

# JOURNAL

OF THE  
NEW ENGLAND  
WATER  
ENVIRONMENT  
ASSOCIATION

VOLUME 56 NUMBER 3 / ISSN 1077-3002

FALL 2022



## COLLECTION SYSTEMS

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Civil engineers' role in wastewater-based epidemiology

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Restored resilience—replacement of coastal Cedar Point's vulnerable sewer system in Scituate, Massachusetts

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Big data and smart sewers—Is the technology ready? Is the industry ready? Are you ready?

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**OUR ASSOCIATION WAS ORGANIZED NINETY-THREE YEARS AGO** in Hartford, Connecticut, on April 23, 1929, with the objectives of advancing the knowledge of design, construction, operation and management of waste treatment works and other water pollution control activities, and encouraging a friendly exchange of information and experience. From 40 charter members, the membership has steadily grown to more than 2,000 today. Membership is divided into the following classes:

**Professional Member**—shall be any individual involved or interested in water quality including any manager or other officer of a private waste treatment works; any person engaged in the design, construction, financing, operation or supervision of pollution control facilities, or in the sale or manufacture of waste treatment equipment.

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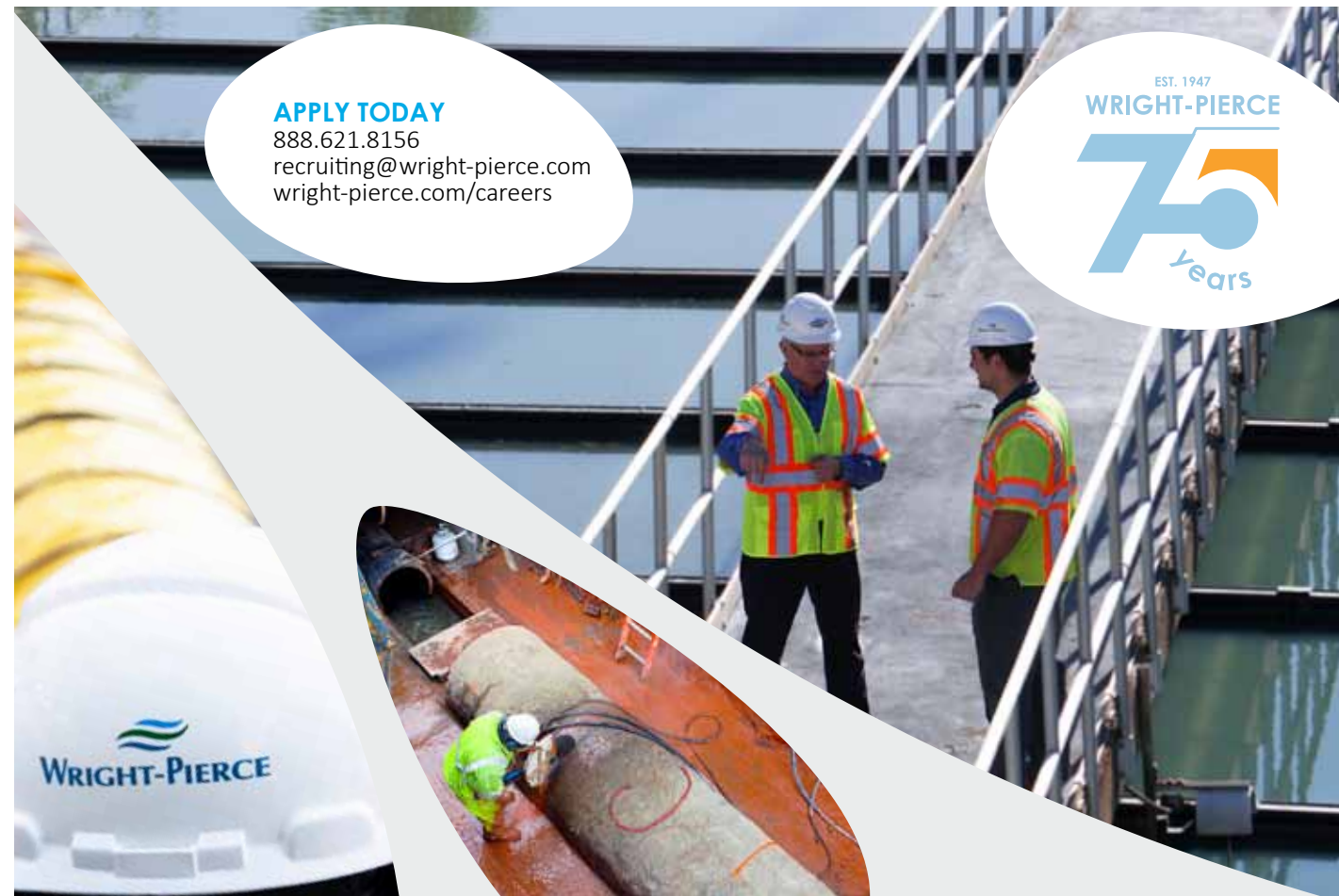
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## President's Message

Welcome to NEWEA's fall *Journal* that focuses on a lifeblood of our industry, collection systems. The 2017 Infrastructure Report Card by the American Society of Civil Engineers (ASCE) estimates that the United States has over 800,000 miles (1,290,000 km) of public sewers and 500,000 miles (800,000 km) of private sewers. The moon is a mere 238,855 miles (384,400 km) from Earth. So our country has enough sewers to stretch from the Earth to the moon and back more than two times—an amazing amount of environmental infrastructure for our industry to operate, maintain, and upgrade/replace.

Unfortunately, ASCE has given the nation a grade of D+ for its wastewater infrastructure. New England, which is home to some of the oldest environmental infrastructure in the country, knows that poor grade all too well. Many of our sewers are still combined, aging, and, in many cases, failing. Most of our sewers were not designed for today's population, impervious area, and, especially, climate change-induced rain events. EPA estimates about 50,000 sanitary sewer overflows annually threaten the health and well-being of our citizens.

As a utility manager, I can proudly say that the City of Manchester, New Hampshire, has implemented a robust and sustainable sewer rehabilitation program. Using the capacity, management, operations, and maintenance (CMOM) requirement included in Manchester's National Pollutant Discharge Elimination System permit as a catalyst, it has implemented and fine-tuned a formal CMOM program in 2009. Since then the City has established and fine-tuned inspection, design, and construction policies and protocols that have provided the foundation for a strong and sustainable CMOM program. Manchester's program averages about 120,000 ft (36,600 m) of internal sewer TV inspection annually along with about 425 manhole inspections. To date, four sewer rehabilitation contracts totaling over \$26 million have been completed. A fifth contract is under design now, and five more sewer rehabilitation contracts are programmed over the next 12 years.

To ensure long-term sustainability, the Manchester has budgeted \$3.25 million annually for the next 20 years to support our CMOM program. This proactive sewer rehabilitation approach is much more cost-effective than addressing



The City of Manchester, New Hampshire has completed four sewer rehabilitation contracts totaling over \$26 million. A fifth contract is under design now, and five more sewer rehabilitation contracts are programmed over the next 12 years.

emergency repairs, which typically cost between 3 and 5 times more than planned repairs. So Manchester is doing its best to raise our country's D+ grade.

This collection system issue of the *Journal* addresses several concerns and challenges facing our industry. Hopefully, this issue will provide our membership with some of the tools needed to address our aging and failing collection systems and provide the resiliency and sustainability required to serve our country into the next century. Among the issues being addressed in the following articles are preventative public health measures, sewer system rehabilitation, and new technologies.

Our first featured article, by CDM Smith's Kyah Lucky, Denise Prussen, and Anthony Russo, focuses on a post-pandemic phenomenon, our industry's role in wastewater-based epidemiology (WBE). This emerging practice is becoming a critical tool for taking preventative public health measures and tracking trends in infection rates. This article discusses the successful implementation of a WBE wastewater surveillance program in a local municipality, describing the field and lab work associated with this emerging practice.

Our second featured article, by Francesca Barilla and Paul Millett of the Environmental Partners Group and Kevin Cafferty and William Branton from the Town of Scituate, Massachusetts, focuses on one of our industry's most critical missions: restored resiliency. This article discusses the replacement of Cedar Point's vulnerable sewer system in the coastal community of Scituate. The original Cedar Point gravity sewer collection system was constructed of vitrified clay pipe in the 1970s. These short-length pipes result in 4 times more joints than present-day pipe lengths. Improper bedding, high groundwater, and other factors can contribute to offset pipe joints

thereby increasing infiltration rates. The new water-tight gravity sewer system for the Cedar Point neighborhood was placed into service in May 2021. Since its installation, average flow in the area's sewers has been reduced by about 80 percent, providing Scituate the resiliency and sustainability to carry the system into the next century.

***Many of our sewers are still combined, aging, and, in many cases, failing. Most of our sewers were not designed for today's population, impervious area, and, especially, climate change-induced rain events.***

Our final featured article, by NEWEA Past President Mike Bonomo and his colleague from ADS Environmental Services Kevin Einfinger, is titled Big Data and Smart Sewers and asks three key questions: Is the technology ready? Is the industry ready? And most importantly, are you ready? The article presents smart sewer technologies that provide insight into furnishing wastewater collection systems with greater efficiency and reliability. Technologies such as reliable sensors, cloud computing, and machine learning are presented. This article discusses these core technologies, their status today, and how best to use them to solve problems in your wastewater collection system.

We hope you will be educated, entertained, and enlightened by this third *Journal* issue of 2022 focused on collection systems, the networks that are the lifeblood of our industry. As I continue my presidency of NEWEA for 2022, I want to again thank our membership for their support and continued contributions to the growth and sustainability of our industry and our great association. Looking forward to seeing you at our annual conference in Boston this coming January.

# From the Editor

Ask anyone outside our industry about their associations with collection systems (after clarifying that collection systems are sewers, of course), and I guarantee that the most popular answers would include the “Teenage Mutant Ninja Turtles,” “Super Mario Brothers,” and the epic escape scene from “Shawshank Redemption.” I doubt anyone would mention collection systems’ integral role in protecting public and environmental health. In fact, some would likely respond with tales of sewer backups and mishaps, such as the recent failure of a vacuum sewer in a Cape Cod town that shuttered the downtown area mere days before its largest summer festival.<sup>1</sup>

With this edition of the *Journal*, I challenge all of you to share the more promising (and exciting!) side of our wastewater collection systems with your connections outside the industry. I don’t know about you, but for the past two years I have started each morning with a quick check of the Sars-CoV-2 load in my own collection system: [www.mwra.com/biobot/biobotdata.htm](http://www.mwra.com/biobot/biobotdata.htm).<sup>2</sup> Before the Covid-19 pandemic, who would have imagined that we’d be checking near real-time data from our collection systems daily? Exciting stuff.



In the 1994 movie “Shawshank Redemption,” wrongly convicted protagonist (Tim Robbins) escapes from prison by crawling through a sewage outfall pipe to a nearby stream and freedom

Our first article, by Kyah Lucky, Denise Prussen, and Anthony Russo, describes just how the Covid-19 pandemic thrust collection systems into the main-stream spotlight. These three engineers were on the front lines of our industry’s foray into wastewater-based epidemiology (WBE),<sup>3</sup> and helped develop



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the tools for turning information retrieved from collection systems into public health actions. They make a strong case for the civil engineers’ prominent role in WBE.

The next article, by Francesca Barilla, Paul Millett, Kevin Cafferty, and William Branton is a great example to share with all of those disgruntled sewer users. The authors describe a hugely successful collection system restoration project in Scituate, Massachusetts, where over 4,350 lf (1,325 m) of 50-year-old vitrified clay pipe was replaced with more modern materials. The restoration not only improved the resiliency of this section of the collection system against sea level rise (and the general harsh conditions of coastal New England), but also mitigated infiltration and inflow to the point where the average flows from the subject neighborhood were reduced by approximately 80 percent—freeing up much-needed capacity at the downstream reclamation facility.

Our final article, by Mike Bonomo and Kevin Enfinger, looks toward the future of collection systems—not only as a system to deliver wastewater to reclamation facilities, but also as a “smart” system to prevent the release of undesirable pathogens and nutrients into our nation’s waterways. Can you imagine a world where all of our urban waterways are safely swimmable and fishable? I know I mentioned *thinking* about swimming in the Charles River in my last letter, but I’d feel much more comfortable actually jumping in if I knew that the collection systems were being “smartly” managed to eliminate combined sewer overflows.

As always, I hope you enjoy reading this edition of the *Journal* as much as I did putting it together! If you feel inspired by these articles to become more involved with collection systems, please reach out to the Collection Systems Committee chair and vice-chair, Scott Lander and Kara Johnston. Their Committee Spotlight provides a nice overview of opportunities to get involved.

1. Cote, J. (2022) “Provincetown sewer emergency ends in time for kickoff of massive LGBTQ+ carnival.” <https://www.masslive.com/capecod/2022/08/provincetown-sewer-emergency-ends-in-time-for-kickoff-of-massive-lgbtq-carnival.html> Accessed 9/1/2022.  
2. MWRA (2022) “Wastewater COVID-19 Tracking.” <https://www.mwra.com/biobot/biobotdata.htm> Accessed 9/1/2022.  
3. O’Keeffe, J. (2021) “Wastewater-based epidemiology: current uses and future opportunities as a public health surveillance tool.” *Environmental Health Review* 64 (3) 44-52.



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# Industry News



EPA will invest up to \$4.5 million in each of the six New England estuaries of national significance. Shown: Piscataqua Estuary—Rye, New Hampshire

## \$24 Million from Bipartisan Infrastructure Law to Protect and Restore Six New England Estuaries of National Significance

EPA announced in July it will invest \$132 million from President Biden’s Bipartisan Infrastructure Law in the National Estuaries Program (NEP). This unprecedented investment will provide each of New England’s estuaries of national significance with up to \$4.5 million over the next five years to fund important work to protect and restore the estuaries.

New England’s estuaries of national significance include Buzzards Bay, Casco Bay, Long Island Sound, Massachusetts Bay, Narragansett Bay, and the Piscataqua Region estuaries.

“I’m engaging directly with communities who will benefit from the work we will do thanks to President Biden’s Bipartisan Infrastructure Law, and the message is clear—it’s about time,” said EPA Administrator Michael Regan. “Communities have been waiting for far too long. This funding is an important investment in equity, clean water, and resilience for some of our most treasured water resources.”

EPA New England Regional Administrator David Cash added, “Estuaries, where freshwater from rivers and streams mixes with salt water from the ocean, are among some of the most productive environments on earth. With these funds, our six New England national estuary programs will not only help to address key water quality and habitat challenges, but address climate resilience and prioritize equity as well, helping our most vulnerable communities.”

NEP is a place-based program that, since it was authorized by section 320 of the Clean Water Act in 1987, has funded projects that restore water quality and ecological integrity across 28 estuaries of national significance, located along the Atlantic, Gulf, and Pacific coasts, and in Puerto Rico. The Bipartisan Infrastructure Law funding will accelerate work on Comprehensive Conservation Management Plans (CCMPs), which are structured frameworks for protecting and restoring estuary resources and meeting water quality needs. Additionally, NEPs have been at the forefront of addressing climate impacts and environmental justice disparities in their watersheds. NEPs are part of President Biden’s Justice40 Initiative, which aims to deliver at least 40 percent of the overall benefits from certain federal investments to underserved communities.

*Note: All EPA industry news provided by EPA Press Office*

The official announcement includes guidance for NEPs on how EPA will administer program funding from the Bipartisan Infrastructure Law. The guidance provides key information, including equity strategies, reporting requirements, and flexibility to NEPs to address the priorities in their watersheds that are defined by local, city, state, federal, private, and non-profit stakeholders. EPA expects NEPs to accelerate CCMP implementation, develop strategies and practices that enable these program areas to be resilient and adapt to changing climate conditions, and make investments that ensure water quality and habitat benefits are realized by disadvantaged communities.

NEPs are associated with a variety of institutions, including state and local agencies, universities, and individual nonprofits. Each NEP has a Management Conference (MC) that consists of diverse stakeholders, and uses a collaborative, consensus-building approach to implement the CCMP. Each MC ensures that the CCMP is tailored to the local environmental conditions and is based on local input, thereby supporting local priorities.

## Funding Secured to Complete Cleanup of New Bedford Harbor

In May, EPA Deputy Administrator Janet McCabe was joined near the banks of New Bedford Harbor by federal, state, and local officials to announce that EPA’s decades-long work to address polychlorinated biphenyl (PCB) contamination in New Bedford Harbor sediments is on track to be completed in about three years, owing to the Bipartisan Infrastructure Law.

EPA and the Commonwealth of Massachusetts also announced a settlement with Cornell Dubilier Electronics, Inc., a South Carolina-based capacitor company with a facility in New Bedford, which will provide additional funding toward the cleanup and the costs of operating and maintaining the Superfund remedy.

“Thanks to vital funding from the Bipartisan Infrastructure Law and the steadfast commitment of our enforcement attorneys, state counterparts, and community partners, EPA now has the resources to complete the job of addressing hazardous pollution that has contaminated New Bedford Harbor for decades,” said Ms. McCabe. “EPA and the Biden Administration have prioritized protecting public health and addressing environmental impacts in communities that have

historically been left out of the conversation and overburdened by dangerous pollution. I am proud of this collaborative effort and the progress that we have made.”

The New Bedford Harbor site is one of thousands of contaminated sites nationally that have been given Superfund status due to the nature and extent of hazardous wastes at the site, and the cost and logistics of cleaning them. Superfund sites can include former manufacturing facilities, industrial locations, processing plants, landfills, and mining sites. The \$72.7 million allocation for the New Bedford Harbor Superfund site is part of a \$1 billion “first wave” of funding out of a total of \$3.5 billion in the law to help clean up polluted Superfund sites across the country.

Over the next five years EPA will put \$60 billion into improving the health, equity, and resilience of communities throughout the country. The Bipartisan Infrastructure Law will make a dramatic difference, including improving drinking water, wastewater, and stormwater infrastructure, removing lead services lines, and protecting communities from emerging contaminants such as PFAS. It will invest \$5.4 billion to clean up legacy pollution at Superfund and brownfields sites, helping to restore the economic vitality of communities. It will also help communities with a \$5 billion investment in electric and low-emission school buses and healthier air for children.

EPA has made significant progress removing and addressing PCB contamination in New Bedford Harbor since 2012, when the U.S. Government and the Commonwealth of Massachusetts reached a \$366 million settlement with AVX Corporation. However, by 2022 those funds were mostly depleted, with work still remaining to complete shoreline remediation. The cost for the harbor PCB cleanup, including agency indirect costs, is approximately \$1 billion. Approximately half has been funded by the federal and state governments’ cost recovery efforts.

“Nearly 40 years ago EPA began a generational, transformational cleanup commitment to remove and address PCB pollution in New Bedford Harbor and surrounding areas. Because of the funding announced today, we can now foresee the end of this lengthy chapter of cleanup work. We can also clearly see the future for New Bedford as a vital coastal community coming into focus, maintaining its vibrant fishing industry while also pivoting to servicing the offshore clean energy economy of the 21st century, and growing much needed jobs in the community. This is a fantastic outcome for a community that has shouldered a disproportionate burden of pollution,” said EPA’s Mr. Cash.

The settlement with Cornell Dubilier Electronics, Inc., includes an agreement for the company to pay \$4 million that will help fund the cleanup of PCB contamination at the New Bedford Harbor Superfund site. The U.S. Department of Justice on behalf of EPA lodged this and a related settlement agreement in U.S. Federal District Courts. Of the \$4 million of settlement funds designated for New Bedford Harbor,



New Bedford Harbor

\$400,000 will go to the Commonwealth of Massachusetts for the operation and maintenance of the Harbor Superfund remedy. The remaining \$3.6 million will be applied to the remaining shoreline cleanup work being conducted.

The 18,000 ac (7,300 ha) New Bedford site, added to the National Priorities List (NPL) in 1983, is an urban tidal estuary with sediments that were highly contaminated with PCBs and heavy metals until EPA remediated the harbor. At least two manufacturers in the area used PCBs while producing electric devices from the 1940s to the late 1970s. These facilities discharged industrial wastes containing PCBs directly into the harbor and indirectly through the city sewer system. As a result, the harbor was contaminated with PCBs in varying degrees for at least 6 mi (9.7 km) from the upper Acushnet River into Buzzards Bay. This discharge stopped when the manufacture of PCBs was banned by EPA in the late 1970s.

In 1980, the Comprehensive Environmental Response, Compensation and Liability Act, known as Superfund, was passed. This important law gave EPA the authority and funds to hold polluters accountable for cleaning up the most contaminated sites across the country. When no viable responsible party is found, or the responsible party cannot afford the cleanup, funds appropriated by Congress are used. A tax on chemical and petroleum industries provided funds to the Superfund Trust Fund for Superfund cleanups until 1995. The Bipartisan Infrastructure Law reinstates the chemical excise taxes and invests an additional \$3.5 billion in environmental remediation at Superfund sites, making it one of the largest investments in American history to address the legacy pollution that harms human health and the environment of communities and neighborhoods.

## Narragansett Bay Commission Receives \$55 Million Loan to Modernize Wastewater Infrastructure

EPA announced in July a \$55 million Water Infrastructure Finance and Innovation Act (WIFIA) loan to the Narragansett Bay Commission in Providence. EPA’s third WIFIA loan to the commission will help finance upgrades to increase climate resiliency and cybersecurity at one of the nation’s oldest wastewater facilities.



“Water is essential, and resilient wastewater infrastructure ensures that we can count on the pumps and pipes that safely return used water to the environment,” said EPA Assistant Administrator for Water Radhika Fox. “The Field’s Point wastewater facilities are among the oldest in the country, and I am so pleased that the Narragansett Bay Commission is using its WIFIA loan to protect the system from vulnerabilities due to extreme weather events as well as cybersecurity threats.”

The Field’s Point wastewater treatment facilities have been in continuous operation for nearly 100 years. EPA’s WIFIA loan will help the Narragansett Bay Commission ensure the reliable operation of these facilities by making them more resilient to increasing extreme weather events in the Northeast and potential cybersecurity attacks. The project will replace the odor control system, will implement improvements to disinfection and de-chlorination systems, and will construct a new septage receiving station. It will improve the system’s resiliency by improving cybersecurity to protect critical information technology infrastructure, and by installing standby power capabilities to maintain uninterrupted operation of treatment processes. Additionally, the project will support the installation of a solar carport at Field’s Point that will help power the wastewater treatment plant.

“The Narragansett Bay Commission is so gratified to again participate in the WIFIA program,” said Narragansett Bay Commission Chairman Vincent Mesoelle. “We are tremendously excited to continue our work to build a resilient clean water future for our ratepayers and all Rhode Islanders.”

The July announcement marks the Narragansett Bay Commission’s third WIFIA loan, bringing the amount of financing by EPA to \$515 million. Construction is expected to be completed in 2026.

