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MARCH/APRIL 2021

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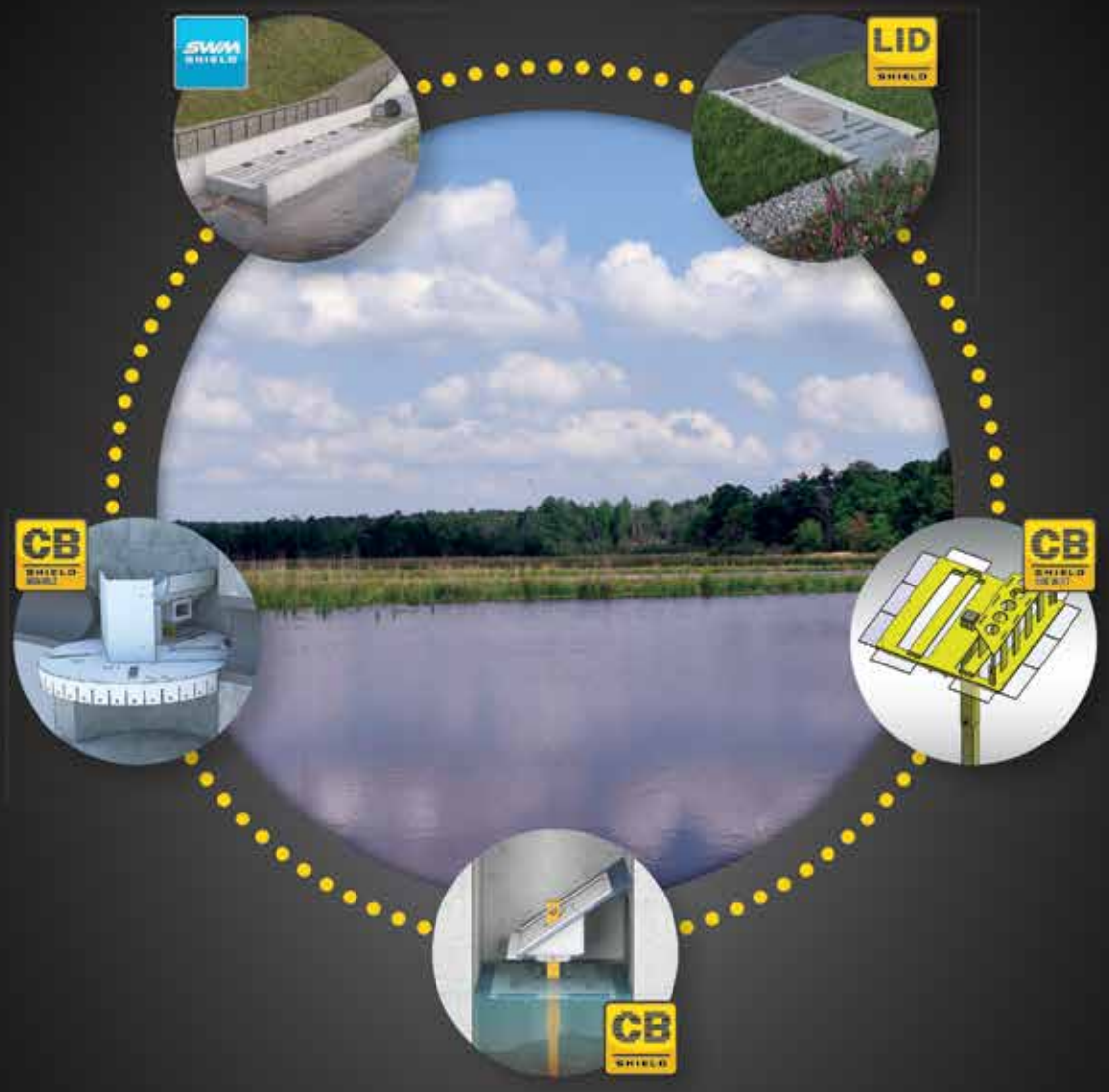

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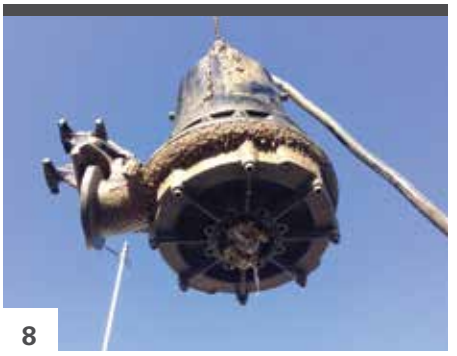
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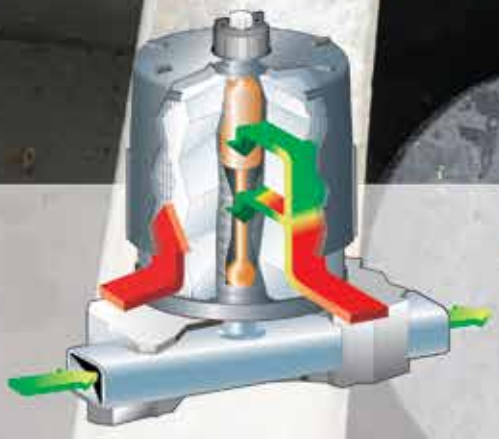
ASSET MANAGEMENT

GROUNDBREAKERS

NATURAL RESOURCES

DEPARTMENTS

Protecting Canada's *Waterways*



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WATER CANADA

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Reflection on the Past Year

BY SIMRAN CHATTHA

AS I TOOK SOME TIME to reflect on the past year, I thought about what has come to the forefront since the start of Canada's first wave of the COVID-19 pandemic.

One issue that came to the forefront was the general support for nature-based solutions. In 2020, many organizations called for governments to include nature-based solutions in their economic recovery plans. At the same time, the organizations highlighted the multiple benefits (e.g., reducing flood risk, increase in property values, etc.) provided by these solutions. While many environmental organizations have understood the benefits of nature-based solutions for a number of years, the conversations about them became more mainstream in 2020.

Since the first wave of the pandemic, it appears that utilities have become more comfortable with adopting digital technologies. The Smart Water Networks (SWAN) Forum surveyed employees from 50 utilities in 14 countries and it found that "utilities' overall comfort level with digital technology has increased by a full point on a 5-point scale as a result of the pandemic."

The SWAN Forum also noted that since more employees have been working from home, they have become more reliant on cloud-based solutions, such as teleconferencing and remote monitoring, to connect with co-workers, customers, and critical infrastructure. While the topic of digital technologies is not completely new, the COVID-19 pandemic accelerated the adoption of some of these technologies.

Something else that is noticeable is the continued need for public education on issues like 'flushable' wipes. In March 2020, there was an increase in the amount of 'flushable' products that were being flushed down toilets. This was in response to the fact that stores ran out of toilet paper and individuals started buying alternative products, which were then being flushed down toilets.

Companies producing wipes are still continuing to push the message that wipes are safe for flushing, despite the negative impacts of 'flushable' wipes on municipal sewer systems. Thankfully, there are organizations that are leading the way on providing accurate information. For example, a publicly available specification was released by the International Water Service Flushability Group (IWSFG) in December 2020. More information about this is available in the article written by Robert Haller and Barry Orr for this edition of the magazine.

I expect that these topics will continue to impact the Canadian water industry beyond the COVID-19 pandemic. In the meantime, our team at Water Canada will continue to monitor how conversations about these topics continue to evolve. WC

Simran Chattha is the interim editor of Water Canada.
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PG. 8

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Barry is the spokesperson for the Municipal Enforcement Sewer Use Group.
PG. 8

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Bita is the founder of Water Movement.
PG. 20

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PG. 20

ABOUT THE COVER

There are some challenges associated with providing reliable access to safe drinking water, even in a country like Canada. At the same time, work is being done to overcome those challenges. Read more on page 12.

