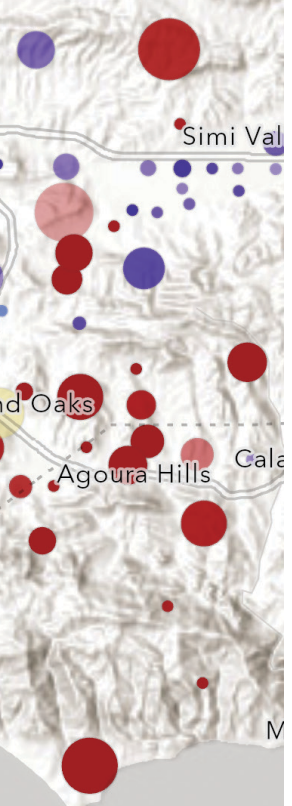


GIS FOR COUNTY GOVERNMENT

Advancing Sustainable and Resilient Approaches



Foreword by National Association of Counties (NACo)

The nation's 3,069 county governments represent far more than just lines on a map. Those lines play an important role in strengthening healthy, safe, and vibrant counties across America.

Nearly all county government programs and services start from a neighborhood or geographic context—for example, tax assessments, human services, transportation, emergency response and management, public safety, community development, and elections.

A solid geographic framework supports decision-making with data and analytics, resulting in greater efficiency and better services. Geographic information system, or GIS, technology has become instrumental in translating data and information into visual, actionable knowledge.

GIS has evolved from a conceptual approach within niche departments and programs to a widely used enterprise solution. The past few years have seen the proliferation of new apps, analysis tools, collaboration platforms, and operations dashboards that have led to integrating GIS solutions into counties' daily workflows.

Many county leaders have embraced GIS to tackle complex challenges and achieve results for our residents. GIS creates opportunities to facilitate cross-department and intergovernmental collaboration and open new gateways for dialogue on how to best meet the public's needs. Recent advancements in GIS are helping counties modernize operations; become more resilient; and pursue equitable, inclusive policies.

As you delve into this booklet, you will find a variety of compelling GIS examples from counties of all types and sizes. We are proud to have partnered with Esri to publish this resource—just one manifestation of NACo's long-standing partnership with this trailblazing company.

We encourage you to explore the additional resources we have developed in partnership with Esri, including the Technology Guide for County Leadership; which also focuses on GIS opportunities for counties.

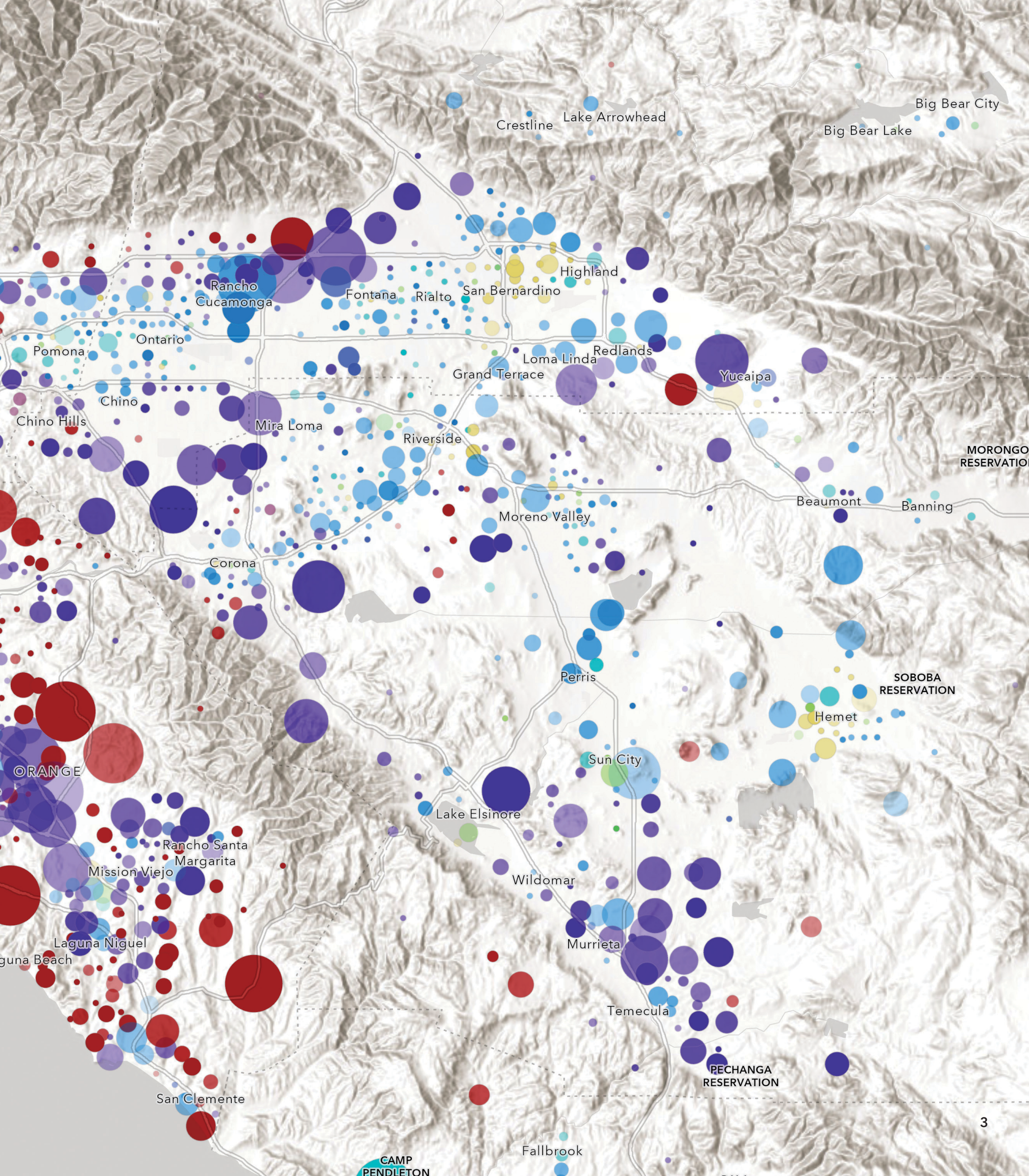
NACo and Esri hope this booklet will help county leaders better understand opportunities for GIS to be applied in the public sector and the business values any community can develop with this technology.

County geographies are places where people live, work, and play. GIS technology provides a means to examine these places and explore how we can constantly improve our communities and our residents' quality of life.



Matt Chase, CEO/Executive Director, NACo





ORANGE

Rancho Cucamonga

Pomona

Chino Hills

Chino

Corona

Rancho Santa Margarita

Mission Viejo

Laguna Niguel

Laguna Beach

San Clemente

CAMP PENDLETON

Crestline

Lake Arrowhead

Big Bear City
Big Bear Lake

Highland

Fontana

Rialto

San Bernardino

Grand Terrace

Loma Linda

Redlands

Yucaipa

Mira Loma

Riverside

Moreno Valley

Beaumont

Banning

MORONGO RESERVATION

Perris

SOBOBA RESERVATION

Hemet

Sun City

Lake Elsinore


Wildomar

Murrieta

Temecula

PECHANGA RESERVATION

Fallbrook



"GIS is more than mapping. It brings together geographic knowledge to help make intricate and abstract problems more real and concrete, and while it does not simplify problems, it does help manage their complexity more effectively—far better than maps alone."

Jack Dangermond
President, Esri

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Visionary County Leaders Pave the Way

Pioneering organizations that understood and embraced geographic information system (GIS) technology for the first time were subscribing to a concept of a geographic approach in changing the way they addressed their work. Early adopters saw the technology as a means of modernizing workflows or rethinking how they tackle the world's most complex issues. GIS is made up of two guiding principles. First, GIS is a concept—an acknowledgment that location brings a unique perspective to organize data and information and apply spatial thinking to provide new insights. The second principle is that GIS is a technology—it allows organizations to build and connect data based on geographic tags and provides a system to apply spatial thinking. Understanding the power of spatial thinking propelled organizations from project to departmental to enterprise and, eventually, societal GIS.

As GIS technology moved from consulting services running on mainframes to today's in-house use of geospatial tools, county governments were among the leaders that paved the way for others to follow. Some applied the spatial technology to land records, urban planning, engineering, public works, law enforcement, and health care. Today, Esri® software is used by over 300,000 organizations in 160 countries. The organizations listed here on the right were among the earliest adopters in the Esri community. They helped write the guidelines of how GIS would become a critical infrastructure for governments worldwide.

Recognizing the First Group of Counties to Embrace GIS

County of Los Angeles, California
County of Loudon, Virginia
County of San Bernardino, California
Borough of North Slope, Alaska
County of Orange, California
County of Utah, Utah
County of St. Louis, Minnesota
County of Washoe, Washington
County of Boulder, Colorado
County of Randolph, North Carolina
County of Riverside, California
County of Broward, Florida
County of Pasco, Florida
County of Miami-Dade, Florida
County of Suffolk, New York
County of Kenton, Kentucky
County of Cook, Illinois
County of St. Johns, Florida
County of Cabarrus, North Carolina
Douglas County, Colorado
County of Johnson, Kansas
County of Maricopa, Arizona
Borough of Matanuska Susitna, Alaska
County of Nash, North Carolina
County of Pima, Arizona
County of Fulton, Georgia
County of Lexington, South Carolina
County of Palm Beach, Florida
City and County of Honolulu, Hawaii
County of Lancaster, Nebraska

GIS: A Critical Infrastructure for Counties

Governments are the first users of GIS technology and have been using it the longest. This is because the challenges governments face are spatial problems. County governments must understand where county-owned property is located, where easements are in the right-of-way, where crews are needed, where fleets are located, where additional services or resources are needed, where the underserved or unserved populations are, and more. For county governments, GIS provides a means to question how we can constantly improve our environment; infrastructure; safety; health; economies; planning; engineering; and, ultimately, our world.

In addition to the traditional areas GIS supports such as land records, planning, public works, and public safety, GIS is moving into new areas. Some of the latest GIS capabilities are providing more county departments with the opportunity to leverage and benefit from GIS technology.

GIS is no longer a back-office system. At its core, GIS is a technology that can push data into more people's work. Health professionals, field crews, economic developers, housing authorities, broadband managers, and others, are leveraging GIS and its capabilities to supplement their workflows. GIS is initiating data-driven decisions within all county departments. Everyone is becoming a GIS user and applying the geographic approach at scale.

The real return on investment realized by county governments came when the GIS data was opened to all departments. It helped open new approaches, added alternative viewpoints, and stimulated cross-departmental collaboration. The use of GIS to perform analysis, receive citizen input, monitor project progress, and communicate effectively is on the rise. County governments are getting GIS tools into the hands of nearly every department. In doing so, county governments are tackling topics such as homelessness with the support of every department that affects these humans in crisis. Public works, housing, planning, economic development, law enforcement, and health and human services can all share their perspective and their role and attack the issue from multiple disciplines.



GIS Makes It into People's Living Rooms

The events during the coronavirus 2019 (COVID-19) pandemic opened GIS to a whole new world of individuals that saw the power of maps to communicate what was going on in the world and more importantly in our own backyards. Maps and analysis became commonplace in the news and on websites explaining the cycles of the spread of the coronavirus. Apps paved the way to share vaccination locations, businesses still open for business, and where infrastructure like broadband needed to be stood up immediately to help keep children educated.

The events of the pandemic accentuated the business value GIS brought to counties when approached as an enterprise- or organization-wide mission-critical infrastructure. Cobb County, Georgia, and Maricopa County, Arizona, raised the bar in implementing GIS. Each of these counties boasted the launch of more than 140 applications during this precarious time period. These apps touch on health and human services, law enforcement, parks and recreation, public works, departments of transportation, economic development, and several other departments. Their work was supporting homelessness solutions; safe streets; economic recovery; operations dashboards; efforts to connect residents to outdoor recreation; and of course, better interaction between cities and the county offices. Organizations like Fairfax County, Virginia, followed similar patterns and were able to address racial equity, civic inclusion, and climate change.

Inspiring What's Next for Counties

This booklet highlights many examples of how county governments are using GIS technology to help modernize their operations, remain agile, and create equitable and inclusive policies. These examples show successful applications of GIS that counties have implemented to solve complex problems. The stories in this booklet are from your peers across the country and hopefully will inspire you to replicate some of these best practices into your own organization.

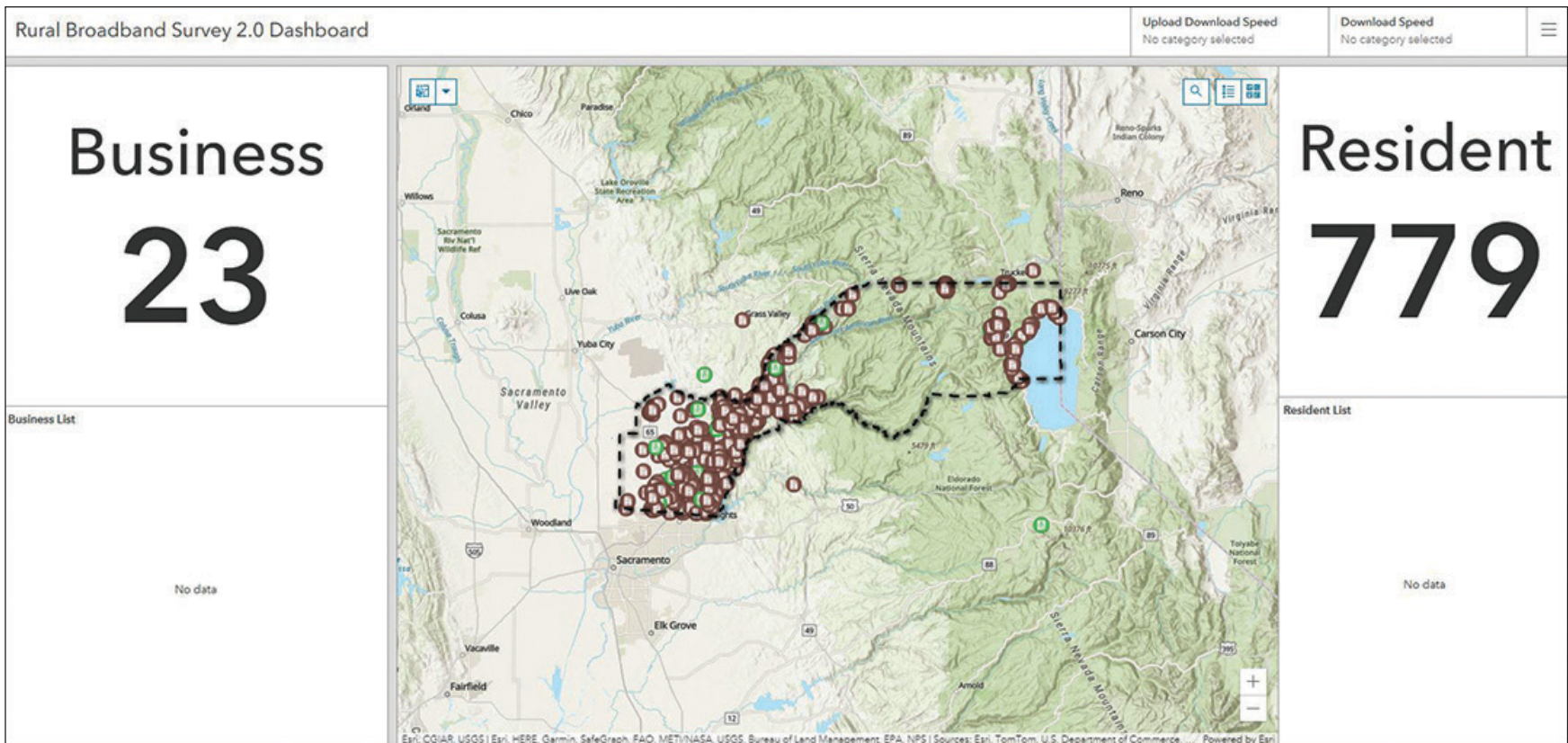
We have divided this booklet into two main sections:

- Emerging Trends will highlight some of the new approaches and advances in GIS technology that we are seeing and encourage you to keep an eye on. This section includes the early adopters and pioneering organizations that seize the opportunity to embrace new capabilities, functions, and integrations that others should commend and aspire to.
- County Workflows highlights how counties are modernizing their approaches to traditional disciplines through GIS.

Broadband

Broadband is essential for effective economic growth, education, workforce development, telehealth, and more. While access to broadband is a necessity for communities to compete in the global economy and provide equal opportunity for residents, COVID-19 has increased awareness of gaps in service, particularly for rural areas and underserved populations. To address broadband challenges, cities can use GIS to identify service levels through accurate data collection, incorporate equity considerations, and present strong evidence of broadband needs to providers and funding agencies. By creating a more accurate understanding of broadband access with the use of GIS, communities can better prioritize broadband investment.





Placer County, California, Advances Broadband Strategy with GIS

Placer County has always accepted GIS as a foundational tool, which staff have used to meet many challenges—like addressing homelessness in the county. Broadband was the next challenge, and the information systems team was ready with the geospatial infrastructure to address it.

For Placer County, rural broadband advocacy is a top priority, and closing the gap in the digital divide for the county's residents was the team's main goal. This Northern California county's broadband plan is designed to create economic opportunity through a connected, countywide strategy.

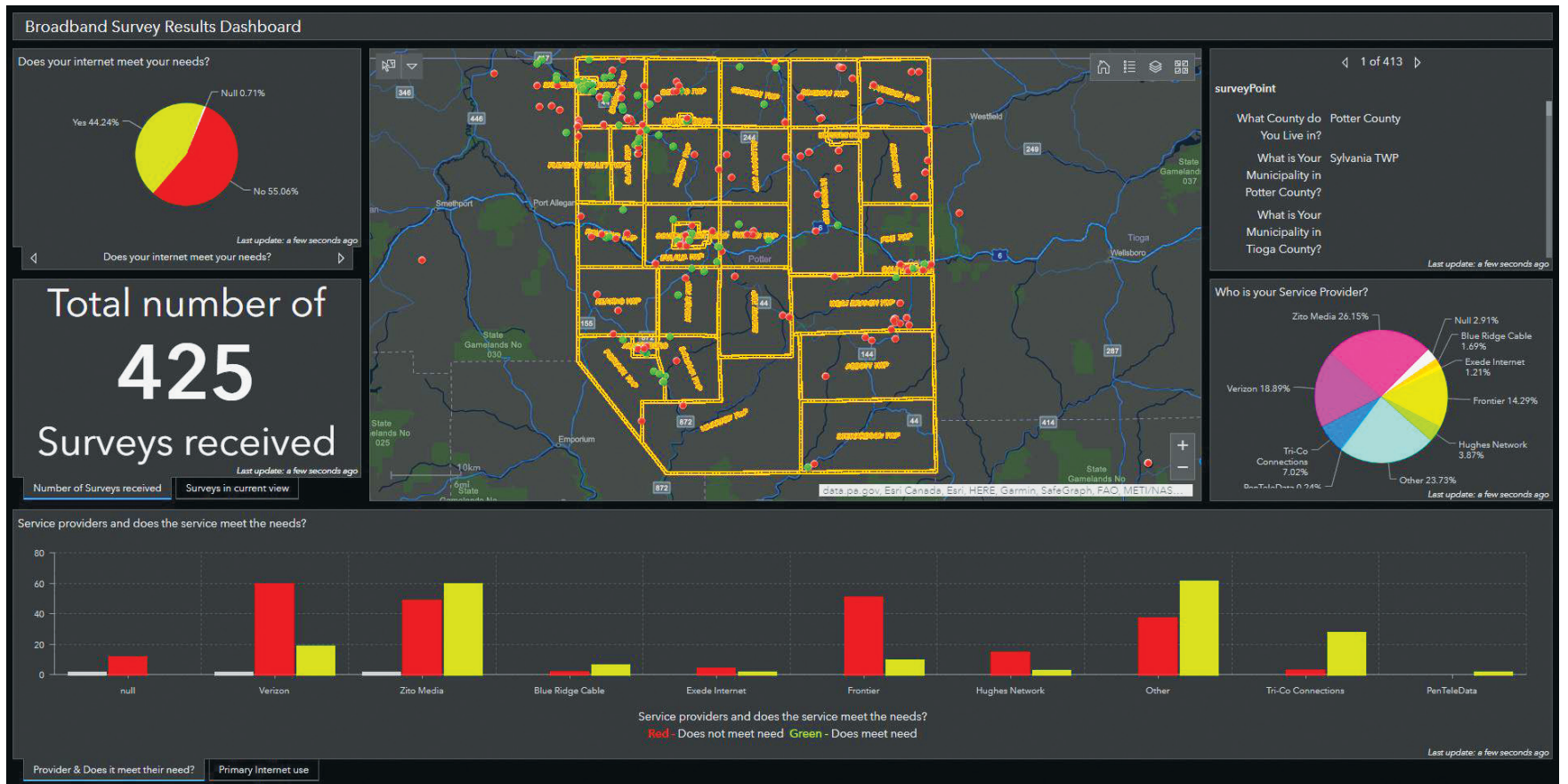
To start to develop a more holistic understanding of the community, the team determined the GIS work would include a two-step process. First, the county needed to crowdsource additional data

and gain insight; then, the county would feed this information to dashboards that decision-makers could use to better allocate resources and determine priorities.

While working to collect data and understand the county's needs, staff members are looking into things like how they can enable cross-departmental collaboration. For example, they are looking to find a mechanism rooted in GIS to coordinate construction with other capital projects while upgrading the county's current broadband service. Staff hope to be able to take data from the transportation team and identify the parts of the county with private roads versus where there is public infrastructure—this information will help prioritize the rollout of modifications to existing infrastructure. For Placer County, GIS plays a part in the county's vision.

"Solving for accuracy in planning was a critical component of our approach. For us, it starts with geospatial data. We must see and understand the magnitude of the [issues], know where those issues are, and ultimately try to determine an equitable distribution across our rural districts."

Dieter Wittenberg
Manager, Information Technology, Telecom ,
Placer County, California



Potter County, Pennsylvania, Crowdsources Authoritative Data from Residents to Improve Broadband Access

Providing broadband service helps address the digital divide; offers access to telemedicine; and provides economic opportunities for education, jobs, and business operations. Extending broadband services to communities of color as well as small and rural communities without large budgets has become a national priority. In rural Pennsylvania, Potter County is addressing this issue by engaging residents to crowdsource GIS data to identify gaps in coverage and support the expansion of broadband coverage.

To meet this demand, Potter County leaders decided to involve residents, businesses, schools, churches, and neighborhood groups in gathering GIS data, crowdsourcing

information from residents on their broadband speed or lack thereof. Using ArcGIS® Survey123, county staff conducted a public survey to gain more data points to address the coverage gaps. The crowdsourced data helped populate maps to visualize where services are located, where there is a lack of service, and which communities are disadvantaged.

The data from the survey responses is visualized in a dashboard for county leaders and the public to review and see where there are gaps in coverage. Reducing the cost per square mile is the key to bringing service to those who need it. The county is now able to use this information to negotiate with area service providers and identify where the need is greatest to prioritize investment.

“Potter County developed a dashboard that is fed by survey results. The survey is perpetually open and shared with the decision-makers in our area. It has evolved into a living and breathing report for county leaders, employees, and community residents.”

William Hunt
Director, Planning and GIS,
Potter County, Pennsylvania

A woman with long blonde hair, wearing a red textured sweater, is seen from behind with her right arm raised high, hand open. In the background, other people are blurred, including a man in a blue shirt and a woman with long brown hair. The scene appears to be a meeting or a public gathering.

Civic Engagement

Governments and residents rely on each other to meet the community's needs and shape its future. What occurs in a community is inherently geographically personal; everyone who lives in a place cares about that place. Civic engagement is important for all governments in order to ensure no community is at risk of falling behind. Esri's GIS civic engagement tools provide an opportunity to open two-way communication with residents, gather feedback, and take action to achieve inclusion.

Equitable Property Value | Polk County, Minnesota Home Hub Disclaimer

Sales Comp Finder ... locate comparable sales in our community

Locate Sale

Search for an address or locate on map

Find parcel, address, or sct

Show results within 1 Miles

0 15

Select filters to apply

Sales

Adjusted Sale Amount is between

100000 and 150000

Year Built is between

House Style is any of

3 selected

Sale Date is between

NUTC Description is any of

0 selected

711 BROADWAY ST N, 82.00240.00

Parcel ID: 82.00240.00
Property Address: 711 BROADWAY ST N

Sale and Value Information
Adjusted Sale Amount: **\$147,000.00**
VCS Value: **\$144,000.00**
NUTC Description: **Less than Minimum Downpayment with CD longer than 1 year**

Sale Price per Deeded Acre: \$
Sale Price per Tillable Acre: \$
Est. Market Value from Sale: \$144,000.00

Recording Details
eCRV: [407,122](#)
Sale Date: 9/11/2015, 1:00 AM
Buyer: RICK ANTHONY R
[Zoom to](#)

Esri Community Maps Contributors, State of North Dakota, Esri, HERE, Ga... **esri**

Fostering Trust between Taxpayers and Government

Polk County, Minnesota, is enabling property owners and taxpayers to better understand its property assessment and valuation data through the Equitable Property Value Hub, a one-stop shop that delivers a combination of data and information in the form of apps and maps. Providing self-service applications to taxpayers results in fewer in-person visits and more staff time allocated to maintaining and editing parcels and valuating property fairly and equitably. A hub site is the location for what governments want to communicate to the public: tax and property information,

maps, assessment calendars of activities, appeals information, explanations of how property is assessed, and more.

Mapping applications make it simple for residents to look up and understand landownership and see where activities are occurring.

Polk County continues to improve its services to its residents, leveraging the Equitable Property Value Hub to connect them with the county's authoritative land records data.

"Deliver a one-stop shop using the latest GIS technology. This not only improves public trust and confidence in your work, it also improves stakeholder access to information and your staff."

Brent Jones
Industry Manager, Land Records and Cadastre, Esri



Renville County

Empowering our community to live better

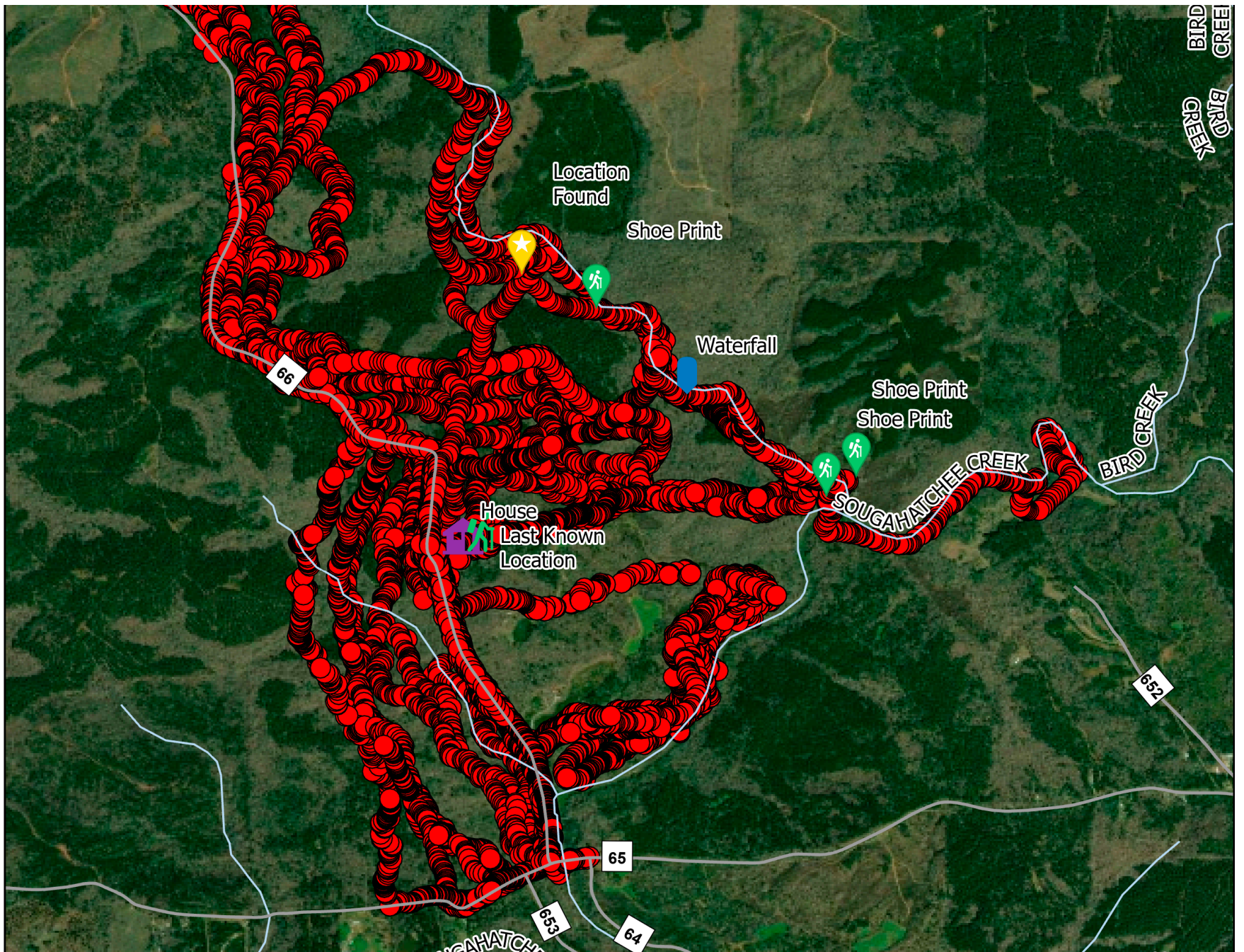
The Renville County Hub transforms how we engage and collaborate with our community using data-driven tools for innovation.



Providing Taxpayers in Renville County with Self-Service Maps and Apps

In today's world, the general public expects information to be easily accessed, visualized, and understood—on any device, at any location. With a hub site created using ArcGIS HubSM, Renville County, Minnesota, is meeting these expectations for its taxpayers. One focal point of the county's hub site is serving land record information to residents via easy-to-use applications. One of these apps, Tax Parcel Viewer, allows users to intuitively navigate to a property of interest and find the answers to questions about property tax.

To enhance the self-service experience, Renville County integrated its document management system with GIS. All recorded documents connected to a property can be accessed via an app on smartphones. Thus, taxpayers in Renville County have self-service access to a complete and transparent view of property information. With the hub site, the county has been able to grow its taxpayer self-service offering to share valuable land record documents.



Homing in with GIS

When a four-year-old girl and her dog went missing in a forested area of Lee County, Alabama, location-sharing ArcGIS software was called to the scene to coordinate the search and rescue efforts remotely and in real time. Due to the county's rural setting and wooded terrain, location-sharing capability was critical.

The search was a massive undertaking, with hundreds of volunteers and multiple agencies participating in the operation. When searchers came across the girl's footprints on the second

day, geotagged pictures of the evidence were taken and uploaded to ArcGIS Pro. The response team manually mapped the girl's direction of travel based on the photo locations and was able to project where she had likely gone.

Access to ArcGIS Pro and ArcGIS Field Maps allowed the search and rescue team to hone in on a specific area of interest. By narrowing the search area, the team was able to locate the girl—and her dog—unharmful, on the third day.

“Search and rescue [teams] should have access to that [capability] nationwide. In this day and age, to conduct a proper search and rescue mission in the woods, you need [an] ArcGIS location-sharing map.”

