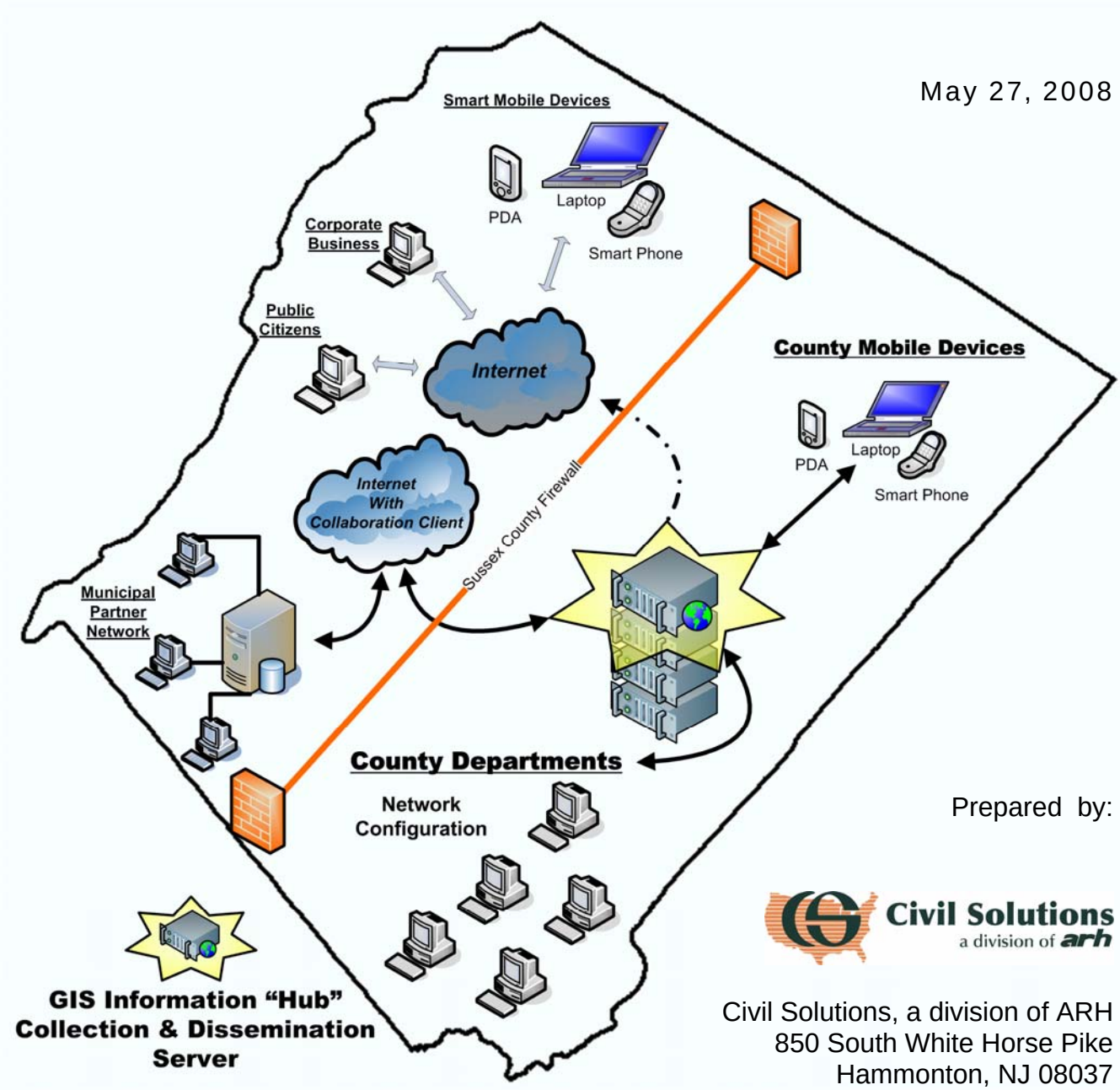
Geographic Information System (GIS) Enterprise Configuration and Deployment Strategy

for the:

County of Sussex, New Jersey

May 27, 2008



Prepared by:

Civil Solutions, a division of ARH
850 South White Horse Pike
Hammonton, NJ 08037
800.924.0842 p
609.704.8011 f
www.civilsolutions.biz

1.0 Executive Summary

In order to properly support the anticipated operations of the various projects currently underway, the County is looking to leverage its current investment in Geographic Information System (GIS) technology as a means to distribute both spatial and tabular data to a variety of end user data consumers. In order to define the methods and mechanisms to quickly access this information, a great deal of project planning and strategic design is required.

This planning process included a thorough review of recently completed Shared Service reports at both County and municipal levels, as well as an evaluation of the County's existing network infrastructure. Through this process, interoperability and the development of a true enterprise solution for data exchange became the focal point of this report; providing a solid foundation for these efforts to be accomplished while simultaneously uniting many of these individual objectives.

Assembling a centralized "hub" to support data distribution through an Internet portal was found be the most cost effective and simple method to achieve the desired results. The enterprise GIS portal within the County will act as a data repository where the end user will gain access to a cross section of information through a common interface.

Using internet based technology, this report recommends the implementation of a "pilot" program to facilitate information collaboration with its municipal partners to establish efficient methods of communication, as well as test the County's network architecture. This collaboration will foster data exchange that will be mutually beneficial and result in a reduced level of effort to maintain both municipal tax maps and the County's digital parcel basemap.

The method of data delivery and information exchange during this evaluation will also provide the means to test some implementation strategies for the anticipated Electronic Document Management System (EDMS). This exercise will help to establish a benchmark for future performance measures.

The importance of the maintenance of the tax maps and digital parcels will be recognized when the State finalizes the rollout of its new Property Assessment Management System (PAMS). The following is a short excerpt from the document "Procedure for Submitting Updates of GIS Parcel Data for PAMS", which can be read in it's entirely by following the url address listed after this passage.

