Energy Currents

Esri • Winter 2010/2011

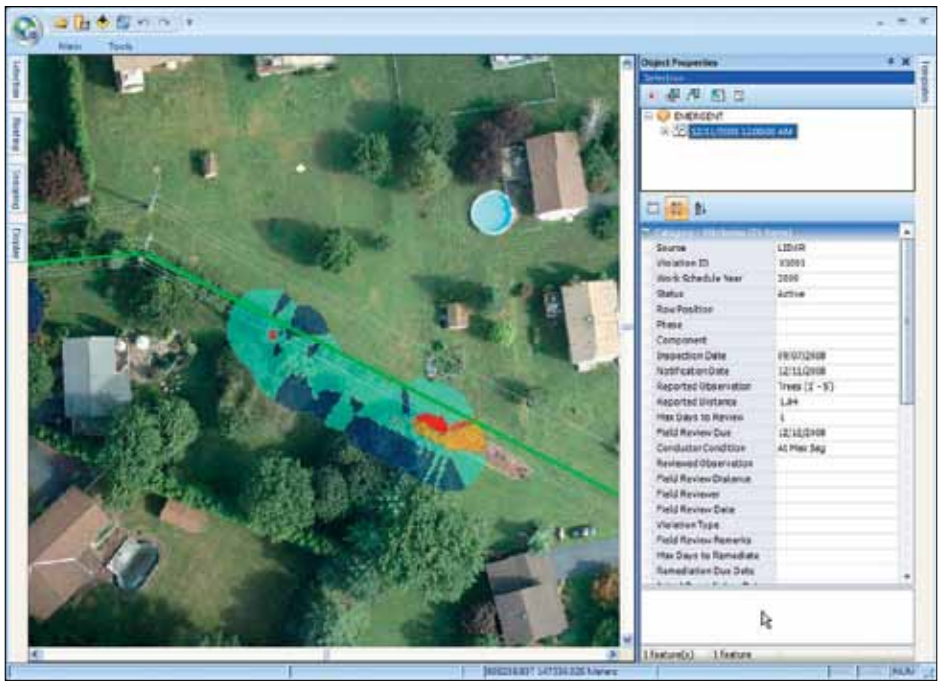
GIS for energy

PPL Electric Utilities Manages Vegetation at NERC Standards

Vegetation managers deal with the operational challenges of keeping compliant with regulations from the North American Electric Reliability Corporation (NERC). Even with comprehensive plans and adequate resources, achieving a transparent picture of up-to-date internal performance and completing defensible compliance reporting can be difficult. When the worst happens and a NERC line experiences an outage, a utility needs access to current reports to show regulators the patrol activities and remediation steps that were taken to stay current and compliant.

Unfortunately, most utilities struggle to track activities and prove compliance to regulators. Often, records of arborist patrols; maintenance inspections; vegetation prescriptions; and the subsequent trimming, spraying, and repair are incomplete or lost. Documenting that a contractor carried out the assigned work is also a challenge and often results in a labor-intensive quality assurance process that includes extra trips to the field.

"The big concern every day is to make sure we don't cause an outage because something falls through the cracks. Things can get lost, and doing things the old way increased the risk," said Earl Burnside, system forester for PPL Electric Utilities Corporation. "As is the case with many utilities, over the course of time, critical information is collected, stored, analyzed, and communicated in a myriad of ways, and the old way of doing things leads to stuff falling through the cracks."



Lidar analysis provides PPL with color-coded conductor clearance profiles, allowing planners and crews to focus their cyclical maintenance efforts on the areas of highest risk.

PPL transmits and distributes electricity to 1.4 million customers in 29 counties in eastern and central portions of Pennsylvania. The utility operates more than 40,000 miles of overhead and underground power lines.

Five years ago, PPL embarked on a project to standardize all information used for planning and management of a cyclical line-clearing program including processes, toolsets, reporting, and audits. PPL's goal was to implement a vegetation management system that would allow standardized map-based accounting of all vegetation management work, along with tracking capabilities, to provide better assurance of regulatory compliance needs and measures. The company also needed a mobile solution to enable data collection from the field and centralized management of information.

PPL selected the transmission vegetation management solution from Clearion Software, an enterprise system built on an ArcGIS platform. With the application, users can create, share, track, and audit map-based vegetation control information using ruggedized Panasonic CF-19 laptops with wireless broadband. Onboard GPS technology allows faster mapping and easier navigation, and the solution provides tools to synchronize data to and from PPL's centralized GIS database.

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In This Issue

Esri on the Road

TechAdvantage
March 8–11, 2011
Orlando, FL USA
techadvantage.org

Gastech
March 21–24, 2011
Amsterdam, The Netherlands
gastech.co.uk

Telvent User Group (TUG) meeting
March 29–31, 2011
Loveland, CO USA
telvent.com/go/tug2011

APGA's Operations Conference
April 6–8, 2011
Pensacola, FL USA
Apga.org

GITA's Geospatial Solutions Conference
April 10–13, 2011
Grapevine, TX USA
gitaservices.org

International SAP Utilities Conference
April 12–14, 2011
Mannheim, Germany
delegate.com/sap/utilities/2011

WindPower
May 22–25, 2011
Anaheim, CA USA
windpowerexpo.com

AGA's Operations Conference & Biennial Exhibition
May 24–27, 2011
Nashville, TN USA
aga.org

Esri Online

Simple-to-Use Software Adds Maps and Spatial Analytics to SharePoint
Download or get more information at esri.com/sharepoint.

Esri Press Releases GIS Tutorial Series for ArcGIS 10
Workbooks are available at online retailers worldwide at esri.com/esripress.

Creating and Sharing Notes Using ArcGIS Explorer
Learn about other ways you can use notes to support new workflows by visiting the ArcGIS Explorer blog at esri.com/arcgisexplorerblog.

Community Speaks Up at Spatial Roundtable
Pull up a virtual chair at spatialroundtable.com and join the conversation of GIS thought leaders as they address topics requested by the geospatial community.

Follow the Esri Utilities Community on Twitter
Keep up with the latest geographic information system (GIS) technology news, especially as it relates to the energy industry, by following Esri on Twitter:

Industry writer Jessica Wyland: @EnergyGIS
Pipeline and gas industry manager Rob Brook: @robertgbrook
Director of utility solutions Bill Meehan: @bill_meehan

Join Esri and Transform Your Future

Are you looking for a career where you can apply your industry expertise in a challenging new way? Join Esri's utility team of sales, marketing, consulting, and project management experts and help companies worldwide make better decisions using geospatial technology.

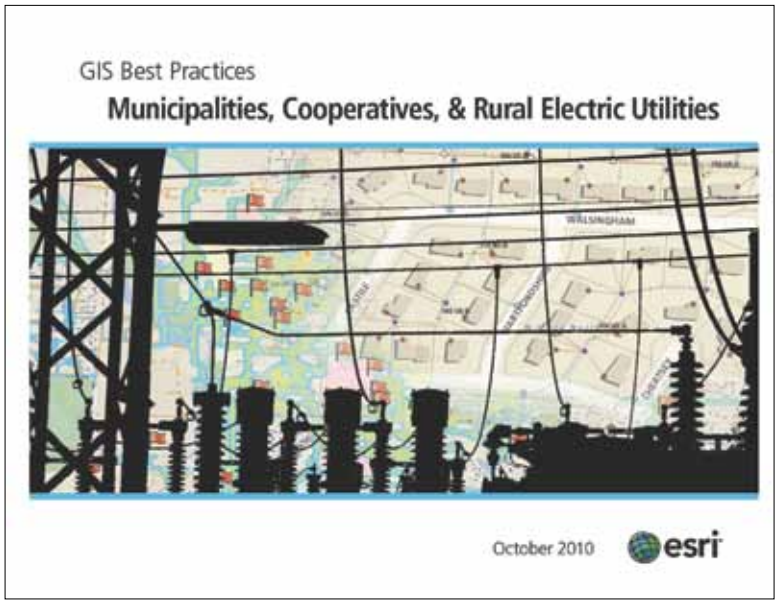
- **Electric Utility Industry Solutions Manager:** Promote and champion the use of GIS in the utility market worldwide; introduce and develop GIS as an enterprise-wide solution.
- **Account Executive, Electric and Gas:** Prospect business development activities and focus on selling Esri solutions to electric and gas accounts. This position can be based in any Esri regional office.
- **Account Executive, Pipeline (Houston, Texas):** Support existing client relationships, advance relationships with Esri partners, and cultivate new business within the pipeline industry.