Ken Busby
GIS coordinator of Lee County,
Alabama

County Service Centers and Facility Locations

Address, Service Location, [Search]

(1 of 2)

Location: Benson Service Center

Address:
126 W. 5th Street
Benson, AZ 85602

Services:
[Assessor](#)
[Constable](#)
[Facilities](#)
[Health and Social Services](#)
[Superior Court Divisions](#)
[Adult Probation](#)
[Sheriff](#)

Zoom to [Map]

Building Description	Address	City	Zip Code	Department 1	Department 2	Department 3	Department 4	Department 5	Department 6	Department 7	Department 8	Department 9	Department 10	Department 11	Department 12
Benson Service Center	126 W. 5th Street	Benson	85602	Assessor	Constable	Facilities	Health and Social Services	Superior Court Divisions	Adult Probation	Sheriff					
Bowie Service Center	201 N. Central	Bowie	85605	Superior Court Divisions	Library	Facilities									
Cochise County Courthouse	101 Quality Hill	Bisbee	85603	Court Administration	Clerk of the Superior Court	Superior Court Divisions	Law Library	Court Administration							
County Service Center	1012 G Avenue	Douglas	85607	Assessor	Superior Court Divisions	Sheriff	Health and Social Services	Facilities	Adult Probation	Court Administration	Justice of the Peace				

14 features 0 selected

All rights reserved

Cochise County Service Centers and Facilities Locator

Accessing services is not always easy to navigate, so Cochise County, Arizona, wanted to make this process easy for its residents. Leveraging GIS tools, the county built a web mapping application that displays the county service centers and facilities within Cochise County, including the Health and Social

Services department. Residents can click on a service center or facility point on the map and a window will display department information for the building, including a link to the department web page. Through the use of GIS, the county is improving its operational abilities by leveraging the value of geographic information.

Sustainability

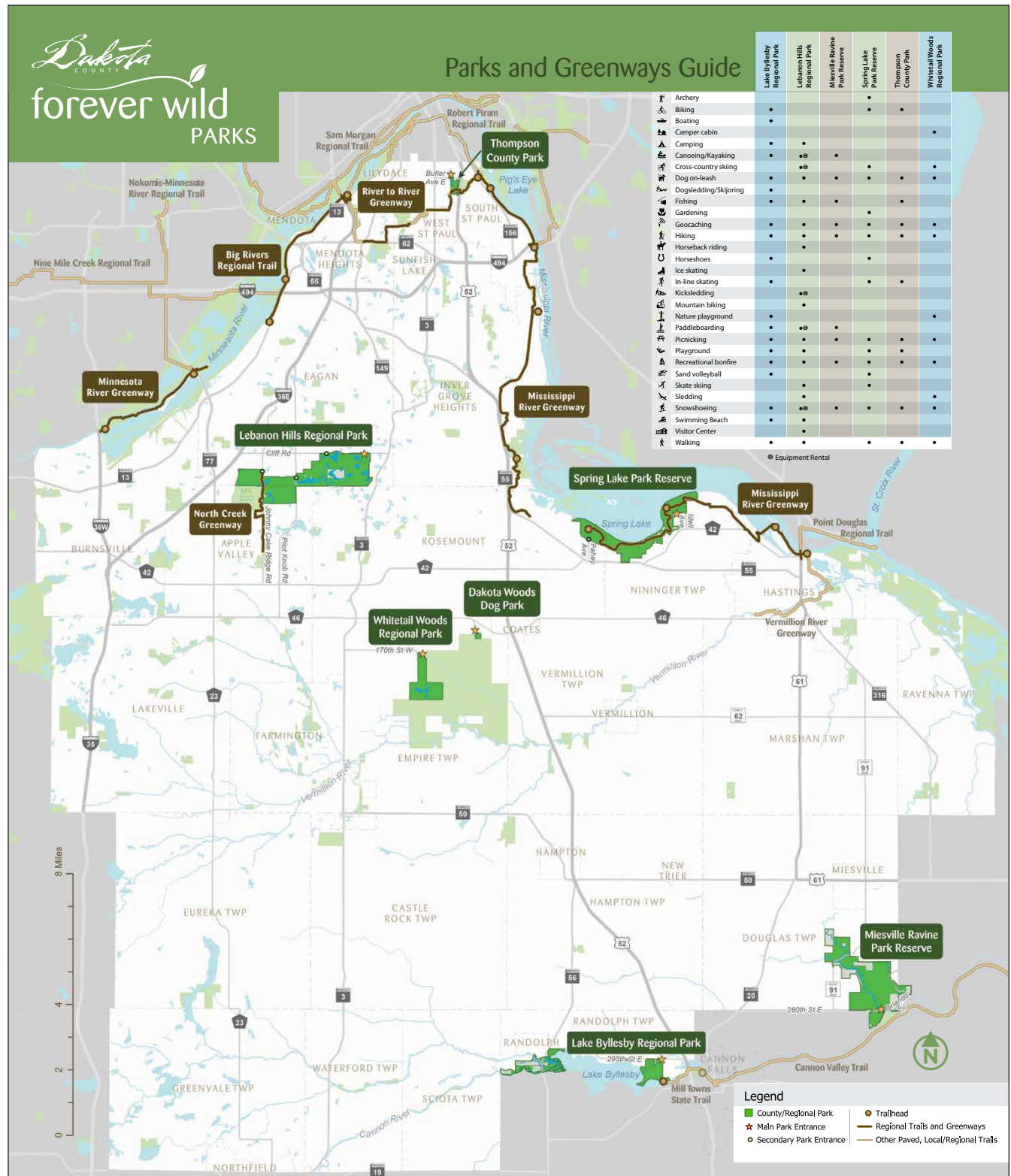
Environmental agencies were some of the early adopters of Esri's world-leading GIS technology, using it to preserve and protect the earth through automated mapping and analysis. Esri location intelligence solutions allow organizations to monitor and visualize valuable resources in real time, deliver analysis and science-based support for critical decision-making, and respond to changing needs in real time. Governments are using GIS to monitor environmental changes, which allows them to respond in real time.



Dakota County Parks and Greenways

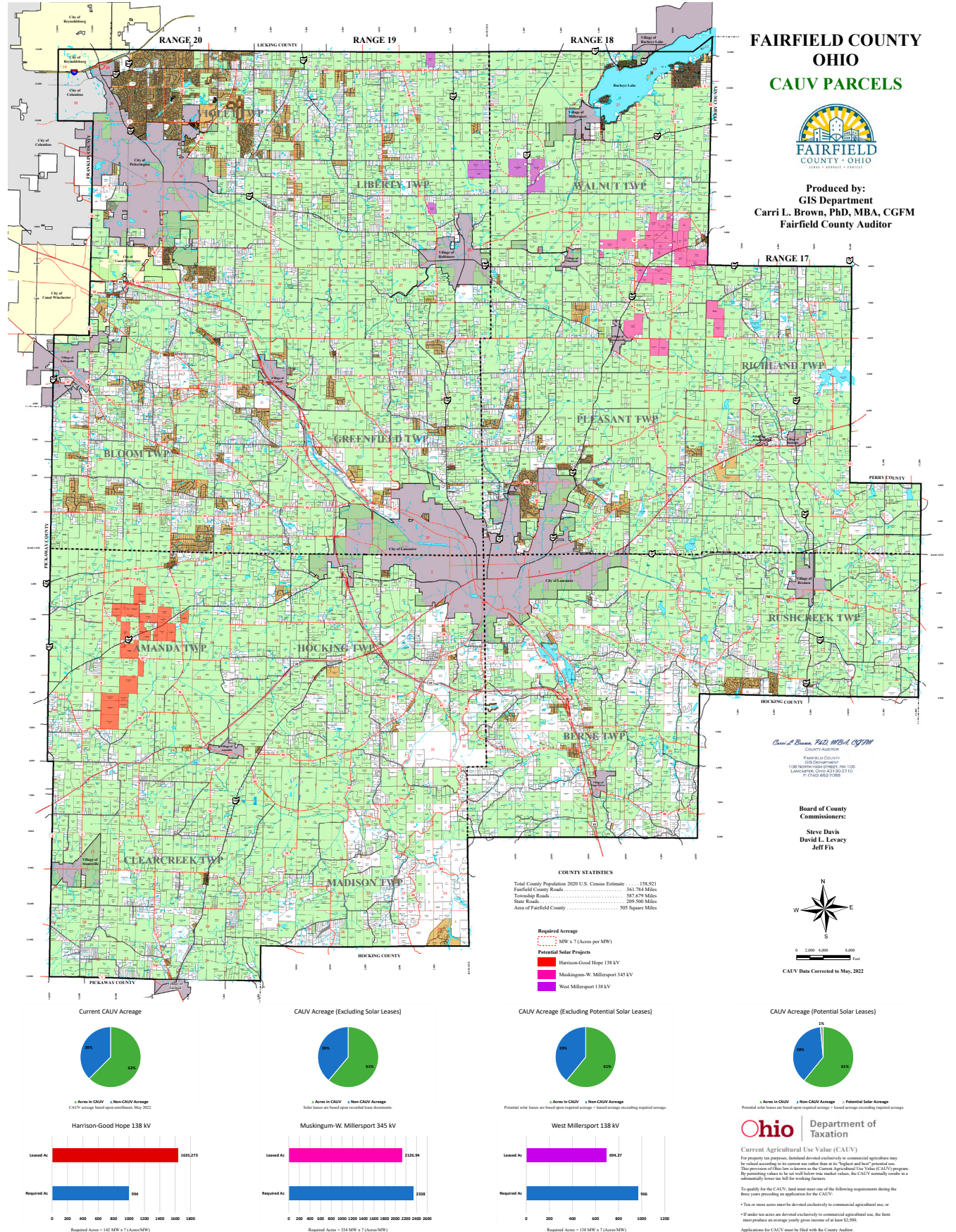
Dakota County Parks in Minnesota improves lives by providing high-quality recreation and education opportunities in harmony with natural resource preservation and stewardship. Greenways and trails connect communities to one another and to rivers, prairies, forests, lakes, bluffs, and wetlands.

To provide residents with an easy-to-use guide of Dakota County's parks and greenways, the county leveraged GIS tools. Not only was the county able to pinpoint where parks were located, but it was also able to map the miles of scenic regional trails and greenways that showcase the Minnesota and Mississippi Rivers; connect communities; and provide safe ways for residents and visitors to bike, walk, and hike through the county. Keeping track of the parks and greenways also allows the county to easily preserve the environment by having this data accessible in one central location.



County CAUV Parcels and Potential Solar Project Impacts

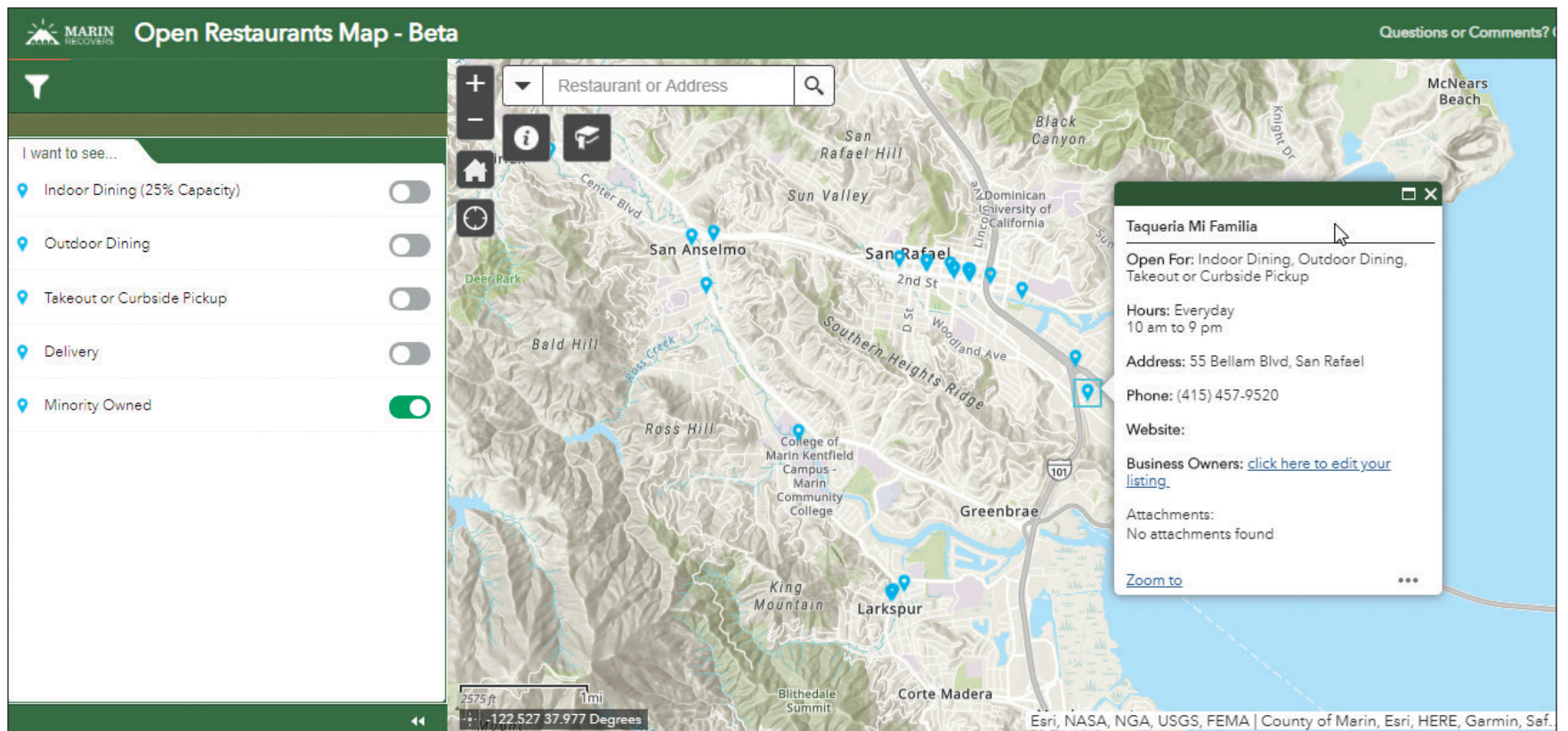
This map was created to highlight the amount of acreage in Fairfield County, Ohio, that is enrolled in the Current Agricultural Use Value (CAUV) program, and the impacts of potential solar projects. Data was gathered from recorded lease holdings to look at the impact of CAUV acreage lost to potential solar projects that are planned in the county. This map also shows the amount of acreage each solar project currently holds by lease, and the minimum projected amount for the project.





Equity

Governments across the nation are addressing institutional racism to ensure opportunities for all their constituents—and geography is critical to the solution. They are applying a geographic lens to disparities in their jurisdictions, on topics such as the digital divide, economic opportunity, health equity, environmental justice, and education. Location helps governments improve communications, allocate resources, and improve public policy. Governments are applying an equity lens to programs, services, and initiatives by using maps, spatial analysis, and dashboards to ensure equitable experiences and outcomes for vulnerable communities.



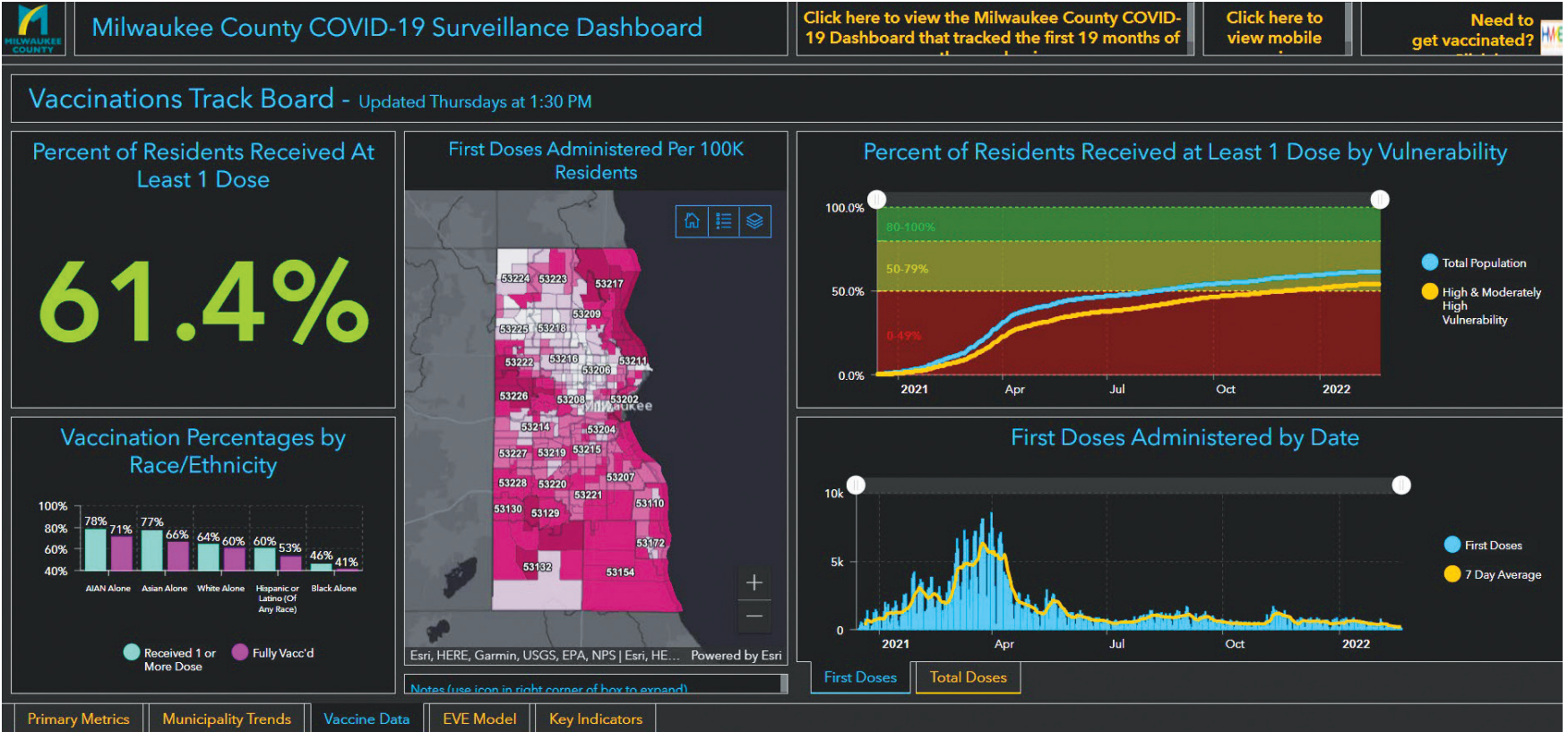
Marin County Leverages GIS to Support Businesses Owned by People of Color

To support the restaurant industry during the pandemic, the Northern California city of San Rafael created an interactive online map of open restaurants with an added map layer highlighting eateries owned by proprietors who are Black, Indigenous, (and) People of Color (BIPOC). By using the ArcGIS Survey123 app, a simple and intuitive, form-centric data-gathering solution, business owners can add their restaurant to the map, update their listing, and designate whether it is BIPOC owned. In response to the positive community feedback, the effort was expanded across all of Marin County. Since the launch of the Open Restaurants Map in June 2020, more than 140 small and BIPOC-owned businesses across Marin County have been added. In the first two months of going live, the map accumulated over 8,200 views.

The public-facing web map gives local businesses a way to connect with residents, letting them know about open status, the availability of outdoor seating, and takeout and delivery options. The region's commitment to supporting racial justice influenced the inclusion of the BIPOC-owned component of the Open Restaurants Map, providing an easy way for residents to locate and support self-identified restaurants owned by people of color.

"Offering this map to businesses [that] are struggling has been one of several other support efforts that have helped show our businesses that we care and we're here to help."

Danielle O'Leary
Director, Economic Development and Innovation, City of San Rafael



Milwaukee County, the First Jurisdiction in the Nation to Declare Racism a Public Health Crisis

Milwaukee County is Wisconsin’s most populous county and—with some of the state’s largest racial health disparities—one of its least healthy. So the county has adopted the vision that by achieving racial equity, it will become the healthiest county in Wisconsin. One of the most innovative approaches the US has seen to address health inequities occurred in 2019, when Milwaukee County became the first jurisdiction in the nation to declare racism a public health crisis.

To create targeted solutions to address racial health equity, the county turned to GIS technology. With GIS, staff members were able to rely on data that showed them where health and racial disparities were throughout the county so that they could allocate resources to these impacted areas. First, they mapped

COVID-19 cases by race and ethnicity to tailor interventions to address the pandemic equitably. From their findings, they were about to convince the State of Wisconsin to open vaccine eligibility early for residents of the most vulnerable communities.

With the use of GIS, Milwaukee County is working toward becoming the healthiest county in Wisconsin and is moving forward with additional measures to address racial inequities.

“There is a hunger for GIS insight now. Stakeholders throughout the county see how GIS helps create targeted solutions for their problems, and we are seeing a lot more cross-divisional collaboration.”

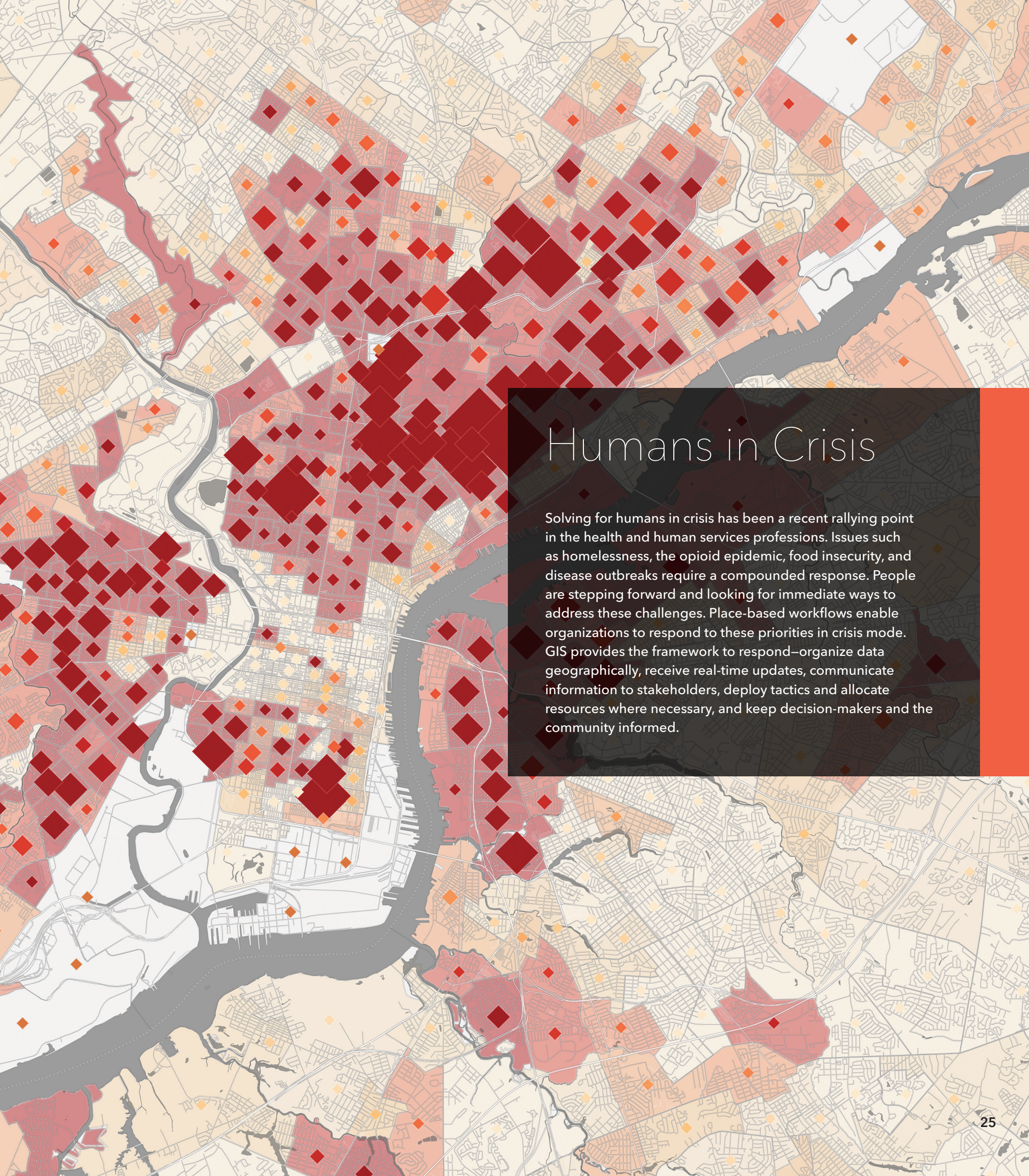
Zac Swingen
GIS Specialist for Milwaukee County Office of Emergency Management



Leveraging GIS to Ensure Diversity, Equity, and Inclusion throughout the County

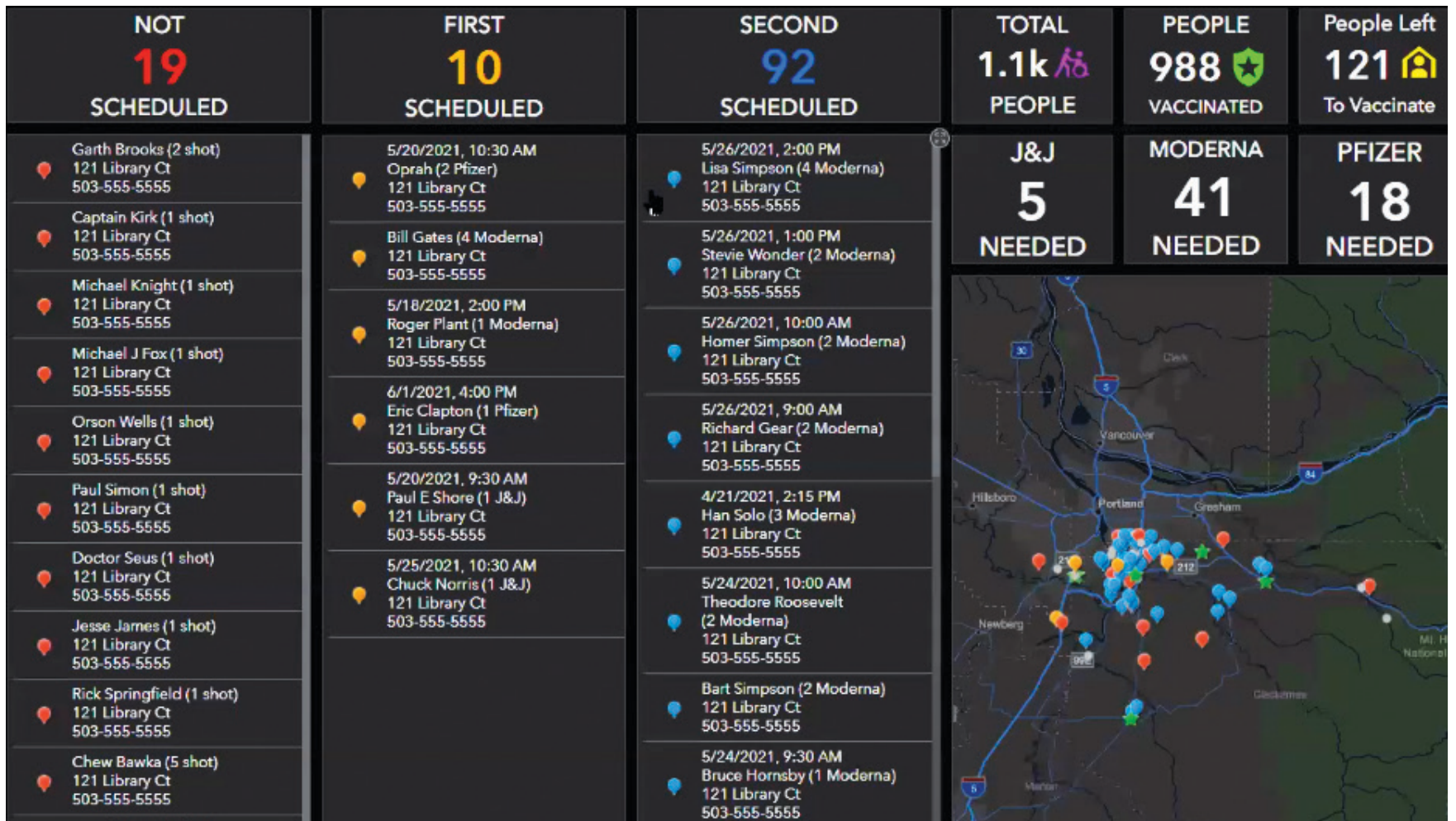
Douglas County, Nebraska, is the state's most populous county, home to well over one-fourth of Nebraska's residents. In support of equity, the county considers all residents when hiring new employees. To understand its population demographics, Douglas County turned to GIS technology.

The county leveraged a dashboard—a visual display, created using ArcGIS Dashboards, that combines tabular and spatial information in an easy-to-read format. Presenting this data visually assists county leadership in understanding its staff and setting goals to increase diversity, equity, and inclusion (DEI) within departments and across the entire workforce.



Humans in Crisis

Solving for humans in crisis has been a recent rallying point in the health and human services professions. Issues such as homelessness, the opioid epidemic, food insecurity, and disease outbreaks require a compounded response. People are stepping forward and looking for immediate ways to address these challenges. Place-based workflows enable organizations to respond to these priorities in crisis mode. GIS provides the framework to respond—organize data geographically, receive real-time updates, communicate information to stakeholders, deploy tactics and allocate resources where necessary, and keep decision-makers and the community informed.



Clackamas County, Oregon Vaccinates Residents 50 Times Faster by Using GIS

Clackamas County is the third-largest county in Oregon, with a population of well over 400,000 people and an area of 1,883 square miles. Attempting to return to normalcy in the wake of COVID-19, the county knew vaccines would be the key to keeping the public safe while moving to the next phases of economic recovery. The county set a goal of having 70 percent of the community vaccinated but knew that this would require a solution that supported a data-driven approach to serve its large population.