FRONT

Northern Lakes at Risk of Losing Ice Cover Permanently: Research

YORK UNIVERSITY RESEARCHERS have found that close to 5,700 lakes in the Northern Hemisphere may permanently lose ice cover this century.

Those lakes include large bays in some of the deepest of the Great Lakes, such as Lake Superior and Lake Michigan, which could permanently become ice free by 2055 if nothing is done to curb greenhouse gas emissions or by 2085 with moderate changes.

Many of these lakes that are predicted to stop freezing over are near large human populations and are an important source of drinking water. A loss of ice could affect the quantity and quality of the water.

"We need ice on lakes to curtail and minimize evaporation rates in the winter," said Sapna Sharma, associate professor in the Faculty of Science at York University and lead researcher of the study.

"Without ice cover, evaporation rates would increase, and water levels could decline," added Sharma. "We would lose freshwater, which we need for drinking and everyday activities. Ice cover is extremely important both ecologically and socio-economically."

The researchers, including Postdoctoral Fellows Kevin Blagrave and Alessandro Filazzola, looked at 51,000 lakes in the Northern Hemisphere to forecast whether those lakes would become ice-free using annual winter temperature projections from 2020 to 2098 with 12 climate change scenarios.

"With increased greenhouse gas emissions, we expect greater increases in winter air temperatures, which are expected to increase much more than summer temperatures in the Northern Hemisphere," said Filazzola. "It's this warming of a couple of degrees, as a result of carbon emissions, that will cause the loss of lake ice into the future." WC

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

Email Interim Editor Simran Chattha at **simran@actualmedia.ca**

Credit: UBC

New Tool Removes Chemotherapy Drugs from Water Bodies: Researchers

PHARMACEUTICALS, like a chemotherapy drug called methotrexate, can be highly effective for patients. However, these pharmaceuticals are finding their way into water bodies with wide-ranging negative implications for public health and the environment.

"Methotrexate is an anti-cancer drug used at a high dose in chemotherapy to treat cancer, leukemia, psoriasis, rheumatoid arthritis, and other inflammatory diseases," said Mohammad Arjmand, an assistant professor of mechanical engineering at UBC Okanagan. "However, the drug is not absorbed by the body and ends up in water channels from hospital waste, sewage, and surface waters."

Removing these types of contaminants from wastewater can be costly and complicated explained Arjmand, who is also a Canada Research Chair in Advanced Materials and Polymer Engineering.

"We work on modifying the structure of adsorbent nanomaterials to control their ability to attract or repel chemicals," said Arjmand.

Arjmand's team of researchers was looking at methods to remove the anti-cancer drugs from water supplies. While doing this, the team designed a porous nanomaterial, called a metal-organic framework (MOF), that is capable of adsorbing these pollutants from water.

Adsorption takes place when the molecules of a chemical adhere to the surface of a solid substance, according to Arjmand. In this case, the chemotherapy drug sticks to the surface of the adsorbent, which is Arjmand's MOF. WC

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Online at WATERCANADA.NET

NEWS: Yukon Releases New Guidelines for Quartz Mining. *bit.ly/QuartzMining*

NEWS: Barrie, Ontario Joins Provincial COVID-19 Wastewater Surveillance Initiative. *bit.ly/BarrieWastewater*

NEWS: Canada Partners with Lennox Island First Nation to Enhance Marine Safety http. *bit.ly/MarineSafety*

NEWS: Engineering Team Selected for First Stage of Lake Diefenbaker Irrigation Expansion Project. *bit.ly/StageOneEngineeringTeam*

Photos: City of London

A new specification for flushability has been developed by wastewater professionals.

Flushability

Wastewater professionals release their own specification for flushability.

BY ROBERT HALLER AND BARRY ORR

IT'S NOT FLUSHABLE just because the salesman says so! This has been our debate with the powerful wipes manufacturing industry for well over a decade now.

Currently, anyone can call anything 'flushable.' There are no rules. There has been no legal definition of the term. And so, we have seen an ever-increasing amount of products improperly labelled and marketed as 'flushable.'

Regardless of marketing claims, these products have not been breaking down in any reasonable time frame and wreak havoc on our wastewater systems. The flushing of these products leads to millions of dollars of equipment damage and dangerous sewer clogs threatening homeowners, wastewater workers, and the environment.

Those of us in the wastewater utility sector have always argued that we, the actual owners and operators of these systems, should be the ones determining what can be called flushable. So on December 2, 2020, the wastewater industry released a critically reviewed version two of the Publicly Available Specification (PAS) in an effort to define the term 'flushable.'

This is an international effort that aligns with the key aspects required for materials to be compatible with sewerage infrastructure as defined through the International Standards Organisation (ISO). This PAS is the product of years of collaboration amongst wastewater professionals toward producing enforceable standards for any products intended to be flushed into public sewer systems.

This specification was developed and produced by a coalition of wastewater experts from around the world. The International Water Services Flushability Group (IWSFG) describes itself as a group of passionate water professionals seeking to provide clear guidance on what should and shouldn't be flushed down the toilet to protect customers, wastewater systems, their workers, and the environment. This called for a global initiative because it is a global problem.

> It is now up to individual countries to determine if and how the new specifications will be adopted.

An initial statement, that only the three P's (pee, poo, and toilet paper) should be flushed, was released in 2016 with the support of 250 water organizations. The first PAS was released in 2018 and sent out for review before being approved by the wastewater associations in Canada, Australia, New Zealand, Japan, Spain, and the United States.

The PAS 2020 followed a critical review to ensure 80 per cent dispersibility of a product once flushed. The PAS includes criteria for determining material suitable for toilet flushing and the recommended testing protocols. The PAS also defines appropriate labelling requirements. This testing specification will allow for clear methods that will assist manufacturers to properly test, certify and label their flushable products.

To communicate a product's ability to be flushed, the IWSFG has created a logo that manufacturers can use on their products to clearly identify to users that their product has passed the IWSFG flushability criteria.

Now that a new specification has been developed, it is up to individual countries to determine if and how it will be adopted.

Marketing claims about 'flushable' products like wipes are not necessarily true.

While this PAS is a major step forward, it is now up to individual countries, particularly their water utilities and citizens, to determine if and how these specifications will be adopted. Our intention at Canadian Water and Wastewater Association (CWWA) is that they will be adopted here to form a National Standard on Flushability within Canada. This would ensure both a clear definition of what is flushable, and clarity about the labelling consumers should look for to know that a product is safe for their home and their community.

CWWA and its partners at the Municipal Enforcement Sewer Use Group (MESUG) have been supporting the development of such a Canadian Standard for years. In 2019, CWWA, along with the Friends of the Earth, co-signed a formal complaint to the Federal Competition Bureau against the improper labelling of products as 'flushable.' This complaint has launched a formal review by the Bureau, but now this PAS provides the detailed specifications needed to create a national standard that can be tested and enforced.

The manufacturers and their powerful lobby association will argue that there has been a standard for flushability for several years. And many consumers have assumed that government bodies have determined the criteria for products to be labelled as flushable.

However, in actuality it has been the wipes manufacturers that came up with their own rules despite objections from the wastewater professionals. The wipes manufacturers' association, known as INDA, published a series of guidance documents to set specifications for products to be labelled flushable and also approved a Code of Practice for labelling.

A coalition of representatives from the National Association for Clean Water Agencies (NACWA), the Water Environment Federation (WEF), and the CWWA tried to work with INDA to strengthen the guidelines to a level where their wipes would be truly dispersible within the sewer systems, but to no avail. Similarly, tremendous effort and expense was put toward developing a standard through the ISO process, but again, we could not get any support from the manufacturers to make their products more dispersible.

Despite INDA's approval and promotion of its own guidelines, compliance has been minimal as participation is voluntary and many wipes manufacturers are not members of INDA. Research conducted at Ryerson University in 2019 showed that only 56 per cent of the baby wipe tested had the Do Not Flush symbol displayed. Of that 56 per cent, none met the INDA EDANA CoP requirements.

