i Style, and neither is coming to Moloka'i with a "missionary attitude."

An important non-Moloka'i Style included values related to money. People objected to the attitude that everything is a commodity and has a price, that money can buy everything. This implies power for the affluent, and suggests that non-tangible assets, such as culture and values, are unimportant since they have no price tag. Money-related issues also extend to conspicuous consumption, whereby the affluent build expensive luxury homes, drive fancy cars and wear designer clothes. This emphasizes economic differences and creates schisms between haves and haves-not.

4.2.3. Hopes for the future

The most common hope for the future was that Moloka'i residents would improve their ability to survive on the island. It was noted that struggling should not be a requirement to living on Moloka'i. This hope extended to people who had left the island and would like to return; currently, they have few options. Survivability was linked to the following:

- A stable economy: It was noted that Moloka'i had not yet recovered from the plantation closures, and that island still needs economic opportunities that will provide a diversity of jobs, including management positions, and alternatives to the visitor industry.
- Improved education: People wanted to see the educational system help young people improve their skills and increase their knowledge so that they can make better choices and have more options.
- Decreased dependence on public assistance funds: It was noted that receiving government assistance is somewhat of a sub-culture on the island, and that this dependence is not a healthy condition.
- Improved public services: People hoped that on-island medical services would be expanded so that they did not need to travel to other islands for treatment, and that police and fire protection services and facilities would be upgraded. West end and DHHL homestead residents hoped that infrastructure improvements would be implemented as planned and expected. DHHL homestead resident hoped that their water system would be expanded and improved.

Another common hope related to the legacy for future generations.

- Resilient values: It was generally recognized that change is inevitable. Indeed, it was pointed out growth and decline are part of natural cycles in physical, social and economic environments. While people were willing to "keep up with the world" and incorporate modern improvements, they wanted to make sure that the positive aspects of Moloka'i Style prevailed. Hawaiian culture, strong family values and social respect and support must be passed down to future generations.

  It was also hoped that the Moloka'i community will be more unified in the future. The strong passion expressed in controversial projects is eroding some of the good parts of Moloka'i Style, and it was hoped that people learn to be more open and accepting of each other's views.

- Relationship to environment: An important component of the Moloka'i Style is a strong relationship with the environment. As discussed previously, people depend on their environment for sustenance, recreation and general well-being, and they are committed to protecting environmental resources.

  Passing on this legacy was very important. One person noted that "we have not inherited earth from our ancestors, but are borrowing it from our children," and others stressed that they wanted to make sure that their children and grandchildren have the same affinity for and relationship with the environment. Additionally, they wanted the environment to be even more abundant and accessible, thereby providing more food sources and other resources that can be shared by all.

  It was also felt that the environment should not be compromised in any way, even it means less jobs and economic opportunities.

An important part of hope for the future was growth and development, and there was strong consensus that growth needs to be planned, slow and controlled. Further, there was a sense of the "right type of growth." People wanted to make sure that new development would fit in. They were concerned that luxury housing would bring in millionaires, and generally assumed that these new residents would have values that conflict with Moloka'i Style. Further, there was concern that rich newcomers would have more power and would take control over future decisions.

Maunaloa residents hoped that their town would be revitalized. They remembered when the Maunaloa was a thriving community supporting many businesses and more activities. They pointed out that Maunaloa has too many empty houses, and that business is slow. They wanted to see their town regain its previous vitality, energy and liveliness.

4.3. Reactions to the Community Based Master Land Use Plan

Meeting participants and interviewees were asked to share their views on the Molokai Ranch Community Based Master Land Use Plan. People either liked the Plan because of what it contains, or disliked the Plan because of what it represents. The divergent reactions are hereby discussed.

4.3.1. Positive Characteristics of the Plan

People who approved of the Plan believed that it is a rare and unique opportunity. Given over three decades of conflicts between the community and Molokai Ranch, this Plan forges ahead with mutually beneficial results. Both people who were active in the formation of the Plan and non-participants felt that the Plan offers many benefits to the Moloka'i community and the following highlights these types of comments.

- Reliable basis for community expectations

  The Plan designates future uses for over 60,000 acres. People noted that this commitment to future uses provides a solid basis for what to expect on these lands. It was noted that the planning area comprises 110 census tracts, which raises the possibility of multiple landowners and thus different directions for future change. Consolidation of these properties in one overall Plan results in a collective set of changes in one source. The Plan is therefore a reliable source for community expectations for future uses and activities.

- Meaningful local control

  It was felt that the process for developing the Plan was open and inclusive, and the community had several opportunities to participate. The resulting Plan is the product of two years of meetings and many compromises. People felt that the Plan was truly the result of a local control in a community-based process.

  They noted that this local control will be extended through various components of the Plan. Most significant is the transfer of ownership of 26,200 acres to a Land Trust. These lands would be owned and managed by a local entity in perpetuity. Additional control would be achieved in Conservation-designated lands and other lands set aside for preservation purposes. Further, through the CDC, there would be local control in the development of affordable housing and community expansion. The Plan therefore promotes community-based self-governance of substantial assets.

  It was stressed that the implementation measures to carry out the land transfers and other transactions needs to ensure fairness and responsible stewardship.

- Significant conservation and preservation measures

  The people's relationship between environmental and cultural resources is core to Moloka'i Style. The Plan allows for preservation, protection and management of significant cultural features and valuable environmental resources.

- Protection and management of subsistence activities

  The Plan was considered consistent with community subsistence practices in that it allows access to areas that previously were off limits. Further, resource and activity management would be by local control via the Land Trust.

- Reopening of the Kaluako'i Hotel and upgrade of the Golf Course

  People associated the reopening of the hotel with positive economic activity. They felt that the reinstatement of hotel employment, coupled with visitor spending dollars throughout the community, would help stabilize the economy and increase personal income. Further, residents looked forward to revisiting a once popular local gathering place.

Those who liked the Plan felt it embodies Moloka'i style in several ways. It allows for local control over land and other resources. It helps people survive by providing economic opportunities and provisions for affordable housing. The Plan promotes subsistence gathering and ensures the protection and preservation of large tracts of land. This will protect these lands from further development in perpetuity, thereby maintaining the rural open space character of the West End.

4.3.2. Problems with the Plan

Those who did not like the plan had problems with what the Plan represents.

- Questionable process

  People were critical of the process undertaken to form the Plan. Those who oppose the plan said that the resulting Plan was very different from early discussions. They felt that much of the process was lip service and patronizing, and that "they were going to do what they were going to do anyway."

  Those involved in the ALDC process felt that their efforts and recommendations went unheeded. They cited the short time frame in which they were to produce their report, and felt that decisions were made without consideration of their input. One person's perspective of this situation was that the process employed manipulation, fear-based thinking and a hastened time frame.

  Also, some people had difficulty sustaining effort in attending numerous meetings over a long period of time.

- Undesirable carrot

  People who did not like the Plan expressed resentment over the Plan's relationship to the Project. They felt that the Plan is "being dangled like a carrot" so that the community will accept the Lā'au Point Project. They believed that the Plan's give backs were not worth the Project. They objected to the "either-or" choice as if choosing Lā'au would somehow solve the community's problems. One person likened the situation to the unsuccessful use of mongoose, which are nocturnal animals, to eradicate rats, which are diurnal. He felt that using Plan to justify the Project would cause more harm than good.

- Unnecessary and gratuitous effort

  The Plan was criticized for being unnecessary. It was noted that Moloka'i had successfully opposed other projects, and would continue to fight future undesirable projects. Hence, if Molokai Ranch were to sell the property to another developer who would propose development, they would fight the new owner anyway.

  It was also felt that the land to be gifted was "'ōpala land." The 1,600 acres that would be transferred to the Land Trust were described as "just a bunch of cliffs" and they placed little value on the rest of the land to be transferred. In the public meeting, people noted, "The land is ours anyway. We may have to play cat and mouse games, but we go there anyway."

People who object to the Plan believe it is not Moloka'i Style. They questioned the integrity of the process and felt that it did not embody social interaction that is characteristic of Moloka'i Style. They do not feel that the tradeoff is fair and therefore not Moloka'i Style. Moreover, they believed that the Plan will bring in outsiders with different values that would conflict with Moloka'i Style. These outsiders would have direct access and use of resources that people depend on and value for their cultural and spiritual attributes.

4.4. Reactions to the Lā'au Point Project

4.4.1. Full Support for the Project With or Without the Plan

Those who supported the Project unconditionally believed that it was the best option for the project site.

They believed that the Lā'au Point project is probably the least obtrusive of options for the site. The density is low, and there is a generous setback from the ocean. Cultural and archaeological resources would not be disturbed, and there will be shoreline access to a coast that has historically been off-limits to the majority of the population.

Further, development of the properties will yield economic opportunities. Construction related jobs will be generated by infrastructure improvements, lot preparation and house construction. There would also be ongoing jobs to fulfill the security, service and maintenance needs of new homeowners. It was expected that the cost benefit ratio would benefit the island. The property tax base would be increased, thereby increasing funding for schools and other public services and facilities. Yet, because the new residents would mostly be part-time, their use of these facilities would be intermittent and minimal.

Those who take this unconditional position note that, as the landowner, Molokai Ranch has a right to develop its property to yield reasonable profit. For them, this Project reflects a thoughtful and positive alternative in the use of the subject property. The Project is compatible with Moloka'i Style.

4.4.2. Conditional Acceptance of the Project and Support of Plan

Those who wholeheartedly approved of the Plan tended to accept the Project as a satisfactory trade-off. They believed that the Plan's long-term and far-reaching benefits outweigh potential negative Project impacts.

Acceptance of the Project is not always easy, however. The Project elicits mixed feelings, and this was a common tendency among Plan proponents. The Project requires significant change in an area that is virtually untouched. People value the pristine nature of Lā'au Point. Those who have fished or camped in this area cite the area's abundant resources and powerful mana. Ideally, for them, no change would come to Lā'au Point.

Nevertheless, they are willing to accept the Project because they understand that its implementation is the only way the Plan can be implemented. The Project will provide the springboard for Plan. These people envision a significant legacy through Plan implementation, one that will persevere through future generations. For them, because the Plan is Moloka'i Style, the Project is also Moloka'i Style because of its relationship to the Plan.

Local control over portions of the Lā'au Point Project is reassuring for those who have mixed feelings. The Land Trust will manage the shoreline conservation area in partnership with the new homeowners association. They will manage Kāmaka'ipō Gulch and oversee other significant resources in the Project site.

Further, it is felt that the low-density nature of the project, buffer zones and shoreline access features are positive features compared to higher density housing developments. The Project is also preferable to what has occurred on the East End, where change has been scattered, uncontrolled and subtle. With Lā'au Point, the community knows what will happen.

4.4.3. Opposition to the Project and Support for Plan

Support for the Plan did not always imply Project support. Those involved in the ALDC liked the Plan, but preferred that the Lā'au Point Project not be carried out for reasons incorporated in Section 4.4.4.

This group has recommended an alternative to the project. The ALDC supports "the purchase of the Lā'au Point property, in full or in part, by a "single" purchaser, meaning a third party, individual or entity." The purchaser should be motivated to preserve or conserve the property, including conservation development, or by educational uses. The purchaser may be motivated by tax incentives. [14] It was hoped that the new buyers would work with the Land Trust in its role in carrying out the Plan.

4.4.4. Opposition to the Project and the Plan

For those who do not like the Plan, the Project is the focus of their objection. While their objections have various facets, there are two recurring themes in their opposition.

[14] *Alternative to Lā'au Development Committee (ALDC), Memorandum to Ke 'Aupuni Lōkahi, Molokai EC, Board of Directors re: New West Land Company Report to the ALDC/EC and Next Steps, dated January 12, 2006.*

- Impacts on social environment

  People who oppose the Project are concerned that the impacts of 200 luxury homes on currently limited access property will have irrevocably negative social impacts. They feel it is unfair that millionaire newcomers will be able to live on a shoreline that has historical restricted access. They expect that the rich newcomers will come from neighborhoods that have pet leash laws and noise ordinances; the new residents will not appreciate local people fishing and hunting in their backyard. Eventually, it is expected that the newcomers will restrict such activities.

  Project opponents also believe that the millionaire newcomers will have a commodity-based value system that will clash with Moloka'i Style. The new residents will demand more services to suit the lifestyle to which they are accustomed. It was expected that the newcomers will demand expensive wine and gourmet food in the markets and restaurants.

  People who disagree with the Project fear that, because "money is power," the new residents will have powerful influence over local matters. All in all, it is feared that the newcomers will force local residents to live by imported values and outsider norms. To these people, the cumulative effects of change are that the Hawaiian culture and Moloka'i Style will be negatively impacted.

- Water application

  Project opponents strongly resent that Molokai Ranch is requesting an increase in non-potable water allocation to support the Project and other activities. The subject water source is in central Moloka'i where homestead lands are located. They perceive that the Project is taking DHHL water to support rich newcomers.

  Further, project opponents fear that there may not be enough water to support future local needs, much less the needs of rich newcomers. They do not believe aquifer and sustainable yield data from independent sources.

4.5. Suggestions from Meeting and Focus Group Participants and Interviewees

The last query was for suggestions, and participants in all venues responded. This section groups suggestions by topic, and every effort was made to capture the essence and tone of their input.

4.5.1. Suggestions on the Plan

Make sure the Land Trust has trustworthy and honest people.

Select credible and honest people for the Land Trust. Make sure they are from Moloka'i.

Bring in a few experts from outside to sit on the Land Trust. They could bring in broad experience and help the other trustees do their job.

Find a way to put water issues under Land Trust.

Continue to have a community-based process. This will be especially important when you set up the Land Trust and CDC.

Have a Maunaloa representative on the Land Trust.

Do the Land Trust and CDC. Don't ask us to choose Lā'au Point.

Give us something without asking for Lā'au.

Sell the property to the Moloka'i people.

Community needs to buy the ranch. If we own it, there would be no more trade offs.

If you want to make money, one that doesn't threaten existing lifestyle, find an alternative method of reaching your goals over longer period of time and in concert with community goals.

Find other ways to make money at Kaluako'i, such as an educational center or teaching resource (marine science, aquaculture, agriculture)

Get the hotel, restaurant and golf course running first.

Renovate the hotel, then we talk. Find alternatives for ranch lands (koa, macadamia nuts).

Build one more hotel, renovate the existing hotel, build two more condo projects, and add nine holes to the golf course.

Support the 15 acres designated for expansion of Maui Community College, Moloka'i campus. Expand the designated acreage for sale of property to be the same as the Moloka'i Community Plan.

Document the Plan in an enforceable legal document, preferably under government jurisdiction.

4.5.2. Suggestions on General Overall Project

Make sure the Project gets passed. We need the jobs and economic benefits.

Get going on the Project so that the Plan can go forward.

Let people know how the community can help move the Project forward. We need the Plan.

Make sure the Project gets approved. We need it.

Spread development over larger area that is integrated into different communities, rather than on one parcel.

Help us find a new buyer for Lā'au Point, one who would take care of the land and not develop it. This will help Molokai Ranch meet its financial objectives and protect the land from development.

Sell the Lā'au property to Bishop Estate. Let them come up with cultural theme that is more ecologically friendly.

There are other alternatives for the Lā'au site, such as a Hawaiian cultural tourism model. Give alternatives a real time frame.

Cancel the project. We don't want to be another Honolulu, Lahaina or LA. We want subsistence and self-sufficiency. We want sovereignty.

Don't do Lā'au; it isn't needed.

4.5.3. Suggestions on Specific Project Components or Effects

Preserve the human relationship with the fishing grounds. Put in a fence between the makai boundaries of the houselots and the shoreline. Plus, make sure new residents must also go through the resource management program.

Don't develop the shoreline. Move inland.

Move housing more mauka. Increase the buffer zone between the ocean and houses.

Increase shoreline access points.

Make sure that the resource management team is effective and follows whatever rules are set up.

The resource management team needs to be from this ahupua'a. We have been taking care of this land for generations.

Need to set up a good educational program. Start with a pilot program that addresses ocean and shoreline conservation practices.

Enforcement in conservation areas need to start in the very the beginning. Don't let people cut corners.

Need a spiritual component. Make sure kūpuna provide spiritual guidance are provided throughout the process. Get kūpuna from the West End, one that is from the ahupua'a and knows the land, not one from the other side or another island.

Help to educate visitors and new residents so the can feel welcomed and not be afraid to interact. Mutual respect is important.

Show new Lā'au Point residents how to participate in local efforts.

Do not create a gated community.

Re-route the Project access route through Maunaloa town. This will establish a connection between new and local residents, and support the town's businesses.

Don't put a road through Maunaloa town.

Don't bring the road through Pāpōhaku.

Put in walking paths along new roads.

Fix existing infrastructure.

Expand infrastructure to existing Pāpōhaku and Kaluako'i residents (electricity, water, telephone, cable).

Upgrade the infrastructure in the West end. This should include improvements to water, telephone, cable, DSL and electricity systems.

A parcel of land has been designated to house a fire station near Kaluako'i. MPL and its partners should commit to building a fire station as part of the overall plan. The facility could then be transferred to the control of Maui County.

Put land aside for water desalination.

Keep police and fire departments informed of the Project's progress so we can prepare.

Put in affordable housing.

4.5.4. Other Suggestions

We need to change our attitudes and not be selfish. We need to share our water.

Think about locals before you accommodate newcomers.

Keep up a good process.

Be open with the community. Don't hide information even if it's not favorable to the ranch. Trust us.

Get people involved. Openly communicate. Don't be afraid or ashamed.

We need to get more open-minded people to the meetings – enough fighting.

Have more informal meetings like the focus groups so people like us can learn more about the Project. We do not want to go to public meetings. Too intimidating. The newspapers are biased.

We've worked so hard to get this far. Let's not start over.

Develop affordable housing by Moloka'i standards, not Maui standards.

Don't give us a myth that there is water. There is one land. Prove that there is more than one aquifer.

Don't impact water supply. Respect the Hawaiians.

Take care of your employees. You have good people.

4.6. Analysis

Despite the wide range of opinions and concerns about the Plan and the Lā'au Point Project, this analysis finds significant commonalities. First, there is a consensus on Moloka'i Style. People share the Moloka'i identity and relate to each other through a common understanding of Moloka'i values and behavior.

Second, people are passionate about Moloka'i. Living on Moloka'i is an intentional choice. People are committed to their relationship with the island. Those who left for awhile have been drawn to return. They seek the return of their children so that they too can enjoy strong relationships with the island and her people. More recent residents made a conscious decision to live here and fit into the social fabric.

People are equally passionate about protecting their island and perpetuating the Moloka'i Style. Regardless of their position on the Project or Plan, people want to protect Moloka'i from detrimental change. The controversy stems from a divergence in the approach on *how* to protect and perpetuate.

For proponents of the Plan, their approach to protecting Moloka'i is to be proactive in determining the island's destiny. The lack of control due to landownership and land use issues implies an unknown future and possible proposals that could threaten the island, its people and its resources. They have chosen to solve this problem by coming up with a Plan that brings more community control over land resources through land ownership, resource management and land use controls.

To them, the Project is part of this larger scenario because it is a necessary springboard for the Plan. In this scenario, the Project is part of the solution.

For others, however, the Project is the heart of the problem and not a solution. They focus on Lā'au Point because to them it signifies a threat to the people, the environment, the Hawaiian culture and Moloka'i Style. Their approach to solving the problem is to fight its approval and implementation. Indeed, there have been strong public statements by project opponents that they will do whatever it takes to stop the Project.

Activism is not new to Moloka'i. Proposed development projects are typically met with scrutiny and skepticism. Moloka'i residents are experienced in taking a stand and opposing efforts they disapprove. Recently, the proposal to allow cruise ships to land in Moloka'i was defeated, and the University of Hawaii withdrew its patent applications for genetically-modified taro when Moloka'i activists protested. Proponents of the Plan and Project participated in these efforts.

The uniqueness of this situation is the relationship between a specific development proposal and a plan that extends far beyond project boundaries. While Lā'au Point Project opponents are putting up signs and organizing protests, Plan proponents are exploring mechanisms for coming up with a resource management program and establishing a Land Trust and a Community Development Corporation. Hence, while both sides are seeking to protect Moloka'i, their strategies have no commonality. There is little that can be done to bridge the gap.

For those who are not strongly aligned with either side, and this is likely a large part of the community, the prominent issue is the Lā'au Point Project. They are accustomed to activist efforts, and Lā'au Point is no exception. In interviews and three of the four focus group sessions, people were very aware of the Project and less knowledgeable about the Plan. It was easier for them to address the Project than to discuss the Plan.

Based on our issues analysis, we believe that the uncommitted residents of Moloka'i share the same values of Moloka'i Style and have the same passion and commitment to protect the island. It is to their advantage to know about the Plan and the Project so that they understand the full implication of both. Many of those we interacted with in this study indicated that they will not attend public meetings because they dislike the antagonism and conflict. To help them make an informed decision, every effort should be made to share information with them in a non confrontational environment that encourages constructive dialogue.

5. Potential Social Impacts

An overview of impact analysis is presented in Section 5.1. Section 5.2 identifies population impacts and Section 5.3 discusses the Project's relationship to public and community plans. Section 5.4 presents the Project's impact on the social environment and potential impacts on public services and facilities are identified in Section 5.5.

5.1. Overview of Impact Analysis in this Report

5.1.1. Direct and Indirect Impacts

Because of the relationship between the Project and the Plan, the Project's implementation, or its non-implementation, will have a direct effect on the Plan. Further, it has an indirect relationship with Plan components. Where appropriate, a discussion of the Project's effect on the Plan is provided to understand the full social context of social impacts.

For the purposes of this analysis, two levels of impact are identified. Direct impacts are those that specifically result from Project implementation. These include, for example, population increase, and increase in demand for public services resulting from the new population.

Indirect impacts are the Project's effect on the Plan. A secondary impact, for example, is the Project's enabling of the formation of the CDC and the Land Trust, as well as the reopening of the Kaluako'i Hotel.

5.1.2. The No-Project Scenario

In our social impact assessments, the No-Project scenario typically signifies the absence of a projected impact. Hence, the project need (e.g. affordable housing, infrastructure improvements, housing demand) would not be met, and direct and indirect impacts would not occur.

In this analysis, the No-Project scenario has a significant effect on the Plan. Since the Project is the only springboard for the Plan, the Project's non-implementation means that most of the Plan will not be realized. The only Plan component that will occur without the Project is the gifting of 1,600 acres to the Land Use Trust. All other Plan components would likely not be implemented.

Further, the principal issue of the No-Project scenario is the viability of ongoing operations of Molokai Ranch and its employees. The net loss from operations between 2002 and 2006 was approximately $31.6 million. Cost cutting measures reduced operating losses from $8.6 million in 2001 to a range of $3.6 to $3.8 million in the past three years. In addition to operating losses, annual capital expenditures annually average over $800,000 million. In total, the MPL subsidy of operations and upkeep average between $4.7 to $10.2 million annually. The cumulative subsidy in the last five years is $36.9 million.

If the Project is not implemented, it is therefore highly likely that MPL will need to seek other options summarized as follows:

- Sale of other land inventory: MPL has 101 lots that could be sold exclusive of inventory in Pāpōhaku Ranchlands, Maunaloa and the Industrial Park. In addition, the agricultural lots in the West End could legally be subdivided into more than 1,500 lots; this does not include the parcels held outside the Kaluako'i ahupua'a. It is unlikely that a single buyer would acquire all these holdings, and highly likely that multiple buyers would be involved.
- Further reduction in operations: Without increased support for the hotel and golf course operations that would result from the Project, MPL options include further operational reductions and possible closures. In addition, MPL would likely be forced to reduce or eliminate other subsidized operations such as maintenance, nursery, gas station and other services.

  With these reductions would come possible termination of ranch operations and land banks. Employment could be reduced by over 100 jobs to ten full time positions.

  These measures would result in lost tourist expenditures and severely affect local businesses throughout Moloka'i. [15]

As appropriate, the No-Project scenario is incorporated in this impact analysis.

5.2. Population Impacts

The population characteristics of the proposed Project are based on the marketing objectives and program, which are included in the economic analysis in the EIS. [16]

[15] *Knowledge Based Consulting Group, Economic and Fiscal Impacts of the Proposed* ***Lā'au Point Residences on Moloka'i (June 2006),*** *page 16.*

The Project features low density oceanfront and near shoreline lots in a setting of undeveloped seclusion and natural beauty. It is considered a unique project and expected to attract buyers who seek privacy and the natural setting, and appreciate the Moloka'i community. These buyers are distinguished from those who would be attracted to the resort environment of other islands.

Lots will be an average of two acres. Lot prices will range from approximately $1.48 million on the western shoreline section to an average of $650,000 on inland lots. The overall average lot price is estimated at $970,952.

The residential market values are projected at $34.4 million in 2008, which is the first year of lot sales, and increase to $211.9 million in 2012, when the lots are sold and the initial homes are built. As additional homes are built, residential values are projected to increase annually by an approximate $16 million, and at the projected build-out in 2023, the residential market value is estimated at $352 million.

The average size of the residential units is 3,500 square feet. It is anticipated that the building footprint will cover between three and eleven percent of the lot.

The time frame for the Project calls for the development and sale of the proposed 200 lots over a five-year period beginning in 2007. Construction of initial houses should begin in 2010 and is expected to continue through 2023.

Lā'au Point buyers are typically expected to be in their pre-retirement or retirement years with very few or no school-aged children. In terms of housing occupancy rates, Lā'au Point is projected to follow resort community occupancy patterns, whereby less than 20 percent of the units are occupied full time and the average overall occupancy is less than 30 percent.

Table 15 summarizes Project population estimates.

[16] *Knowledge Based Consulting Group,* ***Economic and Fiscal Impacts of the Proposed Lā'au Point Residences on Molokai*** *(April 2006).*

Table 15: Project Population Estimates

Average household size *	2.90 persons
Estimated permanent population in 2012 (end of lot sales period) **	12 persons
Estimated permanent population in 2023 (final build-out)	174 persons
Estimated seasonal population during peak seasons ***	325 persons
Estimated peak population of permanent and seasonal residents	499 persons
Average on-site combined population of permanent and seasonal residents	230 persons

* *Includes possible caregiver*

** *Permanent residence is defined as living in the unit at least 6 months in a year.*

*** *Up to 80 percent of seasonal residences may be occupied during peak seasons.*

Source: Knowledge Based Consulting Group, ***Economic and Fiscal Impacts of the Proposed Lā'au Point Residences on Moloka'I*** *(June 2006).*

In terms of numbers, the Project population at build-out will account for a very small portion of the County population forecasted for Moloka'i in 2025. The permanent population will account for two percent of the forecasted 8,068 persons in 2025. During peak seasons, the on-site population will account for six percent of the island population, and, on the average, Lā'au Point residents will make up three percent of the island population. The Project population will be well within the population forecast for Moloka'i and will therefore have an insignificant impact on population counts.

For comparison purposes, another development effort proposed for Moloka'i is the increase of DHHL residential lots. The MIP identifies the development 361 lots or units as a priority. Assuming that these units would be developed by 2025, and based on the County-generated socio-economic forecast for Moloka'i, the new DHHL units could house an estimated population of 1,018 persons. [17] Residents at this new DHHL residential development would account for 13 percent of the forecasted population for 2025.

[17] *Based on ratio of projected population to projected households, which is 2.82 persons.*

In terms of relationship to the Plan, the Project would allow the Plan to move forward with affordable housing and community development. The Plan calls for provisions of both land and financial resources. The affordable housing component would generate population impacts, the extent of which is unknown at this time. The CDC would need to evaluate impacts in its efforts to develop the affordable housing, and submit necessary studies to support its applications for those development projects.

5.3. Relationship to Public and Community Plans

Section 3.1 presents public policies that guide the future direction of Moloka'i. These policies embody community values and provide a basis for community expectations for the social environment.

The Maui County General Plan identifies county-wide themes, and the Project is consistent as follows:

- Agricultural and rural identity: The Project contains provisions intended to protect the rural identity. The Project is directly consistent with this theme in that the bulk of the Project site would remain undeveloped, and therefore retain a rural character. Indirectly, the Project would act as a catalyst for the Plan, which calls for the protection of 55,000 acres in perpetuity.
- County shoreline and visitor industry growth: The Project includes the expansion of the shoreline conservation area, and is therefore directly consistent with the theme of shoreline protection. The Plan is also consistent with this theme in that, while it includes provisions to re-open the Kaluako'i Hotel, it puts a cap on further development of visitor units. Part of the property that is zoned for resort use would be conveyed to the Land Trust and further development would be prohibited.
- Economy: The Project supports this theme in that revenues from its implementation would be used to upgrade the Kaluako'i Hotel. This action would generate short and long term employment and therefore help to support a viable economy.
- Resident housing: The Project supports this theme in that it would lead to the formation of the CDC that would in turn develop affordable housing.

The Project requires revision to the Land Use Map in the Moloka'i Community Plan for portions of the development. It is relevant to several goals advocated by the Moloka'i Community Plan, as follows:

- Land use: The Project is consistent with the goal of providing future generations with the opportunity to experience rural and traditional lifestyle. Its implementation will lead to the protection of 55,000 acres from development and formation of the Land Trust to own and manage these lands for future generations.
- Subsistence: The Project is consistent with the goal to promote the continued practice of subsistence. Project plans include the expansion of shoreline conservation lands that would be available for subsistence practices. These lands would be managed by a local Land Trust. In addition, Project implementation would lead to the protection of 55,000 acres that would be managed by the Land Trust. Subsistence activities would be an integral part of its management program.
- Environment and cultural resources: The Project supports goals intended to preserve, protect, manage and enhance environmental and cultural resources. Within Project boundaries, the conservation area would be expanded and be placed under the ownership and management of the Land Trust. Further, Kāmaka'ipō Gulch and other cultural resources will be part of the Land Trust's responsibility. The Project also supports these goals in that it will make possible Plan components that lead to the protection and management of 55,000 acres for preservation purposes.
- Economic activity: The Project is consistent with the goal for a preferred, viable and sustainable economy that is in balance with resident needs and values, cultural and natural resources and lifestyle. Proceeds from Plan implementation will support the reopening of the Kaluako'i Hotel, an action that was strongly supported in the development of the Plan.
- Housing: Project implementation will allow the transfer of land and financial resources to the CDC for the development of affordable housing. It is therefore consistent with the goal to provide housing opportunities that are affordable and culturally compatible.

Section 3.2 presents the Ten-Year Community Strategic Plan prepared by the EC in collaboration with the community. The Project is highly consistent with this plan in that it is the result of the EC's strategy to create compatible development strategies as part of the Community Based Master Land Use Plan. Further, the Project enables the formation of a Community Land Trust, a strategy intended to make the vision a reality.

In summary, the Project is consistent with public and community plans that guide the future of Moloka'i. The Project serves as a catalyst to carry out the community policies and goals embodied in the Molokai Ranch Community Based Master Land Use Plan. Hence, the Lā'au Point Project has a significantly positive relationship with public and community plans.

5.4. Impacts on the Social Environment

The fabric of the social environment is woven by relationships. The threads of this fabric are interpersonal relationships, relationships to the environment, to the culture, to the past and future, to the global community, to the neighborhood.

The Moloka'i social environment is a colorfully rich textured fabric. Those of Moloka'i readily recognize it, and others see its uniqueness. In Section 4, the identity of Moloka'i Style was found to be common and prevalent. While this social environment has proven resilient over time, it was also considered fragile and vulnerable. The desire to protect this social environment was widespread and often passionate.

This analysis explores how the Lā'au Point Project fits into this social environment. Will it blend into the existing pattern, or will it change the design? Will it add to the richness, or will it detract from its beauty?

The following sections present two models for growth, explore how they relate to the Project, and examine the Project's social impacts.

5.4.1. Two Models

Two models of growth in Hawaii were analyzed to understand how they might apply to the Lā'au Point Project. In our study, both Lanai and West Maui were cited as examples of what people did not want to see in Moloka'i. Recent rapid change in Lāna'i has resulted in major transformation in the social environment and related problems. Lāna'i development is therefore presented as a model of rapid, significant change. West Maui has experienced significant population growth over a thirty-year period. It is included in this analysis because of the population increase due to in-migration and the shift in settlement patterns.

Lāna'i Development – Rapid Economic Shift and Social Problems

The Lāna'i community had been a stable community of 2,700. Residents lived a rural plantation lifestyle for many years. Since 1920, Lāna'i's one-crop economy was built solely on the primary production of pineapple. In 1985, California-based Flexi-van Corporation merged with the island's existing landowner Castle & Cooke and assumed 98 percent of the island. Plans to phase out pineapple and develop tourism were subsequently announced.

Agriculture was phased out and the first resort was opened in 1988, followed by a second in 1990. The rapid development of a tourism based economy, with the development of Koele Lodge and Manele Bay Hotel and golf courses, marked a shift away from agribusiness for the entire island. In addition, the development includes a 375-acre luxury residential development.

The longitudinal social impacts and mental health aspects of this change were studied over a five year period from 1989 to 1993. [18]

The resort development phase necessitated the influx of construction workers from other locations. Local residents underwent extensive training for resort positions that would require radically new interactive skills and knowledge for the upscale resort. The population increase and interactive difficulties between newcomers and residents was just the first shock to the very cohesive agricultural and agrarian, multiethnic community. In 1989, drug and alcohol use attributed to construction worker influx was reported. Marital difficulties and divorce increased as more personal and social options became available to women in unstable relationships. Psychological and family problems increased as the resorts neared completion in1991.

As Dole Co. attempted to gain permits for luxury resort homes and golf courses, resistance was mounted by Lanaians for Sensible Growth (LSG) and the ILWU leaders to slow or alter the development progress. Some felt that the plans would create a two-tiered society - the rich and the working poor. The luxury homes met with resistance as residents felt the negative social and cultural impacts out weighed the Company's desire for profits.

As the researchers observed, some cultural infusion can broaden the cultural base of a community but often the new values clash with the traditional ones, thereby upsetting the social fabric as drastic demographic and ecological shifts have been shown to affect other Hawaiian communities.

For those residents having strongly felt community cohesion, the faster, unfamiliar pace and new faces were threatening. Recreation areas were taken over by visitors and new workers from the mainland. Researchers were faced with uncovering the depth and breadth of these overt and covert feelings, social and psychological impacts. The qualitative reports of residents were evaluated through guided discussion and focus groups. Issues included the following:

[18] *Jon K. Matsuoka, PhD.,* ***Economic Change and Mental Health on Lana'i: A Longitudinal Analysis*** *(1997).*

- Families were changing - Awareness that less structured work schedules was affecting time spent with family and in recreating activities, hunting and fishing.
- Loss of community cohesion – Past plantation working hours afforded time spent supporting others and in group and calendrical cultural activities. Families were becoming more self-centered.
- Increased crime – The youth, spending more time with peers and less unsupervised time with parents, was committing petty, property theft.
- Increased stress - Long-time residents were less adaptive than newcomers to rapid economic changes and working in up-scale environment under demanding supervisors.
- Company controls – The economic changes were forced on them by the company.
- Company broke promises in the past – Newcomers hold most of the higher supervisory positions that residents had trained for and been promised.
- Growing job insecurity – Financial losses at the resorts forced layoffs. The Company used layoffs as leverage to gain support for luxury home developments. Many workers had mortgages in new affordable homes.
- Greater disparity between rich and working poor – Wealthy tourists become new residents in luxury home communities.
- Development leads to changing behaviors/values – The new economy afforded purchasing new items. Children were given money by parents and became more materialistic.
- Big chain stores could wipe out local businesses – The 27 small business owners feared that wealthy new residents' consumer demands would displace them or cut off the trickle down financial benefits they had anticipated. As it turned out, few experienced business benefits from newcomers, the resorts had their own services and gift shops.
- Development brought loss of local culture – Acculturation to new lifestyles and pace decreased family values and cultural institutions. Loss of culturally esteemed values of collectivity, support and respect for elders were diminishing.
- Out-migration of youth/no jobs – Youth employment during the summer months at plantation jobs had given them a common bonding experience, increasing community cohesion. Many forced to leave the island because of layoffs at the resorts.

- Concerns about water supply – Some felt that the aquifer should not be depleted; careless watering of the golf course with potable water would cause problems in event of a drought.
- Overcrowding of beaches – Residents felt the presence of newcomers occupying favorite recreation areas. Youth and fishermen were sensitive to this.
- Race problems between haole and locals – There were rank, class differences in jobs with Caucasians holding more supervisory/ managerial positions. [19]

Some social impacts had generational, age, class and cultural implications. For example, those older, long-term residents with strong sentiments for community cohesion were affected most by rapid change, seen as threatening and most stressful. Feelings of disrupted community cohesion brought on by shift work and holding multiple jobs for job instability, placed more stress on the nuclear family. Community cohesion was also reduced by limited discretionary time available for traditional institutions (church activities) and voluntarism in community projects. Work place adaptations to mainland supervisors, differences in socially acceptable behaviors and interactions, and cultural misinterpretations interacting with authoritarian superiors and resort guests caused mental health problems. In contrast, the Caucasian newcomers and repatriated Lanaians holding better jobs were optimistic, with new opportunities, and having left problems behind.

The most striking negative adaptation to economic change was the increase in crime. Assaults, vandalism, theft of property, disorderly conduct, and so on, increased remarkably in the period of 1991 to 1995. The influx of non-local, wealthy newcomers evidently created a "have and have not "scenario of resentment. Young residents and fisherman also resented the presence to newcomers "taking over" favorite beaches, polluting them, and having amenities built to serve the newcomers. Overcrowding was disruptive and fishermen had to compete with tour boats and snorkelers.

[19] *Ibid, pages 76 to 83.*

The study concluded that, given the problems resulting from the rapid and monolithic social change, it might be more worthy and cost-effective to encourage prevention of these problems through the sustainability of traditional lifeways than through human service interventions. Human service response to social fall-out is a requisite measure, but cannot compensate for what is lost in the way of family and community process. The qualities imparted to individuals from healthy families and communities reflect the sanctity of these institution; they cannot be replicated.

West Maui – Significant In-Migration and Shift in Settlement Patterns

West Maui's main settlement areas include the former whaling town of Lahaina, which has most of West Maui's permanent residents, and the coastal resort expanse stretching north from Kā'anapali to Kapalua. Kā'anapali has been planned and marketed as an integrated unit since the early 1960s. Complementing the resort area along the shoreline are planned residential communities mauka of the main highway. The newer developments around Kapalua have followed a similar strategy of master planning. Interspersed with the major resorts are pockets of older residential neighborhoods and villages.

During the heyday of West Maui's sugar industry early this century, camps for the workers of Maui Land and Pineapple and the Pioneer Mill dotted the region. The plantation camps dwindled and ultimately disappeared as employment in the West Maui sugar industry dwindled.

With the development of Kā'anapali, West Maui experienced major economic revival, and as the region's visitor industry grew throughout the 1970s and 1980s, the population mix significantly changed. Labor shortages in the booming visitor and construction industries attracted young workers, especially from the continental U.S., to the area. Retirees and investors also moved into the area and purchased upscale homes, often vacation units in planned communities developed around the Kā'anapali and Kapalua golf courses.

Between 1970 and 2000, West Maui's population more than tripled, subdivisions replaced agricultural fields, and hotels and condos fronted the shoreline. Also, settlement patterns shifted. Almost three-fourths of the West Maui population resided in and around Lahaina in 1990. Ten years later, almost half the population lived in the Kā'anapali – Kapalua region.

Earthplan conducted two social impact assessments on Kā'anapali projects. The first study was on a timeshare resort on the 96-acre at North Beach. [20] The second study was conducted six years later on the Kā'anapali 2020 Plan. [21] Kā'anapali 2020 was a master planning effort that incorporated the principles of Smart Growth, New Urbanism and alternative modes of transportation aiming to create livable communities where people can live. The planning area covered 4,325 acres. Proposed uses were intended to be consistent with town development and included residences, employment centers, a hospital and other community uses. Kā'anapali 2020 entailed a lengthy and intensive community participation program.

In both studies, community interviewees were asked to describe the region's strengths and problems. Community strengths were similar in both. They included the social environment, including the diversity of people, the beauty of the natural environment, and the cultural and historical legacy. Community problems in both studies tended to be related to regional growth, and these included:

- Public Infrastructure: Traffic congestion and the lack of an efficient transportation system were the direct result of increased resident and visitor population. Parks were overused and improvements to sewerage and drainage systems were not keeping up with new development.
- Affordable Housing: The lack of affordable housing was a big problem. The region's rental unit supply is dominated by short term, high-priced rentals targeting tourists. Many of the region's employees cannot afford to live in West Maui, and must therefore commute from other parts of the island.
- Social Problems: In the second study, some people felt that the relationship between newcomers and long-time residents had improved. Still, there was continuing animosity based on financial disparity. It was pointed out the many of the relatively new residents (ten years and less) live in the higher-priced and gated Kā'anapali and Kapalua communities. It was felt that it was difficult for some workers to witness the conspicuous economic differences while they have difficulty with economic survival. Also, it was felt that newcomers tend to be more articulate, and some eventually assume leadership roles in community organizations and efforts. While this was considered a positive contribution, it was sometimes considered negative when the

[20] *Earthplan,* ***Kaanapali Vacation Club: Social Impact Assessment*** *(February 1997).*

[21] *Earthplan,* ***Kaanapali 2020: Social Impact Assessment*** *(August 2003).*

newcomers try to impose their own culture and experience on the existing community. Crime and drugs were a continuing concern.

Although there was continued concern about social problems generated by an influx of newcomers and visitors, there was a difference in attitude between the two studies. In the second study, community informants felt that there was more community cohesion. As the newer residents settled in, people were accepting the differences in viewpoints and cultures. The newer residents were contributing to local efforts, and the respect between long-time and recent residents was reportedly growing.

Further, there was optimism about the future in the second study. Many of the interviewees participated in the Kā'anapali 2020 effort. They felt that they were able to work together and compromise, and that the plan was a reflection of a preferred future for West Maui.

5.4.2. Relevance to Lā'au Point

The Lāna'i model illustrates how a rapid shift from a single-product agribusiness to resort and luxury development caused significant social disruption. While other communities with plantation closures have options of diversification or relocation to nearby employment centers, the Lāna'i community was only offered the option of upscale resort development and accompanying resort service jobs. Long-term residents were forced to adapt to the new economy. Faced with the specter of unemployment, they supported the economic change and job opportunities of resort development, but with some skepticism.

The problems related to lack of options are directly to lack of community control. Lāna'i residents were not afforded to opportunity to have meaningful input in the future of their island. Economic disparity and racial tension exacerbated feelings of helplessness and social stress.

In meetings and interviews on the Lā'au Point Project, people who opposed the project feared the Moloka'i would follow this Lāna'i model if the Project were implemented. They felt that residents would be subject to the control of the rich newcomers. They were concerned that their lifestyle would be irrevocably diminished by the presence of millionaires who would flaunt their wealth and disrespect local values.

Two factors suggest that Project implementation would not result in social conditions that exist on Lāna'i.

- Community control: Whereas Lāna'i residents historically accepted the conditions of the island's predominant employer, Moloka'i has traditionally exhibited self-reliance and independence. Changes and proposals are scrutinized, and residents make their own options if they

do not like what is presented. Community control was a salient factor in the development of the Plan and Project.

