



The City of Haverhill Water and Wastewater Division

Meeting critical needs and maintaining high quality



The city of Haverhill, Massachusetts, keeps a close watch on its water infrastructure, operating both Water and Wastewater Divisions.

The city's Water Division provides drinking water to 58,000 Haverhill residents and businesses, and produces two billion gallons of water on average each year. The plant itself is manned 24 hours a day, seven days a week, to ensure the highest quality water is delivered each day to the city's residents. Water quality is constantly monitored to make sure that it meets both state and federal drinking water quality standards at all times. Water treatment processes include conventional surface water treatments such as coagulation, flocculation, sedimentation, filtration, disinfection, and pumping.

The city's Wastewater Division maintains the wastewater treatment plant, which provides both primary and secondary treatment for the city's wastewater. Within the Wastewater Division there are two groups—one monitoring wastewater

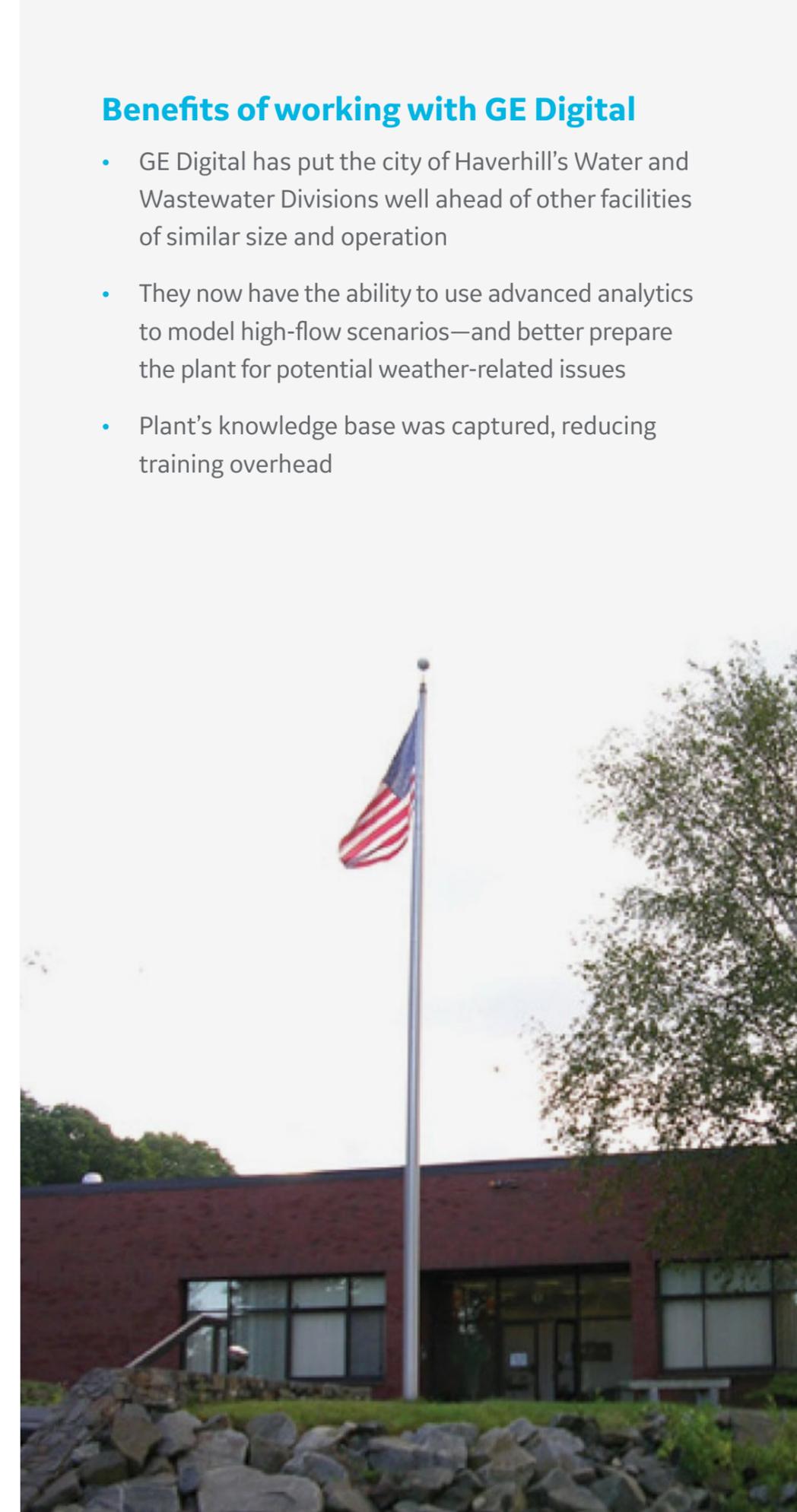
collection, and the other overseeing wastewater treatment, which includes bringing water and routing wastewater into various facilities from multiple points across the city.

