GEOGRAPHIC INFORMATION SYSTEMS

Integrating GIS with the Citizens' Volunteer Monitoring Program

On-line application provides access to water quality data and mapping tools

As part of an overall program to protect the county's water resources, staff from both Westchester County Departments of Information Technology and Planning have designed and created an interactive GIS mapping application as part of the Citizens' Volunteer Monitoring Program (CVMP) *(http://cvmp.westchestergov.com/cvmp)* At the website, citizens can sign up to become a local volunteer stream or lake monitor, learn water quality collection procedures, upload water sample data to an "on-line" database, query and explore water quality data, and display water monitoring site data using web mapping GIS tools.

The web-based GIS mapping component of the CVMP provides users with basic mapping tools such as turning data layers on & off, address matching, zoom/pan functions, identify, and printing capabilities. Using the application tools, citizens can easily locate water monitoring sites and simultaneously view corresponding water quality data. Physical, chemical and biological characteristics of the water monitoring sites are dynamically mapped; the available GIS chemical layers include dissolved oxygen, pH nitrate and phosphate levels. Where available, New York State Department of Environmental Conservation (NYSDEC) stream classification and affiliation are also provided.

The CVMP application is built with Java and ESRI's ArcIMS 4.0.1 technology and also includes two Oracle databases. One Oracle database is used to upload and query water quality data using Java programming, Oracle 9iAS and Oracle 8.1.7 on Windows platform, while the other Oracle database is used for GIS data layers using Oracle 9i2 database and ArcSDE 8.3 on UNIX Solaris 8. These two remote Oracle databases are dynamically linked. As designed, the application allows users to upload sample data to the water quality database. They can immediately view the water monitoring sites within the context of the new sample data, with the uploaded data using the GIS on-line mapping application. The GIS on-line mapping application is running on Windows 2000 using Microsoft's Internet Information Services (IIS 5), ArcIMS 4.0.1 with New Atlanta's ServletExec 4.1.1.

The Westchester County Citizens' Volunteer Monitoring Program is part of the county's comprehensive water quality protection program, training volunteers how to collect data that is needed to assess water quality in streams throughout the county. For more information on the CVMP, contact Karis Tenneson (Dept. of Planning) at (914) 995-4407 or Xiaobo Cui (GIS) at (914) 995-3371. More information on the county's comprehensive water quality program is available at *http://www.westchestergov.com/waterquality*.

Physical, chemical and biological characteristics of water monitoring sites are dynamically symbolized and mapped as GIS layers in the county's new on-line mapping application. As illustrated above, the nitrate level of the Annsville Creek monitoring site (red dot) is below 10 mg/l.

GIS Intern Partnership

Westchester County GIS is pleased to announce a unique partnership with the Environmental Science program in the Division of Natural Sciences at Purchase College. In the 2004 spring semester, county GIS staff will be working with Dr. Yuri Gorokhovich in identifying internships (paid and unpaid) in both government and business for Purchase College students who have at least two semesters of GIS coursework. All students are "majoring" in Environmental Sciences and have backgrounds in ecology, geology and environmental sciences.

Agencies and organizations interested in the intern program are encouraged to contact Dr. Gorokhovich at (914) 251-6738 or Sam Wear at Westchester County GIS at (914) 995-3047. Information on the Environmental Science curriculum at Purchase College is available at *http://www.ns.purchase.edu/geo/courses.html*.

ArcGIS Certification

Westchester GIS staff members Xiaobo Cui and Ana Hiraldo have recently completed the ESRI Authorized Teaching Program (ATP) and are now certified trainers in *Introduction to ArcGIS I*. Westchester County anticipates offering the 2-day course in the 1st quarter of 2004 at the county's data training center in downtown White Plains. Class participants learn how to use ArcMap, ArcCatalog, and ArcToolbox as well as receiving instruction on specific GIS concepts such as how to query a database, manipulate tabular data, edit spatial and attribute data, and present data clearly and efficiently using maps and charts. In addition, Westchester County GIS will also continue to offer the *Introduction to ArcView 3.x*. For a more detailed course descriptions, visit *http://www.esri.com/training/index.html*. Information on any of these courses and other training schedules will be posted on the county's GIS web site in January 2004. For more information, contact either Xiaobo Cui at (914) 995-3781 or Ana Hiraldo at (914) 995-4416.