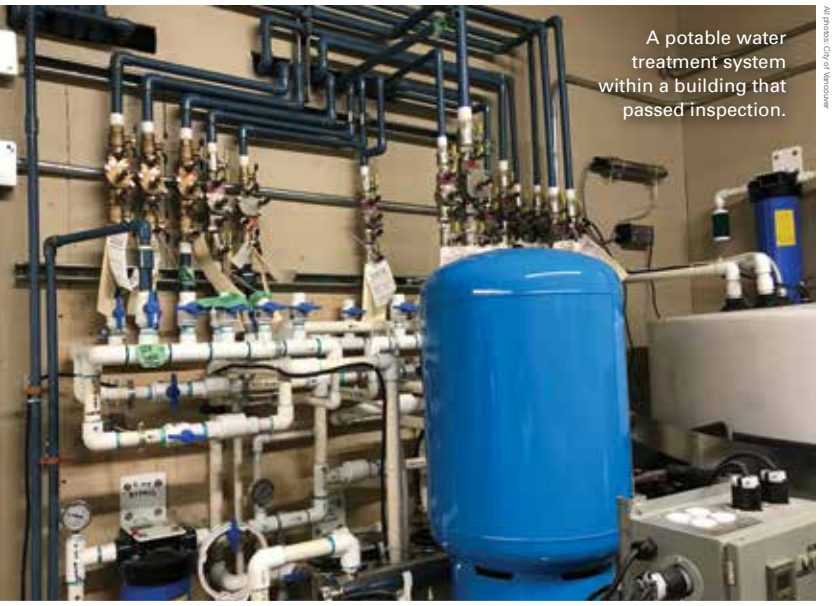
A second study at the University of Western Ontario showed that the nonwoven product industry fails to comply with its own Code of Practice. This is apparent through the analysis of products not advertised as flushable showing a 100 per cent violation regarding packaging standards through improper logo placement, size, colour contrast, and formatting, further contributing to consumer misuse and improper disposal.

Until such a national standard is enacted, the IWSFG recommends that all toilet users adopt the approach that only the '3P's—pee, poop, and (toilet) paper' should be put in the toilet. Other items of recent concern being flushed are gloves, masks, paper towels, condoms, feminine hygiene products, facial tissues, and fats, oils, and grease. Toilets are not garbage cans! WC

Robert Haller is the executive director of the Canadian Water and Wastewater Association.

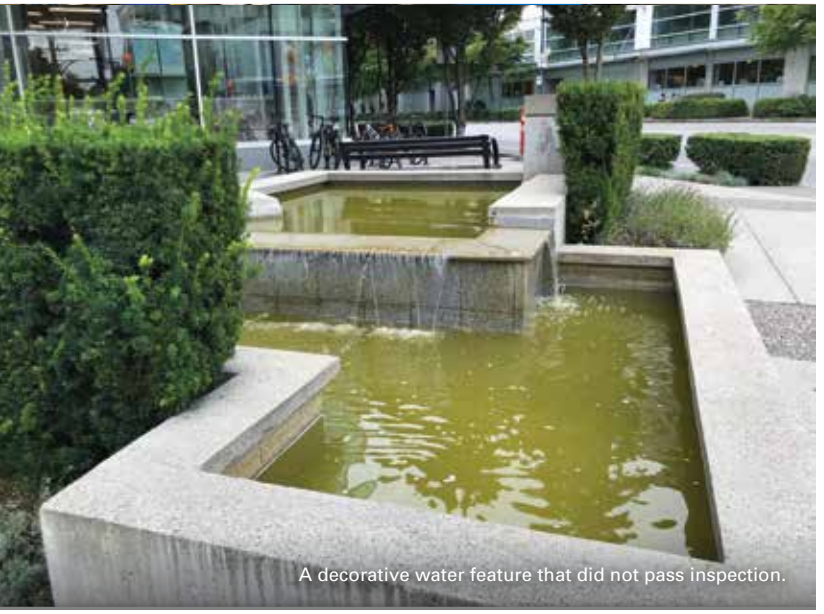
Barry Orr is the spokesperson for the Municipal Enforcement Sewer Use Group.

More information about the IWSGF is available at **iwsfg.org**



A potable water treatment system within a building that passed inspection.

All photos: City of Vancouver



A decorative water feature that did not pass inspection.

A cooling tower that did not pass inspection.

Preventing Legionnaires' Disease

New Building Water Systems certification aims to prevent Legionnaires' Disease.

BY JENNI GREEN AND KALPNA SOLANKI

LEGIONELLA was discovered after an outbreak in 1976 among people who went to a Philadelphia convention of the American Legion. Those who were affected suffered from a type of pneumonia (lung infection) that eventually became known as Legionnaires' disease.

Interestingly, Legionella was also implicated in another illness. The first identified cases of Pontiac fever occurred in 1968 in Pontiac, Michigan among people who worked at and visited the city's health department. It wasn't until Legionella was discovered after the 1976 outbreak in Philadelphia that public health officials were able to show that the same bacterium causes both diseases. While there is no vaccine, the disease is preventable as it is almost always connected to improperly maintained mechanical systems.

Monitoring the disease trends in Canada shows there is a reason to be concerned about the incidence of Legionnaires' disease in Canada. In 2000, the rate of Legionella in Canada was around 0.2/100,000. By 2018, this number had jumped to 1.7 per 100,000. Considering that these are only the reported cases, there is a very strong likelihood that individuals with milder forms of the illness may have attributed it to a cold or flu and may not have even sought treatment. There is also the strong possibility that many who did have Legionella were never tested even if they did seek medical attention.

Some recent cases of Legionella in Canada include:

- **Surrey, British Columbia:** An outbreak in 2018 resulted in 14 cases (all hospitalised). Seven people ended up in and intensive care unit and there were two deaths.
- **Moncton, New Brunswick:** In 2019, there were 16 cases. Out of these, 15 were hospitalised.
- **Quebec City, Quebec:** In 2012, there were 181 cases and 14 deaths.
- **Toronto, Ontario:** In 2005, there were 135 cases and 23 deaths.

Most recently, several individuals got Legionella during the summer of 2020 in New Westminster, British Columbia. One woman in her 70s needed to be hospitalized for 28 days after contracting the illness. To date, despite an extensive investigation, the Health Authority is not aware of the source of the bacteria.

Monitoring the disease trends in Canada shows there is a reason to be concerned about the incidence of the disease.

"That is not a small piece of work," said Dr. Elizabeth Bodkin, vice president of Population Health and chief medical health officer. "Any manmade water system, whether it is a cooling tower on top of a building or whether it's a fountain or water feature are possible places where the bacteria can grow and thrive, and so all of these are being looked at."

A review of the data from the U.S. shows similar alarming trends where year after year since 2000, the number of cases has been increasing steadily.

The COVID-19 pandemic has further heightened attention to Legionella as some health experts express concern that a prior COVID-19 infection could make a person more susceptible to Legionella. There is another concern as well related to shutdown of buildings during the pandemic, where water in cooling towers, fountains, and distribution systems has been left stagnant—providing a perfect environment for Legionella to multiply.

Where can Legionella be found?

Legionella is a genus of bacteria that includes the species L. pneumophila that causes a pneumonia-type illness called Legionnaires' disease and a mild flu-like illness called Pontiac fever. Legionella bacteria are ubiquitous in water and soil, and multiply quickly in warm water (20-50˚C).

Legionella are associated with the built environment. The bacteria can proliferate in poorly maintained plumbing and building mechanical systems and are transmitted through inhalation of contaminated water that has been aerosolised, but not by ingestion of water. Sources include, but are not limited to, cooling towers, swimming pools, domestic water systems, ice-making machines, whirlpool spas, hot springs, and fountains.

Cooling towers, decorative water features, and non-potable water treatment systems (such as for rainwater re-use) have all been implicated in Legionella outbreaks.

