

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII



GILBERT S. COLOMA-AGARAN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

JANET E. KAWELO
DEPUTY

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

AQUACULTURE DEVELOPMENT
PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND
ENVIRONMENTAL AFFAIRS
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT
WATER RESOURCES MANAGEMENT

March 16, 2000

OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Ste. 702
Honolulu, Hawaii 96813

Dear Ms Salmonson:

Subject:

**Negative Declaration Determination and Final Environmental Assessment for
Papaaloa Homesteads Forest Stewardship Project, TMK 3-3-5-01-73, Hamakua
District, Hawaii, HI**

The Department of Land and Natural Resources, Division of Forestry and Wildlife has reviewed the draft Environmental Assessment for the subject projects. No comments were received during the 30-day public comment period that ended on January 22, 2000. The County of Hawaii Planning Department had commented previously (letter attached) that their findings supported our anticipated FONSI.

We have determined that, according to the significance criteria established according to the Department of Health Rules, the project will not produce a significant environmental impact.

(1) **The project involves no irrevocable commitment to loss or destruction of any natural or cultural resources:** The primary objective of this project establish a small-scale high-value hardwood timber plantation, on land that has been cultivated for sugar production and most recently, used as a pasture area. There are no significant natural or cultural resources on the project site.

(2) **The project will in no way curtail the beneficial uses of the environment:** The project will, in-fact put this land to a more valued use, both environmentally and economically.

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

(4) **The project will not substantially affect the economic or social welfare of the community or state:** The project will only serve to benefit the economic and social welfare of the Hamakua community and the state by contributing to economic diversification, providing limited employment, and contributing to the development of timber supply markets to Hawaii's growing forest industry.

(5) **The project will not substantially affect public health:** The management practices proposed will not significantly impact public health. Although the weed control practices involve some limited use of a herbicide, the application areas are relatively small and the site is a good distance from any adjacent property dwellings and potentially affected areas. All applications will adhere to state BMPs and all federal and state guidelines and regulations.

(6) **The project does not involve any substantial secondary impacts, such as population changes or effects on public facilities.**

(7) **The project does not involve any degradation of environmental quality.** This project can in fact only serve to enhance the aesthetic environmental quality of the Hamakua area.

(8) **The project does not involve a commitment for larger actions or a considerable cumulative affect on the environment:** Most actions will take place during the establishment stage of the project. After year four, practices involve only routine maintenance and periodic thinning. Then after several years, periodic, relatively small timber harvests will give way to the establishment of a new rotation of timber and a similar, cycle. The cumulative affect on the environment will be positive as the site will support more biodiversity and the soils will improve over time.

(9) **The project will not substantially affect a rare, threatened or endangered species or its habitat:** There are currently no rare, threatened or endangered species on the property. Should the planted forest attract any such species, the landowners will take precautions to assure that they are not adversely impacted.

(10) **Project activities will not affect air or water quality or ambient noise levels.** The project is likely to eventually improve water quality, reducing runoff and increasing infiltration. All proposed chemical herbicide and fertilizer applications are small scale and well within allowable ranges.

(11) The project is not likely to affect or suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, geographically hazardous land, estuary, and freshwater or coastal waters overland flow.

(12) The project will not affect scenic vistas and view planes identified in county or state plans or studies.

(13) The project will not require substantial energy consumption.

As we have deemed no environmental impacts to be significant, we declare a Finding of No Significant Impact for this project and we ask that you publish this determination in the April 8 edition of your Environmental Notice. We have enclosed a completed OEQC Publication Form and four copies of the final EA. You should already have a copy of the project summary on disk, which we submitted with the original draft EA. Please call Karl Dalla Rosa, at 587-4174 if you have any questions, or if you require an additional copy of the project summary.

In addition to this Environmental Assessment, we are also preparing a Forest Stewardship Contract Agreement for review and approval of the Board of Land and Natural Resources.

Sincerely,



Michael G. Buck
Administrator

2001-04-08-HI-PEA-Papaalooa Homestead
FINAL

APR 8 2001

FILE COPY

**ENVIRONMENTAL ASSESSMENT FOR FOREST
STEWARDSHIP PROJECT**

APPLICANTS

Ingrid Dockersmith and Christian Giardina
1456 Wailuku Drive
Hilo, Hawaii 96720

Daniel Binkley and Jane Higgins
1218 Mountain Avenue
Fort Collins, Colorado 80521

Michael Ryan and Linda Joyce
1208 West Oak Street
Fort Collins, Colorado 80521

APPROVING AGENCY

Department of Land and Natural Resources
Division of Forestry and Wildlife (DLNR-DOFAW)
1151 Punchbowl Street, Room 325
Honolulu, Hawaii 96813

ANTICIPATED DETERMINATION

Finding of No Significant Impact (FONSI) is anticipated.

DATE COMPLETED

NOVEMBER 22, 2000

ENVIRONMENTAL ASSESSMENT FOR FOREST STEWARDSHIP PROJECT

APPLICANTS

Ingrid Dockersmith and Christian Giardina
1456 Wailuku Drive
Hilo, Hawaii 96720

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ANTICIPATED DETERMINATION

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AGENCIES AND INDIVIDUALS CONSULTED

Department of Land and Natural Resources, Division of Forestry and Wildlife
USDA Natural Resource Conservation Service Office, Hilo
University of Hawaii - Hilo, Natural Resources Environmental Management
University of Hawaii at Manoa, College of Tropical Agriculture and Human Resources -
Agricultural Diagnostic Service Center
Extension Forestry Services
Local Planning Department, Hilo
Adjacent and Neighboring Property Owners (correspondence attached):
Bishop Estate, to the attention of Alfred Mau, TMK 3-3-5-01-89
Bari Green, TMK 3-3-5-01-69
James and Elizabeth Shouse, TMK 3-3-5-01-73

The following agencies will receive a copy of the Environmental Assessment and Forest Stewardship Management Plan:

Division of Historic Preservation
Hawaii County Planning Department

LAND USE CLASSIFICATIONS

State designation: Agricultural
County general: Intensive agriculture/ extensive agriculture
Community: Laupahoehoe Rural Design Plan
Development planning and zoning: Agriculture AG-20

SPECIAL DESIGNATIONS

None

PROPERTY DESCRIPTION

Location: Island of Hawaii, Hamakua Coast, Papaaloa Homesteads (Figures 1, 2 and 3)

Tax map key number: 3-3-5-01-75

Size: 17.15 acres (Figure 4)

Elevation: ~1,200 feet elevation

Rainfall: ~ 150 inches of rainfall annually

Soil classification: Honokaa silty clay loam, low elevation, 10 to 20 percent slopes (HsD) and 20 to 35 percent slopes (HsE)

Existing vegetation: Current land cover consists of pasture grasses, remnant sugar cane and weedy exotics.

Proposed land cover: Plantation forest of high value hardwood trees.

SUMMARY

The primary management objective of this project is to establish stands of non-invasive, high value hardwood trees for sustainable timber production. Approximately 6,750 trees will be planted at an initial spacing of 3 m by 3 m on 15 acres of the 17.15 acre property, with the remaining 1.75 acres planted in fruit trees. Species to be planted include: *Acacia mangium*, *Albizia saman*, *Eucalyptus cloeziana*, *E. deglupta*, *E. microcorys*, *Khaya senegalensis*, *Pterocarpus indicus*, *Swietenia macrophylla*, and *Tectona grandis* (Figure 5). The anticipated start date for the project is December, 2000. Every 6 months the project will submit progress reports and cost documentation to the DLNR-DOFAW Administration for a period of 10 years.

The project is not located in or near the following sensitive areas: flood plains, tsunami zones, beaches, rivers, ocean, estuaries, anchialine ponds, fresh or coastal waters, erosion-prone areas or geologically hazardous land. However, the property and project borders State of Hawaii land surrounding Kapehu Gulch. An existing road on the property runs adjacent to Kapehu Gulch, and will not be disturbed during site preparation. Additionally, trees which will not be harvested will be planted between the road and State of Hawaii land, resulting in a buffer of at least 25 feet between the edge of the gulch and any soil disturbance or future harvesting.

Current flora at the project site consists of exotic pasture grasses, remnant sugar cane and weedy invasive species including: *Clidemia hirta* (Koster's curse), *Cyperus rotundus* (purple nutsedge), *Mimosa pudica* (sensitive plant), *Panicum maximum* (Guinea grass), *Pennisetum clandestinum* (Kikuyu grass), *Psidium cattleianum* (strawberry guava), *Saccharum officinarum* (sugar cane), and *Spathodea campanulata* (African tulip tree). Existing fauna consists of mongoose, rats, feral pigs and goats, and insects. There are no known historical, archaeological or cultural sites at the project site. Given the former intensive uses of this property (sugar cane production and cattle grazing) it is unlikely that there will be cultural or social impacts from the project. Finally, the Division of Historic Preservation will receive a copy of the Environmental Assessment and Forest Stewardship Management Plan for the project for review.

A Forest Stewardship Management Plan has been prepared with the assistance of the DLNR-DOFAW and has been reviewed by the Forest Stewardship Advisory Committee (see management plan). Funding for the project is being provided by the applicant/owners of the property, as well as an anticipated \$31,586.00 in state funds over a period of ten years from the DLNR-DOFAW Forest Stewardship Program.

The positive impacts of this forestry project include: i) wildlife habitat enhancement for birds, insects, and other native and non-native fauna due to increased vertical spatial complexity; ii) noxious weed suppression due to shading from closed forest canopy and herbicide application; iii) enhanced site aesthetics due to diverse forest replacing degraded cane field / pasture; and, iv) harvest related economic diversification and employment opportunities for the community .

Forestry is an expanding land use in Hawaii, currently dominated by low value hardwood production for chips. This management plan proposes to diversify the local forest industry by planting non-invasive, high value hardwoods that would meet local and state wide needs for high value lumber used in construction, timber framing, cabinetry, furniture, flooring, and interior finishing. This supply of hardwoods would provide employment opportunities for the community, including but not limited to assistance with site preparation, seedling propagation, planting, harvesting, milling, and finishing.

The potential negative impacts of the project include: i) soil disturbance and erosion during site preparation; ii) use of herbicide to control weeds; and, iii) harvest of trees.

The project will consult the DOFAW Best Management Practices for Maintaining Water Quality in Hawaii for planned activities. Soil disturbance and erosion will be minimized at site preparation by having soil moving equipment follow elevation contours. Soil moving equipment will not be used immediately adjacent to Kapehu Gulch as discussed previously, but will remain at least 25 feet from the edge of State of Hawaii land. The project will mostly use rapidly growing tree species that should close canopy within three years, reducing the need for herbicide. Weed mat will be used for slower growing species, further reducing the need for herbicide. Following site preparation, herbicide treatment will be minimized by spot spraying weeds as necessary. Herbicides will be applied in accordance with registered uses and directions on label.

Thinning of trees and harvesting trees in blocks of approximately 0.5 to 0.75 acres will occur periodically during the project as needed, which is proposed to continue beyond 35 years. Timber harvesting will consult the DOFAW Best Management Practices for Maintaining Water Quality in Hawaii. Harvested blocks will be immediately replanted to re-establish tree cover. Because all units are less than 1 acre, with most about 0.5 acre, skidding distances will be short. Trees will be felled in the direction of existing roads to minimize skidding distances. As currently planned, 18 of 22 units are bordered by existing roads. All of the remaining 4 units can be harvested together with an adjacent unit that borders a road.

