Water Innovations
JULY 2024

TIME TO INVEST IN WATER AUTOMATION?

Learn How To Tackle 5 Operational Technology Challenges

PLUS:

Hydraulic Modeling For Population Growth

Rainwater For Municipal Reuse

Water Partnerships For Social Impact

WHAT DO YOU **EXPECT** FROM A **TURBO BLOWER?**

AERZEN TURBO

- Operation in hot environments (up to 122 Degrees F)
- Long-life airfoil bearing (>80,000 start cycles)
- Superior response to changes in system demand (sequencing, upsets)
- Operation with other blower technologies

LET'S TALK

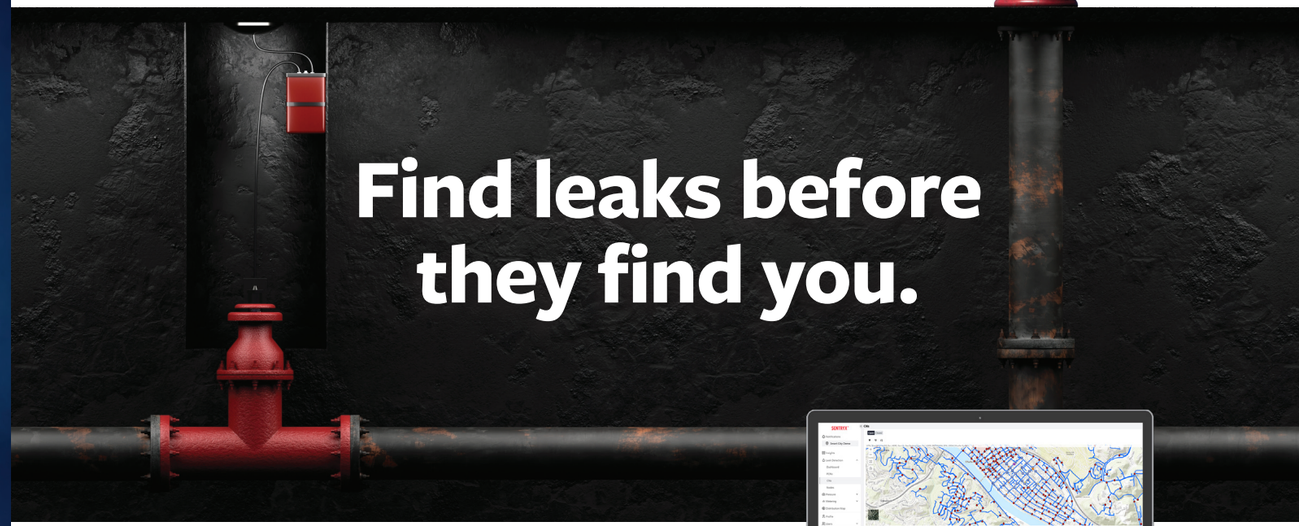
Tom McCurdy, Director of Environmental Sales
Phone: +1 610 656 1683
E-Mail: tom.mccurdy@aerzen.com
Web: www.aerzen.com

AERZEN

Compressed air, gas and vacuum solutions

ECHOLOGICS®

a MUELLER brand



Find leaks before they find you.

EchoShore®-DX System

Protect critical infrastructure with EchoShore®-DX, the state-of-the-art leak detection and monitoring system, now available with hydrant-based and valve-based sensors.

- **Minimize pipe failure risks while reducing water loss**
- **Receive reliable, real-time leak alerts**
- **View system leak and pressure points using the Sentryx™ Water Platform**
- **Integrate seamless work orders by API**

Discover the potential at marketing.muellerwp.com/discover-ESDX

MUELLER

MUELLER® | ECHOLOGICS® | HYDRO GATE® | HYDRO-GUARD® | HYMAX® | i20® | JONES® | KRAUSZ® | MI.NET® | MILLIKEN® | PRATT® | PRATT INDUSTRIAL® | SINGER® | U.S. PIPE VALVE & HYDRANT

TABLE OF CONTENTS

JULY 2024

@WaterOnline

Editor's Insight

6 A Tiny Bit Of PFAS

Articles

8 Helping To Keep Life Flowing: Hopeworks And American Water Forge Powerful Partnership For Social Impact

10 Hydraulic Modeling: Engineered For Florida's Booming Population

12 How To Tackle 5 OT Management Challenges In Water Automation

16 The Potential Of Rainwater As A Renewable Resource

18 The Unexpected Impact Of Payments Optimization On The Workforce Gap

20 Optimization Strategies To Streamline Community Wastewater Utility Operations

Advertiser Index

Aerzen USA Corporation C2

MUELLER Company 3

Krohne, Inc. 5

Vaughan Co. Inc. 7

KLa Systems, Inc. 15

YSI 19

Myron L Company 22

FROM THE EDITOR

By Kevin Westerling
Chief Editor, editor@wateronline.com

A Tiny Bit Of PFAS

In the pages ahead, there is not a single article focused on PFAS. That wouldn't be exceptional if not for the fact that discussion around per- and polyfluoroalkyl substances has so thoroughly dominated the water space lately. And yet, I penned this as an intro to the edition — just "a tiny bit of PFAS" content — because a small portion of PFAS is of the utmost importance in terms of treatment, policy, and cost.

When the U.S. EPA finalized the National Primary Drinking Water Regulation (NPDWR) limiting PFAS in drinking water in April 2024, the maximum contaminant levels (MCLs) were mandated at 4 parts per trillion (ppt) for PFOS and PFOA. The rule also includes new limits for four compounds — an MCL of 10 ppt for PFNA, PFHxS, PFBS, and GenX chemicals. Further, it mandates treatment when a 1.0 "Hazard Index" threshold is reached for mixtures of two or more of PFHxS, PFNA, HFPO-DA, and PFBS compounds.

Those are tiny numbers.

Pursuant to the mandatory monitoring period, utilities must start reporting results three years after promulgation of the rule. Utilities that are above the MCL thresholds must have reduction steps in place *and* alert consumers of exceedances after five years.

In the water industry, that is not a lot of time.

The American Water Works Association (AWWA), the largest organization of water supply professionals in the world, and the Association of Metropolitan Water Agencies (AMWA), which represents the largest (metropolitan) publicly owned water utilities in the U.S., took notice — and action.

In a joint statement from AWWA CEO David LaFrance and AMWA CEO Tom Dobbins, the pair stated:

"We are concerned ... that EPA did not use the best available data and appropriate processes in developing the PFAS regulation. For example, we question the use of a novel 'Hazard Index' in place of a Maximum Contaminant Level for mixtures of certain PFAS, and the issuing of a preliminary determination to regulate certain PFAS simultaneously with the proposed rule.

"The rule significantly underestimates nationwide costs, does not take into account the latest PFAS data, and will add to affordability challenges for many households without achieving the public health outcomes we all seek.

"Scientific process matters, especially when it will set precedent for how EPA develops future drinking water regulations. AMWA and AWWA therefore believe it is prudent to ask a court to verify that EPA constructed the PFAS regulation according to the letter and spirit of the Safe Drinking Water Act, and to give EPA an opportunity to revisit any components of the rule that fell short."

