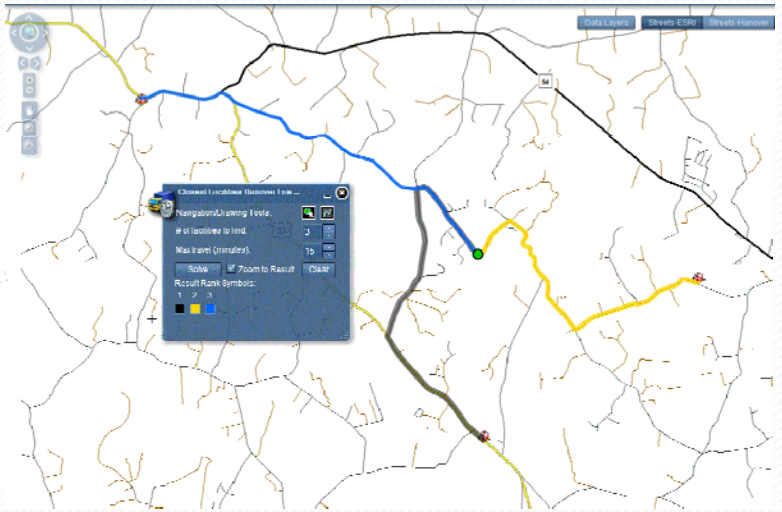
HANOVER COUNTY PUBLIC SAFETY GEOGRAPHIC INFORMATION SYSTEM WEB APPLICATION

June 2011

HANOVER COUNTY 911 COMMUNICATIONS



PUBLIC SAFETY GEOGRAPHIC INFORMATION SYSTEM WEB APPLICATION

Category: Criminal Justice & Public Safety

Project Summary

The Hanover County Geographic Information System (GIS) program was initiated in 1995 and has grown into a mature and effective operation. The County recognized the importance of having GIS technology available in the Emergency Operation Center (EOC). With the budget challenges that the county has experienced over the past couple of years the County Administration defined the challenge as how to integrate GIS technology and functionality into EOC operations in an effective and seamless manner at no cost.

This challenge required staff to develop an innovative approach to implementing the project, including integrating local authoritative data sources with State and private data sources and web services. Collaboration between GIS staff and stakeholders in the design of the solution was important to the success of the project and led to a design that is not limited to just EOC operations, but a solution that creates a common operating picture for public safety GIS. The application developed is based on Environmental System Research Institute's (ESRI) ArcGIS software, which is an industry standard GIS platform, so applications developed can be replicated by other localities on the same platform.

Developing the web application as a browser-based solution, using standard easy to use technology tools, and leveraging external web services saved the County money in development, implementation, and training. Using in-house staff to develop the application has given existing staff the knowledge and expertise to support the application. The Public Safety GIS Web Application is now an integral component of the EOC and provides a standard operating picture for all public safety personnel not just during emergency events, but at all times.

Introduction

Hanover County is located in east-central Virginia at the heart of Virginia's Golden Crescent. The County, which is part of the Richmond metropolitan area, is characterized by excellent schools, low unemployment, a diverse economy, a commitment to public safety, and a healthy financial base, which have made it one of the most desirable places to live and work in Virginia.

The County's GIS, which became operational in 1995, provides support services to all County Departments and Agencies. The GIS program has been implemented based on ESRI ArcGIS Server and Desktop software platform. ArcGIS is an industry standard GIS software, so applications developed can be replicated by other entities on the same platform. The County has developed over 300 data layers in support of GIS initiatives. Each of these data layers has various attributes associated with them such as address, street name, contour elevation, and flood elevation. Specific GIS attributes are the source data for other County Business Information Systems, so these attributes are entered and maintained in a single place. The County has also acquired several digital orthophotography (aerial photography) data sets.

The County has expanded its access to GIS data for staff and the public using web-based technology. A series of intranet (internal) web pages have been developed to provide general access to GIS data linked to County business data for all County staff. The County has a GIS internet (external) web site that makes similar data available to citizens and businesses conducting business in the County.

Problem

After Hurricane Isabel in 2003 and Hurricane Gaston in 2004 the County took a more concerted effort toward defining its EOC operations. GIS technology was not a part of EOC at that time. Over time the GIS Office was added as a required group in the EOC, but the focus was still on hard copy mapping.

