1.0 Abstract of the Program

The Montgomery County, Maryland Department of Technology Services - Geographic Information Systems (DTS-GIS) team, with technical assistance from Towson University GIS Services and ESRI Inc., has successfully served up GIS data to support the needs of emergency managers within the county and the State of Maryland emergency management member agencies. Unlike many regional efforts to provide GIS data, which for the most part are still in the planning or pilot stages, this Web based GIS data service created by the county has been successfully implemented. The experience the county has gained during this effort is expected to serve as a model for the Geospatial Interoperability Initiative being undertaken by the GIS Committee of the Metropolitan Washington Council of Governments (MW-COG).

2.0 The Problem/Need for the Program

Following the lead of the federal government, the Montgomery County Council approved the County Executive's proposed legislation authorizing the creation of the Montgomery County Homeland Security Department (MCHSD), effective July, 2005. MCHSD assumes a major coordination role for the emergency response and management functions for the county. One of these responsibilities is overall management of the county's Emergency Operations Center (EOC). MCHSD licensed Ramsafe as its emergency management application, and has requested DTS-GIS to provide relevant GIS data layers for Ramsafe.

On the state government side, Maryland Emergency Management Agency (MEMA) coordinates emergency management functions across the State of Maryland. MEMA has been promoting WebEOC as the preferred emergency management application for the state and its counties. Like Ramsafe, WebEOC also requires access to a rich set of relevant GIS data layers. To that end, MEMA contracted with Towson University Geographic Information Services (tuGIS) to develop a web-based GIS data service for the state's emergency management community. The community basically consists of MEMA and the EOC's (Emergency Operations Centers) of Maryland's 23 counties and Baltimore City. The project is known as the Maryland Emergency Geographic Information Network (MEGIN).

With the strong urging of the federal Department of Homeland Security (DHS), the CIO Council of MW-COG (MetroCIO) tasked the GIS Committee to embark on the Geospatial Interoperability Initiative. The goal of the Initiative is to develop a federated network of GIS web sites among the 19 National Capital Region member jurisdictions for serving up a selected set of GIS data layers for access by any agencies' first responders and emergency management personnel.

To satisfy the GIS data needs of the three initiatives (county, state and regional), the county's MCHSD Director, Mr. Gordon Aoyagi, and Chief Information Officer (CIO), Ms. Alisoun Moore, jointly approved the County's development of a dedicated GIS web site for satisfying these needs. The DTS-GIS team was tasked to lead this effort, supported by GIS staff from both the Montgomery County Police Department (MCPD) and the Montgomery

