Establishment of a Public Land Trust Information System, Phase One

A Report to the Governor and the Legislature of the State of Hawaii

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Submitted by:
THE AUDITOR
STATE OF HAWAII
March 2001

OVERVIEW

Establishment of a Public Land Trust Information System, Phase One

March 2001

Summary

This progress report is submitted in response to Act 125, Session Laws of Hawaii (SLH) 2000, which directed the Auditor to initiate and coordinate all efforts to establish a public land trust information system. Act 125 requires that the information system include an inventory of the lands and other information useful for the proper administration and management of the public land trust. The act requires the Auditor to submit a progress report to the 2001 Legislature that outlines necessary tasks to complete the public land trust information system and inventory.

The project is divided into two phases. In the first phase, relevant issues, tasks, plans, recommended system, and projected costs are identified. The second phase will encompass the actual implementation of the information system. Through a competitive bid process, R. M. Towill Corporation was selected as the consultant to complete the first phase of the project. This is a report of the consultant's findings and recommendations.

The significance of a public land trust information system is reflected in the historical purpose of the public land trust. Hawaii was admitted as the fiftieth state through the Admission Act of 1959. The Admission Act transferred the bulk of the ceded lands—those lands ceded by the Republic of Hawaii to the United States when it became a territory—to the State of Hawaii to be held in trust for five specific purposes. One of the purposes is the benefit of native Hawaiian people. In 1978 the Office of Hawaiian Affairs was constitutionally created to administer that portion of the public land trust benefits designated for the native Hawaiian people. Act 273, SLH 1980, subsequently designated that 20 percent of the revenues from the public land trust would be the pro rata share for the benefit of native Hawaiians. However, the determination of what constituted 20 percent of the revenues has been an ongoing problem because the scope and exact identification of all lands in the public land trust have never been definitive. Creation of a public land trust information system is intended to resolve this dilemma.

The consultant concluded that a geographic information system (GIS) is the preferred method to develop an information system. GIS displays information in graphical presentations and produces useful analysis of related data. The consultant determined that data for the GIS are located at various agencies, with the Land Division of the Department of Land and Natural Resources (DLNR) and the Survey Division of the Department of Accounting and General Services (DAGS) being the primary custodians of historical land data.

The consultant also notes that several issues can impede the implementation of a public land trust information system. These include the unresponsive record

retrieval from DLNR's Land Division, the mapping backlog at DAGS' Survey Division, the counties' non-assignment of tax map key numbers to all ceded land parcels, and time needed to research and inventory previously unidentified parcels. The consultant recommends the continued involvement of the State Auditor to facilitate access to information necessary for the completion of the project.

The consultant evaluated three state agencies—the Land Division of DLNR, the Survey Division of DAGS, and the Office of Planning of the Department of Business, Economic Development and Tourism (DBEDT)—for the placement and administration of a completed public land trust information system. Each agency's functions in relation to administering the proposed GIS and the impact on the agency were considered, but the consultant concluded that the recommendation should be made in the next phase.

Two cost options were developed for the next phase. Option A would perform the abstracts and recording of data into the GIS on a county-by-county basis. Information would become available as each county is completed. Option A would cost approximately $18.5 million. Option B would assign tasks by function, first completing abstracting, followed by recording of the data in the GIS. Abstracting and recording would each take approximately two years to complete. Option B is estimated to cost approximately $19.1 million.

Recommendations and Response

The consultant recommended that the Legislature implement a GIS and require relevant state agencies to change certain practices or policies to expedite completion of the second phase. The consultant also recommended that the Auditor continue to direct and control completion of this project.

The Office of Hawaiian Affairs responded that it generally supported the findings and recommendations of the report, but reserved the right for further comment after a more thorough review of the report. The Department of Land and Natural Resources submitted comments in defense of its performance and its relationship with the consultant. The department also described the current status of the Land Division's own information system development. The Departments of Accounting and General Services, and Transportation elected not to respond to the draft report.

The consultant's response is included in this report. The consultant stands by its statements and recommendations.

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Foreword

The Legislature, through Act 125, Session Laws of Hawaii 2000, directed the Auditor to initiate and coordinate all efforts to establish a public land trust information system. This report outlines the steps necessary to complete and institute a public land trust information system.

We wish to express our appreciation for the cooperation and assistance extended to us by officials and staff of the Office of Hawaiian Affairs; the Departments of Land and Natural Resources; Accounting and General Services; and Business, Economic Development and Tourism as well as others who provided assistance during the course of the audit.

We also wish to thank the firm of R.M. Towill Corporation that conducted the work for this report.

Marion M. Higa
State Auditor

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Chapter 1

Introduction and Background

This is a progress report submitted in response to Act 125, Session Laws of Hawaii (SLH) 2000, which directs the Auditor to initiate and coordinate all efforts to establish a public land trust information system. Act 125 requires that the information system should identify all lands the public land trust inventory and other information useful for the proper administration and management of the public land trust. The Act requires a progress report that outlines what needs to be done to complete the public land trust inventory and the public land trust information system, and including any legislation the Auditor deems necessary to facilitate the system's expeditious completion and support. The report is to be submitted to the 2001 Legislature.

The extensive requirements of Act 125, Session Laws Hawaii (SLH) 2000, requires a thorough analysis of the diverse issues relating to the public land trust and geographic information systems. The Auditor divided this project into two phases in order to conduct the necessary analysis. The first phase consists of conducting title searches, surveying, mapping, digitizing and other related work on certain parcels of land to develop recommendations and plans for the establishment of a comprehensive public land trust information system. The second phase is to consist of performing title searches, surveying, mapping, digitizing and other necessary tasks to carry out the plans developed in the first phase to complete the information system.

In accordance with Chapter 103D, Hawaii Revised Statutes, the Hawaii Public Procurement Code, the Auditor conducted an extensive competitive procurement process and selected R.M. Towill Corporation (Towill) to conduct Phase One of this project. Towill was founded in 1930 and has provided professional services in engineering, surveying, photogrammetry, developing geographic information systems, planning for land development, and construction management of projects to private and government sectors throughout the Pacific and Asia. Towill utilized a team of professionals with disciplines in abstracting, title searches of private and government lands, land law, translating native Hawaiian language, surveying, developing and implementing databases and geographic information systems, and aerial photogrammetric mapping services. Security Title Corporation was also a part of the Towill team.

The Auditor also procured Oceanit Laboratories, Inc. (Oceanit) to provide technical assistance in the selection process and to be the project monitor. Oceanit provides engineering, biotechnology, environmental and industrial information technology services. Oceanit's project

monitor team included professionals with experience in land use planning, geographic information systems, law, a former assistant registrar with the Land Court of the State of Hawaii with over 18 years of title searching and abstracting experience, and other disciplines related to the Public land trust.

Introduction and Background

The Admission Act of 1959 that admitted Hawaii as the fiftieth state of the United States transferred the bulk of the ceded lands – those lands ceded to the United States by the Republic of Hawaii in 1893 – to the State of Hawaii to be held in trust. Section 5(f) of the Admission Act stipulates that these lands be held in a public land trust and that one of the purposes of the trust was the betterment of the conditions of Native Hawaiians, as defined in the Hawaiian Homes Commission Act of 1920. In 1978 Hawaii's Constitution was amended to create the Office of Hawaiian Affairs (OHA) that is responsible for administering the designated portion of the public land trust revenues for the benefit of native Hawaiians. Act 273, SLH 1980, subsequently determined that 20 percent would be the pro rata share of the public land trust revenues to be received by OHA. However, determination of revenues has been an ongoing problem because the scope and exact identification of all lands in the public land trust have never been definitive. Consequently, Act 125, SLH 2000, was enacted to facilitate the establishment of a comprehensive information system to inventory and maintain information about the lands of the public land trust described in Section 5(f) of the Admission Act and Section 4, Article XII of the State Constitution.

Background of the Trust Lands in Hawaiian History

The problems of identifying lands in the public land trust can be traced to the origin and development of landownership in Hawaii. Prior to Western contact the concept of private ownership of land was unknown in Hawaii. Those holding land were viewed as stewards whose possession of land could be severed for failing to make lands productive. When Kamehameha I united the islands into the Kingdom of Hawaii, he basically retained the traditional land stewardship practices. However, when Western contact and grants of land to foreigners increased, pressure to change the traditional stewardship of land concept to one of private ownership also increased.

The Great Mahele of 1848 represents the formal transition from the ancient land system to a private ownership land system. During the Great Mahele, King Kamehameha III divided lands throughout the islands amongst himself and approximately 250 Hawaiian chiefs. The

king divided his holdings, declaring approximately 1 million acres to be retained for himself and identified as Crown lands. Approximately 1.5 million acres were "set apart forever to the chiefs and people." These lands were subsequently designated as government lands. In addition, *Konohiki* lands or lands distributed to chiefs totaled approximately 1.6 million acres. *Kuleana* lands or lands that commoners could own were available from one third of lands remaining after the king partitioned his personal lands. Commoner's claims totaled only approximately 26,800 acres or about one percent of these lands.

After the Great Mahele was completed, landownership patterns quickly changed. Most of the 1 million acres of Crown lands were eventually sold, leased and/or mortgaged by Kamehameha III and his successor Kamehameha IV for the benefit of their personal estates. To preserve the Crown lands, the Hawaiian Legislature passed an act on January 3, 1865 making these lands inalienable and restricting all leases to a thirty-year duration. Much of the government lands created by the Great Mahele had been sold under statutes of the monarchy to any interested party. In 1893, the monarchy was overthrown and the Republic of Hawaii was formed. The Republic expropriated all Crown lands in the name of the Republic. All remaining government lands came under the control of the Republic as well. Most of the *Konohiki* lands retained by individual chiefs were also eventually sold. However, *Konohiki* lands did not come under the control of the Republic and did not become part of the public land trust.

On July 7, 1898, the Republic of Hawaii relinquished its sovereignty and was annexed to the United States under the terms of the Joint Resolution of Annexation (herein "Joint Resolution"). The Crown lands and remaining Government lands were ceded to the United States. These lands together with lands subsequently acquired in exchange for Crown or Government lands are referred to as "ceded lands." The Joint Resolution further provided that Congress would enact "special laws for [the] management and disposition" of the ceded lands and required that all revenues from the ceded lands, except for certain exceptions, would be used "solely for the benefit of the inhabitants of the Hawaiian Islands for educational and other purposes."

On April 30, 1900, the Organic Act that formally made the Hawaiian Islands a territory of the United States substantiated the ceded lands trust provisions introduced in the Joint Resolution. The Act created the Territorial Government of Hawaii and provided that all of the public lands would be subject to the "possession, use and control" of the Territory and that the proceeds generated by the ceded lands be used for purposes "consistent with the Joint Resolution."

Creation of the Public Land Trust

The Admission Act of March 18, 1959 that granted Hawaii statehood transferred title to most of the ceded lands to the State of Hawaii. The federal government retained title to approximately 400,000 acres of ceded lands to be returned to the State of Hawaii when declared a surplus to the federal government's needs. Section 5(f) of the Admission Act states that all lands received by the State and all income and proceeds from their disposition were to be held by the State as a "public trust" for the following five purposes:

1. Support of the public schools and other public educational institutions;

2. Betterment of the conditions of native Hawaiians, as defined in the Hawaiian Homes Commission Act, 1920, as amended;

3. Development of farm and home ownership on as widespread basis as possible;

4. Making of public improvements; and

5. For the provision of lands for public use.

A classification system for public lands

In order to better define the public land trust, a classification system based on Section 5 of the Admission Act and subsequent legislation was established. The nine "ceded/non-ceded land classifications" of public lands are as follows:

- "5(a)" means lands owned by the Territory of Hawaii and its subdivisions, immediately prior to statehood, and to which the State of Hawaii succeeded.

- "5(b)" means lands granted to the State of Hawaii by the United States immediately prior to statehood.

- "5(c)" means lands set aside upon statehood, for the use of the United States under any Act of Congress, Executive Order, Presidential Proclamation or Gubernatorial Proclamation and which remained the property of the United States.

- "5(d)" means public lands conveyed to the State of Hawaii under section 5(b) of the Admission Act, but immediately prior to statehood, were controlled by the United States by permit, license or permission from the Territory of Hawaii and during the five years following statehood were set aside by an Act of Congress or Presidential Executive Order for use by the United States.

- "5(e)" means public lands owned by the United States upon statehood under sections 5(c) or 5(d) of the Admission Act and conveyed to the State of Hawaii within five years following statehood.

- "5(i)" means lands that pertain to the Submerged Lands Act of 1953 and the Outer Continental Shelf Lands Act of 1953, which apply, to the State of Hawaii.

- "X" means lands acquired by the State of Hawaii after statehood by purchase in fee, condemnation or other means, excluding 5(e) and 5(i) lands and "Y' and "Z" lands as described below, including fee purchases from the United States.

- "Y" means former Federal Fee Lands acquired by the State of Hawaii at Public Benefit Discount and under Federal Property and Administrative Services Act of 1949 and the Surplus Property Act of 1944, as amended by Public Law 80-616.

- "Z" means public lands owned by the United States upon statehood under sections 5(c) or 5(d) of the Admission Act and conveyed to the State of Hawaii after 21 August 1964 under Public Law 88-233.

Section 5(f) of the Admission Act provides that lands granted to the State of Hawaii under section 5(b) and public lands retained by the United States under sections 5(c) and 5(d) and later conveyed to the State of Hawaii under section 5(e), together with proceeds from the sale or disposition of such lands and the income therefrom, "shall be held by said State as a public trust…." Section 5(f) was to be implemented "in such a manner as the constitution and laws of said State may provide." Lands classified as 5(a), "X" or "Y" are considered public lands but are not ceded or trust lands.

The Office of Hawaiian Affairs and the Public Land Trust

The Constitutional Convention of 1978 amended the Hawaii State Constitution to further define the State's role in administering the trust imposed by section 5(f) of the Admission Act. The convention delegates expanded Article XII (formerly Article XI), by adding new Sections 4, 5, and 6. Section 4 stated that the public land trust was to be held for native Hawaiians and the general public. Section 5 created the Office of Hawaiian Affairs and section 6 defined the powers of the Board of Trustees of the Office of Hawaiian Affairs. In 1979, the Hawaii State Legislature enacted Act 196 (codified as Chapter 10, Hawaii Revised Statutes), which statutorily implemented Article XII, sections 4, 5, and 6,

of the Hawaii State Constitution. In 1980, the Legislature further clarified the administration of the public land trust for the benefit of native Hawaiians through Act 273, SLH 1980. Act 273 provides that 20 percent of all funds derived from the public land trust shall be expended by the Office of Hawaiian Affairs (HRS section 10-13.5).

Past Efforts at Creating an Inventory Have Been Unsuccessful

In Report No. 79-1, *Financial Audit of the Department of Land Natural Resources,* the Auditor found that the department had not developed a comprehensive inventory of public lands, nor distinguished ceded lands from non-ceded lands. In response to this report, the department developed a computerized listing of all public lands in 1982. This listing included a designation of whether the land was ceded or non-ceded. However, due to lack of maintenance and upkeep, the computerized list is now outdated and inaccurate.

In 1982, the Legislature enacted Act 121 requiring the Auditor to (1) complete the inventory, (2) to study the numerous legal and fiscal issues relating to the use of and (3) to study the use and distribution of revenues from ceded lands. In Report No. 86-17, *Final Report on the Public land trust,* the Auditor noted that the public land trust contained public lands as well as ceded lands. Also, there were some ceded and public lands that are not a part of the public land trust. The report included survey maps and title searches of a portion of the State's airport and harbor lands, but did not analyze all ceded lands due to time and resource limitations.

It was also noted in Report No. 86-17 that the Department of Land and Natural Resources' (land department) inventory of public lands had inaccuracies. The inventory was based on outdated tax maps and executive orders and confusing and inconsistent land transfer documents. In addition, department practices created uncertainties. The land department traced title histories of parcels primarily from executive orders and files within the department and from survey maps and documents from the Department of Accounting and General Services. In some cases, for a parcel without a title history, the department used the title history of surrounding properties to assist in determining the history of the land in question. In other cases, the department applied a majority rule to classify a piece of land with mixed ceded or non-ceded status. A parcel was classified as ceded if the percentage of ceded lands identified in the parcel was greater than the non-ceded portion. Similarly, a parcel containing a majority of non-ceded lands was classified as non-ceded. While the land department identified about 30 parcels classified in this manner, it did not maintain a list of these parcels.

In 1997, the Legislature enacted Act 329 that required the Department of Land and Natural Resources to complete a comprehensive inventory database of all lands subject to section 5(f) of the Admission Act. The department was to coordinate its efforts with a joint committee made up of members of the Legislature, the Office of Hawaiian Affairs, and the governor's office. The committee was tasked with studying and making recommendations on issues relating to the public land trust. The land department issued a Request for Proposal, held a pre-selection conference with contractors, but did not select a consultant to conduct the project because the joint committee failed to agree on the date of origination for title histories.

Objectives

As previously noted the project has been divided into phases. Phase One objectives are:

1. Identify issues that affect the establishment of a comprehensive and definitive inventory of the public land trust as of the date of statehood and assess the fiscal and legal impact of alternative resolutions.

2. Develop cost estimates for completing a comprehensive and definitive public land trust inventory system based on surveying, mapping, and digitizing of a sufficient number of parcels.

3. Make recommendations as appropriate.

Phase Two objectives are:

1. Complete a public land trust information system that describes the lands and pertinent activities related to the lands of the public land trust from August 21, 1959 to present.

2. Make recommendations as appropriate.

Scope and Methodology of Phase One

To satisfy the objectives of the project and to meet the requirements of Act 125, SLH 2000, we needed to address three basic issues: the type of information system that best fits the requirements of Act 125, the information to be obtained for the information system, and the placement of the system. In order to address these issues, our methodology included the following tasks:

1. Establishing criteria for the selection of parcels to be included in Phase One;

2. Conducting title searches of the selected parcels and collect all pertinent documents;

3. Examining available resources within and outside of State agencies;

4. Developing the methodology for implementing a comprehensive public land trust information system;

5. Establishing a time frame for completion of Phase Two;

6. Identifying issues that would affect the successful implementation of a public land trust information system;

7. Analyzing the various issues relating to the classification of lands within the public land trust;

8. Examining available database software programs and options that are presently available for the creation of a database;

9. Determining surveying specifications necessary for urban, agricultural and conservation lands of the public land trust;

10. Determining whether the public land trust information system would be in a non-graphical or graphical format;

11. Determining information necessary for the public land trust information system;

12. Recommending which coordinate system should be utilized in the development of survey data (metes and bounds descriptions of the parcels and easements) and in the graphical database of the system;

13. Researching and interview geographic information system software vendors to identify optimum software and hardware to specifically meet the needs of a public land trust information system;

14. Identifying state agencies that would have a direct connection with the public land trust information system;

15. Recommending which governmental agency or agencies should be responsible for the maintenance of the system; and

16. Developing cost estimates for the development of a public land trust information system with breakdowns of costs for specific tasks.

To develop reasonable cost estimates to complete a comprehensive public land trust inventory information system, we selected a sample of parcels of various land classifications to analyze and research. Utilizing

the Department of Land and Natural Resources' State Land Inventory Listing, a judgmental sample was selected of parcels representing the various classifications of the lands of the public land trust listed in Section 5 of the Admission Act of 1959. Parcels with more than one classification were also chosen. Parcels selected included a variety of land uses, including parks, schools, harbors and airports. Exhibit 1.1 lists 20 selected parcels by tax map key, location, description and public land trust classification.

Exhibit 1.1
Parcels for Examination in Phase One From Various Classifications

TAX MAP KEY	LOCATION	DESCRIPTION	CLASSIFICATION
2-1-4-004-032	Hana, Maui	Hana Beach Park	5(a)
3-3-6-009-033	N. Hilo, Hawaii	Stable Site	5(a)
1-2-2-016-020	Pauoa Valley, Oahu	Pauoa School	5(b)
1-8-5-018-001	Waianae, Oahu	Pokai Bay Beach Park	5(b)
1-8-5-001-009	Waianae Kai, Oahu	Crown land of Waianae	5(c)
1-1-1-008-008	Moanalua, Oahu	Fort Shafter School	5(e)
1-1-2-025-017	Kalihi-Kai, Oahu	Honolulu Harbor	5(e)
1-3-6-001-035	Waikiki, Oahu	Pier Easement	5(i)
3-6-7-002-011	S. Kohala, Hawaii	Waimea Civic Center	X
1-9-7-094-26	Manana-Uka, Oahu	Pearl City Library	Y
1-9-9-001-012	Halawa, Oahu	Pearl Harbor Kai School	Y
1-2-1-015-021	Kaakaukukui, Oahu	Honolulu Harbor Facility	Z
1-3-1-042-010	Fort Ruger, Oahu	Fort Ruger Military Reservation	Z
1-1-2-025	Kalihi-Kai, Oahu	Honolulu Harbor	Various
1-2-1-015	Kaakaukukui, Oahu	Honolulu Harbor	Various
1-3-1-042	Fort Ruger, Oahu	Fort Ruger Military Reservation	Various
2-3-7-001	Kahului, Maui	Kahului Harbor	Various
2-5-2-004	Hoolehua, Molokai	Molokai Airport	Various
3-6-1-003	Kawaihae, Hawaii	Kawaihae Harbor	Various
3-3-9-005	Lihue, Kauai	Lihue Park	Various

For the selected parcels, we requested original land records and maps dating back to the Great Mahele from government agencies, primarily the Land Management Division of the Department of Land and Natural Resources and the Survey Division of the Department of Accounting and General Services. Documents were analyzed to determine and confirm the classification of each parcel. Research and abstracting was conducted of the sample parcels to identify any issues that could arise in the abstracting and classification process. We also reviewed documents and files at various governmental agencies such as the Department of Transportation, the State Office of Planning, county tax offices, and federal government agencies.

Abstracting is performed primarily to identify:

- Issues related to retrieving and extracting data from the various state agencies that maintain records relating to land title or tenure,
- Availability of metes and bounds descriptions of government lands,
- Existence of plats and modern survey records,
- Determination of what agencies maintain records relating to encumbrances of public lands such as leases and permits,
- Identification of data maintained by county agencies that is critical to the development of a public land trust information system,
- Evaluation of the level of difficulty in obtaining data from the various government agencies that maintain records having a direct bearing on the evolution of the public land trust information system, and
- The impact of data retrieval and its cost implications on the public land trust information system development.

We also interviewed the directors and staff of the various governmental agencies identified above to address the issues encountered during Phase One that would relate to the recommendations for Phase Two. Our subcontractor Security Title Corporation assisted us. Throughout the project, we met frequently with the Auditor and the Auditor's project monitor, Oceanit. Oceanit reviewed our document research, information system design and development, and cost estimates.

We also designed and implemented a pilot geographical information system (GIS) concurrently with document research. Graphical and tabular databases were created and populated by information collected during title searching and abstracting. The collaboration of the abstracting and GIS development efforts resulted in a functional GIS with the necessary tools and capabilities to inventory and maintain a land information system. Exhibit 1.2 summarizes the tasks performed for each sample land parcel selected. Exhibit 1.3 summarizes the steps taken to develop the pilot GIS system.

Exhibit 1.2
Tasks Performed for Each Parcel of Land

Coordination of Research Tasks	Senior staff analyzes parcel with readily available resources such as tax assessor maps and implements a course of action. Tasks are assigned to staff based on the complexity of the title search.
Abstract of Titles	Parcel is collaboratively researched and pertinent information is gathered at the various public agencies.
Collection of Historical Data	Historical maps and documents pertaining to government lands are gathered from various agencies. These maps were scanned and converted into a digital computer-aided drafting (CAD) file.
Preparation of Chain of Title Report	A thorough review of all documents is conducted. Senior staff makes determinations and judgments of the status of the parcel and a chain of title report is prepared summarizing the parcel's land transaction history.

Exhibit 1.3
GIS Development Task Matrix

Development of GIS Database	The overall structure of the GIS is built to specifically meet the needs of the PLTIS.*
Creation of Themes and Fields	The graphical and tabular databases are compiled to allow efficient queries and simplified maintenance.
Document Scanning/Conversion	Relevant documents are scanned into a digital format compatible with the GIS. Text documents are scanned and also converted into a word processing file to facilitate editing and other changes.
Populating the Database Fields	Necessary information (e.g. classification, land use, zoning and encumbrance information) is registered in the various fields of the tabular database. Precise input of this data is required to perform queries and analyses.
Preparation of CAD Files Based on Modern Survey Data	Maps describing the parcel are digitized into a CAD format compatible with the GIS. The parcel's metes and bounds description is determined from modern survey-level data ensuring proper graphical representation in the GIS.
Incorporation of Digital Orthophotos and United State Geological Survey (USGS) Data	Digital orthophotos and USGS data are inserted into the GIS to provide a backdrop for each parcel. This will enhance visual perception and provide valuable topographical information.

* Public land trust information system.