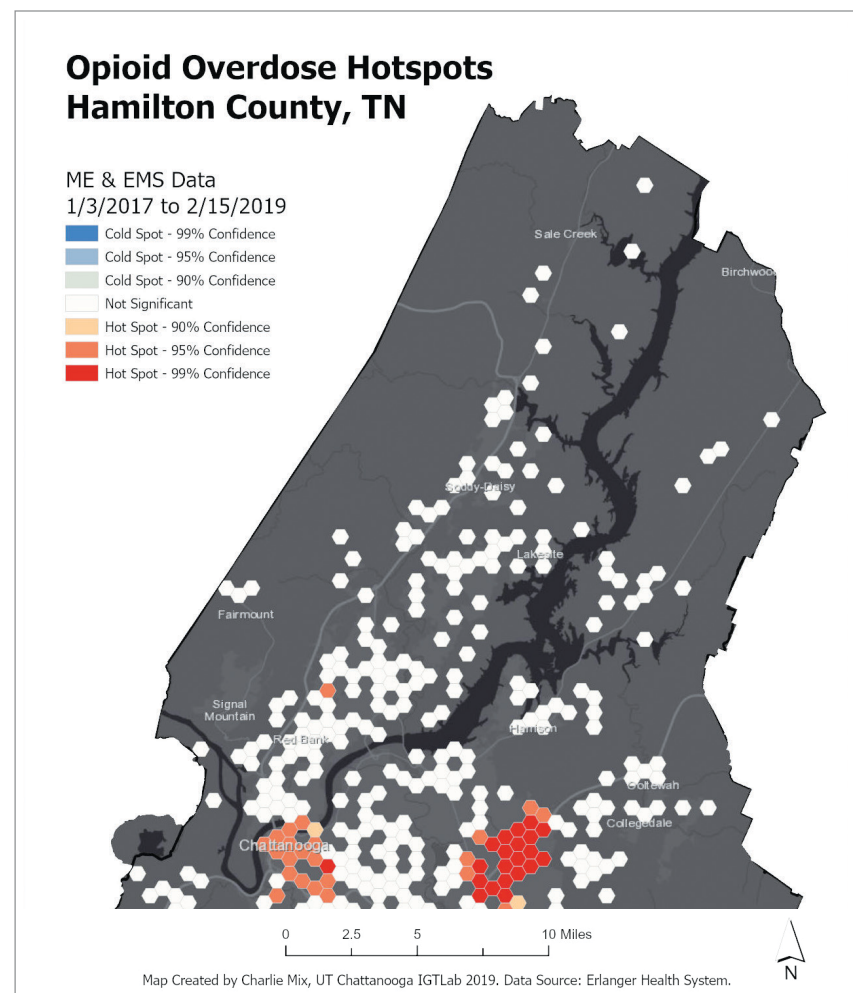
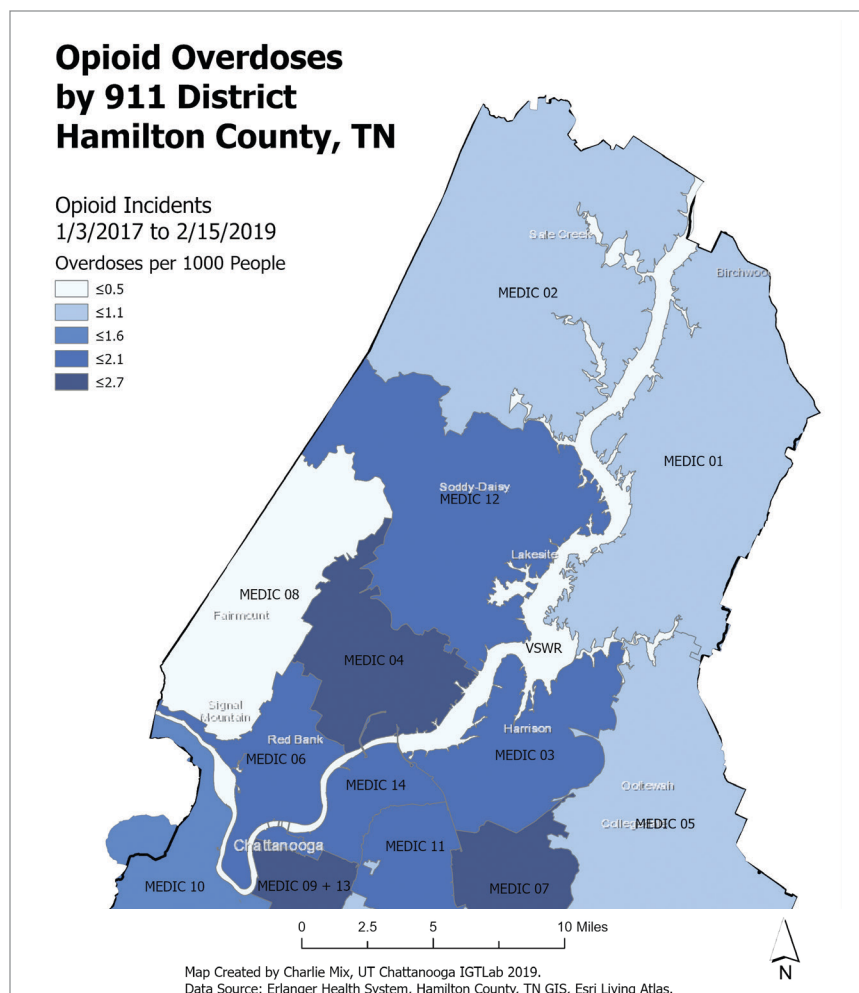
The county health department turned to GIS technology for support. When Clackamas County first started its at-home vaccinations, residents were sent a sign-up link via email. But the volume of requests was unmanageable, as this information was then kept on spreadsheets, a practice that was not sustainable.

County staff then turned to ArcGIS Survey123, a mobile-friendly survey app that gathers data, to schedule appointments, which then generated a location on a web app with all the necessary patient information. The new GIS-enabled workflow updates data from various teams and applications automatically via a dashboard created using ArcGIS. Management staff members were able to refresh their dashboard anytime to analyze staffing needs and communicate project status.

While many communities face the challenge of reaching their remaining unvaccinated population, Clackamas County realized that a geographic approach simplifies the process. Using GIS, the Clackamas County at-home vaccinations program reached its goal 50 percent faster than staff initially expected.

“Through the use of Esri’s ArcGIS software, we were able to reduce the time of in-home vaccinations—that was expected to take six months—down to three months.”

Kim La Croix
Public Health Program Manager,
Clackamas County, Oregon



Spatial Analysis of Opioid Use Gets Lifesaving Medicine to the Right Places

In Hamilton County, Tennessee, approximately 106 people died from overdoses and other drug-related issues in 2019, and that number increased by 50 percent in 2020 to about 160, according to the medical examiner. Fortunately, overdose treatments are effective—particularly naloxone, a medication that quickly reverses the effects of opioids. Naloxone is easy to administer and has been used for many years as an immediate treatment for opioid overdoses. The rise in opioid overdoses prompted area health organizations to search for a way to get the state's first leave behind program for naloxone up and running.

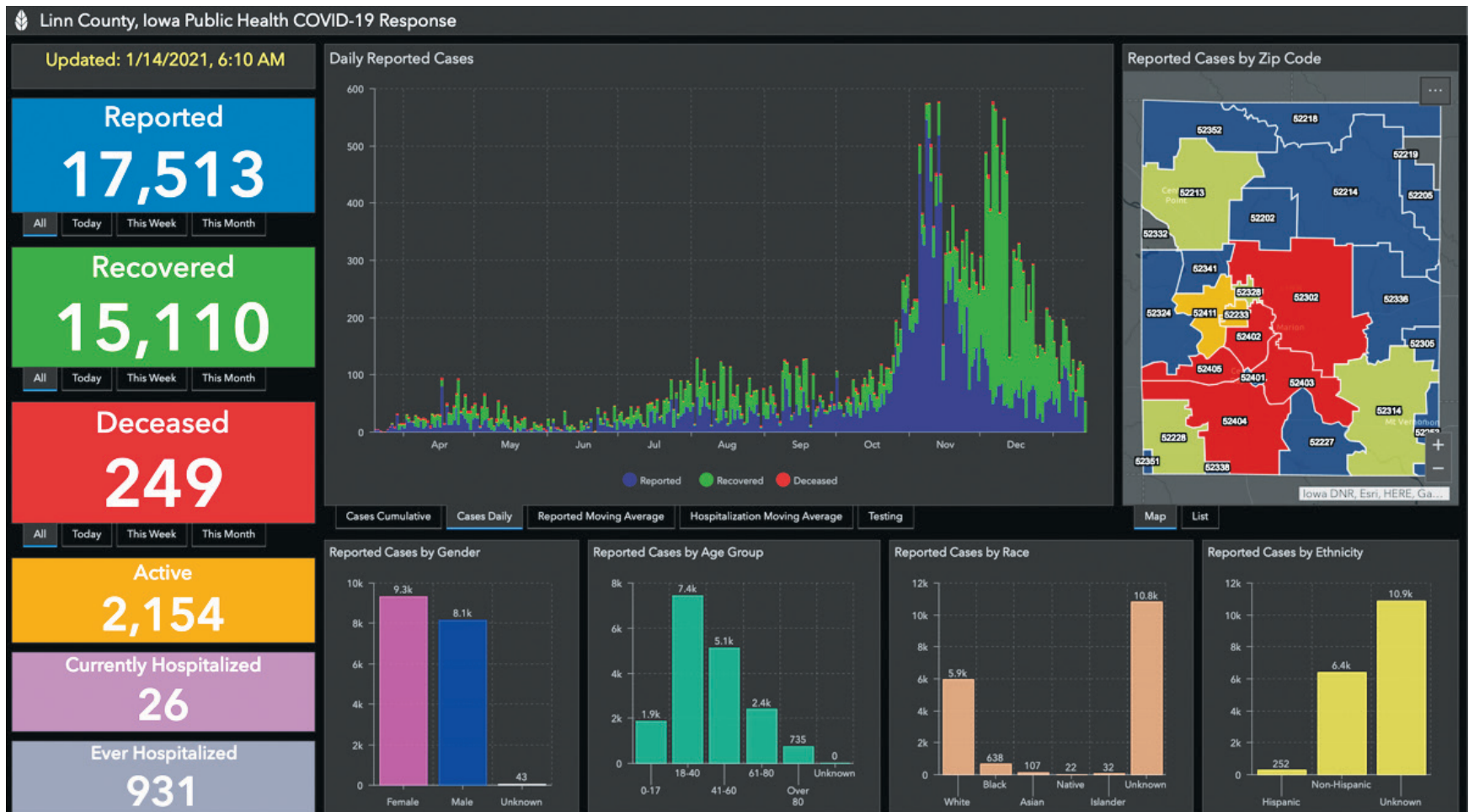
Using GIS, a research team analyzed opioid overdose trends in Hamilton County and determined the most effective way to distribute naloxone kits in local areas having emergency

medical services (EMS) stations. To apportion the naloxone kits, the research team, along with the two doctors leading the study, decided to distribute the kits based on the number of opioid overdose calls each EMS station got. This would identify which EMS stations were likely to respond to the highest number of opioid overdoses and provide an opioid overdose map for EMS station coverage areas. This data allowed administrators to reallocate EMS resources and emergency department resources to better serve the most vulnerable populations.

Projects like this illustrate the power of maps and GIS as collaborative tools for taking action and bringing about change.

"Identifying opioid overdose hot spots within Hamilton County allowed us to better understand the local epidemic and where to target interventions."

Dr. Rebecca Martin
Emergency Medical Physician,
Erlanger Health System,
Tennessee



GIS Allows County to Respond to Multiple Crises at Once

Linn County, home to Cedar Rapids, is Iowa's second most populous county. By early March 2020, the mounting number of hospitalized victims in the county due to the pandemic had already stretched medical resources. As the pandemic shut down schools and businesses, many people needed help securing food and shelter. The problems were all compounded when local meatpacking plants also slowed or closed as employees fell ill. Local epidemiologists knew they had to turn to GIS technology to successfully assemble all the relevant data to help leaders coordinate their responses and provide resources where they were needed most.

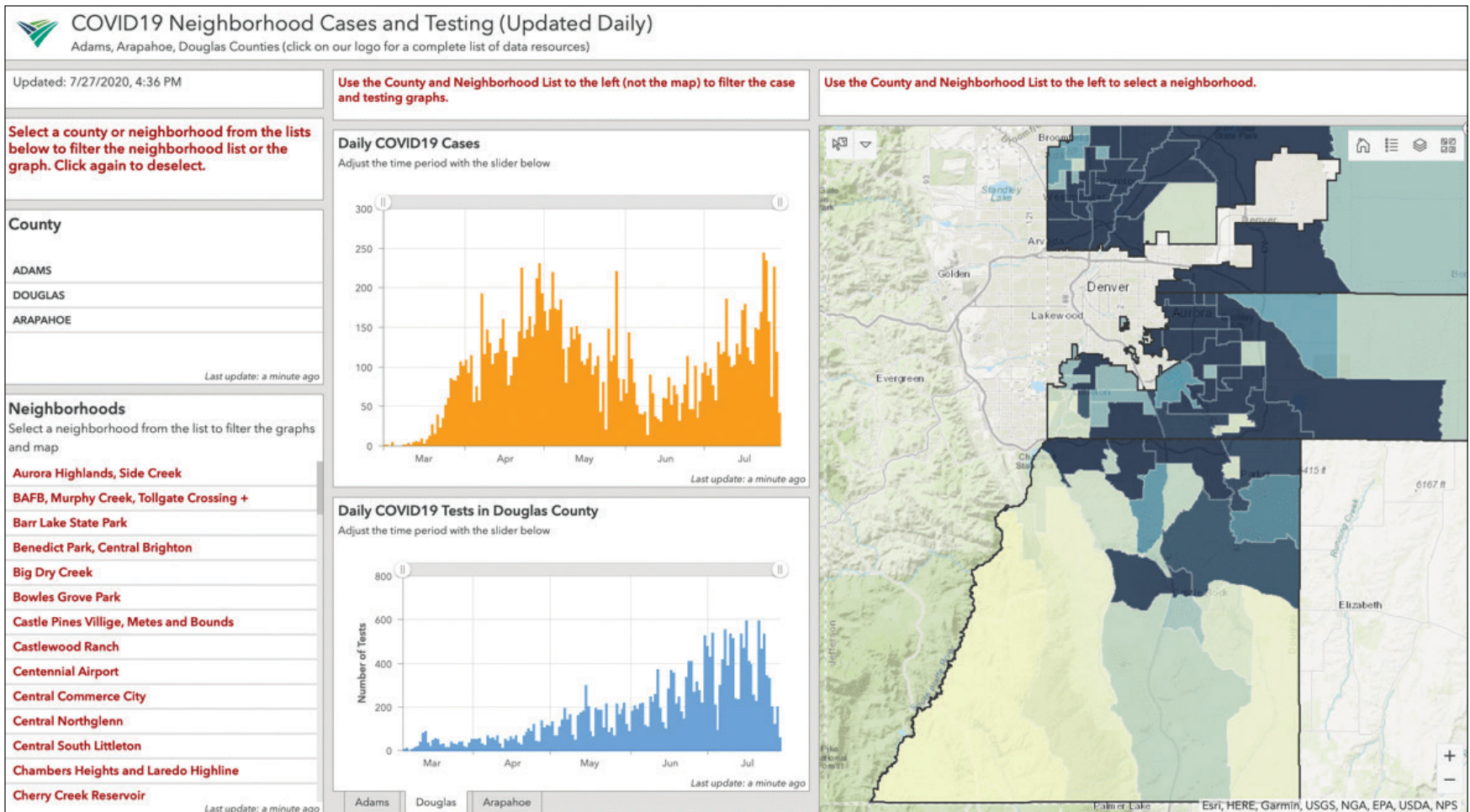
They built a COVID-19 dashboard to easily monitor the number of cases and see which communities were being impacted the most. Not only was the pandemic upending county resources, but amid the pandemic, Linn County also suffered a

derecho, which caused widespread destruction. The county used GIS to layer data about food resources, ethnic groups and languages spoken across the county, homes where electrical outages could stop lifesaving medical machinery, and more. Without the development of the GIS tools, Linn County's response would not have been as robust as it was.

Because this work had added immensely to the county's resiliency, GIS is now being used for all emergency response.

"We built relationships early on, and people know to come to us for support now. Going through a derecho and COVID-19 has really helped illustrate the power of GIS and what we can do."

Amy Hockett
Epidemiologist,
Linn County Public Health, Iowa



Contact Tracing Helps Stop COVID-19 Outbreaks in Tri-County, Colorado

The international lure of Colorado ski resorts made the state's remote communities some of the nation's earliest hot spots for coronavirus cases. In these resort towns, case rates were more than eight times higher than the state average before the ski season was canceled on March 14, 2020. As health organizations around the world continued to struggle to identify, isolate, track, and extinguish the virus, one health department in the Denver metropolitan area decided to modernize its approach to contact tracing using GIS. Tri-County Health Department embraced location technology to investigate with whom an infected person had come into contact, where cases were occurring, and where contacts spent time.

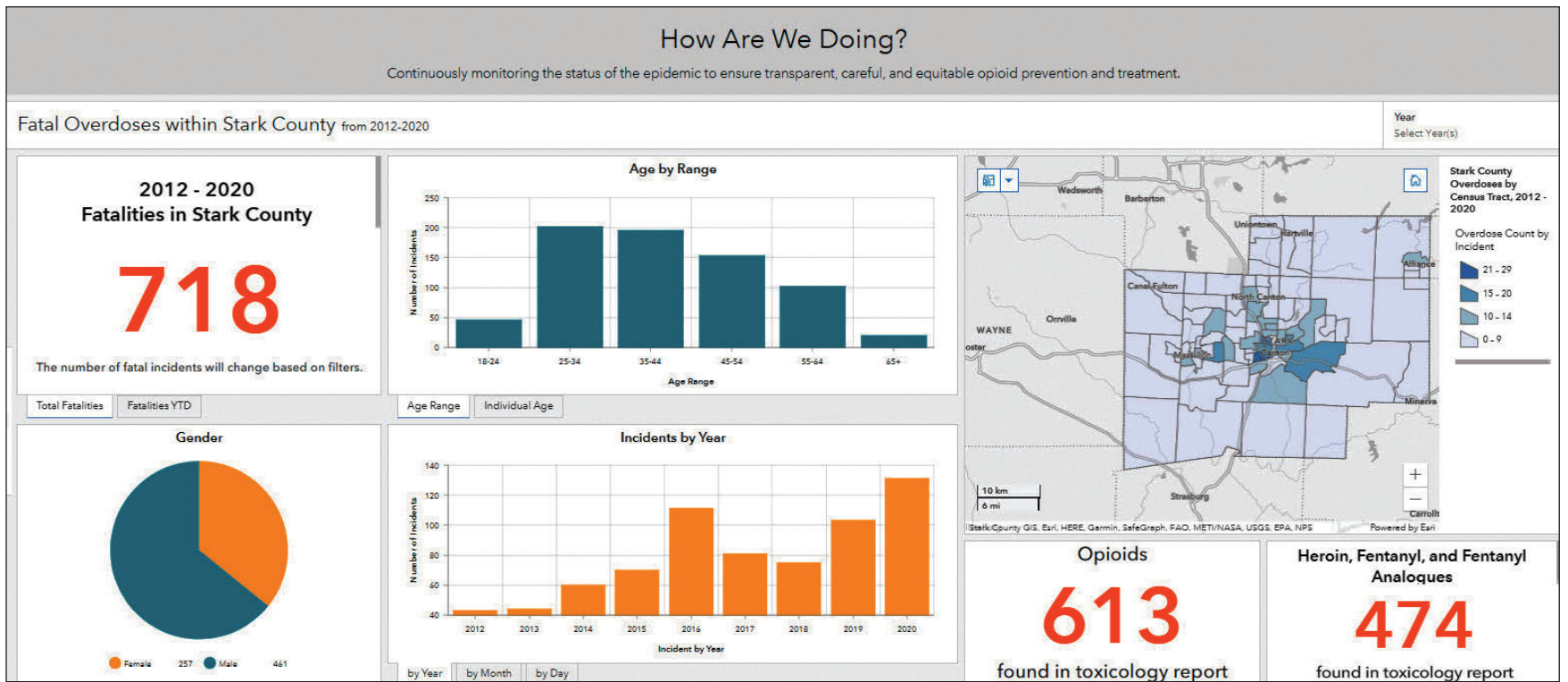
The team was made up of contact tracers, case investigators, program planners, data managers, and IT managers who worked to architect a solution using the Esri cloud-based offerings.

Tri-County Health had a vision for closely integrated workflows to fit the structure of its operations. The solution includes defined roles for everyone who needs access to the information, with oversight mechanisms for supervisors, security to adhere to privacy laws, and a shared geographic awareness of cases and hot spots. Keeping all the data in one system was important to Tri-County Health from an efficiency and reliability standpoint. It eliminated parallel systems that can duplicate work or report different totals, leading to misinformation.

Seeing the spread at the neighborhood level added context and helped guide the response. It allowed epidemiologists to see that the spread wasn't random and it happened in waves even across a small geographic area. To date, Tri-County Health Department analyzes the data to simply see infection rates at different scales of geography—for its full jurisdiction, a municipality, or a neighborhood.

"Maps are essential to our reporting, all details have to go into a map to quantify and contextualize what's going on."

Adam Anderson
GIS and Data Manager,
Tri-County Health Department,
Colorado

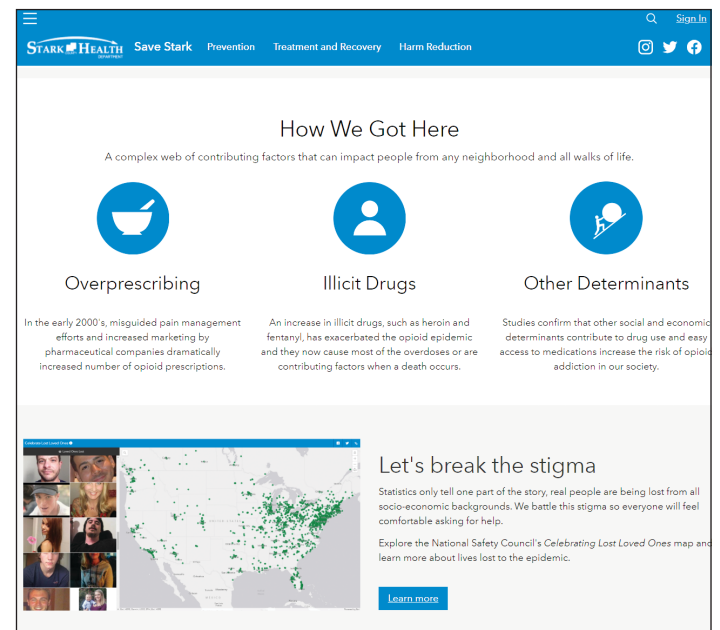


Stark County, Ohio, Leverages Location Intelligence to Address Opioid-Related Deaths

In early 2020, Stark County was experiencing the highest number of opioid-related deaths on record, then the COVID-19 pandemic hit. Faced with a shortage of resources and staff, the health department leadership needed to find a way to monitor the crises and make better-informed decisions on where to put its resources.

In November 2020, the health department prioritized resources to bring the necessary geospatial literacy to the county's efforts in combating multiple health crises. Leveraging the power of GIS, the county deployed the Opioid Epidemic Outreach solution, a set of preconfigured GIS applications and maps that allowed the county to quickly index local prevention and treatment resources. This included Save Stark, a public information site, created using ArcGIS Hub, where the county could communicate the severity of the epidemic in the community; promote resources available to those in need; and share real-time data and resources it received from local health organizations, emergency management, and local nonprofits.

Stark County's geographic approach allowed it to effortlessly collaborate between internal teams and develop GIS tools to effectively improve public health. Moving forward, it recognizes the need to leverage the power of GIS in all future health matters.



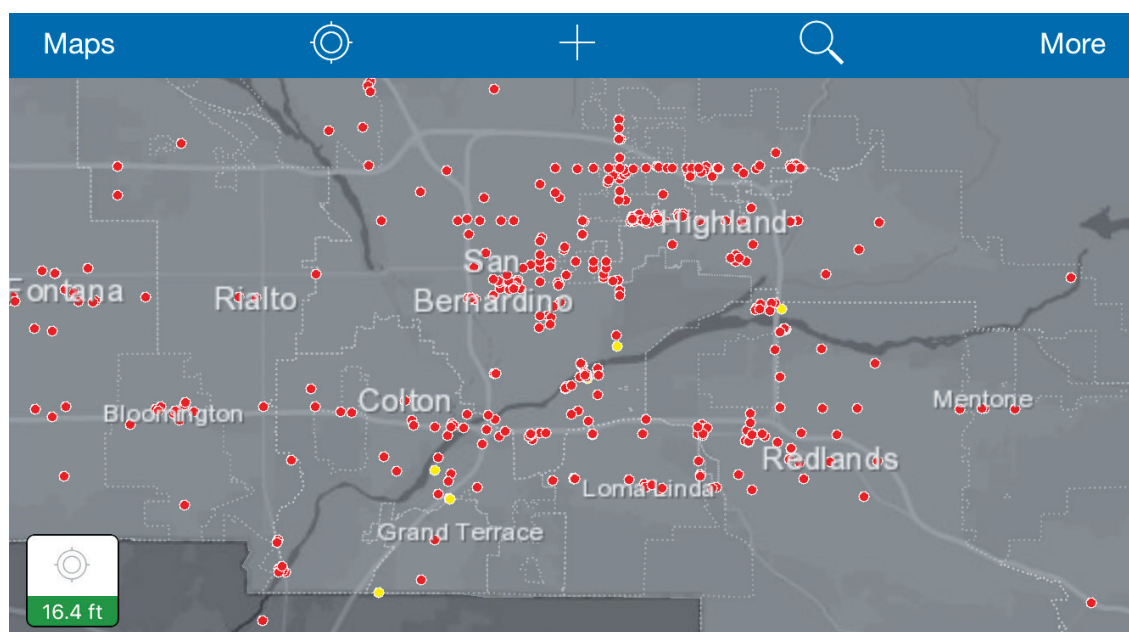
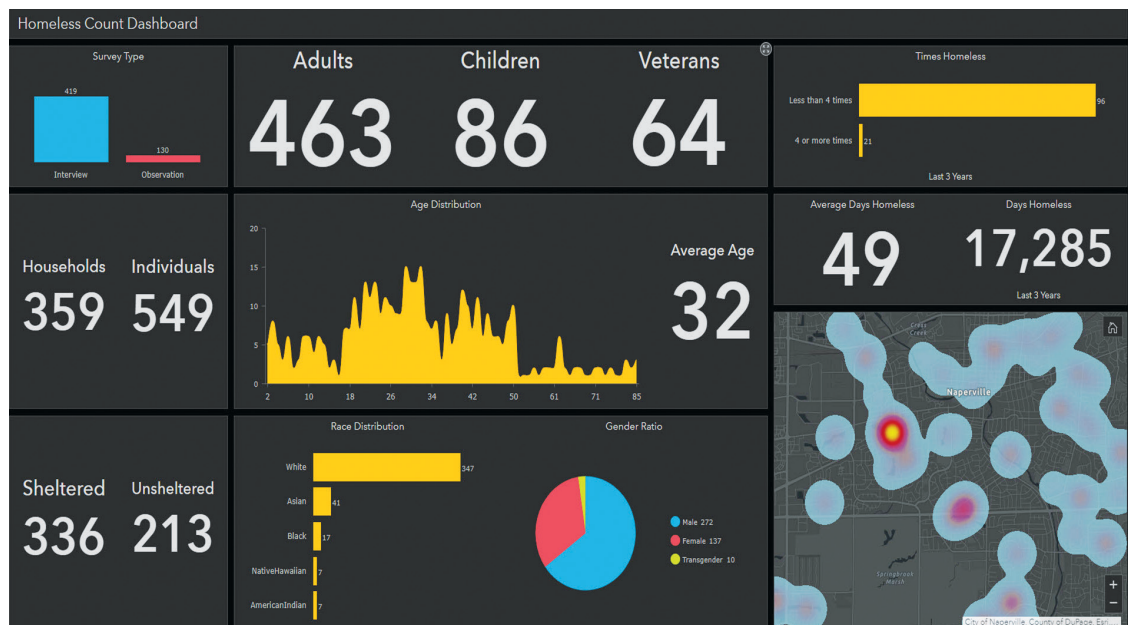
“The Opioid Epidemic Outreach solution allowed us to combat this issue from all angles, which is exactly what we needed. It was so easy to use that other counties are now reaching out and looking to set up their own hub site.”

Jorian Krob
GIS Specialist, Stark County, Ohio

ArcGIS Apps Help County Sheriff Provide Targeted Assistance to Homeless Populations

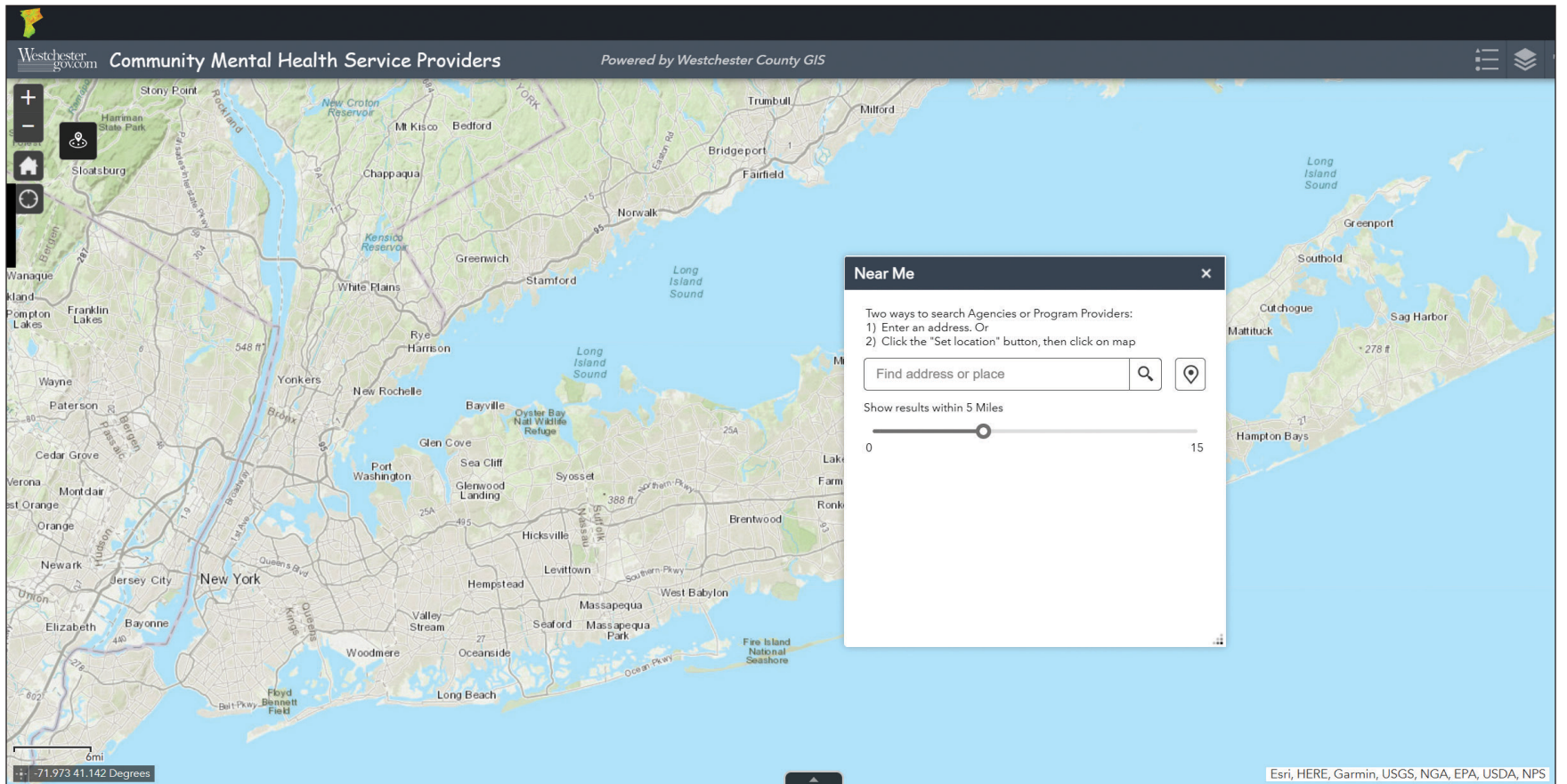
San Bernardino County, California, is the largest county in the US and faces a growing problem of homelessness. To address this issue, the San Bernardino County Sheriff's Department (SBSD) formed the Homeless Outreach Proactive Enforcement (HOPE) team to provide services to the more than 1,800 people within the county who are experiencing homelessness. With 20,000 square miles to cover, the HOPE team modernized its approach to homelessness by replacing spreadsheets with a GIS to serve as the central system of record. Nine law enforcement agencies, fire services, the US Forest Service, and health and human services agencies contribute information to the GIS and use shared data to make informed decisions concerning homelessness.

The county's population of people experiencing homelessness was originally documented on paper during field surveys. The SBSBD HOPE team members then moved to Esri's ArcGIS Survey123 on smartphones and tablets to easily collect data in the field and quickly create detailed profiles and contact records for each person. They also used ArcGIS Collector to quickly create accurate maps of homeless encampments. Partnering agencies used Esri's ArcGIS Dashboards to track the progress and location of the field data collection efforts and to monitor changes in the populations. The survey and map information collected by the SBSBD HOPE team members helped them understand where to allocate the appropriate resources most effectively. GIS saved the teams time and reduced their driving distances, saving money as well. Having access to detailed digital maps on mobile devices gives officers the ability to collect data in the field and make it immediately available with real-time dashboards for faster decision-making and coordination of work in the field. Ultimately, GIS made it easier for officers, health workers, and people in other agencies to work together and connect underserved populations with the services they needed.



"With the ArcGIS apps, we are able to provide a more targeted approach, saving us an additional hour to an hour and a half a day."

Mike Jones
Deputy Sheriff, San Bernardino County Sheriff,
Homeless Outreach Proactive Enforcement Team, California



Westchester County GIS: Community Mental Health Providers Viewer

Westchester County is the seventh most populous county in New York State. The county knew it had to keep its residents informed on any projects and programs under way, so it decided to leverage GIS tools.