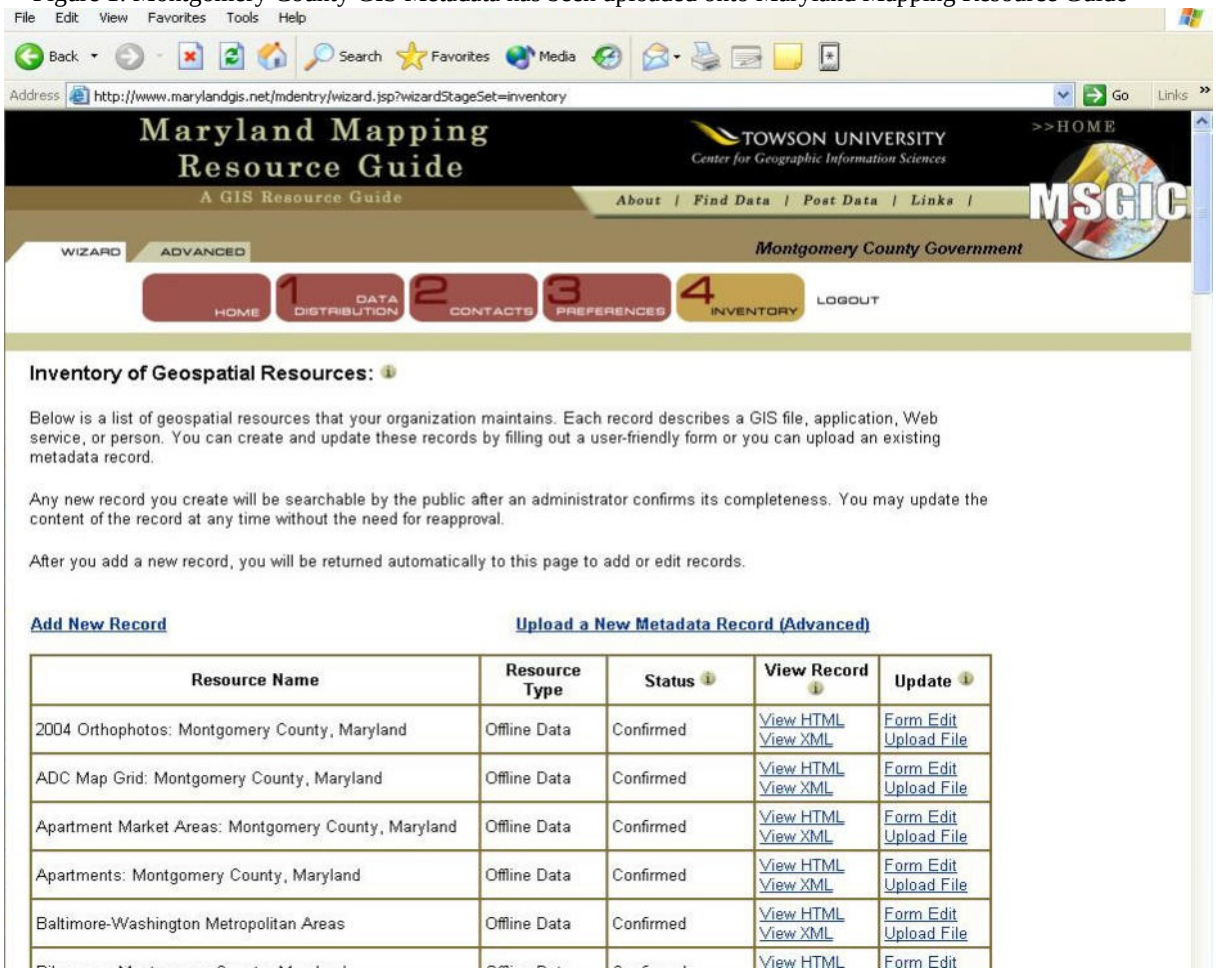
County Fire& Rescue Service (MCFRS). The County viewed the MEMA MEGIN pilot project as a natural entry point for the effort.

3.0 Description of the Program

The MEMA MEGIN pilot project enlisted the participation of a large urban county (Montgomery), a medium suburban county (Frederick) and a small rural county (Garrett).

To make the Montgomery County GIS data understandable for other Web users, on-line metadata (data about data) had to be established. To this end, the County, with the help of tuGIS's project partner ESRI Inc., generated the metadata for the 100 data layers and bulk uploaded the data to the Maryland GIS Network Web site (http://www.marylandgis.net/) (Figure 1 – Maryland Mapping Resource Guide). In addition to the attributes necessary to describe the data layers, an access policy for the emergency management community was also defined.

Figure 1: Montgomery County GIS Metadata has been uploaded onto Maryland Mapping Resource Guide



Setting up the server

Due to the short turnaround time required, DTS-GIS team did not have the time and money to acquire a brand new Web server for serving up the GIS data. Instead, the team obtained a spare machine (a Dell PowerEdge 2650) from within the County. The Windows 2000 Server and the Microsoft Internet Explorer service were updated with the proper patch levels. In addition, the latest (Version 9.1) ArcIMS (Arc Internet Map Server) software from ESRI Inc. was installed and configured on the server.

Patterned after the DTS-GIS on-line intranet Map Viewer, the joint DTS/ESRI Inc. project team implemented a simplified map viewer (http://megin.montgomerycountymd.gov/website/megin/). The main purpose of the viewer is to verify that the 100+ Montgomery County GIS data layers are indeed available from this MEGIN member site (Figure 2 – Map Viewer.).