Due to time restrictions the sample size and selection of parcels to test for Phase One was limited. As a result, there was no discovery or inclusion of a ceded lands parcel that is not included in the existing state land inventory. While this situation may occur in Phase Two of the project, we are unable to estimate any adjustments that may be needed to classify a parcel that fits this situation.

The project was commenced in the last week of November 2000 and fieldwork was substantially completed in February 2001.

Chapter 2

An Automated Public Land Trust Inventory System Will Be Costly

This chapter outlines our findings and recommendations for Phase One of the project to establish an information system to inventory the lands of the public land trust. Based on our analysis of the requirements in Act 125, Session Laws of Hawaii 2000 and abstracting of selecting parcels, we conclude that a geographic information system (GIS) is the best choice. In this chapter, we describe the process to complete the inventory system and the impediments that hinder the collection of data and the timely completion of a comprehensive inventory system. Two cost estimates were developed to aid the Legislature in deciding the best method to proceed for Phase Two.

A Geographic Information System (GIS) Best Satisfies the Requirements of Act 125

Based on our experience with geographic information systems (GIS) and the extensive informational requirements of Act 125, we selected a GIS for this project. A GIS provides easy to understand graphical output and analysis. In addition, the data requirements stated in Act 125 directly correlate with the GIS strengths that provide spatial analyses.

GIS graphical presentations are better suited for this project than spreadsheet type databases

A GIS has the ability to display data graphically and in a series of "visual maps." The maps are easy to view and a series of maps can "overlay" the previous display to show the relation of data among the series of maps. A GIS is capable of displaying complex information in an easy to understand visual format.

Act 125 requires that the information system track an extensive amount of information about each parcel of land. The information system's inventory should identify and describe every parcel of land comprising the public land trust and include a title history for the parcel. The Act also required that the Auditor determine whether to include information such as the parcel's location by metes and bounds, tax map key number, size, date acquired, date conveyed, and other descriptive information about the ownership, land use, zoning, and classification status of the parcel. Data requirements also included easements, covenants, or regulatory conditions affecting the land.

A GIS has the unique capabilities to display such information in an easy to understand manner. By establishing different data layers for each type of data, the system can show the impact of each type of data on the

parcels depending on the criteria specified by the user. For example, starting with a map of one island, the user may specify zoning for a parcel then overlay the zoning view with a view of the parcel's current use for comparison.

The mapped views available with a GIS are superior to other types of presentation provided by a non-graphical database management system. Non-graphical systems present data in a tabular format that may also be charted. The non-graphical database management system does not convey the relation between the spreadsheet numbers and the land until the user can see a land map. GIS software allows the user to see, explore, and analyze data by location. It can reveal hidden patterns, relationships, and trends that are not readily apparent in spreadsheet or statistical packages. A GIS provides the ability to associate information with a feature on a map. It can create new relationships that can determine the suitability of various sites for development, evaluate environmental impact, identify the best location for a new facility, and so on. In relation to this project, a GIS could display a map of an island and highlight all parcels with leases that are to expire within a certain time period or highlight all commercially zoned parcels. In addition, the parcels' tax map keys, encumbrances, or metes and bounds could be shown as well.

Five key components of a GIS

A GIS integrates five key components: hardware, software, data, people, and methods. Hardware is the computer on which a GIS operates. Today, geographic information software runs on a wide range of hardware types, from centralized computer servers to desktop computers used in stand-alone or networked configurations.

GIS software provides the functions and tools needed to store, analyze, and display geographic information. Key software components are tools for inputting and manipulating geographic information, a database management system to store tabular data, tools to support query and analysis, and a graphical user interface to access the tools.

The people component consists of users of the GIS. Users range from technical specialists who design and maintain the system to those who use it to perform their everyday work. GIS technology is of limited value without the people who manage the system and develop plans for applying the system to real-world problems.

Methods refer to the analytical methodology used to interpret the results generated by the GIS. Methods relate to the business rules, models, and operating practices unique to each organization. For this project a method may involve the classification of a particular parcel and the parcel's income generating potential.

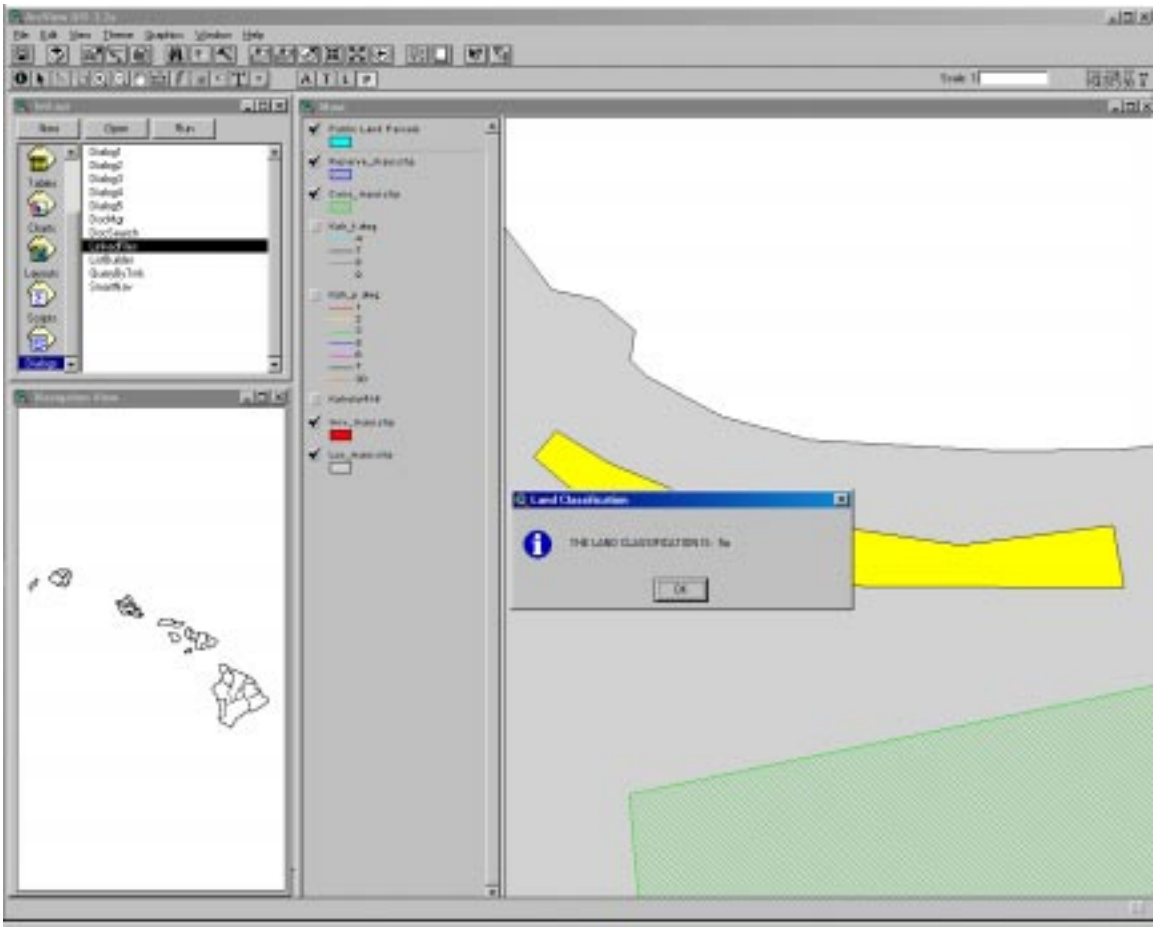
The most important component is the data. Data for a GIS come in three basic forms. Spatial data consists of points, lines and areas and is the heart of most GIS. Spatial data forms the locations and shapes of maps features such as buildings, streets, and cities. Tabular data adds information to maps. Tabular data describes map features. For example, a map of customer locations may be linked to demographic information about those customers. Image data use images to build maps. Image data includes such diverse elements as satellite images, aerial photographs, and scanned data—data that has been converted from paper to digital format. Geographic data and related tabular data can be collected in-house or purchased from a commercial provider. A GIS will effectively integrate spatial data with other data resources and can even use a database management system, used by most organizations to organize and maintain their data, to manage spatial data.

Tools available with a GIS provide useful analyses

A GIS provides both simple point-and-click query capabilities and sophisticated analysis tools to provide timely information. Point-and-click query capability means that a user with a computer-pointing device like a mouse can click on specified menu options to see additional information that the system can display. For instance, a user seeking the tax map key of a parcel need only to point the mouse at the command to show tax map keys and click the mouse button. Other types of data could be queried in the same way. Exhibit 2.1 shows an example of a point-and-click query to display the classification status of the selected parcel of land.

A GIS also provides powerful analytical tools to analyze geographic data for patterns and trends and to undertake "what if" scenarios. Two such tools are called the proximity analysis and the overlay analysis. With proximity analysis, the system answers queries that relate the proximity of two landmarks. For example, the user could query the computer to identify all parcels within 100 meters of a particular water main. An overlay analysis was briefly described previously and consists of joining one or more data layers over a map. An overlay analysis could be used to integrate data on land ownership with tax assessment or other data that have been appropriately defined for the system.

Exhibit 2.1
A GIS Answers Query to Show the Classification Status of a Parcel



Gathering Information Led To Impediments That May Hinder or Delay The Project

The public land trust information system must contain meaningful information to be useful. We find that most of the data elements listed in Act 125 would be useful for the inventory system. The primary source from which to gather the necessary data are abstracts or title searches of government lands. We selected a diverse sample of parcels of various categories to conduct our abstract work. We found that the abstracting of government lands took the most time to complete.

However, we also found that certain agency operations or procedures may impede the ability to gather all the data necessary to produce a comprehensive public land trust information system. Some impediments may increase time delays and increase cost. Other impediments may diminish the comprehensiveness of the final product. Solutions to some

of these impediments must be implemented or the success of the overall project may be jeopardized. After the data is gathered, converting the data to a computerized form is a straightforward process.

Most of the data requirements listed in Act 125 should be included in the inventory system

Act 125 requests that the Auditor evaluate the usefulness of including certain data in the inventory system. The list included information that are common in matters related to land such as tax map keys, easements, parcel size, date acquired, and date transferred. Almost all of the data requirements listed in Act 125 are suitable for inclusion in the public land trust information system. The only exception is the requirement to include a description of all natural resources and water rights found on or appurtenant to the parcel. Such information would be cost prohibitive to obtain at this time and water rights are still being litigated in the courts.

Gathering information involves several agencies

A title search traces the history of the ownership of a piece of property and is fundamental to elements of this project. The title searching, or abstracting process for state-owned lands usually begins with requests at the Land Division of the Department of Land and Natural Resources and the Survey Division of the Department of Accounting and General Services for documents dating back to the time of the Great Mahele. These two agencies retain most of the documents relevant to the public land trust. However, in some cases, it may be necessary to obtain documents from the Airports and Harbors divisions of the Department of Transportation, the Land Use Commission and the Office of Planning of the Department of Business Economic Development and Tourism. In general, the document retrieval service at the various agencies was the most time consuming of all tasks performed during Phase One. Land classification may be determined after the establishment of a proper chain of title.

The following sections describe government agencies from which that the abstractor must visit and retrieve documents in order to perform a complete title search and fulfill the data requirements of Act 125.

Land Division of the Department of Land and Natural Resources

The Land Division serves as an office of record and maintains a central repository of government documents dating back to the Great Mahele of 1848. A thorough retrieval of hard copies of these land documents is an essential component of preparing a chain of title.

The Land Division also holds Executive Orders and Land Office Deeds that contain metes and bounds descriptions necessary to transfer a parcel's information into computer form. A metes and bounds

description provides a method of surveying property by using physical and topographical features in conjunction with measurements. For parcels without a modern metes and bounds description, historical maps and documents must be obtained and researched at the Land Division.

Current encumbrance information (i.e. lessee, lease commencement and expiration dates, etc.) is available on General Leases and Revocable Permits held at the Land Division. Executive Orders also describe current program uses. Definitions of specific land documents and records such as Executive Orders and Land Office Deeds may be found in Appendix A of this report.

Bureau of Conveyances of the Department of Land and Natural Resources

The Bureau of Conveyances stores many types of conveyance documents, such as recorded deeds, that occurred after the original grants of the Great Mahele. A conveyance is a transfer of title of property from one to another. Copies of these documents are stored on microfilm or in bound volumes.

Survey Division of the Department of Accounting and General Services

The Survey Division under the Department of Accounting and General Services maintains historical maps of both government and private lands relevant to the public land trust. These original maps are often the only records which depict the boundaries of lands lacking modern descriptions. Thousands of maps relevant to the Public land trust information system are archived in the Survey Division, all of which may be viewed only by request. A very small percentage of the division's maps are in computer digital form and the division presently uses a manual system to index and maintain the historical maps.

A primary function of this division is to produce and maintain Copy Survey Furnished maps, which accompany Executive Orders and must be produced for each government parcel to be properly recorded. Land set aside by an Executive Order is not officially recognized until the Copy Survey Furnished map is complete. At this time, the survey office is approximately two years behind schedule in the production of such Copy Survey Furnished maps.

Department of Transportation

The State Department of Transportation's Airports and Harbors divisions maintain current lease documents affecting lands occupied by these divisions. These documents are available for reproduction upon formal request to the respective divisions. These documents are necessary to

identify encumbrance information as requested by Act 125. The Airports and Harbors divisions also possess maps of airport and harbor properties. Some of these maps are in computer digital form.

County tax map agencies

County tax map agencies produce and maintain maps for tax assessment purposes. These agencies assign a unique tax map key number to each parcel. County tax map agencies also maintain tax history sheets. These sheets provide reference to the parcel's recorded conveyance documents. An abstractor begins research on a specific parcel by first identifying this tax map parcel number and then analyzing the tax history sheets maintained by these agencies.

County planning and subdivision agencies

The planning and subdivision agencies of the various Counties review and approve subdivision maps. Hard copies of these maps are submitted to the respective agency for review and approval. These agencies grant approval if the established conditions, such as metes and bounds annotation, are satisfied.

Department of Business, Economic Development and Tourism

Information about current land use designations are important for understanding the existing and potential use of a parcel or parcels. Current land use designation may be obtained from maps and supporting documents at the Land Use Commission of the Department of Business, Economic Development and Tourism and is also available on the State GIS maintained by the department's Office of Planning.

Federal Department of Defense

The Department of Defense has compiled "An Inventory of Real Property Owned or Controlled by the United States Under the Custody and Accountability of the Department of Defense in the State of Hawaii." This 285-page report provides a comprehensive inventory of real property in the State of Hawaii which is currently U.S. Government-owned, leased and controlled by a component of the Department of Defense. This information may be useful for the compilation of boundary data and for identification of conveyance and lease documents. The report identifies all ceded lands under the Department of Defense's control.

Real Estate Section of the United States Army Corps of Engineers

The Real Estate Section is responsible for maintaining maps of land occupied by the U.S. Army. Because many parcels of the public land

trust had once been occupied or are presently occupied by the Army, these maps may provide metes and bounds information.

Title must be traced back to the Great Mahele to properly identify ceded lands

To ensure that ceded lands are properly identified, title searches back to the Great Mahele are needed. Because of many legal requirements to properly convey title, the abstractor must examine and analyze a multitude of documents from various agencies. Ideally, a chain of title would contain no breaks or gaps in these instruments of recordation, but this is not often the case. The process of establishing a chain of title for a particular parcel of land is typically as follows:

1. Identify the tax map parcel number.

2. Note the property's history recorded in field books or tax history sheets at the appropriate county agency.

3. If the property is registered under the Land Court Registration System, note the Transfer Certificate of Title number.

4. Gather land transfer documents at the land department's Bureau of Conveyances or Land Division.

5. Gather encumbrance documents from the land department's Land Division and transportation department's Airports and Harbors divisions if necessary.

6. Identify the original owner or awardee at the time of the Great Mahele.

7. Gather historical maps from the accounting and general services department's Survey Division.

8. If there is a break in the chain of title where no documents have been recorded, trace title forward from the original owner or awardee as identified in the step above and trace genealogy of the owner's family at the time of the break in the chain of title.

9. Check federal and district court records for any litigation or judgments.

10. Check records at the Department of Health and the U.S. Immigration and Naturalization Services.

To determine whether a parcel is ceded land requires that the title history be searched back to the time of the Great Mahele. Titles to lands were awarded as a part of the Great Mahele. The Confirmation Act of 1848 confirmed land title to private individuals by the Land Commission. The

Confirmation Act also served to delineate those lands declared by King Kamahameha III as Crown Lands and Government Lands. The listing of parcels defined by island, district, *ahupuaa* or *ili*, not by metes and bounds descriptions, are included in the Indices of Awards made by the Board of Land Commissioners to Quiet Land Titles in the Hawaiian Islands. Approximately 1.5 million acres were allocated to the government, 1.6 million acres for the chiefs, and 1 million acres for the crown.

By the time of the overthrow of the monarchy in 1893 and subsequent annexation to the United States, most of the 1.5 million acres of Government Lands had been sold and portions of the 1 million acres of Crown Lands had also been sold, leased or mortgaged. Pursuant to the Joint Resolution of 1898, the remaining Crown and Government Lands were ceded to the United States; however, a definitive list of these ceded lands was never established.

Since the land tenure started from the Great Mahele, it is imperative that a determination be made as to what lands were sold from 1848 onward in order to determine what remained and was therefore ceded to the United States in 1898. It is therefore necessary for an abstractor to work from the Great Mahele in order to separate ceded and non-ceded lands and facilitate the process of classifying the parcels into the categories defined by the Admission Act of 1959. The Admission Act essentially defines the classifications of the lands ceded in 1898, acquired by the Territory between 1898 and 1959 and conveyed back to the State of Hawaii; but in and of itself, the Act does not determine if a land is ceded or non-ceded.

The significance of this issue cannot be overstated. Far-reaching fiscal and legal impacts beyond the scope of this report hinge upon what lands are determined to be ceded and non-ceded. Since such a determination is an impetus driving this project, a chain of title for each parcel should be established from the time of the Great Mahele.

In some instances title will be unclear

A conveyance is contingent upon proper and accurate recordation of documents; therefore, technical irregularities, as noted below, may delay the abstracting process. An improper conveyance creates a break in the chain of title that hinders the abstractor's ability to efficiently trace the origin of ownership. Such technical irregularities occur when:

- Judgments, liens and mortgages against the property or owner are not released or satisfied and therefore remain an encumbrance even after conveyance.

- A seller with partial interest in a property acquired through a general quitclaim or by other means conveys the entire property.

- In the absence of a will or probate proceedings, one of a number of surviving heirs sells the entire property.

- Proper notarization is lacking.

- Signatures of all parties named as seller or grantor are lacking.

- A person acting on behalf of the owner or grantor signs without a properly recorded power of attorney.

In these circumstances, legal action may be pursued to quell any ownership disagreements. No such circumstances were uncovered during research for Phase One; however this should not preclude such a scenario when Phase Two of the project is implemented. If any discrepancies are discovered, they should be noted and included in the information system.

Various agencies retain genealogy information

In some instances, a broken chain of title may be an issue. In such cases an abstractor needs to research genealogical information to ascertain title. Although tedious, charting genealogy is necessary to bridge the break in the chain of title. After completion of a genealogical chart, an abstractor must identify references made to land transfers to determine title. Genealogical information is available at the following agencies:

- Department of Health: Information of birth, marriages and deaths records may be obtained as far back as 1896 with some records going back to 1863.

- Archives Division of the Department of Accounting and General Services: Records of Hawaii's government from the pre-constitution era of 1790 to present-day Statehood are located at this branch. The Archives' files also contain newspapers dating from 1836, photographs and negatives, census records, Hawaiian genealogies, immigration records from 1840 to June 1900 and land award records.

- Federal, District and Family Courts: Court records provide information about families that have been involved in litigation. Probate records (estate and guardianship determinations), civil actions and divorce proceedings may all provide links in a genealogical trace.

- U.S. Immigration and Naturalization Service: This agency may have records of persons who arrived in the state after June 1900.

- Churches: Local church records may provide chronological information about marriages, births and deaths in a family.

- Libraries: Records of Hawaiian and Polynesian family histories may be available on microfilm.

Abstracting will be one of the major costs

A chain of title report summarizing the results of the title search was generated for each parcel examined in Phase One and incorporated into the prototype public land trust information system. A sample of a title search has been included in Appendix B. The average time to conduct a title search and to determine the classification and status of a parcel was approximately four hours. Complicated searches, although rare, may take up to two days or more. According to the current State Land Inventory, the public land trust is comprised of a total of 15,898 parcels. Using this number, although admitted by the Department of Land and Natural Resources to be inaccurate, and assuming that no complicated title searches are required, the estimated time allocated for abstracting parcels amounts to about 1,600 standard workweeks. An estimated team of ten full-time, experienced abstractors may need to be retained to complete this endeavor within the projected schedule. Abstracting was the most time-consuming task performed in Phase One and will certainly be true of Phase Two.

In conjunction with the abstracting process, we scanned into a digital format all documents at the Land Division having any relevance to the public land trust. The cost estimate we have proposed incorporates the scanning to be done by the consultant for Phase Two. To scan a record, collect its attributes, and register the information into a database takes an average time of 15 minutes per record and will be done concurrently with the abstracting process.

Impediments encountered will add time delays or hinder the development of a comprehensive inventory system

During our title searches, we encountered several impediments that may hinder the timely completion of Phase Two of the project or affect the integrity of the data in the system. The degree that these impediments are reduced or eliminated will affect various elements of the final product. If the impediments are not resolved before initiating Phase Two, costs may increase, the completion of the system would incur delays, data would not be complete, and the inventory system would not be a comprehensive inventory. These impediments result from policies and/or procedures in place at various government agencies.

Land Division's document retrieval services will prevent the timely completion of the project

The land department's Land Division was able to furnish to us only four documents per day to conduct our title searches. To complete a title

search, the abstractor needs documents such as Executive Orders and Land Office Deeds maintained by the division. An abstractor requests these documents from division personnel who then retrieve the documents from the division's files. At the rate of four documents per day, a complex title search of one parcel that requires numerous documents would take several days to complete. This retrieval limitation hinders the timely completion of title searches.

The division's document retrieval services are inefficient. In response to our request for timely service for this project, the division's deputy administrator replied with a memorandum dated January 16, 2001, which stated that the division would "provide copies by 2:00 p.m. for requests that are submitted by 10:00 a.m." during the same day. The division has not been able to meet that pledge. As shown in Exhibit 2.2, the division met its own same day delivery standard in only one instance out of all of our requests. All document requests were made prior to 9:00 a.m. The division produced documents on an average turnaround time of a day and a half, from initial request to our receipt. This untimely delivery of documents delayed our project and will cause delays for Phase Two if the division is unable to provide documents in a more timely manner.

The division administrator claims that the division can only produce four documents per day because it is understaffed. However, in a memorandum dated January 17, 2001, the division also stated that with its existing staff it would be able to "provide up to fifty (50) files a day." We do not foresee the division being able to fulfill this promise when it can deliver only four files per day and cannot meet its own guidelines of delivering the files on the same day. An alternative would be to permit public land trust information system personnel direct access to the division's files. However, the division remains committed to its policy that only division personnel can access the division's vault of historical documents. The division expressed apprehension that abstractors who are not familiar with the division's filing system would misplace documents. However, the current and limited rate of delivery of four documents per day is untenable and infeasible.

The Land Division's document retrieval services are a major impediment that will delay the timely completion of the project and may increase the estimated budgeted costs included in the report. The division holds most of the necessary information for this project and most of the work in Phase Two will be centralized at this location. Work delays at the division will significantly impact the rest of the project.

Exhibit 2.2
Document Requests From DLNR* Have Been Fulfilled Within an Average of 1.7 Days

DOCUMENT	DATE ORDERED	DATE RECEIVED	DAY(S)
Gubernatorial Executive Order (GEO) 97	1/9/01	1/10/01	1
GEO 147	1/11/01	1/12/01	1
GEO 674	1/05/01	1/08/01	1
GEO 802	1/09/01	1/09/01	0
GEO 809	1/5/01	1/8/01	1
GEO 923	1/10/01	1/12/01	2
GEO 936	1/10/01	1/12/01	2
GEO 1019	1/5/01	1/8/01	1
GEO 1611	1/5/01	1/8/01	1
GEO 1850	1/5/01	1/8/01	1
GEO 1880	12/29/00	1/3/01	2
GEO 1904	12/29/00	1/3/01	2
GEO 1950	12/29/00	1/3/01	2
GEO 1988	12/29/00	1/3/01	2
GEO 1997	1/10/01	1/12/01	2
GEO 1998	1/10/01	1/12/01	2
GEO 2169	1/5/01	1/8/01	1
GEO 2281	1/5/01	1/9/01	2
GEO 2438	1/5/01	1/8/01	1
GEO 2521	1/10/01	1/12/01	2
GEO 2600	12/29/00	1/3/01	2
GEO 2632	1/8/01	1/15/01	5
GEO 2602	1/5/01	1/8/01	1
GEO 2705	12/29/00	"document missing" as stated by DLNR staff	NA
GEO 2917	1/5/01	1/8/01	1
GEO 2928	12/29/00	1/3/01	2
GEO 3013	1/5/01	1/10/01	4
GEO 3259	1/3/01	1/4/01	1
GEO 3340	1/8/01	1/9/01	1
General Lease (GL) S-4101	1/10/01	1/12/01	2
Land Office Deed (LOD) 4469	12/29/00	1/3/01	2
LOD 7442	12/29/00	1/3/01	2
LOD 8971	12/29/00	1/3/01	2
LOD 9044	12/29/00	1/3/01	2
LOD 9516	12/29/00	1/3/01	2
Registered Map 1451	12/21/00	12/22/00	1
Presidential Executive Order (PEO) 2521	1/10/01	1/12/01	2
PEO 8724	1/11/01	1/16/01	3
PEO 10648	1/9/01	1/10/01	1
		TOTAL DOCUMENTS: 39	
		TOTAL DAYS: 65	
		AVERAGE DAYS: 1.7	

* Department of Land and Natural Resources.