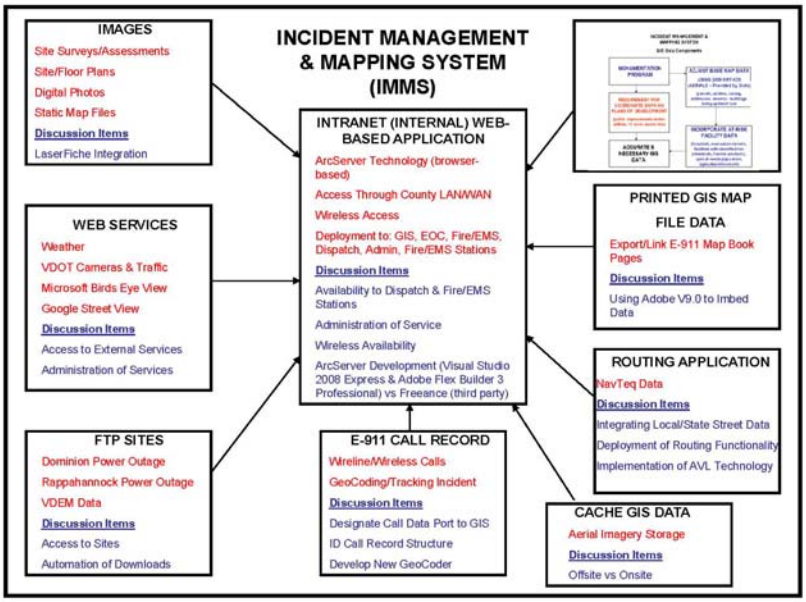
The problem culminated during a North Anna Power Plant drill in the summer of 2008. GIS produced numerous maps depicting various conditions, which were placed on the wall of the EOC. When the EOC was activated large projector screens were lowered to display local news and weather. The screens covered up the maps.

A study was initiated to develop a requirements analysis with the intent of determining how to integrate GIS into the EOC. Stakeholder meetings with Public Safety, Health Agencies, Information Technology, and County Administration were held to define the parameters for implementing the project. The resultant recommendations included the purchase of new hardware and software and consulting services to develop an ArcView-based software application and train users. The total cost for the project was estimated at $40,000, which was to be included in the FY2009/2010 budget. The timing could not have been worse as the economic downturn forced the County to eliminate funding for new projects.

In the summer of 2009 **County Administration defined the challenge as how to integrate GIS technology and functionality into EOC operations in an effective and seamless manner at no cost.**

Solution

After reviewing the requirements for the project it was determined that the best approach would be to develop a browser based intranet (internal) GIS web application. This solution would leverage existing infrastructure and would require no additional hardware, software, or maintenance costs. Using a browser-based application rather than a software application would also reduce training requirements. A determination was made that the application could be developed in-house with existing staff, so no outside consulting services would be needed. A design team was put in place, which would oversee the application development process and a *project architecture design* diagram was developed to guide the project.



Project Architecture Diagram

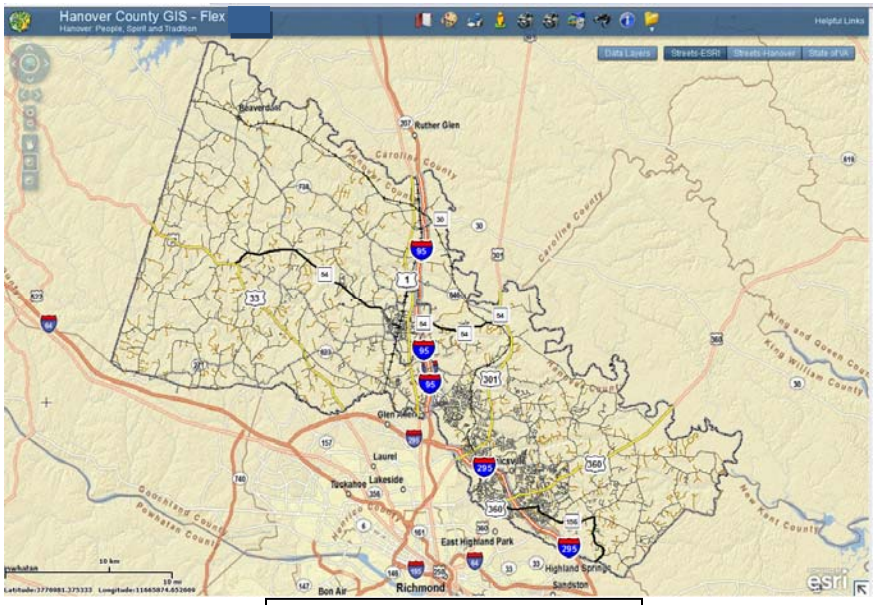
The design team reconsidered the original approach and determined that the application should be standardized in a manner where it would be beneficial to all public safety responders not just in the EOC. Because the EOC is activated infrequently, the design team decided to expand the usability of the application developed to create a common operating picture for public safety personnel accessing GIS technology at all times not just during an emergency event.

