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Miami, Florida

AN INTERACTIVE ENVIRONMENTAL SITE ASSESSMENT AUDIT FOR
WAGNER CREEK RIVER BASIN CLEAN UP PROJECT

A thesis submitted in partial fulfillment of the

requirements for the degree of

MASTER OF SCIENCE

in

ENVIRONMENTAL ENGINEERING

by

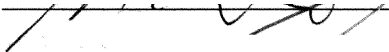
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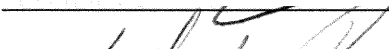
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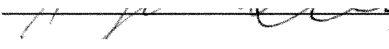
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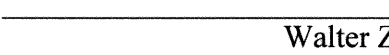
This thesis, written by Joy Ashby, and entitled An Interactive Environmental Site Assessment Audit for Wagner Creek River Basin Clean Up Project, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this thesis and recommend that it be approved.


M. A. Ebadian

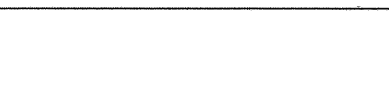

L. David Shen


Alfredo Ravinet


Walter Z. Tang, Major Professor

Date of Defense: November 26, 2003

The thesis of Joy Ashby is approved.


Dean Vish Prasad
College of Engineering


Dean Douglas Wartzok
University Graduate School

Florida International University, 2003

DEDICATION

I dedicate this thesis to my wonderful grandparents Octavia Caton and Phillip Tom, to my very gracious mother Yvonne Ashby and to my selfless sister Denise Ashby. Without their vision and the foundation they built for me, this work would not be realized.

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ABSTRACT OF THE THESIS

AN INTERACTIVE ENVIRONMENTAL SITE ASSESSMENT AUDIT FOR THE
WAGNER CREEK RIVER BASIN CLEAN UP PROJECT

by

Joy Ashby

Florida International University, 2003

Miami, Florida

Professor Walter Z. Tang, Major Professor

The primary purpose of this thesis was to design and create an Interactive Audit to conduct Environmental Site Assessments according to American Society of Testing Material's (ASTM) Phase I Standards at the Wagner Creek study area. ArcPad and ArcIMS are the major software that were used to create the model and ArcGIS Desktop was used for data analysis and to export shapefile symbology to ArcPad. Geographic Information Systems (GIS) is an effective tool to deploy these purposes. This technology was utilized to carry out data collection, data analysis and to display data interactively on the Internet. Electronic forms, customized for mobile devices were used to survey sites. This is an easy and fast way to collect and modify field data. New data such as land use, recognized environmental conditions, and underground storage tanks can be added into existing datasets. An updated map is then generated and uploaded to the Internet using ArcIMS technology. The field investigator has the option to generate and view the Inspection Form at the end of his survey on site, or print a hardcopy at base. The mobile device also automatically generates preliminary editable Executive Reports for any inspected site.

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1. Introduction

Wagner Creek is identified as the most polluted waterway in Florida. The goal of the National Oceanic and Atmospheric Agency (NOAA) and the Hemispheric Center for Environmental Technology (HCET) is to remediate the upper part of the creek. That is to transform it from an unhealthy, smelly and littered waterway, into an amenity that can be embraced by the community (Miami River Commission Stormwater Subcommittee, 2002). This process includes creating a greenway along the creek, identifying chemicals that pollute the waterway and sensitizing the community by having outreaches about the present water quality. In an attempt to meet these goals Environmental Site Assessments (ESA) will have to be conducted in the area. This action is necessary to identify any contaminant sources and hence remediation processes can be carried out to minimize the negative impact the water quality may have on the people who live and work in the area.

1.1 Background

The intention of this work is to develop a generalized framework that will be a standard to conduct environmental site assessments for the Wagner Creek project, as well as for any other Phase I ESA application based upon the American Society for testing materials (ASTM). The goal - to find an expeditious way of doing ESA in a more efficient manner. To deploy a prototype specifically designed and suited to ESA investigators. It will present them with customized digital data entry forms for field data collection, present their results in a standardized output format and display their findings on an interactive Geographic Information System (GIS) Internet website.

1.2 Objective

1.2.1 Research Purpose

The purpose of this thesis is to develop a software package to create an interactive Environmental Site Assessment Audit. This model will be synthesized using predominantly GIS technology. The collected field data will be stored automatically into an attribute table (a type of database associated with a class of geographic features) which can then be analyzed using GIS technology. A HyperText Markup Language (HTML) “Investigator Form” will be generated at the end of any site assessment, as well as an Executive Summary Report in both a non-formatable HTML version and in a formatable Word document version. The new field data, the analyzed information as well as any documentation related to a specific site can then be uploaded onto an interactive GIS-based Internet website. This tool is an asset to any Environmental Site Assessment investigator since it allows him to have access to static historical and researched data, documentations from environmental agencies, links to other websites such as the Miami-Dade Government website and to photographs via Internet connection - while he is onsite.

1.2.2. Significance of study

This research will facilitate the development of an application that would compile and store environmental data pertaining to a site and generate relevant Environmental Site Assessment reports. This information would be made available on the Internet and users

2. Literature Review

2.1 Computer Desktop Environmental Audits

Today's advancing technology enables the user to enhance and improve traditional methods. Traditionally, environment site assessments required a process that involved cumbersome paper handling. Initially, documentation from agencies were not electronic, site reconnaissances were conducted using paper and pencil. The investigator carried bulky static maps and documents with him during field inspections. Field data was then transferred into a database by hand, and then a report was typed out. Presently there are two known software used to generate ESA Phase I Reports. These environmental audits are desktop applications.

One software is the "Environmental Site Assessment" Version 4.0 by Softshel, Inc. (www.flash.net/~softshel/sofshel3.htm). It is a desktop application and it requires the investigator to transfer data collected from the field into the software. It then generates a Phase I Report. This application allows the consulting firm or relevant personnel to manage different clients and the different jobs associated with each client. The application allows data to be edited or deleted accordingly.

The other application called "Site Assessment" provides a pick list from which the investigator can create an entire report, or it can be used to insert site-specific text into a report template. The field officer visits the site, gather records, and then assemble a report by selecting sections of written text from a pop-up pick list. The application has features

such as fonts, bold, italics, underscore, justification, edit, print, export, fax, and the option to

Work Screens Menu.

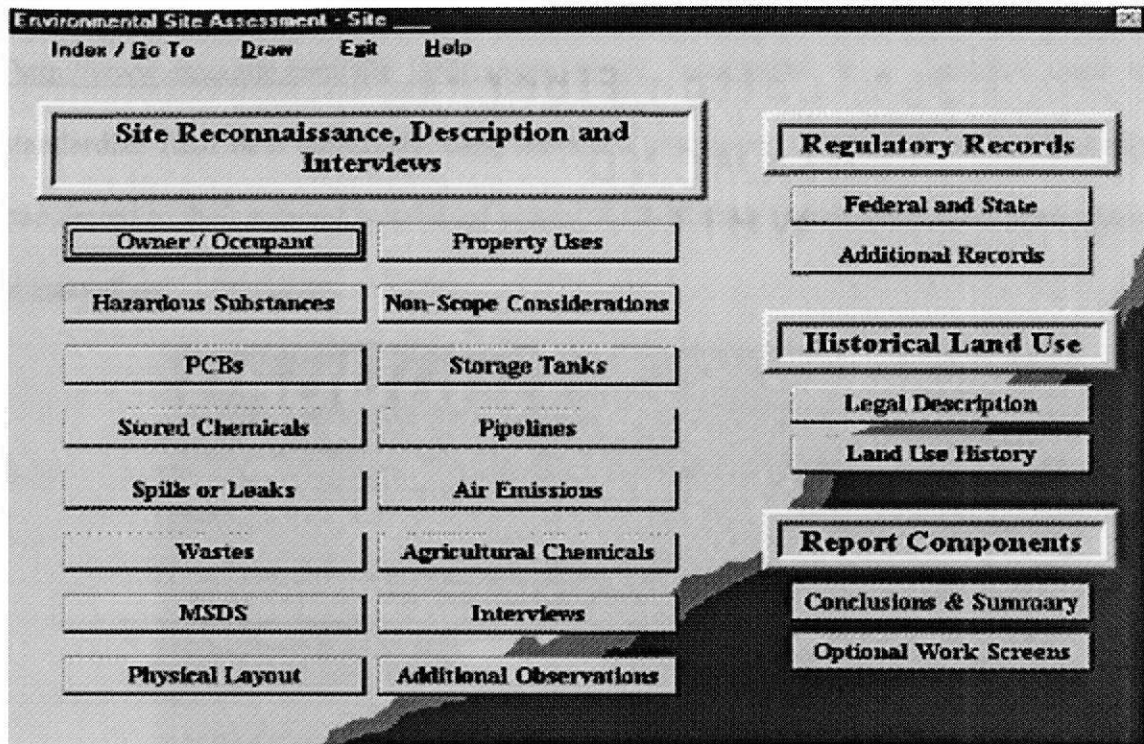


Figure 2.1 An Environmental Audit Software by Softshel, Inc.

email reports. Images can also be inserted in Rich Text Format (.RTF) documents which can then be printed on letterheads. Reports are generated according to ASTM standards. (www.macneillj.com/saswin.html)

2.2 Web Based ASTM Environmental Assessment (Non-GIS)

“esaQuote” is a software developed by GuideWire Consulting, an environmental consulting firm based in Kansas City, Missouri (http://www.esaquote.com/site_information.php3). “esaQuote” is a protocol used to standardize field data collection using handheld computers. Field data is electronically transferred to their secured web-based central data resource and an automated draft report is immediately obtainable.

The screenshot displays the esaQuote website interface. At the top, the logo "esaQuote" is prominent, followed by navigation links: "GET A QUOTE", "HOME", "GET A QUOTE", "PARTNERS", and "CONTACT US". Below the navigation bar, it indicates "Page 1".

The main form area is titled "Please enter your esaQuote Customer Number or Special Order Number. If you have not been previously assigned a customer number, esaQuote will automatically generate a customer number when a quote is requested." It features a text input field for the "Customer Number OR Order Number" and a note stating: "Entering your customer or order number will save you time when contracting or requesting a written proposal; however, it is NOT necessary to enter a number to proceed with esaQuote."

Below this, a section titled "Please enter the following information about your property. Providing complete site information will enhance the accuracy of the instant on-line quote." contains several dropdown menus and a button:

- State: AK
- Site Development Category: Agricultural or Undeveloped
- Property Size: Less than 5 acres (with a link to "Access Calculator")
- Facility Size: Not Applicable
- Facility Age: Not Applicable
- Environmental Concerns: None (with a note: "If more than one listed concern is present at the site, please select the most significant concern.")

At the bottom, a section titled "Please choose the service priority:" offers three options, each with a "GET A QUOTE" button:

- Electronic copies of reports to be delivered within 10 business days, with 2 hard copies delivered within 14 business days.
- Electronic copies of reports to be delivered within 5 business days, with 2 hard copies delivered within 8 business days for an additional 20% surcharge.
- Electronic copies of reports to be delivered within 20 business days, with 2 hard copies delivered within 25 business days for a savings of 10%.

Figure 2.2 A Web based Non-GIS Environmental Assessment

It was developed as a service to financial institutions, legal representatives, buyers and sellers of real property and to provide immediate quotes of the costs associated with environmental due diligence services. It also enables customers to immediately contract for all types of environmental due diligence services on-line. This product boasts of its ability of being precise, accurate and its ability to produce extremely high quality products at the lowest possible cost. (www.esaQuote.com, 2003)

2.3 Environmental Site Assessments and Geographic Information Systems (GIS)

A feasibility study was conducted for the City of San Antonio Environmental Services Department to incorporate GIS to improve the quality and efficiency in conducting their Environmental Site Assessments. The Environmental Services Department at San Antonio performs an average of 500 Environmental Site Assessments every year for property acquisitions, street maintenance projects, and highway improvement projects. The proposal recommends using ArcView GIS software applications developed by Environmental Systems Research Institute (ESRI) to create the departmental database. This software consolidates voluminous stores of data, as well as provides a tool for the development and implementation of GIS models, and web applications. ArcIMS software is recommended to design and deploy an Internet based system that combines GIS tools with the environmental data, to be served over the city network, and to the public (Stuver, 2002). The overall goal of this prototype is to efficiently maintain historical data, predict future environmental impacts more quickly, to better optimize resources, to provide added project control and to improve response time. It also shows the cost effectiveness

of implementing this GIS model. This research however, did not include ArcPad technology - a technology that will be further developed in this paper.

2.4 Field Data Collection, Customized PDA interfaces and ArcIMS

This project though not specifically designed for Environmental Site Assessments, successfully incorporated the technology of collecting data, using Personal Digital Assistants (PDA) and uploaded the data onto the Internet. This project integrated a real-time Global Positioning System (GPS) device with a handheld PC device used for field data collection. The field data was subsequently migrated to an ArcSDE-compliant Oracle database which is then used to display the data on a customized ArcIMS website. The application aimed at providing a solution of time-consuming, error-prone manual data entry, as well as providing instant conversion of field data into a digital format. (Bruce, and Hodson, 2002). The model does not cater to meet the specific needs of an ESA investigation, for example generating reports.

2.5 Digital Geologic Field Mapping Using Arcpad

Edmondo, (2002) researched the practicality of digital mapping for a geological organization, and identified some hardware and software solutions to enhance the efficiency and accuracy of field work. The goal of the research was to find a lightweight hardware-software system that allows the user to build a digital map from field observations in much the same way as pen and paper methods. The focus of the research was to minimize the size and weight of computer systems. Systems identified consist of a

wearable PC or handheld computer (PDA) and lightweight GPS systems that can be used for a variety of tasks. These systems incorporated ArcPad, a scalable, customizable field-based data-capture software package. He reported that ArcPad provides the user with the functionality needed to build a geologic map in the field and with data-capture methods to allow mapping to fit the needs of the field project. Field testing has shown the hardware-software systems to be effective field-based solutions for the Earth Sciences.

Portable computers and software systems that allowed the geologist to map in a setting similar to pen and paper were identified. Due to recent technological advances that have brought to the industry, smaller and more powerful computers, smaller and more accurate GPS units, and GIS data-capture software, such as ArcPad, that has GIS database functionality. This dual functionality allows for easy data capture and simple integration into GIS software, such as ArcView and ArcGIS. These developments have allowed real-time digital mapping for the geologist to become a reality.

GIS data-acquisition software is currently undergoing a technological evolution, with many new software packages coming to the market. This is in direct response to availability of hardware and the need for efficient data collection and upkeep for field-based industries. In the future, these new software developments, and the trend toward smaller, more powerful computer and GPS devices will continue to provide even greater enhancements to digital geologic field mapping.

3. Fundamental Theory

3.1 Environmental Site Assessment

“A Phase I Environmental Site Assessment (ESA) is a systematic process by which an Assessor seeks to determine whether a particular property is or may be subject to actual or potential contamination. A Phase I ESA does not involve the investigative procedures of sampling, analyzing and measuring unless enhancements are agreed to. A Phase I ESA may also include a review of previously performed environmental ESAs.” (The Associated Environmental Site Assessors of Canada Inc, 2003)

3.1.1 ASTM Standards (American Society for Testing Materials)

The American Society for Testing & Materials (www.ASTM.org) created committee E-50 on Environmental Assessments in 1990. On March 20, 1990 a meeting to organize a subcommittee (E-50.02) on environmental assessments of commercial real estate transactions was held in Washington, D.C. A scope of activities and objectives was established to ensure the efficiency and integrity of commercial real estate transactions, facilitate compliance with applicable governmental requirements for environmental protection, improve the quality of environmental assessments, clarify the legal responsibilities associated with commercial real estate transactions, and ensure that the standard of inquiry is practical and reasonable. In September 1990, a working document, *Model Protocol for Phase I Environmental Assessments of Multifamily Properties*, was presented to the subcommittee by its Multifamily Housing Task Force. Although the model protocol had elements common to ESAs performed for many types of properties, it

was developed only for multifamily commercial transactions. The model protocols include recommended practices for site histories, site inspections, agency records review, and a proposed environmental questionnaire and checklist. In September 1990, the ASTM subcommittee introduced the concept of a fundamental minimum assessment, which would determine whether a full phase I EAS was appropriate for a piece of commercial real estate. In February 1991, the ASTM subcommittee presented the draft standard upon which all subsequent versions would be based. It consisted of a transaction screen process, which would be used so a property could meet due diligence through the process, and a phase I ESA process which would be used if the transaction screening indicated that more investigation was required. Both processes were intended to meet the all appropriate inquiry requirements of the CERCLA. Although the phase I ESA standard was well received, there was confusion regarding the intent, design, and liability minimizing qualities of the transaction screen process. In a memorandum to the subcommittee in November 1991, the ASTM discussed the motivation for the transaction screen, noting that it was brought about by lenders who believed that their loans involved little if any due diligence. In addition, the ASTM concluded that “in some cases, an owner can satisfy the legal requirement through a preliminary screen if no potential concerns are raised as a result of a good faith effort.” (ASTM International, 2003). In 1992, the subcommittee reviewed and voted on several drafts of the transaction screen and phase I ESA standards. In September 1992, in the last round of voting on the draft standards, over 98% of the subcommittee voted in favor of the standards. The standards became publicly available in summer 1993 (ASTM International, 2003).

3.1.2 Purposes for conducting ESA

Phase I Environmental Site Assessment is deemed necessary as a legal obligation and/or for the purpose of:

- A commercial transactions;
- Qualifying for a landowner defense (to Comprehensive Environmental Response);
- Liability, Compensation and Liability Act (CERCLA);

Most likely an environmental site assessment is required, otherwise to reduce liability and managing risk. (ASTM International, 2003).

3.1.3 Phase I Environmental Assessment ASTM Guidelines

The Environmental Assessment Phase I requires a progression of activities. These activities combine a process that involves planning, on-site assessment and reporting Phase I Assessment. In the USA the ASTM have set the guidelines for the activities encompassing Phase I Environmental Assessment.

At times, there is very little knowledge or information on a site. The advancement to engage in the environmental assessment process includes:

- Acquiring initial information through questionnaire
- Inquiring on the site historical activities and surroundings
- Observation of the site through a first visit with the objective to acquire and corroborate information

Based on the information obtained, requirements set forth by lender, banking institution, regulatory entity action may merit a complete Environmental Phase I Assessment.

Situation varies if the site is occupied, an industrial or residential classification / zoning (ASTM International, 2003).

3.1.4 Phase I Environmental Site Assessment

Through observation, questionnaire information and inquiries propitiating a complete Environmental Assessment Phase I, ASTM E-1527-96 provides the guidelines. The assessment must identify potential environmental liabilities relevant to the property and purpose for the assessment. If soil, subsoil or otherwise contamination is present, in many regions it is required that an action plan is presented when activities are closed, sold or transferred. It is advisable and prudent that owners consider performing an environmental site assessments even if the law does not require. This will identify potential liabilities and responsibilities, and as required, prudence.

The evolution of regulatory requirements and the need of competent independent inspectors / auditors is a prudent decision. It is for this reason that organizations seek professional independent advice for environmental assessments. In fulfilling the requirements set forth by ASTM Standards, for a Phase I Assessment include the following:

1. Planning - An activity that identify purpose, objectives and gathers information to effectively progress through the steps that follow;
2. Review of Records - Includes reviewing records (governments and related entities) by accessing several governmental databases and historical records. It involves the review aerial photography and topographic maps;

3. On-Site Visit - Observing the site and with the information previously obtained study and analyze the site and surroundings from a past, present and potential future effects;
4. Dialogues & Interviewing - Gathering information in dialogue with site present (and previous) owners, site occupants and local regulatory entities. If the information warrants, further investigation through others that may provide or assist with relevant information; and
5. Assessment Report - The obtained data and information is compiled in a report structured to meet requirements of the assessment objectives which includes findings, recommendations and conclusions (ASTM International, 2003).

3.1.5 Major Data Requirements for a Phase I ESA

Data on the following types of sites within the indicated minimum search distances. This information should be gained from records reviews of Federal, State and local lists. Records should be searched back to the first developed use, to include agricultural use or the placement of fill material, or until 1940, whichever is earlier.

1. Federal National Priorities List (NPL) sites in a 1.0 mile radius
2. Federal Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list in a 0.5 mile radius
3. Federal Resource Conservation and Recovery Act (RCRA) Treatment, Storage, or Disposal Facility (TSDF) in a 1.0 mile radius
4. Federal RCRA generators in local area

5. Federal Emergency Response Notification System (ERNS) list for the property only
6. State hazardous waste sites in a 1.0 mile radius
7. State landfills in a 0.5 mile radius
8. State leaking Underground Storage Tanks (USTs) in a 0.5 mile radius
9. State registered USTs in local area

Data obtained from a site visit. The property should be visually and physically inspected to include exteriors and interiors of any structure on the property. Note the site setting, evidence of hazardous substances in and around the property, current and past uses of the property and adjoining properties, and any avenues for the migration of hazardous substances. Particular attention should be paid to odors, standing pools, containers, corrosion, stained soils, stressed vegetation, waste piles, heating ventilation and air conditioning (HVAC) systems, equipment containing polychlorinated biphenyls (PCBs), asbestos, possible lead-based paint, bulging or subsiding areas on the property, etc. Data obtained from interviews which either provides new information about the property or adjoining properties, or confirms known information. Current and prior owners and occupants, as well as local government officials should be interviewed.

3.1.6 Site Reconnaissances or Site Walkthrough

Site Reconnaissance - the site walkthrough is useful and necessary in order to judge the general housekeeping of the site in question. Signs of spillage (staining, dead grass), empty drums, old refuse, all indicate possible poor housekeeping and potential costly problems. Metal covers, cut up concrete, above ground piping near building that

disappears underground are good indicators of subsurface equipment which may cause problems or recognized environmental conditions. (<http://members.optushome.com>, 2003)

3.1.7 Recognized Environmental Conditions

The term recognized environmental conditions means the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws (ASTM International, 2003).

3.1.8 ESA Report

A report describing the study and stating the study was performed in accordance with ASTM Standard E 1527. The report should include documentation of the research conducted, the credentials of the environmental professional, the presence or absence of any recognized environmental condition in connection with the property, and the environmental professional's signature. The report must clearly state, in the Findings and Conclusions section, whether or not recognized environmental conditions were found in connection with the property. If there are recognized environmental conditions associated

with the site and buyer plans to acquire the property, a Phase II study should be performed.

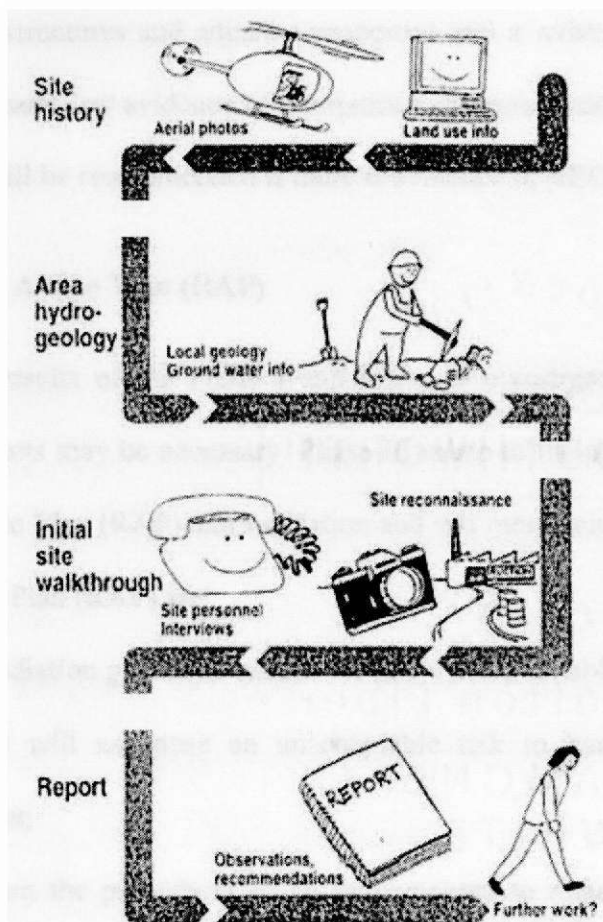


Figure 3.1 The Process of a Phase I Environmental Site Assessment
(Courtesy Hayes Environmental Consulting)

3.1.9 Transaction Screen Survey

The Transaction Screen Process or Survey is not as comprehensive as a Phase I ESA. One area of its application is to assess the environmental condition of commercial real estate. The process is very similar to a Phase I survey. It includes an interview with

property owner and or occupants by filling a Transaction Screen Questionnaire according to ASTM E1528 standards. Review of historical and regulatory Federal and State records. A Site Reconnaissance which is a visual and physical examination of the property, including structures and adjacent properties and a written report to document the findings and present any evidence of recognized environmental conditions (REC) at the site. A Phase I will be recommended if there is evidence of REC.

3.1.10 Remediation Action Plan (RAP)

Depending on the results of the Phase I and Phase II investigations, site clean-up of identified contaminants may be necessary. Phase III relate to the preparation of a site for a Remediation Action Plan (RAP) and validation and site monitoring. The objectives of a Remediation Action Plan (RAP) are:

- To set remediation goals that ensure the site will be suitable for the proposed use and that it will not pose an unacceptable risk to human health or to the environment;
- To document the procedures to be implemented to reduce risks to acceptable levels for the proposed site use
- To establish the environmental safeguards required to complete the remediation in an environmentally acceptable manner (US EPA, 1997).

Where site remediation has been performed, the site must be validated to ensure that the objectives stated in the RAP have been achieved. Where full clean-up is not feasible, or on-site containment of contamination is proposed, then an ongoing monitoring program may need to be implemented (US EPA, 1997).

3.2 Geographic Information Systems (GIS)

Geographic Information Systems (GIS) is a relatively young field, with antecedents that go back hundreds of years in the fields of cartography and mapping. GIS provides a digital way for storing, retrieving, manipulating, analyzing, and displaying geographically referenced data. Since GIS has the potential of including ecological, biological, demographic, or economic information, it becomes a valuable tool in the environmental, and engineering sciences (Stuver 2002).

GIS is the process where information, usually contained in a database is transformed and represented geographically, as well as in the form of graphs. It links a database to a map [sometimes called a “smart map” since the map and database are interactive] and this data can be used for analysis. It is a system of computer software, hardware and data, and personnel who help manipulate, analyze and display information that is tied to a spatial location. It uses information, represented in layers to give a better understanding about a location. (www.GIS.com, 2003). ESRI’s ArcGIS suite is a scalable system of software for geographic data recommended for every organization, from an individual desktop to a level serving a globally distributed network of people. It provides flexibility when configuring a system since it is modular and scaleable. It is modular in the sense that you acquire the system in pieces. (www.ESRI.com, 2003). Therefore, it possible for a multiple of ArcGIS clients (ArcGIS Desktop - ArcReader, ArcView, ArcEditor, ArcInfo), mobile clients (ArcPad), and ArcGIS servers (ArcSDE and ArcIMS) to be arranged uniquely to meet the needs of specific scalable GIS solutions (www.ESRI.com, 2003).

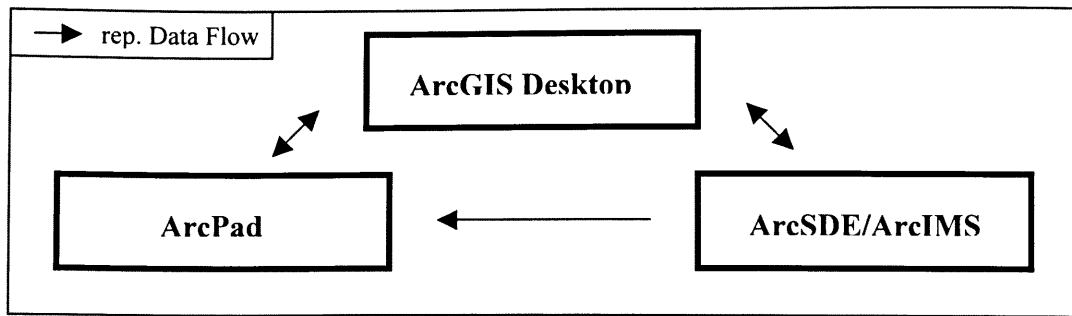


Figure 3.2 Demonstrates the Scalability of ArcGIS Suite of software to uniquely meet the needs of an ESA data-management solution

3.2.1 ArcGIS 8.2

ArcGIS 8.2 is an integrated system that consists of three Desktop applications – ArcCatalog, ArcMap, and ArcToolbox. A combination of all three applications can be used to create and manage shapefiles as well as to perform analysis. For this project, ArcMap was used to prepare shapefiles for both the ArcPad and ArcIMS applications and for exporting symbology to ArcPad. ArcToolbox was used to add projection to shapefiles.