In July 2020, Westchester County GIS launched a web map created using ArcGIS StoryMapsSM, software as a service that lets users integrate maps, legends, text, photos, and video, which has made Westchester County geospatial data more organized and accessible to the public. The site offers

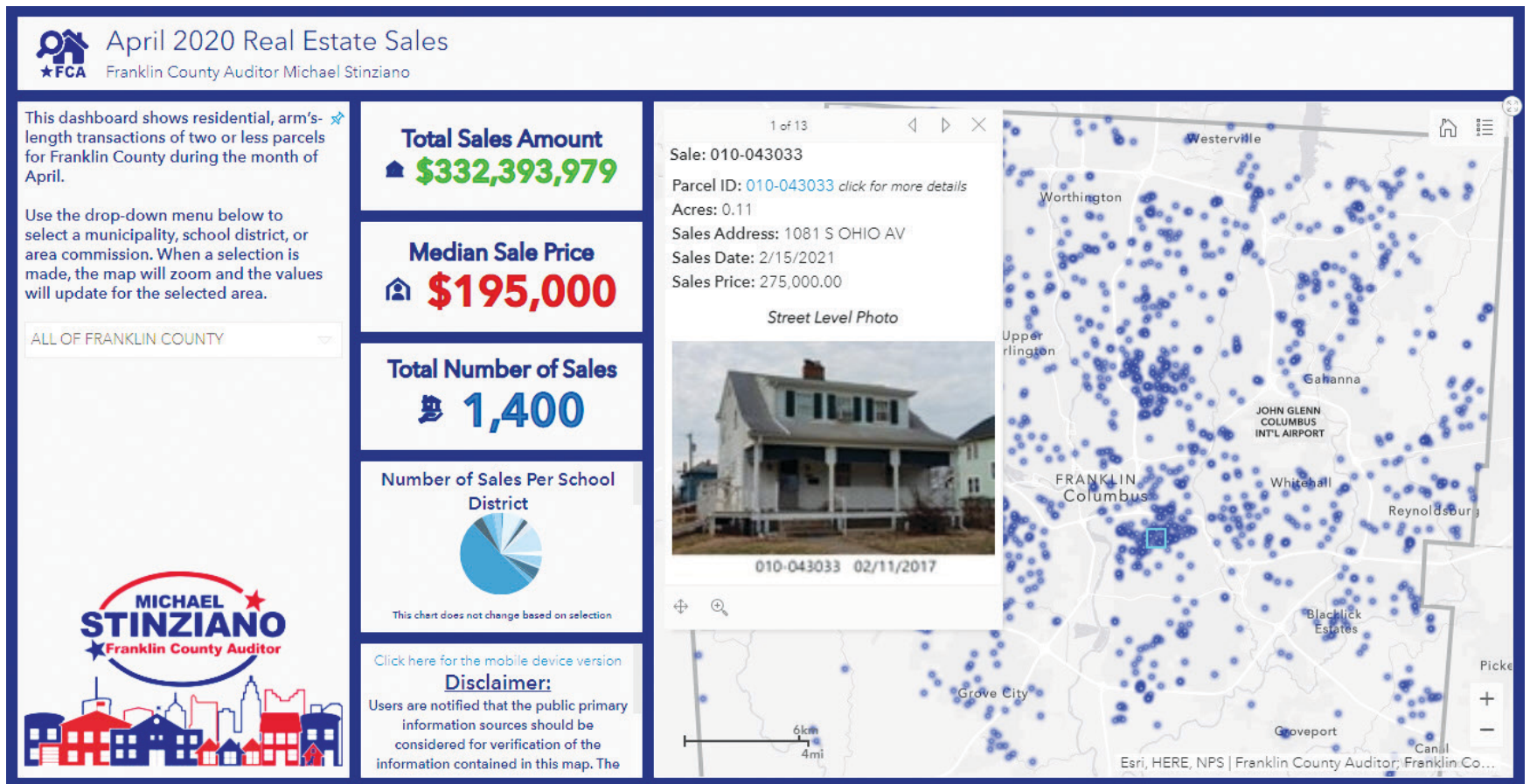
an abundance of free county-focused data and maps, including interactive mapping applications, which provide information on specific topics. From infrastructure to flood zones, ecosystems to census data, local businesses to nonprofits, the site offers a way to visualize, communicate, explore, analyze, and plan.

The use of ArcGIS StoryMaps allows the county to remain transparent on the progress of all community projects important to Westchester County government and its residents.



Tax, Assessment, and Land Records

Land is an essential resource that supports nearly every aspect of our social and economic well-being. Because land is finite resource, it is necessary to govern and manage land effectively for social stability, sustainable economic development, and equitable taxation. GIS technology helps in managing all aspects of land information and land records including land tenure, value, management, and use. With all land information in a GIS-based comprehensive land administration system, counties are able to improve land information management, property valuation and analysis, and communication with the public.



The Property Mappers

Franklin County, Ohio, is one of the top real estate markets in the nation, according to Forbes. Due to an increase in real estate sales—which impacted property values and school district funding—local neighborhood groups sought to gain full transparency from the auditor's office. They requested that it provide authoritative, easily accessible, and hyperlocalized real estate sales information. So the GIS team launched the Real Estate Sales Dashboard, which displayed the requested information on an easy-to-understand, single screen. The GIS manager for the auditor's office

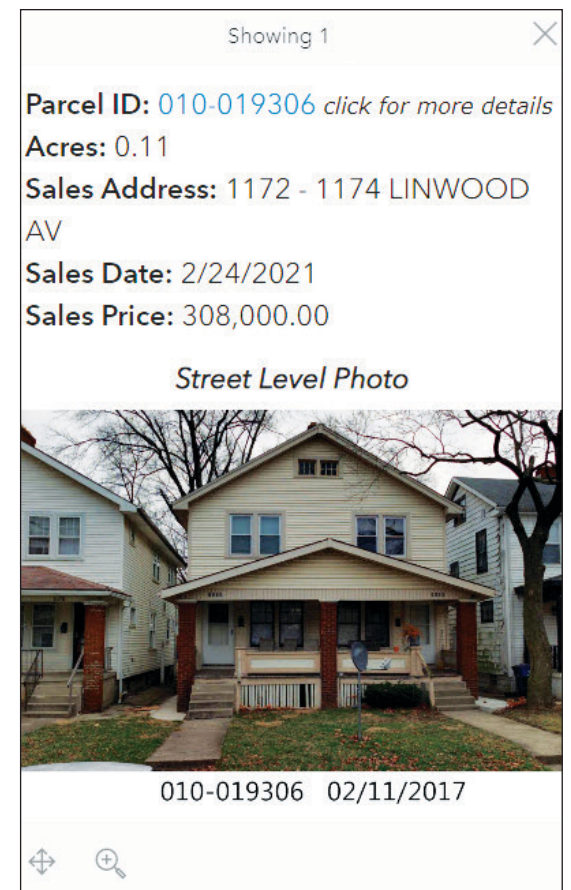
said that this project was the first time his team had created a configurable web app using ArcGIS Dashboards and that it was easy to do.

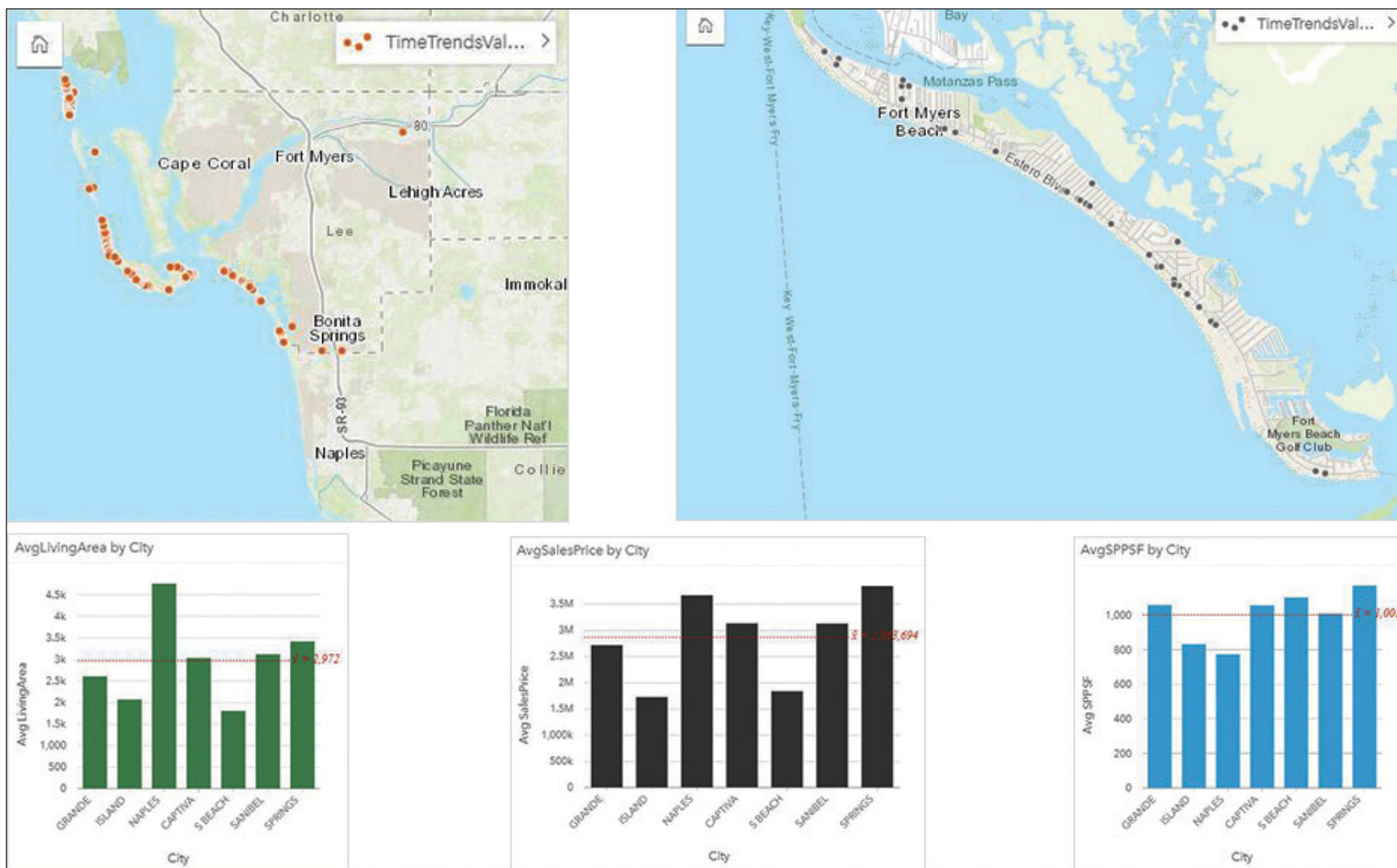
Realtors like the dashboard because it's a good resource to search for comparable sales. School district officials also will find the dashboard useful because they can see the number of home sales in their districts each month, along with the total sales amount and the median sales price.

ArcGIS Dashboards, which was used to create the dashboard for this project, provides a seamless and efficient way to share key statistics.

"Having such a competitive housing market means buyers, sellers, and agents are constantly reviewing properties for sale. Our dashboard gives accessible and transparent data to help inform those choices."

Michael Stinziano
Auditor, Franklin County, Ohio





Florida Property Appraiser Enhances Analysis with Data Analytics Solution

The Lee County Property Appraiser, a government office in Lee County, Florida, implemented data analytics software that has enabled staff members to quickly communicate results and improve data analysis, helping them better serve county residents and provide exceptional service.

Report generation for property valuation was a cumbersome process that made collaboration among the different departments challenging and time-consuming. The county wanted a new solution to not only improve analysis but also facilitate faster, more accurate results.

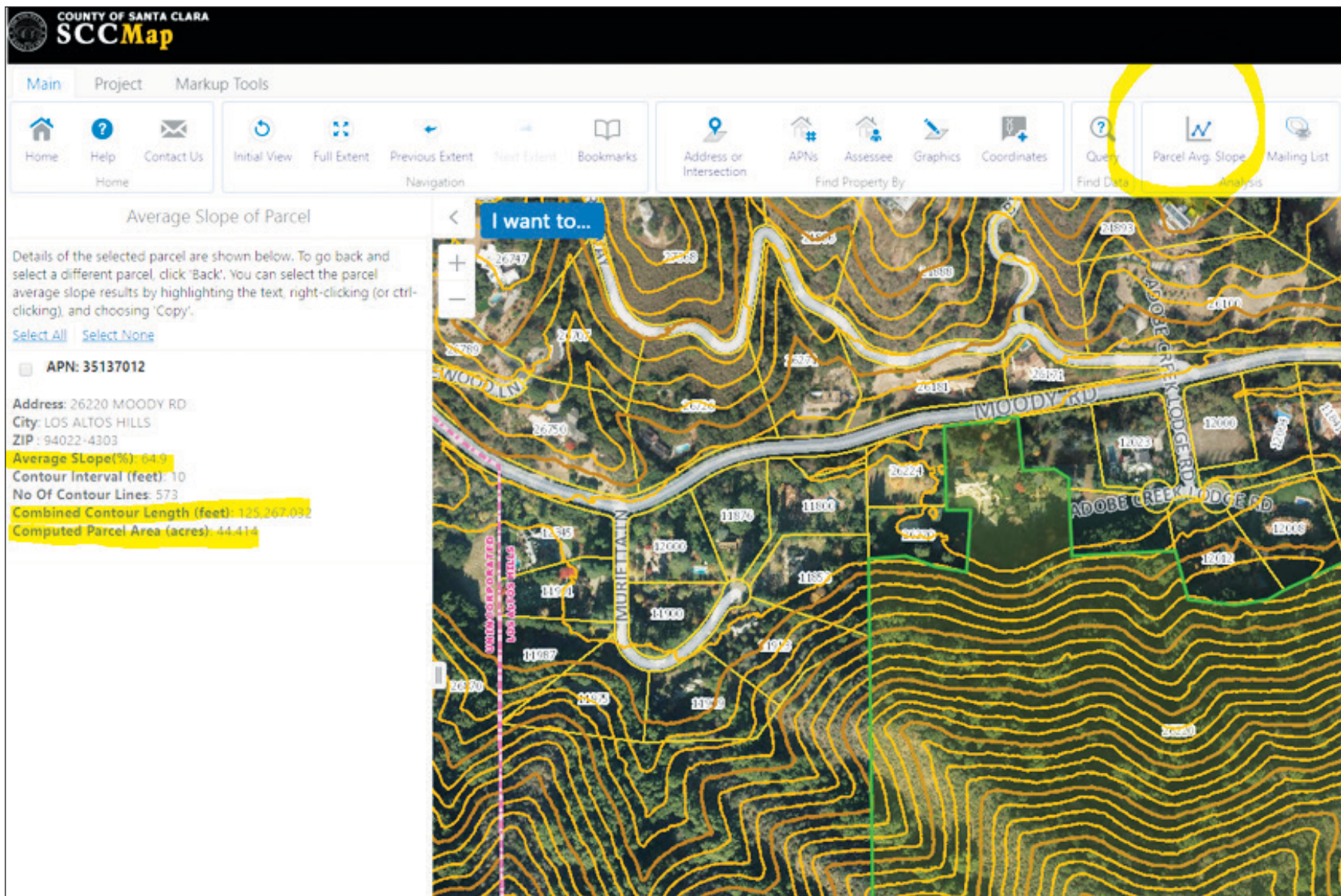
The property appraiser implemented ArcGIS InsightsSM to quickly communicate results

and improve data analysis. ArcGIS Insights is designed for iterative and exploratory data analysis. The county appraiser's office frequently uses time trending for property valuation, which is a method that allows staff to use sales that are more distant from their assessment date by adjusting the sale price to reflect the impact of time.

The use of ArcGIS Insights has streamlined the data analysis process and given the appraiser's office the ability to better explore its data, yielding more accurate results and enabling the appraiser to provide exceptional service to county residents. Users can simply drag data into ArcGIS Insights, pick a metric to analyze, figure out how best to present it, and go.

"We always had the ability to prepare maps after we analyze tabular data, but now we can do the analysis on the map with the data. There is not a long or expanded period of figuring out what data to use or put on the map. ArcGIS Insights allows it all to be available."

James A. Sherron
Lee County Property Appraiser's Office



Santa Clara County, California, Sees \$2.1 Million Return on Investment from Slope Calculation Tool

The landscape in Santa Clara County is varied, running the gamut from flat and highly desirable for development to so steep that a large percentage of the parcels are not suitable for any commercial or residential purposes. And these differences in slopes greatly influence land values. To help the county better calculate the slope of parcels, the GIS team developed a new slope calculation tool that saves at least 30 minutes of staff time with each use.

The application has roughly 300 users across the various departments and cities within the county. One of the first departments to use the app widely was the assessor's office. The county has about 80 assessors who use the app when collecting data for appraisals. The key data element is average slope, which is required to conduct a GIS analysis of the slope percentage. To calculate the property value, staff members had to incorporate slope percentage in their calculations. While the app

involves lots of clicking and entering data for each parcel being appraised, that time cost has been greatly reduced. It takes about an hour to manually calculate the average slope versus 10 seconds with the app.

The county calculated that it saves \$350,000 of staff time annually due to the deployment of the slope calculation app. The cost to build the new app was roughly \$37,000, and since the tool has been running for six years, it has resulted in an over \$2.1 million return on investment.



Tippecanoe County, Indiana, Identifies \$1.86 Billion in Additional Property Value

Tippecanoe County conducts property assessments annually. This is an essential function to sustain revenues for the community, which in turn are used to pay for county operations and other much-needed government functions. But property values and sales prices in the county have been increasing, as they have in real estate markets across the country. This can cause concern among residents who may file an appeal and also impacts county operations, as the county may not be properly collecting all the revenue due to it.

Using GIS, the county was able to look for optimal ways to ensure it was collecting every dollar owed while also keeping in mind that assessments needed to be able to withstand appeals and challenges from the public and business community. To do this, the county assessors focused on the accuracy of the data they were using to bill individual property owners. They used GIS to analyze the fair market value of property in the county based on current sales activities and comparable sales (comps). They analyzed items such as improvements or social and

cultural amenities being built in the area that increase property values and ultimately the sales prices. Adjustments to the property tax rolls were made based on the most current data available on these sales comps, yielding a high valuation from which to tax each property. Knowing that civic engagement was an essential element of the process, staff shared information publicly through a dashboard, created using ArcGIS Dashboards, to communicate what services residents should expect to receive and how assessment increases were calculated.

The data on increasing revenue streams was viewed across multiple departments. The total revenue increases derived from several sources, including school taxes, fees, and other revenue streams based on the property value or other information in the assessor's database. Between 2019 and 2020, the county was able to identify \$1.86 billion in additional property value. This resulted in an uptick in actual revenues based on a 3 percent increase in value. This increase resulted in over \$3 million in increased revenue.

"We regularly show our commissioners what new GIS tools and apps we are using to generate new property assessments. This background information helps explain to the public why their property values (and their property taxes) have increased over the years."

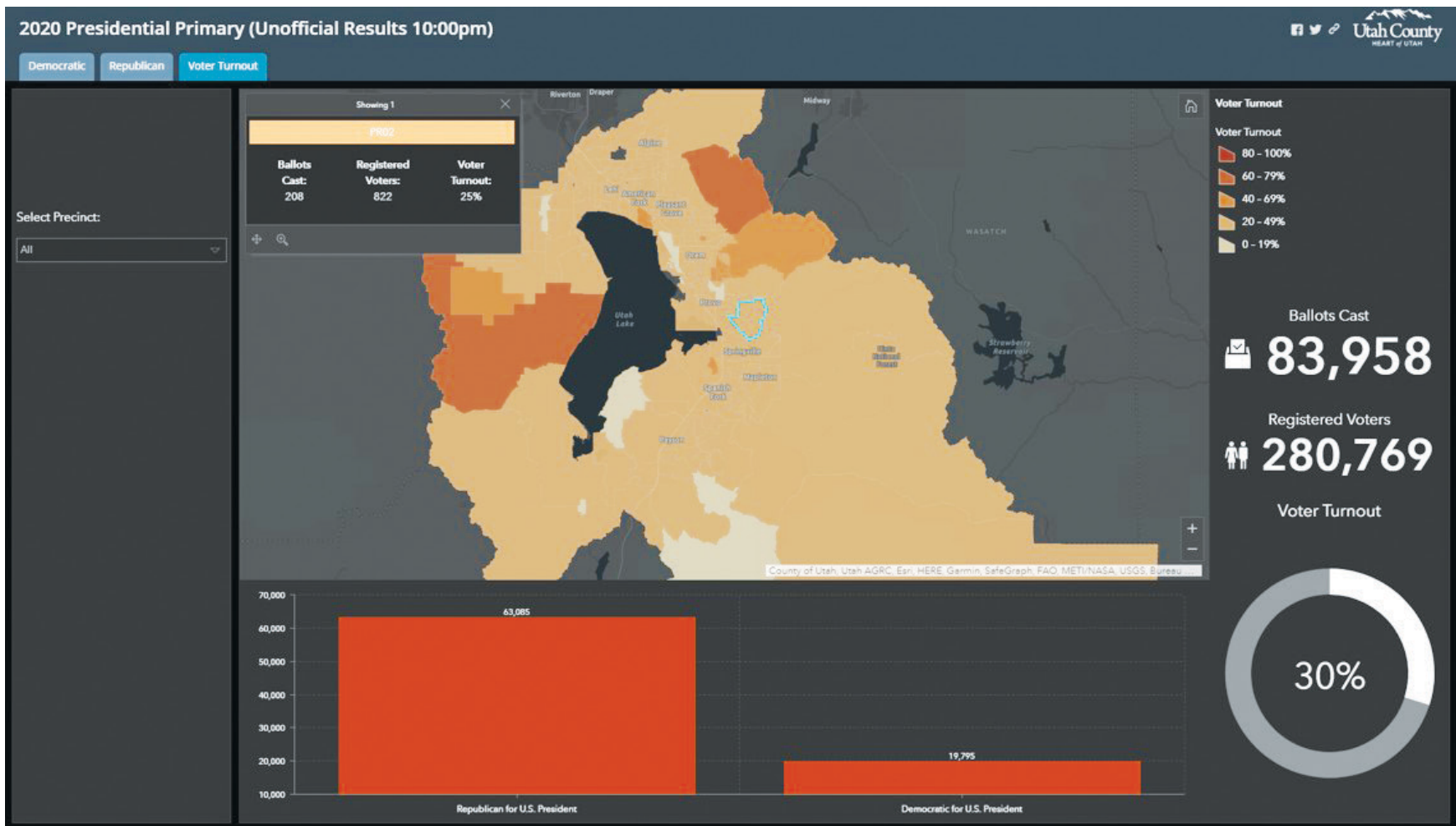
James Werner
Project Manager,
Office of the County Assessor,
Tippecanoe County, Indiana



Elections & Redistricting

Counties rely on GIS to streamline the elections process. Geography is the common denominator of where voters live, how residents engage the voting process, and how officials manage elections. With elections-enabled GIS, elections departments of all sizes can simplify their registration management, elections operations, voter outreach, and results reporting. Through GIS, counties can efficiently modernize their election process.

Redistricting, the process that occurs every 10 years to redraw district boundaries, can be fraught with disagreements and disputes. County governments have learned that providing unparalleled visibility and access to all stakeholders, including citizens, is the key to providing clarity to the redistricting process. Esri's GIS-based redistricting software enables counties to complete and share regulation-compliant redistricting plans for feedback and collaboration.



A Win for Secure Elections

Utah County, the second-largest county in Utah, transformed its outdated election processes into a location-enabled system suited for modern-day elections.

Using ArcGIS Dashboards, the GIS team was able to input voter data, including voter turnout, political party affiliation, number of total ballots cast, election night results, and other essential voter information.

Residents can now use the dashboard to go back to any recent election, filter out specific voter data, and do their own analysis, thus enabling public interaction with the county's voter data like never before. The election results dashboard not only is useful for displaying historical data but also has proved to be a vital resource on election night.

A process that once took 50 minutes to update election results can now be achieved in only

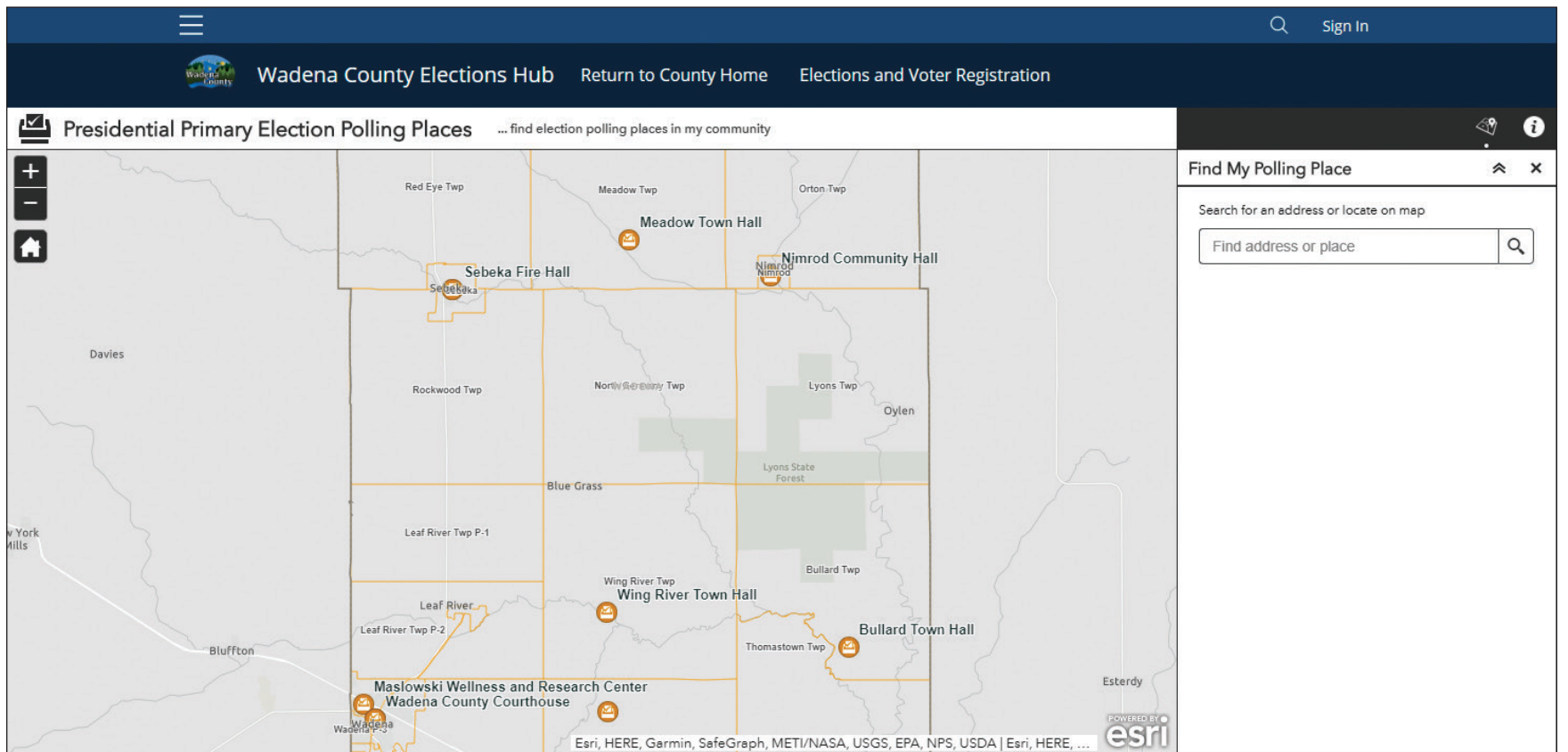
3 minutes using ArcGIS, with information on which candidates are winning per geographic area.

Utah County has deliberately placed ballot drop boxes near strategic locations, such as libraries, recreation centers, and city offices, for registered voters to place their ballot envelopes. To maintain ballot security, Utah County's GIS department is using ArcGIS QuickCapture, an app that allows mobile staff to quickly capture photos, text, and other data for drop box ballot tracking.

As the Election Day technicians arrive at their assigned drop box, they can drop a point on a map with a time stamp, weigh the ballots, and provide the exact location and time they pick up the ballots. Once they return to the office, the elections department weighs each bag of ballots again to make sure the bag's weight matches what was typed in the application, double-checking that no ballots were lost in transit.

"In today's election environment, security at every step of the process is crucial to ensure public trust and confidence in our system—the very system that undergirds democracy itself. The new drop box tracking and mapping feature allows us to anticipate the volume of ballots and ensure that we are staffed appropriately. It also gives us critical security oversight on the movement of returned mail-in ballots."

Andrea Befus
GIS Systems Analyst, Utah County, Utah



Smaller Counties Delivering Modern Voting Services

Wadena County, Minnesota, with a population of about 13,000, has previously helped voters find their polling places, look up elected representatives, and find early voting sites with user-friendly GIS applications. The pandemic only amplified the need for digital, self-service solutions, prompting the county to move its applications from previous years onto a redesigned elections hub site.

Election staff can provide simple answers to complex questions, such as where to vote and when. The location of voters directly impacts questions like these. Leading with a geographic approach ensures the county can deliver the right information to each voter every time.

Where to Vote

Polls on election day are open from 6 a.m. to 7 p.m. Your precinct name and number is also shown on your voter registration card. You will vote at the same location for every election.

Early voting is available at the Morrison Courthouse prior to an election and at the Sterling Courthouse on specific days.

View locations and find your polling place in the applications below.

The image displays two screenshots of web applications. The top screenshot is titled "Election Polling Places" and shows a map of Whiteside County with numerous orange pins indicating polling locations. To the right of the map is a search interface titled "Find My Polling Place" with a search bar and a magnifying glass icon. The bottom screenshot is titled "Early Voting Centers" and shows a map of Whiteside County with a few orange pins indicating early voting centers. To the right of the map is a search interface titled "Locate Voting Center" with a search bar, a magnifying glass icon, and a slider control labeled "Show results within 20 Miles" with a range from 0 to 30.

Shift Your Focus to Location When Voters Have Questions

In Whiteside County, Illinois, the current elections hub site makes it easier for members of the public to have access to everything they need to know before they go vote. By providing them with self-service web maps, residents are no longer limited to the county clerk's office hours. Instead, they can find the same resources and services at any time—all within the hub site.

The county recently expected an increase in vote-by-mail applications since COVID-19, so staff embedded an ArcGIS Survey123 form into the site. Staff were able to configure the required fields and questions in the survey to efficiently process the applications and replace the mail-in process with a trustworthy digital solution.

"I am much happier with our user-friendly hub site and the information it provides to our voters. Through our web-based survey on the hub site, we processed over 1,000 applications for vote-by-mail ballots in an efficient manner."

Dana Nelson
Whiteside County Clerk, Illinois

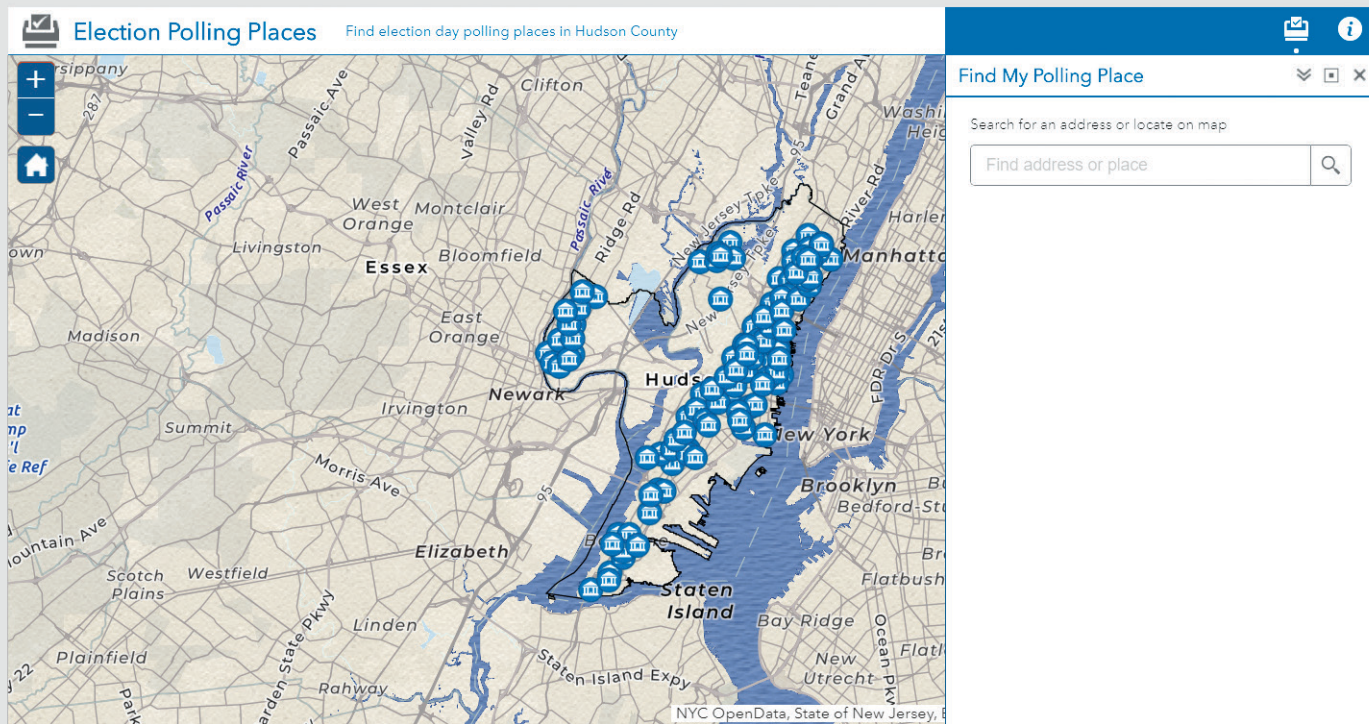


To translate this website please click the following button to the left. Para traducir este sitio web, presione el botón a la izquierda.