As part of its duty to safeguard the city's water supply, the Water Division is also responsible for monitoring, water maintenance, and water treatment, which includes protecting water resources. The city of Haverhill is currently supplied with water from Kenoza Lake, Millvale Reservoir, Round Pond, and Crystal Lake.

The facilities themselves are 32-years-old, however, the control strategies they have in place today have put them well ahead of other facilities of similar size and operation—thanks in large part to tools becoming more readily available, accessible, and connected.

Benefits of working with GE Digital

- GE Digital has put the city of Haverhill's Water and Wastewater Divisions well ahead of other facilities of similar size and operation
- They now have the ability to use advanced analytics to model high-flow scenarios—and better prepare the plant for potential weather-related issues
- Plant's knowledge base was captured, reducing training overhead



John D'Aoust, Plant Manager for the city of Haverhill's Water Division, has been with the city for 18 years, and has been leading the charge to harness the power of the Industrial Internet. He began many years ago by teaming with GE Digital to automate many of the processes that his team had manually documented in order to follow standard operating procedures (SOPs), including state-mandated emergency response plans (ERPs).

D'Aoust's first step was to implement GE Digital's iFIX. It quickly became a real asset in maintaining water quality. Next, the Haverhill team added GE Digital's Workflow, a software platform for measuring and managing the efficiency of plant operations. It was an immense performance improvement over their documented processes. Moving to a computerized process environment allowed D'Aoust and his team to have a cohesive system to follow procedures, and respond to events in a consistent and sequenced manner.

He took his connected environment even further, and purchased Dell Latitude laptops for his on-call operators. Allowing them to be untethered from the facility, but still access GE Digital's software to maintain control of operations from any location. The on-call people are the first responders for after-hour issues—maintaining pumps, monitoring chemical levels in the treatment plant, and even keeping a watchful eye on the plant itself as the post-911 era raised awareness for new safety concerns.

“With GE Digital's iFIX you can dial in the plant—get it set up and you don't have to watch it as closely. It was all manually controlled before—all hardware based, and it took a lot of attention by the team to maintain,” he said.