NYS GIS Conference

This year's 19th Annual New York State GIS Conference was held at the Holiday Inn Turf in Albany from October 2-3. Westchester County GIS staff contributed a total of six map posters with titles including: *Westchester County Citizens' Volunteer Monitoring Program, GIS Development Services for the Town of Cortlandt, GIS Development at Westchester County Airport, GIS Applications for Emergency Response in Westchester County, GIS Development in Human and Social Services,* and *Customized Buffer Tool Using Avenue*. All of the Westchester County 2003 NYS GIS posters can be viewed at *http://giswww/wcgis/nysgis/nysgis03.htm*. Sam Wear, GIS Manager, lead a pre-conference workshop titled : *Creating the NYS GIS/LIS Association*. This presentation (PDF format) is also available for viewing.

DEF Manhole Inventory

County GIS staff have recently assisted Westchester County Department of Environmental Facilities (DEF) in developing a scope of work and vendor selection focusing on the development of an application which will automate the department's manhole inspection program. The proposed application will integrate desktop GIS software (ArcGIS), GPS, and tablet PC components. Field work is scheduled to begin in Spring 2004. For more information, contact Mike Facelle (DEF) at (914) 813-5449 or Deb Parker (GIS) at (914) 995-3888.

GIS and GPS Used to Map Rare Wood Turtles
County GIS staff work with naturalists at Ward Pound Ridge Reservation

For two years, county naturalists at Ward Pound Ridge Reservation have been monitoring and tracking the population of rare and endangered wood turtles that inhabit the park. The turtles have been fitted with radio transmitters, so that they can be located by naturalists using a special antenna and receiver. The reservation's resident turtles are active for about nine months each year, from late February until late November. As winter approaches, they enter a state called brumation, shutting down even their respiratory functions to reserve energy. The turtles spend the winter months safely hidden underwater, tucked among tree roots on the banks of streams.

During the warmer months of the active season, observers note time and weather conditions, habitat, and details of feeding, mating and nesting behaviors, while also capturing the turtles' geographical location with a hand-held GPS unit. Over a period of time, these observations will establish the turtles' habits and the limits and extent of their territory. This past summer, GIS staff worked with Park Superintendent Beth Herr to implement the park's GIS by configuring a desktop computer with data (park environmental and basemap datasets including orthophotography) and software (ArcView). GIS staff also began converting the GPS-acquired coordinates so that turtle locations could be displayed for the first time in context of the half-foot-resolution, true color orthophotos (illustrated below).

"There is always something new to learn about wood turtle habits and habitats and that with the use of radio transmitters, GPS, and GIS staff support, we are now able to see the locations of turtles in difficult locations such as under the ice in a swollen river," said Ms. Herr. "Recent data shows that the wood turtles need to be able to adapt to the ever changing conditions of their river. Even in the middle of winter, they are able to move upstream, and therefore, do not go into complete torpor (inactivitiy)," continued Ms. Herr. Articles highlighting her work have recently appeared in both *The Journal News* and The *New York Times*.

While a very large factor in the threat to these creatures is loss of habitat, wood turtles also reach reproductive maturity even more slowly than most humans. Thus even though the reservation's ten females and two males are all over 50 years old, they are still young enough to produce new generations if their nesting sites can be protected from the park's predatory populations of skunks, coyotes, and perhaps their most persistent threat, raccoons.