Learn more about career opportunities on our utility team and apply online at esri.com/utilitycareers.

New Best Practices Book Speaks to Municipalities, Cooperatives, and Rural Electric Utilities

Esri recently released a collection of case studies and articles demonstrating how municipalities, cooperatives, and rural electric utilities use GIS to meet challenges, from outage and vegetation management to regulatory compliance and design.

Read and download a PDF of the GIS Best Practices book at esri.com/library/bestpractices/municipalities-cooperatives.pdf.



Is Your GIS Smart Grid Ready?

Esri recently conducted a benchmark study asking U.S. electric utilities, "Is your GIS smart grid ready?" Respondents received customized study results based on individual utility needs. The report, which includes information about the state of the industry and top recommendations, is now available to the public.

Watch the video and view the survey at esri.com/smartgridstudy.

New Release of ArcGIS for AutoCAD Offers Improved Performance

ArcGIS for AutoCAD offers significant performance improvements in its latest release including faster access and enhanced image quality of map services. AutoCAD professionals can use the free, downloadable tool to find and use geographic information system data and imagery either from ArcGIS Online or ArcGIS Server. Build 250 of ArcGIS for AutoCAD has also been updated to support 32-bit and 64-bit AutoCAD versions 2010 and 2011, allowing users to share and exploit GIS content within local files, throughout the enterprise, and in the cloud.

Using the new ribbon interface, ArcGIS for AutoCAD users can add GIS maps to AutoCAD with a single click from the Esri Maps button. Additionally, an organization's relevant GIS content or project work can be easily organized and shared via ArcGIS Server by ArcGIS for AutoCAD users similar to desktop, Web, and mobile users.

ArcGIS for AutoCAD users can access maps in AutoCAD without translating or converting the underlying GIS data. Maps are accurately projected into AutoCAD based on the coordinate system of the CAD drawing. ArcGIS for AutoCAD Build 250 supports ArcGIS Server 10 and ArcGIS Server 9.3.

To learn more about or download the new release of ArcGIS for AutoCAD, visit esri.com/autocadapp.

EGUG 2010 in Review

Electric and Gas Users Get Edge on Success

by Barbara Shields, Esri Writer

Esri's Electric and Gas User Group (EGUG) held its annual conference in Dearborn, Michigan, October 18–20, 2010. More than 400 people attended the conference, including electric and gas ArcGIS users; GIS experts, developers, and consultants; and Esri specialists. They shared their GIS project successes and learned how today's geospatial technologies are guiding the future of energy generation, transmission, and service.

Keynote speaker Robert A. Richard, senior vice president of gas operations of MichCon, a subsidiary of DTE Energy, candidly described the challenges of serving a region of the country wherein unemployment and poverty levels are significantly above the national average. "GIS is helping us be more efficient and effective in delivering power," he said. Richard explained some of his company's GIS solutions such as an automated work order application, an energy theft analysis, a leak survey and replacement prioritization rating, and an engineering load analysis model.

Addressing EGUG via a video presentation, Jack Dangermond, president of Esri, described how Esri's product enhancements help utilities improve the way they do their work. This includes evolving data management; supporting real-time information within the smart grid environment; bringing more external data from data providers (e.g., topographic, weather) into the GIS platform; and providing easier-to-use analytics to meet utilities' specific needs such as load forecasting, routing crews, and carbon management. Dangermond concluded by thanking DTE for hosting the EGUG conference.

New to this year's EGUG were the Lightning Talks. These five-minute user presentations about GIS projects were well received. Among the 10 projects presented were NStar's dig/save tickets solution, Caroll Electric's use of ArcGIS Workflow Manager, and Laclede Gas's leak data model. Also new to EGUG was an online means for the user community to submit electric and gas GIS product enhancement ideas to Esri developers via the Web site ideas.arcgis.com.

Conference participants chose from more than 30 presentation and panel discussions about GIS for regulatory requirements and compliance, fieldwork, leading-edge applications, safety and reliability, best practices, and more. Many Esri specialists were on hand to talk with users one on one. In addition, the GIS Solutions EXPO offered a venue for users to explore GIS vendor opportunities that could best meet their needs. EGUG sponsors provided food, beverages, socials, and giveaways that engendered camaraderie and network building.

For more information, visit esri.com/egugconference.

Welcome to the 2011 EGUG Officers

2011 EGUG President Wayne Boone

Wayne Boone is a principal of Alabama Power Company, a subsidiary of Southern Company. In his current capacity, he works directly with the groups focused on electric distribution information systems. Alabama Power Company, Georgia Power Company, Gulf Power Company, Mississippi Power, and Southern Company Services work together in creating synergistic solutions for electric distribution GIS. Prior to his current position, he led the Data Management Center of Alabama Power Company in the first complete statewide implementation of GIS. Boone's career in information technology spans almost four decades. For the last 22 years, his work has been directly associated with Esri products in an electric utility environment. Boone holds a degree in business administration from Faulkner University.

2011 EGUG Vice President Theo L. Laughner

Theo L. Laughner is a power quality specialist in the System Applied Maintenance Department at Tennessee Valley Authority. He is responsible for integrating data from more than 600 power quality monitors, digital fault recorders, and microprocessor relays into an enterprise database system. In addition, Laughner has been integrating asset and weather information into the enterprise GIS. He is a professional engineer in the state of Tennessee and lives in Harrison with his wife, Holly, and their three children, John, Hannah, and Cote.

2011 EGUG Chair Wayne Meyer

Wayne Meyer is the manager of the corporate GIS for the South Carolina subsidiaries of the SCANA Corporation. The South Carolina operations are made up of South Carolina Electric and Gas (SCE&G), Carolina Gas Transmission, and SCANA Communications. The GIS currently contains 17,000 miles of wire, 8,000 miles of distribution gas, 2,000 miles of gas transmission, and 800 miles of fiber. Meyer has been with SCE&G for more than 17 years. He has been involved as an application developer, technical support specialist, project manager, and area manager. For the past 6 years he has served on the Board of Directors for Palmetto Utilities Protection Services and is the current president. Prior to joining SCANA, Meyer worked as a consultant for an economic development firm in Columbia. He has a BS in geography from Carroll College and an MS in geography from the University of South Carolina.

Thank You to the EGUG 2010 Conference Sponsors

Accenture is a global management consulting, technology services, and outsourcing company with more than 190,000 people serving clients in more than 120 countries. Its more than 8,000 utility industry professionals have worked with 275 clients in 40 countries for over 30 years to tackle the unprecedented challenges facing utilities. The company offers Esri customers comprehensive smart grid readiness-related GIS consulting, systems integration, and application support, including EAM-to-GIS and smart grid integration. As transmission and distribution utilities seek new ways to achieve high performance, Accenture can help by delivering a sustainable enterprise GIS focused on transforming, modernizing, and more effectively managing asset infrastructure and achieving the goal of smart grid state connectivity, analytics, and visualization using Esri ArcGIS 10 software.

For more than 25 years, Rolta has been a market leader in the geospatial, engineering, and enterprise information industries, with operations in North America, Europe, Australia, the Middle East, and India. For the energy market, Rolta offers OneView, a spatial business intelligence platform for developing operational and executive dashboards; OnPoint for creating spatial Web portals; and OneView Mobile for mobile field force automation. Rolta also provides custom applications that solve utility challenges such as distribution integrity management program (DIMP) and real-time operational key performance indicator (KPI) monitoring. Rolta can bring actionable information and operational awareness to all users—from the field to the corporate boardroom. Visit rolta.com.

Gas utilities need to support their gas integrity requirements with consistent, high-quality gas network data. Telvent's GIS-based solutions deliver the most comprehensive, accurate gas distribution information—ensuring valid DIMP results. A consistent, uniform approach to managing gas network asset data not only helps facilitate accurate information but also increases planning and work efficiencies critical in today's cost-conscious environment. Telvent's Enterprise ArcFM Solution, including Designer Express, helps gas companies do this while growing their utility to meet customers' changing needs. Telvent's Enterprise ArcFM Solution provides one version of the truth for a variety of critical gas functions, such as dispatching, troubleshooting, engineering analysis, planning, reporting, customer service, and even media relations during emergency conditions.

Building a Knowledge Infrastructure

As Seasoned Utility Staff Retire, Will They Take Wisdom with Them?

