WATER ONLINE

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Asset Monitoring: Are You Getting Your Money's Worth?

Source: Trimble Water

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Mapping assets of a water treatment, water distribution, or wastewater collection and treatment system is just the means to an end. Maximizing value from that effort requires systematic planning and a healthy curiosity for looking into patterns of activity. Here are some considerations for turning raw asset data into more valuable benchmarks for better decision-making across multiple aspects of water operations.

Proactive vs. Reactive: A Matter Of Perspective

Being reactive to changes in plant or system performance, by its very nature, keeps utility operators behind the eight ball. At that point, they are resigned to damage control and trying to manage the system back to equilibrium.

In contrast, having insight into changing system performance as a result of comprehensive asset mapping and monitoring creates opportunities to anticipate changes in advance of problems. That means utilities can be better prepared to stay ahead of impacts resulting from those changes before they knock operations out of equilibrium.

The inherent value of water and wastewater analytics systems in general is that they provide data reliability and context for how the utility is performing and how to best prevent asset failure. Here are several key focal points for the benefits of asset mapping and monitoring:

- **Prioritizing Asset Inspection, Maintenance, And Repair Activities.** Being aware of every utility asset — its age, condition, and any changes in its performance — prepares utility operations and maintenance managers to make decisions on infrastructure maintenance

according to identifiable metrics of deteriorating performance or the potential for improved payback (Figure 1).

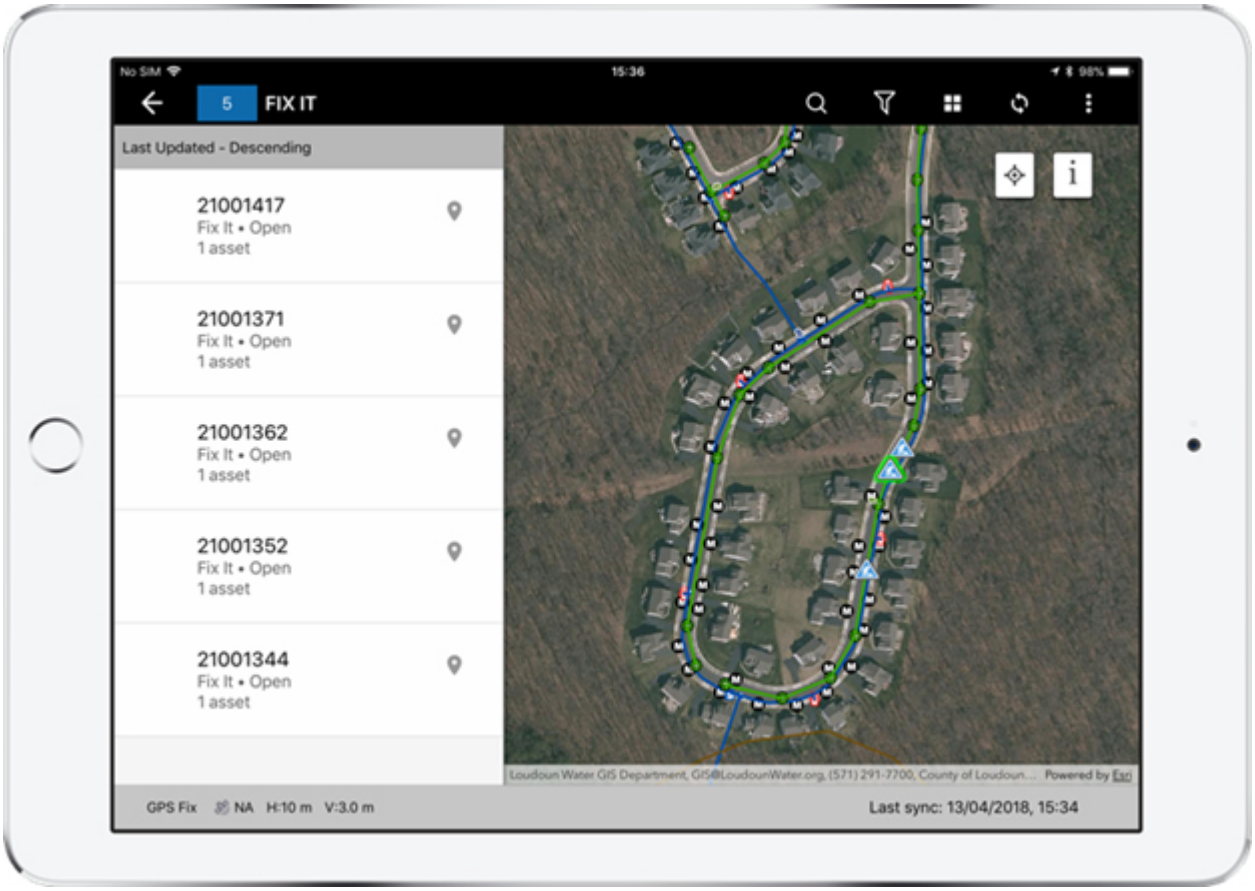

Photo courtesy of Trimble Water

Figure 1. Sensor data and inspection data, combined with GIS mapping services, can pinpoint specific maintenance locations and activities for timely repair and documentation.