According to two of the most influential water organizations, the "small" parts of the PFAS NPDWR — low limits combined with a short compliance schedule (court consideration could extend the deadlines) — could have large, and detrimental, impact.

It should be noted that at the outset of their statement, LaFrance and Dobbins express their support for a national PFAS regulation, and even the EPA's decision to "swiftly pursue development" of the rule. But they also stated the imperative "to maximize public health benefits in a cost-effective manner."

Did the EPA move too swiftly to meet utilities' treatment and cost concerns? Maybe just a tiny bit. ■

Water Innovations

101 Gibraltar Road, Suite 100
Horsham, PA 19044
PH: (215) 675-1800
Email: info@wateronline.com
Website: www.wateronline.com

CHIEF EDITOR
Kevin Westerling
(215) 675-1800 ext. 120
kwesterling@vertmarkets.com

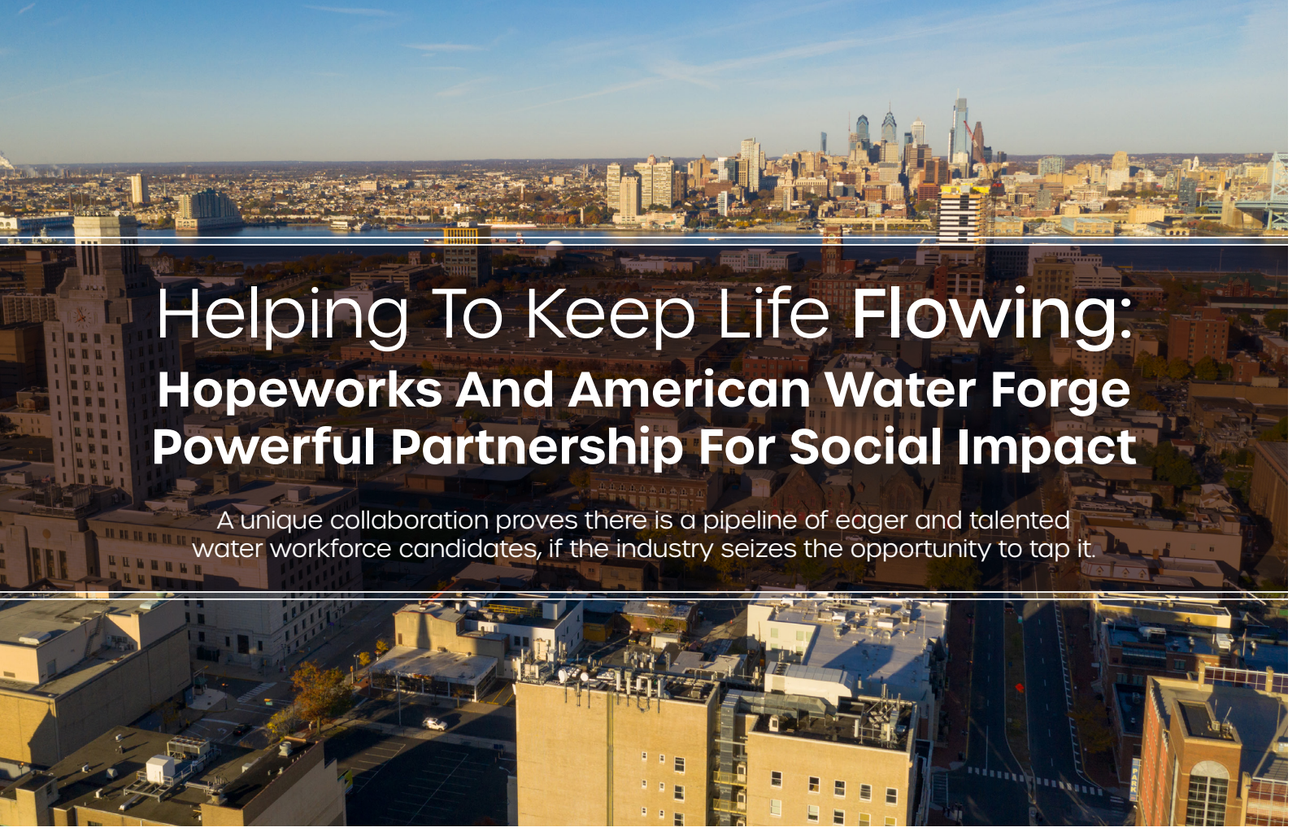
PUBLISHER
Travis Kennedy
(215) 675-1800 ext. 122
tkennedy@vertmarkets.com

PRODUCT MANAGER
Bill King
(215) 675-1800 ext. 100
bking@vertmarkets.com

MANAGING EDITOR
Karen White
(814) 897-9000 ext. 316
kwhite@vertmarkets.com

CREATIVE DIRECTOR
William Pompilii
(215) 675-1800 ext. 145
bpompilii@vertmarkets.com

DIRECTOR OF ONLINE DEVELOPMENT
Art Glenn
aglenn@vertmarkets.com



Helping To Keep Life **Flowing:**

Hopeworks And American Water Forge Powerful Partnership For Social Impact

A unique collaboration proves there is a pipeline of eager and talented water workforce candidates, if the industry seizes the opportunity to tap it.

By LeAundra McCullough, Riscee Langhorne, Zamir Williams, and Tianna Coleman

Since 2015, Hopeworks and New Jersey American Water have partnered on a groundbreaking collaboration aimed at empowering young adults through a unique workforce program. Through this program, individuals from Hopeworks were directly engaged, trained, and employed on geographic information system (GIS) projects. The expertise and resources from New Jersey American Water combined with the passion and dedication of Hopeworks have resulted in a holistic approach to empower young adults and address the workforce needs in the water utility industry. By providing young adults with opportunities for growth and development, Hopeworks equips the students with the necessary skills to enter the workforce and also foster a sense of empowerment and self-belief. This powerful partnership creates a ripple effect, as these individuals go on to make meaningful contributions to their communities and pave the way for a brighter future for themselves and future generations.

Lead And Copper Rule Requirements Project

Hopeworks scanned and cataloged over one million service cards for several American Water subsidiaries located across the U.S. They entered the data into the MapCall database and provided quality assurance (QA) services. This collaboration allowed American Water to fulfill its long-term control plan (LTCP) requirements and support water infrastructure improvements, helping ensure the delivery of high-quality water services.

The successful partnership started with New Jersey American Water, where Hopeworks delivered exceptional results. Impressed by their work, New Jersey American Water referred Hopeworks to Tennessee American Water, which benefited from the identical project. Subsequently, American Water referred Hopeworks to its subsidiaries in Virginia, Maryland, and Indiana.

The project had significant environmental implications, as it facilitated the identification and removal of copper and lead pipes, in compliance with federal and local regulatory requirements. Additionally, the collaboration allowed water utility companies to inventory their water infrastructure accurately. More than 150 interns have contributed to this project over the years, showcasing that this project has long-lasting impact and has been instrumental in Hopeworks' growth by allowing it to expand and support additional young adults.