[CLICK HERE TO VIEW UPDATED 2020 ELECTION RESULTS IN HUDSON COUNTY](#)

VOTING AT A POLLING PLACE

You can bring your mail-in ballot to your polling place by 8:00 p.m. on election day, November 3. Remember only you, the voter, can bring your ballot to your polling place on election day.



Helping Citizens Vote with a Single Website

Hudson County, New Jersey, like many other counties during the pandemic, had to pivot its Election Day voting methods and move voting locations at the last minute. In less than three days, the Hudson County Clerk's Office hub

site was launched, and the county was able to push this out quickly to voters via social media, press releases, etc. As Election Day neared, the Hudson County Clerk's Office hub site saw an average of 1,500 views a day.

Optimizing Elections—GIS Improves Preparation and Execution for County

With over 1.6 million registered voters, in Orange County, California, the Orange County Registrar of Voters (OCROV) is responsible for elections held for administrative areas that range from the local to the federal. These cover school districts; special districts such as water, sewer, storm, sanitation, and community service areas; and municipal and county districts.

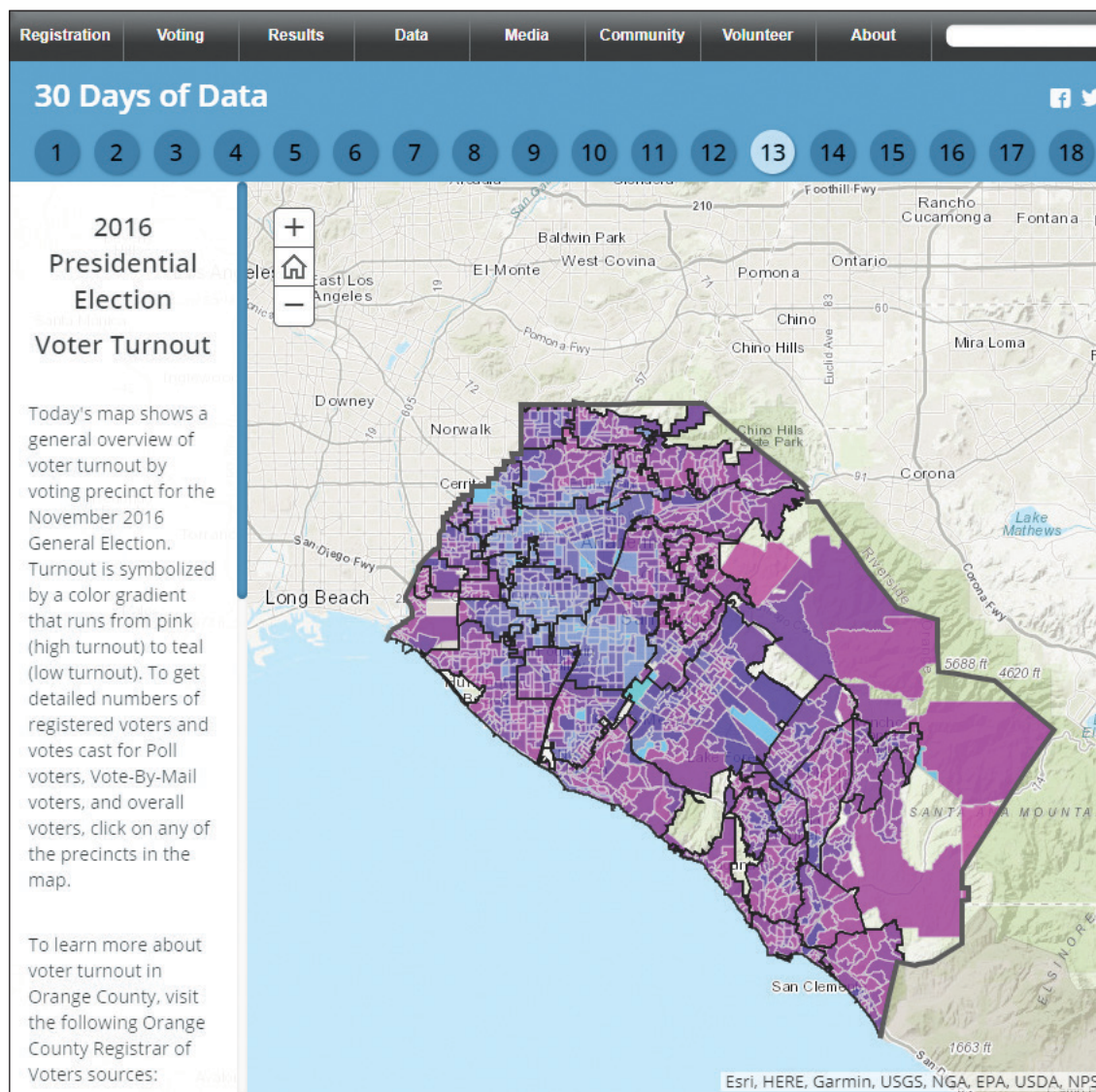
Ballots must be tailored to where each voter lives, which is why the task of verifying voter addresses and precincts is so critical to the operations of a county elections office.

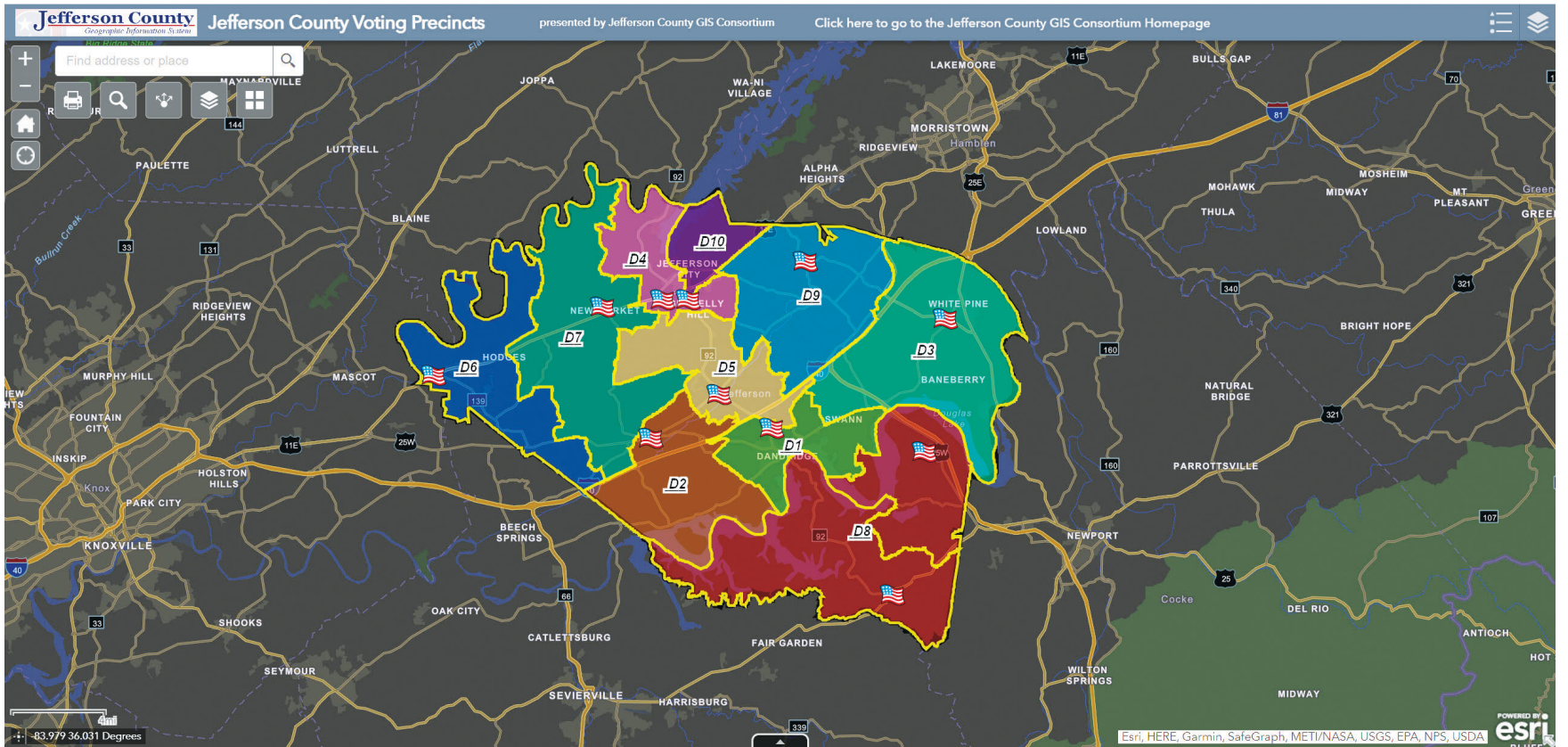
OCROV has greatly expanded the use of GIS in its operations and planning for elections. Previously, the OCROV GIS team was tasked to modernize all voter addresses by geocoding them and verifying the location of precinct boundaries in advance of the presidential election. What used to take months to verify can now be done in a few weeks in GIS. This becomes especially critical during special elections, when OCROV has even less time than it normally does to prepare for a general election.

This process has ensured OCROV would not face the problems other county registrars have experienced that are caused by inaccurate addresses, which can lead to the nullification of election results.

OCROV also uses GIS apps for Election Day reporting and to track the delivery and return of equipment used at polling places. These tools allow OCROV staff to spot deficiencies and misallocations of resources.

In pre-GIS days, OCROV verified that precincts had reported results via phone, which was a staff-intensive process that took a significant amount of time. Time is something that OCROV does not have on election night, since all ballots must be returned to OCROV following the closing of the polls, as mandated by law. Now, instead of having every precinct call in, staff use dashboards to verify the status of polling places and track the return of machines containing electronic ballots.

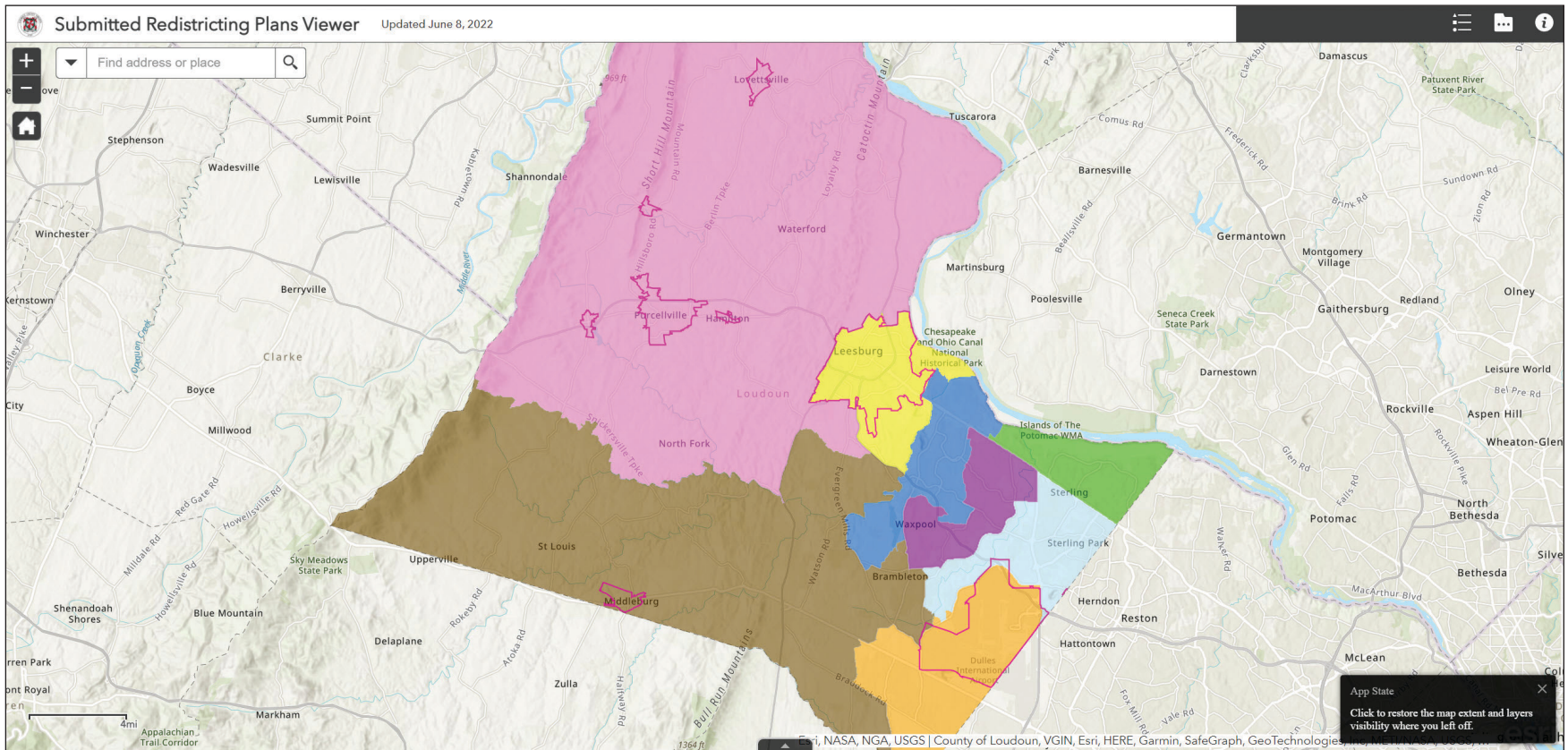




Jefferson County Voting Precincts

In order to provide residents with the most accurate polling locations, Jefferson County, Tennessee, leveraged GIS to map its communities' voting precincts. The map

groups the county by districts and places a point on each district polling location. This makes it easy for residents to view the map and find their voting precinct.



Loudoun County Local Redistricting

Loudoun County, Virginia, leveraged GIS to remain transparent with its communities regarding local redistricting. Using ArcGIS Hub—an easy-to-configure cloud platform that organizes people, data, and tools to accomplish initiatives and goals—the county created a public redistricting hub site that included redistricting maps, data, and training material residents could easily access. The use of the hub site allowed the county to keep all this information in a central public location.

Not only are residents able to see the redistricting plans, they also can see 2020 Census data, community sites, and aerial imagery—all created with GIS technology, making the data easy to visualize.

REDISTRICTING OLMSTED Olmsted County 2022 Redistricting

2022 District Maps Redistricting Timeline What is Redistricting? 2012 District Maps Community Input

2022 Commissioner Districts passed by resolution April 26, 2022 (Plan 1)

Olmsted County Commissioner Redistricting Proposed Plan Draft Maps (Public)

- Township Precincts (2022)
- City of Rochester Precincts (2022)
- Legislative Districts (2022)
- Plan 1
 - District

Use + and - in the upper right corner of the map above to zoom in and see more street details
 Contact Olmsted County GIS for help or requests of large prints: [507-328-7145](tel:507-328-7145)

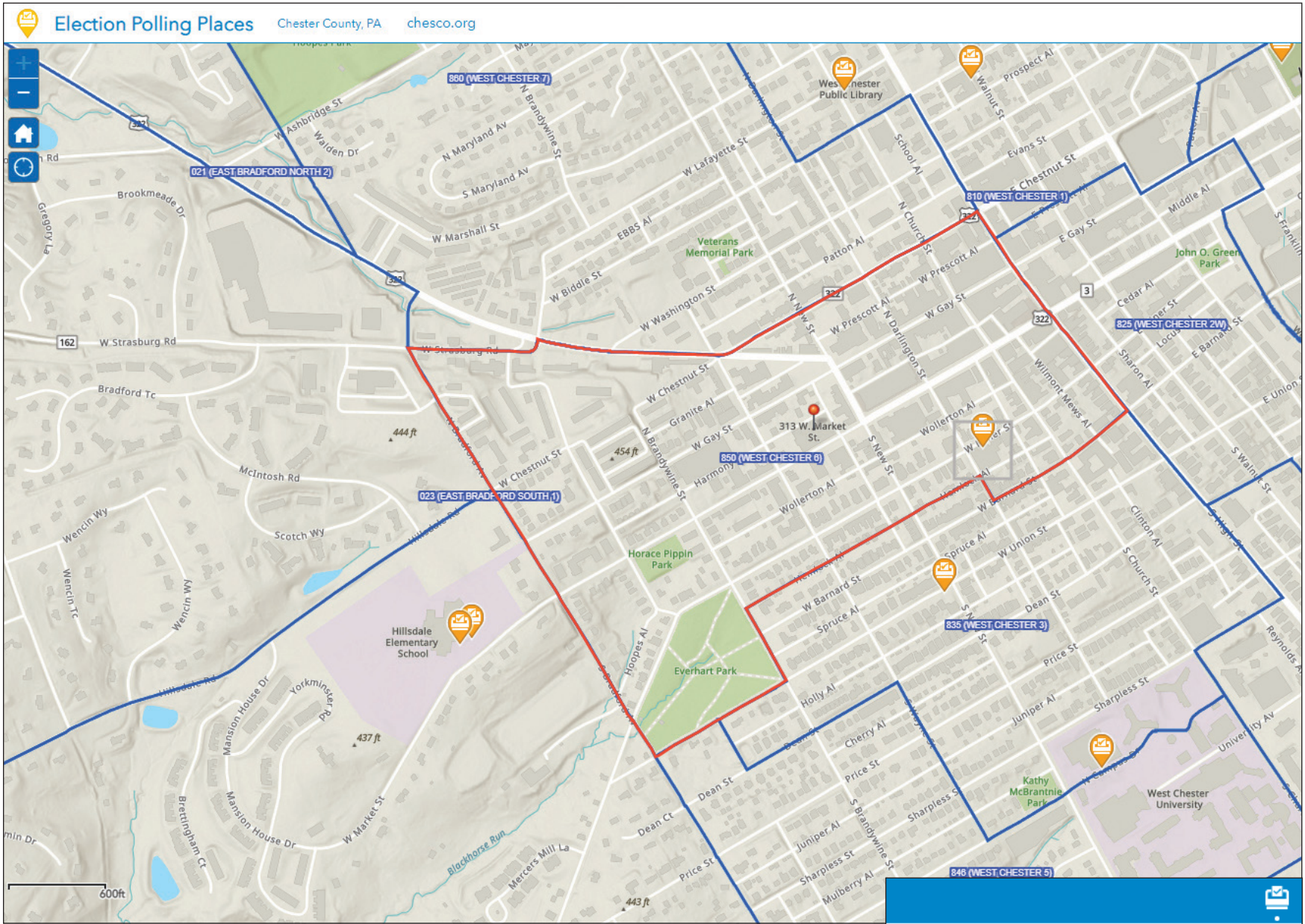
Leveraging GIS for Redistricting Plans

Olmsted County, Minnesota, wanted to remain transparent with its redistricting efforts and effectively receive community feedback throughout the process, so staff turned to GIS—specifically, ArcGIS Hub, an easy-to-configure cloud platform that organizes people, data, and tools to accomplish initiatives and goals.

Leveraging GIS, Olmsted County created the Olmsted County 2022 Redistricting public hub site, which staff updated with the different redistricting

plans, posted any upcoming events, allowed residents to sign up for any redistricting updates, and even had a feature that allowed community members to submit any feedback they might have.

The use of GIS allowed Olmsted County to keep the community updated on redistricting plans and provide residents with necessary information. Residents can access the hub site to see the changes that were approved and made.



Enhancing Elections with GIS

Chester County, Pennsylvania, serves its community in multiple ways during the election season. The Election Polling Places application offers a way for people to locate their polling places by entering their street name and city/town in the search box. Besides that, the application allows residents

to designate polling locations, outline precinct locations, and display other precinct boundaries.

The county leveraged GIS to provide residents with an easy-to-use guide to find their polling places.

Election Polling Places
⌵
✕

Search for an address or locate on map

▼

✕
🔍
📍

Information
Directions

Polling Place: 1ST PRESBYTERIAN CHURCH

130 W. MINER ST.
WEST CHESTER, PA

Details

Voting for Precinct #850 WEST CHESTER 6

The next election will be held on **Tuesday, May 17, 2022** and voters must be registered by **Monday, May 2, 2022** to participate in this election.

This polling place is open between the hours of **7:00am-8:00pm**.

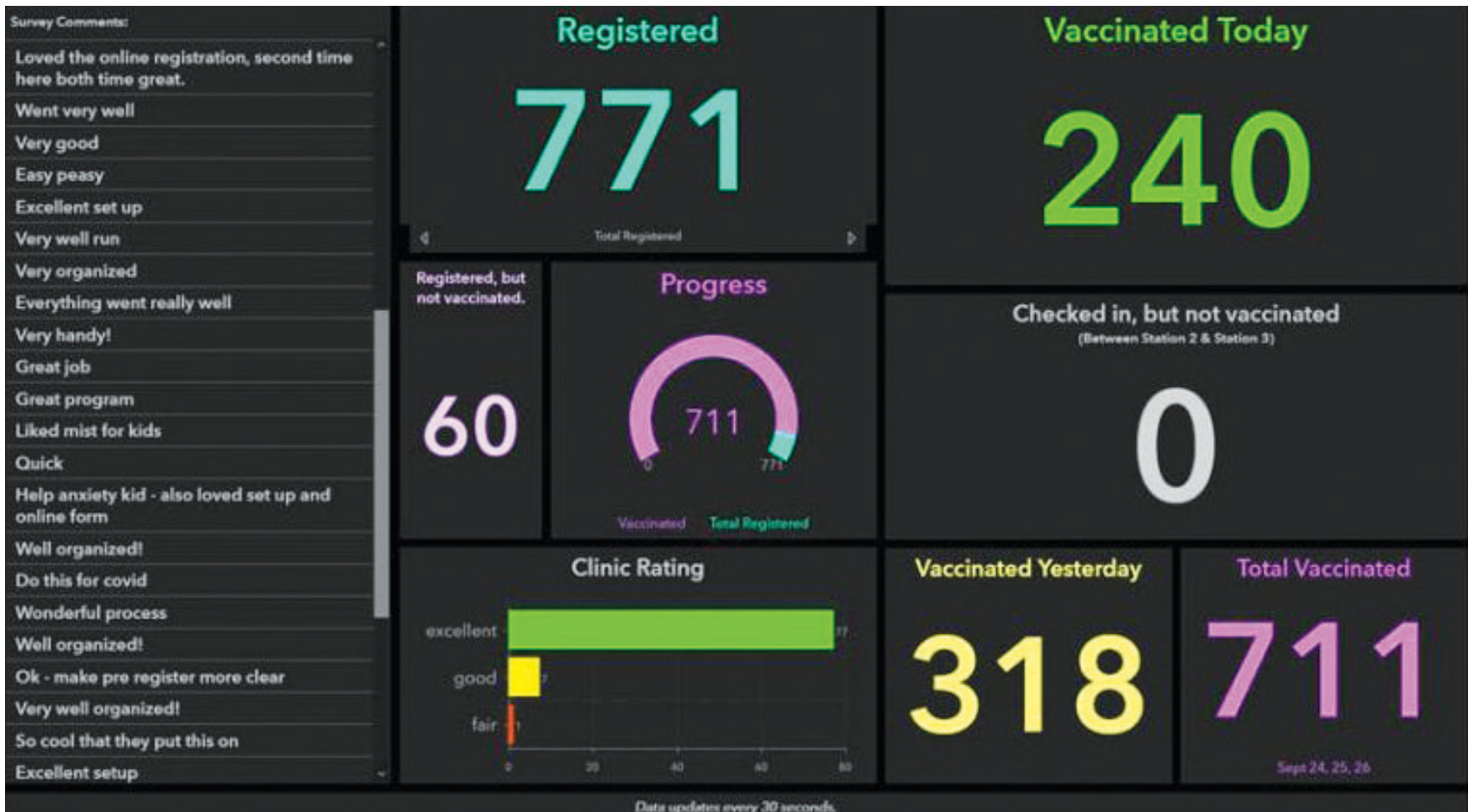
Questions

For more information on elections, visit <https://chesco.org/elections>.



Health & Human Services

Health and human services professionals are benefiting from insights that the power of place brings to their work. Spatial data and GIS technology can underscore coverage gaps in the populations county staff hope to reach, the opportunities to improve workflows, and the ability to plan for and mitigate against unforeseen events. Applied GIS leads to improved health outcomes, increased accessibility to health care, and healthier communities.



Utilizing ArcGIS to Digitize the Drive-Thru Clinic's Administrative Process

When the COVID-19 pandemic threw a wrench into plans to host traditional walk-in influenza vaccine clinics, Carlton County, Minnesota, decided to go the safer, socially distanced route: a drive-thru flu clinic where people could get vaccinated in their vehicles.

Due to the availability of GIS technology, Carlton County Public Health & Human Services decided to go all digital for its drive-thru flu clinic in September 2020.

The ArcGIS Survey123 forms would be the linchpin of this new flu clinic model and for the COVID-19 vaccine distribution process. Online forms made registration for the clinic faster and easier for the public and provided real-time statistics, enabling county officials to quickly analyze how many people were being vaccinated and how fast this was being done.

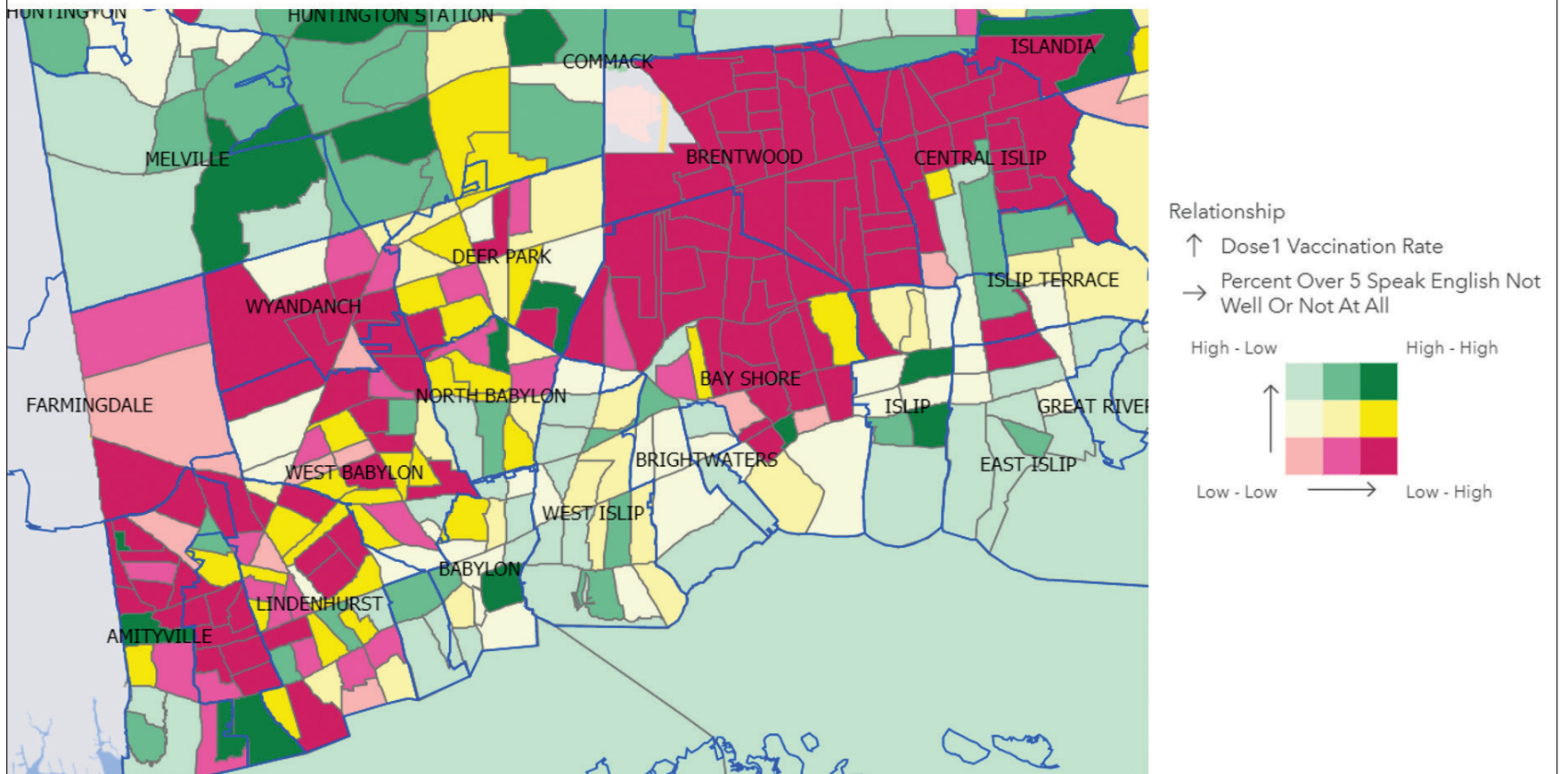
It also helped the county determine clinic attendance and how many people would be needed to staff it. Important information about individuals receiving a vaccine—such as which type of vaccine they received—could be stored and accessed rapidly, and responses were standardized to avoid data entry errors.

The county used ArcGIS Hub to create the Carlton County Drive-Thru Flu Vaccine Clinic site with basic details such as the dates and times of the event and contact information. The hub site also included a flu clinic registration icon. Clicking the icon opened an ArcGIS Survey123 form to be filled out with all the pertinent personal and insurance- and health-related information that registrants were required to provide. The use of GIS allowed residents to access the clinics, receive their shot, and be on their way—all within five minutes.

“That digital process helped speed people through the clinic. For the people who had preregistered, the average time for getting a vaccine—from the time they checked in up to the time they exited the garage—was only about five minutes.”

Jenny Barta
Public Health Nurse Specialist,
Carlton County Public Health & Human
Services, Minnesota

Western LI: Vaccination & Language Barrier, 3/30/21



Suffolk County Maps COVID-19 Transmission and Vaccination Vulnerabilities

Founded in 1683 and the fourth most populous county in New York State, Suffolk County spans over 911.8 square miles. For this extensive and diverse county, GIS technology has played a critical role in business operations since the 1990s.