By Bill Meehan, Esri Director of Utility Solutions

Bill Meehan, Esri Director of Utility Solutions

When I ran an electric utility operations division, one of my favorite employees was a guy named Stanley. Stanley started as a line worker, climbing poles, then became a foreman and a supervisor. Finally, Stanley managed all the crews in the region. I remember how Stanley worked.

In the northeastern United States, the hot, humid summer months present a particularly serious storm threat. The severity and location of the thunderstorms were never predictable. Since this part of the country is heavily treed and the vast majority of the distribution lines are overhead, one of these violent storms could cause significant damage to the electrical system, which in turn would result in many outages.

So, the challenge for Stanley was this: As the crews rolled back into the service center after a day of work, Stanley had to decide whether to keep workers on overtime in case trouble hit or send them home and hope nothing bad would happen.

Stanley had a routine. He would carefully check the latest weather forecast to see where a storm would likely hit. He also knew which areas of the system were more vulnerable than others. He listened to his crew chiefs telling him where poles were leaning and wires were frayed. He knew where they hadn't trimmed trees in a while and where the fussy customers lived. Stanley then stood outside and smelled the air. After his routine, which only took a few minutes, he would walk back into his office and call the union steward and tell him exactly how many crews to keep on overtime.

If Stanley kept too many crews and nothing happened, he would have wasted overtime money and be shorthanded in the morning. If he kept too few workers, or none at all, and something bad happened, he'd have to scramble to get people back to work, which was difficult and sometimes even dangerous. Yet in all the years I knew Stanley, he rarely made the wrong decision.

Then Stanley retired.

Thousands of workers like Stanley will leave the industry over the next several years. The average age of U.S. utility workers is nearly 50, and more than 148,000 utility employees fall in the 55- to 64-year-old range, with another 26,000 employees over age 65, according to the Bureau of Labor Statistics. A recent study published by the National Rural Electric Cooperative Association (NRECA) showed that 61 percent of line superintendents are age 50 or older.

Imagine all the wisdom and analytic power that will be missing when these workers retire. People like Stanley know where infrastructure problems exist. They know where the utility has not trimmed trees. They know the location of old and frayed wires that are just waiting to fall down. They remember where storms generally hit and the problems that storms cause.

What many utilities are missing is an ability to capture as much of that wisdom as possible before the Stanleys of the industry retire. What we need is a way to share what retiring workers know and how they know it.

The Need to Capture Information

The common denominator of that knowledge is location. Utilities have been capturing facts in geographic information systems for years. Today, GIS can capture observations and predictive information, collect data from all kinds of sources, and help utility staff make better risk predictions the way Stanley did. GIS can create geoprocessing models that document the data sources, run analyses, and produce results in the form of a map.

The key is to have these models validated and supplemented by experienced workers before they leave, so that utilities can truly build a knowledge infrastructure. I discussed this in a recent blog on this topic and received valuable feedback from others in the utility industry.

Victoria Morrow, GIS manager for Broward County Government in Florida, believes knowledge retention is important for all aspects of government. "How do we capture the years and years of experience in emergency operations, traffic management, 911, elections, etc., before these experienced workers retire?" Morrow asked. "As GIS manager of a large metropolitan county, I see this issue across almost all departments. It is even more pronounced in those agencies that have only just begun to embrace GIS technology."

As rightly noted, the concern is shared by any department that collects and stores data. This institutional data is a must in almost every industry. We acknowledge a need for it, but what can organizations do to get the data that is stored in the heads of seasoned workers?

Collecting Subject Matter from SMEs

There are notable concerns that accompany the idea of moving information from the mind of a subject matter expert (SME) to a tangible, accessible database. How do we best approach the task? What questions do we need answered? How do we compile and utilize this information once we have it?

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—Bill Meehan, Esri Director of Utility Solutions

"One approach that we have used successfully is to gather some of the SMEs in a room," said Ron Brush, president of New Century Software. "We have a meeting facilitator, a GIS analyst, and a system map on a big screen. We ask the SMEs to tell us about different parts of the system they know best. The analyst creates new features and feature classes—usually polygons—and captures the knowledge about that part of the system."

SMEs can impart information related to known problem areas, installation methods and materials used, landowner information, and more. The SME's name and date and other metadata are attached. This information can then be vetted with other SMEs and later organized into a more usable format.

"The spatial SME approach will be important for gas distribution operators as they move forward with their Distribution Integrity Management Program [DIMP] planning and implementation," Brush said. "While this approach may not replace Stanley's ability to predict the weather, it can help retain valuable knowledge about utility assets that might otherwise be lost. Plus, I think it's a compliment to the SMEs to acknowledge their experience and value to the organization."

In the absence of SMEs, some industries are relying on historical incident data to fill the gaps in knowledge, according to Sentil Prakash Chinnachamy, GIS project coordinator/business development for Spatial Edge.

"Institutional knowledge management is similar to metadata management—a challenging workflow in federal and private agencies, usually considered a time- and resource-consuming process," Chinnachamy said. "Combining old-school methods with the latest technologies could help. Imparting institutional knowledge collection in the data collection workflow is a way to go."

For companies that have not yet started data collection, Chinnachamy says it is better late than never.

Add It to the To-Do List

"We have spoken of this concept in our shop as well, and I think it could be worthwhile to pursue," said DeAnna Hohnhorst, GIS technician, Georgia Power. "As a GIS technician with skills in building geodatabases, spatial analysis, and modeling, I would be pleased to add this type of endeavor to my project list."

The idea of gathering experts in a room and drawing concerns on a map for entry into a GIS has significant value. By applying spatial analytics, we can combine SME data with authoritative data. This analysis connects the dots between what people know and what operations or historical data is stored in the system. Also, the visual presentation in a GIS-based model-builder environment gives experienced workers the ability to investigate variables in something crucial such as risk assessment. Stanley might look at the model and say, for example, "You forgot to include soil types in the assessment, since trees fall over easier in sandy soil than in clay."

What Stanley is doing in his head in this case is spatial analysis. He is taking data from a variety of sources, merging that data with his own and coworkers' experiences, and predicting where problems are most likely to occur. He then takes action to mitigate or at least prepare for the problems. When a storm does hit and outages occur, Stanley is never very surprised. In fact, he has a restoration plan in his head ready to go.

The common denominator of Stanley's thinking is geographic location. Stanley connects the dots related to geography. The intersection of the many problems together creates for him the areas of highest risk and vulnerability. If the storm hits there, he is ready.

Most utilities have collected an enormous amount of data that can be used for spatial analysis within a GIS. While GIS has traditionally been used for making clearer maps of the electrical system, it now serves as a framework and foundation for the knowledge infrastructure.

For utilities, this knowledge infrastructure is as much an asset as the actual pipes, wires, and hardware of the electrical or gas system. The more knowledge a utility has about its assets, employee experiences, customer behavior, and the world around them, the better management decisions will be.

About the Author

Bill Meehan joined Esri in 2002 and is director of worldwide utility solutions. He is the author of *Empowering Electric and Gas Utilities with GIS* and *Power System Analysis by Digital Computer.* Meehan has an extensive background in utility operations management including the integration of IT and GIS. He holds a BS degree in electrical engineering from Northeastern University, Boston, Massachusetts, and an MS degree in electric power engineering from Rensselaer Polytechnic Institute, Troy, New York. He is a registered professional engineer, Commonwealth of Massachusetts.

Spatial Business Intelligence to Improve Smart Meter Deployment

By Gareth Thompson and Aaron Patterson, Enspiria Solutions

To address one of the initial tasks of smart grid—smart meter deployment—utilities are relying on spatial business intelligence.

Spatial business intelligence uses geospatial technology and data to clarify, streamline, or improve utility job tasks and business processes and to improve utility decision making. It is accomplished by merging GIS and business intelligence (BI) technologies.

With the growing focus on smart meters and increasing demand to meet projected business case goals, a utility's ability to accomplish the mammoth task of deploying smart meters is crucial. Utilities can leverage geospatial technology to increase the speed and quality of deployment, ensure reliability from meter installers and vendors, and maintain confidence in automated metering infrastructure (AMI) systems and the network. In short, spatial business intelligence can make it possible to reach smart metering goals.