This project also contributed to the growth of Hopeworks' GIS social enterprise and team, while providing valuable resources to the American Water's subsidiaries. Additionally, it accelerated the professional growth of the individuals involved, allowing them to develop leadership skills, confidence, and a deeper understanding of water infrastructure. Ultimately, the project resulted in and remains a win-win situation: improved water infrastructure for the communities served and invaluable resources for Hopeworks through its partnership with American Water.

Asset Mapping

Hopeworks partnered with New Jersey American Water and American Water Operations and Maintenance to conduct field mapping of water distribution systems and sewer assets using high-precision GPS technology. This provided valuable hands-on experience for the young professionals at Hopeworks, while assisting American Water in accelerating its asset-mapping process. The project took place in Camden, where the young adults reside, generating interest among community members who were eager to experience involvement in improving water infrastructure where they live.

At the start of the project, the interns were provided with area maps that needed to be surveyed, and upon completion, they were assigned new areas. They received training on how to use the GPS system, navigate the database where American Water stores information, and follow strict safety protocols. The maps the interns worked with had estimated points identifying the location of sewer lines and other assets, and their task was to verify and update these points. The project achieved significant success within the initial three-month contract period, as the interns accomplished a remarkable amount of work in a short time, leading to an extension of the contract.

Throughout the project, the interns experienced personal and professional growth. Their confidence and professional skills developed and improved, enabling them to communicate effectively with American Water employees. As the project progressed, the interns took on leadership roles and even contributed to training subsequent groups of interns, providing guidance and advice on the work process. By entrusting the field assessment work to Hopeworks, American Water eliminated the need for its own employees to visit the sites and verify the information. The partnership fostered a strong sense of trust, with American Water recognizing and appreciating the professionalism and dedication of the young adults at Hopeworks.

Overall, this collaboration proved beneficial for both parties. American Water was able to focus on other areas of its operations while relying on Hopeworks' increasing level of expertise, and the interns at Hopeworks gained valuable skills and knowledge while contributing to the improvement of their community's water infrastructure.

Water UP! Program

Water UP! — Water Utility Pipeline — is a comprehensive paid training program specifically designed for young adults to provide them with the necessary skills and knowledge to enter the water utility industry upon completing the program. This innovative initiative is a collaborative effort between Hopeworks, Jingoli Construction, and APEX Solutions Group.

Water UP! offers a diverse range of training, encompassing water utility operations and essential business skills. Through engaging STEM lessons, customer service training, and OSHA 30 certification, participants gain valuable exposure to various aspects of the water and wastewater industry, allowing them to identify their interests and strengths while paving a solid career path in the water utility sector.

The pilot class of Water UP! consisted of young individuals from Hopeworks who participated in the 11-week program and received hands-on field training facilitated by New Jersey American Water, alongside classroom-based lessons administered by Jingoli and APEX Solutions Group. By the end of the program, graduates of Water UP! possessed unique qualifications and certifications, making them eligible for various roles within the utility industry.

With a significant portion of the workforce aging out, there is a growing requirement to identify and develop emerging talent. By providing young adults from the local community with specialized training, Water UP! helps fill this talent gap, particularly in the field of water mechanics. This program not only strengthens the workforce in the water and wastewater utility industry but also demonstrates the commitment to developing future talent and meeting the evolving needs of American Water.

Conclusion

The partnership between New Jersey American Water and Hopeworks is a testament to the power of collaboration and shared goals. This partnership serves as a shining example of how collaboration between private entities and nonprofit organizations can lead to positive change and open doors of opportunity for young adults. It also demonstrates that when organizations come together with a shared purpose, they have the ability to create a powerful force for change and uplift communities in meaningful ways. ■

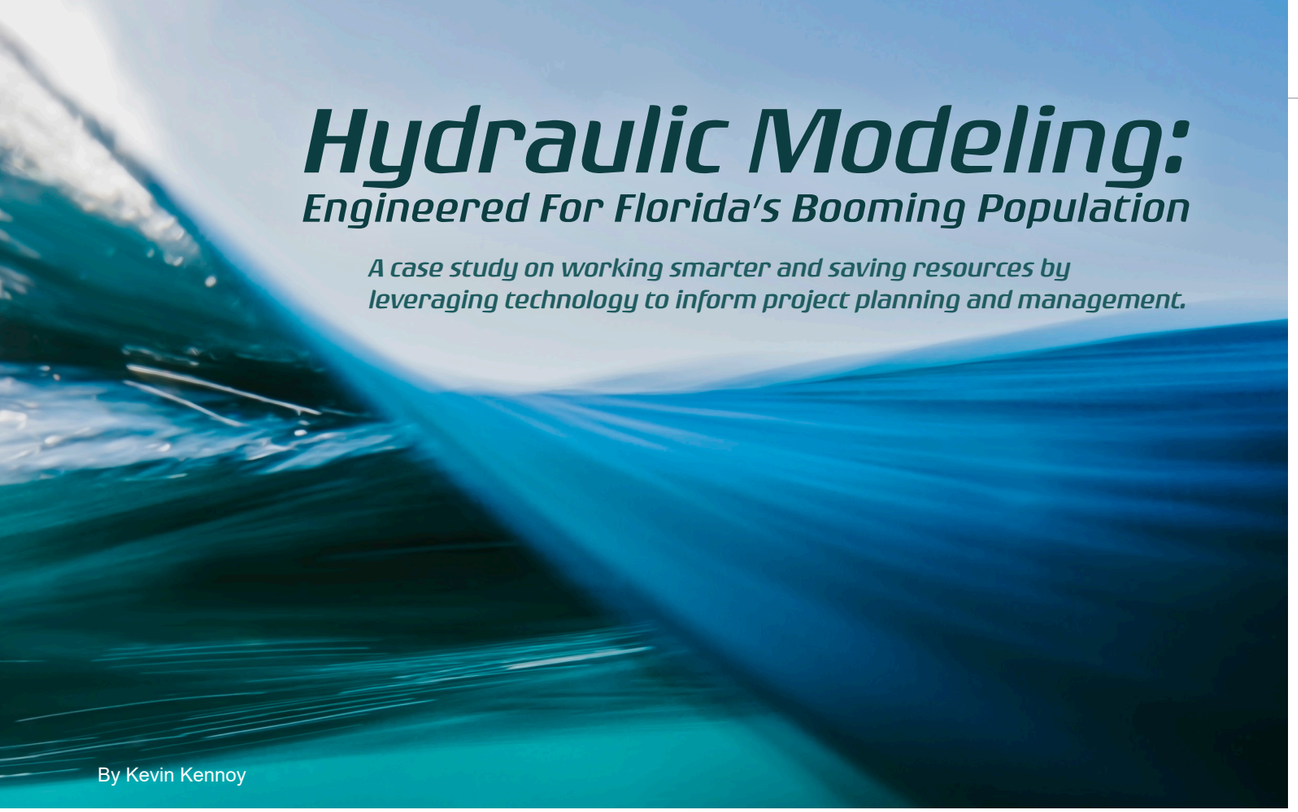
About The Authors

LeAundra "Lily" McCullough is currently a Hopeworks GIS team lead. During her two years in this position, McCullough has worked to ensure the completion and accuracy of projects from prestigious partners, such as American Water amongst others.

