

Energy Currents

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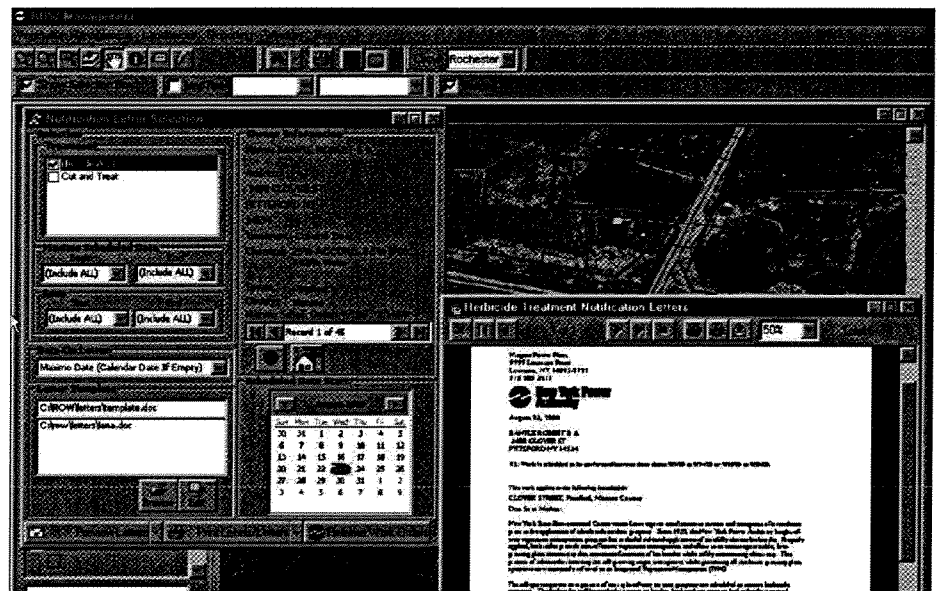
Vegetation Management Solution for High-Voltage Transmission Lines

New York Power Authority

On August 14, 2003, one of the worst blackout events in history descended upon the midwestern and northeastern United States and Ontario, Canada. More than 50 million people were affected, and many lost power for up to two days or experienced rolling blackouts for up to a week before preblackout conditions were restored. Consequently, the United States and Canadian governments created a binational task force to investigate the causes of the blackout and to recommend system changes that would reduce the possibility of future outages. The task force determined that the loss of key transmission lines in Ohio due to contacts with trees was one of the primary causes of the blackout. A variety of other problems enlarged the crisis. The events triggered by the encroachment of trees within the wire security zones highlight the importance of vegetation management along electric transmission lines.

The New York Power Authority (NYPA) vegetation management program maintains approximately 16,000 acres of right-of-way (ROW). The program's principal goal is to provide safe and reliable transmission of electric power in an economical and environmentally compatible manner. Therefore, the authority has designed an Integrated Vegetation Management (IVM) computer application (called the ROW Application) that uses GIS technology.

NYPA is the United States' largest state-owned power organization and one of the largest producers of electricity in New York state. The power is generated at 17 generating facilities and is distributed by approximately



GIS provides access to geographic data so IVM treatment techniques can be examined taking into account conditions such as wetlands, landowner's issues and agreements, site access, regulatory commitments, and security.

1,400 circuit miles of high-voltage transmission lines. John Wingfield, GIS/Survey manager, explains that the enterprisewide GIS ROW Application "is linked to the land management, equipment maintenance, and environmental and engineering data, which is necessary to efficiently and effectively manage the authority's facilities and to comply with all relevant regulations."

This technology has provided a focused and coordinated approach to fulfilling the goal of Integrated Vegetation Management, which has become a utility industry standard throughout the United States.

In an effort to enhance and modernize the implementation of its vegetation management program, NYPA partnered with the URS Corporation of Buffalo, New York, to develop

and integrate new technologies that would improve its ROW management program. The previous ROW management process had relied on an existing postconstruction plan—profile drawings as basemaps for delineating vegetation inventory data. NYPA's maintenance crews used these drawings to identify the location of treatment sites. Although this system worked, it had its drawbacks.

A major concern was that the drawings used for the inventory process did not reflect current conditions along a ROW. Additionally, there was no effective way to faithfully delineate the actual vegetation configuration within a ROW. This resulted in inaccurate estimates of brush acres or vegetation that actually needed maintenance. Employees manually recorded information

about maintenance activities on paper.

The labor intensity of juggling these disparate data sources and the problems and costs associated with their deficiencies led NYPA to seek a better way to achieve its ROW management goals.

In 1999, NYPA aggressively promoted the use of geographic information system technology throughout the company in the areas of right-of-way vegetative and real estate management. Because NYPA has been using GIS technology to support special projects since 1990, it had a realistic idea of the best method for achieving its goals.