The upper property boundary borders Bishop Estate land already dedicated to commercial, short-rotation forestry with *Eucalyptus grandis* trees for chips. There are no anticipated negative impacts on these lands. The lower property boundary borders land owned by Bari Green that is dominated by remnant cane and exotic weeds. During site preparation, some soil may erode onto this adjacent property. Herbicides are not expected to move from proposed project land. Aside from very minor movement of soil, there are no anticipated negative impacts. There are no anticipated negative impacts on lands bordering to the south and north.

Overall, a finding of no significant impact is anticipated for the proposed reforestation stewardship plan because: i) no historical sites are present on the property; ii) no native species have been observed on the property; iii) sugar cane was cultivated on this land for 40+ years - a practice that involved biannual plowing, burning and fertilization of most of the site and eliminated most native species from site; iv) a 25' buffer will be put in place between proposed forestry activities and State of Hawaii lands (Kapehu Gulch) on the north property boundary, a gulch that is dominated almost entirely by exotic species including *Psidium cattleianum* (strawberry guava), *Clidemia hirta* (Koster's curse), *Trema orientalis* (gunpowder tree) and *Spathodea campanulata* (African tulip tree); and, v) proposed activities are restorative in that forest cover will be returned to the site, degraded and compacted soils will be improved through tillage, fertilization, organic matter and nutrient inputs from nitrogen fixing and non-nitrogen fixing trees.

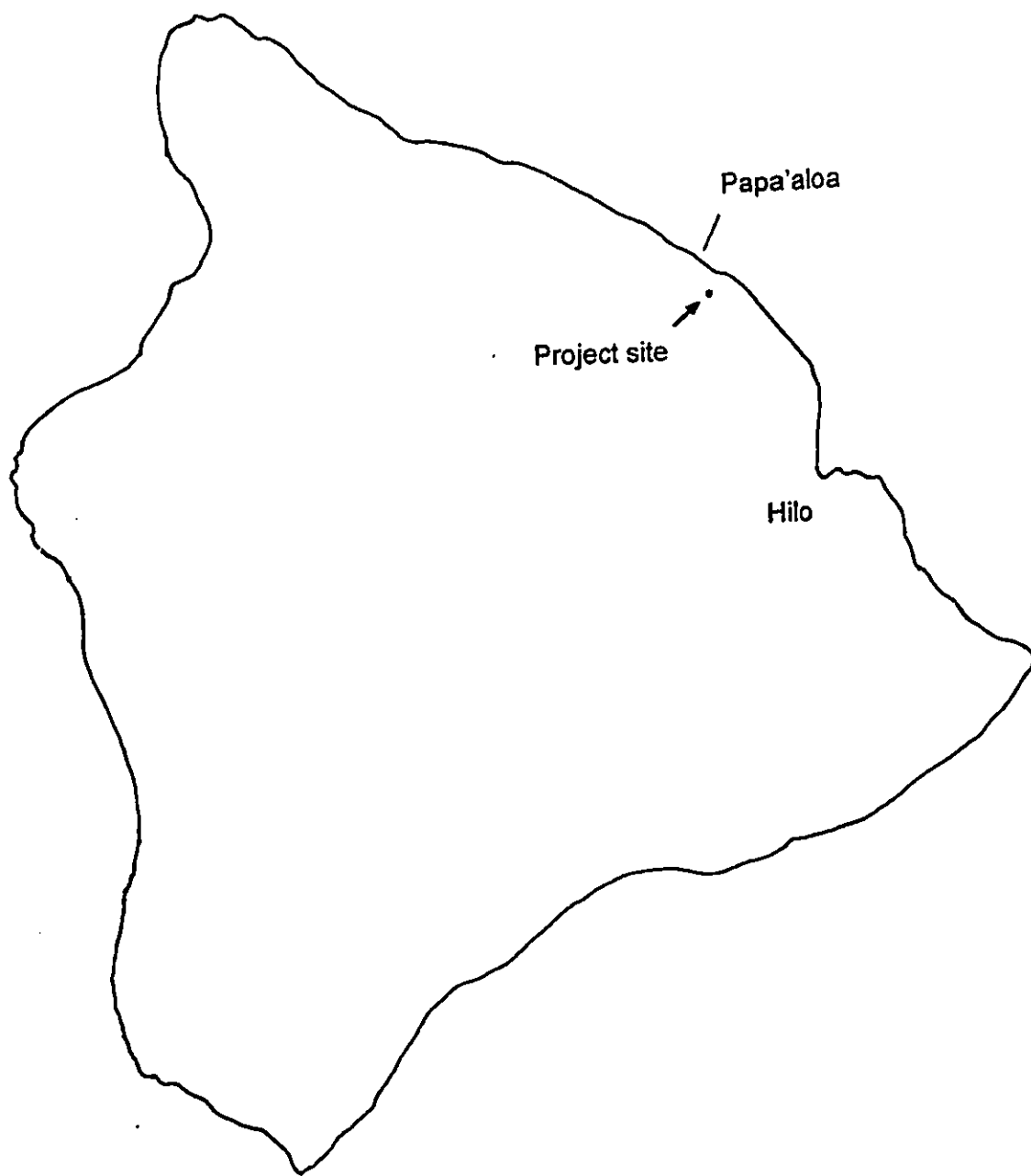


Figure 1. Island of Hawai'i

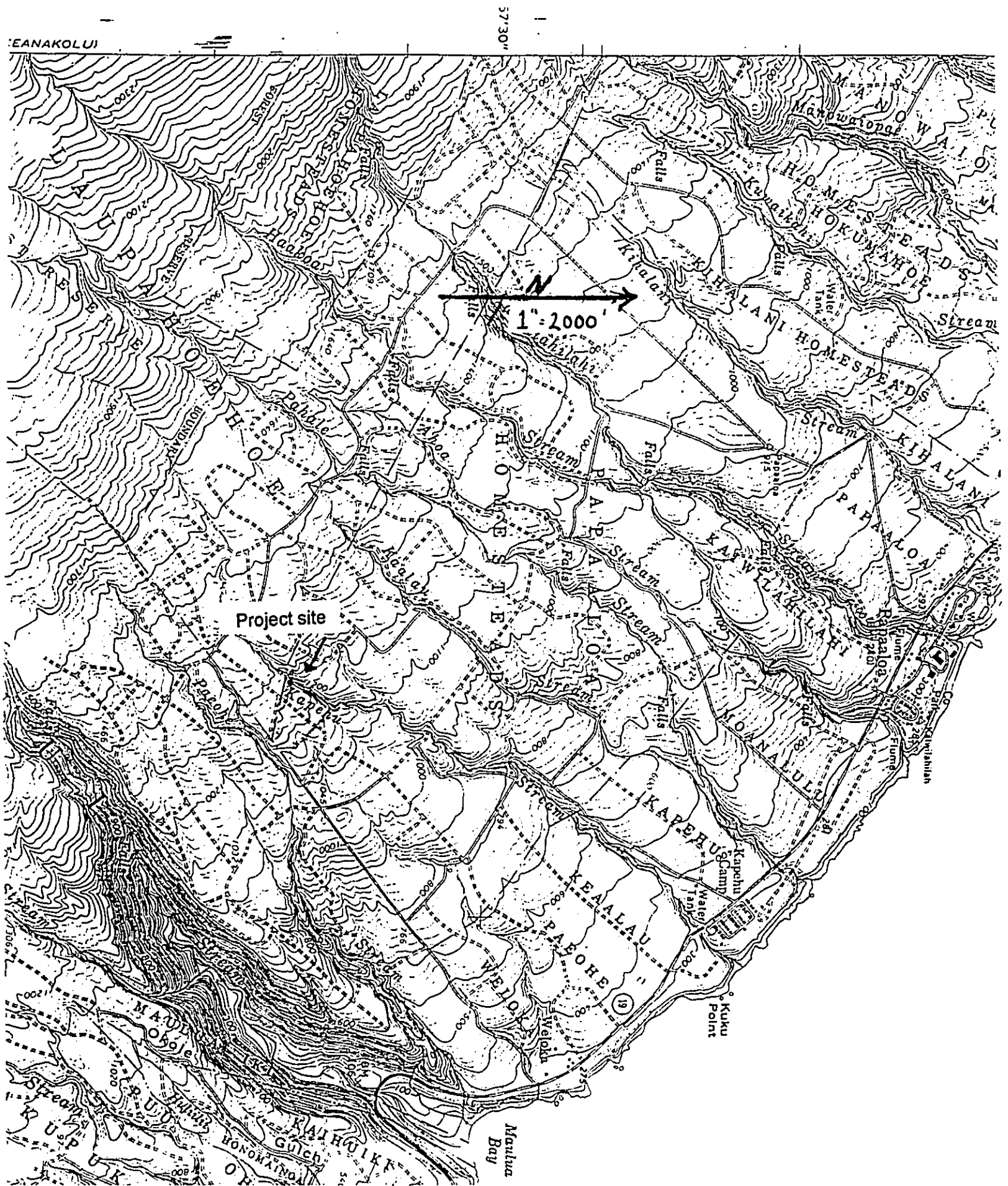
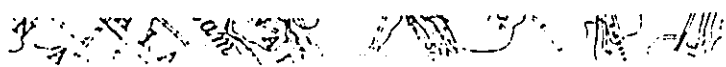


Figure 2. Topographic map of Papa'aloa Homesteads and project site at an elevation of ~ 1,200 feet. (Scale 1:24000)



