

Modernizing Water & Wastewater GIS

with High-Accuracy GNSS



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INTRODUCTION:

Closing the Accuracy Gap in Water & Wastewater GIS

Across the water and wastewater industry, organizations are transforming the way they manage their infrastructure by adopting high-accuracy GNSS. From rural utility districts to large municipal water and wastewater departments, our customers rely on our receivers to stream precise asset locations, improve system maps/GIS, and streamline daily field workflows. Whether documenting new installations, locating aging valves and hydrants, or supporting regulatory reporting, high-accuracy GPS has become an essential tool for modern utility management.

This ebook highlights how water and wastewater professionals use Eos Positioning Systems' GNSS technology to build smarter networks, reduce field time, strengthen data integrity, and ultimately deliver more reliable service to their communities.

From “Hard to Find” to “Hard to Miss”: How the City of Oak Hill Mapped Over 630 Manholes in Rural West Virginia While Rehabbing Them for the Future



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City of Oak Hill, West Virginia, Sanitary Board |  Wastewater Utility

📍 Oak Hill, West Virginia, United States

Nestled in southcentral West Virginia, the 12-person City of Oak Hill Sanitary Board serves about 9,000 wastewater customers. In 2017, the Board acquired the rural Arbuckle system, a sprawling network across steep Appalachian terrain and dense canopy. The inherited maps — created with mixed survey methods and older GPS — often placed manholes 10–40 feet off, with some as much as 80 feet away. “We’ve spent days looking for manholes,” Collections System Foreman Kyle Hobbs said. “Your truck could be parked right on top of it.”

Built in the 1980s, Arbuckle’s manholes also had open vents that today contribute to infiltration and inflow (I&I). In 2025, the Sanitary Board launched the Arbuckle Rehabilitation Project to inspect every manhole, replace lids, and collect a complete high-accuracy inventory. “It adds two minutes at each manhole, but it saves days of work later on,” GIS Coordinator Bragg said.

To support any contractor regardless of GIS experience, Bragg created a GIS replica of legacy data, built a standardized ArcGIS Field Maps form, and supplied the engineering firm — The Thrasher Group — with a city-issued iPad® and Arrow Gold+™ GNSS receiver. Using the nearby West Virginia CORS network, the Arrow Gold+ delivered accuracy within a few feet even in deep valleys. Bragg also built an ArcGIS Dashboard to track progress.

When fieldwork was complete, he reviewed the data, resolved anomalies, and replaced the legacy GIS with the new authoritative dataset. “It’s the clean slate we wanted,” he said.

The project transformed Arbuckle’s GIS from mismatched coordinates and inconsistent records into a precise, verified system. “Nothing from previous records compares,” Hobbs said. With accurate locations and standardized documentation, the city can now find assets faster, respond more quickly to incidents, and reduce I&I through sealed lids. Despite early challenges, Bragg said the payoff is clear: “We knew the headaches were worth it. Now we’re going to be that much more prepared.”



California Utility Maps Recycled Water System with High-Accuracy GNSS and GIS

Eastern Municipal Water District |  Recycled Water Network

 Perris, California, United States

Eastern Municipal Water District (EMWD), California's sixth-largest water utility, serves nearly one million accounts across 682 square miles in western Riverside and northern San Diego counties. In an arid climate, EMWD relies heavily on its recycled water program, which supplies agriculture, public landscapes, schools, parks, and habitat areas. "Any approved use of recycled water saves raw groundwater and helps us avoid using potable water where recycled will do," Water Operations Manager James Lee said.

Although ArcGIS® was already central to EMWD's operations, accuracy needed improvement. Eight years ago, only two teams used GNSS, and their legacy units required loading files manually, post-processing data, and importing it into ArcGIS. The lack of automation meant field crews sometimes had to revisit sites to verify locations.

The district adopted Eos Positioning Systems® GNSS receivers — including Arrow Gold® and Skadi Gold™ — which integrated seamlessly with existing maps and the district's base station to deliver 1-centimeter accuracy without post-processing. Paired with iOS® devices and ArcGIS Field Maps, crews now collect and update as-builts in real time, with data flowing directly into ArcGIS Online and the enterprise GIS viewer, HydroMapper.