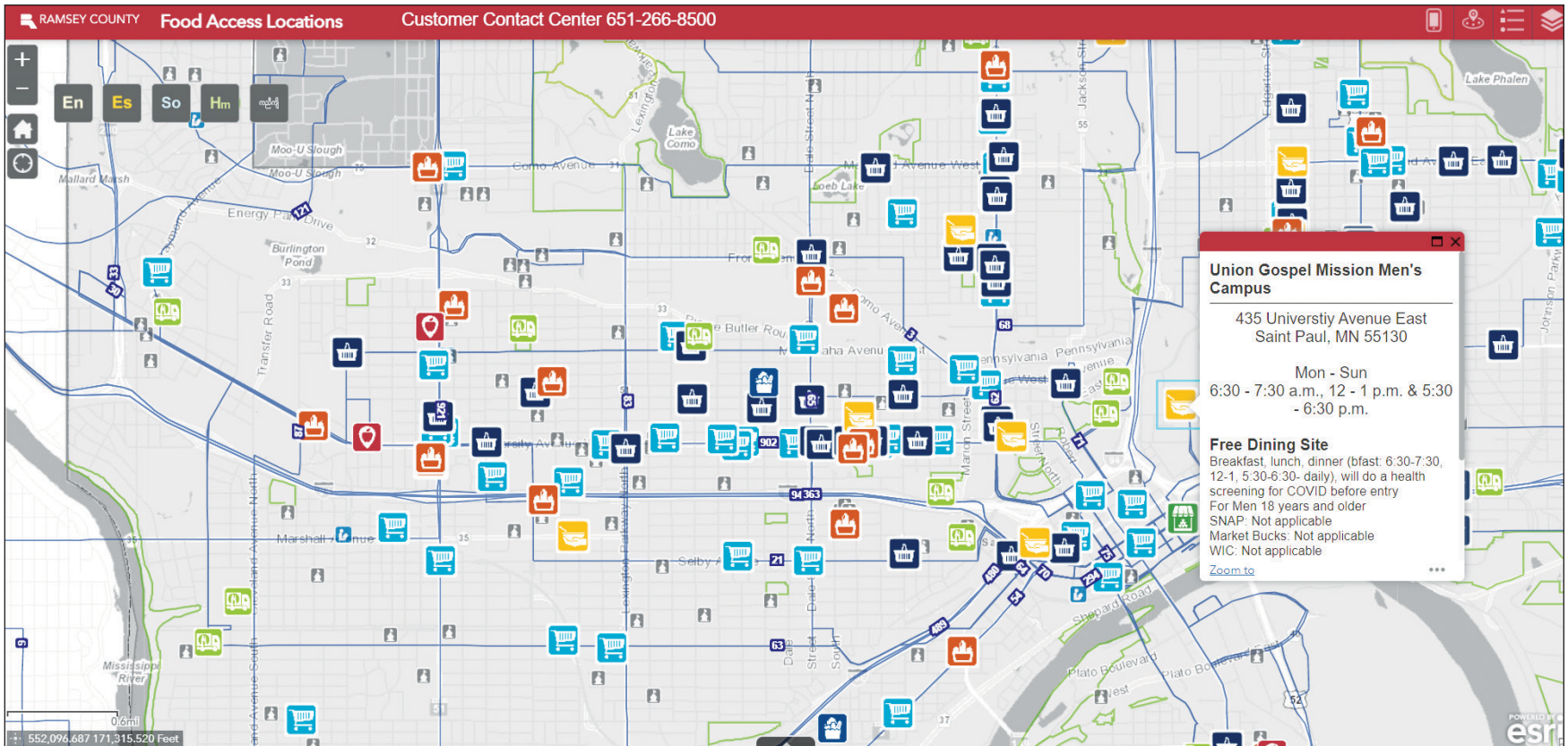
During the pandemic, Suffolk County officials needed a comprehensive picture of COVID-19 transmission and its impact across the county to make context-driven decisions. Using GIS technology and bivariate analysis, county officials identified priority ZIP codes to improve vaccination outreach. Geospatial analysis and location-based data were critical to Suffolk County's vaccination outreach strategies. From the maps, officials targeted specific geocoded neighborhoods and learned the possible barriers to vaccination, such as language and

transportation. Officials then modified their strategy to include language assistance and a rideshare partnership with Lyft and identified locations for community vaccination sites.

Suffolk County officials continue to rely on GIS dashboards and bivariate analysis to tailor their pandemic response, most recently monitoring breakthrough COVID-19 cases. For the teams involved, this collective effort has been critical to the county's successful response.

"Maps are so powerful. When I want to communicate to the County Executive office a correlation between factors, maps speak for themselves. So it's easy for me to explain the correlation and what needs to be done."

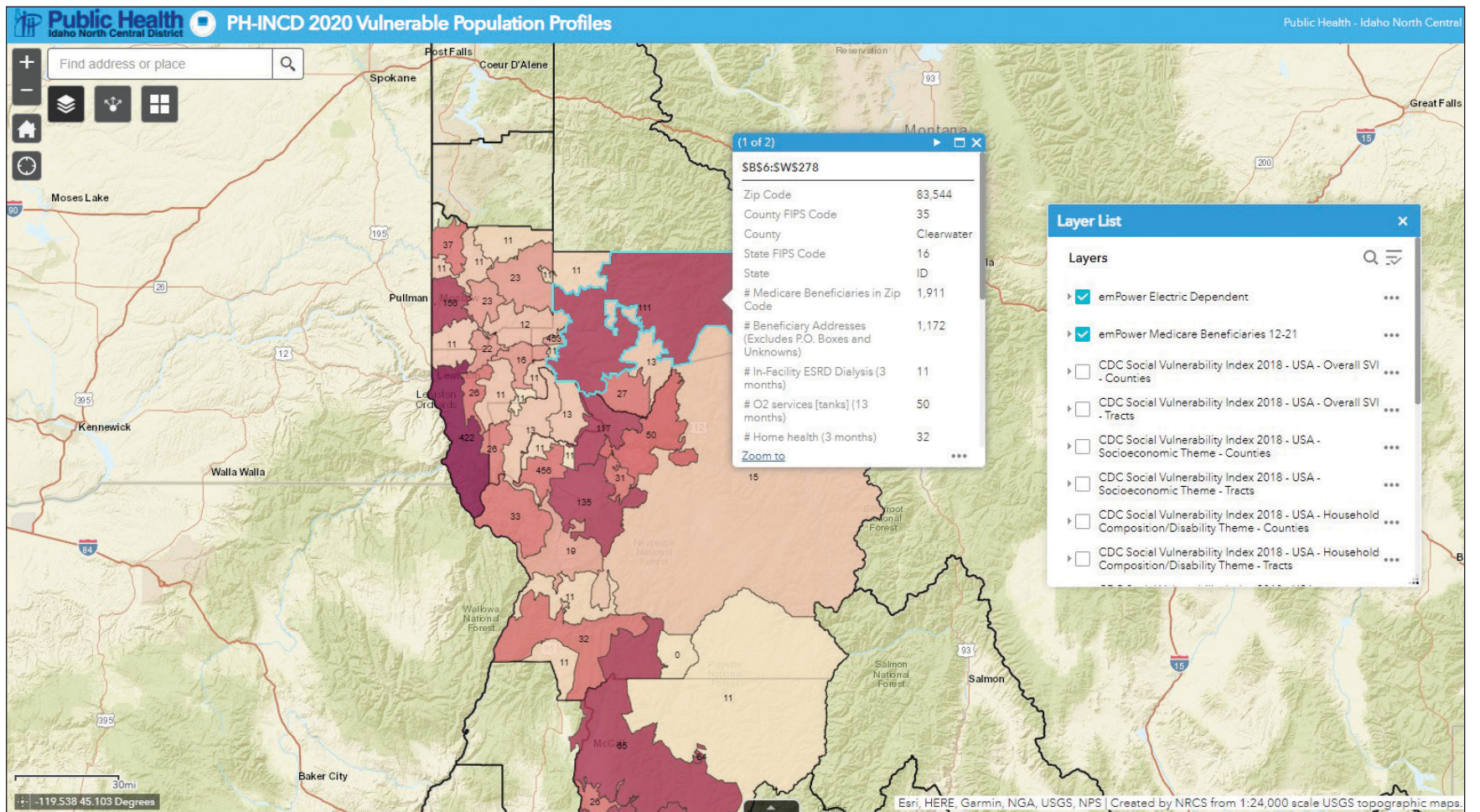
Dr. Harsha Rajashekharaiyah
Senior Project Coordinator for COVID-19 Response, Suffolk County, New York



Food Resources Web Map for Ramsey County, Minnesota

In response to the economic downturn resulting from the COVID-19 pandemic beginning in 2020, Ramsey County's Health and Wellness Division and Information Services Department collaborated with numerous community partners to create a continually updated web map locating various food access resources within the county. These include food shelves; free meal sites; food programs associated with schools; food mobiles; and stores participating in the

Supplemental Nutrition Assistance Program (SNAP) and the Women, Infants and Children (WIC) program. The use of GIS allowed the county to assist those in need and make it easy for them to find healthy, affordable food near them.



Idaho North Central District Vulnerable Populations

Idaho North Central Public Health District is responsible for the health of five counties: Clearwater, Idaho, Latah, Lewis, and Nez Perce. To promote the greatest quality of life and make sure vulnerable communities were receiving accurate resources, the district turned to GIS.

The district started by first mapping the number of people who are electric dependent as well as those who receive Medicare benefits. Along with these critical layers, staff also mapped the Centers for Disease Control and Prevention

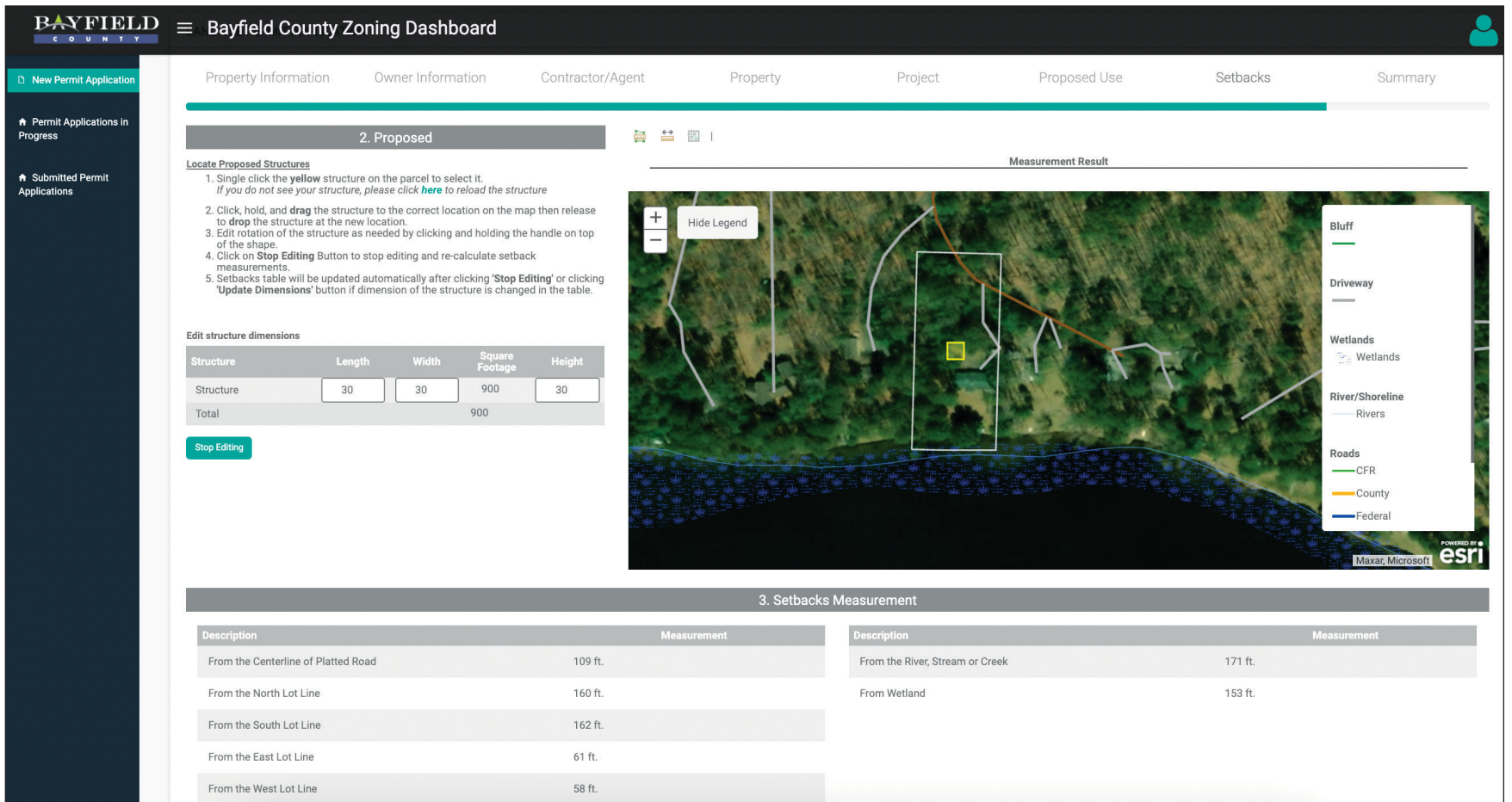
(CDC) Social Vulnerability Index indicators by county and census tract.

This allowed the district to easily see the social vulnerabilities of each county, leverage this information during the COVID-19 pandemic, and use it for grant writing. In case of a fire, flood, pandemic, etc., these maps give the district confidence that its vulnerable communities, senior population, and those dependent on electricity won't be forgotten or overlooked.

An aerial photograph of a city valley. In the foreground, a multi-lane highway with several cars is visible, curving through a lush green area with trees showing autumn colors. The middle ground shows a city with various buildings, including a large modern glass-walled structure. In the background, a range of mountains with some snow-capped peaks stretches across the horizon under a blue sky with scattered white clouds. A dark grey semi-transparent box is overlaid on the right side of the image, containing text.

Planning

Counties have an obligation to create a path of sustainable and equitable development that leads to opportunities for all residents. To achieve this, counties have embraced GIS to find the right balance between the built and natural environments, taken a data-driven approach to long-range planning, and applied an equity lens to their decisions. County governments are advancing beyond traditional processes and workflows to develop policy and design smart communities that reflect their residents' needs.



Efficient Permit Application Process Helps Bayfield County

The sudden flexibility of remote work during the pandemic increased the demand for home improvements and relocating to larger homes in lower-cost and less-dense areas of the country. In Bayfield County, Wisconsin, land-use applications surged to unprecedented levels. Bayfield County's Zoning and Permitting Department leveraged GIS technology to automate its permitting process to meet its community's growing needs.

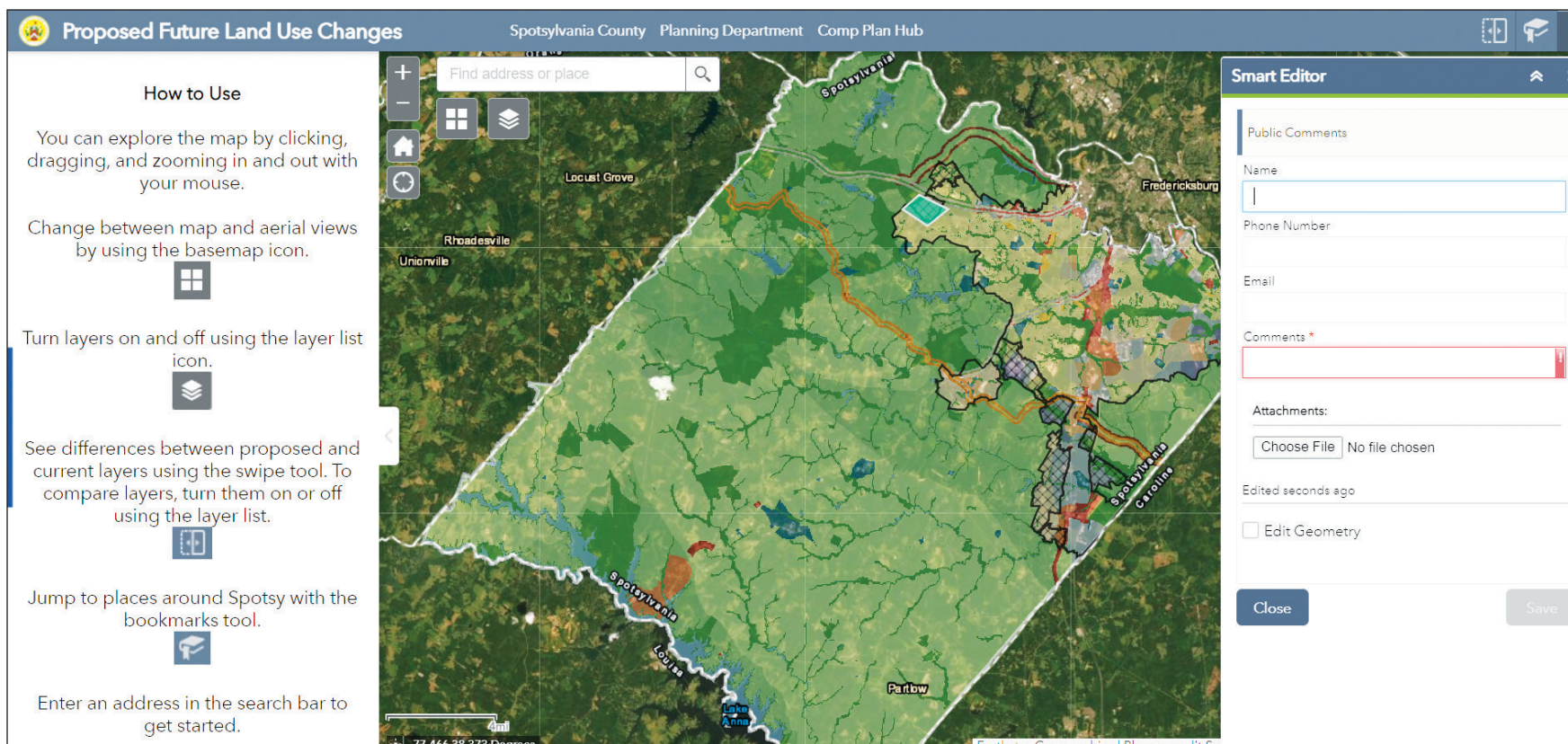
The county's web-based permitting application references the county's authoritative parcel data via ArcGIS Online. This allows property owners and contractors to draw a proposed structure within the property of interest on an interactive web map. Once drawn, the application automatically calculates the setback location based on the measurements of the proposed build.

As inspectors visit each site, they simply select the parcel on a tablet and confirm the accuracy or update the setback measurements, if needed. This is accomplished using ArcGIS Field Maps, an all-in-one app that simplifies field deployments and mobile data collection with location-tracking capabilities. The updated data is saved and uploaded in real time into the same application online where applicants can see real-time updates.

The ongoing vision for this project is that the application will soon integrate many other permit types. The county's web-based online permit application and its use of ArcGIS ensure land-use applications are more accurate and transparent and move much faster. Issues of the past are no longer hindering residents from building their future homes.

"All of the georeference information is in there, as far as parcel lines, wetlands, and roads. This results in a more accurate and consistent product. The days of drawing plot plans on bar napkins and receipts are over."

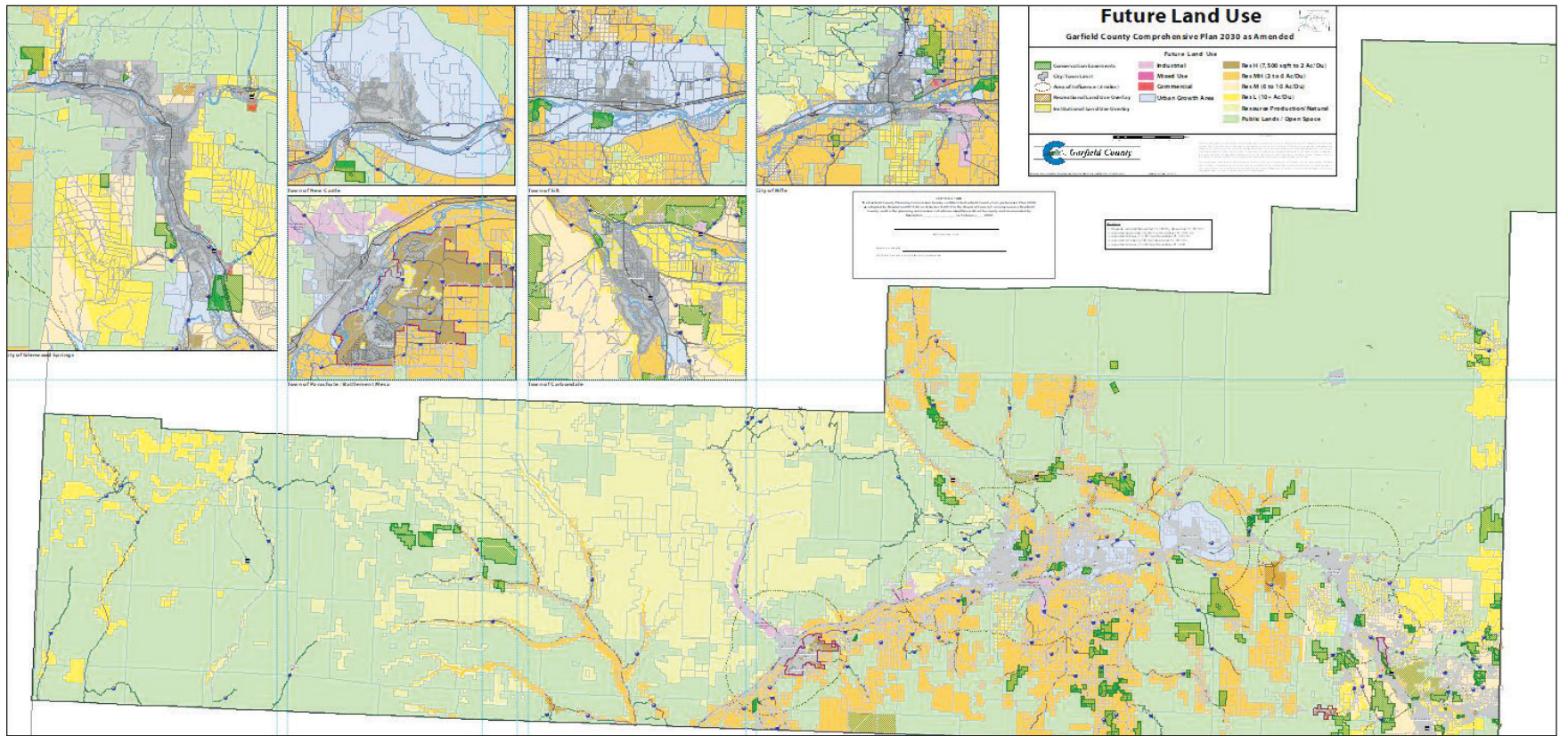
Robert Shierman
 Director, of Planning and Zoning,
 Bayfield County, Wisconsin



Comprehensive Plan Update Hub Site for Spotsylvania County, Virginia

The Spotsylvania County Comprehensive Plan Update hub site was created as a way for residents and stakeholders to interact and review the proposed changes to the Comprehensive Plan update during the COVID-19 pandemic. The plan includes things like proposed land-use changes, public facilities locations, and historic resources. With a combination of Esri technologies,

users can explore the draft documents and maps and submit feedback to staff virtually. Once approved, the hub site will be used as a resource for residents and county staff to reference the plan as it shapes Spotsylvania County's next 20 years.



Garfield County, Colorado, Uses GIS for Comprehensive Future Land-Use Plan

Garfield County is a large rural county in western Colorado. Approximately 62 percent of land is public. The almost 60,000 residents of Garfield County live near or within six municipalities, of which five are located off I-70, a major east-west interstate. The county knew it had to map the overall land use to plan for future projects and population growth, so it leveraged GIS tools to achieve this.

The map the county created shows the overall land-use distribution within Garfield County as its population continues to grow. The map allows the county to not only strategically plan future projects and programs but also support the growth and workforce of the communities of Aspen, Snowmass, and Basalt.



Fastest-Growing County Enhances Planning with Location Intelligence

Monongalia County is possibly the fastest-growing county in West Virginia when it comes to development—both commercial and residential. To keep track of this growth, the county knew it had to leverage GIS tools.

With the use of aerial imagery, county staff created a map that shows one of the largest and most popular growing, developed areas in Monongalia County: the University Town Centre tax increment financing (TIF) district. The University Town Centre TIF district was created in 2012 and added to in 2015. Since then, a

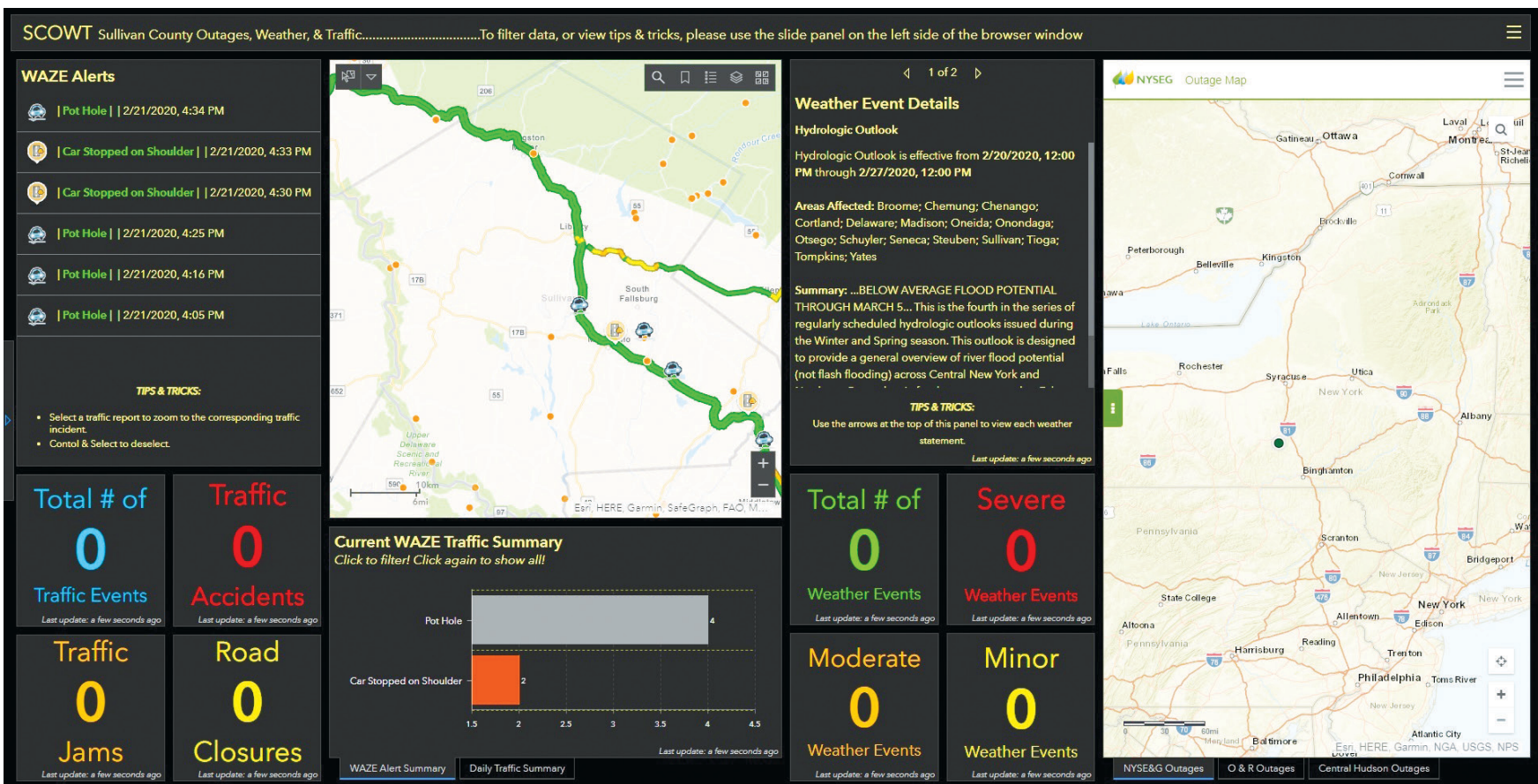
massive amount of earth has been moved, structures built, parcels split and divided, and a plethora of new addresses added into the 911 dispatch call system. A lot has changed in roughly seven years, including a new interstate exchange to access the development, roads, and infrastructure to support the TIF district along with multiresidential units throughout the district.

The use of aerial imagery has allowed the county to keep track of this large development and allocate resources where they are needed most.

Public Safety

Public safety agencies must gain a deeper understanding of where to focus efforts in order to prevent, protect against, and mitigate complex threats and hazards. GIS allows real-time data-driven insights aiding mission-critical decisions for law enforcement, fire, and emergency management departments to respond to threats, keep communities safe, and quickly recover from disasters.





GIS Enables Tourist Destination to Operate Efficiently while Empowering Others

Sullivan County wanted to find a way to help its staff balance tourism needs with the realities of country living. The county's GIS program first used ArcGIS Pro to deploy ArcGIS Solutions to focus on emergency preparedness, response, recovery, and mitigation.

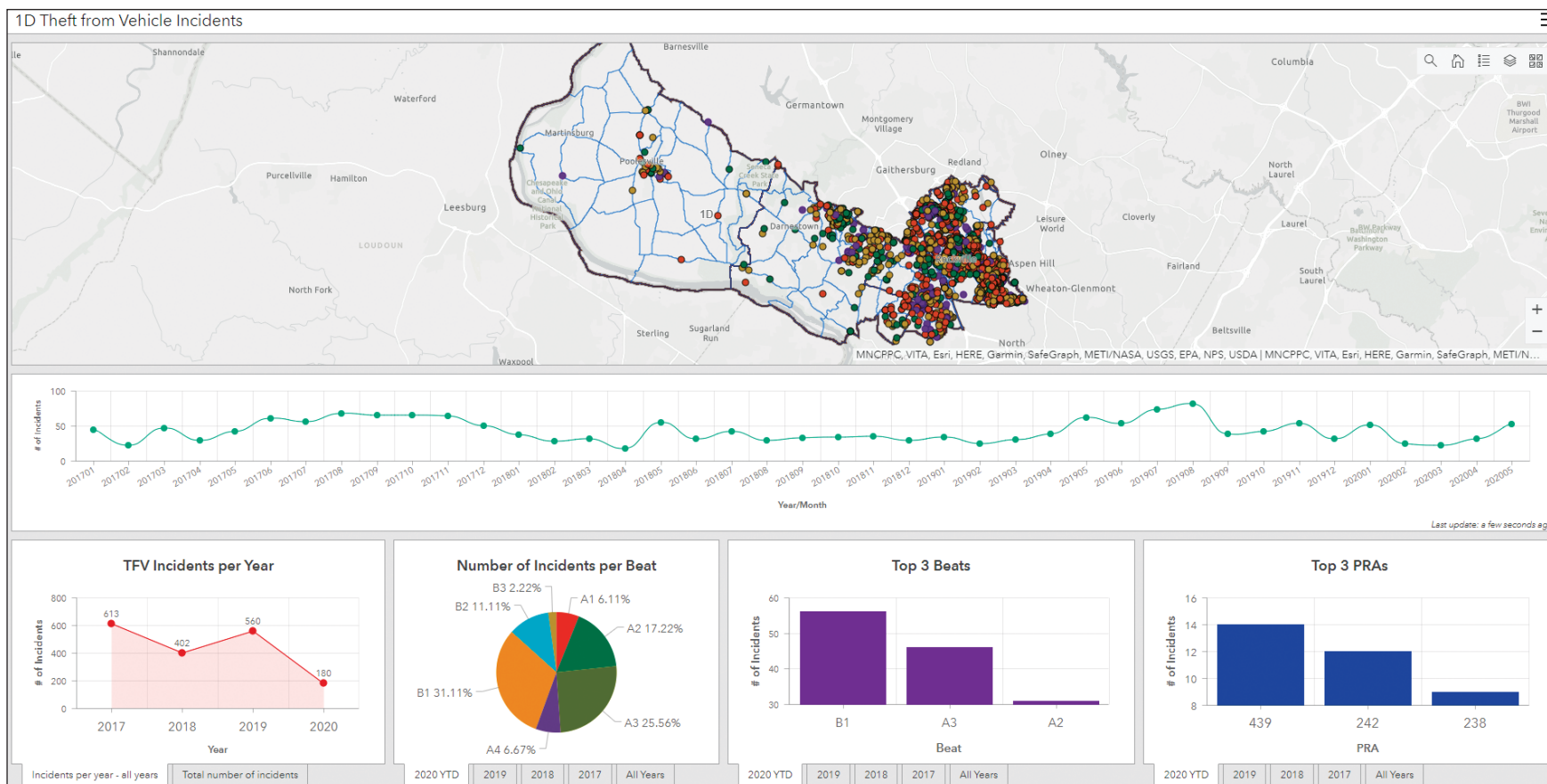
The team created four apps for emergency operations center staff members: Operations Response, which helps users identify and map emergency facilities; Situational Awareness, which lets users map event and incident perimeters and identify affected populations; Logistics Planning, which helps users outline emergency

logistics; and the Emergency Resources Reporter, which allows users to streamline field data collection via an offline map with sync capabilities and an online reporter.