During this time the State Department of Emergency Management (VDEM) released the VIPER application, which is designed to provide a high level assessment of emergency management events. The County saw this as a good model to follow and technology to leverage, but that application was developed for State agencies. The County needed to expand on this technology and provide a detailed locally-oriented picture that would allow public safety personnel access to locally managed GIS data.

A service-based technology design was determined to be the best solution. Since this was and is state of the art technology, staff had to learn the new technology while developing the application. After a soft launch of the web-based application in February 2010 some modifications were made and the final **Public Safety GIS Web Application was released in conjunction with the North Anna Power Plant drills in June 2010.**

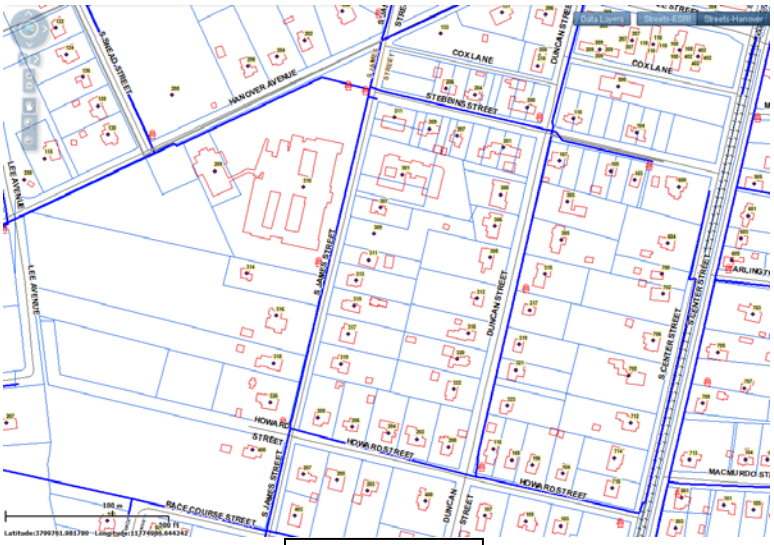
Success

The *public safety GIS web application* developed was based on ESRI's standard application programming interface. The design of the application was based on utilizing a combination of local, state, and private data resources. The application uses a number of cloud based Google-like external web services. The County has established a computer network for staff to access applications internally in a secure and stable environment, so this application was developed as an intranet (internal) site. The application has four main components: GIS data layers; external web services; data queries; and links to scanned documents.



Public Safety GIS Web Application

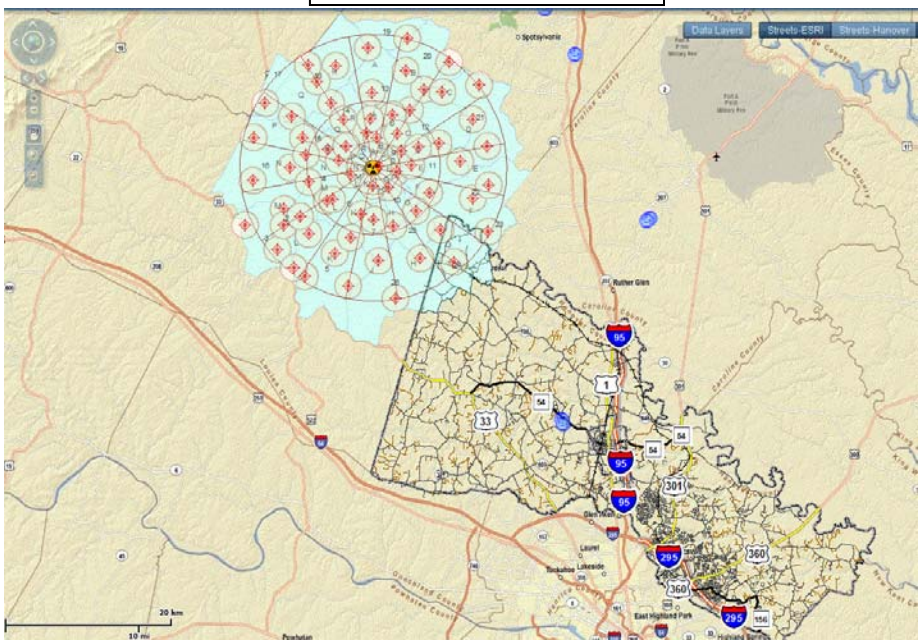
The *GIS data layers* included in the application were defined through stakeholder meetings based on what these users determined would be the most necessary data to include. GIS data layers are available to users in the application via a drop down menu. The main component of the application is to provide access to address, street, building, water line & hydrant, topography, and tax parcel