3.2.2 ArcPad 6.0.1

ArcPad integrates near seamlessly with ArcView and ArcGIS as a front-end data-capture solution. Although not perfect (no software package is), ArcPad and the ArcGIS suite of software provide the field user with the flexibility needed to manage all aspects of a field-mapping project, from setup to final map production, and data storage. This integration provides for better data management, better project management, and more efficient data acquisition and manipulation (Figure 3.1). Geologically, using ArcView and ArcGIS to establish a mapping project in ArcPad provides significant benefits, including the ability

to develop and use custom symbols, establish symbol rotation, and construct legends for data values. This capability allows for simple mid-project changes in symbology and/or data values, additions or deletions of data layers, and complex editing tasks.

ESRI's ArcPad software is mobile mapping and geographic information system (GIS) technology. ArcPad provides database access, mapping, GIS, and global positioning system (GPS) integration to users out in the field via handheld and mobile devices. Data collection with ArcPad is fast, easy, and significantly improved with immediate data validation and availability.

- It supports industry-standard vector and raster image display.
- Adds data from the Internet via wireless technology.
- Includes a number of map navigation tools including zoom and pan, spatial bookmarks, and center on the current GPS position.
- Queries data, identify features, display hyperlinks, and locate features.
- Measures distance, area, and bearings on your ArcPad map.
- Navigates with your GPS, connect a GPS and guides you.
- Edits data. Creates and edits spatial data using input from the mouse pointer, pen, or GPS.

3.2.3 ArcPad Studio (Application Builder) 6.0.1

ArcPad Application Builder is a custom solution for mobile systems. This application can be used to customize the interface of a mobile device to cater for an organization's unique needs. The following personalization and customization tasks can be made:

- Create new toolbars that contain built-in and custom tools.
- Design custom forms to streamline data collection in the field.
- Write scripts that automate tasks and interact with ArcPad software's internal objects.
- Build applets to accomplish your organization's unique goals.
- Develop extensions to support new file formats and positioning services.

All customization is performed on the desktop and deployed to ArcPad on the mobile device.

3.2.4 ArcIMS

ArcIMS is the solution for distributing mapping and GIS data and services on the Web. It can be used on an Intranet or Internet. It can share information with hundreds of thousands of people over the Internet to distribute geographic data to many concurrent users and allow them to do location-based analyses. It is a powerful, scalable, standards-based tool that lets you quickly design and manage Internet mapping services. ArcIMS integrates with ESRI's ArcGIS Desktop products including the ability to publish ArcMap documents on the Internet

- Ability to combine data from multiple sources
- Secure access to map services

- Wide range of GIS capabilities
- Highly scalable architecture
- Standards-based communication
- Support for a wide range of clients
- Useful metadata services for indexing and sharing geographic information.

On a basic level, the Arcview Internet Map Server (ArcIMS) architecture includes the server and the client. The client requests information from the server, and the server processes the request and sends the information back to the client. More specifically, this framework includes the Spatial Server, the Application Server, the Application Server Connectors, ArcIMS Manager, and the ArcIMS Viewers. The Spatial Server is used to process requests for the maps and related information such as streaming features, conducting queries, and address geocoding. Managing the Server involves running the ArcIMS Spatial Server along with the Virtual Servers that are defined for the ArcIMS Spatial Server. Each Virtual Server allows the ArcIMS Spatial Server to perform different operations. There are five types of Virtual Servers: Image, Feature, Geocode, Query, and Extract.

Image and Feature Virtual Servers publish MapServices called Image MapServices and Feature MapServices, respectively. Although these two MapServices appear similar in a web browser, an Image MapService is processed as a picture, while a Feature MapService is processed as a stream of feature data. Geocode, Query, and Extract Virtual Servers are typically used in conjunction with either Image or Feature Virtual Servers to

provide support for their own functions. Choosing an Image or Feature Virtual Server depends on how the maps will be delivered to the web site, and the functionality the web site needs to provide. The Application Server keeps track of which MapServices are running on which ArcIMS Spatial Servers, as well as handles all incoming requests. The Application Server is written as a Java application and runs as a Windows service. The ArcIMS Application Server Connectors are used to connect the web server to the ArcIMS Application Server. The ArcIMS Servlet Connector is the standard connector used for ArcIMS, and it uses the ArcIMS language, ArcXML (Arcview Extensible Markup Language), to communicate from the web server to the ArcIMS Application Server. The Web Server is software enables the web site to run. When a web browser makes a request for a file, the web server locates the file and sends it back to the browser.

The ArcIMS 3.1 package contains a manager application that allows the authoring of the map configuration files, the publishing of the map services, the designing of the web pages, and the administration of the web site. To accomplish this, the Manager application combines three independent applications, which are Author, Designer, and Administrator. ArcIMS has three viewers to choose from. These viewers determine the look of the web site and offer the necessary tools for viewing and querying data. Viewers also can perform spatial analysis tasks like selecting and buffering features, as well as sharing ideas about data using such tools as EditNotes and MapNotes. The ArcIMS Viewers also feature legends, overview maps, saving and retrieving projects, and map printing. The three viewers that ArcIMS uses are the HyperText Markup Language (HTML) Viewer, the Java Custom Viewer, and the Java Standard Viewer.

An HTML viewer uses a single Image MapService and does not require a Java plug-in. This viewer has the least functionality of the three but also requires the least amount of bandwidth to operate making it the fastest viewer. It is therefore recommended to use this viewer in a situation where the client represents the general public browsing the website.

The Java Standard and Custom Viewers offer enhanced functionality by streaming features rather than images, as well as offering additional tools for the web page. However, these viewers require a java plug-in for viewing as well as a degree of GIS knowledge from the end users. Since these viewers stream feature data rather than images, it also takes more time to download images. It is therefore recommended that these viewers be installed for high end users on an intranet who require additional functionality.

A MapService can be published with either an Image Virtual Server or a Feature Virtual Server. The difference between them is that an image server shows images only, while a feature server provides the data as well as the image. This web application will use an Image Server since ITSD's web site coordinators prefer an HTML solution. The HyperText Markup Language (HTML) viewer on an Image Server provides a user-friendly webpage with the appropriate functionality for the client's level of expertise as well as the tasks they need to complete. The HTML Viewer employs JavaScript and Dynamic HTML (DHTML) to enhance its capabilities. The Java Viewer was not used due to the fact that this viewer is only compatible with web browsers that support Java plug-in functionality. This viewer is designed for clients that have a certain level of GIS

expertise and is therefore not feasible for public consumption. The Java Viewer is most effective when plug-ins are acceptable and client machines are large enough to handle local processing. The ArcIMS Administrator application can monitor the MapService usage and performance, update content, and change the configuration of the servers if necessary.

3.3 Personal Digital Assistance (PDA)

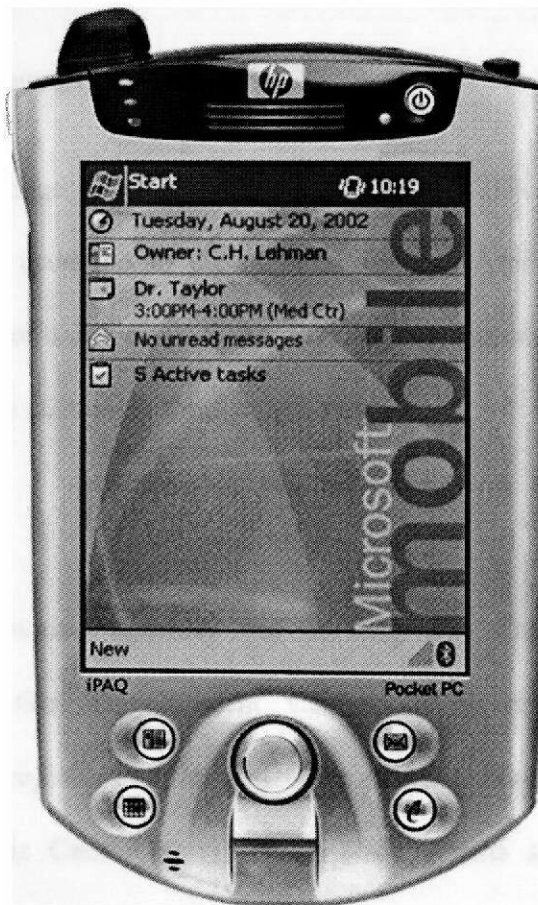


Figure 3.3 The iPAQ H5450

iPAQ H5450 is a versatile wireless Pocket PC solution, with integrated wireless and security features for mobile professionals. The versatile design makes it an outstanding fit

for a wide range of business environments. Ease-of-use features, reliability, and ready-to go solutions are combined for the ultimate wireless experience. With the new H5450 users can scale applications, capabilities, and solutions to their level of usage - and expand them as their needs change. The sturdy, industrial design includes backward compatibility for expansion pack support, screen protection, and a universal cradle that supports USB or serial interface.

3.4 Programming Languages

The programming languages used in this project included VBScript, Windows XML and HTML. VBScript was used for all the customization in ArcPad, HTML was used to generate the Investigator's Report and the Preliminary Executive Reports. XML, and Javascripts were used to customize the ArcIMS website.

3.5 Data

Spatial data was provided courtesy the Hemispheric Center for Environmental Technology (HCET) GIS Development Center. These are the Parcel shapefile representing the entire region of Civic Center, the shapefile for the Empowerment Zones of Allapattah and Civic Center (east), Miami-Dade Streets shapefile and the Aerial photographs under lay these layers.

4. Methodology

A model was designed specifically to meet the needs of the ESA field investigator. It was developed using predominantly Geographic Information System (GIS) technology. The ESRI ArcGIS suite of software used were ArcGIS (8.2) Desktop, ArcPad, ArcPad Studio (Application Builder) 6.0.1 and ArcIMS 3.0. ArcGIS Desktop was used to generate additional shipefiles and for analysis. ArcPad together with Arcpad Studio Application Builder was used to cutomize the digital form for collecting field data and to generate reports. ArcIMS was used to upload analyzed information onto an interactive GIS-based Internet website. (Figure 4.1)

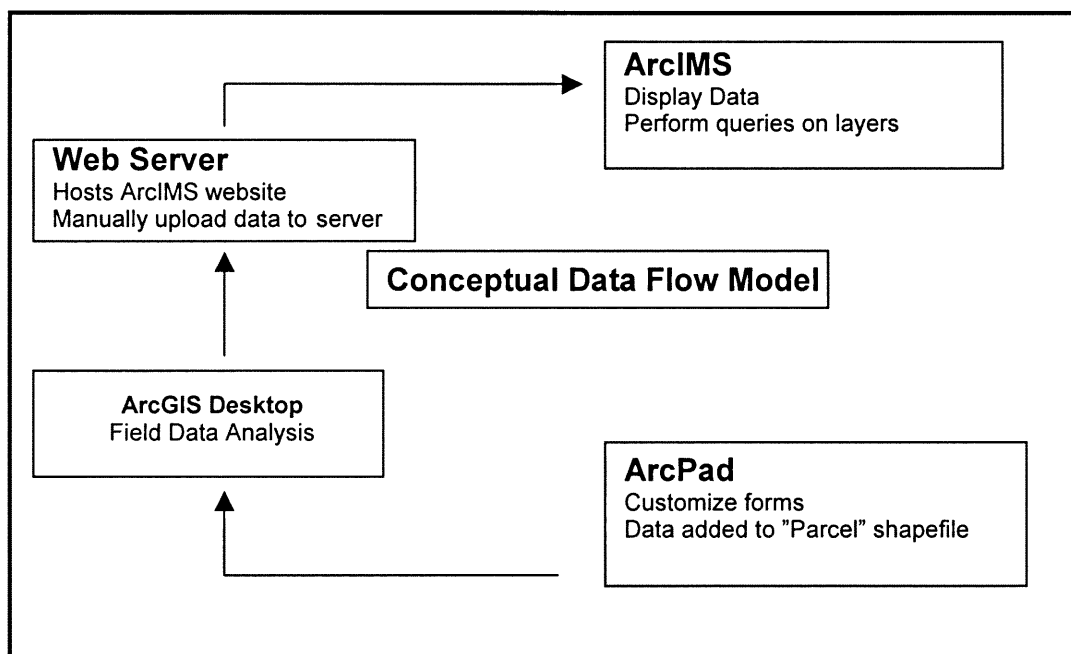


Figure 4.1 Conceptual Data flow Model

Since ArcGIS is scaleable (Figure 4.2) and can serve on an individualized level as well as meet the needs on a distributed network level, it shows that this ESA design can also serve from an individualized level and can “grow” as an enterprise grows, this implies

that this model will be efficient on varying scales - from small scale demands to distributed network levels demand.

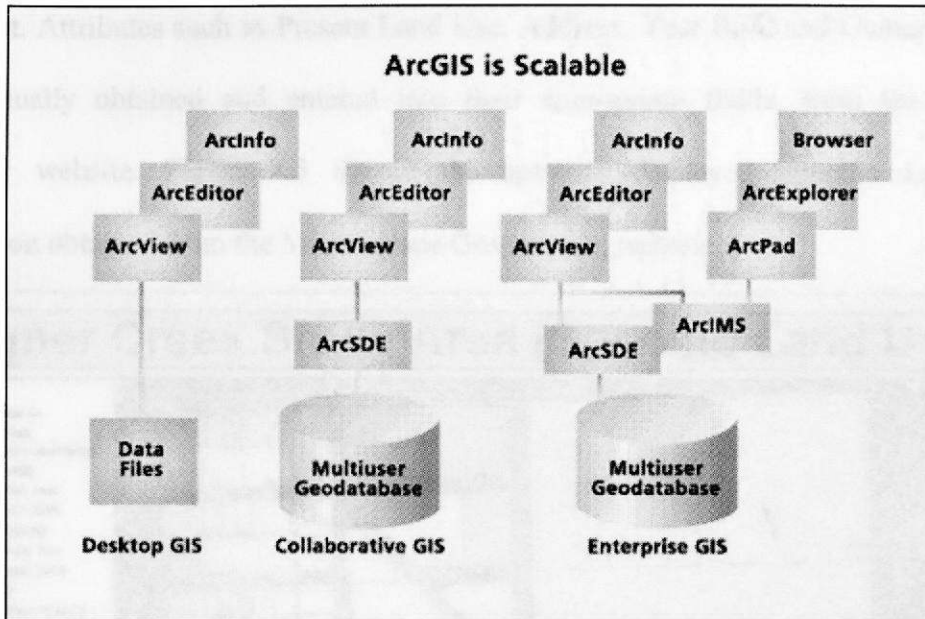


Figure 4.2 ArcGIS Suite is both Scalable and Modular

4.1 Preparation of Spatial Data

The spatial data provided by the Hemispheric Center for Environmental Technology (HCET) were generally the basic layers used. They are as follows:

Layers	Type
Street	Polyline
Parcels	Polygon
Aerials	Photograph

New fields were added to the attribute table of the Civic Center shapefile. Additional fields were needed for 1) to input general information from other websites and 2) for field data input. Attributes such as Present Land Use, Address, Year Built and Owner's Name was manually obtained and entered into their appropriate fields, from the Miami-Dade.gov website. Figure 4.5 Shows the spatially displayed Specific Land use information obtained from the Miami-Dade Government website.

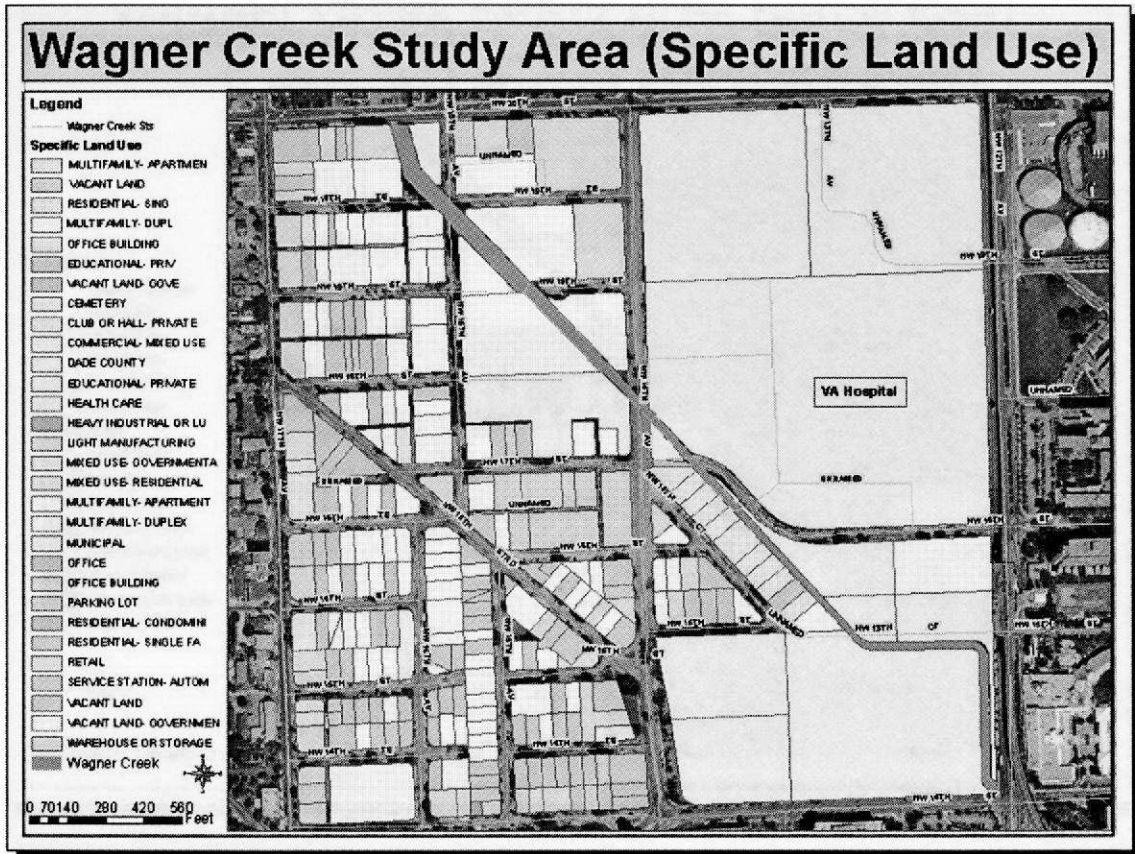


Figure 4.3 Specific land use shapefile

Once the information was updated, ArcMap, ArcCatalog and ArcToolbox were used to edit and analyze the new information in the desired format. Records were analyzed to generate a layer consisting of the general land uses.(Figure 4.4) That is, all “single

4.2 Site Visits and Site Information

The battery of students and project manager attached to the Wagner Creek Remediation Project made numerous visits to the creek's study site. For these visits historical data, pictures and information were researched and obtained. After field visits, photographs and documented observations were made into reports. These findings are made available to the public via hyperlinks on the ArcIMS website.

4.3 ArcPad and ArcPad Studio (Application Builder)

The ArcPad application was deliberately selected to design the model since it comes with many built-in features which are useful and can be incorporated into the model – so that the needs of an ESA investigator can be met. These will be discussed further on.

ArcPad Studio (Application Builder) was used to customize the Graphical User Interfaces (GUI) for the data collection form according to ASTM standards. Once data has been collected via this digital form, the field investigator has the option to generate a hardcopy “Environmental Inspection Form” which can be attached to the preliminary Executive Report. Data needed to produce both the “Environmental Inspection Form” and the “Executive Summary Report” was captured from the “Parcel” shapefile layer. ESRI's ArcIMS software was used to upload the data to make it public accessible. The interactive web site was designed such that the user need not have previous GIS knowledge or experience yet it is efficient and effective for the ESA investigator. Aerial photographs and GIS layers pertaining to the Wagner Creek study are displayed on the

website. Display of these layers can be manipulated but the user. For example he may remove the aerial photograph layer to study the shapefile layers only, or he may choose to view just one layer specifically. This is one of the very versatile features that comes with this software. The website will give access to information pertaining to the different types of land uses in the area such as industrial and residential sites, and show the proximity of these sites to the Creek. The website also contains links to documents, static maps, previous ESA Executive reports (if any), photographs, and links to other agencies' websites such as Miami-Dade.gov website.

4.3.1 Customized Digital Forms

ArcPad Studio (Application Builder) was used to customize the “Identify” form and the “Edit” form. These were designed to suit the project’s needs.

Identify Form

Figure 4.5 illustrates how the identification form allows the user to click on any parcel and the general significant information about the parcel will be displayed on the first page – such as PID (Property ID), Folio Number and Land use according to Miami-Dade Government data. When the user “taps” on the second tab, the entire attribute table with its contents for that parcel is displayed. The field investigator can reference the first page as he scans from parcel to parcel, once he has identified a parcel in question, he can then refer to the other tabs in the “Identify” Form. These are the “Attribute” page (Figure 4.6) and the “Geography” page (Figure 4.7) where he can view more detailed information about that parcel.

ArcPad Studio allows the designer to navigate through the Parcel layer, to the attribute field “PID” to “grab” the Property ID information (Figure 4.8).

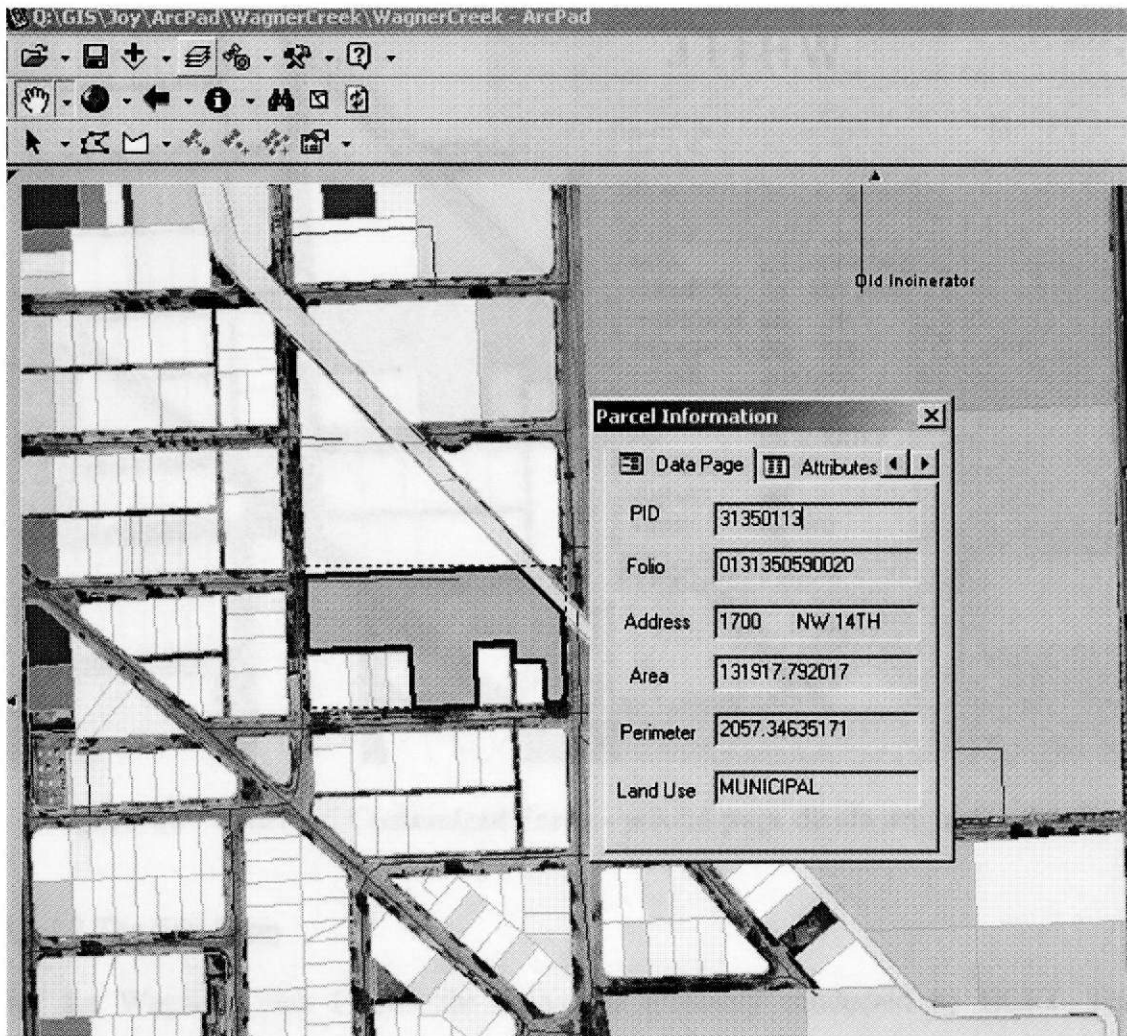


Figure 4.5 The “Identify” Customized Form – first page with general information

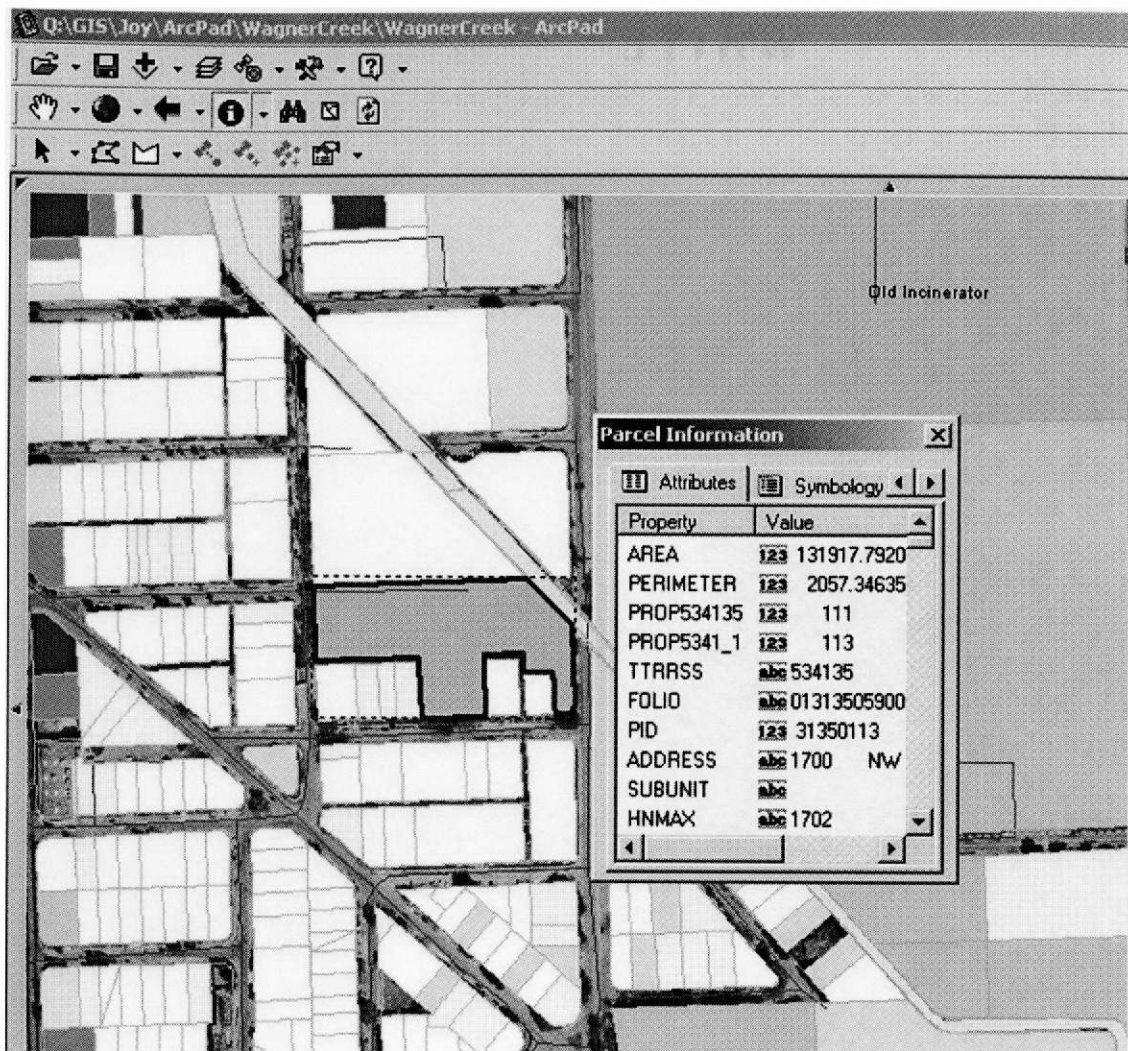


Figure 4.6 “Identify” Customized Form – second page displaying more detail

4.3.1.2 The Edit Form

For the Wagner Creek Project the ESAs are primarily conducted by HCET. This organization initially uses the Standard Practice for Transaction Screen Process (TSS - ASTM E1528) for site reconnaissance. If there are RECs on a given site, then further investigations or a Phase I will be recommended. Since TSS are more frequently used by the organization, for these reasons the sample materials used to design the digital

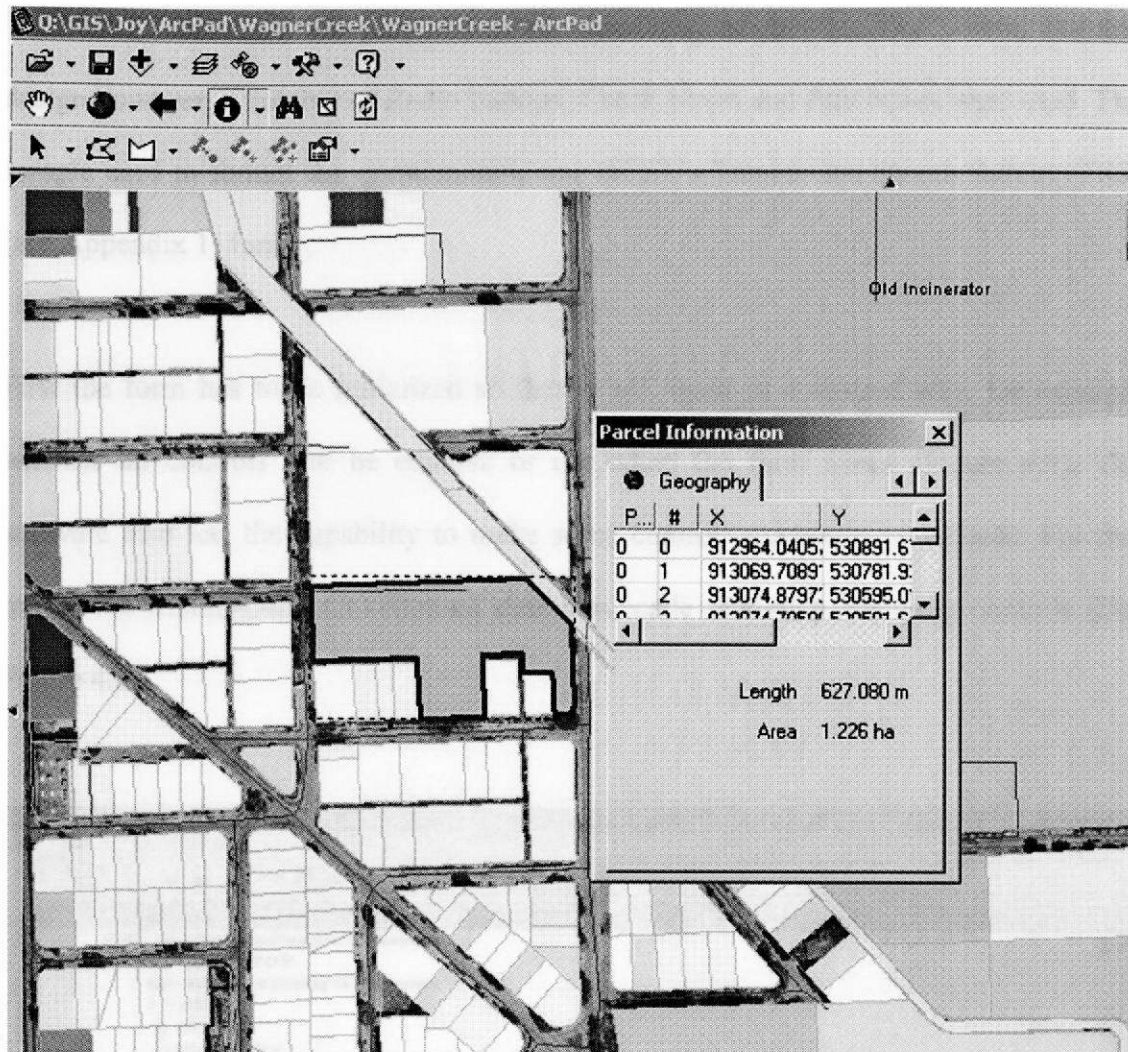


Figure 4.7 “Identify” Customized Form – fourth page displaying coordinate positions, Perimeter value and Area value

replicas, utilized HCET’s model of TSS questionnaires and Executive Reports. It must be emphasized though, that the following procedure will be the same to customize the model for a Phase I ESA. That is, the “Edit” Form will mirror that of a Phase I ESA form according to ASTM E1527 standard practice, and similarly the Executive Report will be modified to resemble a Phase I Executive Report.