### EPA Selects 30 Members for Environmental Financial Advisory Board

EPA announced in July the appointment of 30 members, both new and returning, to the Environmental Financial Advisory Board (EFAB). The EFAB advises the EPA administrator and the agency’s programs and regional offices on innovative ways to lower costs while increasing investments in environmental and public health protection. A priority for the EFAB is to support the agency’s investments through the Bipartisan Infrastructure Law to advance progress on key priorities, including uplifting underserved communities, tackling the climate crisis, and protecting public health.

“EPA is uniquely positioned to create good-paying jobs and deliver significant economic benefits to communities across the nation. That’s why the guidance from the EFAB to make smart investments and use funding effectively is more important than ever,” said EPA’s Mr. Regan. “I look forward to engaging with the board on critical investment and financing issues and calling upon its expertise to address environmental challenges facing communities throughout the country.”

EPA selected new and returning members for two- or three-year terms. Selections were made in accordance with the EFAB’s charter to achieve balance and diversity concerning workplace sector, geographic location, gender, ethnicity, and

stakeholder perspective. These 30 members join the chairperson and six members currently serving terms expiring in 2023. The current chairperson and the members are drawn from all EPA regions and hail from 21 states.

#### New Members

- Courtney L. Black, King County Wastewater Treatment Division, Maple Valley, WA
- Matthew T. Brown, District of Columbia Water and Sewer Authority, Washington, D.C.
- Albert Cho, Xylem Inc., Washington, D.C.
- Janet Clements, One Water Econ, Loveland, CO
- Lori Collins, Collins Climate Consulting, Charlotte, NC
- Eric Hangen, Center for Impact Finance at the Carsey School of Public Policy, University of New Hampshire, Danby, VT
- Barry Hersh, New York University, New York, NY
- Thomas Karol, National Association of Mutual Insurance Companies, Washington, D.C.
- Gwen Keyes Fleming, DLA Piper LLP, Washington, D.C.
- Joanne Landau, Kurtsam Realty Corp., Croton-on-Hudson, NY
- Lawrence Lujan, Taos Pueblo Utility Service, Taos, NM
- Sanjiv Sinha, Environmental Consulting & Technology Inc., Ann Arbor, MI
- Marilyn Waite, Climate Finance Fund, Washington, D.C.
- David Wegner, National Academy of Sciences, Tucson, AZ
- Gwen Yamamoto Lau, Hawaii Green Infrastructure Authority, Honolulu, HI

#### Returning Members

- Kerry E. O’Neill (chairperson), Inclusive Prosperity Capital, Inc., Stamford, CT
- Ashley Allen Jones, i2 Capital, Washington, D.C.
- Steven J. Bonafonte, The Metropolitan District of Hartford, Hartford, CT
- Angela Montoya Bricmont, Denver Water, Denver, CO
- Stacy D. Brown, Freberg Environmental, Inc., Denver, CO
- Theodore Chapman, Hilltop Securities Inc., Dallas, TX
- Zachary Davidson, Ecosystem Investment Partners, Baltimore, MD
- Jeffrey R. Diehl, Rhode Island Infrastructure Bank, Providence, RI
- Sonja B. Favors, Alabama Department of Environmental Management, Montgomery, AL
- Phyllis R. Garcia, San Antonio Water System, San Antonio, TX
- Edward Henifin, Hampton Roads Sanitation District (retired), Virginia Beach, VA
- Craig Holland, The Nature Conservancy, Arlington, VA
- Craig A. Hrinkevich, Robert W. Baird & Company Inc., Red Bank, NJ
- Margot M. Kane, Spring Point Partners LLC, Philadelphia, PA
- George W. Kelly, Earth & Water Strategies, Denver, CO
- Cynthia Koehler, WaterNow Alliance, San Francisco, CA
- Colleen Kokas, Environmental Liability Transfer, Inc., Lahaska, PA
- MaryAnna H. Peavey, Idaho Department of Environmental Quality, Boise, ID

- Dennis A. Randolph, City of Kalamazoo, Kalamazoo, MI
- Eric Rothstein, Galardi Rothstein Group, Chicago, IL
- William Stannard, RAFTELIS, Kansas City, MO
- David Zimmer, New Jersey Infrastructure Bank, Lawrenceville, NJ

### EPA Announces 2022 President’s Environmental Youth Awards Winners

EPA, in partnership with the White House Council on Environmental Quality (CEQ), announced in June the 2022 recipients of the President’s Environmental Youth Award (PEYA) in New England. One student from Westford, Massachusetts, and 18 students in Portsmouth, Rhode Island, were chosen to receive awards for their work to solve local and global environmental problems.

“These students are making a difference for the environment they live in,” said EPA New England’s Mr. Cash. “They have tackled environmental challenges in their communities and in the world at large, and we honor them for their hard work.”

PEYA was established by the Environmental Education Act of 1970 and recognizes outstanding community-level environmental projects by K-12 youth that promote awareness of natural resources and encourage positive community involvement. Each year, PEYA honors a variety of local projects developed by students, school classes, summer camp attendees, and youth organizations to promote engagement in environmental stewardship and protection.

The New England winners are among 49 PEYA winners nationwide recognized for their environmental work. This year’s PEYA winners in New England are as follows:

**Rahul Sriram Ram**, Day Elementary School, Westford, Massachusetts—Mr. Ram won for a project called “Reducing Air Pollution & Conserving Water in Community Gardens.” His project aims to reduce air pollution and conserve water in community gardens, as well as encourage environmentally friendly agricultural practices. At the end of each season, 150

community farmers will use an average of about 7,000 gal (26,000 L) of gasoline and transmit about 150,000 lbs (68,000 kg) of carbon dioxide traveling back and forth to their community gardens. Mr. Ram created a website that lets people from the community reduce pollution by signing up to water each other’s plots. This reduces air pollution and saves community members’ time. The project also educated farmers, making them aware of using hydroponics to save water. Mr. Ram is also spreading the word about air pollution reduction and water conservation at his school, and he expects to expand his project and the knowledge of hydroponics to other communities next year.

**Portsmouth Middle School**, Portsmouth, Rhode Island—Eighteen students in Portsmouth were recognized for their Portsmouth AgInnovation Farm project, which made use of six ac (2.5 ha) given to the school. During the pandemic, students held a virtual afterschool class called Portsmouth Ag(riculture) Innovation where they developed a plan to create a garden on the land, which is about 0.5 mi (0.8 km) from the school. After eight weeks, students broke up into groups focusing on soil health, water quality regenerative farming practices, irrigation, and work with small animals. In the spring of 2021, more students joined to help maintain and expand the garden. Fresh produce from the garden was donated to local food banks. The Portsmouth AgInnovation continues and is expanding into sustainable gardening, reducing food waste, building a greenhouse, and using solar energy as an energy source for irrigation.

The Portsmouth Middle School team comprised the following students: Olivia Almilli, Anabella Barber, Tatum Brennan, Dahlia Brilhante, Aurelis Brockman, Cameron Davis, Elizabeth Lantz, Elle McFadden, Stella McInerny, Maggie Mullen, Raelin Nary, Brooke O’Brien, Hannah Pilotte, Olivia Purdy, Fiona Sarro, Noah Sidewand, Owen Sidewand, and Rowan Willet.

To read about the winning projects in detail, visit [epa.gov](http://epa.gov).

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# Civil engineers' role in wastewater-based epidemiology

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**ABSTRACT** | Wastewater-based epidemiology, also referred to as wastewater surveillance (WS), analyzes biomarkers in sewage to support public health. WS first gained notoriety in tracking viral diseases such as polio and illicit drug use in communities of concern. However, the approach was not widely applied until the Covid-19 pandemic, caused by the SARS-CoV-2 virus. When the outbreak first emerged in March 2020, engineers and scientists turned to WS to detect and track the SARS-CoV-2 virus in our community wastewater, with the goal of using the data to establish preventative public health measures. This article discusses the implementation of a WS program shortly after the Covid-19 pandemic outbreak in a local municipality from the perspective of early-career professionals involved in two critical components of the approach—sample collection and viral quantification—and establishes lessons learned for future programs.

**KEYWORDS** | Wastewater, wastewater-based epidemiology, Covid-19, SARS-CoV-2, wastewater surveillance, RNA, composite sample, grab sample, public health, in-house analysis, qPCR, wastewater sampling

Prior to March 2020, little was known about the SARS CoV-2 virus (which caused the Covid-19 pandemic) as it began to hit New England. Critical medical supplies needed to mitigate the outbreak, such as tests and personal protective equipment (PPE), were sparse and primarily reserved for medical professionals. Individuals waited in several-hour-long lines to get tested, with results often taking many days. During peak times, such as around the holidays, it was common to wait up to seven days to get a Covid-19 test result. The sudden demand and strain on public health departments and medical supply chains demonstrated a clear need for real-time information about the extent of community spread of the SARS-CoV-2 virus to inform the public health response.

Wastewater surveillance (WS), the analysis of biomarkers in wastewater to obtain information on the health of the community in the service area, met that need.<sup>1</sup> Historically, WS has been used in research and academic settings to track viral diseases as well as illicit drug use in communities.<sup>2</sup> Prior to March 2020, WS was not widely implemented, and such programs existed in fewer than 10 countries.<sup>3</sup> At

the onset of the Covid-19 pandemic in March 2020, academic institutions, wastewater utilities, and consulting firms quickly began identifying methods of using WS to detect and quantify SARS-CoV-2 to provide public health departments with needed data. At the time, it was known that people shed the virus with their bodily fluids, and that it could be detected in wastewater collection systems. With this knowledge, public health institutions recognized the value WS could provide when tracking Covid-19. Development of local, state, and national programs ensued. The technique has rapidly advanced over the past two years, with the significant innovation and experimentation during this time having made the application of this technique successful. As of August 2022, wastewater-based epidemiology (specifically for the tracking of Covid-19) is now used in approximately 3,500 locations globally.<sup>4</sup>

## WHY DO WASTEWATER SURVEILLANCE?

Reliance solely on clinical testing of symptomatic individuals for SARS-CoV-2 for developing public health measures has proven challenging due to both the inability to identify asymptomatic cases and

the lack of positive cases being reported with the increased accessibility of home tests. WS can support a community's ability to act quickly to prevent the spread of Covid-19. WS, alongside clinical testing, has quickly revealed itself as invaluable for taking preventative public health measures and tracking trends in infection rates: not only does it detect infected yet asymptomatic cases, it also gives public health professionals up to a week of additional and crucial time to act to prevent the virus from spreading within a community (Figure 1). WS does not rely on health care access or voluntary clinical testing, therefore allowing communities to continue to accurately represent infection rates. Subsequently, it has also advanced wastewater as a source of information.

## PROGRAM IMPLEMENTATION

Prior to March 2020, utilities and public health departments were not in frequent communication with each other. To have a successful WS program, consulting engineers saw an opportunity to bridge the gap between these entities. Previous experience working with both utilities and public health departments individually and managing multidisciplinary efforts allowed the consulting engineers to develop a collaborative WS program. A successful WS program requires collaboration among wastewater utilities, epidemiologists, public health officials, community leaders, wastewater engineers, and other scientists.

The approach involves engaging with health agencies to establish an effective methodology and objectives including identifying appropriate and possibly vulnerable populations to monitor. Consulting engineers provide knowledge of wastewater collection systems and experienced field staff. This expertise allows the selection of ideal sampling sites and the consistent collection of representative samples. Once samples are collected, they undergo pretreatment and concentration in a laboratory. These steps are necessary to concentrate RNA—the building block of the SARS-CoV-2 virus—in the sample. Here, RNA is extracted from the sample and quantified using a quantitative polymerase chain reaction (qPCR) machine. Once data are received from the laboratory, the team of engineers analyzes and interprets the data, and then communicates data results and quickly provides valuable information to public health officials who can act. Successful program implementation has six components:

1. Collaboration with public health agencies
2. Establishment of approach and objectives
3. Application of technology to identify sampling locations in areas of interest
4. Consistent sampling
5. Appropriate sample analysis
6. Data management and interpretation

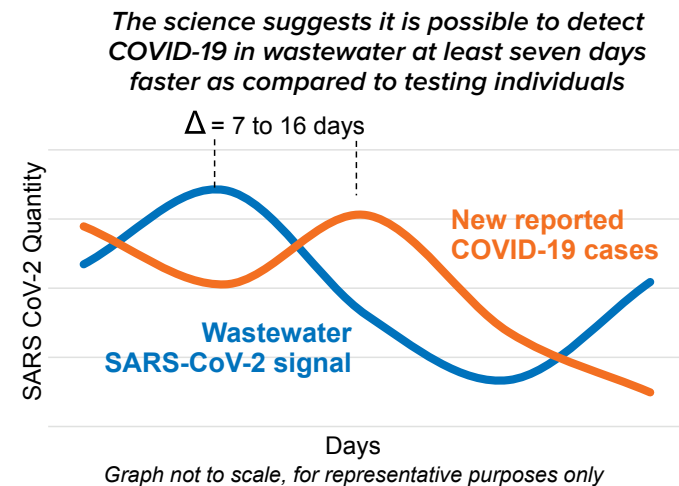


Figure 1. Research in 2020 showed detection of Covid-19 in wastewater signal days before clinical testing.<sup>5</sup>

When planning a WS program, sampling scale matters. Scale must be matched to the program's objectives. Implementing WS at different scales has various advantages and disadvantages. The benefits of sampling at a municipal or regional treatment plant include the provision of community-wide trends and the logistical ease of collecting samples from a plant. However, sampling a large service area yields non-location-specific data that do not allow for public health departments to act specifically other than messaging. The data may be too general to be useful, particularly in targeting specific vulnerable communities. Conversely, if samples are taken at a single building, the data only apply to that location and do not represent the larger community. In addition, the timing of collecting a sample from one building requires strict sampling protocols to capture the stool. With knowledge of collection systems, engineers pinpointed and refined the proper application of WS to maximize the utility of the data collected and match the sampling scale with a program's objectives. The program as discussed in this paper primarily sampled from a neighborhood scale. Smaller catchment areas typically containing multiple residences were analyzed during this program. This sampling program protected vulnerable populations and prompted specific public health actions as a result of the sampling.

## PROGRAM CONSIDERATIONS

### Sampling Siting

As the field teams conducted WS at various locations and for various programs, efforts were made to standardize field techniques and protocols for sampling and sampling site selection. When determining effective sampling locations, the amount of flow, feasibility of obtaining representative samples, and if the selected manhole could accommodate an auto-sampling device were all considered.



Figure 2. Kyah Lucky programming auto-sampler during sample collection trip

The wastewater's physical variability meant that each sampling site had different characteristics. At some locations, the concentration of sanitary flows might be affected by other flows such as rainfall or other infiltration, or even industrial wastewater mixing in. The time of day could also cause variability in wastewater characteristics. Time-of-day considerations led to the team using an auto-sampler that could collect a time-based composite sample.

This auto-sampler was programmed (Figure 2) to take a small volume of sample every 15 minutes over a 24-hour period.

All the small samples collected over the 24-hour period then became the composite sample. This minimized the effect of time variability in the flow and improved the ability to obtain a representative sample of the area's sanitary flows.

Besides the logistics of sampling locations, the sampling equipment itself can raise issues to consider. If an issue arose following installation at a given manhole, the field team would assess options for sample recovery. Sometimes the sampling methodology would be adjusted, and other times the auto-sampling device's parameters would be adjusted.

When establishing an approach and objective with public health agencies for program implementation, congregate care facilities were identified as a high priority, owing to the number of severe cases reported at these locations. With the goal of accurately monitoring the viral activity of a highly vulnerable population, WS was implemented by selecting a manhole on site that covered the entire facility, eliminating any potential cross-contamination from additional tie-ins to buildings outside the facility. The first sampling location had several issues, particularly with viscosity such that the laboratory's quality control was failing, and no data could be reported. For this situation, the team considered if there were low flows, sediments entrained in the samples, introduced industrial inputs, abnormal manhole flow dynamics, or viscous fluids causing the lab quality control to fail. By working with the facility, the team identified that the viscosity issues were likely due to the large amount of flushed adult care products and dietary additives such as thickening agents for liquids, coupled with the non-standard design and flow dynamics of the manhole. To resolve the issue, the team identified

a manhole further downstream that would still give a representative sample of the facility yet would potentially be free of quality control failure. Infrastructure mapping and dye testing confirmed that the new manhole was a viable alternative. Mapping confirmed that no additional tie-ins existed upstream of the new manhole. Non-hazardous neon dye was flushed from the facility, while the new location was observed to make sure the dye was visible in the line. The new location was ultimately deemed viable, and the sampling equipment was relocated.

**Sampling Method Troubleshooting**

At times the auto-sampler had issues and did not deliver a useable sample; in these cases, a grab sample—a sample taken at one point in time on a given day—was taken. When refining the sampling techniques, the team considered that taking grab samples would be easier and less costly due to the lack of equipment needed, if it could be used as the main sampling method. To confirm validity, the team explored if grab samples could provide comparable results to time-based composite samples.

A research program quantified the difference in SARS CoV-2 in grab versus composite samples when the final samples were removed at the same time from the same location. The samples were analyzed using quantitative reverse transcription PCR (RT-qPCR) on a qPCR machine. The results proved a drastic difference in values of SARS CoV-2 between grab and composite samples. As shown in Table 1, a significant difference was noted in several instances where composite samples detected values of SARS CoV-2, but the grab samples were reported as non-detect, or as below the limit of quantification (below LOQ).

Table 1. Grab versus composite sample results for Covid-19 tests using the PCR method

Date Collected	Grab (copies/L)	Composite (copies/L)
12/14/2020	Below LOQ	0.037
12/9/2020	Below LOQ	0.004
12/21/2020	Below LOQ	0.037
1/6/2021	Below LOQ	0.131
1/11/2021	Below LOQ	1.252
1/11/2021	Not Detected	0.496
1/13/2021	Not Detected	0.049

As shown by the representative R = 1 line displayed on the graph in Figure 3, virtually no correlation exists between the grab and composite samples.

These results show a drastic difference between grab and composite samples collected from the same

location on the same day. The composite samples better represent the value of SARS CoV-2 in a sewershed. When a composite sample is collected, it removes an aliquot of wastewater every 15 minutes over the 24-hour period, allowing for a higher chance of collecting the wastewater from an infected individual(s). Grab samples capture only a specific moment. When collecting a grab sample, a discharge point upstream of the sample location could discharge water to the sewer from activities such as running a sink, a dishwasher, or a washing machine. Such activities do not capture RNA from an infected individual. Therefore, grab samples are much less reliable for capturing the RNA of infected individuals in the sewershed. Overall, time-composite samples are the preferred method of sampling because they provide more representative samples.

**Timing of Analytical Results**

The research team of engineers also experimented with refining sample analysis techniques to reduce turnaround times for data analysis. Typically, the team would send samples to an external lab, which would then analyze them and provide results within three business days. However, during some busier times, such as around the holidays, shipments would be delayed, and the team would not receive results until seven days after the sample was collected. At that point, the early-detection benefits of WS were lost, especially for early detection capable of prompting rapid and specific public health actions.

To resolve this time lag, the team looked into conducting lab analysis in-house at a consulting engineering company. Duplicate samples were collected from several sampling locations—one set of samples was shipped to an external laboratory for analysis and one set was analyzed in-house using RT-qPCR. As of August 2022, many standardized methods now exist for analyzing SARS CoV-2 in raw wastewater using qPCR. However, when this in-house analysis was conducted, methods for analyzing SARS CoV-2 in raw wastewater were just being developed. The steps followed during the in-house analysis (Figure 4) were sample preparation, sample concentration, RNA extraction, and RNA measurement.<sup>6</sup>

In-house lab analysis showed that SARS CoV-2 results could be processed approximately eight hours from sample collection. This allowed public health departments to receive results up to three days earlier versus samples sent to an external lab. This quick turnaround could be crucial in protecting vulnerable communities. Some public health actions that could be prompted from WS data showing an increase in SARS CoV-2 values include resident notification, mask distribution, and mobile testing deployment. These actions were implemented as a

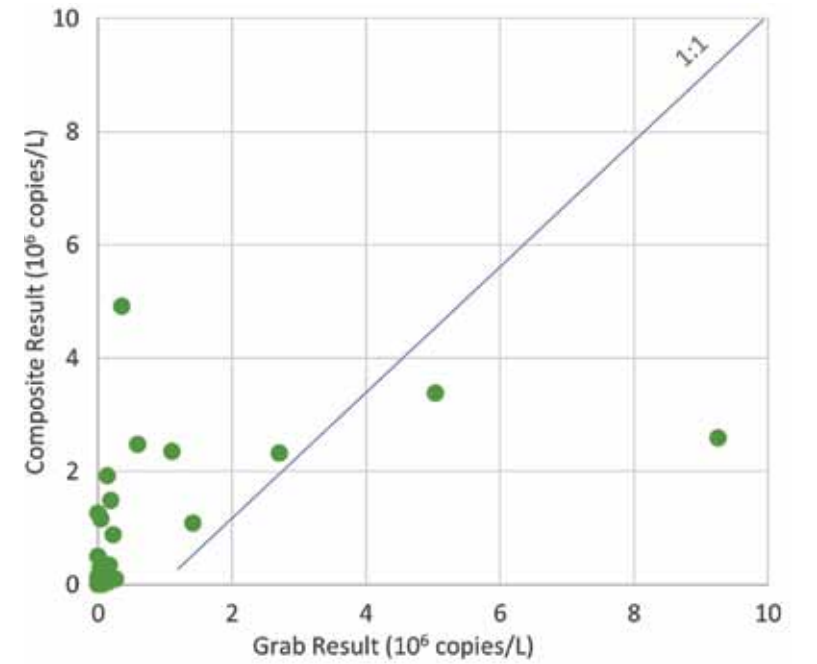


Figure 3. Results of grab versus time-composite samples taken during the same sampling period

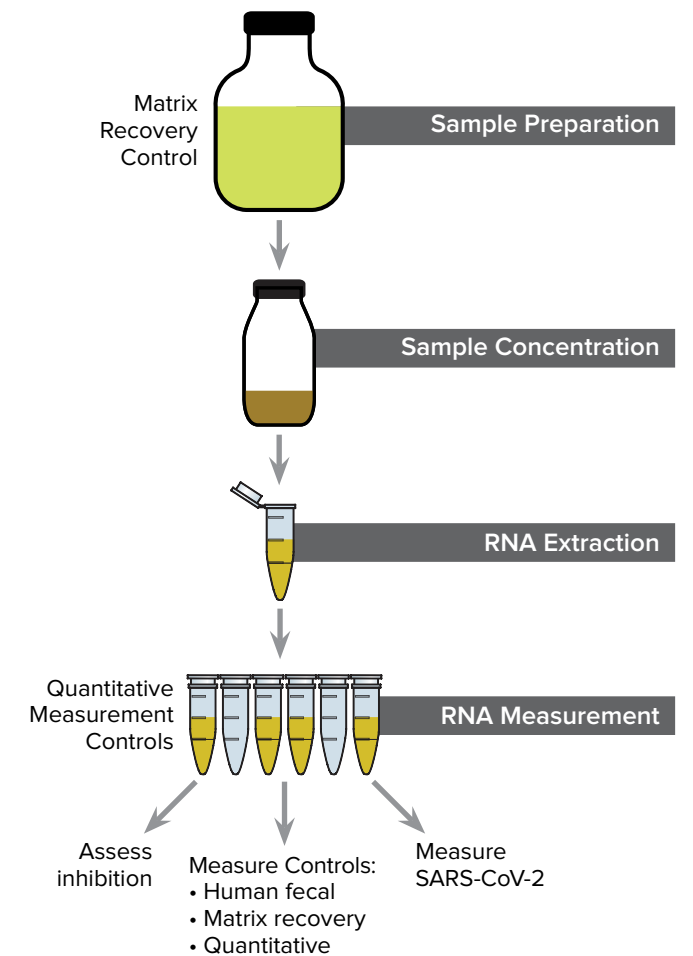


Figure 4. Sample analysis process when using a qPCR machine

direct result of data provided by this WS program. For logistical reasons, the in-house lab analysis was not ultimately used on an ongoing basis as the primary method of analysis. The reagents would expire too quickly, and in-house analysis was not as cost-effective. However, the program showed that more rapid turnaround times could be obtained if necessary.

