

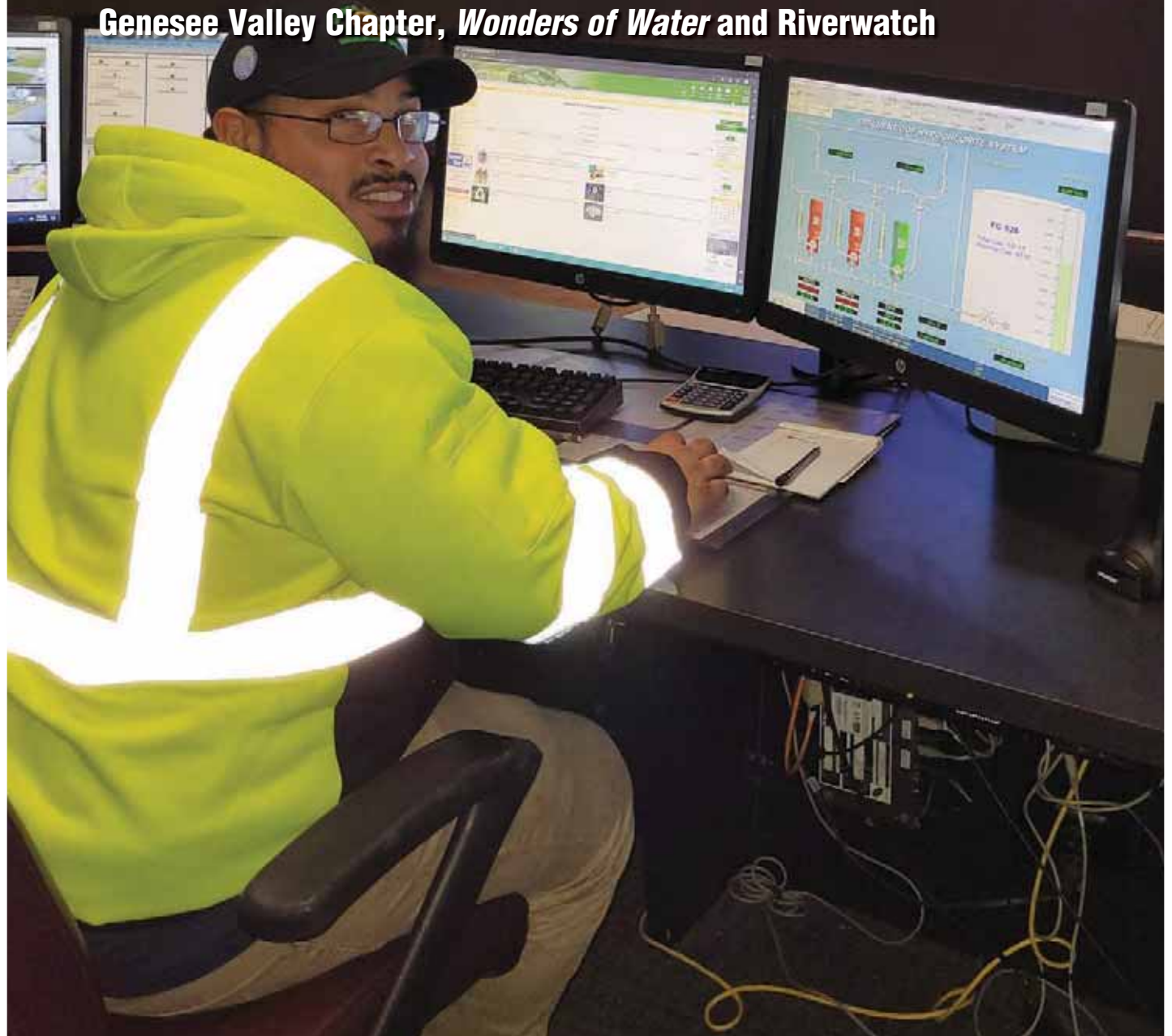
New York Water Environment Association, Inc.

# ClearWaters

**Protecting Water Quality  
in the Genesee River Region**

**Also inside:**

**Highlights of the 95th Annual Meeting,  
Genesee Valley Chapter, *Wonders of Water* and Riverwatch**





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Cover: From the operator chair in the Frank E. Van Lare Water Resource Recovery Facility (WRRF) control room, water resource recovery operator trainee Raphael Santiago oversees the Van Lare and Northwest Quadrant WRRFs, as well as the collection, security and tunnel systems. *Monroe County DES*

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## President's Message | Spring 2023



Spring is in the air, my friends! I am still over-the-moon excited about the success of our IN-PERSON annual meeting this year! Though we have gotten together over the past year at the Spring Meeting in Syracuse and WEFTEC in New Orleans, there is nothing quite like the excitement of New York City and the chance to see so many friends all be “Everything, Everywhere, All at Once”! (If you haven’t seen this movie, you absolutely must! But I digress ...).

We wrapped up President Dodson’s Year of the JEDI with an illuminating opening session with speakers who challenged our ideas and perceptions while asking us to open our eyes to other perspectives. We learned to use the JEDI principles to strengthen our workforce and invite new faces and fresh ideas into our NYWEA family. I also used my own version of the “Force” to convince President Dodson that it was time for a leadership transition!



“A peaceful transition of power.”

Trent Wellott

### Celebrate Our Essential Workers

And now, we move on to Celebrate our Essential Workers! When I first became a wastewater operator, I was 43 years old. Even though I had family in the business, I really didn’t understand what the work entailed, and the impact that the folks who work in water resource recovery truly had on our environment. I was concerned about what people would think about a middle-aged woman starting a career in wastewater. Luckily for me, the salary was tempting enough that I put my trepidation aside and jumped in (metaphorically of course) with both feet. This was my first opportunity to work in a blue-collar field and it was truly eye-opening. I have so much respect for my brother and sister operators and all that they do each and every day that goes overlooked by both the public, the administrators, and oftentimes even themselves. This is why I take every opportunity to shout it from the rooftops, “WHAT WE DO MATTERS!” One of the best ways we can let the world see what we do is to share our stories, and there are some great ones being told in these pages.

This issue of *Clear Waters* highlights the Genesee Valley Chapter and some of their shining stars. The article *Monroe County DES Collection System Operator Training Program* was inspirational to me. Here is an example of a municipality that values the professional status of their employees, helps them achieve it, and rewards them when it is obtained. The graduates of this program then turn around and become the instructors. In the end, there is a more highly trained staff with a network that they can rely upon for help and advice. What more can you ask for?

Of course, anyone who knows me will understand how much I enjoyed Angelo DiNottia’s article about the Genesee Valley Water Recyclers Operations Challenge team! Ops Challenge is my passion and watching the degree of commitment and professionalism that these competitors show is awe-inspiring, not to mention the work that goes on behind the scenes for the judges and coordinators. All these people come together to showcase what we do and to hone their skills.

And why do we do these things?? To protect public health, our environment, and the quality of life for the residents that we serve. We learn about the experiences at the facilities in Wayne County, the Village of Bath, the Town of Webster and the Chosen Spot of Canandaigua through the eyes of the people who do the work every day.

And then there is an integral component of the celebration, the public outreach! How better to achieve that than educate the children of our communities. The Rochester Museum and Science Center has taken on this task brilliantly. Through fun and interactive exhibits, they encourage children and teens to explore the *Wonders of Water!*

### 2023 NYWEA/NEWEA Spring Meeting

Looking forward, we still have much work to do. I am honored to represent you all and am excitedly anticipating the challenges of the upcoming year. But most of all, I hope to see you all at the joint NYWEA/NEWEA Spring Meeting, June 7 through 9, 2023. NEWEA President Bob Fisher and I are thrilled to welcome you all to network with our counterparts from New England, to enjoy a robust technical program, and to witness the largest regional Operations Challenge competition in the history of the event. We will also be saying goodbye to our beloved Executive Director Patricia Cerro-Reehil. There will be laughter and I’m sure a few tears, but a good time will be had by all! See you in Saratoga Springs!



Donna Grudier  
NYWEA President





**Khris and Patricia relax by the water after hiking Bear Mountain State Park on the Hudson River.**

### An Amazing Flight of Time

This is my last quarterly message in *Clear Waters* magazine as executive director. It has been my honor to serve this organization these many years, and I really can't believe how fast the time has, literally, flown by!

I began working for the New York Water Pollution Control Association in 1987, under the leadership of then-Executive Secretary Robert "Bob" Hennigan. I followed in his footsteps, becoming executive director in February 2000. Looking back, I can hardly believe it's been that long! Taking stock of the changes over three decades, I am amazed at the progress made in our industry – and I feel proud in having been part of it.

When I first started in 1987, we had computers, but no cell phones, no internet, no clouds for storage and no email! We used fax machines and paper reigned! Unfortunately, there was little in the way of recycling. (Although NYWEA played a role in the Bottle Bill and its expansion!) It's even more overwhelming to consider the technological advances that changed our industry, an evolution that continues apace every single day. It's exciting to ponder, what's next?

As our industry changed so did the language used to describe what we do. Water pollution control became wastewater treatment. Wastewater treatment became water resource recovery, terminology that more accurately reflects the precise work the clean water industry carries out. I'm hopeful these changes in terminology helped usher in a new era of awareness of the value of water among elected officials and the public. Recent increases in funding for clean water infrastructure may indicate that it has; the Clean Water, Clean Air, and Green Jobs Environmental Bond Act is just one example – \$4.2 billion! Wow! Our work has always mattered, and I believe it is appreciated more now than ever.

During my meetings, board members could smoke in windowless rooms and *all* of them were men. This has changed dramatically over three decades. I've gone from being the only woman in the room, to today preparing for consecutive women to serve as NYWEA president. Lisa Derrigan will become president in 2024. Our current president, Donna Grudier, becomes only the second female chief operator leading the organization since Gale Wolfe in 1994, the first woman to do so. Another

notable first for me: seeing three women – Lauren Livermore, Shannon Harty and Angela Delillo – at the head of the table during the Utility Executives Meeting at NYWEA's 95th annual meeting.

It has been really refreshing to see a healthier work-life balance taking place, bringing different people skills to the surface by disconnecting, listening better and ensuring everyone is heard. That sort of awareness and empathy complements the good work of the Diversity, Equity and Inclusion Committee. Their recent kick-off of the WEF Introducing Future Leaders to Opportunities in Water program (InFLOW) aims to enhance diversity in the water workforce. Though there's still work to do, the diversity among chief operators in New York state has grown exponentially since I started in 1987. That is fantastic to see!

Speaking of growth, NYWEA's scholarship program has grown in dollars and in the number of scholarships awarded. We now have several named memorial and operator scholarships for people entering the field. Our assets have grown significantly too, as has our total membership, including over 400 hard-working and dedicated volunteers. Without them NYWEA wouldn't exist. They identify the programs we pursue and determine the path forward for this great organization. I look back with tremendous satisfaction at our growth – and my own – but always bear in mind something Bob Hennigan used to say: no one is indispensable. It is a humbling thought that I will never forget.

To do any job well takes commitment and dedication. Our operators practice this every day as they make themselves available 24/7, on holidays and birthdays, and without fail when least expected (think the Blizzard of 2022!). This takes incredible loyalty and caring for others. Operators must respond quickly to situations affecting water quality, which of course is paramount to keeping people healthy. ***Our NYWEA operators are a community of environmental professionals not unlike paramedics ... an emergency response team for the environment. Your jobs are really a calling and a service to humankind, and we are grateful for the work you perform!*** It has been an incredible privilege to visit many utilities and see the operators that innovate, create and proudly serve their communities.

### Looking Ahead

Members, volunteers and staff all bring unique talents to NYWEA, and our successes are the work of many hands. When you look at the mission of NYWEA, and the work that is carried out, ***it's the people that help bring the institution to life and make our organization so special!***

As I prepare to step down, I am so pleased to introduce my successor, NYWEA's own immediate Past President Khris Dodson! Khris' education, experience and enthusiasm for our environmental mission, combined with his knowledge of and care for the organization's volunteers, make him uniquely suited for this role. I know that, in concert with the amazing staff we have, he will carry on and do great things for NYWEA!

Again, thank you for the privilege to serve as a leader of this amazing organization. A special thank you to NYWEA's dedicated staff and the incredible volunteers and Past Presidents I have had the pleasure to work with. Time has indeed flown by, and it has truly been the opportunity of a lifetime!

  
Patricia Cerro-Reehil, [pcr@nywea.org](mailto:pcr@nywea.org)

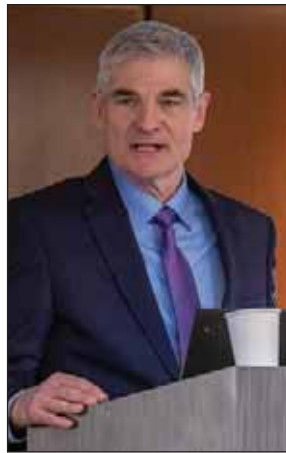
# A Few Highlights of NYWEA's 95th Annual Meeting



President Khristopher Dodson addresses the members in an overflowing Opening Session.



Commissioner Rohit T. "Rit" Aggarwala, NYCDEP, speaks in the Opening Session.



Peter Grevatt, Chief Executive Officer, Water Research Foundation, during the Opening Session.



William Brizzell, Director, Division of Engineering of NYSEFC, talks about funding opportunities.



Walt Walker, Chair of the DE&I Committee, introduces the InFLOW Scholars.



Jen Muir receives the Kenneth Allen Memorial Award.



Above: InFLOW Scholar Giovalli Botello speaks during the Opening Session.



Alex Emmerson talks about the seiche that took place on Lake Erie.



Panelists discuss "Justice, Equity, Diversity & Inclusion on Workforce Sustainability." Top right, Lisa Garcia, Administrator USEPA Region 2; bottom right, Nicole Brown, Suburban Consulting Engineers; bottom left, Aimee Killeen, WEF President-Elect.



Craig Hurteau, Albany County, moderates Session 12.



Lucy Grassano Scholarship winners (l-r): Erik Hartmann, Scott Owen, Timothy Keegan, Nicholas Sullivan and Joseph McDonald.



Rosey Nogle, Buffalo Sewer Authority, indicates snow depth of the Blizzard of 2022.



Many session rooms were standing room only!



Joe Clark of JWC Environmental.



Magdalena Gasior and Walt Walker.



Winner of the Outstanding Student Service Award, Julia Boyne (center) with fellow students, l-r: Noah Bohl, Samantha Finlay, Drew Fedele and Christopher Ginter.



Silvia Marpicati receives the John Chester Brigham Award.



Lina Posso, left, and Darcy Sachs.



(L-r:) Jessica Chiu, Shayla Allen, Mariana Costa Tomazelli and Brian Barkwill.



Kate Edden, left, and Erika Jozwiak.



Khri Dodson is recognized by incoming President Grudier.



Over 500 people attend the YP event!



Iris Giboyeaux and Shrinivasan (Shri) Sewgobind.



Siwei Chen, left, receives the 1st place student paper competition award worth \$600. Krish Ramalingam happily looks on.



Tucker Cox, left, and David Railsback.

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## Water Views | Spring 2023



### Clean Water for the Genesee River

The Genesee River Valley is endowed with beautiful vistas, finger lakes, waterfalls, stunning state parks and other places to enjoy. Unfortunately, the Genesee River is burdened with excess nutrient phosphorus and sediment, which then burdens Lake Ontario. Most of these water pollutants are from diffuse sources on the landscape – often referred to as nonpoint pollution.

To address phosphorus and sediment pollution within this large watershed, NYSDEC collaboratively developed a Nine Key Element Watershed Plan in 2015. This plan provides a science-based road map on how to effectively focus conservation efforts and management practices to improve water quality.

Since 2015, NYSDEC's Water Quality Improvement Project (WQIP) grant program has awarded \$10.5 million to projects in the Genesee River watershed to reduce phosphorus. Other grant programs operated by the Environmental Facilities Corporation and the state Department of Agriculture & Markets have provided additional water quality investments. Projects include land acquisition to protect drinking water sources, stream and shoreline restorations, green infrastructure, farm management practices, and upgrades to wastewater treatment facilities. Given the prime focus on "non-point" pollution, county Soil and Water Conservation Districts are key implementation partners.

Clean water infrastructure can be expensive but deferring investments only adds costs. New Yorkers understand the importance of investing in the protection of our environment, as demonstrated by

the passage of the landmark \$4.2 billion Clean Water, Clean Air, and Green Jobs Environmental Bond Act in November 2022. These funds will be central to our efforts to enhance the overall ecology and resiliency of the Genesee River.

The Bond Act describes how funds should be used and invested. In addition to protecting and improving our water resources, the Bond Act will help restore critical environmental habitats, reduce flood risks, conserve open space, and reduce carbon emissions. Bond Act funds will be deployed in a manner that equitably includes disadvantaged communities, communities that are often overburdened with environmental insults or limited outdoor recreational opportunities.

It is likely that a significant portion of Bond Act funds will be allocated to communities through competitive funding programs already in place. While there may be new or heightened focuses, it is likely that funds will go to help bolster existing, popular water grant programs. To the extent communities are able, it makes sense to start in on the technical formulation of specific proposals for action, be it for water quality, flood resiliency, energy efficiency or open space preservation.

The Genesee River Basin Nine Key Element Watershed Plan remains a key blueprint for communities within the watershed to identify projects and apply for Bond Act and other state grant funding. The future will have cleaner water because of actions and investments the Genesee Valley community undertakes now.

Genesee River Nine Key Element Watershed Plan: [https://www.dec.ny.gov/docs/water\\_pdf/geneseenineelement.pdf](https://www.dec.ny.gov/docs/water_pdf/geneseenineelement.pdf)

– James Tierney, Deputy Commissioner for Water Resources

New York State Department of Environmental Conservation

## Focus on Safety | Spring 2023



### Respirators: Nothing to Sneeze At (or In)

I was still in the environmental field, working in a cancer-hazard area, when I first wore a respirator. I was simply issued a half-face air-purifying respirator with cartridges and told to tighten the straps. Many years later, in a NIOSH training course, the instructor asked me to be the test subject for the respirator class. I agreed (not realizing what I was in for). He said, with my small facial bones, I would be difficult to fit. For qualitative fit

testing, I donned the half-face respirator, he placed a hood over my head and put irritant gas under the hood. My respirator leaked badly, I coughed like crazy, and the class had a good laugh. Next, I donned a full-face respirator, with tubing attached, for quantitative fit testing. I entered the test booth, corn oil aerosol was released into the booth, and the difference in aerosol was measured between the mask and the booth. At a protection factor of 500-to-1, he stated that a full-face respirator would be the best protection for me. Now you tell me!

The NIOSH instructor showed us his respirator collection – including one with a hole so the wearer could smoke a cigarette. I thought that was a doozy until I told this to a colleague. She once dealt with a worker who had affixed a holder to his respirator so he could smoke a pipe while wearing it!

I was in a workplace where workers needed protection from both dust and an organic solvent. A worker had screwed in a particulate cartridge on one side and an organic solvent cartridge on the other side. ("Did you put a sign on your nose so that the dust and the solvent would know which sides to enter?" – oh, the things you want to say, but can't.) When conducting training in a woodworking shop, I saw workers wearing N95 respirators with the lower strap missing. I asked one of the workers, "What happened to the lower strap?" He said, "that strap bothers me, so I just cut that sucker right off."

An employer asked me to measure an air contaminant in a manufacturing department where workers had requested respirators. Air sampling indicated there was no regulatory overexposure, but the chemical smelled like rotten fish, an odor so foul and sickening I definitely recommended respirators anyway.