Teams across the district now use this accurate data to locate assets, analyze system conditions, and respond to issues. The Recycled Water Group maps as-builts immediately. "We see pipes going into the ground right away," inspector Bobby Toomey said. Water Operations uses high-accuracy GNSS to update valve locations and return to buried valves quickly. "You can go back to exactly where it's at, even once it's paved over," Valve Technician II Brandon Harlacher said. Crews have also deployed the Skadi Smart Handle™ for safer mapping at a distance.

In early 2025, EMWD began migrating to the Utility Network to support network modeling and deeper system insights — another step in advancing their mission as stewards of California's resources. "Water is too precious to use only once," Lee said.



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Customer Spotlight: Garrett Black Brings Accuracy Full Tilt with Skadi Gold GNSS



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Oldham County Water District | Water Utility

 Oldham County, Kentucky, United States

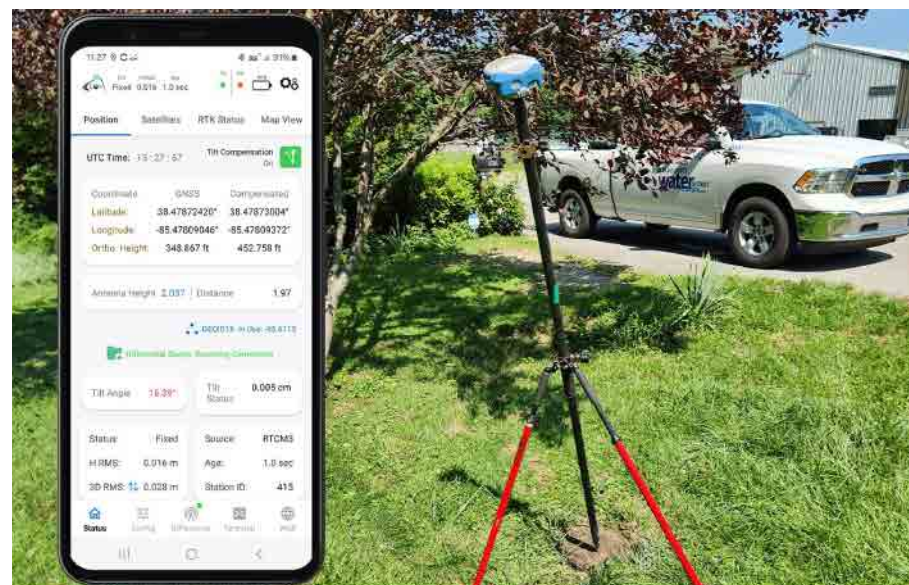
Oldham County Water District (OCWD) in Kentucky relies on accurate mapping to support daily operations across its water system. Water Service Worker Garrett Black discovered early in his career how essential GIS and high-accuracy GNSS are to delivering safe, reliable drinking water. With strong support for innovation, OCWD equips staff with ArcGIS® Field Maps and Eos Positioning Systems® GNSS receivers — including the new Skadi Gold™ with Skadi Tilt Compensation™ — to maintain an up-to-date, precise digital representation of their infrastructure.

OCWD manages hundreds of miles of pipe and thousands of assets. While the utility already valued GIS, many workflows required labor-intensive processes to verify asset locations. The team set a major goal: collect accurate, consistent points for all infrastructure, including more than 9,000 customer meters, valves, hydrants, and fittings — even in areas where access was difficult or unsafe.

OCWD deployed Arrow Series® receivers and later added Skadi Gold™, which delivers survey-grade accuracy directly into ArcGIS Field Maps on iOS® devices. The technology supports real-time updates without post-processing, enabling staff to see newly installed assets immediately on mobile or web maps. Skadi Tilt Compensation proved especially impactful. By allowing crews to collect points without leveling the pole — even from the edge of trenches or under tree canopy — it increased safety and expanded where high-accuracy data could be captured. “Skadi Tilt Compensation will rectify the inaccuracy from my tilted position, and the point will still be accurate,” Black said.

OCWD quickly met its goal of capturing all meter locations and now collects every new or exposed asset with sub-centimeter accuracy. The improved GIS helps crews navigate directly to buried valves, reduces revisit trips, and supports efficient maintenance and emergency response. “I know I’m helping build a map that will be used for years to come,” Black said.

The utility continues to expand its high-accuracy workflows for inspections, flushing, boil-water advisories, and service interruptions — all supported by standardized digital forms that replace paper and improve efficiency.