Critical Deployment Questions

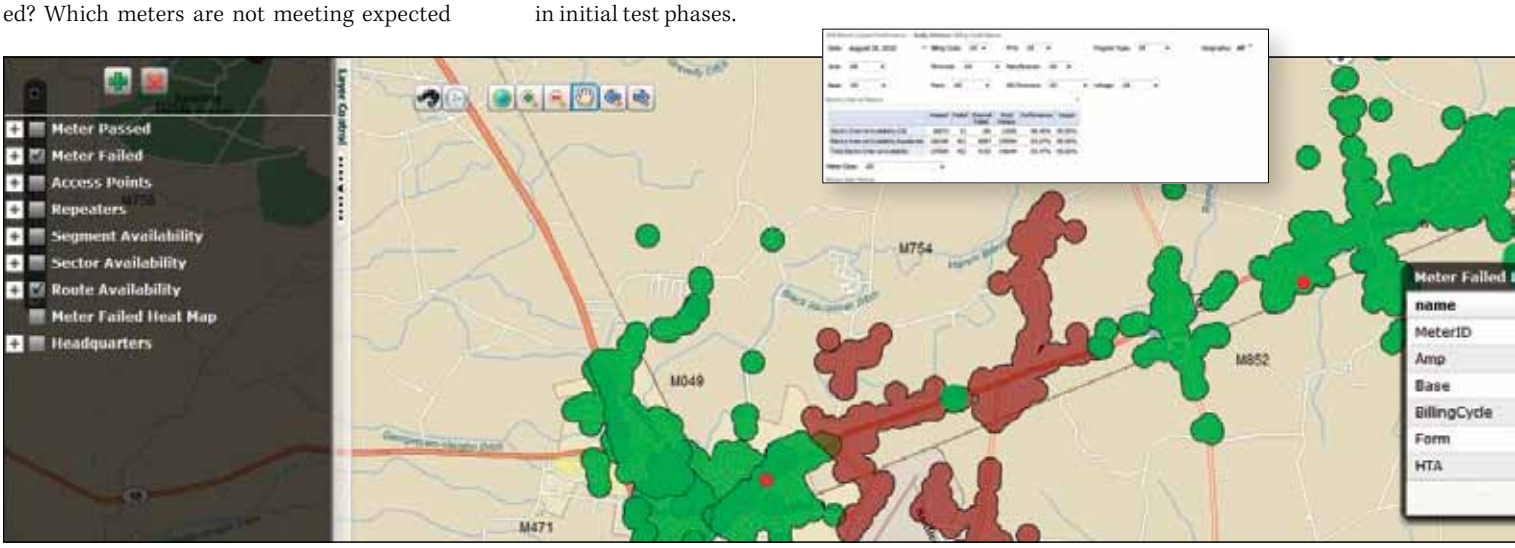
At all stages of smart meter deployment, utilities ask a number of important questions. For example: How can I quickly determine whether my smart meter program is measuring up to the original benefits ascribed in the business case? How should test phases be implemented? Which meters are not meeting expected performance criteria? How many meters have been deployed to each area? How many meters are "talking" to the AMI? How many customers are billing from the new meters? How are we doing with respect to the original schedule? When is my network "saturated" with new smart meters? How can I verify my network?

Utilities today can use spatial business intelligence to answer these questions.

Field Test Performance Management

Accurately assessing AMI performance during testing and deployment is a critical need for today's smart grid projects. Field test performance management requires mechanisms for validating that the deployed AMI technology performs as expected, and it is important at various stages of the smart meter deployment process including

- Field Acceptance Testing (FAT): For initial tests on a small subset of AMI meters, spatial business intelligence can be used to test short-listed AMI technologies prior to final selection.
- Sector Testing: A larger deployment, such as 50,000 to 100,000 meters, can be tested to ensure that the AMI system scales beyond the initial FAT meter deployment and maintains performance levels tested in initial test phases.
- Segment Testing: Utilities then test several hundred thousand meters to ensure that the system scales and maintains performance as specified in the service-level agreement.
- An automated BI solution that evaluates AMI data can provide audit-quality reports of system performance and contractual metrics in support of these deployment stages. Expanding the BI capabilities to include a spatial component provides invaluable views of the contractual metrics. Problematic locations can be identified using spatial views, and thematic layers can show views of the data provided by the AMI meters in the following constructs:
- Data availability: Are the meters providing all the expected data? If not, can the spatial view be used to determine inadequate network coverage?
- Data accuracy: Are the meters providing accurate data compared to temporary manual meter reading processes?
- Event/Alarms tracking and trending: Are meters returning expected messages such as outage, restoration, and firmware upgrade confirmation? Or are the messages unexpected, such as errors? Can

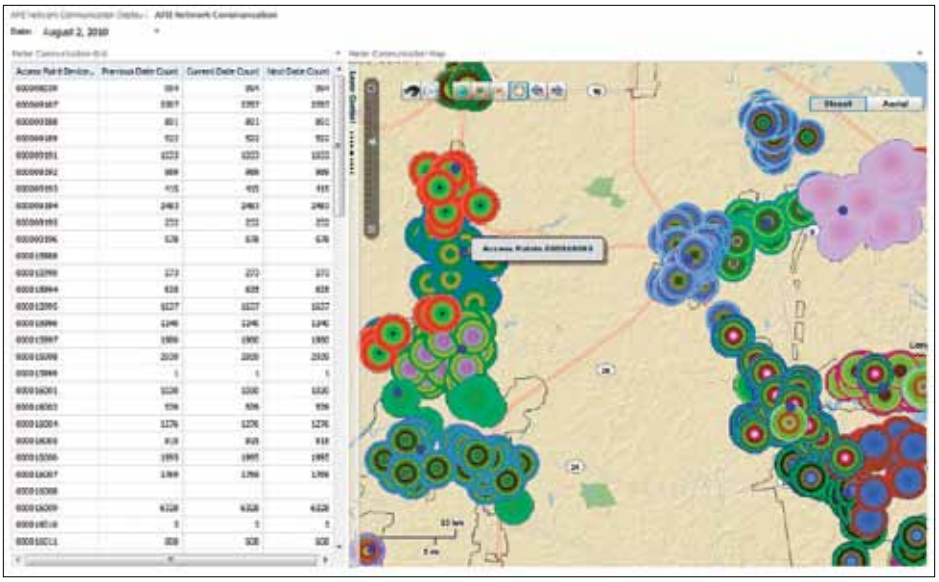


An example dashboard from Enspiria Solutions' ESIntial tool displays an AMI data delivery metric page. The map view shows meter reading routes thematically mapped and colored by percentage of AMI data delivered for the meters within each route.

the spatial view be used to determine correlations between events and alarms from neighboring meters and AMI network equipment?

During FAT, performance management concentrates on the service point spatial level, allowing the AMI test team to analyze individual meter and localized issues within the meter population.

In sector and segment testing and full deployment phases, the BI tools can be used to augment and validate the AMI system reporting capabilities, and the spatial analysis can be expanded to an aggregated area level for meter reading route, ZIP Code, or service territory.

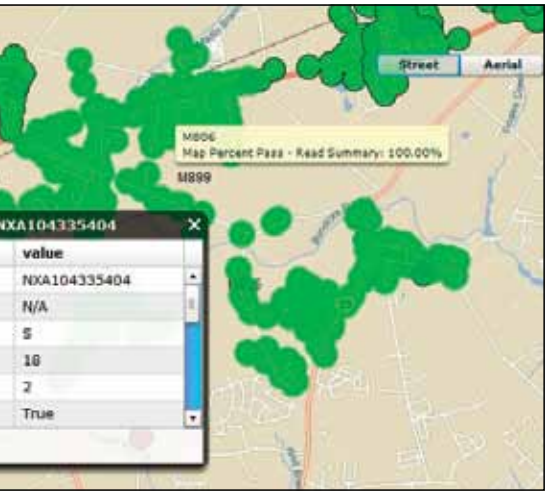


An example dashboard shows colored heat maps of meter communication paths. AMI network equipment and the AMI meters communicating via that equipment are shown in the same colored circles.

Deployment Tracking

Large deployments come with their own unique sets of issues and problems. Spatial BI tools for smart meter deployment tracking can provide the necessary visibility and insight to fix issues quickly before they impact overall project success. Spatial BI provides a snapshot of whether the deployment is behind, ahead of, or right on schedule in specific deployment areas. Deployment, reading, and billing can be tracked. This allows decisions to be made on whether to reallocate installation resources to areas falling behind schedule.

Often, a certain level of saturation is required in an area to move to AMI billing of those customers. The spatial view provides, at a glance, views of which areas are close to meeting those thresholds. Other core BI functionality can be used to further slice the saturation statistics. Based on customer type, can AMI billing be used for only a specific saturated set of meters within the area? Should a specific saturation of firmware be installed across the meters within the area to cutover? Are metrics being met by the meters within the area?