GIS Data Layers

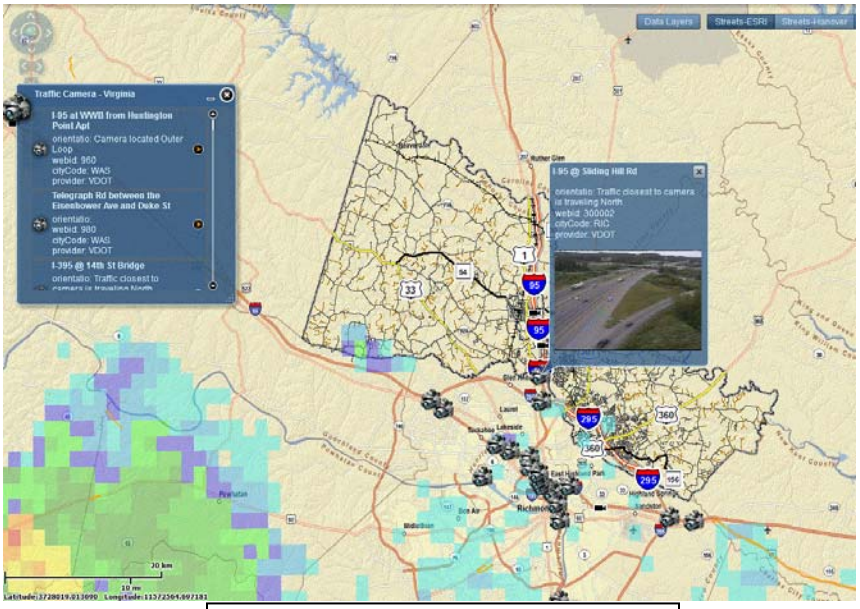
data layers. These data layers are supplemented by other local public safety related data layers, including emergency response districts, flood plains, traffic lights, towers, Sheriff beats, and critical sites.

North Anna Power Station Data



Digital aerial photography flown in 2009 by the Virginia Geographic Information Network (VGIN) and data related to the *North Anna Power Station* has been incorporated from Dominion Virginia Power through VDEM.

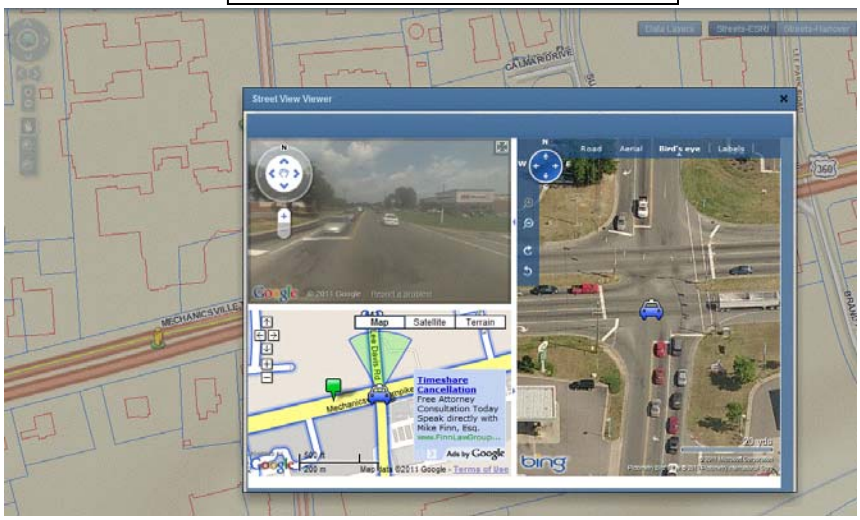
The application leverages a number of free external web services. The design team evaluated a number of sources for each of the web services to ensure that the best available product was being used. The GIS Office continues to evaluate the web services using the same process on an ongoing basis. Although the County uses its own data for Hanover, in an effort to improve the quality of data provided in the application and to leverage existing resources, a base map web service published by a private company ESRI that provides streets for the region, state, and world is used. The County has also coordinated with VGIN to acquire a routable street centerline file from NavTeq, which allows point to point routing to be provided as a function of the application.