Indiana Utility Cuts Turnaround Time with Eos GNSS and Expands GIS Access with ArcGIS Utility Network



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Evansville Water and Sewer Utility |  Water & Wastewater Utility

 Evansville, Indiana, United States

Located along the Ohio River, the City of Evansville serves more than 115,000 residents with water and sewer services through Evansville Water and Sewer Utility (EWSU). As the utility prepared to migrate from ArcMap and the Geometric Network to ArcGIS® Pro and the ArcGIS Utility Network, staff saw an opportunity to correct long-standing location inaccuracies in their asset data. “We knew our source data had to be squeaky clean,” said GIS Manager Ryan Key.

EWSU launched a six-month effort to recapture infrastructure with high accuracy, focusing on areas where clusters of meters, valves, and other assets were difficult to locate during maintenance and inspections. Legacy inaccuracies also slowed customer service and delayed capital-refresh design work, making accurate, real-time GIS essential ahead of the Utility Network migration.

After evaluating multiple GNSS options, EWSU adopted Arrow GNSS receivers from Eos Positioning Systems®. The receivers paired easily with the iOS® devices crews already used and delivered centimeter-level accuracy through ArcGIS Field Maps. To support precise mapping across the county, EWSU’s surveyor deployed two RTK base stations for real-time corrections. Field crews — many new to GIS — adapted quickly. “A lot of these guys had no GIS experience, and they transitioned to collecting data like ducks to water,” Key said.

With accurate locations captured in the field, updates flowed instantly into ArcGIS Online. Staff monitored progress through ArcGIS Dashboards and used the corrected data to modernize maps, resolve outdated records, and streamline inspections. EWSU also built U-Net, a custom Utility Network web app that gives non-GIS teams access to asset information, service histories, CCTV data, and customer records from a single map.

The new workflow dramatically improved accuracy and efficiency. EWSU collected roughly 9,000 assets in two years, completing as-builts in near real time rather than months later. The clean data will also power future Utility Network capabilities, including automated tracing for boil-water advisories and capital projects. “Having this type of accuracy allows for greater response, reaction, and repair,” Key said. “It all translates to a better customer experience.”



Building Confidence at Cassatt Water with Valid Valve Locations



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Cassatt Water Company |  Water Utility

 Cassatt, South Carolina, United States

Cassatt Water, a small South Carolina utility serving about 24,000 customers across 764 square miles, long relied on paper mapbooks with only approximate valve locations. As veteran staff retired and the system expanded, inaccurate GIS points made it difficult for newer crews to find valves quickly during leaks. “You know the general location of something, but you can’t find it,” said Chief Operations Officer John Watkins.



Based on this mapbook, a crew member looking for valve “V-214-19D-7” for maintenance or to turn it off during a leak might start his search 60’ northeast of the intersection of Sycamore Drive and John Richards Road.

In reality, valve “V-214-19D-7” is located right at the intersection of the two roads.

Director of Engineering Nathan Ward set out to improve accuracy by equipping all field workers with ArcGIS® Field Maps on iOS® devices and enabling them to correct locations as they worked. After evaluating GNSS options, Cassatt Water adopted the Arrow Gold+® receiver with South Carolina’s RTK network to achieve sub-inch accuracy. “It brings the confidence to know our valves are now very accurate,” Ward said.

Crews immediately noticed the difference. Instead of relying on outdated mapbooks, they now see precise valve, hydrant, and meter locations in real time. “It takes the guesswork out of it,” Water Quality Manager John Bowers said. The utility has already corrected thousands of assets and now maps all new construction as it is installed.



With accurate GIS and GNSS, Cassatt Water is capturing institutional knowledge, improving leak response, and preparing the next generation of workers. “Having everything correct in the GIS makes it better for the ones coming behind us,” Bowers said.

A Forward-Thinking Michigan Municipality Implements High-Accuracy Maps for Program Management