**CONCLUSIONS**

WS is effective in measuring aggregated community-level biomarker data, including those associated with Covid-19. To implement a successful WS program, an ideal sample site must be selected to capture a select population. Troubleshooting sample collection in the field is often necessary, and rapid analysis of samples coupled with expedited analysis of the results is critical. In addition, research found a drastic difference in samples collected as grab samples versus composite samples. In-house lab analysis found that turnaround times of less than one day are possible.

This successful WS program, conducted and managed by a team of civil engineers, confirmed overall presence or absence of the disease in a community, in addition to leading to specific public health actions to help protect vulnerable communities. As reported cases have now diminished and home testing has ramped up, the potential for a lack of data and reporting has increased. However, wastewater testing allows for an anonymous measure of the presence of Covid-19 in a community. Future applications of WS programs not only include proactive tools to respond to disease outbreaks but also tools to understand community drug use and other indicators of community health and well-being.

**ACKNOWLEDGMENTS**

CDM Smith has been working on wastewater surveillance programs in the United States and internationally since March 2020 and continues to collaborate with public health agencies to use wastewater data to improve public health. The authors thank colleagues Karen Kelley, Jonathon Sheets, Scott Craig, Gregory Scott, our field team, and Anna Mehrotra (WS program director, Water Environment Federation).

**ABOUT THE AUTHORS**

• Kyah Lucky is an environmental engineer with experience on projects including wastewater and stormwater collection systems, drinking water treatment, emerging contaminants, and coastal resiliency. Her field work includes leading field teams and performing construction oversight, as well as planning and optimization for deployment of networks of sensors, inspection of conveyance systems, and wastewater sampling.

- Denise Prussen is an environmental engineer with experience in trenchless rehabilitation and inflow/infiltration investigation, water main design, water use demand projections, and coordination of field programs. She is a NEWEA member and has served as chair of the Environmental Water Resource Institute (EWRI) chapter of the Boston Society of Civil Engineers (BSCES).
- Anthony Russo is an environmental engineer with experience including stormwater and wastewater rehabilitation, monitoring wastewater treatment data, closed-circuit television inspections, inflow/infiltration investigations, and drain extensions. His field work consists of leading field teams in wastewater sampling, performing inspections/investigations on stormwater and wastewater structures, and surveying.

**REFERENCES**

1. Subedi, Bikram, and Burgard, Dan. (2019). Wastewater-Based Epidemiology as a Complementary Approach to the Conventional Survey-Based Approach for the Estimation of Community Consumption of Drugs. <https://pubs.acs.org/doi/pdf/10.1021/bk-2019-1319.ch001>. Accessed August 8, 2022.
2. Bishop N, Jones-Lepp T, Margetts M, Sykes J, Alvarez D, Keil DE. (2020, July 15). Wastewater-based epidemiology pilot study to examine drug use in the Western United States. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7361084/>. Accessed August 8, 2022.
3. Wu, F., Lee, W.L., Chen, H., Gu, X., Chandra, F., Armas, F., Xiao, A., Leifels, M., Rhode, S. F., Wuertz, S., Thompson, J., and Alm, E. J. (2022, May 3) Making Waves: Wastewater Surveillance of SARS-CoV-2 in an Endemic Future. *Journal of Water Research, Water Research*. <https://pubmed.ncbi.nlm.nih.gov/35605390/>. Accessed August 8, 2022.
4. UC Merced Researchers. Covid Poops19: Summary of Global SARS-CoV-2 Wastewater Monitoring Efforts. <https://ucmerced.maps.arcgis.com/apps/dashboards/c778145ea5bb4daeb58d31afee389082>. Accessed August 8, 2022.
5. Miyani, B., Fonoll, X., Norton, J., Mehrotra, A., and Xagorarakis, I. (2020, August 15). SARS-CoV-2 in Detroit Wastewater. <https://ascelibrary.org/doi/10.1061/%28ASCE%29EE.1943-7870.0001830.146>.
6. Centers for Disease Control and Prevention. (2022, January 26). Wastewater Surveillance Testing Methods. <https://www.cdc.gov/healthywater/surveillance/wastewater-surveillance/testing-methods.html>. Accessed August 8, 2022.

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# Restored resilience—replacement of coastal Cedar Point’s vulnerable sewer system in Scituate, Massachusetts

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**ABSTRACT** | The Cedar Point gravity sewer collection system in Scituate, Massachusetts, was constructed of vitrified clay (VC) pipe in the 1970s. Despite construction of several sewer system rehabilitation projects over the last decade, the coastal area remained a source of excessive infiltration and inflow (I/I). Consequently, Scituate initiated a project to design and construct a new, watertight gravity sewer system for Cedar Point. The new system was designed to meet NEIWPCC’s TR-16 design guidance manual requirements and included the installation of 30 monolithic fiberglass manholes with watertight frames and covers, 4,350 lf (1,326 m) of joint-wrapped 8 in./10 in. (20 cm/25 cm) PVC gravity sewer, and the replacement of 127 sewer laterals up to the building foundation with joint-wrapped 6 in. (15 cm) PVC pipe. The system was placed into service in May 2021. Since its installation, flow as measured by the nearest downstream flowmeter has been reduced by about 80 percent.

**KEYWORDS** | Gravity sewer, infiltration, inflow, pipeline replacement, watertight, coastal community

Scituate, Massachusetts, is a coastal community in Plymouth County approximately 20 mi (32 km) southeast of Boston. The town encompasses approximately 17.6 mi<sup>2</sup> (46 km<sup>2</sup>) of land and 14.2 mi<sup>2</sup> (37 km<sup>2</sup>) of water and has a population of 19,000. The town’s wastewater system is operated and maintained by the Scituate Department of Public Works and comprises one wastewater treatment facility, nine pump stations, and approximately 52 mi (83 km) of sewers. The Cedar Point peninsula contains almost 1 mi (1.6 km) of gravity sewer, is centrally located along the town’s coastline, and is home to the historic Old Scituate Lighthouse along with 127 residences.

## INTRODUCTION

The project site is on the Cedar Point peninsula in Scituate on Lighthouse Road, Rebecca Road, and Turner Road. The original gravity sewer collection system in this area was constructed in the early 1970s. As the system aged, it became increasingly vulnerable to infiltration due to the tidally influenced groundwater table and inflow from severe

coastal flooding issues during heavy storms. As a result of the excessive infiltration and inflow (I/I) from this area and other susceptible areas, the town’s sewer system was at capacity and could no longer allow new connections to be made.

Scituate conducted several sewer system rehabilitation projects on Cedar Point over the last decade to reduce the amount of I/I in the system and regain system capacity. These projects included closed circuit television (CCTV) pipe inspection, pipe lining, and replacement of selected sewer laterals. However, these efforts were not enough and thus plans were made to replace the original gravity sewer system. A low-pressure sewer system with individual grinder pumps and generators for each property was originally considered to minimize excavation and dewatering requirements and to provide a more watertight system. However, the neighborhood did not support this approach, as it preferred a deep gravity sewer system that mirrored the existing system and would not rely on individual pumps, electricity, backup power, or continual residential equipment maintenance to function. Consequently,



Figure 1. Cedar Point Peninsula in Scituate  
Figures 2 and 3.  
Flooding of Cedar Point Peninsula

the design and construction of a new, deep, watertight gravity sewer system for Cedar Point and its 127 existing dwellings was started.

## OBJECTIVES

The main objectives of the Cedar Point Gravity Sewer Replacement Project included the following:

- **Restore Capacity of Sewer System by Eliminating I/I.** Design and construct a new gravity sewer system with watertight appurtenances (pipes, manholes, laterals, etc.) to minimize the amount of I/I into the system, and enable Scituate to regain capacity in its sewer system, thereby allowing modest new development and connections
- **Satisfy Residents’ Desire for a Gravity System.** Design and construct a new gravity sewer system that mirrors the existing system, and eliminate originally proposed reliance on individual pumps, electricity, backup power, and consistent residential maintenance for the suggested system to function, in accordance with the desire of the Cedar Point residents
- **Meet TR-16 Design Requirements.** Design and construct a new gravity sewer system that adheres to NEIWPCC’s TR-16 *Guides for the Design of Wastewater Treatment Works* (TR-16) design requirements, including pipe sizing, pipe material, pipe depth, buoyancy resistance, reserve capacity, minimum slope, manhole spacing, and manhole size
- **Minimize Disruption to Abutters.** Plan the construction schedule such that disruption to abutters is minimized, and halt construction for the summer months/tourist season

- **Minimize Disruption to the Environment.** Plan construction to minimize impacts to the highly sensitive environmental resources abutting the project area, and incorporate environmental protection measures into the design of the project, including the requirement of 24-hour sewer bypass pumping
- **Minimize Construction/Betterment Costs.** Design and construct a cost-effective new gravity sewer system to minimize betterment costs paid by the Cedar Point residents, with partial funding obtained through a Community Development grant



Figure 4. Locus map of the Cedar Point Peninsula

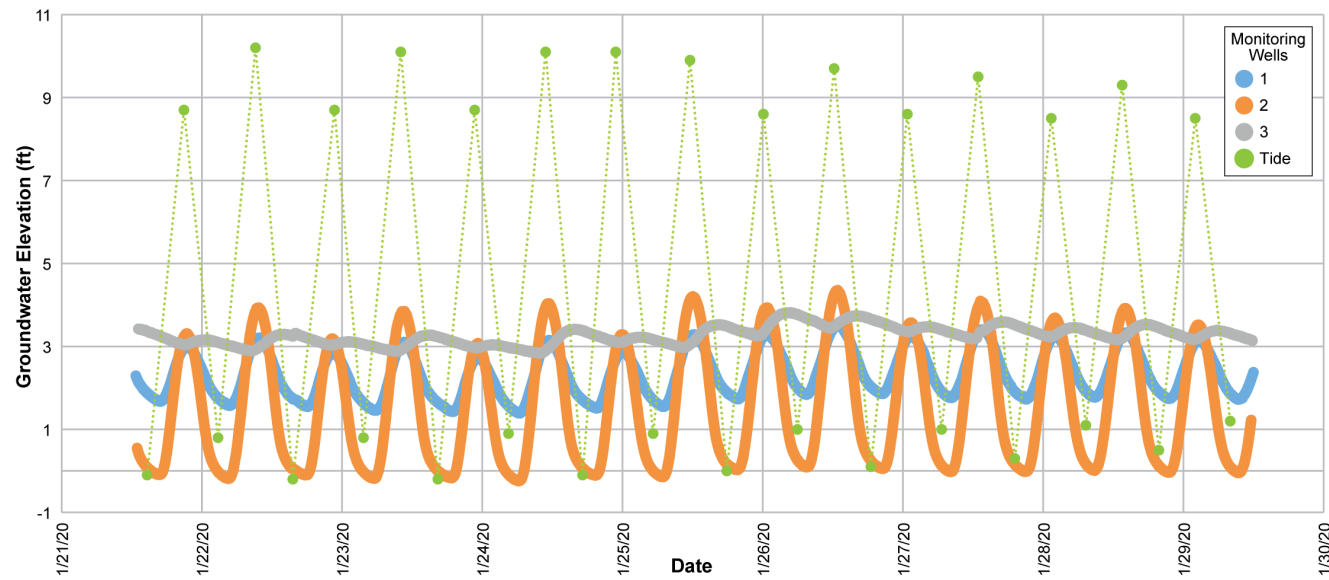


Figure 5. Groundwater monitoring data

**DESIGN APPROACH**

The new Cedar Point gravity sewer system removed and replaced approximately 4,350 linear ft (1,326 m) of gravity sewer, 30 sewer manholes, and 127 sewer service laterals with new, watertight pipes and structures. The following tasks were completed to prepare for this work.

**Record Review and Definition of Existing Conditions**

To accurately define existing conditions within the project area, record information and prior reports for Cedar Point were reviewed and analyzed. From this review, it was determined that Cedar Point’s original gravity sewer mains were constructed of vitrified clay (VC) pipe and ranged from 6 in. (15 cm) to 10 in. (25 cm) in diameter. Pipe cover depths ranged from 6 ft (1.8 m) at the upstream ends of Lighthouse Road and Rebecca Road to 17.5 ft (5.3 m) at the intersection of Turner Road and Lighthouse Road. Both Lighthouse Road and Rebecca Road had 8 in. (20 cm) gravity sewer mains that discharged into a common manhole in front of No. 30/No. 32 Lighthouse Road. Downstream of the connection manhole, the gravity

sewer main on Lighthouse Road increased in size to 10 in. (25 cm) to accommodate additional flows from Rebecca Road. Flows from six residences on Turner Road joined the Cedar Point gravity sewer system via a 6 in./8 in. (15 cm/20 cm) main that discharged into the sewer manhole in front of No. 10 Lighthouse Road. Flows from all three streets reached a discharge point at a sewer manhole in front of No. 169 Jericho Road.

Gravity sewer services on Cedar Point ranged in size from 4 in. (10 cm) to 6 in. (15 cm) and consisted of both gravity and chimney-type connections. Sewer service material was not consistent across the project area and included reinforced concrete, VC, cast iron, asbestos cement, and polyvinyl chloride (PVC) piping. Since the initial construction of the gravity sewer system in the 1970s, many sewer services had required repairs or modifications and, as a result, were constructed of various pipe materials. In addition, a previous attempt to partially line some of the laterals was of limited benefit, as the liner appeared not to be fully adhered or bonded to the wall of the original VC pipe.

**Geotechnical Investigation**

A geotechnical investigation characterized underlying soils, groundwater, rock, and rock profiles within the project area that would ultimately affect the design and cost. Six standard penetration test borings, including three monitoring wells, were advanced across the site in January 2020. Test borings on Cedar Point generally encountered a varying depth (5 to 8 in. [13 to 20 cm]) surficial layer of asphalt underlain by sand and silty sand with trace amounts of gravel. Bedrock was not encountered in any of the borings. Groundwater was monitored in the three installed monitoring wells for roughly eight days using piezometers. The

study concluded that groundwater levels within the project area are affected by tidal conditions and that the gravity sewer was predominantly below the fluctuating groundwater table. Therefore, significant dewatering was anticipated for the proposed project. A geotechnical memorandum was prepared based on the results of the subsurface exploration and was provided as part of the contract documents.

**Topographic Survey and Wetlands Flagging**

Following the geotechnical investigation, a topographic survey and wetlands flagging were conducted to construct accurate base plans of the site and quantify the project’s environmental impacts. The topographic survey concluded that in general the project area consisted of a relatively flat terrain with a range of elevations from 7.4 to 11.75 ft (2.25 to 3.58 m) on Lighthouse Road, and 9.4 to 10.39 ft (2.87 to 3.14 m) on Rebecca Road. Additionally, it showed that the narrow roadways along Cedar Point were congested with gas, electric, water, sewer, and stormwater infrastructure. Wetlands flagging of the site concluded that coastal banks, coastal beaches, and bordering vegetated wetlands would be within 100 ft (30.5 m) of the proposed work and that a Notice of Intent (NOI) would be required.

**Assessment of Design Alternatives and Preliminary Design**

With the primary goals of reducing I/I, meeting TR-16 design requirements, and minimizing construction costs, various gravity sewer alignments, pipe materials, and manhole materials for installation along Cedar Point were considered. Table 1 summarizes the alternatives assessed during the preliminary design phase (shading represents chosen preferred materials).

**Final Design Recommendation**

The final design for the Cedar Point gravity sewer system identified optimal alternatives for the proposed system and was presented in a Basis of Design memorandum. The memorandum outlined the following final design recommendations and features:

**Gravity Sewer Alignment.** Removing and replacing the original gravity sewer in its existing location was determined to be the preferred alternative to avoid utility conflicts with water, gas, and stormwater infrastructure. The narrow roads and density and proximity of the sewer, water, and gas utilities left virtually no lateral corridor for a new pipe. Proposed gravity sewer inverts varied slightly from existing inverts and provided adequate slope to meet TR-16 design requirements.

**Gravity Sewer Main Pipe Material.** SDR 35 PVC pipe was determined to be the preferred alternative

due to its long design life, watertight joints, compatibility with gasketed tee and wye saddles, and long history of use in gravity sewer systems. All SDR 35 PVC pipe was proposed to be installed with external joint wrap and impervious clay dams to further protect against infiltration.

**Gravity Sewer Design Flow and Pipe Sizing.**

Existing flow estimates were determined based on TR-16 average daily per capita flow rate (70 gpd [265 L/d]) and the average number of persons per household for Plymouth County (2.6). Existing flow estimates were used for designing the proposed sewer collection system, as no future buildout within the project area is expected. Existing and proposed sewer capacities were evaluated against peak hourly flows determined by TR-16 multipliers. An allowance for infiltration due to normal aging of piping systems was also applied to flow projections. For the entire sewer catchment, an I/I rate of 500 gpd/in. diameter/mi of sewer (462 L/d/cm diameter/km of sewer) was applied. It was determined that all existing sewer segments were appropriately sized to meet existing demands and had adequate reserve capacity. Hydraulic capacity calculations indicated that an 8 in. (20 cm) diameter gravity sewer sufficed for most of the service area, using TR-16 guidelines and including a modest allowance for infiltration.

**Gravity Sewer Manholes.** Fiberglass-reinforced plastic (fiberglass) manholes were determined to be the preferred alternative for application along Cedar Point due to their monolithic, watertight nature, H-20 loading rating, and ease of installation given the prefabricated options. These manholes were proposed to have watertight covers to prevent surface water inflow into the gravity sewer system. Owing to the light weight of the fiberglass manholes, their design included a concrete anchoring pad to prevent buoyancy. Manholes were proposed in locations that adhered to TR-16 recommendations for manhole spacing.

**Gravity Sewer Services.** Sewer services for Cedar Point’s 127 residences were proposed to be replaced in their current locations up to 3 ft (0.91 m) from the house exterior wall. Laterals were proposed to be constructed of SDR 35 PVC pipe. Chimneys were proposed to be constructed of C900 PVC pipe and 401-epoxy-coated ductile iron tees to ensure structural strength and stability of the service. To further protect against infiltration, all service joints were proposed to be installed with external joint wrap. It was critical that the laterals were replaced beyond the edge of the right of way, rather than leaving old lateral pipes in service with their suspected poor construction and leaky joints.

**Gravity Sewer Bypass System.** Because of the area’s environmental sensitivity, the new gravity sewer system’s installation on Cedar Point was

Alignment	Pipe Material	Manhole Material
Remove and replace existing gravity sewer	SDR35 PVC pipe	Fiberglass
	C900 PVC Pressure pipe	
	A-2000 PVC pipe	Precast concrete
	SaniTite HP pipe	
Install new gravity sewer and abandon existing gravity sewer in place	SDR35 PVC pipe	Fiberglass
	C900 PVC Pressure pipe	
	A-2000 PVC pipe	Precast concrete
	SaniTite HP pipe	



Figure 6. Dewatering system  
 Figures 7 and 8. Gravity sewer service replacement  
 Figure 9. Gravity sewer support of excavation  
 Figure 10. Gravity sewer manhole installation

proposed to have a full-time monitored sewer bypass system. Sewer laterals were not allowed to temporarily discharge into the trench while the gravity sewer was being replaced. Manhole-to-manhole temporary bypass main and service connection piping were proposed to isolate a portion of the gravity sewer main prior to its replacement. Temporary bypass systems were proposed to be decommissioned following installation and testing of the new gravity sewer main and completion of permanent sewer lateral connections.

**Permitting and Public Outreach**

Replacement of the Cedar Point gravity sewer required extensive permitting and public outreach prior to construction. An NOI was completed, and an Order of Conditions was received from the Scituate Conservation Commission. As part of the work, the contractor was required to obtain street opening and trench permits from the Department of Public Works as well as coverage under the NPDES Construction Remediation General Permit. Public outreach included coordination with the Cedar Point Homeowners Association prior to construction and presentations during Town Select Board meetings.

**CONSTRUCTION APPROACH**

Construction of the proposed gravity sewer system took place between September 2020 and May 2021. Construction halted for the summer and final restoration and pavement of the site was completed in the fall of 2021. To achieve all project objectives, the following general approach was taken during construction of the Cedar Point gravity sewer system:

1. Install all environmental protection measures required by the Order of Conditions, including filter sock and catch basin silt sacks, to prevent disruption to the surrounding sensitive environment
2. Replace all 127 sewer services between house foundations and the gravity sewer main, including joint wrap, cleanouts, temporary connections to the existing main, and surface restoration
3. Prior to mainline excavation, install a dewatering system along the gravity sewer segment to be replaced including deep wellpoints, PVC piping, frac tanks, pumps, and dewatering bags
4. Install a gravity sewer bypass system along the gravity sewer segment to be replaced including HDPE piping and pumps
5. Construct concrete manhole bases for fiberglass manholes to be installed along the active gravity sewer segment
6. Beginning at the downstream end and working upstream, install trench support, excavate, and remove the VC gravity sewer, wood shoring, and precast concrete manholes; install the new PVC gravity sewer with joint wrap and fiberglass manholes at depths and locations indicated on the drawings; connect the new PVC gravity sewer services to the mainline as work progresses; complete temporary surface restoration; and remove temporary bypass and dewatering systems as segments are finished and reinstall them along active segments
7. Test installed portions of the gravity sewer via low-pressure air testing, mandrel testing, and



Figure 11. Final surface restoration near lighthouse



Figure 12. Existing sewer service found with damaged liner and (inset) in broken condition

8. Hold weekly meetings with the contractor, the consultant, the Town, and the Cedar Point Homeowners Association to review project progress and address any abutter concerns, a key activity to establish and maintain open communication during construction
9. Complete final surface and pavement restoration (full-width, full-depth reclamation) in the fall to avoid disruption to abutters during the summer season

**CHALLENGES**

Installation of the new gravity sewer system on Cedar Point had various challenges that were overcome. Production was slowed due to the deep excavation, trench support, and existing utility support required for installation of the gravity sewer and manholes. Additionally, removal of the unexpected wood shoring system left in place from the original construction was a significant effort. Together with gravity sewer installation, the contractor had to maintain traffic and detours along one-way roads, maintain the sewer bypass system, and control groundwater levels with the dewatering system during tidal fluctuations. Because of these requirements, gravity sewer installation was limited to 20 to 35 ft (6 to 11 m) per day. Finally, the final design, bidding, and construction occurred during the Covid-19 pandemic, requiring much coordination and planning to overcome supply chain issues and to adhere to Massachusetts guidelines and procedures.