- Multiple forces for change: Lāna'i was given only one option to change. Moloka'i has multiple options. The economic base is more diversified than that of Lāna'i, and people have more choices than just the visitor industry.

The social problems present on Lāna'i could occur anywhere, however, as long as long as people feel an absence of choice and loss of control due to development. The lesson to be learned from Lāna'i is how to prevent such social problems. The Lāna'i study encourages the prevention of these problems through the sustainability of traditional values and practices. Rather than replacing existing values with imported standards, new development should build upon the traditions that existed prior to the change.

To those who participated in this SIA, West Maui is an urban environment characterized by too many structures, too many people, too many newcomers, and too much development. This was highly undesirable, and it was felt that any step in this direction would be detrimental to Moloka'i. For those who oppose Lā'au Point, this Project is a step in that direction.

Development has indeed significantly altered West Maui's social environment. The social impacts of development in West Maui have generated significant changes. The increase in population and shift in settlement patterns are measurable impacts. Changes in the political and social structure are less tangible but no less significant.

Two factors suggest that the replication of West Maui's social environment in Moloka'i due to the Lā'au Point Project is highly unlikely.

- Significant difference in timing and scale: Lā'au Point Project build-out is estimated to take 16 years. At the end of this period, an estimated 174 people will be permanent residents. This will account for only two percent of the population forecasted for 2025. The likelihood of these people having significant influence in changing Moloka'i's social and political structure is low.

- Protection of land from future development: If the Project is implemented, over 55,000 acres will be protected from development. This will prevent a change in settlement patterns on subject lands.

Nevertheless, the West Maui model can serve as example for relationships between long-time residents and newcomers. While there are still differences in values and lifestyle, community cohesion in West Maui was growing. Long-time residents have come to appreciate the contributions of more recent residents, and the latter have learned to work within the framework of the local community.

5.4.3. Lā'au Point Project Impacts

The impacts of the Project on the social environment are based on the number and type of new residents. It is estimated that 174 permanent residents will live at Lā'au Point, and that peak occupancy would have 499 residents on-site. The average number of permanent and seasonal residents is 230.

The new residents are expected to share common socio-economic characteristics, the most notable of which is high income. Lā'au Point residents are expected to be empty nesters and in pre-retirement or retirement age. Further, most of them are expected to be based elsewhere, and will live at Lā'au Point on a part-time or seasonal basis.

Expectations of conflicting values and unfair treatment

The impacts of this new community are related to expectations and preconceptions of other social groups. There is a tendency to expect certain behavior and values of people who are different. Race and gender have culturally and historically been the bases for expectations. Economic class differences also elicit preconceptions, as do age, religion, politics, occupation and lifestyle. The bases for these expectations vary, including cultural mores, the media, experience, parents, authority, and so on.

It is therefore typical to expect that Lā'au Point residents will have values and behavior that are different if not counter to Moloka'i Style. Part of the Project's impact on Moloka'i's social environment is therefore the sheer expectation of conflicting behavior and values. These expectations create an atmosphere that awaits conflicts, and an atmosphere of tension and apprehension.

This impact on the social environment is already occurring. In meetings and interviews for this study, we found that people have many expectations of the new residents, and these expectations are especially negative for those who oppose the Project. People expect the new residents to have materialistic values and to look down on those who are poor. They expect the new residents to be haole, and to have stereotypical characteristics of that ethnic group. People expect the new residents to have little or no appreciation for Moloka'i Style, including social behavior, subsistence gathering and ocean recreation.

Further, Project opponents publicize these expectations, and these visible and vocal expectations can influence those who are neutral about the Project.

Community conflict

The Project has elicited passionate community discourse. Project opponents especially have vocalized their strong objection to the Lā'au Point project. In interviews and meetings for this study, opponents have vowed to use aggressive measures to fight the project in legal and public arenas. Bumper stickers and signs are reminders of their position, and members of the Save Lā'au group, Hui Ho'opakele, are planning to occupy the Lā'au area.[22]

This contentious public debate affects the social environment because it breeds apprehension and social disharmony.

Social interactions and relationships

Another impact on the social environment is related to future social interactions and relationships between existing and new residents. These interactions can be positive or negative.

- Interactions at Lā'au Point

  The Project will open up Lā'au Point to the community, and existing and new residents will interact. These interactions are especially sensitive because Lā'au Point is "our 'aina" to existing residents and home to the new residents. Interactions can be positive if both parties are respectful and appreciate each other's privacy and right to enjoy Lā'au Point. The interactions are inevitably negative if either party displays possessiveness or disrespect for the other's relationship to this area.

- Interactions in community efforts

  Community efforts provide opportunities for positive interactions because both existing and new residents can work toward a common goal. Encouragement and appreciation for each other's contributions go a long way in creating positive interactions. If newcomers insist on his or her way, or places higher value on "where I come from," or existing residents exclude newcomers, then interactions become negative and counter-productive.

[22] *Bree Ullman, Linda Lingle Endorses Master Plan; Criticizes Lā'au Opposition,* ***Moloka'i Dispatch*** *(August 18, 2006).*

- Casual interactions

  Casual interactions in stores, churches, schools, banks and other public places are the most common and impressionable. In discussing Moloka'i Style, people often referred to their experiences in these venues. Friendliness and common courtesy between casual acquaintances plant the seeds for positive interactions. Impatience and rudeness will leave a negative impression that may extend to future interactions.

Community experience at Lā'au Point

In addition to personal interactions at Lā'au Point, the social environment of existing residents also includes the actual experience of visiting the area. Although study participants generally did not frequent this area, they knew of and appreciated its mana. The seclusion and pristine nature, along with abundance of food sources, make this a very special place for Moloka'i residents. It is part of Moloka'i Style.

Having luxury homes and affluent residents would alter this experience, particularly if the homes and property fences are very visible or prominent. The juxtaposition of natural beauty and expensive homes would be offensive for those who resent the presence of outsiders or structural development.

On the other hand, existing residents may appreciate the ability to visit a previously inaccessible area regardless of nearby uses.

Impact on West End residents

Residents of Pāpōhaku Ranchlands and Kaluako'i would have a direct relationship with the Lā'au Point Project. These areas are currently fairly isolated, and the project would bring increased activity due to the shared access road with Lā'au Point residents and those using the public access.

5.4.4. Project Significance and Mitigation

As previously discussed, the Lā'au Point Project is not expected to have the same magnitude of impact as the development of Lāna'i or West Maui.

A significant impact on the social environment is the embodiment of negative expectations related to Lā'au Point residents and the public controversy. Project opponents have focused on Lā'au Point as *the* problem. While the Project itself does not generate this impact of negative, it is the target of intense criticism.

The heated nature of this controversy has a detrimental effect on the social environment. It causes social disharmony and stress. In focus group sessions and interviews conducted for this study, people repeatedly said that they do not go to meetings because of confrontational behavior. They feel intimidated and have become less inclined to participate in public meetings. Kūpuna were concerned that this type of behavior was becoming more common. The mitigation to offset this already existing impact is to give people the opportunity to learn about the Project and the Plan in a non-confrontational setting so that they can make an informed decision on their own.

Regarding social interaction and relationship, the Project does not add a new element to Moloka'i's social environment. The community is already experiencing change, and East Moloka'i in particular has undergone transformation.

Recent real estate transactions suggest that affluent people are continuing to buy expensive homes in East Moloka'i. From January 2000 to May 2006, there were 83 real estate transactions, not including family transfers and other non-applicable transactions. The mean selling price for the total inventory, not including the highest and lowest values, was $334,774. In contrast, the mean selling price of the 47 homes in Maunaloa, Kualapu'u and Kaunakakai was $235,586. [23]

Interaction between existing residents and affluent newcomers is therefore already occurring. And from accounts in interviews and meetings, Moloka'i Style is still persistent and resilient in spite of these new residents.

To mitigate potential social conflicts due to economic disparities between the existing and new residents, there needs to be social integration on a regional level. Newcomers need to be informed of and sensitized to local values and lifestyle. Existing residents could help the new residents assimilate into the community using practices recommended in the Community-Based Tourism Plan. This scenario of mutual adjustment and acceptance is very likely, especially given the acceptance and aloha that is characteristic of Moloka'i Style.

[23] *Information provided by Ke 'Aupuni Lōkāhi, with assistance from local realtors.*

In terms of community experience at Lā'au Point, it is crucial that existing residents feel welcome to use the public accesses and visit the shoreline. Expectation management should be incorporated in the resource management program orientation so that shoreline visitors are comfortable with the new development. Also, to the extent possible, the structures should be located to limit visibility from the shoreline. This would enhance the natural setting for shoreline visitors and provide privacy for the homeowners.

Regarding impacts on Pāpōhaku Ranchlands and Kaluako'i residents, improvements to shared infrastructure would help to balance the impacts related to increased users and activities. In meetings and interviews with these residents, they had several suggestions which are included in Section 4. Further discussion on these matters is recommended.

5.4.5. Social Impacts of No-Project Scenario

Except for the impact related to negative expectations and current community conflict, Project impacts on the social environment are manageable and can be mitigated, as discussed in the previous section.

The Project's most significant impact on the social environment is its enabling of the Community-Based Land Use Plan. While many parts of the Plan are important, its core social value is the provision for community control and self determination. It is community control that will help existing and new residents take care of the shoreline and other conservation areas. It is community control that will mālama cultural resources and promote subsistence activities. It is community control that will develop the right type of affordable housing and will make sure that Moloka'i Style is perpetuated.

This type of community control strengthens the social fabric because it allows people to make meaningful contributions within a predictable framework. Hence, while, the Project by itself is just a development project, its contextual impact in the Plan has major social significance and value.

Non-implementation of the Project is even more significant. If the Project is not implemented and MPL seeks other alternatives, the future of its holdings is uncertain. The community would lose control of resources, and economic opportunities would decrease. There may be multiple landowners, which would make it difficult to develop a cohesive and comprehensive plan for West Moloka'i. The uncertain future of land uses and cultural and environmental resources, coupled with diminished hope for jobs, would cause social anxiety and tension and stress social and health services.

Unemployment and out-migration rates would likely increase. Further, for those who would lose their job or business due to business closures, financial pressures and family stress would result and they would need to find alternative means of support.

5.5. Impacts on Public Services and Facilities

5.5.1. Police Protection Services

Moloka'i police protection services are provided by the Maui County Police Department. The Police Station is located in Kaunakakai, next to the Kaunakakai Fire Station. In addition to the Commanding Officer position, there are 29 positions including:

- One Lieutenant
- Six sergeants
- Twelve patrolmen
- Five dispatchers
- One school resource officer
- One community officer
- One auxiliary officer

Approximately 90 per cent of the police officers are from Moloka'i.

A minimum of two officers and one sergeant are on duty at any given time. The island is divided into an east and a west beat. Each beat has three eight-hour shifts, and each shift is staffed by one officer.

The Moloka'i community is very rural in character. The most frequent crime problems revolve around domestic quarrels, neighbor disputes and family quarrels. Many of these are situational; younger males are sometimes participants in fights. Some problems could stem from stress related to financial issues due to the high unemployment rate. Moloka'i also has a drug use problem like every other community after the introduction of crystal methamphetamine to Hawaii. [24]

[24] *Personal communication with Captain Dan Matsuura, Maui County Police Department, Moloka'i Division, July 25, 2006.*

The Project will directly impact police protection services due to increase of people and activity on and around the Project site. During construction, construction activities will increase activity and access on private property. In the long-term time frame, there will be an increase in demand from the additional population, more homes and property, and increased activity resulting from public parks and more public accesses. Lā'au Point is very remote and the response time for all emergency services is about 25 minutes. Further, the population in the Kaluako'i region is dispersed.

To mitigate impacts, the Police Department should be kept informed of each stage of the construction process in anticipation of security or traffic issues. Further, on-site private security services can help to deter trespassing, loitering and property crime.

The Project will have an indirect impact on police protection services due to implementation of the Plan. Additional population would result from the increase in affordable housing units, and portions of conservation land may be accessible for cultural and subsistence uses. Specific impacts of these efforts are outside the scope of this study, and would need to be analyzed the implementation of these Plan components progresses.

5.5.2. Fire Protection

Three fire stations serve Moloka'i. The main station is the Kaunakakai Fire Station located next to the Police Department. An engine company, Kaunakakai Fire Station has an Engine and Tanker, a rescue boat and a utility truck. There are five to six firefighters on duty every twenty-four hours.

The Ho'olehua Fire Station serves the west end, and houses a full five-man engine company. The Pūko'o Fire Substation is 16 miles east of Kaunakakai and houses a two-man engine company.

In addition to fire emergencies, the department has first responder medical assistance capability when needed. Emergency Medical Service, or EMS, is provided by Medivac, a private ambulance service of American Medical Response Company. EMS has two ambulances, one with two people on duty and a backup ambulance serviced by call-back personnel.

The Project will directly impact fire protection services due to the increased demand generated by additional population, the presence of more structures, and increased activity at the parks and along the shoreline. The Project area is about 25 to 35 minute response time from the Ho'olehua Engine Co. station and about 20 additional minutes from Kaunakakai Engine Co.

Most responses to the project area would probably be medical related given the older population. Further, there is a risk of brush fires in the area due to dryness and high winds. Due to the remoteness and long response-time, brush fires can have a considerable head-start.

Mitigation measures to address these impacts include:

- Inform residents that keeping driveways open for fire truck and tanker access is their responsibility.
- The access points at the public parks at either end of the project should be designed for jet ski launch capability. There should be clearly defined access points within the Project area.[25]
- Water rescues such as wind surfers, diver and swimmer related accidents can be handled by jet skis. Fishing boat accidents would require the rescue boat. Newspaper accounts of helicopter assistance (from Maui) being used in searching for lost boats or swimmers, though uncommon, give Moloka'i additional ocean rescue capability.[26]

The Project will have an indirect impact on fire protection services due to implementation of the Plan. Additional population would result from the increase in affordable housing units, and portions of conservation land may be accessible for cultural and subsistence uses. Specific impacts of these efforts are outside the scope of this study, and would need to be analyzed as Plan implementation proceeds.

[25] *Currently the Fire Department's 21 foot rescue boat is launched from Kaunakakai. The feasibility and community acceptance of boat launch facilities is undetermined at this time. Given the past and possible future boat landings at Lā'au Point, there is strong community concern that outside boaters would be inconsistent with subsistence activities along this shoreline.*

[26] *Personal communication with Captain Wren Westcoatt, Kaunakakai Fire Station, July 27, 2006.*

5.5.3. Medical Facilities

Moloka'i is served by the Moloka'i General Hospital, which is part of the Queens Health System based in Honolulu. Located in Kaunakakai, the Moloka'i General Hospital houses 15 patient beds, of which 13 are acute care beds and two are long-term care beds. Its service population is the island of Moloka'i. [27]

Services include:

- 24-hour emergency room
- Inpatient services
- Family planning/midwifery
- Family doctor/internist
- Laboratory
- Physical therapy
- Radiology
- Ultrasound
- Mammography
- CT (cat scan)
- Bone density testing
- Echo-cardiograms

In addition, there are specialty clinics for appointment visits including

- Allergist
- Cardiologist
- Endocrinologist
- Gastroenterologist
- General surgeon
- Nephrologist
- Ophthalmologist
- Orthopedist
- Pediatric-develop mentalist
- Physiatrist
- Podiatrist
- Urologist
- Veterans' affairs

[27] *Information was provided by Punahele Alcon, Administrative Assistant, Moloka'i General Hospital, August 31, 2006*

In June, 2005, Moloka'i General Hospital celebrated the opening of a new wing to their facility. The $7.5 million project represents completion of Phase I of the development, conceptualized in 1997. The new wing includes two new trauma rooms, new CAT scan, new radiology room, emergency room, delivery room, and storage rooms among others. Work on Phase II, which included the relocation of the Women's Health Center and expansion of the medical office, was to begin shortly thereafter. [28]

In addition to the hospital, Moloka'i's medical services include a rural health clinic that is part of the hospital, two private physician practices, a midwife, three dental practices, a community health center, and one chiropractic clinic. Other medical and health services include three mental health care homes, an area health education center, Care Resources (nursing home without walls), ambulance medical response, Moloka'i Occupational Center, Na Pu'uwai, Kalua Ola Hou, Molokai Drugs, and several government programs. [29]

The Project will directly impact hospital services by increasing the service population; the service area will be unaffected. It is anticipated that on-site residents will be older than the general population, and thus require a higher level of service.

The low level of permanent population will help to offset impact on health care services. Further, it is expected that on-site residents will have live-in caretakers and caregivers, thereby reducing the need for medical and health services.

The Project will have an indirect impact on medical and health services related to implementation of the Plan. Additional population would result from the increase in affordable housing units. Specific impacts of these efforts are outside the scope of this study, and would need to be analyzed as the implementation of these Plan components proceeds.

5.5.4. Public Schools

Moloka'i has six public schools, including three elementary, one conversion charter school elementary, one intermediate and one high school. In the last three years, educational resources were expanded to include a private charter high school and a private charter middle school. Maui Community College offers post-secondary opportunities.

[28] *Tracy Liu, MGH unveils its new wing, **The Moloka'i Island Times**, Volume 01, Issue 23 (June 29, 2005).*

[29] *Center for Rural Health Works, **Island of Molokai, Hawaii, Medical Service Area - Economic Impact of the Health Center** (September 2005), Table 9: Direct Economic Activities of the Health Sector, Island of Molokai, 2005.*

Project residents would be served by Maunaloa Elementary School for kindergarten through grade six, Moloka'i Intermediate School for grades six through eight, and Moloka'i High School for grades nine through twelve. Other options include the three charter schools.

Located in upper Maunaloa town, Maunaloa Elementary School has been experiencing decreasing enrollment, from 73 students in 2003, to 69 students in 2004, and to 57 students in 2005. Moloka'i High School is located in Ho'olehua. It experienced decreasing enrollment from 446 in 2003 students to 405 students in 2004, and a minor increase to 408 in 2005.

The Project impact on the public education system was assessed in the economic and fiscal analysis. It was found that in the permanent resident population, at full build-out, less than 25 students are projected. This includes less than ten students in kindergarten through grade six, and less than 15 students in grades seven through twelve.

These estimates are based on a low housing occupancy rate, the age of the anticipated population and educational preferences. Approximately 30 percent of the La'au Point residents are expected to be permanent residents and the new residents are expected to be older than the general population. About 25 percent of the permanent residents are expected to have children under 18 living at home; another ten percent are estimated to have family members over 18 living at home. Further, it is likely that some of the Lā'au Point residents will home school or send their children to private schools.

The Project impact on educational facilities is therefore expected to be minimal. Mitigation measures are presented in the economic and fiscal analysis. [30]

[30] *Knowledge Based Consulting Group,* ***Economic and Fiscal Impacts of the Proposed La`au Point Residences on Molokai, p****repared for Molokai Properties Limited (April 2006).*

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Appendices

Appendix A: Written Comments From the Public Meeting

One person submitted the following comments:

- *The Land Use Plan guarantees cultural, substance, environmental, economic sustainability. Without a plan, the island will be destroyed. The focus is on a minor part of the plan – 200 homes. I'll be dead before 200 homes are built – just as Pāpōhaku Ranchland developed slowly.*
- *Having economic development will allow families to qualify for homestead properties, affordable homes, self-sufficiency, etc.*
- *The future is not bright without this plan. Technology will allow development of the land – make water. This technology is around the corner. With land in the land trust, it stays under the stewardship of* Moloka'i. *This land will be protected from development,*
- *Two hundred homes will not bring permanent residents. The expansion of Hawaiian homesteads will perpetuate the dominance of Hawaiians population-wise. Three month residents don't get involved in the community.*
- *The island real estate market has already stressed the island. The land use plan will bring stability to the west end.*
- *Moloki will change; there is no such thing as staying the same. The plan helps reduce impacts by the community input and charting a course for the future.*
- *The population was once 10,000 on Molokai. Memories are short.*
- *In the community plan, a larger development was approved. The plan has a smaller development.*
- *Subsistence is part of the plan. The plan wants to perpetuate subsistence.*
- *Hawaiian culture will survive. The plan shows a sensitivity for culture to allow for Hawaiian practices. The rules are developed by Hawaiians for the community and Hawaiians. That is better than a foreign landowner.*
- *This plan is an agreement for the future.*

Appendix B: Written Comments from West End Residents Focus Group

One couple submitted the following comment:

As full time residents of Moloka¹i for the past 19 years (and part time residents for an additional 5+ years), we¹d like to voice of wholehearted support for the La¹au Point Project under discussion at meetings being held this coming week. Having attended planning meetings related to La¹au since the very beginning, we stress that our support has not changed and that we firmly believe the project is good for the island and that the years of careful planning will benefit the people of Moloka¹i.

Specifically, this project is in deed low-impact and most certainly being planned with environmental and aesthetics in mind. Issues such as water, erosion and land preservation, care of flora and fauna all have been addressed.

In the latter case, in regard to fishing and hunting, we¹d like to add that from our experience some of the very people who oppose the project in respect to fishing and hunting are the very folks who are misusing these precious resources and at times endangering the lives of islanders during poaching expeditions.

As for the cultural aspects of the project, great care has been taken to include preservation in a very sensitive and caring manner. This in itself is exciting and a win/win for the island and those who treasure Hawaiian heritage.

Not to be forgotten, the financial benefit the project will have for our island that most certainly needs all the help it can get in terms of employment and economic input. To survive Moloka¹i must feed its economic engine. Controlled growth such as this will does just that meaning that residents will be able to remain on their home island and will be able to raise their families in a healthy and productive social setting. Stagnation is not the answer nor is massive development. Thus, La¹au is a perfect solution.

Beyond this is the Land Trust element that has been incorporated and which will benefit and save the entire island for generations to come

I think it is important for those reviewing this project to fully review the standing and credentials of those who oppose this important project. The agenda of the vocal minority group and its funding source should be noted as their negative campaign is nothing new on-island and has disrupted the community for years. Be it the well organized hui or West Enders with NIMBY mentalities, their goal is and has long been to bring down the Ranch at the expense of the good folks who hope to have a future on Moloka¹i. Please, in considering this matter, don¹t base your conclusions on bumper-sticker mentality and paid ads in newspapers. There is a huge, albeit, silent majority who want this project to go through and want to see Moloka¹i succeed. Again, please think beyond the negative rhetoric much of it wrong and hyped for propaganda purposes.

In conclusion, we truly believe that a controlled growth project such as La¹au Point could well serve as a model for others. The Ranch and the EC are to be congratulated for devoting so much time and effort in working with the community at large and for thinking to the long-term sustainability of our fragile environment and those who live here. Again, we commend them and strongly support the La¹au Point Project.

Thanks to all who have worked so long and hard during the planning phase.

Their dedication and unselfish desire to ensure better time for Moloka¹i are remarkable as has been their creative thinking with a view to the future.

Mahalo nui loa!

The following comment was submitted by an individual after the meeting:

I have one comment that I neglected to make at the meeting which does relate to social impact/quality of life specifically to residents of Maunaloa, Pāpōhaku Ranchlands, Moana Makani, Kaluakoi Hotel guests, the condo owners and renters and the Fairway residents as well as future owners at La'au Point. I understand that a parcel of land has been designated to house a ***FIRE STATION****. Rather than just a parcel, I propose that MPL and its partners, commit to* ***building a fire station as part of the overall plan.*** *The facility would then be transferred to the control of Maui County.*

As a practical matter, most insurance companies will not write policies because the community is located a distance from a fire station which they consider an unacceptable risk. Perhaps as a result of having first responders within a reasonable distance of emergencies, one of the many lives lost on our West End beaches could be saved. A fire station would serve the entire West End community, not just the proposed La'au Point.

I can't stop thinking about it and need to underscore the importance of the negative impact it will have on Moana Makani, Ranchlands and Fairways residents....that is the use of Kaluakoi Road as the access point. I saw a report of the Maunaloa meeting you held and noticed that comments had been made in support of constructing the road through their town. Initially, it probably falls under economic impact however the fall out of NOT allowing economic development is negative social impact....poor schools, no job opportunities and the social vitality of the town. MPL seems to be turning a deaf ear to this suggestion.....as is sometimes said "don't confuse me with the facts, my mind's made up".

Appendix C: Written Comments from Filipino Focus Group

One person submitted the following comment:

I feel that the Laau Development will not impact Molokai's lifestyle.

- *We want people to have jobs.*
- *Get off of welfare and learn how to work and be self-sufficient.*
- *No other landowner would even think of giving any community ¾ of their lands. This opportunity is rare.*
- *Having more new money on island will help all businesses, schools, churches, etc.*

My family is in support of Laau development. I appreciate you letting us write our comments. We are not public speakers. Too intimidating.

One person submitted the following comment:

The project is a great opportunity for the people of the community to be self-sufficient. Will create continuing jobs for the people. The amount of land that will be sold is limited so I don't see any threat of mainlanders or rich people disrupting the present Molokai.

Appendix N

Preliminary Engineering Report

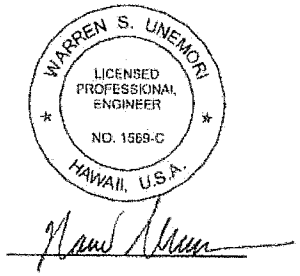
Established 1969

Preliminary Engineering Report

Laau Point Project at West Molokai, Hawaii

TMK: (2) 5-1-02: Portion of 30

Prepared For:
Molokai Properties, Ltd.
745 Fort Street Mall, Suite 600
Honolulu, Hawaii 96813



Date: July 2006
Revised: November 2006

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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Preliminary Engineering Report
for
Laau Point Project at
West Molokai, Hawaii

I. INTRODUCTION

The applicant, Molokai Properties, Limited (MPL), is asking the State Land Use Commission to change the land use designation of approximately 850 acres of ag land to rural that would ultimately allow for the subdivision of this area for 200 rural homesite lots averaging 2 acres each. They will also be seeking a County of Maui Community Plan amendment and change in zoning of the project area from ag to rural.

This report briefly describes and evaluates existing infrastructure in the project vicinity. It also provides a brief summary of probable infrastructural improvements that will be constructed to support the project.

II. PROJECT LOCATION AND TOPOGRAPHY

The project is located at the southwest tip of the Island of Molokai. The project area encompasses a band of land ranging from 1,500 to 2,000 feet inland of the existing conservation district boundary. The land along the western coastline extends approximately 10,400 feet north of Laau Point terminating at Kaupoa Beach Camp. The land along the southerly coastline extends approximately 15,400 feet east of Laau Point towards Hale Lono Harbor.

Existing grade across the westerly parcel ranges from 25 feet at the conservation line to approximately 125 feet along its mauka boundaries. Cross slopes varies between 3 to 7 percent. The southerly parcel of land has a steeper cross slope ranging from an elevation of around 50 feet at the conservation line to approximately 200 feet along its mauka boundaries. This translates to cross slopes that range between 7 and 15 percent, although steeper slopes can be found in isolated areas in between.

III. EXISTING INFRASTRUCTURE

3.1.a Potable Water:

MPL operates two water systems that serve West Molokai.

The Molokai Ranch Mountain System (MRMS) taps surface water from the mountains in central Molokai and conveys it to Puu Nana water treatment plant for Maunaloa and the Industrial Park. In addition, it provides water for landscaping at Maunaloa Village, the lodge and Kaupoa Camp as well as water for the Ranch's livestock. Seasonal flows vary between 1,300,000 gpd and 65,000 gpd. The average yield of this system is 500,000 gpd. This system's mountain source has a storage capacity of 39,000,000 gallons which helps to compensate for the seasonal fluctuation in source.

The source of water for the Kaluakoi water system is well 17, east of Kaulapuu. In December 2001, MPL acquired the assets of Kukui (Molokai) Inc. including its water system and its water use allocation of 1,018,000 gpd. Current use of the Kaluakoi system, with the Kaluakoi Hotel totally closed, is approximately 800,000 gpd. Water from well 17 is transported via rental space in the Molokai Irrigation System to Mahana. It is then pumped to a 7,000,000 reservoir at Puu Nana for treatment. The treated water is then piped to a 3.0 MG reservoir in Maunaloa and gravity fed to Kaluakoi. The Kaluakoi distribution system terminates approximately 9,000 feet north of the Laau Point project site.

3.1.b Non-Potable Water:

Although untreated mountain water is being used for irrigation in Maunaloa, water from the existing, but currently unused Kakalanale well above Kaunakakai, is proposed to replace this irrigation water source. Mountain water presently being used for irrigation will then be treated and converted to augment the potable water supply for West Molokai.

3.2 Sewer System:

The project site is obviously not sewered. Although, Maunaloa Village which is located approximately 5.60 miles northeast of the project site, has its own private sewered system, the distance and grade makes it impractical to pump wastewater from the project site to Maunaloa.

Kaluakoi depends on individual wastewater systems to handle its sewer in accordance with DOH rules and regulations.

3.3 Drainage System:

There are several drainageways that transect the project site in the mauka/makai direction. Runoff in these gullies will be allowed to pass through the project site uninhibited. The present flow patterns in these channels will be preserved. Where roads cross these drainageways, culverts will be installed to convey the 100 year flows across the roadway.

3.4 Roadway:

Primary access to the project will be from Kaluakoi Road which is located 9,000 feet north of the project site. This is a 22 feet wide paved road.

Maunaloa Highway, which is a State Highway, terminates at Maunaloa Village. Hale Lono Harbor is served by a coral-based unpaved road which abuts the southeast corner of the project site. This road connects Hale Lono Harbor to Maunaloa Highway.

3.5 Electrical, Telephone and CATV Systems:

Currently, there is an underground distribution system in Kaluakoi north of the project site. There is also an overhead system that runs to Hale Lono Harbor east of the project site.

IV. PROPOSED INFRASTRUCTURAL IMPROVEMENTS:

4.1.a Potable Water:

A new potable water system will be extended from Kaluakoi to the project. All lots will be metered separately. For the near term needs, water from MPL's mountain source will continue to be treated at the Puu Nana treatment plant. Long term sourcing is proposed to come from well 17 and MPL's mountain source as current non-potable uses being supplied by these sources are shifted to the non-potable source from Kahalehale well. When customer demand in Kaluakoi warrants, the Laau Point distribution system will be looped to the Maunaloa system, thereby augmenting the systems at Kaluakoi and the Laau Point project.

Probable water demand at full buildout is projected at 96,000 gpd. This is based on 80% occupancy of the 200 lots at 600 gpd, exclusive of irrigation.

4.1.b Non-Potable Water:

Initially, water for irrigation and fire protection will be provided from surplus mountain water. In the long term, brackish water from Kahalehale well will be used for irrigation and fire protection. A storage tank or reservoir will also be constructed above the project site to provide adequate pressure and to meet the storage requirements for fire protection. All lots will be metered. Fire hydrants will be installed along the road spaced at intervals between 450 to 500 feet. Various alignments are under consideration to bring non-potable water to the project site from the Kahalehale well source. The applicant projects that the non-potable demand at full buildout will be around 300,000 gpd.

4.2 Sewer System:

The applicant proposes to install a central package treatment plant for the project. Individual homes will be connected to this plant via a low pressure force main. The treatment plant will be designed to provide tertiary quality water suitable for use of common area landscape irrigation.

At full buildout and 80% occupancy, the project could generate as much as 70,000 gpd of wastewater; however, daily flows of approximately 20,000 gallons are anticipated due to projected average occupancy of 30%.

The wastewater treatment and collection system will be designed and constructed in full compliance with State Department of Health Rules and Regulations.

4.3 Drainage System:

Roadways constructed across existing drainageways will be provided with culverts to convey 100 year 24 hour offsite runoff safely across them. Storm drainage systems will also be installed along the roadway shoulders to convey pavement runoff into the closest drainageways. Subsurface storage and filtration systems will be installed at the end of each roadway drainage system to intercept water borne silt and other debris before they are discharged into the drainageways and State waters.

Additional runoff generated by each lot will be retained on the lot in an onsite surface or subsurface retention systems. This is to ensure that additional runoff generated by the project is kept within the project limits all in accordance with the provision of the Maui County's Storm Drainage Standards.

The current runoff from the proposed project limits is 512 cfs for a 50-year 1-hour storm. After development, this is expected to increase to 623 cfs. This translates to approximately .25 cfs per acre of developed area.

4.4 Roadway:

Roads within the project will be designed and constructed in accordance with the Provisions of Section 18.16 of the Maui County Code. All roads will be built to County minor road standards with 40 feet wide right-of-way and 22 feet pavement widths. Grassed swales will be provided on shoulders to convey runoff into a storm

drain system. Horizontal and vertical curves will be designed to meet stopping sight distance requirements for residential projects in the County of Maui.

4.5 Electrical, Telephone and CATV Systems:

Electrical, telephone and CATV distribution systems will be extended underground from Kaluakoi. At its eastern terminus, this underground distribution system will be connected to the existing overhead system servicing Hale Lono Harbor to provide an alternative means of serving the project.

4.6 Solid Waste:

Material derived from the clearing and grubbing operation will be chipped and spread over adjoining Ranch Lands and allowed to decompose as organic matter. Boulders and other excavated material that are not recycled and used in the project will be stockpiled in adjoining Ranch Lands also with proper erosion control measures.

V. CONCLUSION:

Based on the foregoing, it is our professional opinion that any project related impact can and will be readily mitigated by initiating Best Management Practices (BMP) during construction and by installing the infrastructural improvements proposed herein by the applicant.

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.

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Appendix O

Preliminary Drainage Report

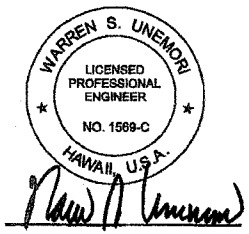
Established 1969

Preliminary Drainage Report

Laau Point Project at West Molokai, Hawaii

TMK: 5-1-02:Portion of 30

Prepared for:
Molokai Properties, Ltd.
745 Fort Street Mall, Suite 600
Honolulu, Hawaii 96813



Date: July 2006
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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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A	Hydrologic Calculations
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Preliminary Drainage Report
for
Laau Point Project
West Molokai, Hawaii

I. INTRODUCTION

This preliminary drainage report has been prepared to examine both the existing drainage conditions and proposed drainage plan for subject development.

II. PROPOSED PROJECT

A. Site Location:

The project is located at the southwestern tip of Molokai on the north and easterly side of Laau Point. It is situated along the coastline between Kaluakoi Resort to the north and Hale Lono Harbor to the east (see Exhibit 1).

The petition area encompasses approximately 850 acres summarized as follows:

200 house lots	400± Acs.
Roadways	46± Acs.
Infrastructure	14± Acs.
Park	8± Acs.
Open Space	382± Acs.
Total =	850 Acs.±

B. Project Description:

The proposed plan is to create 200 rural residential lots ranging in size between approximately 1 and 3acres.

Proposed improvements include asphalt paved roadways, grassed drainage swales; storm, sewer and water systems; underground electrical, telephone and CATV distribution systems; and landscaping.

III. EXISTING CONDITIONS:

A. Topography and Soil Conditions:

The project site is undeveloped and was previously used for seasonal grazing. The site generally slopes in a mauka/makai direction. The cross slopes along the westerly strip of land between Kaluakoi and Laau Point varies between 3 to 7 percent, whereas the lands along the southerly boundary toward Hale Lono Harbor is a bit steeper with cross slopes ranging between 7 and 15 percent.

According to the *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii* [1], prepared by the United States Department of Agriculture, Soil Conservation Service, the soil classification found at the project site is predominantly KKTC Kapuhikani. These soils are geographically associated with Holomua and Molokai soils. This soil contains many stones on the surface and throughout its profile. Average depth to bedrock is estimated at 27 inches.

B. Drainage:

There are several drainageways that transect the project site in the mauka/makai directions. Current runoff in these drainageways for a 100 year 24 hour storm range between 79 and 2194 cfs. The present flow patterns in these channels will be maintained. Culverts will be sized to convey these flows across the roadways that generally run perpendicular to these natural drainageways.

C. Flood and Tsunami Zone:

According to Flood Insurance Map parcel number 150003 - 0025B dated June 1, 1981 prepared by FEMA, the project site is predominantly situated in Zone C which is described as areas subject to minimal flooding. Portions of project site located along the lower lying coastline are in A4 and high hazard V zones. However, none of the lots fall within these zones. However lots that extend into the high hazard V zone will be required to comply with the provisions of section 19.62.060, "Standards of Development," Subsection "G" in Title 19 of the Maui County Code.

IV. DRAINAGE PLAN

A. General:

The primary objective of the drainage plan is to minimize the impact on the downstream conservation land and coastal ecosystem by implementing the following practices and design criteria:

a. Maintain the present drainage patterns within the existing drainageways.

b. Confine the clearing, grubbing and grading to the road right-of-ways and areas needed for installation of the infrastructure.

c. Install storm drainage system to collect runoff from the roadway swales and run it through a surface or subsurface detention and desilting facilities before discharging the runoff into nearby drainageways.

d. Where necessary, install grass lined diversion ditches along the mauka boundaries of the project areas to keep offsite runoff from flowing across the residential lots.

e. Require all lots to retain the additional runoff generated by the development of their lot in surface or subsurface retention facilities onsite.

f. Plant all disturbed areas with ground cover upon completion of the grading operation. Provide interim and/or permanent sprinkler systems to ensure continuous ground cover.

g. Initiate and maintain erosion control practices during and after completion of the project.

According to our calculations, the current peak runoff from the project site for a 50 year 1 hour duration storm is 512 cfs. Peak post development runoff from the developed lots and roadways is estimated at 623 cfs.

Surface and/or subsurface retention facilities will be sized to retain the difference in peak runoff in each lot. The runoff volume each lot must retain is approximately 282 cubic feet per acre of land.

B. Hydrologic Calculations:

The onsite hydrologic calculations are based on the "Rules for the Design of Storm Drainage Facilities in the County of Maui", Title MC-15, Chapter 4 and the "Rainfall Frequency Atlas of the Hawaiian Islands", Technical Paper No. 43, U. S. Department of Commerce, Weather Bureau:

Rational Formula used:

$$Q = CIA$$

Where Q = Rate of Flow (cfs)
C = Runoff Coefficient
I = Rainfall Intensity (inches/hour)
A = Area (Acres)

The offsite hydrologic calculations are based on procedures by the U.S. Department of Agriculture, Soil Conservation Service (SCS). This procedure is described in detail in the SCS National Engineering Handbook, Section 4, Hydrology (NEH-4). The 100-year inundation limits was determined by using the US Army Corps of Engineers HEC-RAS River Analysis System Version 2.2 software.

C. Conclusion:

The proposed development is not expected to have a significant adverse effect on the existing downstream properties. The anticipated increase in surface runoff from the paved roadway area will be directed into surface or subsurface detention and/or desilting facilities before being released into the nearby drainageways. Also, the increase in runoff from each developed lot will be retained onsite in surface or subsurface facilities. In addition, the contractor will be required to comply with State and County approved Best Management Practices for the duration of the construction period.

V. 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 00025 B, 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

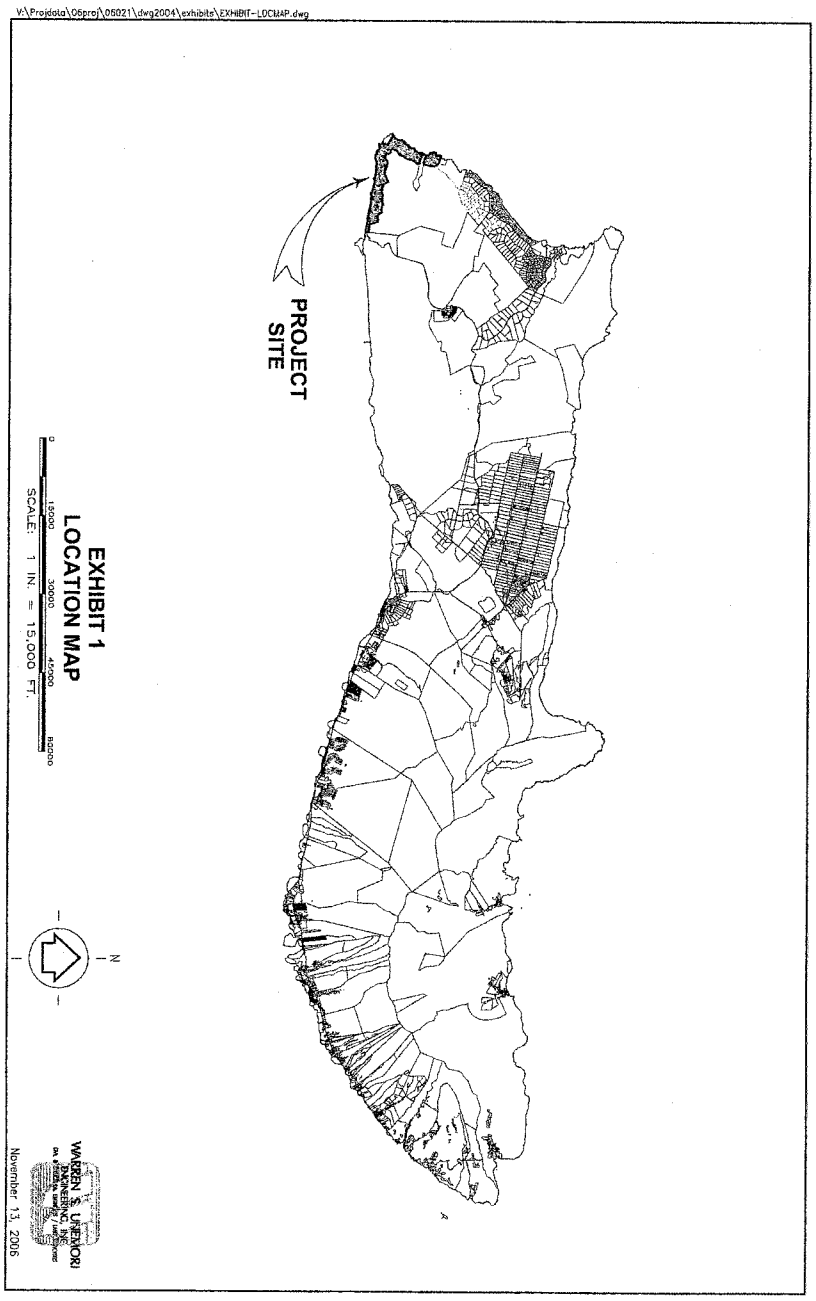
2 Site Specific Soil Classification Map

3 Flood Insurance Rate Map

4 Existing Drainage Map

5 Proposed Drainage System Map

6 Offsite Drainage Area Map



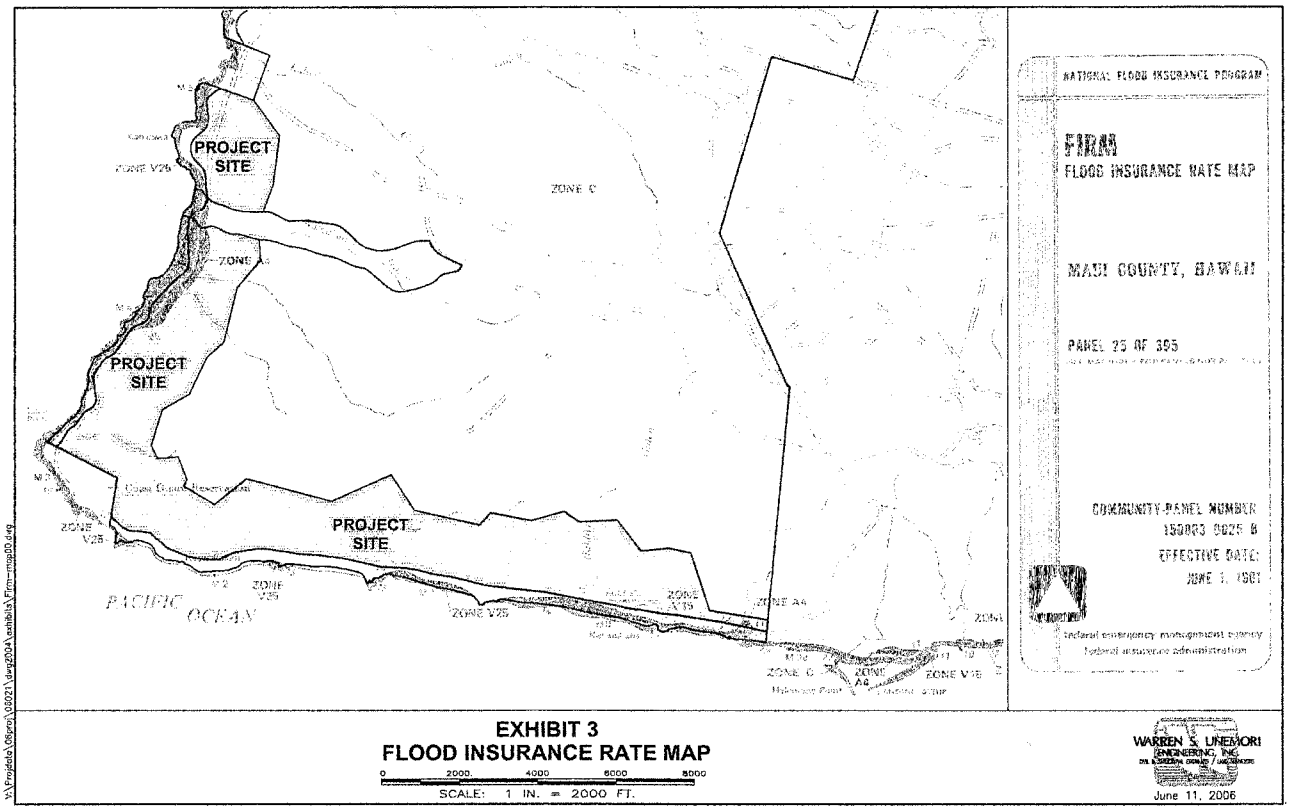


EXHIBIT 3
FLOOD INSURANCE RATE MAP

0 2000 4000 6000 8000
SCALE: 1 IN. = 2000 FT.