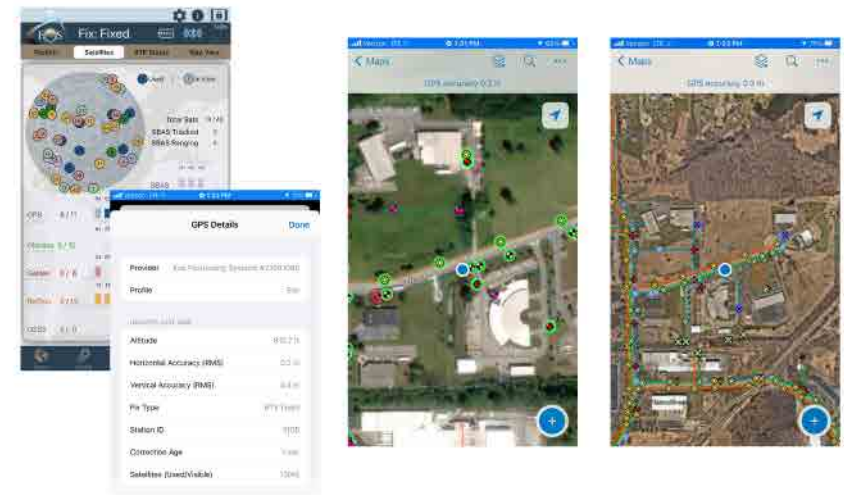
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Eastern Municipal Water District | Water & Wastewater Utility

📍 Saline, Michigan, United States

The City of Saline, Michigan, serves about 8,000 residents with water, wastewater, and stormwater systems — many over a century old. Until recently, its records lived in paper folders, notebooks, and aging as-builts managed by a third-party GIS vendor, leaving staff without direct access to reliable maps. “We had what I call a ‘somewhat map,’” said Public Works Director Larry Sirls.

Sirls brought the GIS in-house and partnered with OHM Advisors to digitize decades of paper records. Veteran technician Joel Radenbaugh reviewed historical as-builts and flagged discrepancies, while Field Maps was deployed to validate whether assets still existed and where they were actually located. To establish accurate basemaps, the city adopted Arrow Gold® GNSS receivers connected to Michigan’s CORS network, allowing field crews to capture centimeter-level locations on iOS® and Android devices.



When connected to the Eos Arrow Gold GNSS receiver, fieldworkers stream centimeter-level horizontal and vertical accuracy in real time to their iOS and Android mobile devices during data collection. Mobile workers can capture and update any asset's location and related attribute information, such as condition, in real time. Data is collected in ArcGIS Field Maps. Back in the office, data is quality-checked before publishing it to the official Saline geodatabase.

As the utility mapped water and sewer assets, staff began relying on the new GIS for daily work. Crews can now locate valves and hydrants during main breaks within minutes instead of hunting through paper files. Historical documents are linked to the map, eliminating searches through basement storage. New employees get up to speed faster, navigating directly to assets with reliable mobile maps.

Dashboards built in ArcGIS Dashboards now summarize main breaks, maintenance, and contractor work. Contractors also submit geospatial deliverables directly into the GIS, replacing PDFs and speeding turnaround. With accurate data finally in one system, Saline can plan maintenance, reduce I&I, and prepare for long-term capital needs.

Sirls is now using the GIS foundation to build a utility master plan. “We finally have a way to manage our data so we can make the best investments,” he said.

Warren County Water District Looks to “Elevate” Its Hydraulic Modeling with Survey-Grade Maps



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Warren County Water District |  Water & Wastewater Utility

 Bowling Green, Kentucky, United States

Warren County Water District in southcentral Kentucky provides water and wastewater services across more than 2,100 miles of main. For years, crews relied on heavy paper mapbooks and later subfoot-accurate GIS data — sufficient for field navigation but not precise enough for engineering workflows like wastewater hydraulic modeling, which requires centimeter-level elevation accuracy.

To modernize, the utility moved field mapping to ArcGIS® Field Maps and Survey123 on iOS® and Android™ devices and adopted Arrow Gold® GNSS receivers for real-time RTK accuracy. The receivers integrate natively with Esri apps, eliminating postprocessing and allowing crews to capture engineering-grade data directly into the GIS. “It streamlined both office and mobile workflows,” said GIS analyst Josh Smith.

With accurate data in hand, Warren Water now supports hydraulic modeling, smarter system planning, and faster customer service. The GIS also powers installation of 41,000 smart meters and has become essential for responding to a surge in fiber-optic locate requests. Crews use Field Maps, Arrow GNSS with RTK, and GPR to find buried mains quickly, mapping more than 68,000 underground points to date.

Today, nearly all 74 employees use the GIS daily. High-accuracy data has improved efficiency across field and office operations. “When we added accurate locations into the GIS, that’s what really paid off for us,” said IT/GIS Manager B.J. Malone.