The “Edit” Form is made primarily in the same way as the “Identify” Form. For this design however, a number of Radio buttons, Check boxes and Edit boxes were used. The sample used to format the questionnaire was HCET’s Transaction Screen Survey (TSS) (see Appendix 1) form.

First the form has to be initialized so that it will open in a desired way, for example whether all controls will be editable or not when the form opens (Figure 4.9). The software also has the capability to make some controls read-only or editable. For this model the Miami-Dade Government data was made read-only for these controls (See Figure 4.8).

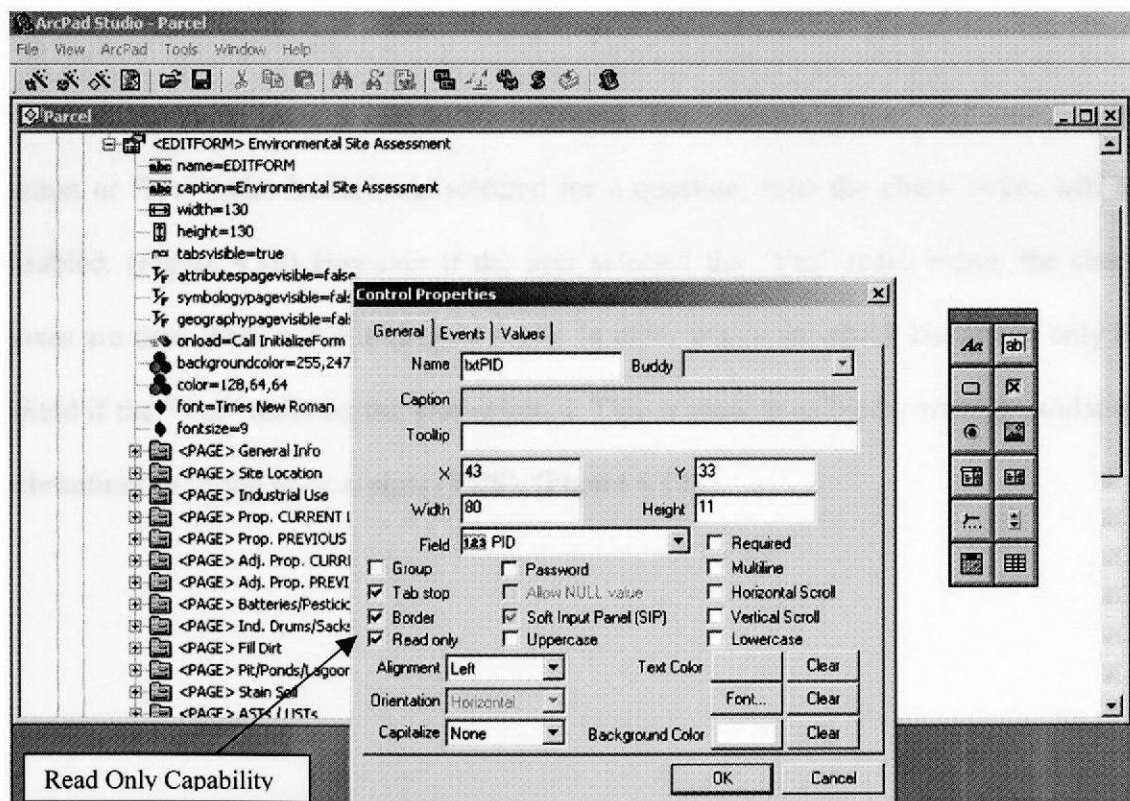


Figure 4.8 Built-in capability for Read-only Controls(show what is a control)

```
Sub InitializeForm
```

```
‘Initialization of form
```

```
Set objEditForm = ThisEvent.Object
```

```
Set objEFPPage1Controls = objEditForm.Pages("PAGE1").Controls
```

```
Set objEFPPage2Controls = objEditForm.Pages("PAGE2").Controls
```

```
.
```

```
.
```

```
‘Pg 26 Enabling
```

```
objEFPPage26Controls("txtNotes").Enabled = False
```

```
objEFPPage26Controls("btnReport").Enabled = True
```

```
End Sub
```

Figure 4.9 Script to Initialize form - makes form open in desired way

Many of the radio buttons had to be validated. For example if the “Unknown” radio button or ”No” radio button was selected for a question, then the check boxes will be disabled. (Figure 4.10) However if the user selected the “Yes” radio button the check boxes are then made editable (Figure 4.11). In other words the check boxes can only be edited if the “Yes” radio button was selected. This is made possible by writing validation subroutines in visual basic scripts (VBS). (Figure 4.12).

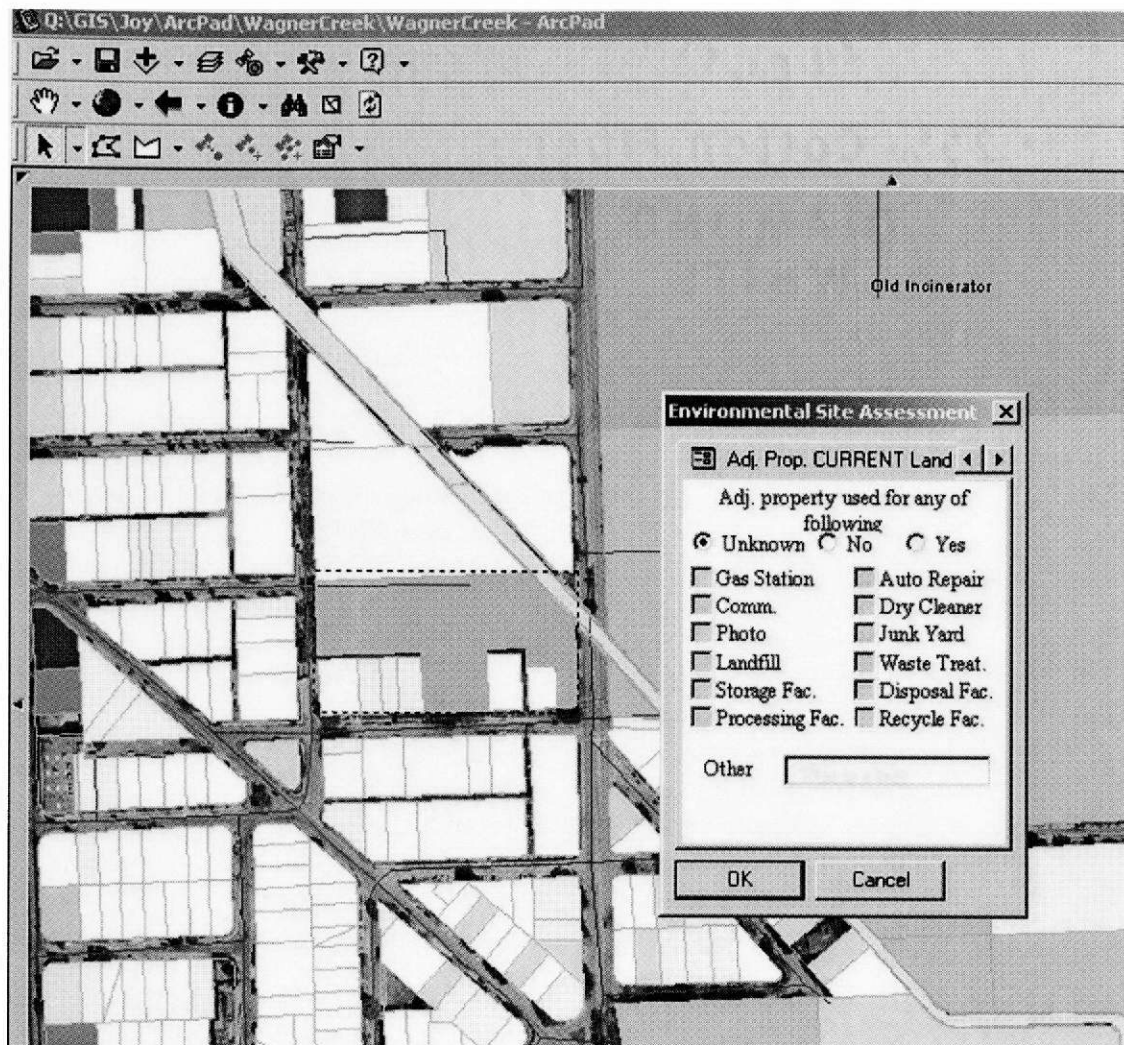


Figure 4.10 Disabled check boxes

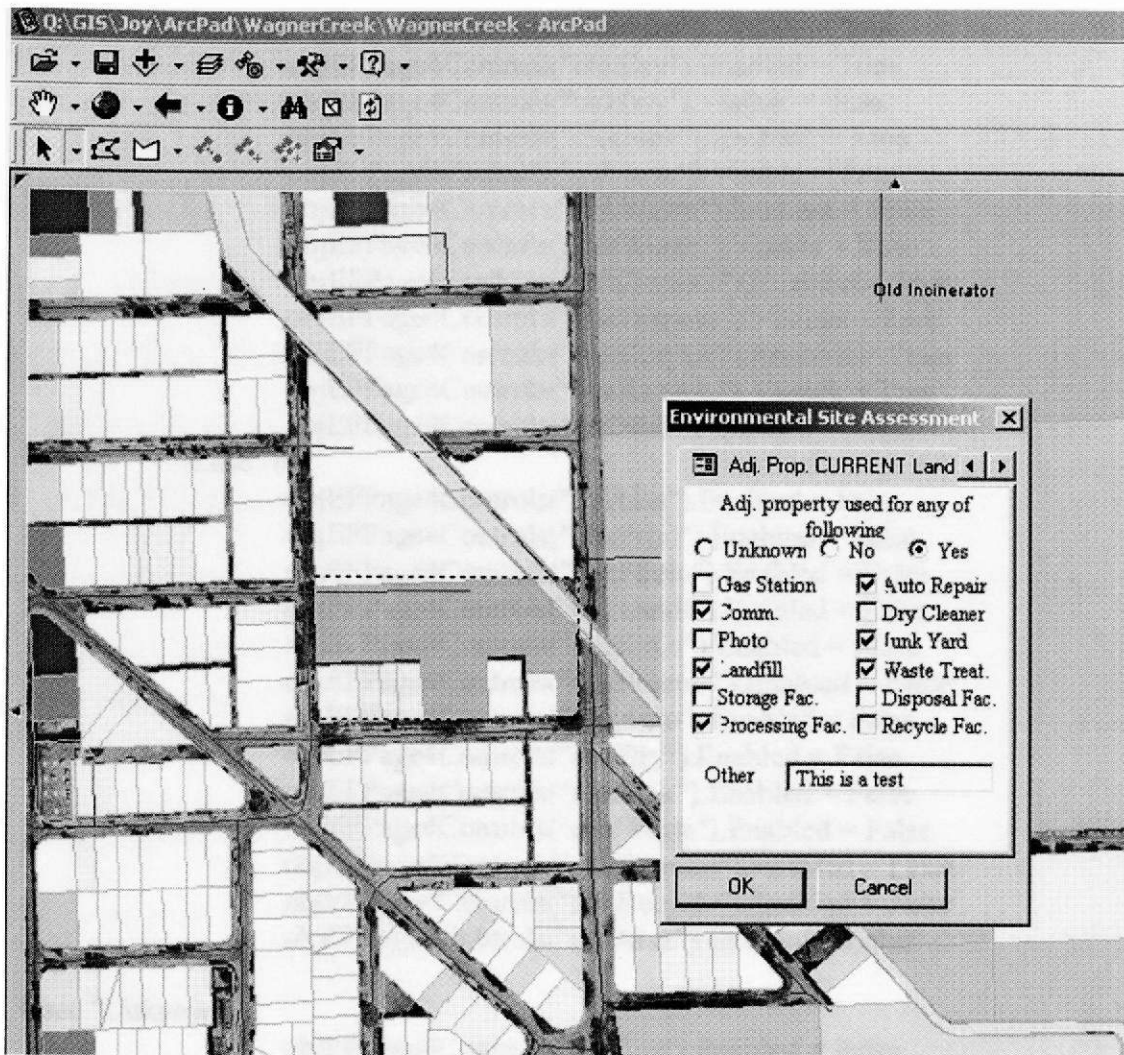


Figure 4.11 Enabled check boxes button

Sub Pg4Validate

Select Case ThisEvent.Object.Value

Case "Yes"

```
objEFPPage4Controls("chkPrint").Enabled = True
objEFPPage4Controls("chkPrint").Visible = True
objEFPPage4Controls("chkPhoto").Enabled = True
objEFPPage4Controls("chkPhoto").Visible = True
objEFPPage4Controls("chkLandf").Enabled = True
objEFPPage4Controls("chkLandf").Visible = True
objEFPPage4Controls("chkStore").Enabled = True
objEFPPage4Controls("chkStore").Visible = True
objEFPPage4Controls("chkProcess").Visible = True
objEFPPage4Controls("chkAuto").Enabled = True
```

```

objEFPage4Controls("chkAuto").Visible = True
objEFPage4Controls("chkDry").Enabled = True
objEFPage4Controls("chkDry").Visible = True
objEFPage4Controls("chkJunk").Enabled = True
objEFPage4Controls("chkJunk").Visible = True
objEFPage4Controls("chkWaste").Enabled = True
objEFPage4Controls("chkWaste").Visible = True
objEFPage4Controls("chkDispose").Enabled = True
objEFPage4Controls("chkDispose").Visible = True
objEFPage4Controls("chkRecycle").Enabled = True
objEFPage4Controls("chkRecycle").Visible = True
objEFPage4Controls("txtOther").Enabled = True

```

Case "No"

```

objEFPage4Controls("chkGas").Enabled = False
objEFPage4Controls("chkPrint").Enabled = False
objEFPage4Controls("chkPhoto").Enabled = False
objEFPage4Controls("chkLandf").Enabled = False
objEFPage4Controls("chkStore").Enabled = False
objEFPage4Controls("chkProcess").Enabled = False
objEFPage4Controls("chkAuto").Enabled = False
objEFPage4Controls("chkDry").Enabled = False
objEFPage4Controls("chkJunk").Enabled = False
objEFPage4Controls("chkWaste").Enabled = False
objEFPage4Controls("chkDispose").Enabled = False
objEFPage4Controls("chkRecycle").Enabled = False
objEFPage4Controls("txtOther").Enabled = False

```

Case "Unknown"

```

objEFPage4Controls("chkGas").Enabled = False
objEFPage4Controls("chkPrint").Enabled = False
objEFPage4Controls("chkPhoto").Enabled = False
objEFPage4Controls("chkLandf").Enabled = False
objEFPage4Controls("chkStore").Enabled = False
objEFPage4Controls("chkProcess").Enabled = False
objEFPage4Controls("chkAuto").Enabled = False
objEFPage4Controls("chkDry").Enabled = False
objEFPage4Controls("chkJunk").Enabled = False
objEFPage4Controls("chkWaste").Enabled = False
objEFPage4Controls("chkDispose").Enabled = False
objEFPage4Controls("chkRecycle").Enabled = False
objEFPage4Controls("txtOther").Enabled = False

```

End Select

End Sub

Figure 4.12 VBScript for validating radio buttons

Three buttons were added at the end of the “Edit” form (Figure 4.17). They are to generate the HTML “Inspection Form”(Figure 4.13), the HTML preliminary “Executive Summary Report ” and the editable “Executive Summary Report ”. The sample used to fashion the Executive Summary Report was taken for HCET’s TSS template. The sample scripts for these subroutines was taken from ESRI’s San Diego ArcPad example. Portions of these subroutines are presented (Figure 4.14 and Figure 4.16). The script for converting HTML to a Word document was modified from a shareware site.

Environmental Inspection Form Site Information: Last Date Modified : 11/17/2003 Inspection done by : Joy Property ID : 31350113 Folio Number : 0131350590020 Property Address : 1700 NW 14TH AVE 1. Land Use Site : MUNICIPAL Adjoining Property North : Residential Property

Figure 4.13 Generated Inspection Form (Subroutine below)

```

woFile.WriteLine("<HTML>")
woFile.WriteLine("<HEAD>")
woFile.WriteLine("<TITLE>Environmental Inspection Form</TITLE>")
woFile.WriteLine("</HEAD>")
woFile.WriteLine("<BODY>")
woFile.WriteLine("<H1>Environmental Inspection Form</H1>")
woFile.WriteLine("<H2>Site Information:</H2>")
woFile.WriteLine("<P>")
woFile.Write("<B>1. Land Use </B>")
woFile.WriteLine("<br>")
woFile.WriteLine("<br>")
woFile.Write("<B> Site:                               </B>")
woFile.Write(str2WOSite)
woFile.WriteLine("<br>")
woFile.WriteLine("<br>")
woFile.Write("<B>Adjoining Property North:  </B>")
woFile.Write(str2WONorth)

```

Figure 4.14 Portion of Inspection Form Subroutine

On 11/17/2003, HCET personnel performed the site reconnaissance. Photographs from the site visit may be found in Attachment D. (MODEL ANSWER) The property is a vacant rectangular lot. Since access to the property was restricted, HCET personnel did not enter the lot. The property is not fenced and can be accessed from NE 1st Avenue or from NE 15th Street. The entire lot is covered with grass, and a tree is located on the southeast corner. The adjacent property on the west side is an old building in bad condition with old paint. **(Refer to INVESTIGATOR'S NOTES in blue)**

This area contains additional information concerning the parcel.

Site: MUNICIPAL

Adj. Property to the North: Residential Property

Adj. Property to the South: parking Lots

Adj. Property to the East: Residential apts

Adj. Property to the West: VA Hospital

Figure 4.15 Portion of Executive Report - Showing Model Answer, investigator's notes and additional relevant information from the form in blue. The date of last inspection is automatically entered. (Subroutine Below)

```

rFile.WriteLine("<P align=left>")
rFile.WriteLine("<br>")
rFile.WriteLine("On ")
    rFile.Write(objEFPage1Controls("dtPg1").Text)
rFile.WriteLine(", HCET personnel performed the site reconnaissance. Photographs
from the site visit may be found in Attachment D. ")
rFile.WriteLine("<font color=red>")
rFile.WriteLine("(MODEL ANSWER) The property is a vacant rectangular lot.
Since access to the property was restricted, HCET personnel did not enter the lot. The
property is not fenced and can be accessed from NE 1st Avenue or from NE 15th
Street. The entire lot is covered with grass, and a tree is located on the southeast
corner. The adjacent property on the west side is an old building in bad condition
with old paint. <B>(Refer to INVESTIGATOR'S NOTES</B>")
rFile.WriteLine("</font>")
rFile.WriteLine("<font color=blue>")
rFile.WriteLine("<B> in blue</B>")
rFile.WriteLine("<br>")
rFile.Write( objEFPage26Controls("txtNotes").Value)
rFile.WriteLine("<br>")
rFile.WriteLine("<B> Site:</B>")
rFile.Write(objEFPage2Controls("site").Value)
rFile.WriteLine("<br>")
rFile.WriteLine("<B> Adj. Property to the North:</B>")
rFile.Write(objEFPage2Controls("north").Value)
rFile.WriteLine("<br>")
rFile.WriteLine("<B>Adj. Property to the South:</B>")
rFile.Write( objEFPage2Controls("south").Value)
rFile.WriteLine("<br>")
rFile.WriteLine("<B> Adj. Property to the East: </B>")
rFile.Write(objEFPage2Controls("east").Value)
rFile.WriteLine("<br>")
rFile.WriteLine("<B> Adj. Property to the West:</B>")
rFile.Write(objEFPage2Controls("west").Value)
rFile.WriteLine("</font>")

```

Figure 4.16 Executive Report Subroutine

The stylus, keyboard or the Soft Input Panel (SIP) can be used to enter text in the edit boxes. At the end of the form the investigator may enter any additional notes and generate his field report.



Figure 4.17 Digital Form Showing Edit Area for Additional Notes and the Buttons for the “Inspection Form”, “Create ESA Report” and “Convert Report to Word” functions

4.4. Reports

Two different reports are generated after each ESA. The “Inspection Report” (Figure 4.13) which is used to attach to the final report, and the preliminary Executive Summary Report (Figure 4.15).

4.4.1 The Inspection Form

The Inspection Report is a non-editable HTML document that can be generated at the end of any site inspection, or it can be reproduced at anytime based on the information already stored in the attribute table for a parcel in question. This format will have the collected data already entered onto the form (Figure 4.13).

4.4.2 The Preliminary Executive Summary Report

The preliminary Executive Summary Report will be generated with field data appended in the appropriate places, see Figure 4.15 as well as sample answers and attached relevant data such as notes and edit boxes content from the digital form. (See Appendix C)

4.5 Transfer of Data from ArcPad to ArcIMS

Field data from the hand held or laptop will be synchronized to the desktop when the investigator returns to base. The collected field data is then analyzed with ArcGIS Desktop. Analyzed information is moved to the server where updated findings are uploaded to Interactive GIS website.

4.6 ArcIMS Website

This website is intended for the general public but specifically designed to meet the ESA investigator's needs. The user is not required to have previous GIS knowledge, and queries will be performed via the "Identify" icon hence the HTML Viewer was selected verses the Java Viewer. The Java Viewer is recommended for users who have GIS

knowledge and also if extensive client-side and server-side communications are anticipated.

4.6.1 The Architecture of ArcIMS

The ArcIMS (Internet Map Service) software is an Internet platform that facilitates the capture, manipulation, and distribution of documents (5280solutions, 2003)

"ArcIMS is more than just an Internet mapping solution—it is a framework for distributing GIS capabilities via the Internet. As a publishing technology, ArcIMS features unique capabilities for supporting a wide variety of ESRI clients. As a serving technology, ArcIMS includes a wide variety of ESRI serverside technologies and provides unique opportunities for data integration potential." (ESRI, 2003).

A working ArcIMS site requires a web server, Java Virtual Machine (JVM- JRE or JDK), a Servlet engine in a Java 2 environment.

Web server - handles requests from a client using HyperText Transfer Protocol (HTTP).

The Web server forwards a request to the appropriate application and sends a response back to the requesting client.

JavaVM - Many of the ArcIMS components are Java 2 components and require a JavaVM, which provides the basic application program interface (API) for running these applications.

Servlet engine - It's an extension to the JavaVM and provides support for servlets through a servlet API. The servlet engine plugs into a Web server and provides the link between the JavaVM and the Web server. An example of Web Servlet is Jakarta-Tomcat.

ArcIMS software architecture

ArcIMS was designed with a multi-tier architecture. What does this mean? A single-tier application would be something that runs only at the client and does not need persistent storage, such as a calculator. Two-tier applications consist of a client which provides a user interface and a server which provides persistent storage. Two-tier applications tend to be personal productivity applications, such as word processors and spreadsheet programs, that access user files.

A multi-tier architecture makes use of three or more tiers, each of which may make use of several applications or services. ArcIMS consists of three tiers, described as the presentation tier, the business logic tier, and the data storage tier. These tiers describe logical groupings of the functionality of the various application components and do not necessarily correspond to their physical location.

The presentation tier includes the ArcIMS client viewers for accessing, viewing, and analyzing geographic data.

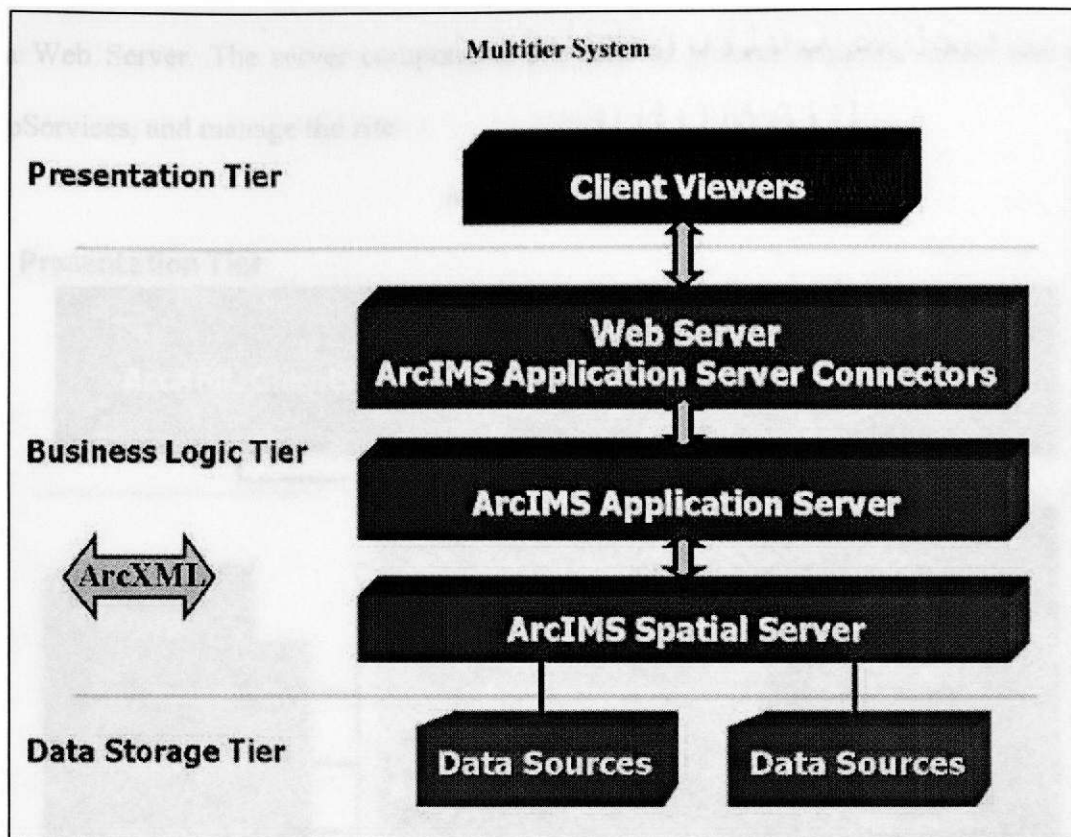


Figure 4.18 ArcIMS Architecture

The components in the business logic contains the components needed to run MapServices and process requests and responses. The components include the Application Server Connectors, the ArcIMS Application Server, and the ArcIMS Spatial Server. The framework also requires the Web server, JavaVM, and the servlet engine. The data tier includes all data sources available for use with ArcIMS.

