

# WATER CANADA

## PROTECTING OUR WATER

Lessons Learned from  
the COVID-19 Pandemic

Emerging  
Contaminants

Plastics Pollution

Smart Water

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Window  
on Ottawa

## WATER RESILIENCE AND ECONOMY 2020

Due to the COVID-19 pandemic, the in-person Canadian Water Summit, CWWA Window on Ottawa and Water's Next Awards event has been postponed to June 9-11, 2021 in Ottawa.

**We're making CWS/WOO a virtual experience this year!**

The in-person event may be moved to 2021, but we're still going ahead with an exciting virtual conference program on June 11 that will engage our delegates, sponsors and speakers with online conversations around municipal water/wastewater resilience, the circular Blue Economy and the Water's Next Awards "e-gala"



Visit us online to view the virtual event agenda

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**watersummit.ca**

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## Giving Credit Where It's Due

BY ANDREW MACKLIN

**THE CANADIAN WATER INDUSTRY** deserves a physically-distanced high-five and a press conference thank you.

When this country went into lockdown in mid-March, putting its best effort forward to flatten the curve on the spread of the coronavirus, the water industry didn't miss a beat. The water kept flowing: the drinking water was processed. It was business-as-usual at one of the craziest times in our country's history.

I'm sure it hasn't been easy. Many of our industry professionals have had to spend time away from their immediate families, taking the necessary steps to ensure that they don't become the reason why a community has a tough time providing clean water to its residents. Some have lived in the plants, while others have quarantined to ensure health and safety is priority one. The sacrifices have been much greater than so many of us have had to make.

When Canada returns to some semblance of normalcy, either because we have flattened the curve or a cure has been discovered, there will be no shortage of issues to reflect on within the Canadian water space. Did we prepare properly? Did we have enough redundancy in place? Did we have the right health and safety protocols in place? These issues, and many more, are and will be discussed in the days and months ahead to ensure that we are prepared in the event of another disruptive event.

Without question, this pandemic has emphasized the need to ensure clean, safe water resources for all

communities, which ensures people can properly clean and disinfect to stop the spread of the virus. It shouldn't take a pandemic to make this brutally-obvious point, but it has made the case even clearer.

There are also less severe but also important lessons to be learned. In an effort to achieve a greater understanding of what those lessons are, we reached out to a handful of industry leaders for their thoughts on this, which we have shared on pages 18 and 19. Their insights help us appreciate the next steps forward for the sector in a post-COVID-19 Canada, allowing us to educate the political leaders on the pandemic's impact on the water sector.

In the months ahead, we hope to help facilitate the important conversations that emerge from the pandemic. Whether it be thought leadership through online forums, or personal stories from frontline workers, we will provide a forum for the sharing of information on the impacts of the pandemic on the Canadian water sector and how to prepare for what comes next.

Water has not reached the headlines during the COVID-19 pandemic, mainly because nothing has gone terribly wrong. And for that, we owe a great deal of gratitude to you, the people who have kept the clean water flowing. WC

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PG. 26

ABOUT THE COVER

When the global pandemic hit, the water kept flowing. What should we take away from the impact of the coronavirus on the Canadian water sector?

Turn to page 18 to read insights from industry leaders.

Coming up in the next issue:  
JULY/AUGUST



20 years after Walkerton



Educating the next generation



2020 Water's Next award winners



**PLUS:** Columns, news and insights, coverage on the industry's biggest events, people on the move, and more.

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Credit: City of London Wastewater Treatment Operations

# Municipal Leaders Urge Residents to Think About What They Flush

CANADIAN MUNICIPAL LEADERS and wastewater professionals are urging everyone to NOT flush anything but the 3P's—pee, poop, and paper (toilet paper).

There is never a good time for a toilet to back-up in your home or your whole street. "But now, at a time when we are being quarantined or self-isolated at home due to COVID-19, nobody wants a situation that would force you out of your home where you are safest," observed Robert Haller, executive director of the Canadian Water and Wastewater Association (CWWA).

CWWA is aware there has been a rush to buy toilet paper. It is also aware that some people may need to consider alternative products. Yes, there are many alternatives

but they cannot be flushed.

Our municipal sewer systems are built to handle human waste and toilet paper that is specifically designed to deteriorate quickly. Anything else that is put down your toilet or sink can lead to clogs, blockages, and wastewater equipment damage. Any of these situations can shut down sewer systems.

Fats, oils, and grease (FOG) poured down the sink congeal and line the sewer walls. Then, so-called 'flushable' wipes, paper towels, and hygiene products collect together with the grease to form clogs. These clogs can block your toilet, your home sewer line, or form "fatbergs" that constrict the sewers of entire neighbourhoods. These clogs can also result in overflows of raw sewage into local rivers and lakes. *wc*

Share your story about the Canadian water industry with Water Canada!

Email Managing Editor Andrew Macklin at [andrew@actualmedia.ca](mailto:andrew@actualmedia.ca)

# REPORT: Natural Assets Help Communities Better Manage Flood Risk



**RESEARCH** from the Municipal Natural Assets Initiative (MNAI) found that natural assets like wetlands, forests, and ponds help communities in Canada better manage flood risk.

“In Canada and beyond, urban infrastructure is in very poor shape,” said Roy Brooke, executive director of MNAI. “And every year, local governments face increasing pressures from growing populations, extreme weather conditions, and tightening budgets. These latest MNAI research results demonstrate why more and more local governments are discovering that it makes sense to incorporate natural assets such as wetlands, forests, ponds, watersheds, or creeks into their asset management plans.”

These findings are based on six assessments of natural infrastructure values from the District of Sparwood and City of Courtenay in British

Columbia; the Town of Florenceville-Bristol, Village of Riverside-Albert, and Town of Riverview in New Brunswick; and the City of Oshawa in Ontario.

In each community, the assessment results demonstrated that conservation and proper management of natural assets has helped local governments deliver core services to their residents at a reduced cost compared to traditional engineered or grey infrastructure assets.

In the communities MNAI worked with, natural assets provided savings ranging from \$0.2 to \$414 million. “In Riverview the wetlands and forests in a proposed development area provided a minimum of \$1.4 million in stormwater services,” said James Bornemann, geomatics manager at the Southeast Regional Service Commission. “This has led to initial steps to alter the future road network to avoid the wetlands.” **wc**

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Online at  
[WATERCANADA.NET](http://WATERCANADA.NET)



**NEWS:** University of Saskatchewan Partners with Saskatoon to Study Stormwater.  
[bit.ly/SaskatoonStormwater](http://bit.ly/SaskatoonStormwater)



**NEWS:** Manitoba Launches Flood Protection Program for Municipalities.  
[bit.ly/FloodProtectionProgram](http://bit.ly/FloodProtectionProgram)



**NEWS:** TNew Mercury Care Home to be Built in Grassy Narrows First Nation. [bit.ly/MercuryCareHome](http://bit.ly/MercuryCareHome)



**NEWS:** New Brunswick Launches 2020 River Watch Program.  
[bit.ly/RiverWatchProgram](http://bit.ly/RiverWatchProgram)





Pharmaceuticals pose challenges for wastewater treatment.

What solutions are available?

BY KIMBERLEY GILBRIDE

**THROUGHOUT THE LAST DECADE**, the definition of ‘contaminants of emerging concern’ (CECs) has morphed into an open ended and ambiguous term. Currently, any compound that is not currently monitored in the environment but might enter the environment and potentially cause an adverse effect to the ecosystem or human health can be considered a CEC. The uncertain nature of the term reflects the emergent state of scientific research on the characteristics and classification of these contaminants that can include compounds such as pesticides, illicit drugs, synthetic and natural hormones, personal care products, antibiotic resistant bacteria and genes, and pharmaceuticals.

Thirty to 90 per cent of oral pharmaceuticals or their degradation products are estimated to be excreted in urine and faeces. There has been a large increase in the quantity of these drugs that enter our sewage systems since wastewater treatment plants (WWTP) were not designed to eliminate many of these compounds. Aging populations and the desire to improve the quality of life worldwide will continue to increase

the consumption of pharmaceuticals, and without suitable best available technologies, wastewater effluent will become the major pathway for CECs to enter our environment. For example, the use of therapeutic drugs increased at an annual rate of 12 per cent in Canada between 1985 and 1992. Likewise, between 1998 and 2007 spending on prescription drugs used outside of hospitals grew from \$8.0 billion to \$19.0 billion. It is estimated that the global pharmaceutical market will exceed \$1.5 trillion by 2023.

Research has shown that pharmaceuticals discharged from WWTPs are present in downstream freshwater sources that are relied upon for drinking water, irrigation, and fish habitats. In general, scientific research on CEC has characterized these contaminants as discrete chemicals. However, the cumulative and synergistic impacts of these chemicals upon human and ecological health is overlooked and is not well understood. As a consequence, CEC scientific knowledge has not yet been translated to support the development of evidence-based decision-making tools,

new wastewater technologies, and legal regulations that could protect freshwater sources, ecosystems, and human health, and be relied upon by municipalities operating WWTPs.

In 2018, the Canadian Water Network published a comprehensive pan-Canadian public awareness report affirming the regulatory gap and the WWT challenges facing federal and provincial governments. The report leaves open for further research the task of identifying and prioritizing CEC from the growing list that are “most significant health risks to receiving waters and environments.”

A report published by Pollution Probe in 2019 examined the sources, pathways, and impacts of pharmaceuticals in the Great Lakes. It identified that a gap existed in “ecotoxicology data on active pharmaceutical ingredients and mixtures.” It also highlighted the absence of federal and Ontario wastewater regulations on “the management of pharmaceutical pollutants.” The report recommended prioritizing research on “active pharmaceuticals” as well as site-specific monitoring of wastewaters at “pharmaceutical manufacturers”



and healthcare institutions while also considering “pre-treating on site prior to release to WWT facility.”

In practice, environmental monitoring at a WWTP should provide stakeholders data to assess the risk not only of each contaminant but also of the cumulative impacts and removal rates of CECs. However, WWT operators face the problem of deciding what data to collect and what to measure when assessing the risk of CECs. The need to determine the occurrence, seasonal timing, and spatial distribution of CECs in order to monitor, predict and mitigate the health and ecological impact complicates monitoring protocols. Research from the United States’ EPA demonstrated that CECs sampling concentrations often vary significantly and appear dependent on sampling locations and season of the year.

The traditional analytical approach to monitoring CEC applies targeted screening with techniques such as HPLC and GC coupled with mass spectrometry. However, the requirement for precise sample preparation and the low levels of the contaminants can produce misleading test results raising doubt as to the efficacy of this approach for WWTP operators. It has been shown that these misleading results can be explained by chemicals acting as transformation products, which may exhibit similar chemical activity and toxicity levels to the parent CEC compound, and then, can become undetected in the WWT monitoring of influents and effluents. These findings not only demonstrate the inadequacy of the current contaminant-by-contaminant classification system that informs the traditional monitoring approach but also support water policymakers call for a precautionary and adaptive management approach for developing suitable and standardized sampling protocols.