An employer asked my advice about a worker with two recent heart attacks who wanted to return to work but couldn't unless he could wear a respirator. I suggested changing the respirator to a powered air-purifying respirator (PAPR). The PAPR has a battery pack, worn on the belt, which powers a little fan to pull air through cartridges and up to the facemask, relieving the wearer from the strain of inhalation through the cartridges. The worker's doctor approved this option, and the employee could work for two more years until he retired. Of course, on hot summer days, the PAPR blew refreshing air over his face; his envious co-workers wished for PAPRs, too.

– Nellie J. Brown, MS, CIH, ILR School, Cornell University

# Experience and Knowledge Come Together: Genesee Valley Chapter's Industrial Issues Committee

by Marshall Shannon, Libby Ford and David Murtha

**T**he Genesee Valley Chapter's Industrial Issues Committee (GVC-IIC) is a group of multi-disciplined environmental professionals who come together on a regular basis to:

- discuss regulatory issues
- share their real-life challenges, ideas and possible solutions affecting environmental, health and safety (EH&S) issues in our community
- provide educational opportunities on these topics

The GVC-IIC's roots date back to the late 1970s. In those days, New York's State Pollutant Discharge Elimination System (SPDES) program and Monroe County's Industrial Pretreatment Program were relatively new, and key individuals within both the New York State Department of Environmental Conservation (NYSDEC) and Monroe County Pure Waters (now the Department of Environmental Services, or MCDES) saw the need for outreach and training. To this end, educational seminars were organized, and permittees were invited to attend. Through these seminars early GVC-IIC members recruited additional members from industry and local consulting firms and expanded their activities to include regular meetings focused on regulatory issues and information sharing. The group quickly found there was great benefit in sharing experiences among GVC-IIC members.

The GVC-IIC meets bimonthly, and meetings are hosted on a rotating basis by our committee members. The morning-long meetings are centered on a substantive roundtable discussion where attendees from local industry and consulting firms share their current challenges, inviting suggestions and recommendations from each other. Typical topics of discussion include current and proposed regulations, EH&S best management practices, innovative technologies, and much more. Everyone attending the meeting is given an opportunity to ask questions and provide input as they see fit. The widely popular roundtables are followed by regulatory updates given by representatives of NYSDEC, MCDES and veteran GVC-IIC members who closely follow New York's and USEPA's legislative, regulatory, enforcement and judicial activities.

The structure of our group is purposely informal, with the positions of chair and vice-chair filled by volunteers for a period of one calendar year. Subcommittees are formed as needed to address issues or activities based on the committee's interests. The GVC-IIC's finances are managed by the Genesee Valley Chapter treasurer, with all funds held in the chapter's accounts. We also rely on the chapter for our web presence, maintenance of our mailing list, and distribution of news and event notices. While joining NYWEA is strongly encouraged, it is not required.

Over the years GVC-IIC activities have grown to include several initiatives that benefit both our members and our community. These include:

- annual wastewater compliance awards
- cash grants designed to promote environmental education and awareness
- environmentally-focused outreach and volunteer efforts within our community
- an annual technical seminar

## Compliance Recognition Awards

Each year the GVC-IIC recognizes local facilities that have achieved exemplary compliance with their SPDES and/or pretreatment permits. Awards are given for varying levels of compliance – gold for 100%, silver for 99%, and bronze for 98%. Applicants are also required to be active in the GVC-IIC and must not be in significant non-compliance with their discharge permit. Award winners are individually recognized during a luncheon ceremony and receive a signed certificate suitable for display. These awards are highly valued by local industrial and institutional permittees. Many of the winners prominently display their awards in public spaces and make note of them in newsletters and annual reports. The awards demonstrate the success of a company's commitment to consistently achieve wastewater discharge compliance.

## Environmental Education Grants

The GVC-IIC makes cash grants available to local not-for-profit organizations in support of environmental education, environmental awareness and community good works. Grants are based on the need and merit of each project. Requirements include:

- the project has yet to be completed
- the money will be used for the specified project
- without GVC-IIC support the project may not occur

Applicants are asked to describe how their activity/program relates to environmental education and awareness in the Genesee Valley region. They are also required to provide pertinent dates and timelines, number and type (students, adults, etc.) of people impacted, and the expected outcome of the activity. Last, the GVC-IIC requests that recipients acknowledge the NYWEA/Genesee Valley Chapter in some appropriate manner for the contribution received and provide a report of the success of the project. Specific grant requests are presented to the full GVC-IIC with a recommendation from the Grant Subcommittee to evaluate the request, and funds are allocated based on the approval of a majority of the GVC-IIC members in attendance at any bimonthly meeting.

## Community Outreach

The GVC-IIC routinely contributes to the betterment of our community through a variety of volunteer efforts. Examples include the monitoring of local waterways via stream macroinvertebrate biomonitoring, removing trash and debris from public spaces and maintaining trails.

Most recently we have directed our efforts into maintenance of the Regional Green Infrastructure Showcase at the Rochester Museum & Science Center (RMSC). This outdoor exhibit includes an education pavilion with a "green roof," bioretention areas to capture stormwater runoff, rain gardens, rain barrels, a porous parking lot and interactive displays. Our funds helped underwrite the installation of in-situ monitoring equipment integral to the Green Infrastructure Showcase, and this equipment is used by Rochester Institute of Technology EH&S students to collect and analyze the data output as part of their pre-graduation capstone project.

## Annual Joint AWMA/NYWEA Seminar

Twenty-five years ago, the GVC-IIC joined forces with the Genesee Finger Lakes Chapter of the Air & Waste Management Association (AWMA) to offer an annual technical seminar. Over the years this event has developed into one of the premier gatherings of multi-discipline environmental professionals across New York state. The event typically draws over 250 participants including industrial EH&S managers, consultants, state and local regulators, environmental contractors, and a variety of environmental service providers. The seminar's format is comprised of a morning-long plenary session focused on major trends and issues in the environmental field, followed by an afternoon of breakout sessions specific to air, water, solid/hazardous waste and energy/sustainability. In short, this seminar provides the perfect blend of technical education and a relaxed atmosphere where old friends and acquaintances can reconnect. The proceeds from this event are directed into community grants and academic scholarships.

## Conclusion

For over four decades the GVC-IIC has served as a forum where EH&S professionals can develop relationships and exchange information that benefit our community. Our success is due in no small part to the support of numerous individuals, companies and organizations, including:

- General Motors Corp.'s Rochester facility
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However, as we all know, the past is no guarantee of future success. In recent years, the viability of our group has been challenged on several fronts. These challenges include a waning interest on the part of regulated entities (especially those that would benefit most from participation), a younger workforce that increasingly prefers a virtual work environment, and regulators that are wary of creating the appearance of favoritism. And as one would expect, the COVID pandemic only exacerbated these challenges.

Looking toward the future, our committee is working hard to reinvent itself while holding onto many of the characteristics that have proven valuable over our long history. At present we are making plans to add a professional development segment to our bimonthly meetings, streamlining our regulatory update process and actively recruiting new members. First and foremost, however, we are working hard to get the word out to local industries and institutions. The benefits of focused, professional networking should be obvious. No one individual has all the answers, and easy access to our collective experience can only enhance everyone's ability to succeed. Essential to this messaging will be convincing EH&S professionals, as well as their management, that a few hours away from the office has a very real monetary benefit.

---

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# Wayne County Water and Sewer Authority

by Martin J. Aman

The Wayne County Water and Sewer Authority (WCWSA) is a public benefit corporation created by special state legislation in 1987. The WCWSA was originally created as a water authority only, with the sewer designation added in 1990. Through its board of directors, the WCWSA has the powers necessary to plan, finance, operate and manage water and wastewater systems throughout Wayne County, including the power to fix and collect rates, fees, and charges adequate to pay the costs associated with operation and maintenance of the systems within its service area. The WCWSA's revenues are generated primarily from water and sewer sales and construction revenue, with WCWSA's crews installing approximately 45,000 linear feet of new water main annually under contract with local towns.

Today, the WCWSA provides water and/or sewer services to approximately 50,000 people throughout Wayne County (Figure 1). The WCWSA currently employs 45 full-time employees along with several part-time and seasonal employees who assist with hydrant painting and facilities upkeep.

In addition to approximately 650 miles of water transmission and distribution mains, the WCWSA operates and maintains over 50 primary facilities including:

- approximately 21 master metered water pits
- assorted control valve stations

- eight water pumping stations
- 17 sewage pumping stations
- 13 water storage tanks
- three wastewater treatment plants (WWTP)
  - WCWSA Eastern Regional WWTP
  - Town of Lyons WWTP
  - Town of Macedon WWTP

The WCWSA also maintains four low-pressure sanitary sewer systems (Town of Palmyra, the Blind Sodus Bay District in the Town of Wolcott, the South Street and Canada Street system in the Village of Red Creek and the Port Bay Sewer District in the towns of Huron and Wolcott), along with traditional gravity sanitary sewer mains and/or force main systems in the former Village of Lyons, former Village of Macedon, Village of Red Creek and the Hope Village development in the Town of Huron. Wastewater flows from the various WCWSA-operated treatment plants discharge to tributaries of Lake Ontario or to the Erie Canal System, based on plant location.

## Major Ongoing Capital Projects

### Western Wayne County Regional WWTP Project

The WCWSA and the towns of Macedon, Marion, Palmyra, and Walworth are working together with the Village of Palmyra to

*continued on page 14*

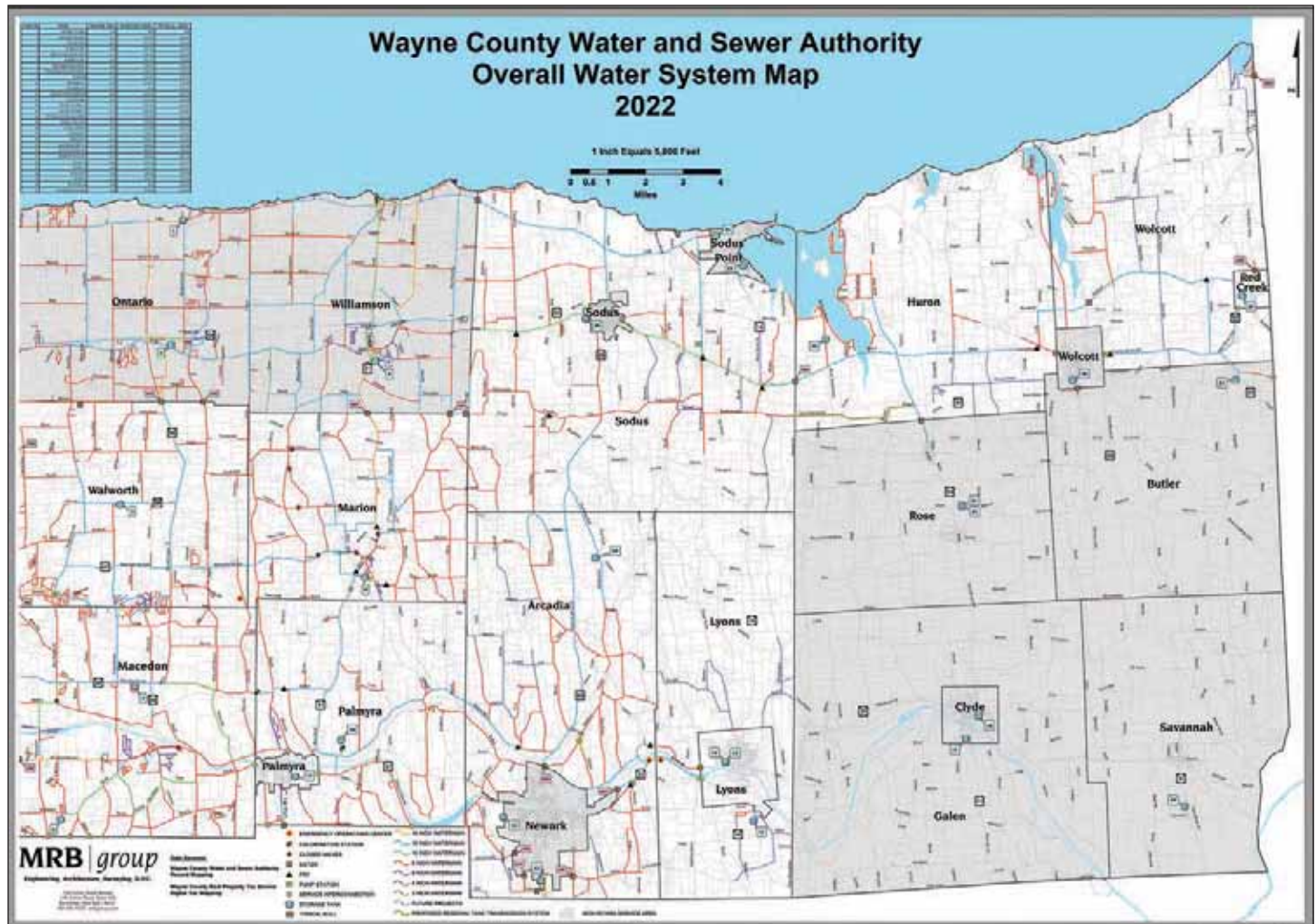


Figure 1. The Overall Water System Map of Wayne County shows the WCWSA service areas in white, while non-WCWSA service areas are in gray.

WCWSA

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WCWSA UV Disinfection Project at Eastern Regional WWTP. WCWSA

plan for and build a new regional wastewater treatment facility. Currently, four of the communities own and operate their own existing treatment facilities, which are all faced with aging infrastructure issues and more stringent regulatory requirements. Given the significance of the necessary upgrades and associated costs, the communities engaged the WCWSA and their consultants to evaluate the feasibility of a regional approach that would provide a more cost-effective long-term solution. The resultant regional approach eliminates the need for each community to undertake the substantial cost implications of independent upgrades.

The new Western Regional WWTP will be built adjacent to the Village of Palmyra’s existing wastewater facility on Route 31 in the village. This new facility will be built with a permitted treatment capacity of 3.0 million gallons per day (mgd), with existing average daily flows of approximately 1.5 mgd at startup. New pumping stations, screening facilities, and transmission systems will convey wastewater from each community to the new regional WWTP, thereby consolidating operations into one modern and more efficient facility. Once the new plant is up and running, the outdated facilities will be decommissioned and taken out of service.

Based upon current bidding conditions as reflected in actual bids received, the overall project budget has now been revised to \$110 million. The WCWSA was very fortunate to recently be awarded an intermunicipal grant in the amount of \$30 million through New York State Environmental Facilities Corporation for the project. This award reflects the strong commitment of New York state toward regional projects such as this with clear long-term financial and environmental benefits to multiple communities.

Construction on this project is expected to begin in early 2023 with an estimated completion date of 2025.

**Regional Water Storage Project**

The WCWSA and the towns of Arcadia, Huron, Lyons, Marion, Sodus and Williamson are working collaboratively to construct a regional storage project to provide enhanced water storage and related redundancy and water system resiliency for the central portion of Wayne County. The primary components of the project include:

- a new 2-million-gallon water storage tank located on Brantling Hill Road in Arcadia
- a new pumping station on Route 88 in Sodus
- improvements to the Route 21 pumping station in Williamson



WCWSA Regional Water Storage Project. WCWSA

- approximately 18 miles of transmission main
- a secondary transmission connection into Huron
- a transmission crossing of the Erie Canal in Lyons

This project will be completed in early 2023 with an estimated final project cost of approximately \$11.4 million.

**Looking Ahead**

The WCWSA continues to experience steady, controlled growth in Wayne County, with the expansion and upgrading of water and sewer systems remaining as a common challenge for many communities. Like all water and wastewater utilities in New York state, the WCWSA is working with its service area communities to help keep user costs down despite greatly increased material and labor costs, supply chain issues, increasing regulatory pressures and operator shortages.

The WCWSA takes great pride in its many dedicated employees who work hard to deliver vital and exceptional service to our customers. With proper planning and solid guidance from its board of directors, the WCWSA remains well positioned to continue serving the water and wastewater needs of Wayne County well into the future.

*Martin J. Aman is the executive director of the Wayne County Water and Sewer Authority and may be reached at [maman@wcwsa.org](mailto:maman@wcwsa.org).*



WCWSA Operations Building entrance. WCWSA



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# The History of Monroe County Pure Waters and the CSOAP System

by Clement Chung

For several thousand years, major civilizations around the world have had some form of sanitary drainage, removing domestic sewage from dense urban areas to less populated sites. Over time, open drains were replaced with piped flow, and interceptor sewers were designed to convey wastewater away from city centers.



Monroe County DES staff touring the CSOAP Culver-Goodman Tunnel.  
*Monroe County DES*

Combined sewers were a common design in cities in the 19th century, as there was no meaningful differentiation between sewage and stormwater. At the time, this was an acceptable solution: impervious surfaces were limited and what stormflow did enter the sewers could be useful in diluting flow and flushing deposits. However, as cities grew rapidly with industrialization, combined sewer capacity became increasingly overwhelmed and combined sewer overflows (CSOs) into local watercourses became a common occurrence.

Early solutions to water sanitation were heavily based upon the philosophy of dilution. To those responsible for managing sewer infrastructure, CSOs during storm events were assumed to be acceptable due to the reduced concentrations of pollutants when discharging to larger body of water. However, this was highly dependent on the efficiency of dispersal and the assimilative capacity of the receiving waterbodies.

Eventually, cities such as Rochester, New York, grew to the point where the frequency and volume of overflows, and the aggregated mass of pollutants they carried, degraded the health of these waterbodies. In the Rochester area, these waterbodies are the Genesee River and Irondequoit Bay. By 1980, the estimated total annual discharge into both waterbodies was 1.9 billion gallons, 88% of which went into the Genesee River. As our understanding evolved, studies performed by the Federal Water Pollution Control Agency (the predecessor to the

U.S. Environmental Protection Agency) demonstrated that earlier expectations about dilution did not prove to be true: pollutant loadings in CSOs were just as high as in raw wastewater.

The seeds of Monroe County's approach to addressing the CSO problem were sown in the 1950s and 1960s. Comprehensive sewerage studies were performed that supported the creation of a county-wide wastewater management entity, which was eventually established as the Monroe County Pure Waters Agency (after New York voters overwhelmingly approved the state's Pure Waters Program). The agency, under the leadership of State Senator Frank E. Van Lare, commissioned the first *Monroe County Pure Waters Master Plan*.

## Pure Waters Master Plan

Published in 1969, the *Pure Waters Master Plan* acknowledged twin drivers for action: increased pollution from overtaxed combined sewers and increasing interest in using water resources for recreation. According to projections at the time, the population of Monroe County was expected to almost triple to 1.5 million over the 50-year planning period (the actual population in 2020 turned out to be half that at 750,000). Focusing on the City of Rochester, where 75% of the sewers were combined, the dry weather flow was expected to grow from 108 million gallons per day (mgd) to 260 mgd. Significantly, the *Pure Waters Master Plan* recognized the environmental harm caused by untreated discharges to the Irondequoit Bay that, compounded by its long hydraulic detention time of up to one year, was "fast making [the bay] a highly-fertilized waste treatment unit."