ArcIMS components

The servers consist of components in the business logic tier. They are the ArcIMS Application Server Connectors, Application Server, Spatial Server, and Manager as well

as a Web Server. The server components are used to process requests, create and run MapServices, and manage the site.

ArcIMS Components

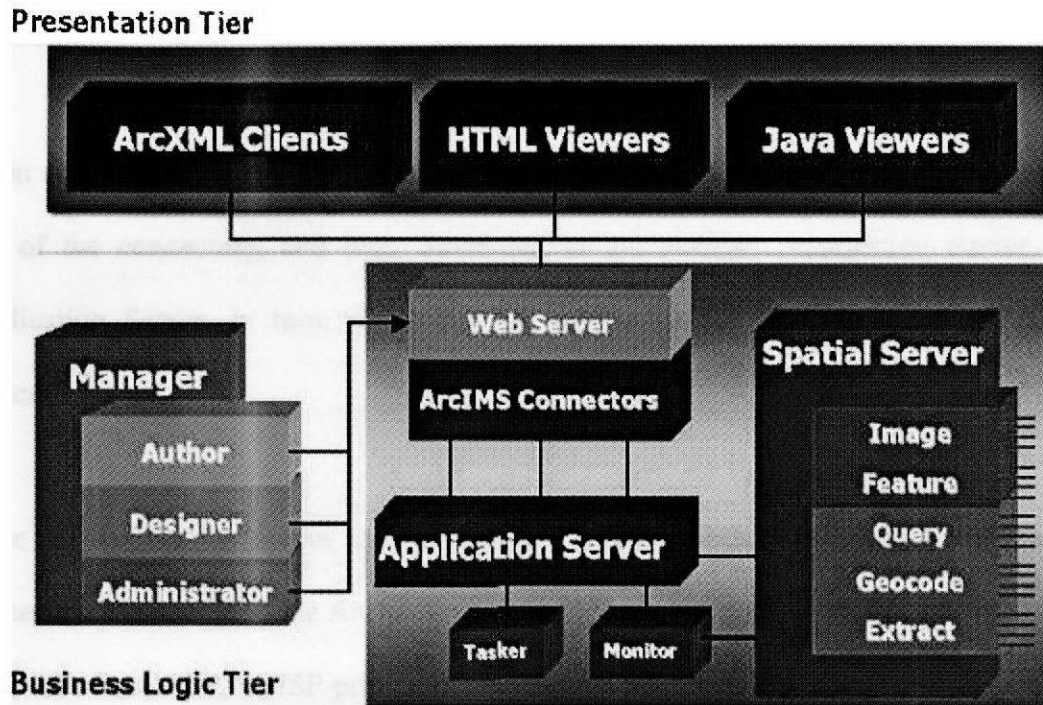


Figure 4.19 ArcIMS components

ArcIMS Application Server - runs as a background process and handles the load distribution of incoming requests. It also catalogs which MapServices are running on which ArcIMS.

ArcIMS Spatial Server - provides the functional capabilities for accessing and bundling maps and data into the appropriate format before sending the data back to a Web browser. The Spatial Server is a container for holding components that support different

functionality as shown in Figure 3. Each of these components (i.e., Image server, Feature server) makes up a server type inside the ArcIMS Spatial Server.

ArcIMS requests and responses (connectors)

When an ArcIMS request is made, it is first handled by the Web server, passed through one of the connectors, and then forwarded to the ArcIMS Application Server. The Application Server, in turn, dispatches the request to an ArcIMS Spatial Server for processing.

Since the Application Server can only process requests written in ArcXML, connectors are needed to either pass the ArcXML straight through or translate third party syntax such as ColdFusion, ASP, or JSP prior to forwarding the ArcXML request to the Application Server. Thus, the connectors provide a communication pipeline between a Web server or third party application server and the ArcIMS Application Server. The connectors communicate with the application server through TCP.

ArcIMS has four connectors:

1. ArcIMS Servlet Connector (default connector for ArcIMS). This servlet works with a Web server and allows for HTTP posts to be gathered and sent to an application server.
2. A Web Map Server (WMS) Connector is contained in the ArcIMS Servlet Connector that processes WMS requests. This connector allows any Open GIS

Consortium WMS-compatible browser or client the ability to access an ArcIMS MapService. ArcIMS is fully compliant with the WMS specification.

Steps Taken by ArcIMS to Process a Request and Send a Response

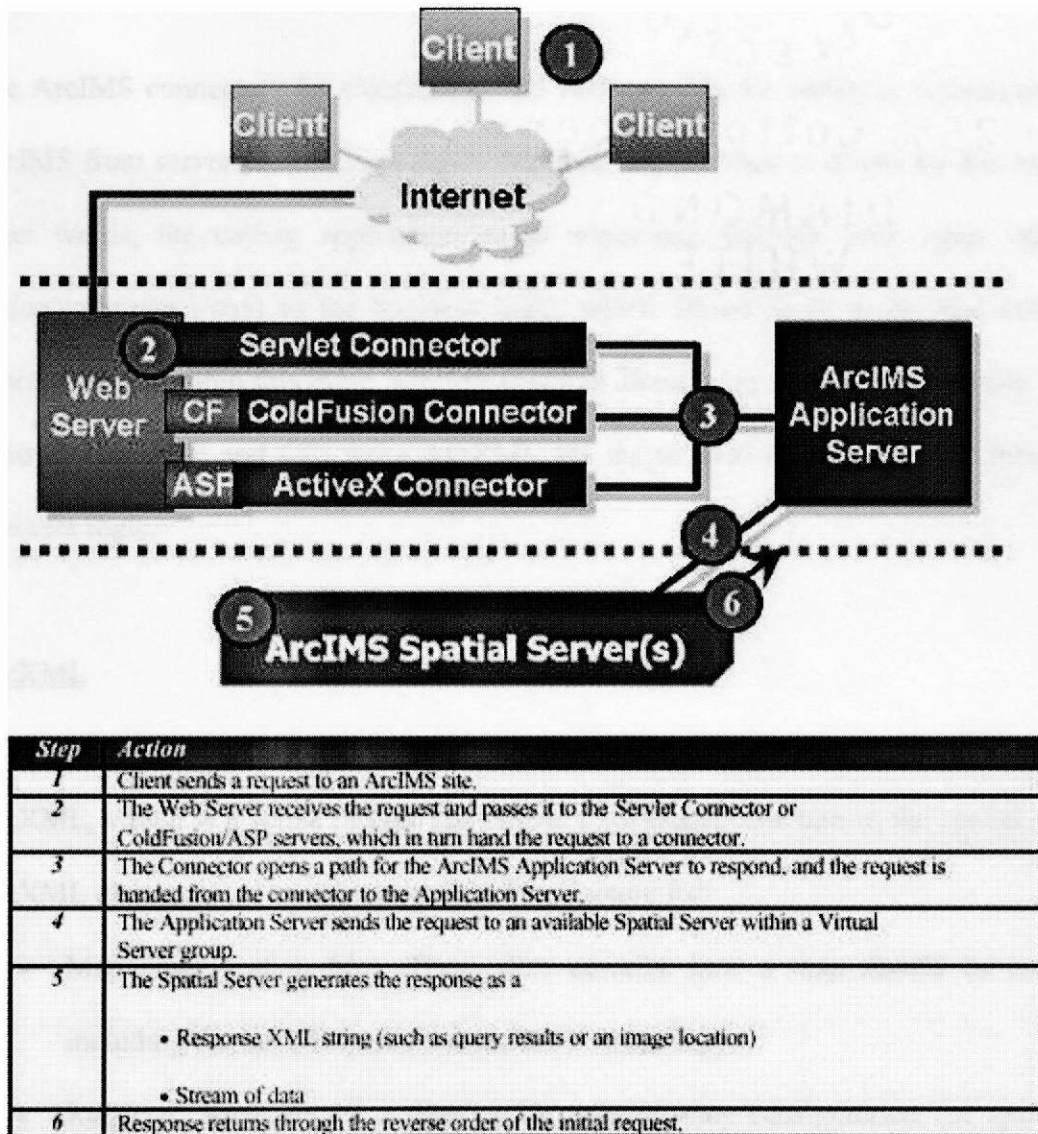


Figure 4.20 ArcIMS requests and responses cycle

3. ArcIMS ColdFusion® Connector (for serverside application logic).
4. ArcIMS ActiveX® Connector (also for serverside application logic). It's a Component Object Model (COM) DLL that can be used in a COM application such as Microsoft® Active Server Pages (ASP).

The ArcIMS connectors for ColdFusion and ASP provide the ability to communicate to ArcIMS from serverside business logic; therefore, the interface is driven by this logic. In other words, the calling application sends commands through form input variables (value/argument pairs) to the business logic, which allows them to be read and used appropriately. Within this logic, ArcIMS is called directly via design time controls. These controls (for ASP and CF) write ArcXML via instantiated objects and call inside the business logic.

ArcXML

Communication between components in the business logic tier is handled through ArcXML, which is a series of tags that define a command structure to the spatial server. ArcXML elements and attributes provide the structure for:

- Map configuration files. These files describe how a map should be rendered including the list of layers used and their symbology.
- Requests. Requests set a filter on an existing map configuration file specifying which part of a map and associated data will be acted upon.
- Responses. Responses return information to the requestor.

- Administration. All administration such as adding, starting, stopping, and deleting ArcIMS Spatial Servers, Virtual Servers, and MapServices is handled using ArcXML.

As an example of ArcXML, the following is a request & response to generate an image map:

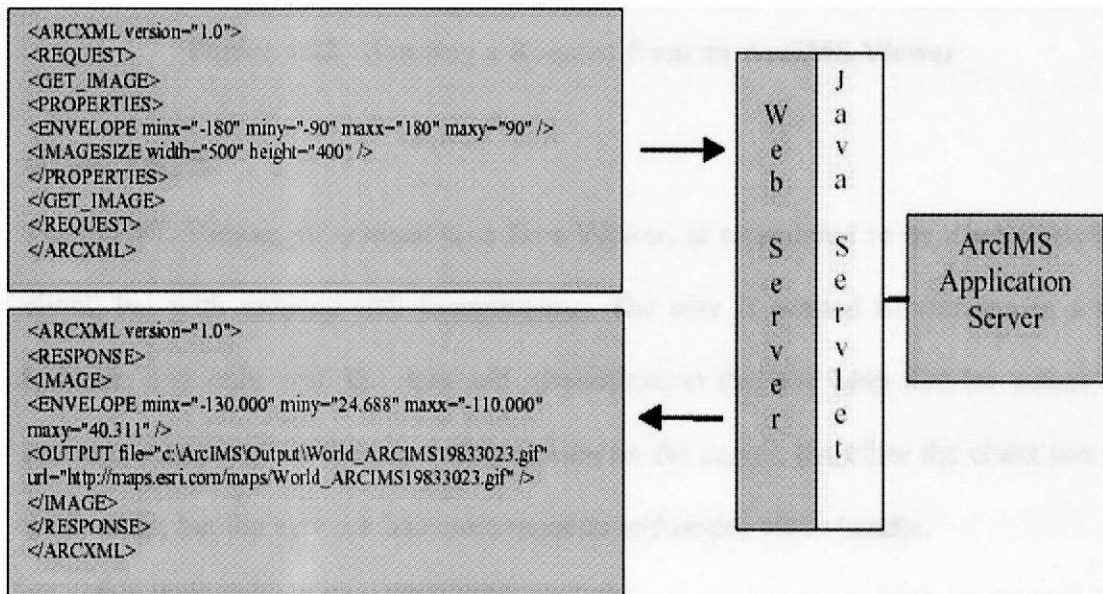


Figure 4.21 ArcXML - the request and response to generate an image map

ArcIMS Clients (Viewers)

The ArcIMS Viewers generate requests and process responses on the client side. When a user clicks on a map, a request is generated in ArcXML by the client and sent to the ArcIMS site as shown in Figure

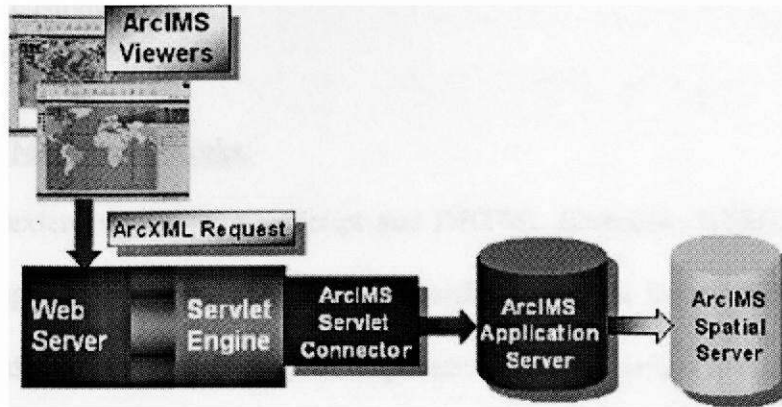


Figure 4.22 - Sending a Request from an ArcIMS Viewer

HTML Viewer

The HTML Viewer, in contrast to a Java Viewer, is considered to be a relatively thin client, but with reduced GIS functionality. The user is limited to working in a web browser, and only with the data and symbolization that the Map Service author has created. Almost all of the processing occurs on the server, therefore the client has less work to do, but the network has more requests and responses to handle.

Disadvantages of the HTML Viewer:

- Can only view a single Image Map Service
- No Feature Map services
- No Edit Notes, Map Notes, Map Tips, layers added by user, etc.

Advantages of the HTML Viewer:

- Works with both Internet Explorer and Netscape (although not all functions are available in Netscape, and I recommend against it.)
- Less client side processing
- Does not require Java 2 plug-in or applet support

- Easily customizable

How the HTML Viewer works:

By making extensive use of JavaScript and DHTML (Dynamic HTML), and Frames, we turn a regular web browser into a lightweight GIS client for ArcIMS. All requests are generated using JavaScript, and all responses are parsed using JavaScript. JavaScript is a browser scripting language that works in both Netscape and Internet Explorer (but Netscape does not support as many functions as IE, so not everything works the same in Netscape).

Frames:

The ArcIMS HTML Viewer starts by dividing up the browser into Frames. In HTML, Frames are used to define the structure of a web browser rather than to define content. The ArcIMS HTML Viewer uses a special HTML file called viewer.htm to divide the available browser space into multiple windows. Each of these windows then loads a different html page.

There are about 20 HTML files that define the page content for the HTML Viewer. Figure 6 shows the basic layout of the frames, the name we use to refer to that frame, and the initial HTML page that is loaded into that frame. While the client is using the Viewer, other html pages may be loaded into various frames. While some JavaScript is contained in each of the html pages, the majority of it exists in separate files of JavaScript. This is done in order to better organize all of the functions

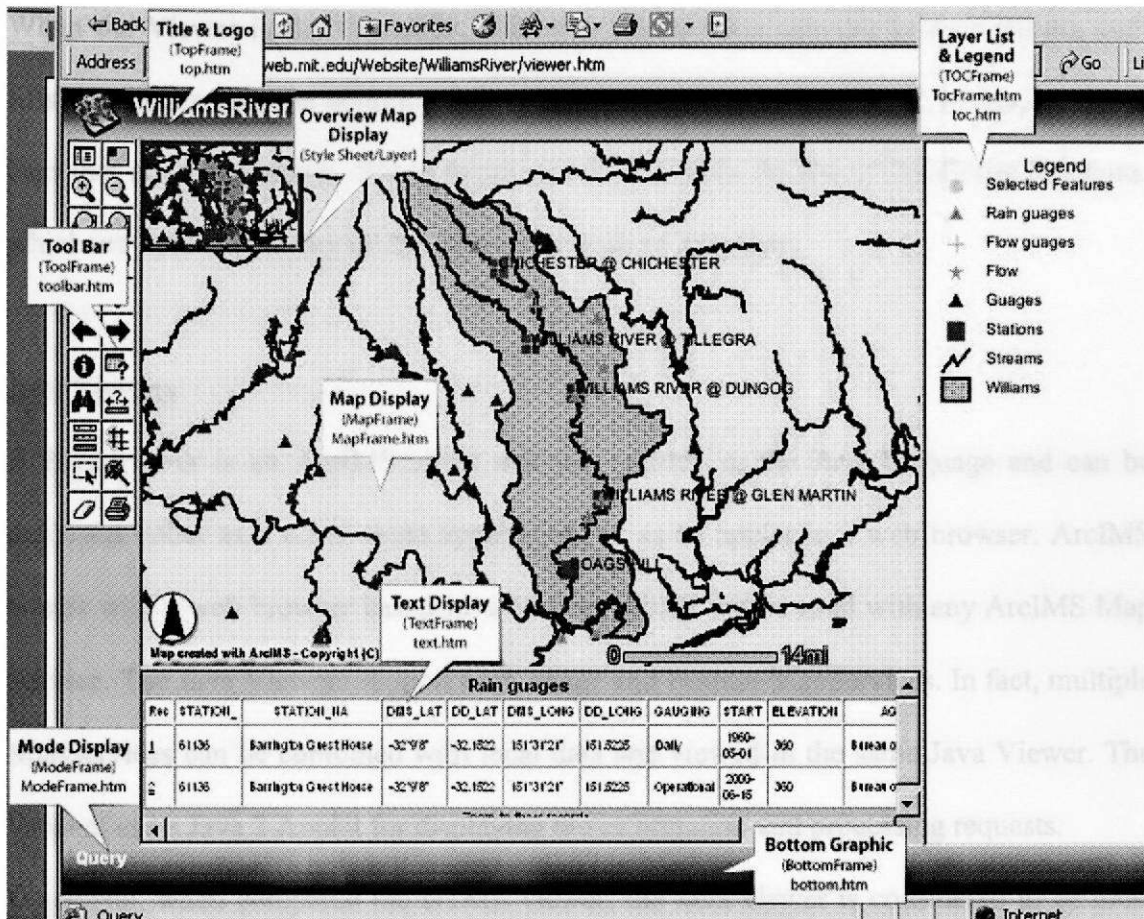


Figure 4.23 HTML Viewer Frames

(sub-routines) into logical groupings, making it easier to find code when the need to customize arises.

Below is the directory structure of the viewer pictured above. All of the HTML pages are in the root directory along with a JavaScript parameters file, which contains a few functions but mostly global variables that can be set for quick and easy customization of the viewer. The JavaScript is in its own directory, grouped into files based on their function.

When the Viewer is first launched, it formats the browser into the various frames, then fills the frames with the appropriate HTML file, and then it reads in all of the JavaScript files that are listed above. These JavaScript files contain dozens of JavaScript functions, which are held in memory by the browser as long as it is open.

Java Viewers

A Java viewer is an ArcIMS client that was written in the Java language and can be deployed either as a stand alone application, or as an applet in a web browser. ArcIMS comes with a web browser based Java Viewer, which can be used with any ArcIMS Map Service. The Java Viewers support both Image and Feature MapServices. In fact, multiple MapServices can be combined with local data and viewed in the same Java Viewer. The viewers use a Java 2 Applet for displaying the information and processing requests.

In general, when compared the HTML viewer, the Java viewer is considered to be most appropriate for intranet deployment, because so much of the processing is done on the client side, and if using a Feature Map Service, the amount of data to be downloaded can be too much for slow, dial up connections. The initial loading of the Java Viewer may also take longer, especially the first time when the applets are first downloaded.

Disadvantages of the Java Viewer:

Map interaction and GIS processing primarily on client machine

Slower initialization, but more powerful applications possible.

Java2 plug-in required.

Client must download and install the Java Runtime Environment (JRE) if not already present.

Does not run in the Netscape browser

Advantages of the Java Viewer:

Supports both Image and Feature MapServices

Supports feature streaming from a Feature Map Service

Supports more clientside processing

User may add layers on top of those from the Map Service. Anything on the user's networked drives can be added.

Downloads feature vectors and attributes, minimizing the need for multiple server requests.

Can have more than one Map Service in the same viewer.

Some ArcIMS functions can only be utilized with a Java Viewer, such as:

MapTips - hover over a feature, a piece of text appears

MapNotes - user draws shapes and text on the screen and sends it to the server.

Other users can see the notes

EditNotes - user draws points, lines or polygons on the screen and sends it to the server. the System Administrator can then turn that into a shapefile.

Data streamed to the Java Viewers is temporarily cached on the client machine. Requests are handled on the client machine unless the request requires data that is not currently in the cache. In that case, the request is sent to the server to either retrieve more data or process data residing on the server. The temporary cache is removed when the viewer is closed.

ArcIMS comes with two Java Viewers: Java Custom and Java Standard. Both have the same functionality. The Java Custom Viewer uses JavaScript to communicate with the applets. The Viewer can be customized using methods in a Viewer Object Model API.

The Java Standard Viewer uses no JavaScript. The tools and functions are predefined and cannot be customized using the Viewer Object Model. The Java Standard Viewer is supported on Netscape and Internet Explorer (Kris Kolodziej).

4.6.2 Customizing the ArcIMS Interface

The two major files in ArcIMS responsible for the website's interface are the Viewer.html file (Figure 4.24) and the ArcIMSParam.js files (Figure 4.25). The former is a HTML file and the latter is a JavaScript file. In these two files script is modified at different locations. A couple of scripts are displayed.

```
document.writeln('</HEAD>');
    document.writeln('<FRAMESET ROWS="' + (50+addNS) + ',*,30,0"
FRAMEBORDER="No" FRAMESPACING="0" onload="doIt()" BORDER=0 ' + moreStuff +
'>');
    document.writeln('  <FRAME NAME="TopFrame" SRC="top.htm" MARGINWIDTH="5"
MARGINHEIGHT="0" SCROLLING="No" FRAMEBORDER="0" NORESIZE>');
    document.writeln('  <FRAMESET COLS="' + (70+addNS) + ',*,350"
FRAMEBORDER="No" FRAMESPACING="0" BORDER=0>');
    document.writeln('    <FRAME NAME="ToolFrame" SRC="toc.htm"
MARGINWIDTH="0" MARGINHEIGHT="0" SCROLLING="No" FRAMEBORDER="0" NORESIZE
FRAMESPACING="0" BORDER="0">');
    document.writeln('      <FRAMESET ROWS="*,50"> ');
    document.writeln('        <FRAME NAME="MapFrame" SRC="MapFrame.htm"
MARGINWIDTH="0" MARGINHEIGHT="0" SCROLLING="No" FRAMEBORDER="Yes"
RESIZE="YES">');
    document.writeln('          <FRAME NAME="TextFrame" SRC="Toolbar.htm"
MARGINWIDTH="0" MARGINHEIGHT="0" SCROLLING="Auto" FRAMEBORDER="Yes"
RESIZE="YES">');
</SCRIPT>
```

Figure 4.24 Script to Customize the Frames – Viewer.html

```

//variables for MapDrawing
    // North Arrow
var drawNorthArrow = true;
var NorthArrowType = "2";
var NorthArrowSize = "10";
var NorthArrowCoords = "20 35";
var NorthArrowAngle = "0";
    // Scale Bar
var drawScaleBar = true;
    // MapUnits=DEGREES,FEET,METERS
    // can MapUnits be changed by user?
var setMapUnits=false;
    // ScaleBarUnits=KILOMETERS,METERS,MILES,FEET
var ScaleBarBackground = "TRUE";
var ScaleBarBackColor = "255,255,204";
var ScaleBarFontColor = "0,77,194";
var ScaleBarColor = "51,102,153";
var ScaleBarFont = "";
var ScaleBarStyle = "Regular";
var ScaleBarRound = "1";
var ScaleBarSize = "9";
var ScaleBarWidth = "5";
var ScaleBarPrecision = 2;
var numDecimals = ScaleBarPrecision;
    // Scale Bar 2
var drawScaleBar2 = false;
var ScaleBar2Units = "KILOMETERS";
var ScaleBar2Background = "false";
.
.
.

    // Copyright blurb
var drawCopyright = true;
var CopyrightFont = "";
var CopyrightStyle = "Regular";
var CopyrightSize = "8";
var CopyrightCoords = "3 3";
var CopyrightColor = "0,77,194";
var CopyrightBackground = "True";
var CopyrightBGColor = "255,255,255";
var CopyrightGlow = "true";
var CopyrightGlowColor = "255,255,255";
var CopyrightShadow = "False";
var CopyrightShadowColor = "32,32,32";
var CopyrightText = "FIU HCET NOAA Wagner Creek Project (Thesis -
JAshby)";

```

Figure 4.25 Script to manipulate North Arrow, Scale bar and Copyright – ArcIMSParam.js

Links To Other Websites

With the availability of Internet connection the field investigator may access other websites to enhance his investigative needs. For example he may observe an environmental condition that was not previously mentioned in the historic review of the property. On location at the inspection site he can immediately click on a website to inquire about the condition (See Figure 4.26).