The Survey Division's backlog will hinder the development of a comprehensive inventory

The Department of Accounting and General Services' Survey Division is backlogged by approximately two years in producing maps for other state agencies. The division is responsible for developing Copy Survey Furnished maps for state agencies. These copy survey maps must accompany an Executive Order that set aside government land before the Executive Order is considered official. An Executive Order lacking a Copy Survey Furnished map that involves a ceded land parcel would create conflicts in the public land trust inventory and jeopardize the integrity of the information system because the ownership has not been officially recognized.

One reason for the backlog may be the division's slow adoption of computerized map drafting methods. The division manually drafts most of its maps. This manual method is slow in comparison to techniques using computer-aided design (CAD) drafting methods. A CAD program is an automated system used to draft, design, and display graphically oriented information. The backlog could also result from the division's work in reviewing and verifying maps and surveys of state lands conducted by licensed surveyors. The division verifies maps at the request of the land court. When the division's surveyors discover discrepancies, additional work is required to resolve these discrepancies. Promulgating modern surveying and mapping standards for all licensed professional land surveyors to follow in mapping and surveying state lands should reduce the time the division's surveyor spend in resolving discrepancies.

Other factors that may affect the timely completion of the project are the Survey Division's lack of automated index system for its CAD files and maps that are based on different coordinate systems. The division possesses CAD files of maps that could be incorporated into the proposed public land trust information system. However, the division lacks an automated indexing system so developing linkages from the public land trust information system to these CAD files will require tedious procedures. In addition, the Survey Division's maps are drawn using various coordinate systems. Coordinate systems establish a reference system to relate the map's measurements to a common reference point. In order to relate separate layers of information in the public land trust information system, maps must be based on one coordinate system. Without a common coordinate system, the parcels would "float" spatially when displayed in the GIS. Without a common reference point, different views of the same land parcel would not be linked. The division should require all mapping activities to follow the Hawaii State Plane Coordinate system. The division's current and future maps should also comply with this one coordinate system.

Counties need to assign tax map key numbers to all parcels

The public uses tax map keys to identify lands and the proposed public land trust information system would likewise use the same identification. However, the assignment of tax map keys to public lands has been inconsistent. The various county tax agencies assign tax map key numbers to land parcels but numbers may not have been assigned to each land parcel for public lands. On the other hand, a tax map key number may have been assigned to a leased parcel within a larger parcel. Under this scenario, multiple tax map numbers may be assigned to one property with the result that land areas may be counted twice. In addition, state roads and in some cases, easements are not assigned tax map numbers. Roads are not considered ceded. Without a tax map key to identify the road, it may be included in a surrounding ceded land parcel. This would result in overstating the size of a ceded parcel. Similarly, an easement without a tax map key may not appear when a particular view of a parcel is selected in the GIS.

The Department of Land and Natural Resources should request the various counties to assign tax map keys to all ceded lands, roads, and easements. Tax map keys are commonly used to identify land parcels. The GIS uses tax map keys to identify ceded lands. Without a tax map key, a particular property may not be accurately recorded in the public land trust information system.

The Department of Transportation's Airports and Harbors Divisions must comply with requirements for this project

The Department of Transportation's Airports and Harbors Divisions possess documents relating to leases and other encumbrances involving airport and harbor lands that no other agency possesses. Most airport and harbor lands are ceded lands and therefore any information relating to ceded lands should be included in the public land trust information system. These documents could be scanned and included as part of the public land trust information system.

In addition, the Department of Transportation has in-house surveyors who conduct surveys and prepare maps of lands within the department's jurisdiction. Because the Survey Division of the Department of Accounting and General Services has not promulgated a mapping standard, the Department of Transportation's maps may not be consistent with maps at the Survey Division. If the same standards are not used, the public land trust information system cannot relate one map to other maps that were drafted under a different standard or referenced to a different coordinate system.

Land Division's information system's data needs to be verified

Most of the information requested by Act 125 can be retrieved from the Land Division. The division maintains an automated State Land Inventory on a non-graphical database. The division developed its database in April 1979 by creating a list of parcels by tax map key with the acreage, zoning, encumbrances, date of the encumbrance and annual rent of each parcel. The automated transfer of the data from the division's current information system would add greater functionality to the proposed public land trust information system by populating more data layers. However, some of the information in the division's current information system may not be accurate and should be verified before this option is utilized.

By the division's own admission, the automated inventory is both inaccurate and incomplete. In response to Act 329, SLH 1997, the division held a conference with potential contractors to discuss the status of the inventory. In the September 25, 1997 meeting, the division stated that "our State Land Inventory is not totally accurate, not totally complete." In addition, a disclaimer on the cover of the current inventory states, "The accuracy of the data contained in this report is not guaranteed."

Several factors contributed to the inaccuracies. With time and budget being primary concerns, extensive title searches and surveys of lands without modern descriptions were not performed. Between 1846 and 1855, the Board of Land Commissioners responsible for awarding land was tasked with processing approximately 13,000 land claims and grossly lacked enough trained surveyors to complete such an effort. Lands believed to have little economic value were not surveyed and were conveyed by name only. Inaccurate surveys also stemmed from the combination of lack of trained personnel and limited time as proper reviews and checks of the surveys were not conducted. Lands described by name only and bounded by natural features were assigned inaccurate data. All of these components deem the division's State Land Inventory inaccurate.

The primary function of any inventory is to evaluate and assess one's resources over a period of time. Thus, inventories need to be periodically updated to be fully functional, whether it is yearly, monthly, or daily. With its current resources, the division is unable to find the sources of error within its inventory, much less perform the research and/or surveys necessary to resolve these errors.

If determined to be reliable, information from the State Land Inventory could be easily transferred to the proposed public land trust information system to supplement the system's data and enhance functionality and decrease the cost of the project. However, we found the various

inaccuracies in the information in the State Land Inventory. In an exercise to locate and resolve discrepancies, the State Land Inventory as of April 29, 1999 was compared to current tax maps and an independent data source compiled by First American Real Estate Solutions (FARES), the nation's largest collector and provider of real estate information.

FARES collects raw data from public offices so its database is only as accurate as the data produced and managed at the real property departments of the various counties. Data currency, accuracy and completeness, however, are prioritized so FARES conducts manual checks to identify any inconsistencies and corrects any misinformation. The FARES database is presently used by professionals who deal with land transactions (e.g. abstractors, insurers, mortgage lenders, realtors and investors).

The comparison between the State Land Inventory database, the FARES database and the tax maps revealed conflicting items of varying degrees: parcels in the State inventory were no longer shown on the tax maps and were listed as "dropped"; parcels listed in the FARES database as being owned by the State of Hawaii were not found in the inventory; and total areas of sub-parcels were inconsistent. A manual examination of the discrepancies between the FARES database and the State Land Inventory was conducted and confirmed the FARES data.

The division is currently implementing a new computer system that will incorporate the State Land Inventory database, the division's accounts receivables, and its property management (leases, revocable permits, executive order, etc). Most of this information would be useful to include in the public land trust information system. However, the division is still converting the data from the old systems to the new system and is in the process of verifying the information. Without verified information, the public land trust information system will have one fewer source to use to update the information related to ceded lands and any possible cost savings would not be realized.

The Auditor's continued involvement for Phase Two is necessary

The public land trust information system should be developed under the auspices of the Auditor. The successful implementation of the public land trust information system requires cooperation from several state and county agencies with the consultant who is tasked with conducting Phase Two. However, government agencies do not always provide information to private entities freely and in a timely manner. For some agencies, legal requirements restrict the free disclosure of information. Such restrictions will delay the project.

The Auditor's continued involvement would reduce or eliminate government agencies' reluctance to provide information. The Auditor's office has the ability to facilitate timely disclosure of information with its authority to examine all books, records, files, papers and documents of every state agency along with its power to summon persons to produce records and answer questions under oath. A consultant acting under the authority of the Auditor would have easier access to retrieve documents and encumbrances that affect the public land trust information system.

Various agencies must coordinate efforts to maintain the public land trust information system

After the public land trust information system is completed and is ready for use, various agencies must supply necessary information to keep the information up to date. The following list of the major agencies must be directly involved and provide information to update the public land trust information system:

- Land Division of the Department of Land and Natural Resources,
- Survey Division of the Department of Accounting and General Services,
- Department of Transportation,
- Land Use Commission,
- Various county agencies, and the
- Office of Hawaiian Affairs

The preceding agencies would need to cooperate in the area of furnishing documents and data in an expedient manner so as not to impact the integrity and usability of the system and to maintain a complete and definitive public land trust information system. Most of these agencies' information are already in a computerized format, but to ease data linkage they should supply information in a format compatible with the public land trust information system.

Other agencies may have relevant information to add to the public land trust information system. The addition of information from these agencies would enhance the usefulness of the public land trust information system. The following agencies would be indirectly involved:

- University of Hawaii,
- Bureau of Conveyances of the Department of Land and Natural Resources,
- Housing and Community Development Corporation of Hawaii,
- Department of Hawaiian Home Lands,
- Hawaii Community Development Authority,
- Department of Agriculture,
- Aloha Tower Development Corporation,
- Agribusiness Development Corporation, and
- Private agencies

Information gathered must be converted to computerized form

Development of the computerized, prototype public land trust information system entailed the following tasks:

- Collection of data and production of spatially-related parcels into a graphical database;

- Development of tabular databases containing parcel information, such as land classification and land use;

- Cataloging of scanned documents and CAD files to be digitally linked to these parcels; and

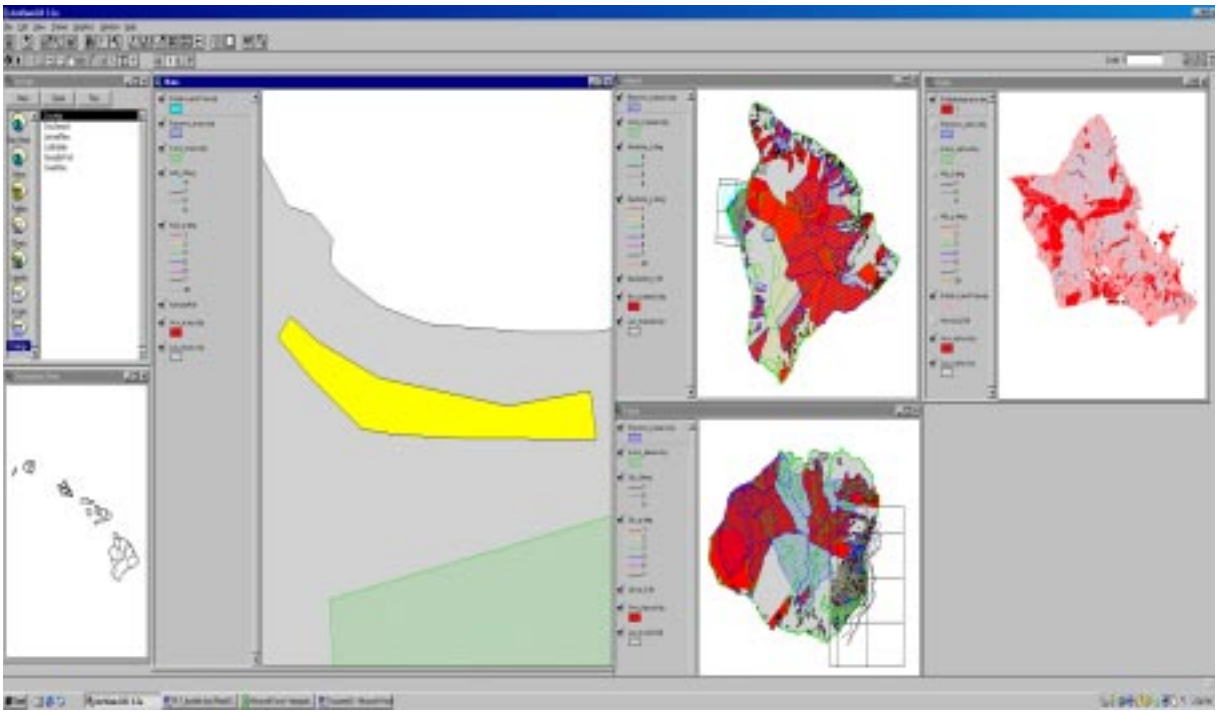
- Update and revision of both graphical and tabular data.

Appendix C contains hardware and software requirements and Appendix D contains a glossary of GIS-related terms.

Information gathered is then placed into the computer system

Once the parcel has been classified and an acceptable metes and bounds description has been determined, an image of the parcel is generated with a CAD application. This image is referenced to the Hawaii State Plane Coordinate System for proper placement into the GIS. Once a parcel is successfully entered into the GIS, information compiled pertaining to that parcel is entered into the GIS, including information as title searches, maps, and other documents. This results in a complete set of information for each parcel of the GIS. The following exhibit is an example of a parcel displayed in the GIS format.

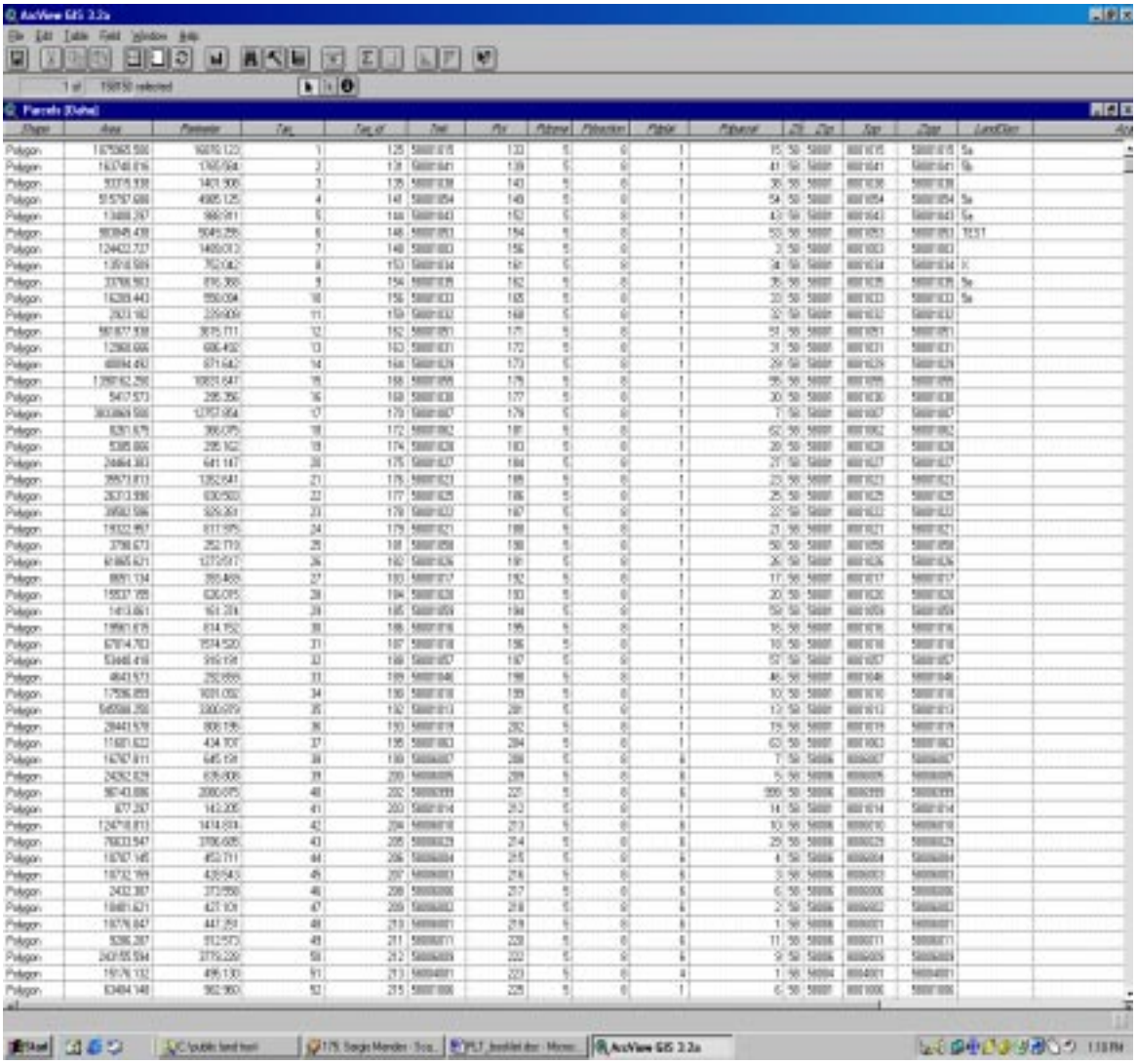
Exhibit 2.3
A Public Land Trust Information System Parcel in ArcView, a GIS Application



Pertinent information will be assigned to each parcel in tabular databases

Each parcel in the GIS is assigned a unique number that links all related information in the database to the parcel. For this project, we used the nine-digit tax map parcel number. The fields of the database contain information such as land classification (i.e. 5(a), 5(b), 5(c), 5(d), 5(e), 5(i), X, Y, or Z), source of information, agency with current legal jurisdiction, current land use and zoning designation, current program uses, current encumbrances, commencement and expiration dates of encumbrances, noted discrepancies discovered during title search or any other applicable miscellaneous information. The following exhibit displays a screen shot of the tabular portion of the GIS.

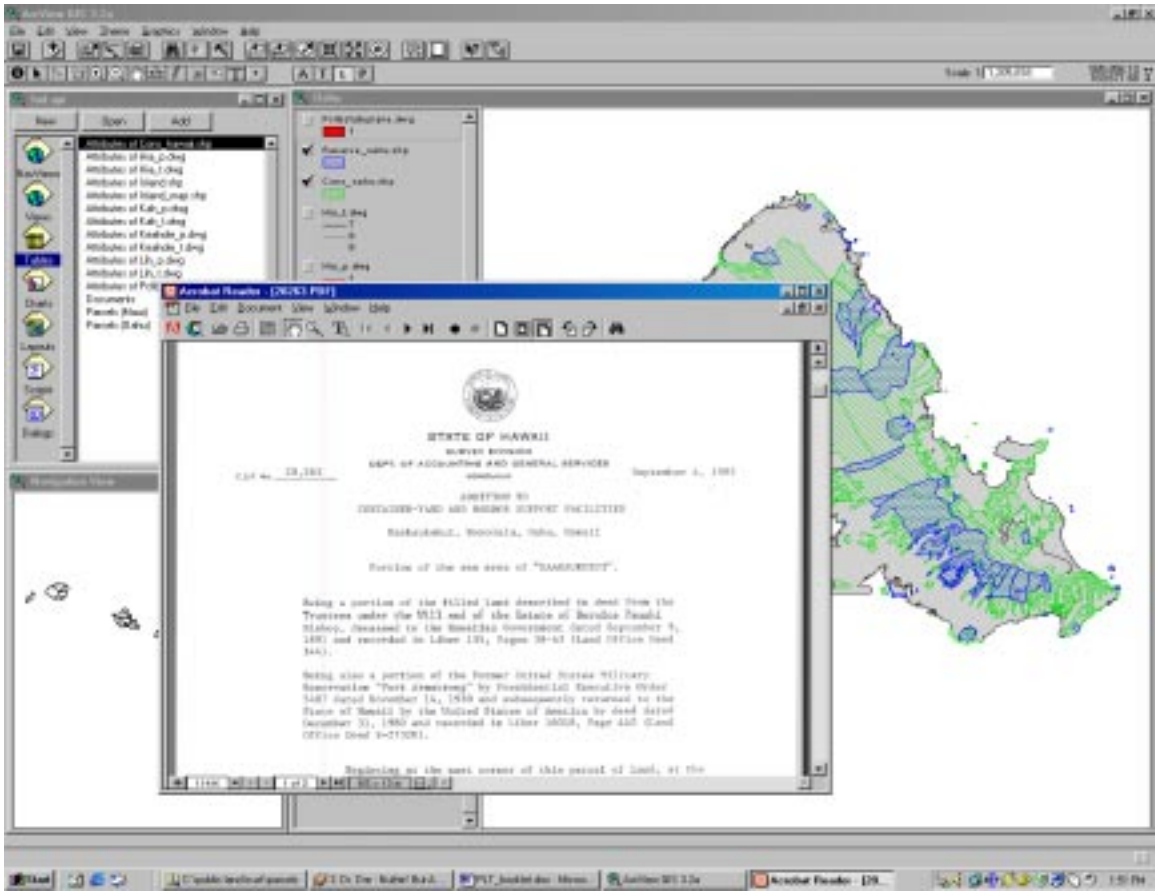
Exhibit 2.4
A Public Land Trust Information System Tabular Database Populated with Fields of Information



Users will be able to view and print linked documents and files

Once the information is entered in the GIS, various tools are created to facilitate access to the information by the user. Users click on a parcel and can bring up a linked document. For the purposes of the public land trust information system, these links to land transaction documents and digital CAD files are critical. A link to a summary chain of title report was also compiled with which the user may browse the title history of a parcel and view any supporting documents. The following exhibit is an example of the linking of a parcel map and related document.

Exhibit 2.5
A Linked Digital Document Opened With the Prototype GIS



The administrator will ensure the system is effective and efficient

Once the public land trust information system is completed, the system will require an "administrator" to manage and maintain the system. Proper administration of the system ensures the system operates efficiently and effectively.

Ensuring that a GIS operates efficiently is not a simple task but rather involves several functions. Simple functions may include creating and changing user profiles, establishing operational procedures, and developing backup strategies. More complex functions involve maintaining system performance and program integrity. A GIS stores graphical data and requires an efficient system to display the graphic data effectively. The administrator must adjust the system to ensure that what a user gets to see is limited to what the user asked to see.

Presenting more information to a user than what is needed draws resources and processing power away from other users. The administrator must also ensure that users do not see what they are not entitled to see to preserve the integrity of other users' programs.

An effective system is one that delivers useful and up-to-date information to users. The administrator must adjust data linkages to enable users to see all information they need to see without affecting system efficiency. Keeping the system up-to-date requires that land purchases, exchanges, conveyances be updated and reflected in the system's graphical and tabular databases. Both the graphical and tabular databases need updating in situations such as: subdivisions of public lands; lands conveyed as a result of the sale of public lands; and new lease agreements. The administrator will also be responsible for updating the system in addition to the information in system.

It is anticipated that the public land trust information system will only need an administrator on a part-time basis. The administrator of the system will require adequate facilities to house the public land trust information system and adequate full-time staff support. The number of staff required depends on the amount of users and on system usage, but one support staff should be sufficient in the initial stages of the system. The public land trust information system is similar to the State GIS and it is anticipated that operating costs will be similar. It is anticipated that initially an annual budget of $175,000 to $200,000 is needed to administer and maintain the system, with an anticipated five percent increase per year.

We have included an abbreviated user's manual for the public land trust information system in Appendix E. The administrator will be responsible for the production of an unabridged user's manual after delivery of the system.

Three State Divisions or Offices Were Evaluated for Placement of the Public Land Trust Information System

We evaluated three state agencies to determine the placement of the public land trust information system. From our evaluation, we believe that the placement of the system depends on the satisfactory completion of some of the recommendations in this report. Due to these unknown variables we do not make a conclusive recommendation as to the placement of the system at this time. However, we have provided an analysis of the advantages and disadvantages of placing the system in each agency to assist the Legislature in designating the administrator of the system.

In order to develop recommendations and alternatives relating to the placement of the public land trust information system, we applied the

following criteria to analyze the placement of the system in various state agencies:

1. The duties, responsibilities and services currently performed by the agency;

2. The existing agency's workload and ability to handle additional assignments;

3. The availability of existing office space within the agency to accommodate additional hardware and personnel; and

4. The agency's past performance with information systems technology.

We also established some basic premises that we used to conduct our analysis. Our evaluations were based on the premise that a GIS will be utilized as the system of choice, that Phase Two of the public land trust information system would be implemented by a consultant under the direction and supervision of the Auditor, and that the system would be a "turn-key" computer system with all the components installed and ready for operation when delivered to the administrating agency. Based on the preceding premises, we used the above criteria to evaluate each agency's capabilities to be the administrator of the system.