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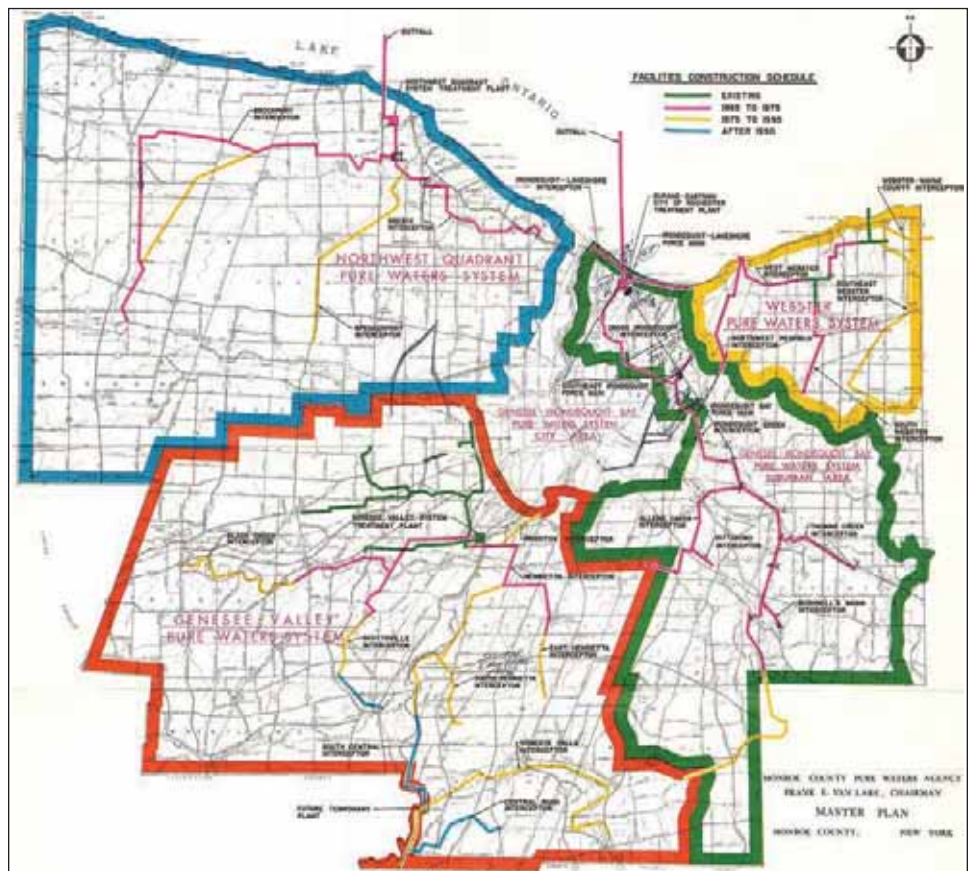


Figure 1. Pure Waters Districts as proposed in the *Pure Waters Master Plan*.

*Monroe County DES*



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To address these issues, the *Pure Waters Master Plan* identified a number of strategies, including:

- Maximize conveyance of combined sewage to water resource recovery facilities (WRRFs), and chlorinate remaining CSOs.
- Limit effluent discharge to Lake Ontario and Genesee River only.
- Increase treatment efficiency to minimum 85% removal of biochemical oxygen demand (BOD) and total suspended solids (TSS) removal and minimum 80% removal of phosphorus.
- Provide year-round disinfection to achieve less than 2,400 coliform bacteria count.
- Provide primary treatment and phosphorus removal at a minimum for wet weather flow.
- Rehabilitate local collection systems to limit infiltration.
- Extend the outfalls of WRRFs that discharge to Lake Ontario to beyond the impaired Rochester Embayment.
- Require industrial wastewater to be discharged into public sewers wherever possible.
- Only permit septic systems when public sewer is not available.

The *Pure Waters Master Plan* envisioned dividing the responsibilities for collection and treatment into four regional systems serving the Lower Genesee River and Irondequoit Bay tributaries, the Northwest Quadrant of Monroe County, the Genesee Valley area (already organized as the Gates-Chili-Ogden Sewer District) and the Webster area in the northeast of the county (*Figure 1*). This vision is somewhat reflected in the Pure Waters Districts that exist today. The plan led to the reduction of the number of WRRFs spread throughout the county from 42 to five. Under Monroe County Pure Waters, the Frank E. Van Lare WRRF serves the Rochester, Irondequoit Bay-South Central and Gates-Chili-Ogden districts, and the Northwest Quadrant WRRF serves its namesake district. The Town and Village of Webster did not join the Pure Waters system and both operate their own publicly owned treatment works, as does the Village of Honeoye Falls at the southern border of the county.

While consolidation of WRRFs accommodated incredible strides in treatment improvement and efficiency, the question of how to address CSOs in the Rochester Pure Waters District remained. Moreover, with the passage of the Clean Water Act in 1972, more stringent water quality standards were enacted than were considered in the *Pure Waters Master Plan*. Prior reports and analysis had evaluated possible abatement solutions, including collecting tunnels with multiple surface-level holding basins. The first phase of the Cross-Irondequoit Tunnel, the first collection tunnel to be constructed, served as proof-of-concept that tunnels could be used not just for conveyance but also for storage, eliminating the need for surface basins.

### Combined Sewer Overflow Abatement Program

In 1974, the *Combined Sewer Overflow Abatement Program (CSOAP) Facilities Report* was published. The program adopted a total overflow abatement philosophy built upon the following guidelines:

- CSOs constituted the major remaining source of water pollution.
- Stormwater discharges also needed to be addressed.
- Overflow quantity and quality data should be measured.
- Construction should take place over five to 10 years depending on the availability of federal and state aid.
- The program should be phased to expedite implementation of priority components.

Phase I projects were to eliminate all CSOs to the Erie Canal,

Irondequoit Bay and Genesee River upstream of High Falls via interceptor sewer and tunnel construction. Phase II projects would eliminate all remaining CSOs (as well as some stormwater overflows) and would include tunnels and high-flow management facilities.

Building upon the *CSOAP Facilities Report*, the final long-term control plan was prepared in 1977 as the *CSOAP Wastewater Facilities Plan*. Through the lenses of environmental and fiscal stewardship, abatement strategies were evaluated and categorized in order of preference:

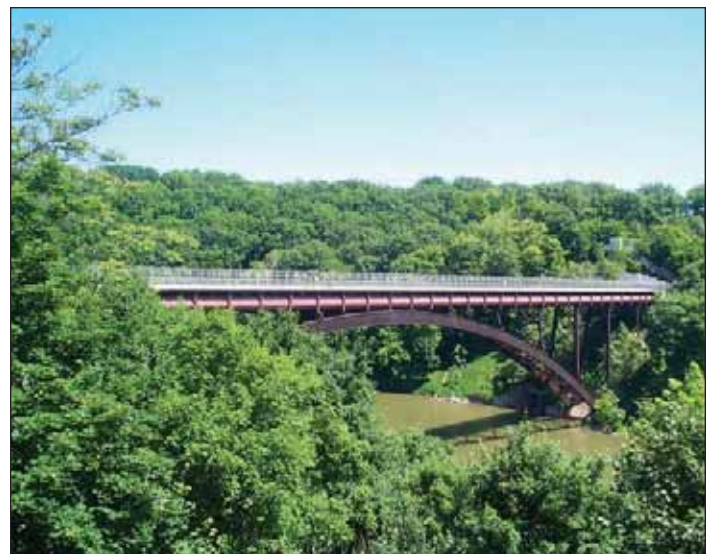
- non-structural measures
- operational optimization of existing facilities
- minimal structural improvements
- major structural improvements to existing facilities
- major structural additions

To satisfy all the program goals, it was determined that only major structural improvements (storage, treatment, and discharge facilities) were viable strategies.

The *CSOAP Wastewater Facilities Plan* solution was divided into two systems: the Irondequoit Bay Storage Conveyance System and the Genesee River System (*Figure 2*). The Irondequoit Bay Storage Conveyance System would serve the east side of the Rochester Pure Waters District and included the Culver-Goodman and Cross-Irondequoit Tunnels, a Control Structure at Densmore Creek, a major new Cross-Irondequoit Pump Station to lift flows to the Van Lare WRRF, and wet weather treatment at the WRRF. The Genesee River System would serve the central and west portions of the district and would consist of the West Side Tunnel, the new St. Paul Conveyance Tunnel (to the Cross-Irondequoit Pump Station), 33 overflow drop shafts from the surface sewer system to the conveyance tunnel, five upstream overflow relief points to the Genesee River, and wet weather treatment at the Van Lare WRRF.

The Genesee River System was to be designed to flow completely by gravity to the Van Lare WRRF, and a follow-up engineering study recommended splitting the tunnels into east and west sides connected by a siphon, which was ultimately carried underneath a new pedestrian bridge dramatically spanning the Genesee River gorge. The program goal for the Genesee River System would be to limit CSOs to two per year, necessitating a recommended tunnel storage volume of approximately 10 million cubic feet. The overall program

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Pedestrian bridge carrying CSOAP siphon over Genesee River.

Monroe County DES

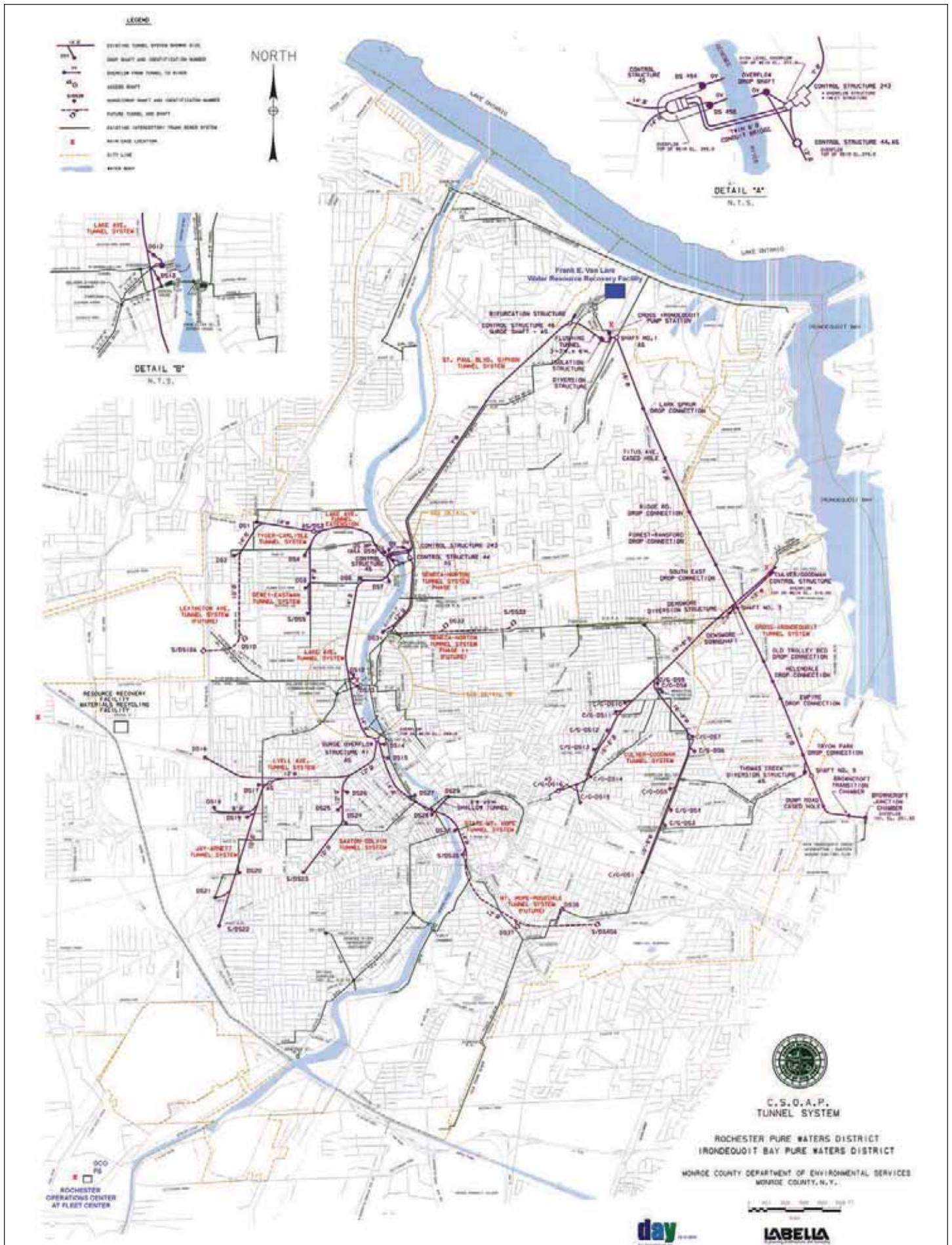
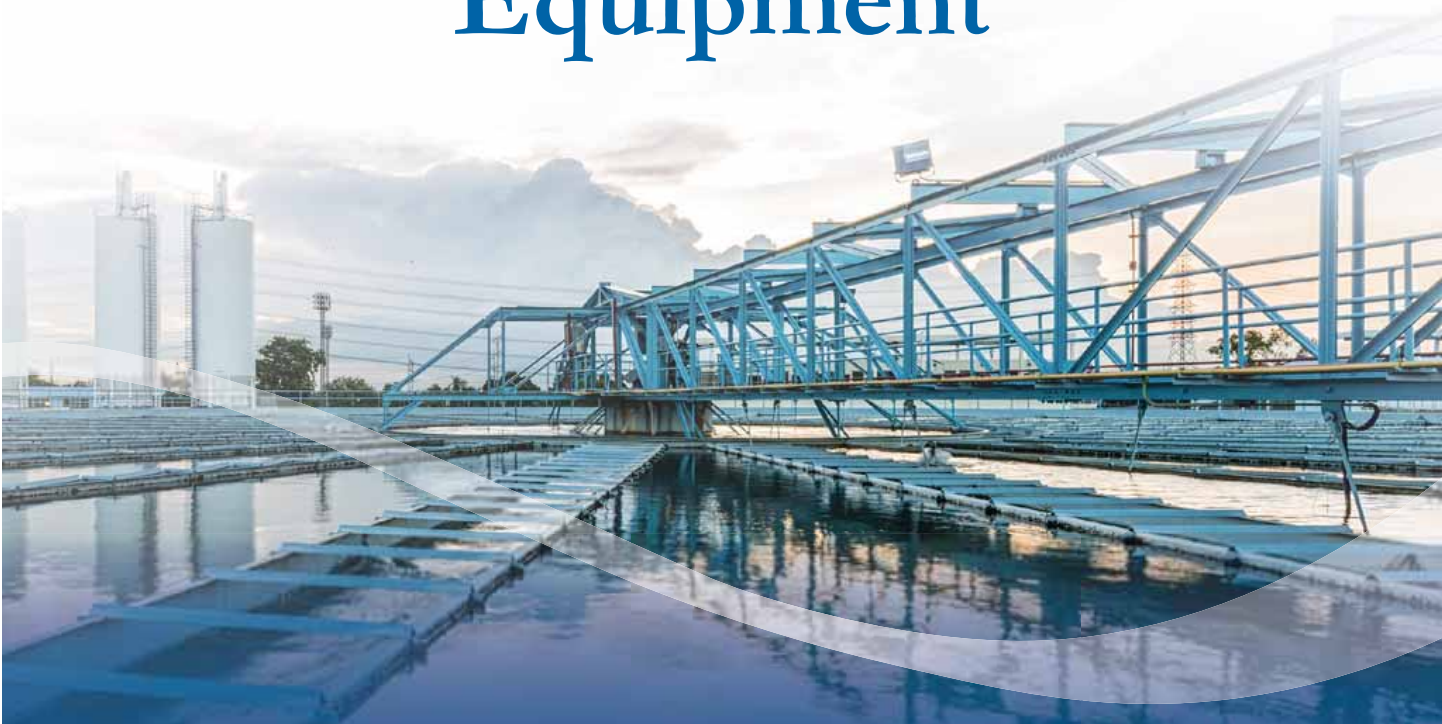


Figure 2. CSOAP tunnel map.

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continued from page 19

cost was estimated at the time at \$475 million.

Alongside the tunnel engineering analysis, the 1982 *Additional Treatment Facilities Report* specified the necessary upgrades at the Van Lare WRRF to address the expected increase in flows requiring wet weather treatment. In total, 600 mgd could be expected from the CSOAP tunnel system, requiring an increase in hydraulic capacity of 400 mgd. In addition, the anticipated process flow capacity increased to 425 mgd; at the time, the dry weather flow limit was 100 mgd. Given the hydraulic and site constraints, the report recommended allowing split-flow treatment (bypassing the secondary process) at flows above 150 mgd. A 275-mgd-capacity Additional Treatment Facility was also to be constructed to treat the remaining wet weather flow. The estimated cost of these improvements was another \$24 million on top of the CSOAP tunnel price tag.

Construction of the CSOAP improvements continued through the 1980s and was completed in 1992 when the west side of the Genesee River System became operational; the east side commenced operation in 1985. The system consists of 35 miles of tunnels ranging from 7 feet to 16 feet in diameter, buried between 85 feet and 200 feet below the surface. All in all, 30 CSO sites were eliminated, leaving just six primary relief points and 14 secondary relief points.

A reassessment of the receiving water quality by the New York State Department of Environmental Conservation determined that an average of 3.5 CSOs per year could be permitted, reducing the required tunnel storage capacity to 6.3 million cubic feet. In 1994, the actual constructed system capacity was modeled at 7.4 million cubic feet, definitively demonstrating the success of CSOAP. The ultimate program cost was approximately \$550 million (\$1.1 billion in 2022 dollars). County leaders showed foresight in taking advantage of 75% in federal construction grants and 12.5% in state

grants. Consequently, local ratepayers only needed to contribute 12.5% of the overall cost.

### Investment for the Future

Since the system went online, Monroe County has continued to invest in collection system improvements and remote sensing and operation through the CITECT supervisory control and data acquisition (SCADA) system. Despite the system's generous capacity, the proportion that can be utilized is highly dependent upon precipitation patterns. Therefore, no two events are ever the same, and each event's management strategy is unique. A highly-trained operator workforce is essential to maintaining compliance, even as new technologies are incorporated to make their jobs easier. The CSOAP system is a perfect example of why our water resource recovery operators are truly the last line of defense for the water environment.

Today, the benefits of a strategy formulated over 50 years ago are most visible in the proliferation of aquatic species that have returned to the Genesee River and Irondequoit Bay, as well as both waterbodies (along with Lake Ontario) becoming major recreational attractions for locals and visitors alike. As Monroe County proceeds with updating its *Pure Waters Master Plan* and looks to address the challenges of the next 50 years, we can build on the accomplishments of those who transformed how we care for our local water resources.

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*Clement Chung, PE, is the deputy director of the Monroe County Department of Environmental Services. He may be reached at [clementchung@monroecounty.gov](mailto:clementchung@monroecounty.gov).*




Inspecting the CSOAP Tunnels.



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# Monroe County Investing in the Future

by Hannah Rockwell, Madeline Harp, Jacob Hunt and Kevin Quinn

The Frank E. Van Lare Water Resource Recovery Facility (Van Lare WRRF) is the largest water resource recovery facility operated by the Monroe County Department of Environmental Services (MCDES). It is a combined sewer treatment facility located on the southern shore of Lake Ontario within Monroe County, treating 135 million gallons per day (mgd) (permitted) and over 600 mgd of combined wastewater during wet weather events.

Following the initial facility construction circa 1900, Monroe County made substantial improvements to the Van Lare WRRF in the 1970s through its Pure Waters Program, much of which was funded under the Clean Water Act. While improvements and maintenance have continued, significant investments in the critical infrastructure at the Van Lare WRRF were identified to improve the resiliency and long-term reliability of the facility.



Aerial image of the Van Lare WRRF, September 2022.

*Schuler-Haas Electric Corp.*

Based on the assessed needs, Monroe County embarked on a multi-year Capital Improvements Program to simultaneously pilot, test, design and construct improvement projects for three main systems at the Van Lare WRRF:

- Aeration System
- Secondary Clarifiers
- Electrical System

Construction of these major projects is being performed under a project labor agreement, which also initiated a new apprenticeship training requirement pilot program. The total projected construction cost of the Capital Improvements Program is over \$35 million. To add to the immense task of completing construction on three major facility systems concurrently, the Van Lare WRRF is operating under a consent order from the New York State Department of Environmental Conservation. However, thanks to careful planning and the dedicated work of MCDES staff, no permit exceedances have occurred due to the construction operations.