WARREN S. UNEMORI ENGINEERING, INC.
June 11, 2006

V:\Projects\06proj\06021\dwg2004\exhibits\Firm-map30.dwg

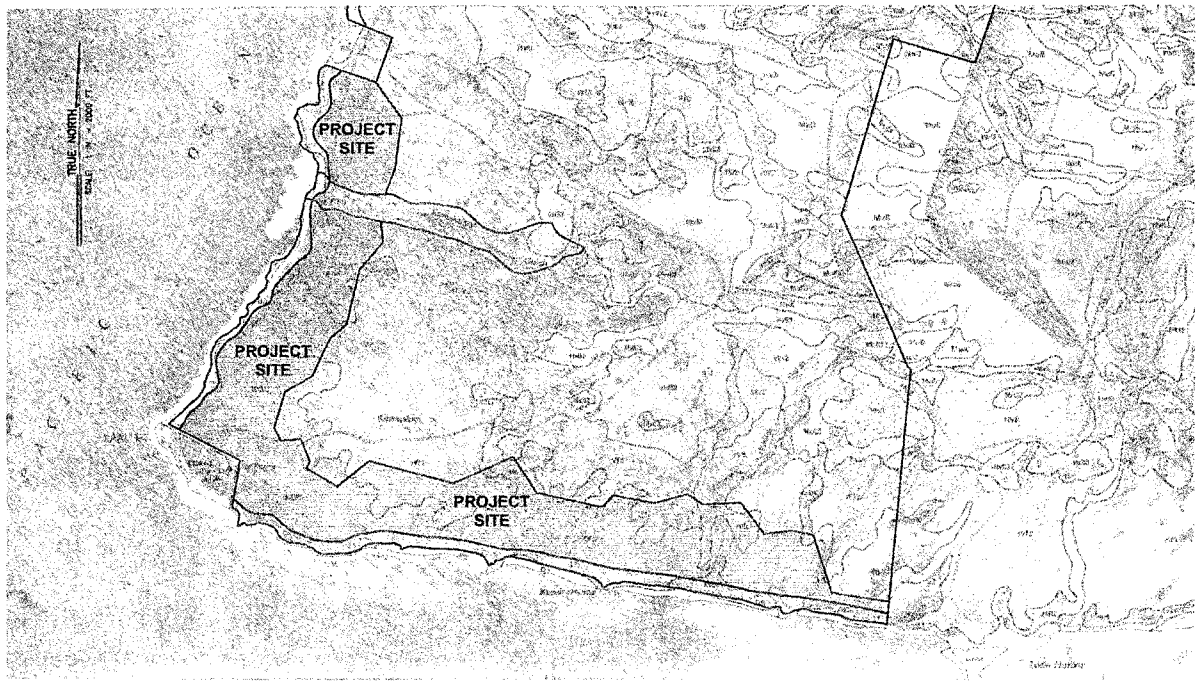


EXHIBIT 2
SITE SPECIFIC SOIL CLASSIFICATION MAP

0 2000 4000 6000 8000
SCALE: 1 IN. = 2000 FT.

WARREN S. UNEMORI ENGINEERING, INC.
June 11, 2006

V:\Projects\06proj\06021\dwg2004\exhibits\Soil-map30.dwg

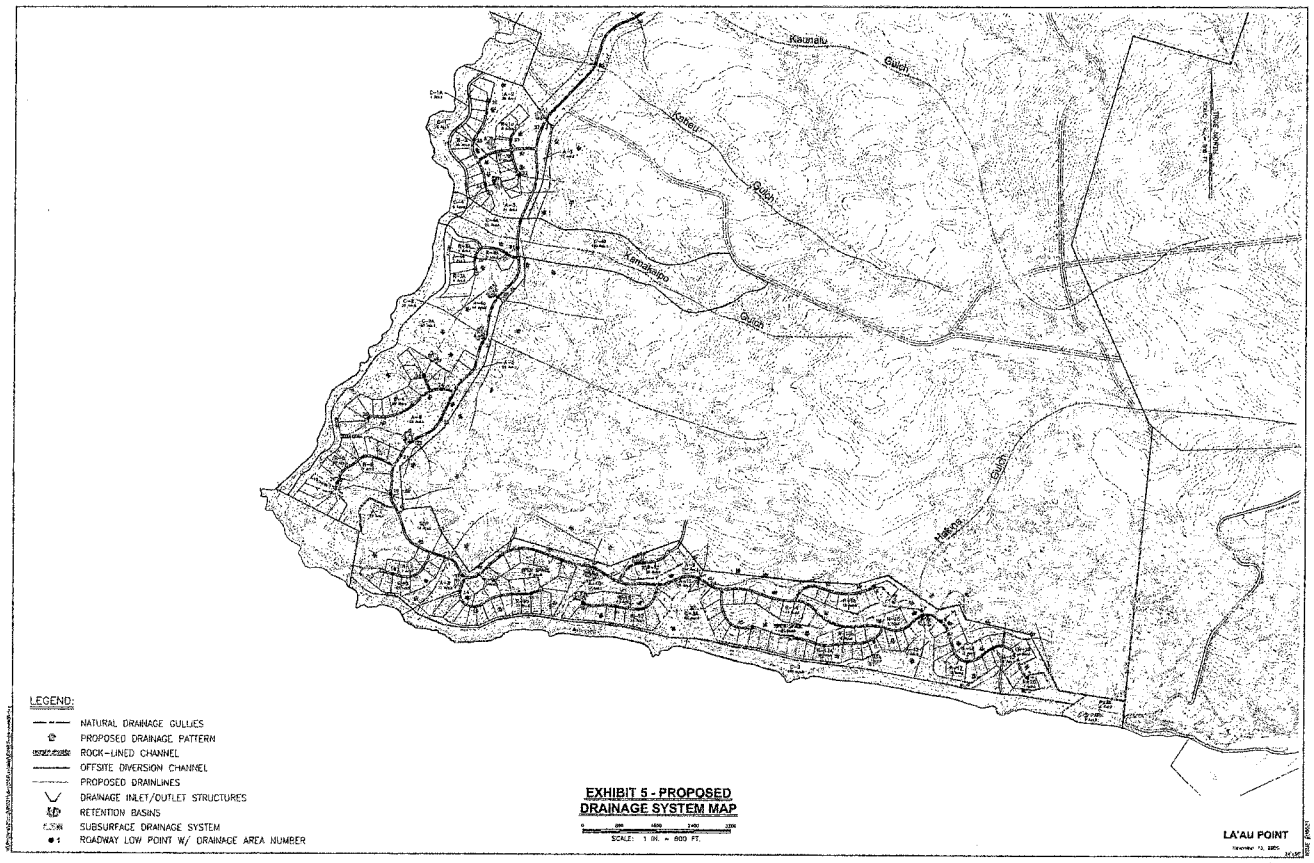


EXHIBIT 5 - PROPOSED DRAINAGE SYSTEM MAP

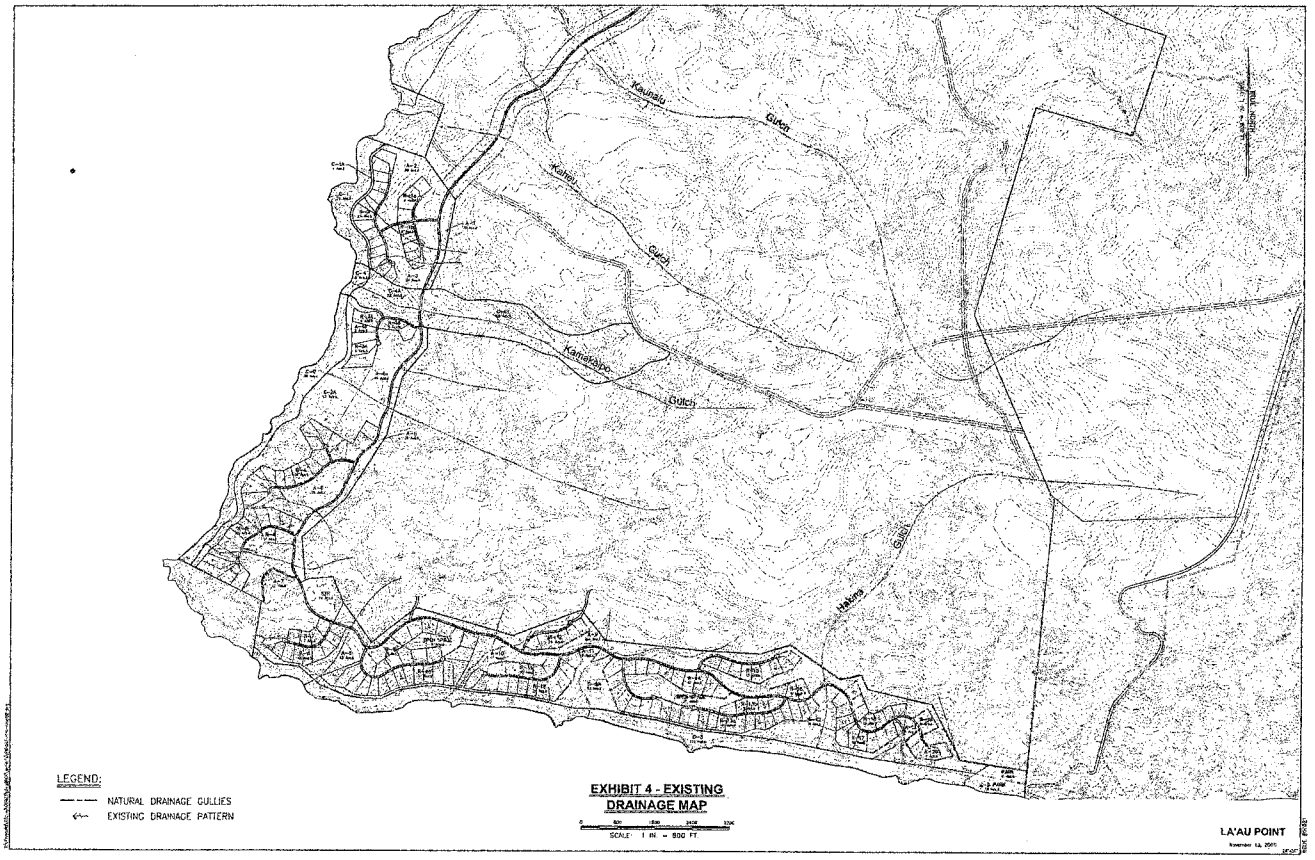


EXHIBIT 4 - EXISTING DRAINAGE MAP

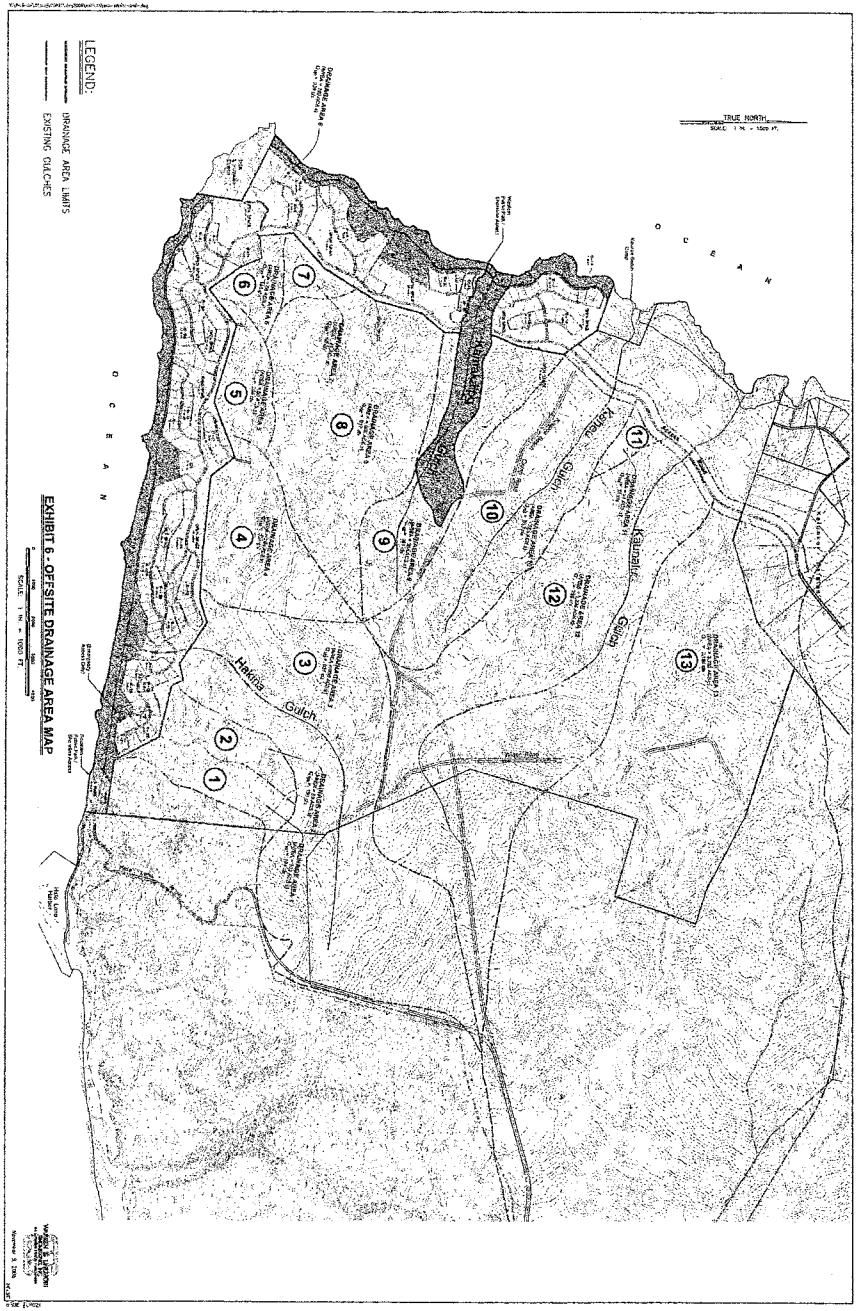


EXHIBIT 6 - OFFSITE DRAINAGE AREA MAP

APPENDIX A

HYDROLOGIC CALCULATIONS

R-13a	44	640	60	9.38%	24	2.76	41.24	0.35	0.39	19.0	4.00	68.21	116643
R-13b	8	420	32	7.62%	5	0.57	7.43	0.35	0.39	17.5	4.15	13.05	20553
R-14	18	440	23	5.23%	9	1.03	16.97	0.35	0.38	17.5	4.15	28.72	45230
R-15	15	510	29	5.69%	9	1.03	13.97	0.35	0.39	20.0	3.95	23.19	41735
R-16	6	450	38	8.44%	3	0.34	5.66	0.35	0.38	17.0	4.20	9.69	14822
R-17	19	690	38	5.51%	9	1.03	17.97	0.22	0.26	22.0	3.80	18.75	37125
R-18	12	365	35	9.59%	7	0.80	11.20	0.35	0.39	15.5	4.40	20.60	28739
R-19	4	570	50	8.77%	2	0.23	3.77	0.22	0.26	19.0	4.00	4.19	7166
R-20	7	520	46	8.85%	4	0.46	6.54	0.22	0.27	18.0	4.10	7.69	12455
TOTAL	401				201							521	1014064

LAAU POINT SUBDIVISION
POST-DEVELOPMENT DRAINAGE CALCULATIONS
Project Site Surface Runoff (50 Yr. - 1 Hr. = 2.4 Inches)

Lot #	Area (acs)	Longest Run (ft)	Elevation Change (ft)	Percent Slope	Number of Sublots	Roof Area (acs)	Heavy Soil Area (acs)	Heavy Soil C coeff	Weighted C coeff	T_c (min)	I coeff	Q value (cfs)	Storage Volume (c.f.)
R-1a	8	400	10	2.50%	5	0.57	7.43	0.22	0.27	21.0	3.90	8.50	16062
R-1b	8	400	12	3.00%	5	0.57	7.43	0.22	0.27	20.0	3.95	8.61	15493
R-2	26	580	17	2.93%	14	1.61	24.39	0.22	0.27	23.5	3.70	25.51	53943
R-3a	13	580	4	0.69%	4	0.46	12.54	0.22	0.25	32.0	3.30	10.54	30367
R-3b	5	450	23	5.11%	2	0.23	4.77	0.22	0.25	19.5	3.95	5.01	8787
R-4	39	950	54	5.68%	18	2.07	36.93	0.35	0.38	25.0	3.70	55.09	123958
R-5	32	750	30	4.00%	14	1.61	30.39	0.35	0.38	25.0	3.70	45.01	101268
R-6	7	910	34	3.74%	3	0.34	6.66	0.35	0.38	28.0	3.50	9.30	23432
R-7	7	775	42	5.42%	4	0.46	6.54	0.22	0.27	23.5	3.70	6.94	14675
R-8	15	980	43	4.39%	9	1.03	13.97	0.22	0.27	30.0	3.35	13.58	36671
R-9a	27	1080	61	5.65%	12	1.38	25.62	0.35	0.38	26.0	3.60	37.00	86570
R-9b	37	450	23	5.11%	16	1.84	35.16	0.35	0.38	19.5	3.95	55.51	97413
R-10	24	775	62	8.00%	12	1.38	22.62	0.22	0.26	21.5	3.85	24.20	46827
R-11	10	510	42	8.24%	5	0.57	9.43	0.22	0.26	18.0	4.10	10.74	17396
R-12	10	340	24	7.06%	6	0.69	9.31	0.22	0.27	16.0	4.30	11.62	16736

R-13a	44	640	60	9.38%	0.35	19.0	4.00	61.60	105336
R-13b	8	420	32	7.62%	0.35	17.5	4.15	11.62	18302
R-14	18	440	23	5.23%	0.35	17.5	4.15	26.15	41178
R-15	15	510	29	5.69%	0.35	20.0	3.95	20.74	37328
R-16	6	450	38	8.44%	0.35	17.0	4.20	8.82	13495
R-17	19	690	38	5.51%	0.22	22.0	3.80	15.88	31450
R-18	12	365	35	9.59%	0.35	15.5	4.40	18.48	25780
R-19	4	570	50	8.77%	0.22	19.0	4.00	3.52	6019
R-20	7	520	46	8.85%	0.22	18.0	4.10	6.31	10229
TOTAL	401							463	901505

LAAU POINT SUBDIVISION
PRE-DEVELOPMENT DRAINAGE CALCULATIONS
Project Site Surface Runoff (50 Yr. - 1 Hr. = 2.4 Inches)

Lot #	Area (Acres)	Longest Run (ft)	Elevation Change (ft)	Percent Slope	C coeff	T_c (min)	I coeff	Q value (cfs)	Storage Volume (c.f.)
R-1a	8	400	10	2.50%	0.22	21.0	3.90	6.86	12973
R-1b	8	400	12	3.00%	0.22	20.0	3.95	6.95	12514
R-2	26	580	17	2.93%	0.22	23.5	3.70	21.16	44762
R-3a	13	580	4	0.69%	0.22	32.0	3.30	9.44	27181
R-3b	5	450	23	5.11%	0.22	19.5	3.95	4.35	7625
R-4	39	950	54	5.68%	0.35	25.0	3.70	50.51	113636
R-5	32	750	30	4.00%	0.35	25.0	3.70	41.44	93240
R-6	7	910	34	3.74%	0.35	28.0	3.50	8.58	21609
R-7	7	775	42	5.42%	0.22	23.5	3.70	5.70	12051
R-8	15	980	43	4.39%	0.22	30.0	3.35	11.06	29849
R-9a	27	1080	61	5.65%	0.35	26.0	3.60	34.02	79607
R-9b	37	450	23	5.11%	0.35	19.5	3.95	51.15	89773
R-10	24	775	62	8.00%	0.22	21.5	3.85	20.33	39335
R-11	10	510	42	8.24%	0.22	18.0	4.10	9.02	14612
R-12	10	340	24	7.06%	0.22	16.0	4.30	9.46	13622

19	49931	1.146	0.35	0.68	800	26	3.25%	28.5	3.45	1.38	2.69	1.31	3347
20	85111	1.954	0.35	0.68	1700	69	4.06%	34	3.2	2.19	4.25	2.06	6314
21	13457	0.309	0.35	0.68	160	7	4.38%	13	4.7	0.51	0.99	0.48	561
22	18180	0.417	0.35	0.68	240	6	2.50%	17	4.25	0.62	1.21	0.59	896
23	33186	0.762	0.35	0.68	575	19	3.30%	22.5	3.8	1.01	1.97	0.96	1935
24	41618	0.955	0.28	0.65	633	41	6.48%	21	3.85	1.03	2.39	1.36	2572
25	32881	0.755	0.28	0.65	980	61	6.22%	25	3.7	0.78	1.82	1.03	2325
26	41575	0.954	0.35	0.68	820	54	6.59%	23	3.8	1.27	2.47	1.20	2477
27	72489	1.664	0.28	0.65	1650	86	5.21%	31.5	3.3	1.54	3.57	2.03	5760
28	65685	1.508	0.28	0.65	950	30	3.16%	30.5	3.35	1.41	3.28	1.87	5131
29	22491	0.516	0.28	0.65	350	18	5.14%	17	4.25	0.61	1.43	0.81	1242
30	42142	0.967	0.28	0.65	590	27	4.58%	21	3.85	1.04	2.42	1.38	2605
31	92097	2.114	0.28	0.65	2050	55	2.68%	37	3.1	1.84	4.26	2.43	8075
32	17595	0.404	0.28	0.65	290	11	3.79%	16.5	4.3	0.49	1.13	0.64	954
33	22984	0.528	0.28	0.65	350	2	0.57%	27	3.5	0.52	1.20	0.68	1660
34	75894	1.742	0.28	0.65	1950	54	2.77%	37	3.1	1.51	3.51	2.00	6655
35	72813	1.672	0.28	0.65	2100	56	2.67%	37.5	3.1	1.45	3.37	1.92	6471
36	30760	0.706	0.28	0.65	660	11	1.67%	28	3.5	0.69	1.61	0.91	2304
37	12864	0.295	0.28	0.65	200	3	1.50%	17.5	4.25	0.35	0.82	0.46	731
TOTAL	2006627	46.066								49.2	102.2	53.0	152390

LA'AU POINT SUBDIVISION
PRE/POST DEVELOPMENT ROADWAY DRAINAGE CALCULATIONS
Project Site Surface Runnoff (50 Yr. - 1 Hr. = 2.4 Inches)

Drainage Area	Area (Sq. Ft.)	Total Area (acres)	Pre-Devleopment Runoff Coefficient	Post-Devleopment Runoff Coefficient	Length (ft.)	Elevation Difference (ft.)	Average Slope	Time of Conc. (Min.)	Rainfall Intestity (50yr.-1hr.) (in./hr.)	Q Pre-Development (50yr.-1hr.) (cfs)	Q Post-Development (50yr-1hr) (cfs)	ΔQ (Net Increase)	Volume Increase (Sq. Ft.)
1	23487	0.539	0.35	0.68	500	29	5.80%	20	4	0.75	1.47	0.71	1281
2	82232	1.888	0.35	0.68	1300	37	2.85%	34	3.2	2.11	4.11	1.99	6100
3	18044	0.414	0.35	0.68	350	28	8.00%	16	4.4	0.64	1.24	0.60	866
4	148893	3.418	0.35	0.68	4350	175	4.02%	75	2.2	2.63	5.11	2.48	16750
5	134582	3.090	0.35	0.68	1810	44	2.43%	36	3.15	3.41	6.62	3.21	10406
6	28381	0.652	0.28	0.65	625	14	2.24%	25	3.7	0.67	1.57	0.89	2007
7	48170	1.106	0.35	0.68	1100	44	4.00%	28	3.5	1.35	2.63	1.28	3219
8	139869	3.211	0.35	0.68	2100	83	3.95%	35	3.2	3.60	6.99	3.39	10681
9	78926	1.812	0.35	0.68	1800	77	4.28%	33	3.25	2.06	4.00	1.94	5771
10	16821	0.386	0.35	0.68	300	16	5.33%	15.5	4.35	0.59	1.14	0.55	773
11	36123	0.829	0.28	0.65	640	31	4.84%	21.5	3.85	0.89	2.08	1.18	2286
12	72080	1.655	0.28	0.65	1125	56	4.98%	27.5	3.5	1.62	3.76	2.14	5304
13	40519	0.930	0.28	0.65	720	33	4.58%	23	3.8	0.99	2.30	1.31	2707
14	60219	1.382	0.35	0.68	1950	84	4.31%	35	3.2	1.55	3.01	1.46	4599
15	25920	0.595	0.35	0.68	450	7	1.56%	23	3.8	0.79	1.54	0.75	1545
16	46741	1.073	0.35	0.68	840	8	0.95%	33	3.25	1.22	2.37	1.15	3418
17	86412	1.984	0.35	0.68	1800	39	2.17%	36	3.15	2.19	4.25	2.06	6681
18	75455	1.732	0.35	0.68	1900	58	3.05%	37.5	3.1	1.88	3.65	1.77	5981

APPENDIX B

TR-20 OFFSITE DRAINAGE CALCULATIONS

LAAU POINT SUBDIVISION
OFFSITE DRAINAGE CALCULATIONS (EXISTING)
Project Site Surface Runoff (100 Yr. - 24 Hr. = 8.2 Inches)

Drainage Area	Area (Acres)	Longest Run (ft)	Elevation Change (ft)	Percent Slope	Curve Number	Q value (cfs)
1	102	4975	282	5.67%	74	164
2	89	4360	285	6.54%	74	159
3	996	15075	608	4.03%	74	837
4	264	5230	243	4.65%	74	391
5	88	2160	120	5.56%	74	205
6	65	2120	143	6.75%	74	159
7	43	2400	70	2.92%	74	80
8	606	9835	371	3.77%	74	617
9	351	8936	355	3.97%	74	381
10	525	10030	342	3.41%	74	513
11	51	3045	70	2.30%	74	79
12	1235	21085	623	2.95%	74	795
13	3732	30183	1185	3.93%	74	2194

MASTER DESIGN STORM SUMMARY

Network Storm Collection: MyCounty

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre100	8.2000	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	43.382		10.5000	164.07		
POND 10	IN	POND	100	43.382		10.5000	164.07		
POND 10	OUT	POND	100	43.382		10.5000	164.07		
SUBAREA 10		AREA	100	43.382		10.5000	164.07		

SCS UNIT HYDROGRAPH METHOD
Calc.Method Option = 2
STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 8.2000 in
Rain Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
Rain File -ID = - TypeI 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
HYG File - ID = - SUBAREA 10 Pre100
Tc = .9590 hrs
Drainage Area = 102.000 acres Runoff CN= 74
Calc.Increment= .04918 hrs Out.Incr.= .0500 hrs
HYG Volume = 43.382 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

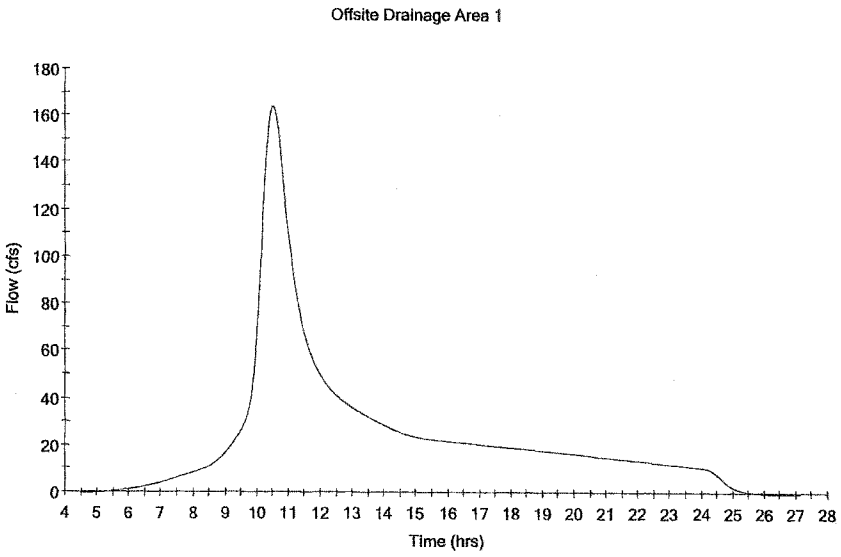
Time hrs					
4.5000	.00	.00	.00	.01	.01
4.7500	.02	.03	.05	.07	.10
5.0000	.14	.18	.23	.28	.34
5.2500	.41	.48	.56	.64	.72
5.5000	.81	.90	.99	1.08	1.18
5.7500	1.28	1.38	1.48	1.58	1.68
6.0000	1.78	1.89	1.99	2.10	2.20
6.2500	2.31	2.42	2.53	2.65	2.77
6.5000	2.89	3.02	3.15	3.29	3.44
6.7500	3.59	3.75	3.92	4.09	4.27
7.0000	4.46	4.65	4.85	5.05	5.26
7.2500	5.47	5.69	5.91	6.13	6.36
7.5000	6.58	6.81	7.03	7.25	7.47
7.7500	7.70	7.91	8.13	8.35	8.56
8.0000	8.77	8.99	9.20	9.42	9.64
8.2500	9.87	10.12	10.38	10.67	10.98
8.5000	11.33	11.72	12.15	12.62	13.13
8.7500	13.69	14.29	14.94	15.62	16.35
9.0000	17.11	17.92	18.75	19.63	20.54
9.2500	21.49	22.49	23.55	24.66	25.83
9.5000	27.08	28.42	29.92	31.63	33.66
9.7500	36.18	39.42	43.78	49.60	57.10
10.0000	66.32	77.15	89.37	102.60	116.22
10.2500	129.32	140.97	150.49	157.51	161.99
10.5000	164.07	163.91	161.78	157.99	152.81
10.7500	146.52	139.38	131.73	124.06	116.77
11.0000	110.07	104.00	98.48	93.43	88.78
11.2500	84.48	80.50	76.83	73.47	70.41
11.5000	67.63	65.09	62.76	60.63	58.68
11.7500	56.89	55.26	53.77	52.40	51.13

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
12.0000	49.97	48.88	47.86	46.91	46.00
12.2500	45.15	44.34	43.58	42.85	42.17
12.5000	41.52	40.90	40.31	39.74	39.20
12.7500	38.66	38.15	37.65	37.17	36.70
13.0000	36.25	35.83	35.43	35.04	34.67
13.2500	34.31	33.95	33.59	33.24	32.90
13.5000	32.55	32.21	31.87	31.53	31.19
13.7500	30.85	30.51	30.17	29.83	29.50
14.0000	29.16	28.82	28.48	28.15	27.81
14.2500	27.48	27.16	26.84	26.54	26.24
14.5000	25.96	25.70	25.45	25.21	25.00
14.7500	24.80	24.61	24.44	24.28	24.13
15.0000	24.00	23.87	23.75	23.64	23.53
15.2500	23.43	23.34	23.25	23.16	23.07
15.5000	22.99	22.91	22.83	22.76	22.68
15.7500	22.61	22.54	22.46	22.39	22.32
16.0000	22.26	22.19	22.12	22.05	21.99
16.2500	21.92	21.85	21.79	21.72	21.66
16.5000	21.59	21.53	21.46	21.39	21.33
16.7500	21.26	21.20	21.13	21.07	21.00
17.0000	20.94	20.87	20.81	20.74	20.67
17.2500	20.61	20.54	20.48	20.41	20.34
17.5000	20.28	20.21	20.14	20.08	20.01
17.7500	19.94	19.88	19.81	19.74	19.67
18.0000	19.61	19.54	19.47	19.40	19.34
18.2500	19.27	19.20	19.13	19.06	19.00
18.5000	18.93	18.86	18.79	18.72	18.65
18.7500	18.58	18.52	18.45	18.38	18.31
19.0000	18.24	18.17	18.10	18.03	17.96
19.2500	17.89	17.82	17.75	17.68	17.61
19.5000	17.54	17.47	17.40	17.33	17.26
19.7500	17.19	17.12	17.05	16.98	16.91
20.0000	16.84	16.77	16.70	16.63	16.56
20.2500	16.49	16.42	16.35	16.28	16.21
20.5000	16.13	16.06	15.99	15.92	15.85
20.7500	15.78	15.71	15.64	15.56	15.49
21.0000	15.42	15.35	15.28	15.20	15.13
21.2500	15.06	14.99	14.92	14.84	14.77
21.5000	14.70	14.63	14.56	14.48	14.41
21.7500	14.34	14.27	14.19	14.12	14.05
22.0000	13.98	13.90	13.83	13.76	13.68
22.2500	13.61	13.54	13.47	13.39	13.32
22.5000	13.25	13.17	13.10	13.03	12.95
22.7500	12.88	12.81	12.73	12.66	12.59
23.0000	12.51	12.44	12.37	12.29	12.22

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
23.2500	12.15	12.07	12.00	11.92	11.85
23.5000	11.78	11.70	11.63	11.56	11.48
23.7500	11.41	11.33	11.26	11.19	11.11
24.0000	11.04	10.95	10.83	10.68	10.49
24.2500	10.25	9.93	9.54	9.07	8.54
24.5000	7.96	7.35	6.73	6.10	5.50
24.7500	4.91	4.36	3.85	3.38	2.96
25.0000	2.59	2.27	2.00	1.76	1.55
25.2500	1.36	1.20	1.06	.93	.81
25.5000	.71	.63	.55	.48	.42
25.7500	.37	.32	.28	.25	.22
26.0000	.19	.17	.14	.13	.11
26.2500	.09	.08	.07	.06	.05
26.5000	.04	.04	.03	.03	.02
26.7500	.02	.01	.01	.01	.00
27.0000	.00	.00	.00		



MASTER DESIGN STORM SUMMARY

Network Storm Collection: MyCounty

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre100	8.2000	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	37.861		10.4000	159.00		
POND 10	IN	POND	100	37.861		10.4000	159.00		
POND 10	OUT	POND	100	37.861		10.4000	159.00		
SUBAREA 10		AREA	100	37.861		10.4000	159.00		

SCS UNIT HYDROGRAPH METHOD
Calc.Method Option = 2
STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 8.2000 in
Rain Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
Rain File -ID = - TypeI 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
HYG File - ID = - SUBAREA 10 Pre100
Tc = .8035 hrs
Drainage Area = 89.000 acres Runoff CN= 74
Calc.Increment= .04869 hrs Out.Incr.= .0500 hrs
HYG Volume = 37.861 ac-ft

HYDROGRAPH ORDINATES (cfs)

Time hrs	Output Time increment = .0500 hrs Time on left represents time for first value in each row.				
4.5000	.00	.00	.00	.01	.02
4.7500	.03	.05	.07	.10	.14
5.0000	.18	.23	.29	.35	.42
5.2500	.49	.56	.64	.72	.80
5.5000	.89	.97	1.06	1.15	1.24
5.7500	1.33	1.42	1.51	1.60	1.70
6.0000	1.79	1.88	1.97	2.07	2.16
6.2500	2.26	2.36	2.46	2.57	2.68
6.5000	2.80	2.92	3.05	3.18	3.32
6.7500	3.47	3.62	3.78	3.95	4.12
7.0000	4.29	4.47	4.66	4.85	5.05
7.2500	5.25	5.45	5.65	5.85	6.05
7.5000	6.25	6.45	6.65	6.84	7.04
7.7500	7.23	7.41	7.60	7.79	7.97
8.0000	8.16	8.34	8.53	8.72	8.92
8.2500	9.13	9.36	9.62	9.91	10.24
8.5000	10.61	11.02	11.47	11.97	12.51
8.7500	13.09	13.71	14.37	15.07	15.79
9.0000	16.54	17.32	18.13	18.98	19.85
9.2500	20.77	21.74	22.76	23.84	25.00
9.5000	26.23	27.57	29.08	30.86	33.05
9.7500	35.88	39.70	45.00	52.27	61.74
10.0000	73.39	86.92	101.70	116.77	130.87
10.2500	142.78	151.60	156.97	159.00	158.01
10.5000	154.52	149.03	141.98	133.84	125.17
10.7500	116.58	108.52	101.25	94.77	88.96
11.0000	83.67	78.86	74.47	70.47	66.87
11.2500	63.64	60.73	58.10	55.73	53.60
11.5000	51.69	49.96	48.42	47.02	45.76
11.7500	44.61	43.56	42.60	41.71	40.88

Type.... Unit Hyd. (HYG output) Page 7.04
Name.... SUBAREA 10 Tag: Pre100 Event: 100 yr
File.... V:\Projdata\06proj\06021\Calcs\DRAINAGE\offsite-area02.ppw
Storm... TypeI 24hr Tag: Pre100

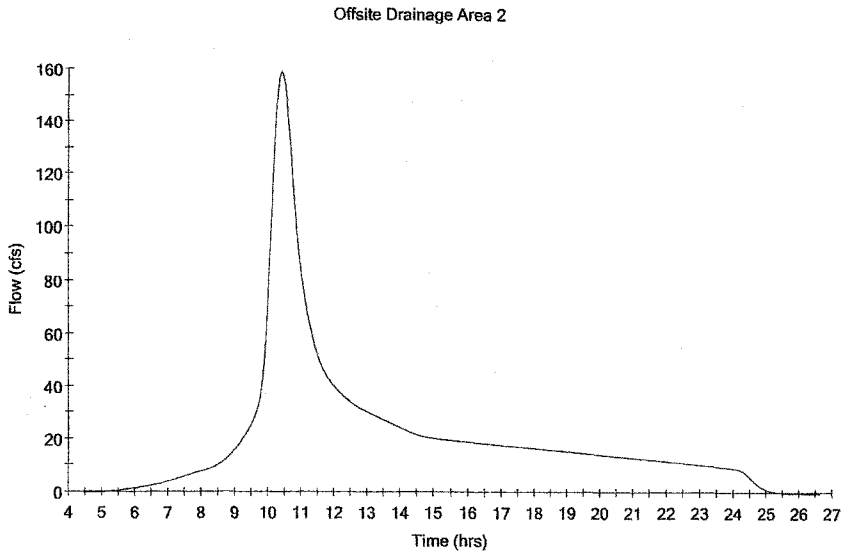
HYDROGRAPH ORDINATES (cfs)

Time hrs	Output Time increment = .0500 hrs Time on left represents time for first value in each row.				
12.0000	40.12	39.39	38.71	38.07	37.45
12.2500	36.85	36.26	35.70	35.16	34.65
12.5000	34.16	33.71	33.30	32.91	32.54
12.7500	32.19	31.84	31.51	31.19	30.87
13.0000	30.56	30.25	29.95	29.65	29.35
13.2500	29.06	28.76	28.47	28.17	27.88
13.5000	27.59	27.30	27.00	26.71	26.42
13.7500	26.13	25.83	25.54	25.24	24.95
14.0000	24.66	24.36	24.07	23.77	23.49
14.2500	23.20	22.93	22.67	22.42	22.18
14.5000	21.96	21.76	21.58	21.41	21.25
14.7500	21.11	20.99	20.87	20.76	20.66
15.0000	20.57	20.48	20.40	20.32	20.24
15.2500	20.17	20.10	20.04	19.97	19.91
15.5000	19.84	19.78	19.72	19.66	19.60
15.7500	19.54	19.48	19.43	19.37	19.31
16.0000	19.25	19.20	19.14	19.08	19.03
16.2500	18.97	18.92	18.86	18.80	18.75
16.5000	18.69	18.63	18.58	18.52	18.46
16.7500	18.41	18.35	18.29	18.24	18.18
17.0000	18.12	18.06	18.01	17.95	17.89
17.2500	17.83	17.77	17.72	17.66	17.60
17.5000	17.54	17.48	17.42	17.37	17.31
17.7500	17.25	17.19	17.13	17.07	17.01
18.0000	16.95	16.90	16.84	16.78	16.72
18.2500	16.66	16.60	16.54	16.48	16.42
18.5000	16.36	16.30	16.24	16.18	16.12
18.7500	16.06	16.00	15.94	15.88	15.82
19.0000	15.76	15.70	15.64	15.58	15.52
19.2500	15.45	15.39	15.33	15.27	15.21
19.5000	15.15	15.09	15.03	14.97	14.90
19.7500	14.84	14.78	14.72	14.66	14.60
20.0000	14.54	14.47	14.41	14.35	14.29
20.2500	14.23	14.16	14.10	14.04	13.98
20.5000	13.92	13.85	13.79	13.73	13.67
20.7500	13.60	13.54	13.48	13.42	13.35
21.0000	13.29	13.23	13.17	13.10	13.04
21.2500	12.98	12.91	12.85	12.79	12.72
21.5000	12.66	12.60	12.54	12.47	12.41
21.7500	12.35	12.28	12.22	12.16	12.09
22.0000	12.03	11.96	11.90	11.84	11.77
22.2500	11.71	11.65	11.58	11.52	11.46
22.5000	11.39	11.33	11.26	11.20	11.14
22.7500	11.07	11.01	10.94	10.88	10.81
23.0000	10.75	10.69	10.62	10.56	10.49