"One-Time Data Preparation
Beginning in spring of 2008, NJOIT's Office of GIS will take copies of the most up-to date parcel data available in each county. These will then be adjusted to align with each other along county boundaries and the database structures will be normalized to one consistent schema. These steps are necessary in order to create a single unified data set of the whole state (where data are available) for use in PAMS. The normalized data will then be replicated and sent back to each county. Data maintenance at the local level will then continue, using the normalized replicas."

"Ongoing Updates
In order for the mapping modules in PAMS to be useful to assessors, the parcel data must be kept up to date to remain in sync with the assessment data as subdivisions and other changes occur. Ideally, the parcel layer should be maintained on an ongoing basis, with changes entered as soon as practical after they are finalized. In cases where staff resources are unavailable to perform data maintenance, updates should be done at a minimum of once a year (more often in areas undergoing significant growth)."

http://njintouch.state.nj.us/treasury/taxation/pdf/pamsvol/gisdatasum_.pdf

2.0 Introduction

The overall goal of this consulting effort was to develop an overview document that generalized the details related to a variety of ongoing shared service and consolidation approaches being considered by the County of Sussex.

There are several projects occurring simultaneously to augment existing and introduce new business processes throughout the County. While these efforts are beginning to increase momentum, the County is looking to gain a more comprehensive global view of their respective technology requirements for both software and hardware. This is necessary to establish proper network architecture and support methods that ensure overall implementation success.

The implementation of an Enterprise Document Management System (EDMS) is a key element of the County's 5 year Strategic Plan. Specifically, the objective to implement an Enterprise EDMS Pilot Project was identified as a Year 2 goal under section 7.4.2 of the County's Strategic Plan. The completion of this Pilot Project will be the essential first step toward establishing an EDMS technology platform that can be efficiently distributed as a Shared Service to all County Departments and 24 municipalities.

To date, the County has deployed Department level EDMS systems in the Clerk's office as well as that of the Surrogate. The County is currently working on a Year 3 project to prepare an Enterprise EDMS Rollout Plan that will provide a global solution to meet the needs of County's core government, as well as to establish the infrastructure to offer a document management solution as a Share Service for their municipalities.

This project will include the RFP and Vendor selection process, together with the implementation of a Pilot Project for the Clerk of the Board. In parallel with this work another project will be initiated to complete a Business Process Assessment for Engineering, Planning and Facilities, necessary for these departments to be prepared for EDMS implementation immediately after the Clerk of the Board's Pilot Project concluded.

The following report provides a brief description of previous consulting efforts, County initiatives underway, municipal tax map updates, spatial data maintenance, interactive web-based data exchange and the use of GIS technology as the "hub" of information dissemination.

3.0 Previous Consulting Efforts (Shared Services)

The County has contracted for several studies over the past two years, many of which document the current condition, goals, objectives, obstacles and related funding requirements to implement an Enterprise Document Management System (EDMS). The following are brief descriptions of each report reviewed during our consulting effort.

3.1 Records Management Assessment

County of Sussex Records Management Assessment Results and Strategic Plan
Author: Smart and Associates, Devon Pa
Date: February 7, 2006

As part of a multi-year approach toward a Enterprise EDMS, Smart helped the County by examining current processes and technologies used to manage information, documents and records effectively throughout the County. The goal of this investigation was to develop a five year implementation plan focused on key elements of People, Process and Technology. The study found that each department has different methods for document storage, access and retrieval. A thorough assessment of document types (i.e. paper, electronic, microfilm, etc.) was performed along with existing hardware and software resources.

Online collaboration and web-form presentment has been recommended as a means to facilitate workflow, create a knowledge base, access imaged documents and provide a means for user friendly report generation.

The last portion of the report provides specific analysis describing actions, related costs and anticipated benefits. Also detailed are calculations of required digital storage capacity based on current storage and projected five (5) year growth requirements.

As an appendix, Smart has provided an extremely comprehensive section, with details on each individual department analysis, including observation that describe potential risks associated with the department's current records management tools and practices.

3.2 Communication Consolidation Feasibility Study

Sussex County, New Jersey - Communication Consolidation Feasibility Study
Author: RCC Consultants, Tallahassee Fla
Date: June 2007

This report "Phase 1" describes the process and options related to consolidation of services into one or more PSAP (Public Safety Answering Points) and potential benefits. Phase 1 was initiated to study the real value of benefits along with uncovering and understanding any possible pitfalls. The results were to provide the County with a variety of alternatives including both operational and financial benefits through the consolidation of existing PSAP's.

Today, there are six (6) existing PSAP's throughout the County. An interview and analysis was completed for each PSAP. A variety of information was captured and formulated into a series of comparison tables in the report that recorded the number of calls, staffing and other specific details related to the resources and daily activities of each facility.

A great deal of analysis was performed to project staffing requirements, Computer Aided Dispatch (CAD) system considerations, physical building structures and budgetary considerations for the consolidation options. Recommendations were submitted that included one for the development of a single communication center for Fire, EMS, Sherriff and 9-1-1 dispatch operations for all County Police. Each recommendation was accompanied with arguments in support of a full consolidation that include improved citizen/officer safety, minimizing call transfers and cost reductions.

The conclusion of the report details the existing municipal budgets for each PSAP and non-PSAP municipality in the County to help illustrate the overall long term value of the recommended options.

3.3 Municipal Shared Services

Sussex County Municipal Shared Services Assessment
Author: Smart and Associates, Devon Pa
Date: October 2007

The findings presented in this report document the mutual benefits that would be realized if the County and constituent municipalities were to develop a shared service initiative for document management. Shared services could lead to increased efficiency, better security, full regulatory compliance and reduction of related costs. The project was completed in two phases, the first being appropriate training for municipal record owners, followed by an inventory of all their records. This inventory was completed using an online survey tool.
The second phase of the project included onsite interviews and a review of existing business processes related to records management. The online survey and interviews were then used to determine a level of need and interest for each municipal partner.