Detailed and thoughtful planning is an important part of any large capital project. Monroe County took an atypical approach in investing in the future of the Van Lare WRRF that went beyond traditional capital planning and employed strategic piloting and phasing of the planned improvements prior to executing the full Capital Improvements Program. By piloting and testing improvements in a phased approach with field validation testing between the alterations prior to full-scale construction/implementation, the

incremental benefit of each improvement could be measured, and a cost benefit analysis could be completed to determine the full-scale design. This approach – design, pilot, test, modify, test, implement at full scale – allowed MCDES to maximize return on investment and improve operational capabilities for the staff.

The remainder of this article describes the three main project areas within the Capital Improvements Program, presenting a high-level overview of each project focused on how the improvements benefit the operations of the facility now and prioritize resiliency and reliability into the future.

## Aeration System – Operational Improvements and Increased Flexibility

The Van Lare WRRF's aeration system is comprised of 20 rectangular aeration basins divided into four separate quadrants. In December 2016, Monroe County engaged Arcadis to review the aeration system and provide initial recommendations to improve system performance.

To cost-effectively analyze aeration system performance under various operating modes, the Van Lare WRRF operators constructed a pilot-scale aeration basin for testing potential modes of operation prior to implementing full-scale modifications. MCDES personnel monitored various parameters within the pilot-scale system, including mixed liquor suspended solids and sludge volume index, to evaluate and compare various aeration basin operating modes. Key configurations tested at the pilot scale included plug flow, step feed, contact stabilization and complete mix modes of operation.

During pilot-scale testing, the full-scale facility experienced challenges associated with seasonal changes (water temperature, etc.) and industrial impacts on the influent wastewater. The results of the pilot-scale testing and experience of full-scale operations demonstrated that no single mode of operation could consistently provide adequate treatment to meet all permit requirements due to the highly variable influent loading and characteristics at the Van Lare WRRF. Therefore, full-scale modifications to the aeration basins were designed to provide flexibility through additional operating modes within two aeration basins in each quadrant. This would allow operators to respond to changes in influent conditions by providing the ability to operate two basins in each quadrant in plug flow, step feed, contact stabilization, return activated sludge (RAS) pass-through, RAS storage or complete mix modes. Additionally, automated aeration basin influent gate actuators were installed along with two additional turbo blowers to provide redundancy and additional airflow during peak oxygen demands. Automated influent gate actuators on the RAS and primary effluent piping have allowed operators to quickly adapt and switch operating modes to respond to changes in influent wastewater conditions, especially during wet weather events.

The ability to quickly change aeration basin operating modes maximizes the operator's time and efficiency by allowing them to focus on other challenges associated with wet weather events when resources are already spread thin. The additional modes of operation can be used to optimize secondary treatment under a wider range of different operating configurations than was available before. Each of the aeration basin quadrants can now operate in different modes, giving operators the flexibility to select the

*continued on page 25*

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Nicknamed “Frank Jr.,” the pilot-scale aeration system is constructed and operated by the Van Lare WRRF staff. *MCDES*

best mode for the current influent conditions to improve effluent quality. This flexibility also increases the opportunities for future improvements. Monroe County continues to refine its playbook, exploring options to automate changes to operating modes based on data collected throughout the facility. This will lead to enhanced performance, reduction in energy and maintenance costs, and better effluent water quality.

### Secondary Clarifiers – Beyond Replace in Kind

The secondary clarifiers at the Van Lare WRRF consist of six 145-foot-diameter concrete “squircle” tanks with center-drive draft tube collector mechanisms originally installed in the 1970s. Monroe County re-engaged with Arcadis in 2018 to maximize the capabilities of the existing secondary clarifiers. After an initial analysis of the current secondary clarifiers, the following three options for potential improvements were identified:

- construct additional clarifiers
- replace the existing equipment in the clarifiers in kind
- improve the existing clarifiers

Based on an evaluation of the potential improvement options, MCDES elected to improve the existing secondary clarifiers through a two-phased approach. Phase 1, completed in 2022, involved the design and testing of improvements in a test clarifier. Phase 2, scheduled to begin construction in March 2023, will implement the improvements tested in Phase 1 in the remaining five clarifiers. Utilizing a test clarifier pilot to evaluate potential improvements optimized the components selected for implementation in Phase 2 and significantly lowered the overall project cost.

The first step in evaluating potential secondary clarifier improvements was to create a computational fluid dynamics (CFD) model. The CFD model allowed for a wide range of potential improvements to be analyzed and only the higher-performing elements were incorporated into the final test clarifier design for implementation and field testing.

Following a stepwise approach, the clarifier equipment was designed and installed in the test clarifier. Modifications, such as adjusting the height of a cylindrical baffle, adjusting draft tube valves, adding a Stamford baffle, and revising the spacing of the effluent weirs were made after the initial test clarifier equipment was installed. After each modification was made, field testing was used to determine the effect of the alteration on clarifier performance. The initial field testing of the test clarifier and a control clarifier was performed by MCDES, Clarifier Performance Evaluations, Inc., and Arcadis. Various modifications and subsequent field testing were performed on the test clarifier from December 2019 through June 2022. Following completion of the field testing, the cost



Field verification testing conducted by MCDES, Clarifier Performance Evaluations, Inc. and Arcadis staff. *Hannah Rockwell/Arcadis*

benefit of each modification was assessed, and the final selected improvements were incorporated into the final design for Phase 2.

By implementing the test clarifier pilot and limiting the optimization modifications to only one of the six clarifiers, an additional expense to the project of approximately \$4 million was avoided, which would have represented an approximately 36% increase to the original total project budget. While the Phase 1 process was time consuming, field verification after each test clarifier modification was essential in understanding which modifications yielded positive results, and thus were suitable to be incorporated into subsequent clarifier improvements.

### Electrical System – Resiliency and Reliability

The existing outdoor electrical substation at the Van Lare WRRF was installed in the 1970s and receives power from two incoming 34.5 kilovolt (kV) circuits from Rochester Gas & Electric (RG&E). The original power source of the two incoming circuits came from separate power stations. Beginning in the 1970s, RG&E made changes to their power transmission system that eliminated redundant power service for the Van Lare WRRF. The electrical equipment and cabling at the Van Lare WRRF are also over 50 years old and significantly beyond their useful life. Repair parts for the aging equipment are difficult to procure, and the increased likelihood of failure from antiquated equipment may introduce a safety risk to facility staff.



3D rendering of Electrical Building substation. *Arcadis*

As part of the electrical system improvements project, a new Electrical Building is currently under construction to replace the existing outdoor electrical substation. In addition, new incoming utility transformers and major medium voltage distribution cabling will be installed throughout the facility. The new Electrical Building includes 38 kV metal enclosed switchgear, 5 kV medium voltage switchgear, and provisions inside the building for future standby power generation for the entire facility to be installed at a

*continued on page 27*



MTA-LIRR Third Track



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Courthouse Commons Pump Station



Massapequa Creek Preserve



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later date. In addition, the new switchgear includes electrical safety features such as remote breaker controls and remote breaker racking, which allow the facility staff to safely operate the equipment away from the front of the electrical breaker/enclosure.

Power outages at the Van Lare WRRF have historically coincided with storm events and high-flow conditions at the facility. These outages amplify other challenges faced by the staff, who could be attending other unit processes that are also crucially important. Improvements to the electrical system will increase the facility's resiliency and reliability during these critical operating conditions. The electrical improvements project is necessary to maintain the continuity of services provided to the community by the Van Lare WRRF.



Construction progress drone photo of Electrical Building and RG&E substation, taken November 2022. *Schuler-Haas Electric Corp.*

## Investing in the Future

As it has throughout the facility's history, Monroe County continues to make significant investments in critical infrastructure at the Van Lare WRRF. By implementing the Capital Improvements Program, resiliency and long-term reliability of the facility is improved for today's needs while proactively preparing for the future. The nontraditional approach selected emphasized the long-term needs of the facility and its operators by strategically piloting, testing, and phasing improvements prior to full-scale implementation. While the phasing of the projects required additional time, the improvements made go beyond replacement in kind and strategically allocate the county's capital resources to provide the largest benefit rather than the quickest project completion. Construction of the Capital Improvements Program is currently 50% complete and all remaining work is scheduled to be completed more than two years ahead of the December 2027 consent order deadline.

Monroe County expresses its gratitude to the New York State Environmental Facilities Corporation for funding the Capital Improvements Program in part with a \$5 million Water Infrastructure Improvement Act grant and State Revolving Fund financing.

*Hannah Rockwell, PE, is a project engineer with Arcadis of New York, Inc. and may be reached at [Hannah.Rockwell@arcadis.com](mailto:Hannah.Rockwell@arcadis.com). Co-authors Madeline Harp, EIT, and Jacob Hunt, EIT, are water resource designers with Arcadis. Kevin Quinn is a project manager with the Monroe County Department of Environmental Services and may be reached at [hquinn@monroecounty.gov](mailto:hquinn@monroecounty.gov).*

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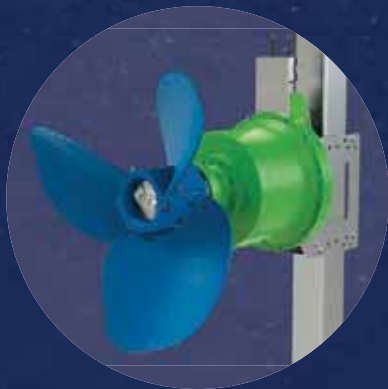
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# Monroe County Environmental Lab: Supporting Everything from Process Control to Public Health

by Gary Brown

The Monroe County Environmental Laboratory has existed in some form since the mid-1970s. Initially, there were two labs serving two separate departments. The Monroe County Department of Public Health (MCDPH) lab conducted analyses on both non-potable and potable waters for the purpose of protecting public health. The Monroe County Department of Environmental Services (MCDES) lab, located at the Frank E. Van Lare Water Resource Recovery Facility (Van Lare WRRF), performed work on non-potable waters only, primarily to support the operations of the WRRFs operated by the Monroe County Division of Pure Waters. To better align services, the two labs were combined in 2001 as the Environmental Laboratory and co-located at Van Lare WRRF.

## Capabilities

The Environmental Laboratory has the capability to run analyses on a variety of instruments, including:

- Gas Chromatogram Mass Spectrophotometer (GCMS)
- Inductively Coupled Plasma Mass Spectrophotometer, (ICP-MS)
- Lachat Flow Injection Instrument
- Gallery Discrete Analyzer
- Spectrophotometers

Detailed training is required to operate this equipment. In addition to specific training, all staff are required to have an associate's and/or a bachelor's degree in a natural science. The whole lab

process is monitored by the Quality System, which is maintained by the Quality Assurance Officer.

The Environmental Laboratory is regulated by the New York State Department of Health's Environmental Laboratory Approval Program (NYSDOH ELAP) and the U.S. Environmental Protection Agency. To demonstrate compliance, the lab must analyze proficiency samples two times per year for both non-potable and potable waters. Two out of three samples must pass to retain certification. In addition, NYSDOH conducts a biannual inspection to ensure the lab is following mandated procedures.

Wherever possible, the Environmental Laboratory looks to streamline its processes to improve efficiency. For example, the Industrial Waste Control (IWC) section records its sampling information in its iPACs database, which is linked to the lab's database (Star LiMS). This allows data to be transferred directly, eliminating manual data entry and reducing the risk of errors. A new program to link the two systems was needed, entailing code writers from both software developers. MCDES also has limited in-house software development capabilities to facilitate some customizations.

## Clients

The Environmental Laboratory performs work for both internal (i.e., MCDES) and external clients, which includes other county departments and other agencies and facilities. Internal clients include the Frank E. Van Lare and Northwest Quadrant WRRFs and the IWC section.

For WRRFs, State Pollution Discharge Elimination System (SPDES) analyses are conducted to report data to demonstrate  
*continued on page 31*



Environmental Chemist I Bridget Doyle operating a spectrophotometer in the Environmental Laboratory wing, which was renovated in 2022.

MCDES



Environmental Chemist II Douglas Dumbleton preparing alkalinity analysis equipment to run samples.

MCDES



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**Environmental Chemist II Connor Armstrong preparing samples for analysis.** MCDES

compliance with the facilities' permits. Process control analyses allow the operators to make adjustments based on an understanding of how various parameters are changing within the plant. Typical analyses include biochemical oxygen demand, total suspended solids, settleable solids, phosphorus, ammonia, metals and organics.

The IWC section conducts analyses for industries that discharge to the Monroe County Pure Waters system, which are monitored to ensure that the discharge is meeting the requirements of the county's Sewer Use Law. This includes industrial users directly connected to the sewer, as well as haulers of materials such as septage that may discharge at one of three locations throughout the system. This IWC section also samples surface waters (Genesee River, Irondequoit Creek and Irondequoit Bay) to monitor the health of these waterbodies.

External clients include:

- MCDPH
- New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP)

**Table 1. Environmental Laboratory's Supported Work for External Clients.**

External Client	Supported Work
MCDPH	Monitoring conditions at bathing beaches (Ontario Beach and Durand-Eastman Beach) Public drinking water system analyses, including: <ul style="list-style-type: none"> <li>• New watermain connections/repairs</li> <li>• General distribution system surveillance and sanitary code compliance monitoring</li> <li>• Source water surveillance (e.g., monitoring Lake Ontario intake water quality for the two Monroe County Water Authority water treatment plants)</li> </ul> Responding to public complaints about water quality concerns.
NYSOPRHP	SPDES compliance Monitoring conditions at bathing beaches and swimming pools (Hamlin Beach State Park)
Seneca Park Zoo	Monitoring conditions in the polar bear and sea lion tanks General troubleshooting with water quality issues
RED Rochester	SPDES compliance and process control (similar to the Pure Waters WRRFs)

- Seneca Park Zoo (which is a Monroe County-owned facility)
- Recycled Energy Development (RED) Rochester

RED Rochester is an entity created to manage the utilities at the former industrial site operated by Eastman Kodak (now known as Eastman Business Park). RED Rochester operates the Kings Landing Wastewater Treatment Plant, which discharges treated industrial effluent directly to the Genesee River under its own SPDES permit.

The work supported for each external client is summarized in *Table 1*.

### COVID-19 and Wastewater Tracking

Innovation at the Environmental Laboratory is not limited to improving existing services. In March 2020, as the COVID-19 pandemic spread across the world, Monroe County joined others looking to discover if wastewater could be harnessed in the public health response. In New York state, a team of epidemiology researchers at Syracuse University headed by Dr. David Larsen reached out to various partners to solicit interest in joining a SARS-CoV-2 Early Warning Wastewater Surveillance Platform. In Monroe County, a wastewater coronavirus working group was formed between the University of Rochester, Rochester Institute of Technology, St. John Fisher University, the Town of Webster, MCDPH and MCDES. Monroe County's initial interest stemmed from a desire to protect our essential workers from the potential risk of infection, as it was not yet clear whether the virus could be spread through wastewater. It was later determined that SARS-CoV-2 typically did not pass through the digestive system as a live virus and what was being detected was non-contagious RNA fragments.

The Environmental Laboratory took the lead in the county's participation in the program with its expertise in non-potable water sampling and analysis, since MCDPH was at the time overwhelmed with responding to clinical cases. The lab collaborated with the IWC section to install autosamplers at specific locations in the collection system, and samples were also collected at the influent to Van Lare and Northwest Quadrant WRRFs. Since the Environmental Laboratory does not perform epidemiology work, samples were then sent to Syracuse University's contracted lab partner for analysis.

The initial round of analysis was funded through the federal pandemic relief CARES Act. When that budget was exhausted, the working group discussed the most helpful frequency and geographic spread. Since at the time, the infection rate of the SARS-CoV-2 virus was considered to be highly variable, it was determined that more frequent data points would better track the spread of the

*continued on page 33*



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ease. The autosamplers in the collection system were removed and the county's sampling was scaled back to just the WRRF influent.

In July 2020, interest in establishing a national wastewater surveillance system (NWSS) was expressed by the federal Centers for Disease Control and Prevention (CDC), and funding was extended for a year for analysis by CDC's contractor. Meanwhile, Syracuse University continued to develop a statewide pilot program in conjunction with NYSDOH. Analysis switched back to Syracuse University's contractor in 2021 and data is now reported both to New York state and the NWSS. Frequency of sampling is twice per week, and the Town of Webster WRRF was added to Van Lare and Northwest Quadrant WRRFs to provide more comprehensive geographic coverage in Monroe County.

As the clinical response to COVID-19 has diminished with the increase in vaccination rates, MCDPH has expressed interest in potentially using the system established for the NWSS to track other public health parameters. While protocols are still in development, this potentially could include mpox and poliovirus, as well as nondisease-related data. One advantage that wastewater has over clinical testing is the consistency of the sample data, which replaces the need for mandatory testing without introducing skewing factors like self-selection and self-reporting. In other words, there is value in our wastewater because it cannot lie!

---

*Gary Brown is the Environmental Laboratory technical director for the Monroe County Department of Environmental Services, Division of Pure Waters. He may be reached at [gbrown@monroecounty.gov](mailto:gbrown@monroecounty.gov).*



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# Monroe County Department of Environmental Services Collection System Operator Training Program

by William Putt and Robert Tyndall

Accreditation for wastewater collection system operators in New York state became a reality for Monroe County when the New York Water Environmental Association (NYWEA) offered the Voluntary Collection System Certification Program. While this certification program establishes a grading system with qualification requirements and examinations, preparation and training are up to the employee or utility. Entry level employees, often young and without any wastewater collection system experience or training, are challenged by lack of knowledge. Veteran employees, perhaps with collection system experience, need comprehensive training as well. How do we educate and prepare these individuals effectively and efficiently with wastewater collection system knowledge?

At Monroe County's Department of Environmental Services (MCDES), our answer to educating staff about wastewater collection systems was "Team DES can do it!" Recognizing our most valuable assets of qualified, experienced MCDES employees as our instructors was a natural course. Many on our staff have a variety of collection system skill sets and were eager to share their knowledge and experiences. Students learning from our veterans, such as their superiors and peers, also helped them relate to the given instructional topic. While the focus was on wastewater collection system operation, an important side benefit was increased familiarity in all areas of our collection system. Additionally, areas of instruction beyond the collection system include laboratory, treatment plant operations, industrial and solid waste activities and administrative responsibilities.

In preparation for the NYWEA collection system certification exam, MCDES began internal training for collection system personnel in 2004. This year, we began our 14th training course class. Training for Grade 1 certification begins mid-November and is conducted in a department classroom setting. Classes are one day a week for two and half hours and continue through mid-April. Typically, there are 20 classes in the course including breaks for holidays and school recess.

MCDES utilizes the California State University at Sacramento (CSUS) program. The Sacramento textbooks, *Operation and Maintenance of Wastewater Collection Systems* Volumes I and II, are used as a course template. Class size is usually limited to 12 students; instructors are MCDES staff, most of whom have NYWEA collection system certification. A math curriculum is also presented for students who need refresher training. There are review classes held immediately before NYWEA examinations where a variety of topics are discussed. This review is also offered to those taking Grades 2, 3 and 4 examinations.

## MCDES Course Preparation Steps

Register students in CSUS's courses *Operation and Maintenance of Wastewater Collection Systems* Volumes I and II. Successful completion of these courses is required for Grades 1 and 2 certification examinations.

Order textbooks, enough for all students and instructors (instructors can share).

Reserve the classroom and prepare the schedule of classes with topics. Ensure any equipment needed (projector, computer, etc.) is

also reserved.