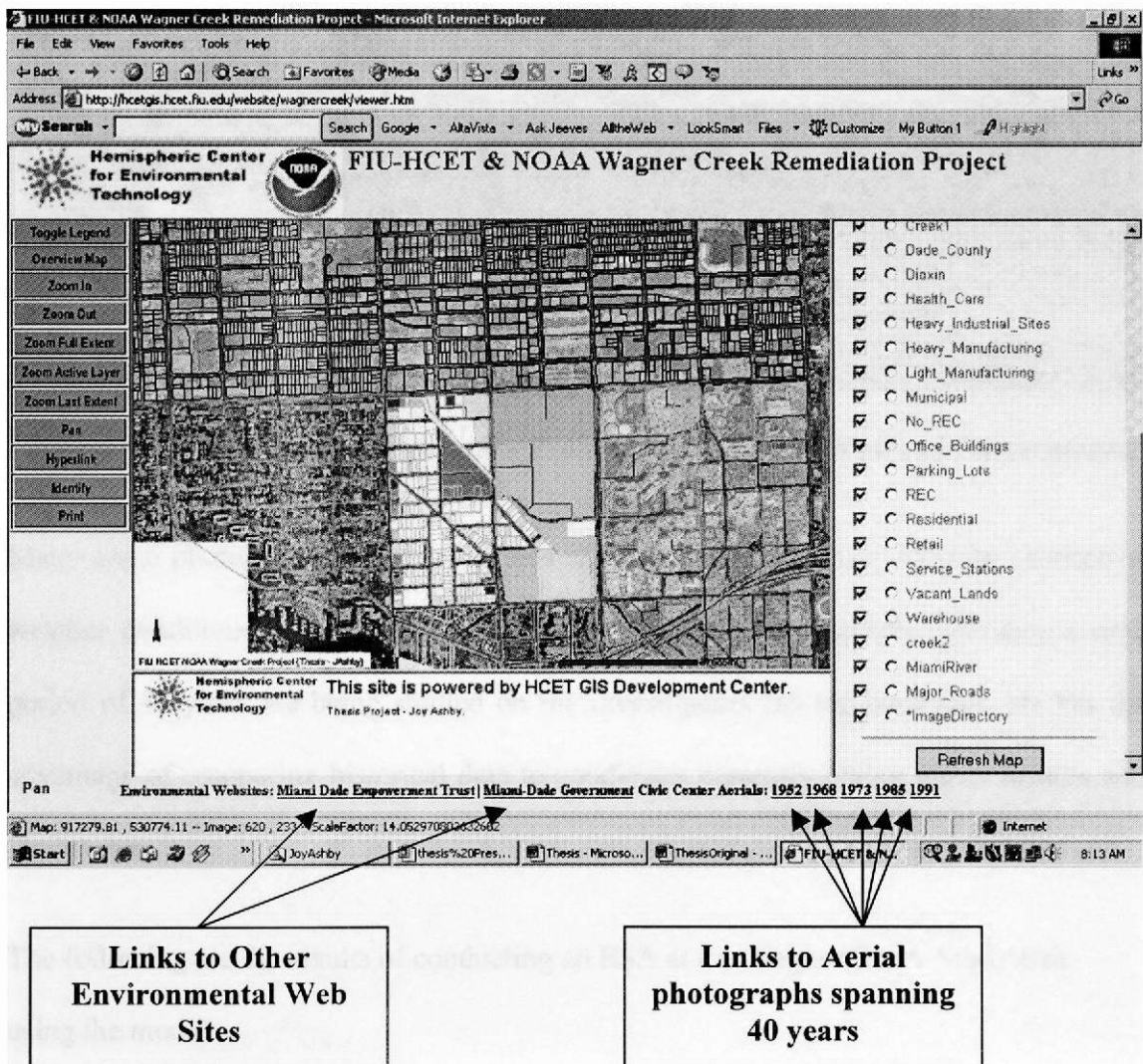


Figure 4.26 Links To Other Websites and To Aerial Photographs

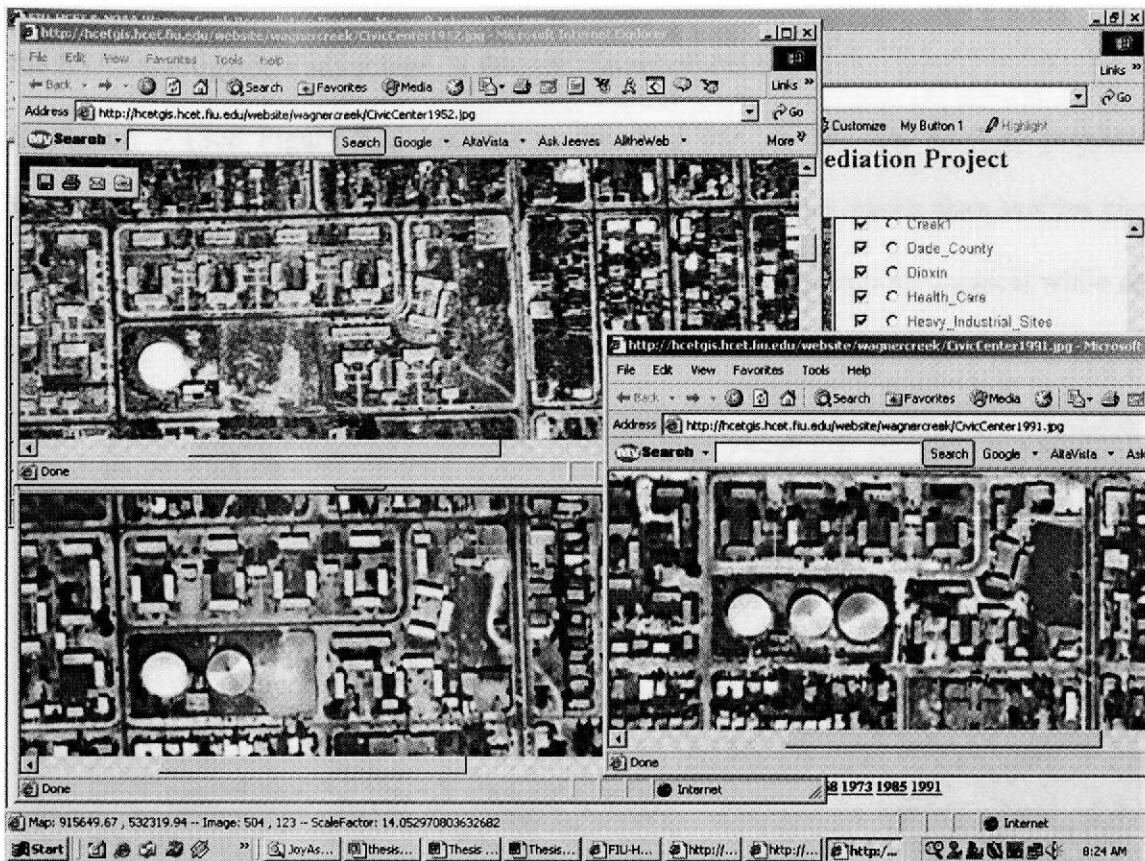


Figure 4.27 On Site Observation of a Property Spanning 40 Years of Development

Many aerial photographs can be examined all at once while on-site, with the absence of weather conditions such as winds. In figure 4.26 aerial photographs spanning a time period of 40 years are being studied on the investigators lap top computer. He has the advantage of comparing historical data to conditions presently before him.⁵ Results and Discussion

The following are the results of conducting an ESA at the Wagner Creek Study area using the model.

5.1. Features of Mobile Application

ArcPad software was selected because it has special built-in features that can be used to the ESA investigator's advantage. A few are discussed below:

Bookmark – (See Figure 5.1) Located in the drop box of the “Go back to previous Extent” button, this feature allows the user to create a bookmark which then enables him to zoom directly to that particular parcel. This eliminates the search for a parcel while on the field.

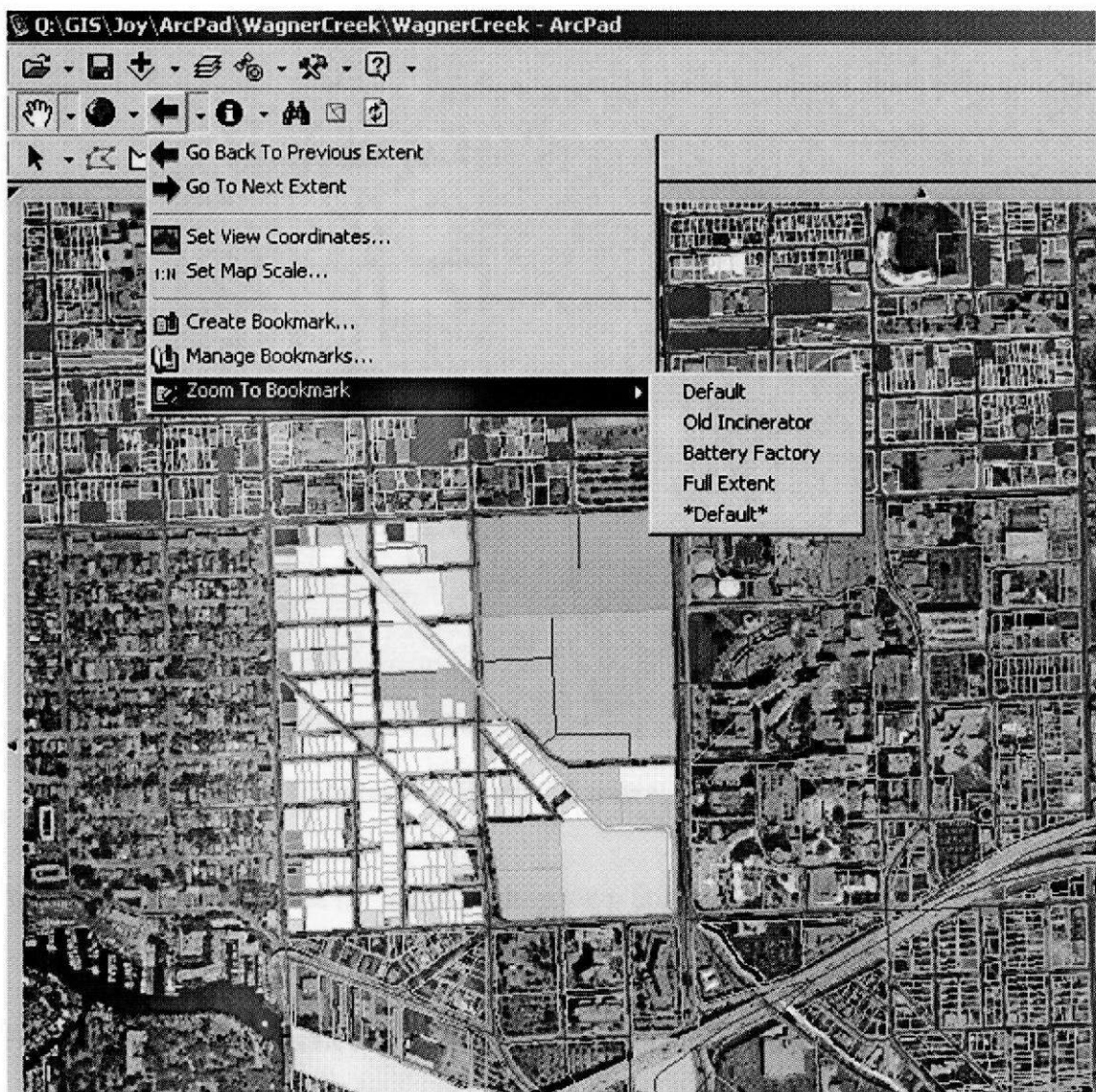


Figure 5.1 Built in feature to zoom to a specific location

Measure – Measure tool located on the drop box of the “Identfy” Icon. (Figure 5.2)

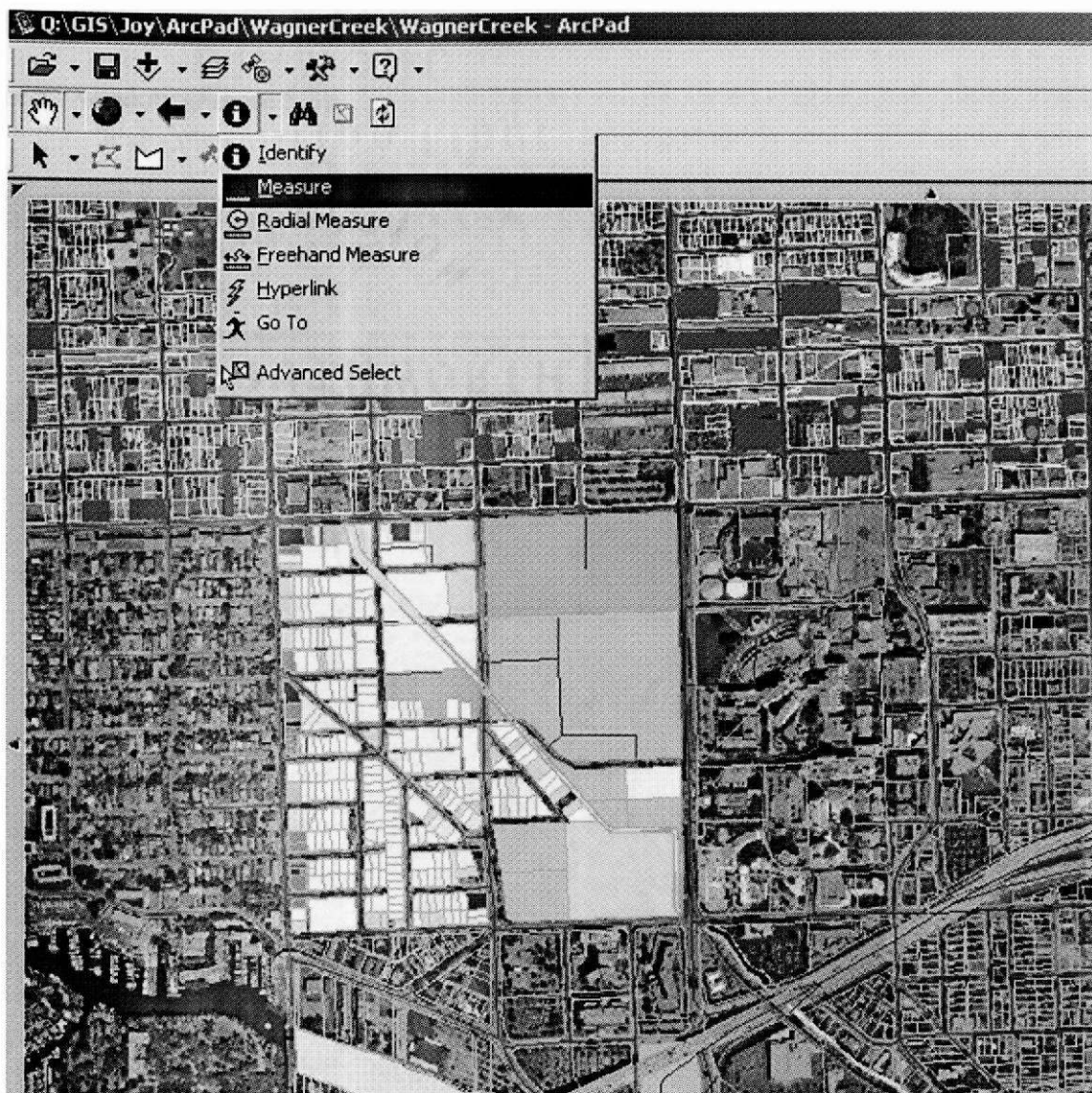


Figure 5.2 Built in features for Linear Measure, Radial and Freehand measure

Radial Measure – Located in “Identify” dropdown box (Figure 5.2).

Freehand measure – Located in “Identify” dropdown box (Figure 5.2).

Hyperlink – Is enabled if the selected layer has an active hyperlink field. Clicking on different locations will reveal information for that location. Information will be opened in a new window (Figure 5.2).

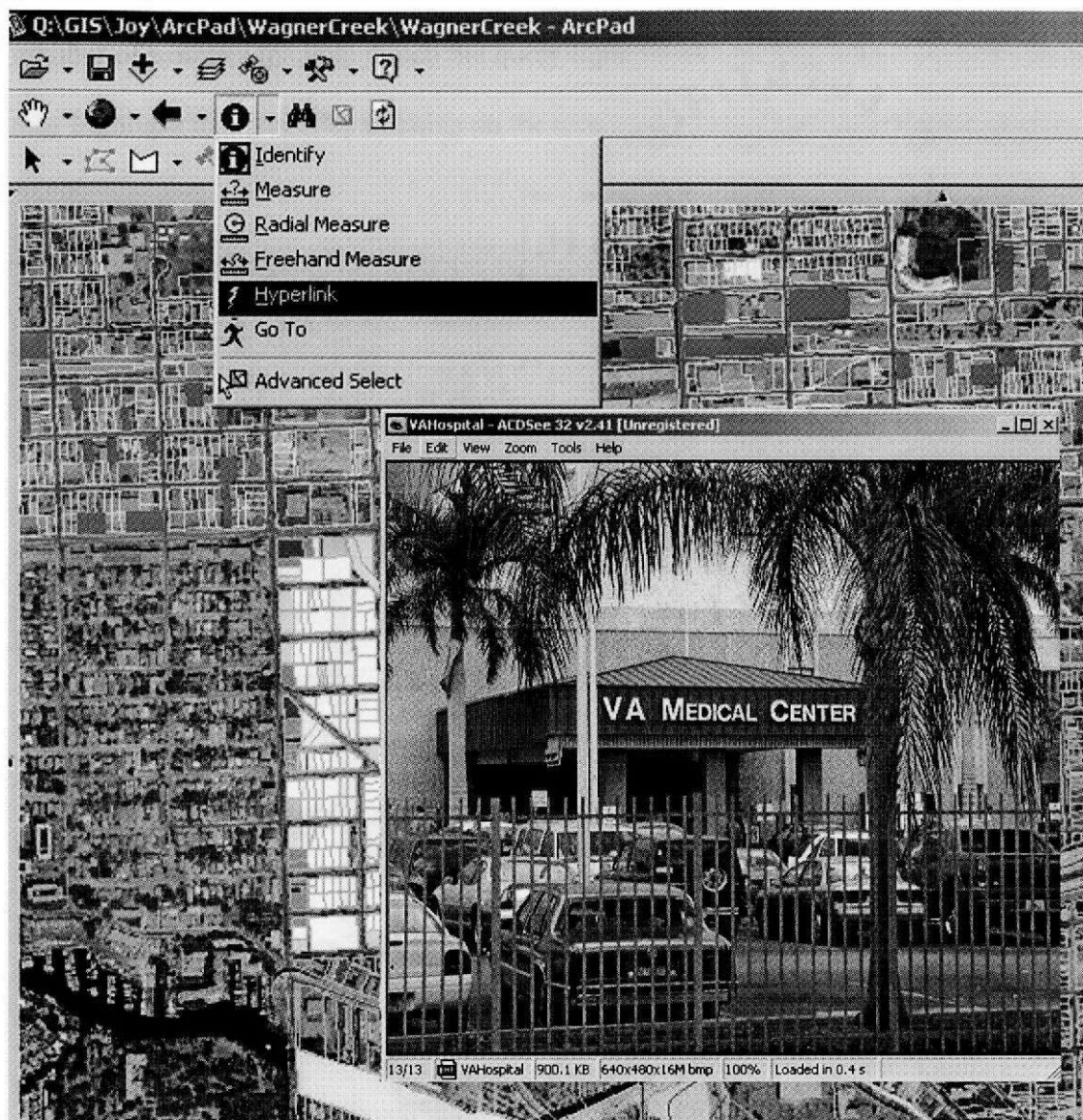


Figure 5.3 Built in Hyperlink feature. Information opens in a new window

Find –Figure 5.4 shows how the “Find” tool allows the user to do a search by layers. He selects the appropriate layer to search by clicking on the icon located to the right of the “In” field. Enter the phrase (eg Folio Number or PID) to be queried in the “Find” field and click on the “binocular” icon to the right. At the top left of the window shows the number of matches made to match the query input. If there is one match or more, the user may highlight that parcel by clicking on the icon to the left of one of the search results.

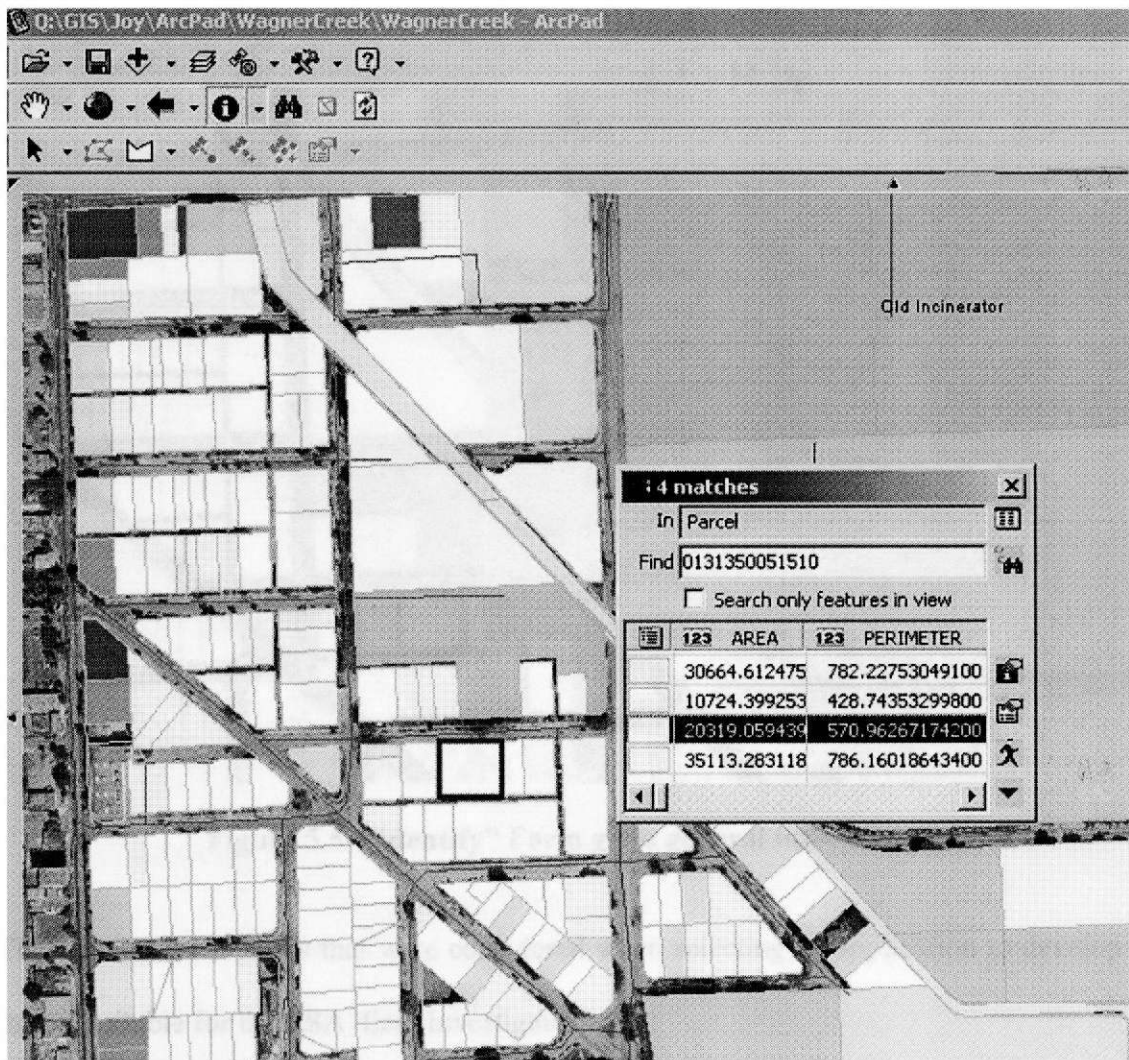


Figure 5.4 Built in Find feature

The user has three additional options to manage the results. One is to view the “Identify” Form (Figure 5.5) for the selected parcel by clicking on the blue identify icon to the right of selection, the other is to access the “Edit” Form for that parcel by clicking on the Edit Form, located to the right of the selection, and another is to “mark” the parcel by clicking on the icon of the “Man” icon at the right of the selections.



Figure 5.5 “Identify” Form gives general information

These are some features that were considered when selecting an application to develop a model suitable for the ESA field investigator.

5.2 Case Study : 1401 NE 16TH ST

The parcel located on 1401 NE 16TH ST is one of the sites selected to perform an ESA.

1) The “Identify” Form is selected to ensure that the correct parcel is selected and to verify pertinent information such as Property Identification number, Folio number, Lot size and Miami-Dade Land use information.

2) The “Edit” Form is deployed to collect field data (Figure 5.6). the investigator will input data. The first page of the Edit Form shows the PID, Folio and Address. This feature was specifically designed to ensure that the correct property is being accessed.

The screenshot shows the ArcPad interface with a map of a residential area. Overlaid on the map is the 'Environmental Site Assessment' form. The form has two tabs: 'General Info' and 'Site Loc'. The 'General Info' tab is active. The form includes the following fields:

- PID: 31350166
- FOLIO: 0131350051510
- ADDRESS: 1401 NE 16TH
- Area/Sq: 20319.0594392
- Investigator: (empty field)
- Inspection Date: 11/17/2003 (dropdown menu)

At the bottom of the form are 'OK' and 'Cancel' buttons. The background map shows a grid of lots, with labels for 'Old Incinerator' and 'V.A. Hospital'.

Figure 5.6 “Edit” Form for Data Collection

3) The investigator inputs data using his stylus. Collected data is automatically entered into the attribute table.

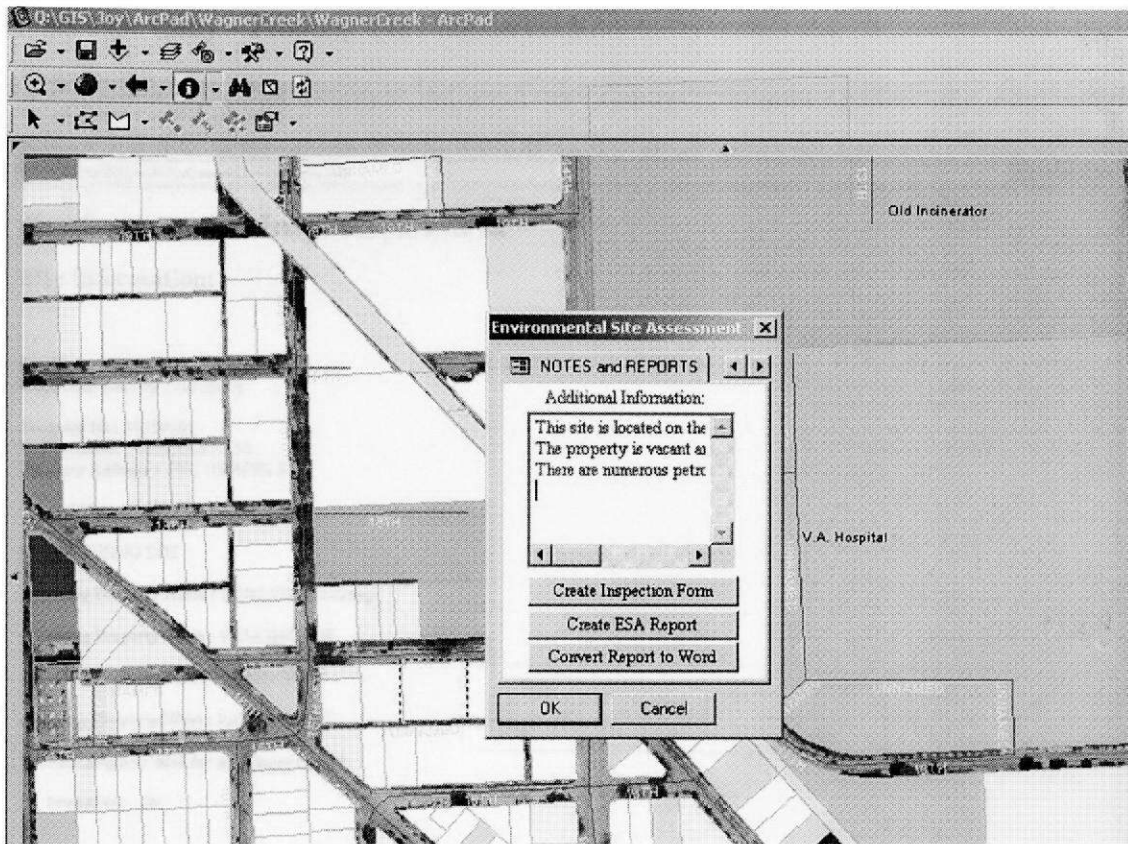


Figure 5.7 Notes are entered and the relevant forms produced

4) Generation of the Inspection Form (See Appendix B).

5) Generation of the HTML non-editable preliminary Executive Report. The preliminary report will recommend further investigation to be carried out if the value in the “Stained Soil” field in the attribute table was “TRUE”. Once the value of selected fields like UST, Dry Cleaner and Batteries are true, the preliminary report will automatically recommend further investigation. In the event that all the field reads “false”, the preliminary report

will recommend no further environmental inspection. However the investigator's experience and knowledge is critical to make the final decision. For example for the site in this case study – Property 1401 NE 16TH ST

The screenshot shows a Microsoft Internet Explorer window titled "Environmental Inspection Form - Microsoft Internet Explorer provided by HCEI". The address bar shows the file path "Q:\GIS\Joy\ArcPad\WagnerCreek\31350166.htm". The form content includes:

- Environmental Inspection Form**
- Site Information:**
- Last Date Modified : 11/17/2003
- Inspection done by : Joy Ashby
- Property ID : 31350166
- Folio Number : 0131350051510
- Property Address : 1401 NE 16TH ST
- 1. Land Use**
- Site : PARKING LOT
- Adjoining Property North : MUNICIPAL building
- Adjoining Property South : PARKING LOT
- Adjoining Property East : PARKING LOT
- Adjoining Property West : PARKING LOT
- 2. Is the property used for an industrial use?**
- Response: No
- 3. Is any adjoining property used for an industrial use?**

The taskbar at the bottom shows various open applications including "Start", "THE...", "MSN...", "Arc...", "Final", "Unk...", "FIU...", "The...", "Q:\...", "envi...", and a system clock showing 3:32 PM.

Figure 5.8 Snapshot of “Environmental Inspection Form”

if there were no stained soil observed, it must be noted that it is located in an industrial environment surrounded by a remediation dioxin site and is located in close proximity to a medical facility. These factors must be taken into consideration by the investigator. Hence the investigator may still recommend further investigation based on the activities of the surrounding parcels. Figure 5.9 shows a snap shot of the non-editable “Executive Report”. An edited version is attached in Appendix C.

5.3 Analysis of field data

The folder containing the new data was copied from the mobile device unto the PC desktop at base. ArcMap was used to analyze data. The updated file was then moved to web server to be uploaded to the ArcIMS interactive website.