A section in the report named "Common Findings and Observations" provides a great overview of record conditions and document management practices used across all municipalities in the County. Details are provided for each municipality and then summarized in the "Shared Services Results Overview" in the conclusion of the report. This overview describes the particulars regarding microfilming, information backup, storage space, training, shared services concepts, IT infrastructure and the use of GIS for access and dissemination of this information via the Internet.

To help summarize the results, the end of the report provides a series of tables that rank each item by its overall "need" vs. "interest" and then further breaks this information down by individual municipality. These tables provide a valuable summary and help to demonstrate that education is an important element of any shared service implementation. Some communities show an interest in one area, but a need in another, where in actuality the interest is spurred by the need; the two concepts are intertwined.

3.4 Central Records Management Facility

Sussex County Central Records Management Facility Assessment
Author: Smart and Associates, Devon Pa
Date: October 2007

The goal of this assessment was to determine the appropriate means to justify the construction of a centralized records management facility within the County. As previously mentioned and documented in the actual "Municipal Shared Service Assessment", storage capacity, security and data replication are areas that must be addressed for a successful cooperative project implementation.

This assessment was funded through a PARIS grant awarded to the County by the New Jersey Division of Archives and Records Management.

As described in the project overview, there are three (3) main areas described within the report. The first is a review of all county and municipal records management practices, followed by associated risks and mitigation alternatives related to specific business processes and their individual and cumulative impact on a county records management facility. The report also provides requirements and considerations for each proposed scenario.

Estimated high and low costs to support the centralized storage facility and EDMS systems are provided at the end of the report. These costs do not include construction, building and related maintenance costs for the facility, but more appropriately the hardware, software, shelving/boxing and facility staff requirements for year one rollout, followed by three additional years of service. An Appendix was also provided that contains details related to the policies and procedures to guide daily operations of the facility.

4.0 County Initiatives Underway

4.1 EDMS Pilot in Surrogate's Office

The Surrogate was awarded a PARIS grant that initiated an EDMS project for the Surrogate's Office in 2005. This office has now successfully implemented the ApplicationXtender 5.30 product from EMC, named Documentum.

ApplicationXtender electronically stores, organizes, and manages virtually any kind of business content. ApplicationXtender provides instant, role-based access to content from either a desktop interface or web browser. The Surrogate's Office is currently in the process of back scanning Estate/Will documents from 1993 to present. The County is also initiating a second project in the Surrogate's Office with the imaging firm Foveonics to complete back scanning to 1969.

This system is also being used for the day-forward scanning of all new documents. The application consists of a single screen for entering a limited number of metadata fields at the time the documents are scanned. The Surrogate can search the index on the various metadata fields to locate a specific case file. This document database is currently operating in a standalone configuration.

4.2 Clerk's EDMS Program

During the past three years the Office of the County Clerk has undertaken a significant project to implement a new Land Records Management System (LRMS), including the back scanning of all deeds and mortgages to 1900. This includes making use of the Monmouth County Portal as a means for receiving electronic submissions. At the conclusion of the work being done during 2008 they Clerk's LRMS will achieve Level 2E functionality, which will enable the Clerk to also receive electronic payments for deed and mortgage filings.

In addition to increasing the security and backup of all the documents maintained by the Clerk, the public now has a simple and efficient way to access this County resource via the web. As the County moves forward with its enterprise records management strategy there will be multiple ways that this data resource can be leveraged. One of the immediate goals is to improve the efficiency of the workflow involving the County Tax Board together with the Municipal Tax Assessors. This is the same workflow that is at the heart of maintaining accurate parcel data which is one of the key elements of the County's data management strategy. The Enterprise strategy recommended in this report offers an effective way to meet this business requirement and deliver important value to the Public, County Departments and Municipalities as well as the State.

4.3 Engineering, Planning and Facilities – Document Imaging

In addition to completing the scanning of Deeds and Mortgages in the Clerk's office, dating back to 1900, the County is also in the process of finalizing a project that has scanned over 1,000,0000 documents in Engineering, Planning, and Facilities. This has been a significant undertaking that is the initial step toward the implementation of a Countywide EDMS solution. In addition to the imaging of these documents, each of 35 different record series are also being indexed with appropriate metadata. This document repository represents a critical asset for the County and contains information that will be valuable to many users.

As with the Deeds and Mortgages now maintained within the Clerk's EDMS, the bulk of the Engineering documents are directly linked to a defined Block and Lot or other geospatial index value (mile marker, etc). As the County continues to improve their Enterprise Document management for all records they will be looking for more effective ways to link related data sets across department boundaries. The means and mode for the presentation of this information will be a key consideration to determine the implementation of appropriate technology platforms.

4.4 GIS Web-based Data Distribution

In 2003 Sussex County established the Office of GIS Management and conducted a comprehensive internal GIS Needs Assessment and Survey. This effort both helped to educate County staff on the use and benefits of this technology, as well as created an information road map for continued technology implementation. Major components of the IT infrastructure were inventoried and evaluated to determine baseline and future scalability potential based on projected estimates.

Data and application inventories were also conducted to document and describe available GIS data, current unrelated database "tracking" applications, as well as general business processes. This task helped to identify both the processes that could be augmented by the use of GIS technology and the required data layers needed to support such processes.

In combination with some State data, the County now has a variety of spatial data features and aerial imagery that aid in daily decision making processes related to land development and conservation among other uses.

The County has been successful in developing a number of geographic information system (GIS) framework data layers. In 2006, the County has been successful in acquiring County-wide digital parcels with the ability to link individual Assessor records to each property.
This effort has helped the County comply and disseminate information to government agencies and the general public related to cross-acceptance, strategic growth, stormwater management, environmental health, etc.

Spatial data and information are delivered through the use of a GIS portal. This portal allows the user to perform queries on a variety of database information and to see the results spatially by providing a visual depiction of the location(s). This analysis and visualization is achieved through the use of internet based GIS software that creates maps based on user input.