Engage instructors for each textbook chapter topic and mathematics.

Prepare a folder for each student with:

- course expectations
- class roster
- schedule
- topics
- instructors
- ABC formula/conversion sheet
- contacts
- NYWEA collection system certification examination application and fact sheets

The examination applications should be filled out by students and reviewed by their supervisor before submission to NYWEA in Syracuse, New York.

MCDES pays for the examination and course registration costs for each student. Textbooks require an initial cost to purchase but may be reused by subsequent students.

Other applicable course training available from CSUS include:

- *Collection System Operation and Maintenance Training* video series
- *Small Wastewater System Operation and Maintenance* Volumes I and II

These resources are not utilized by Monroe County in favor of personalized training from MCDES instructors.

## MCDES Class Presentation Steps

Classes are two and a half hours weekly from November through April. For the 2022/2023 session, classes are Tuesdays from 7:30 a.m. to 10 a.m. and are held at our Rochester Operations Center.

The first day of class is introductory for the students and instructor. Textbooks and folders are issued and reviewed, any paperwork is processed, an overview of course is given, and students read Chapter 1 and complete the test. Going forward, students are required to read and complete the assigned chapter tests prior to the next class; the classroom presentation reinforces what the students have read. Completed tests are sent to Sacramento, California for scoring.

Math tutoring is provided during the second half of the course to those requesting it. Also included in this course is a field trip to various sized pump stations. This guided tour of different sized pump stations allows students to see the equipment that they have been studying in "working operation." The pump station tour occurs in place of a normal weekly class and usually takes four to five hours.

MCDES students are predominantly new wastewater collection system field staff. However, employees in other areas of MCDES such as industrial waste, mechanical, electrical, laboratory, water resource recovery facility (WRRF) operators, and administrative personnel have also been students in the course. Instructors include team supervisors from construction, TV/investigations, cleaning, permits and WRRF/collection operations. Additional math instruction is provided by MCDES staff. Administrative and supervisory topic instruction are presented by MCDES managers and senior staff. Department skill sets, knowledge and expertise are

*continued on page 36*



The 2022/2023 class is standing in front of the Wall of Fame. From left: Miguel Rosario, Emma Marsch, Cody Detoy, Michael Smith, Seth Keifer (Village of Skaneateles), Joshua Shufelt, Emily Kleinhenz, Jarod Ruffle, Gabriel Brett and Chris Dexter.

MCDES



Instructor Jake Furtner training the 2022/2023 class about flow meters.

MCDES



Instructor Jake Furtner is presenting to the 2022/2023 class about plugging.

MCDES



MCDES Sewer Collections Team at the Rochester Operations Center facility.

MCDES

eagerly shared by our staff.

Other courses required for NYWEA collection system certification include Traffic Work Zone Safety and Permit-Required Confined Space Entry Training (PRCSE). These courses are conducted by MCDES staff who are experts with these topics. PRCSE site time is also required for the Grade 1 exam. MCDES routinely makes confined space entries so providing documented entry time is never a problem. These additional training requirements, ancillary to the CSUS training course, are fundamental skill elements of the collection system operator.

The last CSUS chapter test completes the textbooks and the training course. Examination review classes are held between the end of the course and the NYWEA exam. With successful completion of both CSUS *Operation and Maintenance of Wastewater Collection Systems* Volumes I and II, combined with the education, experience, traffic work zone and confined space requirements met, candidates are qualified to take the NYWEA Grade 1 and 2 exams. MCDES hosts and proctors the NYWEA volunteer collection system certification examinations (Association of Boards of Certification, or ABC, exams) at our Training Center.

### Summary

NYWEA examination results are the final indicator of how effective the training (and instructors) were. Upon receipt of the NYWEA (ABC) examination results, confidential analysis of each candidate's Mastery Report is recommended. The results of that analysis may identify the candidate's strengths and weaknesses and indicate where additional training is needed. Through this self-examination the training course itself can be altered and improved upon to provide the most useful and productive experience for the student.

The total investment of the training program includes the course registration fee and instructional materials costs plus the employee's labor time. **Table 1** summarizes the labor time commitment per attendee.



Instructor Eric Lamendola is demonstrating a full-body fall arrest harness to student Cody Detoy as part of PRCSE training. MCDES

**Table 1. Employee's Labor Time Investment for Training.**

Training	Labor Time per Attendee
20 classes at 2.5 hours each	50 hours
1 pump station tour	5 hours
2 review classes at 4 hours each	8 hours
Examination	3 hours
<b>Total</b>	<b>66 hours</b>

The total labor time commitment per student/instructor is 66 hours, or 83% of a biweekly paycheck. Overall for a course, the employee labor hour total for 12 students plus one instructor (13 attendees) times 66 hours equals 858 total labor hours.

The entire department benefits from the training program, not just the employees. Graduates of the program are well versed in all areas of MCDES operations. This gained knowledge provides for better understanding and improved communication between various areas within the department. As employees complete the course and pass the certification exam, their certificates are proudly posted on the department's "Wall of Fame."

### MCDES Collection System Operator Training Program by the Numbers

- 149 Total number of MCDES employees who have completed the training program.
- 127 Total number of MCDES employees who obtained NYWEA collection system certification.

*William Putt is the chief of Collections and Maintenance Operations for Monroe County Department of Environmental Services and may be reached at [BPutt@monroecounty.gov](mailto:BPutt@monroecounty.gov). Robert Tyndall is a safety and training analyst with MCDES and may be reached at [RTyndall@monroecounty.gov](mailto:RTyndall@monroecounty.gov).*



Steven Reiter's Certificate of Qualification received upon successful completion of the voluntary collection systems certification program. MCDES



Students taking NYWEA's on-line exam in the spring of 2022. Back row left to right: Tim Rombaut, Will Emblidge, Anthony Morelli, William Burgio. Front row left to right: Tom O'Brian, Phil Carris, Max Michaels. MCDES



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# Genesee Valley Chapter Water Recyclers – Teamwork Makes the Dream Work!

by Angelo DiNottia

Every year, teams from across New York state come together at the NYWEA Spring Technical Conference & Exhibition for the annual Operations Challenge event. Operations Challenge is a four-person team competition that allows wastewater professionals to showcase their skills in five fast-paced and fiercely competitive events that simulate real-life tasks that operators, mechanics, and lab staff perform to keep their water resource recovery facilities running. This “Wastewater Olympics” is a glimpse into the daily operation of both small and large plants around the state.

For the past four years (two of which I served as captain), I have been lucky enough to have been a part of the Genesee Valley Water Recyclers, the Operations Challenge team for the NYWEA Genesee Valley Chapter (GVC). Our members are based at the following Monroe County Department of Environmental Service (MCDES) facilities that serve Rochester and the surrounding communities:

- Frank E. Van Lare Water Resource Recovery Facility (WRRF)
- Northwest Quadrant WRRF
- Monroe County Pure Waters Rochester Operations Center (ROC)

During my time on the team, I have competed with many great people, making a lot of friends as well as professional connections. GVC and Monroe County have been amazingly supportive of the Water Recyclers and I can't thank them enough for the opportunities they've given me and my team members.



The GVC Water Recyclers (from left to right) Tyler Richardson, Jeff Wallace, Will Monier, Raphael Santiago, Angelo DiNottia, Joe Amorese. MCDES

The Operations Challenge consists of five events:

- Collections
- Safety
- Lab
- Maintenance
- Process Control

Following descriptions of these five events, I will share some feedback on the Operations Challenge from some of the Water Recyclers team members.

## The Collections Event

The Collections event is designed to simulate a crew repairing an active leak in a cracked 8-inch PVC sewer main in the field.

Team members begin by using a 4.5-inch hole saw to cut a hole out of a new 6-foot section of SDR 35 PVC and install an Inserta Tee lateral connection. While this is happening, another team member cuts the broken section out of the simulated sewer main (with water actively flowing through it) using a straight saw. The newly installed Inserta Tee section is cut free from the 6-foot length of replacement PVC pipe using the straight saw, and then installed in the active main and secured with rubber Fernco connectors. After the repairs are complete, the newly repaired main is pressure-tested to ensure all seals will hold and not leak.

This event is by far the fastest and most competitive; an average event time is around 90 to 120 seconds, with the best teams completing the repairs in 60 seconds or less.



Team members cutting PVC pipe during collections event.

MCDES



Team members fastening tension bands on Fernco to ensure a seal.

MCDES

## The Safety Event

The Safety event is designed to simulate the rescue of a worker (simulated with a safety dummy) who has become incapacitated during the repair of a check valve in a confined space.

At the start of the event, one team member must test the atmosphere and complete a confined space entry permit. Meanwhile, the

*continued on page 41*



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*continued from page 39*

other three team members set up a 3M tripod (with attached rescue winch and fall protection) and a blower to ensure a safe, circulated atmosphere in the confined space. Two team members make an entry through a manhole and attach a harness to the dummy, who is then cranked out with the retrieval winch and attended by the two team members who have remained outside the confined space. After the rescue, the team members inside the confined space must finish the repair to the check valve, following proper lock-out-tag-out procedures.

This event usually takes around nine to 12 minutes to complete, with the best teams completing it in six to eight minutes.



Team prepares for confined space entry to retrieve “victim” dummy.

*MCDES*

### The Lab Event

During the Lab event, team members will complete some commonly run tests on water samples from a WRRF, including total suspended solids, total dissolved solids and conductivity. There is also a small written test to calculate parameters such as mean cell residence time, percent removal of solids or solids loading; these parameters are frequently used by operators as indicators to adjust process control.

This event is usually completed in around eight to 12 minutes.



Raphael Santiago weighing dried samples.

*MCDES*



Will Monier measures out sample to filter.

*MCDES*

### The Maintenance Event

The Maintenance event is designed to simulate a crew running routine repairs on a submersible pump in a wet well at a pump station.

Two team members begin the event by voltage-testing the pump control panel, then locking out the controls and verifying the pump will not run. Meanwhile, the other two team members assemble a gantry to hoist the pump out of the wet well and position the gantry over the pump. Once the pump controls and suction isolation valves have been locked and tagged out by all team members, the pump is removed from the wet well and moved to a service table to be disassembled. Three team members remove the pump’s volute and replace the impeller, as well as the guide rails that the pump sits upon inside the wet well.

While these repairs are being completed, the fourth team member tests for (and replaces) any bad fuses in the control panel. Teams reseal the rotating assembly back into the volute following impeller replacement, reassemble the pump, and lower it into the

*continued on page 43*



Team members prepare the gantry unit for pump removal.

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wet well and secure it. The controls are then unlocked, voltage is verified on the pump control panel, and the pump is turned back on. Many fingers are crossed as the team hopes it pumps correctly! If not, teams must troubleshoot everything up to and including removing the pump again.

This is one of the more challenging events to complete and can take anywhere from seven to 20 minutes depending on how familiar teams are with the pump, and whether the pump runs properly when first put back in service.

## **The Process Control Event**

The final (and my personal favorite) event is Process Control. This event is a little different from the others in that it represents a more cohesive task instead of focusing on one component.

This event starts with the Hydromantis modeling software, which simulates a WRRF to meet the permitted discharge limits, operational costs or outgoing solids waste. One team member has 15 minutes to make various process input changes such as chemical dosing feed, return and wasting rates, aeration parameters (e.g., dissolved oxygen, internal recycling), and solids handling.

The next component of this event is a written exam consisting of 40 multiple choice questions, 15 short mathematics questions that can cover any topic, and four scenario questions that each contain four long math questions on targeted topics such as anaerobic digestion, activated sludge, secondary effluent filtration, and chemical addition for nutrient removal. One or more team members has 15 minutes to answer the multiple choice questions and 30 minutes to work on the mathematics portions of the test.

## **Operations Challenge Take-Aways**

I can truly say that being involved in Operations Challenge has not only been a fun and rewarding experience but has made me a better operator overall. When I first joined the GVC Water Recyclers, I was new to the wastewater field, with only around one year of plant time under my belt. Like many others, wastewater wasn't the industry I planned on entering and I viewed being an operator as just another job. I hadn't yet achieved an operator certification and didn't really grasp the larger world of wastewater outside the walls my WRRF. Through the Operators Challenge, I was able to meet other operators, visit other facilities and interact with others in the field. Their enthusiasm and love for the wastewater profession was contagious and sparked the same in me. I became aware of the larger NYWEA community, not only the GVC but also other chapters and even other member associations. I learned what it meant to be a part of a large organization on the front lines of pollution control.

My experiences of the Operations Challenge are not unique. I asked my fellow team members for their takeaways. Jeff, a fellow 3A operator replied, "My favorite part of Ops Challenge is exactly that: the challenge. We encounter many things that we may never experience in our individual plants. This promotes having a broader knowledge of wastewater as a whole. It also lets me bring back those ideas to my plant and implement some new things that may never have been considered."

This is very important: when we participate, we talk about the challenges or unique situations we've experienced in our own plants with other operators. It's very beneficial to be able to reach out to them and see how they handled a particular situation in their plant, and then be able to apply those experiences back home.

Raphael, a 3A operator trainee, said, "I joined the Ops Challenge

Team as an alternate in 2020, and now am a competing member. My favorite part of Ops Challenge is traveling with my co-workers to compete, and the bond that we built just by practicing and being out of town with each other. I also enjoy the information that I get from the other operators on the team. I'm currently working on earning my certification and the guidance when studying and encouragement from other operators helps keep me motivated and striving to be my best."

Similar to Raphael, I can credit passing my NYWEA Grade 3A operator and Grade 3 collection system certifications to the hours I spent studying for the Process Control event with my team, even before I took my Basic Operations or Activated Sludge classes.

"My favorite part is definitely the comradery," Will, another 3A operator, said. "Work is a lot more enjoyable when you have supportive people around you – not only my team, but other teams competing. Never have I met so many people rooting for each other and being supportive, even during competition day. It has been a truly unique experience and I recommend that everyone try Ops Challenge at least once in their career."

Being around such supportive professionals inspired me as well. I became passionate about professional development and helping those around me succeed. I encourage any operators reading this to seek out ways to get involved in NYWEA. If you don't have an Operations Challenge team, you can even speak with your plant management and your local chapter to try and get one up and running!

Thank you to our sponsors: NYWEA GVC, Monroe County, and the staff at the Van Lare WRRF for their continued support of the Operations Challenge and the Water Recyclers, without whose guidance and support it would be impossible for the team to exist. We're lucky to be surrounded by such wonderful people (including former competitors) that allow us to compete year after year. If you're planning on attending the NYWEA-NEWEA Joint Spring Technical Conference and Exhibition or WEFTEC in 2023, please stop by the Operations Challenge events and watch us compete!

---

*Angelo DiNottia is a 3A water resource recovery operator with the Monroe County Department of Environmental Services, Division of Pure Waters, and may be reached at [angelodinottia@monroecounty.gov](mailto:angelodinottia@monroecounty.gov).*



# Immerse Yourself in *Wonders of Water* at the RMSC Museum & Science Center

by Todd Stevenson



The climbing structure at the new *Wonders of Water* exhibit allows visitors to explore Lake Ontario underwater species up close and also functions as a “graph” presenting data about changing water temperatures in the Lake. RMSC

The Rochester Museum & Science Center (RMSC) is the region’s hub for lifelong learning. It enables visitors to experience the thrill of adventure and innovation while inspiring a better future for all through curiosity, exploration and participation in science, culture and the natural world. In November 2022, the RMSC opened an exciting new permanent exhibition, *Wonders of Water*, inspiring visitors to explore the science, history and culture of the region’s extraordinary waterways through hands-on interactives, collections objects and immersive spaces. *Wonders of Water* is a continuation of the RMSC’s ongoing efforts, in collaboration with Monroe County and other partners, to inspire the community to become good stewards of Lake Ontario, the Genesee River, and the region’s abundance of lakes, streams and wetlands.

The 13-acre RMSC campus is located adjacent to downtown Rochester and includes the Museum & Science Center – with four floors of galleries and over 200 educational exhibits – and the Strasenburgh Planetarium. The RMSC also includes the 900-acre Cumming Nature Center in Naples, New York. The RMSC holds in trust for the community an irreplaceable collection of 1.2 million



The Erie Canal Lock interactive allows visitors to guide a model canal boat through a lock on the famed waterway. RMSC

objects that tell the story of the region’s fascinating past and present. It receives approximately 385,000 visitors each year and is a very popular destination for school field trips. Monroe County has provided baseline funding for the RMSC for more than 50 years.

For more than a decade, the RMSC has conducted public outreach at community events on behalf of the Stormwater Coalition of Monroe County using a tabletop watershed model to engage both youth and adults and raise awareness of stormwater pollution and actions the public can take to protect our local waterways. Building on this partnership with Monroe County, the RMSC was the recipient of two Green Innovation Grant Program grants from the New York State Environmental Facilities Corporation to retrofit large areas of campus with green infrastructure, including porous asphalt and pavers, bioretention, and an educational pavilion with a green roof and rain barrels. The intent of these projects is to showcase green infrastructure to a broad, public audience and to promote more widespread adoption of these practices for protecting water quality.

When the RMSC’s most popular and visible gallery, *AdventureZone*, reached the end of its life span the museum decided to reimagine and reconstruct the space to tell important and timely stories of our shared connections to water through science, history and diverse cultural perspectives. *Wonders of Water* is a permanent exhibit developed and designed in collaboration with technical advisers including the Rochester Institute of Technology and historically underserved communities. From the moment visitors approach the gallery, everyone can see themselves and the numerous connections to water that they can explore.

Upon entering the gallery, visitors are greeted by the Lake Ontario Climber, a large-scale, custom-designed climbable art sculpture and a central element in the “underwater” section of the exhibition. With dramatic LED lighting, visitors can transform the climber into a giant “graph” that displays the changing water temperatures in Lake Ontario and the impact of climate change. Providing access to all was a key priority in the design of *Wonders of Water*, so the under-climber space features areas for exploring and viewing Lake Ontario underwater species up close. A talking tube connects explorers on the ground with those in the structure above through sound.



*Wonders of Water* includes a reproduction of the USS Scourge crafted by RMSC exhibits staff. RMSC



Students from the Genesee Community Charter School learn how to fix a fire hydrant, control a hydropower dam, and manage stormwater infrastructure at the stream table. RMSC

“Making heady topics like climate data fun and interactive are an essential part of what a science museum can do for communities. This exhibition does an incredible job of communicating and interpreting science, culture and the natural world in a fun, accessible and hands-on way,” says RMSC president and CEO Hillary Olson.

Other highlights of *Wonders of Water* include a large-scale, climbable reproduction of the USS Scourge, a War of 1812-era shipwreck in Lake Ontario. Throughout the exhibition, special media-based interactives diversify visitors’ understanding of the people and communities that engage with the region’s waterways. In the USS Scourge, a cut-out in the ship features a monitor with animated stories of the sailors who made a living aboard the Scourge, the powerful squall in August 1813, and the struggle to escape the sinking ship.



The Haudenosaunee creation story of Sky Woman is presented using holographic technology. RMSC

Moving through the exhibition, a Wetlands Walk area creates an accessible opportunity for everyone to travel out on a “boardwalk” to see native plants and animals while exploring the role of wetlands in protecting water quality. The iconic Erie Canal lock interactive from *AdventureZone* has been modernized and re-engineered with accessible controls and sight lines. And the complex story of the Erie Canal, as well as its impact on the region, has been diversified through an original artwork by G. Peter Jemison, a famed Seneca Nation artist. A new stream table, designed for 360-degree access, provides a fun, relatable and hands-on entry point for young visitors to explore water. And a holographic presentation explores the central role of water in creation stories from diverse cultures around the world that are represented in the Rochester region.