**RESULTS**

The design and construction of the new, deep gravity sewer system met the needs of the Cedar Point residents and achieved the project objectives. Gravity sewer mains, laterals, and manholes that were observed to be in poor condition during their removal were replaced with TR-16-compliant watertight pipes and structures. Scituate has since observed an approximate 80 percent reduction in flow as measured by the nearest downstream flowmeter (Figures 13 and 14—next page). Visibly less flow appears in the newly installed manholes, and there is a lesser direct reaction to tide cycles compared to existing conditions. Consequently, the downstream sewer pump station runs less frequently, and additional system capacity has been regained.

The project also minimized construction costs as well as disruption to abutters and the environment. Construction change orders did not exceed 3 percent of the bid cost. Disruption to abutters was minimized by performing construction throughout the winter and outside the summer months. Disruption to the surrounding sensitive environment was prevented by adhering to Conservation Commission requirements, installing environmental protection measures, and providing continuous sewer bypass during the project. Overall, the Cedar Point project in Scituate exemplifies a successful coastal sewer replacement project.

**CONCLUSIONS**

Originally installed in the 1970s, Cedar Point's gravity sewer collection system underwent several unsuccessful rehabilitation projects prior to being



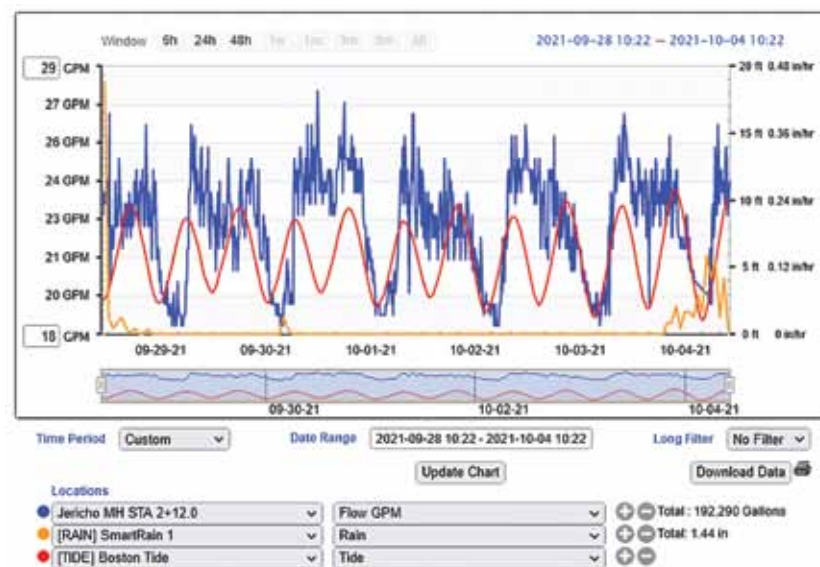
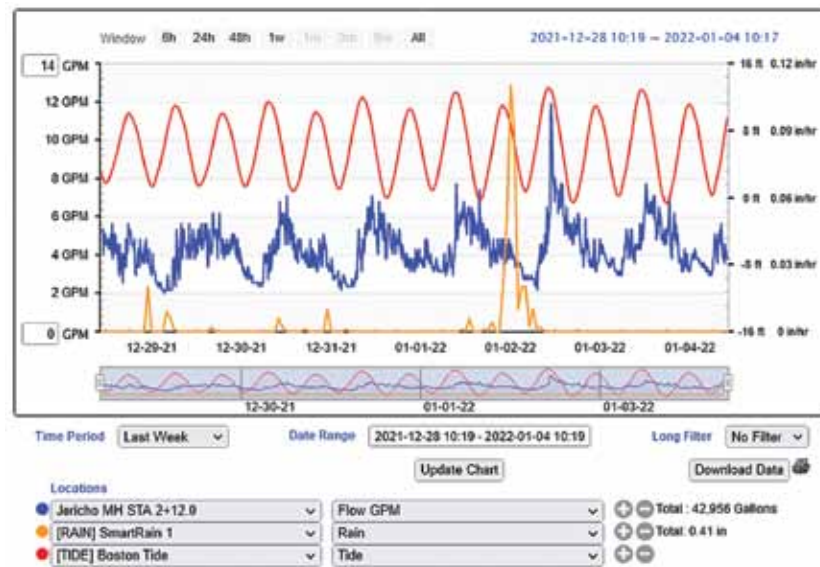


Figure 13. (top) Downstream flowmeter readings pre-construction  
Figure 14. Downstream flowmeter readings post-construction

fully replaced during 2020 and 2021. The new, watertight gravity sewer system was carefully and methodically designed and constructed to eliminate I/I and meet TR-16 design requirements. Considerations were also made to minimize construction costs as well as disruption to abutters and the environment. The system was placed into service in May 2021. Since its installation, an approximately 80 percent reduction in flow has been seen as measured by the nearest downstream flowmeter. The additional capacity that has been regained in the system because of the project will allow Scituate to continue economic and residential development and accept new service connections.

**REFERENCES**

Waller, J. (2018, March 2). 33 photos from the nor'easter that show the sheer power of Mother Nature. <https://www.boston.com/news/weather/2018/03/02/photos-boston-noreaster-storm-march-2-2018/>. Accessed August 16, 2022.

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# Big data and smart sewers—Is the technology ready? Is the industry ready? Are you ready?

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**ABSTRACT** | Read the latest blog post, sit in on a conference presentation, or talk to people active in wastewater collection systems. When you do, you will come across a discussion on smart sewers—a confluence of intelligent technologies designed to provide a higher level of insight on your wastewater collection system, tracking and optimizing performance with greater efficiency, reliability, and peace of mind.

Smart sewer technology is in early adoption. Researchers, entrepreneurs, innovators, and forward-thinking utilities are taking the latest technologies—sensing, cloud computing, machine learning, and the Internet-of-Things (IoT)—and using them to solve problems in wastewater collection systems. This article discusses these core technologies and their status today. No doubt these technologies will be transformational, but is the wastewater collection system industry ready to be transformed by them? We share insights on what we have learned, what problems we have faced, and the “adoption interface” where organizations and individuals wrestle with changes to long-held processes and procedures that smart sewer technologies imply for wastewater collection systems.

**KEYWORDS** | Smart sewer, blockage prediction, sewer overflows

Remote-controlled collection systems communicating one node to another; operating gates and valves, controlling the Water Resource Recovery Facility (WRRF) headworks, and regulating the inflow of stormwater from storage systems, all through a centralized neural network. Imagine how clean our waters would be if we could eliminate overflows with such technology, achieving the water quality goals of swimmable and fishable communities throughout the United States and around the world. While this may sound somewhat Sci-Fi, it is a world imagined by visionaries in our industry. Technology, innovation, science, engineering, policy and politics, and operation and maintenance (O&M) must all come together to achieve this vision of zero overflows. This technology is being developed and implemented by clean water utilities who are willing to push forward, through trial and error, through discovery and learning, to improve the way we operate and maintain wastewater collection systems. Real time, actively monitored and controlled collection systems are in their infancy, but the reality of “zero overflow” capability is clearly in view.

So how would such a network look? How would it work in real time, and how close are we, really, to this Sci-Fi thriller?

## FUTURE OF WASTEWATER COLLECTION

Figure 1 presents a high-level view of a smart sewer network with sensors, using Artificial Intelligence (AI) to control valves, wet weather storage systems, and a hosted control system. A dense sensor network sends real-time measurements to a central data management and decision-making system, which is an integrated component to the supervisory control and data acquisition (SCADA) system. Reliable communication is critical; the smart sewer network can, in real time, select the optimal communication network available including cellular, satellite, local area network (LAN), or wide area network (WAN) to send information back and forth.

This highly reliable communications network sends level data, flow data, and various other physical, chemical, and biological parameters to the SCADA system along with conditions at wet weather storage systems. Continuous, real-time weather forecasts are also received by SCADA. The system

has integrated modeling capabilities that allow operators to view simulated wet weather forecast scenarios and prepare to manage the collection system. Operators monitor the system, but decisions are made using sensor data, weather forecasts, real-time model simulations, and an AI decision process to prevent overflows. To achieve this, remote-controlled valves are regulated to hold and release flow as system capacity is available.

While extreme events in sewer systems may require occasional maintenance, the sensors in a smart sewer will require much less maintenance than a traditional sewer, and the work is also easier and safer.

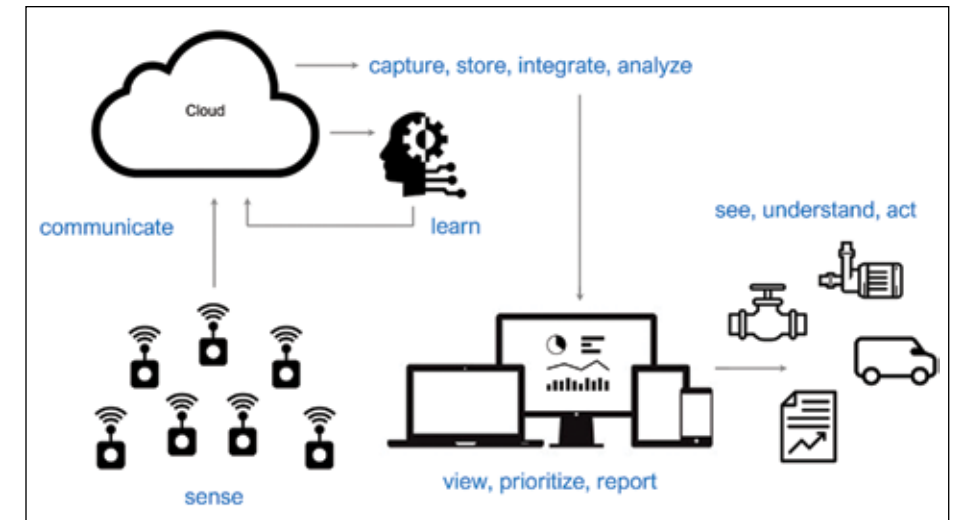


Figure 1. Various technologies that make up a smart sewer

## FROM CONCEPT TO APPLICATION

While we are not yet at zero overflows, smart sewer technology has evolved from concept to early adoption. Our first steps into smart sewers have focused on reducing or eliminating overflows caused by debris buildup in the collection system by identifying developing blockages and allowing them to be resolved well before they can cause serious problems. While not fully developed to include remote control gates, weather forecasts, and feedback loops, this system indicates what the future holds.

Blockages are predicted in a smart sewer setting using a level monitor installed upstream from a location of interest and measuring sewer flow depth at regular time intervals. These data are transmitted periodically to the cloud where a machine learning (ML) algorithm evaluates the data for signs of developing blockages. The results are available on a website application (app) in an intuitive, easy-to-use format.

The blockage status of each location is conveyed by one of three simple icons:

1. A blockage is not detected based on the ML algorithm. There is no urgency, and no action is needed.
2. A blockage is probable based on the ML algorithm and is in its earliest stage of development before the sewer has surcharged. The urgency level is proactive, and you may have between a few days and a week or more to intervene and prevent a sanitary sewer overflow (SSO).
3. A blockage is probable based on the ML algorithm and is in a more advanced stage of development after the sewer has surcharged. The urgency level is reactive, and you may have a few days or less to intervene and prevent an SSO.

The case study below shows an example of this blockage prediction technology at work. The hydrograph in Figure 2 shows flow depth data measured in a 15 in. (38 cm) diameter sewer. A developing blockage

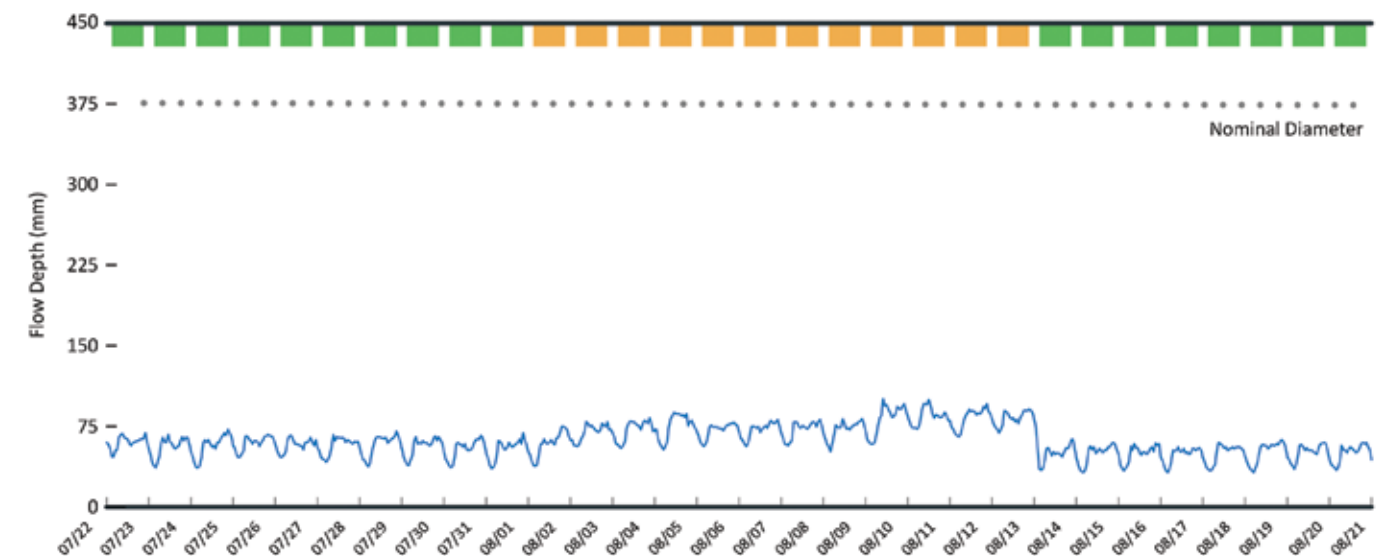


Figure 2. Developing blockage in a sewer identified with smart sewer technologies



**Figure 3. Smart sewer technologies identify developing blockages before a problem arises**

was identified by the ML algorithm and followed over a 12-day period, when a field crew was then sent to investigate. What was the problem? A stick was lodged at the outgoing sewer in a downstream manhole and was collecting debris, as shown in Figure 3. After removing the stick and debris, flow conditions returned to normal. The blockage detection and resolution all happened before the sewer ever surcharged and before an SSO could occur. This incident was remarkable in that it was unremarkable—an SSO was averted by detecting and resolving a developing blockage well before most even knew a problem existed. This is just one example of the power of smart sewer technologies at work.

**IMPROVEMENT THROUGH INSIGHT**

While developing our first smart sewer application, we learned key insights that are useful to those developing other smart sewer apps or those looking to implement them. When first researching various approaches to blockage detection, we soon recognized that flow depth was an important indicator. However, we also recognized that flow depth alone would not provide a sufficient answer. How the flow depth changed over time was important. We also noted that, while an experienced person can correctly identify if a blockage is present or not by looking at a hydrograph of flow depth data, other sources of information, such as weather, were implicitly used to arrive at a conclusion. Recognizing what information is used and how it is processed guides the ML process for smart sewer apps. We also learned that ML requires a vast amount of data to thrive. Having extensive access to sewer flow monitoring data allowed our team to leverage these data

to label historical data as “blockage” or “no blockage” as they trained and evolved our ML algorithm. We were fortunate to have this extensive database, but it certainly took more data than we first imagined to start up our smart sewer app.

Perhaps the most important takeaway we learned is that smart sewer apps *must* change the way organizations operate, and this change is often transformational. However, this change can be hard, especially when established processes and procedures are involved. It may seem counterintuitive, but initial discomfort with smart sewer apps is often a subtle sign you are headed in the right direction. Nevertheless, successful smart sewer apps should be designed with this initial discomfort in mind. One thing we observed with blockage prediction was an initial reluctance to suspend regularly scheduled cleaning in favor of data-driven cleaning. While there are significant economic benefits to reducing cleaning frequency, blockage prediction represents a paradigm shift that disrupts established preventive cleaning procedures. That change alone is enough to cause concern. Also, the suspension of scheduled cleaning often causes an initial anxiety viscerally—fear of change and fear that smart sewer technology may not work. In our case, we eased the anxiety by incorporating data visualization to build confidence and familiarity in the ML algorithm while coupling it with more traditional high-depth alarms.

**NEXT STEPS**

With the promise we have seen, the technology that is here today, and the vision we see on the horizon, what has to happen before wide-scale implementation of smart sewer technologies occurs? How much of this is today’s reality? How far are we from “zero overflow”? Although the technology is possible and the need exists for implementation of data-driven, automated O&M of collections systems, what are the impediments to rapid adoption? What must happen to make this vision a reality?

**COST**

Municipal budgets are already stretched, and state funding will continue to be limited. The federal infrastructure spending bill will help, but more action is needed to improve affordability. We have seen supply chain issues dramatically increase component costs. To drive costs down, monitoring devices must be simplified and be easily replaceable, but be connected to a hardened, robust communication and data network. This low-cost, accurate sensor must be robust enough to withstand the harsh sewer environment. It must work in partially full and surcharged conditions. Many manufacturers have inexpensive pressure sensors, and others have relatively inexpensive radar



or ultrasonic sensors, but very few combine technologies that will work in varied sewer conditions. AI is one potential solution to this cost challenge, as it could take control when sensing extreme sewer conditions that would not support inexpensive sensors. If AI can fill this gap, it could enable the use of lower cost equipment that relies on hosted AI to fill data gaps.

**UNINTERRUPTED SENSOR COMMUNICATION**

Most commercially available sewer level and flow monitoring equipment uses the cellular communication network. While cellular service has vastly improved over the past 10 years, areas still exist where the network strength is weak and cellular service can be interrupted, especially during severe weather. A few commercial vendors use satellite technology for sewer level and flow monitoring, and this technology provides uninterrupted service as long as line of sight is maintained. Radio frequency (RF) is also widely used and, while more expensive to install, results in fewer service interruptions when equipped with an uninterrupted power supply. LAN, WAN, long range radio (LoRa), and other such versions are also available but can be expensive to install and must be maintained by the host provider, often either a contracted entity or specialized municipal staff. There will be a trade-off between cost and control of the network, which is why most commercial providers use the lower-cost cellular network. Owing to the widespread use of cellular communication and the increasing dependency on cellular technology by numerous utilities, financial institutions, government agencies, and other entities, further hardening of the cellular network is anticipated. The cost trade-off between cellular and another owned-and-operated communication network must be evaluated case by case.

**MAINTENANCE-FREE SENSORS**



There has long been a desire for “maintenance-free” sensors in sewer systems based on the safety risks, cost, and downtime associated with installed sensor maintenance. Sensors installed “in the flow”—so-called “wetted” sensors—are more likely to require routine maintenance. Non-contact sensors, whether installed at the crown of the sewer or in the manhole, are less subject to fouling and therefore can have a reduced maintenance requirement compared to wetted sensors. However, even these non-contact sensors require maintenance, especially after a surcharge. Even if the location never surcharges, some maintenance will likely be required

to clean the sensor and maximize functionality and useful life. Reliable, accurate, non-contact sensors are the closest we have to a reduced maintenance sensor. If the technology can evolve to where a sensor can be installed from the street level, is wetted to achieve maximum accuracy, can be easily retrieved without personnel entry, does not catch debris, never fouls, and requires little to no maintenance, we will have reached the next level in the drive to a maintenance-free sensor. While it sounds ambitious to develop this type of sensor, the technology may be closer than many people think.

**LOW POWER, SUSTAINABLE POWER SOURCE**

Alternating current (AC) power is rarely available in sewer systems, except at pump stations and at the WRRF. Typically, in-manhole sensors, data loggers, and communication devices use direct current (DC) battery power and are designed for low power consumption. This requires a relatively long battery life depending on the technology and what it is asked to do. Devices can run anywhere from three months to five years on a single battery; however, once frequent communication to a web host is needed, battery life tends to be about one year or less. In cases where even this is too much of a maintenance issue, a sustainable power source will be necessary. Solar power can be used in many cases and is technologically a viable option, but the solar panels face vandalism and other physical damage in both populated urban areas and remote regions near an urban area. Solar power is frequently used to power rain gauges as they are on rooftops and less subject to traffic or vandalism. Rechargeable batteries are not viable if they cannot be recharged in situ with solar power or some other renewable energy source. As the technology develops to use alternative renewable energy in a form less subject to physical damage, we will get closer to achieving the low power, maintenance-free power source.



**AI THAT HAS LEARNED THE MYRIAD OF CONDITIONS AND RESPONSES**

AI is a wonderful tool that, when deployed correctly, can help operators make better decisions; in some cases it can make decisions on its own to redirect, hold back, or increase flows. However, AI requires a learning process that is best developed using historical data, learned experiences, and fine-tuning the AI as it encounters different scenarios. An available data set is a treasure trove to data scientists and engineers to learn the patterns and signatures of the myriad of depth and velocity combinations

in the collection system. Data scientists have used our enormous database to learn patterns to alert operators of blockages as they are forming and long before they cause a backup or overflow. The AI must learn each pattern, and to do that, human review and confirmation is first necessary. Engineers, along with data scientists, have reviewed many thousands of flow, level, and other patterns and confirmed whether the pattern represents a blockage. As the AI learns, it steadily improves at predicting a real pending blockage rather than a false positive or false negative. Only by constant feedback and correction is the AI refined enough to be viable for alert notifications. So yes, AI is possible, and it is powerful, but it requires a large enough database from which to learn and expert human partners to guide the learning.

**PEOPLE**

Perhaps the most challenging impediment to the adoption of smart sewers is people. The phrase “old habits die hard” is true and the development of “new habits,” despite risk and uncertainty, will be necessary to advance the use of smart sewer technology.

Adoption of new technology in any industry or walk of life is always driven by the early adopters, those who are the innovators and can steer behavior despite uncertainty. These early adopters will be critical to persuading others to more quickly “cross the chasm” from old behaviors, including schedule-driven cleaning, reactive maintenance, “best judgement” on wet weather management, and other non-data-driven decision-making. As we increase our reliance on automation, data-driven decisions, and AI, we will move toward a world of zero overflows and clean waters, a Sci-Fi dream that will become tomorrow’s reality.