With good planning, diligence and perseverance, the information compiled in the ongoing tracking effort with GIS and GPS tools will help park staff protect next season's crop of eggs, and ensure the continued presence of this threatened species at Ward Pound Reservation. For more information on the project contact Park Superintendent, Beth Herr at (914) 864-7318 or Deb Parker at (914) 995-3888.
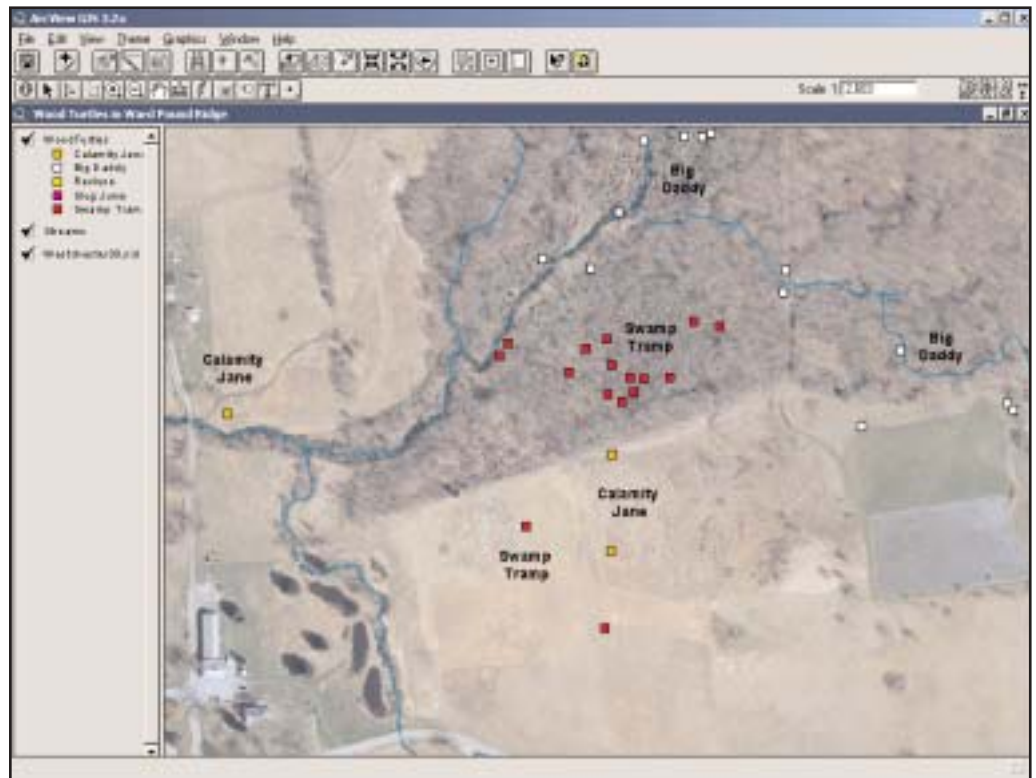
Ward Pound Ridge Reservation's resident wood turtles, tracked with radio transmitters and located using GPS, confirm the species' reputed preference for wooded areas near clear streams. As for mobility, note the two sightings in late September of the wood turtle named Swamp Tramp (in the open field at lower center) which are nearly 285 linear feet apart.

GIS Expands EOC Support
## *Both desktop and Web applications utilized*

Several GIS applications were utilized during the most recent Indian Point drill held in the county Emergency Operations Center (EOC) on October 29. County commissioners and other upper management staff, most of whom have had limited "hands-on" GIS training, were able to utilize browser-based applications which have been designed and developed by county GIS staff. The Critical Facility Locator allows users to quickly identify significant facilities such as schools, congregate care centers, nursing homes, day care centers, public facilities, or hospitals within a selected radius of Indian Point (1, 2, 5, or 10-miles). Based on certain drill scenarios, these critical facilities may need to be evacuated by emergency services personnel. Once specific facilities are selected, the application lists contact information, address and phone numbers and other pertinent information. Information can then be printed out in both tabular and map format.

The Emergency Services GIS Data Viewer offers users the ability to view many emergency related data layers such as reception centers, Indian Point siren locations and traffic control points, fire district boundaries, evacuation routes, police stations, and many other county-wide emergency response datasets. This application also includes access to digital orthophotos, which provides registration and reference for most vector layers. Both browser applications are built on ESRI's ArcIMS 4.0.1 technology and access an Oracle database. The Oracle database is used for GIS data layers using Oracle 9i2 database and ArcSDE 8.3 on UNIX Solaris 8.

In addition to the web programs, GIS staff also deployed a desktop emergency services application with ArcView 3.2 (currently being migrated to ArcView 8.X), which contains more advanced spatial analysis capabilities. The application includes the ability to identify specific Emergency Response Planning Areas (ERPAs), which are affected by plume overlay scenarios. In the aftermath of the regional electrical blackout on August 14, this application has been designed to be totally self-contained and is not dependent on network connections for any data transfer or spatial data processing. The application includes the capability to show near real-time radiological readings being reported by field teams from fixed sites surrounding Indian Point. Field monitoring teams are dispatched to designated locations to record radiological reading information. Once the reading is reported to the EOC it can be entered into a SQL Server database linked to the GIS and rendered as acceptable or unacceptable on the map.