Riscee Langhorne is the director of career partnerships at Hopeworks Camden. In this role, she has successfully created several employment pathways with corporate partners to place young professionals in full-time, living wage positions. Langhorne holds a bachelor's degree in accounting from the University of Maryland Eastern Shore.

Zamir Williams, a GIS team leader at Hopeworks, guides a team to use maps and data to help the environment and the community. Williams started out supporting individuals with disabilities doing direct care support and eventually worked with AmeriCorps through PowercorpsPHL to lead environmental projects and support their team.

Tianna Coleman, GIS team lead, is a Camden County College graduate (2021) turned full-time employee at Hopeworks. Coleman's professional career has evolved through various positions, including a summer program teacher at the neighborhood center and Hopeworks part-time GIS intern. In 2018, she was awarded the Townsend Scholarship as she pursued a degree in human services.



Hydraulic Modeling:
Engineered For Florida's Booming Population

A case study on working smarter and saving resources by leveraging technology to inform project planning and management.

By Kevin Kennoy

Population growth trends have continued to rise in regional hot spots nationwide since the COVID-19 outbreak in 2020. For example, in Florida, numbers are expected to grow by more than 25% — or 5 million people — by 2040,[1] increasing demand on water systems that may already be at capacity. Modeling software is crucial to understanding these capacity challenges, proactively planning innovative infrastructure improvements, and developing new systems to eliminate hydraulic "bottlenecks," fueling smart growth for communities.

Supporting Infrastructure Using Hydraulic Modeling

Like many Northwest Florida communities, Bay County's Panama City and Panama City Beach faced significant damage after Hurricane Michael in 2018. Two years later, amid the lengthy process of rebuilding the communities, a global pandemic caused lockdowns and many other restrictions across the nation. However, Florida remained open, spurring an unprecedented population surge, which is still ongoing. This included the development of one of the country's fastest-growing all-inclusive retirement communities for ages 55 and over in the U.S. — Latitude Margaritaville in Watersound, located near the Northwest Florida Beaches International Airport. While regional growth pointed to a robust increase in development in the area, it placed additional strain on water infrastructure that was not fully rebuilt to support it.

Hydraulic modeling software for projects like this is essential for understanding how developments will impact water and wastewater utility systems and the costs associated with expansion. Results can be effectively used to help public utilities comprehend the significant capital investments associated with development, removing the burden for ratepayers with those often-expensive infrastructure capacity improvements that were not accounted for in development planning. This is a crucial step forward in solving water and wastewater infrastructure capacity challenges as populations trend upward.

Applying Hydraulic Modeling For Accuracy And Long-Term Advantages

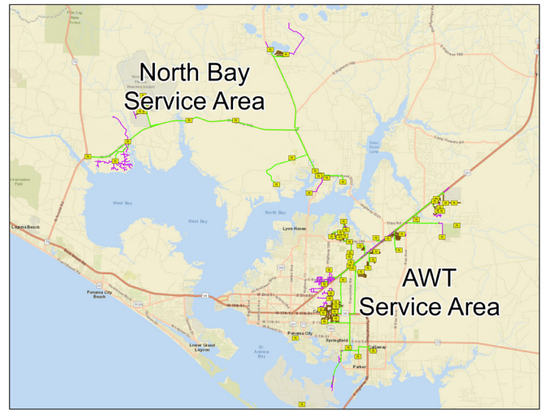
Applying hydraulic modeling software to water and wastewater systems is critical for infrastructure planning and management. An accurate and well-calibrated model can positively impact a client or developer's return on investment, making it a go-to for calibrating long-term solutions. Models can also be applied to all types of water systems, such as recycled, freshwater, and wastewater, with accurate results.

While many modeling software options are available, such as InfoWorks ICM and EPA Swimm, all software can provide real-time insights on how existing water infrastructure must be expanded or entirely built from the ground up to accommodate population growth. For instance, modeling evaluates the capacity of existing systems, simulates the impact of growing demand, and simulates solutions to visualize how challenges can be solved to meet specific timelines and needs. Building and testing deficiencies in a drainage system with a computer program is much easier than configuring pipes underground, making modeling an invaluable tool for saving time and money.

Using modeling software has added advantages, including eliminating misinformed, non-collective, and shortsighted infrastructure sizing choices to prevent future capacity issues. Software documents can be easily shared with non-technical stakeholders, and infrastructure capacity decisions can be easily changed or altered when new information is available.

Visualizing Infrastructure Using Hydraulic Modeling Software

Conveniently located near the Northwest Florida Beaches International Airport in Panama City and Florida's scenic 30A corridor, Latitude Margaritaville is a fast-growing retirement community contributing to the state's upward growth projection. The development is also a prime example of how to proceed in planning when the strain on existing water infrastructure is so severe that new facilities must be built to support the 4,500 homes that come with it. Water professionals can use hydraulic modeling software for planning analysis to visualize the impact on infrastructure, creating solutions for phased support as the population grows. Exploring how much a regional utility can pump before the system reaches capacity and how it can pace development until a solution is in place prompts valuable feedback that contributes to proactive planning decisions for the long term.



Kevin and his team used hydraulic modeling software to highlight areas of infrastructure with green, yellow, and red for planning analysis in the Panama City Beach and Panama City, Florida, region.

Water professionals also used hydraulic modeling to visualize the impact in planning for the new $12 million, 30-acre Southport Sports Complex in Bay County, Florida. Modeling visualization highlighted areas of the infrastructure in green, yellow, and red to represent stages of capacity and to show how updates can be phased in to meet capacity until a new treatment plant is needed. As part of the solution, the team repurposed effluent into public access to reuse water to irrigate the baseball fields and maintain landscaping, promoting sustainability.

Overcoming Bottlenecks With Hydraulic Modeling

When water or wastewater flow becomes constrained, hydraulic bottlenecks can form. This can lead to reduced pipe capacity, increased pressure, and other operational inefficiencies caused by issues with pipe diameter, pipe roughness, pipe blockages, pipe network, layout pump capacity, and hydraulic gradient. Identifying these bottlenecks is essential for ensuring efficient and effective water system operation. Ignoring them can cause development interruptions, state and federal consent forms, or to face fines.

Hydraulic modeling helps us visualize the impact of bottlenecks so engineering professionals can better understand challenges and optimize solutions that fit the client's needs. Modeling can simulate options for consideration and show us their implications. Feedback is generated from questioning scenarios like whether to expand the pipe diameter or reroute water flow within the system, expand the existing plant, or build a new site. If the piping diameter is sized for a specific demand, it begs the question, "How much can it be changed before negatively impacting water pressure?" The ability to ask these questions through modeling provides data-driven insights for informed decision-making.