Being able to easily deploy these resources enabled the county to map and monitor all its public safety assets and resources more effectively. It also helped the team quickly provide maps and updates and identify any additional critical information.

"All these efforts provided for a successful 50th Woodstock Anniversary weekend by increasing situational awareness [by] leaps and bounds, having the right people in the room at the right time, and assisting decision-makers."

Rick Sauer
Commissioner of Public Safety,
Sullivan County, New York

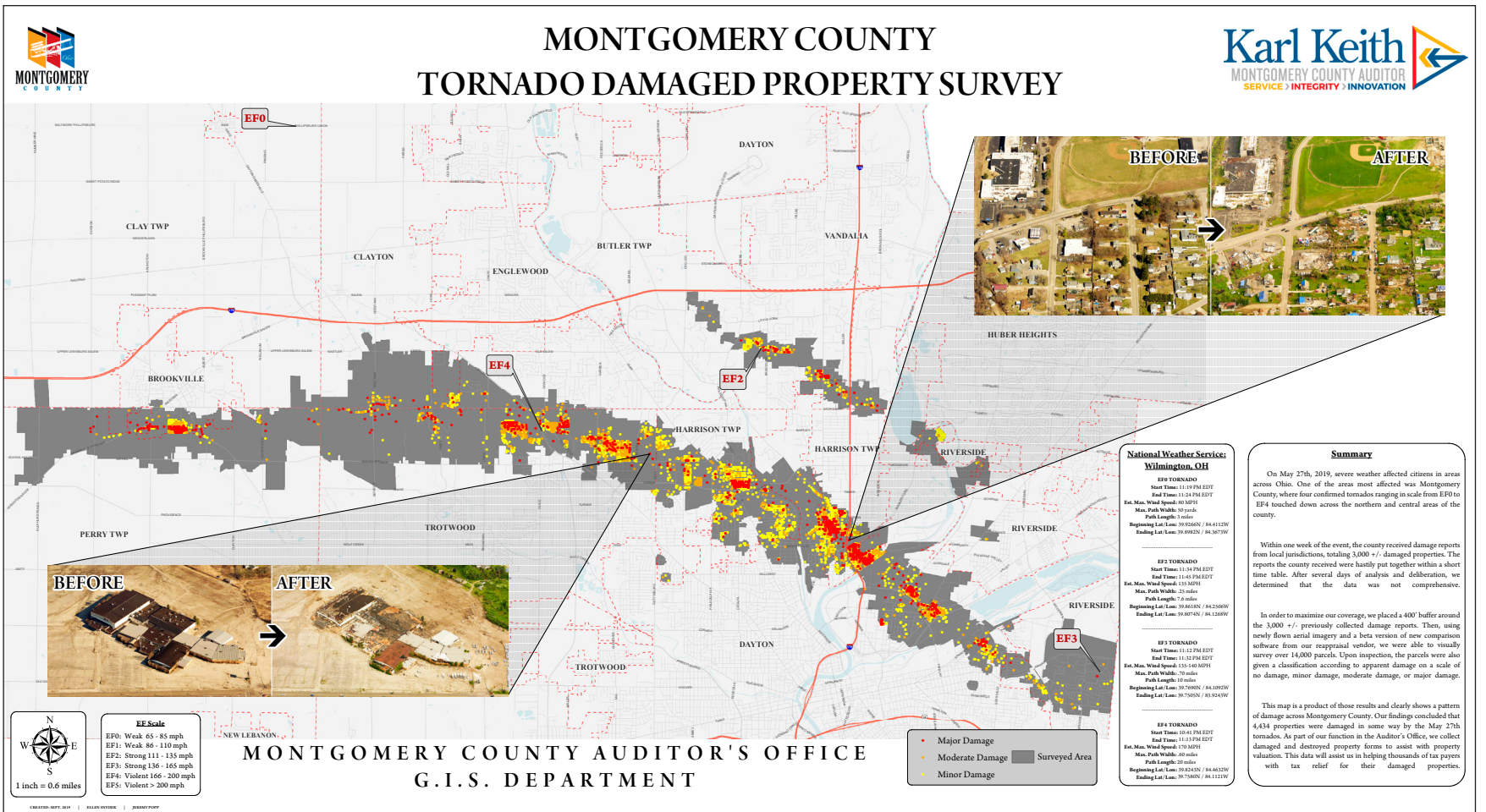


Monitoring Vehicle Thefts with Location Intelligence

The Montgomery County Department of Police, Maryland, includes approximately 1,300 sworn officers and approximately 650 support employees. The department is responsible for policing a county with a population of over one million residents.

The police department utilized ArcGIS Dashboards to show vehicle theft incidents. It is used by the first district in the Montgomery County Department of Police. The dashboard allows officers and analysts to visualize and

analyze trends in vehicle theft calls for the last three years. The dashboard updates automatically on a daily basis. It pulls records directly from a records management system, which has saved a tremendous amount of time, as analysts no longer need to cobble data together and produce manual maps or charts from various sources.



Montgomery County Surveys Properties Damaged by Tornadoes

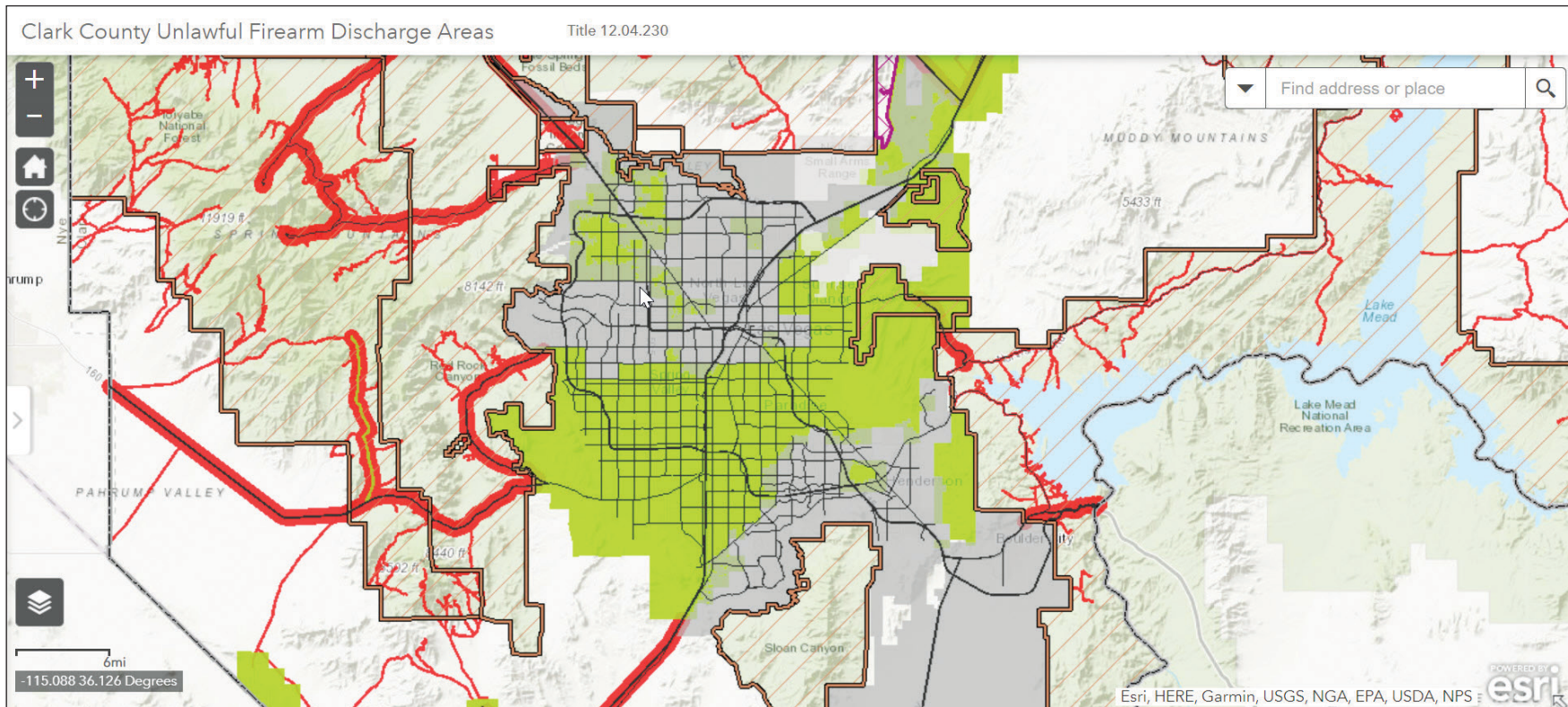
On May 27, 2019, severe weather affected citizens in areas across Ohio. One of the areas most affected was Montgomery County, where four confirmed tornadoes, ranging in scale from EF0 to EF4, touched down across the northern and central areas of the county.

Within one week of the event, the county received damage reports from local jurisdictions, totaling about 3,000 damaged properties. The reports were hastily put together within a short timetable. After several days of analysis and deliberation, the county determined that the data was not comprehensive.

The county turned to GIS technology to be able to easily see the damage done across the county, all in one map. County staff members took the damage reports they

had received and then, using newly flown aerial imagery, were able to visually inspect about 14,000 damaged parcels in the newly identified survey areas. Upon inspection, the parcels were also given a rating according to apparent damage on a scale of no damage, minor damage, moderate damage, and major damage.

The map was able to clearly show a pattern of damage across Montgomery County. The findings concluded that 4,434 properties were damaged in some way by the May 27 tornadoes. The auditor's office was then able to easily collect damaged- and destroyed-property forms to assist with property valuation. This data will assist the county in helping thousands of taxpayers with tax relief for their damaged properties.

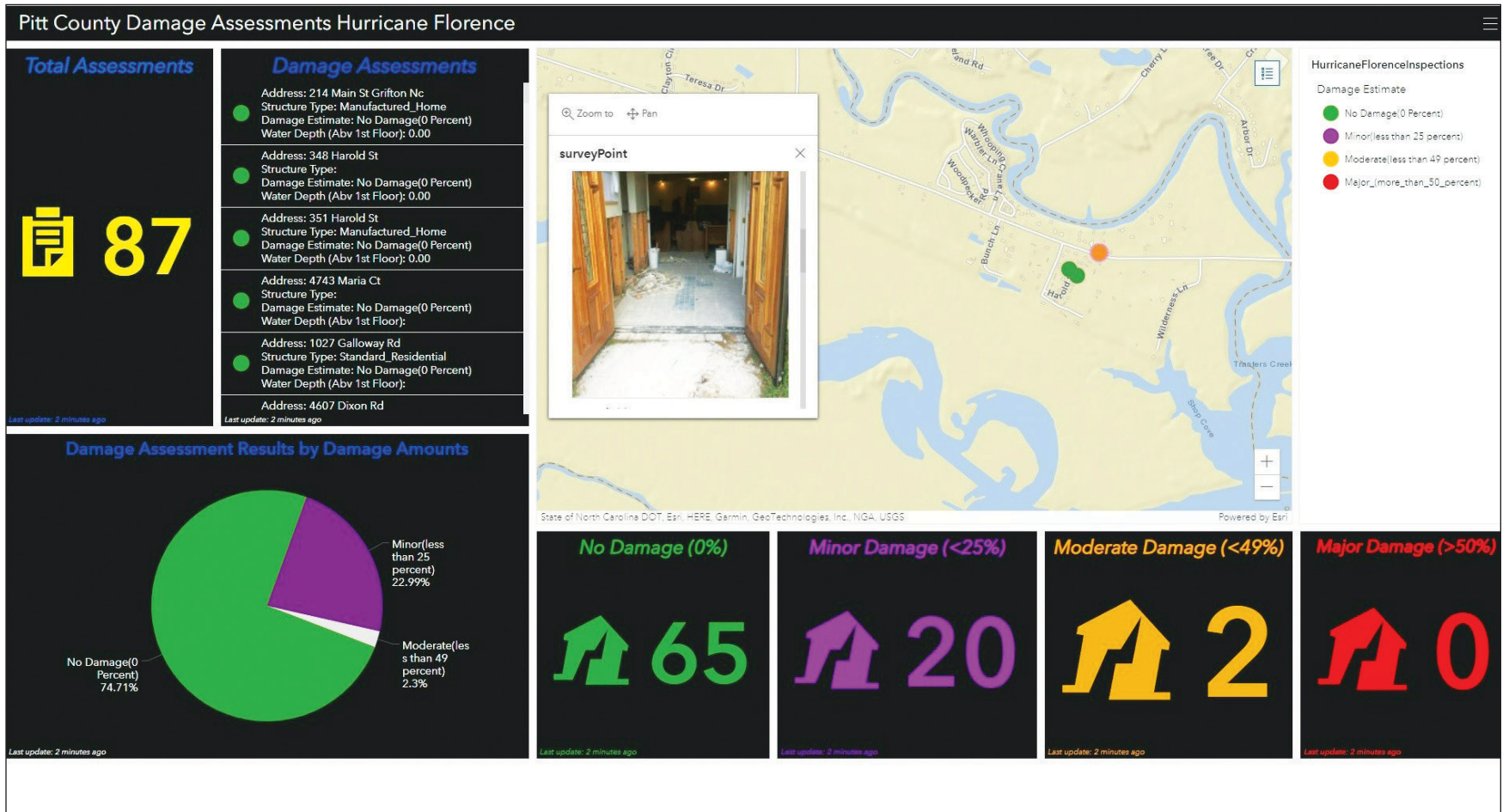


Clark County Maps Unlawful Firearm Discharge Areas

Clark County is by far the most populous county in Nevada, and the 11th most populous county in the United States. Most of the county population resides in the Las Vegas census county divisions.

Clark County has adopted an ordinance that bans shooting within half a mile of a highway or within 500 feet of any of the a public or private roads, improved trails, designated campgrounds, or picnic areas located throughout the unincorporated areas of Clark County.

To aid the public in identifying locations in Clark County where firearm discharge is legal and where it is not, the county turned to GIS to create an interactive web map application that easily identifies the unlawful firearm discharge areas.



Pitt County Leverages GIS in Response to Hurricane Florence

Natural disasters require response efforts from many government departments. When Pitt County, North Carolina, suffered through a hurricane, it turned to GIS tools to cohesively respond.

The Pitt County Planning Department assembled a team of building inspectors, engineers, and planners to perform countywide damage assessments after the Hurricane Florence storm event. The Planning Department utilized ArcGIS Online and mobile devices to capture and display inspection results in real time as the inspectors

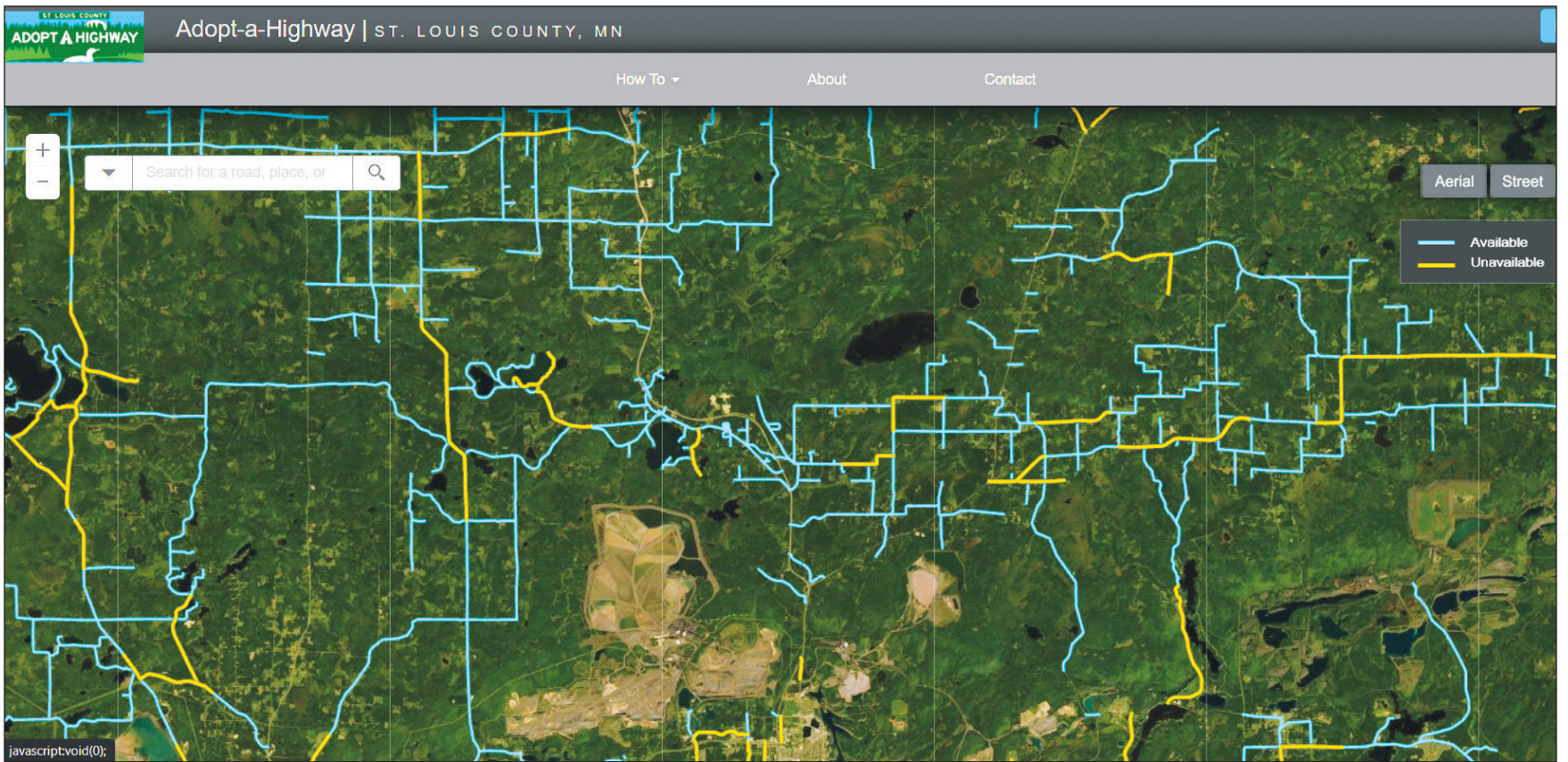
were working in the field. The planning director was able to track the status and location of inspections during this process with the Damage Assessment Dashboard through ArcGIS Online. The chief building inspector was able to view images of the damage captured by the inspectors during assessments.

The utilization of ArcGIS Online and mobile devices to create the Damage Assessment Dashboard saved time and resources, allowing staff to assist residents through the recovery process.



Transportation & Public Works

It is the transportation, roads, and public works departments in our counties that keep our communities running. For these agencies, operating in real time must be second nature. GIS-based operations dashboards and asset management tools provide the real-time capabilities needed to manage assets and infrastructure, improve mobility, streamline capital improvement planning, manage the right-of-way, plan for sustainability, and prepare communities for evolving resident needs.



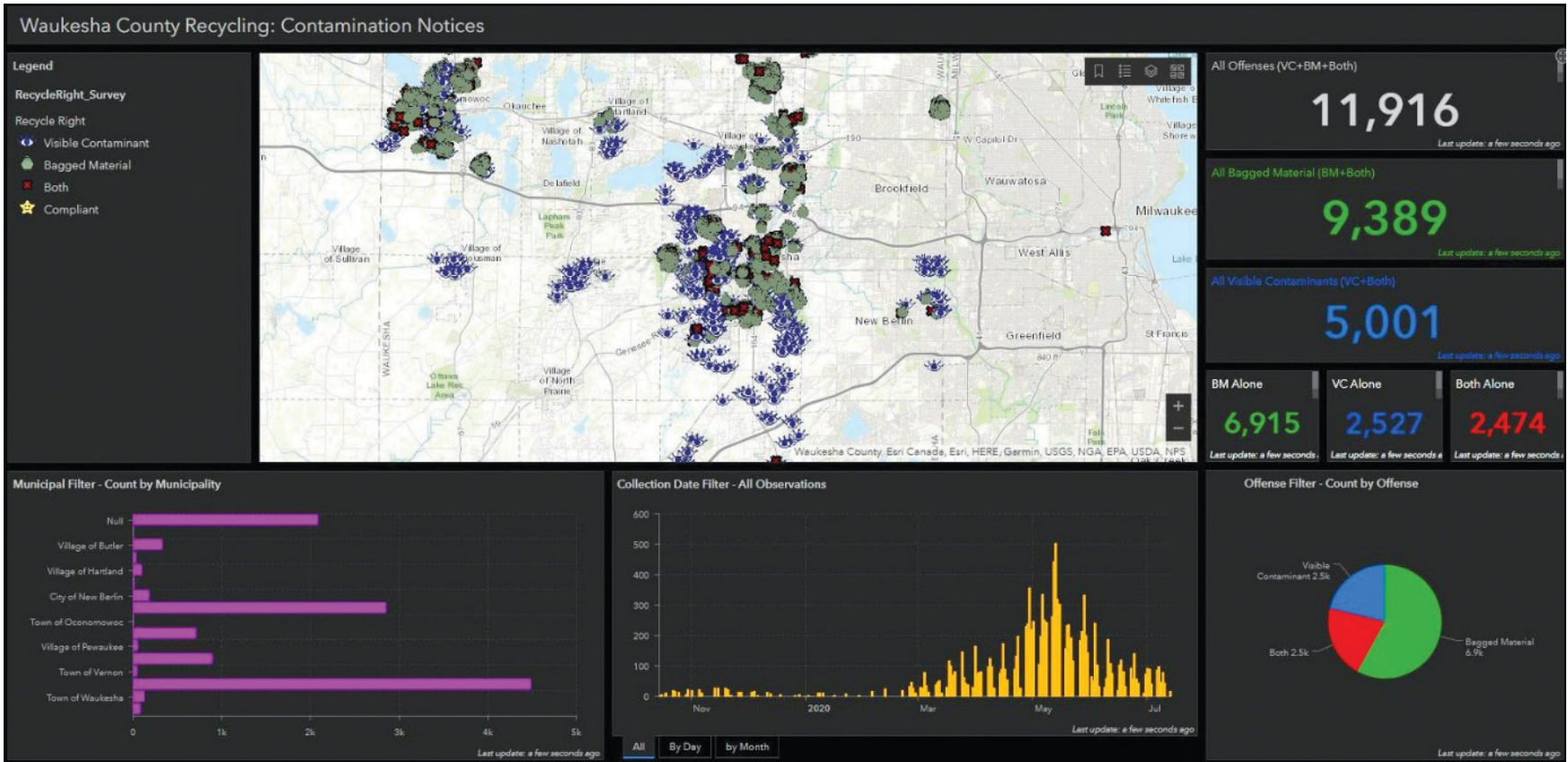
St. Louis County, Minnesota, Saves over \$200,000 in Keeping Roads Clean with GIS

St. Louis County in northern Minnesota manages an estimated 2,000 miles of roadways within its limits and relies on volunteer organizations to assist in the roadways' maintenance. The county previously managed the program through an outdated system. The inability to map and track which volunteer organization was maintaining each road segment or to see the cleanup status of each adopted roadway in real time was a serious concern. The county was in search of a web-based GIS solution that not only could improve productivity and efficiency but also would encourage more community engagement by having a user-friendly, public-facing interface.

The county leveraged ArcGIS Online—cloud-based software that creates and shares interactive web maps—to develop a user-friendly web application that manages all the Adopt-a-Highway workflows. There are two main components to the web application. The front-end

component is a map where county employees and the public can view which highway segments are available or unavailable. The administrator component of the dashboard allows county staff to approve new highway adoptions, verify information, and contact highway adopters. It also allows staff to track when a cleanup was reported and how many bags of trash were collected.

Having an efficient and effective GIS-based system to manage the Adopt-a-Highway program has proved to be cost-effective and have a powerful environmental impact. What was once a system based on paper maps has now become a web-based GIS solution that saves the county over \$200,000 in annual labor costs.



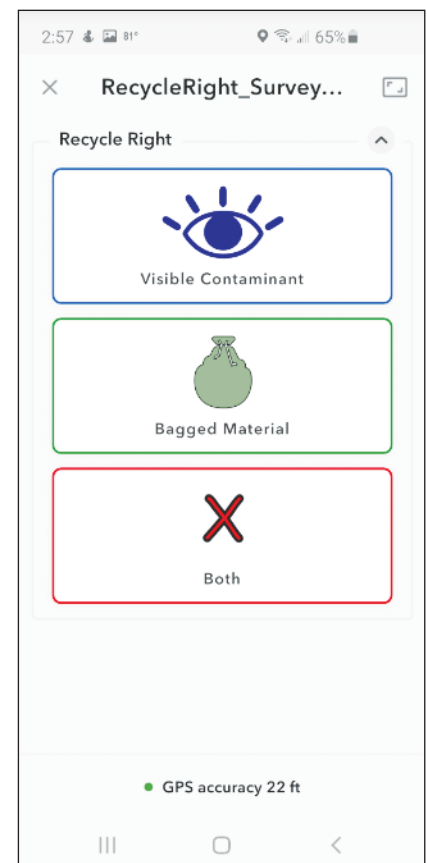
Addressing Recycling Challenges

Waukesha County, Wisconsin, devised a system to improve the quality of its recycling program using GIS to identify and educate residents who contributed unacceptable items. ArcGIS QuickCapture is used for the project. The interface is simple, with large and single-function buttons for ease of use during on-the-move data collection.

ArcGIS Dashboards provides an executive-level look at data distribution and transaction-level trends in real time using interactive graphs, charts, and heat maps. The county assembled an intuitive and informative dashboard for the recycling staff. The easy-to-use dashboard gave staff a deep-dive lens into their data. It was also used to brief supervisors,

managers, and elected officials on the progress of the initiative. It provided tangible numbers for reports and was even used to educate the public on problem areas and contaminant trends over time.

With a successful pilot project, the Land Resources/Recycling division is preparing to equip every truck in the contractor fleets with the QuickCapture app. The division is also preparing to deal with the projected increase in contaminant locations and the efforts required to mail reminder cards to residents at those locations. Using GIS to help zero in on offending areas is just one small part of a broader initiative toward a greener county and a better planet.

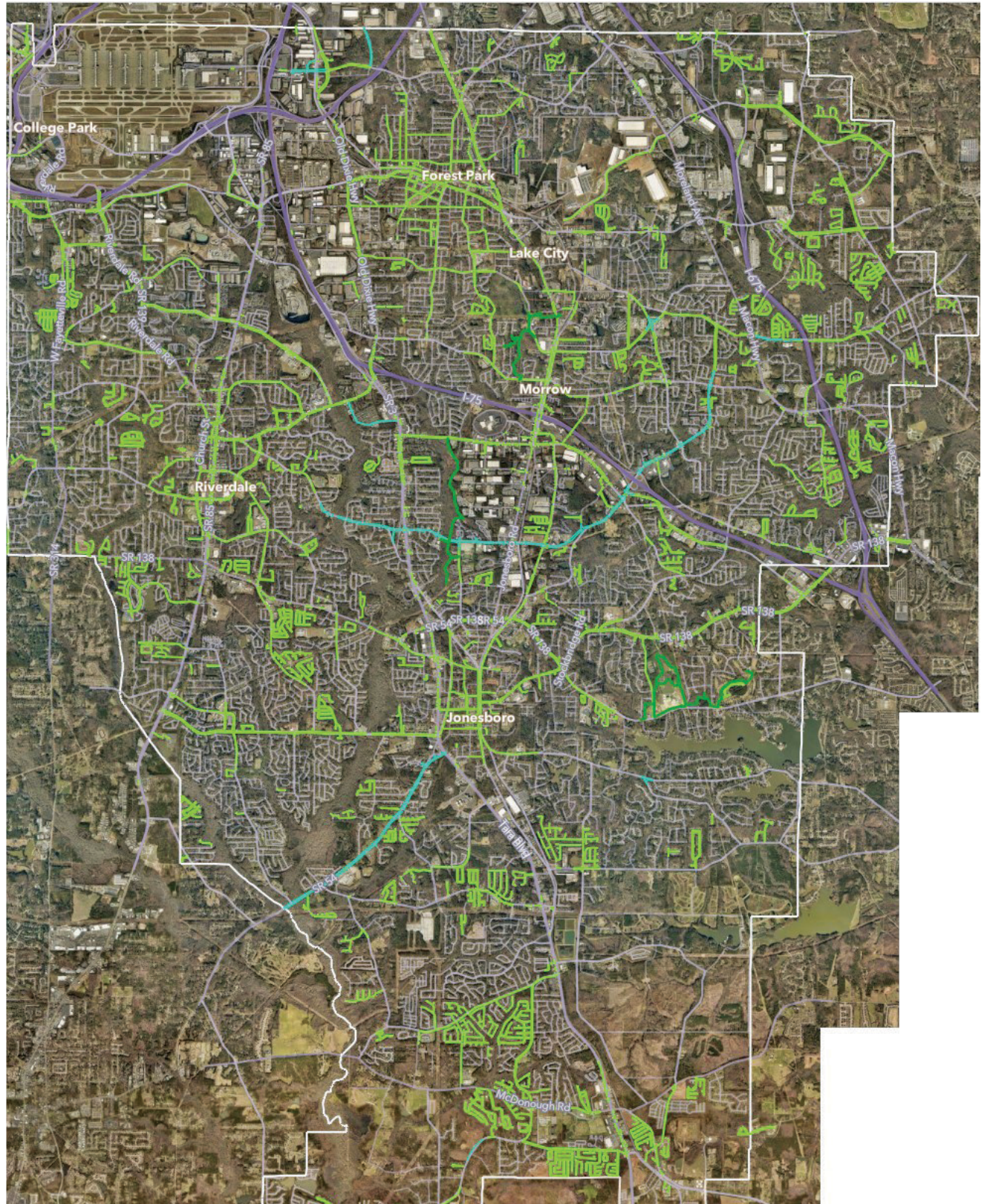


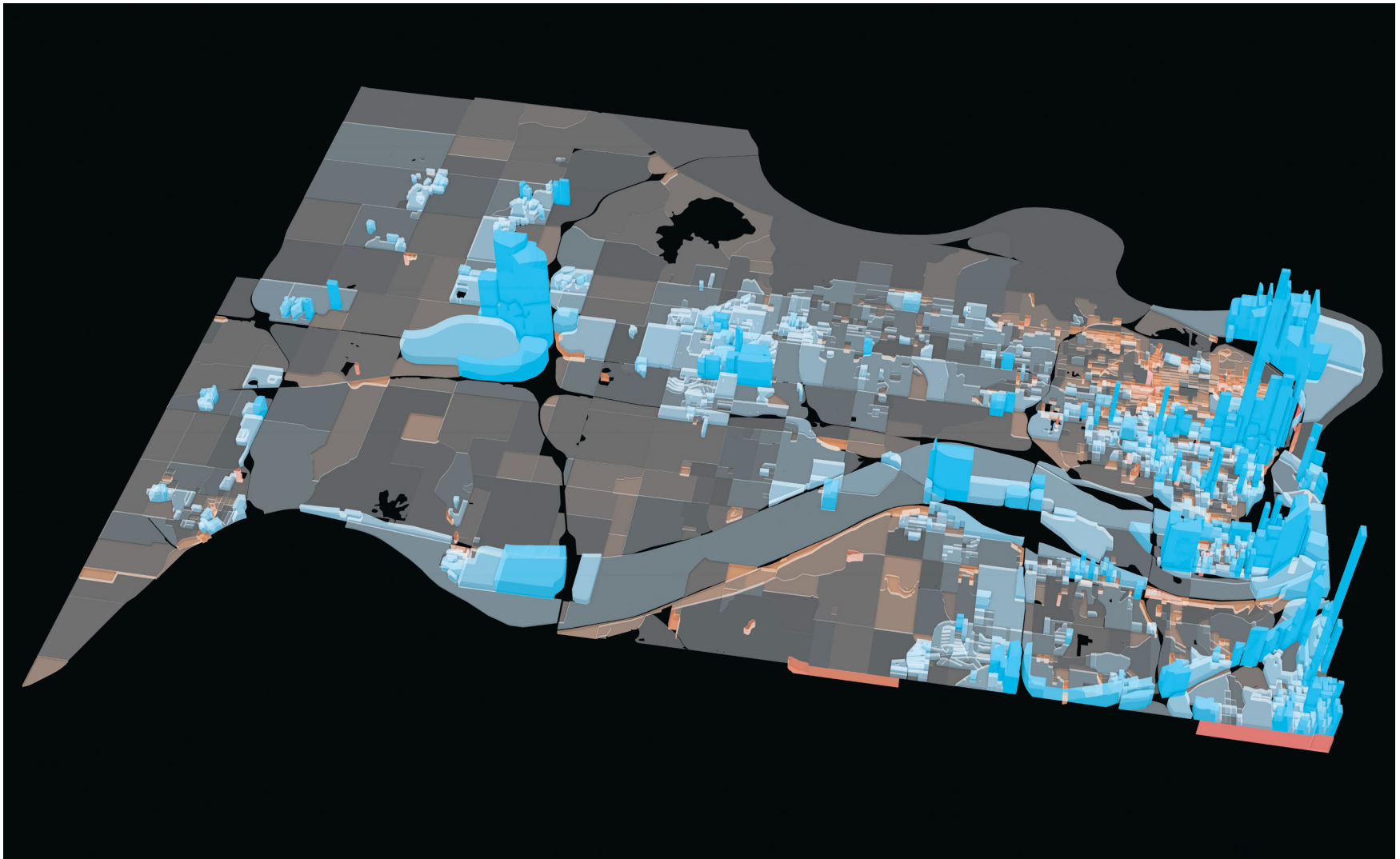
“I have seen GIS used for other applications at the county and thought it would be a good fit for the Recycle Right initiative.”