In Canada, a legislative gap exists regarding the safe regulation of CEC effluents from WWTPs stemming from a shared constitutional responsibility for water resources and wastewater treatment that is divided between federal, provincial, and municipal authorities. At the federal level, Environment and Climate Change Canada administers the legislative instrument (i.e., the Wastewater Systems Effluent Regulations (SOR/2012-139))



The consumption of pharmaceuticals has increased along with a desire to improve the quality of life, according to Gilbride.

that falls under the Fisheries Act. This 2012 non-binding regulation sets a quality baseline for monitoring effluent discharges. However, both CEC and influents into wastewater systems from industrial, commercial, and institutional sites are overlooked.

However, in the end, WWTPs are managed at a municipal level. If regulations on the release of CECs are legislated, the WWTPs will be responsible for implementing new technologies that can eliminate CECs including pharmaceuticals during treatment. Currently several technologies have been shown to significantly remove pharmaceuticals from wastewater. The most widely used process is activated carbon treatment as it is able to remove both organic and inorganic pollutants. However, the process requires adequate monitoring strategies since adsorption competition can reduce a compound’s removal and large bed volumes are required to have enough available adsorption sites.

Advanced oxidation processes are also promising technologies. They are able to remove a wide range of CECs. However they can be expensive to operate due to the need to prepare and

recover the photocatalyst. Constructed wetlands are a new green technology that mainly involves the use of vegetation, soil, and microorganisms to improve the water quality. They can remove large percentages of CECs but do not seem to achieve total removal and may suffer from sediment accumulation and microbe release. Currently no single technology is ideal in all circumstances.

The increase in pharmaceuticals in wastewater is directly linked to the increase in the use of pharmaceuticals worldwide for global health. However, the outcomes of such compounds being released into the environment has highlighted the importance of knowing the risks associated with exposure to these compounds. The solution relies on the development of adaptive and holistic environmental monitoring strategies, implementation of wastewater regulations based on CEC management protocols, and research into new technologies to remove the compounds during wastewater treatment. WC

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Kimberley Gilbride is a professor at Ryerson University.



# COMMUNITY CIRCLE

Addressing the need to streamline water treatment solutions for Indigenous and non-urban communities. BY SIMRAN CHATTHA

**IN THE TRADITIONAL APPROACH** to developing water treatment solutions for Indigenous and non-urban communities, there is a linear relationship between source water, a drinking water treatment plant, and the community that is receiving treated potable water. This approach focuses on using a technology to do a certain job, like treating organic or inorganic contaminants, in a water treatment plant.

A different way to approach the design of a water treatment solution for an Indigenous and/or non-urban community is to think about who it is designed for. Operators, who are responsible for ensuring that communities receive safe drinking water, hold a number of functions in their job. In fulfilling their responsibilities, operators face a number of challenges and stressful situations.

The water industry can deliver local water solutions for Indigenous and

non-urban communities if it considers the people (operators) that are using them. This can, in turn, support sustainable drinking water supplies in these communities. But how can we move forward in a more effective manner to deliver sustainable solutions for Indigenous and non-urban communities?

To explore this question in detail, Water Canada and the RESEAU Centre for Mobilizing Innovation hosted a Community Circle workshop in January 2020. About 30 attendees—including engineers, academics, and technology providers—from across the country participated in the workshop.

## Need: Design for operator

Value proposition design is one of the approaches that can be used to design a water treatment solution for an operator. In this context, some key elements of value proposition design include:

- Ease of maintenance.
- Absence of chemicals, taste, and odour.
- Robustness of solutions.
- Awareness of water health and risks.
- Operational safety.

Going into the group discussion, participants attending the Community Circle workshop were asked about what is keeping the water industry from value proposition design. Attendees were also asked about how value proposition design could be incorporated into a project if plenty of funds were available.

## Factor: Support for operator involvement

Operator engagement from the outset of a project is something that was recognized by multiple attendees at the workshop. In order for this to occur, resources





There are unique factors in each community that need to be considered when implementing a solution to meet a community's water needs.



About 30 attendees participated in a workshop that considered the factors that need to be taken into account when designing local water solutions for Indigenous and non-urban communities.



Madjid Mohseni (pictured) from the RESEAU Centre for Mobilizing Innovation and Ted Molyneux from Indigenous Services Canada set the context for the Community Circle workshop on January 27, 2020.

need to be provided to support operator participation and capacity building. This is in part because many operators can't take a leave from their day-to-day responsibilities since they don't have a backup that can take over in their absence.

However, inviting operators to provide input is not enough because some tend to stay quiet while technical discussions are taking place. If this is the case, the operators need to be actively prompted to provide their views. Otherwise, they may not find their participation valuable and may choose to no longer participate in meetings.

This approach, to keep operators engaged from the outset of a project, assumes that a dedicated operator is in place at the start of a project, which is not always the case. This is a barrier to value proposition design. One potential solution to overcome this barrier is to provide sufficient resources that can be used to support training and capacity building.

### Factor: Language differences

When working with different communities, we need to be mindful of language differences since a word can mean different things in different languages. One workshop attendee noted that there was a case where a consultant was working on a pilot project with an operator whose first language wasn't English. There was no word for 'chlorine' in the operator's first language so the translation came out as 'poison.' In situations similar to this one, things can get confusing if community members are being told that poison is going to be added to their water to make it better. For this reason, language barriers to be overcome in order to build trust.

### Factor: Need for qualified engineers

A number of attendees agreed that there is a need for qualified engineers to be engaged in water treatment projects. There are some engineers and companies that don't have the knowledge needed to

understand how a water treatment plant works. However, they are still able to get projects because of their low bids.

One potential solution to overcome this challenge is to move away from a low-bid selection process and move towards a qualification-based selection process. Another potential method to ensure that water treatment solutions are being designed with operators in mind could be to engage operators from the beginning of a project, since they will be the ones operating and maintaining the plant.

### Implementing value proposition design

Ensuring that a water treatment solution is designed with an operator in mind is one of the factors that needs to be considered when implementing value proposition design. Another factor to consider is the decision-making process that is undertaken before a project is started, while a project is being undertaken, and after the project is completed.

During the Community Circle workshop, attendees were asked to consider the following questions: If I were to implement value proposition design, what would be my decision-making criteria? What are the payoffs of the decision-making criteria? What are the risks?

### Influence: Building trust

The need for trust building in the decision-making process was identified by multiple attendees during the group discussion. One of the ways that this can be done is by making time for rights holders and stakeholders to get to know one another. This enables stakeholders to understand traditional perspectives related to the activities that are being undertaken in a community.

### Influence: Incorporate transparency into the decision-making process

Based on input from attendees at the Community Circle workshop, transparency in the decision-making process is an important part of value proposition design.

Incorporating transparency into the decision-making process requires building trust with a particular community and ensuring that it sees the process as transparent. It also means that the stakeholders, which are engaged in a project, are aware that they are accountable to the community and that they are there to support the community. These factors combined will help develop a sustainable solution for the community.

Incorporating transparency into a decision-making process also requires that individuals involved in the project be educated about the process because they are not used to thinking this way. This takes time, which means that many more project meetings will be required go up because a paradigm shift is needed.

### Influence: Understand the unique characteristics of each community

When implementing value proposition design, a factor to consider is the 'uniqueness' of each community. In other words, each community is unique and is going to require a unique solution.

Taking this approach means that the appropriate solution and the most cost-effective solution will be developed for each community. This solution will also have the highest level of community ownership, which will help to ensure the success of the solution in the long-term.

There are some risks associated with this approach. It takes time to understand the uniqueness of a community. In the time it takes to develop this understanding, there could be a turnover in staff. There could also be a change in Chief and Council—this may or may not change the direction of a project but more time will need to be invested by stakeholders to get buy-in.

### Influence: Economic sustainability and operational viability

How much money is needed to maintain a level of service standard? How much money would we lose if this was a business that we were running?

These are some questions that need to be considered when a water treatment solution is being designed. This is because every community has a limited amount of resources available to build, commission, operate, and maintain a water treatment solution. Another factor to consider is that Indigenous Services Canada (ISC) will only provide a limited amount of resources to support a project. Despite the limited resources, a service standard still needs to be met.

When making a decision about which water treatment solution to implement, some questions for communities to consider include: What are the costs? What are the risks and complexities?

Another way to think about owning and operating a water treatment solution is to run it like a business. Is it going to lose money over the life cycle of a water treatment solution? Is there an alternative that's available, which will meet the needs of the community and also be more affordable? Is it better to go with a different option that's a little more complicated to operate but may be a little cheaper to replace later on and/or cheaper to sustain?

## Implementing decision-making processes

In the final group exercise of the day, participants in the Community Circle workshop were asked to provide input on the implementation of an iterative decision-making process that can help develop sustainable water treatment solutions for Indigenous and non-urban communities. Some of the questions they were asked to consider include:

- ① Starting with the hypothesis, what creates value proposition for the community?
- ② What do we still need to know or answer?
- ③ Who should be involved?
- ④ How should we design the next test to validate improvement or viability of new experience?

Below, we have included some of the decision-making processes that were developed during the workshop.

### One possible decision-making process

In one of the group discussions that took place during the Community Circle workshop, George Thorpe from BI Pure Water noted some takeaways from the discussion in his group about the steps that could be taken as part of an iterative decision-making process. The steps include:

- ① **Gather the team:** This step would include getting feedback from the community about the project and a site visit. It would also include brainstorming, defining the preliminary scope, and selecting the project manager.
- ② **Understand client requirements:** This step of the iterative decision-making process would help identify the technical, cultural, and financial requirements of the project. It would also involve engagement with the community.
- ③ **Engage contractors:** Some of the tasks to undertake in this step of the process would include: budget, schedule, scope, purchase order, and funding.
- ④ **Design:** The design stage of the process would include designing and documenting the water treatment



solution, submitting it for review, and revising it as required. It would also include finalizing the budget and conducting a site safety review.

**5 Build:** Some steps to undertake at this stage of the project would include: purchasing components, assembling the solution, conducting a factory acceptance test, developing an operations and maintenance manual, and having an operator undertake a review.

**6 Install and commission:** This stage of the process would include delivering and installing the water treatment solution. It would also include performance testing and approval, commissioning, operator training, and turnover to the owner.

**7 Operations and maintenance:** At this stage, the operator would perform repairs as needed. This stage of the process would also include follow-up training and support.

### Another possible decision-making process

Based on another one of the group discussions that took place during the Community Circle workshop, Nico Paul from Indigenous Services Canada (ISC) noted that the first step when developing an iterative decision-making process would include building trust and relationships in the community. An important part of this step would be to listen actively to all of the concerns brought forward by the community.