These systems need to be properly installed, routinely tested and maintained, and reported on to ensure that corrective action takes place to help prevent outbreaks.

New certification aims to reduce Legionella outbreaks

In early 2020, the City of Vancouver, Vancouver Coastal Health Region, and the Environmental Operators Certification Program (EOCP) embarked on a project to implement a new certification, that of Building Water Systems Operator certification. This certification also encompasses potable water systems where anti-corrosives are used, as well as rainwater harvesting systems.

The certification was announced at the EOCP's conference in September 2020. It is anticipated that the operator training and certification process will have a significant impact in reducing the number of Legionella outbreaks in British Columbia.

Pre-requisites for the Building Water System (BWS) Operator certification, and ongoing requirements to maintain the certification, include:

1. 50 hours of experience working as:
   - A relevant red seal trade (e.g. plumber, boilermaker, etc.).
   - Facility maintenance technician.
   - Professional engineer working in a related field.
   - Certified EOCP operator.
   - Water treatment service provider.
   - Environmental health officer.
   - Drinking water officer.
   - Swimming pool operator.
2. Completion of an accredited BWS course*:
   - Course will be two to three days long.
   - Cost for course will be approximately $750.
   - Course may be in class or online.

   **Courses have been developed by training providers; accreditation is provided by the EOCP.*
3. Examination
   - Web-based or paper.
   - Cost is $100.
   - 50 questions.
   - Two hours long.
4. Maintaining Certification
   - Payment of EOCP annual dues ($99).
   - Completion of 1.2 CEUs (core and related) in every two-year reporting period (first reporting period will be from January 1, 2022 to December 31, 2023).

While the Building Water Systems certification is first being rolled out in Vancouver, there has been a great deal of interest in this new certification throughout North America. It is expected that other jurisdictions will follow suit. WC

Jenni Green is the technical expert at EOCP.

Kalpna Solanki is the president and CEO of EOCP.

Volunteer professional videographer Matt Miller films Disa Crowchief of Siksika Nation. The interview will be featured as part of an upcoming documentary project Water Movement is working on to advocate for better water access to Indigenous communities.

All photos: Water Movement

Sharing Expertise

How Water Movement is promoting information sharing between operators.

BY BITA MALEKIAN

WHY DO SOME COMMUNITIES not have access to safe, reliable access to drinking water? Especially in a country like Canada that's known for having one of the largest freshwater reserves in the world? A devoted team of volunteer industry professionals and university students from Calgary spent three years investigating this question.

The research team focused on facility operations and maintenance since water operators are the first line of defense in mitigating water plant failures. After connecting with expert Indigenous water operators in British Columbia, Alberta, and Saskatchewan, the team noticed reoccurring themes in the challenges faced by operators. The most common challenges can be grouped into three categories: training, collaboration, and retention.

Training

Understanding best maintenance practices, how to troubleshoot equipment issues, and ways to enhance equipment reliability are fundamental aspects of a water operator's role. Typically, this information and knowledge is shared and passed down by senior operators at the facility or through training.

While training programs play a key role in enhancing the operators' skills, they come with their own set of challenges. The programs themselves are expensive. They also have added costs involved with travelling and accommodations. In addition to this, requesting time off work is a common challenge, especially at smaller facilities that have limited qualified operators to begin with.

Even when an operator does have the opportunity and resources to attend a course, questions about specific equipment remain unanswered because the instructor may not be familiar with that equipment model or manufacturer.

If these challenges mentioned above are overcome, many times the operators are overloaded with information and content. This makes the very retention of the material difficult.

To mitigate the challenges involved with attending training programs, the Water Movement (WM) team, a venture under Engineers without Borders Calgary, designed a video learning library with content tailored for 'Indigenous Water Operators by Indigenous Water Operators.' Similar to the videos provided by some YouTube channels, Khan Academy and Udemy, the fundamental concept behind the video learning library is to connect the experts to the operators.

WM's team has partnered with professional volunteer videographers Matt Miller, Ben Grayzel, Roud Almasoud, and Reuben Dandurand to capture professional footage for the online library. In collaboration with expert Indigenous operators, including Warren Brown of Lytton First Nations and Deon Hassler of Carry the Kettle Nakoda Nation, WM works to cultivate short four to five minute videos that explain concepts and answer direct questions operators have. Making these videos available helps remove the cost, travel time, and retention barriers often associated with training programs.

While the videos don't replace formal training, the video learning library does provide an additional resource to water operators.

Collaboration

Industries rely on collaboration for growth and development. In Canada, the oil and gas sector has formed a hub in Calgary, the upcoming tech and software industry is expanding in Vancouver, and there are plenty of examples of other industries in these same and other places throughout the country. These hubs allow for experts from all companies to network, cultivate mentorships, and share ideas that enhance innovations in their respective fields.

Since Indigenous water operators work in remote locations, opportunity for collaboration is limited. Outside of annual conferences and regional water operator Facebook pages, Indigenous water operators do not benefit from the same collaboration opportunities that centralized industry hubs see.

To address this gap, WM created a 'collaboration zone' on its website. This interactive online space provides three channels for operators to connect on: ask the community, lessons learned, and the spotlight channel.

Operators can use the 'ask the community' channel to help troubleshoot equipment issues, removing the trial-and-error process and inevitably saving precious time. When operators cannot solve an issue on their own, they are forced to wait for an expert to visit their site which can take days or weeks due to the remoteness of their facilities. Since most issues operators see are typically systematic, it is not uncommon for other operators to have dealt with and can provide support.

The 'lessons learned' channel was created to provide a space where operators can share not just lessons learned but new innovations, tips, and tricks, and what some may call, life hacks.

The 'spotlight' channel is a WM favourite because it allows operators to virtually spotlight exemplary operators in their communities. Water operators are essential workers and WM is proud to be a pioneer in creating a space where they can be formally and properly appreciated on a regular basis.

Retention

It is no surprise that there is a need for more water professionals and water operators. Cultivating the next generation of water leaders is a key pillar of WM. It is unequivocal that while WM provides this additional resource to water operators, much work remains to solve the water crises Canada faces.

To bridge the connection between students and the water sector, WM provides free lunch and learns, technical and non-technical workshops, and facilitates tours of wastewater treatment plants. Schools also have the opportunity to inform WM of water infrastructure challenges they may face. WM can then use its advocacy and fundraising channels to help address the challenges.

WM also advocates to other groups. Currently, WM is working on a documentary that aims to educate Canadians of the water crisis. The documentary is being filmed by volunteer videographer Matt Miller and it features current water leaders: Warren Brown, Dr. Madjid Mohseni, Candace Cook, Dr. Michael Hart, and Disa Crowchief. Once the documentary is ready, it will be screened at several events.

Volunteer professional videographer Matt Miller, alongside expert water operator Warren Brown of Lytton First Nations, shooting for the video learning library and documentary.

Volunteer professional videographer Ben Grayzel, alongside expert water operator Warren Brown of Lytton First Nations, shooting for the video learning library.

Overcoming challenges

To address challenges associated with training, collaboration and retention, WM website promotes information sharing. The website provides an online interactive space where Indigenous water operators can connect, ask questions, share lessons learned, access training videos, and spotlight exemplary operators in their communities. More information can be found at ***watermovementyyc.com***.

Your part

It is our collective responsibility to ensure everyone has access to clean drinking water. We need innovation from engineers, better legislation from our policy makers, and more water education in schools. To solve one of the biggest challenges our society faces, we need big thinkers, action makers, and visionaries. We need everyone. We need you. WC

Bita Malekian is the founder of Water Movement.

Health Concerns

What risks do asbestos cement water pipes pose to the health of Canadians?