Figure 2: Map Viewer

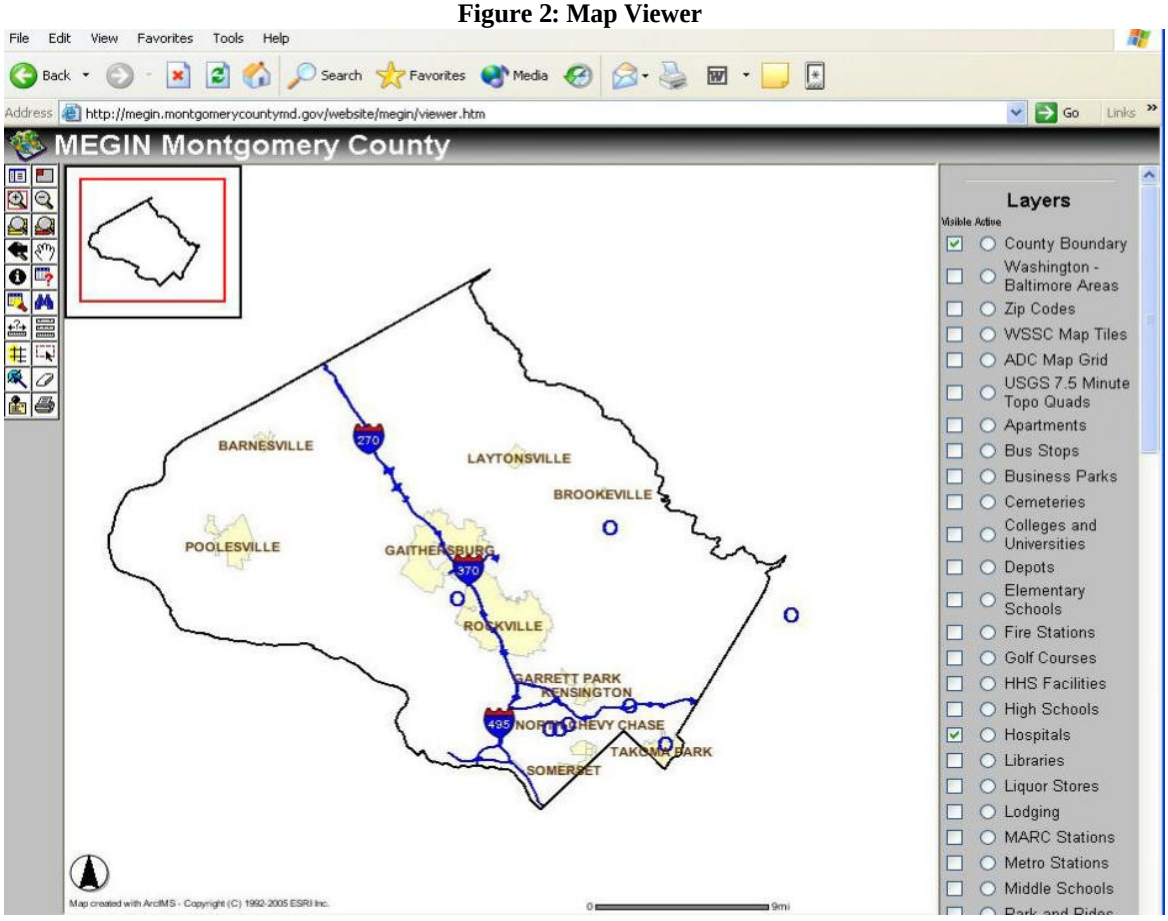


Figure 2. A sample map viewer pulls 4 GIS data layers (county boundary, municipalities, interstate highways, and hospitals) from the MEGIN map server's 100+ layers. Metadata for these layers are available at the www.marylandgis.net web site.

With the knowledge (stored at the Maryland GIS metadata server) of the GIS data layers, the end user application can enable or disable data layers as the situation dictates (Figure 3 –

Data Layer Administration). The three-county pilot project was presented to MEMA on December 8, 2005. Comments were received and enhancements to the application are being implemented. This will pave a sound foundation for the eventual state wide implementation.