The ROW Application development team includes NYPA's consultant, URS Corporation; surveyors; real estate managers; foresters; biologists; transmission maintenance managers; and GIS professionals from the authority. Wingfield believes that inclusive management leads to successful planning. "An effective program is not just a software application, it is using a bottom-up management style that

gains an understanding of what people really need so you can fully leverage the system and the database. We had a series of meetings with virtually every member of the proposed user community and asked them to tell us what was needed. They were not bashful. In some cases, this caused us to change direction and get more out of the solution."

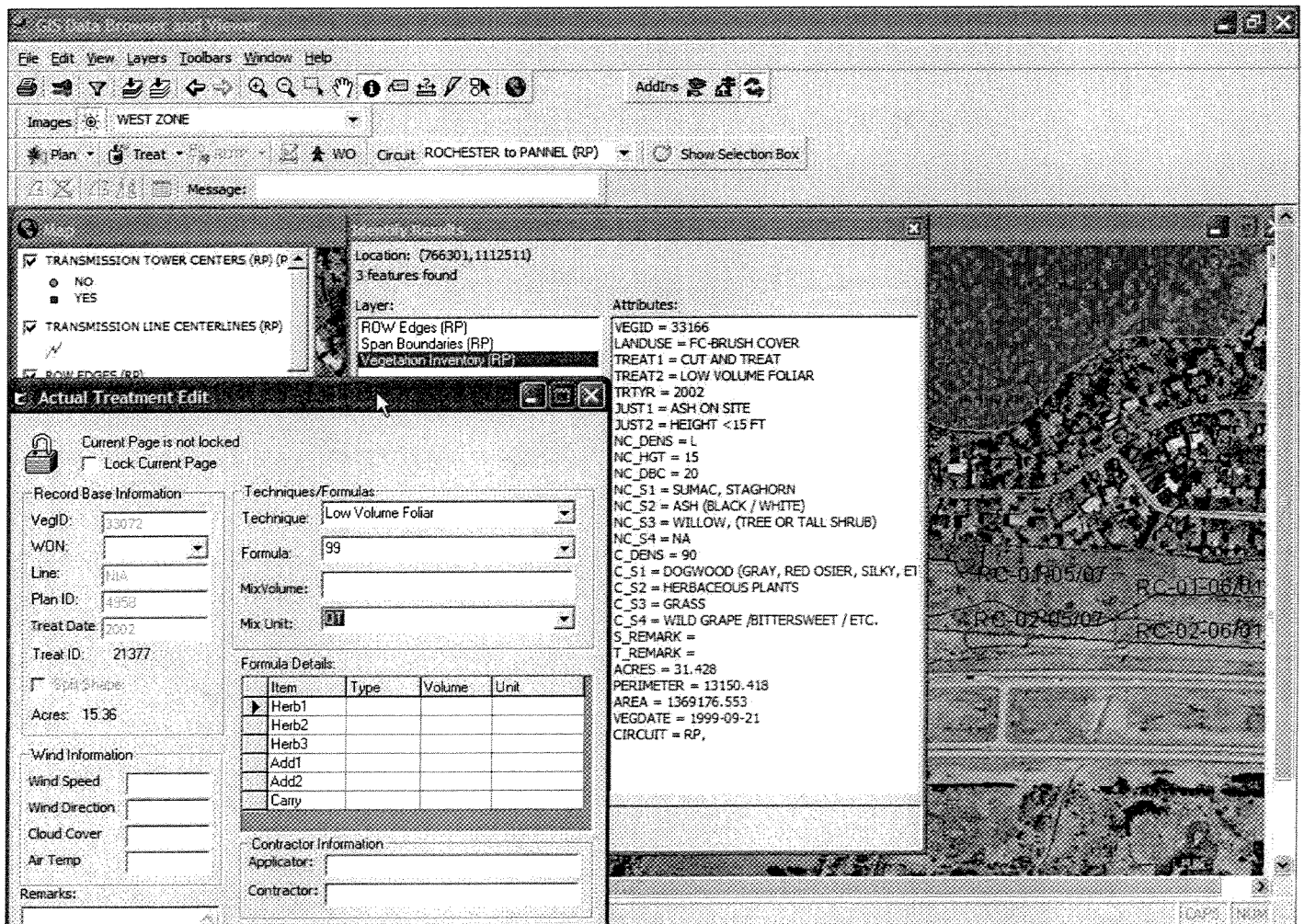
The team created an application that effectively organized a comprehensive data set so end users could easily use the data to support their work. Implementation of the program began by carefully determining all data elements that were necessary to support IVM. Development of the NYPA enterprise GIS ROW Application included two major steps—data collection and user applications.