Stewarding The Next Generation With Hydraulic Modeling

Hydraulic modeling is fast becoming the growth management tool not only for large utility systems but also for smaller systems. It assists water and wastewater system operators in discovering unknown hydraulic capacity issues while anticipating new ones before they occur. This is a move from traditional reactive decision-making to more of a predictive modeling system. The innovative software empowers water professionals to make smarter decisions, optimize water networks, and enhance overall infrastructure resilience. Using hydraulic modeling to support infrastructure demands for today's growing populations is destined to serve critical purposes in the realm of water infrastructure, playing a vital role in shaping the future for the next generation. ■

References:

1. Florida Demographic Estimating Conference, March 2021 and the University of Florida, Bureau of Economic and Business Research, Florida Population Studies, Volume 54, Bulletin 189, April 2021.

About The Author

Kevin Kennoy, PE, is vice president and client service team leader at Barge Design Solutions. He has over 32 years of municipal potable water and wastewater system infrastructure improvement experience throughout the Southeast. His hydraulic modeling expertise spans 20 years in developing potable water models in some of the most challenging hydraulic and water flow management geographies in the U.S.

How To Tackle 5 OT Management Challenges In Water Automation

Get the most out of your automated systems by mastering the human element sustaining them — i.e., operational technology (OT).

By Kevin Johnson, Pete Perciavalle, and David Wilcoxson

There is no shortage of challenges facing managers, plant operators, and automation specialists in water and wastewater utilities today. That's where operational technology comes in. With smart, innovative water automation systems, organizations can leverage capital expenditures and improve a utility's performance, resilience, and compliance.

What is operational technology, or OT? Well, let's compare it to information technology or IT. Organizations have IT systems that connect people to processes and tools. Think of word processing programs, billing systems, spreadsheet software, and other programs. IT helps with the productivity of that labor force.

OT connects people with assets and machinery. In the case of the water industry, OT helps us focus on producing clean water or cleaning wastewater. Typical components of OT in water include distributed control systems, supervisory control and data acquisition servers, and open platform communications servers. It also includes control programming for pumps, valves, conveyors, digestion, and aeration. OT's priority is to keep water automation systems running, prevent any loss of production or treatment, and maintain regulatory compliance.

IT and OT don't have to be separate. These days, it's important to be aware of the fusion of IT and OT. You can use that fusion to take care of important cross-business functions for your utility.

We've spent decades working in OT, and we're preparing for a big shift. Things are changing in OT, and we're fascinated to see the innovation, opportunities, and challenges to come.

In this article, we'll talk about five key OT management challenges that utilities face and how to address them. These ideas can improve your utility's performance. We'll also talk about how to assess your current operations to identify gaps and optimize assets and processes.

1. Lessen System Obsolescence

The typical approach that many utilities take with OT burdens them with the risk and upkeep of the OT environment. OT system obsolescence starts on day one, so utilities must deal with system hardware upgrade costs, licensing costs, warranty, and spare part inventory.

But there's another way. As an analogy, let's look at buying a car. One method, like the traditional OT approach, involves buying large pieces of the vehicle and then assembling it yourself. If, however, we treat the OT system more like purchasing a car from a dealer, then we can negotiate things like cost, warranty, maintenance, and part replacement.

Treat your OT system like an asset. It's the same way you'd view your car, house, or treatment plant. Think of your OT system from a lifecycle standpoint, instead of just looking to the next six or 12 months.

An effective OT agreement can include warranty, repair, and replacement contracts to keep the system up to date. It can also include more than a decade's worth of competitive and predictable pricing, a clear understanding of data ownership, and other benefits.

It's important to put thought into the technological components of your water automation system. But it's even more vital to get that commercial agreement right.

We worked with the City of Los Angeles' Bureau of Sanitation on a project that mitigated system obsolescence and reduced risk by applying this OT agreement approach. Up front, we saved $120 million in OT system capital costs by helping the utility to negotiate the agreement. We also avoided risks like technology obsolescence and price gouging in the future. And we included a system refresh, which was built into the agreement. After 13 years, the whole water automation system was refreshed. So, the OT system is kept up to date, which removes the burden from the utility.

2. Bring Down Operating Expenditures

What's another challenge? Capital expenditure spending typically raises OPEX costs.

It's important to take a programmatic OT approach. This optimizes OPEX costs and makes them more predictable. You're able to bring down both the operations and maintenance expenses and make them more consistent, which lowers the costs and risks.

In one project, we helped the City of San Diego add five times more assets than what they originally had — with a minor increase in operation and maintenance costs. They added three new treatment plants and 11 major retrofits to their existing Point Loma wastewater treatment plant. But their O&M costs only increased from $84 million to $87 million over a 12-year period. They were able to run their facilities for only $3 million more than what they used to run the previous asset base. We fully automated their new assets and helped them optimize their staffing, which kept operating and labor costs low.

If you grow your asset base, it doesn't mean that you must increase your operating costs.

3. Address Labor Shortages

There is another big challenge with OT in the water sector. What is it? Labor shortages and skill gaps. They are expected to worsen over the next few years. In water occupations, we're noticing that an aging workforce isn't being replenished by the younger workers the industry needs. According to U.S.-based research by Joseph W. Kane and Adie Tomer, many water industry workers are older than the national median. The national median hovers around 42.2 years old, with water occupations at 42.8 years old. Water treatment operators are even older on average, with a median age of 46.4 years old.

When it comes to members of the workforce, less than 24 years old, Kane and Tomer's research shows that 12.5% of all occupations fall in this age group. But in the water industry, it's just 10.2% of workers.

We're in a fight for talent to attract the workforce needed. And we need to ramp up OT skills so that we can begin to adapt and make a positive change toward this new reality.

We're finding that there aren't many current workers specialized

in online analytics, real-time control aspects, artificial intelligence, and machine learning — or not as many as the industry needs. How can we create an OT career path that includes a focus on modern technology? Thankfully, younger generations are fluent with technology — and willing to work with it. These are the types of people we should encourage to join the water workforce.

Our team has collaborated with utilities on recruiting strategies like working with tech schools and trying to find nontraditional labor pools. We've also found ways to enhance the OT discipline, via pay and other benefits to offer new graduates.

We're all in a battle for talent. To succeed, we want to create programs to help our clients attract and retain that workforce in a digitally enabled environment.

4. Reduce Cybersecurity Risks

Most public and private organizations need help in this area. Cybersecurity threats to OT — including ransomware, malware, and phishing — change constantly. And these threats aren't going away. In the water industry, it's important to embed security in our planning, design, and operations.

When working with utilities, we advise them to take a cybersecurity assessment. We follow standards from the National Institute of Standards and Technology (NIST). You can apply these standards to your operations and OT systems.

We consider things like an impact analysis or risk scoring, using tools like the free Cyber Security Evaluation Tool (CSET) from the Cybersecurity & Infrastructure Security Agency (CISA). Then, after the assessment, utilities can look at employing an incident response or recovery plan. After that, they can share risk communication through training and awareness with their staff.

5. Stop Utility Data Silos

Unfortunately, core utility OT systems are often siloed. Utilities tend to separate operations and maintenance.

But we advocate bringing the data together. It's easier to manage the centralized data that way, which leads to cost savings and a reduction in work orders. You're speeding things up and designing water automation systems for business outcomes. As we said earlier, there's been a fusion of IT and OT, and we think it's time to embrace that fusion.