**ABOUT THE AUTHORS**

- Mike Bonomo is the director of strategic sales for ADS Environmental Services and has over 40 years of water project-related experience. Mr. Bonomo is a NEWEA past president.
- Kevin Enfinger, PE, is a senior region engineer for ADS Environmental Services and co-author of the ADS scattergraph poster. He has published many papers and articles on the use of flow and rain data for wet weather analysis and “Sewer Sociology.”

**2023 NEWEA Annual Conference EXHIBIT REGISTRATION is now open**

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# NEBRA Highlights

## Preview of the Joint Residuals Conference with NEWEA

There should still be time for you to register (if you act quickly) for the 2022 Northeast Residuals & Biosolids Conference being held at The Venue

at Portwalk Place in downtown Portsmouth, New Hampshire, on November 1 and 2.

The joint NEBRA/NEWEA program has something

for everyone and anyone working in biosolids and residuals management. The conference planning committee comprises volunteers from NEBRA and NEWEA's Residuals Management Committee. The 2022 conference has much in store for attendees, including a tour of the Dover New Hampshire, water resource recovery facility (WRRF) showcasing a new solids handling technology, a panel discussion about master planning, a "Shark Tank"-type event for checking out innovative processes, and of course an entire session devoted to per- and polyfluoroalkyl substances (PFAS) and related solids management issues. There will also be a celebration of NEBRA's 25th anniversary, with many NEBRA alumni in attendance. For more information and to register, go to [newea.org](http://newea.org).

## NACWA Issues White Paper on Critical Need to Maintain Biosolids Options

In direct response to the pending implementation of legislation in Maine that prohibits the land application of biosolids and other residuals, the National Association of Clean Water Agencies (NACWA) released a white paper on the critical need to maintain all biosolids management options at this time.

According to NACWA's press release:<sup>1</sup>

"Responding to premature policy decisions such as the Maine legislature's complete ban on sustainable land application practices, the paper makes the case that taking any single biosolids management option off the table absent scientific rigor and honest, comprehensive policy assessments will cause serious harm to local communities and could inadvertently cripple the ability of utilities to protect public health and the environment."

The white paper is intended for NACWA members, to assist them in communicating with legislators, regulators, media, and the public about this critical issue. NACWA members can access additional resources at the NACWA website.<sup>2</sup>

In an interview with the publication *Inside EPA* published on July 11, NACWA's Deputy CEO Chris Hornback called for a "collective pause" to address the broader policy and societal impacts of PFAS legislation and regulations.

NEBRA has been working through its Regulatory-Legislative (Reg-Leg) Committee to create and compile outreach materials for its members to communicate about PFAS with the public, customers, and elected officials (Figure 1). Members can obtain these materials at the NEBRA website.<sup>3</sup>

## EPA Biosolids-Related Updates Staffing Changes

Liz Resek, credited by many with reinvigorating the EPA's Biosolids Program, retired effective May 31. Ms. Resek has served as the biosolids lead for EPA since 2017 after a long career in numerous other leadership roles at EPA headquarters. In her five years at the helm, Ms. Resek increased funding and employees for EPA's Biosolids Program, facilitated major new grants to research unregulated contaminants in biosolids (more than \$6 million), and re-established regular meetings with state co-regulators, biosolids associations, and other stakeholders. She also addressed negative press and repercussions from the EPA Office of Inspector General's review of EPA's biosolids regulatory program.

EPA's Biosolids Program will now be led by David Tobias, who has been leading EPA's PFAS in biosolids risk assessment, taking over for Ms. Resek as the acting team lead. Owing to the foresight and persuasive groundwork of Ms. Resek, EPA's Biosolids Program's resources have nearly doubled through August. Besides Mr. Tobias, the re-energized EPA biosolids team

now includes Tess Richman, who had been working in the Biosolids Program through a fellowship program with Oak Ridge Institute for Science and Education (ORISE), hired on August 1 as a biologist; Dr. Lisa Weber, hired on August 15 as a physical scientist; Elisa Davey, hired as an ORISE fellow on the team effective August 29; and Lauren Questrell, another ORISE fellow and a current EPA staff member.

## EPA Publishes a Centralized Database for Thermal Destruction Technologies

EPA has published the PFAS Thermal Treatment Database to centralize information about the effectiveness of PFAS thermal destruction technologies.<sup>4</sup> The database includes over 70 reference publications covering 58 PFAS chemicals. The database shares information about the following technologies: calcination, pyrolysis, gasification, granular activated carbon reactivation, hydrothermal processing, incineration, indirect thermal desorption, and smoldering.

## EPA Publishes Curated List of Pollutants in Biosolids

EPA staff teamed up on an article, "Curation of a List of Chemicals in Biosolids from EPA National Sewage Sludge Surveys & Biennial Review Reports," published in *Nature* on April 19, 2022.<sup>5</sup> The lead author, Ms. Richman, formerly with ORISE, has worked in EPA's Biosolids Program for a while now. She was joined by Elyssa Arnold, formerly with the EPA Office of Water and now with the U.S. Department of Agriculture's Office of Pest Management, and Antony J. Williams from EPA's Office of Research & Development in Triangle Park, North Carolina.

The article documents a major effort by EPA to curate—or scrutinize and compile—all the data on all the pollutants identified in biosolids from the eight biannual reviews and three national sewage sludge surveys. The list of 726 chemicals is up from the 484 that came from the three National Sewage Sludge Surveys (NSSS) in 1988, 2001 (focused on dioxins), and 2006 (targeting certain contaminants of emerging concern). In the article, the authors cite early inconsistent reporting and failure to cumulatively

track pollutants as the reason the number has increased significantly. To find the new, complete listing of pollutants found in biosolids, go to EPA's CompTox Chemicals Dashboard.<sup>6</sup> This new list will be used by EPA in its upcoming risk assessment process, getting underway this fall with a review of the proposed methodology by the EPA Science Advisory Board.

## NEBRA and NEIWPCC Collaborate to Complete Second National Biosolids Survey

Management professionals, engineering consultants, researchers, policymakers, regulators, and technology vendors need reliable data to assess stressors on the region's sludge market and inform future discussions and collaboration. To provide states with more accurate biosolids management information to make sound policy decisions, NEBRA, together with North West Biosolids, Mid-Atlantic Biosolids, the California Association of Sanitation Agencies, and *BioCycle* magazine, developed the Second National Biosolids Survey (the first was published in 2007). Simultaneously, NEIWPCC identified the need to collaborate regionally on wastewater residuals, so NEBRA and NEIWPCC joined forces: NEBRA administered the survey across the country and NEIWPCC in New England and New York.

State biosolids coordinators and wastewater treatment facilities completed extensive surveys for each state. Data from 2018 was requested for a baseline—before the PFAS stressors exerted themselves on the wastewater management industry. Because 2018 sludge data had already been collected under a Massachusetts Clean Energy Center project, NEIWPCC asked for 2019 data from Massachusetts facilities. NEIWPCC also requested 2019 data from Maine facilities to develop a couple of state case studies, evaluating the impacts of New England PFAS regulations and aging infrastructure on sludge use and disposal.

NEBRA has prepared state summaries for the national data project website. Figure 2 shows the relative amount of biosolids each New England state must manage. Figure 3 summarizes the end uses for Massachusetts,

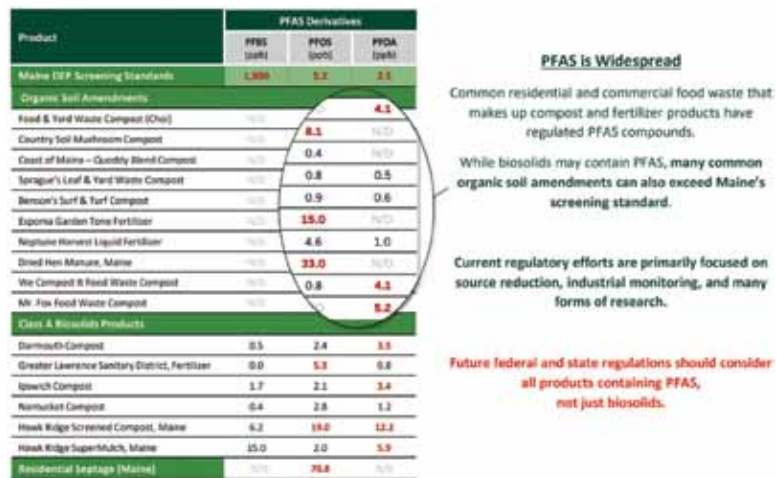


Figure 1. PFAS levels in common soil amendments

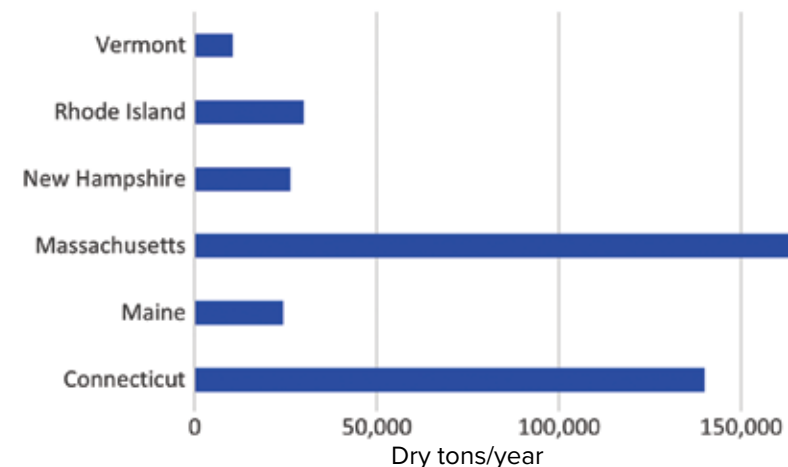


Figure 2. Biosolids generated by New England states 2018 (source: biosolidsdata.org)

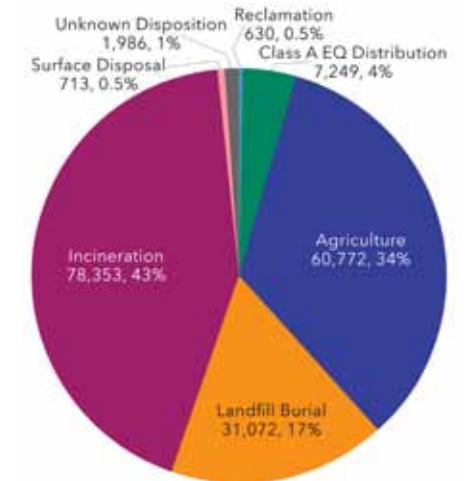


Figure 3. Massachusetts biosolids use and disposal 2018—dry tons—total 180,800

which had the most even split among incinerated, landfilled, and beneficially reused material in our region. Check out the national and state summaries<sup>7</sup> and let us know what you think. Thank you to the many sponsors of this project, recognized on the NBDP Partners—National Biosolids Data Project website.<sup>8</sup>

### THE YEAR OF POO Public Engagement—Scaled Up

By Maile Lono-Batura, Water Environment Federation

During the 2019 WEF Biosolids National Convening, biosolids leaders converged to identify key challenges and concrete actions that the sector could take to ensure biosolids programs remain sustainable. A thread that was clear throughout the convening was the need to level our approach to biosolids beyond the status quo as it relates to program management, communication, and research.

Since this convening, WEF has made strides in the action plan that include the following:

- Releasing the Biosolids Communication Toolkit
- Hiring a new director of Sustainable Biosolids Program and part-time biosolids coordinator
- Advocating for increased leadership in EPA's Biosolids Program
- Continuing to advance the Leaders Innovation Forum for Technology program
- Revamping the National Biosolids Partnership to improve accessibility and explore product certification

To prepare for the new biosolids director role in 2021, I canvassed the biosolids community to learn what our sector is getting right, what is not working, and how we can course correct or reinvent ourselves where we are missing the mark. I heard the following:

- **Be Proactive.** Lead our story—we know it best. Be a representative voice for biosolids rather than letting others tell our story.
- **Remain Poised.** Biosolids offer a remedy to global challenges including soil conservation, food security, renewable energy, and climate change.

- **Make it Personal.** Humanize the conversation and engage people beyond our echo chamber to share ownership of this valuable resource we all create.

This was the inspiration for launching a grassroots campaign that pulled in key actions from the convening as well to do the following:

- Build broader partnerships
- Enhance benefits of biosolids communications
- Establish a biosolids champion

Enter 2022 Year of Poo, a social engagement campaign inspired by the need to reconnect to the critical role we all play in creating a circular resource society. This approachable platform will invite users to learn how everyday conveniences and choices can affect their poo-print. The campaign takes on many poo-related topics with



interactive features including Fun Fecal Facts and Friday Flushes featuring Movement Makers who have made poo a part of their re-poo-toire.

The objective is to lift the lid on talking about the fascinating side of poo to begin a larger conversation to transform the way we connect to our food, our flush, and our role as contributors in creating a quality product. A key driver for this type of platform is to focus on connecting with, versus communicating to, moving from outreach to engagement and connecting to producers further up the pipe at the flush. Flushing is a universal act that bonds us all, and 2022 Year of Poo aims to move beyond public acceptance to public ownership. Please visit [2022yearofpoo.org](http://2022yearofpoo.org) and follow us on social media to meet our featured Movement Makers and gather digestible chunks of pipeline wisdom.

### NEBRA Committee Meeting Schedule

- Carbon & Nutrient Trading: 4th Tuesday of the month at 1 PM
  - Reg-Leg: 3rd Tuesday of the month at 2 PM
  - Research: 4th Wednesday of the month at Noon
  - Residuals: 3rd Tuesday of the month at 10 AM
- Go to [nebiosolids.org/events](http://nebiosolids.org/events) for the latest events.

1. [https://www.nacwa.org/advocacy-analysis/advocacy-alerts/advocacy-alerts-details/2022/06/29/nacwa-releases-white-paper-on-critical-need-to-maintain-biosolids-management-options?utm\\_source=RealMagnet&utm\\_medium=email&utm\\_campaign=183177400](https://www.nacwa.org/advocacy-analysis/advocacy-alerts/advocacy-alerts-details/2022/06/29/nacwa-releases-white-paper-on-critical-need-to-maintain-biosolids-management-options?utm_source=RealMagnet&utm_medium=email&utm_campaign=183177400)
2. <https://www.nacwa.org/advocacy-analysis/campaigns/pfas>
3. <https://www.nebiosolids.org/reglegcommitteework>
4. <https://www.ordspub.epa.gov/ords/pfast/f?p=pfas-thermal-treatment-about-the-database>
5. <https://www.nature.com/articles/s41597-022-01267-9#citeas>
6. <https://www.comptox.epa.gov/dashboard/chemical-lists/BIOSOLIDIS>
7. [www.biosolidsdata.org](https://www.biosolidsdata.org)
8. <https://www.biosolidsdata.org/partners>

Janine Burke-Wells, Executive Director  
603-323-7654 / [info@nebiosolids.org](mailto:info@nebiosolids.org)

For additional news or to subscribe to NEBRAMail, NEBRA's email newsletter, visit [nebiosolids.org](http://nebiosolids.org)



AS WATER PROFESSIONALS, WE CAN CREATE A BETTER PATH—a path that leads to public appreciation for the value of water, investment in our essential water infrastructure, and a better quality of life for our states and communities. WEF's Water Advocates Program is a simple and effective way for you to become more involved with engaging elected officials, the public, and other interested stakeholders on important water issues. The Water Advocates Program provides training and engagement to promote grassroots advocacy before elected officials, the public, and other stakeholders with the goal of creating a network of trained water advocates not only in every member association, but also in every state and U.S. territory.

NEWEA members are the experts when it comes to water issues. We need to speak up and share our knowledge with those who are making decisions on funding and regulations. Aging infrastructure, new and updated regulations, resiliency, and economic pressures are placing unprecedented stress on local governments and agencies that provide essential water services. With reduced revenues, elected officials must make tough choices that will affect water quality and the viability of our communities for generations.

To help explain WEF's Water Advocates program, we sat down with Peter Garvey from the Government Affairs Committee to understand the program. Mr. Garvey is one of NEWEA's delegates to WEF and has been active on WEF's Federal Advocacy work group promoting the Water Advocates program.

#### Journal: What is the Water Advocates program all about?

Peter: WEF's Water Advocates program empowers all of us to share our knowledge and expertise to inform government decision-makers about the importance of water. It is founded on an online platform developed by WEF, which allows advocates to easily reach out to legislators regarding key/current topics in our industry.

#### ■ How does someone become an advocate?

Peter: WEF has made the signup process easy. Access this link: [wef.org/advocacy/water-advocates/](http://wef.org/advocacy/water-advocates/). Once you are there, click on the *Become A Water Advocate* button; it will create an email from you to Amy Kathman at WEF, asking that you be added to the list of water advocates. If for some reason it doesn't work, simply send an email to [akathman@WEF.org](mailto:akathman@WEF.org) asking her to sign you up for the program.

#### ■ What happens then?

Peter: After that, it's up to you. As you will see on the website, there are generally at least two current Calls to Action. Currently, the calls focus on the PFAS Action Act, the Wastewater Infrastructure Pollution Prevention and Environmental Safety (WIPPES) Act, and infrastructure funding. For each of these, the website makes it easy to take a pre-written letter, select your local legislator, and send the letter. The Calls to Action will change over time, so be sure to check back regularly.

#### ■ That sounds really efficient and targeted for those of us who want to advocate for our industry. Is this a big-time commitment?

Peter: It's actually a pretty minimal time commitment. It takes a minute to sign up, and then roughly five minutes to send out one of the pre-written letters. There are no other commitments. Occasionally WEF will send an email with a new topic/Call to Action, asking for water advocates to go to the site and get send one of the letters to their legislators. That's it in terms of commitment.

#### ■ Can you share any success stories that have come from the program?

Peter: Absolutely! The recent Infrastructure Investment and Jobs Act (IIJA) received significant support from the Water Advocates program. Key to remember though, while the IIJA has authorized funds for water, these funds must be allocated each year by Congress—so we need to stay on top of this to make sure they do that.



Please visit the Water Advocates website at <http://bit.ly/wef-water-advocates> and let your voice be heard, or email Amy Kathman at WEF to join the Water Advocates program: [akathman@wef.org](mailto:akathman@wef.org)

Include your name, title, organization, address, e-mail, and telephone number. After you sign up, you will be in the Water Advocates program and receive important announcements about bite-size actions you can take to help, right from your computer.

Committee Focus

# Collection Systems

The Collection Systems Committee (CSC) organizes and promotes programs for stimulating participation related to collection systems. To learn more about the committee, the *Journal* reached out to its current chair, Scott Lander, and vice-chair, Kara Johnston.

**Journal** *The CSC has been one of the longest running committees at NEWEA. Can you tell us more about the committee's goals?*

Scott: The primary charge of our committee is to provide a forum for the exchange of information on issues relating to collection systems operations, design, construction, and management. We identify key issues in our industry that warrant special attention and develop solutions.

■ *What is the makeup the CSC membership?*

Scott: Our committee comprises around 82 members with a diverse range of experience in disciplines. Our members include civil engineers and designers, PEs (professional engineers), and EITs (engineers in training) employed with consulting engineering firms, city and town engineers, wastewater treatment plant managers and operators, department of public works engineers and managers, to name a few.

Additionally, a number of our CSC members are suppliers to our industry. They provide collection system testing and flow monitoring equipment and services, sewer maintenance, inspection and rehab services, pumps and related service, pipe and collection

system components, lab services, process equipment and systems, computer hardware, software, asset management software, and cloud services, chemicals, biosolids and sludge processing systems, air quality and odor control equipment, stormwater detention, retention, and infiltration treatment systems, and effluent disposal services and treatment technologies. These folks are an important component of our association as a whole and our committee in particular.

Kara: If anyone is interested in joining the CSC, please do not hesitate to reach out to NEWEA, Scott, or me. We are always looking for new members and would love to have you!

■ *What does the CSC focus on?*

Scott: With such a deep, knowledgeable team of members who are willing to jump in and volunteer their time and experience, we deliver compelling material that has included awesome lineups of technical sessions for our CSC specialty conference held every two years and NEWEA's annual and spring conferences. Our members have developed and published white papers on the subjects of fats, oils, grease (FOG) and private inflow. We currently have two active task forces: Non-Dispersibles and Preventative Maintenance/Technology.

Another CSC charge is to recognize NEWEA members for their outstanding efforts in the operation, maintenance, management, or design of a wastewater collections system with the James J. Courchaine Collection Systems Award. The award recipient exemplifies the dedication essential to continuously improve a wastewater collection system's capability to adequately, cost-effectively, and safely service its community's ongoing needs. This award was established in 1995 and named in 1996, honoring NEWEA member James J. Courchaine for his many contributions to the collection systems field.

In addition to the James J. Courchaine Collection Systems Award, the CSC also has the pleasure of nominating a member for the annual Golden Manhole Award. The Golden Manhole Award is awarded to a CSC member, an individual who has had significant participation in one or more of the following areas: operations, maintenance, design, field evaluation, education, training, certification, management, and planning of wastewater collection systems.

Kara: Over the next few months, the committee will be focused on updating NEWEA's position paper for non-dispersibles. Given the significant increase in wipes in sewers and pumping stations, the CSC will be reviewing manufacturing standards and public education opportunities on this topic.

■ *Does the CSC have any upcoming events?*

Scott: Yes we do, but, first, I wanted to mention that in the fall of 2021 our committee held a joint virtual webinar with the Pacific Northwest Clean Water Association. The webinar was titled "Infiltration and Inflow Coast to Coast: Tools and Technology Webinar." The webinar focused on infiltration and inflow (I/I) impacts, comparing and contrasting how this problem affects communities in both regions and sharing lessons learned. We had a great turnout with over 60 attendees, and training contact hours were offered to the attendees.

The CSC holds a specialty conference every two years. The next one will be in September 2023. It will be another joint conference. This time, we will be teaming up with the NEWEA Asset Management Committee and Sustainability Committee. We are currently in the process of formulating a program that will focus on a risk/resiliency theme.

Kara: The CSC had four excellent sessions at this year's Annual Conference. The topics included Covid-19 sampling, force main inspections, sewer process modeling, siphon design, I/I removal, and more. The sessions were widely attended, both in person and virtually. The CSC highly encourages submitting collection system-related abstracts for NEWEA's upcoming annual and spring meetings.

■ *How have you enjoyed your experience on the CSC?*

Scott: As chair of the CSC, I feel compelled to share my personal thoughts with you. I realize how much I have learned about various aspects of collection systems that would not have been possible without joining this committee some 14 years ago. Starting my third and final year as chair of the CSC this year has helped me grow as a professional in the industry as well as personally, by exploring things outside my comfort zone. In addition, I have made many new friends which is the "icing on the cake" of this great experience.

