



Left: Warren County Water District Serviceman Brandon Edwards maps subsurface water mains. Middle: To detect an asset's location, he uses GPR. Right: To map it, he uses ArcGIS Field Maps on Android and an Arrow Gold GNSS receiver connected to the free the KYCORS network.

User
Warren County Water District

Partner
Esri

Industry
Water, Wastewater, Local Government

Challenge
Paper maps and legacy as-builts made field work cumbersome and hydraulic modeling unreliable.

Solution
Arrow Gold® GNSS Receiver, ArcGIS® Field Maps, iOS®, Android™, KYCORS network

Results
Warren Water mapped all water assets in three systems with subfoot accuracy and wastewater assets with centimeter-level accuracy that can streamline hydraulic modeling. Multiple teams are gaining efficiencies from access to the accurate system data.

WARREN COUNTY WATER DISTRICT LOOKS TO “ELEVATE” THEIR HYDRAULIC MODELING WITH SURVEY-GRADE MAPS

In Southcentral Kentucky, Warren County Water District (Warren Water) offers water and wastewater services over a 530-square-mile area between Nashville and Louisville. Every day, their utility delivers over 8.1 million gallons of drinking water across 1,194 miles of water lines, while their wastewater system transports 2 million gallons of wastewater across 218 miles of sewer line. In addition, Warren Water manages the water systems for Simpson County Water District and Butler County Water System, which brings their total water main to just over 2,100 miles across 1,200 squared miles. The three utilities have three separate boards of directors, but their operations are streamlined through one geographic information system (GIS) and customer information system (CIS).

THE ORIGINAL MOVE TO A GIS

In the past, Warren Water used to equip its field crews with 75-lbs paper mapbooks to navigate to service orders. Although the mapbooks got the job done, they were time-consuming to use — especially for new employees.

In 2006, Warren Water hired their first full-time GIS employee along with a contractor. They digitized and georeferenced thousands of paper as-builts into GIS features. The contractor then field-mapped all above-ground assets (e.g., valves, meters, pump stations) with sub-foot mapping equipment. Once the locations were post-processed, Warren Water IT and GIS Manager B. J. Malone uploaded them into the GIS and snapped features to the new accurate locations. After mapping the Warren Water system, Malone brought field-mapping in house to map the Simpson and Butler County systems.

“When Eos came along and made that marriage with Esri, that became a huge time saver for us, with both data collection and post-processing. It streamlined office and field workflows by keeping everything in one place and eliminating the need to pass data through multiple applications.”

Josh Smith

Warren Water GIS Analyst, Warren County Water District

THE CHALLENGE: HYDRAULIC MODELING FOR WASTEWATER ASSETS

Sub-foot accuracy was good enough for field workers but not the engineers’ hydraulic modeling, which require centimeter-level accuracy in the GIS’s elevation values.

Extracting elevation values from legacy paper as-builts was both time-consuming and not always accurate to begin with. So Malone looked for a way to further improve the mapping accuracy level. He hired another contractor to remap Warren Water’s wastewater assets with centimeter-level accuracy. After a proof-of-concept showed the idea was valuable, Malone looked for a way to affordably scale centimeter-level field mapping.

THE SOLUTION: REAL-TIME, ACCURATE MOBILE DATA COLLECTION INTO ARCGIS

Malone wanted to use Esri’s mobile data-collection apps — ArcGIS® Field Maps and ArcGIS Survey123 — because they enabled real-time data collection directly into the GIS, in GIS format. Then he looked for hardware crews were comfortable using. Field workers were allowed to use either iOS® or Android™ tablets. Finally, after consulting with a nearby water district, Malone chose the Arrow Gold® GNSS receiver for real-time, centimeter-level location accuracy. The Arrow Golds could be used with the local free Kentucky Real Time Reference Network (KYCORS), worked with all mobile apps, and supported iOS and Android. Both the GIS apps and GNSS receiver had solutions for working in remote areas with spotty cell coverage.

“We went to some of the most remote areas of our system to test out the Arrow GNSS receiver, and it just worked,” Malone said.

THE RESULTS: STREAMLINED DATA FOR HYDRAULIC MODELING

Today, Warren Water has mapped all three water systems with subfoot accuracy and just the Warren Water wastewater system with centimeter-level accuracy. This year they have deployed RTK data collection for all newly constructed assets. Meanwhile, engineers have engaged a consultant who will now use the RTK elevations to develop a wastewater hydraulic model. With the hydraulic model in the works, the field team has already starting seeing benefits from the accurate digital maps in their mobile devices. “They are able to find things faster and can access what they need on one device,” Malone said. “It has eased everybody’s mind.”

Warren Water has since hired one more full-time GIS employee to support Malone. Out of 74 total employees at the utility, they estimate that 65-70 use the GIS regularly.

Meter readers use the maps to find meters, and meter data is now stored in the CIS so service team members can respond faster to customer inquiries, generate service orders for field crews, and respond to contractor information requests. “We save a ton of time for our customer service representatives,” Malone said.

ANOTHER UNEXPECTED BENEFIT: KEEPING UP WITH RISING FIBER CALLS

Today, developers and inspectors are also using the technology to map assets in new subdivisions before they are buried. Warren Water has also equipped its call-before-you-dig locate teams with the same technology so they can more quickly find buried water mains. Time savings has been huge, which is critical as Malone estimates fiber-optic cable installation has caused locate calls to quadruple in the past year alone.

“With the increased number of locates that we currently have, I don’t think we would have been able to keep up the pace without these maps,” Malone said.

Warren Water has since purchased two ground-penetrating radar (GPR) devices and equipped them with ArcGIS Field Maps on Android and an Arrow Gold. “This provides my team with two methods to locate underground assets,” Warren Water Operations Supervisor Travis Watt said. “At times, they can navigate nearly down the exact center of buried water mains.”

Malone is grateful the utility’s employees and leadership see the value of the GIS.

“We really try to build the workflows and applications that enable us to make smarter decisions,” he said. “When we added accurate locations into the GIS, that’s what really paid off for us. Now our field and office teams are realizing the efficiency gains, and we’re making their lives a little easier.”