The second step would include understanding site-specific needs and constraints. This step would involve performing assessments as required. The third step in the process would include building a streamlined approach and include a project team that would bring together the skills, political and social stakeholders, and knowledge to fill the gaps identified.

Some of the benefits of a streamlined approach include:

**Academic and research perspectives:** These perspectives could help build trust, which would help influence policy briefs and understanding. They could also provide additional time resources to the community.

**Industry perspectives:** These perspectives could help identify constructability issues earlier in the process. They could also put in orders sooner, which would help accelerate the schedule of the project.

**Operator perspectives:** Engaging operators early on in a project could help identify operational issues earlier. Operator engagement throughout the process would also help foster greater stewardship.

### Common takeaways about developing an iterative decision-making process

A number of group discussions, in addition to the ones above, took place to identify possible steps to undertake as part of an iterative decision-making process. Some additional takeaways, in no particular order, are included below.

**Community engagement:** Engaging a community throughout a decision-making process is important because this can help develop relationships and can help build trust.

Stakeholders engaged in project should start by developing an understanding of what is needed to achieve meaningful engagement. They should also take time to understand the community's voice, which is influenced by factors such as the community's context (e.g. social and political realities that exist within the community), history, infrastructure assets, and colonial impositions.

Developing an understanding of these factors, among others, can play an important part in ensuring that a sustainable water treatment solution is developed for a particular community.

**Understanding community needs:** Understanding the needs of a community by asking the right questions is an important part of an iterative decision-making process. As part of this, social, economic, and technical considerations need to be taken into account.

**Operator engagement:** Engaging operators in a decision-making process is important because they are the ones that operate and maintain the water treatment solution. During the decision-making process, it's important to obtain operator

buy-in when considering the advantages and disadvantages of various solutions. It's also important to take operators into account when considering operations and maintenance after a water treatment solution has been commissioned. **wc**



Simran Chattha is the associate editor of Water Canada.

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**Ted Mao**, Trojan Technologies

**Maxwell McCormick**, Arcadis

**John Millar**, Water First

**Ted Molyneux**,  
Indigenous Services Canada

**Meghan Myles**,  
Indigenous Services Canada

**Gerson Neiva**, WSP Canada

**Nico Paul**,  
Indigenous Services Canada

**George Thorpe**,  
BI Pure Water



One of the open cut trenches where the new watermain infrastructure was placed in Mississauga.

One of the biggest challenges facing the project was to build new watermains with as little disruptions to major transportation routes like Dixie Road seen here.

# IMPROVING THE FLOW

Improving water capacity in one of Canada’s largest cities. BY ANDREW SNOOK

**THE CITY OF MISSISSAUGA, ONTARIO** has been a ballooning Toronto suburb for decades. From a population of 172,352 in 1971, it has grown to nearly 750,000 people, making it Canada’s sixth-most populated city. With all of that growth comes the need for a wide array of infrastructure. From new schools and hospitals to wider roads and more highways, and, the topic of this article, improved water capacity.

The Region of Peel recently completed the Hanlan Watermain Project, a \$450-million project funded by the Region of Peel (\$330 million) and York Region (\$120 million). The project installed 14.5 kilometres of 2400-mm diameter Hanlan Feedermain and six kilometres of 1500-mm Mississauga City Centre subtransmission watermain, as well as smaller diameter watermains.

“It was needed for future development in the Region of Peel,” said Bill Turner, project manager for the Region of Peel, adding that the project was also needed to build in

redundancies to the system. “It’s basically twinning the existing feedermain.”

The project will help the Region of Peel fulfill its obligations to York Region to supply water under the York-Peel Water Supply Agreement formed in February of 2002.

The project was broken up into three contracts with construction for Contract 1 (Lakeshore and Dixie Roads to Golden Orchard Drive) being performed by McNally Construction Inc.; Contract 2 (Dixie Road from Golden Orchard Drive to Eastgate Parkway) performed by T2DMP; and Contract 3 (Eastgate Parkway and Tomken and Cawthra Roads) constructed by Southland Technicore Mole JV. The engineering companies on the project were Jacobs, WSP, The Municipal Infrastructure Group, and GM Blueplan. Environmental services were performed by AECOM.

## A challenging path

The biggest challenge of planning out the

project was building a route that would work for all affected parties and limit disruption during the various stages of construction.

“Finding a route that was short enough and used municipal roads that wouldn’t really affect too much by causing disruption to the public, that was a biggest planning issue,” Turner said. “Just trying to find a route that would work for all the piece stakeholders—the area councillors, the residents themselves, the people on the utilities, the conservation authorities... it was huge challenge.”

In the end, the project planners were able to create a suitable route that ran along Lakeshore Road, Dixie Road, Eastgate Parkway and Tomken Road in Mississauga.

“That route was chosen because Dixie Road was actually one of the larger roads, so we could mix the construction between tunnelling and open cut. We just didn’t want to do all tunnelling and all open cut, because some areas are



very difficult to open cut because we'd be taking up most the travel right of ways," Turner explains. "There were multiple interesting crosses we had to cross: two highways, railroads, a couple of major intersections with heavy volumes of traffic on it, so we had to take them into account."

The biggest challenge outside of the planning of the route was trying to satisfy the public and the area councillors for picking the best route that was suitable for the project.

Turner said he's learned a lot from his experience on the project that he can see himself coming back to when tackling future large infrastructure projects.

"What we recognized during the planning and design was this was going to be the largest single individual project the Region has ever carried out. We had to recognize this was going to be quite the impact on the public, and not just the residents, but the businesses, the local utilities, and even

the conservation authorities," Turner said. "So right from the beginning we set up working groups. We met regularly with all the key stakeholders to keep everyone informed."

To keep all of the stakeholders updated on a daily basis, the Region of Peel adopted a communications strategy specifically for the project.

"It's something we've carried on to other projects in the Region, a similar sort of communications strategy," Turner said.

Considering the size and scope of the project, Turner said the amount of frustrated residents and business owners filing complaints wasn't anywhere near as vast as it could have been.

"There were obviously the odd times when you're starting to disrupt the traffic the first time [...] but with the communication plan everyone was well aware of it, and so we really didn't see what I expected to be a lot more complaints," Turner said. "I think because everyone was so well

informed, they knew to either avoid the area or they knew what was going on. It wasn't a sort of out-of-the-sky someone dropped a big construction project on my street. Everyone was well aware for some time. I think that made it easier on the public."

The communications strategy wasn't the only part of the project that worked out nicely. The vast amounts of planning that took place made the overall project move along without any major bumps, on time and on budget.

"All the planning we put into it ahead of it seemed to pay off. Everything went relatively smoothly for this size of project," Turner said. *wc*

*This story originally appeared in the January/February 2020 edition of Water Canada's sister publication, ReNew Canada.*

Andrew Snook is a business-to-business writer based in Mississauga, Ont.

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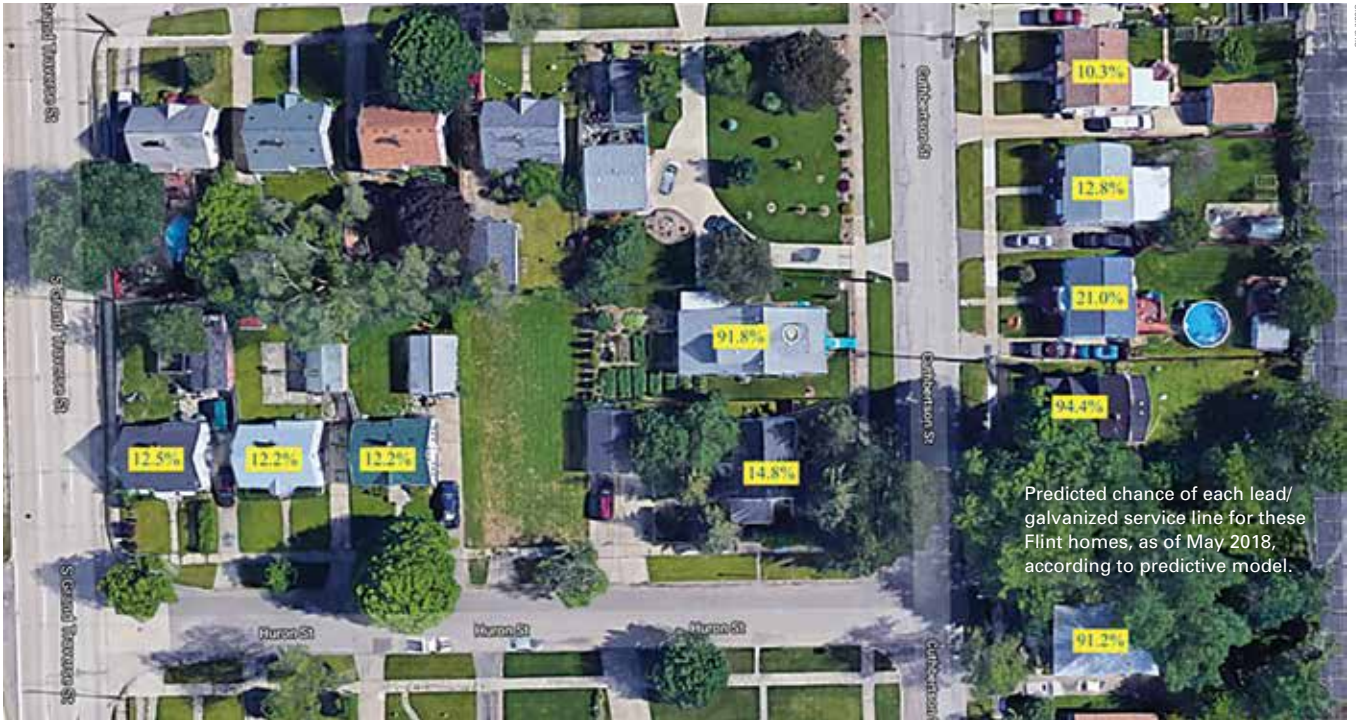
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# Stopping the Guessing Game

Using technology to understand where lead infrastructure exists.

BY TIM KRUSE, JAMES REYES, AND IAN ROBINSON

**SINCE NEWS OF LEAD-POISONED** drinking water in Flint, Michigan emerged in 2015, the water sector has kept it top of mind. A growing body of evidence suggests that what seemed like an isolated incident of mismanagement is relevant to water utilities across North America. The State of Michigan has been a leader in establishing requirements for utilities facing this issue. It has enacted legislation mandating lead testing protocols and even implemented a requirement for municipal systems to identify and plan for the replacement of all lead service lines in the state. Facing similar challenges, Canada can learn a lot from Michigan’s experience.