We assessed each agency's ability to meet each criteria, the impact on the agency of having to manage and maintain the inventory system, and the impact on the viability of the system. The degree of relationship between the agency's duties and responsibilities to functions required to administer and maintain the public land trust information system will help determine the impact on the agency. The agency's ability to handle its current workload affects its ability to maintain the system. The agency's past performance with technology is important because GIS developers and users attest that experience with GIS is a key component in the system's effectiveness.

A review of existing state agencies showed that three agencies have direct input and involvement in the public land trust information system. The Land Division of the Department of Land and Natural Resources, the Survey Division of the Department of Accounting and General Services, and the Office of Planning of the Department of Business, Economic Development and Tourism were selected as possible candidates for placement of the public land trust information system with emphasis being on administration and maintenance of the system and not the development of the system. The following comments on the selected agencies are based only on their abilities to administer and maintain the public land trust information system and do not focus on other aspects of their functions.

Land Division manages state-owned lands

The Land Division of the Department of Land and Natural Resources is responsible for the management of State owned lands in ways that will promote the well-being of Hawaii's people and insure that these lands are used in accordance with the goals, policies and plans of the State. Lands that are not set aside for use by other government agencies come under the direct purview of the division. The division also serves as an office of record and maintains a central repository of all government documents dating back to the Great Mahele.

Present staffing

The present staffing requirements for the basic functions of the Land Division are adequate to perform their primary activities; however, in the area of document retrieval services, the division may be understaffed.

Professional qualifications

The division is presently staffed with professionals in the fields of abstracting, land management and database systems. The abstractors are qualified to conduct title searches for all private and government lands and are often requested to appear as expert witnesses in legal cases involving the derivation of title to government lands and in quiet title actions to protect the interests of the State. The abstractors and staff employed at the Land Division are well-versed in Hawaiian land matters. The land agents all have extensive backgrounds in managing State lands and have the required expertise and knowledge of the disposition of said lands. Their team of computer analysts and technicians are qualified but have been overtaxed in the development and completion of the division's new information system.

Physical plant requirements

The present facilities are adequate to less than adequate depending on the functions that are being performed and as more information is accumulated the lack of storage space will become critical and archiving of data in an electronic format will be necessary.

Past performance with GIS or other database systems

Land Division does not have any experience with the maintenance and administration of a GIS; however, it is well-versed in the development of non-graphical database systems as the division currently operates three computer systems. In the 1996 legislative session, funds were appropriated for Land Division to develop a computer system for the entire division. One of the tasks was to convert the current inventory from a mainframe computer system to a PC-based system. This work is still underway and has not been completed. The division's disadvantages as a system site is its inability to maintain its information

system and its questionable ability to update its system as shown in the previously discussed inaccuracies in its State Land Inventory system.

Impact of placing the public land trust information system with the Land Division

The positive impact of placing the public land trust information system with the Land Division would be that it could directly update information relating to encumbrances such as general leases and revocable permits without dealing with other agencies except parcels maintained by the Department of Transportation. Also, the non-graphical database that is under the division's maintenance could be utilized in the implementation of the public land trust information system, provided that the division's current State Land Inventory information system will be completed and tested prior to the completion of the public land trust information system. The division's team of professional abstractors could also provide clarification on issues that could arise regarding classifications of parcels within the public land trust information system and the records within their possession would facilitate this process.

The negative aspects of placement of the public land trust information system with Land Division would be that the division does not have a professional staff that is experienced in the maintenance and administration of a GIS. Presently, the division has not completed the task of converting and testing the State Land Inventory into a PC-based system and any further demands on its staff to maintain the public land trust information system will only result in further delays on their present programs. In addition, the division's suspect record-keeping and filing practices may affect its ability to keep the data up-to-date. The Auditor cited the division for poor record management in the Auditor's Report No. 96-13, *Follow-Up Audit of the Financial Audit of the Department of Land and Natural Resources.*

Placing the GIS in the division will require that the division recruit an experienced administrator and professional and technical staff to maintain the public land trust information system. The present facility is inadequate to support the physical requirements for maintenance of the public land trust information system and will require extensive modifications to the present offices or acquisition of a new facility to maintain the system. Hardware and software would need to be purchased in order to maintain the public land trust information system.

Survey Division is responsible for mapping all public lands

The Survey Division of the Department of Accounting and General Services prepares, furnishes and maintains maps and descriptions of all public lands required by other state agencies for the issuance of Governor's Executive Orders, general leases, grants of easements as well

as the sale of government lands or purchase of private lands for public purposes. It also performs field survey work to establish the boundaries of the various government parcels, conducts extensive research for all quiet title actions in which the State is cited as a defendant and compiles information including copies of deeds, old reference maps for possible use in court and also appears as an expert witness in litigations involving state lands or interests. The division also serves as the official depository of all government survey registered maps and other historic maps, field books, calculations and other survey information. The Survey Division also certifies all shoreline maps and checks the Land Court and File Plan maps for mathematical correctness.

Present staffing

The present staffing requirements for the basic functions of the Survey Division are adequate at most to perform most of its primary activities; however, in certain areas it's staffing may be inadequate. As previously mentioned, the Survey Division has a current backlog of at least two years of projects.

Professional qualifications

Survey Division is presently staffed with professionals in the surveying field. The surveyors are extremely qualified and efficient in performing their daily tasks. The State Surveyor is often requested to appear as an expert witness in legal cases involving the determination of boundaries and shorelines. The Survey Division's staff are unquestionably capable and well-versed in surveying methods and mapping, but the majority are not conversant and knowledgeable in the use of modern computer-aided drafting and mapping methods. The Survey Division currently has only one CAD software license and none of its present staff are trained in GIS applications.

Physical plant requirements

The present office space is currently less than adequate. The accumulation of maps and documents over the years has deemed the office space inadequate. The lack of storage and vault space will become critical and archiving of the data in an electronic format will be necessary.

Past performance with GIS or other database systems

Survey Division does not have any experience with the maintenance and administration of a GIS or any database management system.

Impact of placing the public land trust information system with Survey Division

The positive impact on placement of the public land trust information system with Survey Division would be that the Survey Division could directly update information relating to graphical data and Executive Orders. The Survey Division staff's background should enable the division to adapt easily to use GIS management and CAD applications. The Survey Division's strength as it relates to the public land trust information system lies in its ability to provide historical documentation and surveys of private and government lands. Thousands of maps relevant to the public land trust are archived in the Survey office. These hard copies are invaluable for a comprehensive public land trust information system.

The negative aspect of placement of the public land trust information system with the Survey Division would be that the division is not adequately staffed to maintain the public land trust information system. Any further demands on their staff to maintain the public land trust information system will only result in further delays on their present programs. The Survey Division would need to obtain an experienced administrator and technical team to administer and maintain the public land trust information system. The present facility is inadequate to support the physical plant requirements for maintenance of the public land trust information system and will require modifications to the present offices or acquisition of a new facility to maintain the system. Hardware and software funding would need to be appropriated in order to maintain the public land trust information system.

Office of Planning already uses a GIS

The Department of Business, Economic Development and Tourism's Office of Planning, formerly the Office of State Planning, was established to maintain an overall framework to guide the development of the state through a continuous process of comprehensive, long-range and strategic planning to meet the physical, economic and social needs of Hawaii's people, pursuant to Chapter 225M, Hawaii Revised Statutes. In an effort to carry out its intent, the state planners recognized the importance of being able to analyze spatial relationships with respect to land resources and activities. The need to combine map overlays to analyze and make policy decisions had long been recognized, but it was not until the rapid advances in the development of computer technology in the mid 1980s that the office pursued an automated methodology such as the GIS.

Present staffing

The present staffing requirements for the basic functions of the Office of Planning is adequate to perform its primary activities. The staff consists

of planners and GIS experts who are skillful in the review and maintenance of large databases. Currently, three full-time staff members maintain the existing GIS, which is offered to the public through the State's Internet site. Staff periodically update the system with data provided by the various participating agencies at both the state and county levels, including zoning changes.

Professional qualifications

Office of Planning is presently staffed with professionals in the fields of database management and GIS applications. The current planning program manager has guided the program from its inception and continues to proactively administer its current functions, seeking to further the system's capabilities. The staff is qualified in the development and maintenance of GIS and currently maintains the State's GIS. The addition of technicians to maintain the system would be needed, however the supervision would be in place.

Physical plant requirements

The present facilities provide adequate accommodations for the maintenance of the public land trust information system. The Office of Planning presently has the space within its office to handle the physical space requirements for a server and additional workstations and staff.

Past performance with GIS or other database systems

Office of Planning has the experience with maintaining and administering a GIS and currently works with the various state and county agencies to update the current system. Office of Planning instituted the State GIS program in 1987, pursuant to House Resolution 275, H.D. 1, Fourteenth Legislature. The office is in the process of obtaining new hardware and software to update its current system.

Impact of placing the public land trust information system with Office of Planning

The positive impact on placement of the public land trust information system with Office of Planning would be that the staff are well-versed in GIS applications and maintenance. The administrator is available and ready to provide training for technicians. The Office of Planning also has no vested interest in the data and the security of the system's integrity would not be jeopardized. The Office of Planning's team of staff members could also troubleshoot hardware and software glitches. The Office of Planning has most of the required software licenses and hardware needed to operate the proposed information system.

The negative aspects of placement of the public land trust information system with Office of Planning would be that the Office of Planning does not have the direct access to the various agency files and that the stability of the office has been questioned. Although long rumored to be unstable, any drastic organizational change including the elimination of the entire office would require Chapter 225M, HRS, to be either amended or repealed. Although its staff members are highly trained and well qualified, additional support staff would be required if the current state GIS program staff is designated as administrator of the public land trust information system.

Two Options for Implementation of Phase Two are Available

We developed two cost estimates for completing the public land trust information as a result of the assessment and analysis conducted in Phase One. The cost estimate for option A is based on implementing the necessary procedures on a county-by-county basis. The cost estimate for option B is based on the sequential completion of the two main tasks—abstracting and developing the GIS without regard for the location of the parcel.

The following procedures are necessary to complete the GIS:

- Coordination of Research Tasks,
- Abstract of Titles,
- Collection of Historical Data,
- Preparation of Chain of Title Report,
- Development of GIS Database,
- Creation of Themes and Fields,
- Document Scanning/Conversion,
- Populating the Database Fields,
- Preparation of CAD Files Based on Modern Survey Data, and
- Incorporation of Digital Orthophotos and United States Geological Survey (USGS) Data.

A more detailed explanation of each procedure was provided in the Scope and Methodology section of Chapter 1. Option A will cost approximately $18,500,000 while option B will cost approximately

$19,100,000. The reason for the difference is explained in the subsequent sections of the report.

Appendix F provides a breakdown of the average cost on a per parcel basis. Appendix G provides a budget breakdown of option A on a per island basis. Appendix H presents the budgetary cost for option B.

Like any cost estimates, some assumptions were made to arrive at the two options:

- The land department's Land Division and accounting and general services department's Survey Division will offer prompt data retrieval services to the project consultant as recommended in this report.

- The public land trust is comprised of 15,898 parcels as listed in the current State Land Inventory. The breakdown is as follows: City and County of Honolulu – 6,385; County of Maui – 2,684; County of Hawaii – 4,803; and County of Kauai – 2,026.

The following assumptions were based on work done in Phase One and on our experience and knowledge of availability of surveys in the field.

- The average time to conduct a title search and to determine the status of a parcel is approximately four (4) hours since many of the contiguous parcels have the same derivation of title.

- Field surveys will not be required to determine the location of lands included in the Trust and existing surveys will be converted.

- The survey level data to comprise the graphical portion of the GIS will be limited to the creation of CAD files based on existing survey data at Land and Survey Divisions.

- The exterior metes and bounds of government lands that do not have modern surveys will be determined by compiling existing survey data of adjoining lands.

The following costs are not included in the cost estimates for Options A and B:

- Salary and compensation of Department of Land and Natural Resources personnel to provide orientation for retrieval of government documents;

- Bonding of abstractors since requirements can only be determined by the Department of Land and Natural Resources;

- All recommendations for the Survey Division of should have no financial impact on Phase Two of the project since such recommendations are necessary to fulfill their primary functions.

- Recommendations for Department of Transportation, Land Use Commission and various county agencies should not have any cost implications.

The successful establishment and continuance of the public land trust information system is contingent on timely implementation of the recommendations, since the initial delivery of a functional system, as stated in Option A, may be completed one year after the date of commencement of Phase Two. Failure to implement the recommendations will result in additional costs to establish and maintain the system. The greatest financial impact would be on the maintenance of the system because fulfilling the recommendations eases the transfer of information to the public land trust information system. The cost estimates developed for the public land trust information system and presented in this report address the establishment of the system, but not the maintenance aspect. A budget for a maintenance program will need to be developed after the initial delivery of the system.

Option A encourages active involvement and at a lower cost

Option A divides Phase Two into four sub-phases, one for each of the four counties: City and County of Honolulu, County of Maui, County of Hawaii and County of Kauai. Each sub-phase would encompass all aspects involved in preparation of a comprehensive public land trust information system from title abstracting to GIS implementation and would result in a usable product within an estimated one year period after commencement of Phase Two. At the conclusion of the first sub-phase, a complete information system for the first designated county will be fully functional, operational and available for transfer to the administrator. This accelerated manageability offers instant value beneficial to all users, participating agencies and project consultants. Any issues uncovered during the first sub-phase should be expeditiously resolved before commencing the ensuing sub-phase. The administrator will append all subsequent data to the initial databases.

This option presents the best opportunity for completion of a definitive and comprehensive public land trust information system. Although the databases will not be fully populated until completion of the final sub-phase, a usable product within one year of commencement will encourage joint discussion among the administrator, project consultants and users to actively investigate every facet of the system. The hands-on experience afforded by this option will benefit all parties.

This option would require the addition of one member to the administrating staff after completion of the second sub-phase, but none thereafter. In total, after the second sub-phase, the administrating staff would consist of a part-time administrator and two support staff.

Option B will not provide a usable product until four years later

Option B entails the division of Phase Two into two sub-phases for the two principal tasks: title abstracting and GIS implementation. The first task requires the title abstracting of each parcel in the public land trust. As evidenced in Phase One, the time to research and gather all pertinent information is directly dependent upon the services of numerous agencies and therefore difficult to quantify. The scheduling of the second task, GIS implementation involving data compilation and input, is less subjective. Immediately following the completion of the abstracting task, the CAD files necessary for graphical representation should be created and the databases should be populated. The entire system will be delivered to the administrator upon full completion of the GIS sub-phase.

Since two years should be allotted for the title abstracting sub-phase and two years for the GIS implementation, it would be four years from commencement of Phase Two before all data collection, compiling and system set-up will be completed. Updating of the database will be necessary through the second, third and fourth years to account for any subsequent changes which may occur while the system is being developed. This is necessary to ensure accuracy of the information at the time of delivery to the administrator. Public access to the system and information will not be available for four years from commencement of Phase Two. Two support staff members and an administrator acting in a part-time capacity are needed for the administrating agency once the system is delivered.

We believe that Option B is less advantageous to all parties because joint discussion is discouraged and a combined effort will be lacking. Eventual users will not be allowed to actively participate in the development of the system. Continued updating of information already accumulated and stored in the public land trust information system databases, if not done diligently throughout the four year development period, may result in inaccurate information being provided in the end product. A concentrated effort of the participating government agencies, the administrator of the system and the project consultant as described in Option A will yield the best product: a definitive and comprehensive public land trust information system.

Unit rates are based on an average cost for each task being performed based with a five percent (5%) increase per year escalation factor. A 10 hour per week computer draftsperson cost has been factored into the

Option B cost breakdown to address the necessary updating of the system through the second, third and fourth years of the development period.

Conclusion

Completing the public land trust information system will be a costly endeavor costing several million dollars and taking several years to implement. The complexities involved require diverse professional experience in abstracting of government lands and development of a GIS. The most effective system for an inventory of this nature would be a GIS because of the system's powerful analysis techniques and informative presentations.

Regardless of the information system selected, current agency operations may cause time delays and impede the implementation of a comprehensive inventory system. The extent that the relevant government agencies can coordinate and comply with the recommendations in this report will determine the extensiveness of the time delays.

There are two possible schemes to implement the public land trust information system. In one, abstracting and developing the system occurs concurrently but all lands in each county are identified separately. The second option requires the identification of all lands, but the system development occurs after the abstracting of all lands.

The administrator to manage and maintain the system need not be designated at this time. The earliest time that an administrator needs to be selected would be one year from the initiation of second phase of this project. When the administrator is selected, the administrator will need additional staff to help maintain and manage the public land trust information system.

Recommendations

The Legislature should:

1. Appropriate funds to implement a geographic information system as opposed to a non-graphical information system. After a one year period, the Legislature needs to designate the administering agency.

2. Require the continued participation of the Auditor to control and direct Phase Two of this project.

3. Require the Land Division of the Department of Land and Natural Resources to:

a. Allow the consultant unlimited access to all pertinent documents in the division's vault under the supervision of a monitor. This would expedite document retrievals. A reasonable area to research and scan said documents should also be allotted for the consultant. The division's concern that documents will be misplaced can be addressed by the following plan of action:

    i. The division should institute a system by which the abstractors will be allowed to view and scan the documents

    ii. The division should provide an orientation detailing procedures for the abstractors for retrieval of documents.

    iii. The abstractors that are used to retrieve documents from the division should be subject to approval and certification by the division.

    iv. The abstractors should be bonded to ensure that the abstracting firms will be financially responsible for all misplaced documents handled by their abstractors. Specific bonding requirements will be set by the division.

b. Complete the conversion of the State Land Inventory from the current mainframe to the new personal computer system file format and complete testing of the system before the commencement of Phase Two of the public land trust information system. If all of the data contained in the existing State Land Inventory is properly transformed and remains intact, utilization of this data in the system will be optimized.

c. Request from the various county tax agencies the assignment of tax map parcel numbers to all public lands which currently do not have a parcel number and said requests should include easements that are appurtenant to private lands and state roads. This parcel number is the common field linking the multiple databases of the public land trust information system. Each parcel presently without a tax map parcel number must have a unique number with which the information system will be able to perform queries and other evaluation.

d. Require lessees of lands owned by the State to be responsible for retaining the services of a licensed professional land surveyor to prepare a modern survey of all new leases from the date of commencement of Phase Two of the public land trust information system. The survey should be conducted in

accordance with the rules of procedure to be established by the State Surveyor of the Survey Division and all mapping documents will be in a digital format that is compatible with the public land trust information system. These actions will ensure proper, accurate surveys and compel private entities to contribute to the ongoing accumulation of information.

Require the Survey Division of the Department of Accounting and General Services to:

a. Automate the indexing of all CAD files. A systematized index system would permit smooth insertion of the CAD files into the public land trust information system, significantly reduce retrieval time, simplify file maintenance and reduce manpower requirements for data retrieval.

b. Require all future mapping activities to be in a digital format compatible with the public land trust information system and the development of maps using manual drafting techniques should no longer be permitted. If manual drafting practices do not cease, the redundant task of digitizing these maps to be compatible with the information system will be required.

c. Require all future mapping projects to be converted to the Hawaii State Plane coordinate system for seamless transition into the public land trust information system. Presently, all the maps at the Survey Division are in various coordinate systems. One common coordinate system is required for proper representation of spatially related objects. Without a common coordinate system, the parcels would "float" spatially when displayed in the system.

d. Require all scanning of recorded and historical maps in raster format be indexed in accordance with the current State Land Inventory that is under the custody of the Land Division. Proper indexing of the scans will assure precise insertion into the public land trust information system and considerably lessen the amount of time spent locating and maintaining these maps.

e. Implement a prioritized listing of current mapping requests by the various state agencies and include projected completion dates. Once all mapping requests are fulfilled, the digital files of the maps will be imported into the public land trust information system. If these mapping requests are left unfulfilled and never brought up-to-date, a comprehensive inventory will never be realized.

f. Develop modern surveying and mapping standards for conducting surveys of lands that are owned by the state for all licensed professional land surveyors in the private sector that perform surveys on government lands. The standards will not only ensure compatibility with the public land trust information system, but also facilitate future manipulation of the digital CAD files.

5. Require the Department of Transportation to:

   a. Provide, to the administrator, copies of all documents relating to leases and other encumbrances involving airport and harbor lands in a scanned digital format. These digital files will be appended to the existing database.

   b. Require all mapping activities involving the platting of lands designated for airports and harbors be conducted in accordance with the procedures to be established by the State Surveyor of the Survey Division. Standardization will simplify input into the information system.

6. Require the Land Use Commission of the Department of Business, Economic Development and Tourism to submit all current land use data and any future changes to land use district boundaries to the administrator for inclusion into the information system.

7. Request the various counties that are responsible for approvals of land subdivisions institute a requirement that CAD files of subdivisions including or bordering government lands be furnished in a format that is compatible with the public land trust information system. A copy of the CAD file should then be submitted to the administrator of the information system. The compilation of said digital data will further enhance the abilities of the system and aid in the determination of accurate metes and bounds descriptions of government lands that are currently lacking modern descriptions.

8. Request the various county tax map agencies to coordinate with the Land Division of the Department of Land and Natural Resources and assign tax map parcel numbers to all lands owned by the state, including state roads.

9. Request the planning departments of the various county agencies to provide the administrator of the public land trust information system all current zoning designations and any changes that affect either state-owned parcels or lands that adjoin state-owned parcels. This action will enable the administrator to update the zoning data contained in the information system.

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Appendix A
Land Record Definitions

Certificate of Title	the registrar of the Land Court issues certificates of title to owners of registered land.
File Plan	a survey of land that is checked as to form and mathematical correctness and filed with the Bureau of Conveyances of DLNR*.
General Lease (GL)	issued by the DLNR* on general leases of public lands; licenses are recorded in the General Lease Book.
Gubernatorial Executive Order (GEO or EO)	an order by the Governor setting aside public lands for special governmental purposes.
Land Court	the state verifies and insures title to land registered under this system.
Presidential Executive Order (PEO)	an order by the President withdrawing state public lands for special federal purposes.
Registered Map	a map registered and filed with the Survey Division, Department of Accounting and General Services.
Revocable Permit	issued by DLNR* permitting occupancy of sites pending drawing of papers authorizing more permanent nature.
Tax Map	the representation on a flat surface of the land area of the state especially for taxation purposes.

* Department of Land and Natural Resources.

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Appendix B
Chain of Title Report

CHAIN OF TITLE FOR PEARL CITY BRANCH LIBRARY SITE AT MANANA-UKA, EWA, OAHU, HAWAII

				Land Transactions	
Classification	*TMK*	*Acreage*	*Before Annexation*	*Territorial Period*	*After Statehood*
Y	197094026	1.286	Royal Patent Grant No. 2060 to Joseph Raymond and Bernard Lewis dated August 7, 1856 Joseph Raymond and Alexandre Bernard convey all of R.P. Grant No. 2060 to Samuel C. Allen, Mark P. Robinson and Gilbert Waller by deed dated March 4, 1878 Liber 108, pg. 166 Glibert Waller conveys all right, title and interest in R.P. Grant 2060 to Mark P. Robinson by deed dated July 9, 1887 Liber 108, pg. 168 Samuel C. Allen conveys all right, title and interest in R.P. Grant No. 2060 to Mark P. Robinson by deed dated March 19, 1889 Liber 122, pg. 434 Mark P. Robinson conveys all of R.P. Grant No. 2060 to Oahu Railway and Road by deed dated March 19, 1889 Liber 114, pg. 433	United States of America vs. Oahu Railway and Land Co., etal; Order Granting and Confirming Possesion dated September 7, 1944, filed in the District Court of the United States for the District of Hawaii under Civil No. 529, re: possesion of land for war and naval purposes Liber 1846, pg. 1	United States of America conveys 1.286 acres to State of Hawai by Quitclaim Deed dated May 9, 1968 Liber 6054, pg. 352 G.E.O. No. 2438 dated April 29, 1696, setting aside land for Pearl City Branch Library Site, to be under control and management of the Dept. of Education

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Appendix C
Software and Hardware Recommendations

Software	The software recommended for the public land trust information system is Environmental System Research Institute's (ESRI) ArcView™ GIS, the industry standard.
Network Operating System	The network operating system should be Windows NT-based.
Server Requirements	The use of digital orthophotos in the GIS requires the server to provide high bandwidth transfers over the network. Therefore, high-bandwidth network hardware, such as 100Mb/s network interface cards, and high capacity, fast-access hard drives, such as Ultra-SCSI hard drives, are recommended.
Workstation Requirements	Each workstation accessing the GIS will need to have the ArcView GIS software installed, as well as software to view and manipulate the various links. At a minimum, the workstation must meet the recommended hardware requirements of ArcView™ GIS.
Security	Security is performed at two levels. First, Windows NT permissions should be set on the server, restricting file access to certain users of the GIS system. Additionally, users should be regulated by ArcView™ GIS according to login name and restrict the functions available to each user. For example, users from agencies who only need to view documents may be restricted from manipulating the database.
Data Management System	Because of the large volume of documents, maps, and digital orthophotos, a data management system may be needed. The selection of this system is vital to the functionality of the entire GIS system. We are recommending FileNet's Panagon™ IDM. This application fully integrates the power of desktop GIS and adds functionality previously unavailable. A document management system allows the user to electronically view, manage, revise, share, and distribute documents in any format across any enterprise. IDM for ArcView™ GIS provides close integration of the two environments, enabling combined viewing and querying of maps and documents. With this software the user can view and query maps and documents in a fast, integrated environment, without hours of programming. Panagon™ users can query documents based on geographic characteristics and easily generate appropriate maps. At the same time, ArcView™ GIS users can access documents inside a Panagon repository and select geographic features based on document properties and content.