Lake Ontario, the Genesee River and the Erie Canal have shaped the Rochester region’s past, present and future. Through *Wonders of Water*, the RMSC seeks to tell the stories of our shared connections to water in a fun, accessible and meaningful manner that will raise awareness of our extraordinary water resources and inspire a culture of stewardship and shared ownership. Next time you are in the Finger Lakes region, we hope you will visit the RMSC and be inspired.

*Todd Stevenson is the senior director for Grants, Government Relations & Strategic Initiatives with the Rochester Museum & Science Center. He may be reached at [tstevenson@rmsc.org](mailto:tstevenson@rmsc.org).*

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# Monitoring Water Quality in Irondequoit Bay

by Andrew Sansone

For over 40 years, water quality data has been collected for the Irondequoit Bay to help efforts to improve the health of one of the most important natural water resources in the Rochester, New York area. The frequency of monitoring has varied since collection began in 1978, ranging from daily, weekly, biweekly, monthly and bimonthly when the Bay is under ice cover during the winter. Changes in the way the Bay has been monitored reflects the success of the water quality improvements implemented over time; in 1993 this effort was conducted on 25 different days at 11 locations, while in recent years, monitoring has been reduced on average to 14 days at one location.

Annual monitoring is planned using staff and resources to provide the specific data required to measure specific indicators of ecosystem health. This data is also used to help develop effective management strategies for nutrient pollutant reduction in the Irondequoit Bay watershed.

## The Bay – Past and Present

The Irondequoit Bay drainage basin covers 107,699 acres primarily in Monroe County, with tributaries extending into Livingston County and Ontario County (Figure 1). The Bay itself, which makes up 37% of the watershed, has a surface area of 1,715 acres, and a maximum depth of 82 feet, with a mean depth of 34 feet. According to the New York State Department of Environmental Conservation (NYSDEC), the retention time in the Bay is 0.6 years. At one point in the region's history, the Genesee River flowed through the Bay. Currently, flow from Irondequoit Creek enters the Bay before

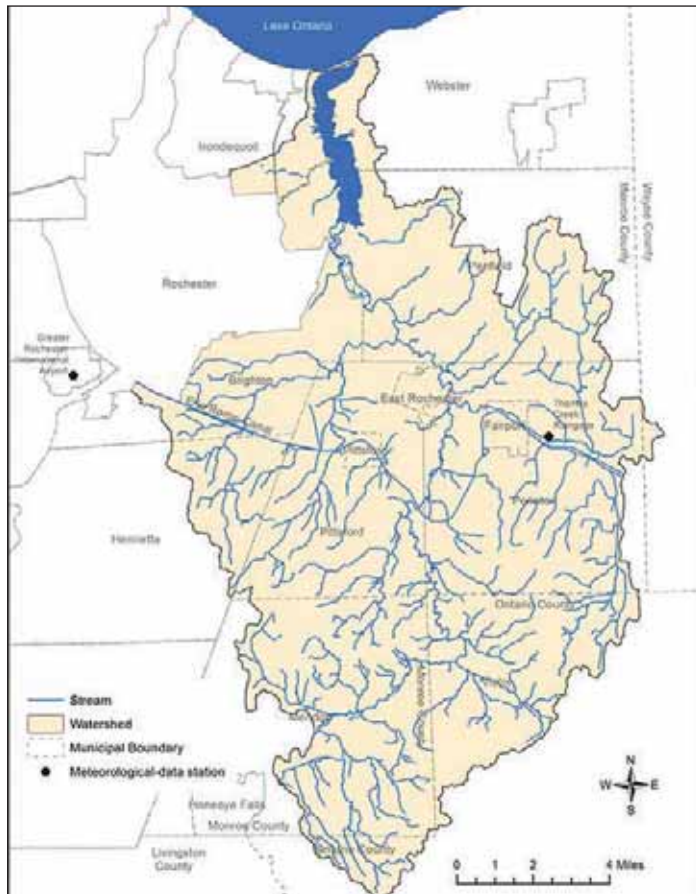
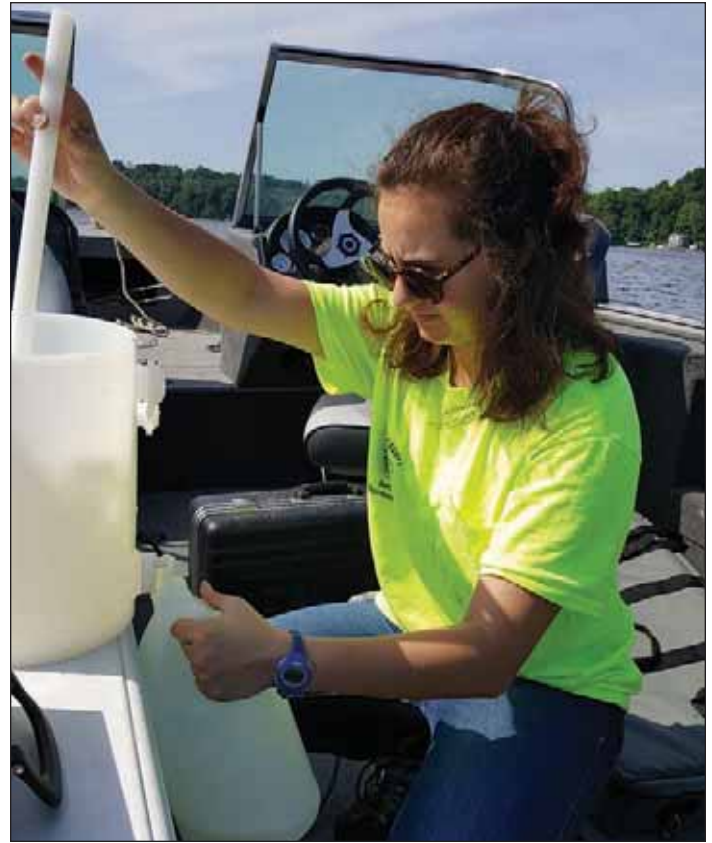


Figure 1. Irondequoit Bay drainage basin.

MCDES



Staff from MCDES collecting a sample.

MCDES

discharging into Lake Ontario. Of the watershed contributing runoff to the Bay, approximately 59% is urban or suburban and about 26% is agricultural or vacant land.

As Rochester and the surrounding towns grew in the 1800s, Irondequoit Bay became a discharge point for untreated sewage. In concert with a broader awareness of water pollution that ultimately led to the creation of the Monroe County Pure Waters system, as early as 1968 plans were drawn to improve the water quality of the Bay. For several decades, the Bay had been in a hypereutrophic state, and subjected to many of the problems of advanced eutrophication such as algal blooms, organically rich deep sediments and hypolimnetic oxygen depletion during summer stratification.

In 1978-79, point-source nutrient loadings from the wastewater system were diverted from Irondequoit Creek to the Frank E. Van Lare Water Resource Recovery Facility (WRRF). This was followed by significant work to reduce combined and sanitary sewer overflow discharges into the Bay. Subsequent monitoring indicated a significant reduction in phosphorus loading from Irondequoit Creek to the Bay. The improved water quality was sufficient to reclassify the Bay's trophic state as eutrophic rather than hypereutrophic.

## Annual Monitoring Program

The Annual Monitoring Program for Irondequoit Bay was established in 1984 and continuity has been maintained by Monroe County Pure Waters staff, now part of the Department of Environmental Services (MCDES).

The primary tool for Bay monitoring is the Hach Surveyor 4a Hydrolab. The Hydrolab is a multi-parameter probe that is lowered

*continued on page 48*

into the water, from which readings are taken at various depths creating a profile. Every monitoring visit to the Bay includes a Hydrolab profile, along with station observations. Measurements are taken for the parameters in *Table 1*.

**Table 1. Measurements Collected During Monitoring Events.**

Hydrolab Profile	Station Observations
Depth	Secchi disk
Temperature	Total depth
pH	Air temperature
Dissolved oxygen	Cloud cover
Specific conductance	Surface elevation
Oxidation/reduction potential (ORP)	Wind direction
Turbidity	Wind speed

During the Hydrolab profile, the probe is lowered into the water and the readings are recorded on a field log sheet. Measurements are taken at depths of every meter and half-meter when the Bay begins to stratify.

Between May and October, the Bay is monitored twice per month. Each visit includes a Hydrolab profile and chemical analysis of water samples from Station 1, in the northern half of the Bay. The chemical analysis allows other parameters, such as nutrients, metals and solids, to be investigated.

Collected samples are then analyzed at the Monroe County Environmental Laboratory, based at the Van Lare WRRF, for the analytes in *Table 2*.

Samples are drawn from the water at various depths by a pump with a tube connected to the Hydrolab. The pump is operated continuously as the Hydrolab is lowered to various depths. This allows the sample line to be purged and fresh water from each depth to always be collected. Composite samples are made from

the stratified layers, as measured by the temperature and specific conductance probes on the Hydrolab. These depths can vary during the year as temperatures change, so the technician collecting the sample determines the boundary between each layer. In general, the epilimnion (warmer surface waters) comprises the top 6 meters (20 feet), the metalimnion (transition zone) comprises depths of 6 to 12 meters (20 to 40 feet), and the hypolimnion (deep cold water) comprises depths of 12 to 22 meters (40 to 72 feet).

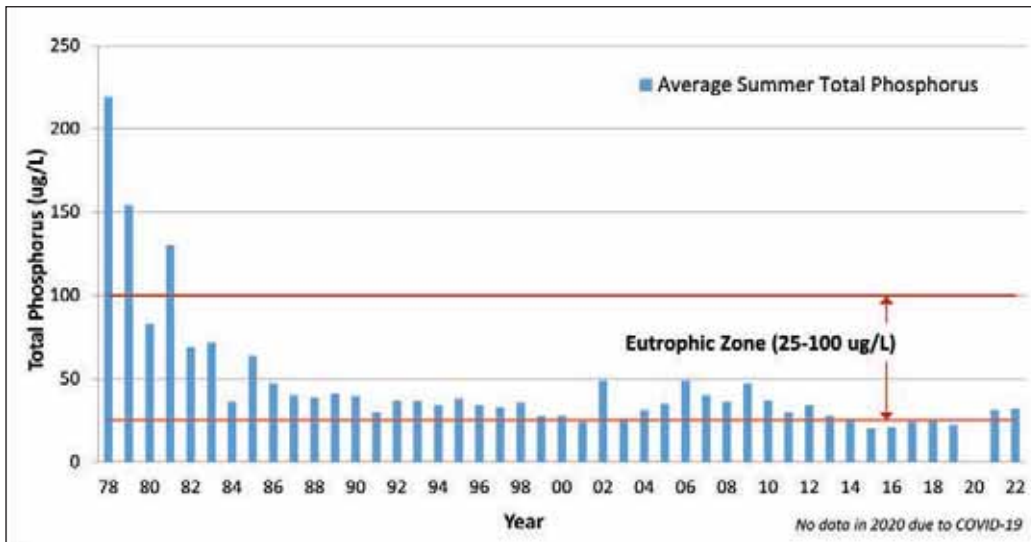


Figure 2. Epilimnion phosphorus level reductions since 1978.

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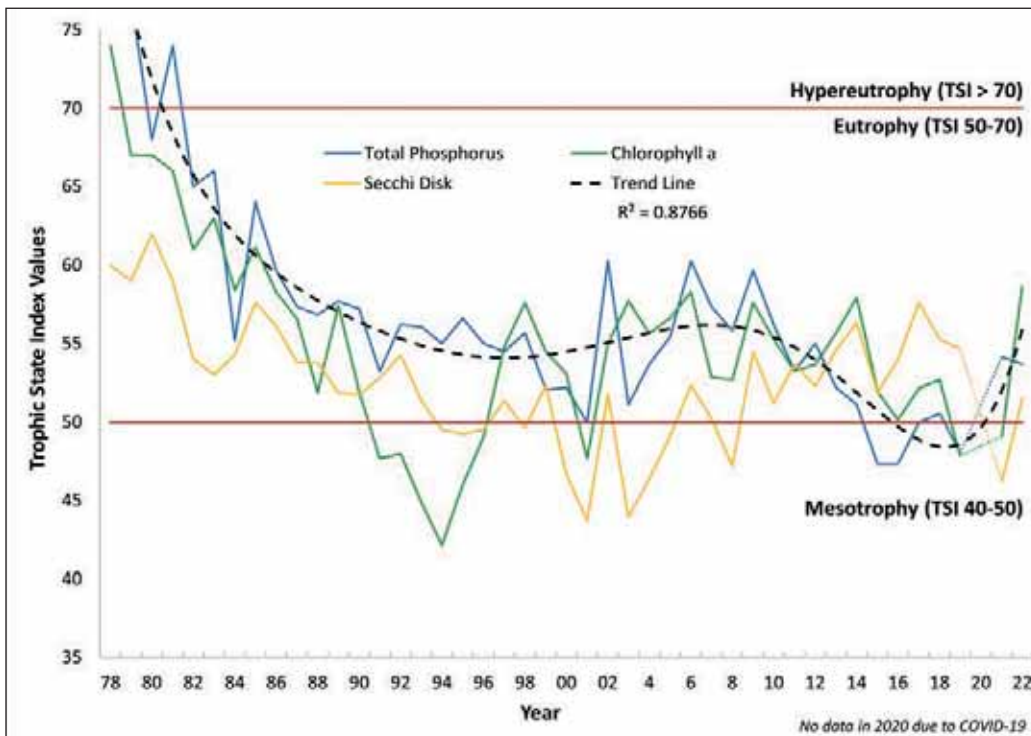


Figure 3. Irondequoit Bay Carlson Trophic State Index.

MCDES

### Phosphorus Levels

Long-term trends have shown lower levels of phosphorus in the epilimnion for the past several years (*Figure 2*). Determining the amount of phosphorus is important as high levels can result in excessive algae growth and eutrophication. The successful effort to reduce the amount of wastewater entering the Bay has resulted in major reductions in phosphorus loading. Watershed contributions from stormwater runoff, as well as the loading from internal processes in the Bay, still have the potential to fuel eutrophication. In recent years, the long-term goals for phosphorus concentration have been met, and the Bay has not experienced large algal blooms.

A measure of the internal loading from bottom sediments can be estimated by looking at the release of phosphorus from the bottom sediments during the summer months. Dissolved phosphorus is released from the sediments and has the



potential to diffuse into the upper waters and becoming available for plant growth.

**Table 2. Irondequoit Bay Chemical Analyses.**

Category	Analytes
Nutrients	Total phosphorus
	Dissolved phosphorus
	Ammonia
	Total Kjeldahl nitrogen
	Nitrate/nitrite
Solids	Total dissolved solids
	Total suspended solids
Ions	Alkalinity
	Chloride
	Conductivity
	Hardness
Metals	Iron
	Manganese
Biological	Chlorophyll-a
	Fecal coliform

### Trophic State Analysis

Another important condition to monitor is the trophic state of Irondequoit Bay. This represents the health of the waterbody based upon the amount of biological productivity they can sustain. The Carlson Trophic State Index (TSI) is a tool used by the U.S. Environmental Protection Agency and others for lake trophic categorization. The TSI is based on a unitless scale from 0 to 100, with each 10-point increment representing a doubling of biomass. A TSI score over 50 would indicate eutrophic conditions.

Figure 3 shows the mean TSI scores for Irondequoit Bay calculated by using phosphorus, chlorophyll-a and Secchi disk measurements from 1978 to 2022. The downward trend from hypereutrophic conditions in the late 1970s can largely be attributed to the near-total elimination of wastewater discharges from the Bay. There has been a more recent downward trend since 2009 that is thought to be a result of improved water quality in stormwater runoff. However, in the last couple of years, a slight uptick in the trophic state is evident. This indicates that, even despite the great work that has been done over the past few decades to improve water quality, monitoring is still necessary to identify new stressors on the Bay's health and to inform future management strategies.

*Andrew Sansone is the stormwater coordinator with the Monroe County Department of Environmental Services. He may be reached at [asansone@monroecounty.gov](mailto:asansone@monroecounty.gov).*

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### Monroe County Stormwater Coalition



The Stormwater Coalition brings together 26 towns and villages, the City of Rochester, SUNY Brockport and Monroe County, to cooperatively comply with state and federal stormwater regulations, including the Municipal Separate Stormwater Sewer Systems (MS4) State Pollution Discharge Elimination System (SPDES) General Permit. These regulations require communities with storm sewer systems to develop programs to reduce stormwater pollution through public education and from sources such as construction, illegal dumping, and our own municipal facilities and operations.

Formed in 2000, the Stormwater Coalition was originally a component of the county's Water Quality Management Agency, performing the bulk of the work of the Water Quality Coordinating Committee. As stormwater priorities have shifted over the years, so have our programs. Examples of Coalition-supported initiatives include:

- Facilitating members' compliance with SPDES permit, including support with required reporting and audits.
- Delivering the public education program (including the highly successful H<sub>2</sub>O Hero brand and messaging developed in conjunction with the Water Education Collaborative).
- Performing watershed assessments.
- Supporting the Monroe County Soil & Water Conservation District in providing technical assistance to members.
- Supporting the Monroe County Soil & Water Conservation District in providing stormwater training to operational staff, engineers and contractors.
- Mapping stormwater assets.
- Creating guidance documents for topics such as stormwater asset inspections, municipal pollution prevention and installation of green infrastructure.
- Collaborating with the New York State Department of Environmental Conservation on a pilot program to encourage municipalities to enroll in the Community Rating System, a key initiative of the Federal Emergency Management Agency's National Flood Insurance Program.



The members of the Stormwater Coalition support its work by contributing annual membership fees, with Monroe County providing staff and resources in lieu of fee to coordinate and facilitate the Coalition's work. The Coalition is successful because of our members' willingness to participate together in compliance projects. This, along with the staffing and leadership from Monroe County, has made it possible for the group to continue to be recognized as a leader across New York state.

# The Evolution of ecopark: from Household Hazardous Waste to Alexa

by Stephen Peletz

In 1988, Monroe County, under the guidance of the county's Environmental Management Council, hosted its first household hazardous waste (HHW) collection. This stemmed from the need to properly handle HHW instead of disposing it with municipal solid waste or discharging it to the county's Pure Waters system. Based on the success of this event and overwhelming support from residents to continue HHW collections, a formal HHW program was created in 1991. The program included the construction of a permanent facility which, due to demand, was expanded in 1998.



Monroe County DES staff assist residents with recycling and HHW drop-offs at ecopark. *MCDES*

When it became clear that even that space did not accommodate the perceived need, the Monroe County Department of Environmental Services (MCDES) developed a vision to create "a one-stop drop-off for hard-to-recycle items." In September 2011, this vision became a reality. Known as the Monroe County/Waste Management ecopark, this public-private partnership took advantage of an underutilized New York State Department of Environmental Conservation (NYSDEC) permitted waste transfer station. The ecopark opened to the public and allowed the HHW program to expand to handle increased demand; the number of households served has steadily grown from approximately 4,500 in 2011 to over 7,500 in 2022!

Modification of the transfer station's permit allowed for not only the collection of HHW but other items such as electronic waste, plastic bags, film and wrap, rechargeable batteries, scrap metal and Styrofoam. County residents can also properly dispose of items such as Freon devices, compressed gas cylinders, cooking oil, hardcover books, fire extinguishers, pharmaceuticals, sharps and syringes, printer cartridges, textiles and tires. Typical curbside recycling items (paper, plastic, metal and glass) are also accepted. The ecopark is the MCDES's official consolidation point for U.S. flags ready for retirement. With such a wide array of items that can be accepted for recycling or proper disposal, the ecopark is truly a unique facility.