- **Reducing Asset Operating Costs.** Being able to prioritize efforts and expenditures to maintain infrastructure for optimal performance enables decision-makers to optimize energy efficiency, maximize labor productivity, reduce asset failure, and fine-tune overall process performance (Figure 1).

- **Monitoring Asset Performance Proactively.** Assets equipped with battery-powered Industrial Internet of Things (IIoT) sensors/transmitters make it easier for users to track performance remotely. This includes the impacts of water levels, flow, pressure, rain, water hammer, and transients on asset performance in real time. Equally important, it can add the benefit of alarm events with analytic reports for providing incident responders with better insights.

The ability to make more productive decisions based on these layers of information helps utilities to reduce operating costs, optimize asset performance and energy use, and prioritize expenditures for repair or replacement. Those actions, in turn, can minimize future system upsets and ultimately

improve customer service, public health, and safety.

Follow Asset Data Wherever It Leads

Knowledge of asset locations provided by detailed feedback from a variety of battery-powered wireless sensors and enhanced with multifactor analysis supports more productive management decisions. Sensor data can be supplemented with feedback gleaned as a byproduct of other operations or from third-party services or resources, such as precipitation forecasts. Here are some examples of how that can work across all aspects of water operations:

- **Water.** Accounting for and monitoring all assets in a water distribution system does more than just improve opportunities for refining insight and control over physical asset operations, regulatory requirements, and treated water output. It can even be used to monitor for secondary effects not related to regulatory requirements but still affecting overall operating cost and efficiency. That could include issues such as water hammer caused by shutting off valves too quickly, pump cycle starts and stops, and defective pressure relief valves, or other vibration effects that can eventually cause pipes to fail. The charts in the video at the bottom of this link demonstrate how transient and sudden those impacts can be.

  Another overriding concern for water distribution is avoiding the dreaded cost and embarrassment of having to issue 'boil water' notices. Monitoring numerous points throughout the distribution system can provide warnings about sudden or extreme pressure changes in time to troubleshoot the source of the problem.

- **Wastewater.** Following the path of wastewater system asset data leads primarily in one direction — downhill. Because gravity has no 'off' switch, monitoring for early warning signs of potential blockages — as indicated by lower than normal flows — is critical. This is where having elevation information in addition to X-Y coordinates is critical for identifying potential bottlenecks in widespread wastewater drainage areas.

  Monitoring a series of known asset locations by elevations and flow rates can also provide broader perspective and deeper insight on stormwater flow, based on how it deviates from normal performance under previous similar circumstances. This is particularly important to systems operating under consent decrees based on historically high levels of combined-sewer overflow (CSO) or sanitary-sewer overflow (SSO) events.

  Identifying such abnormal trends creates opportunities to troubleshoot situations in time to prevent sewer overflows. Monitoring flow rates throughout the system, in real time, can make the difference between safely diverting more water from a surge event to storage locations vs. risking a forced bypass condition at the wastewater treatment plant.

  Even without the immediate threat of a sewer overflow, analyzing flow-rate changes across various storm-related events can help in locating and calculating inflow and infiltration (I&I) impacts during wet weather events. That helps to pinpoint the most deteriorated areas of a

sewer system for inspection and repair and to reduce unnecessary treatment costs for a high volume of I&I flow.

- **Stormwater.** Even in situations where stormwater collection is isolated from wastewater collection, monitoring flow rates by specifically mapped asset locations to identify collection system bottlenecks is still important. It can be combined with additional information — such as NOAA precipitation forecasts — to prioritize emergency cleanouts, divert water to minimize property damage, or warn public health and safety officials in advance of potential flooding during extreme events.

How To Use Asset Monitoring To Set Priorities

Regardless of the age or condition of water/wastewater system infrastructure, the size of a utility's budget, or its historical maintenance practices, having the new insight that asset monitoring provides can help minimize maintenance and capital expenditures (Figure 2). Here are some tangible examples of how to apply the benefits of the technology to the practical performance and maintenance of water-related systems.