One key factor in tackling the issue of lead in drinking water that can save organizations time and money is correct identification of existing lead service lines. The machine learning techniques used to predict Flint’s lead service line numbers and locations saved tens of millions of dollars and reduced the public health

risk. The same methods have similar application opportunities elsewhere.

Although Canada restricted the use of lead in water pipes in 1975, there are still plausibly over 500,000 lead service lines in the country’s water supply, according to testimony before a 2017 federal parliamentary committee. Lead exposure is a serious public health concern, especially for children. The Canadian government lowered the acceptable threshold for lead in drinking water from 0.01 mg/L to 0.005 mg/L in 2019, and most pediatricians (including an expert that testified before the 2017 parliamentary committee) say that there is no safe level of lead for children.

Replacing service lines is expensive, and another problem looms: utilities often do not know how many lead pipes there are or where they are located.

As Canadian utilities work to meet new lead regulations and respond to increased public awareness of lead in drinking water systems, looking at the lessons

learned from Flint will help Canadian utilities get ahead of the game, improve water safety in their communities, and potentially save millions of dollars.

There is no nationwide inventory of lead service lines, and even water utilities themselves may not know which lines are likely to contain lead. Incomplete, outdated, or simply nonexistent records can make the issue of where to look for these lead lines, or even how many exist, formidable.

University of Michigan researchers developed a machine learning model that uses utility and parcel-level data to develop a more accurate service line inventory and calculate the probability that a given service is connected with a lead line. Parcel level data points that were informative in Flint included land value, year the home was built, nearest fire hydrant type, and historic service line records. As pipes are dug up and more data is accumulated, the model updates accordingly and yields more accurate results.



This model was used during the Flint, Michigan water crisis to prioritize high risk areas for service line replacement. Flint's water service line records were largely unreliable, meaning the City could not say how many lead pipes existed, nor where they were. Flint's original estimate for the proportion of lead service lines was 10-20 per cent, but after following the researchers' advice to visually verify pipe materials at a representative set of homes, that number jumped to approximately 50 per cent. Now, four years and 20,000 excavations later, the true proportion of lead water lines is over 48 per cent, bolstering the accuracy of the predictive model.

Flint began using the predictive model to guide replacements in September 2016, yielding a hit rate of about 80 per cent. Despite these impressive results, a consulting firm that took over the replacement effort in 2018 ignored the model. During 2018, they performed 10,000 digs and replaced only 1,500 lead pipes (a hit rate of 15 per cent). This quadrupled the City's cost per successful replacement. A U.S. federal court mandate ultimately required the City to use the model again. As a result, the hit rate has steadily increased since early 2019 and is now close to 70 per cent.

The two professors responsible for developing the model, Jake Abernethy and Eric Schwartz, founded BlueConduit, a company aimed at leveraging data science and machine learning to find and remove lead pipes in other municipalities. Their work was recognized by the most prestigious data science conference in the world (SIGKDD) and was featured as the keynote presentation at the 2019 SWAN Smart Water Conference.

The lessons from the Flint water crisis are numerous. In Flint, it is clear that a data-driven approach allowed public money to be spent more efficiently in ways that directly align with public health protection. Because the public (utility-owned) portion of service lines is buried under roads and sidewalks, it is expensive to verify pipe materials. Depending on the verification method, it can range from a few hundred dollars to a few thousand dollars per home. Flint spent more than \$20 million on unnecessary excavations when it ignored model predictions in



After the crisis in Flint, the State of Michigan became one of the leaders in providing lead guidelines for its water utilities.

2018, instead of targeting homes with the highest likelihood of having a lead service line. This could have been largely avoided with the continued use of the predictive model.

Many municipalities in Canada are also in the dark. Similarly, they may lack adequate data on water service lines and residential lead exposure risk. Carl Yates, the former general manager of Halifax Water, testified before a parliamentary committee in 2017 that he believed lead in drinking water to be a more serious issue "than many utilities in Canada and their provincial regulators understand." The committee report also noted that lead water pipes are especially a problem in smaller municipalities and First Nations communities. Using a predictive model like the one in Flint could yield major advancements in identifying the scope of the problem for Canadian utilities. A clear and early picture of lead service lines could be invaluable for utilities and inform budgeting and decision-making surrounding replacement initiatives.

Utilizing machine learning is also preferable to basing decisions solely on water tests or the age of homes. In Flint, these data points helped inform the predictions but were not determinative on their own. The predictive model integrates these data and others to develop best estimates that improve with more data.

A 2019 investigation by more than 120 journalists in Canada from nine universities and 10 media organizations conducted 12,000 lead tests in 11 cities across the country. Their results found that 33 per cent of tests exceeded the national safety guideline of 0.005 mg/L of lead. The study also found that water coming from municipal water treatment plants was generally below recommended lead levels, but was later contaminated as it traveled to residences. Moreover, Global News reported that due to inadequate records, many municipalities did not know how many lead service lines are in their city limits.

Many municipalities understandably feel overwhelmed by this problem, but using predictive modeling can inform decision-making, save money, and reduce the public's exposure to lead. WC



Tim Kruse is the eRIS product manager for Eramosa Engineering. James Reyes is the vice president of global sales & marketing at Aquatic Informatics. Ian Robinson is the managing director at BlueConduit.

# Change for the Better



Water sector needs in a post-COVID-19 world. BY ANDREW MACKLIN

**THE CANADIAN WATER SECTOR** has proven to be one of the most resilient essential services in the wake of the COVID-19 pandemic. Water utilities, both public and private, were clearly prepared to deliver high-quality service in the wake of an unfathomable disruption.

But even when you think you are prepared for the unthinkable, when the unthinkable happens, hindsight always makes us look at how we might have done things differently. Or, perhaps, how we might change the way we prepare in the event of another significant disruptive event.

We contacted several leaders within the national and global water space and posed a simple, yet general, question:

**What's one thing that should change in the water sector as a result of the COVID-19 pandemic?**

Here are the responses we received, in their own words.

"It's clear, many sectors are stepping forward during the COVID-19 pandemic, including environmental non-profits. A number of watershed groups we partner with in Atlantic Canada are continuing to collect vital data through water quality monitoring, albeit in a paired down capacity. We're also seeing how dependent ENGOS are on government funding. Once we've made it through the current crisis, I hope we see increased trust in community-based water monitoring organizations as well as further financial support of this vital work."

**Emma Wattie,**  
Director, Atlantic Water Network

"A better understanding of the very importance of our industries function as an essential service for the protection of the environment and the health of the population."

**Richard Szigeti,**  
Board President, Water Environment Association of Ontario (WEAO)

"The COVID-19 pandemic is a generational challenge—one that will shape emergency response plans of the future. It has reinforced the importance in how water utilities staff facilities, protect workers and ensure services are delivered without interruption.

We expect the water sector, as a whole, will evolve with more comprehensive business continuity plans focused on pandemic scenarios, and these would be regularly tested and ready to be deployed. These plans will include detailed consideration of the ripple effects across organizations, such as intensive IT support, childcare arrangements for families, customer physical distancing and protocols for sequestered employees.

The pandemic has highlighted the critical importance of water utilities in communities around the globe, and we expect this will influence the future of how governments view our workforces when it comes to health testing and the distribution of key resources such as PPE."

**Shawn Bradford,**  
Senior Vice President,  
EPCOR Water Canada



“Potable water is a basic human right, and a foundational necessity to fighting the COVID-19 pandemic. Unfortunately, the inequalities in accessing clean water for First Nations, exacerbate the already dire circumstances in which too many of our people live, especially for our 96 isolated First Nations. Ensuring access to safe drinking water, and adequate funding for First Nations is key to preventing the spread of COVID-19, and keeping our people safe.”

**Assembly of First Nations National Chief Perry Bellegarde**

“COVID-19 reminds us of other unwelcome events that test our models and resilience. Floods, droughts, and pollutants also harm and haunt us in their unique ways. With COVID-19 we’ve seen a formerly unimaginable response, with collaboration, cooperation and holistic approach being keys to successes. The water sector should emulate this. Our proactive work in risk reduction yields tremendous value to society. Let’s increase our water monitoring and testing network and also put forward innovative risk reduction strategies that integrate science and broad-based social actions.”

**Stephen Braun,**  
President, Canadian Water Resources Association

“There should be a much greater awareness that wastewater utilities are public health agencies and that water workers on the frontlines of protecting our communities. There should be heightened recognition that water and wastewater services are essential to daily life and the critical importance of making investments in the infrastructure. Part of this change will need to come from elected officials, to advance policy that will ensure water utilities have the resources, capacity, and assistance needed to deal with situations like this in the future.”

**Jackie Jarrell,**  
President of the Water Environment Federation

“This pandemic should create a true appreciation of the risks inherent in wastewater and lead to consistent adherence to proper hygiene practices and the use of personal protective equipment (PPE). Human waste carries pathogens; always has and always will. As we accept water from toilets, laundry, hospitals, industrial waste and more, we must never forget that anything almost can be in there. While COVID-19 has posed a heightened risk, each pathogen/virus poses risks to wastewater workers. Moving forward, we must be ever-vigilant to use PPE properly and to have lots of it on hand!”

**Beth Weir,**  
Regional Municipality of York,  
CWWA Wastewater  
Committee Chair

“Moving forward, all critical infrastructure needs to be more aware of interdependencies and their cascading impacts, especially in the water sector. When up to 40 per cent of employees could be lost during a pandemic (sickness, isolation, travel, family care), we need to maintain ongoing operations. This means ensuring; Pandemic Plans are exercised, storing appropriate amounts of PPE, cross-trained staff, Business Impact Analysis, and mutual aid agreements for critical staff.”

**Greg Solecki,**  
Senior Director, Sandhurst  
Consulting and Past President,  
International Association of  
Emergency Managers

“What one thing this Covid-19 pandemic makes again clear is that availability of clean water and good sanitation (handwashing) is a crucial tool in maintaining a good health for people worldwide. So bringing water tech innovations all across the globe will only become more important. This can be done by working closely together in sharing knowledge and technology.

Another thing we learned quickly is the introduction of remote digital meetings as means of alternative communication. Hopefully this will stay for a good part also after this period. Our climate will like that.”

**Hein Molenkamp,**  
Managing Director, Water Alliance

“The pandemic has made it obvious that sizeable investments in safe water provisioning must be viewed as part of the public health equation. While every government has issued advisories on washing hands to protect against the virus, billions of people in developing countries cannot comply because of lack of access to safe water or ignorance about proper hygiene. Many Canadian communities, particularly indigenous ones, similarly lack access to safe water. Changing this situation must receive the highest priority.”