As an innovator, Monroe County is always looking to expand its offerings to better serve its constituents and keep up with the latest developments. A recent example is our vaping/electronic cigarette collection program, the first of its kind in New York state and one of only a handful of such initiatives anywhere in the U.S.



Monroe County DES staff processing HHW containers at ecopark for proper disposal. *MCDES*

Demonstrating our ability to work swiftly with community partners, MCDES listened to concerns brought to us by the American Lung Association that vaping devices confiscated by school districts did not have a proper disposal outlet. Due to the inherent hazards in such devices, including the potential for thermal runaway and combustion of the lithium batteries if improperly handled, an urgent solution was needed. MCDES reviewed the available alternatives and identified three potential waste disposal issues:

- lithium batteries
- concentrated nicotine (an acute hazardous waste)
- in some devices, tetrahydrocannabinol (THC), which is a controlled substance

Each of these wastes has its own set of governing regulations, some of which are in direct conflict with each other. For example, acute hazardous wastes must be incinerated, but lithium battery disposal by incineration is prohibited. While this speaks to the need for better regulation of manufacturers through enhanced product



A sample of vaping devices collected at ecopark. *MCDES*

responsibility (EPR) legislation, fortunately MCDES, along with its partners Clean Harbors and Covanta, has experience handling all three of these components. As such, these devices can be accepted at the ecopark from residents, small businesses and school districts through our permitted Conditionally-Exempt Small Quantity Generator program. County residents can rest assured that these wastes are being properly disposed or recycled.

Another exciting development, aligned with Monroe County's Climate Action Plan, is the role the ecopark plays in the increasingly important ecosystem of lithium batteries. As fossil fuel-powered transportation and building heating and cooling systems are phased out in New York state, lithium battery use is expected to skyrocket, leading to eventual end-of-life concerns. Monroe County and the Finger Lakes region has the potential to become an important location in this cycle. Already, electronic devices accepted at the ecopark are transported to Waste Management's contractor SunnKing's facility for processing. Here, any lithium batteries in these devices are separated and provided to the recycling company Li-Cycle, whose existing facility extracts the valuable metals for eventual resale to battery manufacturers. This leads to a whole host of benefits, including reduced manufacturing and transportation costs, reduced raw materials costs and global supply chain risks, and lower greenhouse gas emissions, as well as creating jobs in the green economy. Li-Cycle is currently building a second-tier facility in Monroe County, which will be able to further process the material it extracts from its current plant in Rochester and other similar facilities across North America. In light of these expanded opportunities, the ecopark will also accept consumer lithium batteries directly from residential customers.

In another first for New York state, on America Recycles Day (Nov. 15, 2022), the Monroe County Recycling skill for Amazon Alexa was launched. This software application provides answers to over 200 frequently asked recycling questions. It can be enabled by using an Amazon smart device or by downloading the Alexa app on an Apple or Android smartphone. At the launch announcement, Monroe County Executive Adam Bello stated, "This app is a testament to our Department of Environmental Services team and their forward-thinking model to increase recycling awareness and help us all Recycle Right."

In total, Monroe County's ecopark has allowed over 350,000 customers to properly recycle 3,266 tons of electronic waste, 2,100 tons of curbside recyclables and 1,150 tons of scrap metal, along with proper disposal of 3,175 tons of HHW, 38 tons of pharmaceuticals, 15,000 Freon devices and 13,500 tires. This is just part of the commitment that MCDES has made to protecting the environment and keeping hazards and pollutants out of our waterways so Monroe County residents can rightfully and safely enjoy them!

*Stephen Peletz is the environmental compliance coordinator for the Monroe County Department of Environmental Services. He may be reached at [speletz@monroecounty.gov](mailto:speletz@monroecounty.gov).*



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# Genesee RiverWatch Champions Solutions That Improve the Water Quality of the Genesee and Initiatives That Connect People to the River

by George Thomas and Mike Haugh

The Genesee River rises from a spring in Potter County, Pennsylvania, and flows 157 miles to the north, emptying into Lake Ontario at the Port of Rochester. In its course, it drains a watershed of 2,373 square miles that covers all or parts of nine western New York counties. It is fed by over 5,000 miles of tributary streams including Black Creek, Oatka Creek, Honeoye Creek and Canaseraga Creek. Three of the Finger Lakes (Conesus, Hemlock and Honeoye) are included in the watershed, as is the flood control impoundment behind Mount Morris Dam and numerous smaller lakes.

## Geography of the Genesee

In general, the Upper (southern) Basin from northern Pennsylvania to Letchworth State Park is characterized by rolling hills surrounding a narrow river valley. The hills are heavily forested, and the valley is dominated by crop farming. Through this area, the average stream slope is 9 feet per mile, generating a number of interesting smaller rapids for boaters and excellent



Mount Morris Dam and Recreation Area is a major flood control project and public park located on the Genesee River near the Village of Mount Morris in Livingston County, New York. The dam is situated deep in the Genesee River Gorge at the northern end of Letchworth State Park and provides flood protection to downstream areas including the city of Rochester. (Source: U.S. Army Corps of Engineers). Mike Haugh Photography



Autumn leaves create a golden glow over the Middle Genesee at Lee's Landing in Letchworth State Park. Mike Haugh Photography

trout fishing in the section above Belmont. Below Letchworth, the stream slope drops to 0.8 feet per mile, the river valley widens considerably, and agriculture dominates the area with extensive dairy farming. Boating in this area is much less dependent on recent rainfall and snowmelt, rapids are rare, and fishermen catch mostly bass and pike. From the Monroe County border north, urban development becomes extensive, culminating in the urban/industrial City of Rochester. Boating and fishing are excellent in the river between Lower Falls and Lake Ontario, where the fall salmon run attracts numerous fishermen.

The glacial history of this region has had dramatic effects on its development and on today's water quality issues. When the last (Wisconsin Stage) glaciers retreated about 10,000 years ago, their meltwaters and the temporary lakes they formed laid down large beds of unconsolidated gravel, sand and finer sediment. On the one hand, these became the fertile soils that have supported our region's extensive agricultural economy. On the other, because they are easily eroded, the Genesee carries away nearly 400,000 metric tons of valuable farmland each year, causing economic loss to farmers and forcing expensive dredging operations at the Mount Morris Dam and throughout the Port of Rochester. Entrained in this eroded material come nutrients, including more than 400 tons of phosphorus, which contribute to algal blooms and beach closings, as well as affecting Lake Ontario's water quality.

At two points – Letchworth State Park and the City of Rochester – the Genesee has cut gorges through shale and limestone beds and formed three sizable waterfalls in each gorge. Today, these are major recreational and tourist attractions. Historically Rochester's waterfalls were the source for industrial power in the 18th and 19th centuries and the reason for the city's rise as a manufacturing and technology center.

Similar to manufacturing centers all across the country, this boon came with its own water quality issues because the Genesee was used as a convenient dumping ground for all manner of pollutants. Much of this problem was brought under control by the



The 96-foot-high Rochester High Falls, where millraces and waterwheels once captured the power of the Genesee River, are a designated New York State Heritage Area. (Source: New York State Parks, Recreation and Historic Preservation) Mike Haugh Photography

Clean Water legislation of the 1960s, but legacy issues such as coal tar, silver and other chemicals are still being addressed.

## Formation of Genesee RiverWatch

In 2014, Rochester's Center for Environmental Initiatives (CEI) was seeking ways to increase its impact by concentrating its efforts on a single area of importance to the region. CEI had a 40-year record of convening multiple groups to address environmental concerns; of productive work in a number of environmental arenas, including water quality; and of successfully executing larger grant-funded projects.

In the course of our research, we realized that the Genesee River was the only major waterway in New York state that did not have a "riverkeeper" who could speak for the welfare of the entire river and its watershed. This fact was particularly striking because the Hudson Riverkeeper was the first such organization in the U.S. and other groups like Save the River on the St. Lawrence and the Buffalo-Niagara Riverkeeper had been extremely effective in improving their waterways. We also found that there were over 125 separate organizations at the local, state and national levels, working in areas that affected the Genesee, but separated by mission, funding source and/or geography.



Chamberlain Property streambank stabilization project. Using a technique called a "toe-wood structure," large trees are placed at river bottom level and crisscrossed to form an inter-linked structure with the root wads pointed outward into the river current. Earth is backfilled over this assembly in two "bench" levels that are held in place by grass and tree plantings. Among other advantages, toe-wood projects improve habitat for fish and other aquatic life and provide a more natural appearance than rock-hardened structures. (Source: Genesee RiverWatch).

*Mike Haugh Photography*



Before (left) and after (right): Edelweiss Property streambank restoration project using rock riprap. This project stabilized 1,980 linear feet of un-buffered agricultural field along the west bank of the Genesee River in the Town of Hume, New York. It reduced sediment and phosphorus loads to the river by adding a new riparian zone while emphasizing the use of bioengineering techniques and habitat enhancement. Stabilization of the riverbank and the establishment of a vegetated buffer on the reduced bank slope has significantly reduced the rate of erosion and the subsequent loss of agricultural land. (Source: Genesee RiverWatch).

*Mike Haugh Photography*

In this environment, we launched the Genesee RiverWatch initiative in 2014 with a vision of a "healthy and sustainable Genesee River ecosystem that is an environmental, recreational and economic asset for all generations." Over the succeeding eight years, we have sought to focus community attention on the Genesee, foster coordination among river-interested organizations, help establish priorities for improvement projects, and bring increased state and federal funding to bear on river projects.

By 2020, our work on the Genesee had become so well known that it was decided to officially change the name of the organization from CEI to Genesee RiverWatch, Inc. While our name may have changed, our now 49-year legacy of forming cooperative partnerships among organizations and providing actionable information to the public remains as compelling as ever and guides our daily decision making.

## Our Work

From the beginning, we have organized our work on the Genesee into three mutually supporting segments:

- Improving water quality
- Connecting people to the river
- Informing and educating the public

### Improving Water Quality

Improving the quality of water in the Genesee has been the main focus of our work since breaking ground on our first streambank restoration/erosion control project in 2015. Since then, we have completed three major river studies and four streambank projects at a total cost of \$1.686 million, including landowner matching funds. For 2023, we have secured funding for three additional projects valued at \$747,000. All this work reduces sediment and nutrient flows into the river and will ultimately reduce dredging costs downstream and improve the quality of water entering Lake Ontario. More immediately, however, these projects preserve farmland in economic areas where the loss of up to an acre per year can be crippling to hard-pressed farmers.

This work, and future work in the areas of wastewater treatment improvements and implementation of agricultural best management practices, is inspired by a major 2013 study of the Genesee and its water quality by Joseph Makarewicz, Theodore Lewis and Blake Snyder of SUNY Brockport. Unfortunately, no comprehensive water quality monitoring program has studied the Genesee

*continued on page 54*



*continued from page 53*

watershed since publication of this work. In order to measure the impact of our streambank work and guide future efforts, we are actively seeking funding for an ongoing water quality monitoring program.

### ***Connecting People to the River***

Under the heading of “connecting people to the river,” we are working to improve boater access to the Genesee. In 2020, we partnered with the City of Rochester to build an ADA-compliant kayak and canoe dock at Petten Street in the Port of Rochester. This facility is separate from the power boat launch area and allows hundreds of paddlers each summer to safely experience Rochester’s “wilderness in the city” area between the harbor and Lower Falls. Expanding on this success, we recently received a grant of \$87,000 to improve boater access sites in Avon and Geneseo. This work should be completed in late 2023 or early 2024.

Complementing these access site improvements, in 2020 we partnered with Genesee River Wilds in Allegany County and the Genesee Valley Conservancy to publish the “Genesee River Blueway Map” showing access sites and mileages from the Pennsylvania border to Rochester’s harbor. The map is available either as a printable PDF or a customizable interactive map on the Genesee RiverWatch website. As part of this project, we have also placed signs at most access sites showing the site’s name, mile point, and distance to the next takeout location, as well as signs on the river alerting paddlers to these landing spots.

Operating on the idea that there is no better way to experience the Genesee than being on the water, since 2018 we have partnered with the City of Rochester and the Genesee Waterways Center to hold public paddling events during the summer. In 2022, we offered five such events on the river within Rochester. Two of these specifically included training opportunities for new paddlers.

### ***Informing and Educating the Public***

Informing and educating the public about the needs of the river and the activities of RiverWatch and its partners is the third major component of our work. Starting with the initial launch of

Genesee RiverWatch, we have produced the annual “Genesee River Basin Summits.” This spring, we will happily return to meeting in-person. While the date has not yet been set, we are hard at work assembling the program and speakers for a summit focused on water quality and the impact of climate change.

As part of this aspect of our work, we published the first ever Genesee River Basin Report Card in 2019. The Report Card is a compilation of New York State Department of Environmental Conservation monitoring data and assigns letter grades to the water quality of the Genesee River Basin as a whole and its six major sub-basins. As additional monitoring data becomes available, we will update and re-publish this report card.

Additional public information vehicles include periodic webinars on river-related topics as they arise, a series of newsletters each year and an annual report summarizing RiverWatch’s work during the year.

### ***In Summary***

All of this work is aimed at improving and preserving the water quality of the Genesee and its tributaries, as well as increasing public knowledge of our river and commitment to its continued welfare.

The large restoration projects referenced in this article are funded by grants from federal agencies focused on the Great Lakes region. Virtually all the rest of our work, including the grant proposals and project designs, is done by a team of dedicated volunteers backed by donations from local individuals and businesses. If you would like to become a volunteer or contribute to our work, please visit our website at [www.GeneseeRiverWatch.org](http://www.GeneseeRiverWatch.org).

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*George Thomas has been the executive director of CEI and Genesee RiverWatch, Inc. since 2008. Prior to joining CEI/RiverWatch, he worked at Eastman Kodak Company as an environmental engineer. He may be reached at [GThomas@geneseeRiverWatch.org](mailto:GThomas@geneseeRiverWatch.org). Mike Haugh is the president of Genesee RiverWatch’s board of directors. He is retired from a career in the management and turnaround of manufacturing firms. He may be reached at [Mike.Haugh@CMHConsulting.us](mailto:Mike.Haugh@CMHConsulting.us).*



The Upper Genesee marks the river’s headwaters, beginning at an elevation of 2,500 feet above sea level in the Allegheny Hills of Potter County, Pennsylvania, the river flows north through the highly dissected Northern Allegheny Plateau to Letchworth State Park. (Source: Genesee RiverWatch).

*Mike Haugh Photography*

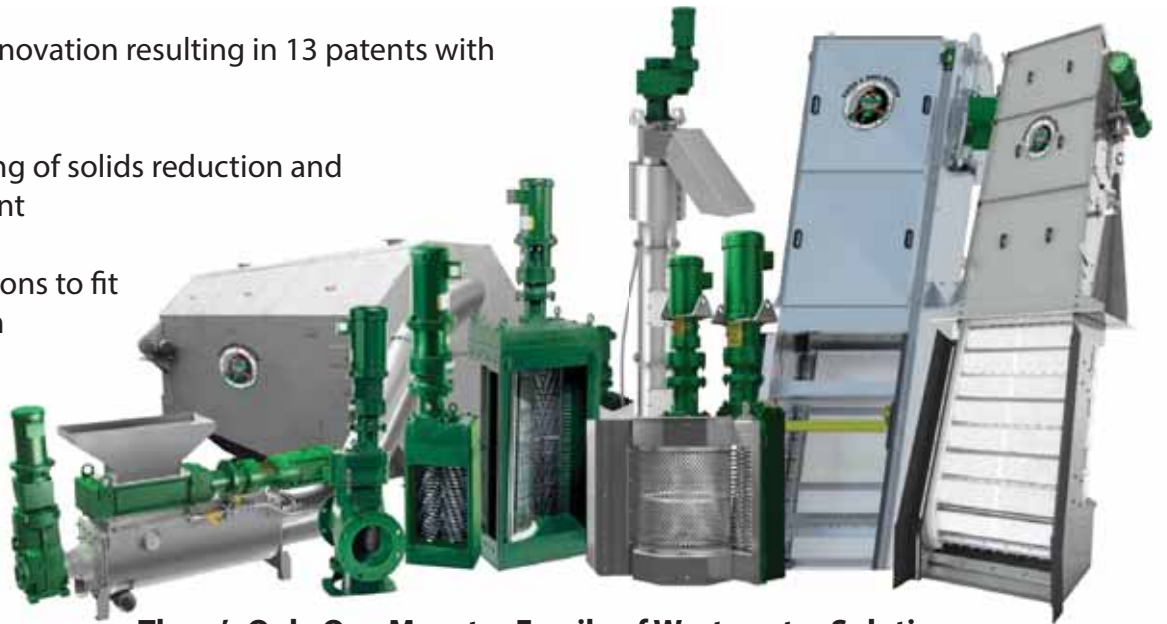
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# Village of Bath Invests in Upgrading Wastewater Treatment

by Erin Bonacci



Aerial view of the Village of Bath WWTP.

Lewis Imagery

**T**he Village of Bath is in New York's beautiful Southern Tier region, east of the Genesee River. The village is only one of two municipalities in New York state that offers electric, natural gas, water and sanitary sewer services to its community.

The village's sanitary sewer utility provides safe and reliable collection, conveyance and treatment to residents and businesses within the village and nearby areas in the Town of Bath.

## The Plant

Treatment is accomplished at the Village of Bath Wastewater Treatment Plant (WWTP). Constructed in 1935, the WWTP treated wastewater through primary settling. Significant upgrades were implemented in 1972 when the WWTP was expanded to secondary treatment using the activated sludge process. In 1993, the WWTP underwent a second round of significant upgrades to include a third train for the secondary treatment process, aerobic sludge digestion and a belt filter press (BFP). Currently permitted for 1.0 million gallons per day (mgd), the WWTP serves a population of approximately 5,600. The WWTP discharges to the Cohocton River, which flows south to the Chemung River, on to the Susquehanna River and ultimately to the Chesapeake Bay.

The Chesapeake Bay has been significantly impaired due to decades of widespread nutrient and sediment loading. As a result, the states that are tributary to the Chesapeake Bay (Virginia, West

Virginia, Maryland, Delaware, Pennsylvania, New York and the District of Columbia) established the Chesapeake Bay Watershed Agreement to restore and protect this critical waterway. Since the Cohocton River is within the Chesapeake Bay Watershed, the Village of Bath WWTP has been subjected to significant changes to its State Pollutant Discharge Elimination System (SPDES) discharge permit to comply with the Chesapeake Bay Watershed Agreement and subsequent total maximum daily load (TMDL) for total nitrogen (TN) and total phosphorus (TP).

To comply with the Chesapeake Bay Watershed Agreement and modifications to its SPDES permit, the village added a polyaluminum chloride chemical feed system in 2014 to achieve TP removal. The existing activated sludge process was modified in 2016 for TN where nitrification and denitrification could be achieved.

Today, the WWTP consists of preliminary and advanced secondary treatment processes, along with sludge thickening, partial aerobic digestion (i.e., aerated sludge holding) and sludge dewatering. Three full-time employees – two certified wastewater operators and one currently in pursuit of his wastewater operator certification – are charged with the operations, maintenance, laboratory and regulatory compliance of the WWTP.

## The Investment

Currently underway is the engineering detailed design of the Village of Bath WWTP Upgrades. This project will be the largest





The Village of Bath WWTP outfall discharges to the Cohocton River.

*Erin Bonacci*

investment in village history. Improvements proposed as part of this project will allow the village to safely and reliably treat wastewater by addressing aging infrastructure and equipment. Improvements will also allow the village to increase its permitted capacity from 1.0

mgd to 1.3 mgd. This will allow the village to continue supporting the residential, commercial and industrial developments within the village and nearby areas in the Town of Bath.