S/N: FCYXYWHN7K7A Bentley Systems, Inc.
Bentley PondPack (10.00.022.00) 5:22 PM 11/17/2006

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
23.2500	10.43	10.36	10.30	10.24	10.17
23.5000	10.11	10.04	9.98	9.91	9.85
23.7500	9.78	9.72	9.65	9.59	9.52
24.0000	9.46	9.38	9.26	9.09	8.86
24.2500	8.55	8.14	7.64	7.06	6.44
24.5000	5.80	5.16	4.54	3.96	3.42
24.7500	2.93	2.50	2.14	1.83	1.57
25.0000	1.35	1.16	.99	.85	.73
25.2500	.63	.54	.46	.39	.33
25.5000	.29	.24	.21	.18	.15
25.7500	.13	.11	.09	.08	.06
26.0000	.05	.04	.04	.03	.02
26.2500	.02	.01	.01	.01	.00
26.5000	.00	.00	.00		



MASTER DESIGN STORM SUMMARY

Network Storm Collection: MyCounty

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre100	8.2000	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	423.699		11.9000	836.55		
POND 10	IN	POND	100	423.699		11.9000	836.55		
POND 10	OUT	POND	100	423.699		11.9000	836.55		
SUBAREA 10		AREA	100	423.699		11.9000	836.55		

SCS UNIT HYDROGRAPH METHOD
Calc.Method Option = 2
STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 8.2000 in
Rain Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
Rain File -ID = - TypeI 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
HYG File - ID = - SUBAREA 10 Pre100
Tc = 2.7613 hrs
Drainage Area = 996.000 acres Runoff CN= 74
Calc.Increment= .04975 hrs Out.Incr.= .0500 hrs
HYG Volume = 423.699 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

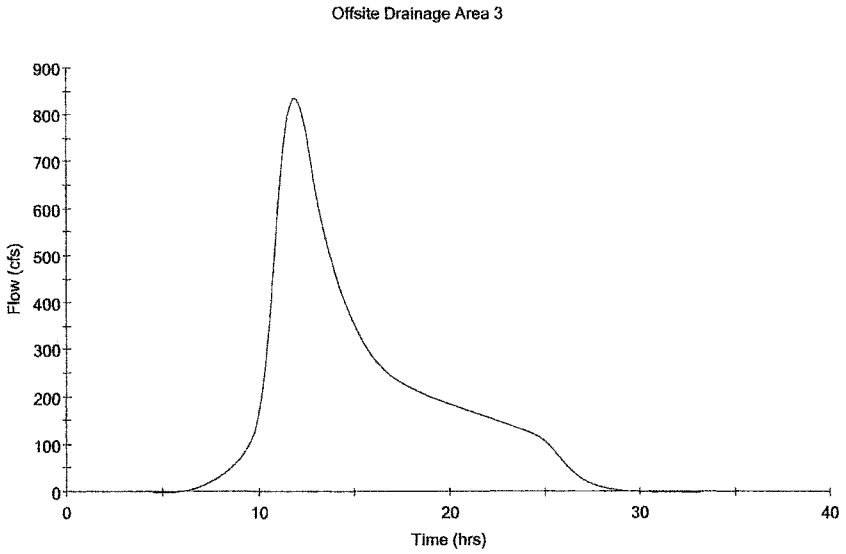
Time hrs					
4.5000	.00	.00	.00	.00	.01
4.7500	.01	.02	.03	.05	.06
5.0000	.08	.11	.14	.18	.23
5.2500	.29	.35	.42	.51	.61
5.5000	.72	.85	.99	1.15	1.33
5.7500	1.52	1.73	1.97	2.22	2.49
6.0000	2.79	3.11	3.44	3.80	4.19
6.2500	4.59	5.02	5.47	5.94	6.43
6.5000	6.95	7.50	8.07	8.66	9.27
6.7500	9.91	10.58	11.27	11.99	12.74
7.0000	13.51	14.31	15.14	16.00	16.89
7.2500	17.81	18.76	19.74	20.75	21.79
7.5000	22.87	23.97	25.11	26.28	27.48
7.7500	28.72	29.98	31.28	32.61	33.97
8.0000	35.36	36.78	38.22	39.70	41.21
8.2500	42.76	44.33	45.94	47.59	49.27
8.5000	51.00	52.77	54.59	56.46	58.39
8.7500	60.38	62.43	64.56	66.76	69.04
9.0000	71.42	73.89	76.48	79.18	82.00
9.2500	84.97	88.08	91.35	94.79	98.40
9.5000	102.21	106.25	110.54	115.17	120.15
9.7500	125.68	131.82	138.93	147.16	156.44
10.0000	166.96	178.70	191.70	205.80	221.06
10.2500	237.26	254.48	272.68	292.06	312.61
10.5000	334.29	357.18	381.31	406.60	432.88
10.7500	460.10	487.97	516.20	544.54	572.43
11.0000	599.50	625.62	650.60	674.16	696.18
11.2500	716.72	735.53	752.70	768.17	782.00
11.5000	794.03	804.40	813.22	820.55	826.50
11.7500	831.16	834.49	836.31	836.55	835.29

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
12.0000	832.76	829.11	824.64	819.38	813.35
12.2500	806.52	798.93	790.56	781.37	771.33
12.5000	760.47	748.86	736.55	723.65	710.35
12.7500	696.85	683.47	670.40	657.68	645.42
13.0000	633.71	622.51	611.74	601.39	591.28
13.2500	581.45	571.89	562.63	553.65	544.95
13.5000	536.52	528.39	520.52	512.87	505.43
13.7500	498.12	490.94	483.88	476.91	470.03
14.0000	463.24	456.57	450.06	443.71	437.52
14.2500	431.48	425.59	419.85	414.22	408.71
14.5000	403.28	397.94	392.69	387.54	382.49
14.7500	377.54	372.68	367.91	363.24	358.66
15.0000	354.17	349.79	345.50	341.29	337.16
15.2500	333.09	329.11	325.23	321.46	317.80
15.5000	314.26	310.80	307.43	304.15	300.95
15.7500	297.84	294.82	291.88	289.02	286.25
16.0000	283.56	280.96	278.43	275.98	273.60
16.2500	271.29	269.04	266.85	264.71	262.64
16.5000	260.64	258.69	256.81	254.98	253.20
16.7500	251.47	249.78	248.15	246.57	245.04
17.0000	243.55	242.09	240.66	239.25	237.88
17.2500	236.54	235.22	233.94	232.69	231.49
17.5000	230.31	229.17	228.04	226.93	225.83
17.7500	224.76	223.69	222.64	221.60	220.57
18.0000	219.56	218.55	217.56	216.57	215.59
18.2500	214.62	213.66	212.70	211.75	210.81
18.5000	209.88	208.95	208.03	207.11	206.20
18.7500	205.29	204.39	203.51	202.63	201.76
19.0000	200.91	200.08	199.27	198.48	197.72
19.2500	196.95	196.20	195.45	194.71	193.97
19.5000	193.23	192.50	191.77	191.05	190.33
19.7500	189.61	188.89	188.18	187.46	186.75
20.0000	186.04	185.34	184.63	183.92	183.22
20.2500	182.52	181.81	181.11	180.41	179.71
20.5000	179.01	178.31	177.62	176.92	176.22
20.7500	175.53	174.83	174.13	173.44	172.74
21.0000	172.05	171.35	170.66	169.96	169.27
21.2500	168.57	167.88	167.18	166.49	165.79
21.5000	165.10	164.40	163.71	163.01	162.32
21.7500	161.62	160.93	160.23	159.53	158.84
22.0000	158.14	157.44	156.75	156.05	155.35
22.2500	154.65	153.95	153.25	152.56	151.86
22.5000	151.16	150.46	149.76	149.06	148.35
22.7500	147.65	146.95	146.25	145.55	144.84
23.0000	144.14	143.44	142.73	142.03	141.32

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
23.2500	140.62	139.91	139.20	138.50	137.79
23.5000	137.08	136.37	135.66	134.96	134.25
23.7500	133.54	132.82	132.11	131.40	130.69
24.0000	129.97	129.25	128.50	127.74	126.95
24.2500	126.13	125.28	124.38	123.44	122.46
24.5000	121.43	120.36	119.22	118.03	116.77
24.7500	115.45	114.05	112.57	111.01	109.36
25.0000	107.62	105.79	103.87	101.86	99.79
25.2500	97.64	95.43	93.16	90.85	88.50
25.5000	86.12	83.72	81.29	78.86	76.43
25.7500	74.00	71.59	69.19	66.80	64.44
26.0000	62.10	59.79	57.52	55.30	53.13
26.2500	51.01	48.93	46.91	44.94	43.02
26.5000	41.16	39.35	37.60	35.91	34.29
26.7500	32.73	31.25	29.83	28.49	27.22
27.0000	26.01	24.86	23.77	22.73	21.74
27.2500	20.79	19.89	19.02	18.20	17.40
27.5000	16.65	15.92	15.23	14.57	13.94
27.7500	13.33	12.75	12.19	11.65	11.14
28.0000	10.64	10.17	9.72	9.29	8.88
28.2500	8.48	8.11	7.75	7.41	7.08
28.5000	6.76	6.46	6.17	5.90	5.63
28.7500	5.38	5.14	4.91	4.69	4.48
29.0000	4.27	4.08	3.90	3.72	3.55
29.2500	3.39	3.23	3.08	2.94	2.81
29.5000	2.68	2.56	2.44	2.33	2.22
29.7500	2.11	2.02	1.92	1.83	1.75
30.0000	1.66	1.58	1.51	1.44	1.37
30.2500	1.30	1.24	1.18	1.12	1.06
30.5000	1.01	.96	.91	.86	.82
30.7500	.78	.73	.70	.66	.62
31.0000	.59	.56	.53	.50	.47
31.2500	.44	.42	.39	.37	.35
31.5000	.33	.31	.29	.27	.25
31.7500	.23	.22	.20	.19	.17
32.0000	.16	.14	.13	.12	.11
32.2500	.10	.09	.08	.07	.06
32.5000	.05	.04	.04	.03	.03
32.7500	.02	.02	.01	.01	.01
33.0000	.00	.00	.00		



MASTER DESIGN STORM SUMMARY

Network Storm Collection: MyCounty

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre100	8.2000	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	112.290		10.6500	391.19		
POND 10	IN	POND	100	112.290		10.6500	391.19		
POND 10	OUT	POND	100	112.290		10.6500	391.19		
SUBAREA 10		AREA	100	112.290		10.6500	391.19		

SCS UNIT HYDROGRAPH METHOD
Calc.Method Option = 2
STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 8.2000 in
Rain Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
Rain File -ID = - TypeI 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
HYG File - ID = - SUBAREA 10 Pre100
Tc = 1.1021 hrs
Drainage Area = 264.000 acres Runoff CN= 74
Calc.Increment= .04898 hrs Out.Incr.= .0500 hrs
HYG Volume = 112.290 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
4.5000	.00	.00	.01	.01	.02
4.7500	.04	.06	.09	.13	.18
5.0000	.25	.33	.43	.53	.66
5.2500	.80	.95	1.11	1.29	1.48
5.5000	1.68	1.89	2.10	2.33	2.56
5.7500	2.79	3.03	3.28	3.53	3.78
6.0000	4.03	4.29	4.55	4.82	5.08
6.2500	5.35	5.63	5.91	6.19	6.49
6.5000	6.79	7.10	7.43	7.76	8.11
6.7500	8.48	8.86	9.25	9.66	10.09
7.0000	10.53	10.99	11.47	11.96	12.46
7.2500	12.98	13.51	14.05	14.60	15.15
7.5000	15.72	16.28	16.85	17.42	17.98
7.7500	18.55	19.12	19.68	20.24	20.80
8.0000	21.35	21.91	22.46	23.02	23.59
8.2500	24.17	24.78	25.42	26.10	26.84
8.5000	27.63	28.51	29.46	30.50	31.64
8.7500	32.88	34.22	35.66	37.20	38.85
9.0000	40.59	42.44	44.38	46.42	48.56
9.2500	50.80	53.15	55.63	58.22	60.96
9.5000	63.85	66.96	70.34	74.17	78.58
9.7500	83.93	90.54	99.21	110.58	125.04
10.0000	142.78	163.67	187.36	213.71	242.01
10.2500	271.14	299.55	325.48	347.80	365.51
10.5000	378.52	386.96	391.06	391.19	387.63
10.7500	380.85	371.35	359.56	345.84	330.59
11.0000	314.45	298.33	282.94	268.73	255.74
11.2500	243.78	232.74	222.53	213.04	204.20
11.5000	195.95	188.25	181.13	174.61	168.61
11.7500	163.08	157.96	153.19	148.78	144.69

Type.... Unit Hyd. (HYG output) Page 7.04
Name.... SUBAREA 10 Tag: Pre100 Event: 100 yr
File.... V:\Projdata\06proj\06021\Calcs\DRAINAGE\offsite-area04.ppw
Storm... TypeI 24hr Tag: Pre100

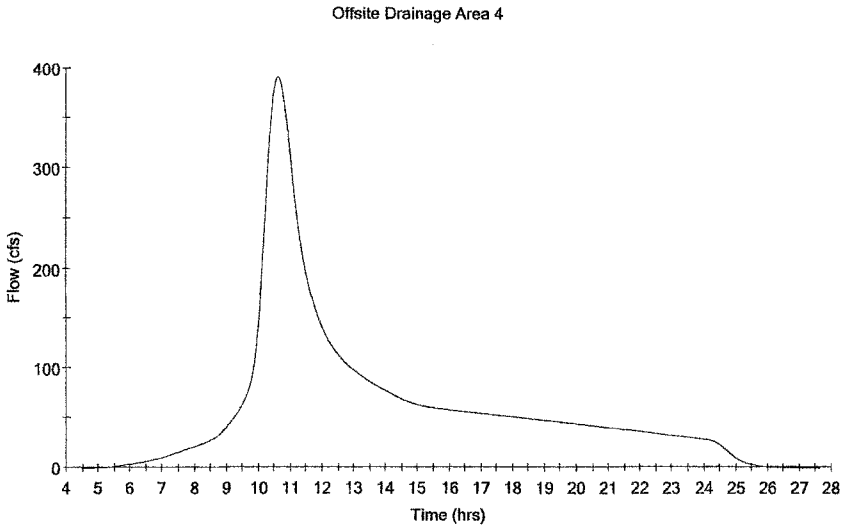
HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
12.0000	140.87	137.33	134.04	130.96	128.10
12.2500	125.41	122.88	120.48	118.21	116.06
12.5000	114.01	112.07	110.21	108.46	106.79
12.7500	105.20	103.69	102.24	100.86	99.54
13.0000	98.26	97.03	95.82	94.63	93.47
13.2500	92.32	91.19	90.08	88.99	87.93
13.5000	86.89	85.90	84.93	84.00	83.08
13.7500	82.17	81.27	80.37	79.47	78.58
14.0000	77.69	76.81	75.93	75.05	74.17
14.2500	73.31	72.45	71.61	70.79	69.99
14.5000	69.22	68.48	67.77	67.09	66.46
14.7500	65.85	65.29	64.76	64.27	63.81
15.0000	63.37	62.97	62.60	62.25	61.91
15.2500	61.60	61.31	61.02	60.75	60.50
15.5000	60.25	60.01	59.78	59.56	59.34
15.7500	59.13	58.92	58.72	58.52	58.33
16.0000	58.14	57.95	57.76	57.58	57.40
16.2500	57.22	57.04	56.86	56.68	56.51
16.5000	56.34	56.16	55.99	55.82	55.64
16.7500	55.47	55.30	55.13	54.96	54.79
17.0000	54.62	54.45	54.27	54.10	53.93
17.2500	53.76	53.59	53.42	53.25	53.08
17.5000	52.90	52.73	52.56	52.39	52.22
17.7500	52.04	51.87	51.70	51.52	51.35
18.0000	51.18	51.00	50.83	50.65	50.48
18.2500	50.30	50.13	49.95	49.78	49.60
18.5000	49.42	49.25	49.07	48.89	48.72
18.7500	48.54	48.36	48.18	48.01	47.83
19.0000	47.65	47.47	47.29	47.11	46.94
19.2500	46.76	46.58	46.40	46.22	46.04
19.5000	45.86	45.68	45.50	45.31	45.13
19.7500	44.95	44.77	44.59	44.41	44.23
20.0000	44.04	43.86	43.68	43.50	43.31
20.2500	43.13	42.95	42.76	42.58	42.40
20.5000	42.21	42.03	41.85	41.66	41.48
20.7500	41.29	41.11	40.92	40.74	40.55
21.0000	40.37	40.18	40.00	39.81	39.63
21.2500	39.44	39.26	39.07	38.88	38.70
21.5000	38.51	38.32	38.14	37.95	37.76
21.7500	37.58	37.39	37.20	37.01	36.83
22.0000	36.64	36.45	36.26	36.07	35.89
22.2500	35.70	35.51	35.32	35.13	34.94
22.5000	34.75	34.56	34.38	34.19	34.00
22.7500	33.81	33.62	33.43	33.24	33.05
23.0000	32.86	32.67	32.48	32.29	32.10

S/N: FCYXYWHN7K7A Bentley Systems, Inc.
Bentley PondPack (10.00.022.00) 10:11 AM 11/18/2006

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
23.2500	31.91	31.72	31.53	31.34	31.14
23.5000	30.95	30.76	30.57	30.38	30.19
23.7500	30.00	29.81	29.62	29.42	29.23
24.0000	29.04	28.82	28.56	28.23	27.83
24.2500	27.33	26.73	25.99	25.09	24.04
24.5000	22.85	21.56	20.20	18.79	17.37
24.7500	15.96	14.57	13.23	11.95	10.75
25.0000	9.62	8.58	7.64	6.81	6.07
25.2500	5.43	4.86	4.35	3.89	3.48
25.5000	3.12	2.78	2.49	2.22	1.98
25.7500	1.77	1.58	1.41	1.26	1.12
26.0000	1.00	.89	.79	.70	.63
26.2500	.56	.50	.44	.39	.35
26.5000	.31	.27	.24	.21	.18
26.7500	.16	.14	.12	.10	.09
27.0000	.08	.07	.05	.05	.04
27.2500	.03	.02	.02	.01	.01
27.5000	.00	.00	.00		



MASTER DESIGN STORM SUMMARY

Network Storm Collection: MyCounty

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre100	8.2000	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	37.404		10.2000	204.54		
POND 10	IN	POND	100	37.404		10.2000	204.54		
POND 10	OUT	POND	100	37.404		10.2000	204.54		
SUBAREA 10		AREA	100	37.404		10.2000	204.54		

SCS UNIT HYDROGRAPH METHOD
Calc.Method Option = 2
STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 8.2000 in
Rain Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
Rain File -ID = - TypeI 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
HYG File - ID = - SUBAREA 10 Pre100
Tc = .4968 hrs
Drainage Area = 88.000 acres Runoff CN= 74
Calc.Increment= .04731 hrs Out.Incr.= .0500 hrs
HYG Volume = 37.404 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time hrs | Time on left represents time for first value in each row.

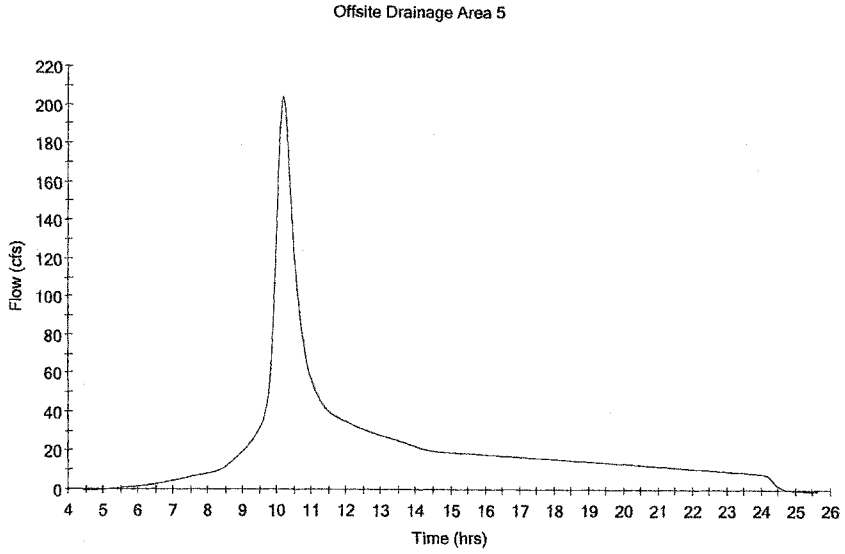
Time hrs					
4.4500	.00	.00	.01	.02	.03
4.7000	.06	.10	.15	.20	.27
4.9500	.34	.42	.50	.59	.67
5.2000	.76	.85	.94	1.03	1.13
5.4500	1.22	1.31	1.41	1.50	1.59
5.7000	1.69	1.78	1.87	1.97	2.06
5.9500	2.15	2.25	2.34	2.44	2.53
6.2000	2.63	2.74	2.85	2.97	3.10
6.4500	3.24	3.38	3.53	3.69	3.85
6.7000	4.02	4.20	4.38	4.57	4.76
6.9500	4.96	5.16	5.37	5.58	5.79
7.2000	6.01	6.22	6.43	6.63	6.83
7.4500	7.02	7.21	7.40	7.59	7.77
7.7000	7.95	8.13	8.31	8.48	8.66
7.9500	8.84	9.02	9.20	9.39	9.60
8.2000	9.84	10.13	10.47	10.88	11.35
8.4500	11.88	12.46	13.10	13.78	14.49
8.7000	15.24	16.02	16.82	17.65	18.50
8.9500	19.37	20.26	21.18	22.13	23.13
9.2000	24.19	25.33	26.55	27.87	29.29
9.4500	30.81	32.43	34.26	36.45	39.39
9.7000	43.52	49.67	58.55	71.51	89.60
9.9500	112.69	139.40	165.97	187.66	201.03
10.2000	204.54	199.02	186.90	170.77	153.62
10.4500	137.42	123.22	111.35	101.26	92.51
10.7000	84.82	78.12	72.35	67.42	63.22
10.9500	59.66	56.62	53.99	51.69	49.65
11.2000	47.85	46.27	44.87	43.63	42.53
11.4500	41.56	40.72	39.99	39.35	38.78
11.7000	38.25	37.74	37.25	36.77	36.31

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
11.9500	35.85	35.40	34.96	34.52	34.08
12.2000	33.66	33.26	32.87	32.50	32.15
12.4500	31.82	31.49	31.18	30.88	30.58
12.7000	30.29	30.00	29.71	29.43	29.15
12.9500	28.86	28.58	28.30	28.02	27.74
13.2000	27.45	27.17	26.89	26.60	26.32
13.4500	26.03	25.74	25.45	25.16	24.87
13.7000	24.58	24.29	24.00	23.71	23.42
13.9500	23.12	22.83	22.54	22.25	21.97
14.2000	21.70	21.46	21.24	21.04	20.87
14.4500	20.72	20.60	20.49	20.39	20.30
14.7000	20.22	20.15	20.08	20.02	19.95
14.9500	19.89	19.83	19.78	19.72	19.66
15.2000	19.61	19.55	19.50	19.44	19.39
15.4500	19.33	19.28	19.22	19.17	19.12
15.7000	19.06	19.01	18.95	18.90	18.84
15.9500	18.79	18.73	18.68	18.62	18.57
16.2000	18.51	18.45	18.40	18.34	18.29
16.4500	18.23	18.17	18.12	18.06	18.00
16.7000	17.95	17.89	17.84	17.78	17.72
16.9500	17.66	17.61	17.55	17.49	17.43
17.2000	17.38	17.32	17.26	17.20	17.15
17.4500	17.09	17.03	16.97	16.91	16.86
17.7000	16.80	16.74	16.68	16.62	16.56
17.9500	16.50	16.45	16.39	16.33	16.27
18.2000	16.21	16.15	16.09	16.03	15.97
18.4500	15.91	15.85	15.80	15.74	15.68
18.7000	15.62	15.56	15.50	15.44	15.38
18.9500	15.32	15.26	15.20	15.14	15.08
19.2000	15.01	14.95	14.89	14.83	14.77
19.4500	14.71	14.65	14.59	14.53	14.47
19.7000	14.41	14.35	14.29	14.22	14.16
19.9500	14.10	14.04	13.98	13.92	13.86
20.2000	13.80	13.74	13.67	13.61	13.55
20.4500	13.49	13.43	13.37	13.30	13.24
20.7000	13.18	13.12	13.05	12.99	12.93
20.9500	12.87	12.81	12.74	12.68	12.62
21.2000	12.56	12.50	12.43	12.37	12.31
21.4500	12.25	12.18	12.12	12.06	11.99
21.7000	11.93	11.87	11.81	11.74	11.68
21.9500	11.62	11.56	11.49	11.43	11.37
22.2000	11.30	11.24	11.18	11.11	11.05
22.4500	10.99	10.92	10.86	10.80	10.73
22.7000	10.67	10.61	10.54	10.48	10.42
22.9500	10.35	10.29	10.23	10.16	10.10

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
23.2000	10.03	9.97	9.91	9.84	9.78
23.4500	9.71	9.65	9.59	9.52	9.46
23.7000	9.39	9.33	9.27	9.20	9.14
23.9500	9.07	9.00	8.86	8.61	8.16
24.2000	7.48	6.61	5.63	4.65	3.74
24.4500	2.93	2.27	1.77	1.38	1.08
24.7000	.84	.65	.51	.40	.31
24.9500	.24	.18	.14	.11	.08
25.2000	.06	.05	.03	.02	.02
25.4500	.01	.01	.00	.00	



MASTER DESIGN STORM SUMMARY

Network Storm Collection: MyCounty

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre100	8.2000	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	27.629		10.1500	159.44		
POND 10	IN	POND	100	27.629		10.1500	159.44		
POND 10	OUT	POND	100	27.629		10.1500	159.44		
SUBAREA 10		AREA	100	27.629		10.1500	159.44		

SCS UNIT HYDROGRAPH METHOD
Calc.Method Option = 2
STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 8.2000 in
Rain Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
Rain File -ID = - TypeI 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
HYG File - ID = - SUBAREA 10 Pre100
Tc = .4442 hrs
Drainage Area = 65.000 acres Runoff CN= 74
Calc.Increment= .04935 hrs Out.Incr.= .0500 hrs
HYG Volume = 27.629 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
4.4500	.00	.00	.01	.02	.03
4.7000	.06	.09	.13	.18	.24
4.9500	.30	.36	.42	.49	.55
5.2000	.62	.69	.76	.82	.89
5.4500	.96	1.03	1.10	1.17	1.24
5.7000	1.31	1.38	1.45	1.52	1.59
5.9500	1.65	1.72	1.79	1.86	1.94
6.2000	2.01	2.09	2.18	2.27	2.37
6.4500	2.48	2.59	2.70	2.83	2.95
6.7000	3.08	3.22	3.36	3.50	3.64
6.9500	3.79	3.95	4.10	4.26	4.42
7.2000	4.58	4.74	4.89	5.04	5.18
7.4500	5.32	5.46	5.60	5.73	5.86
7.7000	6.00	6.13	6.26	6.39	6.52
7.9500	6.65	6.78	6.92	7.06	7.22
8.2000	7.42	7.65	7.94	8.27	8.66
8.4500	9.09	9.56	10.07	10.60	11.16
8.7000	11.73	12.33	12.94	13.58	14.22
8.9500	14.88	15.55	16.25	16.97	17.74
9.2000	18.55	19.43	20.39	21.43	22.54
9.4500	23.72	25.00	26.47	28.33	30.94
9.7000	34.76	40.38	48.53	60.29	76.38
9.9500	96.51	118.77	139.18	153.56	159.44
10.2000	156.50	146.70	132.93	118.16	104.42
10.4500	92.65	83.01	74.97	68.10	62.13
10.7000	56.99	52.61	48.91	45.82	43.24
10.9500	41.06	39.19	37.56	36.12	34.84
11.2000	33.69	32.67	31.78	31.03	30.39
11.4500	29.85	29.39	28.96	28.57	28.19
11.7000	27.83	27.48	27.14	26.81	26.48

Type.... Unit Hyd. (HYG output) Page 7.04
Name.... SUBAREA 10 Tag: Pre100 Event: 100 yr
File.... V:\Projdata\06proj\06021\Calcs\DRAINAGE\offsite-area06.ppw
Storm... TypeI 24hr Tag: Pre100

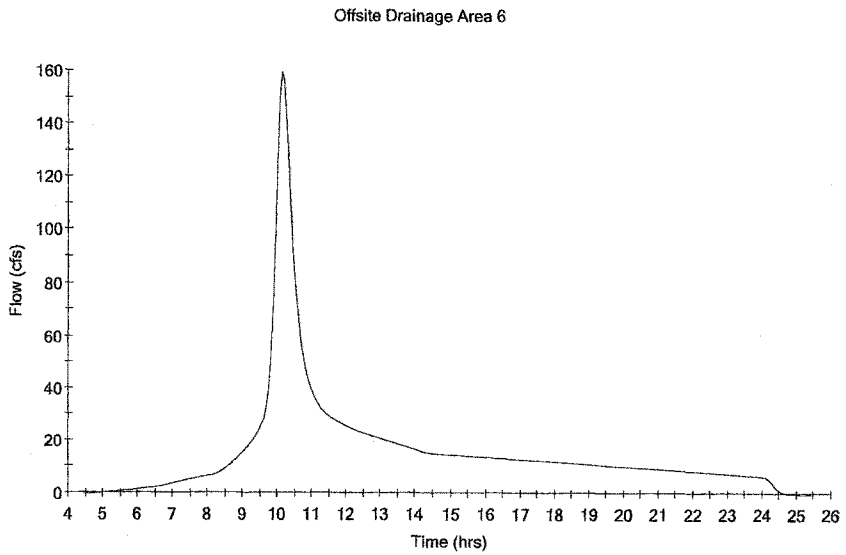
HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
11.9500	26.15	25.83	25.50	25.18	24.87
12.2000	24.57	24.27	24.00	23.74	23.49
12.4500	23.25	23.03	22.80	22.59	22.37
12.7000	22.16	21.95	21.75	21.54	21.33
12.9500	21.12	20.91	20.71	20.50	20.29
13.2000	20.08	19.87	19.66	19.45	19.24
13.4500	19.03	18.81	18.60	18.39	18.17
13.7000	17.96	17.74	17.53	17.31	17.10
13.9500	16.88	16.66	16.45	16.23	16.03
14.2000	15.84	15.67	15.52	15.39	15.28
14.4500	15.19	15.11	15.04	14.98	14.92
14.7000	14.87	14.82	14.78	14.73	14.69
14.9500	14.64	14.60	14.56	14.52	14.48
15.2000	14.44	14.40	14.36	14.32	14.28
15.4500	14.24	14.20	14.16	14.12	14.08
15.7000	14.04	14.00	13.96	13.92	13.88
15.9500	13.84	13.80	13.75	13.71	13.67
16.2000	13.63	13.59	13.55	13.51	13.47
16.4500	13.42	13.38	13.34	13.30	13.26
16.7000	13.22	13.17	13.13	13.09	13.05
16.9500	13.01	12.96	12.92	12.88	12.84
17.2000	12.79	12.75	12.71	12.67	12.62
17.4500	12.58	12.54	12.49	12.45	12.41
17.7000	12.36	12.32	12.28	12.24	12.19
17.9500	12.15	12.11	12.06	12.02	11.97
18.2000	11.93	11.89	11.84	11.80	11.76
18.4500	11.71	11.67	11.62	11.58	11.54
18.7000	11.49	11.45	11.40	11.36	11.31
18.9500	11.27	11.23	11.18	11.14	11.09
19.2000	11.05	11.00	10.96	10.91	10.87
19.4500	10.82	10.78	10.73	10.69	10.64
19.7000	10.60	10.55	10.51	10.46	10.42
19.9500	10.37	10.33	10.28	10.24	10.19
20.2000	10.15	10.10	10.06	10.01	9.96
20.4500	9.92	9.87	9.83	9.78	9.74
20.7000	9.69	9.64	9.60	9.55	9.51
20.9500	9.46	9.42	9.37	9.32	9.28
21.2000	9.23	9.19	9.14	9.09	9.05
21.4500	9.00	8.95	8.91	8.86	8.82
21.7000	8.77	8.72	8.68	8.63	8.58
21.9500	8.54	8.49	8.44	8.40	8.35
22.2000	8.30	8.26	8.21	8.16	8.12
22.4500	8.07	8.02	7.98	7.93	7.88
22.7000	7.84	7.79	7.74	7.70	7.65
22.9500	7.60	7.55	7.51	7.46	7.41

S/N: FCYXYWHN7K7A Bentley Systems, Inc.
Bentley PondPack (10.00.022.00) 10:22 AM 11/18/2006

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
23.2000	7.37	7.32	7.27	7.22	7.18
23.4500	7.13	7.08	7.04	6.99	6.94
23.7000	6.89	6.85	6.80	6.75	6.70
23.9500	6.66	6.60	6.48	6.23	5.80
24.2000	5.16	4.39	3.58	2.82	2.16
24.4500	1.63	1.23	.93	.71	.53
24.7000	.40	.30	.23	.17	.13
24.9500	.10	.07	.05	.04	.03
25.2000	.02	.01	.01	.00	.00



MASTER DESIGN STORM SUMMARY

Network Storm Collection: MyCounty

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre100	8.2000	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	18.292		10.3500	80.36		
POND 10	IN	POND	100	18.292		10.3500	80.36		
POND 10	OUT	POND	100	18.292		10.3500	80.36		
SUBAREA 10		AREA	100	18.292		10.3500	80.36		

SCS UNIT HYDROGRAPH METHOD
Calc.Method Option = 2
STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 8.2000 in
Rain Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
Rain File -ID = - TypeI 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
HYG File - ID = - SUBAREA 10 Pre100
Tc = .7458 hrs
Drainage Area = 43.000 acres Runoff CN= 74
Calc.Increment= .04972 hrs Out.Incr.= .0500 hrs
HYG Volume = 18.292 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

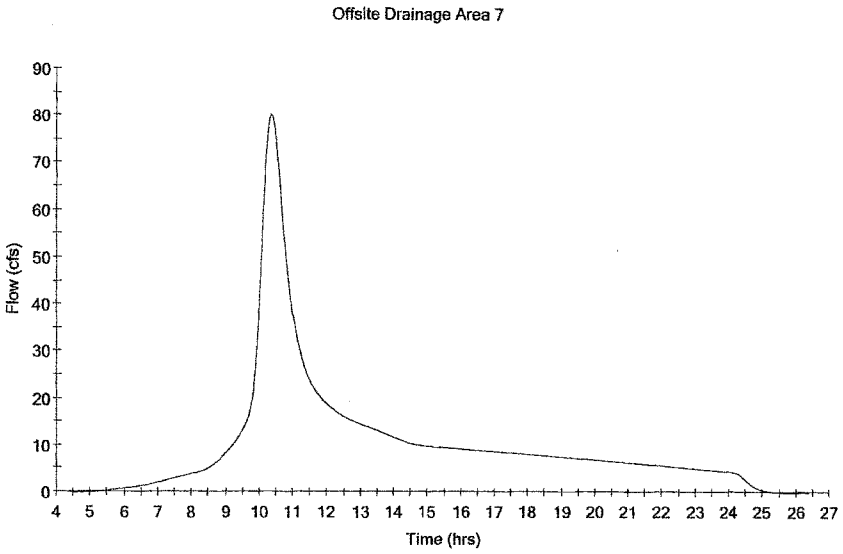
Time hrs					
4.5000	.00	.00	.00	.01	.01
4.7500	.02	.03	.04	.06	.08
5.0000	.10	.13	.16	.19	.23
5.2500	.26	.30	.34	.38	.42
5.5000	.47	.51	.55	.59	.64
5.7500	.68	.73	.77	.82	.86
6.0000	.91	.95	1.00	1.04	1.09
6.2500	1.14	1.19	1.24	1.29	1.35
6.5000	1.40	1.46	1.53	1.60	1.67
6.7500	1.74	1.82	1.90	1.98	2.06
7.0000	2.15	2.24	2.34	2.43	2.53
7.2500	2.63	2.72	2.82	2.92	3.02
7.5000	3.12	3.21	3.31	3.40	3.49
7.7500	3.58	3.67	3.76	3.85	3.94
8.0000	4.03	4.12	4.21	4.30	4.40
8.2500	4.50	4.62	4.75	4.90	5.07
8.5000	5.27	5.48	5.72	5.98	6.26
8.7500	6.56	6.88	7.22	7.57	7.93
9.0000	8.31	8.71	9.11	9.53	9.97
9.2500	10.43	10.92	11.44	11.99	12.57
9.5000	13.20	13.88	14.65	15.57	16.72
9.7500	18.24	20.31	23.22	27.30	32.62
10.0000	39.18	46.77	54.93	62.97	70.04
10.2500	75.51	78.92	80.36	80.00	78.13
10.5000	75.13	71.22	66.71	61.97	57.38
10.7500	53.14	49.39	46.08	43.09	40.39
11.0000	37.93	35.72	33.73	31.95	30.36
11.2500	28.94	27.66	26.51	25.49	24.58
11.5000	23.77	23.04	22.38	21.79	21.25
11.7500	20.77	20.33	19.92	19.54	19.19

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
12.0000	18.86	18.54	18.23	17.94	17.65
12.2500	17.37	17.11	16.86	16.64	16.43
12.5000	16.23	16.04	15.86	15.69	15.52
12.7500	15.36	15.20	15.05	14.90	14.75
13.0000	14.60	14.46	14.31	14.17	14.03
13.2500	13.89	13.75	13.61	13.47	13.32
13.5000	13.18	13.04	12.90	12.76	12.62
13.7500	12.48	12.34	12.20	12.05	11.91
14.0000	11.77	11.63	11.49	11.34	11.21
14.2500	11.07	10.94	10.82	10.70	10.59
14.5000	10.49	10.40	10.32	10.25	10.18
14.7500	10.12	10.06	10.01	9.96	9.92
15.0000	9.88	9.84	9.80	9.77	9.74
15.2500	9.70	9.67	9.64	9.61	9.58
15.5000	9.55	9.52	9.49	9.47	9.44
15.7500	9.41	9.38	9.36	9.33	9.30
16.0000	9.27	9.25	9.22	9.19	9.17
16.2500	9.14	9.11	9.08	9.06	9.03
16.5000	9.00	8.97	8.95	8.92	8.89
16.7500	8.86	8.84	8.81	8.78	8.75
17.0000	8.73	8.70	8.67	8.64	8.62
17.2500	8.59	8.56	8.53	8.50	8.47
17.5000	8.45	8.42	8.39	8.36	8.33
17.7500	8.31	8.28	8.25	8.22	8.19
18.0000	8.16	8.13	8.11	8.08	8.05
18.2500	8.02	7.99	7.96	7.93	7.90
18.5000	7.87	7.85	7.82	7.79	7.76
18.7500	7.73	7.70	7.67	7.64	7.61
19.0000	7.58	7.55	7.53	7.50	7.47
19.2500	7.44	7.41	7.38	7.35	7.32
19.5000	7.29	7.26	7.23	7.20	7.17
19.7500	7.14	7.11	7.08	7.05	7.02
20.0000	6.99	6.96	6.93	6.90	6.87
20.2500	6.84	6.81	6.78	6.75	6.72
20.5000	6.69	6.66	6.63	6.60	6.57
20.7500	6.54	6.51	6.48	6.45	6.42
21.0000	6.39	6.36	6.33	6.30	6.27
21.2500	6.24	6.21	6.18	6.15	6.12
21.5000	6.09	6.06	6.03	5.99	5.96
21.7500	5.93	5.90	5.87	5.84	5.81
22.0000	5.78	5.75	5.72	5.69	5.66
22.2500	5.63	5.60	5.56	5.53	5.50
22.5000	5.47	5.44	5.41	5.38	5.35
22.7500	5.32	5.29	5.26	5.22	5.19
23.0000	5.16	5.13	5.10	5.07	5.04

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
23.2500	5.01	4.98	4.94	4.91	4.88
23.5000	4.85	4.82	4.79	4.76	4.73
23.7500	4.70	4.66	4.63	4.60	4.57
24.0000	4.54	4.49	4.43	4.34	4.21
24.2500	4.03	3.79	3.51	3.20	2.87
24.5000	2.54	2.22	1.91	1.63	1.38
24.7500	1.16	.98	.83	.71	.60
25.0000	.51	.43	.36	.31	.26
25.2500	.22	.19	.16	.13	.11
25.5000	.09	.08	.07	.06	.05
25.7500	.04	.03	.03	.02	.02
26.0000	.01	.01	.01	.01	.00
26.2500	.00	.00	.00		



MASTER DESIGN STORM SUMMARY

Network Storm Collection: MyCounty

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre100	8.2000	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	257.789		11.3000	617.35		
POND 10	IN	POND	100	257.789		11.3000	617.35		
POND 10	OUT	POND	100	257.789		11.3000	617.35		
SUBAREA 10		AREA	100	257.789		11.3000	617.35		

SCS UNIT HYDROGRAPH METHOD
Calc.Method Option = 2
STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 8.2000 in
Rain Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
Rain File -ID = - TypeI 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
HYG File - ID = - SUBAREA 10 Pre100
Tc = 2.0287 hrs
Drainage Area = 606.000 acres Runoff CN= 74
Calc.Increment= .05009 hrs Out.Incr.= .0500 hrs
HYG Volume = 257.789 ac-ft

HYDROGRAPH ORDINATES (cfs)

Time hrs	Output Time increment = .0500 hrs Time on left represents time for first value in each row.				
4.5000	.00	.00	.00	.01	.01
4.7500	.02	.03	.04	.06	.08
5.0000	.11	.15	.20	.25	.32
5.2500	.40	.49	.59	.71	.85
5.5000	1.00	1.17	1.36	1.57	1.79
5.7500	2.03	2.29	2.57	2.86	3.18
6.0000	3.51	3.85	4.22	4.60	4.99
6.2500	5.40	5.83	6.27	6.73	7.20
6.5000	7.68	8.19	8.70	9.23	9.78
6.7500	10.34	10.92	11.52	12.13	12.77
7.0000	13.42	14.10	14.80	15.52	16.27
7.2500	17.03	17.83	18.64	19.48	20.35
7.5000	21.23	22.15	23.08	24.04	25.02
7.7500	26.02	27.04	28.08	29.13	30.21
8.0000	31.29	32.40	33.51	34.64	35.79
8.2500	36.96	38.14	39.34	40.58	41.83
8.5000	43.13	44.46	45.83	47.26	48.74
8.7500	50.29	51.91	53.62	55.41	57.31
9.0000	59.31	61.43	63.66	66.03	68.54
9.2500	71.20	74.01	76.98	80.13	83.45
9.5000	86.98	90.74	94.76	99.13	103.94
9.7500	109.35	115.55	122.87	131.53	141.66
10.0000	153.43	166.73	181.52	197.76	215.36
10.2500	234.42	255.01	277.11	300.78	325.83
10.5000	352.01	379.03	406.33	433.29	459.35
10.7500	484.04	506.92	527.79	546.55	563.02
11.0000	577.26	589.22	598.88	606.45	611.98
11.2500	615.60	617.35	617.13	615.04	611.29
11.5000	606.12	599.78	592.37	583.90	574.37
11.7500	563.76	552.13	539.60	526.30	512.56