We're currently working with the Region of Peel in Ontario, Canada, on a real-time control project that combines data sources, like rain gauges and flow monitoring out in the field. We're able to show helpful information on dashboards that management can use for planning and design. We're fusing data sources from both the operations and maintenance sides. No more silos.

Consider An OT Refresh

Ready to move forward? Work with a team of OT professionals to perform an OT system evaluation. This lets a utility develop short-term and longer-term plans to work through challenges and build better water automation systems. You can address all five of the challenges that we've mentioned above or just focus on one area. Comprehensive or à la carte.

For this OT readiness evaluation, we apply benchmarks and standards to evaluate the current state of a utility's OT. Then we identify priorities. We discover the key issues, risks, costs, and benefits.

We do a current situation analysis. Typically, we find that those running the utility are already aware of some of their OT issues, but they may not be familiar with the benchmarks and standards that we're applying.

The next step is one of the most important. It's really looking at risk. What's the consequence and the likelihood of something happening? What are the costs and benefits? Also, what are the immediate things that need to happen? We then put those answers onto a planning roadmap.

It's important to engage stakeholders and build support. Then, you need to establish long-term partnerships with suppliers, vendors, and key stakeholders that will be partners now and into the future.

OT can work wonders for water and wastewater utilities, but it's important to make sure your systems are performing at their best. The time to evaluate your OT readiness is now. ■

References:

1. https://www.brookings.edu/articles/water-workforce/

About The Authors

Kevin Johnson, Stantec vice president, leads sales and business development efforts for the firm's automation and operational technology group. Kevin partners across the organization to deliver financial, digital, and business solutions to utilities, government agencies, and private-sector clients seeking a sustainable future.

Pete Perciavalle, senior vice president at Stantec, is responsible for the firm's global water digital group. Pete's extensive experience in systems hardware, software data platforms, and analytics helps drive business and compliance outcomes, generate capital efficiency, and optimize operations and maintenance.

David Wilcoxson, Stantec vice president, is primarily responsible for managing the firm's internal water business operating unit for Digital Practice in North America. In this role, he is known for implementing process efficiencies throughout the various design disciplines within the water group.

The Potential Of Rainwater As A Renewable Resource

As water resources become more stressed, continuing to "waste" rainwater becomes increasingly inadvisable, perhaps even irresponsible.

By Katie Brenneman

Precipitation has increased by a rate of 0.04 inches per decade[1] around the globe since 1901. While this has caused flooding and surges in some areas, many other regions have seen drought and desertification. This points toward widespread water mismanagement and highlights the reality that rainwater is a renewable resource whose value has been overlooked.

While turning rainwater into a commodity is ethically dubious, there is no doubt that the harvesting and reuse of precipitation will become a point of contention as climate change progresses. This means we must start to consider the potential of rainwater to combat scarcity issues and mitigate the impact of a warming world.

Treating rainwater as a resource can aid public campaigns to reduce water waste, too. Folks are far more likely to minimize their waste when they see the value of rainwater, and they may be more likely to invest in things like water butts and collection devices in their own homes.

History And Benefits Of Rainwater Harvesting

Rainwater harvesting is not a new idea. Civilizations have treated rainwater as a scarce, important resource for millennia. Archaeologists have even identified water butt-like devices in ancient cities like Dholavira, located in the Indus Valley, which may date back 4,500 years.

However, the increased efficiency of our water supply means that many have overlooked the potential that rainwater still holds. Today, the U.S. Geological Survey (USGS) estimates that 40% of our drinking supply comes from groundwater while most of the remaining supply comes from surface sources, like rivers and lakes.

But, as increased strain is placed on the water tables due to drought and increased pumping during hotter seasons, conventional supply may not be enough. Conversely, failing to store and manage high rates of precipitation during storms leaves urban areas vulnerable to floods. This is why many wastewater companies face a period of uncertainty in the coming years as climate change is set to exacerbate existing issues.

In response to these pressures, the American Rainwater Catchment Systems Association (ARCSA) was established in 2009 to alleviate droughts and improve precipitation management. Groups like the ARCSA support public programs to treat rainwater as a resource and put pressure on politicians to change laws that currently restrict collection. Supporting these efforts is crucial as, according to the U.S. EPA, the benefits of collecting rainwater include:

- improved stormwater management;
- reduced contamination in areas near agricultural sites;
- reduced water bills; and
- provision of an emergency supply during droughts.

Before you start collecting rainwater, you will need to check local laws to ensure that your efforts are legal. Some states have strict laws on how much rainwater you can collect, while others outlaw the practice altogether.

Harvesting Laws

Understanding harvesting laws is crucial for citizens and organizations that want to treat rainwater like a renewable resource. This could result in hefty fines and lawsuits if the legal ramifications and expectations of rainwater harvesting are ignored. Currently, states that limit rainwater collection include Colorado, Utah, Nevada, Illinois, and Arkansas.

Some codes are expected to be updated in the coming years, as more states adopt progressive stances toward rainwater collection in hopes that doing so will reduce strain on water systems. However, folks who do wish to collect rainwater may also need to stay up to date with regulations that may impact how rainwater is collected.

Similarly, those who choose to collect rainwater may find that they are eligible for grants or incentives. For example, cities like Tucson, AZ, offer incentives like the Tucson Water Rainwater harvesting rebate, which offers up to $2,000 to those who invest in rainwater harvesting.

Existing Systems

Treating rainwater as a resource likely means that we'll need to revise the way we harvest water from precipitation. Refining large-scale approaches to rainwater harvesting is crucial, as it is rainwater that feeds much of the groundwater and surface water supply that we rely on today.

Organizations interested in increasing the efficiency of rainwater harvesting can look toward innovative, climate-resistant solutions[2] like those utilized in Kazakhstan. Firms in Kazakhstan, which is one of the driest countries in the world, utilize solar-powered atmospheric water generators (AWG) to pull water from the air. This improves the taste of the water and ensures that a constant supply is always available.

Similarly, more must be done to take advantage of rainfall events like storms. According to a recent Q&A session hosted by the USGS, a large storm will drop around 1 inch of water. For a home situated on half an acre of land, that translates to 13,577 gallons of water across the yard. More mild rainfall can be beneficial, too. If just one-tenth of an inch of rain falls onto a 20-by-30-foot roof, a homeowner who collected this water could fill a 37-gallon water butt in just one weather event.

Urban Rainwater Collection

Rainwater collection is easy to imagine on rural lots where water butts and runoff systems can be easily established. However, for rainwater to reach its potential as a resource, harvesting efforts must take off in urban areas.

Improved water management will play a central role in building sustainable cities for the future.[3] As urban populations expand, more must be done to improve wastewater treatment and reduce pressure on freshwater sources. Rainwater harvesting systems will be key to these efforts and will provide a perfect replacement for non-drinking purposes like toilet-flushing or gardening.

Refining large-scale approaches to rainwater harvesting is crucial, as it is rainwater that feeds much of the groundwater and surface water supply that we rely on today.

Green innovations, like rain gardens and bioswales, can help alleviate stormwater runoff and reduce the risk of floods, too. This is crucial, as more intense storms are predicted across the globe in the face of climate change and warming.