BY JULIAN BRANCH

FOR MILLIONS OF CANADIANS, getting a drink of water from the tap or taking a shower doesn't involve any second-guessing. The assumption is the water is clean and safe. What most Canadians don't know is that for decades asbestos cement (AC) water mains were installed in communities from coast-to-coast-to-coast. Legislation was passed in the United States of America three decades ago to regulate asbestos in water. Health Canada maintains there is no evidence that ingested asbestos is hazardous.

Background

Asbestos cement had become popular as a water pipe material back in the 1930's and 40s. The pipes were cheap to produce, and at the time, thought to be resistant to internal and external corrosion. They can contain up to 20 per cent asbestos. Studies put the length of AC pipe installed in North America at close to a million kilometers. The pipes are used in communities from Baie Verte, Newfoundland to Surrey, British Columbia.

The issue of asbestos in water first came to light in the late 1960s. The Reserve Mining Company had been dumping iron ore tailings into Lake Superior daily for close to two decades. The newly formed Environmental Protection Agency (EPA) found that high concentrations of asbestos fibers had been discovered in the drinking water of Duluth, Minnesota. Following a landmark two-year court trial, the mining giant was ordered to stop dumping its waste into Lake Superior. What followed was an extensive investigation into asbestos in water and asbestos cement water pipes in America.

Health Concerns—cancer risks from asbestos in pipes

A 1979 EPA study found that "as many as 68.5 per cent of the U.S. water systems carry water which is potentially capable of eroding asbestos-cement Type 1 pipe." It went on to state: "If A/C pipe is used, there exists the potential for consumers to be exposed to significant concentrations of asbestos in their drinking water."

In 1980, the EPA produced a study entitled Ambient Water Quality Criteria for Asbestos. In part it reads "Asbestos is a known carcinogen when inhaled. The demonstrated ability of asbestos to induce malignant tumors in different animal tissues, the passage of ingested fibers through the gastrointestinal mucosa, and the extensive human epidemiological evidence for excess peritoneal, gastrointestinal, and other extra-pulmonary cancer as a result of asbestos exposure suggests that asbestos is likely to be a human carcinogen when ingested."

In 1974, Congress passed the *Safe Water Drinking Act*. The regulation for asbestos became effective in 1992. With that came an enforceable regulation for asbestos, called a Maximum Contaminant Level (MCL), set at seven-million-fibers-per-litre of water (MFL). An EPA document entitled National Primary Drinking Water Regulations—Asbestos says the long-term health effects of ingesting asbestos are "lung disease, cancer." The paper goes on to say that if the asbestos in the water supply exceeds the MCL, steps, such as providing alternative drinking water supplies, need to be taken to "prevent serious risks to public health." Asbestos cement pipes are listed in the document as a main cause of asbestos in water.

Another EPA document says the MCL was set at seven-MFL "to protect against cancer."

National Research Council Canada (NRC)

The National Research Council Canada (NRC), Canada's premier scientific research body, has studied the issue of asbestos cement water pipes extensively.

"The use of AC pipe was largely discontinued in North America in the late 1970s due to health concerns associated with the manufacturing process of

AC pipes and the possible release of asbestos fibres from deteriorated pipes," reads the 2008 study Asbestos Cement Water Mains: History, Current State, and Future Planning.

Virtually all the NRC studies refer to asbestos in the water as a "health concern." One report, entitled Bacteriological challenges to asbestos cement water distribution pipelines, goes even further: "Severely deteriorated AC pipes also released asbestos fiber into the drinking water and could pose a hazard of malignant tumors of the gastrointestinal tract and other organs in consumers."

The 2010 report goes on to say "These AC pipes were laid down before the potential environmental, social, and health impacts were recognized and evaluated. In recent years, problems with AC have gradually become significant including increases in the number of pipe breaks and failure."

Yet another 2010 NRC study, entitled Safety and Waste Management of Asbestos Cement Pipes, states severely deteriorated AC pipes "may cause the release of asbestos fibers into the drinking water." The paper continues: "Although there are fewer health concerns about waterborne asbestos fibers, there are still concerns about the inhalation of airborne asbestos from showers, humidifiers, etc. There are also some concerns about the ingestion of fibers from drinking water as well as the clogging of filter systems."

Many Canadians don't second guess the quality of their drinking water.

Asbestos cement water pipes can contain up to 20 per cent of the mineral, according to Julian Branch.

Health Canada

Health Canada maintains there are no health concerns associated with drinking asbestos. "There is no consistent, convincing evidence that ingested asbestos is hazardous. There is, therefore, no need to establish a maximum acceptable concentration (MAC) for asbestos in drinking water," according to the Guidelines for Canadian Drinking Water Quality: Guideline Technical Document.

In an email exchange, spokesman Andre Gagnon says although the Health Canada guidelines were published in 1989, a recent review found that "there is little evidence suggesting a casual relationship between asbestos ingestion and cancer." Gagnon, a communications advisor with Health Canada, declined a request for an interview.

External studies

As asbestos cement water pipes continue to age and deteriorate, they are beginning to attract attention from around the world. One of the more blunt assessments, Possible health risks from asbestos in drinking water, comes from Italy following the discovery of asbestos fibers in the water supply of Tuscany.

"In conclusion, several findings suggest that health risks from asbestos could not exclusively derive from inhalation of fibers," reads the 2016 study. "Health hazards might also be present after ingestion, mainly after daily ingestion of drinking water for long periods."

The report goes on to caution that prompt action is required. "The precautionary principle should impose all possible efforts in order to revise health policies concerning this topic, and a systematic monitoring of drinking water to quantify the presence of asbestos is certainly needed in all regions. Further epidemiological studies aimed to the identification of exposed communities and to an adequate health risk assessment in their specific geographical regions are urgently needed."

Canada and the United States have hundreds of thousands of kilometers of old asbestos cement water mains delivering water to millions of users, and two very different approaches to dealing with the issue. WC

Julian Branch is a journalist and professional communicator with four decades of experience.

Should the definition of the blue economy be expanded to include more than ocean resources? This was a key question that was explored during the Defining the Blue Economy webinar.

Defining "Blue Economy"

Should the term Blue Economy encompass more than the "ocean economy"?

BY SIMRAN CHATTHA

CURRENTLY, predominant definitions of the term Blue Economy are synonymous with ocean resources. For example, the World Bank defines the Blue Economy as the "sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and ocean ecosystem health." Our team at Water Canada believes that this definition of the Blue Economy is too narrow and that it needs to be expanded to encompass the broader water sector.

In January 2021, Water Canada hosted a virtual discussion on why the wider definition of the term Blue Economy is warranted and why it's important for the future of the water sector. Actual Media's **Todd Latham** was joined by **Melissa De Young** from Pollution Probe, **Bruce Dudley** from The Delphi Group, **Geoff Green** from Students on Ice, and **Jason Scorse** from the Middlebury Institute of International Studies.

Setting the stage

Latham kicked off the Defining the Blue Economy webinar by setting the stage for the discussion. He noted that the term should encompass more than ocean and marine ecosystems. It should also include groundwater, drinking water treatment, rainwater, flooding, conveyance, and wastewater management.

As part of this expanded definition, there are two key considerations. The first is the idea that stewardship, which includes protecting water bodies and using water in a way that balances needs with availability, is an important part of the Blue Economy. Stewardship also includes minimizing the impact of human activities on water resources by treating wastewater before it gets into the environment, as well as reducing plastic pollution from runoff.

Economic activities are also a key consideration as a part of the expanded definition. This consideration includes identifying and supporting the sustainable development of business sectors that depend on water like fisheries, tourism, beverage, and mining.

What should the term "Blue Economy" include?

During the Defining the Blue Economy webinar, each of the speakers provided an overview of what the term Blue Economy means to them and what they think it should encompass.

"When I look at the Blue Economy, I definitely see a holistic vision of what

A number of speakers agreed that the Great Lakes should be included in the expanded definition of the blue economy.

Overall, there seems to be support for expanding the definition of Blue Economy to include more than ocean resources.

that means," said Green. "Not just oceans but also groundwater, drinking water, wastewater, marine protected areas, technology, science, education. All of these provide job opportunities and career opportunities."