Figure 3: Data Layer Administration

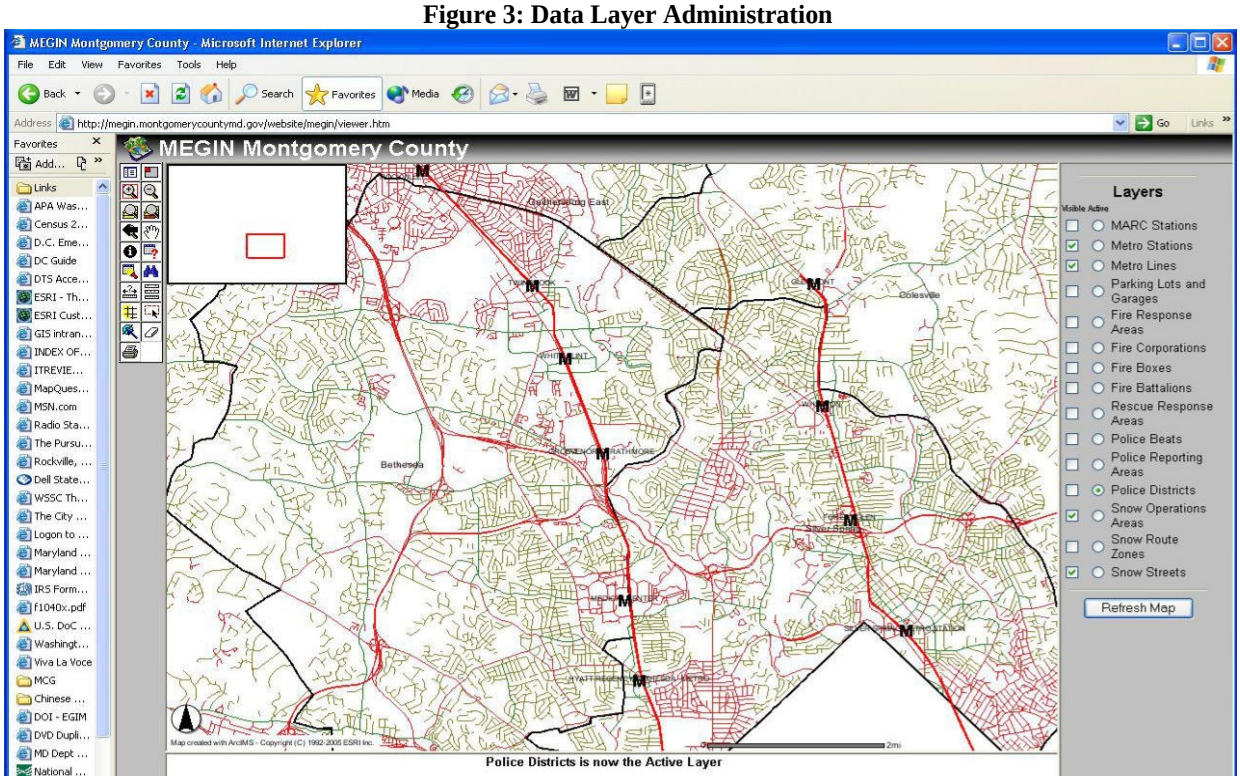


Figure 3. Once the District of Columbia serves up its Minimum Essential Data Set, the void in the lower right corner will be filled with D.C. data. Level of detail for the map display is totally under the control of users.

MW-COG Geospatial Interoperability Initiative

To meet the mandate of the MetroCIO committee, the GIS managers & coordinators of the National Capital Region (Figure 4 - Montgomery County and Neighboring Jurisdictions) met at the Montgomery County EOC on March 28, 2005. During this meeting, the Towson GIS Services team presented the MEGIN and Emergency Management Mapping Application (EMMA). Collectively, the group decided that the existing MW-COG GIS Committee is a suitable organizational structure for tackling the mandate of the MetroCIO committee. The subsequent organizing meetings resulted in the formulation of an executive committee comprising the GIS managers from Fairfax County, Montgomery County and the District of Columbia. Additionally, data and technical sub-committees have been organized to address the two major areas of effort involved in serving up GIS data for the region's first responders. MW-COG (specifically its core GIS staff) is to serve as secretariat.