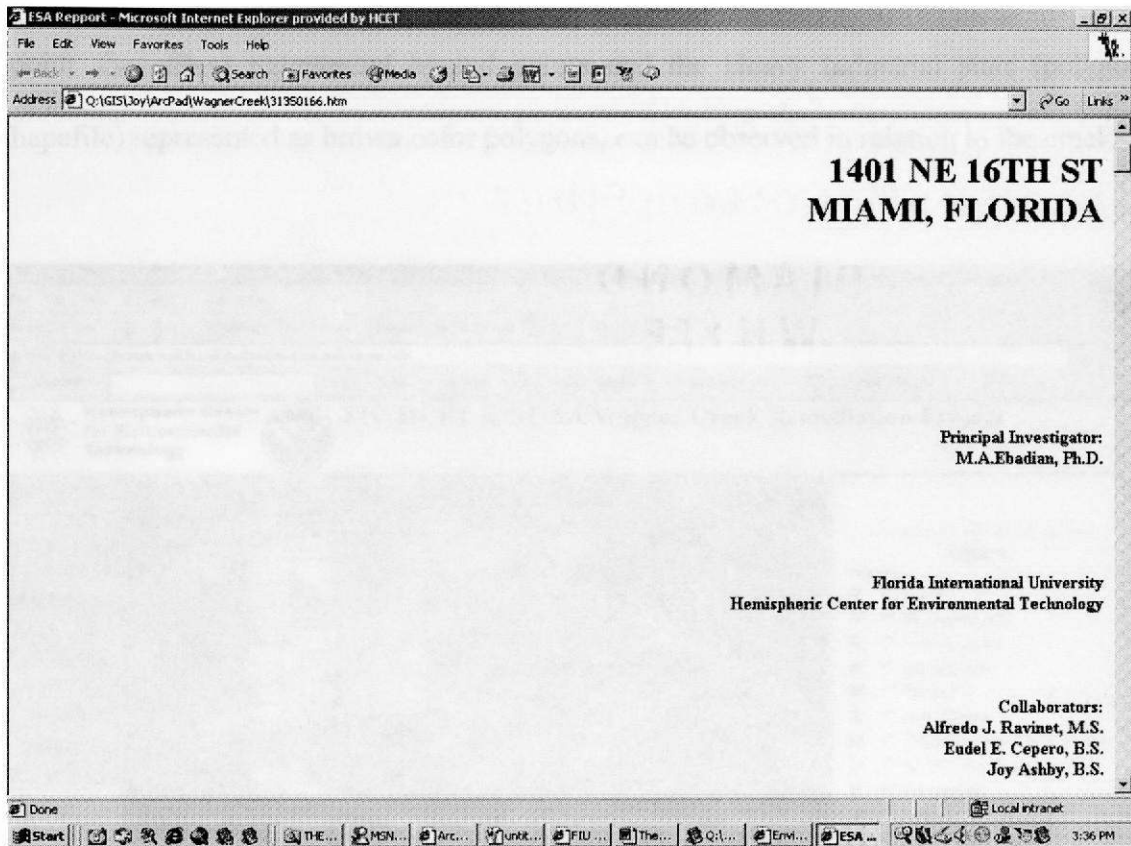


Figure 5.9 Snapshot of the Preliminary non-editable HTML “Executive Report”

5.4 ArcIMS Interactive website

1) On entering the website all the layers pertaining to the Wagner Creek project are visible. The Allapattah layer has a 0.5 transparence so that the aerial can be viewed from underneath. This is an important feature for the site investigator since he can see whether

the parcel is vacant or if there is a structure or if there are Above ground Storage Tanks (AST).

2) In this case study only the aerial layer was made non-visible. By zooming out, the proximity of the Underground Storage Tanks (UST) point sources of contamination (point shapefiles) represented by red points and the Heavy Industrial sites (polygon shapefile) represented as brown color polygons, can be observed in relation to the creek.

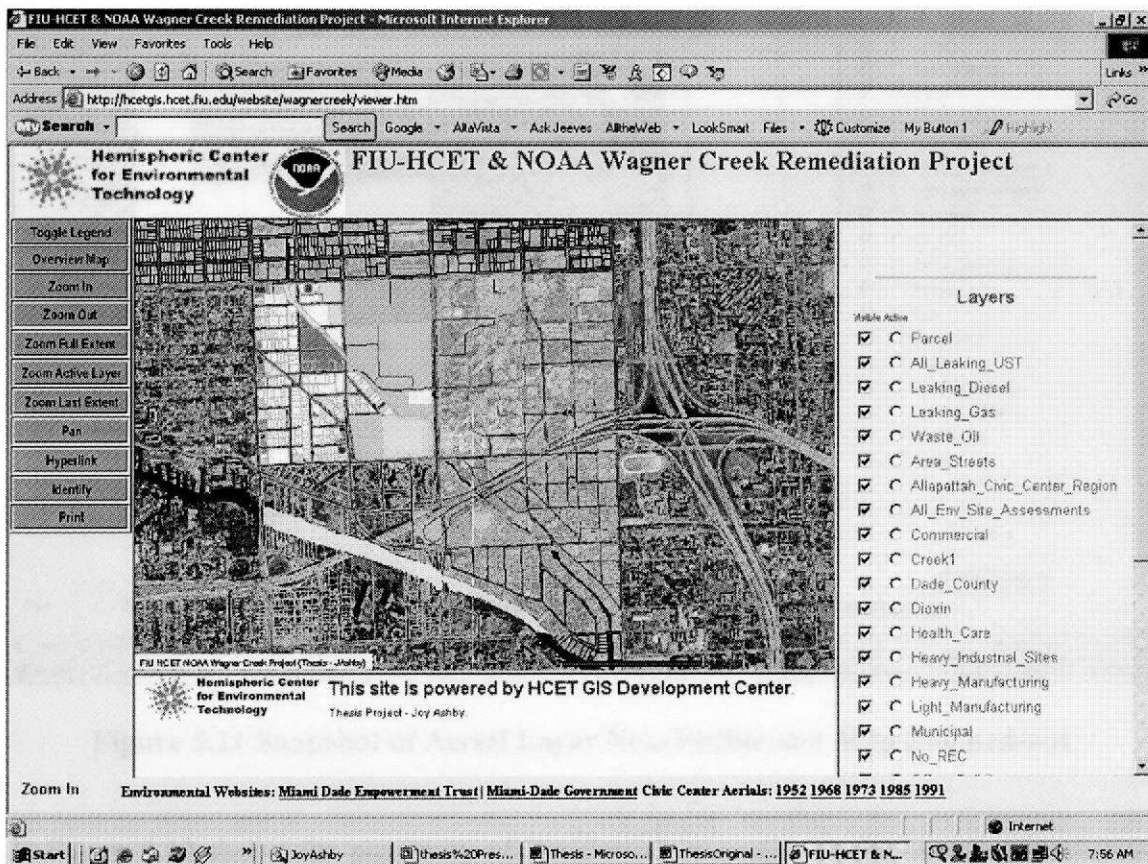


Figure 5.10 Snapshot of ArcIMS website with all Layers Visible

Considering that the creek originates at Comstock Park and runs underground through Allapattah – the region littered with the brown polygons – then resurfaces at NW 20th Street, this setting will be of concern to an ESA investigator. He might take these considerations into his remediation plans.

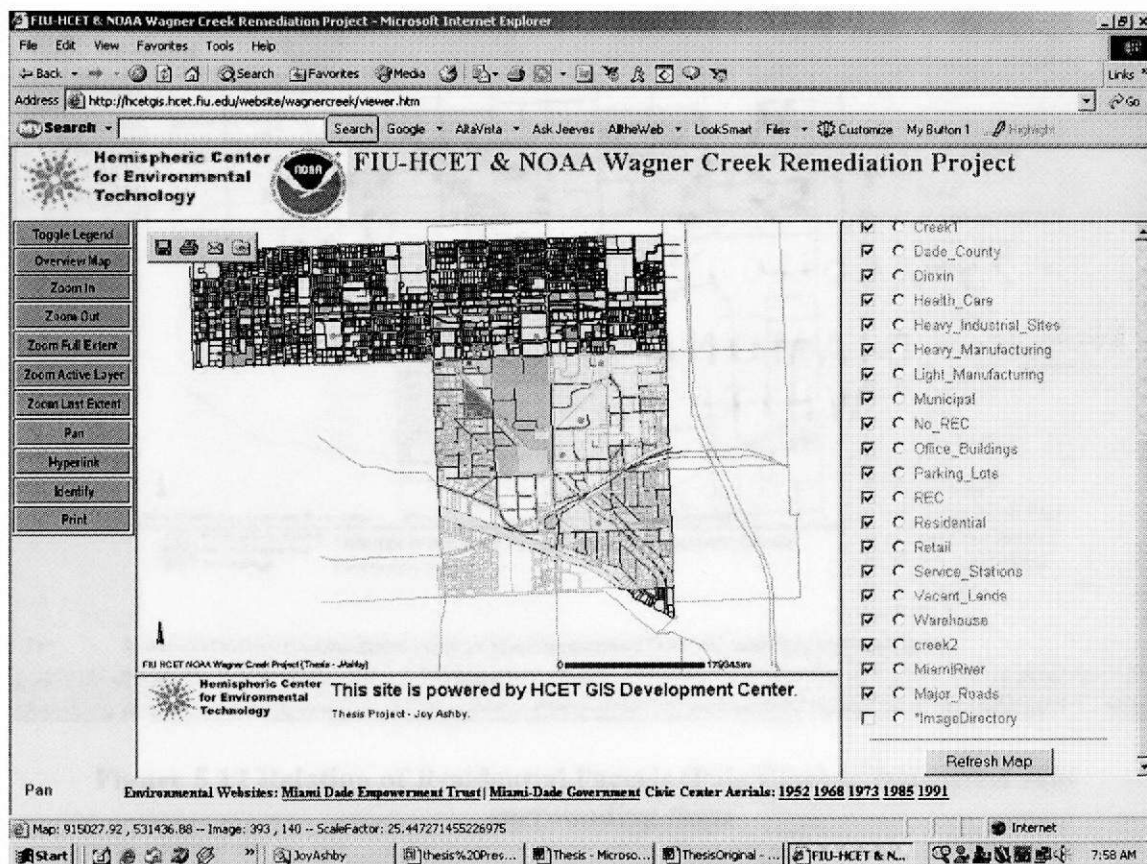


Figure 5.11 Snapshot of Aerial Layer Non-Visible and Map Zoomed-out

3) Figure 5.12 shows the proximity of Residential properties to the Dioxin remediation site (fill-in orange colored polygon), to service stations (fuchsia pink), heavy industrial sites, two hospitals and Municipal sites. This is relevant information for an ESA and for remediation purposes generally.

4) Provided that the field data is analyzed on the desktop PC and uploaded onto the website, using the Hyperlink Tool – the lightening bolt icon – the user can click on any parcel. If there is a link for that parcel, new windows are opened with its contents. This

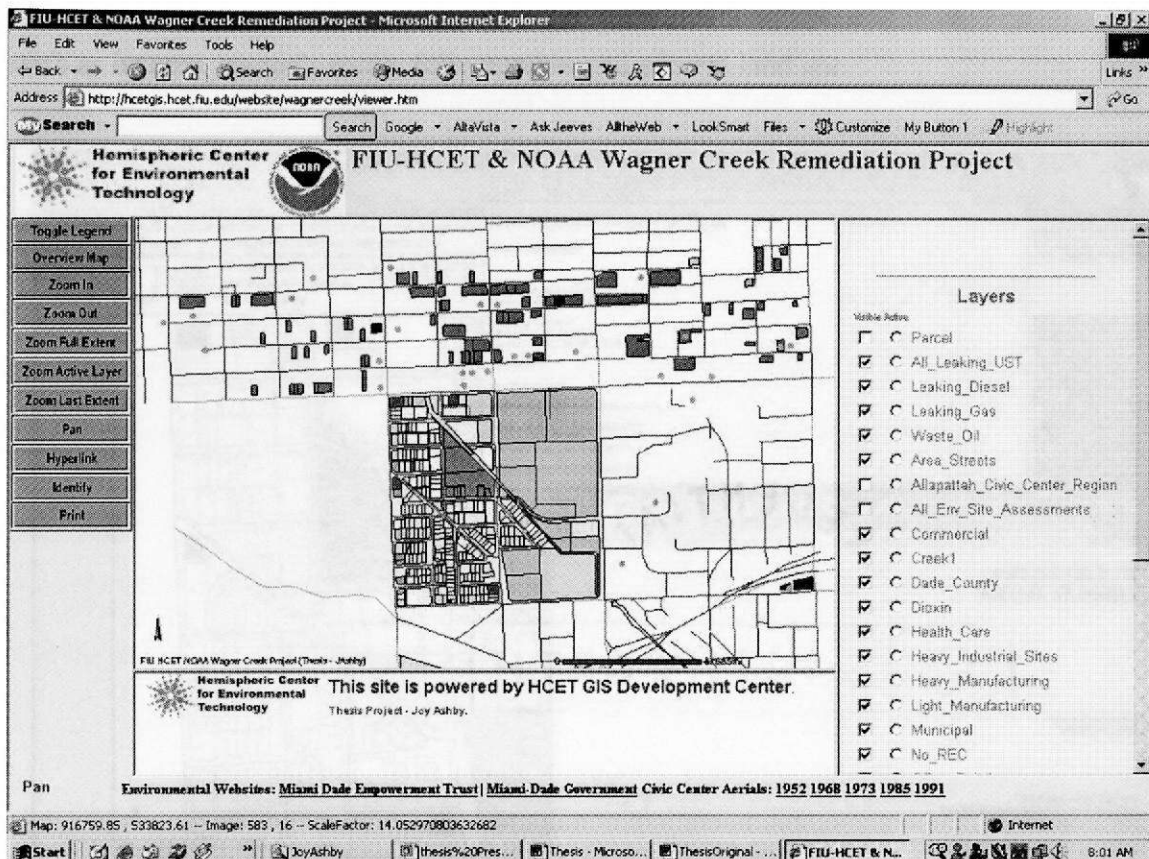


Figure 5.12 Relation of Residential Parcels (Pale Blue) to Industrial sites surrounding them

feature allows the investigator to view many windows at a time (See Figure 5.13). This is especially important for him when he wants to view and compare Executive Summary Reports for different parcels all at one time or if he needs to view records from different agencies about a specific parcel all at the same time.

This tool is an asset to the environmental site assessor for a number of reasons:

The screenshot shows a computer screen with a web browser window open. The browser's address bar displays the URL: <http://hceetgis.hcet.fiu.edu/website/WagnerCreek/viewer.htm>. The page content is divided into two main sections. On the left is a map titled "FIU HCEET NOAA Wagner Creek Project (Thesis - J. Ashby)". The map shows a street grid with a highlighted area. On the right is an "Environmental Inspection Form" titled "Site Information:". The form contains the following details:

- Last Date Modified: 1/17/2003
- Prepared by: Jay Ashby
- Property ID: 1128156
- Title Number: 63325001518
- Property Address: 1401 NE 16TH ST
- 1. Land Use: PARKING LOT
- Site: PARKING LOT
- Adjoining Property North: MEDICAL BUILDING
- Adjoining Property South: PARKING LOT
- Adjoining Property East: PARKING LOT
- Adjoining Property West: PARKING LOT
- 2. Is the property... (partially obscured)

Below the map, there is a "Zoom In" button. At the bottom of the screen, a taskbar shows several open applications: "Map: 112850.81, 531837.87 -- Image: 259, 2 -- ScaleFactor: 5.355793791927785", "WagnerCreek on Hceetgis", "FIU HCEET NOAA Wagner...", "Thesis - Microsoft Word", and "Internet". The system clock in the bottom right corner shows "3:58 AM".

Figure 5.13 Displays the Inspection Form and Executive Summary Report of the investigated Site - 1401 NE 16TH ST

2) All static maps, reports and aeriels can be accessed and viewed by clicking on links. All these documents can be viewed in different windows on the PC screen at the same time. It eliminates time in rolling and unrolling sheets of paper and it also eliminates the

wind element blowing away the sheets. This process is fast, portable and less cumbersome than carrying around realms of rolled static documents, which leads to the advantage of making quicker and more comprehensive decisions.

3) The field user can enter his findings and data immediately into a database. This increases productivity through efficient information handling and eliminates the need to re-enter data when he returns to base, and the software will generate a preliminary draft report there and then on site. This is an advantage over the present paper method where the field officer enters his findings on paper then goes back to his office to enter the information into the database and then to write up or generate a report.

4) Immediate entry into the database also allows for automatic data analysis at base using GIS Desktop or Spatial Analysis

5) The environmental engineer can link to other websites. One theory is if links can be made to various environmental agencies, via an Intranet for example, for secured data, then consulting companies may be able to access historical data directly for themselves. This will eliminate the middle agent who gathers all these information and sells it at a cost to the consulting company. The consultants will benefit financially by eliminating the middle agency and more data might be retrieved in a digital format, making it easier to store this data electronically on an Intranet.

6) This system also has GPS capabilities such that collected data can undergo real-time processing thus making its analyze accessible anywhere.

7) Security – Originally the digital form was customized with a password so that only authorized users can have access to the editable form. That is, only authorized personnel can input data into the database. This was somewhat cumbersome during our field test. In conclusion it was decided that security would be set on the hand held PDA or the login on the Ruggedized Laptop. The password component has since then been eliminated.

7) Automatically generates site plans which are necessary to complete the Executive Summary Report by using the Print function on the Interactive GIS website.

8) Visualization - the overlay of the Parcel shapefile, Land use shapefile, Streets shapefile and Aerial photographs allows the field investigator to visualize the site from an aerial perspective in relation to other properties' land uses. The ability to correlate information directly from databases is not so obvious. Therefore, by overlaying information in the form of shapefiles makes easier deductions. For example, if the land uses around a parcel consist of commercial activities such as a auto repair shop, battery factory or a paint shop, this can give the investigator an idea of the types of chemicals that might be found on the site under investigation.

9) Quick decision making – the advantages of the features embodied in this software enables decision makers to make speedy, reliable and informed decisions.

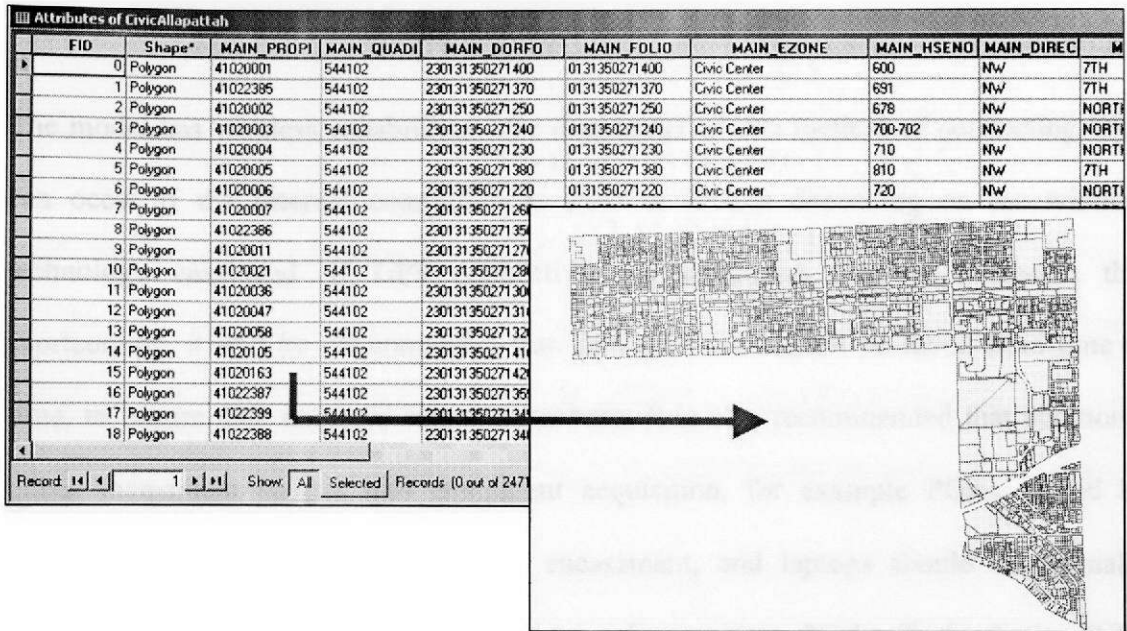


Figure 5.14 Visualization – Turning Data into Information

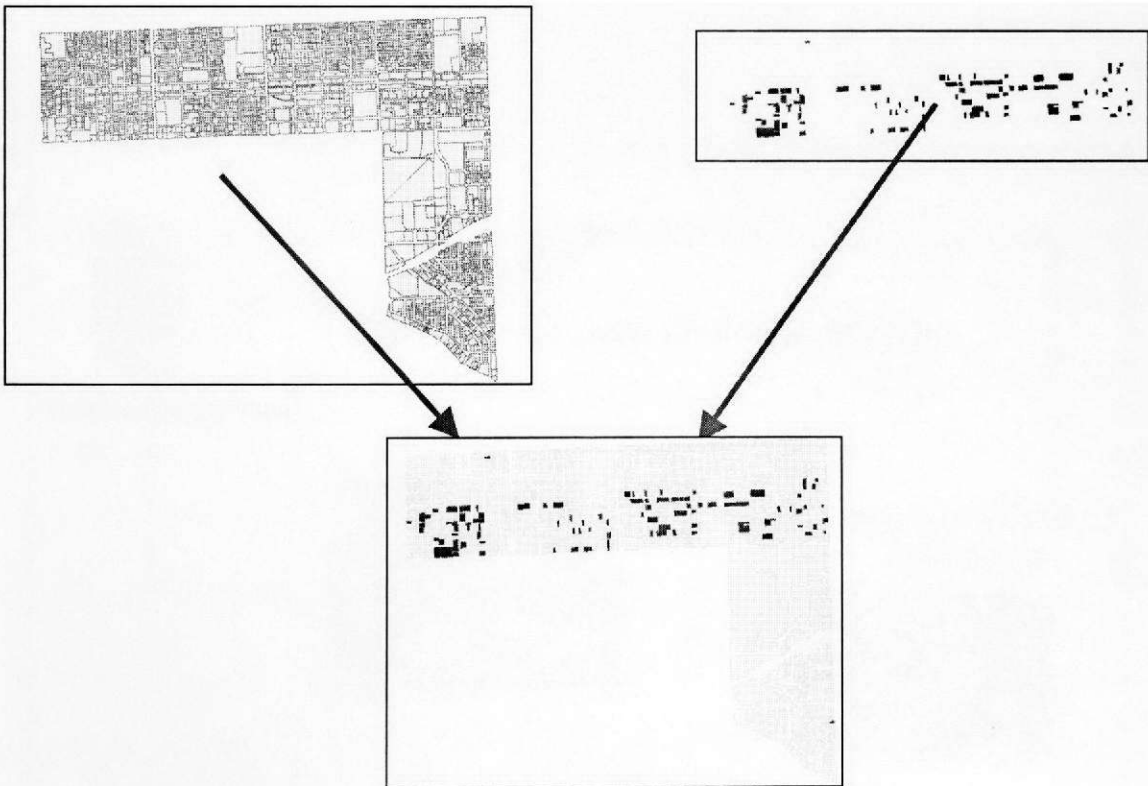


Figure 5.15 Data is more Meaningful with Overlaid Layers.

5.6 The Drawbacks of the Model

The model has wireless capabilities. The drawbacks of this method of conducting ESA can occur if the Internet connection is slow or broken depending on the wireless technology employed. If GPS connectivity is employed then to overcome this shortcoming, it will be recommended that data collected should be saved from time to time, to ensure data is stored into the database. It is also recommended that additional initial investment be put into equipment acquisition, for example PDAs should be contained in a ruggedized, waterproof encasement, and laptops should be specially designed for fieldwork like rugged waterproof computers (Niche Technologies (UK) Ltd).

6. Conclusion and Recommendations

6.1 Conclusion

This model promotes speedy informed scientific decision-making capabilities. Implementation of a customizable digital ESA form of this type allows for fast and easy access of information, automatic generation of forms, scientific analysis of data, easy visualization of information, distribution of data on the Intranet or Internet, and links to other websites.

These attributes qualifies this software as a success. A field tool guaranteed to be an asset to any ESA investigator.

6.2 Recommendations

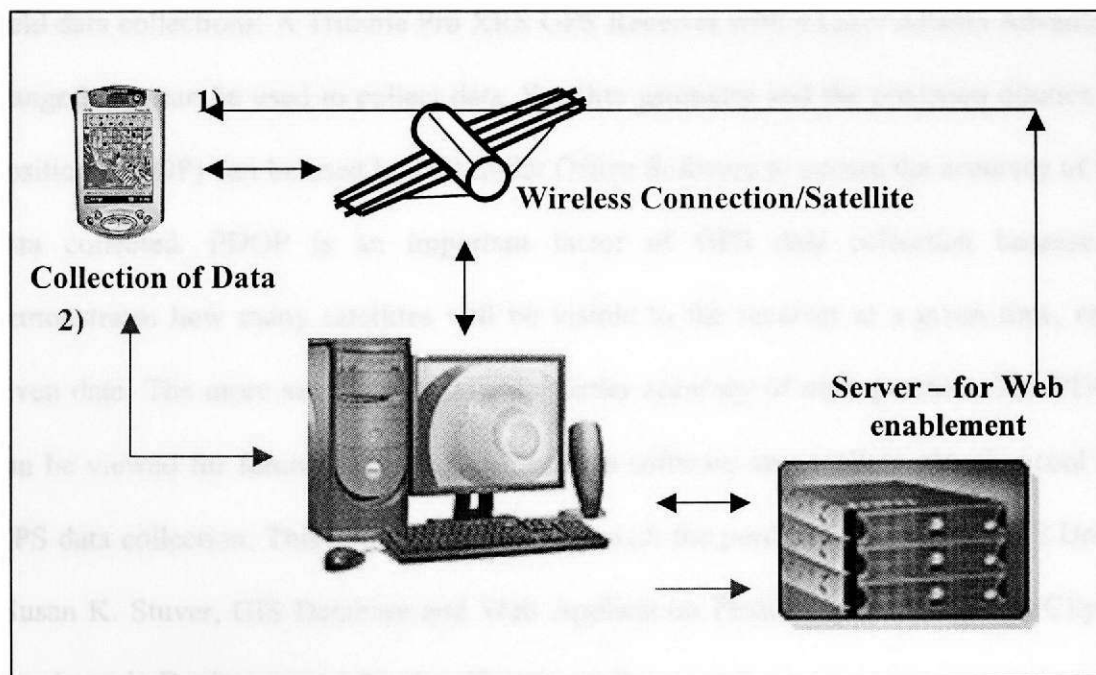


Figure 6.1 Shows Present (2) and Future (1) Capabilities of the ESA Model

6.2.1 Digital Questionnaire

To further enhance the model, one of the short term plans is to create another digital form for the questionnaire – the Questionnaire form.

6.2.2 Geodatabase

The use of a geodatabase and ArcSDE software is recommended for this model. This allows all data, spatial and non-spatial to be stored in one database. ArcSDE “talks” with the server so that the GIS maps will not only be web enabled, but this will allow for dynamic data upload from ArcPad to ArcIMS. It will eliminate the manual method of uploading data.

6.2.3 Global Positioning System (GPS) Pathfinder Office

Global Positioning System (GPS) Pathfinder Office Software can be used make GPS field data collections. A Trimble Pro XRS GPS Receiver with a Laser Atlanta Advantage Rangefinder can be used to collect data. Satellite geometry and the precision dilution of position (PDOP) can be used by Pathfinder Office Software to ensure the accuracy of the data collected. PDOP is an important factor of GPS data collection because it demonstrates how many satellites will be visible to the receiver at a given time, on a given date. The more satellites visible, the better accuracy of ones position. The PDOP can be viewed for future dates thus making this software an excellent planning tool for GPS data collection. This software is available with the purchase of Trimble GPS Units. (Susan K. Stuver, GIS Database and Web Application Feasibility Study For the City of San Antonio Environmental Services Department)

6.2.4 Real-time Update

The implementation of a geodatabase, ArcSDE and GPS technology will enhance this model such that data collected on the field would then be accessible immediately at base.

The GIS personnel on base can make necessary analysis, the information will be uploaded to the website, and the field officer can received the new and upgraded right there in the field.