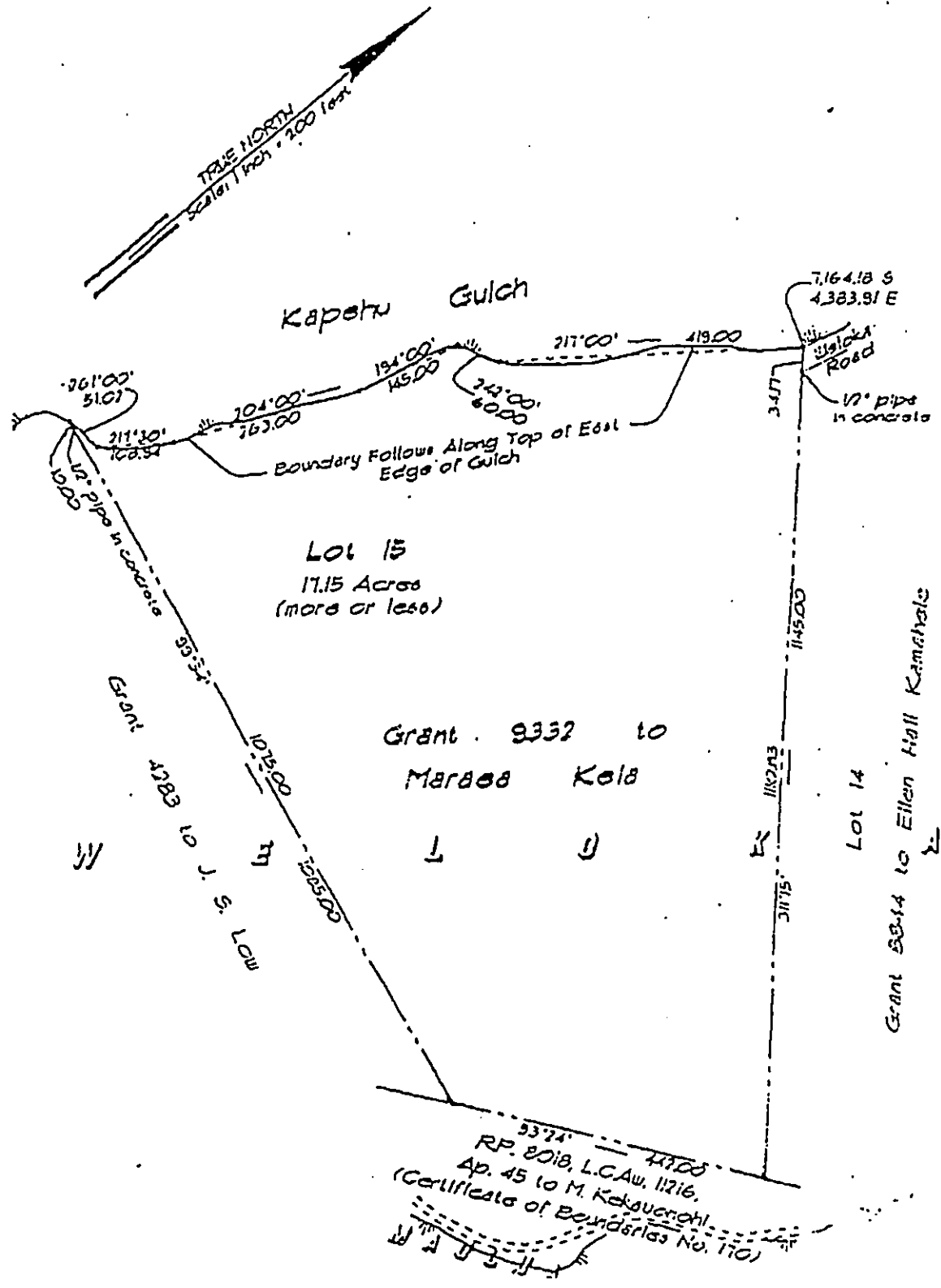


Figure 4. Property survey. TMK 3-3-5-01-75

Species	Number of Trees
<i>E. microcorys</i>	1503
<i>S. macrophylla</i>	1232
<i>K. senegalensis</i>	898
<i>E. cloeziana</i>	862
<i>T. grandis</i>	541
Nitrogen fixers	
<i>P. indicus</i>	422
<i>A. mangium</i>	422
<i>A. saman</i>	422
TOTAL	6301

- A= *E. microcorys*
- B= *S. macrophylla*
- C= *K. senegalensis*
- D= *E. cloeziana*
- E= *T. grandis*

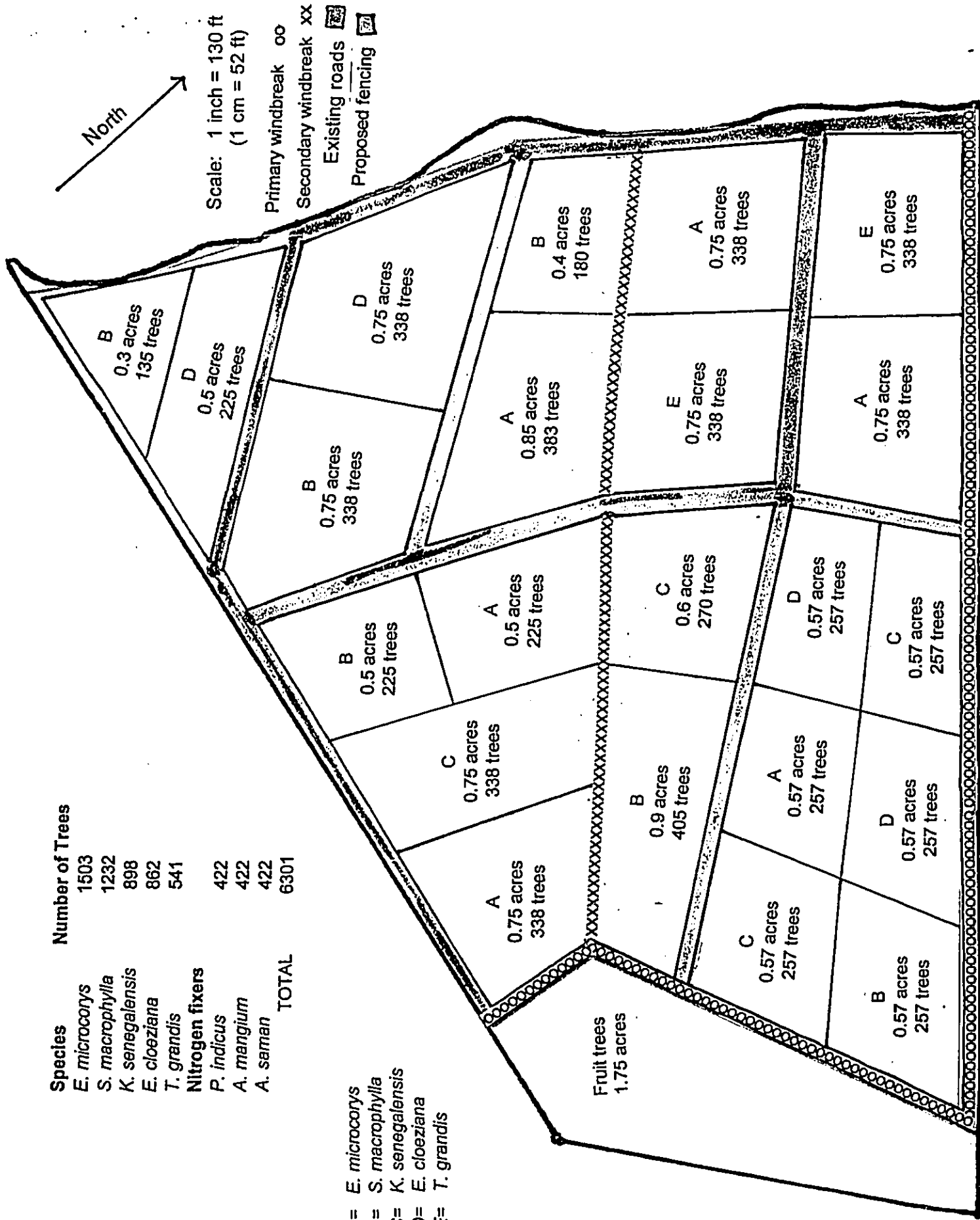


Figure 5. Project site map with location of proposed management practices.

1456 Wailuku Drive
Hilo, Hawaii 96720
September 7, 2000

Bishop Estate
Attn: Alfred Mau
Box 3466
Honolulu, Hawaii 96801

Dear Mr. Mau:

We recently purchased a 17.15 acre property (tax map key # 3-3-5-01-75), which is adjacent to a property owned by Bishop Estate (tax map key # 3-3-5-01-89). We would like to let you know of our plans to establish a stand of high value hardwood trees for sustainable timber production on 15 acres of the property.

A Forest Stewardship Management Plan for our proposed project has been prepared with the assistance of the Department of Land and Natural Resources Division of Forestry and Wildlife (DLNR-DOFAW) at 1151 Punchbowl Street, Room 325, Honolulu, Hawaii 96813, and has been reviewed by the Forest Stewardship Advisory Committee. The project will consult the DOFAW Best Management Practices for Maintaining Water Quality in Hawaii for planned activities.

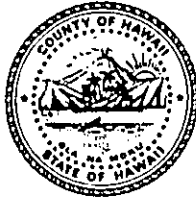
The property landscape will be improved aesthetically by replacing pasture and remnant sugar cane with a sustainable plantation forest of at least six different hardwood species. Because the property was previously in pasture and sugar cane, we do not anticipate negative impacts as a result of converting the property to timber production.

Please contact us at the above address if you have any questions or concerns.

Sincerely,

Ingrid Dockersmith and Christian Giardina

Stephen K. Yamashiro
Mayor



Virginia Goldstein
Director

Russell Kokubun
Deputy Director

County of Hawaii

PLANNING DEPARTMENT

25 Aupuni Street, Room 109 • Hilo, Hawaii 96720-4252
(808) 961-8288 • Fax (808) 961-8742

September 22, 2000

Mr. Karl R. Dalla Rosa
Cooperative Resource Management Forester
Department of Land & Natural Resources
Division of Forestry & Wildlife
1151 Punchbowl Street
Honolulu, HI 96813

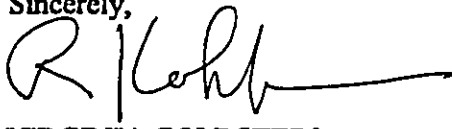
Dear Mr. Dalla Rosa:

**Draft Environmental Assessment (DEA) for
Hardwood Forest & Timber Production
Papaaloa Homesteads, North Hilo, Hawaii Island
TMK: (3) 3-5-01: 73**

The above DEA was reviewed and we found the land use classification information to be accurate. The proposal is consistent with parcel 73's State Land Use designation and the County zoning and General Plan (GP) classifications for agricultural land uses. In addition, the project will not encroach or have an impact on the GP's natural beauty element because for the North Hilo district this lot is not listed by the GP as a site example of natural beauty. Finally, parcel 73 is not within Hawaii County's Special Management Area (SMA); and therefore, it is not subject to the Rule 9 SMA criteria of the Hawaii County Planning Commission.

Thank you for including our participation to comment on this project. Any follow-up to these comments can be made with staff planner, Earl Lucero at 961-8288.

Sincerely,


f VIRGINIA GOLDSTEIN
Planning Director

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1456 Wailuku Drive
Hilo, Hawaii 96720
September 7, 2000

Bari Green
Box 62
Hilo, Hawaii 96720

Dear Mr. Green:

We recently purchased a 17.15 acre property (tax map key # 3-3-5-01-75), which is adjacent to your property (tax map key # 3-3-5-01-69). We would like to let you know of our plans to establish a stand of high value hardwood trees for sustainable timber production on 15 acres of the property.

A Forest Stewardship Management Plan for our proposed project has been prepared with the assistance of the Department of Land and Natural Resources Division of Forestry and Wildlife (DLNR-DOFAW) at 1151 Punchbowl Street, Room 325, Honolulu, Hawaii 96813, and has been reviewed by the Forest Stewardship Advisory Committee. The project will consult the DOFAW Best Management Practices for Maintaining Water Quality in Hawaii for planned activities.

The property landscape will be improved aesthetically by replacing pasture and remnant sugar cane with a sustainable plantation forest of at least six different hardwood species. Because the property was previously in pasture and sugar cane, we do not anticipate negative impacts as a result of converting the property to timber production.

Please contact us at the above address or at 808-969-6991 if you have any questions or concerns.

Sincerely,

Ingrid Dockersmith

Christian Giardina

1456 Wailuku Drive
Hilo, Hawaii 96720
September 7, 2000

James and Elizabeth Shouse
Box 1364
Honokaa, Hawaii 96727

Dear Mr. and Mrs. Shouse:

We recently purchased a 17.15 acre property (tax map key # 3-3-5-01-75), which is near your property (tax map key # 3-3-5-01-73). We would like to let you know of our plans to establish a stand of high value hardwood trees for sustainable timber production on 15 acres of the property.