I have had boundless support from a number of committee members who are experts in their

field and have had their abiding willingness to jump in and share their knowledge and time. Kara Johnston has been an immense help to me as vice-chair as has our clerk, Tom Loto. All these people have been my teammates. I thank these team members for being there to make this experience something I will always remember; seriously, you are the best!

In closing, I just want to say that being an active member of a NEWEA committee is one of the most rewarding and fun things you can do as a NEWEA member, even if it puts you outside of your comfort zone; I found that out 14 years ago.

Kara: Participating in the CSC has given me the opportunity to meet colleagues from the industry whom I may not have had the opportunity to meet otherwise. Sharing project stories and lessons learned, and hearing about available products and technologies have been an invaluable experience. I learn something new during every CSC call and conference session.



Kara Johnston



Scott Lander

Scott Lander is vice president of Retain-it, LLC located in Granby, Connecticut. Mr. Lander has over 30 years of experience providing sealing technologies for municipal sanitary sewer and stormwater collection systems. He is a member of NEWEA's Stormwater, Public Awareness, and Innovation committees as well as chair of the Collection Systems Committee.

Kara Johnston, PE, PMP, is a project manager and environmental engineer with CDM Smith. She has nine years of experience in the water sector, including wastewater planning, utility design and rehabilitation, and infiltration/inflow removal.

# The Stockholm Junior Water Prize

## This year's state winners from New England



The Stockholm Junior Water Prize (SJWP) is the world's most prestigious youth award for a water-related science project. National and international competitions are open to young people between the ages of 15 and 20 who have conducted water-related projects of proven environmental, scientific, social, or technological significance. The projects aim to increase students' interest in water-related issues and research, raise awareness about global water challenges, and improve water quality, water resources management, water protection, and drinking water and wastewater treatment.

WEF organizes the national SJWP competition and solicits electronic research paper entries for each state competition and returns New England entries to NEWEA following the announced deadline. By having applicants apply directly through WEF's website, project presentations can be ranked fairly by local volunteer judges. This year, applications were received from five of the six New England states.

### New Hampshire



**Abhinav Avvaru**  
Nashua High School South  
Nashua, NH

#### An Economical High Precision Home Nitrate Detecting Device for Water Monitoring at Homes

There has been a rise in water pollution with nitrates over the past few years. Currently, there is no cost-effective option to detect nitrates in water. The current nitrate detection options are expensive and not economically feasible to be used in homes. Also, they cannot continuously monitor a water source to allow the user to see whether the nitrate concentration is slowly increasing. The goal of this research is to develop an economic and practical device to detect nitrates. A chemi-resistor sensor, based

on a nanocomposite derived from carbon nanotubes and doped conducting polymers, was created to detect nitrates in water. The sensor was tested with various concentrations of nitrates, and a regression model was established. The model was used to predict the concentration of nitrates present in water and display it on an LCD screen, based on the change in voltage in the sensor.

### Vermont



**Saksham Bhardwaj**  
South Burlington High School  
South Burlington, VT

#### Changes in Algae Growth Due to Changes in Biodiversity

The purpose of this experiment was to determine if an increase in biodiversity would cause a change in the growth rate of three different strains of freshwater algae (*Ankistrodesmus*, *Selenastrum*, and *Chlorella*). Five trials were conducted, containing seven cultures of varying numbers of species each. Growth of each culture was tracked by turbidity readings taken every day, and algae was deemed to be fully grown once there was no change in turbidity for two days. The time it took to grow cultures with three strains was a significantly greater mean amount of days (24.8 days) than those with

one strain (17.13 days) using a one-tailed T-test ( $p < 0.05$ ). Additionally, the average maximum turbidity for cultures with three strains was higher (127.82 NTU) than those with one strain (64.44 NTU). The hypothesis was supported because an increase in biodiversity led to longer, continuous growth. One explanation is that a greater variety of species means that natural processes can be carried out more easily when exposed to external stress, leading to longer, continuous growth.

### Massachusetts



**Akhila Ram**  
Lexington High School  
Lexington, MA

#### Continuous Groundwater Monitoring with Machine Learning

Groundwater is a crucial source of the world's drinking and irrigation water. Nonetheless, it is being rapidly depleted in many parts of the world. To enact policy decisions to preserve this precious resource, policymakers need real-time data on groundwater levels in their local areas. However, groundwater monitoring wells are costly and scarce in supply. This project developed a machine learning model that predicts groundwater levels for the United States at a high spatial resolution. The features for the model consist of GRACE satellite data

augmented with meteorological variables. The model was able to precisely predict local changes in groundwater, with a high Spearman Rho correlation (0.94) and low root mean square error (2.4 ft) on the test set. The model's ability to generalize to the entire United States makes it especially useful in areas with sparse groundwater monitoring wells. With accurate measurements, local officials are empowered to make proactive decisions to ensure the stability of their region's water.

### Connecticut



**Adam Kleshchelski**  
Greenwich High School  
Greenwich, CT

#### Remediation of Fire-fighting Foam PFAS from Contaminated Water Using an Eco-friendly and Reusable Water Filtration System

Per- and polyfluoroalkyl substances (PFAS) pose numerous health risks, however their continued prevalence in common goods has caused the contamination of watersheds. Also, climate change-induced wildfires have caused an increase in PFAS-use as a fire retardant, where their spray-application into forests has led to their runoff into streams and lakes. A simple and effective method for the remediation of PFAS in water is needed. In response, this research culminated in the design of an easy-to-fabricate, and highly efficient PFAS filtration system, made from a crowd-shared 3D-print design, and natural,

biofriendly filter beds. Carboxylic-acid functionalized (10 nm) CdSe quantum dots were first fabricated, and used as the basis for sensitive fluorescence (540 nm) measure of perfluorooctanoic acid (the model PFAS), down to ~8 ppb. Separately, the multilayer water filtration system was 3D-designed and printed to function with a typical 1.5 L plastic bottle, and assembled to include 25 g (each) of SiO<sub>2</sub> and biochar. In use, 10 ppm of PFOA-contaminated water was reduced to 1.8 ppm in one filtration pass, and to only 10.7 ppb, with 5 filtration passes. Extension of the remediation model suggests that approximately 20 filtrations would achieve water potability, at 70 ppt (the EPA water health advisory limit).

### Maine



**Alexander Busko**  
Bangor High School  
Bangor, ME

#### Microplastics: Using Oil's Density to Extract These Tiny Toxins from Water

Microplastics are pieces of plastic less than 5 mm in length. Owing to their toxicity to marine life, it is vital to extract microplastics from water. In 2019, inventor Fionn Ferreira demonstrated that microplastics in water will bond to an oil and iron filings ferrofluid. Magnetically removing this ferrofluid extracted 87 percent of microplastics in a sample. This experiment tests whether the low density of oil eliminates the need for iron filings. Three 350 mL water samples were each spiked with polyethylene terephthalate (PET), polyethylene high-density (PEHD), or polyvinyl chloride (PVC)

microplastics. Baseline microplastic counts were obtained. Oil was added to the mixtures and agitated for homogeneous distribution. After five minutes of settling, the water was drained from underneath the oil layer, and the number of microplastics was counted. Overall, an average of 91 percent of microplastics were removed from the samples, demonstrating non-inferiority to the previous method. This supports the hypothesis that an oil-density-based method without iron filings will effectively extract microplastics from water. Eliminating the need for iron filings simplifies and minimizes the cost of this technique, encouraging application at a large scale.



# YP News & Spotlight



(L–R) James Plummer, Victoria Helle, Evan Karsberg, Paul Russell (Standing up behind all), Jamie Payne, Courtney Botelho, and Daryl Coppola enjoy the YP networking event at Polar Park in Worcester, Massachusetts

## The Young Professionals (YP) Committee

continues to be active within the NEWEA community. On July 14, the YP Committee hosted a Poo & Brew in Providence, Rhode Island; first they toured the Narragansett Bay Commission's Field's Point Wastewater Treatment Facility, and then the group headed to Narragansett Brewery to enjoy food, drink, and lively conversation.

On August 31, the recently formed YP Committee Events sub-group hosted its first networking event—a night at the WooSox (Worcester Red Sox, the Triple-A affiliate of the Boston Red Sox). Roughly 35 NEWEA members signed up to enjoy some good old-fashioned baseball and networking. The WooSox jumped out to an early five-run lead over the visiting Buffalo Bisons that included a three-run home run by catcher Connor Wong. They ended up winning the game, 9–1. The event was planned and run by Jamie Payne (You may remember her from the summer *Journal* spotlight!) from Beta Group and was sponsored by Hayes Pump and BETA Group.

One of the YPs in attendance was James Plummer, who is showcased in this issue's YP Spotlight. Mr. Plummer is an environmental analyst at NEIWPC's Lowell, Massachusetts office and a NEWEA YP Committee member. At NEIWPC, he works on various projects in its Wastewater and Onsite Systems Division as well as in its Stormwater work group. Mr. Plummer has been involved with the YP Committee since 2019.

engagement opportunities that cater to diverse interests and social styles (e.g., extroverts and introverts) helps us tap into often unheard voices and pull new seats up to the table.

Being a NEWEA YP has provided top tier opportunities to learn and take active roles in a variety of efforts (and respectfully back out when I inevitably put too much on my plate). It's a blessing to have support from experienced professionals who are willing and eager to provide guidance and encouragement. I've experienced an environment at NEWEA that encourages innovation, coordination, and camaraderie. Everyone's always willing to incorporate young professionals into their networks.

### ■ Tell us a fun fact about yourself!

James: I make kombucha which, if you haven't tried it before, is sort of like if wine and beer had a baby; it's bubbly, has some fruity and floral notes, and has a good little funk. It's super simple: You add sweet tea to a symbiotic culture of bacteria and yeast and then you just wait a few days for the fermentation to progress. I'm starting to experiment with adding brewer's yeast and testing out different flavors during secondary fermentation with additives like ginger, sumac, habaño, pear, mango, etc. Hoping to submit some kombucha to the Watershed Management Committee's next Source Water Brewing Competition (which I've also enjoyed helping plan).



James Plummer

## Spotlight

### Journal | What drew you to the clean water profession?

James: Destiny. Born and raised in the heart of New England at the confluence of the Nashua and Merrimack rivers, I wandered the region, revering the wrath of the seas and marveling at the nurturing embrace of rivers and wetlands. In my quest to attain the rank of Eagle Scout, I yearned to conquer the rain and oversaw the design and construction of a rain catchment and irrigation system at my town's most central place of worship. While striving toward a B.S. in biology at the University of Tampa, I found sanctuary working for a startup that developed tabletop aquaponic systems. Then, with the necessary tools in my toolbox, and blessed with the last name Plummer, I was fated to dive headfirst into wastewater. However, it wasn't until I coordinated NEIWPC's Youth and the Environment Program in the summer of 2016 that I became acquainted and enamored with the clean water industry.

### ■ What has been the best part of working in the clean water industry?

James: Without question, the people. Everyone seems to be fueled by an unrelenting enthusiasm to find solutions and are driven by a fervent desire to

connect. Like the water we are working to protect, our cohesion is what makes us most powerful.

### ■ As a YP, which of your contributions have you enjoyed the most?

James: I've most enjoyed helping plan the Young Professionals Summit at NEWEA's Annual Conference. Over the past couple of years, we've taken some unique liberties with the design of the summit (e.g., meme contests) that have fostered a collegial and creative atmosphere. We've recently started a YP Slack workspace to encourage remote networking and spark coordination, so I'm excited to see that platform being utilized. Just in the first week of using Slack, we're already talking about hosting game nights, going to concerts and breweries, and generally meeting up for miscellaneous shenanigans—all while talking about water, of course.

By integrating fun, we're intentionally creating a comfortable space for candid dialogue. Professionally, we're addressing some very serious public health and environmental challenges. It can feel exhausting and inexorable, and we can't do our work siloed, so hosting a variety of networking and

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# Webinars, Conferences, and Events

## POO & BREW

NEWEA's Young Professionals Committee hosts a popular multi-discipline networking event, aptly named Poo & Brew. This event features a tour of a local wastewater treatment facility followed by networking at a brewery. These events are open to organization members and non-members who are professionals in all stages of their water industry careers.

Two Poo & Brew events were recently held. On April 7, 2022, 40 attendees toured the Suffield Water Pollution Control Authority's Treatment Facility in Suffield, Connecticut. The second event took place on July 14, 2022, where 44 attendees toured Narragansett Bay Commission's Field's Point Wastewater Treatment Facility in Providence, Rhode Island.

Sponsors: ADS Environmental Services; AECOM; Aqua Solutions; Arcadis; Brown and Caldwell; Carlsen Systems; CDM Smith; CUES; Dewberry; Environmental Partners; EST Associates; F.R. Mahony & Associates; Flow Assessment Services; Fuss & O'Neill; GHD; Green Mountain Pipeline Services; Hayes Group; Hazen and Sawyer; HDR; Hoyle, Tanner & Associates; Jacobs; Kleinfelder; MWH; NEFCO; New England Pump & Valve; Savy & Sons; Stantec;

Tech Sales NE; The MAHER Corporation; Ti-SALES; Tighe & Bond; Vaughan Company; Weston & Sampson; Woodard & Curran; Wright-Pierce

## OPS CHALLENGE TRAINING DAY

NEWEA's Operations Challenge Committee held a Training Day on April 1, 2022, at the Springfield Regional Wastewater Treatment Facility in Springfield, Massachusetts. Thirty attendees participated. Attendees learned about the Operations Challenge and its five competition events (collection systems, process control, laboratory, safety, and maintenance).

Sponsors: ADS Environmental Services; AECOM; Aqua Solutions; Arcadis; Brown and Caldwell; Carlsen Systems; CDM Smith; CUES; Dewberry; Environmental Partners; EST Associates; F.R. Mahony & Associates; Flow Assessment Services; Fuss & O'Neill; GHD; Green Mountain Pipeline Services; Hayes Group; Hazen and Sawyer; HDR; Hoyle, Tanner & Associates; INVENT Environmental Technologies; Jacobs; Stantec; Synagro Northeast; Tech Sales NE; The MAHER Corporation; Tighe & Bond; Vaughan Company; Weston & Sampson; Woodard & Curran; Wright-Pierce

## DIVERSITY, EQUITY AND INCLUSION (DE&I) WEBINAR

NEWEA's newly formed Diversity, Equity and Inclusion (DE&I) Committee held its first webinar on May 10, 2022, to talk about creating pathways to leadership. The webinar was moderated by Stephen King, NEWEA DE&I committee chair, Town of Danvers, Massachusetts, and co-moderated by Marina Fernandes, NEWEA Council Director and DE&I Committee past chair, Town of Milton, Massachusetts.

Panelists:

- Erin (Pink) Mosley, Erin Mosley, Inc.
- Phyllis Arnold Rand, Greater Augusta Utility District, ME
- James Barsanti, MassDEP
- Janine Burke Wells, North East Biosolids and Residuals Association

## EFFECTIVE UTILITY MANAGEMENT WORKSHOP

EPA partnered with NEWEA to host one-day training, *Effective Utility Management: Your Path to Sustainability*, on June 9, 2022, at the Edwards House in Framingham, Massachusetts. This training helps wastewater utilities take a 360-degree look at their facility to set priorities that will protect current infrastructure and work for the future utility and their respective communities.

## COMMITTEE MEMBER APPRECIATION EVENT

NEWEA's 33rd annual Committee Member Appreciation (CMA) event was celebrated at Kimball Farm in Westford, Massachusetts, on July 28, hosted by CMA Committee Chair John Bobreck, who made sure the event ran smoothly. The CMA is an annual celebration and recognition of the importance of all our committee volunteers to the success and vitality of NEWEA and its mission and goals. Over 100 people from across New England attended, including committee members with their guests and families, some with very young potential professionals, who enjoyed the many amusements at the site, including bumper cars, bumper boats, batting cages, a driving range, miniature golf, and lawn games. The crowd was treated to a grilled supper and the ever-popular made-to-order-all-you-can-eat ice cream sundae stand featuring 11 of Kimball's most popular flavors.

This evening of camaraderie among old and new friends included a belated presentation of the Collection Systems Committee's Golden Manhole recognition to the long-dedicated and multi-talented Vonnie Reis, city engineer for Melrose, Massachusetts. Her many accomplishments and contributions to the industry were noted by Collection Systems Committee Chair Scott Lander. The proud and happy Ms. Reis was treated to spirited applause by the audience.

Another major feature of the evening was the third annual Watershed Home Brewing Competition, a friendly invitational event pitting some of the many talented home brewers in our organization against each other in a taste-off judged by all the willing committee members and others in attendance.

Source water for the brews was variable, with several entrants using water furnished by the Metropolitan District (Hartford, Connecticut), while some selected a water source from a watershed closer to their home location. A variety of provocatively named brews was presented by eight inventive brewers, including *Clocked Out Lager* by Wayne Bates, *Lil' Grace Hazy IPA* by Jim Callahan, *Pocket Full of Rye Pale Ale* by David Coppes, *Colon Springs Porter* by Mario Leclerc, *Labor & Delivery Pilsner* by Patrick Lyons, *Sunburnt Pale Ale* by Mary Penny, *When I was a Young Wortdog IPA* by Steven Wolosoff, and *When the Dreamer Dies, so Dies the Dream Berliner Weisse* by Joseph Zaleski.

Most judges who were interviewed agreed there was none among the sampled beverages that was less than excellent, but after the electronically cast votes were tallied, the interestingly sour raspberry *Berliner Weisse* of Mr. Zaleski was declared the winner.

Congratulations and many thanks to all the gifted brewers who participated in this year's competition. Every entered brew received a blue ribbon rating from one or more tasters, and it was obvious from the appreciative responses of the many judges that any one of these brewers would be welcome to share their wares anywhere in New England! Special thanks to NEWEA Watershed Management Committee Chair Sara Greenberg and Vice Chair Steven Wolosoff for spearheading, organizing, and administering the competition, and to the generous Home Brewing Competition sponsors: CDM Smith, Hazen and Sawyer, and Surpass Chemical.

## Committee Member Appreciation Event Kimball Farm, Westford, MA July 28, 2022

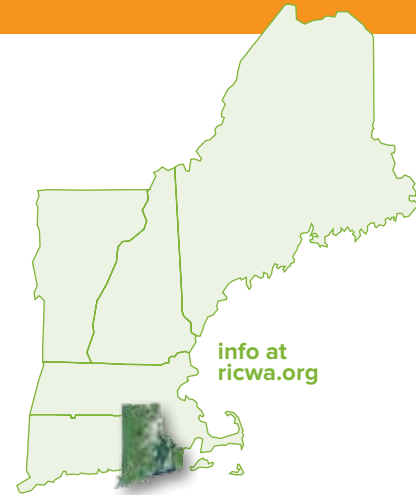


1. Luis Adorno and his wife Rebecca share a laugh at the table 2. Connecticut Director Vanessa McPherson and her family arrive 3. John Digiacoimo with his wife Jen and their daughters Paige and Julianne are ready to celebrate 4. Brewers Mary Penny and Wayne Bates discuss fermentation techniques 5. Hannah Olsen and Evan Karsberg enjoy judging brew samples 6. Dan Roop's Family (L-R, Riley, Abbie, and Emma) enjoying the festivities 7. Vonnie Reis cradles her Golden Manhole pin and certificate presented by Certification Committee Chair Scott Lander 8. Joseph Zaleski proudly shows off his winning brew



## Rhode Island State Director Report

by Eddie Davies  
edavies@quonset.com



Established in 1952, the Rhode Island Clean Water Association (RICWA) is a non-profit organization created to promote the advancement of knowledge concerning the nature, collection, treatment, and disposal of domestic and industrial wastewaters.

### Who's Who—Our Board Members

- **President Peter Connell** has over 25 years of experience in the industry and is the senior projects and infrastructure systems manager for the Rhode Island Resource Recovery Corporation. He has long been an active participant in RICWA.
- **Vice President Jeff Chapdelaine** is the superintendent at the West Warwick Wastewater Treatment Facility and has held positions for the Narragansett Bay Commission and Town of Narragansett. In 2021, Mr. Chapdelaine was awarded the Carmine J. Goneconte Operator of the Year Award for his high level of leadership and performance in wastewater operations.
- **Treasurer Nora Lough** has been the biologist at the Narragansett Bay Commission since 2005. She earned a Bachelor of Science in Microbiology from UMass Amherst in 1998 and has been an indispensable trainer for New England clean water professionals for the last 15 years. Ms. Lough has been active on the NEWEA Lab Practices Committee and is an Operations Challenge judge.
- **Secretary Kim Sandbach** is an environmental chemist working for the Narragansett Bay Commission since 1991, after earning a bachelor's degree from the University of Rhode Island. Ms. Sandbach is a longtime active participant of RICWA, received the James Marvelle Award in 2018, and was the first female participant on the Rhode Island Operations Challenge team.
- **Executive Board Member Dave Perrotta** is the assistant superintendent at the East Greenwich Wastewater Treatment Facility. Mr. Perrotta started his wastewater career after graduating from the University of Rhode Island in 2000. Throughout his career, he has been an active RICWA member and competed on the Rhode Island Operations Challenge team.

- **Executive Board Member Michael Bedard** is the assistant superintendent for the Warwick Sewer Authority, where he has shown exemplary service to the community and to RICWA. He received the Alfred E. Peloquin Award for Rhode Island in 2014 and coordinates the RICWA Member Spotlight articles.
- **Executive Board Member Vincent Russo** is the electrical and instrumentation specialist at the West Warwick Regional Wastewater Treatment Facility and has 18 years of experience in the industry. Mr. Russo is also a proud graduate of the Rhode Island Wastewater Operator Leadership Bootcamp, and he competed for five years on the Rhode Island Operations Challenge team.
- **Executive Board Member Craig Danella** has worked in the wastewater industry for 12 years, all with Veolia in Cranston. Mr. Danella is a graduate of the University of Rhode Island and alumnus of the Rhode Island Wastewater Operator Leadership Bootcamp. He received the 2020 NEWEA Operator of the Year Award and is an active participant in RICWA.
- **Director of Vendor/Consultant Coordination Kelly Bailey** has been involved in the wastewater industry for the past 20 years and with RICWA for the past 15 years. Ms. Bailey is the branch manager for Fluid Solutions with United Rentals and helps maximize vendor exposure within the association and community.
- **Director of Vendor/Consultant Coordination Eli Hannon** is the owner of Fusion Environmental Solutions and works passionately to find economical and sustainable solutions to environmental obstacles. Prior to entering the wastewater industry, Mr. Hannon produced large-scale, environmentally friendly music festivals and concerts that enabled the planting of over 5,000 trees worldwide.