Network Optimization and Failover Testing

With all the focus on the deployment of smart meters, one might think that things get easy once the installation has occurred. Of course, this isn't the case. Those smart meters aren't quite as smart if they stop communicating back to the office. The utility must ensure that the network supporting the smart meters will continue to operate effectively not only during deployment but afterward as well.

To ensure the self-healing capabilities of the network, utilities must use failover testing. Yet to actually see what happens is difficult. A list of meter/module and AMI network devices with connectivity details written on a spreadsheet gives little real visibility into the network healing performance or possible problem areas. Raw numbers show how many changes are made but not where or if they are even correct. By combining spatial and temporal views of this raw data, utilities can realize the benefit of clear before-and-after results showing color-coded meters and communication devices.

Spatial views may be generated to support entrance criteria for the AMI vendors' network optimization processes. For the areas targeted for optimization, asking certain questions is important. Are the areas saturated with AMI meters to a sufficient level? Are the meters delivering data at the contractual metric level or above? Are there expected firmware levels?

The same spatial views can be used during and after the network optimization processes to ensure that expected performance levels are maintained or at least returned to the same or higher preoptimization levels.

During failover testing, seeing that meters fail over to a new point of communication is important. This can be tracked during the purposeful failover tests using time series spatial data to show meters in normal state; failed over to a new communication point; and, finally (once the network has returned to normal state), in the reformed network state.

As demonstrated, spatial business intelligence can provide valuable insight and visibility not normally afforded by other systems. By combining operational and tracking datasets into a spatial context during smart meter deployment projects, utilities can reduce risk and generate business value.

For more information on GIS for smart grid, visit esri.com/smartgrid. For more information on Enspiria Solutions, visit enspiria.com.

Extending GIS to the Marketing Department

By Gerald Marbury, Geospatial Extensions, Inc.

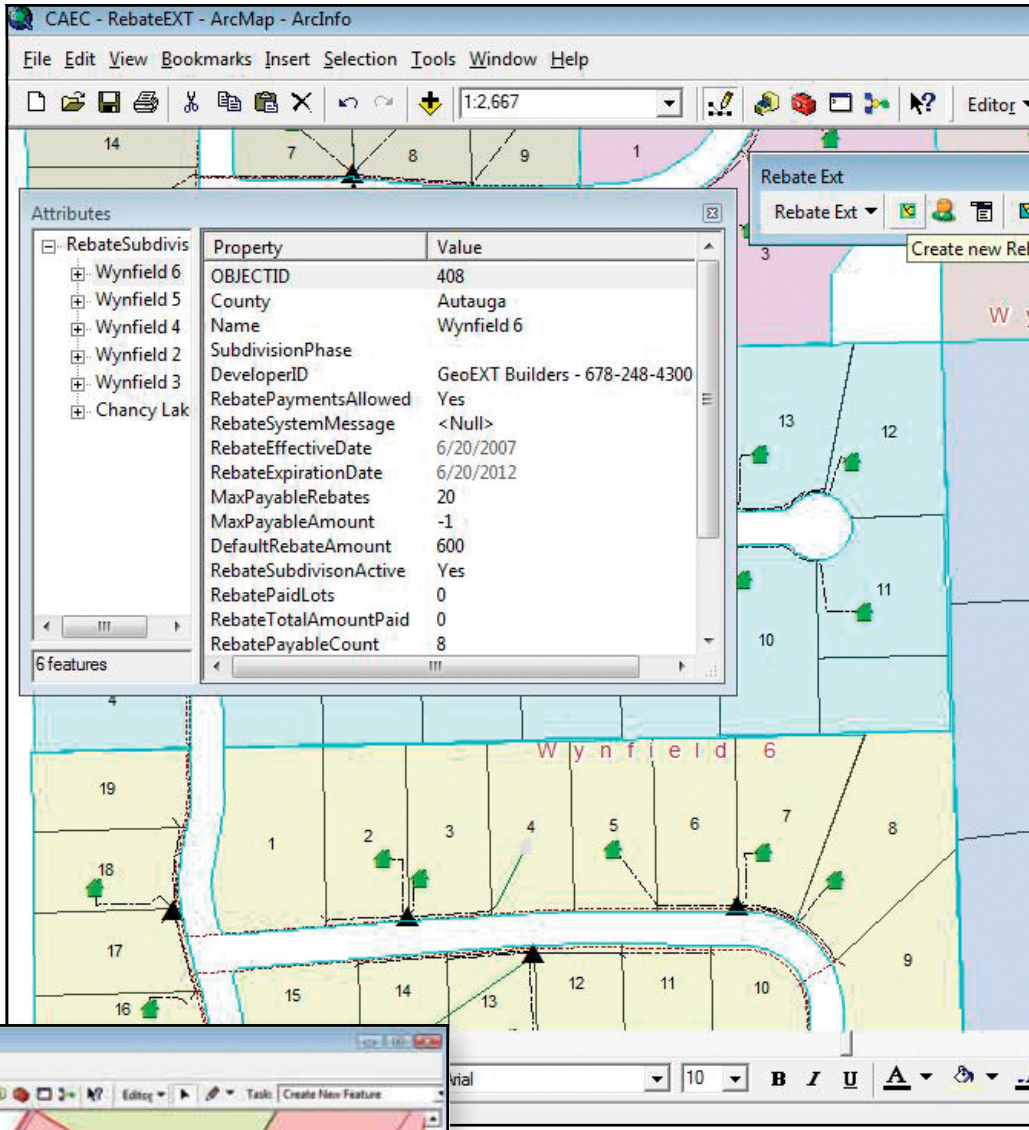
For Central Alabama Electric Cooperative (CAEC), the initial investment in GIS was for mapping and staking. However, because the utility acquired a Small Utility Enterprise License Agreement (SU-ELA) from Esri, it was able to extend GIS into other areas—in this case, the marketing department.

CAEC's marketing department offered rebate incentives to builders who constructed Touchstone Energy Homes. The utility needed a solution to track the lots and distinguish those that were currently eligible for payments from those that had already received rebates.

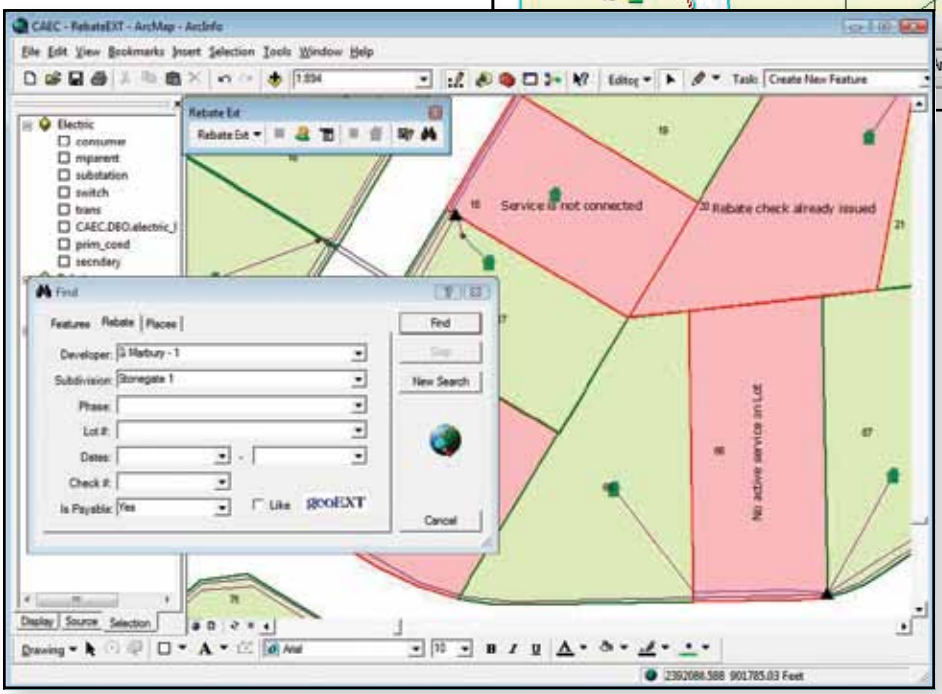
"The small utility ELA made it cost-effective to use GIS to solve the right problems without worrying about additional licenses," said Scott Lee, information systems manager at CAEC. "We can now implement custom solutions to meet the unique needs of Central Alabama Electric Cooperative."

To design and develop the solution, CAEC contracted with Geospatial Extensions, Inc., an Esri partner that specializes in GIS extensions and integrations.