A Forest Stewardship Management Plan for our proposed project has been prepared with the assistance of the Department of Land and Natural Resources Division of Forestry and Wildlife (DLNR-DOFAW) at 1151 Punchbowl Street, Room 325, Honolulu, Hawaii 96813, and has been reviewed by the Forest Stewardship Advisory Committee. The project will consult the DOFAW Best Management Practices for Maintaining Water Quality in Hawaii for planned activities.

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Please contact us at the above address if you have any questions or concerns.

Sincerely,

Ingrid Dockersmith

Christian Giardina

1456 Wailuku Drive
Hilo, Hawaii 96720
November 22, 2000

Karl Dalla Rosa
Department of Land and Natural Resources
Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325
Honolulu, Hawaii 96813

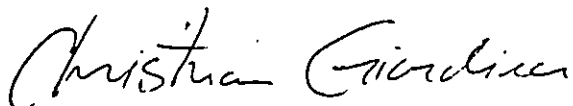
Dear Karl:

Enclosed is the revised Forest Stewardship Management Plan and Environmental Assessment. I have made changes to the plan which the Forest Stewardship Advisory Committee recommended. These changes include the following:

1. Lime is now applied only during site preparation.
2. The applications of Mg-sulfate and gypsum have been reduced, and are applied only in year 4.
3. The amount of side-dressed superphosphate and micronutrient applied has been reduced.
4. The assumed seedling mortality rate has been reduced from 20% to 10%.
5. The purchase of equipment has been modified. Purchase of the ATV and associated equipment has been eliminated from the plan. The plan still includes purchase of a backpack sprayer, broadcast spreader, weed wacker, chainsaw, and appropriate safety equipment for use of this equipment. Rental of this equipment is not economical given the duration of the project and the number of days of use needed for the equipment.
6. The number of seedlings per acre has been reduced from 468 to 450 per acre.
7. More detailed specifications for the windbreaks are included in the plan.
8. The second disking was not removed from the plan, but greater explanation regarding disking is included in the plan.

Thank you very much for all of your assistance and suggestions. Please let me know if any further information should be added to either the Forest Stewardship Management Plan or Environmental Assessment.

Sincerely,



Christian Giardina

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

March 16, 2001

GILBERT S. COLOMA-AGARAN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

JANET E. KAWELO
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AQUACULTURE DEVELOPMENT
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WATER RESOURCES MANAGEMENT

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Ste. 702
Honolulu, Hawaii 96813

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Subject:

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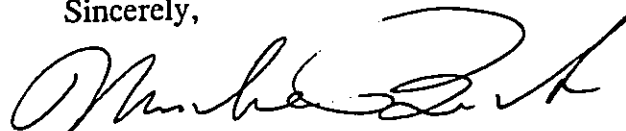
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In addition to this Environmental Assessment, we are also be preparing a Forest Stewardship Contract Agreement for review and approval of the Board of Land and Natural Resources.

Sincerely,



Michael G. Buck
Administrator

FOREST STEWARDSHIP MANAGEMENT PLAN

APPLICANTS

Ingrid Døckersmith and Christian Giardina
1456 Wailuku Drive
Hilo, Hawaii 96720
Home: 808-969-6991
Work: 808-934-9512

Daniel Binkley and Jane Higgins
1218 Mountain Avenue
Fort Collins, Colorado 80521
Work: 970-491-6519

Michael Ryan and Linda Joyce
1208 West Oak Street
Fort Collins, Colorado 80521
Work: 970-498-1012

PROPERTY LOCATION

Tax Map Key Number: 3-3-5-01-75
Papaaloa Homesteads, Hamakua Coast, Island of Hawaii

CONSULTANT

Dr. Christian Giardina
1456 Wailuku Drive
Hilo, HI 96720
Work: 808-934-9512
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DATE COMPLETED

November 22, 2000

FOREST STEWARDSHIP PLAN SIGNATURE PAGE

Professional Resource Consultant Certification: I have prepared (revised) this Forest Stewardship Plan. Resource Professional have been consulted and/or provided input as appropriate during the preparation of this plan.

Prepared by:

Christian Giardina Nov 22, 2000
Professional Resource Consultant's Signature and Date

Christian Giardina

Professional Resource Consultant's Name

Applicant Certification: I have reviewed this Forest Stewardship Plan and hereby certify that I concur with the recommendations contained within. I agree that resource management activities implemented on the lands described shall be done so in a manner consistent with the practices recommended herein.

Prepared for:

Ingrid Døckersmith Nov 22, 2000
Applicant's Signature and Date

Ingrid Døckersmith

Applicant's Name

State Forester's Approval: This plan meets the criteria established for Forest Stewardship Plans by Hawaii's Forest Stewardship Advisory Committee. The practices recommended in the plan are eligible for funding under the appropriate Stewardship Incentives or Forest Stewardship program.

Approved by:

Michael G. Buck 12/13/00
State Forester's Signature and Date

MICHAEL G. BUCK
State Forester's Name

Forest Stewardship Plan Preface

This stewardship plan describes the existing vegetation, soils, and wildlife/fish on the property and addresses the opportunities for the protection and enhancement of all natural resources while assisting the applicant meet his/her objectives for the management of the property. It provides guidelines for a sound strategy which reflects the applicant's commitment to a land stewardship ethic that focuses on integration of all resources to manage the property as a valuable legacy for future generations.

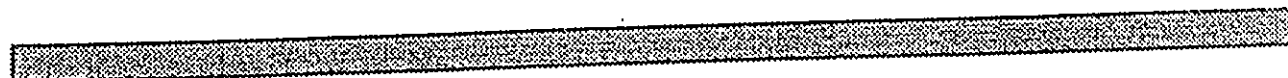


In addition to the vegetative, soil and wildlife/fish resources, this plan addresses the enhancement of additional resource topics checked below. The plan may need to be revisited as the applicant's objectives, conditions, and/or opportunities change.

Applicable Resource Areas Covered

Those checked are targeted by applicant management objectives and are considered in this stewardship plan.

- | | | | |
|-------------------------------------|---------------|--------------------------|-------------------------------------|
| <input type="checkbox"/> | Water Quality | <input type="checkbox"/> | Threatened/Endangered Species |
| <input checked="" type="checkbox"/> | Agroforestry | <input type="checkbox"/> | Forest Health |
| <input type="checkbox"/> | Recreation | <input type="checkbox"/> | Archaeological - Cultural Resources |



- No threatened or endangered species, cultural or historic resource, floodplain or wetland has been identified or is known to exist on this property.

This plan provides a strategy and action plan for sound integrated resource management of the property, and reflects the desires of the applicant to protect or enhance all resources in the management of the property for at least 10 years.

INTRODUCTION

DESCRIPTION OF PROPERTY

Property location:

Island of Hawaii, Hamakua Coast, south of Papaaloa, Papaaloa Homesteads
(Figures 1, 2 and 3)

Property size:

17.15 acres
(Figure 4)

Access routes to property:

Access to the property is off of Highway 19 via Homestead Road to Waioka Road along Kapehu Gulch. Waioka Road ends at the property boundary.

Property tax map key number:

3-3-5-01-75

Property zoning:

Agriculture AG-20

Topographic map:

Elevation ~1,200 feet elevation
Rainfall ~ 150 inches of rainfall annually
(Figures 2 and 5)

Land use history and present condition:

Property was planted in sugar cane until approximately 1994, and then converted to pasture for grazing cattle. Current land cover consists of pasture grasses, remnant sugar cane, and weedy exotics. (Photo 1)

MANAGEMENT OBJECTIVES

1. To establish a stand of forest trees for sustainable timber production.
2. To establish and maintain windbreaks to protect the tree plantation.
3. To enhance timber quality, increase the production, and improve the overall health of the plantation.
4. To generate income from commercial timber production.

LAND AND RESOURCE DESCRIPTION

Existing vegetation:

Existing vegetation includes: *Clidemia hirta* (Koster's curse), *Cyperus rotundus* (purple nutsedge), *Mimosa pudica* (sensitive plant), *Panicum maximum* (Guinea grass), *Pennisetum clandestinum* (Kikuyu grass), *Psidium cattleianum* (strawberry guava), *Saccharum officinarum* (sugar cane), and *Spathodea campanulata* (African tulip tree).

Existing forest health:

No existing forest.

Soils:

Land capability class and subclass:

1. Honokaa silty clay loam, low elevation, 10 to 20 percent slopes (HsD)
Capability Class IV and Capability Subclass e
 2. Honokaa silty clay loam, low elevation, 20 to 35 percent slopes (HsE)
Capability Class VI and Capability Subclass e
- (Figure 6)

Soil loss tolerance:

HsD erosion factors T = 5 tons/acre/year, K = 0.05, Kf = 0.05,
HsE erosion factors T = 5 tons/acre/year, K = 0.05, Kf = 0.05
(Table 1)

Slope and aspect:

Slopes on the property range from 0 to 25 percent, with a northeast aspect.

Water resources:

No existing water resources.

Timber resources:

No existing forest.

Wetland resources:

No existing wetland.

Historic and cultural resources:

No known historic or cultural resources.

Existing wildlife:

Mongoose and feral pigs.

Threatened and endangered species:

No known threatened and endangered species.

Existing recreational and aesthetic values:

No existing recreational or aesthetic values.

RECOMMENDED TREATMENTS AND PRACTICES

MANAGEMENT PRACTICES

Reforestation and afforestation (SIP Practice 2):

This practice will enable the establishment of a stand of forest trees for sustainable timber production.

Site preparation:

Site preparation will follow the currently approved DOFAW Best Management Practices. Fourteen acres of the site will be planted for timber production, one acre will be planted in windbreak, and 1.75 acres will be planted with fruit trees (Figure 7). The entire site will be initially treated with the herbicide Glyphosate, N-(phosphonomethyl) glycine to control grasses, sugar cane and other target plant species on the property. After a period of at least 7 days following herbicide application, the site will be disked to break up the remnant cane, pasture grasses, and soil. Granular Ag 10 dolomite will be applied (1845 lb/acre), and the site will be disked a second time to thoroughly break up remnant cane and soil, and to incorporate the dolomite. This method of disking twice has been recommended for our site, and other similar sites in which a single disking has not adequately broken up the cane and soil. The site will be ripped to ~2.5 feet along elevation contours. Disking and ripping will loosen soil compacted from grazing and cut through any hardpan created by sugar cane cultivation. The site will be treated with the pre- and post-emergent herbicide "Goal" (oxyfluorfen).

Seedling acquisition:

Species to be used include:

Acacia mangium This rapidly growing tree is used for chips, furniture and cabinetry, and supplies soil with fixed nitrogen.

Albizia saman (Monkeypod Tree) This rapidly growing tree is used in woodworking, and supplies soil with fixed nitrogen.

Eucalyptus cloeziana (Gympie Messmate) This rapidly growing tree is used for poles, windbreaks and saw timber.

Eucalyptus microcorys (Tallowwood) This high value hardwood tree is used for fencing, floors, and construction.

Khaya senegalensis (African Mahogany) This valuable hardwood tree is used for woodworking, furniture, and cabinetry.