The reasons why we have selected IDM are as follow:

- ArcView GIS + IDM = most powerful desktop GIS + most powerful IDM package.
- Schema level integration is extremely flexible and powerful.
- Three different methods available for linking the two information environments: relational links, address links, and dynamic segmentation links.
- Implementation of an ArcView GIS means one can document-enable existing ArcView GIS customizations.
- Easy to configure so that different departments or users can have different mappings between the GIS and document schemas.
- Equal emphasis on document-centric and map-centric perspectives.
- Thorough integration of the query capabilities of both environments.

Appendix D
Geographic Information System (GIS) Glossary

Access rights	the privileges accorded a user for reading, writing, deleting, updating and executing files on a disk; access rights are stated as "no access," "read only" and "read/write."
Attribute	1. a characteristic of a geographic feature described by numbers, characters, images and CAD drawings, typically stored in tabular format and linked to the feature by a user-assigned identifier (e.g., the attributes of a well might include depth and gallons per minute). 2. a column in a database table.
CAD	Computer-Aided Design; an automated system for the design, drafting and display of graphically oriented information.
CAD drawing	the digital equivalent of a drawing, figure or schematic created from a CAD system; for example, a drawing file or DWG file in AutoCAD.
Coordinate	a set of numbers that designate location in a given reference system, such as x and y in a planar coordinate system or x, y and z in a three-dimensional coordinate system; coordinates represent locations on the Earth's surface relative to other locations.
Coordinate system	a reference system used to measure horizontal and vertical distances on a planimetric map; a coordinate system is usually defined by a map projection, a spheroid of reference, a datum, one or more standard parallels, a central meridian, and possible shifts in the x and y directions to locate the x and y positions of a point, a line, and area features; a common coordinate system is used to spatially register geographic data within the same area.
Data access security	measures taken to control system users' ability to view or modify data; these measures can include logical views of data and explicit access rights by group or individual users.
Database	a logical collection of interrelated information managed and stored as a unit, usually on some form of mass-storage system such as magnetic tape or disk; a GIS database includes data of the spatial location and shape of geographic features recorded as points, lines, polygons, pixels, or grid cells, as well as their attributes.
Data conversion	the translation of data from one format to another.
Datum	a set of parameters and control points used to accurately define the three-dimensional shape of the Earth (e.g., as a spheroid); the datum is the basis for a planar coordinate system; for example, the North American Datum for 1983 (NAD83) is the datum for map projections and coordinates within the United States and throughout North America.
Digital orthophoto	a geographically correct digital image with the same accuracy as a vector digital map but preserving the information content of the original photography.

Geocode	this is the process of identifying the coordinates of a location given its address; for example, an address can be matched against a TIGER street network to determine the location of a home; also referred to as address geocoding.
Georeference	to georeference is to establish the relationship between page coordinates on a planar map and known real-world coordinates.
GIS	Geographic Information System; an organized collection of computer hardware, software, geographic data and personnel designed to efficiently capture, store, update, manipulate, analyze and display all forms of geographically referenced information.
Global Positioning System (GPS)	a system of satellites and receiving devices used to compute positions on the Earth; GPS is used in navigation and its precision supports cadastral surveying.
Graphical user interface (GUI)	a graphical method of controlling how a user interacts with a computer to perform various tasks; instead of issuing commands at a prompt, the user performs desired tasks by using a mouse to choose from "a dashboard" of options presented on the display screen that are in the form of pictorial buttons (icons) and lists; some GUI tools are dynamic and the user must manipulate a graphical object on the screen to invoke a function; for example, moving a slider bar to set a parameter value (e.g., setting the scale of a map).
Image	a graphic representation or description of a scene, typically produced by an optical or electronic device; common examples include remotely sensed data (e.g., satellite data), scanned data, and photographs; an image is stored as a raster data set of binary or integer values that represent the intensity of reflected light, heat, or other range of values on the electromagnetic spectrum.
Map	an abstract representation of the physical features of a portion of the Earth's surface graphically displayed on a planar surface; maps display signs, symbols and spatial relationships among the features; maps typically emphasize, generalize and omit certain features from the display to meet design objectives (e.g., railroad features might be included in a transportation map but omitted from a highway map).
Map projection	a mathematical model that transforms the locations of features on the Earth's surface to locations on a two-dimensional surface; because the Earth is three-dimensional, some method must be used to depict a map in two dimensions; some projections preserve shape, others preserve accuracy of area, distance, or direction.
Map query	the process of selecting information from a GIS by asking spatial or logical questions of the geographic data; spatial query is the process of selecting features based on location or spatial relationship (e.g., select all features within 300 feet of another; point at a set of features to select them); logical query is the process of selecting features whose attributes meet specific logical criteria (e.g., select all polygons whose value for area is greater than 10,000 or select all streets whose name is "Main St."); once selected, additional operations can be performed, such as drawing them, listing their attributes or summarizing attribute values.

Map scale	the reduction needed to display a representation of the Earth's surface on a map; a statement of a measure on the map and the equivalent measure on the Earth's surface, often expressed as a representative fraction of distance, such as 1:24,000 (one unit of distance on the map represents 24,000 of the same units of distance on the Earth); map scale can also be expressed as a statement of equivalence using different units; for example, 1 inch = 1 mile or 1 inch = 2,000 feet.
Polygon	a coverage feature class used to represent areas; a polygon is defined by the arcs that make up its boundary and a point inside its boundary for identification; polygons have attributes (PAT) that describe the geographic feature they represent.
Raster	a cellular data structure composed of rows and columns for storing images; groups of cells with the same value represent features.
Rectification	the process by which an image or grid is converted from image coordinates to real-world coordinates; rectification typically involves rotation and scaling of grid cells, and thus requires re-sampling of values.
Relational database	a method of structuring data as collections of tables that are logically associated to each other by shared attributes; any data element can be found in a relation by knowing the name of the table, the attribute (column) name, and the value of the primary key.
Scanning	the process of capturing data in raster (graphic) format with a device called as scanner; some scanners also use software to convert raster data to vector (line density) data.
Spatial analysis	the process of modeling, examining and interpreting model results; spatial analysis is useful for evaluating suitability and capability, for estimating and predicting and for interpreting and understanding; there are four traditional types of spatial analysis: (1) topological overlay and contiguity analysis, (2) surface analysis, (3) linear analysis and (4) raster analysis.
Spatial data	information about the location and shape of and relationships among, geographic features, usually stored as coordinates and topology.
Survey level data	data which meets specified precision required to achieve first or second order accuracy.
Table	a set of data elements that has a horizontal dimension (row) and a vertical dimension (column) in a relational database system; a table has a specified number of columns but can have any number of rows; table is often called a relation; rows stored in a table are structurally equivalent to records from flat files in that they must not contain repeating fields.
Tabular data	data that is stored in a relational database system.
Theme	a user-defined perspective on a coverage, grid or image geographic data set specified, if applicable, by a coverage name and feature class or data set name, attributes of interest, a data classification scheme and theme-specific symbology for drawing.
Vector	a coordinate-based data structure commonly used to represent linear geographic features; each linear feature is represented as an ordered list of vertices; traditional vector data structures include double-digitized polygons.

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Appendix E
Abbreviated PLTIS User's Manual

ArcView™ Basics

Themes

In ArcView data is organized into themes. There are 3 theme types: Point, Line, and Polygon themes. Each theme contains spatial data of one of the three types. Additionally, a theme may also contain tabular data describing each feature in the theme.

Views

A View is a window which displays theme data. This is the window which a user will spend the majority of time in. A view may contain one or more themes.

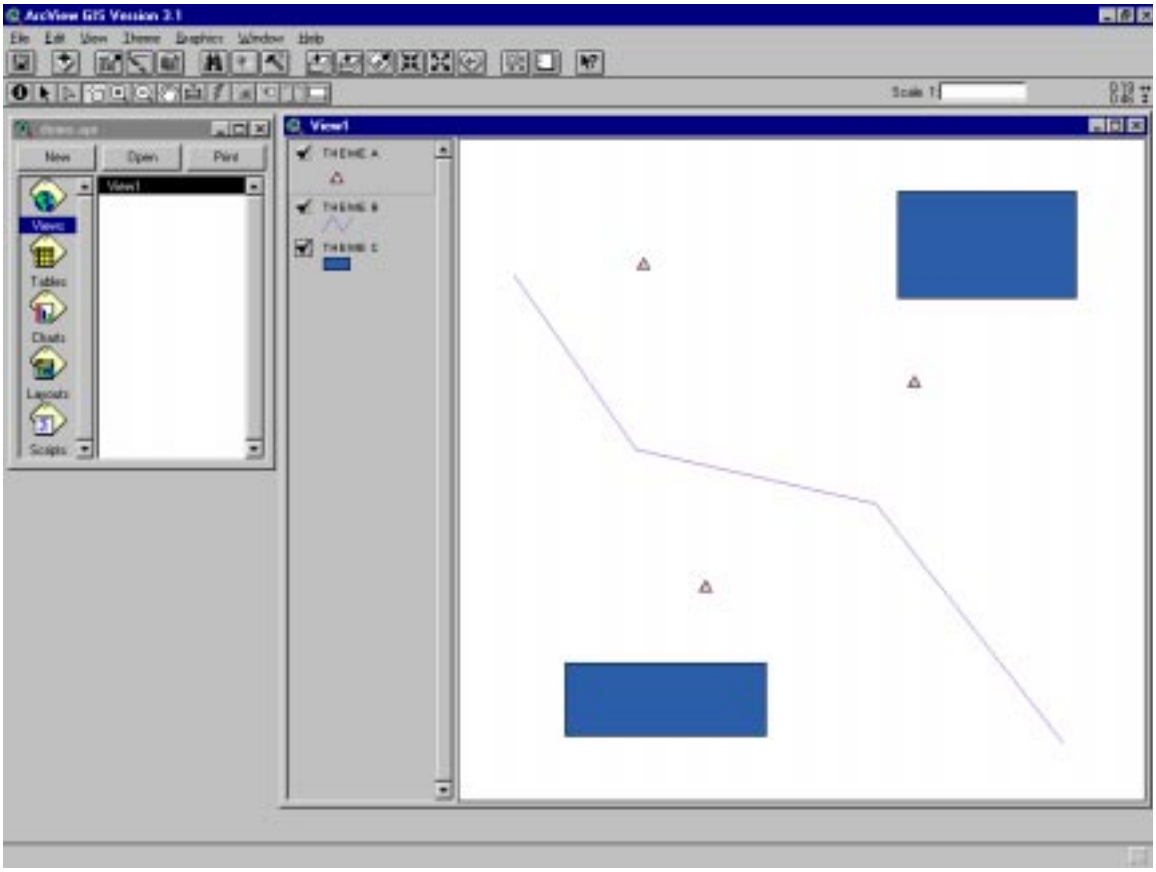


Figure 1: In the figure above, we can see the basic features of an ArcView Project. The window on the left is the Project window. On the right is a View window. In the View we can see that three themes have been added. THEME A is a point theme, THEME B is a line theme, and THEME C is a polygon theme. On the left side of the View Window is the Table of Contents (TOC). We can see by the checkboxes that all themes are visible. The TOC also shows that THEME A is the active theme as it has a raised appearance.

Common Operations

Creating a New View

1. Make the Project Window in ArcView the active window.
2. Select the Views Icon on the left side of the Project Window.
3. Click on the New button at the top of the Project Window.

A new view should be open. You can now add themes to this view.

Opening an Existing View

1. Make the Project Window in ArcView the active window.
2. Select the Views Icon on the left side of the Project Window.
4. On the right side of the Project Window should be displayed a list of existing views in the project. Select the desired view.
5. Click on the Open button at the top of the Project Window.

Creating a New Theme

1. Open the View to which you would like to create a new theme in or if the view is already open make it the active window.
2. From the menu bar, select View → New Theme.
3. You are now selected for the theme type. Select either Point, Line or Polygon and click OK.
4. You are now prompted for a filename to which to save the new theme to. Select the appropriate directory, enter a filename, and press OK.

You may now add features to the theme by selecting the draw tool.

Adding a Theme to a View

1. Open the View to which you would like to add a theme or if the view is already open make it the active window.
2. From the menu bar, select View → Add Theme.
3. You will now be prompted with a file dialog. Select the theme file (usually a shapefile) and click OK.

Deleting a Theme from a View

1. Open the View from which you would like to delete a theme or if the view is already open make it the active window.
2. In the View's Table of Contents (the left side of the View) select the theme which you would like to delete.
3. From the menu bar select Edit → Delete Themes.
4. You are then prompted to confirm that you would like to delete the theme. If you are sure you would like to delete the theme click Yes.

Exercise 1: Creating a view with a theme

1. Open ArcView. You can access ArcView from the Windows Start Menu under ESRI.

2. You are now prompted (see Figure below) whether to start a new project or open an existing one. Select "Create a new project" with the option "as a blank project."

3. You should have a new project open. In the project window, select the Views icon and click on the New button.

4. You should now have a new view open. Click on the view window to make it the active document.

5. From the menubar, select View ® New Theme.

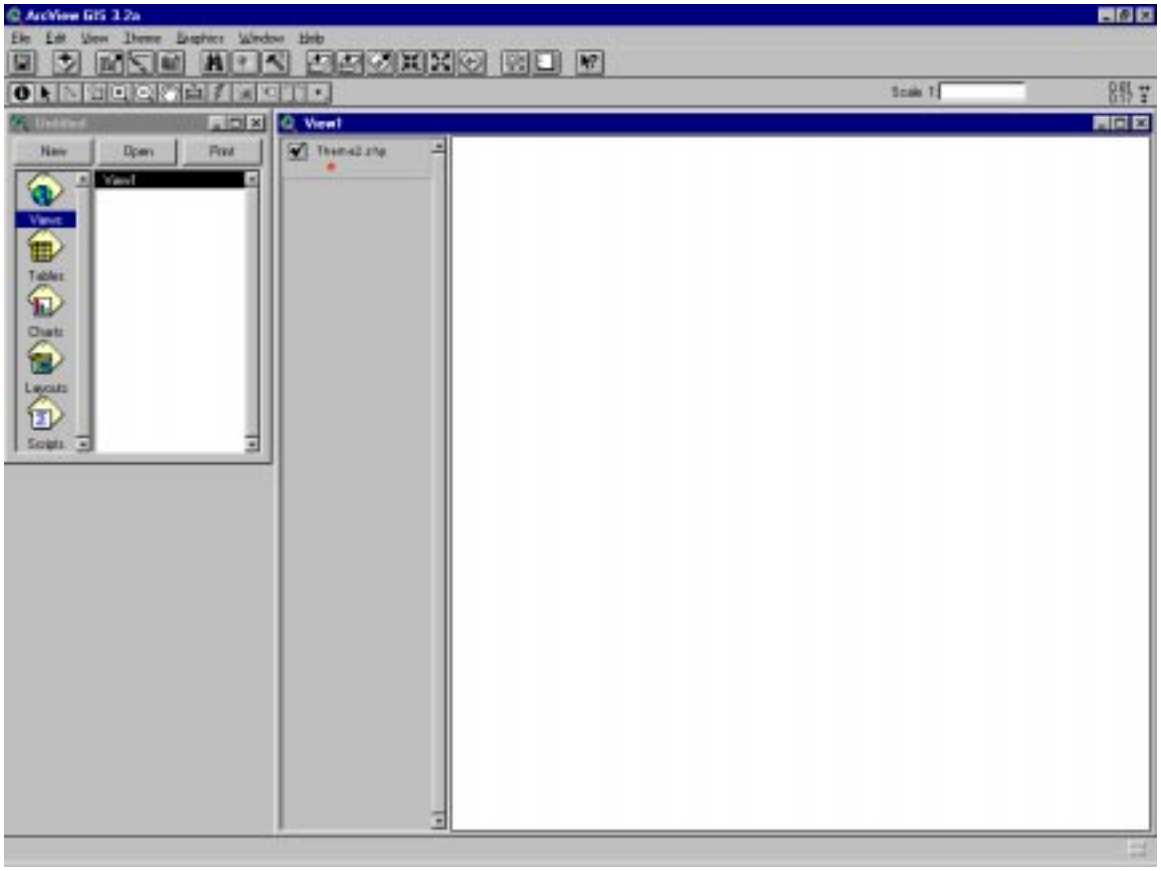
6. You are now prompted for the theme type. We will create a point attribute, so select Point from the pull down menu and click on OK.

7. You are now prompted for a file location and filename for the new theme. Select a directory to place the theme file and enter a filename. Click OK.

8. You should now see in the view's table of contents the theme you just created. In the next exercise, you will learn how to add features to the theme.

9. Save your project. From the menubar, select File ® Save As. You will be prompted if you would like to the save the edits to the theme you created – click Yes. You will be prompted for a directory and filename for the project file. Select an appropriate directory and enter a filename. Click OK.

Using the Toolbar
Note: The following tools are only available when a View is the active window.



Identify

The Identify tool is used to get information of a particular theme feature.

1. Make the theme to which the feature you would like to get information on the active theme.
2. Select the Identify tool. The cursor should change to the i-cursor.
3. In the view, click on the feature you would like to get information about. A window will now appear which will give you information about the particular feature.

Zoom In

1. Select the Zoom In tool from the Toolbar.
2. In the view, click and drag a rectangle around the area you would like to zoom in on.

Zoom Out

1. Select the Zoom Out tool (the magnifying glass with the '-') from the Toolbar.
2. In the view, click and drag a rectangle. The smaller the rectangle, the more the window zooms out.

Pan

1. Select the Pan tool (the hand) from the Toolbar.
2. In the view, click and drag to pan.

Select Feature

1. Click on the Select Feature tool from the Toolbar.
2. Select the Theme from the View's Table of Contents which contains the features you would like to select.
3. If you would like to select only one feature simply click on that feature. If you would like to select more than one feature, click and drag a rectangle around the desired feature. If you would like to select additional features, hold down the Shift key and repeat this step.

   Notice that after selecting a feature its color changes (probably to yellow). You can unselect all features by clicking on Themes→Clear Selected Features

Measure

1. Click on the Measure tool from the Toolbar.
2. In the View, click on the initial point from which you would like to measure. Notice that in the bottom of the ArcView window, the length from your mouse pointer to the initial point is displayed.
3. If you would like to measure multiple segments, click the next point. To stop measuring, double click within the view window.

Exercise 2: Working with Features

This exercise is a continuation of Exercise 1. In this exercise, we will use some of the tools from the toolbar to add features to the theme you previously created.

1. Open ArcView if it is not already open. If the project you created in the first exercise is not open, open the project.
2. Click on the View to make it the active window.
3. From the menubar select Theme → Start Editing.
4. From the toolbar, select the Draw Point tool.
5. Place a few points on the view.
6. From the menubar, select Theme → Stop Editing. You will be asked whether to save edits to the theme. Click on Yes.

The ArcView Databases

ArcView as well as most GISs are based on databases. The themes in a view are simply graphical representations of a databases. Corresponding to each theme in a view is a tabular database which contains other data pertaining to each feature of the theme.

Opening a Theme's Table

To access a theme's table:

1. In the view's table of contents (the left margin of the view window), select a theme to make it active.
2. From the menu bar select Theme→ Table. The active theme's table will now be shown.

Selecting Records from a Table

Sometimes it is easier to find certain features of a theme by it's tabular data.

To select a theme using tabular data:
1. Open the theme's table as described above.
2. Make sure your cursor is the arrow pointer. If not select the arrow icon from the toolbar.
3. Select a record from the table by clicking on the appropriate row. Notice that when you select a record, the row turns yellow in the table. Also notice, that this feature turns yellow in the view.

Editing a Table

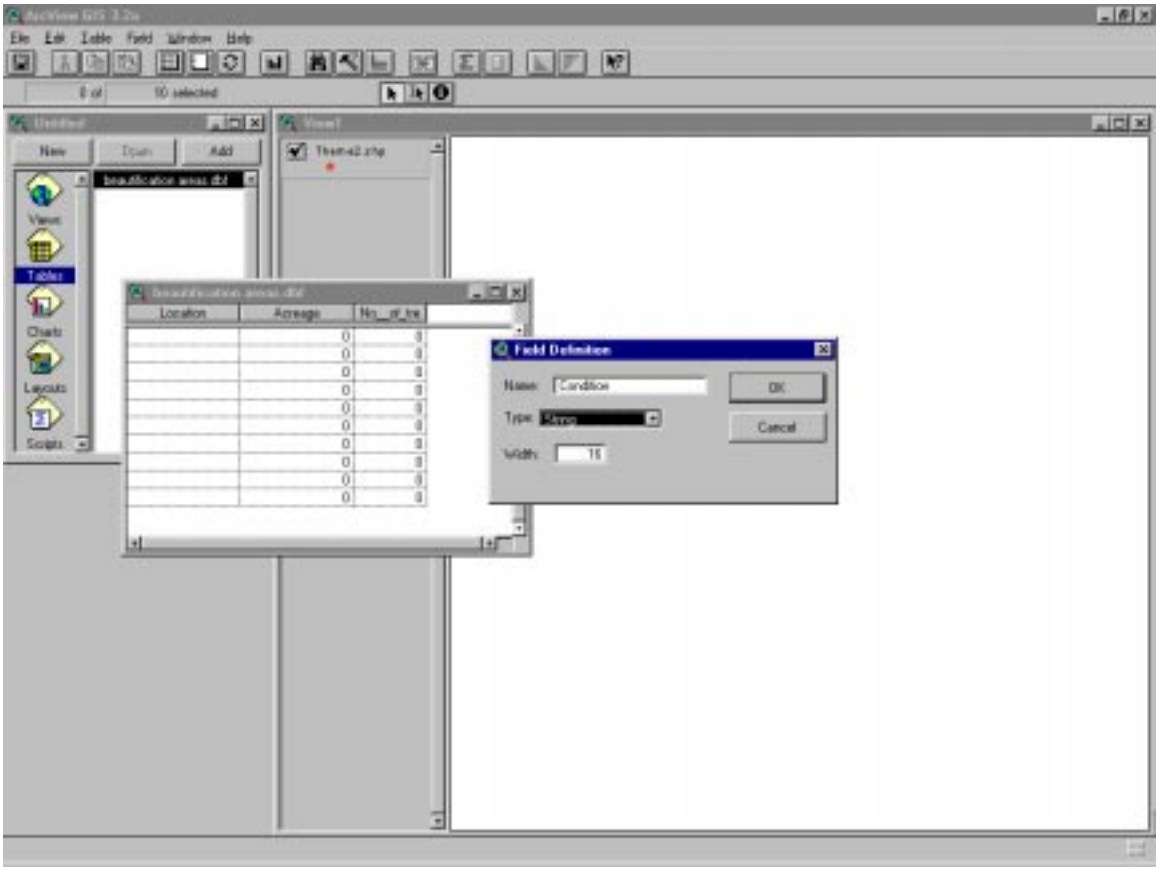
To edit a table:

1. Open the table you would like to edit.
2. From the menu bar select Table → Start Editing.
3. Change to the I-cursor by selecting its icon from toolbar.
4. Click on the cell you would like to edit and type in the new data. Make sure you press the Enter key after each editing a cell.
5. When you are done editing data, from the menu select Table → Stop Editing.
6. You will be prompted "Save Edits?." Click on the Yes button.

Adding Fields to a Table

To add fields to a table:

1. Open the table you would like to add fields to.
2. From the menu bar select Table → Start Editing.
3. From the menu bar select Edit → Add Field.
4. You will be prompted for the Field Definition. In the first box, enter the name of the field.
5. In the second box, select the field type: Number, String, Boolean, or Date.
6. In the third box, enter the width of the field. Note: this field will vary depending on the field type selected.