Conclusion

Rainwater is an underutilized natural resource that could be key in the fight against climate change. Properly managing rainwater will refill supplies and help cities become more resilient following a weather event like a storm. By treating rainwater like a valuable resource, governmental agencies can improve responses to droughts and alleviate the burden placed on the water table in years to come. ■

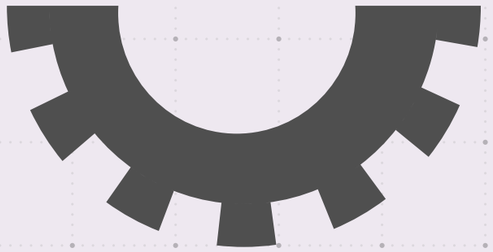
References:

1. https://www.epa.gov/climate-indicators/climate-change-indicators-us-and-global-precipitation
2. https://www.kreo.net/news-2d-takeoff/6-innovations-from-around-the-world-that-can-make-structures-more-climate-change-resilient
3. https://pvcase.com/blog/what-urban-living-of-the-future-might-look-like/

About The Author

Katie Brenneman is a freelance writer and regular contributor to *Water Online*, covering environmental, technology, and utility management issues. She can be reached at katiebrennemanwrites@gmail.com.

THE UNEXPECTED IMPACT OF PAYMENTS OPTIMIZATION ON THE WORKFORCE GAP



Efficiency is the lever that can help remedy the problem of a shrinking workforce.

By Ted Szmaj

It's one thing to read about the workforce gap facing the utilities sector. It's another thing to experience it firsthand. As the controller of the Youngstown Water Department, I've watched my colleagues retire at an increasing rate — and I've felt the stress and strain of being understaffed. We found ourselves in the position of needing to both mitigate the loss of those retiring and to attract new talent. One of the most impactful interventions has also been one of the most unexpected: modernizing our payments software.

The Problem

Before we decided to upgrade our payments software, the Youngstown Water Department was like many legacy utility providers in this country. We were working with an outdated payment system, and a great deal of our more than 142,000 residents still received physical bills, meaning that our workers were opening hundreds of envelopes containing paper checks on any given day. And because enrolling in the paperless billing option we had at the time was a confusing task, many folks never opted in. Those who did opt in found the system difficult to navigate, meaning each bill demanded hours of our overextended workers' attention as they fielded calls to address payment challenges.

And, of course, we also had an aging workforce and were facing the increased retirements that come with that. As more and more experienced staff members retired, our system's inefficiencies became more pronounced — and the workloads for those still in the office only increased. It was clear we needed a change. We needed a solution that would remove the friction and stress of bill payments and the roadblocks to self-service enrollment — to lay the groundwork for increased cost efficiencies and a more sustainable workload for our team.

The Solution

Our search for that solution led us to InvoiceCloud, and we saw the results we'd been hoping for almost as soon as we flipped the switch. Within the first six months, paperless adoption increased six times over, saving us $70,000 in print and mail costs and dramatically reducing our carbon footprint by curtailing our paper consumption. Thanks to intelligent outbound campaigns reminding customers of upcoming bills, we also saw more timely payments, allowing us to reduce truck rolls for shutoffs by 42%. This nearly halved our drivers' workload and helped more customers keep their water running — it even saved us on gas bills. It was truly transformative.

So what does all this have to do with the workforce gap? When we adopted a digital payments solution, we didn't just save money and enhance our customers' experience; we also saved 55 hours per month in manual workload. Tasks that previously required manual intervention, such as processing payments and managing billing inquiries, became automated. This has significantly reduced the amount of work on our employees' plates, giving them time to focus on more critical — and interesting — projects, such as:

1. Training on advanced metering infrastructure (AMI)
2. Adoption and implementation of paperless work orders
3. Paperless workflow for customer move-ins and move-outs

These improvements don't just boost our operational efficiency; they modernize workflows across departments. We're able to demonstrate that we prioritize innovation and foster an environment that supports professional growth and development. Our automated, streamlined processes are simple to explain to new hires, ensuring a quick and easy onboarding process so that our department can continue to operate without disruption (even as experienced staff members retire).

The Moral

At Youngstown Water, we knew we needed to upgrade our entire approach to billing and payments. We also recognized that we were experiencing a significant loss of experienced workers, which was expected to increase, and that attracting new talent was a challenge. But what we didn't know — at least not at first — was that those two issues were related. Then we overhauled our payments system with InvoiceCloud. We made cataloging and tracking payments smoother for both us and our customers, of course. But we also mitigated the impacts of employee retirements on those still at the office as automation dramatically reduced their workloads. This alone may have saved us from losing other valued talent — after all, when you're not wasting your time on the phone with stressed customers all day, you have a calmer work environment and more time to focus on interesting projects.

On top of all that, updating our billing process has created a smoother and more technologically advanced workflow that is more attractive to the next generation of prospective employees. Plus, the onboarding process has been cut in half thanks to our new automated workflows, so when we do secure those new hires, they're up and running in no time.

The dreaded utilities workforce gap is here, and it's likely only going to gain momentum. Our sector must prioritize attracting and hiring new talent, while also mitigating the departure of experienced workers. At Youngstown Water, modernizing how we send and receive bills has had an enormous impact on all our workdays — not to mention how vastly improved our customers' experiences are. ■

About The Author

Ted Szmaj has been the controller and office manager for the water department of Youngstown, OH, for nearly a decade. Ted received his bachelor's degree at Youngstown State University and has decades of experience in accounting and accounts receivable.

Optimization Strategies To Streamline Community Wastewater Utility Operations

The availability of robust, stable treatment systems with simple treatment processes and O&M is key to serving growing community wastewater treatment demand.

By Dennis F. Hallahan and Ashley Donnelly

Wastewater utilities confront a myriad of challenges, from aging infrastructure to evolving regulatory standards and the emergence of new contaminants. This demands a delicate balance of managing treatment processes and infrastructure with constrained resources and time. The difficulty lies in efficiently addressing these issues while meeting growing community demands. Decentralized wastewater treatment is an often-overlooked answer, allowing for a customized solution based on the specific needs of the community. Decentralized wastewater treatment systems can sustain the environment and smart community growth while protecting public health. Engineers, municipal health officials, and regulators need innovative wastewater treatment solutions. The latest evolution of decentralized systems can efficiently handle residential and commercial daily flows and can be a cost-effective alternative to the large, centralized wastewater treatment plants of the past. In fact, some decentralized community systems are collecting and treating more than one million gallons of wastewater per day.

Benefits Of Decentralized Systems

From reduced infrastructure costs to managed aquifer recharge (MAR), decentralized systems offer a resilient and reliable approach to wastewater treatment, minimizing potential environmental impacts while offering flexibility and scalability. Allowing for incremental expansions based on population growth and changing wastewater characteristics, decentralized systems not only offer numerous environmental benefits, but also economic benefits as well offering opportunities for service providers, inspectors, installers, and designers, as noted by the U.S. EPA. These benefits make it an attractive option for addressing wastewater treatment challenges in various contexts.