The first step consisted of compiling existing electronic data. Some of the data was obtained from government sources and included streams, roads, regulated wetlands, and tax maps. The team created some data sets by digitizing data from paper records including real property parcel

maps and transmission line plan—profiles. NYPA acquired high-quality digital orthophotos to serve as basemaps. Other data sets were created by recording the company's corporate memory through interviewing people who have worked for NYPA for years. This data included items such as access road locations and relationships with landowners. To create a consistent data set, all the coverages were normalized and adjusted to match visible features on the digital orthophotographic basemaps.

After NYPA converted existing records, it began collecting field data. A field portable GIS and mapping program facilitated field data collection. Using digital orthophotos as background maps, the field crews traced vegetation sites directly on the computer screen to produce polygons with true spatial coordinates. These vegetation polygons were attributed with information from pulldown menus.

The GIS database contained dozens of accurate, current data sets. URS developed a GIS IVM application based on ESRI's software.



GIS installed on rugged handheld field portable pen computers supports vegetation management in the field.

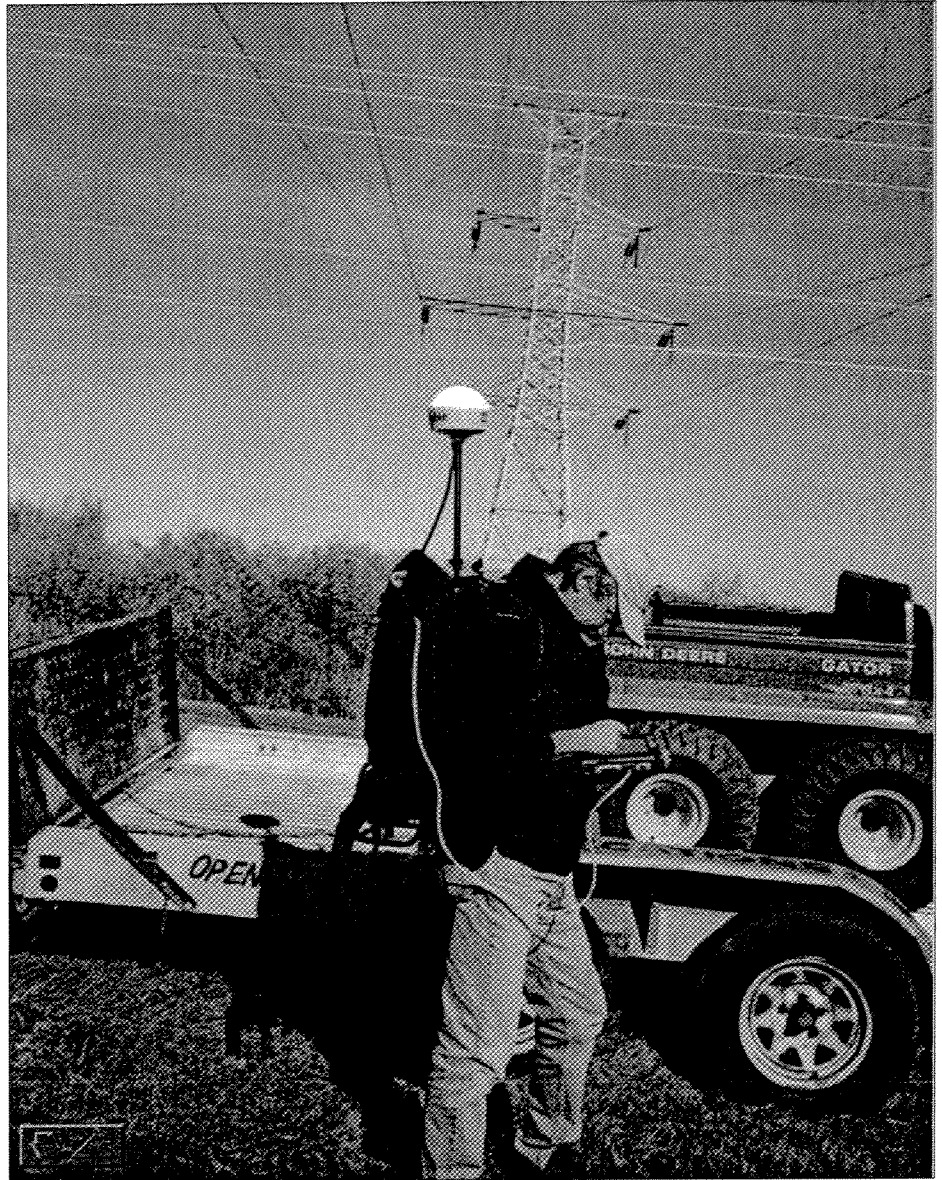
It provides easy access to data and a simple interface to perform relatively complex tasks such as creation of treatment plans that ensure compliance with all regulatory mandates and landowner agreements. NYPA maintains all vector and tabular data at its central data center, which gives all parties access to the most current information. Image data (digital orthophotos and document scans) is maintained on local servers at each NYPA site. This combination of centralized and distributed data storage provides the best possible response times across NYPA's widely separated wide area network. Central data access also ensures data security control.