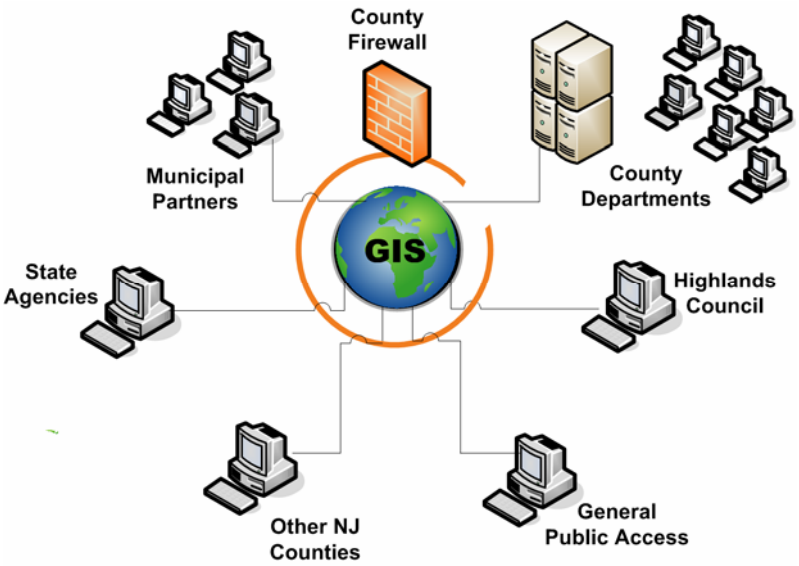
The GIS industry standard software has recently added significant functionality to this delivery mechanism and the County is now investigating the related level of effort to upgrade its IT infrastructure and web-based interface to take advantage of advancements that increase both "ease of use" and capabilities of its existing system. The overall goal of this GIS system is to allow for the distribution, use, information exchange and web-based collaboration between County departments, municipal governments and the general public. Role based services would be established to control access to site functionality or information using predefined restrictions based on user characteristics.

5.0 GIS Technology Migration to Enterprise Solution

5.1 Departmental Silo vs. Centralized Information Hub

The County currently maintains a variety of data silo's to store information related to a specific department. By definition, "an information silo is a management system incapable of reciprocal operation with other, related management systems". These silos function well within the confines of a specific department, but integration with other databases and the ability to effectively share information is often very difficult to achieve. These silos therefore limit productivity, decrease timely access and frustrate potential "outside" data consumers.

GIS technology offers a mechanism to overcome these obstacles by acting as an information "hub" of existing distributed databases and EDMS systems as well as future EIS. A hub is a common connection point where data consumer can go to gain access to a wealth of information for a specific area of interest. The common element for the majority of County activities is either along a road segment or related to a specific piece of property.



5.2 GIS Portal "Hub"

Spatial data features form the central "hub" of information exchange between County departments and municipal agencies alike. A primary responsibility of the government is to regulate land activities based on local and jurisdictional ordinance and resolution processes, GIS technology is a proven method to help manage these land management activities.

Generally, applications for change of zone and variances for bulk requirements (i.e. sideline, setbacks, impervious surface, building height, etc.) relate to the spatial location of specific assets or features within that defined jurisdiction. This location has proximity to environmentally sensitive areas, political boundaries, schools, utility lines, easements, residential or commercial properties, etc.

Most of these features have characteristics and associated records or documentation defining its condition, possible restriction of use, potential hazards, etc. GIS is a technology that allows the end user to access a wealth of information about a specific location relative to its own characteristics or its surroundings. This is an extremely powerful tool that is fueled by accurate and up-to-date information.

The County has done an admirable job in developing and cataloging a vast inventory of spatial information files throughout its jurisdiction. Many of these digital layers also represent the unique characteristics of its partner municipalities. The County currently provides access via a GIS website to this spatial data and related information to its municipal stakeholders, as well as the general public for consumption, visualization and analysis.

This platform of GIS web-based data dissemination has only begun to tap the potential benefits to municipal government and the public based on the information available through this interface. These spatial features act as a container and vehicle to pass a tremendous amount of information back and forth between data gatherers and consumers.

With the investments in time and effort that the County has undertaken over the past few years (e.g., Clerk's EDMS Program, Engineering Document Imaging, etc.), this GIS portal is a perfect mechanism to expand upon, acting as a central repository for information warehousing and delivery.

Now is the time to tie these spatial features with their EDMS images/databases to firmly establish the foundation of the County's Enterprise Information System (EIS). This technology platform will enable the County to integrate and coordinate several business processes, thereby ensuring that information is created and stored in a standard data structure and then available for data analysis, retrieval, visualization and archive.

Goal: Share spatial data layers and EDMS documentation through a common web-based interface to all stakeholders.

6.0 Managing the Land

6.1 Municipal Property Changes

Changes in ownership or property lot lines occur at the municipal level, in the majority of cases through the Board of Adjustment or Planning Board. These changes are generally documented through deed, site plan or subdivision. All changes must be sent to and "registered" with the County Clerk's office. The County is currently in the process of selecting an Enterprise Document Management System (EDMS) in place to scan, index, retrieve and archive all of these document types.

At the municipal level, the Assessor's are also preparing for the State's new Property Assessment Management System (PAMS), which is currently underway. Without getting into significant detail, PAMS has evolved based on the need to replace the antiquated MOD IV system that was put in place twenty-five (25) years ago by creating a consistent state-wide property assessment program. PAMS is being designed to integrate, streamline, standardize and help to administer the local property tax code at the municipal level by providing a more comprehensive, consistent and user friendly business model application.

A function within the GIS allows the property assessment information to be linked to its corresponding digital parcel, thereby making the information available for additional analysis and spatial rendering.