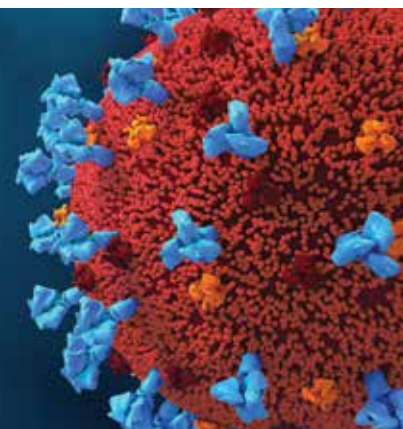
**Dr. Zafar Adeel,**  
Executive Director,  
Pacific Water Research Centre

Thank you to all of our industry leaders who participated in the conversation. WC

Andrew Macklin is the managing editor of Water Canada.

How do you think that the water sector could, or should, change as a result of what we learned during the COVID-19 pandemic?

Share your thoughts by sending me an email to [andrew@actualmedia.ca](mailto:andrew@actualmedia.ca)



Plastic wastes have generated global attention due to their omnipresence and profound ecosystem threats," according to Krantzberg.



# Plastic Pollution in the Aquatic Environment

Why it matters and what we can do about it. BY GAIL KRANTZBERG

**PLASTIC WASTES** have generated global attention due to their omnipresence and profound ecosystem threats. These plastic wastes are polluting waters around the world and negatively impacting ecosystems. This article examines the current research related to plastics and their impacts on the Great Lakes region.

## Defining microplastics

Primary microplastics are those which are manufactured less than five millimetres in size and are regularly found in textiles, medicines, and personal care products (Cole et. al., 2011). The Oxford dictionary defines microplastics as extremely small pieces of plastic debris in the environment resulting from the disposal and breakdown of consumer products and industrial waste.

Secondary microplastics are a result of

the breakdown of plastic debris through photo-degradation, physical, chemical, and biological interactions (Thompson et. al., 2009). The majority of microplastics in the environment are secondary microplastics (Lee et. al., 2018).

Microplastics in the environment have a probability to break-down to nanoplastics which could more detrimental to the environment due to their nano-particle size. Nanoplastics are less than 100 nm in size and small enough to be consumed by biota and permeate biological membranes (EFSA Panel on Contaminants in the Food Chain, 2016).

Microplastics enter the aquatic environment through direct releases (Browne et. al., 2010). For example, polyethylene and polypropylene microbeads in personal care products are not captured efficiently in wastewater treatment plants (Gregory, 1996; Fendall

and Sewell, 2009). Textile laundering is also a source of microplastic fibers (Browne et. al., 2011).

## The impacts of microplastics on wildlife

The quantity of microplastics in the Laurentian Great Lakes tends to be determined by beach surveys (Zbyszewski and Corcoran, 2011). Baldwin et. al. (2016) characterized the quantity and morphology of floating micro- and macroplastics in 29 Great Lakes tributaries in six states that had different land covers, wastewater effluent loadings, population densities, and hydrologic conditions.

The small size of these plastics presents opportunities for ingestion, leading to bioaccumulation of chemical associated with the plastics themselves, or from the



absorption of chemicals onto the plastic particles.

When ingested, microplastics containing chemicals such as bisphenol A and phthalates affect hatching success and the development and reproduction of offspring in amphibians, crustaceans, and insects.

Further, microplastics adsorb pollutants such as polychlorinated biphenyls and dichlorodiphenyltrichloroethane both of which have carcinogenic properties and adversely affect immune systems, nervous systems, endocrine systems, and reproductive systems.

Additional studies are needed to analyze the infiltration of microplastics into the Great Lakes and the consequential impacts they have on the biodiversity ingesting them.

## The impacts of plastic debris on wildlife

Plastic debris is found in all of the Laurentian Great Lakes (Eriksen et al., 2013a; Hoellein et al., 2014; Zbyszewski and Corcoran, 2011; Zbyszewski et al., 2014). As one might predict, litter-related plastics (fragments, foams, and films) were found at higher concentrations in samples from more urban watersheds and during runoff-event conditions.

## The urgency for Canada to act swiftly to curb the vast amounts of plastic waste produced has intensified [...]

Given that the watersheds surrounding the Great Lakes are heavily urbanized (for instance, Chicago, Milwaukee, Detroit, Cleveland, and Buffalo in the United States, and Toronto in Canada), plastic pollution in the Laurentian Great Lakes is a threat to the integrity of the ecosystem and could be expected to increase in intensity.

Wildlife can be injured by entanglement. Plastic entanglement with fishing nets or other ring-shaped materials can result in strangulation and reduce feeding efficiency.

Wildlife can also be injured after ingesting plastics found in the environment. For Great Lakes biota, eroded plastic pieces

appear to be similar to foods they would typically consume. Often, microplastics resemble phytoplankton which are eaten by fish. This can cause reduced stomach capacity, growth inhibition, internal injuries, and intestinal blockages.

## The policy landscape

The urgency for Canada to act swiftly to curb the vast amounts of plastic waste produced has intensified since China stopped importing recycled film plastic from developed countries (Walker, 2018). As Xanthos and Walker (2017) reported, many countries, especially those across Europe, have already successfully implemented bans of single-use plastic bags.

Xanthos and Walker (2017) reported that “bans, partial bans, and fees have been enacted by some local jurisdictions in North America, Australia, and the United Kingdom. Some countries in Europe where interventions are widespread, impose a fee per bag. Germany and Denmark were early adopters of plastic bag bans in most retail stores in 1991 and 1994. However, since 2002, countries in Africa, Asia, and the rest of Europe have steadily introduced bans (South Africa, Bangladesh, and India) or levies (Ireland) on plastic bag consumption.

In most cases, national approaches have been undertaken. Several countries in Africa and Asia completely banned the use of plastic bags.”

Federal bans on microbeads have also been deployed successfully in several countries. Consistent with this direction, the Canadian government classified plastic microbeads as toxic, under the Canadian Environmental Protection Act. On January 1, 2018, the Canadian federal government banned wash-off toiletries and cosmetics containing microbeads from stores in Canada (Pettipas et al., 2016).

Further, in statement issued on June 10, 2019 to the public, Prime Minister Justin Trudeau’s website highlighted the following:

“Plastic pollution is a global challenge that requires immediate action. [...] Less than 10 per cent of plastic used in Canada gets

recycled. Without a change in course, Canadians will throw away an estimated \$11 billion worth of plastic materials each year by 2030. [...] The Government of Canada is taking additional steps to reduce Canada’s plastic waste, support innovation, and promote the use of affordable and safe alternatives. [...] The Government of Canada will:

- Ban harmful single-use plastics as early as 2021 [...] where supported by scientific evidence and warranted, and take other steps to reduce pollution from plastic products and packaging.
- Work with provinces and territories to introduce standards and targets for companies that manufacture plastic products or sell items with plastic packaging so they become responsible for their plastic waste.

With the longest coastline in the world and one-quarter of the world’s freshwater, Canada has a unique responsibility—and opportunity—to lead in reducing plastic pollution.”

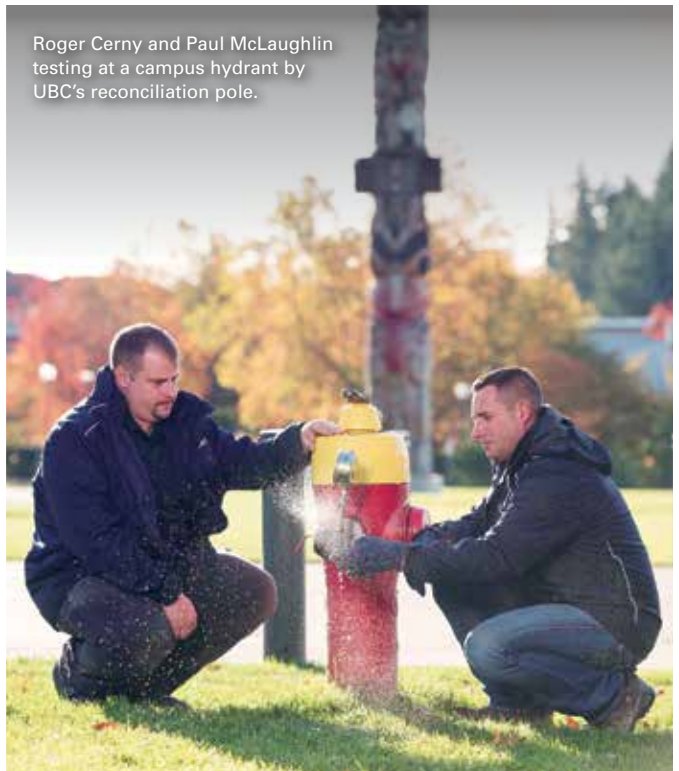
In the Great Lakes region, the Great Lakes and St. Lawrence Cities Initiative (GLSLCI), a binational coalition of mayors that seeks to advance the protection and restoration of the Great Lakes and the St. Lawrence River, has pronounced microplastics to be a significant threat to the Great Lakes region. GLSLCI adopted a resolution that calls on provincial, state, and federal governments to establish legislation banning the use of microbeads in consumer products (Great Lakes and St. Lawrence Cities Initiative, 2014).

The prevalence of single use plastics, resistance to degradation, chemical weathering, mechanical erosion, and biological degradation poses a critical environmental threat (Zbyszewski et al. 2014). This coupled with the long retention times of the Great Lakes lead to the conclusion that plastic pollution will be an increasing concern to ecosystem and human health in the Great Lakes presently, and into the future (Krantzberg 2019). wc

Gail Krantzberg is a professor at McMaster University.



Roger Cerny and Ligia Gheorghita testing water quality at a UBC drinking fountain.



Roger Cerny and Paul McLaughlin testing at a campus hydrant by UBC's reconciliation pole.

PHOTOS: UBC PHOTOGRAPHY UNIT

# Steady Under Pressure

How UBC's in-house teams keep campus flowing.

BY CHRIS FREEK, ANNIE MULLINS, YVONNE KWOK, AND ALFIE PENFOLD

**WATER IS A CRUCIAL RESOURCE** at the University of British Columbia (UBC) for basic human needs and to support research and operations. The simple act of turning on a tap to access a safe and reliable water supply is something more than 60,000 students, faculty, and staff depend on each and every day.

Although UBC isn't technically a municipality, in many ways it operates like one—maintaining a vast infrastructure and supplying its own critical services. Managing UBC's water alone is an intricate process and involves staff members from across UBC's VP Finance & Operations portfolio (VPFO). These in-house teams work in concert every day to ensure the university has a clean, safe, and sustainable resource on tap—by procuring, securing, testing, delivering, financially managing, and safely disposing of the university's water.

## Water makes its campus entrance

UBC's water is purchased from Metro Vancouver and sourced from rain and melted snow in the mountainous watersheds that surround the city. Metro Vancouver tests and treats the water, then it travels many kilometres through pipes to the Sasamat storage reservoir in Pacific Spirit Park, adjacent to UBC and about 30 minutes from Vancouver's downtown core.