Type.... Unit Hyd. (HYG output) Page 7.04
Name.... SUBAREA 10 Tag: Pre100 Event: 100 yr
File.... V:\Projdata\06proj\06021\Calcs\DRAINAGE\offsite-area08.ppw
Storm... TypeI 24hr Tag: Pre100

HYDROGRAPH ORDINATES (cfs)

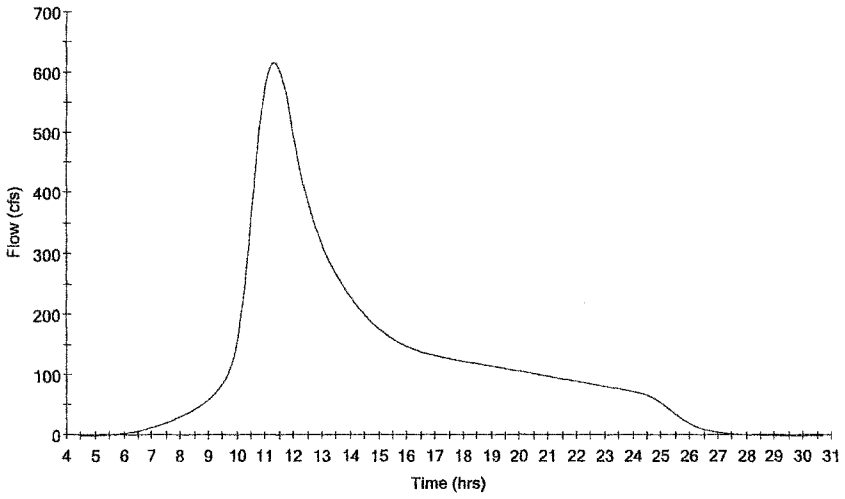
Time hrs	Output Time increment = .0500 hrs Time on left represents time for first value in each row.				
12.0000	498.73	485.16	472.07	459.67	447.96
12.2500	436.86	426.32	416.21	406.51	397.23
12.5000	388.36	379.91	371.87	364.18	356.79
12.7500	349.64	342.68	335.92	329.34	322.98
13.0000	316.86	310.99	305.38	299.99	294.80
13.2500	289.79	284.94	280.22	275.65	271.23
13.5000	266.94	262.79	258.75	254.84	251.04
13.7500	247.34	243.73	240.19	236.75	233.41
14.0000	230.17	227.02	223.94	220.92	217.97
14.2500	215.07	212.24	209.46	206.74	204.08
14.5000	201.47	198.90	196.39	193.91	191.49
14.7500	189.12	186.80	184.55	182.35	180.21
15.0000	178.13	176.12	174.17	172.28	170.45
15.2500	168.67	166.95	165.30	163.71	162.19
15.5000	160.74	159.34	158.00	156.70	155.44
15.7500	154.23	153.05	151.92	150.82	149.76
16.0000	148.74	147.74	146.78	145.84	144.93
16.2500	144.04	143.17	142.33	141.51	140.72
16.5000	139.94	139.20	138.49	137.82	137.18
16.7500	136.56	135.97	135.39	134.82	134.27
17.0000	133.73	133.20	132.68	132.16	131.66
17.2500	131.16	130.67	130.19	129.71	129.24
17.5000	128.77	128.30	127.85	127.39	126.94
17.7500	126.49	126.05	125.61	125.17	124.73
18.0000	124.30	123.87	123.44	123.01	122.58
18.2500	122.16	121.74	121.31	120.89	120.47
18.5000	120.06	119.64	119.22	118.81	118.39
18.7500	117.98	117.56	117.15	116.73	116.32
19.0000	115.91	115.50	115.08	114.67	114.26
19.2500	113.85	113.44	113.03	112.62	112.20
19.5000	111.79	111.38	110.97	110.56	110.15
19.7500	109.73	109.32	108.91	108.50	108.08
20.0000	107.67	107.26	106.85	106.43	106.02
20.2500	105.60	105.19	104.78	104.36	103.95
20.5000	103.53	103.11	102.70	102.28	101.87
20.7500	101.45	101.03	100.61	100.20	99.78
21.0000	99.36	98.94	98.52	98.10	97.68
21.2500	97.26	96.84	96.41	95.99	95.57
21.5000	95.15	94.72	94.30	93.88	93.45
21.7500	93.03	92.60	92.18	91.75	91.33
22.0000	90.90	90.48	90.05	89.62	89.19
22.2500	88.77	88.34	87.91	87.48	87.05
22.5000	86.62	86.20	85.77	85.34	84.91
22.7500	84.47	84.04	83.61	83.18	82.75
23.0000	82.32	81.89	81.45	81.02	80.59

S/N: FCYXYWHN7K7A Bentley Systems, Inc.
Bentley PondPack (10.00.022.00) 10:28 AM 11/18/2006

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
23.2500	80.16	79.72	79.29	78.85	78.42
23.5000	77.99	77.55	77.12	76.68	76.25
23.7500	75.81	75.37	74.94	74.50	74.07
24.0000	73.63	73.17	72.70	72.20	71.66
24.2500	71.08	70.45	69.77	69.04	68.24
24.5000	67.37	66.42	65.39	64.26	63.04
24.7500	61.71	60.27	58.74	57.13	55.43
25.0000	53.67	51.86	50.01	48.13	46.23
25.2500	44.32	42.42	40.53	38.65	36.79
25.5000	34.95	33.17	31.43	29.74	28.10
25.7500	26.52	24.99	23.52	22.12	20.78
26.0000	19.50	18.31	17.19	16.15	15.18
26.2500	14.28	13.44	12.64	11.90	11.20
26.5000	10.54	9.93	9.35	8.80	8.28
26.7500	7.80	7.34	6.90	6.49	6.10
27.0000	5.74	5.39	5.07	4.77	4.48
27.2500	4.22	3.96	3.73	3.50	3.29
27.5000	3.09	2.91	2.73	2.56	2.41
27.7500	2.26	2.12	1.99	1.87	1.75
28.0000	1.64	1.54	1.45	1.36	1.27
28.2500	1.19	1.12	1.05	.98	.92
28.5000	.86	.80	.75	.70	.66
28.7500	.61	.57	.53	.49	.46
29.0000	.43	.40	.37	.34	.32
29.2500	.29	.27	.25	.23	.21
29.5000	.19	.18	.16	.15	.14
29.7500	.12	.11	.10	.09	.08
30.0000	.07	.06	.05	.04	.04
30.2500	.03	.02	.02	.01	.01
30.5000	.01	.00	.00	.00	

Offsite Drainage Area 8



MASTER DESIGN STORM SUMMARY

Network Storm Collection: MyCounty

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre100	8.2000	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	149.312		11.1500	381.23		
POND 10	IN	POND	100	149.312		11.1500	381.23		
POND 10	OUT	POND	100	149.312		11.1500	381.23		
SUBAREA 10		AREA	100	149.312		11.1500	381.23		

SCS UNIT HYDROGRAPH METHOD
Calc.Method Option = 2
STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 8.2000 in
Rain Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
Rain File -ID = - TypeI 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
HYG File - ID = - SUBAREA 10 Pre100
Tc = 1.8310 hrs
Drainage Area = 351.000 acres Runoff CN= 74
Calc.Increment= .05086 hrs Out.Incr.= .0500 hrs
HYG Volume = 149.312 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

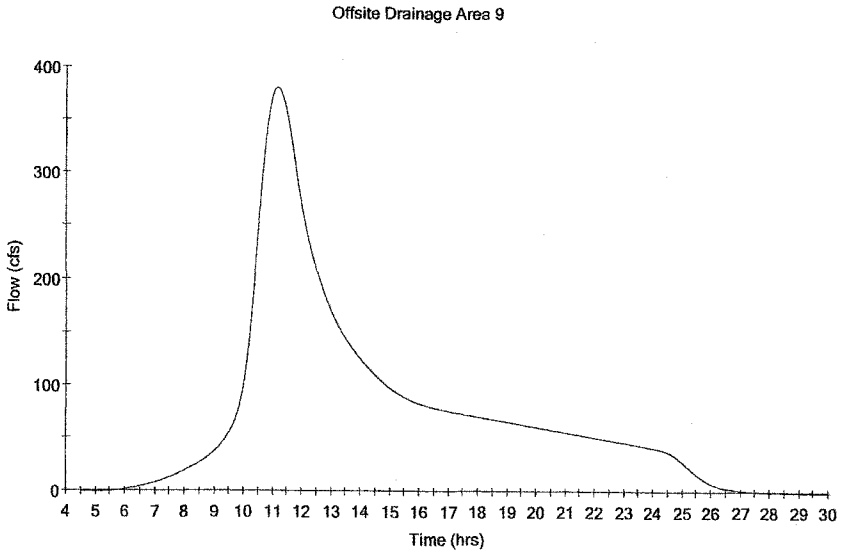
Time hrs					
4.5500	.00	.00	.00	.01	.01
4.8000	.02	.03	.05	.06	.09
5.0500	.12	.15	.19	.24	.30
5.3000	.37	.45	.54	.64	.76
5.5500	.88	1.01	1.16	1.32	1.49
5.8000	1.67	1.87	2.07	2.28	2.51
6.0500	2.74	2.98	3.23	3.49	3.76
6.3000	4.04	4.33	4.62	4.92	5.23
6.5500	5.55	5.87	6.21	6.55	6.90
6.8000	7.27	7.64	8.03	8.43	8.84
7.0500	9.27	9.71	10.17	10.64	11.12
7.3000	11.63	12.14	12.67	13.22	13.78
7.5500	14.35	14.94	15.54	16.15	16.78
7.8000	17.41	18.06	18.71	19.37	20.04
8.0500	20.71	21.39	22.08	22.77	23.48
8.3000	24.19	24.92	25.67	26.43	27.22
8.5500	28.03	28.88	29.76	30.68	31.66
8.8000	32.69	33.77	34.93	36.16	37.46
9.0500	38.84	40.31	41.87	43.52	45.27
9.3000	47.12	49.09	51.16	53.36	55.69
9.5500	58.17	60.83	63.73	66.94	70.58
9.8000	74.79	79.83	85.85	92.98	101.33
10.0500	110.80	121.39	133.06	145.80	159.68
10.3000	174.68	190.80	207.89	225.76	244.11
10.5500	262.46	280.33	297.29	312.98	327.16
10.8000	339.75	350.62	359.76	367.22	372.98
11.0500	377.21	379.94	381.23	381.08	379.51
11.3000	376.73	372.86	368.11	362.55	356.18
11.5500	349.04	341.11	332.53	323.35	313.83
11.8000	304.30	294.97	286.07	277.74	269.89

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
12.0500	262.48	255.46	248.74	242.34	236.25
12.3000	230.49	225.04	219.83	214.85	210.04
12.5500	205.38	200.88	196.54	192.38	188.42
12.8000	184.65	181.05	177.60	174.29	171.09
13.0500	168.01	165.04	162.18	159.42	156.77
13.3000	154.21	151.73	149.34	147.01	144.75
13.5500	142.58	140.48	138.46	136.49	134.58
13.8000	132.72	130.90	129.13	127.41	125.72
14.0500	124.07	122.45	120.85	119.28	117.74
14.3000	116.23	114.74	113.28	111.84	110.44
14.5500	109.06	107.72	106.40	105.11	103.85
14.8000	102.62	101.43	100.28	99.18	98.11
15.0500	97.08	96.08	95.11	94.17	93.26
15.3000	92.38	91.54	90.72	89.93	89.17
15.5500	88.44	87.73	87.05	86.40	85.77
15.8000	85.16	84.59	84.04	83.52	83.04
16.0500	82.58	82.14	81.73	81.33	80.94
16.3000	80.56	80.19	79.84	79.49	79.15
16.5500	78.83	78.50	78.19	77.88	77.58
16.8000	77.28	76.99	76.70	76.42	76.14
17.0500	75.86	75.59	75.32	75.05	74.79
17.3000	74.53	74.27	74.01	73.76	73.51
17.5500	73.26	73.01	72.76	72.51	72.26
17.8000	72.02	71.78	71.53	71.29	71.05
18.0500	70.81	70.57	70.33	70.09	69.85
18.3000	69.61	69.38	69.14	68.90	68.66
18.5500	68.43	68.19	67.95	67.72	67.48
18.8000	67.25	67.01	66.77	66.54	66.30
19.0500	66.06	65.83	65.59	65.35	65.12
19.3000	64.88	64.64	64.41	64.17	63.93
19.5500	63.70	63.46	63.22	62.98	62.74
19.8000	62.51	62.27	62.03	61.79	61.55
20.0500	61.31	61.07	60.83	60.59	60.35
20.3000	60.11	59.87	59.63	59.39	59.15
20.5500	58.91	58.67	58.43	58.18	57.94
20.8000	57.70	57.46	57.21	56.97	56.73
21.0500	56.48	56.24	55.99	55.75	55.51
21.3000	55.26	55.02	54.77	54.53	54.28
21.5500	54.03	53.79	53.54	53.30	53.05
21.8000	52.80	52.56	52.31	52.06	51.81
22.0500	51.57	51.32	51.07	50.82	50.57
22.3000	50.32	50.08	49.83	49.58	49.33
22.5500	49.08	48.83	48.58	48.33	48.08
22.8000	47.83	47.58	47.33	47.08	46.83
23.0500	46.58	46.33	46.08	45.83	45.57

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
23.3000	45.32	45.07	44.82	44.57	44.32
23.5500	44.06	43.81	43.56	43.31	43.05
23.8000	42.80	42.55	42.29	42.04	41.79
24.0500	41.52	41.24	40.94	40.61	40.24
24.3000	39.85	39.41	38.93	38.40	37.81
24.5500	37.16	36.45	35.66	34.79	33.86
24.8000	32.86	31.80	30.70	29.56	28.39
25.0500	27.20	25.99	24.79	23.59	22.40
25.3000	21.22	20.05	18.92	17.82	16.76
25.5500	15.73	14.75	13.80	12.89	12.03
25.8000	11.22	10.46	9.75	9.10	8.50
26.0500	7.94	7.43	6.95	6.49	6.07
26.3000	5.68	5.31	4.97	4.65	4.35
26.5500	4.06	3.80	3.54	3.31	3.09
26.8000	2.89	2.70	2.52	2.35	2.20
27.0500	2.05	1.92	1.79	1.67	1.56
27.3000	1.45	1.36	1.26	1.18	1.10
27.5500	1.02	.95	.89	.83	.77
27.8000	.72	.67	.62	.58	.54
28.0500	.50	.46	.43	.40	.37
28.3000	.34	.32	.29	.27	.25
28.5500	.23	.21	.20	.18	.16
28.8000	.15	.14	.13	.11	.10
29.0500	.09	.09	.08	.07	.06
29.3000	.05	.05	.04	.03	.03
29.5500	.02	.02	.02	.01	.01
29.8000	.01	.00	.00	.00	.00



MASTER DESIGN STORM SUMMARY

Network Storm Collection: MyCounty

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre100	8.2000	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	223.345		11.4000	513.37		
POND 10	IN	POND	100	223.345		11.4000	513.37		
POND 10	OUT	POND	100	223.345		11.4000	513.37		
SUBAREA 10		AREA	100	223.345		11.4000	513.37		

SCS UNIT HYDROGRAPH METHOD
Calc.Method Option = 2
STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 8.2000 in
Rain Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
Rain File -ID = - TypeI 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
HYG File - ID = - SUBAREA 10 Pre100
Tc = 2.1668 hrs
Drainage Area = 525.000 acres Runoff CN= 74
Calc.Increment= .04981 hrs Out.Incr.= .0500 hrs
HYG Volume = 223.345 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
4.5500	.00	.00	.00	.01	.01
4.8000	.02	.03	.04	.06	.08
5.0500	.11	.14	.18	.23	.29
5.3000	.35	.43	.52	.62	.73
5.5500	.86	1.00	1.15	1.32	1.50
5.8000	1.70	1.91	2.14	2.38	2.63
6.0500	2.90	3.18	3.48	3.79	4.12
6.3000	4.46	4.81	5.17	5.55	5.94
6.5500	6.35	6.76	7.20	7.64	8.10
6.8000	8.57	9.06	9.56	10.08	10.62
7.0500	11.17	11.74	12.33	12.94	13.56
7.3000	14.21	14.88	15.56	16.27	16.99
7.5500	17.74	18.50	19.29	20.09	20.91
7.8000	21.75	22.61	23.48	24.37	25.27
8.0500	26.18	27.11	28.06	29.01	29.99
8.3000	30.98	31.99	33.02	34.07	35.15
8.5500	36.26	37.41	38.59	39.82	41.09
8.8000	42.42	43.81	45.27	46.80	48.42
9.0500	50.12	51.91	53.80	55.81	57.92
9.3000	60.16	62.52	65.02	67.67	70.46
9.5500	73.44	76.63	80.08	83.87	88.11
9.8000	92.93	98.60	105.27	112.99	121.94
10.0500	132.06	143.24	155.54	168.82	183.10
10.3000	198.51	215.02	232.66	251.47	271.25
10.5500	291.86	313.10	334.55	355.78	376.38
10.8000	396.04	414.42	431.37	446.85	460.65
11.0500	472.77	483.32	492.09	499.22	504.89
11.3000	509.04	511.86	513.37	513.34	511.91
11.5500	509.27	505.52	500.95	495.62	489.49
11.8000	482.60	474.94	466.47	457.27	447.42

Type.... Unit Hyd. (HYG output) Page 7.04
Name.... SUBAREA 10 Tag: Pre100 Event: 100 yr
File.... V:\Projdata\06proj\06021\Calcs\DRAINAGE\offsite-area10.ppw
Storm... TypeI 24hr Tag: Pre100

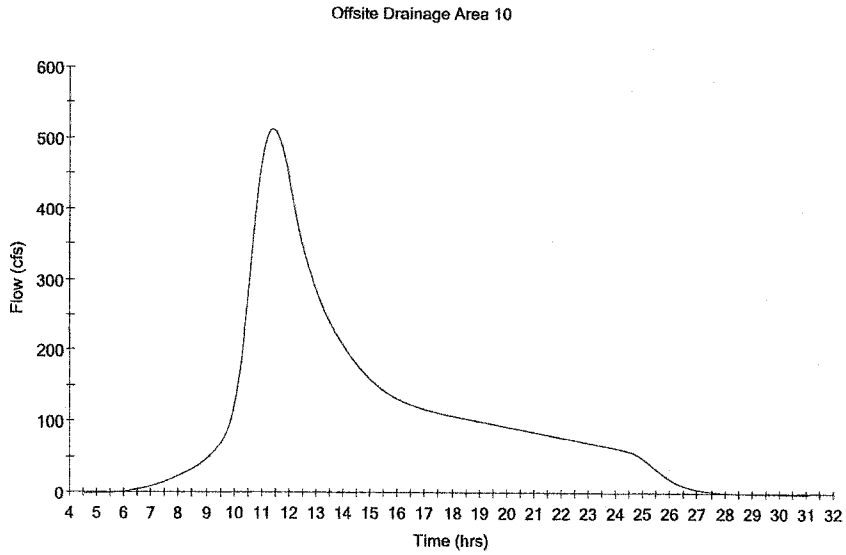
HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
12.0500	437.02	426.33	415.61	405.10	394.94
12.3000	385.30	376.18	367.49	359.23	351.30
12.5500	343.64	336.30	329.27	322.51	316.09
12.8000	309.94	304.02	298.32	292.78	287.37
13.0500	282.10	276.94	271.94	267.11	262.46
13.3000	257.99	253.70	249.55	245.53	241.63
13.5500	237.82	234.12	230.53	227.03	223.63
13.8000	220.32	217.08	213.94	210.88	207.89
14.0500	204.96	202.08	199.26	196.51	193.84
14.3000	191.24	188.70	186.20	183.75	181.36
14.5500	179.00	176.70	174.45	172.25	170.09
14.8000	167.99	165.93	163.92	161.95	160.03
15.0500	158.16	156.34	154.58	152.87	151.21
15.3000	149.59	148.04	146.54	145.09	143.69
15.5500	142.34	141.03	139.76	138.54	137.37
15.8000	136.24	135.17	134.14	133.16	132.20
16.0500	131.27	130.38	129.51	128.66	127.85
16.3000	127.05	126.27	125.52	124.78	124.06
16.5500	123.35	122.66	121.98	121.32	120.67
16.8000	120.03	119.40	118.79	118.20	117.62
17.0500	117.07	116.54	116.03	115.54	115.07
17.3000	114.60	114.15	113.70	113.26	112.83
17.5500	112.40	111.98	111.56	111.15	110.74
17.8000	110.34	109.94	109.54	109.15	108.76
18.0500	108.37	107.99	107.61	107.23	106.85
18.3000	106.47	106.09	105.72	105.35	104.98
18.5500	104.61	104.24	103.87	103.51	103.14
18.8000	102.78	102.41	102.05	101.69	101.33
19.0500	100.97	100.60	100.24	99.88	99.52
19.3000	99.16	98.81	98.45	98.09	97.73
19.5500	97.37	97.01	96.65	96.29	95.94
19.8000	95.58	95.22	94.86	94.50	94.14
20.0500	93.78	93.42	93.07	92.71	92.35
20.3000	91.99	91.63	91.27	90.91	90.55
20.5500	90.19	89.83	89.47	89.11	88.75
20.8000	88.38	88.02	87.66	87.30	86.94
21.0500	86.57	86.21	85.85	85.48	85.12
21.3000	84.76	84.39	84.03	83.66	83.30
21.5500	82.93	82.56	82.20	81.83	81.47
21.8000	81.10	80.73	80.36	79.99	79.63
22.0500	79.26	78.89	78.52	78.15	77.78
22.3000	77.41	77.04	76.67	76.30	75.93
22.5500	75.56	75.18	74.81	74.44	74.07
22.8000	73.70	73.32	72.95	72.58	72.20
23.0500	71.83	71.46	71.08	70.71	70.33

S/N: FCYXYWHN7K7A Bentley Systems, Inc.
Bentley PondPack (10.00.022.00) 10:41 AM 11/18/2006

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
23.3000	69.96	69.58	69.21	68.83	68.46
23.5500	68.08	67.70	67.33	66.95	66.57
23.8000	66.20	65.82	65.44	65.06	64.68
24.0500	64.29	63.89	63.46	63.01	62.53
24.3000	62.01	61.45	60.86	60.22	59.52
24.5500	58.78	57.97	57.10	56.16	55.14
24.8000	54.04	52.86	51.61	50.29	48.92
25.0500	47.49	46.02	44.51	42.98	41.43
25.3000	39.86	38.30	36.74	35.19	33.65
25.5500	32.13	30.63	29.16	27.73	26.34
25.8000	24.99	23.68	22.41	21.19	20.01
26.0500	18.88	17.81	16.78	15.81	14.91
26.3000	14.06	13.27	12.53	11.84	11.18
26.5500	10.57	9.98	9.43	8.92	8.43
26.8000	7.96	7.52	7.11	6.72	6.35
27.0500	5.99	5.66	5.34	5.04	4.76
27.3000	4.49	4.24	4.00	3.78	3.57
27.5500	3.37	3.18	3.00	2.83	2.67
27.8000	2.52	2.37	2.24	2.11	1.99
28.0500	1.87	1.77	1.66	1.57	1.48
28.3000	1.39	1.31	1.23	1.16	1.09
28.5500	1.03	.97	.91	.86	.81
28.8000	.76	.71	.67	.63	.59
29.0500	.55	.52	.48	.45	.42
29.3000	.40	.37	.34	.32	.30
29.5500	.28	.26	.24	.22	.21
29.8000	.19	.18	.16	.15	.14
30.0500	.13	.12	.11	.10	.09
30.3000	.08	.07	.06	.05	.05
30.5500	.04	.03	.03	.02	.02
30.8000	.01	.01	.01	.01	.00
31.0500	.00	.00			



MASTER DESIGN STORM SUMMARY

Network Storm Collection: MyCounty

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre100	8.2000	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	21.695		10.5500	79.38		
POND 10	IN	POND	100	21.695		10.5500	79.38		
POND 10	OUT	POND	100	21.695		10.5500	79.38		
SUBAREA 10		AREA	100	21.695		10.5500	79.38		

SCS UNIT HYDROGRAPH METHOD
Calc.Method Option = 2
STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 8.2000 in
Rain Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
Rain File -ID = - TypeI 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
HYG File - ID = - SUBAREA 10 Pre100
Tc = 1.0166 hrs
Drainage Area = 51.000 acres Runoff CN= 74
Calc.Increment= .04841 hrs Out.Incr.= .0500 hrs
HYG Volume = 21.695 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time hrs | Time on left represents time for first value in each row.

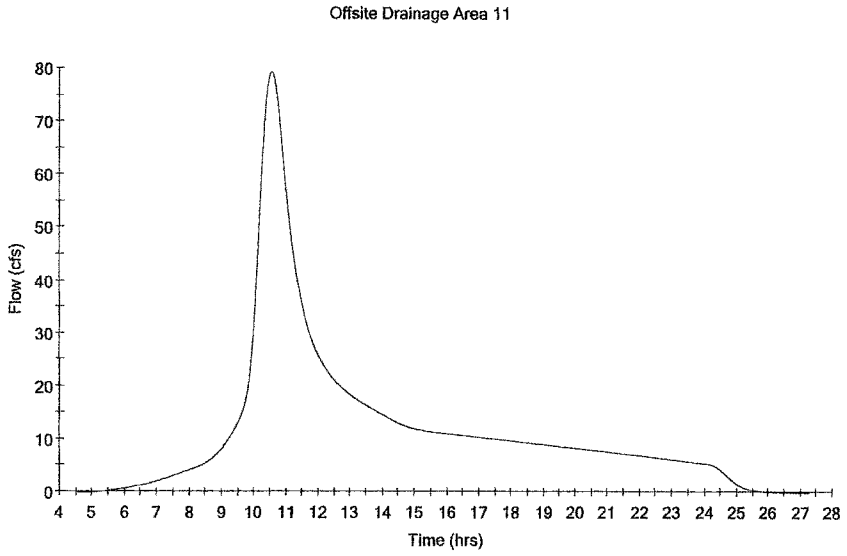
Time hrs					
4.5500	.00	.00	.00	.01	.01
4.8000	.01	.02	.03	.04	.06
5.0500	.08	.10	.12	.15	.18
5.3000	.22	.25	.29	.33	.37
5.5500	.41	.46	.50	.55	.60
5.8000	.65	.69	.74	.79	.85
6.0500	.90	.95	1.00	1.05	1.11
6.3000	1.16	1.21	1.27	1.33	1.39
6.5500	1.45	1.52	1.59	1.66	1.73
6.8000	1.81	1.89	1.97	2.06	2.15
7.0500	2.24	2.34	2.44	2.54	2.64
7.3000	2.75	2.85	2.96	3.07	3.18
7.5500	3.30	3.41	3.52	3.63	3.74
7.8000	3.85	3.96	4.07	4.17	4.28
8.0500	4.39	4.49	4.60	4.71	4.83
8.3000	4.95	5.08	5.21	5.36	5.53
8.5500	5.71	5.91	6.13	6.37	6.63
8.8000	6.92	7.22	7.54	7.89	8.25
9.0500	8.63	9.03	9.45	9.89	10.35
9.3000	10.83	11.34	11.87	12.43	13.03
9.5500	13.67	14.38	15.19	16.14	17.30
9.8000	18.78	20.74	23.32	26.63	30.69
10.0500	35.47	40.88	46.81	53.05	59.25
10.3000	65.03	70.03	74.00	76.86	78.63
10.5500	79.38	79.19	78.15	76.39	74.02
10.8000	71.18	67.95	64.47	60.93	57.52
11.0500	54.37	51.50	48.89	46.49	44.28
11.3000	42.24	40.34	38.57	36.94	35.45
11.5500	34.08	32.84	31.69	30.64	29.67
11.8000	28.77	27.95	27.19	26.49	25.84

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
12.0500	25.24	24.69	24.17	23.68	23.21
12.3000	22.78	22.36	21.97	21.59	21.24
12.5500	20.91	20.59	20.28	20.00	19.72
12.8000	19.46	19.20	18.95	18.71	18.47
13.0500	18.24	18.01	17.80	17.58	17.38
13.3000	17.19	17.00	16.82	16.64	16.47
13.5500	16.29	16.12	15.94	15.77	15.60
13.8000	15.43	15.26	15.09	14.92	14.75
14.0500	14.58	14.41	14.24	14.08	13.91
14.3000	13.75	13.59	13.43	13.28	13.14
14.5500	13.00	12.87	12.75	12.63	12.52
14.8000	12.43	12.33	12.25	12.17	12.09
15.0500	12.02	11.96	11.90	11.84	11.79
15.3000	11.74	11.69	11.64	11.59	11.55
15.5500	11.51	11.47	11.43	11.39	11.35
15.8000	11.31	11.28	11.24	11.20	11.17
16.0500	11.13	11.10	11.06	11.03	11.00
16.3000	10.96	10.93	10.90	10.86	10.83
16.5500	10.80	10.76	10.73	10.70	10.67
16.8000	10.63	10.60	10.57	10.53	10.50
17.0500	10.47	10.44	10.40	10.37	10.34
17.3000	10.30	10.27	10.24	10.20	10.17
17.5500	10.14	10.10	10.07	10.04	10.00
17.8000	9.97	9.94	9.90	9.87	9.84
18.0500	9.80	9.77	9.74	9.70	9.67
18.3000	9.63	9.60	9.57	9.53	9.50
18.5500	9.46	9.43	9.40	9.36	9.33
18.8000	9.29	9.26	9.22	9.19	9.15
19.0500	9.12	9.09	9.05	9.02	8.98
19.3000	8.95	8.91	8.88	8.84	8.81
19.5500	8.77	8.74	8.70	8.67	8.63
19.8000	8.60	8.56	8.53	8.49	8.46
20.0500	8.42	8.39	8.35	8.32	8.28
20.3000	8.24	8.21	8.17	8.14	8.10
20.5500	8.07	8.03	8.00	7.96	7.92
20.8000	7.89	7.85	7.82	7.78	7.75
21.0500	7.71	7.67	7.64	7.60	7.57
21.3000	7.53	7.49	7.46	7.42	7.39
21.5500	7.35	7.31	7.28	7.24	7.21
21.8000	7.17	7.13	7.10	7.06	7.02
22.0500	6.99	6.95	6.92	6.88	6.84
22.3000	6.81	6.77	6.73	6.70	6.66
22.5500	6.62	6.59	6.55	6.51	6.48
22.8000	6.44	6.40	6.37	6.33	6.29
23.0500	6.26	6.22	6.18	6.15	6.11

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
23.3000	6.07	6.04	6.00	5.96	5.93
23.5500	5.89	5.85	5.81	5.78	5.74
23.8000	5.70	5.67	5.63	5.59	5.55
24.0500	5.51	5.46	5.39	5.30	5.19
24.3000	5.05	4.88	4.68	4.44	4.17
24.5500	3.89	3.60	3.30	3.01	2.72
24.8000	2.45	2.19	1.95	1.72	1.52
25.0500	1.34	1.18	1.05	.93	.82
25.3000	.73	.65	.57	.51	.45
25.5500	.40	.35	.31	.27	.24
25.8000	.21	.19	.17	.15	.13
26.0500	.11	.10	.09	.08	.07
26.3000	.06	.05	.05	.04	.03
26.5500	.03	.03	.02	.02	.02
26.8000	.01	.01	.01	.01	.01
27.0500	.00	.00	.00	.00	.00



MASTER DESIGN STORM SUMMARY

Network Storm Collection: MyCounty

Return Event	Total Depth in	Rainfall Type	RNF ID
Prel00	8.2000	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	525.376		13.0500	794.60		
POND 10	IN	POND	100	525.376		13.0500	794.60		
POND 10	OUT	POND	100	525.376		13.0500	794.60		
SUBAREA 10		AREA	100	525.376		13.0500	794.60		

SCS UNIT HYDROGRAPH METHOD
Calc.Method Option = 2
STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 8.2000 in
Rain Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
Rain File -ID = - TypeI 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
HYG File - ID = - SUBAREA 10 Pre100
Tc = 4.2211 hrs
Drainage Area = 1235.000 acres Runoff CN= 74
Calc.Increment= .05025 hrs Out.Incr.= .0500 hrs
HYG Volume = 525.376 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
4.5500	.00	.00	.00	.00	.01
4.8000	.01	.01	.02	.03	.04
5.0500	.05	.06	.08	.10	.12
5.3000	.15	.18	.21	.25	.29
5.5500	.34	.40	.46	.53	.60
5.8000	.69	.78	.88	.99	1.12
6.0500	1.25	1.39	1.55	1.72	1.90
6.3000	2.09	2.30	2.53	2.77	3.03
6.5500	3.30	3.59	3.90	4.23	4.58
6.8000	4.94	5.33	5.73	6.16	6.61
7.0500	7.08	7.58	8.09	8.63	9.19
7.3000	9.78	10.40	11.03	11.70	12.39
7.5500	13.10	13.85	14.62	15.42	16.25
7.8000	17.11	17.99	18.91	19.85	20.83
8.0500	21.83	22.87	23.94	25.04	26.18
8.3000	27.34	28.55	29.79	31.07	32.39
8.5500	33.75	35.15	36.59	38.08	39.61
8.8000	41.19	42.82	44.51	46.24	48.04
9.0500	49.89	51.81	53.79	55.84	57.96
9.3000	60.17	62.45	64.83	67.30	69.87
9.5500	72.57	75.40	78.41	81.61	85.08
9.8000	88.85	93.09	97.86	103.08	108.80
10.0500	114.91	121.51	128.75	136.61	144.99
10.3000	153.86	163.07	172.71	182.83	193.38
10.5500	204.37	215.75	227.54	239.86	252.74
10.8000	266.11	279.98	294.25	309.03	324.42
11.0500	340.38	356.84	373.72	390.90	408.50
11.3000	426.49	444.76	463.22	481.66	499.95
11.5500	517.94	535.58	552.88	569.81	586.40
11.8000	602.44	617.79	632.50	646.57	660.11

Type.... Unit Hyd. (HYG output) Page 7.04
Name.... SUBAREA 10 Tag: Pre100 Event: 100 yr
File.... V:\Projdata\06proj\06021\Calcs\DRAINAGE\offsite-area12.ppw
Storm... TypeI 24hr Tag: Pre100

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
12.0500	673.12	685.40	696.89	707.68	717.75
12.3000	727.28	736.14	744.21	751.52	758.15
12.5500	764.21	769.82	774.92	779.46	783.46
12.8000	786.91	789.82	792.13	793.69	794.48
13.0500	794.60	794.16	793.32	792.10	790.49
13.3000	788.50	786.16	783.49	780.51	777.19
13.5500	773.53	769.52	765.19	760.54	755.55
13.8000	750.15	744.34	738.16	731.63	724.81
14.0500	717.66	710.15	702.34	694.29	686.12
14.3000	677.92	669.79	661.77	653.86	646.06
14.5500	638.36	630.82	623.54	616.50	609.68
14.8000	602.99	596.38	589.85	583.43	577.11
15.0500	570.89	564.73	558.64	552.66	546.78
15.3000	541.01	535.33	529.72	524.20	518.81
15.5500	513.54	508.36	503.27	498.23	493.24
15.8000	488.33	483.49	478.69	473.94	469.22
16.0500	464.54	459.90	455.30	450.76	446.27
16.3000	441.86	437.53	433.30	429.16	425.09
16.5500	421.09	417.17	413.36	409.63	405.98
16.8000	402.38	398.84	395.36	391.95	388.58
17.0500	385.28	382.03	378.84	375.72	372.66
17.3000	369.65	366.71	363.80	360.96	358.17
17.5500	355.43	352.75	350.12	347.54	345.02
17.8000	342.56	340.15	337.78	335.45	333.14
18.0500	330.87	328.64	326.43	324.27	322.15
18.3000	320.08	318.07	316.11	314.18	312.29
18.5500	310.42	308.59	306.79	305.02	303.27
18.8000	301.55	299.85	298.18	296.54	294.92
19.0500	293.32	291.74	290.18	288.66	287.15
19.3000	285.66	284.19	282.74	281.32	279.91
19.5500	278.52	277.14	275.77	274.41	273.07
19.8000	271.73	270.41	269.09	267.80	266.52
20.0500	265.25	264.01	262.77	261.54	260.32
20.3000	259.10	257.90	256.70	255.51	254.34
20.5500	253.17	252.03	250.90	249.77	248.66
20.8000	247.54	246.44	245.33	244.24	243.14
21.0500	242.05	240.97	239.89	238.81	237.74
21.3000	236.68	235.63	234.59	233.56	232.54
21.5500	231.53	230.53	229.53	228.53	227.53
21.8000	226.53	225.54	224.55	223.56	222.58
22.0500	221.59	220.61	219.62	218.64	217.66
22.3000	216.68	215.70	214.72	213.74	212.76
22.5500	211.79	210.81	209.83	208.86	207.88
22.8000	206.90	205.93	204.95	203.98	203.01
23.0500	202.03	201.06	200.08	199.11	198.14

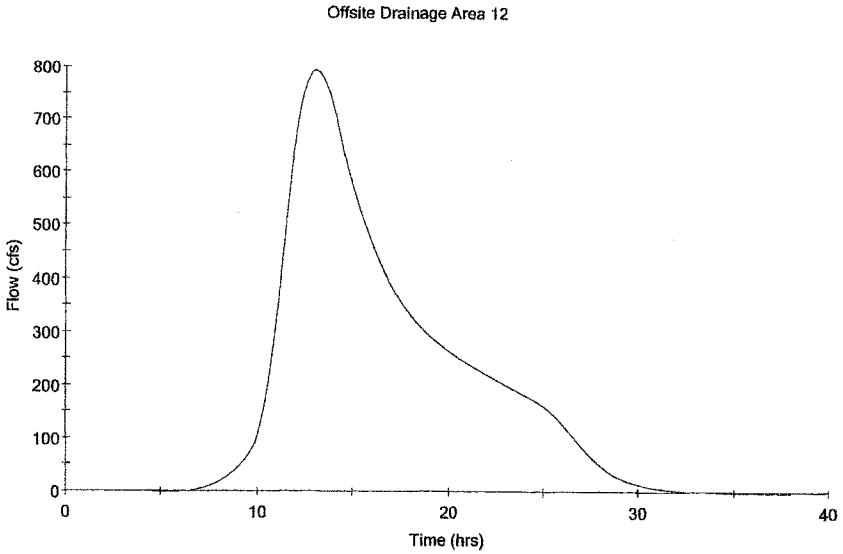
S/N: FCYXYWHN7K7A Bentley Systems, Inc.
Bentley PondPack (10.00.022.00) 10:48 AM 11/18/2006

HYDROGRAPH ORDINATES (cfs)

Time hrs	Output Time increment = .0500 hrs Time on left represents time for first value in each row.				
23.3000	197.17	196.20	195.22	194.25	193.28
23.5500	192.31	191.34	190.38	189.41	188.45
23.8000	187.49	186.54	185.60	184.66	183.74
24.0500	182.82	181.89	180.96	180.02	179.07
24.3000	178.11	177.14	176.14	175.13	174.11
24.5500	173.06	171.99	170.90	169.78	168.64
24.8000	167.48	166.30	165.08	163.83	162.55
25.0500	161.25	159.91	158.53	157.11	155.66
25.3000	154.16	152.63	151.05	149.43	147.76
25.5500	146.04	144.28	142.47	140.62	138.73
25.8000	136.80	134.84	132.84	130.80	128.74
26.0500	126.66	124.56	122.43	120.29	118.13
26.3000	115.96	113.78	111.60	109.42	107.22
26.5500	105.03	102.85	100.68	98.51	96.35
26.8000	94.21	92.07	89.96	87.85	85.76
27.0500	83.69	81.63	79.60	77.60	75.62
27.3000	73.68	71.76	69.87	68.02	66.19
27.5500	64.39	62.63	60.89	59.19	57.52
27.8000	55.88	54.27	52.69	51.15	49.65
28.0500	48.18	46.75	45.36	44.00	42.68
28.3000	41.41	40.17	38.98	37.82	36.71
28.5500	35.63	34.59	33.58	32.61	31.66
28.8000	30.75	29.87	29.01	28.17	27.36
29.0500	26.58	25.81	25.07	24.35	23.65
29.3000	22.97	22.31	21.67	21.05	20.45
29.5500	19.86	19.29	18.74	18.20	17.67
29.8000	17.16	16.66	16.18	15.71	15.25
30.0500	14.81	14.37	13.95	13.54	13.15
30.3000	12.76	12.39	12.02	11.67	11.33
30.5500	11.00	10.68	10.36	10.06	9.77
30.8000	9.48	9.20	8.93	8.67	8.41
31.0500	8.17	7.92	7.69	7.46	7.24
31.3000	7.02	6.82	6.61	6.42	6.22
31.5500	6.04	5.86	5.68	5.51	5.35
31.8000	5.19	5.03	4.88	4.73	4.59
32.0500	4.45	4.31	4.18	4.06	3.93
32.3000	3.81	3.70	3.58	3.48	3.37
32.5500	3.27	3.17	3.07	2.98	2.88
32.8000	2.79	2.71	2.62	2.54	2.46
33.0500	2.39	2.31	2.24	2.17	2.10
33.3000	2.03	1.97	1.91	1.84	1.79
33.5500	1.73	1.67	1.62	1.56	1.51
33.8000	1.46	1.41	1.37	1.32	1.28
34.0500	1.23	1.19	1.15	1.11	1.07
34.3000	1.04	1.00	.96	.93	.90

HYDROGRAPH ORDINATES (cfs)

Time hrs	Output Time increment = .0500 hrs Time on left represents time for first value in each row.				
34.5500	.87	.83	.80	.78	.75
34.8000	.72	.69	.67	.64	.62
35.0500	.59	.57	.55	.53	.51
35.3000	.49	.47	.45	.43	.41
35.5500	.40	.38	.36	.35	.33
35.8000	.32	.30	.29	.27	.26
36.0500	.25	.23	.22	.21	.20
36.3000	.19	.18	.17	.16	.15
36.5500	.14	.13	.12	.11	.10
36.8000	.09	.09	.08	.07	.06
37.0500	.06	.05	.05	.04	.04
37.3000	.03	.03	.02	.02	.02
37.5500	.01	.01	.01	.01	.01
37.8000	.00	.00	.00	.00	



MASTER DESIGN STORM SUMMARY

Network Storm Collection: MyCounty

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre100	8.2000	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	1587.635		13.5500	2194.30		
POND 10	IN	POND	100	1587.635		13.5500	2194.30		
POND 10	OUT	POND	100	1587.635		13.5500	2194.30		
SUBAREA 10		AREA	100	1587.635		13.5500	2194.30		