Figure 4: Montgomery County and Neighboring Jurisdictions

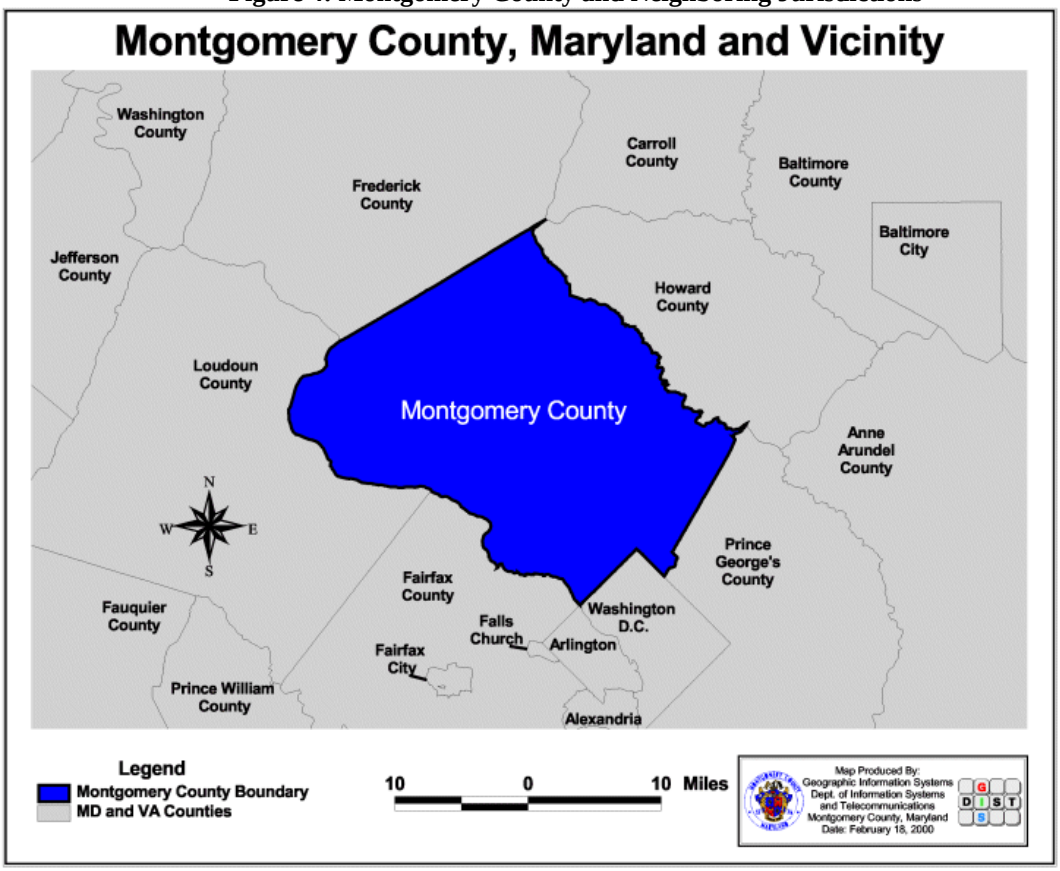


Figure 4. Montgomery County and its neighboring jurisdictions. MW-COG encompasses 19 jurisdictions (counties, cities, or towns) in the National Capital Region.

The data sub-committee has identified the Minimum Essential Geospatila Data Set (Figure 5 - MEGDS). It has also requested that each member jurisdiction inventory its own GIS data based on the requirement of MEGDS. MW-COG drew up a memorandum of agreement (MOA) that will facilitate the sharing of GIS data among the member jurisdictions. Once the MOA is in place, MW-COG will request signatory jurisdictions to submit the data to MW-COG for massaging and cutting DVD's for each member jurisdiction's near term use. Phase II of the initiative will entail the identification of a suitable platform (such as MEGIN, or Virginia's VR3) for sharing the data through each other's web site. Longer term plan calls for 'riding' on the Data Exchange Hub (DEH) being developed by the MetroCIO's other task force. Montgomery County's effort on MEMA MEGIN can also readily serve the need of MW-COG GIS Committee's initiative.