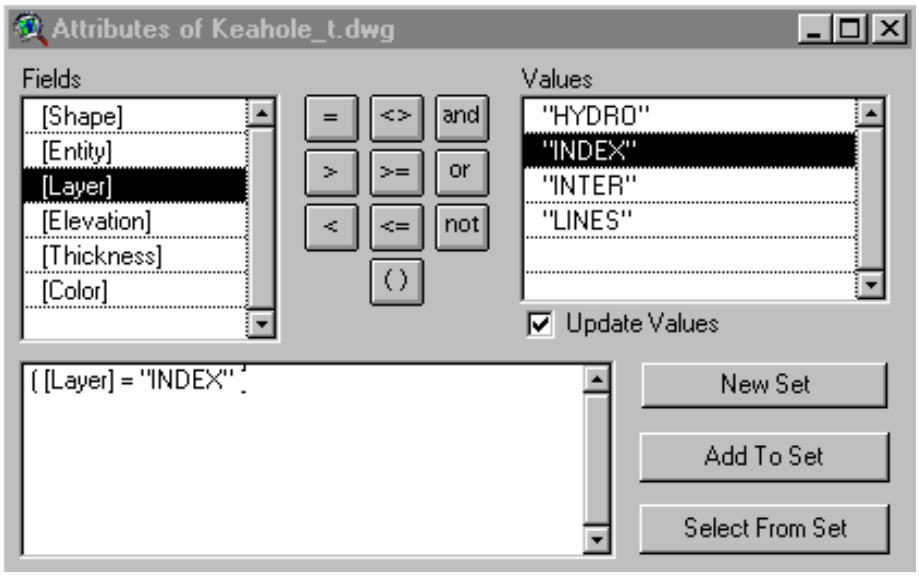
Adding a field to the table.

Querying Data

Queries allow you to do a search on a database using certain criteria which you specify.

To query a database:

1. Open the table you would like to query
2. From the menu bar, select Table→ Query.
3. The Query window will now be open. You specify the search criteria by creating an expression using the fields in the database of the active theme and operators. After creating your query expression, click the New Set button. Notice that any records which correspond to the criteria specified are now selected.
4. If you are done with the query, you can close the query window.



The Query Window. Build a query by selecting a field from the left, an operator (i.e.=,<,>,etc.), and a value.

Reports

Generating a Quick Report

To create a Quick Report:

1. If you would like to generate a report on specific features of a theme, select them in the view.
2. From the menu bar, select Theme → Create a Report.
3. You will be prompted for the type of report you would like to create. Select Quick Report and click on the Next >> button.
4. You are now prompted whether the report will be based on all the records or only selected records (if any records have been selected.) Pick the appropriate choice and click on the Finish button.
5. A window now appears listing the fields available in the active theme. Select one or more of the fields you would like to appear in the report.
6. Click on the Column Layout tab. Adjust the column widths by clicking and dragging the boundaries of the column headings.
7. Click Preview to see what the finished table will look like.
8. Click Print to send the report to the Printer.

Layouts

Creating a Layout

To create a layout:

1. Zoom to the area you would like to appear on the layout.
2. Make active the theme(s) which will appear on the layout. If you would like the legends to appear also, make them visible on your view.
3. From the menubar, select View → Layout.
4. The template manager will appear. Select a template for your layout.
5. You are now prompted for a layout. Select <New Layout>. Click OK.

Creating a Layout Template

To create a template:

1. From the project window, select the Layout icon. Click on New in the Project window.
2.  A layout window should now be open. Select the View Frame tool. Click and Drag out a large rectangle on your layout. This rectangle will contain the contents of your view. A dialog will appear asking for certain information. Select the view you would like to appear in the frame you just created.
3.  Select the Scale Bar tool. Click and Drag out a rectangle where you would like the scale bar to appear. A dialog will appear requesting some parameters for the scale bar. Select Viewframe1 for Viewframe. Select the units of measurement. Also enter values for Interval, Intervals, and Left Divisions.
4.  Select the Legend tool. Click and drag out a rectangle where your legend will appear. Again, a dialog will appear with some options. Select Viewframe1 for Viewframe. Select When Active in the Display box.
5.  Select the Text tool. Place some text where you would like the title to display.
6. From the menubar, select Layout → Store as Template. A dialog will ask you for a name for the template. Enter a name and click OK.

Additional Features

Zooming to an island

Using the window in the lower left corner you can zoom to one of four islands: Oahu, Maui, Kauai, and Hawaii.

To zoom to an island:

1. Make active the window labeled “Navigation View”
2. Select the Zoom to Island tool.
3. Click on an island in the “Navigation View” The area designated should appear in the large view.

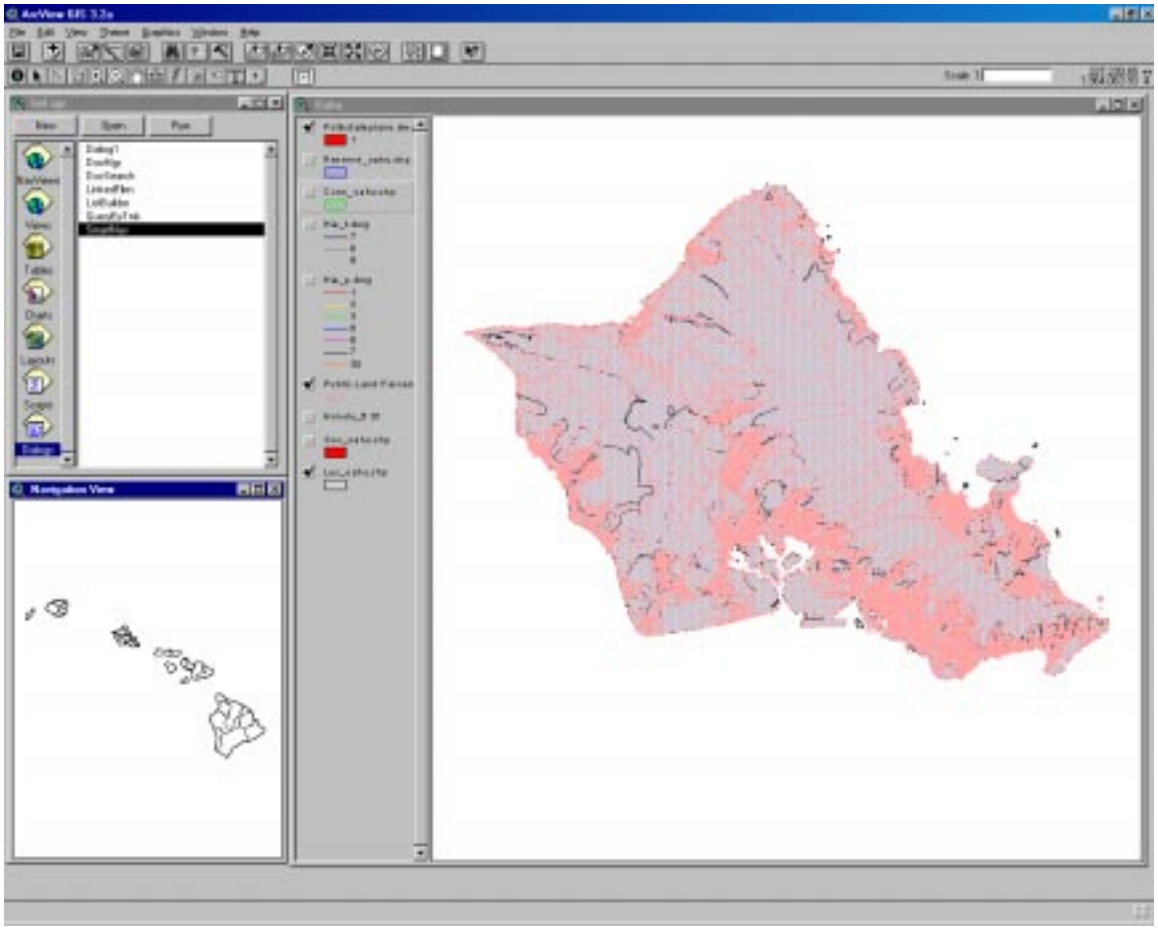


Figure showing "Zoom to Island" tool.

Smart Navigator

The Smart Navigator allows the user to navigate in the GIS. By specifying coordinates, TMK number, or map feature, the user can zoom into a particular feature in the view window.

To zoom to a specific coordinate:

1. Make the View the active window.
2. Click on the Smart Navigator icon.
3. Enter an X and Y coordinates in the Coordinates area.
4. Click on the Go button in the Coordinates area.

To zoom to a specific TMK parcel:

1. Make the View the active window.
2. Click on the Smart Navigator icon.
3. Enter a TMK parcel number in the TMK area.
4. Click on the Go button in the TMK area.

To zoom to a specific map feature:

1. Make the View the active window.
2. Click on the Smart Navigator icon.
3. Enter a map feature in the Map Feature area.
4. Click on the Go button in the Map Feature area.

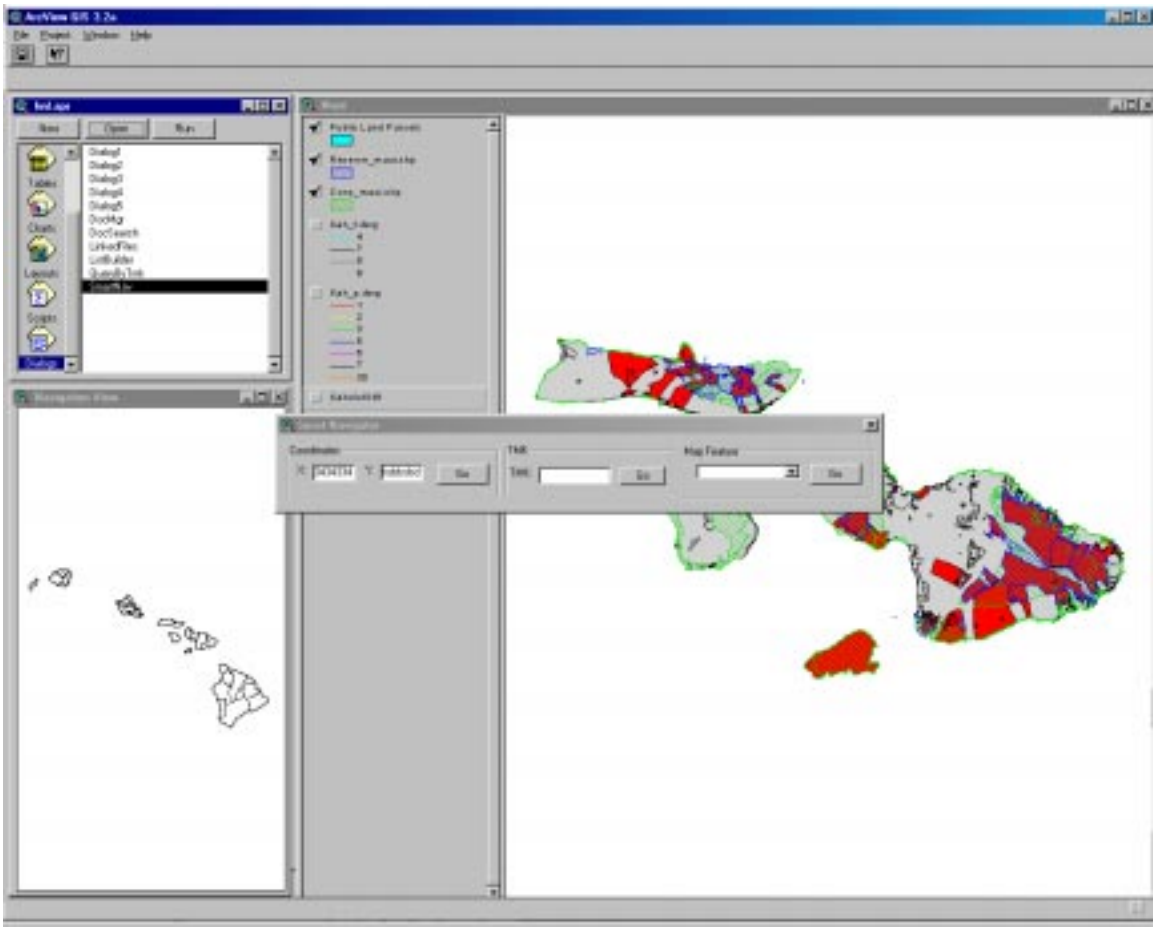


Figure showing the Smart Navigator window.

Link to AutoCAD file tool

The Link to AutoCAD files window will display the AutoCAD file(s) associated with the area that have been selected.

To view the AutoCAD files of a selected area:

1. Click on the Link to AutoCAD file button in the view button bar.
2. By clicking on a parcel in the View Window, an AutoCAD file will be displayed of the selected parcel.

Link to Chain of Title tool

The Link to Chain of Title window will display a Chain of Title chart with hypertext links to scanned documents of the area that have been selected.

To view the Chain of Title chart:

1. Click on the Link to Chain of Title icon in the view button bar.
2. Click on a parcel you wish to view.

To view scanned documents of the parcel:

1. Click on to the hypertext annotations in the Chain of Title chart.

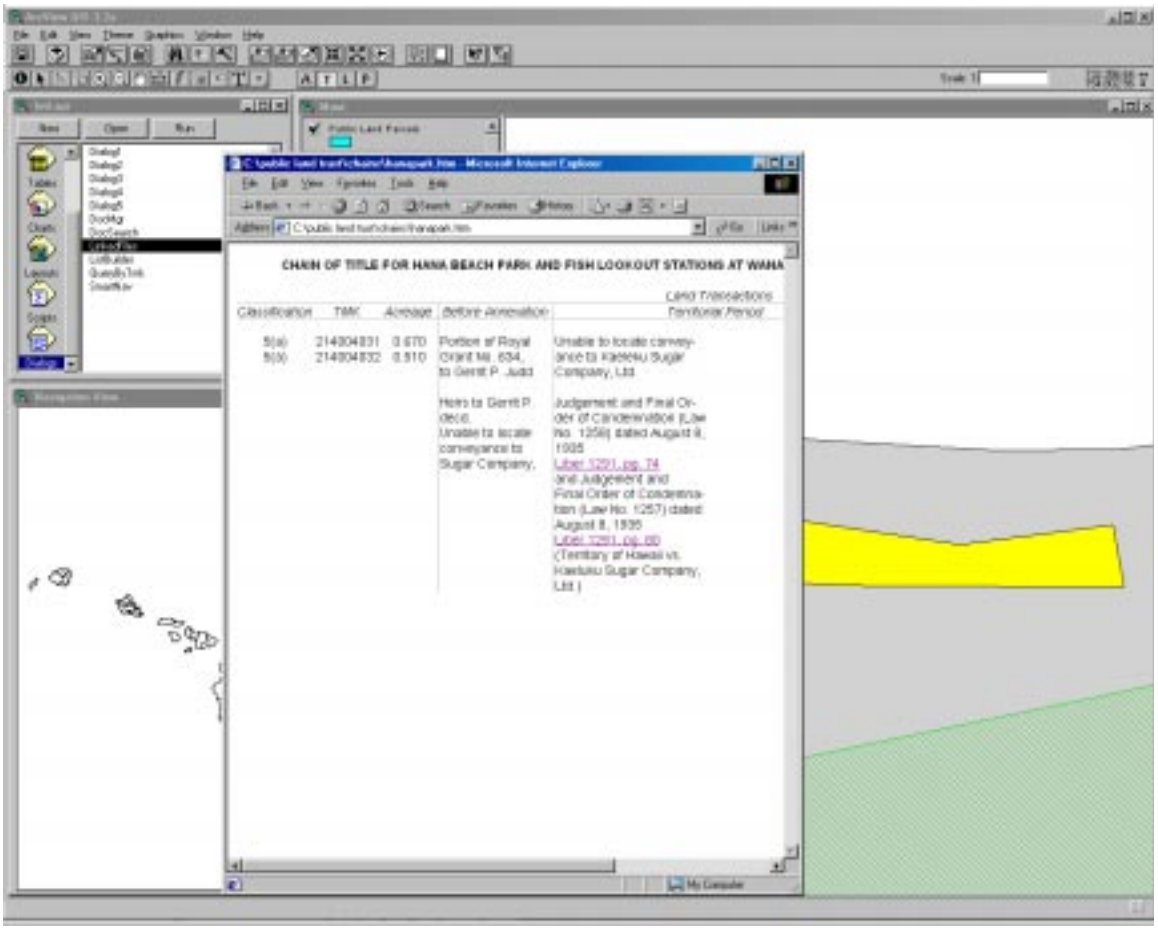


Figure showing Chain of Title chart.

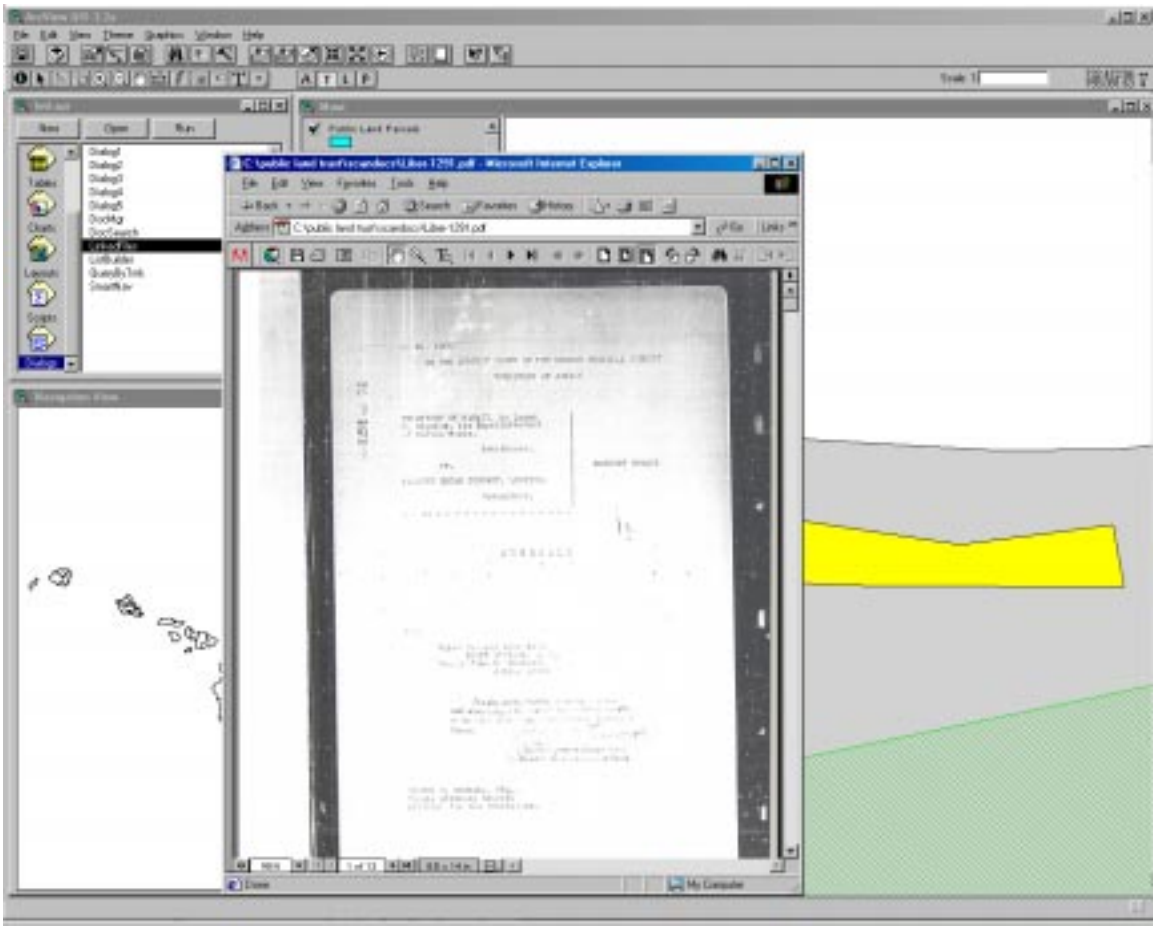


Figure showing a scanned document.

Related Documents

The Related Document window will show a list of scanned documents relating to the selected feature of the current theme.

To view the related documents of a selected feature:

1. Click the **Related Documents** icon in the view button bar.
2. A list of related documents will be displayed. If you would like to open a document, double-click on that document in the listing.

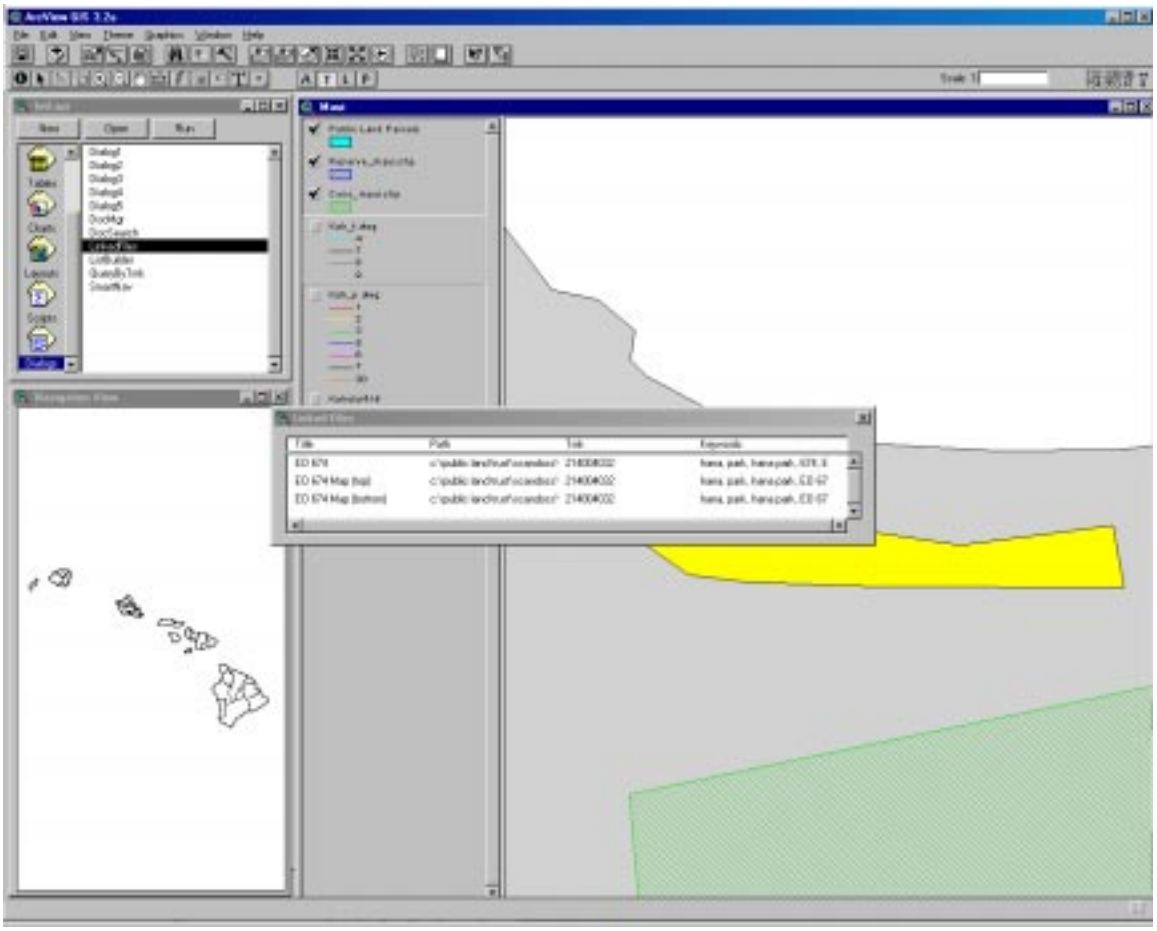


Figure showing a listing of Related Documents.

