



Article | July 1, 2019

Mapping Assets For Resilience And Response In Emergencies

Source: Trimble Water

Among utilities concerned about resilience and response in natural disasters or other emergencies, precise asset inventory and mapping are high priorities. In truth, there is value in having the same information for everyday purposes as well. For anyone who has ever had a problem locating or tracking key water or wastewater system assets, here are several good reasons and ways to avoid a last-minute scramble.



Photo courtesy of Trimble Water

Four Good Reasons To Pay Closer Attention To Asset Mapping

Asset inventory, mapping, and monitoring certainly have value for resilient response to emergency events. Also, in utilities where day-to-day operations depend heavily on the memory of soon-to-be-retired staff members, the urgency for mapping infrastructure grows more critical every day. Whatever the situation, automated solutions that pinpoint asset locations and systematize information related to them can pay dividends.

- **Emergency Response.** The risk of being unable to identify critical assets in an emergency extends far beyond the cost of the asset itself. Potable water losses resulting from the inability to locate a critical shutoff valve can run into the millions of gallons. Ancillary water damages can run into the millions of dollars. On the wastewater side, penalties for sewage spills or overflows can cost tens of thousands of dollars per day. Every day, month, and year that an overlooked piece of aging infrastructure flies under the radar compounds the risk of it becoming an expensive surprise sometime in the future.

- **Underground Asset Location.** It's easy to understand how 'out of sight' can quickly become 'out of mind.' When it comes to underground infrastructure — pipelines, valves, etc. — the lack of an obvious visual frame of reference can result in it being completely overlooked or in requiring extra cost and excavation efforts to locate it.
- **Asset Maintenance.** Even assets that are not buried in underground locations or are not under immediate threat of failure can have a significant impact on productivity or profitability if they are not identified and monitored for maintenance or calibration. An expensive example would be the revenue losses from a large industrial account where the water meter has not been calibrated for a very long time.
- **A Foundation For Asset Management.** Aside from immediate emergencies or ongoing maintenance needs, logging and managing infrastructure through an asset mapping program builds a large repository of information to benefit planning for infrastructure replacement and capital improvement.

What To Look For In An Asset Mapping Solution

While it is possible to record rudimentary asset data on paper or to use paper map books and as-built drawings, the real value in asset mapping lies in the flexibility of an interactive, automated system that can track and analyze digital data for multiple purposes. Whether utilities perform the mapping process themselves or subcontract it to an outside resource, it is important to evaluate the system chosen and the process followed in order to reap maximum benefit from the effort.

- **Location. Location. Location.** With the cost and complexity of excavating around other utility lines, there are certain situations where a miss is as good as a mile. In those cases, the 3-meter to 5-meter GPS accuracy of a consumer mobile phone or handheld tablet is not very practical. Dedicated asset mapping systems with real-time kinematic-positioning precision offer options ranging from 30-cm down to 1-cm accuracy, depending on the criticality of the application. For example, locating a water distribution system valve in crowded urban infrastructure might require 1-cm accuracy, while locating manhole covers could tolerate accuracy ranging from 30 cm to 1 meter (Figure 1).



Photo courtesy of Trimble Water

Figure 1. Highly accurate GNSS receivers can mark an asset to within 1 cm of its actual location. This can be a helpful feature whether trying to locate a rarely viewed asset in a remote location or one nestled among numerous other utility lines in a crowded urban intersection.

- **More Value In More Data.** Location is only the tip of the iceberg in asset mapping. Capturing detailed information about asset type, age, material, and other related information in a geographic information system (GIS) database not only prepares maintenance workers to locate the asset in an emergency, but also on what to expect when they access it, dig it up, or repair it.
- **Supplementing Existing Knowledge.** Organizing a dedicated effort to gather detailed information for parts of a water distribution system that have never before been recorded can be the start of a full-scale recordkeeping plan. In cases where basic information already exists, it can be enhanced into a more thorough profile as a byproduct of inspection or repair activities. Using global navigation satellite system (GNSS)-based asset mapping tools to confirm/update asset location information digitalized from paper ‘as-built’ drawings refines the solution into a searchable, manageable electronic format.
- **Working With Other Systems.** As an extension to existing utility investments in Esri GIS platforms and GIS-based asset management systems (AMS), asset mapping provides the foundation for a variety of asset management activities—including asset location, maintenance, repair, and monitoring activities. (Figure 2).



Photos courtesy of Trimble Water

Figure 2. Complementing existing ‘as-built’ drawing information with GPS information, photographic records, and/or bar code identification makes it easier for maintenance personnel to locate and identify the appropriate assets quickly.

Putting Asset Mapping Into Practice

In instances where no computerized asset mapping is currently available, here are some key considerations to discuss with an asset management system vendor for getting started:

- **Identify The Known.** The easiest place to start is by recording all infrastructure visible to the naked eye or already identified by other asset detection technologies — e.g., metal detectors, ground penetrating radar, etc. Start with valve covers, hydrants, manholes, service connections, meters, etc. in a focused water district or subdivision, and be as thorough as possible in locating all infrastructure before moving on to the next subdivision. Be cautious about transcribing manual entries from hard copy documentation without going out to the field to confirm locations with an appropriately accurate GNSS device.
- **Fill In The Blanks.** Once major reference points are established, use existing records and personnel to account for additional infrastructure based on known account and infrastructure records. Do not take hard-copy file information as a given but confirm it with a second set of accurate GNSS field readings. Precise GIS updates can also be added as a result of subsequent maintenance, service, or repair activities confirmed by GNSS hardware.
- **Transcend The Looming Knowledge Gap.** For utilities facing the loss of a significant amount of institutional knowledge due to upcoming retirements, asset mapping is as much a matter of survival as it is a platform for improved productivity. The very discipline of logging known major assets and linking to historical performance data associated with those assets

allows utilities to document personal experience from senior level personnel before their retirement. It also creates a more formal structure for passing along situational awareness to replacement personnel.

Learn From Experience

The experience of this one small water district showed a 40 percent cost reduction in maintaining its GIS and asset registry by avoiding redundant steps of a paper-based manual system. Likewise, this wastewater utility experienced an eye-opening update on the number of manholes missing from its GIS infrastructure map.