Future emergency response GIS applications will focus on ESRI's ArcObjects technology which will support broader deployment. For more information on the EOC GIS applications or the public access Indian Point Evacuation Plan at *http://giswww.westchestergov.com/wcgis/indianpoint/default.htm*, contact Ariane Porter at (914) 995-3371.
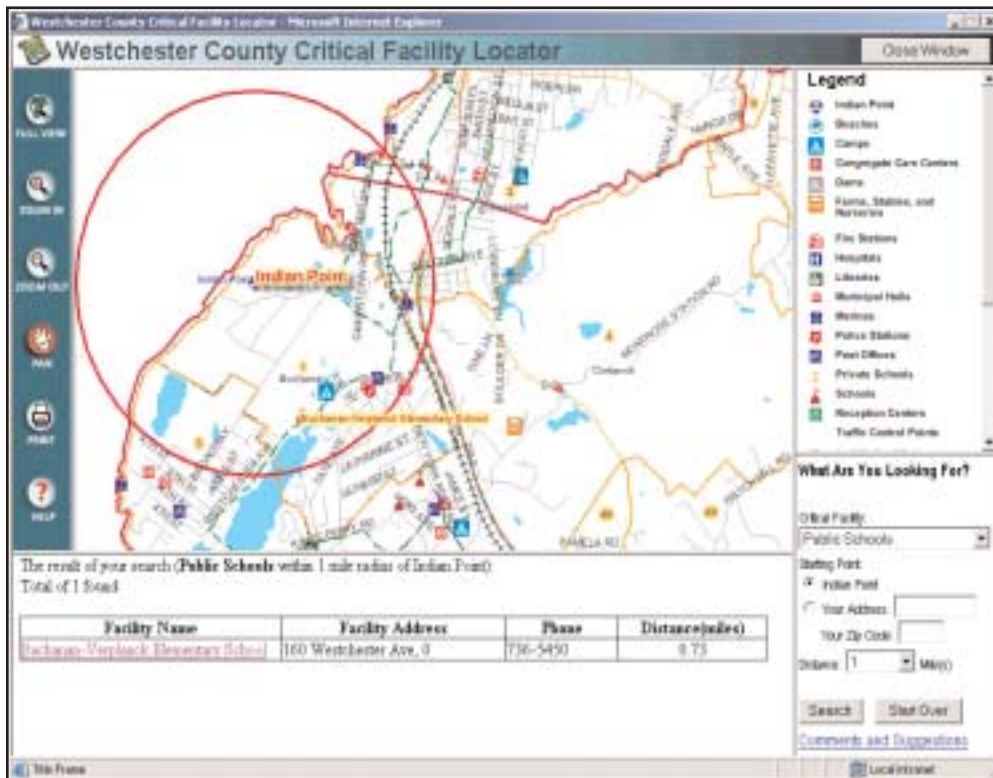
This screen image from the Critical Facility Locator shows the results of a query of all public schools within one mile of Indian Point. This application also allows the user to locate facilities within a certain distance of a street address and zip code. It returns the facility name, address, phone number and distance in miles from your starting point.

GIS Day 2003

Westchester County Department of Information Technology (DoIT) celebrated its 2nd annual GIS Day November 20, 2003. The day started with a Westchester County GIS User Group meeting at the White Plains Library in downtown White Plains. Representatives from local governments and local fire districts gave presentations on how they are implementing GIS technology. Following the meeting the group headed to 148 Martine Avenue (County Building) where they joined others at the Map Gallery. Posters from Westchester County, local governments, academia, and the private sector were displayed. For more information contact Ana Hiraldo at (914) 995-4416.

Local Government News

Westchester County GIS staff continues to provide on-going GIS support to the villages of *Hastings-on-Hudson*, *Briarcliff Manor*, *Irvington* and *Town of Cortlandt*. GIS staff is currently working with the *Village of Port Chester* on a GIS User Needs Assessment (UNA) study. GIS staff are scheduled to begin another UNA with the *Village of Larchmont* in early 2004. GIS staff also recently met with the *Town of Mamaroneck* to discuss conducting a joint UNA with *Village of Mamaroneck*. The *City of Mt. Vernon*, the villages of *Sleepy Hallow*, *Mt. Kisco*, *Irvington*, and *Hastings-on-Hudson* have joined the list of local governments with IMA data sharing agreement with Westchester County. Others in progress include the *City of Peekskill*, *Town/Village of Harrison*, and *Village of Pleasantville*. For more information on local government GIS activity and IMA data sharing agreements contact Ana Hiraldo at (914) 995-4416.