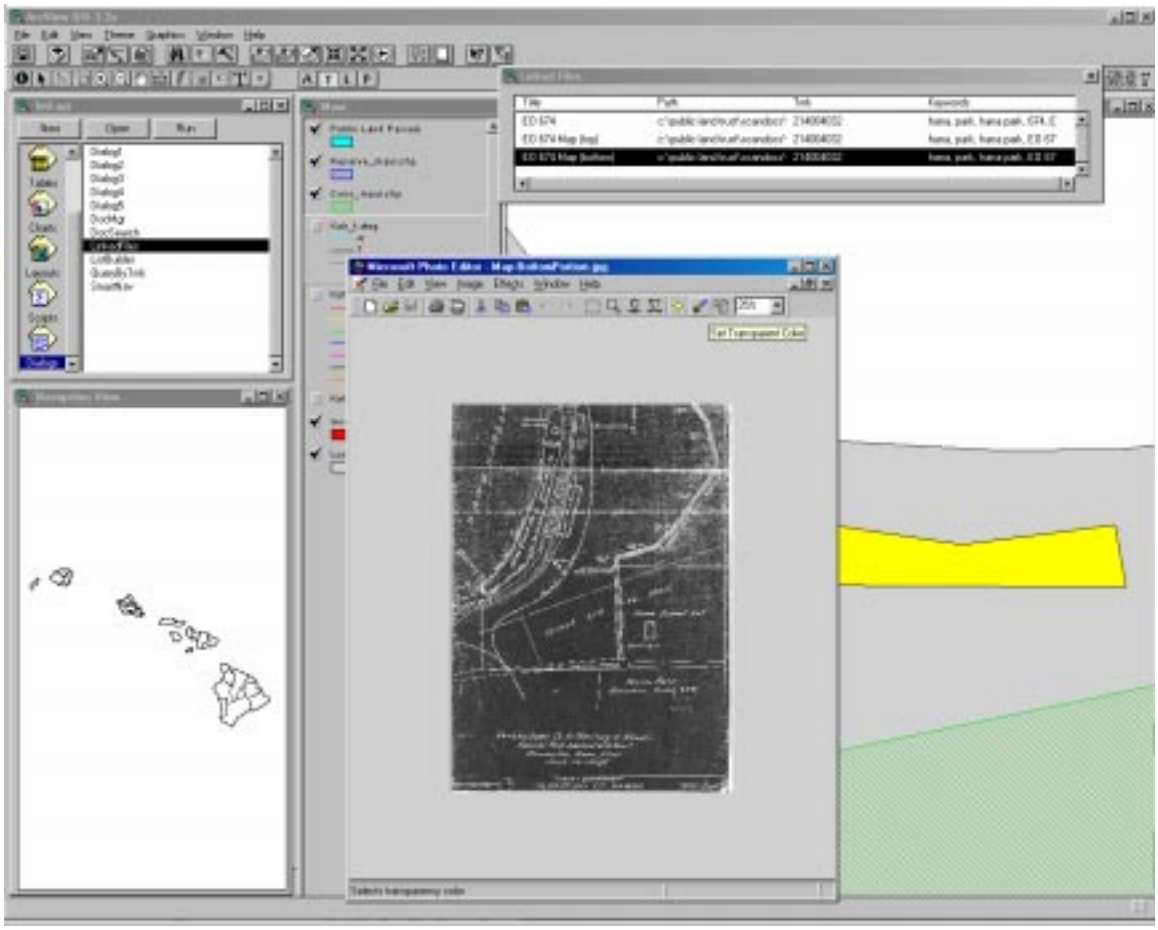


Figure showing a listing of Related Scanned Document.

Classification Tool

The Classification Tool button will display the current land classification of the selected parcel.

To view the current land classification of a parcel:

1. Click on the Classification Tool button in the view button bar.
2. Click on a parcel you wish to identify.

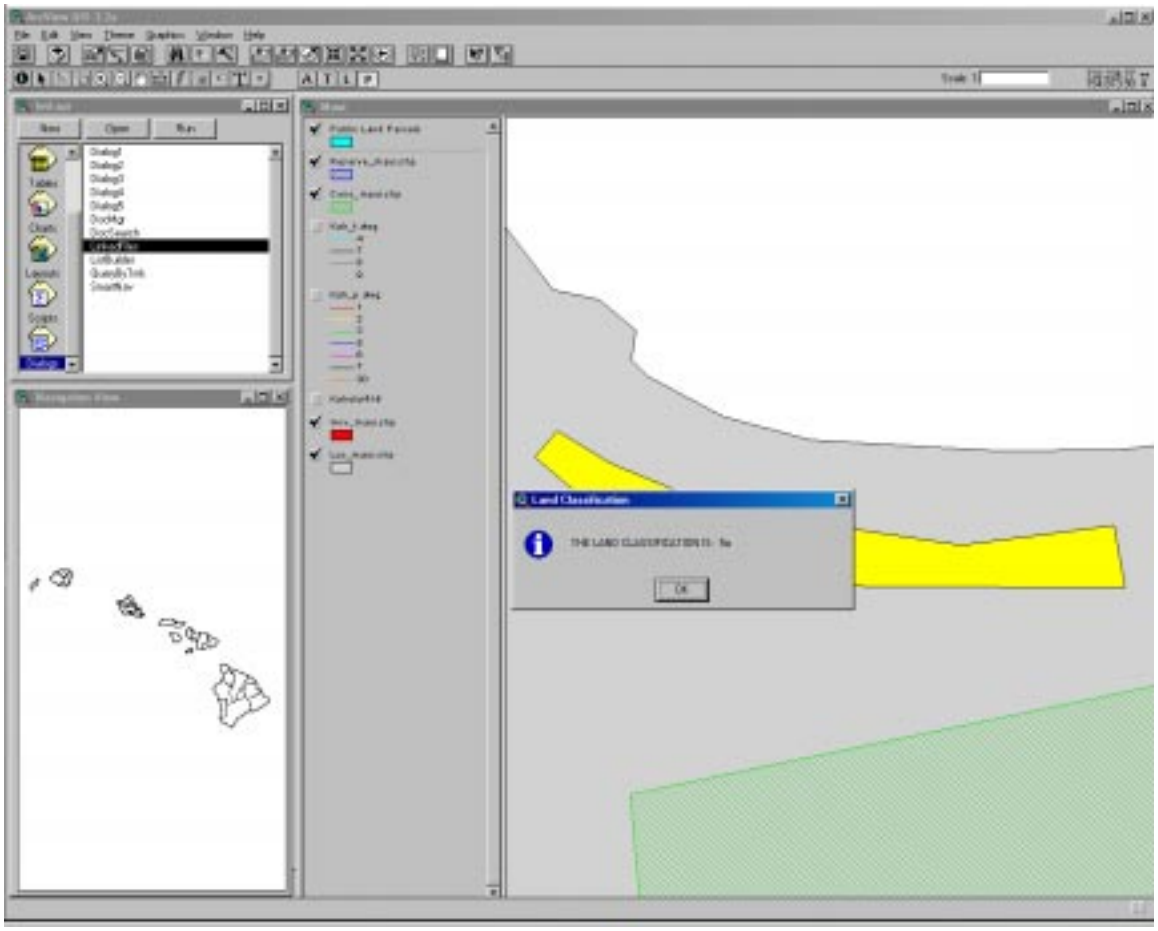


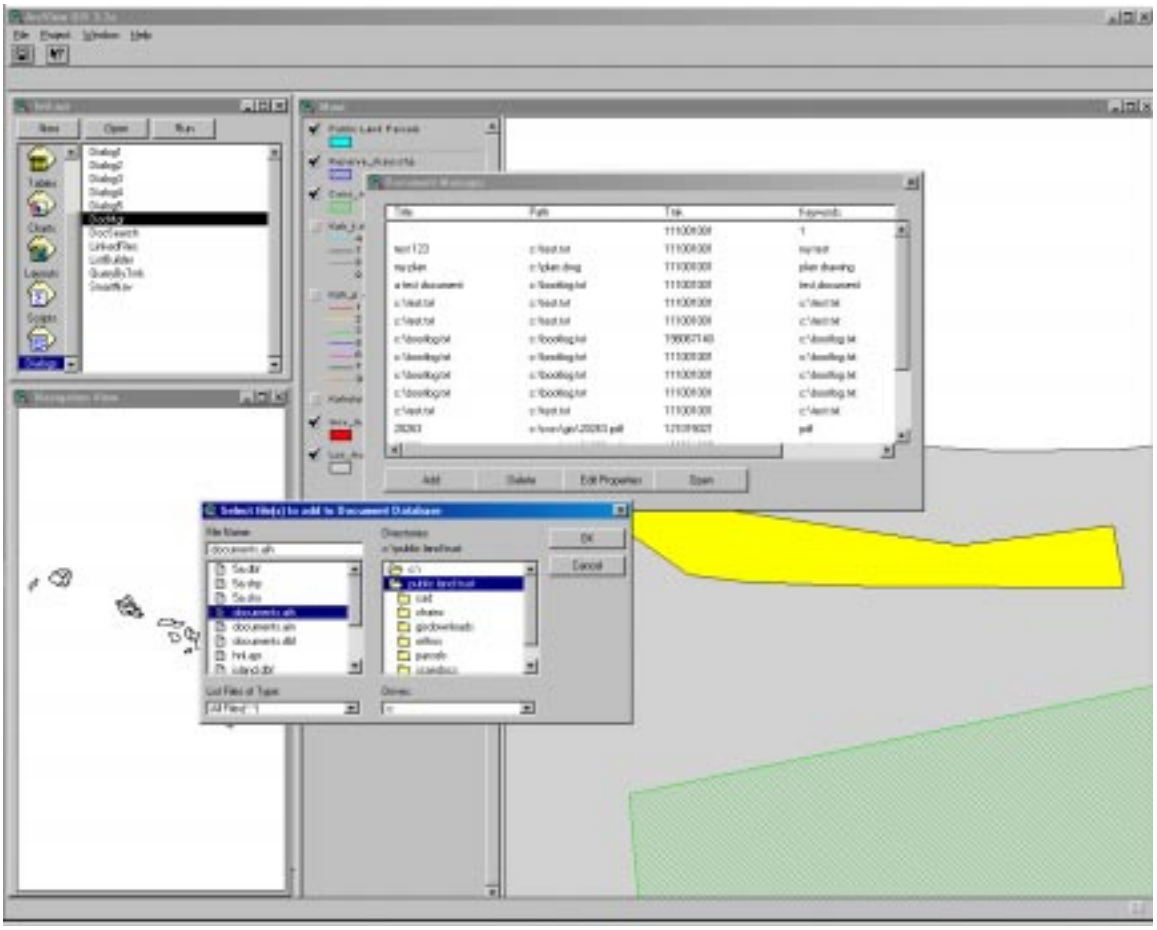
Figure showing current land classification of a selected parcel.

Document Manager

The Document Manager window allows you to add, delete, edit, and open documents in the database.

To access the Document Manager:

1. Click on the **Document Manager** icon in the view button bar.
2. Select appropriate task in the Document Manager window.



Adding a document into the document database.

Document Search

The Document Search window allows you to search for documents using Keywords.

To search for a document:

1. Click on the **Document Search** icon in the view button bar.
2. Enter a keyword (i.e. pdf) in the Keywords window, then click **Search**.

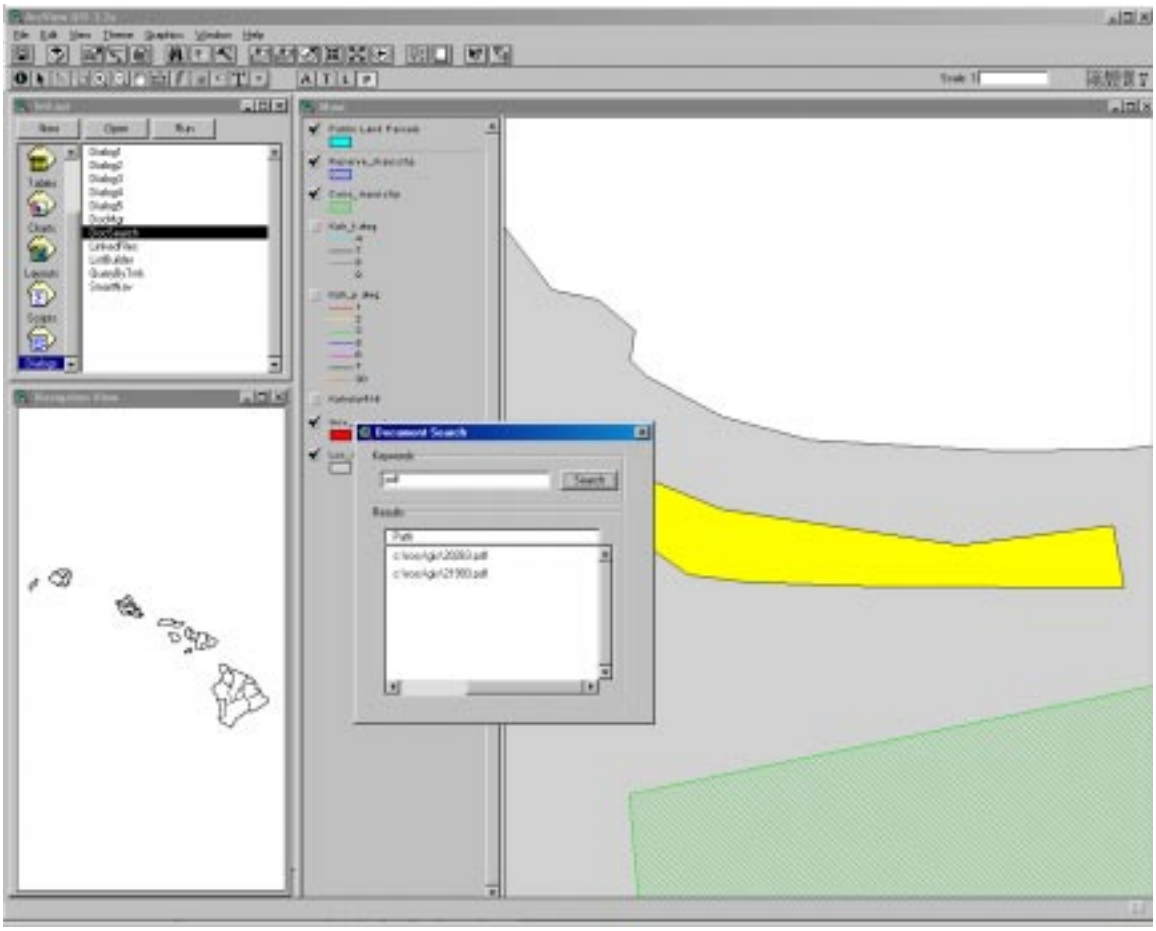


Figure showing document search window.

Appendix F
Average Cost Per Parcel

DETERMINATION OF AVERAGE COST PER PARCEL

										OPTIONS A & B 1ST YEAR COST	x	5% COST INCREASE	=	OPTION A 2ND YEAR COST	x	5% COST INCREASE	=	OPTION A 3RD YEAR COST	x	5% COST INCREASE	=	OPTION A 4TH YEAR COST
A.	Coordination of Research Tasks																					
	Project Manager:	4	minutes per parcel	x	$150.00	per hour	=	$10.00														
	Project Abstractor:	5	minutes per parcel	x	$120.00	per hour	=	$10.00														
	Sr. Abstractor:	6	minutes per parcel	x	$80.00	per hour	=	$8.00														
										$28.00	x	1.05	=	$29.40	x	1.05	=	$30.87	x	1.05	=	$32.41
B.	Abstract of Titles																					
	Project Manager:	6	minutes per parcel	x	$150.00	per hour	=	$15.00														
	Project Abstractor:	8	minutes per parcel	x	$120.00	per hour	=	$16.00														
	Sr. Abstractor:	136	minutes per parcel	x	$80.00	per hour	=	$181.33														
	Jr. Abstractor:	45	minutes per parcel	x	$70.00	per hour	=	$52.50														
										$264.83	x	1.05	=	$278.07	x	1.05	=	$291.97	x	1.05	=	$306.57
C.	Collection of Historical Data																					
	Project Manager:	5	minutes per parcel	x	$150.00	per hour	=	$12.50														
	GIS Specialist:	75	minutes per parcel	x	$80.00	per hour	=	$100.00														
	Computer Draftsperson:	75	minutes per parcel	x	$76.00	per hour	=	$95.00														
										$207.50	x	1.05	=	$217.88	x	1.05	=	$228.77	x	1.05	=	$240.21
D.	Preparation of Chain of Title Report																					
	Project Manager:	3	minutes per parcel	x	$150.00	per hour	=	$7.50														
	Project Abstractor:	4	minutes per parcel	x	$120.00	per hour	=	$8.00														
	Sr. Abstractor:	34	minutes per parcel	x	$80.00	per hour	=	$45.33														
	Jr. Abstractor:	34	minutes per parcel	x	$70.00	per hour	=	$39.67														
										$100.50	x	1.05	=	$105.53	x	1.05	=	$110.81	x	1.05	=	$116.35
E.	Development of GIS Database																					
	Project Manager:	0.25	minutes per parcel	x	$150.00	per hour	=	$0.63														
	GIS Specialist:	2	minutes per parcel	x	$80.00	per hour	=	$2.67														
	Computer Draftsperson:	1	minutes per parcel	x	$76.00	per hour	=	$1.27														
										$4.57	x	1.05	=	$4.80	x	1.05	=	$5.04	x	1.05	=	$5.29
F.	Creation of Themes and Fields																					
	Project Manager:	0.25	minutes per parcel	x	$150.00	per hour	=	$0.63														
	GIS Specialist:	1	minutes per parcel	x	$80.00	per hour	=	$1.33														
	Computer Draftsperson:	0.5	minutes per parcel	x	$76.00	per hour	=	$0.63														
										$2.59	x	1.05	=	$2.72	x	1.05	=	$2.86	x	1.05	=	$3.00
G.	Conversion/Document Scanning																					
	Project Manager:	1	minutes per parcel	x	$150.00	per hour	=	$2.50														
	GIS Specialist:	5	minutes per parcel	x	$80.00	per hour	=	$6.67														
	Computer Draftsperson:	19	minutes per parcel	x	$76.00	per hour	=	$24.07														
										$33.24	x	1.05	=	$34.90	x	1.05	=	$36.65	x	1.05	=	$38.48
H.	Populating the Database Fields																					
	Project Manager:	7	minutes per parcel	x	$150.00	per hour	=	$17.50														
	GIS Specialist:	43	minutes per parcel	x	$80.00	per hour	=	$57.33														
	Computer Draftsperson:	57	minutes per parcel	x	$76.00	per hour	=	$72.20														
										$147.03	x	1.05	=	$154.38	x	1.05	=	$162.10	x	1.05	=	$170.21
I.	Preparation of CAD Files based on Modern Survey Data																					
	Project Manager:	6	minutes per parcel	x	$150.00	per hour	=	$15.00														
	Surveyor:	75	minutes per parcel	x	$80.00	per hour	=	$100.00														
	Computer Draftsperson:	151	minutes per parcel	x	$76.00	per hour	=	$191.27														
										$306.27	x	1.05	=	$321.58	x	1.05	=	$337.66	x	1.05	=	$354.54
J.	Incorporation of Digital Orthophotos, USGS data																					
	Project Manager:	0.25	minutes per parcel	x	$150.00	per hour	=	$0.63														
	GIS Specialist:	1.5	minutes per parcel	x	$80.00	per hour	=	$2.00														
	Computer Draftsperson:	1	minutes per parcel	x	$76.00	per hour	=	$1.27														
										$3.90	x	1.05	=	$4.10	x	1.05	=	$4.31	x	1.05	=	$4.53
K.	Miscellaneous Expenses																					
	GDSI digital files							=	$2.52													
	Printing of maps and documents:							=	$2.00													
	Travel Expenses:							=	$0.38													
										$4.90	x	1.05	=	$5.15	x	1.05	=	$5.41	x	1.05	=	$5.68
										$1,103.39				$1,158.51				$1,216.45				$1,277.27
									SAY	$1,105.00				$1,160.00				$2,220.00				$1,280.00

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Appendix G
Cost Estimate for Option A

OPTION A

BUDGETARY COST BREAKDOWN
FOR
IMPLEMENTATION OF PHASE II
PUBLIC LAND TRUST INFORMATION SYSTEM

I.	ISLAND OF OAHU (FIRST YEAR)								
	A. Coordination of Research Tasks	$28.00	x	6,385	parcels	=	$178,780		
	B. Abstract of Titles	$264.83	x	6,385	parcels	=	$1,690,940		
	C. Collection of Historical Data	$207.50	x	6,385	parcels	=	$1,324,888		
	D. Preparation of Chain of Title Report	$100.50	x	6,385	parcels	=	$641,693		
	E. Development of GIS Database	$4.57	x	6,385	parcels	=	$29,179		
	F. Creation of Themes and Fields	$2.59	x	6,385	parcels	=	$16,537		
	G. Conversion/Document Scanning	$33.24	x	6,385	parcels	=	$212,237		
	H. Populating the Database Fields	$147.03	x	6,385	parcels	=	$938,787		
	I. Preparation of CAD Files based on Modern Survey Data	$306.27	x	6,385	parcels	=	$1,955,534		
	J. Incorporation of Digital Orthophotos, USGS data	$3.90	x	6,385	parcels	=	$24,902		
	K. Miscellaneous Expenses	$4.90	x	6,385	parcels	=	$31,287		
								$7,044,764	
II.	ISLAND OF HAWAII (SECOND YEAR)								
	A. Coordination of Research Tasks	$29.40	x	4,803	parcels	=	$141,208		
	B. Abstract of Titles	$278.07	x	4,803	parcels	=	$1,335,570		
	C. Collection of Historical Data	$217.88	x	4,803	parcels	=	$1,046,478		
	D. Preparation of Chain of Title Report	$105.53	x	4,803	parcels	=	$506,861		
	E. Development of GIS Database	$4.80	x	4,803	parcels	=	$23,054		
	F. Creation of Themes and Fields	$2.72	x	4,803	parcels	=	$13,064		
	G. Conversion/Document Scanning	$34.90	x	4,803	parcels	=	$167,625		
	H. Populating the Database Fields	$154.38	x	4,803	parcels	=	$741,487		
	I. Preparation of CAD Files based on Modern Survey Data	$321.58	x	4,803	parcels	=	$1,544,549		
	J. Incorporation of Digital Orthophotos, USGS data	$4.10	x	4,803	parcels	=	$19,692		
	K. Miscellaneous Expenses	$5.15	x	4,803	parcels	=	$24,735		
	L. Hardware and Software Upgrades					=	$50,000		
								$5,614,323	

III.	ISLANDS OF MAUI & MOLOKAI (THIRD YEAR)							
	A. Coordination of Research Tasks	$30.87	x	2,684	parcels	=	$82,855	
	B. Abstract of Titles	$291.97	x	2,684	parcels	=	$783,647	
	C. Collection of Historical Data	$228.77	x	2,684	parcels	=	$614,019	
	D. Preparation of Chain of Title Report	$110.81	x	2,684	parcels	=	$297,414	
	E. Development of GIS Database	$5.04	x	2,684	parcels	=	$13,527	
	F. Creation of Themes and Fields	$2.86	x	2,684	parcels	=	$7,676	
	G. Conversion/Document Scanning	$36.65	x	2,684	parcels	=	$98,369	
	H. Populating the Database Fields	$162.10	x	2,684	parcels	=	$435,076	
	I. Preparation of CAD Files based on Modern Survey Data	$337.66	x	2,684	parcels	=	$906,279	
	J. Incorporation of Digital Orthophotos, USGS data	$4.31	x	2,684	parcels	=	$11,568	
	K. Miscellaneous Expenses	$5.41	x	2,684	parcels	=	$14,520	
								$3,264,950
IV.	ISLAND OF KAUAI (FOURTH YEAR)							
	A. Coordination of Research Tasks	$32.41	x	2,026	parcels	=	$65,663	
	B. Abstract of Titles	$306.57	x	2,026	parcels	=	$621,111	
	C. Collection of Historical Data	$240.21	x	2,026	parcels	=	$486,665	
	D. Preparation of Chain of Title Report	$116.35	x	2,026	parcels	=	$235,725	
	E. Development of GIS Database	$5.29	x	2,026	parcels	=	$10,718	
	F. Creation of Themes and Fields	$3.00	x	2,026	parcels	=	$6,078	
	G. Conversion/Document Scanning	$38.48	x	2,026	parcels	=	$77,960	
	H. Populating the Database Fields	$170.21	x	2,026	parcels	=	$344,845	
	I. Preparation of CAD Files based on Modern Survey Data	$354.54	x	2,026	parcels	=	$718,298	
	J. Incorporation of Digital Orthophotos, USGS data	$4.53	x	2,026	parcels	=	$9,178	
	K. Miscellaneous Expenses	$5.68	x	2,026	parcels	=	$11,508	
								$2,587,749
								$18,511,786
							SAY	**$18,500,000**

Appendix H
Cost Estimate for Option B

OPTION B

BUDGETARY COST BREAKDOWN
FOR
IMPLEMENTATION OF PHASE II
PUBLIC LAND TRUST INFORMATION SYSTEM

I.	ALL ISLANDS								
	A. Coordination of Research Tasks		$30.17	x	15,898	parcels	=	$479,643
	B. Abstract of Titles		$285.36	x	15,898	parcels	=	$4,536,653
	C. Collection of Historical Data		$223.59	x	15,898	parcels	=	$3,554,634
	D. Preparation of Chain of Title Report		$108.30	x	15,898	parcels	=	$1,721,753
	E. Development of GIS Database		$4.93	x	15,898	parcels	=	$78,377
	F. Creation of Themes and Fields		$2.79	x	15,898	parcels	=	$44,355
	G. Conversion/Document Scanning		$35.82	x	15,898	parcels	=	$569,466
	H. Populating the Database Fields		$158.43	x	15,898	parcels	=	$2,518,720
	I. Preparation of CAD Files based on Modern Survey Data		$330.01	x	15,898	parcels	=	$5,246,499
	J. Incorporation of Digital Orthophotos, USGS data		$4.21	x	15,898	parcels	=	$66,931
	K. Miscellaneous Expenses		$5.29	x	15,898	parcels	=	$84,100
	L. Updating Portions of PLTIS Database	10 hours per week x	$83.79	x	156	weeks	=	$130,712
	M. Hardware and Software Upgrades						=	$50,000
								$19,081,843
						SAY		**$19,100,000**

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Responses of the Affected Agencies

Comments on Agency Responses

On March 21, 2001, we transmitted drafts of this report to the Office of Hawaiian Affairs and the Departments of Accounting and General Services, Land and Natural Resources, and Transportation. A copy of the transmittal letter to the Department of Land and Natural Resources is included as Attachment 1. Similar letters were sent to the Office of Hawaiian Affairs and the Departments of Accounting and General Services, Land and Natural Resources, and Transportation. Responses of the Office of Hawaiian Affairs and the Department of Land and Natural Resources are included as Attachments 2 and 3 respectively. Our consultant's comments on the Department of Land and Natural Resources' response are included as Attachment 4. The Departments of Accounting and General Services and Transportation chose not to respond.