RICWA Chowder/BBQ get together, hosted at the Scarborough WWTF in Narragansett

- **Operator Certification Board Representative Paul Desrosiers** is the technical advisor of operations for the Narragansett Bay Commission with over 35 years of clean-water operations experience. Paul has a Bachelor of Arts in Education from the University of Rhode Island and is known for his long service and involvement with RICWA and NEWEA.
- **NEWEA State Director Eddie Davies** is the superintendent of wastewater and Industrial Pretreatment Program coordinator for the Quonset Development Corporation. He holds a Bachelor of Science in Aquaculture and Fishery Technology from the University of Rhode Island and is a U.S. Army veteran. Mr. Davies has been an active member of RICWA since 2013.
- **Past President Scott Goodinson** is the wastewater superintendent for the Town of Narragansett and has 30 years of experience in the industry. Mr. Goodinson is a U.S. Navy veteran, having served onboard a nuclear-powered fast attack submarine during the 1980s. He has been active in both RICWA and NEWEA for decades.

### Annual Golf Tournament

On June 20, 144 golfers participated in RICWA's annual golf tournament at the Potowomut Country Club, helping to raise \$8,055. Proceeds support the RICWA Scholarship Fund, which funds educational opportunities for both clean-water professionals and college-bound high school seniors, as well as supports the Operations Challenge team.

Special thanks to the following:

Golf Committee Members: Peter J. Connell (Chair), Bill Wilber, Bernie Bishop, Paul Desrosiers, Scott Goodinson, Kelly Bailey, Eli Hannon, Craig Danella, Kim Sandbach  
Volunteers: Bill Patenaude, Traci Pena, Chloe Pena, Melissa Mooradian, Mike Spring, Jim DeLuca, James Lauzon, Vinny Russo, Patty Sheridan, Fern Johnson, Ralph Wilber, and Lidia Goodinson

Sponsors: Aqua Solutions, Arcadis, C3ND, Carlsen Systems, CDM Smith, E.J. Prescott, Hart Engineering Corp., Hayes Pump, Jacobs, New England Environmental

Equipment, PARE Corporation, Safety Source, Sandy Lane Sports, Seacoast Supply, Inc., Seepex, SYNAGRO, The MAHER Corp., United Rentals Fluid Solutions, Weston & Sampson, Wright-Pierce, and Wilkem Scientific.

### Operations Challenge

Congratulations to team Rising Sludge, which competed in the Operations Challenge competition during NEWEA's Spring Conference at the Mount Washington Resort in Bretton Woods, New Hampshire. Operations Challenge, the water sector's premier skills competition, is unmatched in delivering cross training, team building, and professional development. Rising Sludge demonstrated outstanding professionalism, teamwork, and a tireless drive to succeed as they secured wins in four of five events, ultimately earning first place overall! With these results, the Rhode Island team has earned an invitation to compete in an upcoming national competition this fall in New Orleans and will represent both RICWA and NEWEA. The Rising Sludge team includes Eddie Davies and Dave Bruno of the Quonset Development Corporation, Riley Greene of the Town of Narragansett, Rob Norton of the City of Newport, and Max Maher of the Rhode Island Department of Environmental Management.

### Annual Scholarships

RICWA is pleased to provide several scholarships annually to college students, sponsored by our members and fundraising efforts. Scholarships range from \$500 to \$1,000, depending on the number and quality of applications received. Please check ricwa.org for application details.

### 2022 RICWA Event Highlights

- **Annual Trade Show and Luncheon** (September)
- **Annual Awards Banquet** (October)
- **Annual Holiday Party, Food Drive & Elections** (December)

Please check ricwa.org or our Facebook page for all association news and full event listings.



# Connecticut State Director Report

by Vanessa McPherson  
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Every season in New England has its magic moments, and in the summer each day brings a new adventure. Shakespeare wrote that “summer’s lease hath all too short a date”; it always seems that even while the days are longer, the months fly by. In Connecticut, this is most certainly explained by all the happenings that have kept us busy. Be sure to visit our website at [ctwea.org](http://ctwea.org) for event information, photos, and much more.

### CTWEA Wastewater Forum and Expo

The first major event for our merged organization, the Connecticut Water Environment Association (CTWEA), was held on May 2 at the Aqua Turf in



Operations Challenge demonstration at the CTWEA Wastewater Forum and Expo

Plantsville, and the Expo was a resounding success. Opening remarks were offered by Representative Joe Gresko of Stratford, and we thank him for taking time during legislative session to address the group. The event was attended by upwards of 150 wastewater managers, operators, regulators, and engineers and included over 40 vendor booths and exhibits. Highlighting the occasion were several speakers and an Operations Challenge demonstration. Folks even tried their hand at pipe cutting, a key part of the Collection Systems event (and it is definitely not as easy as the Operations Challenge teams make it look). To celebrate the incredible progress made with the merger, swag featuring our new logo was made available for

participants at no cost, and attendees were thrilled. Kudos to the workshop presenters, the Training & Expo Committee, and Chair Larry Murphy for the hard work that made this event happen as well as to Tracy Santoro for obtaining the logo merchandise for all to enjoy.



### Ops Challenge

We are proud of our Connecticut Operations Challenge team and its success at the NEWEA Spring Meeting in beautiful New Hampshire at the Omni Mount Washington. The

team placed first in the Collection Systems event and took second place overall. With a name finally decided on, our team, the Connecticut Storm Surge, is ready for WEFTEC! Team members Paul Burns, Ryan Harrold, Nicole LaBoy, and Jason Nenner, coached by Bradford Vasseur, have been practicing this summer, and we all look forward to cheering them on in October.

### Government Affairs and Legislative Outreach

CTWEA tracked two major items during this legislative session, and the outcome of both was favorable. One was a Department of Energy and Environmental Protection (DEEP) bill, which passed, that allows electronic testing for operator certifications.

The second concerned the proposed S.B. 128 An Act Concerning Foreclosure, Assignment, and Other Enforcement Actions for Unpaid Sewer Assessments and other Fees and Charges. The bill, as proposed, prohibited foreclosure on

owner-occupied residences for sewer assessment arrearages of less than \$10,000. CTWEA testified that financing publicly owned wastewater collection and treatment systems relies on sewer use billing and that the foreclosure process is rarely used; when it is, it is as a last resort. Our Legislative Committee members participated in virtual meetings with legislators to review the impact this bill would have on wastewater treatment in the state. Many thanks to Jeff Lemay for leading the charge and Melissa Biggs for her council. S.B. 128 did not make it through the session. Our Legislative Committee is organizing wastewater treatment facility tours for legislators this fall.



Sewer Open participants (L-R): Virgil Lloyd, Craig Burmeister, Carmen Krzesik, Ray Weaver, Tracy Santoro, and Serdar Umur

### Sewer Open

The beloved Sewer Open was held on June 17 at the Skungamaug River Club Golf in Coventry. Once again, the tournament was sold out and Director Ray Bahr did a great job organizing the event. This tournament is a key fundraiser for programs CTWEA participates in each year. Tee Sponsorships support the Scholarship Fund, which offers scholarships to students who will pursue a college degree in an environmental related field, while Green Sponsorships support the Connecticut Operations Challenge team. We raised \$3,800 for the Scholarship Fund, which has been awarded to four students attending college this fall. This year’s Green Sponsorships were improved to increase support for Connecticut’s Operations Challenge team, and we set a record, raising \$3,700. Additionally, a special thank you to all the attendees who purchased “Win the Driver” raffle tickets during the food festivities, raising an additional \$1,475. This event would not be possible without the support of our generous sponsors. Please check out our website for a full writeup and to see the wonderful photos taken by Mike Spring.

### Operators Committee Updates

This committee has been formed under the leadership of Chair Ted Donoghue to develop and implement educational programs and training to enhance the skills and knowledge of wastewater treatment plant operators and maintenance personnel. One action item was to distribute a poll to CTWEA membership for feedback on

current programs and areas where expanded offerings are desired. Our Operators Committee is also instrumental in planning and implementing the Operator Exchange Program through NEWEA. This year, Connecticut looks forward to partnering with our neighbors in Massachusetts. We are always looking for candidates for the annual operator exchange, so anyone interested should reach out.

### Upcoming Events and Happenings

- **Fall Workshop** – October 20, 2022, at the Aqua Turf in Plantsville
- **Ski Classic** – February 2023
- **Operator Winter Event** – Details forthcoming

### Other Highlights

- A special thanks to the Metropolitan District (Hartford) for providing the source water for the homebrew competition, which was organized by the NEWEA Watershed Committee and enjoyed by everyone who attended the NEWEA Committee Member Appreciation Picnic.
- CTWEA has voiced its support of NEWEA’s Workforce Development Initiative and is committed to participating in the steering process that is being planned. We look forward to collaborating on this critical topic and the outcomes.
- We are always looking for volunteers to work with our committees, so please express interest through our website.



# Maine State Director Report

by Paula Drouin  
pdrouin@lawpca.org



Greetings from Maine! We have transitioned from a summer of drought, 100 degree days, and beach closures due to shark sightings, into a beautiful, cooler, and foliage-painted autumn (the best season if I do say so myself). While many of us took vacations—and I got married!—we never stopped working on our association mission and goals.

Maine Water Environment Association (MEWEA) is going through a time of simultaneous growth and turnover. We have many new committee chairs, and I've realized that I am one of the more experienced folks now. (How did that happen?) We also have some chair position vacancies, leading us to ask the question: How can we do the work we're doing more efficiently and how can we better recruit members to get involved?

At the beginning of the year, MEWEA migrated our website to MemberClicks to modernize the site while also improving member management on the back end. We are still developing the front end by adding content about committee work, events and trainings, and member resources. Also new this year is that administrative services are being contracted with the Maine Water Utilities Association (MWUA), which includes employment of an executive director, Bruce Berger. Mr. Berger brings decades of experience and is a true advocate for the clean water industry, driving the collaboration of water professionals who are working toward common goals. These changes are part of an overall effort to adapt to the expanding workload being taken on by MEWEA, while organizing and maximizing the efforts of our association volunteers. I look forward to continued improvements and reporting on our progress in future *Journals*.

## Events

The MWUA Summer Outing was on August 11 at Cumberland Fairgrounds. The day started with a two-hour training on the cost-effective use of vacuum excavation. A high-energy pipe competition featured teams racing against time to tap into a cement-lined, ductile iron pipe while under pressure and install a corporation stop. After that,

attendees transitioned to networking with a cornhole contest and barbecue lunch. Kudos to the event organizers.

On September 29, a 50th anniversary celebration of the Clean Water Act was held at Simard-Payne Park in Lewiston. Fifty years ago, the Androscoggin River was one of the top 10 polluted rivers in the country. Today, it is a model for the progress we can make and will continue to make in restoring and protecting our waters owing to all those who have helped implement the Clean Water Act. The event will include remarks from leaders in water quality protection, recognition of Maine's Clean Water Act champions, and a celebration with food and drink.

The 2022 Northern Maine Children's Water Festival will be held on October 11 at the University of Maine. This event promotes hands-on learning about water issues. The festival is geared toward fourth-, fifth-, and sixth-grade students and their teachers. Water resource professionals from Maine and New England provide presentations and activities about water, wetlands, human health, and aquatic life. This event is free to participants, and resources will be provided to participating schools. The festival goals will teach students about the value of clean water and healthy habitats and provide teachers with materials and lessons to use for years. Visit [umaine.edu/mitchellcenter/childrens-water-festival/](http://umaine.edu/mitchellcenter/childrens-water-festival/) for more information.

"Imagine a Day without Water" is a national education campaign that brings together diverse stakeholders to highlight how water is essential, invaluable, and in need of investment. This year, the event will take place on October 20 and include events, resolutions, student contests, social media engagement, and more—all across the country. Visit [imagineadaywithoutwater.org/](http://imagineadaywithoutwater.org/) for more information.



**MWUA Summer Outing Tapping Contest First Place—Boothbay Regional Water District = Mud Dogs (orange shirts L–R): Aaron Durgan, Shawn Simmons, Weston Alley and Hunter Arsenault—event time 2.49.87 minutes.seconds.hundredths**  
**Second Place—Greater Augusta Utility District = GAUComplex (blue shirts L–R): Dave Robinson, Dave Curtis, Codey Bell, Wesley Maciadri—event time 4.04.48 minutes.seconds.hundredths**

## Update from MEWEA Government Affairs Committee

On August 8, Maine's L.D. 1911 (now Public Law Chapter 641) became effective. This law bans the land application of biosolids from wastewater treatment facilities, requires per- and poly-fluoroalkyl substances (PFAS) effluent sampling, repeals a \$10 per ton sludge fee from previous legislation, and, among other provisions, requires Maine's Department of Environmental Protection to present a septage management report to the Maine Legislature by January 2023. During legislative review, MEWEA voiced concerns about unintended consequences of this proposal and requested a wider stakeholder engagement process.

MEWEA is shifting its focus toward sustainable solutions, fostering partnerships with associations, regulators, and policymakers to increase stakeholder engagement across a wide range of people. Because of the broad use of PFAS, many of us will need to think outside the box to forge strong collaborations with individuals both inside and outside the water industry. While focusing on partnerships, we are also collecting

data with the North East Biosolids & Residuals Association (NEBRA), launching a survey to help quantify PFAS impacts on Maine's wastewater treatment facilities.

Additionally, MEWEA's Government Affairs Committee has submitted support letters for Build America Buy America (BABA) waivers for section 70914 of P.L. 117-58 for State Revolving Fund projects and for selected EPA funding programs.

Did you know there is a Maine Water Professionals discussion group on Facebook managed by MEWEA that provides a great forum for information sharing? We currently have 135 members, and we welcome more to join. Though started in Maine, we welcome members from other New England states as well.



# Vermont State Director Report

by Michael A. Smith  
smithm@wseinc.com



The Green Mountain Water Environment Association (GMWEA) is having a good year. The following is a summary of major activities and programs that we have advanced most recently, as well as personnel highlights from our association membership.

### Collaboration with the Vermont Agency of Natural Resources and VRWA

The Vermont Department of Environmental Conservation (DEC) has recently unveiled its “American Rescue Plan Act (ARPA)—Pretreatment Initiative.” This innovative Vermont funding program provides grants to fund eligible wastewater pretreatment projects at Vermont businesses that discharge to municipal wastewater treatment facilities through the state’s Clean Water State Revolving Fund (SRF) Loan Program. Industries will work with their communities to obtain these grants, which will support surface water quality improvements by funding source load reduction.

Vermont DEC’s Wastewater Program is seeking eligible pretreatment projects that can be completed by September 2025 to be funded by the available State Fiscal Year 2022 or subsequent ARPA pretreatment appropriations.

### Forever Chemicals

As most of us are aware, EPA recently released four drinking water health advisories for per- and polyfluoroalkyl substances (PFAS). These advisories establish limits of acceptability for these chemicals that are well below detection limits, creating several challenges for water quality professionals. GMWEA and other state water quality associations are collaborating on a position paper to be addressed to EPA as well as to state primacy agencies to voice concerns, thoughts, and recommendations on behalf of the membership regarding these new advisories.

GMWEA member Steve LaRosa has volunteered to be the Vermont representative for the newly formed NEWEA PFAS task force. Mr. LaRosa, a senior technical leader for Weston & Sampson in Waterbury, Vermont, has 35 years of experience in environmental assessment and cleanup. He is managing PFAS-related projects and is a member of the Interstate Technology and Regulatory Council

PFAS team. Mr. LaRosa has designed and overseen the implementation of sampling and evaluation of PFAS sources and impacts to drinking water wells and has led comprehensive assessments of PFAS in wastewater, biosolids, land application sites, landfill leachate, surface waters, and fish tissue in various states. He is on the GMWEA Government Affairs and Residual/Emerging Contaminants committees and is participating in the Environmental Business Council of New England Emerging Contaminants workgroup.

### Workforce Development

NEWEA and New England Waterworks Association (NEWWA) are collaborating on an important issue for our region: attracting talented employees to the water quality field and retaining them. Vermont, along with the other New England states, suffers from a lack of staff throughout all disciplines (especially engineering, operations, and regulatory) in the water quality field. This is not just a temporary inconvenience; it is a serious issue that will take time and effort to correct.

GMWEA recently confirmed support and will contribute funding toward the NEWEA and NEWWA effort to develop a regional workforce development program aiming to echo the success of the Baywork collaborative in California.

### Events

Our Spring Meeting in Killington on May 26 and the George Dow Memorial Golf Tournament in Hinesburg on August 19 were very successful and well-attended in-person events. Upcoming events include the following:

- **GMWEA’s 2022 Fall Conference and Trade Fair** on November 10 at the Doubletree Hotel in South Burlington, planned to be an in-person event
- **Operator training courses and Lunch & Learns** (schedules available at GMWEA.org)

### GMWEA Spring Meeting, Killington, Vermont



**Congratulations to Jim Jutras**, former water quality superintendent for Essex Junction, who retired this spring after 31 years of service. Mr. Jutras was heavily involved in wastewater and solids management issues for his entire career in Vermont and an influential member of GMWEA and NEWEA.

He received numerous industry awards during his career. Chelsea Mandigo, who assumed the Essex Junction water quality superintendent role, has worked with Mr. Jutras for her entire career, and has allowed me to quote this from the wonderful piece she wrote upon his retirement:

*Jim’s career in water quality began when he was hired in December 1990 as director of the tri-town (Williston, Essex, and Essex Junction) 3.3 mgd (12.5 ML/day) wastewater treatment facility for the Village of Essex Junction. He later served as public works superintendent prior to stepping into the role as water quality superintendent, encompassing management of both stormwater and wastewater.*

*Jim often mentioned that when he was hired, he was told to run the facility like a business. This mindset was part of every project or initiative he took on for the facility. He saw the greatest potential for cost savings in energy management, which resulted in the facility being at the forefront of energy management technologies. During a \$15 million maintenance upgrade, the facility added a 150 kw solar field and 150 kw cogeneration system that, combined, produces nearly 60 percent of the facility’s annual electrical and heating needs. In the spring of 2021, Jim enrolled the facility in an innovative energy management pilot program called Flexible Load Management through Green Mountain Power and Dynamic Organics. This program pays the facility to reduce demand on the grid during peak event days by temporarily turning down or off equipment for a 3- to 4-hour window. In January 2022, the facility reached net zero for the entire event window which is a*

*credit to many of the partnerships and technologies Jim and his staff introduced to the plant during his tenure.*

*Jim believed strongly in partnerships and working with the community. This was most evident in the Biosolids program involving the North Williston Cattle Co. Jim advocated for the importance of biosolids programs as a solids management tool for facilities, stressing the importance of recycling nutrients back into the environment as fertilizer rather than filling our landfills with this reusable material and importing fertilizers from outside sources. As such he has kept the facility’s subsurface biosolids ejection program active, recycling approximately 2 million gallons (76 ML) of class B biosolids back into farm fields annually.*

*Jim’s dedication to water quality was not only obvious in the technologies he implemented but also through his contributions to state and regional trade associations and committees. Jim was instrumental in creating GMWEA by working to combine the two separate water and wastewater associations in 1994. He served as president of GMWEA multiple times, was an active member and officer of NEWEA, and was also active in Northeast Biosolids & Residual Association (NEBRA) and the Water Environment Federation (WEF). He participated at both NEWEA and WEFTEC on Vermont Operations Challenge teams, medaling several times. He also volunteered on various water quality advisory committees including GMWEA Governor’s Affairs, NEBRA Research Committee, NEBRA Regulation and Legislative Committee, and the Lake Champlain Basin Program Technical Advisory Committee.*

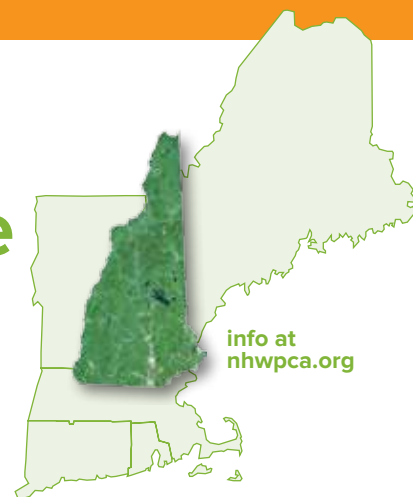
*Jim was a mentor to many more people than he realized, through his willingness to share his experiences in and teach about an industry he has been so passionate about. Thank you, Jim, for all that you have done for the Village community, your staff, colleagues, water quality, and the industry. Congratulations on an outstanding career.*

– Chelsea Mandigo, Water Quality Superintendent, Essex Junction, Vermont



# New Hampshire State Director Report

by Michael Trainque  
mtraink75@gmail.com



Greetings from the Granite State. We hope everyone enjoyed the warm summer weather and took much needed and well-deserved vacation time. During this 50th anniversary of the Clean Water Act of 1972, it is worth pondering the water cycle. There is as much water on planet earth today as there was many thousands of years ago, and it is essentially the same water! Only about 1 percent of the earth's water is fresh water that can be used for agricultural, commercial, industrial, and personal household needs, and sustaining life in all its forms. It's a unique perspective that all of us engaged in the water industry have as stewards of this most precious resource. Water, er, food for thought.

One of the most exciting developments for the New Hampshire Water Pollution Control Association (NHWPCA) is its contract with NEWEA to have administrative services furnished (meeting and event registration, website administration, and a host of other functions). This is a positive step; we are excited about it and looking forward to this partnership with NEWEA. NHWPCA also has a new website as of May. Please check it out: [nhwpc.org](http://nhwpc.org).

At its monthly meeting on June 10, the NHWPCA Board of Directors voted to participate in and support the proposed Regional Water Workforce Collaboration Initiative. Those of us in the Granite State share the concerns of water utilities nationwide that there will not be sufficient candidates, or training opportunities, to fill all the job positions, current and future, in the water industry. Engagement of potential candidates is needed to develop the workforce to fill water industry employment needs now and in the future.

NHWPCA is working with representatives of the four member associations of the New Hampshire Water Coalition (New Hampshire Water Works Association [NHWWA], Granite State Rural Water Association, New Hampshire Municipal Association, and NHWPCA) along with New Hampshire Department of Environmental Services to promote common messaging with state and national leaders and informing the public of important information that affects the water industry. At its meeting on May 3, coalition representatives discussed staying ahead of legislation, communications, legislative support, per- and polyfluoroalkyl substances (PFAS), drinking water fluoridation, and biosolids

management. A second meeting of the coalition was held in late August.

For the 2022 operator exchange, New Hampshire is exchanging operators with Maine. We have been coordinating with Paula Drouin, the NEWEA state director for Maine. The operator exchange took place on September 21 to 23, culminating in NHWPCA's fall meeting at the Keene water reclamation facility on September 23. Facilities visited by the Maine exchange operator may include Whitefield, Hanover, Lebanon, Sunapee, and Keene.

## News and Events

Casey Maranto and Rebecca Elwood have volunteered for the newly formed NEWEA PFAS task force to represent New Hampshire.

The New Hampshire Municipal Association has published a series of articles on New Hampshire's water and wastewater infrastructure. Mike Carle, chief operator of the Hampton Wastewater Treatment Plant, wrote a recent article, "WIN WITH WATER: It's a Dirty Job, but Someone's Got to do it!" You can read Mr. Carle's article at [nhmunicipal.org](http://nhmunicipal.org).