Figure 5: MEGDS

	A	B	C	D	E
1	*Montgomery County Maryland*	*Apollo Teng*			
2	**Layer Name**	**Type**	**Feature Type**	**Does geospatial data exist? If yes, please list last update and update frequency.**	**Does attribute data exis If yes, please list last update and update frequency.**
3	**Data to be provided by member jurisdictions**				
4	Street Centerlines	Transportation	Line	10/2005, weekly	10/2005, weekly
5	Fire Stations	Public Safety	Point	10/2005, as needed	10/2005, as needed
6	Police Stations	Public Safety	Point	10/2005, as needed	10/2005, as needed
7	Hospitals - with Emergency Facility	Public Safety	Points/Polygon	10/2005, as needed	10/2005, as needed
8	Schools - Public and Charter	Cultural	Points/Polygon	7/2005, as needed	7/2005, as needed
9	Jurisdiction Boundary	Boundary	Polygon	7/2003, as needed	7/2003, as needed
10	Airports/Helipads	Transportation	Points/Polygon	10/2005, as needed	10/2005, as needed
11	Ortho Photo Imagery	Imagery	Raster	3/2004, bi-annually	N/A
12	Hydrography	Environmental	Line/Polygon	7/2003, every 3 - 4 years	no individual names
13	Intelligent Place Names	Cultural	Point	7/2004, as needed	7/2004, as needed
14	**Data to be provided by MW-COG**				
15	Rail - Lines and Stations	Transportation	Point/Line	7/2003, as needed	7/2003, as needed
16	Metro Rail - Lines and Stations - Regional	Transportation	Point/Line	7/2003, as needed	7/2003, as needed
17	Night time Population by Census Block - Regional	Census	Polygon	not available	not available
18	Cooperative Forecast Employment by TAZ - Regional	Planning	Polygon	not available	not available
19					

Figure 5. 10 of the 14 data layers identified by the MW-COG GIS Committee as Minimum Essential Geospatial Data Set (MEGDS) are to be provided by MW-COG member jurisdictions. The remaining 4 are readily available from MW-COG.

4.0 Use of Technology

The dedicated MEGIN server runs the Microsoft Windows server operating system. The web service is under Microsoft Internet Information Server (IIS). The Internet map service is under the control of ESRI ArcIMS 9.1. ESRI Arc Extensible Markup Language (AXL) is used to configure the map service. Metadata specifications follow the Federal Geographic Data Committee (FGDC) standards. The metadata coding facility is part of ESRI Inc.'s ArcCatalog software. ArcIMS accesses GIS data stored in ArcSDE (ESRI) and Oracle. Encryption technology will be identified and implemented to add security to the web site.

5.0 The Cost of the Program

Except for the costs associated with the dedicated Dell PowerEdge server machine (priced at about $5,000) that was made available by the county's server support team, existing GIS hardware and software components were used for this program. The ArcIMS software currently running on the MEGIN server is an evaluation copy. Eventually, the County expects to invest $8,000 for the initial license and $2,000 for annual maintenance for this license. DTS-GIS staff time spent on setting up and configuring the MEGIN map server is estimated at 100 hours for a cost of about $6,000. The consultants' time (Towson GIS Services and ESRI Inc.) was paid for by MEMA through its own contract.

These investments will enable the county to satisfy the needs of the early phases of the MW-COG Geospatial Interoperability Initiative. In the long run, the national capital region (NCR) may have its dedicated Data Exchange Hub (DEH).

6.0 The Results/Success of the Program

The Montgomery County MEGIN GIS data server has been successfully set up by the DTS-GIS team with the assistance from the MEMA project consultants. The 100+ GIS data layers being served up by the server meet the needs of the county's EOC. It also fulfills the needs of the MEMA pilot program. It should also be able to meet the data needs of a fully implemented Maryland emergency geographic information network.

For the GIS data needs of the first responders and emergency managers in the National Capital Region, the MEGIN server provides much more than the 10 data layers currently identified. Figure 6, shown below, (Figure 6 - Earlier Version of the Regional GIS Database) supported the mapping needs of the various law enforcement agencies during the October 2002 sniper shootings. This experience laid a good foundation for the current MW-COG Geospatial Interoperability Initiative.