GIS System Design Study

GIS staff and the Department of Information Technology (DoIT) are currently working with ESRI on a major update and redesign of the county's GIS architecture. This fall systems integration staff from ESRI's corporate headquarters in Redlands, California met with various DoIT program managers to review current hardware and software configurations, conducted performance testing on web servers, and made initial recommendations to enhance network performance. A draft *System Architecture Design Strategic Plan* has been submitted to the county, which is currently under review by DoIT. Initial recommendations include hardware upgrades and reconfiguration, software performance tuning and application development, as well as the effective combination and integration of each ESRI and system component. For more information on the ESRI study, contact Tong Zhou at (914) 995-3012.
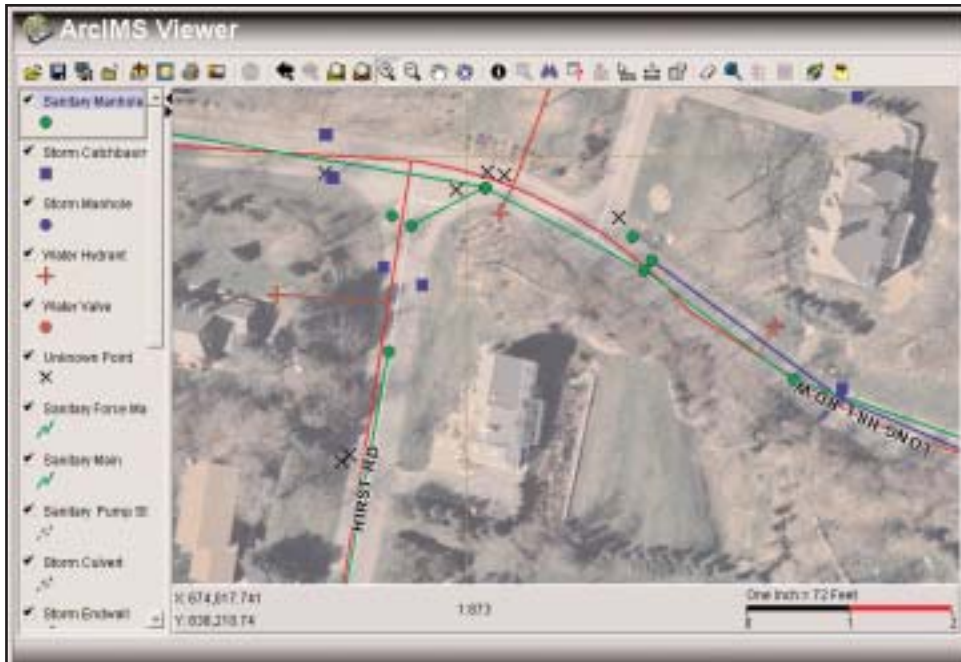
Infrastructure Mapping Project Underway in Briarcliff Manor

Over the past twelve months, Westchester County GIS assisted the Village of Briarcliff Manor in the implementation of a significant data development project, to map and inventory the village's water, storm water and sanitary sewer infrastructure systems. The project was designed toward compliance with the Government Accounting Standards Board Statement 34 (GASB34) regulations. County GIS staff prepared the project RFP, assisted in proposal reviews and contractor selection (James Sewall Co.), and helped identify a second contractor to conduct an independent review of deliverables. Data collection began in November, and deliveries of final products will continue through June 2004. Features are being mapped to accuracies within one foot, using photogrammetrical techniques, augmented by survey-grade GPS and traditional surveying methods. Data will be organized in accordance with the County's Basemap tiling scheme, and posted to a web site for village staff to review for completeness. The data will be integrated into a desktop system comprised of ArcGIS and Cartegraph asset management software, linked through a custom application to the village's MUNIS financial reporting system. village staff will also be trained in GIS functions such as: visualization, records access and editing, map printing, and report generation.

An immediate benefit was the conversion to digital format of hundreds of scattered, valuable and perishable original-source documents. In addition to a first-ever complete inventory of village-owned infrastructure system assets, expected benefits include improvements in: access to information, record-keeping, maintenance procedures, financial planning and resource allocation.

Briarcliff Manor Infrastructure Mapping Project management is assisted by communication via a password-secured ArcIMS website hosted by the contractor. Data is posted as it is developed, for review by village personnel, who can annotate directly on the 'page' any comments or concerns.

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Happy Holidays from Westchester County GIS

Articles and graphics in this newsletter prepared by: Xiaobo Cui, Ana Hiraldo, Cindy Louie, Deborah Parker, Ariane Porter, Sam Wear, Viola Wilson, and Tong Zhou.

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