Analiese Smith
Recycling and Solid Waste Supervisor, Waukesha County, Wisconsin

Clayton County Leverages GIS to Keep Pedestrians Safe

Clayton County is the sixth most-populous county in Georgia. Due to its size, the county wanted a sidewalk inventory map so that the residents could see where sidewalks currently existed and where they were planned. As a grant recipient of the Georgia Institute of Technology's Smart Communities Challenge, Clayton County partnered with the institute to complete the project. Clayton County's goal was to create a decision matrix system that would help the county plan where new sidewalks were going to be installed and future areas of interest. The information was obtained from a combination of existing county data; street and curb cuts QA/QC that was completed by 27 Clayton County high school students who were employed by the county as data gatherers; and information from the county's civic engagement application, which allowed residents to notate where sidewalks were needed or desired. Through the use of GIS, the county was able to leverage civic engagement so that its residents could communicate where they felt more sidewalks were needed.



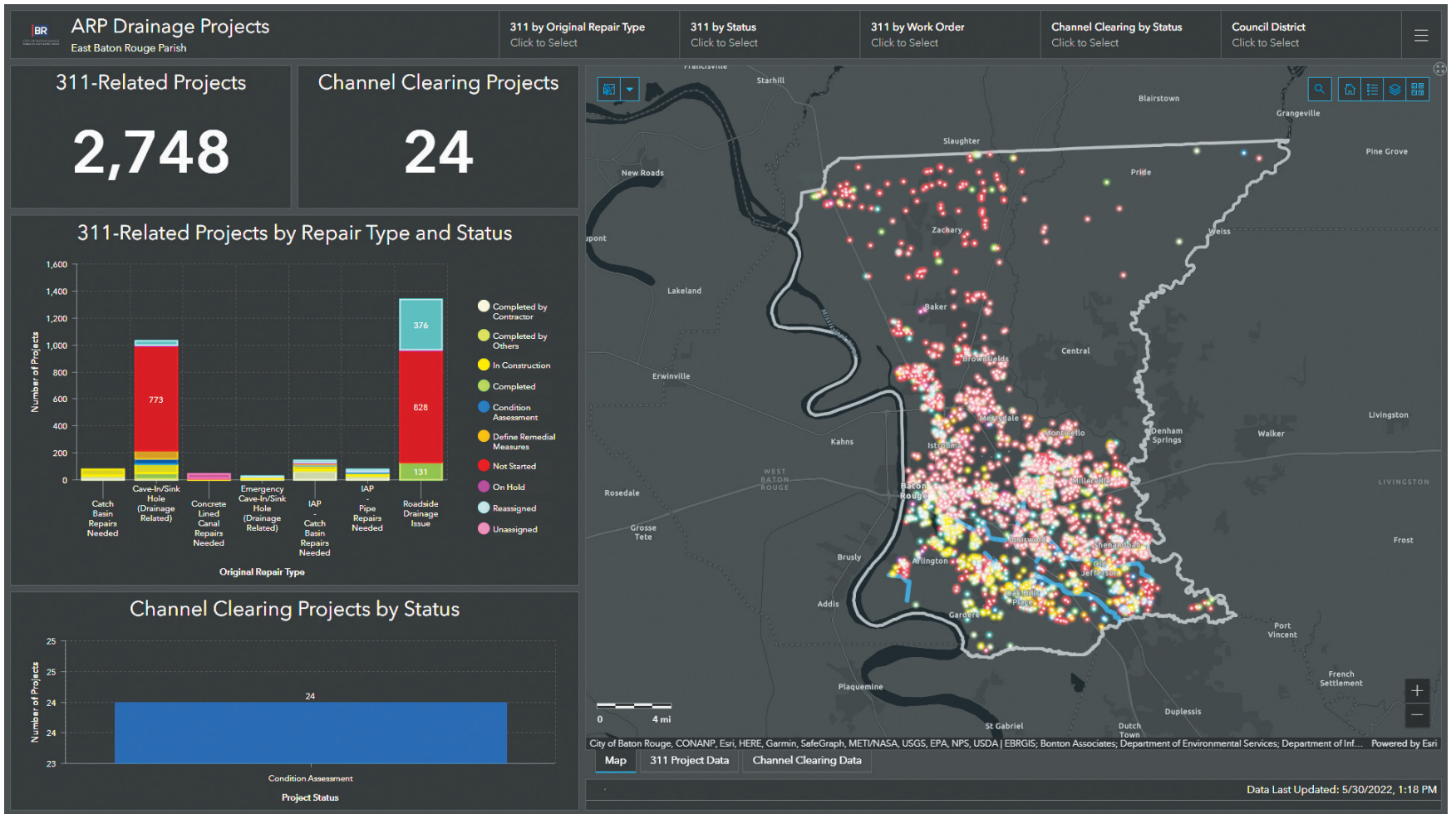


Visualizing Block-by-Block Relationship between Revenues and Expenses for Wyandotte County

A block-by-block analysis of total revenues versus infrastructure costs was created by Wyandotte County, Kansas, utilizing ArcGIS Pro. The visualization demonstrates the relationship between revenues and expenses for the local government. Blocks that are blue and extend upwards represent the degree to which those blocks can fund the curbs, sidewalks, road reconstruction, and streetlights on a given block.

To calculate this, 40 years of total revenues per block were calculated and the total cost of replacing infrastructure on each block was assessed. Blocks that extrude downward in red represent blocks that cannot

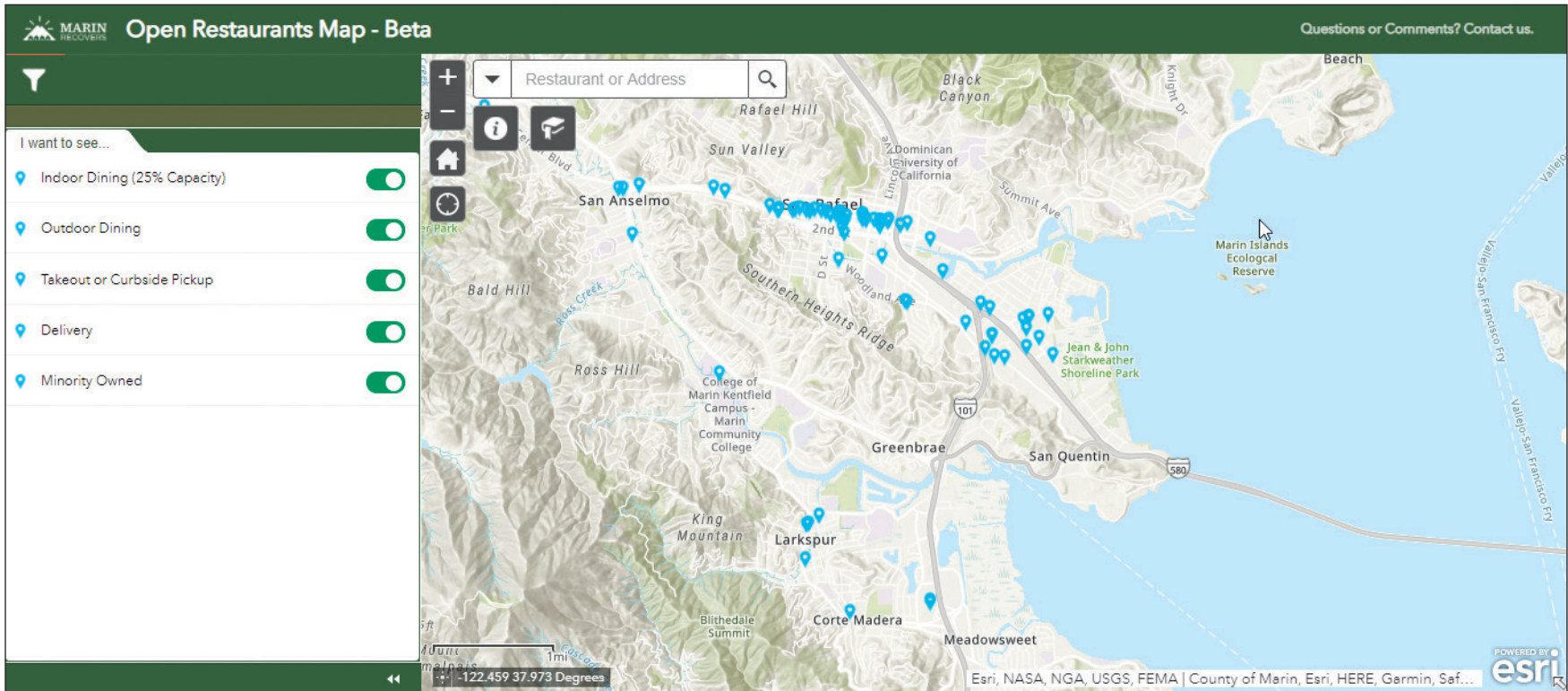
fund the infrastructure replacement with 40 years of all revenues. This visualization assumes that all revenues go toward infrastructure despite that not being the case. In fact, around 6 percent of all revenues end up going toward public works projects. This image is from a project created to inform county leaders about the data behind a new capital criteria selection matrix. This is a visual aid for the return on investment (ROI) criteria for the weighted matrix used to compute rank scores for unfunded capital investment projects. It also serves as an education piece to demonstrate the real cost of public infrastructure.



Parish of East Baton Rouge Leverages GIS to Effectively Distribute American Rescue Plan funds

Since June 2021, the Parish of East Baton Rouge has used American Rescue Plan funds to remove 12 million pounds of debris from 41 miles of drain pipes; 20,000 cubic yards of debris have been cleared from Bayou Manchac; and repairs to drainage structures include 38 cave-ins/sinkholes, 48 catch basins, 30 pipes, and 1 concrete-lined canal.

The parish leveraged GIS to create an online dashboard with information on service requests and projects funded through the parish's recent allocation of more than \$40 million in American Rescue Plan funds to address drainage improvements throughout East Baton Rouge Parish. The use of location intelligence has kept the parish on track for allocating funds to where they are needed most.



Integrating AVL Systems with GIS for Preventive Maintenance

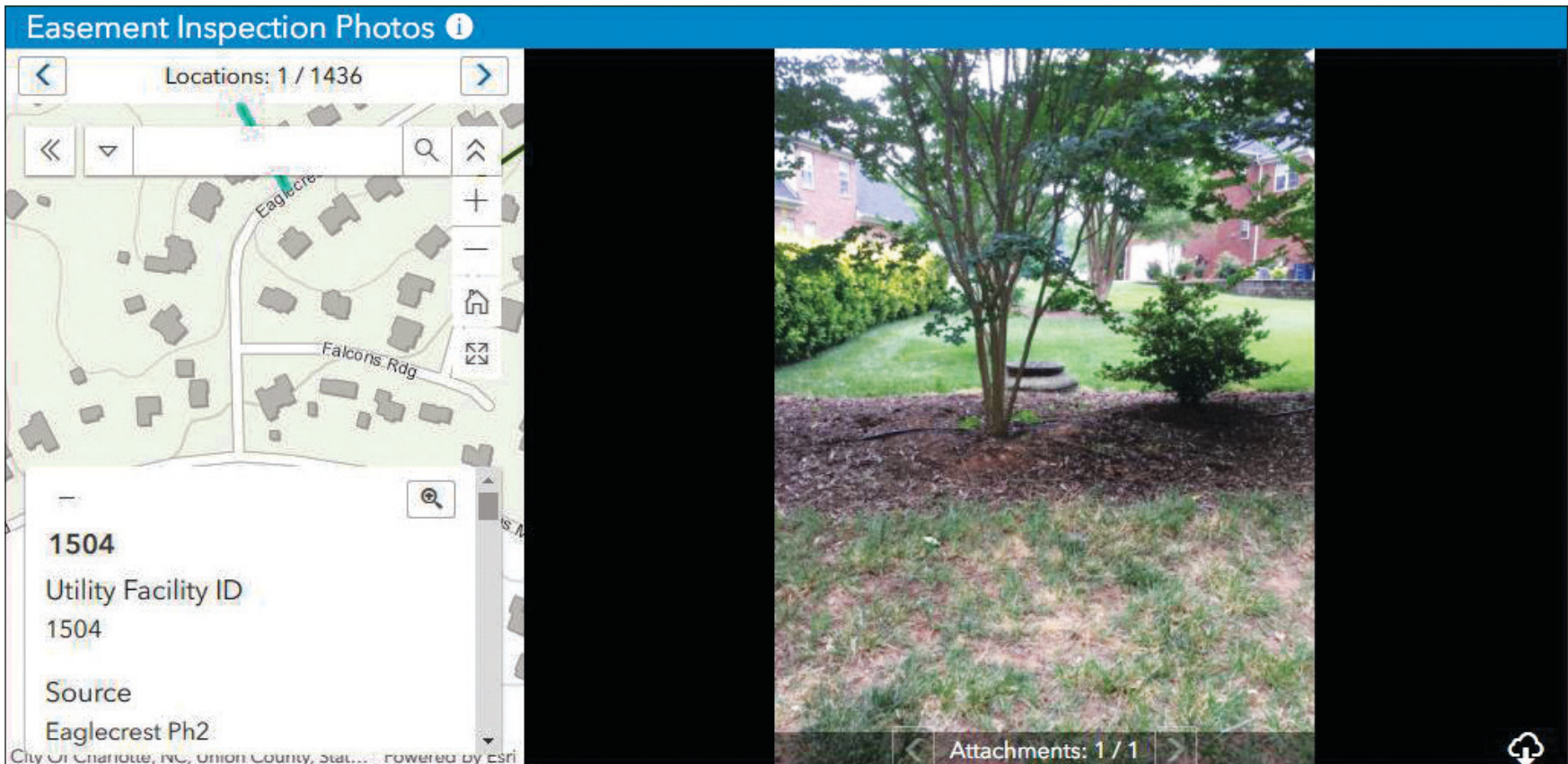
The St. Johns County, Florida, fleet maintenance operations dashboard shows an automatic vehicle locator (AVL) feed, such as vehicles due for preventive maintenance (PM) as well as vehicle counts. Calculation of PM due dates is based on having completed a six-month cycle or been driven more than 5,000 miles. Using ArcGIS GeoEvent™ Server, every time a vehicle hits either milestone, the information is fed in real time onto the dashboard.

St. Johns County also uses ArcGIS Insights to illustrate the amount of fuel used by the county's fleets. Combining the fleet maintenance GIS data along with fuel data, staff can show fuel consumption and conduct a cost analysis of current expenditures and for future budgeting.

Utilities

Residents expect efficient and affordable electric, gas, water, and sewer utilities to maintain their quality of life. As communities face drought, flooding, or climate impacts, counties rely on GIS to develop and manage sustainable and resilient utility networks. GIS has the tools counties need to support asset management, develop and expand networks for population change, and respond to shifts in the industry like renewables and climate change.





Ensuring That Thousands of Easements Remain Accessible Is Critical in Keeping Communities Safe

Union County Water operates and maintains the regional system that provides retail water and wastewater service to 55,000 customers. With over 1,800 miles of service lines in its distribution system, the county is also responsible for the areas where water and wastewater infrastructure assets (e.g., pipes and maintenance holes) are on private property, which are known as easements.

With over 7,700 easements throughout the county, staff turned to web-based maps and apps to inspect and maintain all water and wastewater assets that fell outside the right-of-way.

Starting with the custom-built Easement Inspection Zone Builder web map, which uses the data of the easement locations, each easement section is color coded depending on

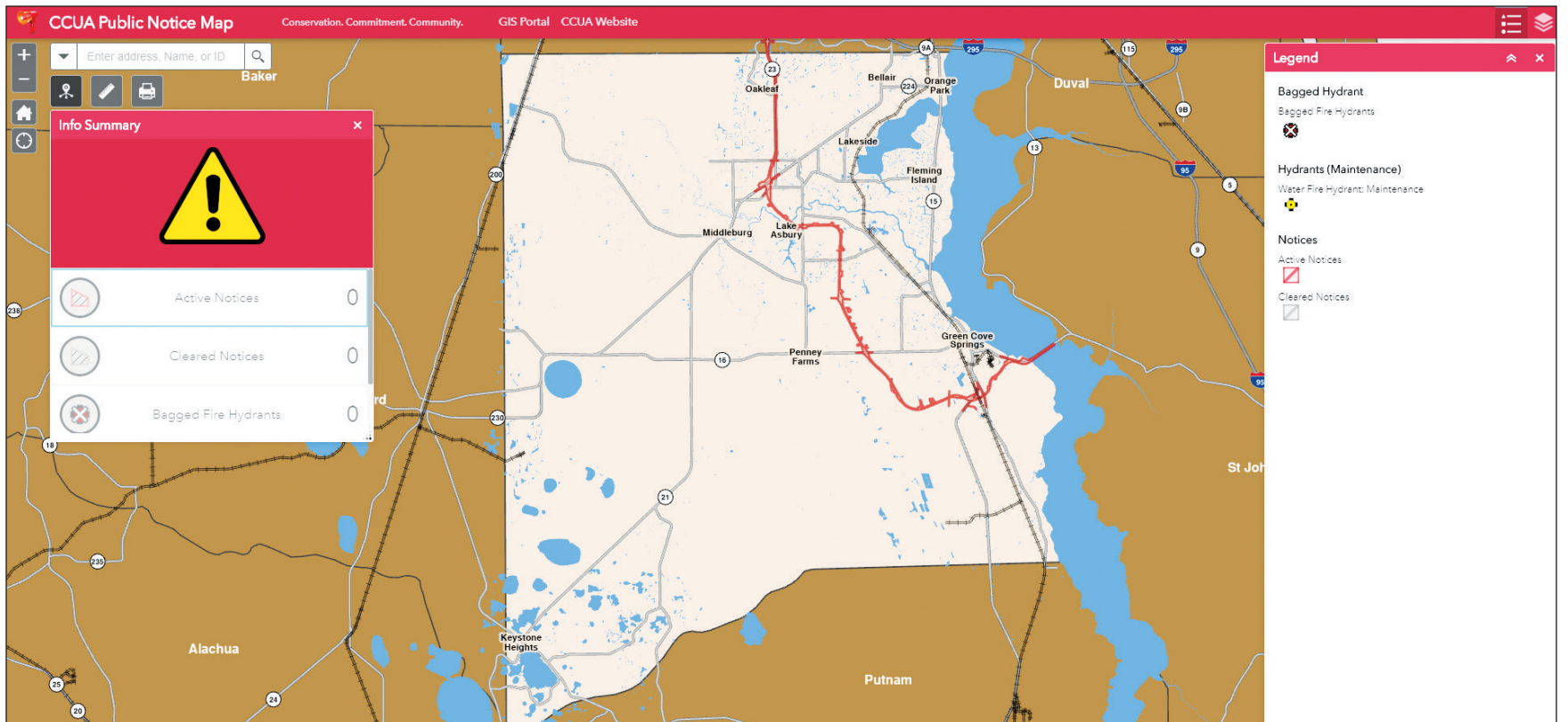
when an inspection was conducted. When an inspection is past due, the section turns red.

Using ArcGIS Collector, an app that leverages a mobile device to capture asset photos, notes, and locations, staff members can conduct their inspections and provide real-time information that updates the easement colors on the Easement Inspection Zone Builder map.

Accessible easements allow Union County Water to save valuable time in responding to emergencies such as a sanitary sewer overflow. This reduces further damage to the distribution system, the environment, and nearby properties. The county plans to turn to ArcGIS Field Maps, an all-in-one app that uses data-driven maps, to help mobile workers perform data collection and editing for their inspection operations.

“The GIS tools have been a game changer for us. We can visualize our work activity and track our progress. And we now have the ability to automatically capture and route the obstructions we find into our Lucity work order system, which manages our notification-of-obstruction workflow with our customers.”

Hayden Hunter
Easement Crew Leader,
Union County Water, North Carolina



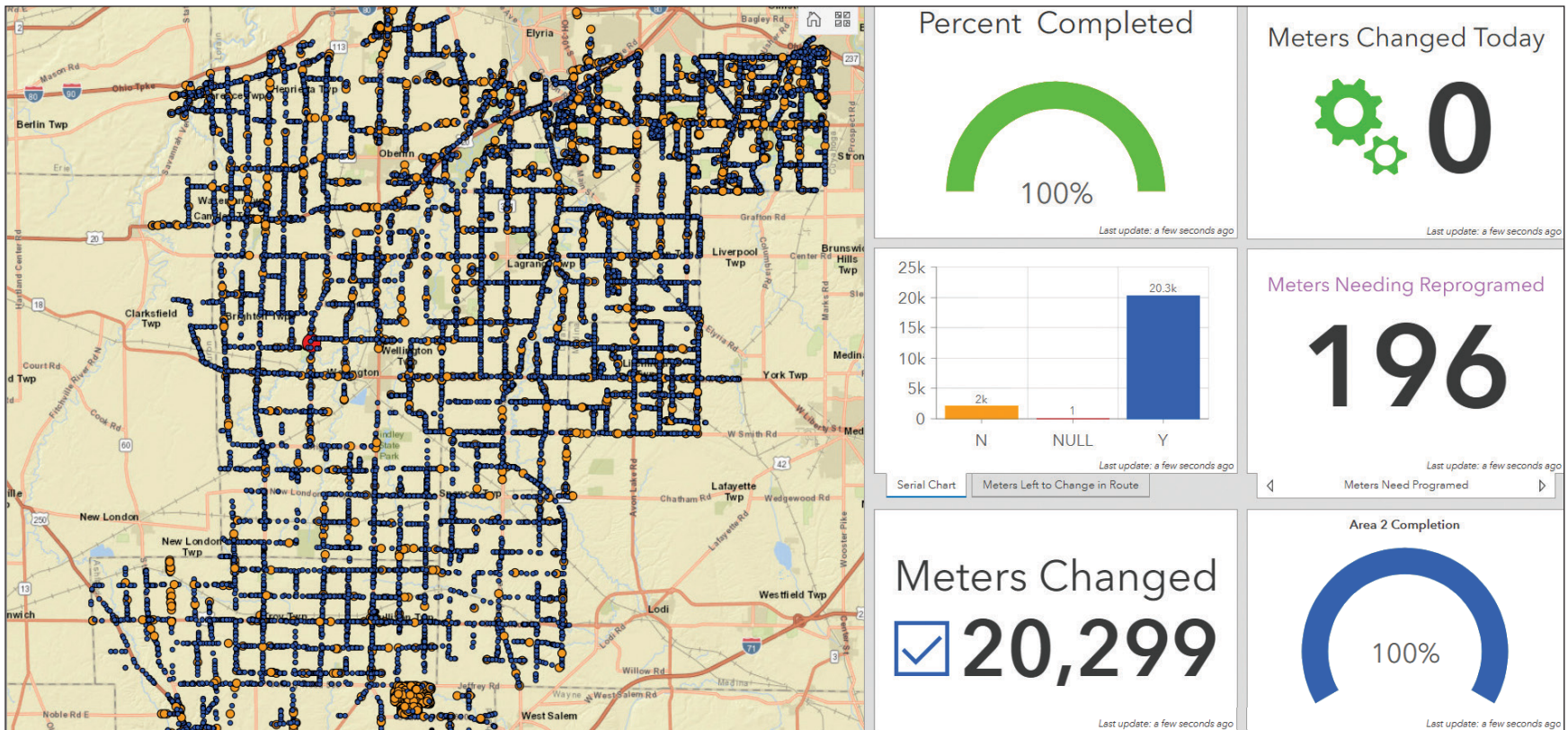
Clay County, Florida, Saves \$110,000 in Labor Costs by Automating Fire Hydrant Inspections

Fire hydrants require flushing once a year. Proper maintenance of hydrants ensures that the system is in good operating condition when firefighters need to respond to emergencies. For Clay County, which must maintain over 3,500 hydrants, completing this work took anywhere from 9 to 11 months. With an average processing time of 30 minutes per ticket, leaders saw an opportunity to realize significant savings in costs and time.

Clay County Utility Authority deployed mobile GIS tools to empower field crews to inspect hydrants, collect data on each asset's condition, and accurately map its location. Prior to this, the process was strictly a tabular, paper-based system that required three staff members working throughout most of the year to prepare for the annual inspection. In addition to being time-consuming, the paper-based workflow did not allow them to collect the exact physical location of the hydrants,

which resulted in additional data entry and management after the inspections were completed.

Now, field crews can accurately collect and send GIS data from their device, in real time, to the back office. By reducing the amount of time and effort it takes to collect and retrieve data from the system, the county estimates that it has saved over \$110,000 in labor reduction costs. Using GIS technology, Clay County Utility Authority improved its operations and reduced the inspection time frame to just four months. It is also able to use this authoritative data as a budgeting tool to help county leaders determine where to invest resources to keep their infrastructure strong and in working order.



Rural Lorain County Water Authority, Ohio, Saves \$1.5 Million by Managing Smart Meter Project with GIS

Monitoring water resources being used by community residents and area businesses is critical to providing a steady source of revenue and ensuring standards for safe drinking water for the public. In Lorain County, Ohio, the Rural Lorain County Water Authority (RLCWA) faced a challenging task to switch out 19,000 existing water meters with new smart meters.

This massive project involved opening up the old meters, recording old data, installing a new meter, and recording that new number from a digital reading while also recording the exact location of the meter for future management and inspection. In the past, the county secured the services of third-party vendors to do this work, resulting in additional costs and less oversight than if the work was done in-house. It also involved a great deal of paperwork—requiring field crews to manually record data and bring it back to the office for analysis.

RLCWA turned to ArcGIS and its field mobility solutions to empower its own staff to process,

collect, and update the new meters. This allowed staff to provide live updates after the meters went into the ground and allowed management in the back office to receive up-to-the-minute progress reports of the field crews and provide easy-to-understand updates to the board of directors as the change out program progressed.

ArcGIS tools allowed RLCWA to execute the meter replacement program more efficiently. In the field, meter replacements increased from an average of 15-20 meters per day to an average of 70 meters per day. In the office, it would traditionally take a clerk from two to three hours to enter the data into the billing system. Now, data on 1,000 meters could be loaded in 15 minutes. Implementing the new platform enabled RLCWA to perform all the work associated with the meter replacement program in-house, saving the utility \$1.5 million in contractor costs. And having all the GIS data accessible digitally also allowed RLCWA staff to submit reports to the board of directors monthly via web maps and dashboards.

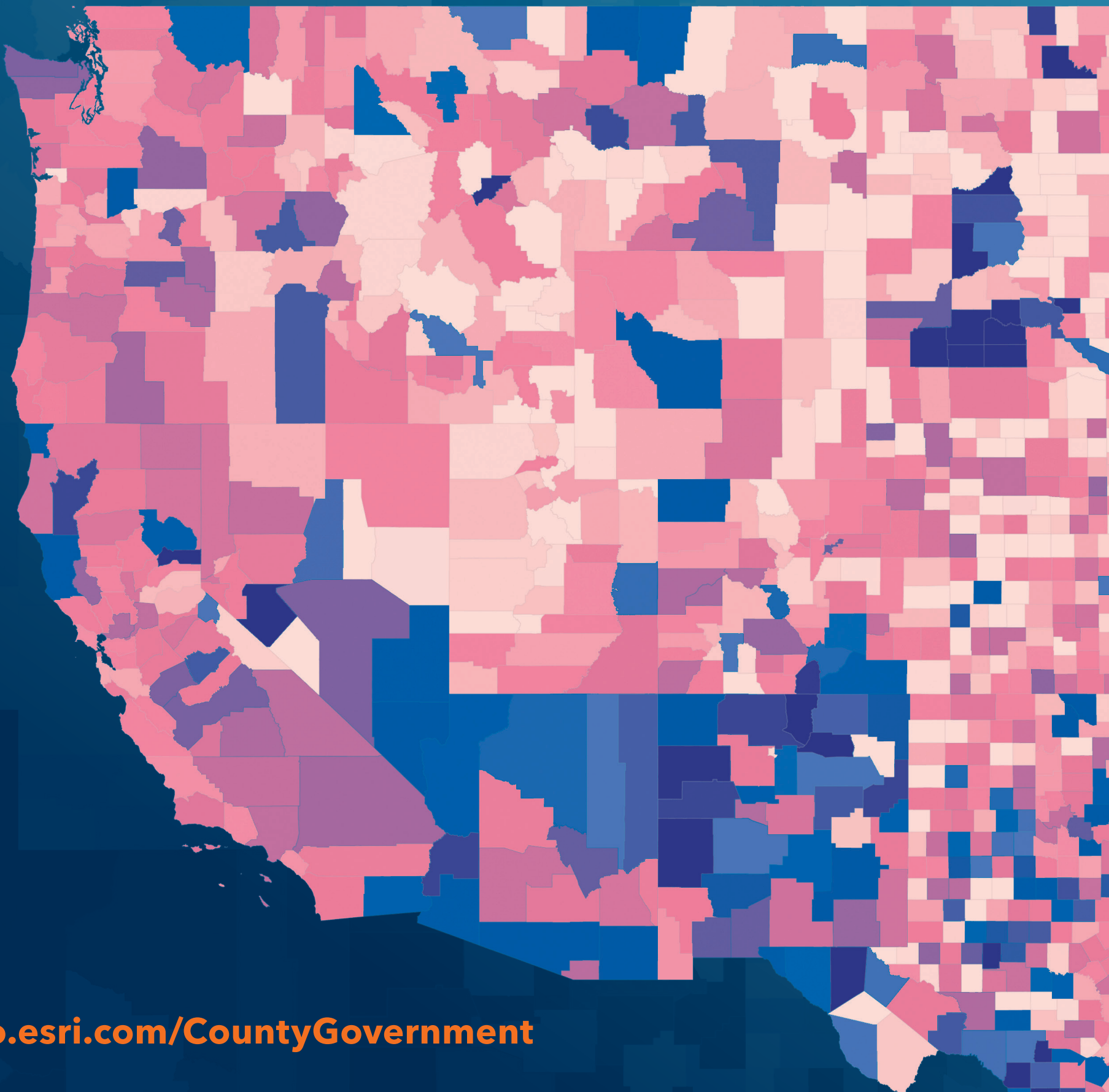
“The massive scale of our project necessitated a more efficient method of tracking the meter installations. Our operations dashboard and apps allowed us to be able to keep the project on schedule and avoid creating a backlog of work orders waiting to be processed.”

Joe Waldecker
Assistant General Manager, Rural Lorain County Water Authority, Ohio



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