The solution, RebateEXT, graphically indicates lots that are not eligible based on the connectivity of the electrical network and information from the customer information system. A lot can be deemed ineligible if, for example, residential service is not connected, a check has already been issued, or the allocated number of lots for the subdivision has been exceeded. When the user attempts to enter a check number for a lot that is not eligible, RebateEXT prevents the edit and notifies the user.

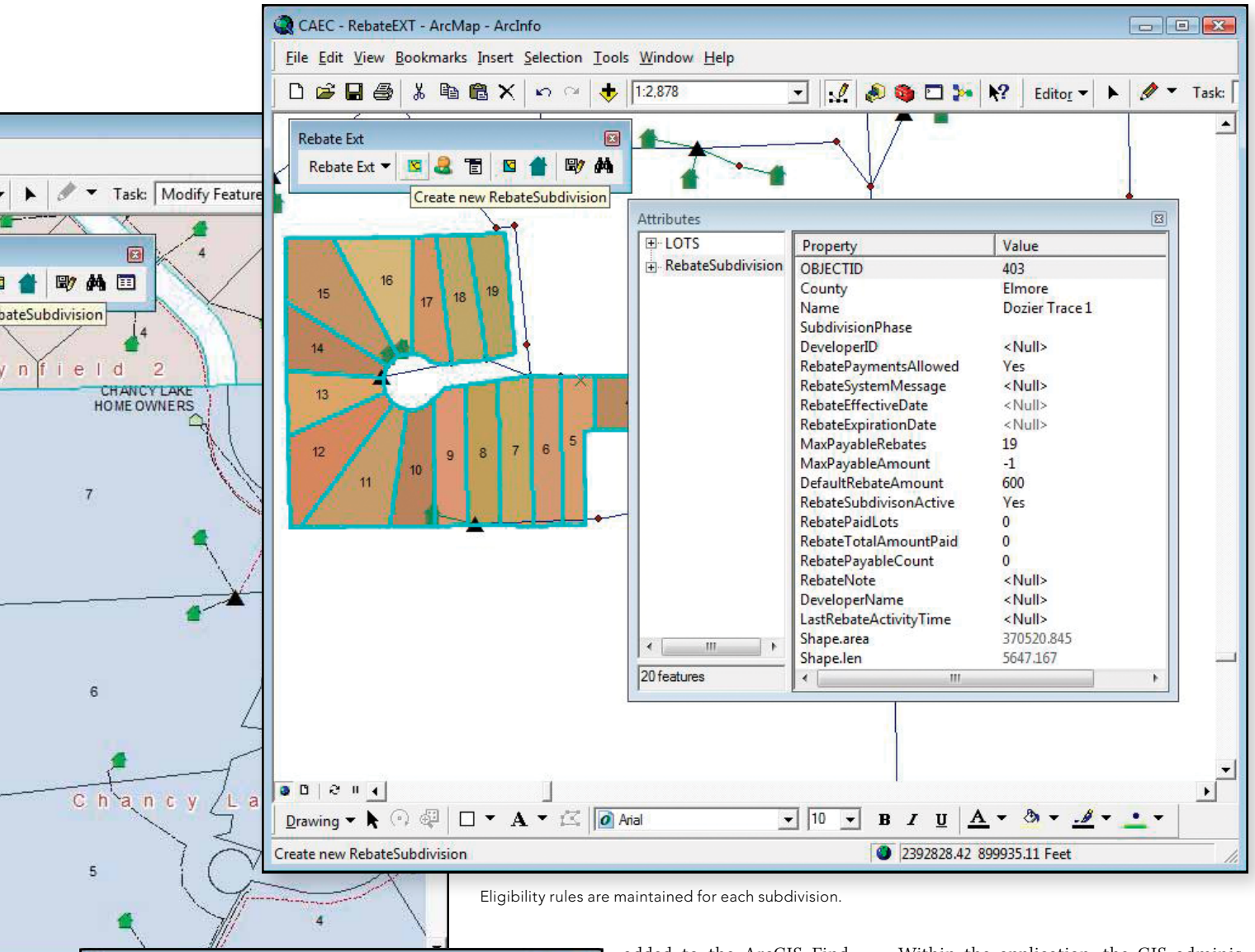


Lots are automatically grouped into subdivisions based on common attributes.

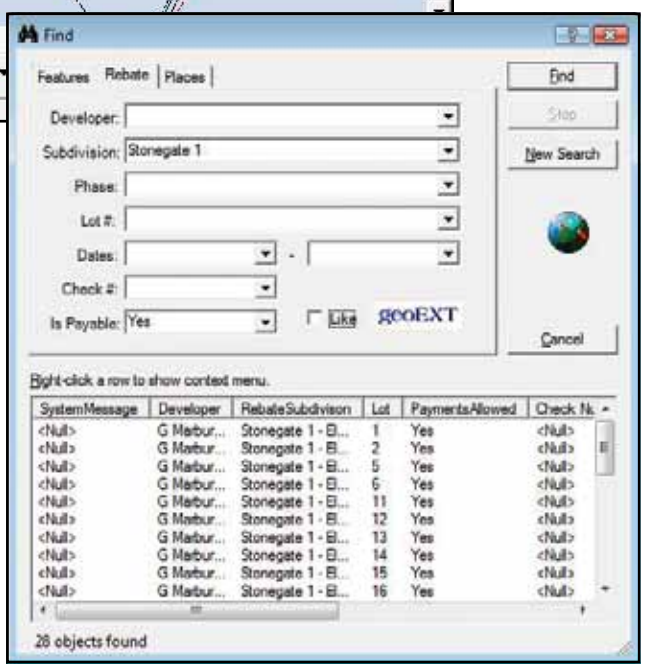


RebateEXT graphically indicates eligible lots.

To create a subdivision, the GIS technician simply selects a group of lots, and RebateEXT separates the lots into multiple subdivisions based on common attributes. To make it easy to search for rebate lots, a Rebate tab was



Eligibility rules are maintained for each subdivision.



The Rebate tab makes it easy to search by developer, subdivision, and check number.

added to the ArcGIS Find dialog box. The tab allows the user to search for rebate lots by relevant fields such as developer, subdivision, lot, and check number.

"As the economy rebounds and developers begin work again, we have a way to track the lots that are being developed, those that have had rebates paid, and those that are eligible for payment of rebates to developers," Lee said. "We can get a graphic look at all our developments across our territory to give updates to management and our board of directors."

Within the application, the GIS administrator has the capability to grant permissions to specific fields in the geodatabase based on user login credentials. This functionality prevents the marketing personnel from accidentally deleting or moving the entire subdivision or from making unintentional changes to the rebate lots.

CAEC completely changed its data model during a recent ArcGIS upgrade; however, RebateEXT was designed to be configurable, and the extension did not have to be rewritten. The new tables and fields simply had to be reassigned in the Configuration dialog box.

For more information on GIS for electric utilities, visit esri.com/electric. For more information on Geospatial Extensions, visit geoext.com.

PPL Electric Utilities Manages Vegetation at NERC Standards

continued from cover

For PPL, the solution incorporated existing asset and land base data from corporate AM/FM/GIS as intelligent background layers within the vegetation management application. The system includes Clearion Mobile, a map-based application for viewing, editing, and reporting; Configuration Editor for setting up and customizing the mobile application; and Clearion Web, a server application for reporting and map viewing in a Web browser.