A significant improvement will be the implementation of a membrane bioreactor (MBR) process (*Figure 1*). The MBR process will allow the village to provide high levels of treatment and improvement of water quality to the receiving stream. WWTP personnel look forward to the replacement of obsolete and unreliable equipment, along with full automation of the WWTP processes. These improvements will allow the Village of Bath to continue serving its residents and businesses while protecting the environment.



Figure 1. Rendering of the MBR complex, August 2021.

*GHD*

*Erin Bonacci is director of Municipal Utilities for the Village of Bath's utility department, Bath Electric, Gas and Water Systems, and may be reached at [ebonacci@begws.com](mailto:ebonacci@begws.com).*

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# The Chosen Spot

by Michelle Hess

The City of Canandaigua, located 25 miles southeast of Rochester, is nestled on the north end of Canandaigua Lake. As you drive down our historic Main Street you are greeted by the charm of the colonial homes that line the north end of our city beginning with the Granger Homestead and Carriage Museum. When you reach the Courthouse with a closer view of the lake, the Native American translation of Canandaigua as “The Chosen Spot” becomes clear. Underfoot marks a long standing history of protecting public health and the environment for the City of Canandaigua and our neighbors.

## The Treaty of Canandaigua

This area was once home to members of the Seneca Nation, part of the Haudenosaunee Confederacy, before being driven off their lands by the French in the late 1600s.

During the American Revolution the Confederacy was split with some nations fighting alongside the British and some fighting alongside the Americans (*Haudenosaunee Confederacy, 2018*). After the American Revolution, the Haudenosaunee Confederacy sent 1,600 representatives to a treaty council with the United States to remove “from their minds all causes of complaint, and establishing a firm and permanent friendship” with the United States as represented by Colonel Pickering and General Chapin (*Kappler, 1904*).

On Nov. 11, 1794, the Treaty of Canandaigua was signed providing 6 million acres of land, primarily in New York, though later treaties and actions by New York state had cut that down to 32 acres (*Haudenosaunee Confederacy, 2018*). The treaty was ratified by the U.S. Congress and signed by President George Washington

(*Kappler, 1904*). Although violations of the treaty have occurred, the treaty has never been broken and is actively recognized by the Haudenosaunee and the United States. The United States still provides \$4,500 for the annual distribution of cloth to the Haudenosaunee people. Our city and representatives from the Seneca Nation continue to celebrate this chain of friendship annually Nov. 11 on the Ontario County Courthouse lawn where a boulder with commemorative plaque was placed to mark the occasion (*Ganondagan, n.d.*).

Traveling in and around Canandaigua, you are regularly reminded of our connection to the Haudenosaunee people who cared for these lands. Our lakes still bear the names of the Haudenosaunee nations like the Seneca (People of the Hill) and the Cayuga (People of the Great Swamps) (*Haudenosaunee Confederacy, 2018*). The Red Jacket school district in neighboring Manchester-Shortsville is named after sachem, or chief, Red Jacket, one of the signatories of the Treaty of Canandaigua. The Ganondagan State Historic Site in neighboring Victor is home to the Seneca Arts and Culture center that hosts a variety of events promoting not only the history and culture of the Seneca but the significance of the natural world as well.

## History of Wastewater Treatment

Sanitary collection pipes were laid underneath Main Street in the City of Canandaigua as early as the late 1800s. According to the city’s archives, our Canandaigua Water Resource Recovery Facility (WRRF) has been located at the end of Saltonstall Street at least as early as the 1930s. The treatment then consisted of a grit chamber, an Imhoff tank and sludge drying beds. The Feeder Canal that



A boulder and plaque were placed on the Ontario County Courthouse lawn to commemorate the Treaty of Canandaigua. Michelle Hess



Diffused aeration replaced a 1970s mechanical mixer in the post aeration tank ahead of the effluent outfall during the effluent disinfection project in 2022. Michelle Hess



An arc of color appears over the primary clarifiers' traveling bridges after rainfall. *Michelle Hess*

connects Canandaigua Lake to the Canandaigua Lake Outlet was dug specifically for our effluent discharge. In 1962 the Imhoff tank was converted to a primary settling tank. A trickling filter, secondary clarifier tank and two anaerobic digesters were also built at that time. During the 1970s, a partnership with Ontario County was developed that led to essentially an entirely new plant being built alongside the old one by 1981 with an average design flow of 6.5 million gallons per day.

A new influent building with three Archimedes screw lift pumps, chain hoist bar screens and two aerated grit tanks enhanced the preliminary treatment. A 1.3-million-gallon equalization (EQ) tank was constructed for a variety of "what-if" scenarios. Flow can enter the primary settling tanks from either the EQ tank or directly from the grit tanks. Thirty-two 12-foot-diameter rotating biological contactors (RBCs) provided for enhanced biological treatment and nitrification. Secondary tanks with 40-foot-wide traveling bridges and chlorine contact tanks rounded out the effluent treatment, although chlorine disinfection was not added to the facility's SPDES permit until 2019. Two gravity thickeners were placed on the site of the trickling filter. Two more anaerobic digesters were added to allow for "high-rate" digester loading and a belt filter press was added for dewatering solids.

The digester covers, mixing equipment and about half of the sludge pumps were upgraded in the early 2000s. The RBCs were converted from air to mechanical drive in the 2010s and a corner of the EQ tank was portioned off to serve as a holding tank for leachate and other high-strength wastes before being metered into the influent. The smaller, continuous duty influent screw pump and one of the bar screens were replaced around 2017. Like many other WRRFs, much of the remaining equipment is original to the Clean Water Act era upgrade. This makes learning the facility easier because new operators can follow along with the operations and maintenance (O&M) manual but it has made maintenance and spending priorities a chore.

### Treatment Plans for the Future

Today, the Canandaigua WRRF serves roughly 10,500 city residents and 15,000 residents from Ontario County's Canandaigua Lake Sewer District. Our facility is currently operated by six dedicated operators, including myself, and we have one position yet to fill. Looking ahead to the future, our facility is finishing up construction of an on-site hypochlorite generation system for effluent disinfection now required in our SPDES permit. We are about to embark on a major solids handling upgrade that will also upgrade a



Sixteen RBCs quietly rotate in and out of the water providing enhanced biological treatment. *Michelle Hess*

few big-ticket items, namely a new transformer, switchgear and one of the 8-foot-diameter influent screw pumps. We'll be converting two of the existing digesters into leachate-specific reactors and the other two into aerobic digesters. The welcomed upgrades should result in more efficient solids processing and Class A biosolids. Next we'll turn our focus back to the head of the plant and work our way through the liquids process until we've managed to address the remainder of the facility and continue our long-standing history of environmental protection.

Growing up with a respect and understanding of Seneca culture and bravery has ultimately guided my career path, which eventually led me back home to Canandaigua. Their stewardship of the environment and preservation of natural resources continues to be an inspiration. This reverence has given me an additional sense of pride to be the first female chief operator of the City of Canandaigua's WRRF.

*Michelle Hess, a Canandaigua native, is a New York state-certified 4A water resource recovery operator and chief operator for the City of Canandaigua's WRRF. She can be reached at [mhess@canandaigua.newyork.gov](mailto:mhess@canandaigua.newyork.gov).*

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# A New Vision for the Town of Webster's Walter W. Bradley WPCF

by Richard Kenealy

Wastewater from the Town of Webster, Village of Webster, and a portion of the Town of Penfield in New York flows to the Walter W. Bradley Water Pollution Control Facility (WPCF) from 22 pump stations. As with many municipal treatment facilities, over time the 1980s-era infrastructure of the WPCF has worn down and new regulatory water-quality requirements exceed the treatment capacity of the older technologies.



Walter W. Bradley WPCF.

Dennis Clough/Navitas

To bring their plant up to date, the Town of Webster completed Phase 1 of a two-phase infrastructure improvement project in 2022. Phase 2, to begin implementation in 2023, presents a new vision to transform the WPCF into a water resource recovery facility (WRRF).

## The Beginning

The Town of Webster was incorporated in 1840 and was originally part of North Penfield. There were approximately 2,200 residents inhabiting the new town. In the early days, the area was known for its fruit growing and other agriculture, such as apples, peaches, pears, cherries, and the production of cider and vinegar. The local Grange, at one time the largest in the world, had 400 farms.

To manage and treat the wastes generated by the agricultural industry, engineers needed to understand the nature of these wastes. Early reports from the 1930s showed the kind of in-depth analyses performed by engineers (Picture 1 and Picture 2). This information was key in the design of the town's sanitary system.

## Mid-to-Late 20th Century

The Town of Webster began constructing package plants at various areas around the town to handle treatment of wastes locally. One of those plants, built in 1958 to handle sanitary waste in the western part of the town, cost an estimated \$1.5 million. Several other projects were implemented over the next two decades.

By 1980 the population in the Town of Webster had quadrupled to just under 30,000 from 7,100 in

1950. A new treatment facility was needed. The town approved a resolution in 1980 authorizing a federal grant application for the construction of a sewage treatment plant under the Federal Water Pollution Control Act Amendments of 1972.

Over the next several decades, the Town of Webster conducted several small upgrades to maintain the facility and keep the plant operating. A few of these projects included primary sludge and grit removal, centrifuge and process control equipment, and an outfall rehabilitation project.

## The 21st Century: Phase 1

The next major project, Phase 1, was the first part of a two-phase project. Phase 1 involved upgrading the secondary clarifiers, improving site lighting and installing a new standby generator. Updates were also needed for the existing traveling bridge final clarifiers, which had become maintenance nightmares, costly to run and causing permit exceedances. The upgrade of the final clarifiers included new return sludge pumps and waste activated sludge pumps. Phase 1 was completed in 2022 at a cost of \$12 million.

In concept, Phase 2 was intended to address the antiquated solids handling side of the facility, focusing on upgrading the three inefficient anaerobic digesters. During implementation of the Phase 1 project, a new deputy commissioner of public works and a new chief

Season	Product	Amount	Water Consumed
July 1 to Sept. 1	Cherries	6,000 to 8,000 cases of No. 10 cans	315,000 gallons
Sept. 1 to Oct. 1	Tomatoes	20,000 to 30,000 cases of No. 8 cans	
Oct. 1 to Jan. 1	Pears	5,000 cases of No. 10 cans	300,000 gallons
	Apples	10,000 to 15,000 cases No. 10 cans	
Jan. 1 to Mar. 1	Sauerkraut	10,000 to 15,000 cases No. 10 cans	15,000 gallons
Apr. 1 to July 1	--	--	75,000 gallons
Mean total for year		37,000 cases No. 10 cans 25,000 cases No. 8 cans	699,000 gallons

Picture 1. Character of Sewage. This tabulation presents the seasonal characteristics of the waste produced by the Webster Canning and Preserving Company in the 1930s. The company packed orchard products, berries, sauerkraut and tomatoes as each came in season.

Newell, 1934

Analysis of Samples Collected May 25, 1934, from several sources in Webster and analyzed by W.A. Ryan, Chemist, are submitted with other analyses for comparison in the following:

TABLE II—CHEMICAL ANALYSES OF SEWAGE IN PARTS PER MILLION.

Source	Webster (day composites)				Albion 5/4/33	Brighton, June-July '37				Remarks
	A	B	C	D		F	G	H	I	
Free ammonia	21	38	19	1	6	11.8	11.8	9.8	8.1	A Sludge from east ditch
Nitrites	Trace	Trace	Trace	0.0	0.0	-	-	-	-	B Sludge, E. ditch, No. 10
Nitrates	1.00	1.50	1.04	0.0	0.00	0.0	0.0	0.7	0.7	C Sludge, E. ditch, No. 10 of village
Dissolved Oxygen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	D Industrial waste, West Photo
5-cub. ft. hours	94	55	5	345	48	-	-	-	-	E Raw sewage
B.O.D. 120 hours	175	95	54	1500	100	154	128	9.8	4.9	F Sewerage sewage
pH Value	8.9	8.0	7.5	6.1	7.3	7.5	7.4	7.4	7.4	G Inflow Tank Effluent
Chlorides	59	78	136	70	48	56	55	50	49	H Trickling Filter Effluent
Alkalinity	461	615	439	550	550	540	540	100	104	I Final Basin Effluent
Suspended Solids	245	154	84	1500	154	159	90	27	20	Note 1—Normal Sew. Sewage
Loss on Ignition	150	49	5	1500	150	150	60	20	15	Note 2—Inflow from normal
Fixed Residue	50	75	15	145	15	43	20	7	5	Note 3—Not readily treated
Unsoluble Solids	503	494	728	3500	503	540	327	572	572	Note 3—Cook sewage with high
Loss on Ignition	245	259	256	2500	177	154	172	103	105	sharlicious
Fixed Residue	340	337	468	330	355	375	305	305	307	Note 4—Difficult waste which
Notes	Note 1	Note 2	Note 3	Note 4	Raw					sewage

Picture 2. Assessment of the comparative strengths of wastes from different residential sewage drainage areas versus the waste from the canning industry.

Newell, 1934

operator for the plant were hired. The new leadership decided to take another look at the proposed Phase 2 project and reevaluate the true needs of the facility.

## A New Vision for Phase 2

Under new leadership, the focus of the Phase 2 project expanded the initial asset renewal plan with a vision to transform the WPCF into a WRRF.

About 40% of the plant's operating budget was directed to solids handling, specifically sludge disposal. Not only was sludge disposal expensive, but landfills were limiting the amount of municipal sludge they could take. A few of these landfills were also projected to close in the not-so-distant future. This large expenditure with an uncertain future became the driving force of the Phase 2 vision.

The Town of Webster wanted to produce a Class A fertilizer that could be utilized locally by the agriculture industry. Therefore, drying technology became the preferred process for Phase 2, with many benefits that included a substantial reduction in the amount of biosolids and elimination of biosolids landfill disposal. This translated into a large cost savings for the town, and will lead the town to a more sustainable future.

The town decided to use performance contracting as the delivery method for this project, and took an in-depth look at the rest of the facility that had not been addressed in Phase 1. The Phase 2 project will include headworks with new bar screens and grit removal; a new aeration system with new diffusers, dissolved oxygen probes and new blowers; anaerobic digester upgrades; and a new Solids Building that would house new solids processing equipment, a new solids dryer and final product storage. This project is set to begin construction in 2023.

We look at this new Phase 2 as a two-part project. One part deals with the asset renewal necessary to keep the facility running and meeting permit requirements. The second part is our transformation into a WRRF. This new outlook not only addresses needed asset renewal, but also builds a facility able to treat outside wastes

(septage, high-strength organic wastes, leachate and biosolids) to create a significant revenue stream and produce a sustainable product. This additional revenue, combined with all the energy and operational savings, would not only pay for the WRRF part of the project, but also help to pay down the asset renewal portion.

The Town of Webster - from the administration in Town Hall, to the town board members and the WRRF staff - believes that continued investment in an upgraded, well-maintained facility will not only protect the environment and the Genesee River Valley but will also help foster community and economic development.

## In Summation

In closing, I'd like to share something interesting that I found while doing research for this article. Engineer George R. Newell (1934) wrote:

*“One of the best ways to interest the operator in his work is to pay his expenses and send him every year it is available to the Short School (one week) of the New York State Sewage Works Association. It has already aided and improved the morale of many operators who have become proud of their plants.”*

It just goes to show that almost 90 years ago they understood the value of having trained staff at their facilities and NYWEA carries that exact tradition and mentality on to this day.

**Richard Kenealy is the chief operator with the Town of Webster WRRF. He may be reached at rkenealy64@gmail.com**

## Reference

Newell, G.R. 1934. *Report on the Sewage Treatment of Webster, Monroe County, New York.*

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# Operator Quiz Spring 2023 – What Do You Know About Activated Sludge Microbiology?

The following questions are designed for individuals/trainees pursuing certification as they prepare to take the ABC wastewater operator test. It is also designed for existing operators to test their knowledge. Each issue of Clear Waters will have more questions from a different process of wastewater treatment. Good luck!

(Credit: Donna Kaluzniak, Florida Water Resources Journal, Feb. 2023).

- 1. Microbiology is a tool that can be used to help control the activated sludge process. Activated sludge is composed of many different types of microorganisms. This is known as a(n)**
  - a. controlled culture.
  - b. integrated culture.
  - c. mixed culture.
  - d. pure culture.
- 2. Representative samples for microbiological examination should be taken from an aeration tank. What type of samples should be collected for microscopic observation?**
  - a. 24-hour flow-weighted composite samples.
  - b. 24-hour time-weighted composite samples.
  - c. Grab samples.
  - d. Preserved samples.
- 3. For a wastewater treatment plant operated in conventional mode, at what location should a microbiological sample be taken?**
  - a. At the influent end of the aeration tank.
  - b. In the middle, between the influent and effluent ends of the aeration tank.
  - c. At the effluent end of the aeration tank.
  - d. At any location in the aeration tank, as long as it is the same location every day.
- 4. The two types of slides that should be prepared for observation include a wet mount for observing live microorganisms and a stained dry slide for observing**
  - a. dead microorganisms.
  - b. *E. coli*.
  - c. filamentous organisms.
  - d. viruses.
- 5. The most common short filament in activated sludge plants associated with aeration tank foaming or frothing and excessive brown floating sludge in clarifiers is**
  - a. *Nocardia*.
  - b. *Sphaerotilus*.
  - c. *Thiothrix*.
  - d. Mastigophora.
- 6. Protozoa are usually single-cell protists often called “indicator organisms” as their presence indicates the amount of bacteria in activated sludge and degree of treatment. They include amoeba, Mastigophora (flagellates), free-swimming ciliates, stalked ciliates, and suctoria. The presence of which protozoa indicates a stable process that produces a low turbidity effluent?**
  - a. Amoeba.
  - b. Mastigophora.
  - c. Free-swimming ciliates.
  - d. Stalked ciliates.
- 7. Ideally, *Nocardia* and which other microorganism should never be seen in a healthy activated sludge system?**
  - a. Free-swimming ciliates.
  - b. Mastigophora.
  - c. Rotifers.
  - d. Suctoria.
- 8. Rotifers are multicellular animals with rotating cilia on the head and a forked tail. They consume enormous amounts of bacteria and can feed on solid particles. The presence of numerous rotifers indicates**
  - a. a young, activated sludge with a high food-to-mass (F/M) ratio and low mean cell residence time (MCRT).
  - b. a stable sludge producing a good quality effluent.
  - c. a sludge that has been impacted by toxicity.
  - d. an old, activated sludge with a high MCRT and associated with a turbid effluent.
- 9. Laboratory process data, process control guidelines, and flows should be plotted on graphs to show upward/downward trends. Comparing microscopic results with laboratory process data**
  - a. should show an exact correlation between results at all times.
  - b. is mandatory to meet regulatory requirements.
  - c. is a check to support interpretation of microscopic examination results.
  - d. is unnecessary.
- 10. How frequently should microscopic examination be conducted when a treatment plant is running poorly?**
  - a. Once or twice per day.
  - b. Every two days.
  - c. Twice per week.
  - d. Weekly.

Answers to the left.



For those who have questions concerning operator certification requirements and scheduling, please contact Carolyn Steinhauer at 315-422-7811 ext. 4, [carolyn@nywea.org](mailto:carolyn@nywea.org), or visit [www.nywea.org](http://www.nywea.org).

Answers: 1. (c) mixed culture. 2. (c) Grab samples. 3. (c) At the effluent end of the aeration tank. 4. (a) *Nocardia*. 5. (a) *Nocardia*. 6. (d) Stalked ciliates. 7. (b) Mastigophora. 8. (d) an old, activated sludge with a high MCRT and associated with a turbid effluent. 9. (c) is a check to support interpretation of microscopic examination results. 10. (a) Once or twice per day.

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