New Hampshire Ski Day, sponsored jointly by the NHWPCA and the Maine Water Utilities Association, was held on March 17 at Saddleback Mountain in Rangeley, Maine. Forty people registered, and nearly all the registrants attended. The weather was sunny and above 50°F (10°C), and all had fun!

New Hampshire Fish and Game Department's biggest community event of the year, Discover WILD New Hampshire Day, on April 16 in Concord, was well attended. Discover WILD New Hampshire Day is a fun way for the entire family to explore New

## NHWPCA Summer Gathering and Cornhole Tournament



Hampshire's wildlife resources and legacy of outdoor traditions, browse educational exhibits from environmental and conservation organizations, see live animals, fish, and trained falcons, try archery, casting, fly-tying and BB gun shooting, watch retriever dogs in action, enjoy craft activities for the kids, and check out the latest hunting and fishing gear and gadgets. NHWPCA gave away 20 fishing poles (two poles and tickets drawn every ½ hour) and provided pizza.

The NHWPCA Annual Trade Fair, originally scheduled for April 8, was held on May 20 at the Radisson Hotel in Nashua. The exhibit area was open from 8 am to 1 pm with displays of products and services from various companies and organizations. Two technical presentations were included: "Inovair Geared Centrifugal Blowers" was presented by Jeff Mercier (Wright-Pierce) and John Hart (Russell Resources); and "Municipal Stormwater Utilities: What Are They and How to Create One" was presented by Julie Stein (HDR). A luncheon started at noon followed by the awards ceremony and the always popular raffle.

NHWPCA's annual summer outing was held on June 24 at Ellacoya State Park in Gilford. The food and the weather were awesome! The cornhole tournament was the highlight of the event.

The NHWPCA Annual Golf Tournament was held on August 4, at beautiful Beaver Meadows Golf Course in Concord. Tee off was at 8:15 AM, and we made it through most of the 18 holes before the temperature hit a balmy 98°F (37°C)! It was a rollicking good time for all 100 or so who played. The tournament included lunch and a raffle with fantastic prizes.

On August 13, the NHWPCA joined the NHWWA Young Professionals Committee at their annual Fisher Cats Outing and played the first ever "Brown vs. Blue" Softball Friendly game between the associations. The afternoon game was followed by a party suite buffet dinner during

the pro game between the Fisher Cats and the Erie Sea Wolves.

## Legislation

New Hampshire House bills HB 398 and HB 412, relative to state aid grants for municipal wastewater and water system projects, respectively, passed both the House and Senate and were signed by Governor Chris Sununu. HB 398 funds the 11 "forgotten" wastewater projects that qualified for state funding in the current biennium but were not funded due to the pandemic budget freeze, and for 110 additional qualifying projects.

Essential Workers—House Bill HB536 and Senate Bill SB325—passed both the New Hampshire House and Senate and were signed by Governor Sununu. The bills cover death benefits for public works employees killed in the line of duty, and workers' compensation offsets for certain retirement system benefits as well as classification of public works employees as essential workers.

A legislative study (NH1134) on wipes was signed by Governor Sununu on July 1. NHWPCA is working with various groups to propose "DO NOT FLUSH" labeling on wipes similar to that required under legislation signed into law in California on October 6, 2021. If successful in New Hampshire, we want to engage all the New England states in moving similar efforts forward. A YouTube video of the recent legislative public hearing can be seen at [youtu.be/2ef68aCl3bM?t=3785](https://youtu.be/2ef68aCl3bM?t=3785).

I want to recognize the current leaders of NHWPCA: Rob Robinson (president), Ryan Peebles (vice president), Patty Chesebrough (secretary), Mario Leclerc (treasurer), Michael Theriault (1st director), Aaron Costa (2nd director), Nate Brown (3rd director), Peter Conroy (1st director-at-large), and Rebecca Elwood (2nd director-at-large). We applaud them and our committee chairs and other members for their commitment and many contributions.



## Massachusetts State Director Report

by Adam Yanulis  
fayanulis@tighebond.com



### MAWEA Election of Officers

At the June 29 membership meeting, held electronically courtesy of NEIWPCC, the election of members to Massachusetts Water Environment Association's (MAWEA's) Board of Directors was formalized. For all four expiring director terms, the only nominations received were for the incumbents, and all four have agreed to serve for an additional term. Michael Burke and John Downey of Veolia, Jennifer Lichtensteiger of NEIWPCC, and Peter Lyons of Woodard and Curran were all elected to new three-year director terms. They join other directors Robert Delgado of Barnstable, John Digiaco of Natick, Robert Greene of Biosafe Systems, Michael Jennings of Utiliency, Landon Kendricks of Rockwell Automation, Benjamin Smith of EOS, Eric Smith of WhiteWater, and Raymond Willis of Onsite Engineering to form the complete 12-person board. Per the MAWEA succession rules, Benjamin Smith will assume the role of MAWEA president, and John Downey will progress to the role of past president. An organizational meeting of the board will be held soon to appoint remaining officers from the board and other functionaries from the general membership. MAWEA members looking for greater involvement are encouraged to contact any officer via the maweal965@yahoo.com admin address to discuss application for any of the numerous administrative and coordinating roles in the organization.

### Mickey Nowak retirement

The administration of MAWEA is transitioning from the last several years of the successful leadership of Mickey Nowak. Following his long career in the wastewater industry as an operator and manager of various wastewater treatment facilities, he had taken on the role of executive director of Massachusetts Water Pollution Control Association, now MAWEA. Mr. Nowak's commitment to our membership was always evident with his passion for operators, the work they do, and the positive impact they have on our environment. His knowledge of wastewater treatment, collection systems, lab operations, residuals handling, and overall management of facilities made him a

great fit for MAWEA. At the end of June, Mr. Nowak retired for real this time, and was last seen heading for a long summer retreat in the wilderness. His many contributions to our association and our industry were significant and will be missed, though it has been rumored he may remain involved as a rank-and-file member in some critical areas of concern.

MAWEA has made the transition to engaging NEWEA to perform administrative duties, including member services, meeting management, website management, and membership communications. While our organization is thankful for Mr. Nowak's service, we look forward to the next chapter of serving wastewater operators, utility managers, lab professionals, consultants, regulators, and vendors who make up our membership. This transition will be an exciting challenge as we work with NEWEA to enhance and grow MAWEA throughout the commonwealth.

### MA SB 2655—Proposed PFAS Emissions Moratorium

An Act "establishing a moratorium on the procurement of structures or activities generating per- and polyfluoroalkyl substances (PFAS) emissions" has been referred to the Senate Ways and Means Committee. In the proposed bill, "Notwithstanding any general or special law to the contrary, the Massachusetts Department of Environmental Protection shall establish and enforce as necessary a moratorium prohibiting the procurement of PFAS-emitting structures or activities and shall not grant approval to any person required to file an environmental notification form proposing a new use or structure or modification of an existing use or structure where said proposal would generate emissions containing perfluoroalkyl and polyfluoroalkyl substances. Said moratorium shall remain effective indefinitely until the promulgation of PFAS emission standards by both:

- (1) the United States Environmental Protection Agency; and
- (2) the Massachusetts Department of Environmental Protection, the Massachusetts Department of Public

### MAWEA Golf Tourney



Highest scoring team celebrates



The winning team

On June 15, the MAWEA golf tournament was held at the Heritage Country Club in Charlton. Over 100 golfers enjoyed a sunny but cool day on the well-manicured course. An enjoyable day was spent, partly celebrating the freedom to associate in person after so many months of Covid isolation. Among the numerous prizes was an award for

the high scoring team, with a score of—well, never mind! The tournament was a rousing success, and everyone had a great time golfing and enjoying the steak dinner at the 19th hole. Many thanks to all of our event, tee, and green sponsors for their participation!

Health, or other state agency or department otherwise charged with the duty to promulgate regulations relative to establishing a maximum concentration of chemicals deemed consistent with the best interests of the public health and safety of the Commonwealth."

From our industry perspective, this bill would have an impact on the development of potential biosolids disposal solutions involving incineration. It is important for MAWEA members and others to pay close attention to this and other legislation that will tighten restrictions on the practical handling and disposal of biosolids for communities all across the state without reasoned discussion of alternatives.

### Congratulations to John Digiaco

MAWEA Director John Digiaco was recently inducted into the "Select Society of Sanitary Sludge Shovelers," otherwise known as 5S. In January, Mr. Digiaco was elected to this prestigious society, which is made up of NEWEA members who have contributed outstanding service to their associations, NEWEA, and our industry. Mr. Digiaco's formal induction in May recognized his commitment and participation in MAWEA as a member of its board as well as his participation in NEWEA as an officer and vital member of several key committees. He will have his shovel on the next time you see him at one of our events!



Mass Chaos

### Mass Chaos to compete in New Orleans

The Massachusetts Operations Challenge team, "Mass Chaos," participated in the Operations Challenge competition at the Mount Washington Hotel this spring and placed third overall, which made them eligible to compete in the national competition in New Orleans. The team includes (L-R) Paul Russell, Roel Figueroa, Scott Urban, Kelly Olanyk, and Coach Mike Williams. If you are attending WEFTEC in New Orleans, we hope you will head to the Operations Challenge event and support our team.

For upcoming activities, please check our website maweal.com.



# Upcoming Meetings & Events



**Northeast Residuals & Biosolids Conference**  
The Venue, Portsmouth, New Hampshire  
November 1–2, 2022

## AFFILIATED STATE ASSOCIATIONS AND OTHER EVENTS

**EPA INDUSTRIAL PRETREATMENT WORKSHOP**  
UMASS Conference Center, Lowell, MA  
**October 25-27, 2022**

**MASSACHUSETTS HEALTH OFFICERS ASSOCIATION ANNUAL CONFERENCE**  
Sea Crest Hotel, Falmouth, MA  
**October 26-28, 2022**

**WEFTEC 2022**  
New Orleans, LA  
**October 8–12, 2022**

**NEWEA RECEPTION AT WEFTEC 2022**  
New Orleans, LA  
**October 10, 2022**

**PLANT OPS/ENERGY TECHNICAL PRESENTATIONS & TOUR**  
Mattabassett District, Cromwell, CT  
**October 19, 2022**

**NORTHEAST RESIDUALS & BIOSOLIDS CONFERENCE & EXHIBIT**  
The Venue, Portsmouth, NH  
**November 1–2, 2022**

**JOINT NEWEA/NEWWA TECHNOLOGY & ASSET MGMT FAIR**  
NEWWA Office, Holliston, MA  
**November 9, 2022**

**NEWEA ANNUAL CONFERENCE & EXHIBIT**  
Boston Marriott Copley Place Hotel Boston, MA  
**January 22–25, 2023**

**GMWEA FALL CONFERENCE**  
Double Tree Hotel, Burlington, VT  
**November 10, 2022**

**NHWPCA WINTER MEETING**  
The Oaks, Somerworth, NH  
**December 9, 2022**

Measurement unit conversions and (abbreviations) used in the <i>Journal</i>			
U.S.	International System of Units (SI)	U.S.	International System of Units (SI)
<b>Liquid volume</b>		<b>Length</b>	
gallon (gal)	liter (L)	inches (in.)	centimeters (cm)
cubic feet (ft <sup>3</sup> )	cubic meters (m <sup>3</sup> )	feet (ft)	meters (m)
cubic yards (yd <sup>3</sup> )	cubic meters (m <sup>3</sup> )	miles (mi)	kilometers (km)
acre-feet (ac ft)	cubic meters (m <sup>3</sup> )	<b>Area</b>	
<b>Flow</b>		square feet (ft <sup>2</sup> ) or yards (yd <sup>2</sup> )	square meters (m <sup>2</sup> )
million gallons per day (mgd)	million liters per day (ML/d)	acre (ac)	hectare (ha)
for larger flows (over 264 mgd)	cubic meters per day (m <sup>3</sup> /d)	square miles (mi <sup>2</sup> )	square kilometers (km <sup>2</sup> )
gallons per minute (gpm)	liters per minute (L/min)	<b>Weight</b>	
<b>Power</b>		pounds (lb)	kilograms (kg)
horsepower (hp)	kilowatts (kW)	pounds per day (lb/d)	kilograms per day (kg/d)
British Thermal Units (BTUs)	kilojoules (kJ) / watt-hours (Wh)	ton – aka short ton (tn)	metric ton or tonne (MT)
<b>Velocity</b>		<b>Pressure</b>	
feet per second (fps)	meters per second (m/s)	pounds/square inch (psi)	kiloPascals (kPa)
miles per hour (mph)	kilometers per hour (km/h)	Inches water column (in wc)	kiloPascals (kPa)
<b>Gas</b>		<b>Head</b>	
cubic feet per minute (ft <sup>3</sup> /min)	cubic meters per minute (m <sup>3</sup> /min)	feet of head (ft of head)	meters of head (m of head)

# THANK YOU

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**Build relationships with water industry leaders *and* make a positive impact on the water environment**

## Join NEWEA's 2023 Annual Sponsor Program

NEWEA offers companies the opportunity to promote their products and services throughout the year by participating in multiple sponsorship activities. Annual Sponsorships include:

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- NEWEA Spring Meeting & Golf Tournament
- NEWEA Golf Classic
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- The option to customize sponsorship levels by selecting to participate in up to eight additional unique NEWEA events plus additional activities

### Sponsorship Benefits:

- Increased corporate visibility and marketing opportunities before a wide audience of water industry professionals
- Relationship-building access to key influencers involved in advancing water industry services, technology, and policy
- Recognition as an environmental leader among peers and customers

For more information contact Jordan Gosselin  
Email: [jgosselin@newea.org](mailto:jgosselin@newea.org)  
Phone: 781-939-0908



**NEWEA**  
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For rates and opportunities contact Jordan Gosselin  
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Call: 781-939-0908

## Upcoming Journal Themes

- Winter 2022—Funding the Work
- Spring 2023—Water Reuse
- Summer 2023—Small Systems
- Fall 2023—Nutrient Control
- Winter 2023—Innovative Solutions

## NEWEA/WEF\* Membership Application



### Personal Information (please print clearly)

First Name	M.I.	Last Name	(jr. sr. etc)
Business Name (if applicable)			
Street or P.O. Box		( <input type="checkbox"/> Business Address <input type="checkbox"/> Home Address )	
City, State, Zip, Country			
Home Phone	Cell Phone	Business Phone	
Email Address		Date of Birth (mm/yyyy)	
<input type="checkbox"/> Check here if renewing, please provide current member I.D.			
<input type="checkbox"/> Check here if you do NOT wish to receive information on special offers, discounts, training and educational events, and new product information to enhance your career.			

\*NEWEA is a member association of WEF (Water Environment Federation). By joining NEWEA, you also become a member of WEF.

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### Membership Categories (select one only)

	Member Benefit Subscription	Dues	
<input type="checkbox"/> <b>Professional</b>	Individuals involved in or interested in water quality	<ul style="list-style-type: none"> <li><input type="checkbox"/> Water Environment &amp; Technology</li> <li><input type="checkbox"/> Water Environment Research (Online)</li> </ul>	\$190
<input type="checkbox"/> <b>Young Professional</b>	Water quality professionals, with fewer than five years working experience and under the age of 35, are eligible to join. This program is available for new member applicants and Student Members and is available for 3 years..	<ul style="list-style-type: none"> <li><input type="checkbox"/> Water Environment &amp; Technology</li> <li><input type="checkbox"/> Water Environment Research (Online)</li> </ul>	\$75
<input type="checkbox"/> <b>Professional Operator</b>	Individuals in the day-to-day operation of wastewater collection, treatment or laboratory facility, or for facilities with a daily flow of < 1 mgd or 40 L/sec. License # _____	<ul style="list-style-type: none"> <li><input type="checkbox"/> Water Environment &amp; Technology</li> <li><input type="checkbox"/> Water Environment Research (Online)</li> </ul>	\$110
<input type="checkbox"/> <b>Academic</b>	Instructors/Professors interested in subjects related to water quality.	<ul style="list-style-type: none"> <li><input type="checkbox"/> Water Environment &amp; Technology</li> <li><input type="checkbox"/> Water Environment Research (Online)</li> </ul>	\$190
<input type="checkbox"/> <b>Student</b>	Students enrolled for a minimum of six credit hours in an accredited college or university. Must provide written documentation on school letterhead verifying status, signed by an advisor or faculty member.	<ul style="list-style-type: none"> <li><input type="checkbox"/> Water Environment &amp; Technology</li> <li><input type="checkbox"/> Water Environment Research (Online)</li> </ul>	\$15
<input type="checkbox"/> <b>Executive</b>	Upper level managers interested in an expanded suite of WEF products/services.	<ul style="list-style-type: none"> <li><input type="checkbox"/> Water Environment &amp; Technology</li> <li><input type="checkbox"/> Water Environment Research (Online)</li> <li><input type="checkbox"/> WEF SmartBrief</li> <li><input type="checkbox"/> Complimentary WEF Webcasts and more</li> </ul>	\$360
<input type="checkbox"/> <b>Corporate</b> (member benefits for one person)	Companies engaged in the design, construction, operation or management of water quality systems. Designate one membership contact.	<ul style="list-style-type: none"> <li><input type="checkbox"/> Water Environment &amp; Technology</li> <li><input type="checkbox"/> Water Environment Research (Online)</li> <li><input type="checkbox"/> WEF SmartBrief</li> <li><input type="checkbox"/> Complimentary WEF Webcasts and more</li> </ul>	\$420
<input type="checkbox"/> <b>Dual</b>	If you are already a member of WEF and wish to join NEWEA		\$50
<input type="checkbox"/> <b>Associate Membership</b>	This membership category is a NEWEA only membership reserved for the general public who have an interest in water and the environment but are NOT currently employed in the industry (e.g., attorney or supplier). Examples of Associate Members include: teachers; journalists who cover water quality issues; citizen samplers/members of various watershed/ sportsman/conservation organizations, etc.		\$45
<input type="checkbox"/> <b>New England Regulator</b>	This membership category is a NEWEA only membership reserved for New England Environmental Regulatory Agencies, including: USEPA Region 1, CT Department of Energy and Environmental Protection, ME Department of Environmental Protection, MA Department of Environmental Protection, NH Department of Environmental Services, VT Department of Environmental Conservation, and RI Department of Environmental Management		\$50

**WEF Utility Partnership Program (UPP):** NEWEA participates in the WEF Utility Partnership Program (UPP) that supports utilities to join WEF and NEWEA while creating a comprehensive membership package for designated employees. As a UPP Utilities can consolidate all members within their organization onto one account and have the flexibility to tailor the appropriate value packages based on the designated employees' needs. Contact WEF for questions & enrollment (703-684-2400 x7750).

### Payment

<input type="checkbox"/> <b>Check or money order enclosed</b> Made payable to NEWEA 10 Tower Office Park, Suite 601 Woburn, MA 01801 For more information: 781.939.0908 Fax 781.939.0907 NEWEA.org	<b>Charge</b> <input type="checkbox"/> Visa <input type="checkbox"/> American Express <input type="checkbox"/> Master Card <input type="checkbox"/> Discover	Card # _____ Security/CVC _____	
			Signature _____ Exp. Date _____
			Name on Card (please print) _____
<b>Billing Address</b> ( <input type="checkbox"/> check here if same as above )		Street/PO Box _____ City, State, Zip _____	

Depending upon your membership level, \$10 of your dues is allocated towards a subscription to the NEWEA Journal.  
By joining NEWEA/WEF, you acknowledge the WEF Code of Conduct ([www.wef.org/wef-member-code-of-conduct](http://www.wef.org/wef-member-code-of-conduct)) is applicable for all members.

## MEMBERSHIP PROFILE

Please take a few moments to tell us about your background and professional interests.

### What is the nature of your ORGANIZATION? (select only one—required) (ORG)

<b>1</b> Consulting, Contracting, Planning Services	<b>4</b> Manufacturer or Distributor of Equipment & Supplies (including representatives)	<b>7</b> Laboratories	<b>11</b> Utility: Stormwater	<b>14</b> Utility: Wastewater and Stormwater
<b>2</b> Educational Institution	<b>5</b> Non-profits/NGOs	<b>8</b> State or Federal Government	<b>12</b> Utility: Wastewater, Drinking Water, and Stormwater	<b>15</b> Other _____ (please define)
<b>3</b> Industrial Systems/Plants)	<b>6</b> Finance, Investment, and Banking	<b>9</b> Utility: Wastewater	<b>13</b> Utility: Wastewater and Drinking Water	
		<b>10</b> Utility: Drinking Water		

### What is your Primary JOB FUNCTION? (select only one) (JOB)

<b>1</b> Executive Level	<b>4</b> Educator	<b>8</b> Operator	<b>12</b> Sales/Marketing	<b>15</b> IT/OT
<b>2</b> ManagementLevel	<b>5</b> Student	<b>9</b> Scientist/Researcher	<b>13</b> Manufacturer's Representative	<b>16</b> Other _____ (please define)
<b>3</b> Elected or Appointed Official	<b>6</b> Consultant/Contractor	<b>10</b> Legislator/Regulator	<b>14</b> Communications/ Public Relations	
	<b>7</b> Engineering/Design	<b>11</b> Analyst		

### What are your KEY FOCUS AREAS? (circle all that apply) (FOC)

<b>1</b> Air Quality and Odor Control	<b>6</b> Drinking Water	<b>11</b> Laboratory Analysis and Practices	<b>16</b> Research and Innovation	<b>21</b> Utility Management and Leadership
<b>2</b> Biosolids and Residuals	<b>7</b> Energy	<b>12</b> Nutrients	<b>17</b> Resource Recovery	<b>22</b> Watershed Management
<b>3</b> Climate	<b>8</b> Finance and Investment	<b>13</b> Plant Operations and Maintenance	<b>18</b> Safety, Security, Resilience	<b>23</b> Wastewater Treatment, Design, and Modeling
<b>4</b> Collection Systems	<b>9</b> Industrial	<b>14</b> Public Communications and Outreach	<b>19</b> Small Communities	<b>24</b> Water Reuse and Reclamation
<b>5</b> Disinfection and Public Health	<b>10</b> Intelligent Water Technology	<b>15</b> Regulation, Policy, Legislation	<b>20</b> Stormwater	<b>25</b> Workforce

### Demographic Information (Check box ) The following is requested for informational purposes only.

**Gender:**  Female  Male

**Education:**  Doctorate  MA/MBA/MS  BA/BS  AA/AAS  Technical School  High School

### Race/Ethnic Origin (Check box ) The following is requested for informational purposes only.

African-American (Not of Hispanic Origin)  American Indian or Alaskan Native  Asian  Caucasian  Hispanic/Latino  Pacific Islander or Native Hawaiian  Other

### Did Anyone Recommend that You Join WEF?

Referring member's name: \_\_\_\_\_ Referring member's email: \_\_\_\_\_



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