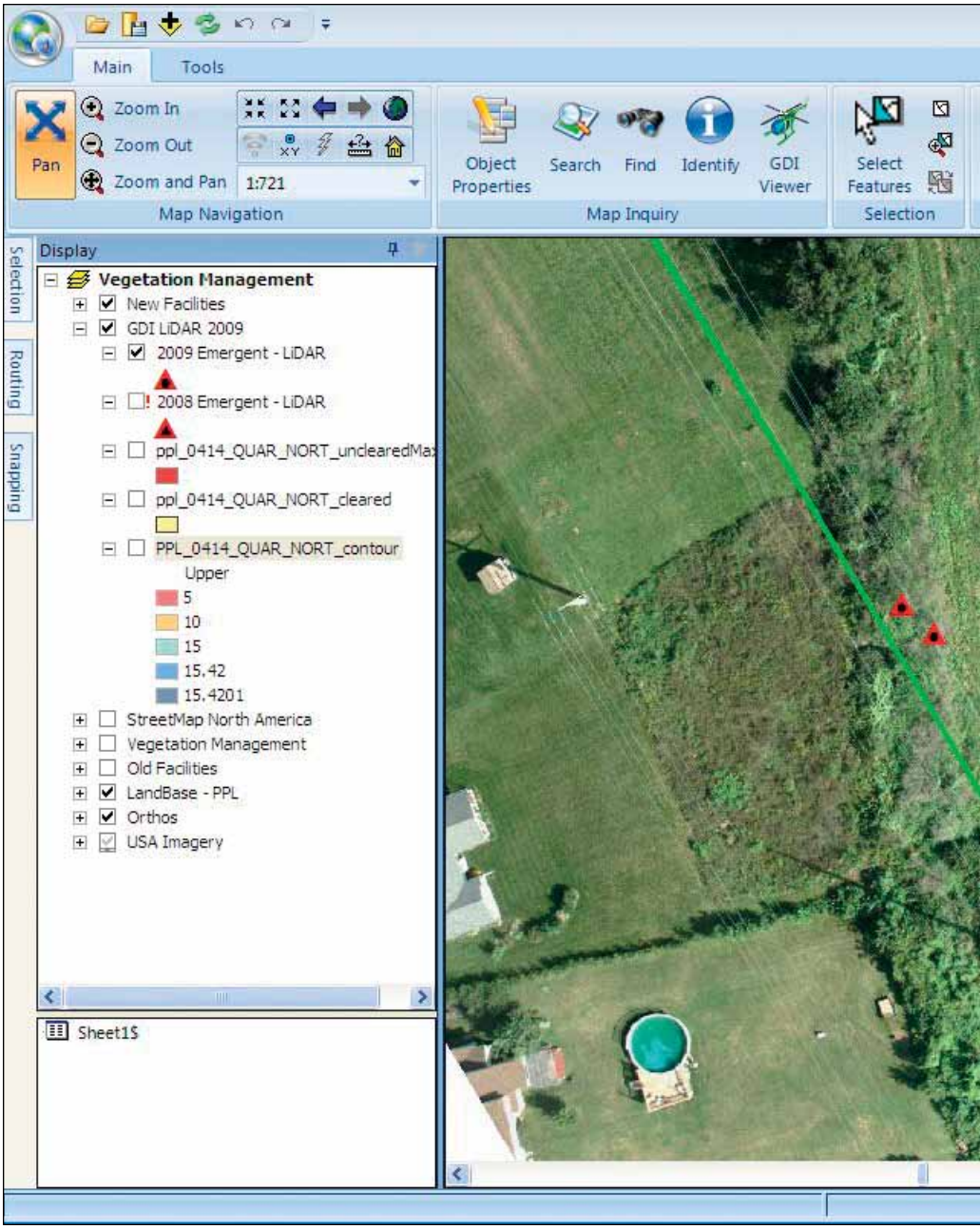
A New Approach

The PPL vegetation management group is organized into five operating regions, with a vegetation manager, system forester, four regional foresters, and 14 line clearance inspectors. The group is responsible for all vegetation-related activities on transmission and distribution assets. It investigates and responds to customer inquiries and is responsible for storm restoration management, contractor management, and financial oversight of the vegetation management program.

"In the past, none of the vegetation information was digital," said Burnside. "There were no consistent methods of representing the scope of work for clearing operations, spraying, or emergent situations. It was very difficult to document compliance with regulatory standards. Some foresters keep great records, but how is it stored?"

PPL needed a uniform way to record data. With GIS, PPL is able to track everything from "cradle to grave." Data is uploaded and saved daily on a secure server. The server automatically updates all other vegetation management devices with the latest information for use in the field.

"We went through a NERC audit without GIS, and having to get reports from various personnel in various formats was a harrowing experience," Burnside said. "Now we can download and update standardized audit reports every day. The next audit will be much easier because an audit tool is built in—now you just have to run the report."

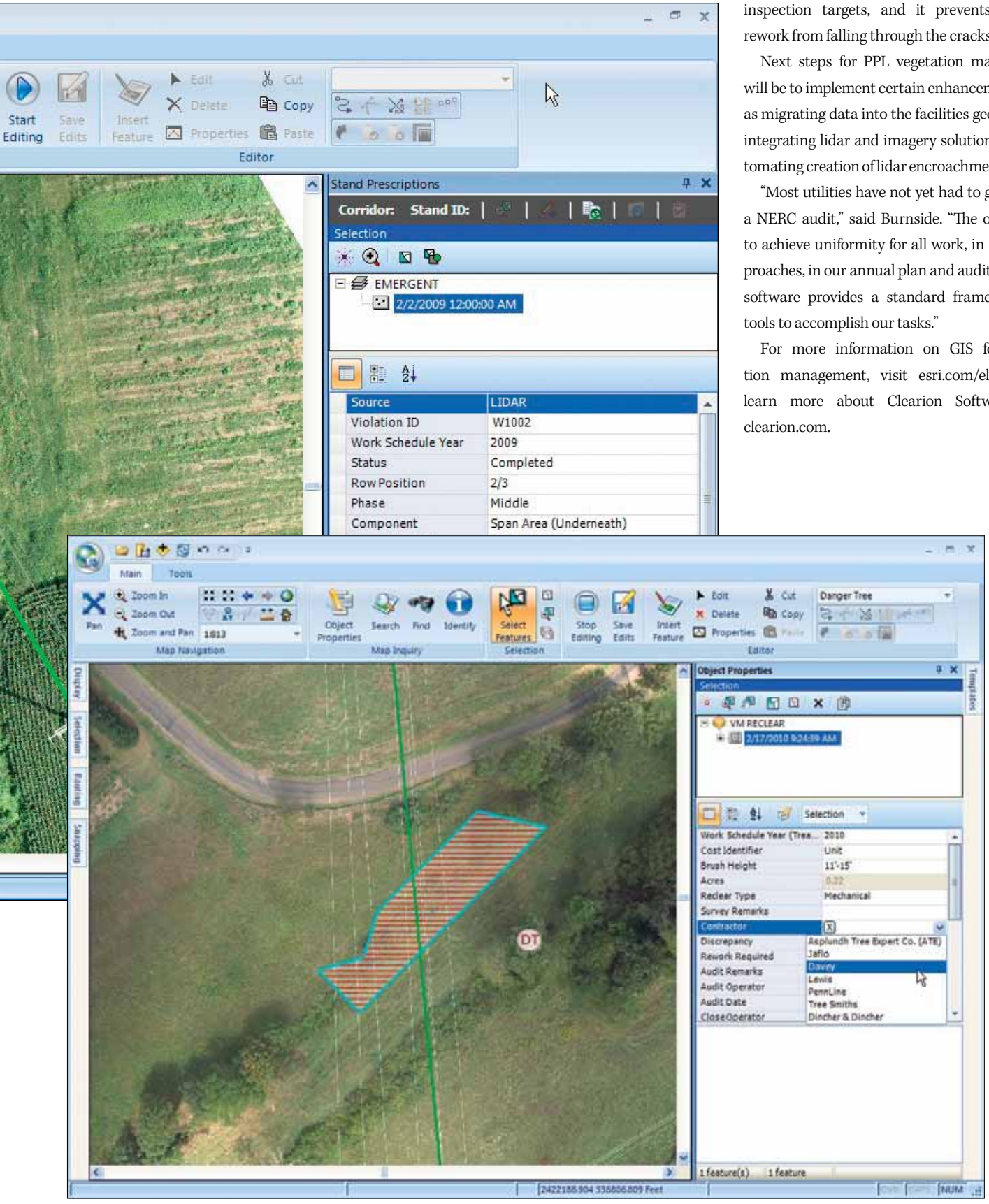


PPL loads lidar-generated "emergent" conditions directly into the Clearion VM system. Situations that require immediate action are assigned to crews. Other areas of interest are reviewed, prioritized, and scheduled.

Tools for the Job

Multiple GIS-based tools support workflows specific to PPL. A transmission line selector tool allows the user to select a line for vegetation management inspection or audit. A list of the available PPL transmission lines allows the selection by clicking on the line of choice, and only the spans on the selected transmission line will be visible on the map. The user can filter the list by selecting a forester, region, or voltage. Once users select a transmission line, they can insert and edit vegetation management activities such as spray or side trim.

Audit tools also allow the user to enter postwork inspections. The system creates a permanent record of all audits, including work performance results, time stamp, and auditor identity. If an auditor flags an item for rework, the system prevents PPL from closing the line until the contractor completes the rework and the forester completes a secondary audit. This audit capability provides evidence for the regulators that PPL is complying with its stated postwork



PPL can plan, schedule, assign, and track its multiyear prescriptions for transmission vegetation management. This polygon represents a planned herbicide application area.

inspection targets, and it prevents required rework from falling through the cracks.