Water enters the Vancouver campus through two trunk water mains. A pipe 600-millimetres in diameter runs below University Boulevard, and a 300 millimetre pipe enters below West 16th Avenue. The 600 millimetre pipe heads straight for the Power House at 2040 West Mall, where booster pumps increase the water pressure for distribution to the student residences and academic buildings in the north part of campus.

The taller buildings in this zone need their water under higher pressure to reach upper floors in the event of a fire. The 300-millimetre pipe mostly supplies residential buildings and student residences along Lower Mall. Water arrives through the 300-millimetre main at sufficient pressure to service the shorter buildings in this zone. From those two entry points, water is distributed across campus through over 80 kilometres of pipes and service connections.

## Keeping the pipes working and the water flowing

One of the many people involved in maintaining that maze of pipes is Roger Cerny, head plumber for UBC's Energy & Water Services department. Roger, who has more than 15 years of experience on campus, oversees a crew of eight, plus two labourers, to ensure the system stays



in good working order and UBC's spaces can fulfill their mission and purpose.

"I have lots of senior people on my crew, and I'm very, very fortunate to have them," Roger said. "We safeguard our system [and] we protect the drinking water. We're very proud of it."

In addition to the many kilometres of pipes Roger and his team maintain, the distribution system has 2,100 shutoff valves and 440 fire hydrants, each of which needs to be tested annually. The campus also has seven pressure-reducing valve stations and two check valves that ensure water is at the right pressure where it needs to be. And this is all before water even enters our buildings.

To make maintenance of all these components manageable, their locations and status are stored in a database. When Roger and his team test a valve, they use an iPad to scan a QR code on the item and register the inspection. The system continues to be expanded to include the thousands of assets managed by Energy and Water Services, making it easy to find and repair components across campus.

**We're trying to prevent pollution at the source, mostly through education and responding to questions.**

"Anybody who finds a problem with any of our assets, like a fire hydrant leaking, can scan it and we would get that information and be able to do the repairs necessary," Roger said. "It's like we have extra eyes in the field—that really helps us out."

Another vital part of Roger's and his team's work is to maintain the pipes themselves. He estimates that in 2018 alone they removed 2,200 metres of old cast iron water main. These are typically replaced with ductile iron pipes, which are more flexible and less susceptible to corrosion.

Once water enters a building, it becomes the responsibility of UBC Building Operations, another team from the VPFO. Sub-head Plumber Paul McLaughlin, who has been with UBC for 13 years, notes the importance of having an experienced in-house team of

plumbers, engineers, and technicians. "We know how everything works," McLaughlin said. "Everybody knows the buildings, and we know the people within buildings—that's huge."

### **Testing at the tap: Collaborating on domestic water safety**

Ensuring water flows without disruption isn't Roger Cerny's only responsibility. As a certified Level III water operator, Roger is also involved in testing the water to make sure it has maintained its quality after traversing several kilometres of pipes to reach the campus. It's a vital part of the job, and supports the VPFO's efforts to lead operational excellence at UBC.

Every Tuesday, water is collected by Energy and Water Services staff from 16 sampling stations strategically placed throughout the water distribution system. It is then analyzed by a third-party lab for pH level, conductivity, turbidity, and many more parameters to make sure it conforms to Health Canada standards.

Water quality is also a primary concern for Ligia Gheorghita, an environmental protection advisor with the VPFO's Safety and Risk Services department. While Roger and his team sample the water in the main distribution system, Ligia oversees the testing of water inside campus buildings—at taps and drinking fountains.

Twice per year, the water in several buildings across campus is sampled and analyzed. The buildings are typically tested twice in a row, to look for any changes in quality, and rotated, to make sure many buildings get tested. The results are reviewed and compared with Health Canada's current guidelines for drinking water quality and published on the Safety & Risk Services website.

Ligia, who obtained her PhD from UBC in chemistry, has worked at the university for 18 years. She often fields queries about the quality of water in specific buildings and works with the VPFO's Building Operations zone facilities managers to conduct ad hoc testing. Sometimes the results necessitate

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having fresh water flushed through the pipes, which may be done by Paul and his Building Operations team.

“It’s sometimes a matter of flushing the system, because the building hasn’t been used in some time—if it’s not used in summer or if some construction went on,” Ligia said.

Ligia is also involved in the safety of another key aspect of water at UBC: its disposal.

UBC’s Vancouver campus has what’s known as a split system. Rainwater and melted snow drain into a stormwater system and are diverted back into the natural environment via storm outfalls, while domestic water—roughly 10 million litres per day—ends up in a separated sanitary sewer system when it goes down our drains and toilets.

In the south part of campus, the sanitary sewage pipe travels straight south, while from the north, a sanitary sewer pipe veers north and east along the cliffs above Spanish Banks where it

links up with the Metro Vancouver sewage network. Both ultimately arrive near the airport, to be treated at Metro Vancouver’s Iona Island Wastewater Treatment Plant.

The Iona plant is a primary treatment facility, meaning it removes large materials from the water but is not equipped for more advanced purification. Because the discharge from Iona ends up in the ocean, it’s vital that UBC prevents harmful materials, such as those that may be generated in labs or from research projects, from entering the sanitary sewer.

“We’re trying to prevent pollution at the source, mostly through education and responding to questions,” said Ligia. Researchers on campus who suspect they might have harmful liquids are required to fill out an Aqueous Waste Profile form, which is reviewed by Ligia to determine how to properly dispose of the liquid. She and the team at Environmental Protection are essentially acting as an important filter to prevent harmful substances from ending up in the marine ecosystem.

## Going with the flow: The big picture

Whether it’s maintenance, strategy, or safety, UBC has staff members with diverse areas of expertise who work together to ensure the university has a steady, sustainable, and secure flow of water. The experience provided by these talented crews is vital to the university’s success, as they keep this essential resource flowing on campus. *wc*

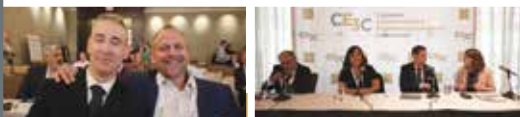


**L-R:** Chris Freek, Annie Mullins, Yvonne Kwok, and Alfie Penfold are part of UBC’s VPFO Communications team. They tell stories about the university’s operations and finance groups and support their innovative work through effective communications.



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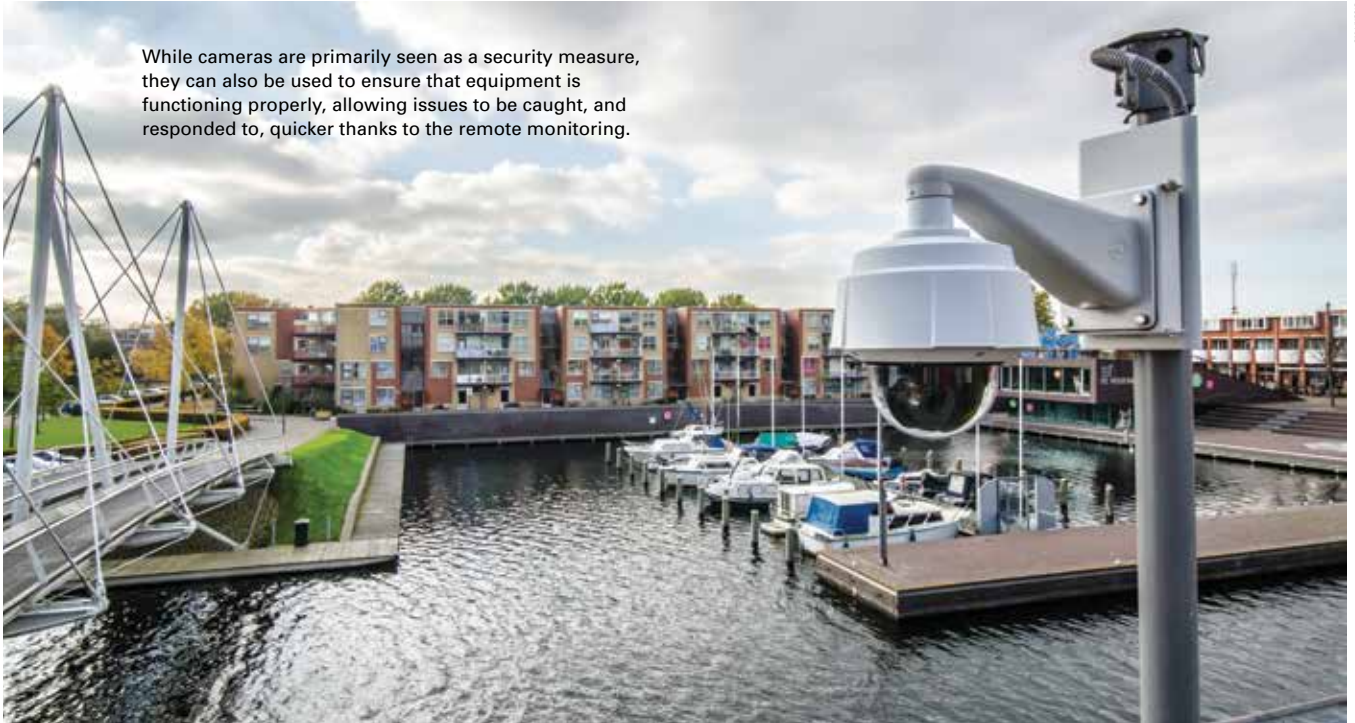
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While cameras are primarily seen as a security measure, they can also be used to ensure that equipment is functioning properly, allowing issues to be caught, and responded to, quicker thanks to the remote monitoring.



# Smart Water

How IoT-based network surveillance is evolving water and wastewater treatment.

BY PAUL LAUGHTON

**WATER IS A PRECIOUS NATURAL RESOURCE** that is essential to our livelihood. People and society cannot function without it. Water and wastewater treatment facilities are critically important for our communities, ensuring people thrive in good health and prosperity, and our economy operates efficiently. Protecting and monitoring such critical infrastructure is a job that requires an intelligent, flexible, reliable, and customizable solutions, while also considering population growth, foreseeing future repairs or retrofits and all external and internal threats. Fortunately, there is such a solution.

You are likely already familiar with security surveillance. What you may not know is that today's advanced systems now incorporate IoT (Internet of Things) devices. IoT-based surveillance is a true game changer, as it uses the sensors built into your security equipment to give you "eyes on everything" or complete transparency. These devices

can extract valuable data, which is then read and analyzed with a connected software platform, for the purpose of detecting patterns and anomalies, making recommendations and alerting users to potential situations before they happen. Through IoT analytics, artificial intelligence (AI), and machine learning (ML) are what make specialized security applications possible, such as facial recognition, licence plate identification, virtual fences, unauthorized person and vehicle tracking, loitering, and "object left behind" flagging.