The Office of Hawaiian Affairs (OHA) responded that it found the report to be comprehensive and generally agrees with the overall strategy proposed by the consultants. OHA favors Option A, the "county-by-county" approach to Phase Two, and the continued involvement of Auditor in the process. OHA requested that it be consulted throughout the second phase and reserved further comment on the report pending a more detailed review.

In its response, the Department of Land and Natural Resources (DLNR) expressed concern that the title abstract methodology was not adequate to determine the status of all ceded lands and that the number of parcels to be identified was restricted to the old state land inventory. DLNR was also concerned that the distinction between "public land trust" and "public lands" was not clear. We have added clarifying language in response.

DLNR also presented additional information concerning the status of its own land management information system, its experience with geographic information systems, and data reliability improvements that are expected as part of the implementation of its new State Land Inventory Management System.

DLNR takes exception to the consultant's characterization of responsiveness of its Land Division, contending that the statements are inaccurate and misrepresented the actual situation.

Our consultant responded that it fully expects the number of parcels identified as part of the public land trust to be adjusted during the actual

research and work to be performed as part of the next phase. The number identified in the report is used primarily as a basis for developing the cost projections.

With respect to the issue of the Land Division's responsiveness, our consultant reiterates that the purpose of the discussion is to identify areas of concern that may impede the progress of Phase Two. These concerns are based on the firm's experience in working with DLNR during Phase One. The firm stands by the findings and recommendations of the report.

STATE OF HAWAII
OFFICE OF THE AUDITOR
465 S. King Street, Room 500
Honolulu, Hawaii 96813-2917

MARION M. HIGA
State Auditor

(808) 587-0800
FAX: (808) 587-0830

March 21, 2001

COPY

The Honorable Gilbert Coloma-Agaran, Chair
Department of Land and Natural Resources
Kalanimoku Building
1151 Punchbowl Street, Room 130
Honolulu, Hawaii 96813

Dear Mr. Coloma-Agaran:

Enclosed for your information are three copies, numbered 6 to 8 of our draft report, *Establishment of a Public Land Trust Information System, Phase One.* We ask that you telephone us by Thursday, March 22, 2001, on whether or not you intend to comment on our recommendations. If you wish your comments to be included in the report, please submit them no later than Tuesday, March 27, 2001.

The Department of Accounting and General Services, Department of Transportation, Department of Business, Economic Development and Tourism, Office of Hawaiian Affairs, Governor, and presiding officers of the two houses of the Legislature have also been provided copies of this draft report.

Since this report is not in final form and changes may be made to it, access to the report should be restricted to those assisting you in preparing your response. Public release of the report will be made solely by our office and only after the report is published in its final form.

Sincerely,

Marion M. Higa
State Auditor

Enclosures

ATTACHMENT 2

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813
March 28, 2001

Ms Marion M. Higa
State Auditor
Office of the Auditor
465 S. King Street, Rm 500
Honolulu, HI 96813-2917

Dear Ms. Higa:

The Office of Hawaiian Affairs (OHA) appreciates the opportunity to review your report, *Establishment of a Public Land Trust Information System, Phase One.*

The Introduction and Background chapter provides excellent historical information on Trust lands in Hawai'i, a clear description of past attempts to create an inventory of public lands, and the current status of Phase One of the public land trust inventory required by Act 125, SLH 2000.

1 Overall Strategy

The report provides a very comprehensive approach to the inventory of the past and current status of lands ceded to the state upon admission to the union. The suggested approach and information that is expected to be inventoried would provide OHA and all Hawai'i with an understanding of all lands previously owned or controlled by the crown and government and their subsequent disposition and transfer to the present.

The Auditor identifies the need for the land "abstractor" to do a complete chain of title search beginning at the time of the *Mahele.* This is a critical piece of analysis that is fully supportable by the OHA Board of Trustees. Your report states:

> *"...the significance of this issue [search chain of title beginning with the Mahele] cannot be overstated. Far-reaching fiscal and legal impacts beyond the scope of this report hinge upon what lands are determined to be ceded or non-ceded".*

The significance of the work to be done is such that the outcome will provide OHA with a complete and accurate inventory and accounting of all ceded lands for the first time. The four-year process outlined, though rather lengthy, appears appropriate considering the breadth and depth of the plan.

2. Cost of the Inventory

The cost of the inventory and system implementation is estimated to be over $18 million (unverified figures). Though the amount is substantial, it is indeed a long overdue action by the State in its responsibility to account for public trust lands. The Office of Hawaiian Affairs will have its fiduciary responsibility to its trust greatly clarified by the implementation of Phase Two, with active OHA consultation.

3. Auditor's Recommendations

- OHA supports the continued participation of the Auditor to control and direct Phase Two of this project.
- OHA supports a methodology which provides for abstracting and developing the system concurrently with all lands in each county identified separately.
- Other recommendations in the report appear to be logical to best implement the process, but OHA should be consulted throughout the process of conversion of land data and systems and the verification of cost estimates.

4. Conclusion

The Auditor's report provides a well-planned and overall historical analysis that is well done. The State's "establishment of a public land trust information system" is long overdue.

In the absence of sufficient time for Trustees, staff and attorneys to review the Auditor's report more thoroughly, the Office of Hawaiian Affairs wishes to reserve further comment at this time.

Best wishes in this monumental undertaking.

Sincerely,

Haunani Apoliona, Trustee
Chairperson, Board of Trustees

Cc: BOT
BOT Attorney
Administrator

ATTACHMENT 3

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P.O. BOX 621
HONOLULU, HAWAII 96809

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

March 27, 2001

Ms. Marion M. Higa
Office of the Legislative Auditor
465 S. King Street, Room 500
Honolulu, Hawaii 96813

Dear Ms. Higa:

Subject: Response to the Draft Report, *Establishment of a Public Land Trust Information System, Phase One*

Thank you for your letter of March 21, 2001 in which you provided us the opportunity to respond to your draft report, *Establishment of a Public Land Trust Information System, Phase One*.

After reviewing the subject report, we would like to provide both general and specific comments for your consideration in revising and finalizing the report to the Legislature.

I. Objective and Priorities for the Public Land Trust Information System:

The focus of the Public Lands Trust Information System should be on conducting an accurate abstract of the title to determine how and when the State, Territory or Republic acquired its lands. It is critical to understand the need to establish a sound methodology for conducting the abstract of the title. Unlike private lands, public lands may not have a recorded chain of title. Often times, when dealing with public lands, there are no recorded documents on the actual conveyance of the property. For example, many public and private lands used for such as road or streets are conveyed to the County or State by "operation of law" [e.g. pursuant to the Highways Act of 1892]. In other situations like lands conveyed to the Department of Hawaiian Home Lands for their trust purposes, the lands were conveyed under the Hawaiian Homes Commission Act of 1921, approximately 200,000 acres of public trust lands were transferred to DHHL under this law. The methodology described in the report does not mention research on applicable laws that have transferred ownership without a "chain of title." [pages 8 and 19] The methodology described is more reflective of the process to search private property and does not seem to address the unique situations that arise with determining ownership with public lands. With each abstract of title estimated to cost between $632 [Option A] and $647 [Option B] per

parcel, it would appear to be in the State's best interest to clearly identify the process used to determine the ceded lands status.

It is also not clear from the report as to what lands are included in the research. Act 125 requires the Legislative Auditor to: ". . . identify all of the lands that should be included in the Public Land Trust inventory." The Report seems to be restricted to all existing public lands based on the projected research of the 15,898 parcels in the old State Land Inventory; however, there is no discussion on why the research is being limited to the existing parcels. Under Act 329, the Office of Hawaiian Affairs [OHA] had proposed the research include other Crown and Government lands that were disposed of [sold] over time. OHA's position on the scope of work is important in establishing which parcels are included in the inventory.

Creation of the Public Land Trust and A Classification System for public lands [page 3]:

The *Creation of the Public Land Trust* section states that: "Section 5(f) of the AdmissionAct states that all lands received by the State and all income and proceeds from their disposition were to be held by the State as a "public trust" for the following five purposes:"

In the next section *A Classification System for the public lands* the report states: "In order to better define the Public Land Trust, a classification system based on Section 5 of the Admission Act and subsequent legislation was established." The report goes on to identify the nine ceded/non-ceded land classification of the Public Land Trust.

The Report should clarify and draw a distinction between the "Public Trust Lands" and the "Public Lands." Section 5(f) of the Admissions Act identifies only 5(b), 5(c), 5(d), and 5(e) lands as being held in a public trust. 5(a) lands or lands acquired by the Territory of Hawaii in fee simple prior to statehood. (X) lands are lands acquired by the State of Hawaii in fee simple after statehood. And (Y) lands are former Federal Fee lands acquired by the State through public law 809-616. 5(a), (X), and (Y) lands are not part of the "Public Land Trust" as identified in the Admissions Act. There is a difference between public trust lands and public lands. 5 (a), (X) and (Y) are considered non-ceded or non-trust lands. While 5 (b), (c), (d), (e), (i), and (Z) lands are considered ceded or trust lands. This is an important distinction as it illustrates the importance of determining how and when the State of Hawaii acquired fee simple interest in the property as it will determine the status of ceded/trust versus non-ceded/non-trust lands.

III. GIS, Scanning and SLIMS:

The Auditor's Report also seems to focus on the delivery system [e.g. enhanced GIS capabilities] for the information as opposed to the need to obtain accurate information on the abstract of title.

The State Land Inventory Management System [SLIMS] project at the Land Division envisions the use of GIS in its next phase and would benefit from a survey-grade GIS for all islands. However, the abstract information clarifying land title status, is perhaps more important

to SLIMS at this time. Unfortunately, like the State Land Use layer, the land title status doesn't always follow current tax-assessed parcel boundaries. Furthermore, many encumbrances on State lands involve multiple parcels and portions of parcels, and in the case of temporary, revocable permits surveys are typically not done.

Currently non-survey grade GIS layers are available for tax-assessed parcels on all islands. As such, the cost to purchase hardware and software may not be necessary. The GIS component amounted to 46% of the cost estimate for Options A [$8,510,000 for GIS from a budget of $18,500,000] and B [$8,786,000 for GIS from a budget of $19,100,000].

Like DBEDT, DHHL and OHA, DLNR recently purchased a departmental license to use these GIS layers for the neighbor islands from Geographic Data Systems International (GDSI) (the layers for Oahu are freely available through the City and County of Honolulu). Testing has already shown that data from SLIMS can be easily imported into these GIS layers, and queries can be run in the GIS environment using ESRI's ArcView as the GIS client. It is our intention to further develop this interface as part of the next phase of SLIMS, using the City and County's web interface as a model – internally, the "native" GIS environment provides powerful analysis tools for land agents, planners and resource managers at the department. However, the ESRI's web-based Internet Mapping Server is seen as the public GIS interface to SLIMS.

The Land Division agrees that development of a survey-grade GIS would enhance the value of PLTIS, but in a budgetary crunch, this part of the proposed PLTIS could be a future phase or a separate project while the GDSI and City and County's layers are used.

In addition, the Auditor's Report proposes to scan all information used on the research for the abstract to be included in the Public Land Trust Inventory. This will surely increase the cost of Phase II if all information must be scanned into a system. One less costly alternative to consider is to have the Abstract Report scanned into the system with specific references to documents used in verifying the land title status. We question the need to have all information used in the abstract scanned into the system. Some or most of the scanned information would be only of use when conducting the Abstract of title. However, if scanning is proposed, it may be more prudent and less costly to establish some criteria for which documents should be scanned into the system.

IV. Counties need to assign tax map key numbers to all parcels [page 26]:

The Auditor's Report recommends that the Department of Land and Natural Resources request the County Tax Offices to place parcel numbers on all ceded lands, roads and easements in the state. As we understand it, despite pleas from various real estate interests, the Counties have consistently held that the tax map key system will be used strictly for taxing purposes, and not as a land identification system. All of the state-owned lands have tax map parcels assigned to them. We have recently completed a manual and electronic comparison of the County tax records and our State Land Inventory for the SLIMS project. The Counties admit to experiencing some difficulty in identifying the location of the entity being assessed, especially

with the Department of Transportation Airports and Harbors. However, as a whole, the exchange of information between the Counties and our SLIMS project resulted in more accuracy on both sides. We are improving our communication and developing ways to improve the accurate exchange information with the Counties.

With respect to easements, we understand that most easements to private parties are assigned tax map key parcel numbers for real property assessment purposes. We are unaware however, of easements to public agencies for sewer and waterline easements.

V In addition, several inaccurate statements and misrepresentations were made in the following three areas.

A. Document Retrieval [Page 23]:

"The division's document retrieval services are inefficient. In response to our request for timely service for this project, the division's deputy administrator replied with a memorandum dated January 16, 2001, which state that the division would 'provide copies by 2:00 p.m. for requests that are submitted by 10:00 a.m. during the same day.' The division has not been able to meet that pledge. As shown in Exhibit 2.2, the division met its own same day delivery standard in only one instance out of all of our requests."

R.M. Towill's "request for timely service," the first and only communication that there were problems with document retrieval, was faxed on January 15, 2001. The division's deputy administrator's response dated January 16, 2001 (attached) stated that, in response to the January 15th fax, the clerical have been instructed to meet the 2:00 timeframe and that the deputy administrator should be contacted immediately if any further delays were experienced. As shown in Exhibit 2.2, all of the requests for documents were made prior to January 15, 2001. Also, no further contact was received indicating no further problems. It is misleading and irresponsible to state that the 2:00 p.m. pledge was not met for requests that were made prior to the deputy administrator making that pledge.

"The division administrator claims that the division can only produce four documents per day because it is understaffed. However, in a memorandum dated January 17, 2001, the division also stated that with its existing staff it would be able to 'provide up to fifty (50) files a day.' We do not foresee the division being able to fulfill this promise when it can deliver only four files per day and cannot meet its own guidelines of delivering the files on the same day."

The division administrator did not make this statement. The January 17th memorandum is attached to clarify the mistruths stated in the report. As clearly stated in this memorandum, we had stated that the regular staff would be able to retrieve up to 50 files a day and that **if copying or scanning was required**, then **additional staff would be required**. Quite obviously, the requirement of copying is much more labor-intensive than the mere retrieval of a file from the vault. Furthermore, Security Title chose to conduct their work at their own office. However, copying is not a necessity as abstractors routinely review records and cite the records in their

reports but do not copy each and every one of them. Certainly as we have stated, for Phase Two of this project, if copying and/or scanning is required, additional staff will be required for the large workload it would impose.

B. Land Management Division's information system's data needs to be verified [page 27]:

"By the division's own admission, the automated inventory is both inaccurate and incomplete."

The report detailed at length the inaccuracies of the State Land Inventory (SLI), the Land Division's former system. As noted in both written and verbal communication with R.M. Towill representatives, the older, mainframe-based data was delivered because the new State Land Inventory Management System (SLIMS) data had not yet been fully verified at the time of the request. Because of the time constraint, it was agreed that the division would supply the electronic version of the SLI to facilitate R.M. Towill's data testing.

The Land Division spent the last two years developing the SLIMS. This system integrates the three functionalities of land inventory, property management (encumbrances) and accounts receivable. The land inventory and property management functionalities are now, by and large, operational while the accounts receivable function will require additional time before it is fully operational. From April to September 2000, the Land Division spent a total of 2,700 hours on updating and validating the SLI. A total of 16,000 SLI records were individually cross-checked with 19,700 county tax records. Discrepancies in ownership or area, or parcels that appeared in one data set but not in the other were researched using survey maps, land office documents and tax records. This monumental task was undertaken to ensure accurate and complete land inventory data.

We would also like to note that the electronic version of First American Real Estate Solutions (FARES) database was evaluated for purchase by the division as early as December 1999 as an alternative to their hard copy data books. The Land Division was prepared to make that purchase, until disturbing inaccuracies were found in which land parcels owned and leased by the State of Hawaii were shown as being owned by the lessee.

"The division's disadvantages as a system site is its inability to maintain its information system and its questionable ability to update its system as shown in the previously discussed inaccuracies of the State Land Inventory system."

The Land Division recognized the maintenance problems of the mainframe-based SLI system. Designing a maintainable system was a high priority for SLIMS in order to ensure continued accuracy of the data after the initial data scrubbing and conversion activities.

The resultant system is part of the overall re-engineering effort within the division, which includes organizational, policy and procedural changes as well. A Central Processing unit has

been established (two new positions have been added to this unit) to process documents and ensure timely and accurate entry of data into SLIMS. New procedures (including auditing steps) and data collection forms have been developed and are now in use to ensure complete and consistent updates to the data.

Coincidentally, the county tax offices and the Bureau of Conveyances (BOC) are implementing new systems of their own on roughly the same timetable as SLIMS. We are taking advantage of this opportunity to work together to enable our systems to "talk" to each other. A monthly electronic update between the Land Division and the City and County of Honolulu has already been designed, with the goal of improving the accuracy and consistency of the data between the agencies. Data fields have been added to SLIMS to facilitate linking to the new BOC system.

C. Impact of placing the Public Land Trust information system with the Land Management Division [page 37]:

"In addition, the division's suspect record-keeping and filing practices may affect its ability to keep the data up-to-date. The Auditor cited the division for poor record management in the Auditor's Report No. 96-13, *Follow-Up Audit of the Financial Audit of the Department of Land and Natural Resources.*"

Three years after this report, the Auditor stated that "the Land Division has substantially improved the organization of its files" in the Auditor's Report No. 99-13, *Follow-Up to the Study of Revenue Entitlements to the Department of Hawaiian Home Lands.* We are also perplexed as to how the conclusion of "suspect" record-keeping was arrived at when neither R.M. Towill nor Security Title (who conducted this Phase One study) accessed the actual files as they were only requesting copies of the documents listed in Exhibit 2.2.

Finally, we would like to note the timeframe provided by your office neither allowed for an extensive review of the document nor for us to consult with other agencies such as OHA. The Draft Report was delivered to the Department on the afternoon of Thursday, March 21st. With Monday, March 26th being a holiday, we were provided with a little more than one working day to have our response in to your office by the Tuesday, March 27th deadline.

Thank you for the opportunity to present this information.

Sincerely,

GILBERT S. COLOMA-AGARAN
Chairperson

cc: Land Board members

Memo

To: Russell Figueroa, R.M. Towill

From: Dean Uchida, Administrator

CC: Auditor

Date: 1/10/01

Re: Ceded Lands Inventory

This is a follow-up to our phone conversation of December 22, 2000 and our subsequent meeting of December 28, 2000 regarding the ceded lands inventory project. It is good to hear that this important project is underway.

At our meeting, you asked for our response in two areas as follows:

First, you had proposed the merging of DAGS Survey Division with the Land Division and asked for my response to this proposal. I am unsure as to how this proposal relates to the ceded lands inventory. But if the underlying purpose for this recommendation is to streamline or increase the efficacy the inventorying of the ceded lands, then I am not sure whether this proposal would accomplish such objectives. As mentioned in our meeting, to effectuate such a merger would require legislation and a reorganization requiring HGEA involvement. These processes could easily take three or more years. Also, I am unclear as to the operational issue(s) this proposal addresses and what other alternatives might be available to address the issue(s). As a result, I do not feel I can fully respond to your proposal.

Second, you asked what our resource needs would be for retrieving, copying and/or scanning files and documents for the ceded lands project. To develop accurate estimates of resource needs, the specific process to be followed (e.g., documents to be accessed, whether they will be copied or scanned, etc.) and scope (average number of documents, total number of parcels) would be important to know. As a general comment:

1) For the retrieval of files, our existing staff could likely handle up to 50 files a day. Since we would like to maintain the security of the vault, the abstractors would request the files and our staff would retrieve and refile them. As mentioned, providing six abstractors with office space may present a problem, but we will make every effort to accommodate them.

2) If you envision copying and/or scanning of documents related to an abstract, then additional staff would be required. Depending on the number of

documents (and the average length of these documents), more specific estimates of the staffing required could be provided.

As a side note, I am not sure of the benefits of scanning all the documents when the time and costs are considered. What might be more meaningful to us is a copy of a detailed abstract report scanned and attached to a parcel. Through this report, anyone would then be able to reference the documents that were used to validate the ceded and public land trust status.

Also, we will have our computer staff person, Mr. Arthur Buto contact Mr. Ryan Suzuki of your office to discuss the existing Oracle database used in the State Land Inventory Management System [SLIMS].

I hope this has addressed the questions you asked. If I can be of further assistance, please feel free to contact me at 587-0446. Thank you for taking time to meet with me and my staff.

1151 Punchbowl Street, Room 220
Honolulu, Hawaii 96813
(808) 587-0426 Phone
(808) 587-0455 Fax

DLNR Land Division

Fax

To:	Russell Figueroa	**From:**	Dede Mamiya
Fax:	842-1937	**Pages:**	
Phone:		**Date:**	01/16/2001
Re:		**CC:**	Dean Uchida, Noreen Valente

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

● **Comments:**

Regarding your fax received 1/15 about copying of documents, I have spoken to our clerical staff and given them instructions that for this project, they are to provide copies by 2:00 for requests that are submitted by 10:00 a.m. According to my staff, they were providing the copies the day following the request, so I explained to them the urgency of this project. Please let Security Title know that they need to identify themselves as Security Title staff and that the copying is for the Ceded Lands Inventory project. If they have any further problems, they should contact me immediately so I can take action.

Regarding your fax received on 1/12 about the database, Art is contacting Ryan with regard to what data he needs to determine whether your GIS system is compatible. Because of the amount of data and the time needed to download the data, we are trying to focus on what information is needed for your purposes.

If you have any questions, please call me at 587-0426. Thanks.

ATTACHMENT 4

420 Waiakamilo Road
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Fax 808 842 1937
eMail rmtowill@hawaii.rr.com

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March 28, 2001

Ms. Marion M. Higa
Office of the Legislative Auditor
State of Hawaii
465 S. King Street, Room 500
Honolulu, HI 96813

Response to the Draft Report
Establishment of a Public Land Trust
Information System, Phase One

After reviewing the March 27, 2001 State of Hawaii Department of Land and Natural Resources (DLNR) response to the Draft Report, *Establishment of a Public Land Trust Information System, Phase One*, we offer the following comments.

As stated on Chapter 1, page 1, "Act 125 requires that the State Auditor initiate and coordinate all efforts necessary to identify all of the lands that should be included in the Public Land Trust inventory". Abstracting is just one of the many efforts involved in identifying land that should be included. In Chapter 2, page 19 we stated that to ensure that the lands in the Public Land Trust are properly identified, title searches extending back to the period of the Great Mahele are needed.

Since phase two of this project consists of the actual research and work needed to identify all public lands and to complete the information system, changes in the classification of these lands may occur. Lands which have been identified as public lands may no longer be classified as public lands after research is completed. Likewise, lands which were not previously identified as public lands may need to be added to the inventory. The exact count of parcels in the Public Land Trust Inventory will most likely change, although not significantly. For now however, the current State Land Inventory count, shown in Chapter 2, page 42 of the report, is the most complete and accurate count of public lands available.

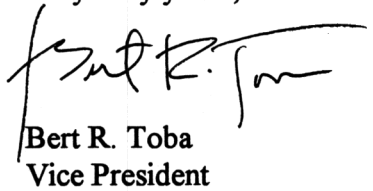
Statements included in the report are not presented for the purpose of offending or maligning anyone. It is our intention to report from our view point: the research findings, experiences and problems encountered while conducting our work for phase one of this project. Our recommendations for phase two are based solely on those research findings, experiences and problems. The recommendations are intended to present suggestions to reduce

the time and cost needed to conduct and complete the establishment of a Public Land Trust Information System.

We thank DLNR for their comments but wish to stand by our statements and recommendations.

Should you have any questions, please call me at 843-1133.

Very truly yours,



Bert R. Toba
Vice President

BRT:ko
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