The County has an application that converts each municipal MOD IV database from its "raw" format into an MS Access database with a unique identifier "uniqueid" established for linking to its parent parcel. This conversion is sometimes hampered by legacy data entry that does not conform to standards either in use today or soon to be required under the PAMS program. The County struggles with the process of modifying these records in order to update their assessment information on a monthly basis.

For more detailed information regarding the PAMS implementation related to parcel maintenance and existing MOD IV record compliance, please visit the following hyperlink.

http://www.state.nj.us/treasury/taxation

One way to resolve the legacy data entry problems is to identify problem records and submit to the individual assessor for correction. Once made, these corrections would then provide the County with a more accurate reflection of current MODIV data while simultaneously helping the municipality prepare its records, in advance, for PAMS conformity.

The benefits of this effort for each individual municipality will also be realized through the use of the web-based GIS application. The GIS data and application functionality provided by the County through future enhancements of their Enterprise GIS will aid each participating community with a variety of daily business processes.

One of the common barriers to entry for municipalities to realize the benefits of GIS technology is the cost for the hardware and software infrastructure. Coupled with this would be the individual cost to support the implementation with IT staff.

In the County of Sussex, the proposed solution to this obstacle is the cooperative and collective establishment of a centralized computer infrastructure owned and maintained by the County to support its own departments, as well as constituent municipal government agencies.

6.2 Spatial Data Maintenance

As previously described, the County now has within its spatial inventory a County-wide parcel data set. Since property ownership changes on a frequent basis and some properties are consolidated or subdivided, the need to keep this parcel inventory up-to-date is extremely important.

These features, parcels and road centerlines are critical elements to the search and retrieval accessibility of EDMS and other digital data sources. Described below are several methods to gather this information in support of ongoing data maintenance.

6.2.1 Clerk Document Filing

In order to keep the County-wide parcel feature class up-to-date, a business process must be initiated to capture land characteristic changes as they occur at the municipal level. The method of registering these changes currently occurs at the County Clerk's office. Municipal agencies submit hardcopy deeds, plat, site plans or subdivision maps that are then officially recorded by the Clerk and filed appropriately.

This filing process has now been modified to scan and archive all documents in the EDMS. Indexing and cataloging these documents has thereby been partially automated and facilitates future lookup and

retrieval. This provides the County with a valuable container of information to help support parcel maintenance.

In order to take full advantage of these advancements in the Clerk's filing process, it would be in the County's best interest to code these documents in such a way as to facilitate an Enterprise search and retrieval query to gather and copy all of these document types into a parcel update folder on the network.

Goal: Provide property lot changes on a frequent basis to support spatial data maintenance efforts.

6.2.2 Digital Data Submission Standards

Each municipality must submit land development documentation to the County as required in the New Jersey Municipal Land Use Law (MLUL). There are several sections within this document that describe the filing process for ordinances, adoption of procedures relative to land use and transmission of record of transfer; assessment and taxation.

These requirements along with the Division of Taxation regulations to keep municipal tax maps up-to-date provide the justification to develop a more effective method for filing and map maintenance. The development and implementation of a digital data submission ordinance at the County and/or municipal level will greatly facilitate this process.

As part of the pilot program, the County should develop a "boiler-plate" ordinance to support its partner municipalities, supplementing the existing land use submission requirements to include a digital version of an approved application for site plan and minor or major subdivisions.

These digital data submission standards would include spatial reference, CADD layering and entity characteristics, acceptable file formats, annotation and delivery media.

Implementing countywide submission standards would result in consistent delivery of digital data at the municipal and County levels. This information could then be used to reduce the costs associated with updating municipal tax maps, as well as the County parcel feature class.

Goal: Consistent process for collecting digital data to reduce the overall cost and effort to perform update municipal tax maps.

6.2.3 MOD IV Records (PAMS conformity)

Although at this time, no one person can predict the exact database design requirements of the State Property Assessment Management System (PAMS) system, there are steps that should be taken to clean up the existing MOD IV database.

The concept of a comprehensive and consistent method to communicate property tax information to the Division of Taxation began some twenty-five (25) years ago. The system implemented was a COBOL-based batch program that stored the information in a flat file format. This represented a major change in how Assessors stored their data, moving from paper to digital storage.

As MOD IV was conceived and deployed many years ago, one could only image how inconsistent record management practices changed as new Assessors were introduced into the process.

The PAMS program has been designed to update this now antiquated system of information exchange to increase functionality, data sharing, integration with other computer systems and the general time and effort related to data accessibility.

A major goal of the PAMS implementation will be “normalization” of data through consistent statewide use of standard naming conventions, handling of additional lots, etc.

In a perfect world, there should be a one-to-one correlation between the parcels and MOD IV records. There are always exceptions to the rule and for this task an example of an exception would be a utility easement. Easements are a portion of a property that are not usually represented on the tax map or in the associated parcel file, but do have taxes levied upon that location. In this case, there is a MOD IV record but no parcel.

The County is performing analysis on a number of GIS produced reports that specifically document these mismatches. This investigation will result in two reports for each municipality.

The first report will document changes required in the MOD IV database, relating to the additional lots field that require specific record updates. This task provides the Assessor with an exact list of property locations that contain out-of-date information pertaining to that database field. This task will not affect the taxation rate, but merely clean the database of old relic information that is no longer relevant.

The second report will note property lot line changes that have been reflected in the MOD IV database, but not visually displayed on the tax map or digital parcel file.

Providing each Assessor with this information will be beneficial as the MOD IV database, when updated, will be more compliant with anticipated PAMS requirements, as well as provide a review and comprehensive list of required tax map changes. As tax map maintenance occurs, these tax map lot changes would then be reflected in the county-wide parcel file, providing a closer correlation to MOD IV.

Goal: Help Assessor's prepare MOD IV database for PAMS conformity.

7.0 Web-based Information Exchange

7.1 Collaboration Client

Another way for the County to collaborate with its municipal partners would be the development of an application, or collaboration client, to track and file digital data received in support of GIS spatial data maintenance. The application would provide a web form to allow each Assessor the ability to document all lot line changes occurring within their jurisdiction.

