QGIS Water Mains and Services Mapping and the Collaboration between Public Water Supply District #6 of Clay County, MO and Alliance Water Resources, Inc., of Columbia, MO

Snapshot

Company Name(s): Alliance Water Resources, Inc.; Public Water Supply District #6 of Clay County, MO; CDP Engineers/Mapsync

Website(s): https://www.mapsync.com/; https://www.info.geosync.cloud/; https://alliancewater.com/

Technology Categories: Locating, Mapping, Software

Stakeholder Target Audience: Facility Owner ■

Key terms /phrases: asset management, GIS, open-source, software, ticket screening

Level of Production: ●

[*manufacturer has determined to move forward but is not in full production at this time*]

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Synopsis

Many small communities struggle with the cost of starting a GIS program. By using open-source GIS and standard processes for collecting and managing data, costs and implementation time are significantly reduced. This case study discusses how a public water district uses GIS asset management tools and services to provide a standardized, scalable asset management solution, enabling them to provide more accurate information to the One Call Center in order to better filter tickets they do not need to receive.

- A collaborative relationship between Public Water Supply District #6 of Clay County, MO, Alliance Water Resources and consultant CDP Engineers/MapSync resulted in the development of a cost-effective GIS program to minimize damages to the District's underground facilities.
- Utilizing a GeoSync app available to smartphones, the District locates assets with handheld GPS units and manages them via GeoSync's app and/or desktop computers through customized data collection forms.

Implementation has produced high-quality initial results in providing better information to Missouri One Call to enhance the field operations of excavators and reduce costs, as well as other useful information including water usage patterns and trends, maintenance, leak history and more.

Background

Public Water Supply District #6 of Clay County, MO (PWSD6) is a growing utility that provides drinking water to 2,000 primarily residential metered connections in rural and suburban areas about 20 miles northeast of Kansas City. PWSD6 is operated and managed by Alliance Water Resources, Inc. (Alliance), a Columbia, Missouri, based contract operator and manager of water and wastewater utilities. Alliance has partnered with CDP Engineers/MapSync, a Lexington, Kentucky, engineering firm specializing in infrastructure and data management to initiate the development and implementation of low-cost, accurate GIS mapping for their client communities. Many small communities struggle with the

cost of starting a GIS program. By using open-source GIS, and standard processes for collecting and managing data, costs and implementation time are significantly reduced. Alliance and CDP bundle GIS asset management tools and services to provide a standardized/scalable asset management solution to their clients.

PWSD6 previously searched for GIS solutions but found that the costs to begin the process were too high. A much more affordable solution was designed by combining the work with the utility's ongoing contract management services agreement. PWSD6 President Harold Winnie stated that the utility "couldn't afford something like this without Alliance's collaboration." GPS data collection began in the spring of 2021 as an addition to the ongoing management and operations services agreement between PWSD6 and Alliance.

GIS Uses for Water and Wastewater

One of PWSD6's primary goals with GIS is to provide better information to Missouri One Call and local contractors to enhance their field operations and minimize damage to the District's underground facilities. Traditional methods of locating underground utilities rely on an electrical signal transmitted via a tracer wire along a pipe. But if the pipe has no tracer wire, or the signal is weak, or the wire fails, excavators must turn to other means to determine where the pipe is located. Damage to unlocatable utilities can be mitigated by taking into account all available information such as historical records, plans, GPS data, and photography. GIS incorporates all these elements and more, offering a highly accurate and comprehensive approach to underground utility detection.

Incorporating a GIS system into Missouri One Call also reduces labor costs by eliminating unnecessary tickets to areas with no known utilities.

Beyond improved mapping of facility locations, other essential uses of GIS information include asset management and analysis of:

- water usage patterns and trends,
- maintenance/leak history,
- customer usage data by region,
- water quality throughout distribution, and options for future capital improvements.

Tools

MapSync developed GeoSync, a web-based, cloud-hosted system with apps available at the Google Play Store and iOS App Store and a SQL asset management database. Assets are located with handheld GPS units and managed/edited with smartphones and desktop computers. Fieldworkers were trained in using the tools to collect data while reading meters, locating facilities for contractors, and during other routine maintenance and system operations activities. The software provides desirable features for the field staff, simplified through easy-to-learn technology.

Data for the GeoSync suite is managed using QGIS, a free, open-source program available for download on any computer. QGIS does not come pre-configured with advanced mapping functionalities or specialized tools, though many of these features are available in hundreds of free plugins. Otherwise, it has all the essential tools needed for vector management and professional cartographic design.

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Data Collected

Data is collected via customized forms. An example of a form for a water main leak repair is shown below in Figure 1. Data is collected by local field staff at the time of the repair. Reporting and analysis become much more robust and thorough by collecting data at every leak repair and including it in the GIS.

Reports

Alliance created standard reports for each of its client communities and can also tailor reports for each client's specific needs as they arise or change. In addition to leak repair summaries, reports could include the total length of mains in the system, customer counts, meter counts, etc. Reports can be read online or easily exported to other software, including Excel. PWSD6 focuses reports on the age of meters, usage, and location related to water loss reduction.

Work Orders

Alliance has created custom workflows connected to its GIS for leaks, meter change-outs, new service connections, condition assessments, customer complaints, etc. Like report creation, Alliance creates standard work orders for its client communities and tailors its reports for each client as needed. At PWSD6, the local manager and team are aiding their meter change-out program by establishing and correcting meter locations and conditions and correcting old district maps.

Costs

This low-cost alternative to other commercially available GIS technology is specifically aimed at smaller utilities with limited budgets. PWSD6 finds cost savings in two primary ways.

First, because QGIS is a free, open-sourced software, there are no ongoing fees to use it. No "per seat" licenses are needed - the local system administrator only limits access and permissions. Recurring charges are for hosting, use of the web, and the mobile software program. The GPS device and tablet are purchased with an expected useful life of 5-10 years.

Second, because data is collected by the current operations and maintenance staff, the out-of-pocket cost of labor is significantly reduced. Tech support is included in the cost and is always available from easy-to-reach Alliance and CDP technicians and engineers.

Item Description	Cost
GeoSync (Cloud Database & Asset Management Administration)	$900/year
QGIS	Free
GPS Devices (Trimble R1)	$2,500
Android tablet, pre-configured for GeoSync & protective case	$800
Total First Year Cost	**$4,200**

Table 1 – First Year Costs of Software and Tools

Figure 1 — Example form for a water main leak repair

Conclusions

While improving its underground utility location information to reduce damage to its underground facilities, PWSD6 chose to develop a detailed GIS for its water distribution system. After investigating its GIS options, PWSD6 partnered with its contact operator and manager, Alliance Water Resources, Inc., and consultant CDP Engineers/MapSync. QGIS, a free, open-source GIS software, has produced high-quality initial results. By implementing GeoSync and its contract operator data collection, PWSD6 has dramatically reduced its initial and ongoing costs.