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Appendix A

The ESA Form Used Presently On ESA Field Visits

Site location <u> NW 14th Street </u>		
City <u> Miami </u>	County <u> Dade </u>	State <u> FL </u> Zip Code <u> </u>
Site is <u> </u> Occupied By Whom <u> </u>		Phone <u> </u>
Environmental Inspector <u> </u>		Date <u> </u>
Interviewee <u> </u>		
☐ Owner ☐ Occupant		
Company <u> </u>		Title <u> </u>
Address <u> </u>		
City <u> </u>		State <u> </u> Zip Code <u> </u>
Phone <u> </u>		Fax () <u> </u>

1. Land use		
Site: <u> NW 14th Street Portion of Wagner Creeks </u>		
Adjoining property north: <u> Office buildings/ corporations </u>		
Adjoining property south: <u> Homes and distressed properties </u>		
Adjoining property east: <u> VA hospital/ Car parking lot </u>		
Adjoining property west: <u> Apartment Buildings </u>		

2. Is the property used for <u>an industrial use</u> ?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown

3. Is any <u>adjoining property</u> used for an industrial use?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown

4. Did you observe evidence or do you have any prior knowledge that the property has been used for <u>industrial use in the past</u> ?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown

5. Did you observe evidence or do you have any prior knowledge that adjoining property has been used for industrial <u>use in the past</u>?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
6. Is <u>the property used</u> as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing property, junkyard or landfill, or a waste treatment, storage, disposable, processing or recycling facility?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
7. Is any <u>adjoining property</u> used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing property, junkyard or landfill, or a waste treatment, storage, disposable, processing or recycling facility (if applicable identify which)?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
8. Did you observe any evidence or do you have any prior knowledge that <u>the property has been used</u> as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing property, junkyard or landfill, or a waste treatment, storage, disposable, processing or recycling facility (if applicable identify which)?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
9. Did you observe any evidence or do you have any prior knowledge that any <u>adjoin property</u> has been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing property, junkyard or landfill, or a waste treatment, storage, disposable, processing or recycling facility (if applicable identify which)?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
10. <u>Are there currently</u> any damaged or discarded automotive or industrial batteries, or pesticides, paints, or other chemicals in individual containers of greater than 5 gal (19L) in volume or 50 gal (190 L) in the aggregate, stored on or used at the property or at the facility?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
11. Did you observe any evidence or do you have any prior knowledge that there <u>have been previous</u> any damaged or discarded automotive or industrial batteries, or pesticides, paints, or other chemicals in		

individual containers of greater than 5 gal (19L) in volume or 50 gal (190 L) in the aggregate, stored on or used at the property or at the facility? Interviewee Yes No Unknown Observed During Site Visit: Yes No Unknown		
12. Are there currently any industrial drums (typically 55 gal (208 L) or sacks of chemicals located on the property or at the facility? Interviewee Yes No Unknown Observed During Site Visit: Yes No Unknown		
13. Did you observe any evidence or do you have any prior knowledge that there have been previous any industrial drums (typically 55 gal (208 L) or sacks of chemicals located on the property or at the facility? Interviewee Yes No Unknown Observed During Site Visit: Yes No Unknown		
14. Did you observe any evidence or do you have any prior knowledge that fill dirt has been brought onto the property that originated <u>from a contaminated site</u>? Interviewee Yes No Unknown Observed During Site Visit: Yes No Unknown		
15. Did you observe any evidence or do you have any prior knowledge that fill dirt has been brought onto the property that is of an <u>unknown origin</u>? Interviewee Yes No Unknown Observed During Site Visit: Yes No Unknown		
16. <u>Are there currently</u> any pits, ponds, or lagoons located on the property in connection with waste treatment or waste disposal? Interviewee Yes No Unknown Observed During Site Visit: Yes No Unknown		
17. Did you observe any evidence or do you have any prior knowledge that there <u>has been previously</u> any pit, ponds, or lagoons located on the property in connection with waste treatment or waste disposal? Interviewee Yes No Unknown Observed During Site Visit: Yes No Unknown		
18. <u>Is there currently</u> any stained soil on the property? Interviewee		

Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
19. Did you observe any evidence or do you have any prior knowledge that there <u>has been previously</u> any stained soil on the property?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
20. <u>Are there</u> any registered or unregistered storage tanks (above or underground) located on the property?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
21. Did you observe any evidence or do you have any prior knowledge that there <u>have been previously</u>, any registered or unregistered storage tanks (above or underground) located on the property?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
22. <u>Are there currently</u> any vent pipes, fill pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
23. Did you observe any evidence or do you have any prior knowledge that there <u>have been previously</u> any vent pipes, fill pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
24. <u>Is there currently</u> evidence of leaks, spills or staining by substances other than water, or foul odors, associate with any flooring, drains, walls, ceilings, or exposed grounds on the property?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown

25. Did you observe any evidence or do you have any prior knowledge <u>that there have been any leaks, spills or staining by substances other than water, or foul odors, associate with any flooring, drains, walls, ceilings, or exposed grounds on the property?</u> Interviewee Yes No Unknown Observed During Site Visit: Yes No Unknown		
26. If the property is served by a private well or non-public water system, is there evidence or do you have prior knowledge that contaminants have been identified in the well or system that <u>exceed guidelines applicable to the water system?</u> Interviewee Yes No Unknown Observed During Site Visit: Yes No Unknown		
27. If the property is served by a private well or non-public water system, is there evidence or do you have prior knowledge that the well <u>has been designate as contaminated</u> by any government environmental/health agency? Interviewee Yes No Unknown Observed During Site Visit: Yes No Unknown		
28. Does the owner or occupant of the property <u>have any knowledge of environmental liens or governmental notification relating to past or recurrent violations of environmental laws with respect to the property or any facility located on the property?</u> Interviewee Yes No Unknown Observed During Site Visit: Yes No Unknown		
29. Has the owner or the occupant of the property been informed of <u>the past existence of hazardous substances</u> or petroleum products with respect to the property or any facility located on the property? Interviewee Yes No Unknown Observed During Site Visit: Yes No Unknown		
30. Has the owner or the occupant of the property been informed of <u>the current existence of hazardous substances or petroleum products with respect to the property or any facility located on the property?</u> Interviewee Yes No Unknown Observed During Site Visit: Yes No Unknown		
31. Has the owner or occupant of the property been informed of the <u>past existence of environmental violations</u> with respect to the property or any facility locates on the property? Interviewee Yes No Unknown		

Observed During Site Visit:		
Yes	No	Unknown
32. Has the owner or occupant of the property been informed of the <u>current existence of environmental violations</u> with respect to the property or any facility located on the property?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
33. Does the owner or the occupant of the property have any <u>knowledge of any environmental site assessment</u> of the property or the facility that indicated the presence of hazardous substances or petroleum products on, or contamination of, the property recommended further assessment of the property?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
34. Does the owner or the occupant of the property <u>know of any past, threatened, or pending lawsuits or administrative proceedings</u> concerning a release of any hazardous substances or petroleum products involving the property by any owner or occupant of the property?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
35. Does the property discharge waste water (not including sanitary waste or storm water) onto or adjacent to the property and/or into a <u>storm water system</u>?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
36. Does the property discharge waste water (not including sanitary waste or storm water) onto or adjacent to the property and/or into a <u>sanitary sewer system</u>?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
37. Did you observe evidence or do you have any prior knowledge, have any hazardous substances or petroleum products unidentified waste materials, tires, automotive or industrial batteries or any other <u>waste materials been dumped</u> above grade, buried and or burned on the property?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
38. Is there a transformer, capacitor, or any hydraulic equipment for which there are any records indicating the <u>presence of PCB's</u>?		
Interviewee		
Yes	No	Unknown

Observed During Site Visit:		
Yes	No	Unknown
39. Are there <u>currently septic systems</u> located within the facility?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown
40. Is there <u>currently lead paint</u> used on interior and exterior of the buildings located within the facility?		
Interviewee		
Yes	No	Unknown
Observed During Site Visit:		
Yes	No	Unknown

Notes:

Appendix B

The ESA Inspection Form That Is Automatically Generated From The Mobile Device

Environmental Inspection Form

Site Information:

Last Date Modified : 11/17/2003

Inspection done by : Joy Ashby

Property ID : 31350166

Folio Number : 0131350051510

Property Address : 1401 NE 16TH ST

1. Land Use

Site : PARKING LOT

Adjoining Property North : MUNICIPAL BUILDING

Adjoining Property South : PARKING LOT

Adjoining Property East : PARKING LOT

Adjoining Property West : PARKING LOT

2. Is the property used for an industrial use?

Response: No

3. Is any adjoining property used for an industrial use?

Response: No

4. Did you observe evidence or do you have any prior knowledge that the property has been used for industrial use in the past?

Response: Unknown

5. Did you observe evidence or do you have any prior knowledge that the adjoining property has been used for industrial use in the past?

Response: Unknown

6. Is the property used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing property, junkyard or landfill, a waste treatment, storage, disposable, processing or recycling facility?

Response: No

Gas Station: False

Commercial Printing: False

Photo Developing: False

Landfill: False

Storage Facility: False

Processing Facility: False

Auto Repairs: False

Dry Cleaner: False

Junk Yard: False

Waste Treatment Facility: False

Disposing Facility: False

Recycling Facility: False

Other:

7. Is any adjoining property used as a gasoline station, motor repair facility, processing or commercial printing facility, dry cleaners, photo developing property, junkyard or landfill, or a waste treatment, storage, disposable, recycling facility?

Response: No

Gas Station: False

Commercial Printing: False

Photo Developing: False

Landfill: False

Storage Facility: False

Processing Facility: False

Auto Repairs: False

Dry Cleaner: False

Junk Yard: False

Waste Treatment Facility: False

Disposing Facility: False

Recycling Facility: False

Other:

8. Did you observe any evidence or do you have prior knowledge that the property has been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing property, junkyard Or landfill, Or a waste treatment storage, disposable, processing or recycling facility. If applicable identify which)?

Response: Unknown

Gas Station: False

Commercial Printing: False

Photo Developing: False

Landfill: False

Storage Facility: False

Processing Facility: False

Auto Repairs: False

Dry Cleaner: False

Junk Yard: False

Waste Treatment Facility: False

Disposing Facility: False

Recycling Facility: False

Other:

9. Did you observe any evidence or do you have prior knowledge that ant adjoining property has been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing property, junkyard or landfill, or a waste treatment, storage, disposable, processing or recycling facility (if applicable identify which)?

Response: Unknown

Gas Station: False

Commercial Printing: False

Photo Developing: False

Landfill: False

Storage Facility: False

Processing Facility: False

Auto Repairs: False

Dry Cleaner: False

Junk Yard: False

Waste Treatment Facility: False

Disposing Facility: False

Recycling Facility: False

Other:

10. Are there currently any damaged or discarded automotive or industrial batteries, or pesticides, paints, or other chemicals in individual containers of greater than 5 gal (9L) in volume or 50 gal (190L) in the aggregate, stored on or used at the property or at the facility?

Response: No

Automotive/Industrial batteries: False

Pesticides (>5 gal or 50 gal aggregate): False

Paint (>5 gal or 50 gal aggregate): False

Other chemicals (>5 gal or 50 gal aggregate): False

11. Did you observe any evidence or do you have any prior knowledge that there have been previous any damaged or discarded automotive or industrial batteries, or pesticides, paints, or other chemicals in individual containers of greater than 5 gal (9L) in volume or 50 gal (190L) in the aggregate, stored on or used at property or at the facility?

Response: Unknown

Automotive/Industrial batteries: False

Pesticides (>5 gal or 50 gal aggregate): False

Paint (>5 gal or 50 gal aggregate): False

Other chemicals (>5 gal or 50 gal aggregate): False

12. Are there currently any industrial drums (typically 55 gal (208L) or sacks of chemicals located on the property or at the facility?

Response: No

Industrial drums (55gal): False

Sacks of chemicals: False

13. Did you observe any evidence or do you have any prior knowledge that there have been previous any industrial drums (typically 55 gal (208L) or sacks of chemicals located on the property or at the facility?

Response: Unknown

Industrial drums (55gal): False

Sacks of chemicals: False

14. Did you observe any evidence or do you have any prior knowledge that fill dirt has been brought onto the property that originated from a contaminated site?

Response: Unknown

15. Did you observe any evidence or do you have any prior knowledge that fill dirt has been brought onto the property that is of an unknown origin?

Response: Unknown

16. Are there currently any pits, ponds, or lagoons located on the property in connection with waste treatment Or waste disposal?

Response: No

Pits: False

Ponds: False

Lagoons: False

17. Did you observe any evidence or do you have any prior knowledge that there has been previously any pits, ponds, or lagoons located on the property in connection with waste treatment or waste disposal?

Response: No

Pits: False

Ponds: False

Lagoons: False

18. Is there currently any stained soil on the property?

Response: Yes

19. Did you observe any evidence or do you have any prior knowledge the there has been previously any stained soil on the property?

Response: Unknown

20. Are there any registered or unregistered storage tanks (above or underground) located on the property?

Response: No

21. Did you observe any evidence or do you have any prior knowledge the there have been previously any registered or unregistered storage tanks (above or underground) located on the property?

Response: Unknown

22. Are there currently any vent pipes, fill pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?

Response: No

23. Did you observe any evidence or do you have any prior knowledge that there have been previously any vent pipes, fill pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?

Response: Unknown

24. Is there currently evidence of leaks, spills or staining by substances other than water, or foul odors, associate with any flooring, drains, walls, ceilings, or exposed grounds on the property?

Response: Yes

Stains: True

Odor: True

Leaks: False

Spills: False

25. Did you observe any evidence or do you have any prior knowledge that there have been any leaks, spills or staining by substances other than water, or foul odors, associate with any flooring, drains, walls, ceilings, or exposed grounds on the property?

Response: Unknown

Stains: False

Odor: False

Leaks: False

Spills: False

26. If the property is served by a private well or non-public water system, is there evidence or do you have prior knowledge that contaminants have been identified in the well or system that exceed guidelines applicable to the water system?

Response: No

27. If the property is served by a private well or non-public water system, is there evidence or do you have prior knowledge that the well has been designate as contaminated by any government environmental/health agency?

Response: Unknown

28. Does the owner or occupant of the property have any knowledge of environmental liens or governmental notification relating to past or recurrent violation of environmental laws with respect to the property or any facility located on the property?

Response: No

29. Has the owner or the occupant of the property been informed of the current existence of hazardous substances or petroleum products with respect to the property or any facility located on the property?

Response: No

30. Has the owner or occupant of the property been informed of the current existence of hazardous substances or petroleum products with respect to the property or any facility on the property?

Response: No

31. Has the owner or occupant of the property been informed of the past existence of environmental violations with respect to the property or any facility located on the property?

Response: No

32. Has the owner or occupant of the property been informed of the current existence of environmental violations with respect to the property or any facility located on the property?

Response: No

33. Does the owner or the occupant of the property have any knowledge of any environmental site assessment of the property or the facility that indicated the presence of hazardous substances or petroleum products on, or contamination of, the property recommended further assessment of the property?

Response: No

34. Does the owner or the occupant of the property know of any past, threatened, or pending lawsuits or administrative proceedings concerning a release of any hazardous substances or petroleum products involving the property by any owner or occupant of the property?

Response: Unknown

35. Does the property discharge waste water (not including sanitary waste or storm water) onto or adjacent to the property and/or into a storm water system?

Response: No

36. Does the property discharge waste water (not including sanitary waste or storm water) onto or adjacent to the property and/or into a sanitary sewer system

Response: No

37. Did you observe evidence or do you have any prior knowledge, have any hazardous substances Or petroleum products unidentified waste material, tires, automotive or industrial batteries or any other waste materials been dumped above grade, buried and or burned on the property?

Response: Unknown

Hazardous Substances: False

Petroleum Products: False

Unidentified Waste Materials: False

Tires: False

Automotive or Industrial batteries: False

Other:

38. Is there a transformer, capacitor, or any hydraulic equipment for which there are any records indicating the presence of PCB's?

Response: No

39. Are there currently septic systems located within the facility?

Response: No

40. Is there currently lead paint used on interior and exterior of the buildings located within the facility?

Response: No

Comments: This site is located on the south border of the Dioxin remediation site. The property is vacant and the ground is covered with asphalt. It is a parking lot in an INDUSTRIAL area.
Many petrol. stains

Appendix C

The Automatically Generated Editable Executive Summary Report in Word Format

**Environmental Site Assessment
Report**

**1401 NE 16TH ST
MIAMI, FLORIDA**

**Principal Investigator:
M.A.Ebadian, Ph.D.**

**Florida International University
Hemispheric Center for Environmental Technology**

**Collaborators:
Alfredo J. Ravinet, M.S.
Eudel E. Cepero, B.S.
Joy Ashby, M.S.**

**Prepared for:
Wagner Creek Project.**

1401 NE 16TH ST

Principal Investigator

M. A. Ebadian, Ph.D.

Hemispheric Center for Environmental Technology

Florida International University

Miami, FL 33174

Florida International University

Collaborators

Alfredo J. Ravinet, M.S., Eudel E Cepero, B.S., and

Joy Ashby

Hemispheric Center for Environmental Technology

Florida International University

Miami, FL 33174

2003

This Transaction Screen Survey, Limited Phase I Environmental Site Assessment is prepared by

Alfredo Ravinet

M.S., Environmental Engineering

Eudel E. Cepero

B.S., Geography

Certified Environmental Inspector by Environmental Assessment Association

Joy Ashby

M.S., Environmental Engineering

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EXECUTIVE SUMMARY

The Hemispheric Center for Environmental Technology (HCET) at Florida International University (FIU) has completed a Transaction Screen Survey (TSS), Limited Phase I Environmental Site Assessment (ESA) in conformance with the scope and limitations of the American Society of Testing Materials (ASTM) Practice E 1528-00. The ESA was conducted for the property located at 1401 NE 16TH ST Miami, FL, **ENTER Zip code here**. Miami-Dade County folio 0131350051510

The intent of the ESA was to identify the presence or absence of recognized environmental conditions (RECs) at the subject site. ASTM defines REC as the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The complete ASTM definition of REC and the limitations may be found in Section 1.1 of the report.

Since the property owner and occupant were not available to answer the transaction screen questionnaire, HCET personnel made TSS conclusions according to Section 5.6 of ASTM E 1528. Because access to the site was restricted, the site reconnaissance was limited to a visual inspection of the site from the perimeter of the property. Additional deviations, if any, from this practice are described in Section 7 of the report. The limitations and exceptions of the ESA may be found in Section 1.3.

This assessment has revealed no further need of inquiry into RECs at the property.

However, HCET also noticed a number of environmentally sensitive properties and operations in proximity to the subject property through environmental database searches. The proximity of these listed properties does not necessarily imply that the subject property is itself contaminated. There is, however, potential for contamination. Some of these sites may have or have had a negative impact on the subject site's groundwater or air quality.

1. INTRODUCTION

The Miami-Dade Empowerment Trust, Inc., contracted the Hemispheric Center for Environmental Technology (HCET) at Florida International University (FIU) to conduct a Transaction Screen Survey (TSS), Limited Phase I Environmental Site Assessment (ESA), in conformance with the scope and limitations of the American Society for Testing and Materials (ASTM) Practice E 1528-00, of potential brownfields sites within the 12 areas of the Miami-Dade Empowerment Zone and Developable Areas.

1.1. Purpose

The purpose of this TSS, Limited Phase I ESA is to define good commercial and customary practices for conducting an ESA of a parcel of commercial real estate with respect to the range of contaminants within the scope of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The goal of the process established by this practice is to identify the presence or absence of recognized environmental conditions (RECs) of the subject property. ASTM defines the term REC as:

The presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be de minimis are not recognized environmental conditions.

1.2. Scope of Services

The TSS, Limited Phase I ESA is intended to serve as a preliminary site screening, including a walk-by site inspection, an overview of pertinent historical records, and a review of environmental regulatory databases and files. The scope of this TSS, Limited Phase I ESA involves the following tasks:

- A review of pertinent records from federal, state, and local agencies and from standard historical sources (fire insurance maps or consultation with the local fire department) to identify past and present environmental conditions of the subject location and its adjacent properties

- A site inspection that includes visual observation of the subject property and adjoining properties to determine current site conditions and evidence of RECs

Transaction screen questionnaire to determine current site conditions and evidence of RECs
Preparation of a written report

1.3. Limitations and Exceptions

While the scope of the TSS, Limited Phase I ESA investigation encompasses RECs related to petroleum products and hazardous substances regulated by the U.S. Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), items outside this scope that may impact the property include radon, asbestos-containing materials, lead-based paint, lead in drinking water, indoor air quality, wetlands, regulatory compliance, cultural and historic resources, industrial hygiene, health and safety, ecological resources, endangered species, and high-voltage power lines. The findings set forth in this report are strictly limited in time and scope to the date of the evaluation. This limited assessment does not constitute a complete Phase I ESA and should not be used or relied upon as such.

1.4. Special Terms and Conditions

This TSS, Limited Phase I ESA was conducted in conformance with the scope and limitations of ASTM Standard Practice for ESAs: the Transaction Screen Process. Although no environmental assessment may disclose all potential environmental liabilities, every attempt has been made to do so within a reasonable time at a reasonable cost.

1.5. Related Practices

According to the ASTM Standard E 1528-00, "This practice is a companion to practice E 1527, which is called a Phase I Environmental Site Assessment, a Phase I ESA, or simply a Phase I. These practices are each intended to meet the standard of *appropriate inquiry* necessary to qualify for the innocent landowner defense of CERCLA."

1.6. Process

According to the ASTM Standard E 1528-00, "The Transaction Screen Process consists of asking questions contained within the transaction screen questionnaire of owners and occupants of the property, observing site conditions at the property with direction provided by the transaction screen questionnaire, and, to the extent reasonably ascertainable, conducting limited research regarding certain government records and certain standard historical sources. The questions asked of owners are the same questions as those asked of occupants."

1.7. Knowledge

According to the ASTM Standard E 1528-00, “While the person conducting the Transaction Screen Process has an obligation to ask the questions set forth in the transaction screen questionnaire, in many instances the parties to whom the questions are addressed will have no obligation to answer them.”

1.8. Government Publication Policy

Points of view, opinions, and conclusions expressed in this report are those of the author and do not necessarily represent the official position or policies of the Miami-Dade Empowerment Trust, Inc., Miami-Dade County, the state of Florida, the U.S. Department of Justice, and or any other agency of the state or federal government.

2. SITE DESCRIPTION

2.1. Location and Legal Description

The subject property is located at 1401 NE 16TH ST , in the Wynwood section of Miami, Miami-Dade County, Florida. Miami-Dade County folio number 0131350051510. It includes the area bounded by vacant land to the north, NE 15th Street and Metrorail to the South, NE 1st Avenue to the east, and an old house to the west. The lot size is 20319.05943920131350051510square feet. A Site Location Map and Site Plan Sketch may be found in Attachment A. According to the Miami-Dade County Property Appraisal Department, *******Champion Entertainment Organization******* is the mailing address of record. **(Refer to INVESTIGATOR'S NOTES in blue)**

This site is located on the south border of the Dioxin remediation site. The property is vacant and the ground is covered with asphalt. It is a parking lot in an INDUSTRIal area. Many petrol stains

2.2. Site and Vicinity General Characteristics

The subject site is a vacant lot. There is a history of a two-story apartment building and a small house on this lot. The entire lot is covered with vegetation. The adjacent area is mainly residential and mixed commercial. The surrounding areas are a vacant area and a residential to the north, a parking lot to the east, a commercial building and Metrorail to the south, and a residential area to the west. **(Refer to INVESTIGATOR'S NOTES in blue)**

This site is located on the south border of the Dioxin remediation site. The property is vacant and the ground is covered with asphalt. It is a parking lot in an INDUSTRIal area. Many petrol stains

3. RECORDS REVIEW

HCET personnel reviewed property and regulatory records and historic documents to identify RECs at the subject site. In addition, the records were reviewed to identify potential RECs that may have resulted from the migration of hazardous substances or petroleum products from the adjacent properties to the subject site. The findings of the records review may be found in Section 5. Specifically, HCET personnel reviewed

- Environmental regulatory databases
- Sanborn Fire Insurance maps or historical aerial photographs

3.1. Environmental Regulatory Databases

HCET utilized Environmental Data Resources, Inc., (EDR) environmental regulatory database searches and report of findings. This report provides the results of the government records search on the target property and surrounding area in accordance with the government records search requirements of the ASTM E 1528-00 Standard. However, in this case HCET utilized a full EDR report in accordance with the government records search requirements of the ASTM E 1527-00 Standard Practice for Phase I ESA. A copy of the report, which includes a detailed description of all databases searched, may be found in Attachment B. A brief discussion of the databases searched to meet the TSS, Limited Phase I ESA practice follows.

National Priority List (NPL)

The NPL is the EPA list of the most serious uncontrolled or abandoned hazardous waste sites identified for priority remedial action under the Superfund program. To be included on the NPL, a site must either meet or surpass a predetermined hazard ranking system score, be chosen as a state's top priority site, or meet all three of the following criteria: (1) The U.S. Department of Health and Human Services issues a health advisory recommending that people be removed from the site to avoid exposure; (2) the EPA determines that the site represents a significant threat; and (3) the EPA determines that remedial action is more cost-effective than removal action. The EPA is required to update the NPL at least once a year. NPL sites pose a significant risk of contaminating surrounding properties and potentially affecting property values.

Comprehensive Environmental Response, Compensation, and Liability Information System Source (CERCLIS)

The CERCLIS list is a compilation by the EPA of known or suspected uncontrolled or abandoned hazardous waste sites that EPA has investigated or is currently investigating for a release of hazardous substances pursuant to Section 103 of the CERCLA. Once a

site enters CERCLIS, it may be subjected to several levels of review and evaluation and possible inclusion on the National Priority List. While it has been determined by the EPA that some CERCLIS sites require no action, others could pose a real or perceived environmental threat to neighboring property, thus affecting property values. The CERCLIS list is updated semiannually.

CERCLIS No Further Remedial Action Planned (CERCLIS-NFRAP)

Since February 1995, the EPA has been removing “No Further Remedial Action Planned” (NFRAP) sites from CERCLIS. The NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require federal Superfund action or NPL consideration. The NFRAP is updated quarterly.

Corrective Actions and Associated Treatment, Storage, Disposal Facilities (CORRACTS-TSD)

CORRACTS identifies hazardous waste handlers with Resource Conservation and Recovery Act (RCRA) corrective action activity. The EPA’s RCRA program identifies and tracks hazardous waste from the point of generation to the point of disposal. CORRACTS-TSD and permitted TSDs are a compilation by the EPA of reporting facilities that generate, transport, treat, store, or dispose of hazardous waste. The CORRACTS is updated semiannually.

Resource Conservation and Recovery Information System (RCRIS) and Permitted TSDs
RCRIS includes selective information on sites that generate, transport, store, treat, and/or dispose of hazardous waste as defined by the RCRA. Generators of hazardous waste are classified as large-quantity generators (LQGs), which generate greater than 1,000 kilograms per month of hazardous waste, or small-quantity generators (SQGs), which generate less than 1,000 kilograms per month of hazardous waste. The RCRIS is updated semiannually.

Emergency Response Notification System for Spills (ERNS)

The ERNS list reports CERCLA hazardous substance releases or spills in quantities greater than the reportable quantity, as maintained at the National Response Center. Notification requirements for such releases or spills are codified in 40 CFR Parts 302 and 355. The ERNS is updated quarterly.

Florida’s State-Funded Action Sites (SHWS)

The SHWS are the state equivalent of CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state-equivalent superfund) are identified along with sites where potentially responsible parties will pay for cleanup. These records are updated semiannually.

Solid Waste Facility Database (SWFD)

The SWFD/Landfill Sites Database contains an inventory of solid waste disposal facilities or landfills in a particular state. These records are updated semiannually.

Aboveground Storage Tanks (ASTs), Underground Storage Tanks (USTs), and Leaking Underground Storage Tanks (LUSTs)

The Florida Department of Environmental Protection (FDEP) maintains databases for registered ASTs, registered USTs, and known or suspected LUSTs. These databases are updated quarterly.

Miami-Dade County Air Permit Sites (AP)

The Miami Dade County Department of Environmental Resources Management (DERM) maintains databases for registered Air Permit Sites. These databases are updated semiannually.

Other Databases (AP)

The subject property or surrounding sites may appear on other environmental databases. While the ASTM standard does not require searches of these databases, they have been included for informational purposes. Explanation of the databases may be found in Attachment B.

3.2. Sanborn Fire Insurance Maps or Historical Aerial Photographs

Sanborn Fire Insurance maps and historical aerial photographs identify past use of the subject site and surrounding area. Copies of the maps or photographs may be found in Attachment C.

4. TRANSACTION SCREEN GUIDE

4.1. Methodology and Limiting Conditions

HCET personnel performed a site reconnaissance inspection of the subject site and documented the reconnaissance through the guide to the site visit, written notes, and photographs; copies of the photographs may be found in Attachment D. HCET personnel also performed a transaction screen questionnaire through the guide for owner/occupant inquiry; copies of the transaction screen questionnaire may be found in Attachment D. The results of the site reconnaissance and the transaction screen questionnaire may be found in Section 5 of this report. During the site reconnaissance and the owner/occupant inquiry process, HCET personnel utilized the questionnaire contained in the ASTM E 1528.

Transaction Screen Questionnaire

- Is the property used for an industrial use?
- Is any adjoining property used for an industrial use?
- Did you observe evidence or do you have any prior knowledge that the property has been used for industrial use in the past?
- Is the property used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing property, junkyard or landfill, or a waste treatment, storage, disposable, processing, or recycling facility?
- Is any adjoining property used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing property, junkyard or landfill, or a waste treatment, storage, disposable, processing, or recycling facility (if applicable, identify which)?
- Did you observe any evidence or do you have any prior knowledge that the property has been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing property, junkyard or landfill, or a waste treatment, storage, disposable, processing, or recycling facility (if applicable, identify which)?
- Did you observe any evidence or do you have any prior knowledge that any adjoining property has been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing property, junkyard or landfill, or a waste treatment, storage, disposable, processing or recycling facility

(if applicable, identify which)?

- Are there currently any damaged or discarded automotive or industrial batteries, or pesticides, paints, or other chemicals in individual containers of greater than 5 gal (19 L) in volume or 50 gal (190 L) in the aggregate, stored on or used at the property or at the facility?
- Did you observe any evidence or do you have any prior knowledge that there have been previously any damaged or discarded automotive or industrial batteries, or pesticides, paints, or other chemicals in individual containers of greater than 5 gal (19 L) in volume or 50 gal (190 L) in the aggregate, stored on or used at the property or at the facility?
- Are there currently any industrial drums (typically 55 gal [208 L]) or sacks of chemicals located on the property or at the facility?
- Did you observe any evidence or do you have any prior knowledge that there have been previously any industrial drums (typically 55 gal [208 L]) or sacks of chemicals located on the property or at the facility?
- Did you observe any evidence or do you have any prior knowledge that fill dirt has been brought onto the property that originated from a contaminated site?
- Did you observe any evidence or do you have any prior knowledge that fill dirt has been brought onto the property that is of an unknown origin?
- Are there currently any pits, ponds, or lagoons located on the property in connection with waste treatment or waste disposal?
- Did you observe any evidence or do you have any prior knowledge that there has been previously any pit, ponds, or lagoons located on the property in connection with waste treatment or waste disposal?
- Is there currently any stained soil on the property?
- Did you observe any evidence or do you have any prior knowledge that there has been previously any stained soil on the property?
- Are there any registered or unregistered storage tanks (above or underground) located on the property?
- Did you observe any evidence or do you have any prior knowledge that there have been previously any registered or unregistered storage tanks (above or underground) located on the property?