SCS UNIT HYDROGRAPH METHOD
Calc.Method Option = 2
STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 8.2000 in
Rain Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
Rain File -ID = - TypeI 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\Projdata\06proj\06021\Calcs\DRAINAGE\
HYG File - ID = - SUBAREA 10 Pre100
Tc = 4.8727 hrs
Drainage Area = 3732.000 acres Runoff CN= 74
Calc.Increment= .04998 hrs Out.Incr.= .0500 hrs
HYG Volume = 1587.635 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
4.5000	.00	.00	.00	.01	.01
4.7500	.01	.02	.03	.04	.06
5.0000	.08	.10	.13	.16	.20
5.2500	.25	.30	.37	.44	.52
5.5000	.61	.71	.83	.96	1.10
5.7500	1.25	1.43	1.61	1.82	2.05
6.0000	2.30	2.57	2.86	3.17	3.52
6.2500	3.89	4.29	4.72	5.18	5.68
6.5000	6.21	6.78	7.39	8.03	8.72
6.7500	9.46	10.23	11.06	11.93	12.85
7.0000	13.82	14.85	15.93	17.06	18.25
7.2500	19.50	20.80	22.17	23.59	25.09
7.5000	26.64	28.26	29.94	31.70	33.52
7.7500	35.41	37.37	39.40	41.51	43.69
8.0000	45.95	48.29	50.70	53.20	55.78
8.2500	58.45	61.20	64.05	66.99	70.02
8.5000	73.16	76.40	79.74	83.20	86.78
8.7500	90.47	94.29	98.23	102.31	106.53
9.0000	110.88	115.39	120.05	124.88	129.87
9.2500	135.05	140.41	145.97	151.73	157.72
9.5000	163.94	170.45	177.26	184.47	192.12
9.7500	200.37	209.28	219.23	230.29	242.33
10.0000	255.39	269.24	283.99	299.90	317.22
10.2500	335.85	355.67	376.44	397.99	420.32
10.5000	443.65	468.01	493.30	519.52	546.51
10.7500	574.35	603.19	633.25	664.43	696.71
11.0000	729.91	764.00	799.03	835.40	873.17
11.2500	912.07	952.07	992.76	1034.16	1076.39
11.5000	1119.57	1163.55	1208.09	1252.91	1297.65
11.7500	1342.16	1386.05	1429.18	1471.64	1513.36

Type.... Unit Hyd. (HYG output) Page 7.04
Name.... SUBAREA 10 Tag: Pre100 Event: 100 yr
File.... V:\Projdata\06proj\06021\Calcs\DRAINAGE\offsite-area13.ppw
Storm... TypeI 24hr Tag: Pre100

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
12.0000	1554.49	1594.85	1634.09	1671.84	1708.19
12.2500	1743.20	1777.14	1810.07	1841.90	1872.09
12.5000	1900.52	1927.48	1952.95	1977.35	2000.58
12.7500	2022.34	2042.32	2060.68	2077.58	2093.34
13.0000	2108.17	2122.09	2134.86	2146.46	2156.95
13.2500	2166.30	2174.60	2181.71	2187.34	2191.21
13.5000	2193.46	2194.30	2194.06	2193.01	2191.17
13.7500	2188.46	2184.89	2180.54	2175.42	2169.63
14.0000	2163.19	2156.04	2148.12	2139.47	2130.10
14.2500	2120.05	2109.31	2097.85	2085.47	2072.16
14.5000	2058.01	2043.07	2027.51	2011.30	1994.35
14.7500	1976.58	1958.09	1939.03	1919.59	1899.99
15.0000	1880.33	1860.85	1841.63	1822.61	1803.82
15.2500	1785.14	1766.67	1748.63	1731.19	1714.29
15.5000	1697.84	1681.64	1665.58	1649.65	1633.96
15.7500	1618.52	1603.29	1588.25	1573.33	1558.55
16.0000	1543.96	1529.63	1515.54	1501.67	1487.97
16.2500	1474.44	1461.08	1448.02	1435.26	1422.75
16.5000	1410.46	1398.29	1386.25	1374.36	1362.65
16.7500	1351.10	1339.70	1328.40	1317.18	1306.05
17.0000	1295.01	1284.06	1273.21	1262.47	1251.84
17.2500	1241.34	1231.01	1220.89	1210.97	1201.23
17.5000	1191.64	1182.20	1172.92	1163.85	1155.00
17.7500	1146.34	1137.84	1129.46	1121.18	1113.03
18.0000	1105.00	1097.09	1089.30	1081.62	1074.04
18.2500	1066.58	1059.25	1052.06	1045.00	1038.05
18.5000	1031.19	1024.42	1017.76	1011.21	1004.76
18.7500	998.42	992.17	986.01	979.95	974.01
19.0000	968.20	962.48	956.86	951.30	945.78
19.2500	940.32	934.90	929.54	924.23	918.97
19.5000	913.78	908.67	903.66	898.75	893.93
19.7500	889.18	884.49	879.84	875.24	870.70
20.0000	866.22	861.78	857.39	853.03	848.72
20.2500	844.45	840.24	836.06	831.93	827.83
20.5000	823.77	819.75	815.77	811.83	807.93
20.7500	804.06	800.23	796.42	792.66	788.93
21.0000	785.24	781.58	777.94	774.31	770.71
21.2500	767.11	763.53	759.97	756.43	752.91
21.5000	749.41	745.95	742.51	739.11	735.73
21.7500	732.36	729.00	725.66	722.32	719.00
22.0000	715.69	712.39	709.12	705.86	702.63
22.2500	699.44	696.27	693.11	689.97	686.84
22.5000	683.71	680.59	677.48	674.37	671.27
22.7500	668.18	665.09	662.01	658.93	655.86
23.0000	652.80	649.76	646.72	643.71	640.73

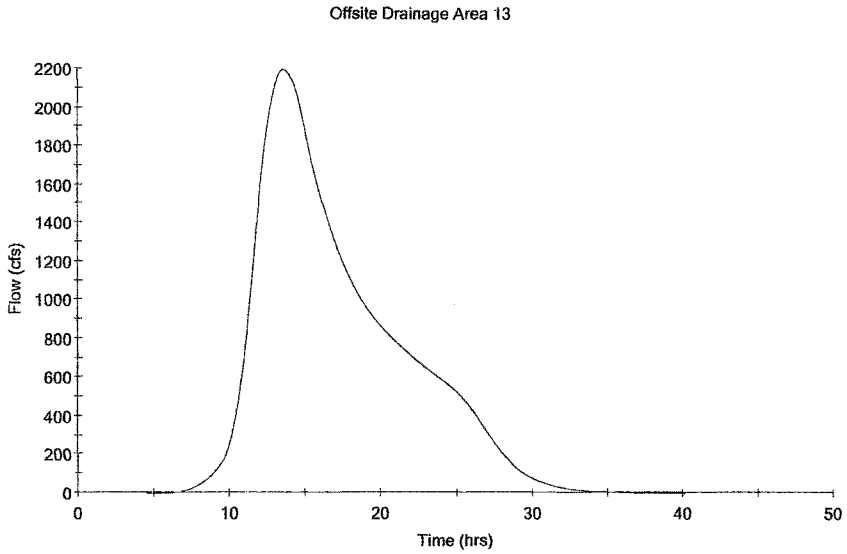
S/N: FCYXYWHN7K7A Bentley Systems, Inc.
Bentley PondPack (10.00.022.00) 11:48 AM 11/17/2006

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
23.2500	637.77	634.83	631.90	628.97	626.05
23.5000	623.14	620.23	617.33	614.42	611.52
23.7500	608.63	605.73	602.84	599.94	597.05
24.0000	594.15	591.24	588.32	585.37	582.40
24.2500	579.42	576.42	573.38	570.30	567.18
24.5000	564.02	560.81	557.56	554.27	550.92
24.7500	547.52	544.07	540.56	537.00	533.39
25.0000	529.71	525.97	522.15	518.27	514.32
25.2500	510.30	506.21	502.03	497.76	493.39
25.5000	488.94	484.40	479.77	475.05	470.22
25.7500	465.28	460.25	455.12	449.88	444.56
26.0000	439.17	433.71	428.19	422.63	417.00
26.2500	411.31	405.57	399.78	393.96	388.09
26.5000	382.19	376.25	370.27	364.28	358.29
26.7500	352.29	346.28	340.26	334.24	328.24
27.0000	322.25	316.29	310.36	304.45	298.56
27.2500	292.71	286.89	281.11	275.36	269.66
27.5000	263.99	258.36	252.79	247.29	241.85
27.7500	236.48	231.19	225.96	220.79	215.71
28.0000	210.69	205.75	200.88	196.09	191.37
28.2500	186.72	182.15	177.66	173.24	168.90
28.5000	164.64	160.46	156.36	152.35	148.43
28.7500	144.60	140.85	137.19	133.62	130.15
29.0000	126.77	123.49	120.31	117.22	114.22
29.2500	111.31	108.48	105.73	103.05	100.46
29.5000	97.95	95.50	93.11	90.78	88.51
29.7500	86.30	84.15	82.05	80.00	78.00
30.0000	76.05	74.15	72.30	70.50	68.75
30.2500	67.03	65.36	63.73	62.14	60.59
30.5000	59.08	57.61	56.17	54.76	53.38
30.7500	52.04	50.73	49.45	48.20	46.98
31.0000	45.79	44.62	43.48	42.38	41.30
31.2500	40.24	39.22	38.22	37.24	36.30
31.5000	35.38	34.48	33.60	32.75	31.91
31.7500	31.10	30.31	29.54	28.79	28.05
32.0000	27.34	26.63	25.95	25.29	24.63
32.2500	24.00	23.38	22.78	22.19	21.62
32.5000	21.06	20.51	19.98	19.46	18.96
32.7500	18.47	17.98	17.52	17.06	16.61
33.0000	16.18	15.76	15.35	14.95	14.55
33.2500	14.17	13.80	13.43	13.08	12.73
33.5000	12.39	12.06	11.74	11.43	11.13
33.7500	10.84	10.55	10.27	10.00	9.73
34.0000	9.47	9.22	8.97	8.73	8.49
34.2500	8.26	8.04	7.82	7.61	7.40

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
34.5000	7.20	7.00	6.81	6.62	6.44
34.7500	6.26	6.09	5.92	5.75	5.59
35.0000	5.44	5.28	5.13	4.99	4.85
35.2500	4.71	4.57	4.44	4.31	4.18
35.5000	4.06	3.94	3.82	3.71	3.60
35.7500	3.49	3.39	3.29	3.19	3.09
36.0000	3.00	2.90	2.82	2.73	2.64
36.2500	2.56	2.48	2.40	2.33	2.25
36.5000	2.18	2.11	2.04	1.97	1.91
36.7500	1.84	1.78	1.72	1.66	1.61
37.0000	1.55	1.50	1.44	1.39	1.34
37.2500	1.29	1.25	1.20	1.16	1.12
37.5000	1.07	1.03	.99	.95	.91
37.7500	.88	.84	.80	.77	.73
38.0000	.70	.67	.63	.60	.57
38.2500	.54	.52	.49	.46	.44
38.5000	.41	.39	.36	.34	.32
38.7500	.30	.28	.26	.24	.22
39.0000	.20	.18	.17	.15	.14
39.2500	.13	.11	.10	.09	.08
39.5000	.07	.06	.05	.04	.04
39.7500	.03	.02	.02	.01	.01
40.0000	.01	.00	.00	.00	


Offsite Drainage Area 13
Flow (cfs)
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0
10
20
30
40
50
Time (hrs)

Appendix P

Water Plan Analysis

ANALYSIS
OF THE WATER PLAN
FOR THE
COMMUNITY-BASED
ENTERPRISE COMMUNITY/MOLOKA`I RANCH
MASTER LAND USE PLAN

I. INTRODUCTION AND PURPOSE

The purpose of this report is to analyze whether the Water Plan proposed for Community-Based Enterprise Community/Molokai Ranch Master Land Use Plan ("Master Land Use Plan") is reasonable and realistic. In particular, this study analyzes:

(1) Whether the projected water demands are reasonable and realistic for the proposed land use plan; and
(2) Whether the identified sources of water to meet the demands are realistically available.

For purposes of this report, a "reasonable and realistic" determination is based primarily upon a regulatory analysis, i.e., considering regulatory, policy, and other legal constraints. The author is not a hydrologist, geologist, or engineer. Thus, no analysis is made, and no opinions are expressed, about the reliability of water resource data upon which regulatory decisions are made, e.g., sustainable yields estimates adopted for the Molokai aquifer systems. Additionally, no analysis is made or opinion expressed about the economic feasibility of the proposed Water Plan.

This report begins in Section II with a brief description of Master Land Use Plan and a discussion of the supporting Water Plan . Section III provides a brief description of fresh water resources on Molokai. A description of the major water developments and water users that potentially may affect, or be affected by, implementation of the Water Plan is provided in Section IV. A nutshell review of pertinent water laws and regulations follows in Section V. Finally, considering all of the above, the analysis set forth in Section VI concludes that the Water Plan is reasonable and realistic.

II. MASTER LAND USE PLAN AND WATER PLAN

A. Community-Based Master Land Use Plan

Molokai Properties, Ltd. (MPL) is the largest private landowner on Molokai, with approximately 65,000 acres in western and central Molokai. Most of that land is currently undeveloped or utilized in low intensity agriculture (ranching, pasture).

The Master Land Use Plan proposes setting aside over 85% of these lands and protecting them forever from any further development. Of the lands that will be set aside, 26,200 acres to be held in perpetuity for the community in a Molokai Land Trust. An additional 29,000 acres will be subject to protective easements that will limit uses to agriculture, conservation and preserving open space. To preserve Molokai's agricultural economy and lifestyle, 14,390 acres that are currently in grass or crops will be protected for future agricultural use.

Instead of the several residential and condominium developments that had been proposed over the years by Molokai Ranch, Alpha USA, and Kaluakoi, MPL (which currently owns, in addition to the Ranch lands, Kaluakoi and the lands previously owned by Alpha USA) will provide approximately 200 acres around Maunaloa and Kualapuu for housing for the community, and approximately 1000 acres above Kaunakakai for future community expansion. The nature and timing of these developments will be determined by Molokai residents.

MPL will limit its future residential development to no more than 200 two-acre lots at Laau Point. These lots will be subject to a number of restrictive covenants that will prevent increased densities. For example, further subdivision of individual lots will be prohibited and disturbance of each 2-acre lot will be limited to no more than 30% (approximately one-half acre).

On the commercial side, MPL will reopen the Kaluakoi Hotel, including the golf course. The Lodge at Maunaloa, and the Paniolo, Kolo, and Kaupoa visitor camps will continue to operate at current levels. Expansion of the Pala'au Industrial Park is expected to more than double current potable water consumption to approximately 297,000 gpd.

B. Water Plan

A key feature of the Water Plan is that only existing sources, at currently permitted amounts, will be utilized to meet all of the potable water needs for Waiola O Molokai and Molokai Public Utilities' current customers and MPL's future developments proposed under the Master Land Use Plan.

MPL controls three water systems: (1) the Kaluakoi System, operated by Molokai Public Utilities, Inc., which services the existing Kaluakoi Development; (2) the Waiola O Molokai, Inc. System, which supplies drinking water to communities on Molokai Ranch land; and (3) the Molokai Ranch Mountain Water System, which currently provides potable water for

Maunaloa and Palaau Industrial Park, irrigation water for Maunaloa Village, the Lodge and Kaupoa Camp, and water for Molokai Ranch's livestock operations.

The source of water for the Kaluakoi System is Well 17, located in the Kualapuu Aquifer system. A water use permit for 1,018,000 gpd from Well 17 has been issued by the Water Commission.[1] Permitted uses include the Kaluakoi Hotel, condominiums and residential uses, the golf course and other irrigation uses, as well as 76,000 gpd that is sold to Waiola for servicing Kualapuu Town, and the 94,000 gpd "charge" for transmission of Well 17 water through the Molokai Irrigation System to Kaluakoi.

Waiola purchases water from the Kaluakoi's Well 17, from DHHL's Kualapuu wells, and from Molokai Ranch's Mountain Water system, which is treated for potable use at Waiola's Puu Nana water treatment plant. Current demand is approximately 195,000 gpd.

The Mountain Water System moves surface water approximately 20 miles from the mountains of Central Molokai to the far reaches of MPL's holdings. The system has an average yield of 500,000 gpd, but, as with all surface water systems, is highly dependent on the weather. Currently, approximately 500,000 gpd from the Mountain Water System has been treated at the Puu Nana water treatment plant for potable uses in Maunaloa and Palaau Industrial Park.

The Water Plan proposes that potable water needs for existing uses and additional needs resulting from the reopening of the Kaluakoi Hotel and development at Laau Point will be met with 1,018,000 gpd from Well 17 and 500,000 gpd of treated water from MRL's mountain water system. Waiola will abandon plans to develop a potable water well in the Kamiloloa Aquifer.

Nonpotable water demands will be met with the remaining water developed by the Mountain Water System and by development of 1 mgd of brackish water from the Kakalahale Well in the Kamiloloa Aquifer. Additionally, in the future, treated wastewater will be another source of irrigation water for the golf course. Other nonpotable uses will include landscaping and irrigation around Kaluakoi, the future Laau Point lots, Maunaloa Village, the Lodge and Kaupoa Camp, and water for Molokai Ranch's livestock operations.

The Water Plan prepared by MPL, dated December 2004, is attached as Appendix A.

III. BRIEF DESCRIPTION OF MOLOKAI WATER RESOURCES

Typical of all of the major Hawaiian Islands, Molokai has very wet areas with abundant water resources and very arid areas where water resources are scarce. Rainfall on Molokai ranges from more than 150 inches in the higher elevations of the northeastern part of the island to less than 16 inches in the coast areas of south and west Molokai.[2]

A. Ground Water Resources

Molokai's ground water resources are of three types: basal, perched, and dike-confined. Although basal groundwater underlies most of the island, its quality varies significantly. Generally speaking, good quality potable water is found in East Molokai; basal water is somewhat brackish in Central Molokai, and completely brackish in West Molokai.

Percolating water temporarily perched on ash beds is often of such volume that some of it runs underground along the bed and issues as springs. Some of these springs have a sufficiently regular flow to be included in the County water system.

The perennial streams in East Molokai are largely due to springs issuing from dike structures. Dike- confined water is also developed with tunnels or wells.[3]

1. Sustainable Yields[4]

For purposes of planning and management of ground water resources, the Water Commission divides each island into Aquifer Sectors, which reflect broad hydrogeological similarities yet maintain traditional hydrographic, topographic, and historical boundaries where possible. As subsets of Aquifer Sectors, Aquifer Systems are more specifically defined by hydraulic continuity.

Sustainable yields are established for each Aquifer System by the Water Commission. Sustainable yield refers to the forced withdrawal rate of groundwater that could be sustained indefinitely without affecting either the quality of the pumped water or the volume rate of pumping. Head is the elevation of the unconfined water table above sea level. There is not a unique value for sustainable yield; the value depends on the head that will preserve the integrity of the groundwater resource at the level decided upon by the Water Commission.

Although established sustainable yield estimates are used as key management tools by the Water Commission, they are sometimes based on scanty data, and, therefore, not very reliable. Furthermore, the sustainable yield estimate for any aquifer system does not consider the feasibility of developing the groundwater. In many regions, including the windward areas of East Molokai, taking advantage of a high sustainable yield estimate may not be economically feasible.

Total estimated sustainable yield for the island of Molokai is 81 mgd The following table shows the sustainable yield for each aquifer system.

Aquifer Sector	Aquifer System	SY	Quality
West	40101 – Kaluakoi	2 mgd	Brackish
West	40102 – Punakou	2 mgd	Brackish
Central	40201 – Hoolehua	2 mgd	Moderately brackish
Central	40202 – Maunawainui	2 mgd	Moderately brackish
Central	40203 – Kualapuu	5 mgd	Potable
Southeast	40301 – Kamiloloa	3 mgd	Potable
Southeast	40302 – Kawela	5 mgd	Potable
Southeast	40303 – Ualapue	8 mgd	Potable
Southeast	40304 – Waialua	8 mgd	Potable
Northeast	40401 – Kalaupapa	2 mgd	Potable
Northeast	40402 – Kahanui	3 mgd	Potable
Northeast	40403 – Waikolu	5 mgd	Potable
Northeast	40404 – Haupu	2 mgd	Potable
Northeast	40405 – Pelekunu	9 mgd	Potable
Northeast	40406 – Wailau	15 mgd	Potable
Northeast	40407 – Halawa	8 mgd	Potable

B. Surface Water Resources

There are 36 perennial streams on Molokai. "Perennial streams" include (1) continuous streams that flow to the sea year-round under normal conditions, including streams with diversions, and (2) interrupted streams (whether the interruptions are natural or man-made) that flow year-round in the upper portions and intermittently at lower elevations under normal conditions.[5]

Virtually all of the stream flow on Molokai originates in the East Molokai mountains, flows north and east to the ocean and is characteristically flashy.[6] In general, streams in the windward northeastern valleys of Molokai are perennial throughout most of their lengths. Most of the streams that drain to the southern cost of East Molokai are perennial only in the upper reaches where rainfall is persistent or where water is drained from marsh area or springs.[7] No measurable stream flow occurs in arid and semi-arid Central and West Molokai.[8]

All of the streams on Molokai are considered "small streams," meaning they have median flows less than or equal to 10 cubic feet per second (cfs) or average flows less than or equal to 20 cfs.[9]

IV. MOLOKAI WATER SYSTEMS

A discussion of the major water systems in west and central Molokai is presented here for consideration of how the Water Plan may affect, or be affected by, other water users.

A. DHHL

The State Department of Hawaiian Home Lands (DHHL) is one of the major landowners on Molokai, owning more than 25,000 acres in Hoolehua, Kalamaula, Kalupapa, Kamiloloa, Kapaakea, and Makakupa'ia. Its Central Molokai homesteads are served by a water system that draws from two wells in Kualapuu (0801-01 and 0801-02). Permitted withdrawals from these two wells total 367,000 gpd. Not all of the water withdrawn from these wells are used on the homestead lots. Waiola purchases approximately 20,000 gpd from DHHL to serve its customers in the Kipu/Kalae area.[10]

DHHL also has a reservation for 2.905 mgd from the Kualapuu Aquifer. This reservation essentially precludes any new ground water development in the Kualapuu Aquifer, except by DHHL. No definite plans are yet known as to when or where DHHL will draw on this reservation. There had been a proposal to increase withdrawals from DHHL's existing wells; however, new well sites will have to be developed to access the full amount of the reservation.

B. County

Maui County's water system on Molokai includes well 0801-03 in close proximity to the two DHHL Kualapuu wells. The County has a permit to withdraw approximately 0.5 mgd from this well.

Additionally, along the southern coastal areas of East Molokai are the County's Kaunakakai and Ualapue systems which utilize ground water from the basal aquifer.[11]

C. Private Systems

Since the purchase of Kaluakoi Development by Molokai Properties, Ltd. in 2001, the major private water systems on the island are ultimately controlled by the same entity.

1. Wai'ola O Molokai

Wai'ola O Molokai, a regulated public utility, is a wholly owned subsidiary of Molokai Ranch, Limited. It is a regulated public utility in the business of purveying potable water to end users. Currently, it supplies residences and businesses in Kipu/Kalae, Kualapuu, and Maunaloa.

Wai'ola does not own any water source. Instead, its water supply is provided by Molokai Ranch's Mountain Water System and through purchases of water from DHHL and Well 17.

In 1998, following contested case proceedings, Wai'ola obtained from the Water Commission authority to drill a deep potable water well in the Kamiloloa Aquifer and withdraw approximately 656,000 gpd to serve Wai'ola's existing customers and for future developments planned by Molokai Ranch. The permit issuance was appealed to the Hawaii Supreme Court, which, in 2004, vacated the permit and remanded the case to the Water Commission for further proceedings. Due to changes in land use plans, as encompassed in the Master Land Use Plan, Wai'ola has not sought commencement of remand proceedings. Instead, under the Water Plan, Wai'ola will abandon plans to develop the potable water well in the Kamiloloa Aquifer.

2. Molokai Ranch Mountain Water System

Six stream diversions and one tunnel in the upper Kawela, Kamakou and Lualohi basins supply the Molokai Ranch Mountain Water System, which feeds Maunaloa Village and Kualapuu. The yield from these sources varies substantially from season to season, with the minimum flow estimated to be about 110,000 gpd.[12]

A 20-mile long gravity-fed transmission system connects the central Molokai sources with Maunaloa Village. From Puu Nana, there is a connection to the Kaluakoi system. Ten million gallons of storage exist within the system.

At Puu Nana, a water treatment plant treats approximately 0.5 mgd of nonpotable water from the Mountain Water System to drinking water standards for distribution to Waiola's customers. The remainder of the water developed by the Mountain Water System is used for irrigation in Maunaloa Village, the Lodge, and Kaupoa Camp, and for Molokai Ranch's livestock operations.

3. Well 17

In Kualapuu, Wells 0902-01 and 0901-01, drilled in 1946 and 1950, respectively, were originally used to irrigate pineapple fields in the Hoolehua Plain area. Well 0902-01 was abandoned in 1964 when water from the Molokai Irrigation System became available. Since 1976, water from well 0901-01, referred to as Well 17, has been used for domestic and irrigation purposes in Kaluakoi, through a system operated by Molokai Public Utilities, Inc. (MPU), a regulated public utility.

The water use permit for Well 17 permits the withdrawal of 1.018 mgd for domestic and irrigation uses in Kaluakoi and for Wai'ola's customers in Kualapuu Town.

Although Well 17 produces potable quality water, the water is treated to meet drinking water standards because in the transmission of water from Well 17 to Kaluakoi, Well 17 water is combined with nonpotable water. Until recently, water used at Kaluakoi was transmitted via the MIS to the west end where it is treated before distribution to customers. This treatment facility has been out of compliance for several years and the subject of a Department of Health Compliance Order. Now, with MPU under common ownership with Molokai Ranch,

a more efficient system is being implemented. Water from Well 17 is combined with water from the Mountain Water System, treated to drinking water standards at the Puu Nana treatment plant, and delivered to the Kaluakoi use area via existing pipes and Molokai Ranch's reservoir at Maunaloa.

D. MOLOKAI IRRIGATION SYSTEM

The Molokai Irrigation System (MIS), built by the State and funded by Federal and State funds, develops surface water and high-level ground water in Waikolu Valley on East Molokai to irrigate farm lands in the central and western parts of the island. Three production wells (0855-01 to -03) drilled in 1961 withdraw water from the dike complex in northeastern Molokai. Combined with surface water diverted from Waikolu Stream, the MIS transports approximately 1.5 mgd via a 10-mile tunnel and pipeline transmission link from the wet northeast section to the central plain. An open reservoir at Kualapuu stores the water prior to its entering a distribution network extending from Hoolehua to Mahana.

Although the existing system is denominated the "first phase," there are no near-term plans for expansion of the MIS.

Pursuant to HRS § 168-4, DHHL lessees have a priority right to two-thirds of the water developed by the MIS system.[13]

V. WATER LAWS, REGULATIONS AND POLICIES

Any analysis of water use or development on Molokai requires consideration of the State Water Code, common law, and the public trust doctrine, as well as the Hawaii Water Plan, and, in particular, the Maui County Water Use and Development Plan, and also the report of the Molokai Water Working Group. Additionally, because DHHL has large landholdings on Molokai, especial consideration of DHHL's water rights is imperative in any discussion of water regulation on Molokai.

A. State Water Code

Pursuant to Article XI, § 7 of the Hawaii State Constitution, the legislature enacted the Hawaii Water Code, Hawaii Revised Statutes Chapter 174C, in 1987. A primary feature of the Water Code is the regulation of water usage through a permitting system under the jurisdiction of the Commission on Water Resource Management (Water Commission). This permitting jurisdiction exists in water management areas that have been so designated by the Water Commission. Outside of designated water management areas, the Hawaii Supreme Court has stated that the common law governs.[14] While this is generally true with respect to ground water, the Water Commission has extensive regulatory authority over all surface waters in streams, whether or not in designated water management areas.

1. Ground Water

The entire island of Molokai was designated as a ground water management area effective May 13, 1992. Thus, a water use permit issued by the Water Commission is required for the withdrawal or use of any ground water on Molokai.[15]

Within one year of the effective date of designation, all existing uses of Molokai ground water was to have filed applications for existing use permits.[16] Although, as a general rule, existing uses have priority over new uses, existing uses must be shown to be "reasonable-beneficial" and allowable under the common law of the state.[17]

Any new uses of water, i.e., uses not occurring on or before May 13, 1992, or uses which had been occurring on or before May 13, 1992, but failed to obtain existing use permits for failing to timely file an existing use application or other reasons, must meet all seven criteria set forth in HRS § 174C-49(a) in order to obtain a water use permit from the Water Commission.

1) That the proposed use of water can be accommodated with the available water source;
2) That the proposed use of water is a reasonable-beneficial use: that it is a "use of water in such a quantity as is necessary for economic and efficient utilization, for a purpose, and in a manner which is both reasonable and consistent with the state and county land use plans and the public interest;
3) That the proposed use of water will not interfere with existing legal uses of water;
4) That the proposed use of water is in the public interest;

5) That the proposed use of water complies with state and county general plans and land use designations;
6) That the proposed use of water complies with county land use plans and policies; and
7) That the proposed use of water would not interfere with rights of the Department of Hawaiian Home Lands.

Ground water use permits that have been issued by the Water Commission for existing and new uses in west and central Molokai (areas potentially affected by the Water Plan), are listed below.

Aquifer System	Well	Permit Allocation (MGD)
Kualapuu	0901-01 Well 17[18]	1.018
	0801-03 Maui DWS	0.516
	0801-01 DHHL 1 0801-02 DHHL 2	0.367
Kamiloloa	0501-04 Kupa Shaft/Haw'n Res.	0.056
	0501-06 Puuehana/Hale Mohalu	0.005
	0501-07 Kaiwakakai Park	0.075
	0601-01 Olooloo/Haw'n REs.	0.075
	0759-01 – Waiola [19]	0.656
Kawela	0456-01 Breadfruit Tree	0.285
	0457-01 Kawela Shaft/DWS	0.330

2. Surface Water

Currently, there are no surface water management areas on Molokai.[20] This does not mean, however, that the Water Commission lacks regulatory powers with respect to surface waters. Indeed, a primary reason for not designating surface water management areas is that the Water Commission has, and exercises, regulatory authority that provides the same protections for streams that designation would offer.

HRS § 174C-3 defines "stream" as "any river, creek, slough, or natural watercourse in which water usually flows in a defined bed or channel. It is not essential that the flowing be uniform or uninterrupted. The fact that some parts of the bed or channel have been dredged or improved does not prevent the watercourse from being a stream."

A "stream diversion" is "the act of removing water from a stream into a channel, pipeline, or other conduit." "Channel alteration" under HRS § 174C-3 means (1) to obstruct, diminish, destroy, modify, or relocate a stream channel; (2) to change the direction of flow of water in a stream channel; (3) to place any material or structures in a stream channel; and (4) to remove any materials or structures from a stream channel.

A permit is required for any stream diversion or channel alteration (except for routine maintenance), whether or not the stream is in a water management area. As with water use permit applications, the Water Commission reviews the application for stream diversion or alteration for consistency with state and county land use plans and policies.[21] Additionally, the Commission is guided by the following considerations:

1) The quantity and quality of the stream water or the stream ecology shall not be adversely affected;
2) Where instream flow standards or interim instream flow standards have been established pursuant to HAR chapter 13-169, no permit should be granted for any diversion works which diminishes the quantity or quality of stream water below the minimum established to support identified instream uses, as expressed in the standards; and
3) The proposed diversion works shall not interfere substantially and materially with existing instream or noninstream uses or with diversion works previously permitted.[22]

Notwithstanding those considerations, however, a stream diversion permit or a channel alteration permit may be granted if the Water Commission determines that it would clearly be in the public interest.[23]

In essence, the Water Commission goes through most of the same analysis in deciding on a stream diversion or channel alteration permit as it does for a water use permit in a designated water management area. In some cases, obtaining a stream diversions or channel alterations permit may be even more difficult to obtain than a ground water use permit. That is because, pursuant to the second criterion, diversions or alterations that would diminish the quantity or quality of water below the established instream flow standard or interim instream flow standard are not to be granted unless there is some clear overriding public interest.[24]

a. IIFS for Molokai streams

The Water Code defines "instream flow standard" as "a quantity or flow of water or depth of water which is required to be present at a specific location in a stream system at certain specified times of the year to protect fishery, wildlife, recreational, aesthetic, scenic, and other beneficial instream uses.[25] An "interim instream flow standard" is "a temporary instream flow standard of immediate applicability, adopted by the commission without the necessity of a public hearing, and terminating upon the establishment of an instream flow standard." [26]

Currently, the interim instream flow standard for all Molokai streams reflects the status quo as of June 15, 1988.[27] This IIFS was based on water diversions existing on that date and not on analyses of biological, ecological, or other instream values weighed against economic impacts of offstream diversions.[28]

3. Reasonable-Beneficial

To obtain a water use permit, whether for existing or new uses, the proposed use must be shown to be reasonable-beneficial. Criteria for stream diversion permits, while not couched in the same terminology, essentially include the same elements as a reasonable-beneficial test.

"Reasonable-beneficial" is defined in HRS § 174C-3 as the "use of water in such a quantity as is necessary for economic and efficient utilization, for a purpose, and in a manner which is both reasonable and consistent with the state and county land use plans and the public interest."

Over the past several years, three significant concepts have been developing and are being applied by the Water Commission in conducting any "reasonable-beneficial" analysis. These are:

(1) Proposed water uses must be consistent with county zoning approvals;
(2) Water duties will be closely scrutinized to promote efficient use of water; and
(3) Alternative sources analyses must be conducted.

a. Consistency with County Zoning Approvals

In Hawaii, at the State level, the State Land Use Commission classifies all lands as either urban, rural, agricultural and conservation. Except for conservation district lands, the uses of which are regulated by the Board of Land and Natural Resources, the counties have a certain degree of authority in regulating particular uses and establishing specific requirements within these broad classifications.

At the county level, each of the counties has adopted its own general plan that includes broad policy statements about the overall development and future of the county. County development or community plans guide development within specific regions or communities within the county, and must be consistent with the county general plan. Finally, zoning designations for individual lots must be consistent with the relevant community plan.

It is not explicit, from the language of the Water Code, whether appropriate county zoning designations are required prior to obtaining a permit for a proposed use of water in order to be "consistent with the state and county land use plans" to meet the reasonable-beneficial test. The Water Commission, in practice, had consistently required that county zoning designations be consistent with the proposed use. In the *Wa'iola* case, the applicant had argued that the timing for obtaining appropriate county zoning designations may not be conducive to long-term water planning, including infrastructure development, and that consistency with the community plan would be a more appropriate test. Wai'ola's argument had been rejected by the Water Commission, and that decision has not been overturned by the Hawaii Supreme Court.[29] Thus, any proposed water use for future developments must show that it has obtained appropriate county zoning designations before the Water Commission will issue a water use or stream diversion permit for such use.

b. Water Duties

A significant issue in the Waiahole Ditch case involved appropriate water duties for particular uses. In that case the Water Commission generally applied a water duty of 2500 gallons per acre per day for diversified agriculture and 2000 gpad for pineapple in Kunia, Oahu; but varied from that standard where particular facts and circumstances evidenced different actual usage. In one case, the allocation was higher than 2500 gpad; in another it was lower. On appeal, the supreme court conducted a lengthy review of how the Water Commission arrived at and applied the water duties, and twice remanded the allocations to the Water Commission for further review.

One of the lessons to be gleaned from the Waiahole Ditch case is that the efficient use of water, one of the benchmarks of a reasonable-beneficial use, will be closely scrutinized through a water duty analysis.

For domestic uses, standards established by the county water departments serve as general guidelines. A more complex analysis is required for irrigation uses.

c. Alternative Sources

An alternative water source analysis, according to the Hawaii Supreme Court, is "intrinsic to the public trust" and the definition of "reasonable-beneficial."[30] Thus, before issuing a water use permit for any proposed use, the Water Commission must ask whether there are other sources of water that could practicably be used for this same purpose. Practicable for this purpose, means that the water is available and capable of being utilized considering cost, technology and logistics.[31] If more than one source of water can practicably be used for the same purpose, then the Water Commission may (and, indeed, may be obligated to) prioritize among the water resources and decide which source should be utilized.

For example, in the Waiahole Ditch contested case, the Water Commission was faced with whether to allow agricultural lands to be irrigated with water that originated on the Windward side of Oahu and directly affected stream flow inasmuch as it may have been practicable to use groundwater pumped from the Leeward side of the island for the same purpose. In prioritizing water resources, the Commission may, among other things, decide that the Leeward groundwater, being of potable quality, should be held in reserve for future drinking water needs, or, alternatively, decide that the benefits from having more water in the streams justified the use of groundwater for irrigation.

As technologies improve and costs decrease, desalinated water and reclaimed wastewater will more and more become practicable alternative sources of non-potable water.

B. Common Law

Common law governs outside of designated water management areas.[32] The common law of water in Hawaii, however, is not well developed, and more questions than answers abound, including questions relating to the intersection and interrelationship of common law with the Water Code.

1. Ground Water: Correlative Rights

City Mill Company, Limited v. Honolulu Sewer and Water Commission[33] held that the rule of correlative rights expresses the common law relating to groundwater in Hawaii. As explained by the court:

> [A]ll of the owners of lands under which lies an artesian basin have rights to the waters of that basin; that each may use water therefrom as long a he does not injure thereby the rights of others and that in times when there is not sufficient water for all each will be limited to a reasonable share of the water.[34]

For purposes of this report, however, the rule of correlative rights is irrelevant. The supreme court, in the Waiahole case, held that the regulatory system based on permits issued by the Water Commission displaces the common law of correlative rights in designated water management areas.[35] Because the entire island of Molokai is designated as water management areas, rights to withdraw and use groundwater are established through permits issued under the Water Code, rather than pursuant to common law doctrines.

2. Surface Water: Riparian Rights

Riparian owners (very generally, those who own land abutting a stream) possessed riparian rights to water pursuant to HRS § 7-1. In *Reppun v. Board of Water Supply*,[36] the Hawaii Supreme Court adopted the "reasonable use doctrine" of riparian rights. Under the reasonable use doctrine "a riparian owner is entitled only to a reasonable use of the waters of a natural watercourse and may not bring an action to prohibit the reasonable use of another absent a demonstration of injury to his own use."[37]

It is clear that riparian rights attach to riparian lands and that the owner cannot convey those rights separate from the land. Beyond that, there is very little that is clear about Hawaii's common law of riparian rights.

Furthermore, questions about how riparian rights under the common law coalesce with permitting requirements for stream diversions and with interim instream flow standards remain unanswered.

On Molokai, where many of the perennial streams are in remote locations removed from developable lands (for agriculture or otherwise), issues surrounding riparian rights are not as urgent as they may be on other islands.

3. Surface Water: Appurtenant Rights

Appurtenant water rights are measured by the amount of land under taro cultivation at the time of the Mahele, multiplied by the average quantity of water used per day per acre in growing that taro. The water rights remain with the land even when taro ceases to be

cultivated on the land. But the water is appurtenant to the taro land and cannot be transferred to other lands.[38] And an attempt to sever the appurtenant water right from the land may extinguish the appurtenant right.[39]

Unlike correlative rights and riparian rights, appurtenant rights are not displaced by the Water Code, even in designated surface water management areas. Instead, Article XI. § 7 of the State Constitution assured its survival and the Water Code accords some of the highest priority and clear preferential treatment to appurtenant water rights.

C. Underlying Policies

1. Rights of DHHL

In addition to the requirement that all water use permits not interfere with, and be subject to, the rights of DHHL, subsection 174C-101(a) of the Water Code provides:

> **§174C-101 Native Hawaiian water rights.** (a) Provisions of this chapter shall not be construed to amend or modify rights or entitlements to water as provided for by the Hawaiian Homes Commission Act, 1920, as amended, and by chapters 167 and 168, relating to the Molokai irrigation system. Decisions of the commission on water resource management relating to the planning for, regulation, management, and conservation of water resources in the State shall, to the extent applicable and consistent with other legal requirements and authority, incorporate and protect adequate reserves of water for current and foreseeable development and use of Hawaiian home lands as set forth in section 221 of the Hawaiian Homes Commission Act.

The essence of Section 221 of the HHCA is the provision of adequate water for the productive use of Hawaiian home lands.[40]

In the *Waiola* case, the Hawaii supreme court held that the Water Commission has a public trust duty to protect a reservation of water for DHHL's future needs. Protecting such a reservation means not only subtracting the amount of the reservation from the available sustainable yield of the aquifer, but also assuring that other water developments do not otherwise jeopardize DHHL's ability to access the reserved water in the future.

Currently on Molokai, DHHL holds a reservation for 2.905 mgd from the Kualapuu Aquifer.

Additionally, pursuant to HRS §168-4, DHHL lessees have a priority right to two-thirds of the water developed for the MIS.

2. Traditional and Customary Native Hawaiian Rights

The Water Code, in section 174C-101(c), provides for the protection of traditional and customary native Hawaiian rights:

> Traditional and customary rights of ahupua`a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778 shall not be abridged or denied by this chapter. Such traditional and customary rights shall include, but not be limited to, the cultivation or propagation of taro on one's own kuleana and the gathering of hihiwai, opae, o`opu, limu, thatch, ti leaf, aho cord, and medicinal plants for subsistence, cultural, and religious purposes.

In the surface water arena, issues involving traditional and customary rights have centered around the availability of water for growing taro, and adequacy of stream flows for indigenous flora and fauna traditionally gathered by native Hawaiians.

With respect to ground water, the issue has primarily been the effect of groundwater withdrawals on freshwater discharge into the ocean and the impact on nearshore biota, such as limu.

3. Public Trust

All decisions made by the Water Commission, including the issuance of water use permits, are overlain by the Commission's responsibility to uphold the public trust doctrine. The Hawaii Supreme Court iterated three fundamental principles embodied in the state water resources trust:

> First, the state has both the authority and duty to preserve the rights of present and future generations in the waters of the state, which, in effect, precludes any grant or assertion of vested rights to use water to the detriment of a public trust purpose. This authority empowers the state to revisit prior diversions and allocations, even those made with due consideration of their effect on the public trust. Second, the state bears an affirmative duty to take the public trust into account in the planning and allocation of water resources and to protect public trust uses whenever feasible. Third, there are no absolute priorities between broad categories of trust uses under the water resources trust, precisely because all public trust purposes must be protected; thus, the Commission must weigh competing public and private water uses on a case-by-case basis. That being the case, the Commission, as the primary guardian of public rights under the trust, must take the initiative in considering, protecting, and advancing public rights in the resource at every stage of the planning and decision making process. In sum, the state may compromise public rights in the resource pursuant only to a decision made with a level of openness, diligence, and foresight commensurate with the high priority these rights command under the laws of our state.[41]

The purposes or uses of the public trust can evolve with changing public values and needs.[42] As of this date, the Hawaii Supreme Court has identified four "uses" protected under the public trust doctrine: (1) maintaining the purity and flow, the continued existence and preservation of the waters of the state; (2) domestic uses, primarily drinking; (3) to preserve

Native Hawaiian and traditional and customary rights; and (4) reservations of water to DHHL for current and foreseeable domestic, stock water, aquaculture, and irrigation activities on tracts leased to native Hawaiians.[43]

D. Hawaii Water Plan: Maui County Water Use and Development Plan

The Water Code requires that the Water Commission implement and utilize comprehensive water resources planning in its regulation and management of the State's water resources. As part of that mandate, the Water Code requires the development and updating of the Hawaii Water Plan to guide the Water Commission in its general powers, duties, and responsibilities assuring economic development, good municipal services, agricultural stability, and water resource protection.