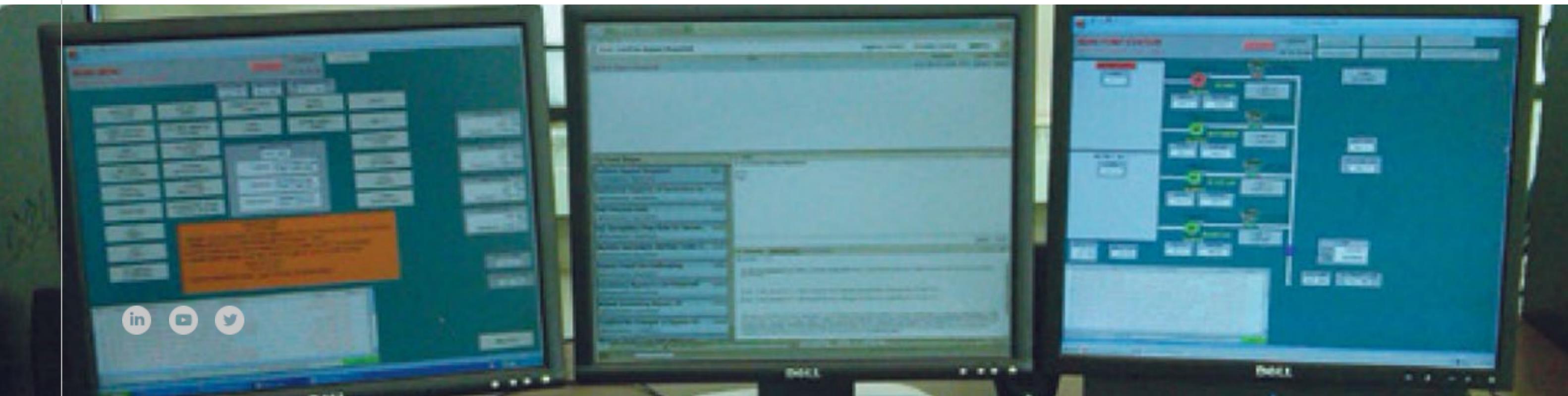
The laptops were equipped with GE Digital's software and cellular dongles to access water facility operations. Each laptop had to be maintained and manually updated. The benefits of being remote and still being able to access iFIX were clearly visible. So much so that D'Aoust put GE Digital's mobile app to work and swapped out his pool of laptops for a single

Apple iPad connected over wireless LTE. The plant's team is alerted to any issue through a series of alarms that have been established, and they can use related products, such as troubleshooter programs to conduct flow chart decision-making for their wastewater operations.

“They have all the features of the control room in their hands.”

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John D'Aoust, Plant Manager for the city of Haverhill's Water Division



According to John D'Aoust, "The upside of moving from three laptops to an iPad is that there's only one machine to maintain, and the price per iPad is considerably less than having to purchase multiple laptops. There's a time savings, and it lowers the complexity of our system."

The one technical hurdle that he had to overcome in his move to become more mobile was to ensure the security of the network. In order to get the iPad onto their internal network, they had to reevaluate their VPN connection. Ultimately that involved a change of provider.

One of the unanticipated benefits of this newly-connected world was the ability to capture and transfer knowledge easily between senior members of this staff and new hires.

"One of the biggest project benefits of putting the data model together has been capturing our knowledge base," said Fred Haffty, Wastewater Facility Manager. "We have people who have been here since the plant started more than 30 years ago, and when they retire, they take that experience with them. So when new operators come in, they are able to know how the system works—to be able to adjust the treatment process for swings without impacting quality."

The move from a manually-intensive operation to a much more efficient software-based mobile operation has afforded the plant with much more flexibility, and resulted in cost savings. The team is able to see everything that's happening at the plant from a remote location, and be alerted to changes in the water operations without a strain on human capital.

Just recently, the team started using advanced analytics to model data for high flow situations—such as potential threats brought about by severe weather. Using GE Digital's Troubleshooter, a powerful analytical tool that utilizes leading-edge techniques to extract knowledge from historical processes and plant data, the team is able to get a real sense of how the plant will perform under certain conditions.

For example, if the plant exceeded X-number of gallons a day, what is the likely result? Previously, the team had to refer back to historical data that was fixed and not fluid. Information was logged into an Excel spreadsheet—it was a very manual process with no modeling capability. Now they have five key performance indicators to monitor operational performance much more effectively. GE Digital's Troubleshooter can have a fundamental impact on present time.

It's been 12 years since John began working with GE Digital to transform the city of Haverhill's water operations from a fixed hardware-based manual operation to one that's leading-edge in his industry. His experience continues to be a positive one.

"We've been working with [GE Digital] for the past 12 years now, and it's been a great relationship," said John D'Aoust. "We've made those 2 a.m. calls to our reps, and they've been right there to answer—whatever we've needed. Our philosophy is that you pick a good company up front to meet your needs, and you stick with them. We haven't been disappointed."





About GE

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