- Are there currently any vent pipes, fill pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?
- Did you observe any evidence or do you have any prior knowledge that there have been previously any vent pipes, fill pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?
- Is there currently evidence of leaks, spills, or staining by substances other than water, or foul odors associated with any flooring, drains, walls, ceilings, or exposed grounds on the property?
- Did you observe any evidence or do you have any prior knowledge that there have been any leaks, spills, or staining by substances other than water, or foul odors associated with any flooring, drains, walls, ceilings, or exposed grounds on the property?
- If the property is served by a private well or nonpublic water system, is there evidence or do you have prior knowledge that contaminants have been identified in the well or system that exceed guidelines applicable to the water system?
- If the property is served by a private well or nonpublic water system, is there evidence or do you have prior knowledge that the well has been designated as contaminated by any government environmental/health agency?
- Does the owner or occupant of the property have any knowledge of environmental liens or governmental notification relating to past or recurrent violations of environmental laws with respect to the property or any facility located on the property?
- Has the owner or the occupant of the property been informed of the past existence of hazardous substances or petroleum products with respect to the property or any facility located on the property?
- Has the owner or the occupant of the property been informed of the current existence of hazardous substances or petroleum products with respect to the property or any facility located on the property?
- Has the owner or occupant of the property been informed of the past existence of environmental violations with respect to the property or any facility located on the property?
- Has the owner or occupant of the property been informed of the current existence of environmental violations with respect to the property or any facility

located on the property?

- Does the owner or the occupant of the property have any knowledge of any environmental site assessment of the property or the facility that indicated the presence of hazardous substances or petroleum products on, or contamination of, the property and recommended further assessment of the property?
- Does the owner or the occupant of the property know of any past, threatened, or pending lawsuits or administrative proceedings concerning a release of any hazardous substances or petroleum products involving the property by any owner or occupant of the property?
- Does the property discharge wastewater (not including sanitary waste or storm water) onto or adjacent to the property and/or into a storm water system?
- Does the property discharge wastewater (not including sanitary waste or storm water) onto or adjacent to the property and/or into a sanitary sewer system?
- Did you observe evidence or do you have any prior knowledge, that any hazardous substances or petroleum products, unidentified waste materials, tires, automotive or industrial batteries, or any other waste materials have been dumped above ground, buried, and/or burned on the property?
- Is there a transformer, capacitor, or any hydraulic equipment for which there are any records indicating the presence of polychlorinated biphenyls (PCBs)?
- Are there currently septic systems located within the facility?
- Is there currently lead paint used on the interior and exterior of the buildings located within the facility?

5. FINDINGS

The findings of the TSS, Limited Phase I ESA summarize environmental conditions and RECs associated with the property.

5.1. Site Reconnaissance Findings

On 12/10/2003, HCET personnel performed the site reconnaissance. Photographs from the site visit may be found in Attachment D. (MODEL ANSWER)The property is a vacant rectangular lot. Since access to the property was restricted, HCET personnel did not enter the lot. The property is not fenced and can be accessed from NE 1st Avenue or from NE 15th Street. The entire lot is covered with grass, and a tree is located on the southeast corner. The adjacent property on the west side is an old building in bad condition with old paint. **(Refer to INVESTIGATOR'S NOTES in blue)**

This site is located on the south border of the Dioxin remediation site. The property is vacant and the ground is covered with asphalt. It is a parking lot in an INDUSTRIal area. Many petrol stains

Site: PARKING LOT

Adj. Property to the North: MUNICIPAL building

Adj. Property to the South: PARKING LOT

Adj. Property to the East: PARKING LOT

Adj. Property to the West: PARKING LOT

(MODEL ANSWER)At the time of the inspection, there were no signs of any foundations or wells on site. The property had a small amount of trash. No petroleum products were observed. No waste pits, ponds, or lagoons were observed. No evidence of surface contamination, such as stressed vegetation, stained soils, or unusual odors, was observed. **(Refer to INVESTIGATOR'S NOTES in blue)**

This site is located on the south border of the Dioxin remediation site. The property is vacant and the ground is covered with asphalt. It is a parking lot in an INDUSTRIal area. Many petrol stains

(MODEL ANSWER)No evidence of septic tanks was observed. Overall air quality on site appeared to be good. Because the property sits on the corner of two large roadways, NE 1st Avenue and NE 15th Street, the air quality will vary, depending on the traffic patterns in the area.**(Refer to INVESTIGATOR'S NOTES in blue)**

This site is located on the south border of the Dioxin remediation site. The property is vacant and the ground is covered with asphalt. It is a parking lot in an INDUSTRIal area. Many petrol stains

5.2. Interviews

During the time HCET personnel performed site reconnaissance and the owner/occupant inquiry process, the property owner and occupant were not available to answer the transaction screen questionnaire.

5.3. Records Review Findings

5.3.1. Environmental Regulatory Databases

National Priority List (NPL) The site is not listed on the NPL, nor is it a proposed NPL site. There are no NPL or proposed NPL sites within one mile of the site.

Comprehensive Environmental Response, Compensation, and Liability Information System Source (CERCLIS) The site is not listed on the CERCLIS list. There are no CERCLIS-listed sites within one-half mile of the site.

CERCLIS No Further Remedial Action Planned (CERCLIS-NFRAP) The site is not listed on the CERCLIS-NFRAP list. There is, however, one (1) CERCLIS-NFRAP-listed site within one-quarter mile of the site. The facility name is People's Gas/Miami Rinker Gasification. The address is 1600 N Miami Avenue. The site is not on the NPL list. Coal tar byproducts have been found in on-site groundwater (Biscayne Aquifer sole source) and on-site soil.

Corrective Actions and Associated TSD (CORRACTS-TSD) The site is not listed on the CORRACTS-TSD list. There are no CORRACTS-TS-listed sites within one-half mile of the site.

Resource Conservation and Recovery Information System (RCRIS) and Permitted Treatment, Storage, Disposal Facilities (TSD) This site is not listed as a treatment, storage, or disposal (TSD) facility. The site is not listed as generator of RCRA hazardous waste. There are no TSD facilities within a one-half mile radius of the site.

Records indicated that there are one (1) LQG of hazardous waste within one-quarter mile search radius of the subject property and seven (7) SQGs of hazardous waste within one-quarter mile search radius of the site. All of these properties are located at elevations equal to or higher than that of the researched property. The following table summarizes the findings available on the RCRIS sites. **Table 1. RCRIS Sites Within 1/4 Mile of the Subject Site** INSERT TABLE HERE

Emergency Response Notification System for Spills (ERNS) The site is not listed on the ERNS list.

Florida's State-Funded Action Sites (SHWS) The site is not listed on the SHWS list.

There are no SHWS-listed sites within one mile of the site.

Solid Waste Facility Database (SWFD) The site is not listed on the SWFD list. There are two (2) SWFD-listed sites within one-half mile of the site. The following table summarizes the findings available on the SWFD list.

**Table 2. Solid Waste Facilities/Landfill Sites Within 1/2 Mile of the Subject Site
INSERT TABLE HERE**

Underground Storage Tanks (USTs) The site is not listed on the USTs list. There are, however, twenty-nine (29) UST sites registered with the FDEP within one-quarter mile of the subject site. These sites are at an elevation equal to or higher than that of the subject site. The following table summarizes the information available on the UST sites.

**Table 3. Registered USTs Within 1/4 Mile of the Subject Site INSERT TABLE
HERE**

Leaking Underground Storage Tanks (LUSTs) The subject property has no record of LUSTs. There are, however, thirty-one (31) LUST sites registered with the FDEP within one-half of a mile from the subject site. These sites are at an elevation equal to or higher than that of the subject site. The following table summarizes the information available on the LUST sites.

Table 4. LUSTs Within 1/2 Mile of the Subject Site INSERT TABLE HERE

Miami-Dade County Enforcement Sites (ENF) The subject property has no record in the Miami-Dade Enforcement Case Tracking System. There are, however, sixteen (16) ENF sites registered within one-half mile of the subject site. The following table summarizes the information available on the ENF sites.

**Table 5. Enforcement Sites Within 1/4 Mile of the Subject Site INSERT TABLE
HERE**

Hazardous Waste Sites (HWS) The site is not listed on the HWS sites of the Miami-Dade County Department of Environmental Resources Management. There are, however, three (3) HWS-listed sites within one-quarter mile of the site. The following table summarizes the information available on the HWS sites.

Table 6. HWS Sites Within 1/4 Mile of the Subject Site INSERT TABLE HERE

Miami-Dade County Industrial Waste Type 2-4 Sites (IW2-4) The subject property has no record on the IW2-4 list. There are, however, seventeen (17) IW2-4 sites registered within one-half mile of the subject site. The following table summarizes the information available on the IW2-4 list.

**Table 7. Industrial Waste Sites Within 1/4 Mile of the Subject Site INSERT TABLE
HERE**

5.3.2. Sanborn Fire Insurance Maps or Historical Aerial Photographs

Six Sanborn Fire Maps were examined to evaluate the use of the subject property and the adjacent properties. In 1914 and 1918, a two-story apartment building was on the southeastern edge of the property. The building was facing NE 1st Avenue, with access stairs on the east side. In the 1921 Sanborn Fire Maps, the two-story building is still on the property, and a small two-story auto garage with an apartment appear on the southwestern edge of the lot. This small building faced NE 15th Street, with access stairs on the west side. In the 1939, 1950, and 1987 Sanborn Fire Maps, no change occurs on the property. The properties surrounding the subject site remained fairly constant as low-development areas in the 1914, 1918, and 1921 Sanborn Fire Maps. In the 1950 and 1987 Sanborn Fire Maps, urban development reached a higher level around the property. Copies of the maps may be found in Attachment C.

6. CONCLUSIONS AND OPINION

HCET has completed a TSS, Limited Phase I ESA, in conformance with the scope and limitations of ASTM Practice E 1528-00, of 1401 NE 16TH ST. Since the property owner and occupant were not available to answer the transaction screen questionnaire, HCET personnel made TSS conclusions according to Section 5.6 of ASTM E 1528. Additional deviations, if any, from this practice are described in Section 7 of the report. The limitations and exceptions of the ESA may be found in Section 1.3.

Since the property owner and occupant were not available to answer the transaction screen questionnaire, HCET personnel made TSS conclusions according to Section 5.6 of ASTM E 1528. Because access to the site was restricted, the site reconnaissance was limited to a visual inspection of the site from the perimeter of the property. Additional deviations, if any, from this practice are described in Section 7 of the report. The limitations and exceptions of the ESA may be found in Section 1.3.

This assessment has revealed no further need of inquiry into RECs at the property.

However, HCET noted a number of environmentally sensitive properties and operations in proximity to the subject property through environmental database searches. The proximity of these listed properties does not necessarily imply that the subject property is itself contaminated. There is, however, potential for contamination. Some of these sites may have or have had a negative impact on the subject sites groundwater or air quality.

7. DEVIATIONS

Access to the subject site was limited, and HCET personnel did not enter the property. The site reconnaissance was limited to a visual inspection conducted from the perimeter of the property. An additional site visit onto the property must be performed to provide a comprehensive assessment of the presence or absence of RECs at the site. This TSS, Limited Phase I ESA may be amended with a later report of on-site inspection findings.

The property owner and occupant were not available to answer the transaction screen questionnaire. HCET personnel made TSS conclusions according to Section 5.6 of ASTM E 1528: ☐ If any of the questions are not answered or the answer is unknown, the user should document such no response or answer of unknown and evaluate it in light of the other information obtained in the Transaction Screen Process, including, in particular, the site visit and the government records/historical sources inquiry.

8. ADDITIONAL SERVICES

None.

9. REFERENCES

American Society for Testing and Materials (ASTM), E 1527-00, Standard Practice for Environmental Site Assessment: Phase I Environmental Site Assessment Process, pp. 127.

American Society for Testing and Materials (ASTM), E 1528-00, Standard Practice for Environmental Site Assessment: Transaction Screen Process, pp. 1 □ 37.

Environmental Data Resources, Inc. (EDR), The Source for Environmental Risk Management Data.

10. QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

The following HCET Environmental Professionals conducted the Phase I Assessment:

Alfredo J. Ravinet

M.S., Environmental Engineering, Florida International University, Miami, Florida, 2000.

Eudel Eduardo Cepero

B.S., Education and Geography, Higher Pedagogical Institute □ José Martí, □ Cuba, 1983. Phase I Certificate Course. Environmental Assessment Association, 2001. Certified Environmental Inspector by the Environmental Assessment Association, Certification No. 73865.

Joy Ashby

B.S., Computer Science (2002), M.S. Environmental Engineering Florida International University, Miami, Florida, 2003

11. ACRONYMS AND ABBREVIATIONS

12. ATTACHMENTS

Attachment A. Site Location Map

Attachment B. Report of Regulatory Records Review and Physical Setting

Attachment C. Sanborn Fire Insurance Maps and Historical Aerial Photographs

Attachment D. Site Photographs and Transaction Screen Survey

Acronyms and Abbreviations

AP	Miami-Dade County Air Permit Sites
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CORRACTS-TSD	Corrective Actions and Associated Treatment, Storage, Disposal Facilities
EDR	Environmental Data Resources, Inc.
EDI	Electronic data interchange
ENF	Miami-Dade County Enforcement Sites
EPA	U.S. Environmental Protection Agency
ERNS	Emergency Response Notification System for Spills
ESA	Environmental Site Assessment
FDEP	Florida Department of Environmental Protection
FIU	Florida International University
FS	Feasibility study
HCET	Hemispheric Center for Environmental Technology
HWS	Hazardous Waste Site
IW	industrial waste
IW2-4	Miami-Dade County Industrial Waste Type 2-4 Sites
IW 5	Industrial waste type 5 sites
LQG	large-quantity generator
LUST	leaking underground storage tank
NFA	No further action status has been approved
NFRAP	no further remedial action planned
NPL	National Priority List
PCB	polychlorinated biphenyl
RA	remedial action cleanup activity in progress
RAP	remedial action plan cleanup activity in progress
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
REC	recognized environmental condition
SA	Site assessment cleanup activity in progress
SHWS	Florida's State-Funded Action Sites
SQG	small-quantity generator
SRCR	Site rehabilitation completion report
SWFD	Solid Waste Facility Database
TSD	Treatment, Storage, Disposal Facilities
TSS	Transaction Screen Survey
UST	underground storage tank

Factors Used To Aid In Hardware Selection For Digital Field-mapping Systems.
(Courtesy Edmondo, Gary P.)

Requirement	Determining Factors
Size, morphology	Proximity to infrastructure, vehicles; carrying capability
Weight	Physical carrying restrictions
Battery type/life	Operating time frame, cost, added weight
Processor and data storage	Amount and type of background data to be used, and amount of data to be captured
GPS accuracy	Scale of mapping project
Connectivity	Number of peripheral devices to be used (GPS, laser rangefinder, etc.)
Display	Readability in low-light and bright-light conditions, available screen-display size
Ruggedness	Environment (tropics/desert)
Cost	Budget

Scenarios, Requirements, And Recommendations For Field Digital Data-capture Systems.

(Courtesy Edmondo, Gary P.)

Requirements	Scenario	GPS	Computer
Accuracy			
Centimeter	Claim staking, land surveying	Survey grade	Any (dependent on amount of base data and data capture)
Submeter/meter	Detail mapping at scales of 1:6,000 or greater, detail sampling	Mapping grade	Wearable PC, handheld PDA
>1 meter	Sampling, reconnaissance	Mapping/recreation	Handheld PDA, Tablet PDA
Data sets			
Large data set	Advanced project, development, mine site	Mapping/survey grade	Tablet/wearable PC
Moderate data set	Advanced project, project work	Mapping grade	Tablet/wearable PC or PDA
Minimal data set	Reconnaissance mapping, sampling	Recreation/mapping grade	PDA
Battery life			
Long life	Inaccessible AC power/ long distance from vehicle or office	Recreation/mapping grade	PDA/wearable PC
Moderate life	Inaccessible power, long stay in field	Recreation/mapping grade	Wearable PC/PDA
Short duration	Nearby power supply/ vehicle	Survey/mapping grade	Tablet PC
Weight of system			
Heavy (weight not issue)	Infrastructure/mine site	Survey/mapping grade, backpack style, integrated	Tablet PC
Moderate (weight of	Mine site to detailed project work (with no	Mapping grade, either backpack or	Wearable PC

moderate concern)	infrastructure)	integrated	
Light (weight of high concern)	Reconnaissance, early stage projects, sampling	Recreation grade/mapping grade	PDA/wearable PC

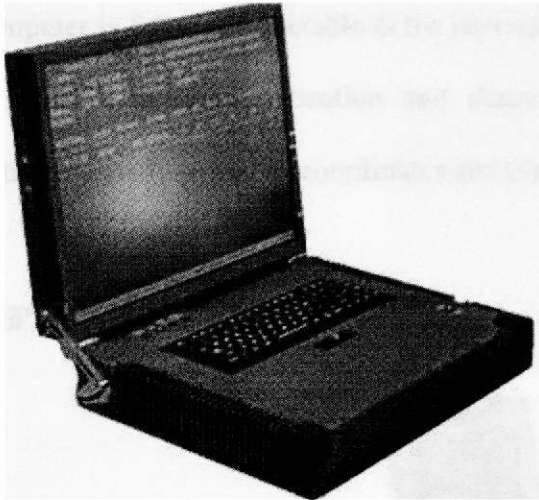
Glossary

Glossary

Attribute Table

An INFO or other tabular file containing rows and columns. In ArcInfo, attribute tables are associated with a class of geographic features, such as wells or roads. Each row represents a geographic feature. Each column represents one attribute of a feature, with the same column representing the same attribute in each row.

20.1" Ruggedized Laptop



The 20.1" Ruggedized Laptop Computer combines mobility with processing power and also boasts a large 20.1" display. The system provides the operator the ability to operate the system in different work conditions including extremely harsh environments. The Ruggedized Laptop Computer's flat-panel display is readable under various lighting conditions (illuminated room, sunlight and full darkness) has 0 to 100% continuous brightness control, without any visible flicker, and is available as night vision goggle

(NVG) compatible. It can be mounted on a mobile platform (ground vehicles, navy surface and sub-surface vessels and airborne, fixed and rotary wing) or on a fixed base for facility monitoring and is a highly reliable man-portable unit that operates in harsh field environmental conditions, working day or night under any adverse weather conditions.

When used in the traditional "Laptop" configuration the Ruggedized Laptop Computer is supplied with an adjustable shoulder strap, making it a very man-portable unit. Other carrying options are also available.

Like all Argon Corp computer and flat-panel products, the 20.1" Ruggedized Laptop Computer is fully customizable to the customer's specific requirements (argoncorp, 2003) Information about the location and shape of, and relationships among, geographic features, usually stored as coordinates and topology.

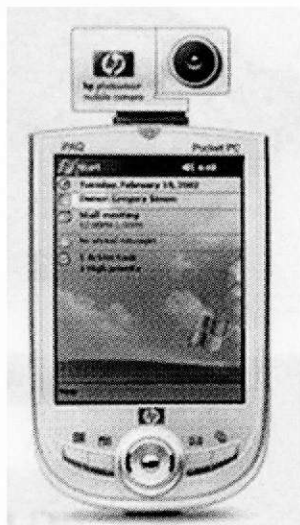
HP iPAQ Foldable Keyboard



Improve productivity when using iPAQ Pocket PC alone or with an expansion pack. The standard keyboard layout allows you to effortlessly take notes, email, or write reports. It

is great for entering a large amount of data quickly. When not in use, the keyboard folds up into an ultra-small package for easy portability. The Foldable Keyboard is designed for use with Compaq iPAQ H3800, H3900 and H5000 Series Pocket PCs and may be used with any of the Compaq Expansion Packs attached to your PDA (expansys.com).

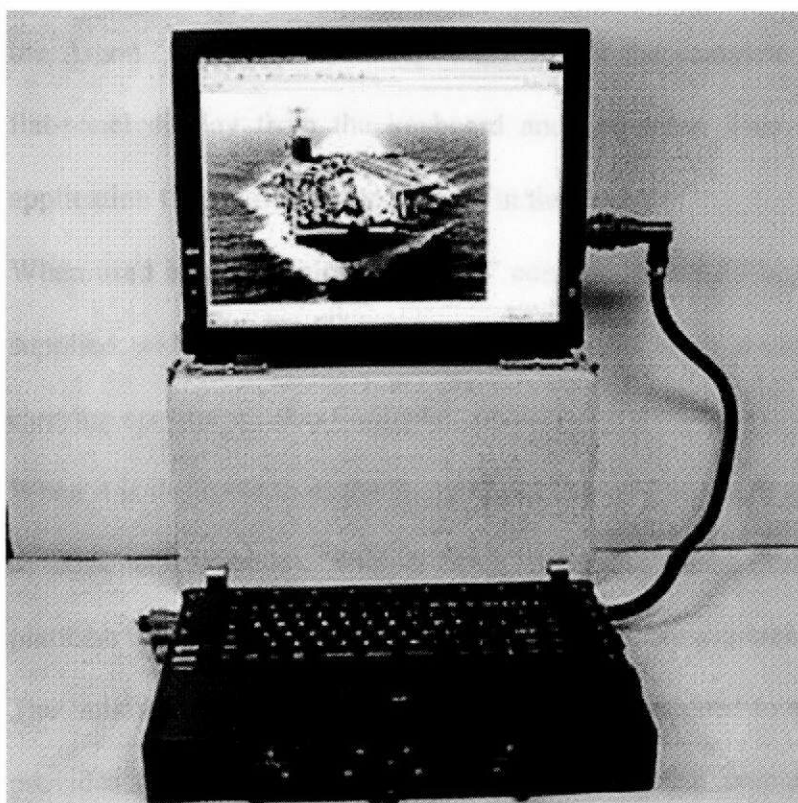
HP Photosmart Mobile Camera



High-performance digital camera SD card accessory that allows you to capture, share, and even send a digital image directly to a Bluetooth enabled printer – all with your iPAQ Pocket PC.

With a 1.3 MP resolution and 4X digital zoom in a 1.1ounce package, the Mobile Camera offers features found in a full size digital camera at the fraction of the size. This is one of the lightest Pocket PC camera options to utilize the SDIO (secure digital input/output) slot, offering fast data transfer rates (expansys.com).

Ruggedized Laptop



The Ruggedized Laptop Computer provides the operator the ability to operate the system in different work conditions such as sitting at a stationary post, lying or kneeling in the field. The Ruggedized Laptop Computer's flat-panel display is readable under various lighting conditions (illuminated room, sunlight and full darkness) has 0 to 100% continuous brightness control, without any visible flicker, and is available as night vision goggle (NVG) compatible. It can be mounted on a mobile platform (ground vehicles, navy surface and sub-surface vessels and airborne, fixed and rotary wing) or on a fixed base for facility monitoring and is a highly reliable man-portable unit that operates in harsh field environmental conditions, working day or night under any adverse weather conditions.

The mechanical design of the Ruggedized Laptop Computer incorporates a variation of the Argon "Piggy-Back" concept allowing for the complete and rapid separation of the flat-panel display from the keyboard and computer. This unique approach brings an application flexibility not seen before in the industry.

When used in the traditional "Laptop" configuration the Ruggedized Laptop Computer is supplied with an adjustable shoulder strap, making it a very man-portable unit. Other carrying options are also available.

When it is desirable to use the Ruggedized Laptop Computer as other than a "Laptop" (i.e., in the separable mode), "Snap & Latch" mounting plates, designed for easy installation to platform bulkheads and horizontal work surfaces, are available.

The bulkhead "Snap & Latch" mounting plate, designed to secure the flat-panel display provides an interface connector for the cabling that connects to the horizontal work surface mounting plate. The horizontal work surface "Snap & Latch" mounting plate

secures the keyboard and computer and provides an interface connector for the cable connecting to the flat-panel display mounting plate. Both are easily installed. The cabling between the mounting plates can be installed behind the bulkhead or left exposed at the option of the user.

Transitioning between the mounted (i.e., the separable mode) and the Laptop configuration is easily accomplished by removing the keyboard and computer and display units from their respective "Snap & Latch" mounting plates and joining the units together utilizing the quick connect and disconnect mechanism. This capability offers the end user numerous application possibilities previously not available.

Like all Argon Corp. computer and flat-panel products, the Ruggedized Laptop Computer is fully customizable to the customer's specific requirements. The Ruggedized Laptop Computer for the one application is configured as follows:

SPECIFICATIONS:

SIZE: 10.77 inches wide by 13.70 inches long by 3.10 inches deep

WEIGHT: 15.5 Lbs.

DISPLAY: Sunlight readable 15-inch diagonal. Front of glass anti-reflection coated, scratch and salt fog resistant IAW Mil-Q-13508. 0.5% maximum reflection over visible light spectrum. Coating IAW Mil-C-675C

DISPLAY RESOLUTION: XGA 1024x768

BRIGHTNESS: Adjustable from 0 to 100% without any flicker.

POWER INPUT: 28VDC (18-32 VDC)

PROCESSOR: 1.2 GHz CPU

RAM: 384 MB (16 MB shared with video)

AGP VIDEO: 16 MB RAM

HARD DRIVE: 20 GB minimum

OPERATING SYSTEM: Linux and Windows 2000, XP, XP Embedded compatible

INTERFACE: Standard 10/100 base Ethernet port. RS-422/RS-485 port. 2 USB ports. External keyboard, monitor and mouse capability. Standard VGA output connector, fire wire, PCMCIA with 2 spare slots.

KEYBOARD: Spill proof, backlit with built in mouse.

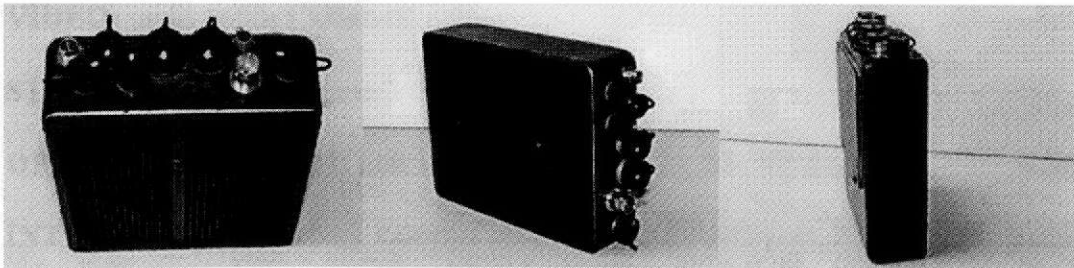
SOUND: "SoundBlaster" compatible card; headphone jack and built-in sound transducer with headphone cut out.

TEMPERATURE RANGE: 0° C to 55° C (-40° C to 65° C optional) Operating; -40° C to 70° C Storage

ENVIRONMENTAL: Drip proof; sand and dust impervious

EMC: 200 V/M peak 2MHz-18GHz IAW Mil-Std-461D. Display supplied with conductive glass overlay bezel and conductive gasket (argoncorp.com)

Wearable PC



Designed as pocket (pouch) or wearable device for field applications, the Wearable PC is light and compact, weighing just 1.25 lbs. Integration with a chest or a helmet mounted

display provides a soldier access to a full x86 based computer without obstructing his performance.

The Wearable PC is not a PDA but a fully functional computer with an 800 MHz x86 compatible processor, giving plenty of power to run the Windows or Linux applications. It utilizes a solid-state flash hard drive for up to 3 GB of storage. The Wearable PC has full audio capabilities, built in 10/100baseT Ethernet, optional modem and capability to connect external devices via its RS422/485, RS232 and USB ports. It can be customized with additional features including a video capture board, GPS, modem, FireWire and ...

Like all Argon Corp computer and flat-panel products, the Wearable PC can be customized for your specific requirements.

SPECIFICATIONS:

SIZE: 5.15" wide x 4.15" long x 1.4" deep

WEIGHT: 1.25 Lbs.

POWER INPUT: 5 to 28 VDC (or as required by your specifications)

PROCESSOR: 800 MHz

RAM: up to 256MB

VIDEO: up to 1600x1200x64K colors

STORAGE DEVICE: up to 3 GB solid-state disk

OPERATING SYSTEM: Linux and Windows 2000, XP, XP Embedded compatible

INTERFACE: 10/100 base Ethernet port. RS-422/RS-485 port. 2 USB ports. External keyboard, monitor and mouse capability. Standard VGA output connector, modem, FireWire(optional), GPS (optional), video capture board (optional)