The Water Code calls for coordination among the Water Commission, the counties and other state agencies to formulate an integrated and coordinated program for the protection, conservation, and management of water in each county.

County water use and development plans are components of the Hawaii Water Plan intended to insure that the future water needs of the county are met by setting forth "the allocation of water to land use."

1. Current Status of Hawaii Water Plan

The initial Hawaii Water Plan prepared by various state and county agencies was formally adopted by the Water Commission in 1990. Action on a 1992 update was deferred pending further refinements to plan components.

In 2000, the Water Commission adopted a Statewide Framework to guide the updating of the various components of the Hawaii Water Plan. The updating process is currently ongoing. No updated plan has yet been approved by the Water Commission. Thus, the 1990 Hawaii Water Plan is still the official document.

2. Maui County Water Use and Development Plan

The Maui County Water Use and Development Plan (WUDP) was passed as an ordinance by the Maui County Council and approved by the Mayor in October 1990.

Much of what is stated in the WUDP with respect to Molokai is significantly outdated. At the time the WUDP was being prepared, three large landowners - Molokai Ranch, the owner of more than 50,000 acres in central and west Molokai; Kukui (Molokai), then the owner of the Kaluakoi Resort; and Alpha USA, owner of approximately 6,300 acres in west Molokai – were in various stages of making significant development plans for their respective properties. At the time, based on very sketchy data, projected 2010 water demand for these three entities amounted to 10 mgd of potable water. It was anticipated that each of these entities would attempt to secure water from the Kualapuu Aquifer to meet their needs.

Noting that there were no plans for additional surface water development, the WUDP concluded that projected water needs by the major water users in central and west Molokai exceed the estimated sustainable yield of the Kualapuu Aquifer. Therefore, the WUDP recommended that all prospective major water users in central and west Molokai, including DHHL, the county, and the large private landowners, work cooperatively towards developing an integrated water system that would include a non-potable water system. Additionally, evaluation of alternative sources development was encouraged.[44]

E. Molokai Water Working Group

The Molokai Water Working Group was originally appointed in October 1982 by Bill Paty, who was then the Chairperson of the Water Commission. Its purposes were (1) to recommend to the Water Commission a plan for water development on Molokai that assists the county and community in developing its Water Use and Development Plan; and (2) to test a community "working group" model that, if it works, could be used elsewhere in the State when communities are faced with tough water issues. The Working Group was asked to enter into good faith deliberations aimed at producing the highest consensus possible on demand forecasts, bulk water allocations, recommendations to manage both supply and demand, and the best plans the Working Group might offer on balancing future water uses.

The original Working Group presented a written report in July 1993.

In late 1995, then Water Commission Chairperson Mike Wilson convened a second Water Working Group for the express purpose of revisiting and updating the July 1993 report. A revised report, superceding the July 1993 report, was issued by the Working Group in April 1996.

In its 1996 report, the Working Group set forth a number of general recommendations, plus several recommendations specific to each of the four Aquifer Sectors on the island. The complete report is attached as Attachment B. A number of the Working Group recommendations are discussed in the analysis section of this report.

VI. ANALYSIS

The purpose of all of the foregoing is to establish the framework within which the analysis of whether the proposed Water Plan is reasonable and realistic can be made. In other words, based on water laws and policies, water resources and potentially competing demands, what is the likelihood of MPL being able to implement the Water Plan in support of its Master Land Use Plan?

As discussed below, the Water Plan is progressive with respect to both water supply and demand. Conservation strategies currently touted but seldom implemented in Hawaii are integral parts of the Water Plan. In conjunction with the proposal that only existing sources at currently permitted amounts will be used to meet all of MPL's current and future potable water needs, the Water Plan should readily pass regulatory muster. Indeed, it should be held up as a model for balancing development with the preservation and protection of our precious water resources.

A. Reasonable and Realistic Water Demands

1. Potable Water

Essentially, the potable water Plan is to use no more than what is currently available from Well 17 and the 0.5 mgd from Mountain Water System to meet not only existing needs, but also to meet the needs for future growth, i.e., reopening the Kaluakoi Hotel, developing 200 lots at Laau Point, and expansion of Pala'au Industrial Park.

At first blush, such a scheme appears overly optimistic, or even unrealistic. However, it is feasible because the Water Plan calls for (1) significantly decreasing current use of potable water for irrigation; (2) increasing efficiencies within existing systems; and (3) aggressive water conservation strategies.

a. Decreasing Current Use of Potable Water for Irrigation

The Water Commission granted a water use permit authorizing the withdrawal of 1.018 mgd from Well 17 based on the following uses (in gallons per day):

Kaluakoi Hotel	67,000	
Kaluakoi Condos	186,000	
Kaluakoi Residential	51,000	
Golf Course	400,000	
Beach Park	26,000	
Nursery	18,000	
Filter Backwash	100,000	
MIS System Use Charge	94,000	
Kualapuu Town (Waiola)	76,000	
Total		**1,018,000**

Of the 1.018 mgd for authorized uses, more than half is for irrigation purposes, including irrigation of the golf course. In doing an alternative source analysis, as a matter of policy, if non-potable water sources are available, such sources should be used for irrigation in this area where there is not an overabundance of potable water.[45] Under the Water Plan, approximately 600,000 gpd of potable water from Well 17 will be "freed up" from existing irrigation uses by using alternative nonpotable water sources, leaving that amount available for potable needs associated with future developments.

b. Increasing Efficiencies In Existing Systems

Inadequate maintenance of the MPU system has resulted in significant system losses. It is anticipated that current system losses 200,000 gpd can be reduced to about 100,000 with improvements to system.

Additionally, not insignificant amounts of water are lost through evaporation as water is transported to Kaluakoi through the open MIS system. Piping potable water to Kaluakoi from the Puu Nana treatment plant will result in less water being lost to evaporation.

c. Aggressive Water Conservation Strategies

Some of the most aggressive water conservation strategies in the State are being implemented and even further strategies are proposed for the future development at Laau Point.

(1) Conservation Rates

After MPL acquired MPU, it restructured the water rates to, among other things, implement tiered water conservation rates that provide a financial incentive to customers to conserve water. The water duties applied by the Water Commission for different user types was used as the base rate. All water use above that amount is billed at a much higher "conservation rate." The utility had proposed a conservation rate of twice the base rate. Due to concern about "rate shock" expressed by the Consumer Advocate, the conservation rate will be ramped up in phases. Ultimately, however, it is anticipated that a conservation rate that is substantially higher than the base rate will go into effect for water usage that exceeds the water duties upon which the Water Commission bases its allocations.

The effectiveness of conservation rates has already manifested itself. Within 15 months of the conservation rate going into effect, there have been measurable reductions in water usage by Kaluakoi residents. Water consumption has dropped by 45% in the Ranchlands, and a passing shower will cause water consumption to drop dramatically.

(2) Water Conservation Strategies: La`au Point Development

It is anticipated that the majority of the residences in the 200-lot La`au Point subdivision will be second or third homes for the owners. Inasmuch as these residences will probably not be

occupied much of the time, domestic water consumption is anticipated to be less than average for these types of units.

In addition, a number of covenants that will be attached to these lots will ensure conservation of potable water. These covenants include:

- Restrictions on further subdivision of lots
- Disturbance of lot limited to no more than 30% (approx. ½ acre)
- Restrict water use for irrigation (landscaping)
  - ✓ Require re-use and collection/storage systems for catchments
  - ✓ Only drip systems permitted for irrigation
- Require all houses to have at least a 5,000-gallon storage tank for water captured from roofs (could be used for drinking water or irrigation)
- Covenants on drinking water use – designed to ensure an overall maximum drinking water daily use of 500-600 gpd
  - ✓ Double flush toilets
  - ✓ Specially designed shower heads for conservation
  - ✓ Must use dual water system (potable and nonpotable)

By combining these aggressive water conservation strategies with improvements in the existing water delivery systems, and taking irrigation uses off the potable water system (i.e., putting the right water to the right use), the projected potable water demands set forth in the Water Plan are reasonable and realistically achievable.

2. Nonpotable Water Demands

Nonpotable uses will include irrigation of the Kaluakoi golf course, landscaping and other irrigation around Kaluakoi, the future Laau Point lots, Maunaloa Village, the Lodge and Kaupoa Camp, and water for Molokai Ranch's livestock operations.

Under the Water Plan, nonpotable water demands will be met with the remaining water developed by the Mountain Water System and by development of 1 mgd of brackish water from the Kakalahale Well in the Kamiloloa Aquifer. Additionally, in the future, treated wastewater will be another source of irrigation water for the golf course.

Compared to domestic water needs, irrigation water demands (especially non-agriculture demands) are much more flexible and more readily fluctuate relative to supply. Additionally, there are more alternative sources of irrigation water. Thus, nonpotable water demand, for purposes of this report, does not require as vigorous an analysis as the demand for potable water.

Nevertheless, it is worth noting several of the covenants that will be attached to the Laau subdivision that are aimed at limiting the demand for non-potable water from the Ranch's mountain water system or the Kakalahale Well that is proposed for development as a brackish water source. The covenants include:

- Restrict landscaping to appropriate native and Polynesian introduced species that are drought tolerant and suitable for coastal locations
- Drainage systems
  - ✓ Require drainage systems that retain any runoff within the disturbed area of the lot
  - ✓ Maximize recharge into the ground
  - ✓ Restore land area that have eroded by re-establishing vegetative ground cover
  - ✓ Minimize impervious surfaces (paved) on each lot

B. Availability of Identified Water Sources

As noted at the outset of this report, an analysis of the availability of the water sources identified in the Water Plan is a regulatory, and not a hydrological, analysis. This analysis considers the degree of consistency between the Water Plan and the various water laws, regulations, and policies.

1. Consistency with Water Use Permitting Provisions of the Water Code

The water use permitting provisions of the Water Code apply to ground water resources in this case. Under the proposed Water Plan, two ground water sources are identified: (1) the already developed Well 17 in the Kualapuu Aquifer, from which withdrawals of 1.018 mgd is already permitted for uses in Kaluakoi and Kualapuu; and (2) the Kakalahale Well in Kamiloloa, which is already drilled but not yet developed or permitted. The proposal is to develop 1 mgd of brackish water from the Kakalahale Well. No additional withdrawals will be sought from Well 17.

a. Potable Water Source

The Water Commission, in the Kukui (Molokai) case, has already gone through the analysis of the impact of withdrawing 1.018 mgd from Well 17 on other existing uses and on other rights belonging to DHHL, including its reservation of 2.905 mgd in the Kualapuu Aquifer. The permit will have to be modified by removing existing irrigation uses in Kaluakoi as permitted uses and substituting domestic uses for future residences and expansion of Palaau Industrial Park. Such modification should, if anything, improve the reasonable-beneficial analysis by better matching the quality of water to the type of use.

As discussed in an earlier section, the Water Plan incorporates aggressive conservation strategies that are aimed at keeping consumption well within the range of water duties applied by the Water Commission. However, in order to meet the reasonable-beneficial test, before such permit modification can be authorized, appropriate zoning designations will have to be obtained for the future Laau Point development.

b. Nonpotable Water Source

The Water Plan calls for developing 1 million gallons per day of brackish water from the existing, but currently unused, Kakalahale Well. Located in the Kamiloloa Aquifer at

elevation approximately 980 feet, the well was drilled in 1969 to provide drinking water to the Kaluakoi Resort. However, because of the brackish quality of the water, the well was never used as a production well.

A water use permit would be required before the Kakalahale Well can be put into production. While the current sustainable yield of the Kamiloloa Aquifer can accommodate a withdrawal of 1 mgd from this well, the Water Commission will have to analyze whether pumpage of this amount at this location will adversely impact other existing wells, and whether it would jeopardize DHHL's ability in the future to access its reservation of 2.905 mgd from the Kualapuu Aquifer.

Additionally, appropriate zoning designations for the future Laau Point development will have to be obtained prior to issuance of a water use permit for the Kakalahale Well to the extent that uses will include irrigation of the Laau Point lots.

The conservation strategies proposed in the Water Plan should be sufficient for a finding that the proposed use of water will be economic and efficient.

2. Consistency with Surface Water Regulations Under Water Code

The only surface water resources proposed for use under the Water Plan are those already developed by Molokai Ranch's Mountain Water System, which has been diverting surface water for over 100 years. All of the diversions have been registered with the Water Commission since 1987. Inasmuch as all of the existing diversions were in place on June 15, 1988, they are incorporated in the current IIFS. Presently, there are no pending petitions to amend the interim instream flow standards of those streams that are diverted for the Mountain Water System.

3. Consistency with the Common Law

Because the entire island of Molokai is regulated as a ground water management area, the common law relating to ground water, i.e., the doctrine of correlative rights, is inapplicable in this case.

Appurtenant and riparian surface water rights do not appear to be issues in this case inasmuch as the surface water resources identified in the Water Plan have been diverted for over 100 years and there are no currently unresolved claims.

4. Consistency with Rights of DHHL

As discussed above, implementation of the Water Plan will require a finding by the Water Commission that the withdrawal of 1 mgd of brackish water from the Kakalahale Well will not impact DHHL's existing wells in Kualapuu, nor jeopardize DHHL's ability to access its reservation in the Kualapuu Aquifer.

The Water Commission already engaged in that analysis with respect to the wirhdrawal of 1.018 mgd from Well 17. Additionally, there are no outstanding claims by DHHL for the surface water that is diverted by Molokai Ranch's Mountain Water System.

Permits issued by the Water Commission are subject to any superior rights to water that DHHL may have pursuant to the Hawaiian Homes Commission Act.

The Water Plan does not rely on water developed by the MIS, and therefore would have no impact on DHHL's priority rights in that system.

5. Consistency with Traditional and Customary Native Hawaiian Rights

In issuing the permit for withdrawal of 1.018 mgd from Well 17, the Water Commission must have already determined that traditional and customary native Hawaiian rights would not be unduly impacted.

That analysis will have to be conducted with respect to withdrawal of 1 mgd of brackish water from the Kakalahale well.

Presently, there are no outstanding claims that traditional and customary native Hawaiian rights are being abridged by the diversions of the Mountain Water System.

6. Consistency with the Public Trust Doctrine and Identified Public Trust Uses

The Water Plan stays within sustainable limits of water development and thus ensures that water resources are protected for future use. Aggressive conservation measures and putting the right water to the right use through the utilization of alternative sources of water are also consistent with protecting and wisely using water resources as the public trust doctrine mandates.

In the Waiola case, the Hawaii supreme court instructed that

> the state may compromise public rights in the resource pursuant only to a decision made with a level of openness, diligence, and foresight commensurate with the high priority these rights command under the laws of our state.[46]

It is significant (and uncommon) that at this early stage of a master plan development process the level of analysis provided in this report is given for a proposed Water Plan. Engaging the water issues from the outset ensures that decisions will be made with the "level of openness, diligence, and foresight" required of those bearing responsibilities for protecting our public trust resources.

7. Consistency with Maui County Water Use and Development Plan

The Molokai section of the currently approved Maui County Water Use and Development Plan is seriously outdated. However, the developments proposed and anticipated water demand under the current Master Land Use Plan and Water Plan are significantly lower than stated in the Maui WUDP.

Still relevant, however, are the WUDP's recommendations that all prospective major water users in central and west Molokai work cooperatively towards developing an integrated water system that would include a non-potable water system and that alternative water sources be developed.

Integrating the MPU system serving Kaluakoi, the Waiola system serving the potable water needs of Molokai Ranch lands, and the Mountain Water system to increase efficiencies and to better match the quality of water with the type of use is a significant step in addressing the first of the WUDP's recommendation.

Plans for developing the Kakalahale well as a brackish water source, treating effluent for reuse as irrigation water for the golf course, and capturing rainwater and runoff on individual house lots for small scale irrigation are consistent with the second of the WUDP's recommendation.

8. Consistency with Recommendations of Molokai Water Working Group

In its 1996 report, the Molokai Water Working Group set forth a number of general recommendations, plus several recommendations specific to each of the four Aquifer Sectors on the island. Below is an analysis of the consistency of the Water Plan with the relevant Working Group recommendations.

General Recommendation B

> *The working group recommends that all large-scale water planning/water management should consider that agriculture will continue to be the economic and cultural "heart" of Molokai.*

The Master Plan provides for the protection and preservation of agricultural lands. Although the Water Plan does not address additional developments of sources for agricultural water, it does not subtract from or jeopardize existing sources of agricultural water.

General Recommendation C.

> *The working group recommends that DHHL's water needs, which are currently tied to lands at Hoolehua and Kalamaula through 2010, be reserved first.*

Use of Well 17 at currently permitted levels does not interfere with or jeopardize existing water sources serving DHHL lands and preserves DHHL's reservation of 2.905 mgd of ground water in the Kualapuu Aquifer. A showing that withdrawal of 1 mgd of brackish water from the Kakalahale Well would not jeopardize DHHL's ability to access its

reservation in the Kualapuu Aquifer will have to be made to the Water Commission in order to obtain a water use permit for that source.

General Recommendation D.

> *The working group recommends that due to limited information, the capacity of the aquifers should be treated conservatively and protected until more precise determinations can be made.*

In line with this recommendation, the sustainable yield of the Kualapuu Aquifer was reduced from 7 to 5 mgd. The ground water withdrawals proposed in the Water Plan are well within the sustainable yields of the respective aquifers.

General Recommendation G

> *The working group recommends that ground water must be reserved first to fulfill domestic, and public health, safety, and welfare needs.*

Of the 1.018 mgd water allocation permitted by the Water Commission for Well 17, about half is for irrigation purposes. Under the Water Plan, potable groundwater withdrawn from Well 17 will not be used for irrigation, but instead will be used for existing and future domestic water needs, which is clearly in line with the Water Working Group's General Recommendation G.

General Recommendation H.

> *The working group recommends priority use of non-potable water should be for demonstrable and reasonable-beneficial agricultural usage which includes subsistence farming and public facility needs.*

Although the Water Plan does not address additional developments of sources for agricultural water, it does not subtract from or jeopardize existing sources of agricultural water. Additionally, by utilizing reclaimed effluent to irrigate the golf course and capturing rain and surface water on individual house lots for irrigation, there will be less competition with agriculture for other non-potable water resources.

General Recommendation I

> *The working group recommends use of any water for golf courses should be lowest priority*

The water use permit granted for withdrawal of ground water from Well 17 does not comport with the working group's General Recommendation I inasmuch as potable water is allocated for golf course irrigation. The Water Plan, on the other hand, calls for non-potable water, developed from the Kakalahale well, instead of potable water from Well 17, to be used for

irrigation. Furthermore, future plans are to use even lower quality water, i.e., reclaimed water from the sewage treatment plant, for golf course irrigation.

General Recommendation K.

> *The working group recommends that all additional water supply should first be sought in the Sector for which is shall be used.*

Due to the lack of water resources in the West Sector, water for the reopening of the Kaluakoi Resort and for the Lanu Point development will have to be imported from other sectors.

General Recommendation L.

> *The working group recommends that all the water rights of DHHL homesteaders as provided under the Hawaiian Homes Commission Act, State Water Code, and other laws must be recognized and preserved by the State of Hawaii and the Counties of Maui and Kalawao. Other rights which may exist pertaining to Hawaiians not residing on DHHL lands must also be honored.*

See the discussion in Section VI.B.4, above, as to the consistency of the Water Plan with the rights of DHHL.

General Recommendation M.

> *The working group recommends that principles of supply and demand management be followed to the greatest extent allowed by law.*

General Recommendation N.

> *The working group recommends that new water supplies should be sought first through conservation management tools such as water pricing (inverted rate structure, etc.)*

Central Sector, Recommendation B.1

> *Bulk groundwater allocations should generally coincide with the "2010 Potable Water Use Projections" subject to on-going studies of the aquifer's capacity (see Exhibit 4).*

Although the uses listed on the Exhibit 4 are outdated, the estimated amount of long-term water use under the Water Plan is less than projected in the 2010 Potable Water Use Projections.

Central Sector, Recommendation B.2

Limit groundwater withdrawal in the Kualapuu Aquifer System to 5.0 mgd. 0.57 mgd (5.0 mgd limit minus 4.43 mgd 2010 Water Projections) may be used to satisfy other correlative uses unless subsequent information changes this.

Subsequent to the Water Working Group report, the sustainable yield of the Kualapuu Aquifer was reduced from 7 to 5 mgd. The Water Plan does not propose additional development of water from the Kualapuu Aquifer beyond what is already developed and permitted from Well 17.

Southeast Sector, Recommendation C.1

Limit groundwater withdrawal to 33% of its developable yield subject to verification of existing users and water use permits.

The combined sustainable yield for the four aquifer systems in the Southeast Aquifer Sector is 24 mgd. Currently permitted uses is less than 1 mgd. Additionally, under the Water Plan, Waiola intends to abandon plans to develop its Kamiloloa well. Developing the 1 mgd Kakalahale brackish water well would be well within the limitations of this Recommendation.

Southeast Sector, Recommendation C.2

Any withdrawals from this Sector should not diminish water supplies and supply availability for traditional uses, including taro patches and fishponds. Baseline water requirements for these uses needs to be determined.

Prior to utilizing the Kakalahale Well as a nonpotable water source, a water use permit from the Water Commission will have to be obtained. In that process, it will have to be shown that withdrawal of 1 mgd of brackish water from the Kakalahale well will not abridge traditional and customary native Hawaiian rights, including rights involving the use of taro patches and fishponds.

Southeast Sector, Recommendation C.3

Development of additional water from the Southeast Sector should be allocated first to existing residences of this Sector that are not yet served.

Prior testing of the Kakalahale well showed that it would not produce potable water. Thus the well site would not be suitable for development of water to serve existing residences.

C. Conclusion

Certain findings and decisions, especially with respect to development of the Kakalahale Well will have to be the subject of future findings and decisions by the Water Commission. Thus, a definitive answer cannot be given at this time as to the whether MPL will be able to

implement all components of the Water Plan. However, given the available information, and the progressive character of the Water Plan, the likelihood is very high that the Water Plan will receive regulatory approvals.

ENDNOTES

[1] Issuance of this permit was the subject of a contested case proceeding, referred to as the Kukui (Molokai) case. The case has been appealed to the Hawaii Supreme Court. As of this writing, the supreme court has not rendered a decision on this matter.

[2] U.S. Geological Survey, *Geohydrology and Numerical Simulation of the Ground-Water Flow System of Molokai, Hawaii, U.S. Geological Survey Water-Resources Investigations Report 97-4176 (1997)* (hereafter "USGS 1997 Study"), at p. 2.

[3] State of Hawaii, Department of Land and Natural Resources Division of Water and Land Development, *Water Resources Development: Molokai, Bulletin B16*, (Feb. 1966) (hereafter "Bulletin B16"), at p. xii-xiii.

[4] Information for this subsection is drawn primarily from George A.L. Yuen & Associates, Inc., *Hawaii Water Plan: Water Resources Protection Plan*, prepared for the Commission on Water Resource Management (June 1990), Vol. I, V-1.

[5] Hawaii Cooperative Park Service Unit, Western Region Natural Resources and Research Division, National Park Service, for the Commission on Water Resource Management, *Hawaii Stream Assessment: A Preliminary Appraisal of Hawaii's Stream Resources, Report R84* (December 1990) (hereafter "Hawaii Stream Assessment"), at p. 9.

[6] *Bulletin B16*, at p. xii.

[7] *USGS 1997 Study* at *p. 15.*

[8] *Bulletin B16*, at p. xii.

[9] *Hawaii Stream Assessment* at p. 55-56.

[10] *Bulletin B16* at p. xiv; *USGS 1997 Study* at *p. 13.*

[11] *Bulletin B16* at p. xiv; *USGS 1997 Study* at *p. 13.*

[12] Fukunaga & Associates, Inc., for County of Maui Department of Water Supply, *Molokai Integrated Water System Study* (Dec. 1989) at 5-6.

[13] **HRS §168-4 Preference.** To the extent that the same may be necessary from time to time for the satisfaction of their water needs, domestic and agricultural, the Hawaiian homes commission and lessees of the Hawaiian homes commission shall at all times, upon actual need therefor being shown to the board of agriculture, have a prior right to two-thirds of the water developed for the Molokai irrigation and water utilization project by the tunnel development extending to Waikolu valley and ground water developed west of Waikolu valley, which was planned by the board of land and natural resources as the first stage of the Molokai irrigation project.

[14] *Ko'olau Agricultural Co., Ltd. v. Commission on Water Resource Management (hereafter "Ko'olau Ag")*, 83 Haw. 484 (1996).

[15] HRS § 174C-48(a). However, no permit is required for domestic consumption by individual users.

[16] HRS § 174C-50(c).

[17] HRS § 174C-50(b).

[18] See endnote 1.

[19] Technically, this is not a permitted allocation because the Hawaii supreme court vacated and remanded the Water Commission's decision for further proceedings.

[20] There are no surface water management areas anywhere in the State.

[21] Hawaii Administrative Rule (HAR) § 13-168-32(a).

[22] HAR § 13-168-32(d) and §13-169-52(c).

[23] HAR § 13-168-32(e) and 13-169-52(c).

[24] HAR § 13-168-32(d)(2) and § 13-169-52(c)(2).

[25] HRS § 174C-3.

[26] HRS § 174C-3.

[27] HAR § 13-168-47.

[28] See *In the Matter of the Water Use Permit Applications*, 94 Haw. 97, 150 (footnote 54) (2000) (hereafter "Waiahole I").

[29] Similarly, in the Waiahole Ditch case, Gentry's application for a water use permit for golf course irrigation was denied on the basis that the lands on which the water was to be used had not yet been zoned for golf course use.

[30] *Waiahole I*, 94 Haw. at 161; *In the Matter of Water Use Permit Applications*, 105 Haw. 1, 15 (2004) (hereafter "Waiahole II").

[31] *Waiahole II*, 105 Haw. at 19.

[32] *Ko'olau Ag*, 83 Haw. at 491.

[33] 30 Haw. 912 (1929)

[34] *Id.* at 923.

[35] *Waiahole I*, 94 Haw. at 179.

[36] 65 Haw. 531 (1982)

[37] *Id.* at 553.

[38] *McBryde Sugar Company, Limited v. Robinson*, 54 Haw. 174 (1973).

[39] *Reppun v. Board of Water Suppply*, 65 Haw. 531 (1982).

[40] Section 221 of the Hawaiian Homes Commission Act reads as follows:

§221. Water. (a) When used in this section:

> (1) The term "water license" means any license issued by the board of land and natural resources granting to any person the right to the use of government-owned water; and
>
> (2) The term "surplus water" means so much of any government-owned water covered by a water license or so much of any privately owned water as is in excess of the quantity required for the use of the licensee or owner, respectively.

(b) All water licenses issued after the passage of this Act shall be deemed subject to the condition, whether or not stipulated in the license, that the licensee shall, upon the demand of the department, grant to it the right to use, free of all charge, any water which the department deems necessary adequately to supply the livestock, aquaculture operations, agriculture operations, or domestic needs of individuals upon any tract.

(c) In order adequately to supply livestock, the aquaculture operations, the agriculture operations, or the domestic needs of individuals upon any tract, the department is authorized (1) to use, free of all charge, government-owned water not covered by any water license or covered by a water license issued after the passage of this Act or covered by a water license issued previous to the passage of this Act but containing a reservation of such water for the benefit of the public, and (2) to contract with any person for the right to use or to acquire, under eminent domain proceedings similar, as near as may be, to the proceedings provided in respect to land by sections 101-10 to 101-34, Hawaii Revised Statutes, the right to use any privately owned surplus water or any government-owned surplus water covered by a water license issued previous to the passage of this Act, but not containing a reservation of such water for the benefit of the public. Any such requirement shall be held to be for a public use and purpose. The department may institute the eminent domain proceedings in its own name.

(d) The department is authorized, for the additional purpose of adequately irrigating any tract, to use, free of all charge, government-owned surplus water tributary to the Waimea river upon the island of Kauai, not covered by a water license or covered by a water license issued after July 9, 1921. Any water license issued after that date and covering any such government-owned water shall be deemed subject to the condition, whether or not stipulated therein, that the licensee shall, upon the demand of the department, grant to it the right to use, free of all charge, any of the surplus water tributary to the Waimea river upon the island of Kauai, which is covered by the license and which the department deems necessary for the additional purpose of adequately irrigating any tract.

Any funds which may be appropriated by Congress as a grant-in-aid for the construction of an irrigation and water utilization system on the island of Molokai designed to serve Hawaiian home lands, and which are not required to be reimbursed to the federal government, shall be deemed to be payment in advance by the department and lessees of the department of charges to be made to them for the construction of such system and shall be credited against such charges when made.

(e) All rights conferred on the department by this section to use, contract for, or acquire the use of water shall be deemed to include the right to use, contract for, or acquire the use of any ditch or pipeline constructed for the distribution and control of such water and necessary to such use by the department.

(f) Water systems in the exclusive control of the department shall remain under its exclusive control; provided that the department may negotiate an agreement to provide for the maintenance of the water system and the

billing and collection of user fees. If any provision or the application of that provision is inconsistent with provisions contained in this section, this section shall control.

Water systems include all real and personal property together with all improvements to such systems acquired or constructed by the department for the distribution and control of water for domestic or agricultural use.

[41] *In the Matter of the Contested Case Hearing on Water Use, Well Construction, and Pump Installation Permit Applications*, 103 Haw. 401, 430 (2004) (hereafter "Wai`ola") (citations, quotations, and editing signals omitted).

[42] *Waiahole I*, 94 Haw. at 136.

[43] *Waiahole I*, 94 Haw. at 136-137; *Wai`ola*, 103 Haw. at 431.

[44] County of Maui Department of Water Supply and Planning Department, *Hawaii Water Plan: Maui County Water Use and Development Plan*, March 1990, at pp. 36-41.

[45] When the Water Commission rendered its decision granting the water use permit for Well 17, MPL was not affiliated with Well 17 or MPU. Also, the requirement of conducting an alternative sources analysis was clarified in 2004, when the Hawaii supreme court issued its Waiahole II decision, long after the Water Commission's decision in the Kukui (Molokai) case.

[46] *Wai`ola*, 103 Haw. at 401.

APPENDICES

Appendix A Molokai Properties, Limited, EC Project #47: Water Plan, December 2004

Appendix B Report of the Molokai Water Working Group, Revised April 1996

MOLOKAI PROPERTIES, LIMITED

EC PROJECT #47

WATER PLAN

DECEMBER 2004

APPENDIX A

WATER USE PLAN

I. Molokai Properties, Limited Existing Water Systems

Molokai Properties, Limited (MPL) operates 3 water systems, two of which are subject to State Public Utilities Commission (PUC) regulation. All three systems are subject to regulation by the State's Commission on Water Resource Management (CWRM).

Molokai Public Utilities, Inc. (MPU), the water company serving Kaluakoi, lost $67,000 for the fiscal year ending June 30, 2004. Waiola O Molokai Inc, the system servicing the remainder of the Ranch, had FY04 losses of $152,000.

II. Kaluakoi System (Molokai Public Utilities, Inc. (MPU)

MPU services the existing Kaluakoi Development. Its source is Well 17 in Kualapuu which has a water use allocation of 1,018,000 gallons per day (GPD). The following is the permitted allocation established by the Water Commission based on the then existing uses:

Kaluako'i Hotel	67,000
Condos	186,000
Residential	51,000
Golf Course	400,000
Beach Park	26,000
Nursery	18,000
Filter Backwash	100,000
Moloka'i Ranch	0
System loss	0
Kaluako'i Total	**848,000**
MIS System Use Charge	94,000
Kualapu'u Town	76,000
Total	**1,018,000**

In this paper "current use" is defined as the average daily use over a one-year period. Current use of the MPU system, with the Kaluakoi Hotel closed is approximately 800,000 GPD.

The Kaluakoi System has not been in full compliance with Department of Health Drinking Water Standards since 1993. These "new" standards which went into effect nation-wide required drinking water systems using surface water or systems using groundwater under the influence of surface water to meet higher water quality standards to provide a greater margin of safety to their customers.

The previous owners of Kaluakoi were subject to a Consent Order, which was extended to September 2004 at the time of MPU's acquisition by Molokai Ranch. A one-year extension was subsequently requested and approved. MPL now has until September 15, 2005 to meet the current standards that can be satisfied by either using a dedicated pipeline from Well 17 (an alternative that has been abandoned) or by installing new treatment facilities that can meet the current standards.

We are currently preparing plans to upgrade our treatment facilities to meet the new standards at a cost of $1.5 million. Failure to bring the Kaluakoi system up to current standards will subject MPU to a one time fine of $125,000 and continuing fines of $5,000 per day until the system is brought into compliance.

Essentially, MPU starts with clean, compliant water as it leaves Well 17. However, use of the Molokai Irrigation System (MIS) to convey this water to the west end mixes in non-compliant surface water creating the need for treatment to again make it safe for drinking water purposes. This treatment process consumes water that can amount to 5 to 15% of the finished water produced.

III. Existing System Losses

Much has been said about MPU's system losses and we acknowledge that the system we inherited had losses of approximately 200,000 gallons per day.

The largest water loss is the approximate 100,000 gallons per day consumed in backwashing the sand filters at Puu Okoli that were part of the system we inherited. Since the acquisition, most of this water is now recycled onto the Golf Course. The old Ag lines and the open reservoir between Mahana and the entrance to Kaluakoi were historically large water wasters. Several major leaks have been repaired and losses on this segment have recently dropped dramatically, but further capital is needed to undertake further pipe repairs.

All systems have some level of loss. Most systems aim for losses of about 10%---- a reasonable target for the Kaluakoi System at build-out.

IV. Waiola O Molokai, Inc. Systems

Waiola is the Public Utilities Commission regulated entity that supplies drinking water to the remaining communities on Molokai Ranch land.

The Ranch has been in the water business for more than 100 years. Its role in this area expanded significantly when it inherited the drinking water systems for Maunaloa and Kualapuu when their lessees abandoned those plantation towns.

Waiola also supplies water to Kalae/Kipu and the Molokai Industrial Park/Manawainui areas. Prior to 1993, all of this water was supplied from the Ranch's surface water system. With the imposition of more stringent standards, these systems shifted from surface water to purchased well water.

The Kipu/Kalae system (approximately 20,000 gallons per day) is supplied with well water purchased from the Department of Hawaiian Homelands (DHHL).

The Kualapuu system (76,000 gallons per day as noted above) is supplied from Well 17 via a bulk water purchase agreement with MPU.

Initially, Maunaloa and the Industrial Park were supplied with water purchased from the County Board of Water Supply, from its well in Kualapuu. When that agreement came to an end in May 1998, MRL built a new treatment facility that meets the new standards.

V. Molokai Ranch Mountain (AG) system

The initial water system of the Ranch is more 100 years old and moves surface water approximately 20 miles from the central mountains of Molokai to the far corners of MPL's holdings through a combination of six and eight inch pipelines. Currently, the surface water system has 3 primary uses:
1.) Feed water for the Puu Nana water treatment plant that provides potable water for Maunaloa and the Industrial Park;
2) Irrigation water for landscaping of Maunaloa Village, the Lodge and Kaupoa camp;
3) Water for the Ranch's livestock operations.

The system has an average yield of approximately 500,000 gallons per day, but as with all surface water systems, its yield is highly weather dependent. Seasonal flows of 1,300,000 gallons per day can be achieved during winter storms, while summer drought lows of 65,000 gallons per day have occurred.

In many ways the Ranch's surface water system is like its much larger counterpart on Molokai, the MIS, which is also a surface water system.

While numbers vary, one estimate of the average yield of the MIS is 3,500,000 GPD making it about seven times larger than the ranch system in terms of yield. In terms of storage, the Ranch's 44,000,000 gallons of storage pales in comparison to the MIS's 1.4 billion gallons which is more than 30 times greater.

Both are highly dependent on the weather and rely heavily on winter rains to sustain demand during the drier summer months. One area of difference between the two systems is the MIS's ability to pump high-level ground water to supplement gravity surface water flows while the Ranch system relies totally on surface water delivered by gravity.

Surface water is the basis for our agricultural industry on Molokai as it is much cheaper to deliver to customers.

The typical energy costs for MPU to raise water 1,000 feet to the surface (the elevation of the Kualapuu Wells) is $1.00 per 1,000 gallons. Without high energy costs, water from Molokai's existing surface water systems can be kept affordable which is a critical factor to the future of farming on Molokai.

Inexpensive water is the key to expanding agriculture on Molokai and Molokai Ranch supports this wholeheartedly.

VI. MPL and the MIS

Since the first days of the Kaluakoi development, transmission of Well 17 water to the Resort utilized the MIS distribution system and the old Libbie, McNeill & Libbie irrigation pumps, pipelines, and reservoirs. These pipelines are 24 inch from the MIS reservoir to beyond the Kaluakoi reservoir at Puu Nana.

Currently MPU leases MIS transmission capacity for $135,000 per year. Based on current usage, that is equivalent to about 51 cents per 1,000 gallons for the right to use a portion of the excess capacity of the existing infrastructure. Other users pay 31.5c per 1000 gallons, plus an acreage assessment. To our knowledge, the Ranch is the largest financial contributor to the system.

In addition MPU "pays" the MIS "a systems loss" equal to 10% of the water it transmits.

MPU does not use MIS water. It puts in 1,111,111 gallons of water for every 1,000,000 gallons it takes out at its Mahana pump station. Over the course of a year, this additional input amounts to about 30,000,000 gallons.

When we acquired the assets of Kukui (Molokai), Inc. and MPU in December 2001, Kukui had a pumping deficit of 30,000,000 gallons. We made up this deficit by mid February 2002.

Since then, we have been in arrears only once, between April 5 to August 19, 2004. It was the result of the change-out of the old Detroit diesel engine with a new Caterpillar four-stroke diesel that is expected to be a more reliable power unit to drive the Well 17 pump. In hindsight, we should have built up greater reserves prior to taking the Well 17 motor out of commission.

This breakdown has, quite rightly, raised concern from homesteaders that a future breakdown could lead to a similar occurrence.

MPL proposes that it advances the MIS system 100 million gallons and retains that surplus in the system at all times. That amount of water would equate to about 4 feet of depth out of the 52 feet of usable storage capacity.

In the event of any future breakdown at Well 17, this surplus would more than cover any conceivable repair time.

MPL also proposes that preference farmers are able to use this surplus in the event of a drought emergency.

[The original MIS/Kaluakoi Corporation transmission agreement contemplated that system "inputs" and "withdrawals" would occur simultaneously. The various amendments, assignments, and extensions of the original agreement over the years have never addressed the reality that these inputs and withdrawals don't happen concurrently.]

VII. Water Needs Going Forward

We have stated that MPL **DOES NOT** need any more drinking water than currently allocated for the proposed Master Use Plan.

Under this Plan, MPL will abandon the Waiola Well application.

If this Plan is approved, MPL will sign covenants preventing it from ever seeking further water permits from the Water Commission.

This Master Use Plan is proposing:

(a) Potable Water:

MPL retains its 1.5 million gallons per day of water currently allocated:

- 1,018,000 GPD from Well 17
- 500,000 GPD from the Mountain System.

(b) Non-Potable Water

It is proposing to develop 1,000,000 GPD from the abandoned Kakalahale brackish water well in the Kamiloloa aquifer sector for future non-potable needs.

By gradually moving current non-potable uses such as the golf course, irrigation of the hotel, condos and large lots to non-potable water, we believe our existing 1.5 GPD potable allocation from a combination of Well 17 and the mountain system will meet all of our long-term potable demand.

Non-potable needs can be supplied by a combination of use of our existing mountain system and the unused Kakalahale Well.

We have proposed that the remaining 1,000,000 GPD be drawn from the Kakalahale brackish water well. This well which was built by Kaluakoi Corporation in 1969, has been pump tested and demonstrated capable of providing 1,000,000 GPD of good quality brackish water (chlorides at 500 ppm, or twice the drinking water standards).

Our advice is that drawing water from the Kakalahale well will have no impact on the yield of the Kualapuu aquifer.

While concerns have been raised about its use by the MIS or on DHHL lands, we believe it is a good source for west end irrigation needs.

We WILL NOT propose transmission of the Kakalahale brackish water to the West End by the MIS system.

We are currently investigating transmission alternatives.

Why is this Plan so different from previous West End water proposals?

Previously three separate large land owners, Molokai Ranch, Alpha USA and Kukui (Molokai) Inc all had or were developing massive comprehensive development plans that would have required as much as a total of 20,000,000 gallons of water per day to support.

Because our proposed Master Plan limits development, proposed water use is subsequently dramatically reduced as the table below shows.

VIII. Laau Point Water Use

The proposed Laau Point project, like the Papohaku Ranchlands subdivision, is expected to comprise second and third homes whose owners spend a limited amount of time on island. At Papohaku, 60% of those who have built houses are not permanent residents.

Also like Papohaku, we would expect actual dwelling construction to lag lot sales by several years. To date, about 20% of lots in Kaluakoi have been built on. After more than twenty years, the build-out rate is less than one percent per year as an average. We believe a combination of low occupancy, water conservation education, xeriscaping and tiered water rates will moderate water consumption by these homeowners.

While we expect home construction to be slow, water demands during the construction period are expected to be in the order of 50,000-150,000 gallons per day. Initial erosion protection and control measures would likely require an additional 50,000-100,000 gallons per day as well. The construction phase is projected to be 2 years. The initial erosion control phase would be expected to continue well after construction ranging from 5 to 10 years.

The public park(s) would require potable water and non-potable water for irrigation concurrent with the completion of site construction.

We anticipate it would be several years into the sales of the project before wastewater recycling would be a significant contribution to the supply of irrigation water for landscaping features, erosion etc. In the interim, non-potable water not required for unbuilt house lots would support these uses.

In summary, we would expect that water use for the project would start out as a significant percentage of total demand then drop after completion of construction and then slowly rise again as home construction proceeded.

IX. Water Usage Under Proposed Master Plan

(In Gallons Per Day)

DESCRIPTION	CURRENT USE			TOTAL DEMAND	
	Potable	Potable IRR	Non-Potable	Potable	Non-Potable
Current Use					
Kaluakoi Hotel & Golf Course	2,000	405,120		2,000	405,120
Kaluakoi Condos	116,250	70,880		116,250	70,880
Kaluakoi Residential	70,500	143,825		70,500	143,825
Maunaloa/Industrial Park	136,370		25,480	136,370	25,480
Ranch Operations/ Misc.	41,500		150,000	41,500	150,000
Kualapuu	76,000			76,000	
Subtotal	442,620	619,825	175,480	442,620	795,305
Subtotal All Categories			1,237,925		1,237,925
Future Changes (within 50 years)					
Kaluakoi Hotel & Golf Course				31,400	-131,880
Golf Course Wastewater Reuse					-100,000
Kaluakoi Condos					
Kaluakoi Residential				156,000	490,000
Maunaloa/Industrial Park				160,500	
Laau Point Lots				96,000	300,000
Laau Point Parks				1,000	40,000
TOTALS				889,520	1,393,425
Long term growth > than 50 yrs					
Community directed growth in Kualapuu and Maunaloa				200,000	
TOTALS				1,089,520	1,393,425
TOTAL ALL USES					2,482,945

We have stated that our projected West End water use will not exceed our existing permits plus 1.0 MGD of brackish water from the Kakalahale Well. Current use is grouped into 3 types of water; potable, potable irrigation, and non-potable. Currently 619,825 GPD of irrigation demand is met with potable water.
This use will be shifted to non-potable sources over time, freeing up this water for new potable uses. Renovation of the golf course (130 acres of turf down to 80 acres of turf) will reduce water consumption and reopening of the Hotel and higher condo occupancies will provide more wastewater. This is reflected in the much-reduced demand for golf course and hotel irrigation.