As a form is completed and submitted it becomes a "work order" that would describe the details related to the lot change(s) and provide associated digital files in support of this update. In a similar manner, information could be uploaded for road realignments, name changes, etc. Digital submission standards previously described would provide a method to deliver these files in a typical format that is standardized and therefore easily integrated into the maintenance process.

Although similar documentation is sent to the Clerk's Office, there is currently no method for a user of the EDMS to search and extract all the required information from the entire digital inventory specifically related to lot line changes. The application should provide functionality for an Assessor to upload scanned documents (i.e. deeds, digital plans and/or filed maps) and link these documents directly to the form which describes the property lot line change(s). Establishing these procedures will aid in the maintenance of the County's spatial inventory allowing the County to complete the updates with internal personnel or externally through the use of a consultant.

Providing the Assessor's with a tool to perform this activity will benefit the County by creating a centralized enterprise data sharing mechanism that will now contain information and digital data to support the GIS data maintenance requirements for parcel features.

The established container of information could also be used by the municipalities to support their own required tax map changes that are often a difficult obligation to maintain. This application may well be augmented to collect information related to open space, historic properties, utility/conversation easements, etc. all of which have fascinating data inventory impediments. All of these data catalogs require constant maintenance and upkeep to provide a comprehensive and consistent list of details related to each independent record.

In the future, additional forms could be tailored to collect information on other types of business processes either to support County; municipal or cooperative land management programs. This initial application would function as a data collaboration vehicle with unlimited scalability.

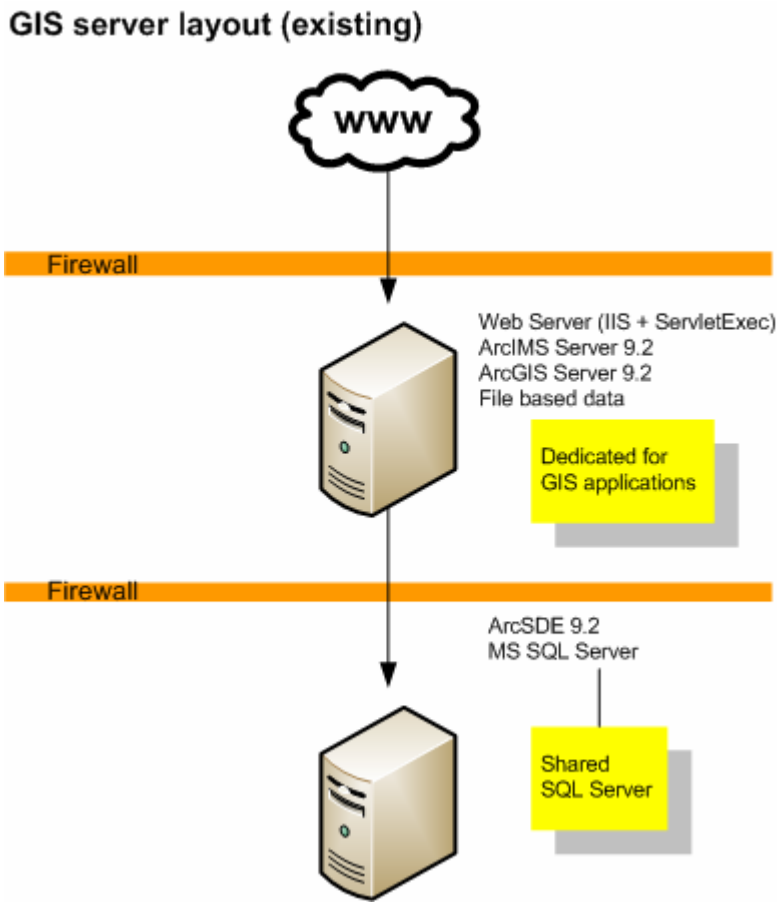
Sussex County is ahead of the curve in implementing an enterprise wide multi-functional information system. The application, if implemented properly, could become a standard model for data-sharing and collaboration for the remaining twenty (20) counties in the State of New Jersey.