"If we play our cards right—not just with the definition but [also] in the way that the Blue Economy gets communicated to people—there's a huge opportunity in ahead of us," noted Green. "It provides a way to bridge environmental and economic pressures and Canada should be a leader in that."

De Young agreed with notion that the definition of the term Blue Economy needs to be expanded.

"When we're talking about what the definition of the Blue Economy means to us at Pollution Probe, I echo the sentiments of Geoff and of Bruce in terms of broadening the definition to include freshwater," said De Young. "It's clearly important from some of the work we're doing. We've long been advocating for ensuring that similar attention is given to freshwater environmental issues as that's been given to ocean and marine environments."

"A recent example was our work related to plastic pollution," noted De Young. "Researchers in the Great Lakes have been finding concentrations, for example, of microplastics that in some cases are greater than those that are found in ocean jars. Our inland water and lakes are also critical pathways for plastic pollution reaching the oceans."

Dudley added that he believes we're in the very early days for the Blue Economy.

Should Blue Economy be more inclusive of all water resources?

During the webinar, we asked participants if they think the definition of "Blue Economy" needs to be more inclusive of all water resources. Here's what they had to say:

Yes: It should include lakes, rivers, freshwater, and urban water issues too. 93.6 per cent

No: It is just about oceans and ocean shorelines. 0 per cent

Maybe: If regulators and business community agree. 0 per cent

Not sure: Just learning about this and haven't got an opinion yet. 6.4 per cent

Are we making things more difficult to understand with an expanded definition?

There are a plethora of terms—like Blue Economy, circular economy, net zero, and green economy—that are being used to describe the work we do. We asked participants whether we're making things more difficult to understand with the definition of the Blue Economy. Here's what the participants had to say.

Yes: Just call it climate change mitigation and adaptation. The rest is semantics. 15.9 per cent

No: It's important to compartmentalize the issues so we can tackle them better. 68.2 per cent

Not Sure: I just go with the flow. Language changes all the time. 15.9 per cent

"You can look at it from a number of different lenses," said Dudley. "One of them is the investment lens. If you look at the green bond, for example, which is a vehicle for financing projects and technologies, you have a trillion dollars for the green bonds. Compare that to a handful of small initiatives for the blue bonds. So we're in the very early days of the Blue Economy."

Meanwhile Scorse from the Center for the Blue Economy at the Middlebury Institute of International Studies noted that he uses the traditional definition of Blue Economy in his work. "We use the World Bank definition," he said. "We are pretty focused on the saltwater, and ocean and coastal systems. We work internationally and we work with a lot of people in leading Blue Economy work. That seems to be pretty much where most of the world is at this point."

Scorse added some caveats as well. He indicated that "in the U.S. national statistics on ocean and coastal economies, which we have a pretty central role in producing, we actually do include the Great Lakes as part of the Blue Economy given their magnitude, the fact that they're used for navigation, and because they're such massive bodies of water."

> Stewardship and economic activities are key considerations in the updated definition of Blue Economy.

Scorse also noted that while he is not using the expanded definition, he could "be persuaded in certain contexts that it could be expanded." For now, he indicated that the current definition of Blue Economy is the right frame for the Centre's work and priorities.

There were a couple of key takeaways from the discussion about what the term Blue Economy should include. The first is that including freshwater in the definition of blue economy would be in line with what some organizations have been advocating for. The second is that the Great Lakes should be included in the definition of the Blue Economy because of the importance they hold in the Canadian and U.S. contexts.

What should the term Blue Economy not include?

During the webinar, some points were raised about how the term "sustainability" fits within the Blue Economy.

Latham indicated that he has "a visceral reaction to the word sustainable. It's not a very good word for what we're trying to do. By definition alone, it means keep doing the same thing and that's not what we have to do

here. We can no longer be doing the same thing."

Scorse also had some strong feelings about how sustainability fits within the Blue Economy.

"We really believe that sustainability is built into the Blue Economy," said Scorse. "That if something has a clear unsustainable dimension, it is not a blue economic element. So we think it's redundant to say sustainable Blue Economy."

"One thing I'm working on and our centre is working on is building that sustainability into that definition and then using it operationally to differentiate unsustainable from sustainable," added Scorse. "This is not something that's been fully agreed on and there isn't consensus on it but within my Centre, I'm pretty clear that offshore oil and gas is not the Blue Economy because it is not sustainable. It is a big source of marine pollution and obviously because of climate change, we need to get off fossil fuels."

"Offshore wind is Blue Economy," added Scorse. "Offshore oil and gas is not Blue Economy. I'm really much more interested in using the framework to differentiate sustainable from unsustainable activities."

Where do we go from here?

Overall, there seems to be support for expanding the definition of Blue Economy to include more than ocean resources. Through the Keys to a Blue Economy webinar series, Water Canada aims to understand all of the key elements (e.g., infrastructure demands, technologies, etc.) that should be included in the expanded definition to support the national water sector. More information about the Keys to a Blue Economy webinar series is available at ***watercanada.net/blue-economy***

In the meantime, we recognize that a number of organizations are also doing important work to support the Blue Economy in different ways. For example, during the Defining the Blue Economy webinar, Dudley provided attendees a preview of GLOBE Advance's report on Scaling Up the Blue Economy.

The report notes that "for the Blue Economy to succeed and for innovation to thrive, a diverse and varied financing approach is needed. This report summarizes the challenges and opportunities identified by experts during the Advance discussion [during GLOBE 2020] and identifies a roadmap for financing the global Blue Economy." A copy of the Scaling Up the Blue Economy report is available at ***bit.ly/ScalingUpBlueEconomy***

Over the coming months, we'll be moving the conversation forward on what the Blue Economy should look like. Stay tuned for more details! WC

Simran Chattha is the interim editor of Water Canada.

The costs, both insurable and uninsurable, of spring flooding are considerable in Canada.

Spring Flooding

Calling on "Team Canada" to Prepare for Spring 2021 Flooding

BY NATALIA MOUDRAK

QUESTION: What do Covid-19 and spring flooding have in common?

ANSWER: They both cause hardship and economic instability—if Canadians are not prepared.

While we all look forward to the end of the coronavirus pandemic, annual flooding caused by extreme weather is a problem that is here to stay.

Scientists worldwide agree that climate change is effectively irreversible and our only choice is to adapt to extreme weather events. For Canadians, flooding has emerged as the most damaging extreme weather disaster, with costs to governments, businesses, and individual Canadians mounting dramatically since 2010.

An event that causes more than $25 million of insured damage is considered a "catastrophic event." In 11 of the past 12 years, annual property and casualty insurance payouts associated with catastrophic events exceeded $1-billion. This is more than double the annual average of $405-million from 1983 to 2008. Water-related losses accounted for more than half of this increase.

In addition to this, businesses and homeowners endure additional uninsurable losses to the tune of three to four times the insurable losses. Also, Canadians affected by floods often suffer physical and mental health problems, sometimes for years afterward.

Spring flood season starts in February and runs into July. And this year, the coronavirus presents another challenge: flood aid for impacted communities could be delayed or limited by physical distancing, stay-at-home orders, and a shortage of emergency response and evacuation capacity.

Canadians everywhere must prepare—right now—by taking simple, practical steps to protect themselves and their properties from flooding.

We know what to do. Canada has developed practical guidelines and standards for mitigating flood risks. These guidelines and standards can inform actions taken by homeowners, municipalities, commercial real estate owners and managers, and other stakeholders.

In late 2020, the Intact Centre on Climate Adaptation published a report, Under One Umbrella: Practical Approaches for Reducing Flood Risks in Canada, that summarized the available guidance, serving as a "toolkit" of practical actions that can be executed immediately.