The La'au potable allocation is based on 600 GPD for 200 lots at 80% occupancy. The non-potable water is based on 1,500 GDP for 200 lots.

X. The Role of Water Conservation

At the time of the Kaluakoi acquisition, we understood that water conservation would play an important role in managing the West End's water usage.

The Water Commission reinforced that understanding in its water use permit for Well 17 that was issued after we took title to the Kaluakoi assets.

The Commission required MPU to report on its progress in controlling water waste, to conduct an educational campaign on water conservation with its customers, and to investigate a non-potable source for the golf course to allow potable water being used for non-potable uses to be available for other potable purposes.

We immediately identified and corrected several long-term water waste issues. We conducted a water conservation campaign over 12 months. However the most important action undertaken to date has been to restructure MPU's water rates to properly reflect the true cost of providing this service and to implement tiered water conservation rates that provide a financial incentive to customers to conserve water.

We approached our rate structure by using the Water Commission allocation amounts by user type as the base rate. All water use above that amount would be billed at a much higher "conservation rate". We proposed that the base rate be $3.18 per 1000 gallons and the conservation rate be twice as much or $6.36 per thousand gallons.

As an example, the Water Commission used 560 gallons per unit for the Condos plus 2,000 gallons per day per acre for irrigation. A 50-unit condo on a 4-acre site would have 36,000 gallons per day in its base rate (560 gallons X 40 units plus 2,000 gallons X 4 acres for irrigation). Any water used above this amount would be sold at the higher conservation rate.

As the permit allocation amount was 1,000 gallons per day for all residential uses (even though the existing usage in the Papohaku Ranchlands was noted in the permit to be 5,308 gallons per day per residence), we proposed that the conservation rate begin at 1,000 gallons per day for residential customers.

Because of a concern the Consumer Advocate termed "rate shock", we agreed to reduce the conservation rate to $4.70 per 1,000 gallons and phase-in the conservation rate for residential customers. For residential customers the conservation rate applies to all water used in excess of 5,000 gallons per day.

However the Consumer Advocate and the Public Utilities Commission agreed that we could telegraph that our next rate increase – then anticipated to be two to three years away-- would likely see the conservation rate take effect for all residential water use in excess of 1,000 gallons per day.

For the most part Kaluakoi residents have adjusted their water use. Consumption has dropped by 45% in the Ranchlands and the condos have shown reduced water consumption as well since the rate hike in September 2003. The most notable change is that customers now respond to rainfall and shut off their irrigation systems. Previously we saw very little reduction in water use after a good rain. Now a passing shower will cause water consumption to drop dramatically.

XI. Contingency Planning

We have stated that the 2.5 million gallons of water per day is the maximum this community-based Master Plan will require; 1.0 million gallons of existing drinking water from Well 17, and 0.5 MGD from the Mountain System, and one million gallons of brackish water from the Kakalahale Well.

The question has been posed; what if the Plan needs more water? What if there is increased demand for agriculture, particularly on MPL lands designated for agriculture, or on lands to be donated to the land trust.

MPL will never go back to the community and seek more drinking water.

If more non-potable water is needed for agriculture in particular, we still have two options:

- The brackish water available to MPL from the Prawn Farm at Palaau, which is currently permitted for 864,000 gallons per day of which 500,000 gallons per day could be available for reuse.
- Desalination.

The Prawn Farm water is very brackish; 1300 parts per million as chlorides (drinking water must have no more than 250 parts per million), and it would three

times as expensive to remove the salts to bring it to an acceptable level for use as agricultural water as obtaining water from the Kakalahale Well.

But it is an option for the future and particularly for non-potable uses.

Currently, desalting is still about 4 times more expensive on Molokai than developing an operating deep groundwater well. While it is not a viable economic alternative today, this technology continues to improve and its costs are declining as a result.

As this technology continues to improve, the cost of producing water will come down. As our conservation rates go up, at some point the two lines will cross, and we will find the balance between demand and supply. We have talked about the ability to have multiple rate blocks for both potable and non-potable water.

Structured properly, these rates would, in effect, subsidize prudent or thrifty water users and penalize excessive water use. At the higher rate blocks, the cost of desalination can be recovered. Because of this, there would be no pressure to pursue additional groundwater or surface water sources from the central or east end of the island.

X11. Water and Hawaiian Rights

Every water use permit issued by the Water Commission contains a provision that the allocation will be reduced if it interferes with the rights of the Department of Hawaiian Homelands.

The water code states that each County's Water Use and Development Plan, and the State's Water Project Plan, "shall incorporate the current and foreseeable needs of DHHL".

Hawaii revised statutes provides that the Hawaiian Homes Commission and its lessees have a prior right to 2/3 of the water in the MIS. Supreme Court rulings have affirmed that the priority uses of water include Native Hawaiian and traditional and customary rights.

For Molokai Properties Limited, the issue of Hawaiian Water Rights is very clear; our existing allocations are subject to reduction if they interfere with DHHL's rights to water in the future and due consideration must be given to DHHL's projected needs with any proposed new allocations.

Essentially we have proposed in our Master Plan to forever limit our withdrawals of potable groundwater to that which has already been permitted and seek only one million gallons per day of non-potable water from the existing proven brackish Kakalahale well in the Kamiloloa aquifer sector.

In essence, we are requesting 2 million gallons of groundwater out of the estimated developable 33.5 million gallon estimated sustainable yield of the island (about 6%), in the knowledge that it could be reduced in the future if necessary for DHHL's needs to be met. As we see it, it's a matter of law.

So we believe that if DHHL used every reasonable effort to develop its 2.905 MGD allocation in Kualapuu and wasn't successful, the Water Commission would then be obligated to reduce our allocation as necessary so that DHHL would get the full benefit of their allocation at the time it was needed.

We do not believe that scenario will eventuate because:

1) We believe the work done by the USGS supports that the estimates of water availability will be realized.
2) There is a strong consensus on island to limit development that will limit total water demand.
3) Large quantities of groundwater for agriculture will be cost prohibitive.

REPORT OF THE MOLOKAI WATER WORKING GROUP

Revised April 1996

Commission on Water Resource Management
Department of Land and Natural Resources
State of Hawaii

Originally Presented July 1993

APPENDIX B

PETER S. ADLER & STANLEY LUM
Facilitators

2471 Manoa Road ○ Honolulu, Hawaii 96822
(tel) 808/537-3886 (fax) 808/528-1974

July 31, 1996

Michael Wilson, Chairman, and
Members of the Commission on Water Resource Management
Department of Land & natural Resources
Kalanimoku Building
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Commissioners:

We are pleased to convey to you the results of the second round of discussions by the Molokai Working Group which was initiated by you in November, 1995 and which concluded its meetings on April 30, 1996.

As you recall, the group reconvened for the express purpose of revisiting and updating the initial report issued in July, 1993. The group was expanded to include additional representation from community, development, agricultural and homestead interests. The report does not make wholesale changes to the work of the original Molokai Working Group. Instead, you will find certain additions, modifications and deletions that, in the eyes of the group, improve the substance and clarity of the report's intent.

Once again, we applaud the efforts of the group's members who spent many hours in tough conversations searching for the highest levels of consensus possible. Where they have achieved such consensus, we hope it will prove useful to the Commission. Finally, we want to express our personal thanks to all those who entered these lengthy discussions in the spirit of good will and collaborative problem solving.

Sincerely yours,

PETER ADLER

STANLEY LUM

MOLOKAI WORKING GROUP
MEMBERSHIP

1993	1996
JUDY CAPARIDA Mana'e Resident	JUDY CAPARIDA Mana'e Resident
WARREN HAIGHT West End Landowners	DUNCAN ANNANDALE Moloka'i Ranch
BEN HENDERSON Dept. Hawaiian Home Lands	KEONI AGARD Dept. Hawaiian Home Lands
ALAN HOLT The Nature Conservancy	ED MISAKI The Nature Conservancy
LARRY JEFTS Commercial Farmer	TOM DECOURCY Commercial Farmer
BOB JOHNSON Maui County Administration	WILL SPENCE Maui County Administration
NOELANI JOY Hawaiian Homesteader	NOELANI JOY Hawaiian Homesteader
PAT KAWANO Maui County Council	PAT KAWANO Maui County Council
COLETTE MACHADO Mana'e Resident	COLETTE MACHADO Mana'e Resident
WAYNE MEYER Mana'e Resident	WAYNE MEYER Mana'e Resident
WILLIAM PFEIL Commercial Farmer	WILLIAM PFEIL Commercial Farmer
WALTER RAGSDALE Moloka'i Planning Commission	WREN WESCOATT Moloka'i Planning Commission
DEGRAY VANDERBILT Kaunakakai Resident	DEGRAY VANDERBILT Kaunakakai Resident
	RON HEDANI Kukui (Moloka'i), Inc.
	GLENN TEVES Hawaiian Homesteader
	TOM MATAYOSHI Moloka'i Irrigation System
	ELLEN KRAFTSOW Maui Dept. of Water Supply

FACILITATORS
PETER ADLER
STANLEY LUM

STAFF
ERIC HIRANO CHARLEY ICE

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APPENDICES
Appendix A - Molokai Working Group "Contract"

I. INTRODUCTION

The report that follows was originally presented in July 1993, following about six months of explorations and deliberations. It was revisited in late 1995 and revised in April 1996.

INTRODUCTION TO THE 1996 REVISED REPORT

This report by the second Moloka'i Water Working Group supercedes the first report done by the original Moloka'i Working Group in July 1993.

The second group was convened by CWRM Chairperson Michael Wilson in late 1995 for the express purpose of revisiting and updating the initial report issued in July 1993. The group was expanded to include additional representation from community, development, agricultural, and homestead interests (see Membership page). The group met seven times, heard presentations from experts, engaged in discussions and deliberations, and then reviewed the previous report with an eye towards updating and revising certain portions of it.

All changes to the original report are indicated in italics and only "consensus changes" have been included. We also note that most of the changes were developed at the group's last two meetings and, based on instructions by the group, were then written out by the facilitators and staff, circulated back to members to insure accuracy, and only then included in this report.

The result follows. The second Moloka'i Water Working Group did not make wholesale changes to the work of the original Working Group. Instead, Commissioners and other readers will find certain additions, modification, and deletions that, in the eyes of the group, improve the substance and clarity of the report's intent, and that can give general and sector-by-sector guidance to decision-makers.

The Moloka'i Water Working Group again gratefully acknowledges the assistance of many people who provided helpful time and information, including attorneys Doug McDougall and Alan Murakami and hydrologist Bill Meyer, for their good work on behalf of current and future generations of Moloka'i.

ORIGINAL INTRODUCTION

This report details the final findings and recommendations of the Molokai Working Group, a group appointed in October, 1992 by Mr. William Paty, recently retired Chairperson of the Commission on Water Resource Management (Commission). In his opening comments to the Molokai Working Group, Mr. Paty explained the group's purpose as follows:

- To recommend to the Commission a plan for water development on Molokai that assists the County and Community in developing its Water Use and Development Plan; and
- To test a community "working group" model that, if it works, could be used elsewhere in the State when communities are faced with tough water issues.

More specifically, Mr. Paty asked the Working Group to enter into good faith deliberations aimed at producing the highest consensus possible on demand forecasts, bulk water allocations, recommendations

to manage both supply and demand, and the best plans the Working Group might offer on balancing future water uses. Between November, 1992 and June, 1993, the group met ten times at various locations on the Island of Molokai. All meetings were open to the public and most were attended by one or more interested Molokaians.

To facilitate its own process, the Working Group developed and adopted a unique set of ground rules governing participation, attendance, and meeting courtesies (see Appendix A). Of particular importance was the group's initial agreement to operate by full consensus rather than through voting. The Working Group agreed that full consensus meant that any single individual could veto an item from going forward. This report, therefore, is forwarded to the Water Commission with the consensus of the entire Working Group.

It is hoped that the Commission on Water Resource Management will find this report helpful in identifying policy areas which should be addressed and which, if properly articulated, can aid greatly in shaping decisions bearing on water usage in the future.

Users of this report should keep four factors in mind when reading this report. First, the Molokai Working Group acknowledges that the data currently available provides an incomplete understanding of Molokai's water resources. Therefore, the group has taken a conservative approach, by generally accepting without revising water use projections submitted to the group.

Second, the report does not attempt to deal with every water issue being faced by the people of Molokai. Time and resource constraints, not to mention data constraints, required that the group focus only on those various supply and demand issues that seem most immediate and important at a policy level. Some of these issues must be reserved for when more complete information is available.

Third, the Working Group has not sought to suggest detailed allocations for the future. The hard work of choosing among different proposed users remains with the Commission. Nonetheless, the Working Group has sought to address the questions of what "principles" ought to have higher and lower priority in the balancing work that the Commission must inevitably do and these are reflected in the recommendations. The group has limited itself to the next 10-20 years as a "planning window" but tried also to provide fundamental guidelines about water use that can guide decisions for the future.

Fourth, the Working Group contained in its membership a reasonable cross-section of some of Molokai's various interest groups, however, many important voices did not, because of time and resource pressures, have an opportunity to participate in the Working Group's discussions. It is important, therefore, that all of Molokai's people be encouraged to share their views on the matters discussed in this report.

In responding to Mr. Paty's directive and submitting this report, the Working Group also wishes to acknowledge the need -- and express its desire -- to continue working together to help analyze and resolve four remaining "tough" issues. These are (1) groundwater and wellhead protection for Molokai; (2) Hawaiian and DHHL rights to water; (3) streamflow protection and possible restoration; and (4) Kualapuu wellfield protection. Until these issues are resolved, the Working Group's work remains meaningful and necessary and we hope the Commission will make every effort to enable the Working Group's continuing discussions.

It is also recommended that the Commission will convey to the Maui County Council, Maui County Administration, including the Board of Water Supply of the County, the State Department of Agriculture, and the State Department of Hawaiian Home Lands the concerns, findings, and recommendations contained herein.

The Molokai Working Group gratefully acknowledges the assistance of William Paty, Rae Loui, Ben Kudo, and Paul Matsuo who provided critical information and perspective at various points during the Working Group's meetings. Finally, the Group thanks the Commission for the opportunity to provide its views and encourages the Commission to continue such efforts on Molokai and on all of the other islands as well.

II. FINDINGS

A. Agriculture will continue to be the economic and cultural "heart" of Molokai.

B. *Sustainable yield of the Kualapu'u Aquifer appears to have been fully allocated in 1996.* The areas of greatest present & future conflict have to do with agricultural and recreational uses of water.

C. *While DLNR/DoWaLD Bulletin B16 (1966) estimated that* the island's sustainable yield was 83 mgd, *the 1993 Working Group agreed to work with a developable yield of 39 mgd for planning purposes (see Exhibit 1). In 1996, the Water Working Group has agreed to use an estimate of 41.5 mgd for planning purposes, which differs from the earlier figure as follows:*

   1. *It includes 4.5 mgd already developed in the Waikolu System of the Northeast Sector;*
   2. *It reduces the original estimate of 7 mgd in the Kualapu'u Aquifer System to 5 mgd.*

   It should be noted that, of the 41.5 mgd, at least 8 mgd is brackish, leaving only 33.5 mgd developable sweet water.

D. The group has worked to gather estimates of existing uses, future demands, and supply and finds the following: (see Exhibits 2 - 5)

   1. *1996 groundwater permitted usage is 8.59 MGD;*
   2. *1996 surface water reported usage is 2.96 MGD;*
   3. *The Department of Hawaiian Home Lands has a groundwater reservation of 2.905 MGD from the Kualapu'u Aquifer System;*
   4. *1993 projected* potable water use for 2010 is estimated at 11.55 MGD;
   5. *1993 projected* non-potable water use for 5-10 years is estimated at 20.52 MGD;
   6. *1993 projected* non-potable water use from 2010 to "build out" is estimated at 42.90 MGD.
   7. *Current use plus 1993* projections of water use exceed supply.

III. GENERAL RECOMMENDATIONS

A. The working group recommends *that the Commission initiate and coordinate* water resource studies to improve everyone's understanding of the available resources.

B. The working group recommends that all large-scale water planning/water management should consider that agriculture will continue to be the economic and cultural "heart" of Molokai.

C. The working group recommends that DHHL's water needs, which are currently tied to lands at Hoolehua and Kalamaula through 2010, be reserved first.

D. The working group recommends that due to limited information, the capacity of the aquifers should be treated conservatively and protected until more precise determinations can be made.

E. The working group recommends that priorities for water use should follow the lead of community development as determined by the intent of the Community Plan and DHHL development plans in force at the time the Commission makes its decision.

F. *The working group recommends that the Water Use and Development Plan follow these guidelines:*

1. *For planning and management:*

   a) all wells and stream intakes should have meters, gages, or other measuring devices; withdrawals greater than 10,000 gpd should be reported monthly, including drawdown and salinity in wells, with instruments subject to periodic checks by CWRM staff; withdrawals up to 10,000 gpd should be recorded monthly and submitted annually, subject to periodic checks by CWRM staff.

   b) Water Use Permit Aplications should include not only TMK, present designations and zoning, proposed use, and consumption standard; they should also include available historical consumption data.

2. Use a projected resident population *that complies with the Community Plan* as a guideline for planning county policies and services (1990 - Resident population, 6,700 ± Visitor population, 800 ± 2)
3. Retain Kaunakakai Town as the population center of the island;
4. Limit the visitor accommodation center to Kaluakoi;
5. Maintain agriculture as the primary economic activity;
6. Develop a comprehensive water system for agricultural use;

2. from West Maui Regional Capacity Study Project, October 1, 1992.

6. Develop a comprehensive water system for agricultural use;
7. Improve current water quality, distribution system, and develop new water sources for Molokai Community Plan areas;
8. *Incorporate a section on supply- and demand-side management, including* water conservation *incentives* and *public* awareness programs; and
9. Incorporate a program to maximize watershed quality, including the initiation of Maunaloa Mountain's reforestation.

G. The working group recommends that ground water must be reserved first to fulfill domestic, and public health, safety, and welfare needs.

H. The working group recommends priority use of non-potable water should be for demonstrable and reasonable-beneficial agricultural usage which includes subsistence farming *and public facility needs.*

I. The working group recommends use of any water for golf courses should be lowest priority.

J. The working group recommends that an intensive study be implemented to capture surface overflow during heavy rains from intermittent streams (Kamalo, Kawela, Kalae, Kaunakakai, Manawainui) for surface water use, increasing recharge of the associated aquifer, and decreasing siltation of Molokai's reefs.

K. The working group recommends that all additional water supply should first be sought in the Sector for which it shall be used.

L. The working group recommends that all the water rights of DHHL homesteaders as provided under the Hawaiian Homes Commission Act, State Water Code, *and other laws* must be recognized and preserved by the State of Hawaii and the Counties of Maui and Kalawao. Other rights which may exist pertaining to Hawaiians not residing on DHHL lands must also be honored.

M. The working group recommends that *principles of* supply and demand *management be followed* to the greatest extent allowed by law.

N. The working group recommends that new water supplies should be sought first through conservation *management tools such as water pricing (inverted rate structure, etc.).*

O. The working group recommends that Molokai should have a core of undisturbed watersheds.

P. The working group recommends that *local advice on* water resource issues be through a permanent entity similar in form and representation to the present Molokai Working Group.

Q. The Water Working Group recommends *that the 1996 version of the Final Report be revisited every two years, and at these times to include meetings or briefings* with the State Water Commission, County Council, Mayor, and Board of Water Supply *to discuss the group's updated report.*

IV. RECOMMENDATIONS BY SECTORS

A. NORTHEAST SECTOR

1. The development of new water resources from the undeveloped portions of the Northeast Sector should be held in reserve.

2. Existing uses (NPS, DOA, DHHL, DOH, etc.) should continue if they are consistent with the State Water Code.

3. Utilization of existing MIS capacity should be done cautiously with current monitoring. Development beyond the existing water systems in the Northeast Sector should not be allowed, unless assessments indicate more water can be withdrawn without further impacts to the natural ecosystems.

B. CENTRAL SECTOR

1. Bulk groundwater allocations should generally coincide with "2010 Potable Water Use Projections" subject to on-going studies of the aquifer's capacity (see Exhibit 4).

2. Limit groundwater withdrawal in the Kualapuu Aquifer System to 5.0 mgd. 0.57 mgd (5.0 mgd limit minus 4.43 mgd 2010 Water Projections) may be used to satisfy other correlative uses unless subsequent information changes this.

3. Groundwater withdrawal from the Kualapuu Aquifer System over the 5.0 mgd limit set in 2 above, *may* be exceeded by a maximum of 2.0 mgd only if DHHL requires additional resources and water quality is not threatened.

4. The Manawainui Aquifer System should be renamed to Palaau Aquifer System.

C. SOUTHEAST SECTOR

1. *Limit groundwater withdrawal to 33% of its developable yield* subject to verification of existing users and water use permits.

2. Any withdrawals from this Sector should not diminish water supplies and supply availability for traditional uses, including taro patches and fishponds. *Baseline water requirements for these uses needs to be determined.*

3. Development of additional water from the Southeast Sector should be *allocated* first to existing residences of this Sector *that* are not yet served.

D. WEST SECTOR

1. Encourage and promote reforestation on Maunaloa's Mountains for the purpose of long range water resource enhancement.

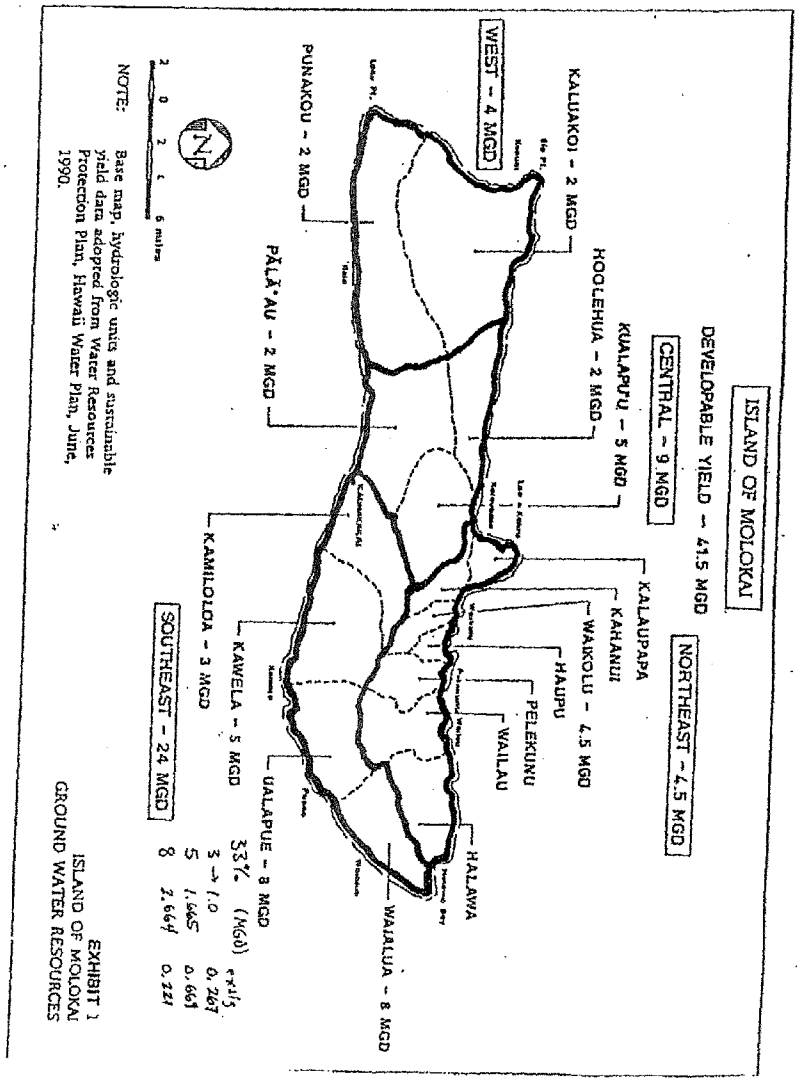
Molokai Water Working Group, 1996

BREAKDOWN OF EXISTING GROUNDWATER USAGE IN MGD

These figures represent information available to but not confirmed nor substantiated by the Group in 1993; current information should be sought from the CWRM.

CENTRAL SECTOR	
Manawainui System	
1. Hawaiian Research	0.56
Kualapuu System	
1. County DWS	0.59
2. DHHL	0.38
3. Kaluakoi Resort	0.82
Subtotal	1.79
NORTHEAST SECTOR	
Kahanui System	
1. National Park Service	0.22
Waikolu System	
1. DOA MIS	1.13
SOUTHEAST SECTOR	
Kamiloloa System	
1. Hawaiian Research	0.26
Kawela System	
1. County DWS	0.32
2. Kawela Plantation	0.16
3. Kamalo Ranch	0.04
Subtotal	0.52
Ualapue System	
1. County DWS	0.18
2. Kamalo Ranch	0.22
3. Place, M. J.	0.22
Subtotal	0.62
WEST SECTOR	0.00
TOTAL	5.10

EXHIBIT 2



NOTE: Base map, hydrologic units and sustainable yield data adopted from Water Resources Protection Plan, Hawaii Water Plan, June, 1990.

EXHIBIT 1
ISLAND OF MOLOKAI
GROUND WATER RESOURCES

BREAKDOWN OF EXISTING SURFACE WATER USAGE IN MGD

These figures represent information available to but not confirmed nor substantiated by the Group in 1993; current information should be sought from the CWRM.

CENTRAL SECTOR	
Kualapuu System	
1. County DWS	0.03
2. Molokai Ranch	0.07
Subtotal	0.10
NORTHEAST SECTOR	
Waikolu System	
1. Molokai Ranch	0.04
2. DOA MIS	2.71
Subtotal	2.75
Halawa System	
1. County DWS	0.002
SOUTHEAST SECTOR	
Kamiloloa System	
1. Molokai Ranch	0.03
Kawela System	
1. Molokai Ranch	0.08
WEST SECTOR	0.00
TOTAL	2.96

BREAKDOWN OF 2010 POTABLE WATER USE PROJECTIONS IN MGD*

Estimates were furnished by users and were accepted by working group without challenge. These figures are estimates and projections made in 1993, based on information available at that time.

CENTRAL SECTOR	
Manawainui System	
1. Hawaiian Research	0.56
Kualapuu System	
1. County DWS	0.94
2. DHHL	0.84
3. Kaluakoi Resort	2.14
4. Other State Projects	0.11
5. Palaau Industrial Park	0.20
6. Others (Kualapuu, Kalae, Kipu)	0.20
Subtotal	4.43
NORTHEAST SECTOR	
Kahanui System	
1. National Park Service	0.22
Waikolu System	
1. DOA MIS	2.70
SOUTHEAST SECTOR	
Kamiloloa System	
1. Hawaiian Research	0.26
Kawela System	
1. County DWS	0.32
2. Kawela Plantation	0.40
3. Kamalo Ranch	0.04
Subtotal	0.76
Ualapue System	
1. County DWS	0.18
2. Kamalo Ranch	0.22
3. Place, M. J.	0.22
Subtotal	0.62
WEST SECTOR	
Alpha USA	2.0[1]
TOTAL	11.55

**** Decisions by the State of Hawaii or County of Maui relating to planning for, regulation, management, and conservation of water resources shall incorporate and protect adequate reserves of water for the full current and foreseeable development and use of Hawaiian home lands.***

[1] Water development source unidentified.

Molokai Water Working Group, 1996

NON-POTABLE WATER USE PROJECTIONS IN MGD*

Estimates were furnished by users and were accepted by working group without challenge. These figures are estimates and projections made in 1993, based on information available at that time.

		5 to 10 years	Total	2010 to Build out	Total
DHHL					
Hoolehua		4.00		16.0	
Kalamaula		1.42		7.5	
Subtotal DHHL			5.42[1]		23.5[3]
Other MIS users			2.50[2]		2.5
Molokai Ranch					
Agriculture, Dairy, Pastures:					
1.	Ag. Park - Kualapuu	7.70			
2.	Coffee - 800 acres	1.50			
3.	Dairy - 4,000 head	0.70			
4.	Palm Nursery - brackish	0.30			
5.	Feedlot	0.20			
6.	Pastures	0.20			
7.	Hay - assume all irrigated on Homesteads	0.00			
Subtotal Agriculture			10.6[3]		10.6[3]
Recreation:					
1.	Maunaloa Links	0.25			
2.	Ironwoods	0.20			
3.	Network	0.05			
Subtotal Recreation			0.50[3,4]		0.5[3,4]
Kaluakoi Resort					
Recreation: Golf Course Addition (two 36-hole courses)			0.00		2.8[3]
Alpha USA			1.50[3]		3.0[3]
TOTAL			20.52		42.9

**** Decisions by the State of Hawaii or County of Maui relating to planning for, regulation, management, and conservation of water resources shall incorporate and protect adequate reserves of water for the full current and foreseeable development and use of Hawaiian home lands.***

[1]From DHHL projections
From DOA - MIS average delivery = 7.5 mgd
2/3 x 7.5 mgd = 5.0 mgd preference to DHHL
1/3 x 7.5 mgd = 2.5 mgd for other MIS users
Note: deficit from MIS of 0.42 mgd

[2]Assumes maximum usage of 1/3 of MIS for other users

[3]Water development source unidentified

[4]A portion of this projection will be met by the MIS and a portion from private sources

Note: Non-Potable Water Use Projections are for major agricultural and recreational uses in the central and western areas of the island. It does not include instreams uses, fishponds, taro patches, aquacultural projections, etc.

EXHIBIT 5

APPENDIX A

Glossary and Acronyms*

Glossary

1. **Appurtenant Water Right - Generally recognized that Kuleana lands in taro production at the time they were granted by the government (usually during the 1848-1856 Great Mahele) retain "appurtenant rights to the quantity of water necessary to grow taro in the same manner on the same land.

2. **Correlative Water Right - Generally recognized as that all landowners overlying a ground water basin have a right to share in the use of the underground waters.

3. Demonstrable - Capable of being demonstrated, to prove, to exhibit.

4. Developable Yield - Calculated by subtracting out water resources not directly available from the sustainable yield due to the possible interaction between ground water and streams.

5. Non-Potable Water - Not suitable for drinking.

6. Potable Water - Suitable for drinking.

7. Reasonable-Beneficial Use - The use of water in such a quantity as is necessary for economic and efficient utilization, for a purpose, and in a manner which is both reasonable and consistent with the state and county land use plans and the public interest.

8. Sustainable Yield - The maximum rate at which water may be withdrawn from a water source without impairing the utility or quality of the water source as determined by the Commission.

Acronyms

1. DOA - State Department of Agriculture
2. DHHL - State Department of Hawaiian Home Lands
3. DOH - State Department of Health
4. DWS - Maui County Department of Water Supply
5. MGD - Million Gallons per Day
6. MIS - Molokai Irrigation System
7. NPS - National Park Service

* The glossary and acronyms have been provided by the facilitators and staff at the request of the Molokai Working Group and does not in any way reflect a concensus decision of the group.

** These definitions are general in nature and are not to be assumed to be a full legal definition of the terms.

APPENDIX B

Working Group "Contract"
(Ground rules of the group were adopted by consensus)

1. Facilitators role is to assist group through the process and enable consensus decision-making. Facilitators will stay neutral and any member of the group can stop the process to remind the facilitators of this.

2. It's OK to disagree -
Members will make their best efforts to stay patient.

3. Be tough on issues wherever possible -
Members will be easy on each other.

4. Common courtesies -
Members agree not to interrupt, walkout or hog the floor.

5. The group will operate by consensus -
See Attachment A

6. Members agree not to have meetings electronically recorded -
Facilitators will record on flip chart paper supplemented with notes.

7. Members agree that there will be alternates when members are not able to attend meetings.

8. Release of group proceedings -
No one person speaks for the group. Group speaks as one, after reaching consensus.

9. Meetings will be open to the community -
But non-working group members can speak only by invitation of the group.

10. The community can submit ideas or information in writing to the members.

11. In the spirit of reaching consensus, it is expected that members will not simply say "NO" to an idea without affirming an alternative.

APPENDIX C

Attachment A

Levels of Consensus

4. "Yes"	I fully support and endorse . . . . .
3. "Yes . . . . . But . . ."	I can live with it, even though it doesn't meet all my needs.
2. "Yes, with Reluctance"	I don't like it and must register my feelings but, I'll defer to the wisdom of the group.
1. "No"	I must stand in the way of this.
0. "Abstain"	I abstain because of . . . . .

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Appendix Q

Wastewater Treatment Design

WASTEWATER TREATMENT DESIGN AND OPERATING ASPECTS

Treatment Requirements for R-1 Recycled Water

The primary method of effluent disposal proposed for the La'au Wastewater Treatment Plant (WWTP) is beneficial reuse as irrigation water for select areas of conservation lands along the coastline and for soil erosion control in arid areas of this project. Therefore, the effluent produced by the WWTP shall meet the Hawaii State Department of Health (DOH) R-1 recycled water quality criteria. R-1 quality recycled water requires the effluent to be at all times oxidized, then filtered, and then exposed to a disinfection process that kills pathogens.

Overview of Proposed Treatment Facilities

A fully integrated wastewater treatment system that incorporates biological processes, ultrafiltration membranes, and disinfection technology is proposed for the WWTP due to the stringent effluent requirements for R-1 recycled water. This technology combines the activated sludge process with micro-pore filtration in a compact membrane bioreactor (MBR). Both oxidation and filtration are achieved in the MBR, thus eliminating the need for separate secondary and tertiary treatment processes.

Preliminary treatment of the plant influent for treatment in the MBR include coarse bar screening, grit removal, flow equalization, anoxic basin, pre-aeration, and fine screening of the wastewater.

Final effluent from the MBR, virtually particulate-free, will be disinfected using ultraviolet irradiation to render it bacteriologically safe for recycle and disposal.

Solids generated at the WWTP include screenings, grit and sludge. Screenings and grit will be dried on-site using sand drying beds and disposed in a county landfill.

A schematic of the treatment proposed at the WWTP and a conceptual site layout are provided in Figures 1 and 2, respectively. Constituent concentration levels anticipated after each treatment process are presented in Table 1.

TABLE 1
ANTICIPATED EFFLUENT CONSTITUENT LEVELS

Constituent	Influent	MBR	UV Disinfection
Average BOD_5 (mg/L)	240	< 5	< 5
Average SS (mg/L)	240	< 5	< 5
Fecal Coliform – median (CFU/100 mL)	10^8	< 23	< 1
Turbidity (NTU)	30 - 50	< 0.2	< 0.2

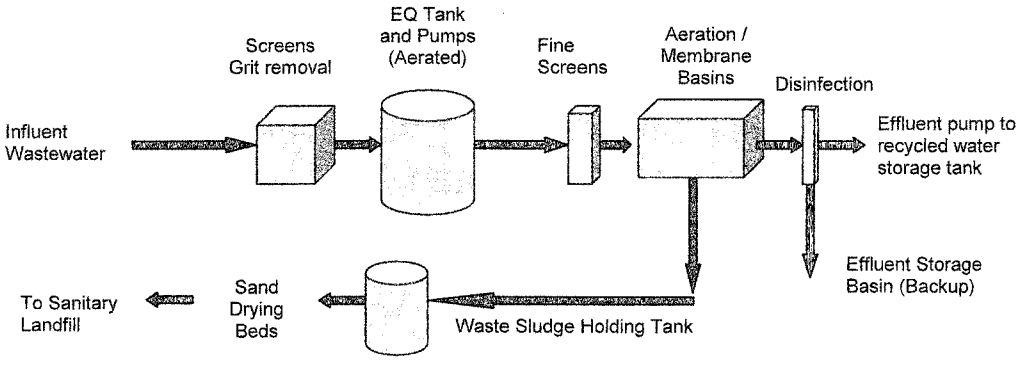
FIGURE 1

PROCESS FLOW DIAGRAM

FIGURE 2

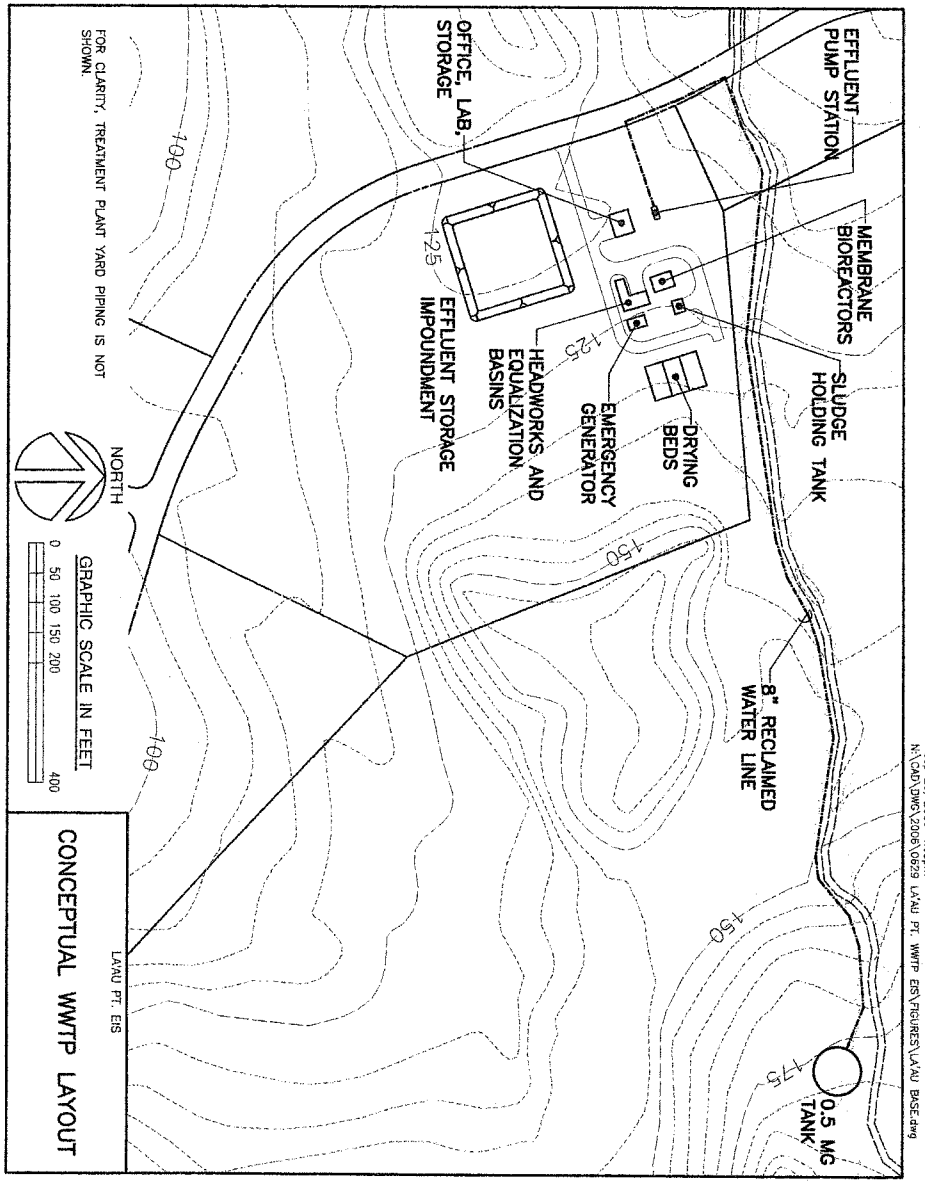
CONCEPTUAL WWTP LAYOUT

Figure 1
Flow Diagram – Submerged Membrane Bioreactor Wastewater Treatment Plant



Recirculation path and equipment are not shown

1. Preliminary treatment using coarse screens
2. Grit Removal
3. Equalization Tank- Size dependent on system peak flow
4. Fine Screen – 1/8" opening
5. Anoxic / Aeration / Membrane Tanks (MBR) and Permeate Pumps and Air Blowers
6. Disinfection by ultraviolet irradiation
7. Effluent storage basins (when not irrigating using recycled water)
8. Waste sludge holding tank for biosolids dewatering on sand drying beds



Sludge Treatment and Disposal

The MBR is essentially a high mixed liquor suspended solids (MLSS) activated sludge process utilizing a membrane as a means to separate the solids from the liquid. The MLSS concentration in the MBR typically ranges between 15,000 mg/L to 30,000 mg/L with sludge ages typically in excess of 40 days. Therefore, sludge digestion is typically not required following the MBR. Wasted sludge (or biosolids) from the MBR will be dewatered to humus using sand drying beds, a practice that is particularly conducive in the arid climate of west Molokai. Biosolids residue for disposal at a county landfill will be small, amounting to about 70 cubic yards annually.

Alarms and Telemetering

Alarms indicating high and low liquid level conditions, equipment malfunction, and other emergency conditions will be a feature of the WWTP. Visual and audio alarms will be integrated in the control centers of the WWTP, and any alarm signals will be sent through telephone lines to the homes and mobile telecommunication devices of key maintenance personnel as an additional safety measure during non-work hours.

Odor Control

Since the collection system for the development is not extensive and the sewer flow velocities are high in the small-diameter pressure mains, the detention time in the sewer system should be relatively short, thereby minimizing the formation and emission of odors at the WWTP.

Reliability and Redundancy

Safeguards will be incorporated in the plant design to ensure that treatment operations are uninterrupted in the event of power failure or equipment malfunction. Design features will comply with the reliability and redundancy provisions promulgated in the *"Guidelines for the Treatment and Use of Recycled Water"*, prepared by the Hawaii State Department of Health, and dated May 15, 2002, and amendments thereto. For power supply reliability, an auxiliary generator will automatically operate and transfer power during electrical power outages. For process redundancy, multiple units of tanks, pumps, and other key equipment will afford parallel operation during times when a process unit is taken out of service for maintenance or repair.

During times when the irrigation system is not in operation or when recycled water quantities exceed the irrigation requirements, a storage tank and backup storage and disposal impoundment will be utilized for any exces, such as in times of inclement weather or system maintenance.

Restricted Public Access

Wastewater conveyance pump stations and treatment facilities will be fenced to restrict public access.

Warning Signs and Special Precautions

Effluent reuse facilities, including piping and appurtenances, and application areas subject to public access will have warning signs stating that irrigation water is not fit for consumption. These signs shall comply with the DOH guidelines.

Construction Phasing

The treatment plant will be constructed with an initial capacity of 60,000 gallons per day (gpd), and consist of dual parallel process trains of 30,000 gpd to afford operating redundancy. At some future time when the wastewater flow is forecast to increase as build-out of the project nears, another increment of up to two 30,000 gpd capacity modules will be added to the existing plant. Concomitant with this expansion will be provisions for additional drying beds and ancillary equipment.