Next steps for PPL vegetation management will be to implement certain enhancements such as migrating data into the facilities geodatabase, integrating lidar and imagery solutions, and automating creation of lidar encroachment records.

"Most utilities have not yet had to go through a NERC audit," said Burnside. "The objective is to achieve uniformity for all work, in all our approaches, in our annual plan and audit work. GIS software provides a standard framework and tools to accomplish our tasks."

For more information on GIS for vegetation management, visit esri.com/electric. To learn more about Clearion Software, visit clearion.com.

East Central Oklahoma Electric Cooperative Tracks Asset Data

By Eric Fulcher, 3-GIS

East Central Oklahoma Electric Cooperative (ECOEC) recently found a GIS solution to track and manage asset data. The utility distributes power to more than 32,000 cooperative members throughout 3,000 square miles of Oklahoma.

Traditionally, ECOEC's only asset inventory came from a DataVoice Outage Management System (OMS) and iVue customer information system (CIS). Due to the nature of the DataVoice and iVue applications, neither was designed to provide an accurate spatial repository of ECOEC's assets.

ECOEC creates and edits GIS data and performs electric network tracing with Network Express from 3-GIS.

Using Field Express from 3-GIS, ECOEC can verify and correct data in the field.

The utility needed GIS to provide a central repository for asset information, serve as a flexible mobile solution, and act as an interface to support DataVoice OMS and Milsoft WindMil. ECOEC also wanted simple access to GIS data throughout the cooperative and applications that do not require extensive administration. The new technology also had to be able to minimize training.

After surveying various GIS options, ECOEC selected a solution from Esri partner 3-GIS, a GIS product development and services company based in Decatur, Alabama.

"3-GIS was able to both meet our specific business requirements and provide us with the enterprise-wide functionality we were hoping for," says Dave Sermons, engineering manager for ECOEC.

The 3-GIS Express Solution offers an ArcGIS software-based suite of thin-client asset management tools including Web-based GIS and a flexible mobile GIS application.

ECOEC's existing asset information and recently collected field data were consolidated into Field Express, an ArcGIS Data Model for MultiSpeak. 3-GIS then used standardized integration components, including MultiSpeak and Web services, to share data across ECOEC's existing third-party technology environment. The data was loaded into a MultiSpeak-compliant geodatabase.

ECOEC used Network Express from 3-GIS to resolve asset issues such as reshaping conductors to the appropriate poles. This data is being output to the DataVoice OMS, improving ECOEC's outage response due to the data enhancements.

For more information on GIS for asset management, visit esri.com/electric. To learn more about GIS solutions from 3-GIS, visit 3-GIS.com.

Gas Utility Upgrades to GIS for Outages, Compliance

Jefferson-Cocke County Utility District (JCCUD) is taking advantage of Esri's Small Utility Enterprise License Agreement (SU-ELA) program to improve outage response and better meet regulatory requirements with the use of GIS technology. The Newport, Tennessee, gas utility serves 7,300 homes and businesses in two counties.

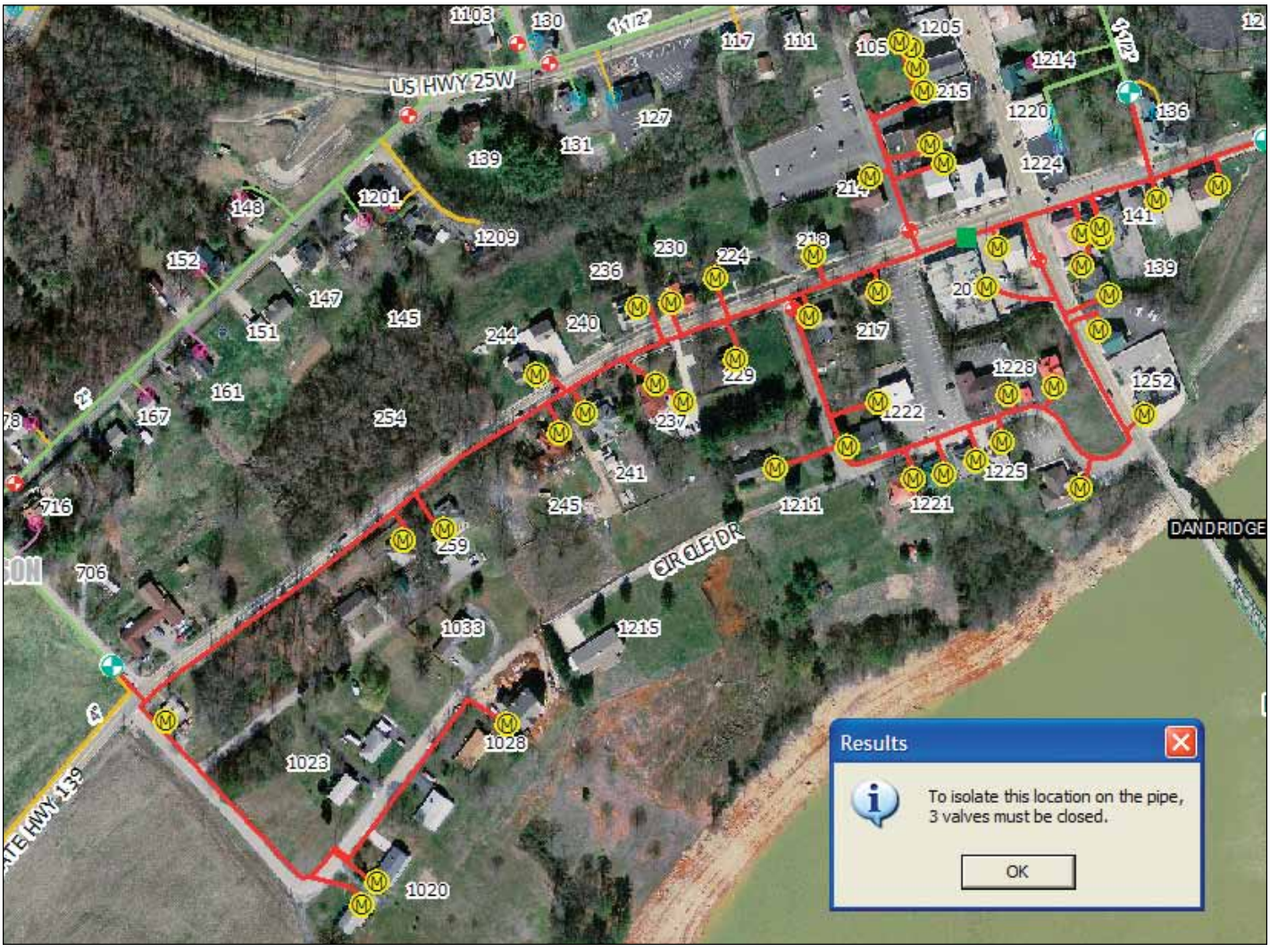
Before the move to GIS, field crews had to rely on paper maps that were costly to produce and often outdated. Now JCCUD can respond to outages equipped with laptops and up-to-date GIS-based maps. Within the GIS, utility staff can view the entire gas network along with customer information, proposed and as-built data, orthophotographs, topographic maps, and street centerlines. Because the initial mobile GIS training session went so smoothly, JCCUD plans to make all work orders paperless by the end of the year.

Access to mobile GIS technology is also helping the gas utility in reporting for regulatory compliance. JCCUD crews will have the ability to input data from the field and synchronize with the home database to ensure accuracy of valve and regulatory station maintenance, as well as odorization and cathodic protection reports.

"Without the small utility ELA, we could not have managed this upgrade," said Larry Masters, engineering/GIS coordinator for JCCUD. "We cut $1,200 this year in the cost of printing map books, not to mention the hours saved working on the map books and returning to the office for sketches. When we looked at the cost of the ELA and what it would save our utility, we saw that we needed to do it."

Through Esri's SU-ELA program, small utilities receive unlimited deployments of Esri's core ArcGIS platform as well as maintenance and support for products, staff training, passes to the Esri International User Conference, and Esri's data models. The small utility ELA program is open to utilities with 100,000 meters or fewer.

For more information on the SU-ELA program and to listen to the SU-ELA podcast, visit esri.com/suela. To speak to an expert, call 800-447-9778, extension 2990.



Jefferson-Cocke County Utility District uses mobile GIS to respond to outages.

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