The ROW Application helps ROW managers evaluate current vegetation conditions. It provides access to geographic data sets so vegetation management treatment techniques can be examined in a way that includes factors such as wetlands, landowner's issues and agreements, site access, regulatory commitments, security, and dangerous tree trimming sites. The application also has a function that serves the treatment plan review process and another function that creates work orders through MAXIMO.

The IVM program incorporates a balance of cultural, physical, biological, and chemical tactics to control the targeted tall growing tree species. It also works to enhance the abundance of all lower growing desirable vegetation. A regular inventory and documentation of maintenance activities allow for analysis, evaluation, and continuous improvement in the overall ROW management program.

The IVM work flow from scheduling treatments to evaluating effectiveness is a smooth process. Field inventories are conducted annually for the ROW scheduled for treatment the following year. NYPA's system forestry staff reviews the inventories and treatment recommendations, accepting or modifying the recommendations as it deems necessary.

Once the actual fieldwork begins, the treatment plan and related data are downloaded to field computers for use by NYPA inspectors. These inspectors track the actual treatment in the field and then upload the data to the central server for future use. This data supports contract change orders, regulatory reporting, information for seeking bids, and other reporting needs. After the next field inventory of the same ROW



GIS helps a real estate professional with notifying landowners of the herbicide application.

is completed, NYPA uses the as-treated data to analyze how well the previous treatment cycle worked.

Says Wingfield, "On the first line where we had a repeated cycle, we saw a 60 percent noncompatible vegetation reduction. Presumably, on the next cycle we will see another significant reduction. Eventually, because of our IVM program, we will be using only a tiny fraction of the herbicides and manual effort we had used in the first cycle. We have already saved a significant amount of money in the first cycle; ultimately, we will have saved money and had an ecologically positive result."

In the aftermath of the 2003 blackout, the Federal Energy Regulatory Commission and other regulatory bodies requested information

for follow-up investigations. NYPA's delivery of comprehensive information was impressive. Federal organizations, such as the Environmental Protection Agency, requested demonstrations of NYPA's management solutions. Wingfield reports that the officials rated the IVM solution as the most successful they had seen.

To learn more about New York Power Authority's GIS ROW Application, contact John Wingfield at John.Wingfield@nypa.gov.



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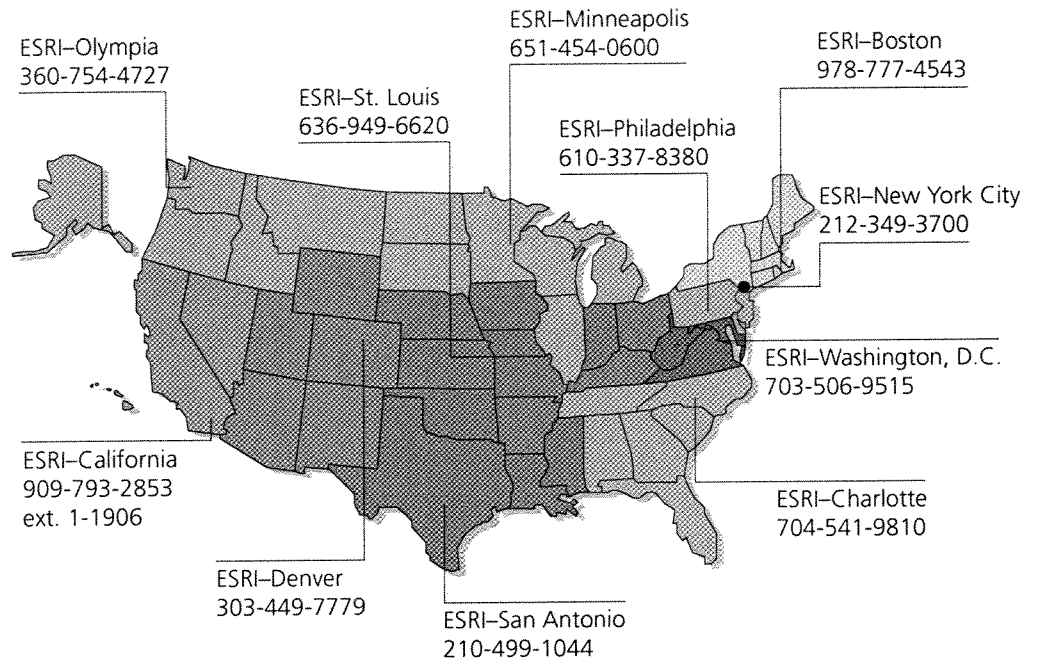
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