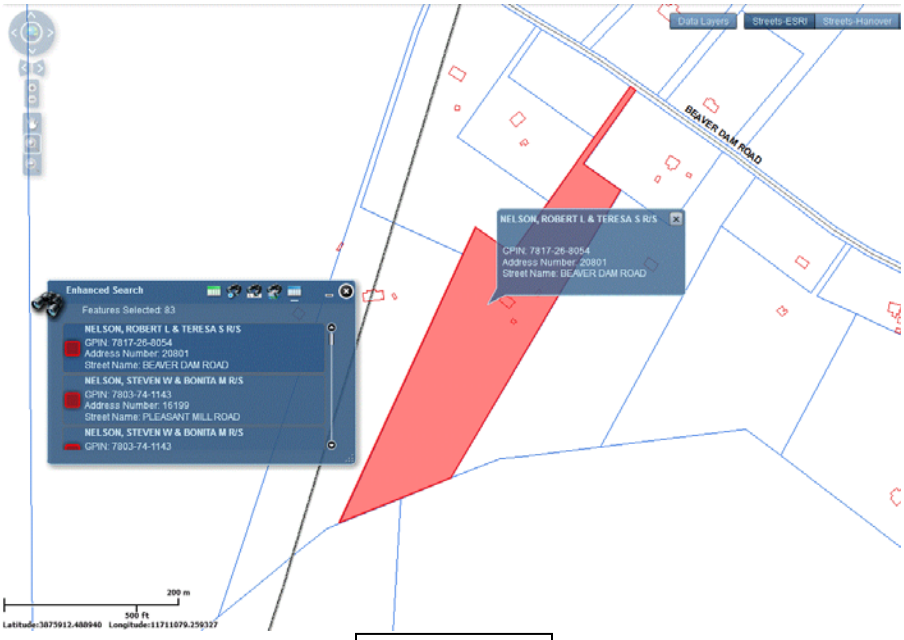
Weather & Traffic Camera Internet Services

The *weather data service* is published by the National Weather Service. The Virginia Department of Transportation (VDOT) coordinated the installation of traffic cameras along Virginia Interstates and has established a service to report traffic incidents. Real-time traffic reports and *traffic camera feeds* are published by a private company Traffic Land. The application also incorporates *Google Street View and Bing Birds Eye View* technology using web services these companies publish.

Google Street View & Bing Birds Eye View

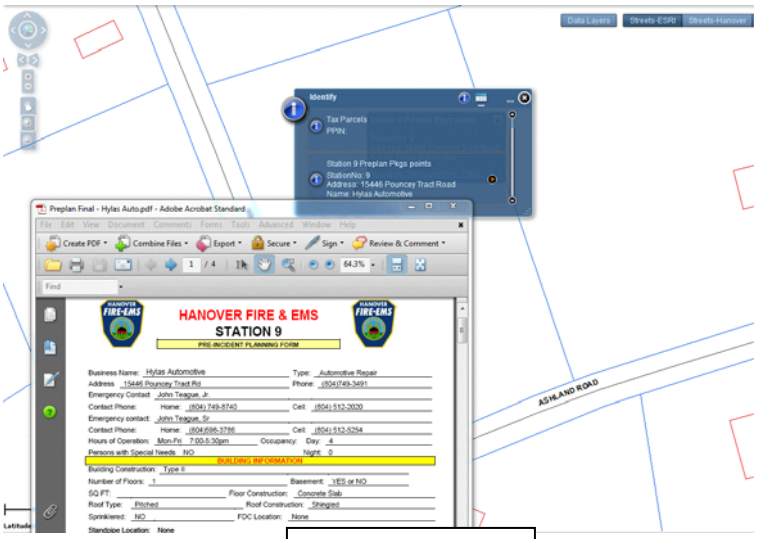


Through the stakeholder meetings *data queries* were identified by emergency responders. A number of data queries are available in the application by entering text in a drop down box or by selecting a feature on the map. These include, but are not limited to owner name, parcel id, address, and street. The County has also linked a variety of *scanned documents* to pertinent features. Working with the Rockville Fire Company planning documents related to response activities for specific critical businesses were linked to physical facility locations. These documents contain critical information about the particular site. The information helps emergency



GIS Data Query

service personnel when they respond to an incident at the facility. These documents were stored in various filing cabinets, but were not readily accessible to emergency responders. Using this application makes the documents available to all responders.



Scanned Documents

The Public Safety GIS Web Application is now an integral component of the EOC and provides a standard operating picture for all public safety personnel not just during emergency events, but at all times. The County's success with the public safety GIS web application has led to plans for development of similar applications in Community Development and Animal Control. Developing the application as a browser-based solution, using standard easy to use technology tools, and leveraging external web services saved the County money in development, implementation, and training. Although using in-house staff to develop the application strained daily operations it has given existing staff the knowledge and expertise to support the application more easily.