8.0 County Network Architecture

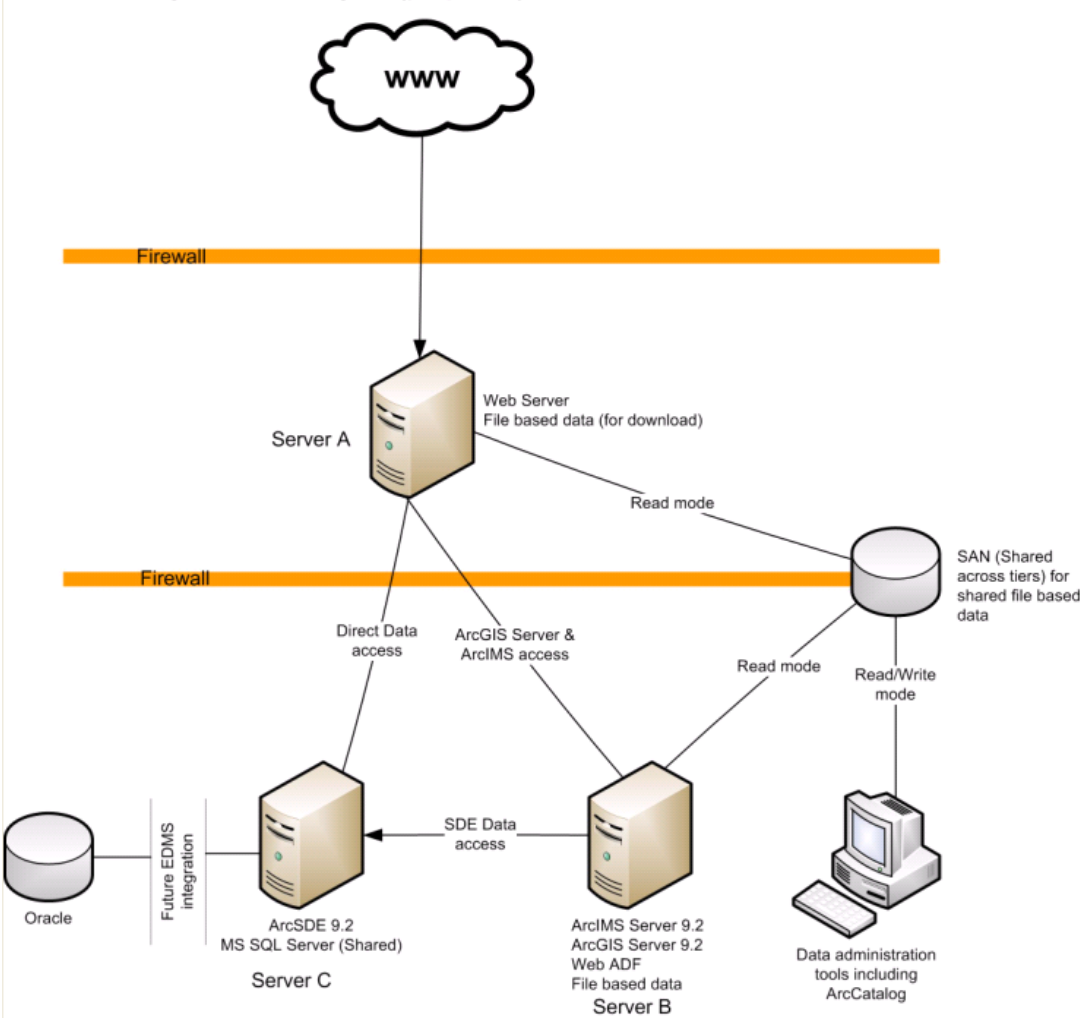
8.1 Existing Configuration

As part of this consulting effort, our organization was asked to perform a quick review of the County's existing GIS network architecture. This analysis was requested in order to provide recommended enhancements to the current configuration that would allow the County to increase system performance in anticipation of a more enterprise-wide data collection and dissemination procedure utilizing GIS technology as previously described.

The following are diagrams documenting the existing system and our proposed recommendations and an associated implementation strategy.


GIS server layout (existing)
WWW
Firewall
Web Server (IIS + ServletExec)
ArcIMS Server 9.2
ArcGIS Server 9.2
File based data
Dedicated for
GIS applications
Firewall
ArcSDE 9.2
MS SQL Server
Shared
SQL Server

8.2 Proposed Hardware Enhancements



Server A *

Preferred option:

4 Socket Dual Core Processors or 2 Socket Quad Core processors
8GB Physical Memory

Alternate Option:

2 Socket Dual Core Processors
8GB Physical Memory

Server B & Server C *

Preferred option:

2 Socket Dual Core Processors (Limited by ESRI license)
16GB Physical Memory

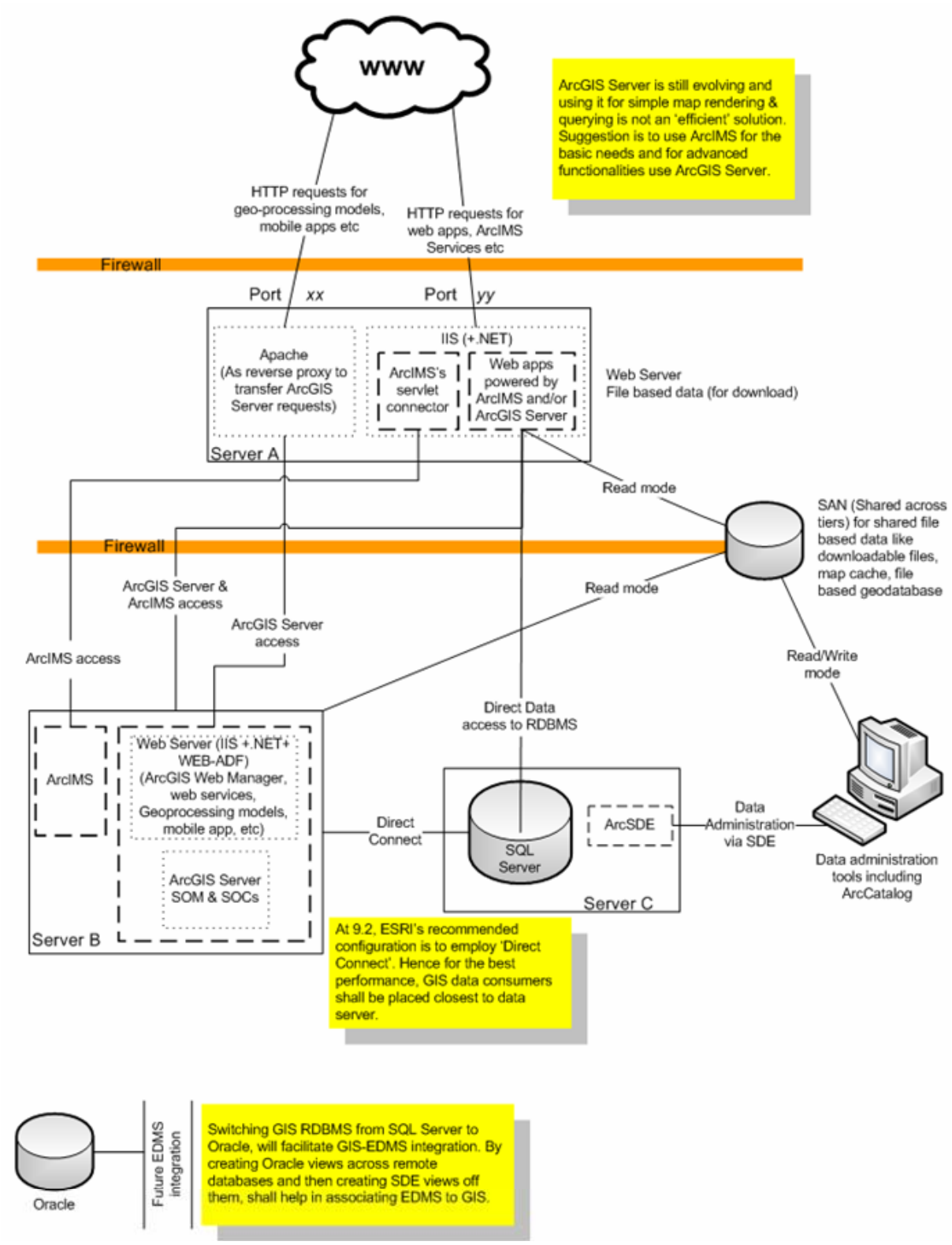
Alternate Option:

2 Socket Dual Core Processors (Limited by ESRI license)
8GB Physical Memory

Processors:

Type: Intel Xeon 5xxx
Cache: 4MB (minimum)
Speed: Faster the better

8.3 Proposed Enterprise GIS Implementation



Storage

Recommend low to medium capacity hard drives for all the servers and shall primarily be used towards OS and program installations. All data preferably shall be parked in SAN, depending on its availability. Invest on bigger HDD only if SAN storage is in shortage.

Critical data (e.g., parcels) may be stored in Tier 1 SAN, while easily replaceable data (e.g., digital orthophotography) may go in a less expensive Tier 2 SAN. Identifying data's significance and allocating storage type shall help reduce costs. Also having file based data in (SAN) folders shared between servers across the network shall make data management a much simpler task and also save on storage cost.

Server type

Depending on the operating environment, Sussex County's IT-Infrastructure team shall determine whether to opt for Blade, Rack or Tower servers.

* Server A - Web Server
  Server B - ArcGIS Server, Web/Mobile ADF, ArcIMS
  Server C - ArcSDE & RDBMS

9.0 Pilot Project

9.1 Testing Network Performance

The County has evaluated its current network architecture and is upgrading the system to increase the performance of the infrastructure to support existing and proposed County initiatives. The proposed pilot project will test the enhanced system resources related to storage, band width, memory allocation and disc space to name a few. Transaction level performance logs and counter logs will be evaluated to determine the amount of latency between client and server machines and help to pinpoint areas for improvement.

These assessments will be performed related to the County's computer resources, as well as measured at the municipal level. Metrics would be determined and used to track trends, evaluate performance and indicate where problems may be occurring due to limited or antiquated resources. Using these indicators, the County will be able to more appropriately evaluate how the system is performing by comparing projected results with real time transaction loads.

All of the testing and evaluations performed as part of this pilot will aid in determining how the system must be scaled to accomplish the goal of implementing a true Enterprise Solution for all stakeholders at the County and municipal level.

This shared IT service, if implemented correctly, will reduce the net costs of required computer resources through greater economies of scale, as well as providing the framework for a consistent and repeatable solution across departments.

Goal: Implement, measure, monitor and document infrastructure performance related to network infrastructure as necessary to create an overall Enterprise information exchange and dissemination solution for all stakeholders.

9.2 Introduction of Enterprise System Approach

As documented in this report, the County has already been successfully providing technology solutions for individual departments within its organization. The backbone computer architecture is in place to "host" and deliver spatial GIS data and tabular information to municipal partners, as well as provide a mechanism to complete a fully executed Enterprise Document Management System (EDMS).

The main focus of this pilot project will be on the methods and strategies to deliver and access these information resources. The means for delivery will be executed through the use of GIS technology, where its foundation is formed by framework spatial data layers (i.e. parcels and road centerlines). At the core of this project, are recommended methodologies to keep these source files current, while simultaneously testing the network architecture and the willingness of all parties to participate in the development of this Enterprise System approach.

An extremely important aspect of this pilot project will be directed toward education. Educating all stakeholders on the flexibly, capabilities and subtle strengths of this technology implementation are paramount to its success. All participating agencies must understand that both individual and the collective group efforts are necessary for positive results.

Creating a comprehensive and consistent set of business processes to test, evaluate and measure approaches to improve communication and data exchange cannot be undervalued. This entire methodology will be viewed as a shared-services type initiative that will provide value to all stakeholders at a variety of different levels.

This pilot will tie together past and existing strategic technology plans by providing an Enterprise vision and associated mechanism(s) to deliver solutions and measure the results.

The pilot would consist of a predetermined number of county departments, as well as one or two partner municipalities (e.g., Sparta, Franklin Boro). These agencies would be targeted to test the County's network architecture, system performance, measuring data transfer speeds, data collaboration loads, new business processes and overall system/application ease of use.

The results of this pilot project would be measured using the following characteristics.

1. Development and acceptance of digital submission standards for tax map changes
2. Ability to transfer digital files and related data entry via collaboration application to support parcel maintenance
3. Update of problematic municipal MOD IV records
4. Network infrastructure upgrades and performance
5. Delivery and dissemination of GIS data through web portal to County departments and pilot municipalities
    a. Countywide departmental distribution of scanned files as per GIS portal
    b. Distribution of scanned images within EDMS to pilot municipalities via GIS portal

10.0 Conclusion

As described within this report, focusing the center of the County's enterprise implementation to use GIS technology will provide benefit at multiple levels. Since the core business function of the government is to manage the land, GIS is a perfect method to pull previously disparate databases, spatial feature and imagery (e.g., EDMS) together in a common user interface. As more data becomes available in the future, this system can be easily modified to increase the variety of information accessed through this user-friendly application.

As far as the physical maintenance of municipal tax maps and digital parcels is concerned, agencies throughout the State of New Jersey continue to struggle to overcome this obstacle. The details provided in this report describe a well constructed and simple methodology to document and gather the required deeds and subdivision plans to keep these records up to date; therefore providing benefit to each participating municipality once the State fully implements the PAMS program.