Large East Coast Water Utility Maps a Million Assets with Sub-Inch Accuracy



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New Jersey American Water |  **Water & Wastewater Utility**

 Camden, New Jersey, United States

New Jersey American Water serves 2.8 million people across 18 counties. For years, its asset data lived in multiple systems and required slow, manual GPS workflows. That changed in 2012 when Director of UAS & Geospatial Services Chris Kahn piloted a high-accuracy mapping project in Ortley Beach. After mapping 7,000 assets with legacy GNSS, Hurricane Sandy hit — wiping out the landscape. Yet Kahn could still locate buried meters and valves in seconds, while neighboring communities without accurate maps spent hours or days searching. The experience revealed the value of survey-grade data.

To scale the workflow statewide, Kahn adopted Arrow Gold® GNSS receivers and installed Arrow Gold base stations across New Jersey to provide real-time sub-inch accuracy to any mobile device. The scalable, fully digital workflow allowed crews to capture more than 1,000 points per day. Within five years, the utility mapped roughly 1 million water and wastewater assets across 10,000 miles of service, uncovering missing infrastructure and safety issues in the process.

The impact is significant: accurate mapping now saves an estimated \$2.6 million per year by reducing the time crews spend searching for buried assets. More than 150 Arrow Gold receivers — and soon hundreds more — support daily operations, work orders, and emergency response. The success in New Jersey sparked adoption across American Water's other states, along with expanded programs in drone mapping, UAS operations, and emerging AR field tools. "It's not a big leap now to see a future in which all assets are mapped accurately — and actually quite doable," Kahn said.



Ortley Beach, New Jersey, was virtually unrecognizable after Hurricane Sandy struck in 2012. The storm ripped utilities out of the ground and left an estimated \$65B in damages. In neighborhoods where assets had been mapped with high accuracy New Jersey American Water was able to locate utility assets in seconds. In areas without such records, locating — and, in turn, being able to repair — these assets took anywhere from hours to days.

Small City, Big Initiatives: City of Seguin Improves Water and Electric Asset Management with GPS and GIS

City of Seguin, Texas |  **Water & Wastewater Utility**

 Seguin, Texas, United States

The City of Seguin, Texas, is experiencing rapid development as it expands toward neighboring communities. To keep pace, the Utility Services Department began modernizing how it maps and manages water, wastewater, and electric assets. “The assets are all very close in proximity, so it’s important that we have the best accuracy we can,” said Smart Grid Solutions Manager John Saldana.

To replace inconsistent paper drawings and improve construction safety, Saldana equipped staff with ArcGIS® Field Maps and Arrow Gold® GNSS receivers, supported by a city-owned Arrow Gold base station for reliable RTK corrections. Crews now capture centimeter-level locations for existing infrastructure and new installations directly in the field using iPads®, ensuring data is accurate before development occurs. “By validating it ourselves, we know for sure where our assets are,” Saldana said.

Seguin now maps water, wastewater, and electric assets in real time, with Utility Data Analyst Felecia Helms performing quality control and leading the city’s migration to the ArcGIS Utility Network. The system also supports AMI smart-meter replacements and helps the city meet lead service line compliance requirements by pairing precise locations with photo documentation.

With a growing GIS team and survey-grade accuracy across all networks, Seguin is building a reliable, future-ready asset database. “Good asset management starts with collecting good data as step one,” Saldana said.



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CONCLUSION:

Turning Better Data Into Better Service

At utilities big and small, water and wastewater teams are proving what's possible when high-accuracy GNSS and modern GIS come together. Whether finding buried valves in minutes, streamlining inspections, reducing I&I, or building future-ready utility networks, each story in this ebook shows the same theme: better data leads to better service.

Now it's your turn.

If your utility is ready to strengthen asset accuracy, improve field efficiency, and build a more resilient system for the years ahead, we'd love to help you get started. Explore what high-accuracy GNSS can do for your team — and unlock the next chapter in your utility's success.

About Eos Positioning Systems®

Eos Positioning Systems®, Inc., (Eos) is a leading global designer and manufacturer of high-accuracy GNSS receivers for GIS and mapping applications. Founded in 2014 with a mission to make high-accuracy location technology accessible to all, Eos offers GNSS solutions that are easy to use, affordable, and compatible with any device or software. Flagship Eos GNSS product lines include the Skadi Series™ and Arrow Series® plus models, which provide high-accuracy location data to any device or app. Eos is an Esri Gold Partner.

Learn more at www.eos-gnss.com.



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