## Network Surveillance 101

Network surveillance is essentially equipment that talks to each other in real time. A robust system can consist of IP-based thermal and visual cameras, radar, door stations and audio equipment, all connected on a converged network. This cost-effective technology is easily scalable and updatable and can also integrate with other IP-based

systems, making it truly future-proof. It is end-to-end protection for your site, your employees and improves operational efficiency—especially since it allows users to manage multiple sites from a central location. Your facility's surveillance solution would likely include a customized combination of the following:

① Network cameras can protect your premises without constant staff presence, by using intelligent features to analyze monitored situations and then alert users as necessary with direct notifications. For example, an alarm can sound when an unauthorized intruder crosses a predefined boundary that you have outlined.

② Thermal cameras and radar can detect people, objects, incidents and temperature fluctuations in complete darkness or other challenging conditions. Hardware variations include pan-tilt-zoom (PTZ), fixed-box, dome, modular





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### Company and Logo Recognition

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- Photos for post-event use
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## AWARD CATEGORY SPONSORS: \$4,000 each

### Award Ceremony Opening Remarks

- Senior representative invited to introduce category award presentation at gala

### Table for Eight at the Gala

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### Company and Logo Recognition

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- Photos for post-event use
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and even purpose-built explosion-protected cameras for hazardous areas.

③ Related audio equipment can include two-way and horn speakers that are triggered in response to intruders. These systems can be used simultaneously with video surveillance as you can detect and deter perpetrators at the same time with live (or pre-recorded) call-outs. The same systems can also be used for scheduled announcements to different zones throughout the day

### Changing water into smart water

For water and wastewater treatment plants, IoT sensors can collect real-time data on water quality, temperature, flow and storage levels, air quality, equipment temperature, humidity, biogas distribution, and energy output. These intelligent sensors working with water meters can also provide crucial information like total dissolved solids (TDS), bacteria, chlorine, and electrical conductivity-enabling water managers to pinpoint the problem areas quickly.

One of the biggest challenges in wastewater management is monitoring water quality and the flow of water through different channels. Strategically placed IoT sensors throughout the system can help with this—by detecting temperature changes, water leakage, chemical leakage, and pressure levels—and send this information to the main server so service engineers can efficiently resolve the issue.

IoT sensors can also monitor water quality through each stage of disinfection treatment, such as chemical levels during chlorination or, when water is being treated with ultraviolet (UV) rays, using flow and UV transmittance data to help optimize output.

The same technology can even help conserve water. Predictive analytics can estimate the amount of water a given city is going to use within a given day, based on historical data, weather, and other factors. By knowing what level of consumption is expected, engineers can maintain levels in reservoirs and tanks throughout the day, pumping water into overhead tanks as required.

### Bringing clean, safe water to Indigenous communities

Smart-water technology is already being used to provide safe and clean water to Indigenous communities in Canada—where boil water advisories have been the norm for decades. Our vendor discovered that water and wastewater overflow events in the community resulted in costly clean up and remediation efforts, taking critical water systems offline or causing boil-water events due to possible contamination. Applying IoT sensors and enabling improved levels of automation has shown to benefit water management, assuring cost reduction and removal of human error in the workflow. Advisories are projected to be zero by 2021.

### Streamlining operations and protecting equipment

IoT sensors can improve efficiency, reduce operational costs and extend the life of a facility's equipment. Thermal cameras, for example, can detect when equipment is overheating and requires repair, allowing staff to shut it off to avoid a breakdown or dangerous incident from occurring.

By combining collected data with machine learning technologies, an IoT platform can also help predict the maintenance needs of pumps, distribution networks, and storage cisterns. Another specific application in wastewater treatment plans is monitoring the flow rate of sludge in grit chambers, which can otherwise strain machinery elsewhere in the process and damage the pumps.

And again, multiple sites can be monitored from a central location.

### Ensuring worker safety

Protecting a site from intrusion and possible contamination of water contributes to public safety, but internal safety is another area where IoT-based sensors can play a role. They can help ensure that certain processes and procedures are always followed, preventing workers from potentially contaminating the water. IoT can even help to decrease liability

and the possibility of lawsuits from union workers and contractors. For example, new emerging analytic concept technologies are being designed so that a network camera can be positioned near an entrance and can detect if employees are wearing the proper safety gear and prevent them from entering if they are not. Sensors can also trigger alarms, such as a chlorine leak alarm, to thwart workers from encountering toxic substances. Security footage can also be used for teaching and training purposes.

### Shaping the system one needs

When considering IoT-based 'smart water' technologies for a facility, it is important to consider local factors, including geographic location. Each plant will entail its own key assets, vulnerabilities, and threats, so each is a unique project. What is the likelihood of incident happening, what is the possible impact and what strategies should be used to mitigate the likelihood of an event to an acceptable risk level?

Insurance is another factor to consider, as underwriters will take everything into consideration when assessing a facility. If the likelihood of having to file a claim is lower, that can work in the plant's favour, helping to potentially lower insurance costs.

As always, consulting engineers should get involved as early as possible, to provide input the owner may not otherwise consider and to ensure a plant's specific systems will perform optimally. There is also the opportunity to consider interdependency. If lighting is not appropriately positioned, for example, some cameras may not work as effectively as they should. By getting involved at the beginning of a new build, engineers can help determine such interdependencies and make the process more cost-effective. When it comes to protecting something as valuable as our water, or any critical infrastructure, taking the time to explore every option is certainly worth it. **wc**

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Paul Loughton is the architect and engineering manager at Axis Communications.



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AquaHacking participant pitching to a judge during the Semi-Final Event of the 2018 Lake Ontario and Beyond Challenge.



Mentor working with finalist teams of the 2019 Great Lakes and St. Lawrence Basin Challenge.



Finalist teams selected at the Semi-Final Event of the 2019 Great Lakes and St. Lawrence Basin Challenge.



First place team, The Green Stop, at the Final Event of the 2019 Great Lakes and St. Lawrence Basin Challenge.

# Youth Leading Innovation

Reflections on five years of AquaHacking Challenges and next steps.

BY MELISSA DICK AND KARIANN AARUP

**IN THE FIVE YEARS** since the launch of the AquaHacking Challenge, remarkable shifts in the tech-engagement and water sector landscapes have taken place. Before, the gap between environmental non-governmental organizations (eNGOs), public utility companies, and the tech innovation sector seemed vast. Now, there is growing recognition of the great potential that young innovative minds and tech talent can bring to the water sector.

The AquaHacking Challenge is the flagship program of the Montreal-based non-profit organization Aqua Forum, established by the de Gaspé Beaubien Foundation. The freshwater focused tech challenge includes mentorship and leadership development opportunities for university students and young professionals on their entrepreneurial journey towards establishing clean tech start-ups.

The AquaHacking Challenge focused on

the Great Lakes and St. Lawrence River Basin when it was launched in 2015. Since then, the AquaHacking Challenge has helped establish 17 youth-led water tech start-ups, create 30 jobs in the water sector, and made over 1,500 tech savvy youth more water-aware. The AquaHacking Challenge has also helped partner eNGOS become more open to engaging tech talent and the innovation sector.

Thanks to its successes, the AquaHacking Challenge is now a national program and is being delivered in British Columbia, Lake Winnipeg, and Atlantic Canada.

## Innovative technology in the water sector

In 2015, AquaHacking was at the forefront of hosting tech challenges for environmental outcomes. Today, the landscape is more active with numerous tech competitions and hackathons for

both social and environmental objectives. Technological solutions are increasingly finding traction as we continue to seek ways to monitor, conserve, restore, and make more sustainable decisions about our precious water resources.

AquaHacking participants are developing solutions that integrate emerging technologies such as artificial intelligence, big data analytics, GIS, model simulation, and more with new types of technology being applied with each edition of the Challenge. For example, the young start-ups Clean Nature and CANN Forecast, both AquaHacking winners, offer artificial intelligence model simulations to municipalities to inform decision-making related to road salt application efficiency and recreational water quality, respectively.

Water Rangers, winner of AquaHacking 2015, focuses on filling gaps in water



quality data by dispatching hundreds of water testing kits to citizen scientists, schools, and water stewardship organisations to collect samples and record results in an interactive online application. Through AquaHacking, we see innovative tools and applications being developed to address critical water challenges and having remarkable benefits in water management optimization, effective resource allocation, increased treatment efficiency, active public engagement, and more.

“Initiatives like the AquaHacking Challenge increase the potential to address complex water issues in impactful and positive ways,” said Anna Warwick Sears, executive director of the Okanagan Basin Water Board and implementation partner for the 2020 British Columbia AquaHacking Challenge. “It is a fantastic model for testing ideas and driving real innovation.”

The majority of Canadian water and wastewater services are publicly provided by municipal governments. As such, many of the start-ups established through AquaHacking turn to local government water service departments and utilities as their first client for solution implementation. This is a hard market for fledgling entrepreneurs. There are numerous barriers to entry for early innovation adoption within the municipal setting. AquaHacking is working to better understand the entry points to better access this market and provide AquaHacking teams with the needed support for their success.

### Breaking silos with demand-driven innovation

While the Challenge has evolved considerably over the past five years, two elements have remained central to its impact and increased traction. The first is the intentional close collaboration with water experts to define the issues brought to the Challenges. The second element is the deliberate recruitment of a diverse talent pool of students.

When tackling complex issues related to water, it takes multiple perspectives and skills to ensure solution-fit, feasibility, and marketability. Successful AquaHacking teams include students from various fields such

as environmental studies, computer engineering, chemistry, biology, business, mathematics, software development, communications, and more. In turn, students receive mentorship from experts representing diverse fields.

It is through these collaborative dialogues and efforts that important learning takes place. Municipal water utilities, eNGOs, and water leaders become aware of the benefits of working with young tech and entrepreneurial talent, and next generation innovators appreciate the reality into which they are applying their technical ideas. It’s a win-win situation resulting in applied innovation for positive water impacts.

“What makes AquaHacking special to me is the fact that the issues these young innovators are solving are championed by leaders from across the water sector—including eNGOs, municipalities and water organizations—and are designed for impact,” said Bernadette Conant, chief executive officer of the Canadian Water Network, who served as a judge in the AquaHacking Challenge Final in 2018.

This year, the Challenge has scaled across the country in partnership with regional host organizations the Okanagan Basin Water Board (Kelowna, B.C.), International Institute of Sustainable Development (Winnipeg, Man.), and Atlantic Water Network (Halifax, N.S.). Each regional host recognises the need to cultivate relationships with their local tech, innovation, and business sectors and to work collaboratively across these fields. AquaHacking is a catalyst for this change in bringing these sectors to the table around water.