"Under One Umbrella is a toolbox of practical solutions that Canadians can put into action—today—to strengthen our resilience to floods," notes Chantal Guay, CEO of the Standards Council of Canada (SCC). "This report is an excellent example of how, working together, SCC and the Intact Centre, supported by a

All is not lost. We can take actions to reduce the impacts of spring flooding.

dedicated group of flood professionals, are helping drive Canada's health, well-being, and economic prosperity. Protecting what we have is especially important in these exceptionally challenging times."

The report includes the following practical actions:

- **Homeowners and tenants** can clean out eaves troughs and catch basins; install plastic covers over basement window wells; extend downspouts and sump discharge pipes away from the foundation walls; remove obstructions from floor drains; raise electronics; and store valuables off the floor in watertight containers.

- **Municipalities can help homeowners** by following the lead of Antigonish County, the Town of Antigonish, and the Paqtnkek Mi'kmaw Nation in Nova Scotia to distribute the Three Steps to Cost-Effective Home Flood Protection infographic. The infographic depicts cost-effective flood risk reduction actions and is distributed vis-à-vis property mailings. This ensures residents receive the guidance and do not discard it as "junk mail."

- **Utilities** can similarly follow example of Energy+ Inc. to send out the Three Steps to Cost-Effective Home Flood Protection infographic to their 57,000 residential and small commercial customer account holders vis-à-vis utility bills, as well as promoting home flood protection on Twitter, Facebook, and other social media channels.

- **Owners and managers of commercial buildings** can create flood response plans and procedures for each building; obtain portable flood barriers, sandbags, backup power generators, and other emergency supplies; protect critical equipment; and incorporate the cost of such actions into asset-management and long-term financial plans.

- **Professionals involved in buying, selling or insuring property**—including insurance brokers, mortgage brokers, real estate agents, and home inspectors—can boost their skills with professional training about household flood protection through their professional associations. They can subsequently help clients with value-add advice about best practices to limit flood risk. Mortgage lenders can offer incentives for retrofits that make homes more resilient to flooding.

- **Regional conservation agencies and not-for-profit organizations** can publicize existing data about flood risks. They can also promote the conservation of natural infrastructure assets, such as wetlands, forests and ponds, for flood protection and other benefits they provide to local communities.

The global pandemic has demonstrated the perils of being taken by surprise. It has shown that being prepared for disaster could have saved lives and minimized harm to the economy.

Let's not be caught off guard by the inevitable floods in spring 2021. If all members of "Team Canada" prepare, by adapting homes, communities, and businesses to reduce their risks, society will benefit.

Taking concrete actions to prevent or lessen flood damage will create new jobs. It will protect the environment. And it will result in less financial hardship, fewer insurance claims and greater economic stability.

The time to act is *now*. We have the knowledge, the practical tools, and—hopefully—the wisdom to do so. WC

Natalia Moudrak is the director of climate resilience at the Intact Centre on Climate Adaptation.

Without proactive investment in water infrastructure maintenance, pipes will eventually break. This can lead to an even greater cost to the municipality.

Waiting on a Crisis

Proactive measures are needed for addressing water infrastructure assets.

BY GEOFF BRITNELL

CANADA'S RESPONSE to the COVID-19 pandemic put our critical infrastructure to the test. One major aspect of that was municipal water systems and its reliability. An industry that has always fought for attention via slogans like "no water, no beer" or "no water, no hockey" changed the message quickly to "no water, no handwashing."

While COVID-19 is an extreme example, it brings to light the question of the condition of our water infrastructure. A system often neglected because it is 'out of sight, out of mind' was thrust into the public eye as an essential service that was needed more than ever. Water system owners and operations were left to hope that systems with 100-year-old infrastructure would hold during this essential time. To say that there were more than a few sleepless nights would be an understatement.

One major reason for these sleepless nights was the current water infrastructure backlog that exists within the country. Water systems, which have been repeatedly underfunded, have suffered from a deferral of maintenance. Aging systems that have been falling apart have been pieced together and asked to hold on long after their useful life is up.

Unfortunately, our water systems are often left to the point where it is too late and the infrastructure gives way before it can be addressed. To prevent this from occurring, the infrastructure requires investment before the point of failure.

Take for example a water system that has 100 kilometres (km) of watermains that are expected to last 100 years. If the water infrastructure lasts its full expected lifespan, it would require that one per cent of the watermains are replaced yearly, starting the day it was first installed.

The newly-installed infrastructure isn't expected to require replacement immediately. That leaves the utility owner to save for future years when the infrastructure would require replacement as more than one per cent would be required to be replaced each year.

Very few utility owners are replacing that one per cent of the water system, and instead are deferring the work and saving it for future years. This increases the backlog along with the risk of a failure occurring. By the time that watermain requires replacement, five-to-ten per cent may need replacement in a given year, and the funding cannot meet that need.

> Rates need to be raised as the asset ages for the utility owner to be able to replace it when the time comes.

Solutions aren't easy

Rates need to be raised as the asset ages for the utility owner to be able to replace it when the time comes. Without it, the asset fails and requires an emergency fix to keep the water running. These emergency fixes are expensive and add up quickly.

It is not unusual for utility owners to reach the point where the cost to repair the system cleans out whatever funding has been set aside, leading to a rate increase without any funding designated to a replacement of the asset. The reason it has been allowed to continue like this? Out of sight, out of mind.

Compare this to a public transit example. A city bus is 50 years old, has a broken window, can only go half speed because the engine is working at half capacity, and may break down a few times before getting to its destination. Compare that to a watermain that is 100 years old, is working at 10 per cent of its capacity because it has nearly rusted shut, is leaking water constantly, and will require several patches due to it breaking. While both are important, what option can you live without?

This chronic underfunding adds to the downward spiral of trust in municipal drinking water. The less funding given to water, the more likely issues are likely to occur, further lessening the trust in water—which leads to less consumption, which leads to lower revenue and therefore further underfunding.

The only way we break this cycle is by increasing the value we place on municipal drinking water and the funding that goes with it. This is not an easy task. It requires significant political support. Rates cannot be increased without political support which funnels down to the voter.

This brings to the surface the difficult question: how do we bring attention to the need to minimize the deferral of maintenance on our water system while still maintaining trust in the water itself? How can a city show a picture of a 100-year-old watermain full of holes and rust to the public without the public losing confidence in the water itself?

It's a difficult question that our public works leaders are left with addressing daily: keep confidence in the system and ensure the reliable delivery of safe clean drinking water.

As a society, we need to do our part in addressing this concern before it is too late. Increasing rates and taxes is not an easy task, especially if the problem is out of sight and out of mind. Rather than kicking the rock down the road to future governments, our current politicians have to take a risk and ask for an increase in rates.

We as a voting populace must support the politicians taking the risk and ask more of the ones who are not.

We can no longer allow for our water systems to deteriorate and presume they will hold together during times of crisis. We can no longer sit on our assets. WC

This article was originally published in the May/June 2020 issue of ReNew Canada.

Geoff Britnell is the business development manager, North America, for Fer-Pal Infrastructure.

All photos: City of Vancouver

One of the projects Melina Scholefield and her team have been working on is the Richards Street Blue-Green Network.

Award-Winning Water Steward

Melina Scholefield helps advance the implementation of green infrastructure in Vancouver.

BY SIMRAN CHATTHA

MELINA SCHOLEFIELD brings her passion for green infrastructure to her role as the manager of green infrastructure implementation at the City of Vancouver.

"Melina has been the driving force behind green infrastructure at the City of Vancouver," said Brad Badelt, assistant director of sustainability at the City of Vancouver. "Over the past several years, she has successfully shifted our culture to recognize the many benefits of green infrastructure, to the point where we now expect green infrastructure to be part of all public and private projects within the city."

Under Scholefield's leadership, the Green Infrastructure Implementation Branch developed the Rain City Strategy for the City of Vancouver. "It goes beyond regulatory obligation of the [Integrated Rainwater Management Plan] to address many of the stresses and pressures facing the City of Vancouver," according to Julie McManus, a planner at the City of Vancouver.