Pterocarpus indicus (Narra) This high value hardwood tree is used for cabinetry, finishing and woodworking, and supplies soil with fixed nitrogen.

Swietenia macrophylla (Big Leaf Mahogany) This valuable hardwood tree is used for woodworking, furniture, and cabinetry.

Tectona grandis (Teak) This valuable hardwood tree is used for flooring, trim and carpentry.

Seedlings will be purchased from private nurseries and are available in dibble tube stock.

Planting seedlings:

Planting will occur from January, 2001 through March, 2001, prior to the growing season. Planting holes for dibble stock will be created using a dibble stick. Approximately 4 oz each of fertilizer (NPK triple 16) and superphosphate (0-46-0) will be added to each tree during planting. The seedlings will be planted at a 9.84 ft by 9.84 ft (3 m by 3 m) spacing for a "dense" planting of 450 seedlings/acre. *Eucalyptus cloeziana*, *E. microcorys*, *K. senegalensis*, *S. macrophylla*, and *T. grandis* will be planted in blocks and harvested in blocks or partial blocks (Figure 7). Approximately every 5th row will be planted with one row of nitrogen fixing trees in order to supply the soil with biologically fixed nitrogen. At a nearby site planted to high value hardwood trees, ~20% of the trees did not survive past the first year, or were of such poor form that they were not useful. Therefore, in year two (assuming a mortality of ~10%) gaps from dead or stunted trees will be replanted with one of the following nitrogen fixing trees: *A. saman*, *A. mangium*, or *P. indicus*.

Fertilization and soil amendments:

Fertilization will enhance seedling growth, and soil amendments will improve soil pH and enhance biological processes. At site preparation, liming material Ag 10 dolomite will be mixed with the soil. At planting NPK and superphosphate will be side-dressed. At 6 and 18 months NPK will be side-dressed. At 12 months NPK, superphosphate and micronutrients will be side-dressed. At 24 months NPK and superphosphate will be broadcast. At 36 months NPK, micronutrients, superphosphate, Mg-sulfate, and gypsum will be broadcast. The extra applications of superphosphate are intended to raise soil phosphorus levels in these very depleted soils. Further, nitrogen fixing trees are known to respond strongly to phosphorus fertilization. Nitrogen fixing trees used in windbreaks, borders, every 5th row, and pukas will supply the soil with biologically fixed nitrogen. See appendix A for fertilizer and lime recommendations from the Agricultural Diagnostic Service Center.

Weed and moisture control:

Chemical application and usage will follow the currently approved DOFAW Best Management Practices. For more rapidly growing tree species, the 9.84 ft by 9.84 ft spacing should close canopy within two years, reducing the need for herbicide. For slower growing species, weed mat (2 ft by 2 ft) will be staked down at the seedling planting area, with individual seedlings planted in the center to minimize the use of herbicide adjacent to the establishing seedlings. The remaining site will be spot treated with the herbicide Glyphosate, N-(phosphonomethyl) glycine as needed, approximately 2-3 days per month for the 15 acre site for weed control.

Tree establishment protection:

Perimeter fencing will be used to protect seedlings from feral and domestic animals. A 47" high, "hog wire" fence (12.5 gauge) with 6" by 6" openings will be used to close off three sides of the site (~2700 feet) or 73 % of the acreage (~12.5 acres). Additionally, one strand of barbed wire (12.5 gauge) will be added to the base of the existing 1075 feet of fencing. Two gates are needed to allow access to the site.

Windbreak and hedgerow establishment, and maintenance (SIP Practice 4):

Windbreaks will help protect the newly established tree plantation from wind stress by filtering and slowing wind. A multipurpose windbreak composed of a fast growing tree species, a nitrogen fixing tree and food producing trees will provide multiple functions.

Site preparation:

Site preparation will follow the currently approved DOFAW Best Management Practices, and will be implemented in conjunction with the rest of the site.

Seedling acquisition:

Primary species to be used include:

Erythrina variegata (Indian coralbean) This rapidly growing tree which is commonly used for windbreaks supplies soil with fixed nitrogen.
(Row 1)

Eucalyptus microcorys (Tallowwood) This hardwood tree is used for fencing, floors, and construction. (Row 2)

Food producing trees (Row 3):

Artocarpus communis (breadfruit) This tree produces a food crop.

Theobroma cacao (Cocoa) This shade tolerant, medium growth rate tree produces a valuable food crop, seeds for making chocolate.

Seedlings will be purchased from private nurseries, and will be dibble tube stock.

Planting seedlings:

Planting will occur in January and February, 2001, before planting of the rest of the site. Planting holes for dibble stock will be created using a dibble stick. Approximately 4 oz each of fertilizer (NPK triple 16) and superphosphate (0-46-0) will be added to each tree during planting. A primary "varied spacing" windbreak will be planted along the northeast border of the site and the east border (Figure 7). The following table indicates the species and spacing for this windbreak, with *E. variegata* adjacent to the fence line, the tallest tree *E. microcorys* in the middle, and the food crops in the protected interior of the windbreak.

Row	Species	In row spacing	Distance from row 1
1	<i>E. variegata</i>	9.8 ft (1.5 m)	0
2	<i>E. microcorys</i>	9.8 ft (3 m)	4.9 ft (1.5 m)
3	<i>T. cacao</i>	9.8 ft (3 m)	4.9 ft (3 m)

A secondary windbreak consisting of a single row of *E. microcorys* will be planted along the middle of the site (Figure 7) to protect the upper section of the site from potential wind damage. A mix of two hundred *E. dunnii* and *E. microcorys* have already been planted along the upper elevation fence line.

Fertilization and soil amendments:

Fertilization will enhance seedling growth, and soil amendments will improve soil pH and enhance biological processes. The fertilization and soil amendment additions and schedule for the windbreaks will follow the outline detailed in the reforestation and afforestation section (see previous section).

Weed and moisture control:

Chemical application and usage will follow the currently approved DOFAW Best Management Practices. Rapidly growing species will be used to reduce the need for herbicide. The windbreak will be spot treated with the herbicide Glyphosate, N-(phosphonomethyl) glycine as needed.

Forest and agroforest improvement (SIP Practice 3):

In order to enhance timber quality, increase production, and improve the overall health of the plantation, non-commercial thinning will be an essential component of the plan.

Non-commercial thinning:

All harvesting activities will be carried out according to the currently approved DOFAW Best Management Practices. In year 10 of the project, poles will be thinned. The larger diameter wood of the poles will be removed. The leaves and fine branches will be left on site to reduce nutrient losses. These fine materials should decompose on site within 4-6 months. Given the rainfall for the area, fire dangers are typically low. In the event of drought, thinning operations will be delayed until wet weather returns in order to minimize fire dangers. The termite resistant poles of *E. microcorys* will be sold for fence posts.

Harvesting trees in blocks of approximately 0.5 to 0.75 acres will occur periodically during the project as needed, which is proposed to continue beyond 35 years. Timber harvesting will consult the DOFAW Best Management Practices for Maintaining Water Quality in Hawaii. Harvested blocks will be immediately replanted to re-establish tree cover. Because all units are less than 1 acre, with most about 0.5 acre, skidding distances will be short. Trees will be felled in the direction of existing roads to minimize skidding distances. As currently planned, 18 of 22 units are bordered by existing roads. All of the remaining 4 units can be harvested together with an adjacent unit that borders a road.

Forest Stewardship Management Plan (SIP Practice 1):

This practice includes the development of a forest stewardship management plan that "emphasizes biological, environmental and economic management".

One to three practices:

This plan was developed by a qualified applicant, and reviewed by the Forest Stewardship Advisory Committee. Revisions were made to the plan based on comments and concerns of the Advisory Committee. The plan covers three SIP Practice Categories: i) SIP Practice 2 – Reforestation and Afforestation; ii) SIP Practice 3 – Forest and Agroforest Improvement; and, iii) SIP Practice 4 – Windbreak and Hedgerow Establishment, Maintenance and Renovation.

ECONOMIC ANALYSIS

Net Present Value (NPV) and Rate of Return (ROR) were calculated using the forval software for evaluating timber investments. Establishment, management, tax and harvesting costs were entered, along with expected revenues from thinning and harvesting. The results are shown in Table 2a-d. The revenue value of the wood at harvest was based on today's dollars. It was calculated using conservative predictions of mean annual increment from global data to predict standing volume at 30 years for species at our site. We assumed stumpage price of \$1,000 per 1000 board feet for *K. senegalensis*, *P. indicus*, *S. macrophylla*, and *T. grandis*, and \$500 for *A. saman*, *A. mangium*, *E. cloeziana*, and *E. microcorys*.

FOREST VALUE ENHANCEMENT AND PUBLIC BENEFIT

The proposed management activities will provide economic diversification. Forestry is an expanding land use in Hawaii, currently dominated by low value hardwood production for chips. This management plan proposes to diversify the forest industry by focusing on high value hardwoods that would meet local and state wide needs for high value lumber used in cabinetry, furniture, flooring, and interior finishing. This supply of hardwoods would provide employment opportunities for the community, including but not limited to assistance with site preparation, seedling propagation, planting, harvesting, milling, and finishing. There will be enhanced forest values due to commercial timber production including: i) wildlife habitat enhancement for birds, insects, and other native and non-native fauna due to increased vertical spatial complexity; ii) noxious weed suppression due to shading from closed forest canopy; and, iii) enhanced site aesthetics due to diverse forest replacing degraded cane field / pasture.

There will be no other organization involvement in the proposed management activities.

TIMETABLE OF MANAGEMENT PRACTICES

Year 1 – (December, 2000 through June, 2001)	
December	Complete perimeter fencing and gate installation
January	Site preparation and lime application
January-February	Seedling acquisition and windbreak planting
February-March	Seedling acquisition and site planting
January-March	Soil fertilization with planting (NPK and superphosphate; side-dress)
March-June	Weed control ~2 days per month
March	Progress report and cost documentation to DLNR-DOFAW Administration for period October to December
Year 2 – (July, 2001 through June, 2002)	
July-June	Weed control ~ 2-3 days per month
July	Soil fertilization (NPK; side-dress)
September	Progress report for period January to June
January	Soil fertilization (NPK, superphosphate, and micronutrients; side-dress)
March	Progress report for period July to December
April	Plant pukas with nitrogen fixing trees
Year 3 - (July, 2002 through June, 2003)	
July-June	Weed control ~ 2 days per month
July	Soil fertilization (NPK; side-dress)
September	Progress report for period January to June
January	Soil fertilization (NPK and superphosphate; broadcast)
March	Progress report for period July to December
Year 4 – (July, 2003 through June, 2004)	
July-June	Weed control ~1.5 days per month
September	Progress report for period January to June
January	Soil fertilization (NPK, micronutrients, superphosphate, Mg-sulfate, and gypsum; broadcast)
March	Progress report for period July to December
Years 5 through 9 – (July, 2004 through June, 2008)	
September	Progress report for period January to June
March	Progress report for period July to December
Year 10 – (July, 2008 through June, 2009)	
September	Progress report for period January to June
March	Progress report for period July to December
February-June	Thin out poles
Year 11	
September	Final report to DLNR-DOFAW Administration