Decentralized onsite wastewater systems are tried and true; they are the workhorses that protect public health. These systems serve us well, with 25% of the population and 30% of new construction in the U.S. utilizing this technology. Effluent is treated onsite, keeping water local to its original source, all while recharging local water supply aquifers. Where individual onsite septic systems are the norm, town officials have a host of traditional and advanced decentralized treatment system possibilities to protect local waterways and water supplies, upgrade outdated systems to reduce nitrogen loading, and improve overall wastewater management for the community. Because of the advances in collection, treatment, and dispersal, system technology and configurations previously only available for large-scale decentralized systems are now available for small-scale systems as well. The recent class of Alternative Onsite Wastewater Treatment Systems (AOWTS) offers high-level treatment strategies and system designs that address nitrogen reduction, watershed protection, and sensitive environments that are particularly critical for coastal communities and those where discharge to surface waters may be limited.

Advanced Wastewater Treatment Solves Greater Issues

Advanced treatment technologies for small-scale residential and commercial systems are now available that can treat wastewater to levels previously only achievable by large-scale wastewater treatment plants.

Well-known technologies include combined treatment and dispersal, extended aeration, and fixed-film systems. These treatment processes utilize naturally occurring microbial communities, which consume the organics and reduce the strength of the waste. Passive advanced treatment technologies, such as combined treatment and dispersal, remove up to 99% of wastewater impurities (BOD/TSS) without using any electricity or replacement media. Highly purified wastewater is then released to the soil, recharging the groundwater and preventing soil and groundwater contamination.

Active advanced treatment systems provide high-quality effluent and are effective in reducing BOD, TSS, nitrogen, and other constituents. Depending on the technology, the treated water can be captured for reuse for non-potable purposes such as irrigation or industrial processes. This reduces freshwater demand and offers this highly treated wastewater a second use prior to returning it to the groundwater. Reuse may require additional levels of treatment, such as disinfection.

Passive and active advanced treatment technologies present unique benefits, offering system designers the ability to provide site-specific solutions that tailor the system design to address the specific needs of the area. Passive treatment systems allow a system designer to offer a highly treated effluent solution in remote or off-grid areas where centralized systems may not be available or are too costly for connection.

Here, one of the drainfields for the community of Rowan, Iowa, is being installed under the local ballfield.

A lakeside community in New Hampshire installs a passive combined treatment and dispersal system to treat 50,000 GPD with nitrogen reduction.

Environmentally Sensitive Areas

In areas with strict environmental regulations or sensitive waterbodies, advanced wastewater treatment may be necessary to meet the required discharge standards. Installing advanced treatment systems can ensure compliance with applicable regulations. Enhanced nutrient removal is required to achieve these discharge standards to protect waterbodies or when a National Pollutant Discharge Elimination System (NPDES) permit is required. Advanced treatment technologies can remove a high percentage of nutrients including nitrogen and phosphorus from wastewater, which is key in sensitive environments. Additional treatment options, such as disinfection with UV light or chlorine, can effectively reduce or inactivate bacteria, viruses, and other microorganisms. This reduces the potential for waterborne diseases, thereby protecting public health.

Long-Term Sustainability And O&M

Advanced wastewater treatment systems often incorporate features that provide ease of maintenance. Remote monitoring and sensors have been introduced for effective management. All treatment systems, passive or active, require some level of operations and maintenance. These O&M frameworks are one of the most critical parts of the wastewater management infrastructure, providing reliability and confidence in their operations.

Conclusion

Utilities have successfully identified less-capital-intensive decentralized solutions designed with O&M in mind to extend the life and expand the capacity of existing utility systems. These utilities have successfully installed robust treatment systems to replace or rehabilitate outdated systems. This increases the opportunity to protect natural resources and public health at a cost that communities can afford while generating opportunities for local employment. Engineers embracing these new options find them easily adaptable to various site conditions. Such decentralized systems provide long-term treatment solutions designed with O&M in mind. ■

Case Study: Section, AL

The rural Alabama town of Section has a population of 770. Local septic systems did not meet current requirements and the town needed a 45,000-gallon-per-day wastewater treatment system to serve residential and commercial properties.

System Design

Engineers specified an ECOPOD® Advanced Wastewater Treatment System for the two-phase project. The ECOPOD is a submerged fixed-film treatment system that has no inner tank filters, screens, or diffusers to service. The nitrogen removal capabilities and simple operation make it ideal for small communities. ECOPOD units were completed and shipped directly to the site ready for installation including all component equipment required. The 45,000-GPD system treats domestic waste at a strength of 300 mg/L for both BOD and TSS and was designed to handle an average daily flow fluctuation of 50–100%. The ECOPOD units were installed in poured-in-place concrete tanks equipped with aluminum hatches for ease of access to allow for O&M. A flow equalization tank was installed to evenly dose the ECOPOD treatment system. The flow equalization tank includes duplex pumps. A primary tank precedes the flow equalization tank. The effluent also passes through a UV system for disinfection of fecal coliform to concentrations below permit levels. Final discharge is via a drip disposal system, which includes an effluent pump chamber, headworks, tubing, controls, and all necessary valves and fittings. A small building was erected onsite by the project contractor to house electrical controls and equipment.

Result

The ECOPOD system requires minimal O&M once installed:

- A qualified wastewater maintenance contractor ensures system components are working.
- Weekly checks involve a visual inspection of operating equipment such as blowers and pumps to ensure they are working properly.
- Monthly visits involve more hands-on maintenance, such as cleaning drip filters.
- Semi-annual maintenance is based on manufacturers' recommendations for equipment, such as belt tightening, UV bulb checks/replacements, and mechanical equipment lubrication.

About The Authors

As technical training and sales development manager at Infiltrator Water Technologies (IWT), Ashley Donnelly manages the inside sales team and is responsible for maintaining and building customer relationships including assisting engineers, contractors, and regulators with technical and design information, training, installation, and O&M. In 2020, she launched IWT's webinar program, which is currently accredited in over 12 states and has trained over 2,000 attendees on various contemporary industry topics. She serves on several industry committees, including TOWA, NOWRA Emerging Professionals, and NEWEA Small Communities Committee.

Dennis F. Hallahan, PE, is the technical director of Infiltrator Water Technologies. Hallahan has over 30 years of experience with the design and construction of decentralized wastewater treatment systems. He has written numerous articles for onsite industry magazines and regularly gives presentations nationally on the science and fundamentals of onsite wastewater treatment systems. Hallahan also serves on various national industry association wastewater committees.

Imagine the Possibilities

Ultrameter II™

Model 6PFC^{E}

Conductivity
Resistivity
TDS
ORP/Free Chlorine Equivalent (FC^{E}™)
pH
Temperature

Ultrapen PTBT Series

Smartphone/Tablet Compatible Testers

X2 MYRON L COMPANY

Compatible with Android and iOS Devices.

Download on the App Store

GET IT ON Google Play

Bluetooth® Enabled

MYRON L® COMPANY
Water Quality Instrumentation
. . . Since 1957

www.myronl.com
760-438-2021

DESIGNED, ENGINEERED AND ASSEMBLED IN THE USA