Figure 6 - Earlier Version of the Regional GIS

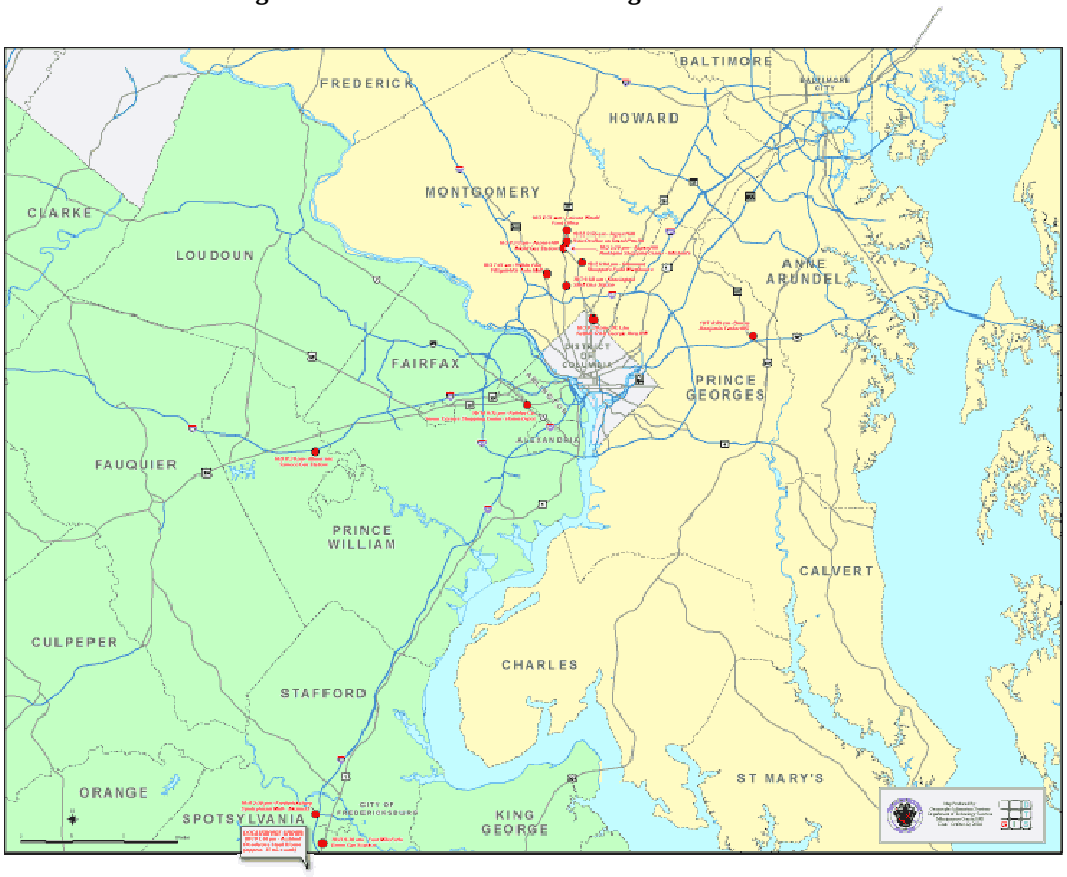


Figure 6. An earlier version of the regional GIS database supported the mapping needs of the various law enforcement agencies during the October 2002 sniper shootings.

7.0 Worthiness of an Award

Montgomery County's experience of serving up GIS data for its own EOC and the State of Maryland emergency management community represents one of the first such endeavors, thus far, in the nation. Many jurisdictions have attempted similar efforts with varying rates of success. The successful three-county pilot implementation will provide a workable path for the other 23 counties within the State of Maryland as well as the City of Baltimore. The same experience should also provide the NCR Geospatial Interoperability project with a good example.

The program required the cooperation of one of County's important GIS data using departments —the Montgomery County Homeland Security Department. Leveraging the huge investment on GIS data creation and maintenance for the needs of emergency management and homeland security is indeed an innovative and necessary step for local governments. The Web based GIS data sharing and technical processing approaches employed in this project serve as a model for other counties or urban centers contemplating similar innovations.