Practice Implementation Schedule

Year 1: Oct, 2000 - June, 2001

Practice component and SIP number	units to be accomplished	cost per unit	total practice cost	landowner share	state share
Reforestation and afforestation (SIP 2)					
<i>Site preparation (SIP-2):</i>					
A. Herbicide (1 gallon/acre)	14 acres	\$52.00	\$728.00	\$364.00	\$364.00
Herbicide application \$25/acre	14 acres	\$25.00	\$350.00	\$175.00	\$175.00
B. Disking site #1 \$75/acre	14 acres	\$75.00	\$1,050.00	\$525.00	\$525.00
Disking site #2 \$75/acre	14 acres	\$75.00	\$1,050.00	\$525.00	\$525.00
Equipment haul charge	14 acres	\$43.00	\$602.00	\$301.00	\$301.00
C. Ripping site \$75/acre	14 acres	\$75.00	\$1,050.00	\$525.00	\$525.00
Equipment haul charge	14 acres	\$22.00	\$308.00	\$154.00	\$154.00
D. Lime - Ag10 dolomite (1845 lb/acre)	14 acres	\$240.00	\$3,360.00	\$1,680.00	\$1,680.00
Lime application \$30/acre	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
E. Pre-emergent herbicide (1 gall/acre)	14 acres	\$132.00	\$1,848.00	\$924.00	\$924.00
Herbicide application \$25/acre	14 acres	\$25.00	\$350.00	\$175.00	\$175.00
Site preparation total		\$794.00	\$11,116.00	\$5,558.00	\$5,558.00
<i>Seedling acquisition (SIP-2):</i>					
Seedlings (450 trees/acre)	6300 trees	\$1.50	\$9,450.00	\$4,725.00	\$4,725.00
Seedling total		\$1.50	\$9,450.00	\$4,725.00	\$4,725.00
<i>Seedling planting (SIP-2):</i>					
Labor (\$10/hr) (19 trees/hr)	14 acres	\$240.00	\$3,360.00	\$1,680.00	\$1,680.00
Planting total		\$240.00	\$3,360.00	\$1,680.00	\$1,680.00
<i>Fertilization/soil amendments (SIP-2):</i>					
Fertilizer-NPK triple 16 (4oz/tree) at planting	14 acres	\$28.00	\$392.00	\$196.00	\$196.00
Superphosphate (0-46-0)(4 oz/tree) planting	14 acres	\$26.00	\$364.00	\$182.00	\$182.00
Broadcast spreader 50 lb pack - \$110	14 acres	\$7.90	\$110.60	\$55.30	\$55.30
Labor (\$10/hr) ~3hr/acre NPK at planting	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Labor (\$10/hr) ~3hr/acre (0-46-0) planting	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Fertilization/soil amendments total		\$121.90	\$1,706.60	\$853.30	\$853.30
<i>Weed/moisture control (SIP-2):</i>					
Weed mat application (2'X2')	14 acres	\$184.00	\$2,576.00	\$1,288.00	\$1,288.00
Labor (\$10/hr) ~3hr/acre weed mat	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Herbicide (0.5 gallon/acre/yr)	14 acres	\$26.00	\$364.00	\$182.00	\$182.00
Labor (\$10/hr) ~6hr/acre/yr	14 acres	\$60.00	\$840.00	\$420.00	\$420.00
Weed/moisture control total		\$300.00	\$4,200.00	\$2,100.00	\$2,100.00

Year 1 (continued)

Practice component and SIP number	units to be accomplished	cost per unit	total practice cost	landowner share	state share
<i>Tree establishment protection (SIP-2):</i>					
11 guage mesh fencing ~2700 ft	12.5 acres	\$93.00	\$1,162.50	\$581.25	\$581.25
12.5 guage barbed wire, ~ 1075 ft	12.5 acres	\$4.00	\$50.00	\$25.00	\$25.00
Heavy duty galvanized posts 6' T post ~270 posts at \$5 each = \$1350	12.5 acres	\$108.00	\$1,350.00	\$675.00	\$675.00
Corner posts metal 2 3/8" X 8' \$15 each	12.5 acres	\$6.00	\$75.00	\$37.50	\$37.50
Gate 10 ft panel, 2 gates at \$110 each	12.5 acres	\$17.00	\$212.50	\$106.25	\$106.25
Equipment - post driver, wire cutters, post hole digger, wire witch, fencing tool \$150	12.5 acres	\$12.00	\$150.00	\$75.00	\$75.00
Labor (\$10/hr) ~75 hr	12.5 acres	\$60.00	\$750.00	\$375.00	\$375.00
Tree establishment protection total		\$300.00	\$3,750.00	\$1,875.00	\$1,875.00
Windbreak and hedgerow (SIP 4)					
<i>Site preparation (SIP-4):</i>					
A. Herbicide (1 gallon/acre)	1 acre	\$52.00	\$52.00	\$26.00	\$26.00
Backpack sprayer 4 gallon - \$125	1 acre	\$125.00	\$125.00	\$62.50	\$62.50
Herbicide application \$25/acre	1 acre	\$25.00	\$25.00	\$12.50	\$12.50
B. Disking site #1 \$75/acre	1 acre	\$75.00	\$75.00	\$37.50	\$37.50
Disking site #2 \$75/acre	1 acre	\$75.00	\$75.00	\$37.50	\$37.50
Equipment haul charge	1 acre	\$43.00	\$43.00	\$21.50	\$21.50
C. Ripping site \$75/acre	1 acre	\$75.00	\$75.00	\$37.50	\$37.50
Equipment haul charge	1 acre	\$22.00	\$22.00	\$11.00	\$11.00
D. Lime - Ag10 dolomite (1845 lb/acre)	1 acre	\$240.00	\$240.00	\$120.00	\$120.00
Lime application \$30/acre	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
E. Pre-emergent herbicide (1 gall/acre)	1 acre	\$132.00	\$132.00	\$66.00	\$66.00
Herbicide application \$25/acre	1 acre	\$25.00	\$25.00	\$12.50	\$12.50
Site preparation total		\$919.00	\$919.00	\$459.50	\$459.50
<i>Seedling acquisition (SIP-4):</i>					
Seedlings 450 seedlings	450 trees	\$1.50	\$675.00	\$337.50	\$337.50
Seedling total		\$1.50	\$675.00	\$337.50	\$337.50
<i>Seedling planting (SIP-4):</i>					
Labor (\$10/hr) (19 trees/hr)	1 acre	\$240.00	\$240.00	\$120.00	\$120.00
Planting total		\$240.00	\$240.00	\$120.00	\$120.00
<i>Fertilization/soil amendments (SIP-4):</i>					
Fertilizer-NPK triple 16 (4oz/tree) at planting	1 acre	\$28.00	\$28.00	\$14.00	\$14.00
Superphosphate (0-46-0)(4 oz/tree) planting	1 acre	\$26.00	\$26.00	\$13.00	\$13.00
Labor (\$10/hr) ~3hr/acre NPK at planting	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
Labor (\$10/hr) ~3hr/acre (0-46-0) planting	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
Fertilization/soil amendments total		\$114.00	\$114.00	\$57.00	\$57.00

Year 1 (continued)

Practice component and SIP number	units to be accomplished	cost per unit	total practice cost	landowner share	state share
<i>Weed/moisture control (SIP-4):</i>					
Herbicide (0.5 gallon/acre/yr)	1 acre	\$26.00	\$26.00	\$13.00	\$13.00
Labor (\$10/hr) ~6hr/acre/yr	1 acre	\$60.00	\$60.00	\$30.00	\$30.00
Safety equipment: respirator & cartridges, splash goggles, gloves, overalls, sprayer vest = ~\$214	1 acre	\$214.00	\$214.00	\$107.00	\$107.00
Weed/moisture control total		\$300.00	\$300.00	\$150.00	\$150.00
Forest Stewardship Plan (SIP 1)					
<i>One-three practices (SIP-1):</i>					
Management plan development	15 acres	\$200	\$3000.00	\$750.00	\$2250.00
Forest Stewardship Plan total		\$200	\$3000.00	\$750.00	\$2250.00
TOTAL for Year 1		\$2588.71	\$38830.60	\$18665.30	\$20165.30

Year 2: July, 2001 - June, 2002

Practice component and SIP number	units to be accomplished	cost per unit	total practice cost	landowner share	state share
Reforestation and afforestation (SIP 2)					
<i>Seedling acquisition (SIP-2):</i>					
Seedlings for planting pukas (10% of 6300)	630 trees	\$1.50	\$945.00	\$472.50	\$472.50
Seedling total		\$1.50	\$945.00	\$472.50	\$472.50
<i>Seedling planting (SIP-2):</i>					
Labor (\$10/hr) (19 trees/hr)	14 acres	\$34.00	\$476.00	\$238.00	\$238.00
Planting total		\$34.00	\$476.00	\$238.00	\$238.00
<i>Fertilization/soil amendments (SIP-2):</i>					
Fertilizer -NPK triple 16 (4oz/tree) - July	14 acres	\$28.00	\$392.00	\$196.00	\$196.00
Fertilizer -NPK triple 16 (4oz/tree) - Jan	14 acres	\$28.00	\$392.00	\$196.00	\$196.00
Superphosphate (0-46-0)(4 oz/tree) Jan	14 acres	\$26.00	\$364.00	\$182.00	\$182.00
Micronutrient (1 oz per tree) - Jan	14 acres	\$16.00	\$224.00	\$112.00	\$112.00
Labor (\$10/hr) ~3hr/acre - NPK July	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Labor (\$10/hr) ~3hr/acre - NPK Jan	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Labor (\$10/hr) ~3hr/acre (0-46-0) Jan	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Labor (\$10/hr) ~3hr/acre micronutrient Jan	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Equipment - Pruning saw, pole saw, heavy duty loppers ~ \$200	14 acres	\$14.50	\$203.00	\$101.50	\$101.50
Fertilization/soil amendmer.ts total		\$232.50	\$3,255.00	\$1,627.50	\$1,627.50
<i>Weed/moisture control (SIP-2):</i>					
Herbicide (0.5 gallon/acre/yr)	14 acres	\$26.00	\$364.00	\$182.00	\$182.00
Pre-emergent herbicide (0.25 gallon/acre/yr)	14 acres	\$33.00	\$462.00	\$231.00	\$231.00
Weed wacker (heavy duty), harness ~\$600	14 acres	\$43.00	\$602.00	\$301.00	\$301.00
Labor (\$10/hr) ~18hr/acre/yr	14 acres	\$180.00	\$2,520.00	\$1,260.00	\$1,260.00
Safety equip.-visor, ear muffs, respirator cartridges, coveralls, gloves ~ \$180	14 acres	\$13.00	\$182.00	\$91.00	\$91.00
Gas can - \$14	14 acres	\$1.00	\$14.00	\$7.00	\$7.00
Weed/moisture control total		\$296.00	\$4,144.00	\$2,072.00	\$2,072.00

Year 2 (continued)