### Adapting the AquaHacking Challenge to the new COVID-19 reality

The AquaHacking Challenge traditionally includes in-person events, networking opportunities, and on-the-water experiences for participants. In respecting the Health Canada advisories to the COVID-19 outbreak, the AquaHacking Challenge is leveraging its tech-agility and transitioning all activities to a digital platform for the remainder of 2020 programming. As we keep a close eye on the evolving situation with COVID-19,

the AquaHacking team also maintains its sights on freshwater as a critical issue for Canada and the world. We will continue to engage the ingenuity and entrepreneurial drive of talented young Canadians, who are hard-wired for experimentation and innovation, and demonstrate the value of technology-based solutions for environmental impact. We aim to get through the current situation with a sense of hope for the future and emerge stronger, more resilient and even more committed to our goals of improved freshwater health in Canada.

### Building an ecosystem of action-oriented, solutions-minded young Canadian water innovators

Through AquaHacking, we have noticed something very inspiring: the incredible energy and optimism that those involved in the Challenge have for the potential of change—be they students, expert mentors, professional coaches, academic partners, or corporate sponsors. The Challenge format is unique in its ability to gather these solutions-minded, problem-solving individuals from different areas of expertise, with a shared passion for water issues. These individuals see challenges as puzzles to solve, not as overwhelming barriers to action. We are keen to galvanise this energy and build on five years of momentum by establishing the AquaHacking Alumni Network to continue to nurture and serve all the young innovators that participate in the Challenge. They are the future of water.

AquaHacking has experienced lots of growth over the past five years and, like any entrepreneurial organization, will continue to learn, reflect, grow, and evolve in the years to come.

To learn more about AquaHacking and how to bring the Challenge to your watershed, visit [aquahacking.com](http://aquahacking.com) *wc*



Melissa Dick is a development officer at Aqua Forum. Kariann Aarup is an advisor at Aqua Forum.

APPOINTED



BRENT  
WOOTTON

Aclarus appointed Dr. **Brent Wootton** as vice president of technology and customer success.

“We are thrilled to welcome Brent to the team,” said Mike Doran, president and co-founder of Aclarus. “Brent is widely recognized as a leader in our industry. His appointment underscores Aclarus’ commitment to excellence and advanced ozone-based solutions for our customers.”

Prior to joining Aclarus, Brent Wootton served as the vice president of applied research and innovation at Fleming College. He also served as a director and senior scientist at the Centre for Advancement of Water and Wastewater Technologies, where he led research on water and wastewater treatment.



JANE  
MCDONALD

**Jane McDonald** is the new executive vice president of the International Institute for Sustainable Development (IISD) and chair of the IISD

Experimental Lakes Area (ELA) Board.

In these roles, Jane McDonald will be overseeing the operations of IISD’s freshwater research facilities and providing leadership to IISD’s global team.

Jane has more than 15 years of Canadian and international experience working with governments, corporate

executives, and major think tanks to advance sustainability. She worked in the financial sector building new environmental markets at investment bank Cantor Fitzgerald, and she led efforts to build a cross-border coalition that succeeded in securing the inclusion of Canadian renewable electricity in the US Clean Power Plan while at Manitoba Hydro.



RICK  
GRUENHAGEN

**Rick Gruenhagen** has been named the chief technology officer of Innovyze.

In his new role, Gruenhagen will oversee the company’s overall product direction and development. He will also lead the engineering, product, and infrastructure teams.

“I am thrilled to have Rick join us at Innovyze,” said Colby Manwaring, CEO of Innovyze. “Rick brings diverse and vast technology expertise to the CTO position based on key leadership roles at PayPal, Amazon, and Microsoft. He has a proven track record of building SaaS-based platforms that effectively leverage Big Data and Internet of Things (IoT) solutions. We are fortunate to have him join our organization.”



CIGDEM  
ESKICIOGLU

UBC Okanagan announced that engineering professor **Cigdem Eskicioglu** has been named the senior industrial research chair (IRC) in advanced resource recovery from wastewater.

The IRC role, awarded by UBC Okanagan in partnership with the Natural Sciences and Engineering Research Council of Canada (NSERC) and Metro Vancouver, will focus on developing the next generation wastewater sludge treatment technologies that recover energy and resources from what we pour down the drain.

“Dr. Eskicioglu is an internationally-recognized researcher in the area of waste reduction and resource recovery,” said Phil Barker, vice principal and associate vice president of research and innovation at UBC Okanagan. “Her research is making wastewater treatment cheaper, safer, cleaner, and more sustainable and is likely to have a significant impact for cities across the globe.”

The Federation of Northern Ontario Municipalities (FONOM) has announced the appointment of North Bay councillor **Mac Bain** as its new executive director.

“Mac’s knowledge of the issues facing our region will be an asset to our membership. He will fulfill the duties of the Executive Director on a part time basis under the direction of the Executive,” said FONOM President **Danny Whalen**.

The board thanks **David King** for the time and energy he gave the organization over his tenure.



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Brenda Martinez from Delta Treatment Systems spoke about the evolution of legislation and regulations related to cannabis in Canada and the United States.



Attendees at the event heard from The Water Brothers, Alex Mifflin and Tyler Mifflin, who were the keynote speakers on day one of the event.



Over 30 speakers spoke at OOWA's 20th Annual Convention about emerging trends in the onsite and decentralized wastewater industry.

## OOWA Convention London, Ont.

Over 30 industry experts spoke about emerging trends in the onsite and decentralized wastewater industry at the Ontario Onsite Wastewater Association's (OOWA) 20th Annual Convention and Expo.

"The conference and trade show were a success again this year," said **Rick Esselment**, president and owner of ESSE Canada. "The event brought together all of the stakeholders in the onsite and decentralized industry, but with a real feeling of community and optimism for our opportunities."

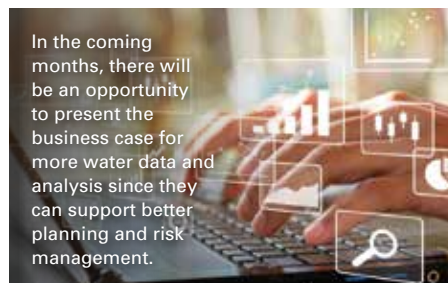
"It was great to have representatives from the Ministry of Environment

Conservation and Parks participating in the sessions to help balance the discussions and build understanding of approvals processes," Esselment added. "We also had a good discussion about education and training frameworks, and new opportunities for Ontario that need to be pursued. I'm looking forward to next year's conference and trade show that are taking place in Ottawa."

One of the speakers that presented at the event was **Brenda Martinez** from Delta Treatment Systems. Martinez covered a number of topics during her presentation, including:

- The levels of cannabis legalization in the United States.
- The types of wastewater being generated and the related concerns.
- How regulations are being developed surrounding wastewater.
- Future research on the impacts of wastewater generation on treatment processes.

While Delta Treatment Systems has worked mostly in the United States, Martinez also presented a comparison of how legislation and regulations related to cannabis have evolved in the United States and Canada.



In the coming months, there will be an opportunity to present the business case for more water data and analysis since they can support better planning and risk management.



The benefits of digitization have become more obvious. Utilities that didn't have digital solutions in place before the pandemic struggled "with the trade-off between safety and service continuity."



There will be more opportunities for Ontario technologies for export," noted Irene Hassas, co-chair of ONEIA's water committee.

## ONEIA Virtual Townhall

What impact did COVID-19 have on cleantech companies? The Ontario Environment Industry Association (ONEIA) surveyed companies to find out. Forty-three companies, of which 17 per cent were water technology companies, responded to the survey.

**Alex Gill**, the executive director of ONEIA, presented the general results of the survey during a webinar on April 16, 2020. Following Gill's update, each of ONEIA's committee chairs presented updates on behalf of their sub-sectors.

**Irene Hassas**, vice president of

corporate development and partnerships at Aslan Technologies, presented an update on behalf of ONEIA's water committee.

"Similar to any other economic downturn, the current crisis will present new opportunities to our economy in general and cleantech sector specifically," noted Hassas, co-chair of ONEIA's water committee. "Although it will not be easy, companies products, services, and skillsets will need to adapt quickly to the immediate needs of our economy."

Hassas presented some of the concerns brought forward by water technology

companies. One of the concerns was that the pandemic has had an impact on the project and sales pipeline. Depending on the type of business, some companies have lost business opportunities. This is in part because industry events have been cancelled and as a result, there have been fewer networking opportunities.

Hassas also presented some potential opportunities. For example, universal access to water has gained more recognition. This is because governments in some developing countries appeared to be spending more to provide water for handwashing.



What new safety protocols needs to be implemented to ensure that many hands can still work together, in close proximity, to get the job done?

# Safety in Close Proximity

BY ANDREW MACKLIN

**AS SOCIAL DISTANCING MEASURES** were introduced to prevent the spread of the coronavirus, construction sites across Canada scrambled to introduce new health and safety protocols to ensure that work could still get done. It wasn't an easy issue to address. Even as pinch points and bottlenecks were identified some proved difficult to resolve, as the manpower needed to do the job meant teams had to still work together in close proximity to one another.

The water industry was no exception, as continued work on pipe replacements necessitated a handful of individuals working together in a trench within less than two metres of each other. Working that close was less than the mandated guidelines for physical distancing (two metres) creating a situation where an infected individual had the potential to spread the virus to his or her co-workers. That resulted in the immediate need for implementation of increased use of personal protective equipment to ensure that the virus couldn't spread, or the jobsites had to be temporarily shut down.

The industry has worked diligently to address the increased health and safety requirements on sites that remain active, as well as when emergency repairs have been required. And they should be commended for their efforts in ensuring that water and wastewater continue to flow throughout our communities.

But now the focus shifts to the medium-term and long-term, and the questions about how health and safety will change for construction sites once the first wave of the COVID-19 pandemic has subsided. First, plans will need to be in place for how to keep a jobsite safely operational should a second or third wave of the coronavirus hit Canada before a cure has been discovered. If physical distancing requirements are instituted again, are there ways that work can be done in order to facilitate the need for multiple people within a small space? Could the need for physical distancing measures further the use of trenchless technologies in the water sector, ones that wouldn't require the need for open cut pipeline replacement?

There are also cost and risk considerations that need to be addressed. Are contractors responsible for financial penalties for projects that were not completed on time due to the pandemic? What about the costs associated with greater onsite safety measures and PPE demands? Whose bottom line will have to absorb those costs on existing projects?

There are a lot of questions that need to be addressed in the coming months. Keeping workers safe and healthy on jobsites is paramount. Staff need to be reassured that the jobsite is safe in every way. How does that look in the fallout from the COVID-19 pandemic?

We want to hear from you on this issue. What new policy and/or governance needs to be implemented in order to ensure the contractors' bottom line is protected, and that staff continue to work in a safe environment. Share your thoughts by sending me an email at [andrew@actualmedia.ca](mailto:andrew@actualmedia.ca). **wc**

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Andrew Macklin is the managing editor of Water Canada.



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