Practice component and SIP number	units to be accomplished	cost per unit	total practice cost	landowner share	state share
Windbreak and hedgerow (SIP 4)					
<i>Fertilization/soil amendments (SIP-4):</i>					
Fertilizer -NPK triple 16 (4oz/tree) - July	1 acre	\$28.00	\$28.00	\$14.00	\$14.00
Fertilizer -NPK triple 16 (4oz/tree) - Jan	1 acre	\$28.00	\$28.00	\$14.00	\$14.00
Superphosphate (0-46-0)(4 oz/tree) Jan	1 acre	\$26.00	\$26.00	\$13.00	\$13.00
Micronutrient (1 oz per tree) - Jan	1 acre	\$16.00	\$16.00	\$8.00	\$8.00
Labor (\$10/hr) ~3hr/acre - NPK July	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
Labor (\$10/hr) ~3hr/acre - NPK Jan	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
Labor (\$10/hr) ~3hr/acre (0-46-0) Jan	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
Labor (\$10/hr) ~3hr/acre micronutrient Jan	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
Fertilization/soil amendments total		\$218.00	\$218.00	\$109.00	\$109.00
<i>Weed/moisture control (SIP-4):</i>					
Herbicide (0.5 gallon/acre/yr)	1 acre	\$26.00	\$26.00	\$13.00	\$13.00
Pre-emergent herbicide (0.25 gallon/acre/yr)	1 acre	\$33.00	\$33.00	\$16.50	\$16.50
Labor (\$10/hr) ~18hr/acre/yr	1 acre	\$180.00	\$180.00	\$90.00	\$90.00
Weed/moisture control total		\$239.00	\$239.00	\$119.50	\$119.50
TOTAL for Year 2		\$1,021.00	\$9,277.00	\$4,638.50	\$4,638.50

Year 3: July, 2002 - June, 2003

Practice component and SIP number	units to be accomplished	cost per unit	total practice cost	landowner share	state share
Reforestation and afforestation (SIP 2)					
<i>Fertilization/soil amendments (SIP-2):</i>					
Fertilizer -NPK triple 16 (4oz/tree) - July	14 acres	\$28.00	\$392.00	\$196.00	\$196.00
Fertilizer -NPK triple 16 - 320 lb/acre Jan	14 acres	\$60.00	\$840.00	\$420.00	\$420.00
Superphosphate (0-46-0) - 160 lb/acre Jan	14 acres	\$36.00	\$504.00	\$252.00	\$252.00
Labor (\$10/hr) ~3hr/acre - NPK July	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Labor (\$10/hr) ~3hr/acre - NPK Jan	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Labor (\$10/hr) ~3hr/acre (0-46-0) Jan	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Fertilization/soil amendments total		\$214.00	\$2,996.00	\$1,498.00	\$1,498.00
<i>Weed/moisture control (SIP-2):</i>					
Herbicide (0.5 gallon/acre/yr)	14 acres	\$26.00	\$364.00	\$182.00	\$182.00
Pre-emergent herbicide (0.25 gallon/acre/yr)	14 acres	\$33.00	\$462.00	\$231.00	\$231.00
Safety equip.- resp. cartridges, overalls \$80	14 acres	\$6.00	\$84.00	\$42.00	\$42.00
Labor (\$10/hr) ~17hr/acre/yr	14 acres	\$170.00	\$2,380.00	\$1,190.00	\$1,190.00
Weed/moisture control total		\$235.00	\$3,290.00	\$1,645.00	\$1,645.00
Windbreak and hedgerow (SIP 4)					
<i>Fertilization/soil amendments (SIP-4):</i>					
Fertilizer -NPK triple 16 (4oz/tree) - July	1 acre	\$28.00	\$28.00	\$14.00	\$14.00
Fertilizer -NPK triple 16 - 320 lb/acre Jan	1 acre	\$60.00	\$60.00	\$30.00	\$30.00
Superphosphate (0-46-0) - 160 lb/acre Jan	1 acre	\$36.00	\$36.00	\$18.00	\$18.00
Labor (\$10/hr) ~3hr/acre - NPK July	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
Labor (\$10/hr) ~3hr/acre - NPK Jan	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
Labor (\$10/hr) ~3hr/acre (0-46-0) Jan	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
Fertilization/soil amendments total		\$214.00	\$214.00	\$107.00	\$107.00
<i>Weed/moisture control (SIP-2):</i>					
Herbicide (0.5 gallon/acre/yr)	1 acre	\$26.00	\$26.00	\$13.00	\$13.00
Pre-emergent herbicide (0.25 gallon/acre/yr)	1 acre	\$33.00	\$33.00	\$16.50	\$16.50
Labor (\$10/hr) ~17hr/acre/yr	1 acre	\$170.00	\$170.00	\$85.00	\$85.00
Weed/moisture control total		\$229.00	\$229.00	\$114.50	\$114.50
TOTAL for Year 3		\$892.00	\$6,729.00	\$3,364.50	\$3,364.50

Year 4: July, 2003 - June, 2004

Practice component and SIP number	units to be accomplished	cost per unit	total practice cost	landowner share	state share
Reforestation and afforestation (SIP 2)					
<i>Fertilization/soil amendments (SIP-2):</i>					
Fertilizer -NPK triple 16 - 320 lb/acre Jan	14 acres	\$60.00	\$840.00	\$420.00	\$420.00
Superphosphate (0-46-0) - 160 lb/acre Jan	14 acres	\$36.00	\$504.00	\$252.00	\$252.00
Micronutrient - 100 lb/acre Jan	14 acres	\$57.00	\$798.00	\$399.00	\$399.00
Mg-Sulfate - 200 lb/acre Jan	14 acres	\$65.00	\$910.00	\$455.00	\$455.00
Gypsum - CaSO4 - 200 lb/acre Jan	14 acres	\$32.00	\$448.00	\$224.00	\$224.00
Labor (\$10/hr) ~3hr/acre - NPK Jan	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Labor (\$10/hr) ~3hr/acre (0-46-0) Jan	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Labor (\$10/hr) ~3hr/acre micronutrient Jan	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Labor (\$10/hr) ~3hr/acre Mg-Sulfate Jan	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Labor (\$10/hr) ~3hr/acre gypsum Jan	14 acres	\$30.00	\$420.00	\$210.00	\$210.00
Fertilization/soil amendments total		\$400.00	\$5,600.00	\$2,800.00	\$2,800.00
<i>Weed/moisture control (SIP-2):</i>					
Herbicide (0.25 gallon/acre/yr)	14 acres	\$13.00	\$182.00	\$91.00	\$91.00
Pre-emergent herbicide (0.13 gallon/acre/yr)	14 acres	\$17.00	\$238.00	\$119.00	\$119.00
Safety equip.- resp. cartridges, overalls \$80	14 acres	\$6.00	\$84.00	\$42.00	\$42.00
Labor (\$10/hr) ~16hr/acre/yr	14 acres	\$160.00	\$2,240.00	\$1,120.00	\$1,120.00
Equipment - chainsaw, chains, gas can, chaps, hardhat, and gloves ~ \$+A297490	14 acres	\$35.00	\$490.00	\$245.00	\$245.00
Weed/moisture control total		\$231.00	\$3,234.00	\$1,617.00	\$1,617.00
Windbreak and hedgerow (SIP 4)					
<i>Fertilization/soil amendments (SIP-4):</i>					
Fertilizer -NPK triple 16 - 320 lb/acre Jan	1 acre	\$60.00	\$60.00	\$30.00	\$30.00
Superphosphate (0-46-0) - 160 lb/acre Jan	1 acre	\$36.00	\$36.00	\$18.00	\$18.00
Micronutrient - 100 lb/acre Jan	1 acre	\$57.00	\$57.00	\$28.50	\$28.50
Mg-Sulfate - 200 lb/acre Jan	1 acre	\$65.00	\$65.00	\$32.50	\$32.50
Gypsum - CaSO4 - 250 lb/acre Jan	1 acre	\$40.00	\$40.00	\$20.00	\$20.00
Labor (\$10/hr) ~3hr/acre - NPK Jan	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
Labor (\$10/hr) ~3hr/acre superphosphate	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
Labor (\$10/hr) ~3hr/acre micronutrient	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
Labor (\$10/hr) ~3hr/acre Mg-Sulfate	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
Labor (\$10/hr) ~3hr/acre gypsum	1 acre	\$30.00	\$30.00	\$15.00	\$15.00
Fertilization/soil amendments total		\$408.00	\$408.00	\$204.00	\$204.00
<i>Weed/moisture control (SIP-2):</i>					
Herbicide (0.25 gallon/acre/yr)	1 acre	\$13.00	\$13.00	\$6.50	\$6.50
Pre-emergent herbicide (0.13 gallon/acre/yr)	1 acre	\$17.00	\$17.00	\$8.50	\$8.50
Labor (\$10/hr) ~16hr/acre/yr	1 acre	\$160.00	\$160.00	\$80.00	\$80.00
Weed/moisture control total		\$190.00	\$190.00	\$95.00	\$95.00
TOTAL for Year 4		\$1,229.00	\$9,432.00	\$4,716.00	\$4,716.00

Years 5 - 9: July, 2004 - June, 2009

Practice component and SIP number	units to be accomplished	cost per unit	total practice cost	landowner share	state share
None					
TOTAL for Years 5-9		\$0.00	\$0.00	\$0.00	\$0.00

Year 10: July, 2009 - June, 2010

Practice component and SIP number	units to be accomplished	cost per unit	total practice cost	landowner share	state share
Forest and agroforest improvement (SIP-3)					
<i>Non-commercial thinning (SIP-3):</i>					
Truck rental ~ \$200	14 acres	\$15.00	\$210.00	\$210.00	\$ 0.00
Equipment - marking paint, log scale stick, rope, timber carrier, flagging, diam tape pulleys, etc. ~ \$300	14 acres	\$21.00	\$294.00	\$294.00	\$ 0.00
Labor (\$10/hr) ~10 hr/acre	14 acres	\$100.00	\$1,400.00	\$1,400.00	\$ 0.00
Non-commercial thinning total		\$136.00	\$1,904.00	\$1,904.00	\$ 0.00
TOTAL for Year 10		\$136.00	\$1,904.00	\$1,904.00	\$ 0.00

Annual Budget Summary

Year	Total Budget	Landowner Share	State Share
Year 1: Oct, 2000 - June, 2001	\$38,830.60	\$18,665.30	\$ 2015.30
Year 2: July, 2001 - June, 2002	\$9,277.00	\$4,638.50	\$4,638.50
Year 3: July, 2002 - June, 2003	\$6,729.00	\$3,364.50	\$3,364.50
Year 4: July, 2003 - June, 2004	\$9,432.00	\$4,716.00	\$4,716.00
Year 5: July, 2004 - June, 2005	\$0.00	\$0.00	\$0.00
Year 6: July, 2005 - June, 2006	\$0.00	\$0.00	\$0.00
Year 7: July, 2006 - June, 2007	\$0.00	\$0.00	\$0.00
Year 8: July, 2007 - June, 2008	\$0.00	\$0.00	\$0.00
Year 9: July, 2008 - June, 2009	\$0.00	\$0.00	\$0.00
Year 10: July, 2009 - June, 2010	\$1,904.00	\$1,904.00	\$ 0.00
Total	\$66,172.60	\$ 33,288.30	\$ 32,884.30

Net Present Value and Rate of Return Calculations

A. Landowner share costs only

Net Present Value = \$192,328
 Interest Rate = 4.0%
 Harvest year 30

Type	Year	Amount	Reason
COSTS			
Single Sum	0	-\$17,915.30	Establishment Costs
Single Sum	1	-\$4,638.50	Management Year 1
Single Sum	2	-\$3,364.50	Management Year 2
Single Sum	3	-\$4,716.00	Management Year 3
Terminating Annual	4-9	-\$3,000.00	Management Year 4-9
Single Sum	9	-\$952.00	Thinning Cost Year 9
Terminating Annual	10-30	-\$1,000.00	Management Year 10-30
Terminating Annual	0-30	-\$1,000.00	Taxes Year 0-30
REVENUE			
Single Sum	9	\$5,000.00	Thinning Revenue Year 9
Single Sum	30	\$842,219.00	Harvest Year 30

B. Landowner share costs only

Net Present Value = \$927
 Interest Rate = 9.9%
 Harvest year 30

Type	Year	Amount	Reason
COSTS			
Single Sum	0	-\$17,915.30	Establishment Costs
Single Sum	1	-\$4,638.50	Management Year 1
Single Sum	2	-\$3,364.50	Management Year 2
Single Sum	3	-\$4,716.00	Management Year 3
Terminating Annual	4-9	-\$3,000.00	Management Year 4-9
Single Sum	9	-\$952.00	Thinning Cost Year 9
Terminating Annual	10-30	-\$1,000.00	Management Year 10-30
Terminating Annual	0-30	-\$1,000.00	Taxes Year 0-30
REVENUE			
Single Sum	9	\$5,000.00	Thinning Revenue Year 9
Single Sum	30	\$842,219.00	Harvest Year 30

Table 2 a-d. Net Present Value (NPV) calculations using a 4.0% interest rate. Rate of Return (ROR) calculations showing the rate of interest earned on the investment when NPV is near zero. Calculations are for landowner share costs only versus the total budget costs.

Net Present Value and Rate of Return Calculations

C. Total budget costs

Net Present Value = \$161,981
 Interest Rate = 4.0%
 Harvest year 30

Type	Year	Amount	Reason
COSTS			
Single Sum	0	-\$35,830.60	Establishment Costs
Single Sum	1	-\$9,277.00	Management Year 1
Single Sum	2	-\$6,729.00	Management Year 2
Single Sum	3	-\$9,432.00	Management Year 3
Terminating Annual	4-9	-\$3,000.00	Management Year 4-9
Single Sum	9	-\$1,904.00	Thinning Cost Year 9
Terminating Annual	10-30	-\$1,000.00	Management Year 10-30
Terminating Annual	0-30	-\$1,000.00	Taxes Year 0-30
REVENUE			
Single Sum	9	\$5,000.00	Thinning Revenue Year 9
Single Sum	30	\$842,219.00	Harvest Year 30

D. Total budget costs

Net Present Value = \$1,386
 Interest Rate = 8.0%
 Harvest year 30

Type	Year	Amount	Reason
COSTS			
Single Sum	0	-\$35,830.60	Establishment Costs
Single Sum	1	-\$9,277.00	Management Year 1
Single Sum	2	-\$6,729.00	Management Year 2
Single Sum	3	-\$9,432.00	Management Year 3
Terminating Annual	4-9	-\$3,000.00	Management Year 4-9
Single Sum	9	-\$1,904.00	Thinning Cost Year 9
Terminating Annual	10-30	-\$1,000.00	Management Year 10-30
Terminating Annual	0-30	-\$1,000.00	Taxes Year 0-30
REVENUE			
Single Sum	9	\$5,000.00	Thinning Revenue Year 9
Single Sum	30	\$842,219.00	Harvest Year 30

Table 2 a-d. (continued)

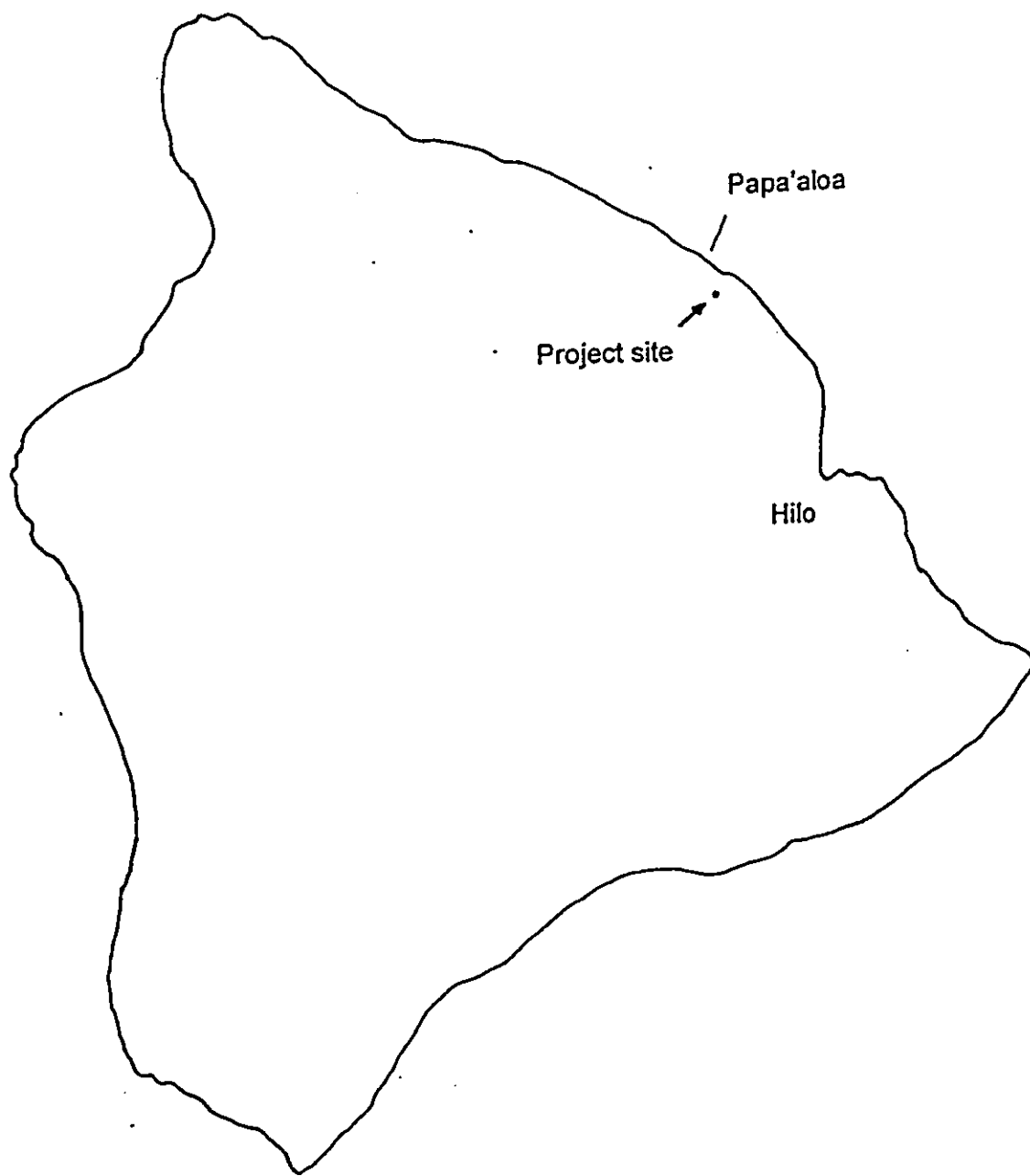


Figure 1. Island of Hawai'i

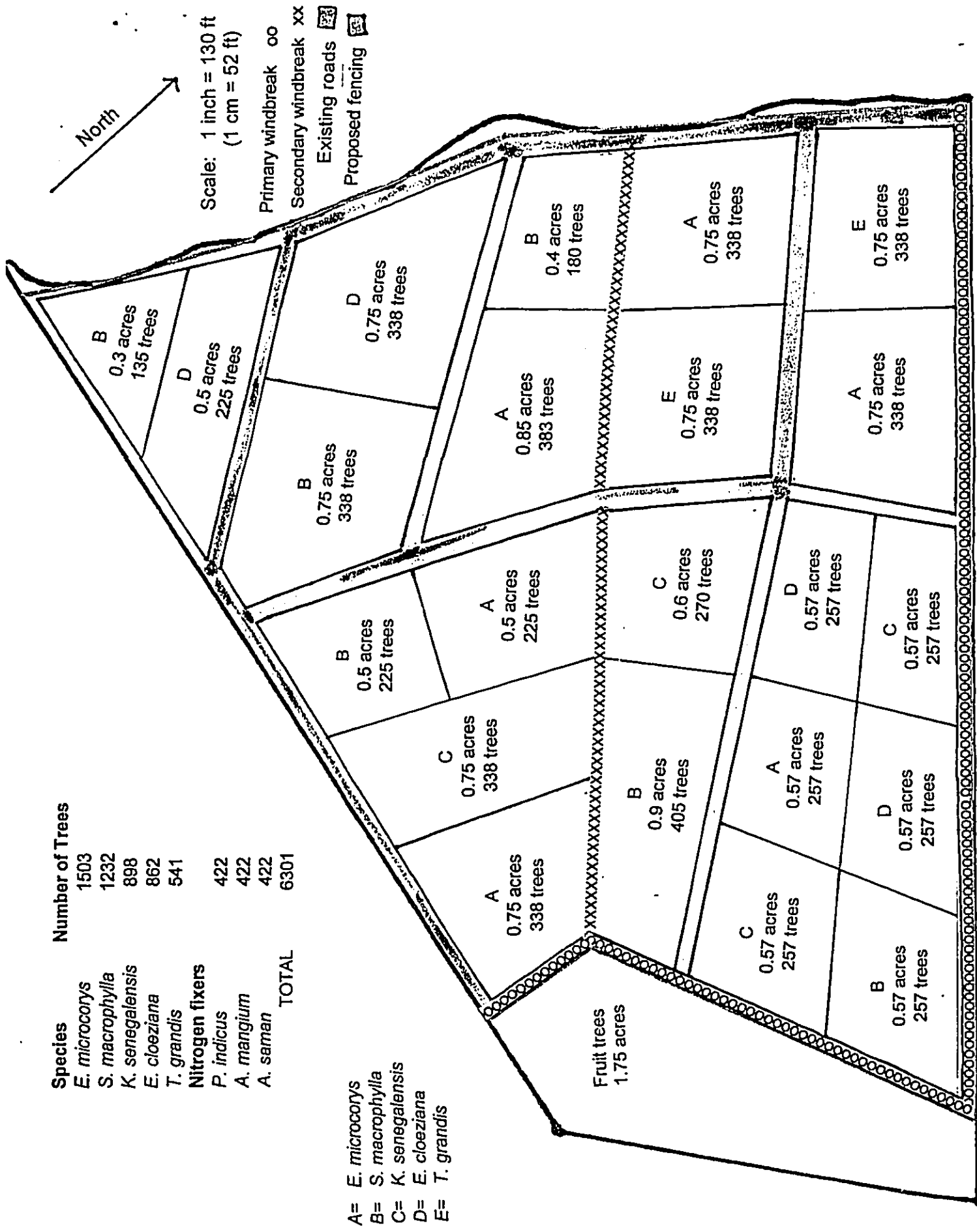


Figure 7. Project site map with location of proposed management practices.