"This Strategy is an ambitious, yet pragmatic 30-year roadmap for advancing rainwater management practices in Vancouver by making GI a prioritized option for managing urban rainwater runoff," added McManus.

For Scholefield's leadership, she received the **Water Steward of the Year award** during the virtual celebration of the Water's Next Awards in June 2020. Water Canada recently had an opportunity to catch up with Scholefield and ask her a few questions.

What was it like winning the Water Steward of the Year award in 2020?

I was very surprised and thrilled and so grateful. I want to say how much it means to me to have that support and recognition from such a broad peer

Scholefield's team has "delivered 46 new green infrastructure assets in public rights of way in Vancouver" over the last three years.

group. That was so meaningful. This is really hard work—doing transformative work that's really breaking a lot of new ground and creating new ways of doing business.

We've developed a network of really terrific champions. We've also had our fair share of resistance and people that have been threatened by what this kind of change means, what it means for people in their professional practice, or having to share power and decision-making.

Through the process to develop the Rain City Strategy, we recognized that many people have a role to play in water management in the city; it's not just the domain of the engineers or the utility group. We have responsibility and ability to achieve outcomes by working across disciplines and different sectors. It really means people coming together, doing their part, building common alignment, and building a common vision so that we're aiming for something similar.

Taking a more integrative, holistic, and collaborative approach is hard work and quite challenging at times but also extremely rewarding. That's why the Water Steward of the Year award is so meaningful and such a great validation for what we've been trying to do. I feel full of gratitude and full of appreciation about it.

What projects and/or initiatives have you been working on since winning the award?

In the past three years, we've delivered 46 new green infrastructure assets in public rights of way in Vancouver. We've developed dozens of partnerships around research, policies, technical performance monitoring, and design typologies. We've also been developing communications and outreach materials to engage with different audiences on rainwater management.

In the past year, we've been working on the Richards Street Blue-Green Network. It's a 1.2-kilometre, eight block long green infrastructure system in one of the most dense parts of the city. It's in the heart of downtown Vancouver in an area that has a high volumes of vehicles, cyclists, and pedestrians.

In this area, we're implementing a AAA bike lane. We've integrated a new green infrastructure typology, called a stormwater tree trench. We believe this typology has significant potential in highly urbanized context. It's also a very cost-effective form of green infrastructure with relatively low maintenance requirements and positive benefits for stormwater management, pollutant treatment, and support for urban forestry and ecology.

Melina Scholefield presenting at a workshop on the City of Vancouver's Rain City Strategy.

Credit: City of Vancouver

What's really exciting about this project is that this is an area with so many utility conflicts, as you might imagine in a big, high-density downtown. There are actually two B.C. Hydro duct banks right underneath the location. Normally, there would not have been an opportunity to introduce trees along this corridor because of the underground utilities. This is because trees would have absorbed a lot of moisture in the group that otherwise would cool the electrical ducts.

However, B.C. Hydro was very supportive about our design approach. We focused on redirecting water from the roadway and the adjacent sidewalk areas into the stormwater tree trenches and into the ground around the duct banks. Our green infrastructure approach to drainage services in this project will clean 15-million-litres of stormwater per year, divert 11-million-litres of run-off per year from the pipe system, and deliver over 100 new trees. It will also sequester an estimated 1,100-pounds of carbon dioxide per year in an urban concrete jungle in downtown Vancouver. We're really excited about that.

Another piece that I'm quite proud of was finalized on December 24, 2020. My team has been looking at how we can leverage water management, drainage infrastructure, and nature-based solutions to support community goals beyond water management. Equity, community capacity building, and reconciliation with Indigenous peoples are really important to us and we're trying to develop a better understanding of how to support them through our work.

Using funds from a demonstration project at 63rd and Yukon that came underbudget, we developed a partnership with the Museum of Vancouver to host an Indigenous youth art mentorship camp program. Rather than hiring an artist-at-large, we thought we would leverage the opportunity to raise Indigenous perspectives and an expression of what they would want to see in this.

With the Museum of Vancouver, we organized a one-week program for youth over March Break. Nine Indigenous youth from local Indigenous nation, as well as some urban Indigenous youth. Artist mentors were brought in from our three host First Nations. They brought in some other really talented and skillful professional Indigenous artists to provide mentorship and guidance. Together, they produced really beautiful designs. The City of Vancouver's machine shop supported the fabrication of their beautiful designs in metal, as well as installation.

The art is now a feature in highlighting our green infrastructure project. It also was a terrific capacity-building opportunity for Indigenous youth.

What types of industry trends have you observed through your work?

Within the consulting industry, there's an emerging appetite and interest in integrated approaches to water planning. I think there's an appetite to further develop concepts related to One Water or Water Sensitive Cities. However, I think that the consulting industry needs clients, which tend to be public sector organizations, or developers who are asking for it.

A lot of public sector organizations are grappling with really significant challenges for the future. In other words, things like the economics of asset renewal, the economics of serving growth,

and dealing with climate change. Many of our systems are not well-positioned right now to be resilient. If we continue on with business as usual, it's going to be problematic.

Some of our traditional approaches are not best suited to deal with complex and changing needs and expectations within communities that we invest in infrastructure that meets a broader set of goals and objectives that respond to the climate and biodiversity emergencies, that leverage social amenities, environmental protection, and equity.

Going forward, I think that there is an appetite for undertaking more integrated approaches and nature-based solutions that yield outcomes for your basic engineering water performance. At the same time, these nature-based solutions can provide other service outcomes related to climate adaptation, resilience, heat mitigation, flood protection, and reducing pressure on existing pipes. It would be great to have a market to move more in this direction from both the public and private sectors.

What's your hope for your water legacy?

My legacy is that I've been able to, with others, craft a vision for something different for the future. People have come together and understood the value of this vision and they are committed to helping move it forward. We're learning as we go and we're not always going to get it right. But we are certainly proud of what we're trying to do and we want more jurisdictions come together.

The Water Steward of the Year award, Water Canada, and the Canadian Water and Wastewater Association can provide a forum for raising awareness and inspiring people to come on this journey to think differently and strategically about water management in the future. It can make a difference in the lives of people, systems, and our stewardship roles. WC

Simran Chattha is the interim editor of Water Canada.

All photos: Conservation Halton

"Monitoring the health of the watershed is key to assessing climate change impacts and identifying adaptation and mitigation measures," according to Chitra Gowda and Barbara Veale.

Inset: Conservation Halton and the Hamilton Conservation Authority form the Halton-Hamilton Source Protection Region.

Watershed Management

Understanding how a watershed agency is helping manage natural resources.

BY CHITRA GOWDA AND BARBARA VEALE

IMAGINE LIVING in a growing, thriving community surrounded by clean streams, vigorous forests, parks, trails to hike, bike and snowshoe, and diverse plant and animal habitat. In Ontario, Conservation Halton is a watershed agency that applies watershed management principles towards this vision, from the headwaters to the escarpment and to the lake.

Established through Ontario's *Conservation Authorities Act*, Conservation Halton is one of Ontario's 36 conservation authorities that protect, conserve, and manage natural resources on a watershed basis. Crossing multiple political boundaries, Conservation Halton's watershed encompasses approximately 1000-square-kilometres. The watershed includes several high growth communities, watercourses, wetlands, groundwater, biodiverse habitats, forested areas, 26-kilometres of Lake Ontario shoreline, and 80-kilometres of Ontario's Niagara Escarpment.

Watershed community programs for resilient drinking water

Leadership, innovation, watershed partner collaborations, and subject matter expertise are all key elements in successful community programs for protecting our natural resources. The local Halton-Hamilton source protection program carried out under Ontario's *Clean Water Act*, is a successful example of this type of multi-stakeholder collaboration. Its foundational elements include the watershed expertise and jurisdictions of Conservation Halton and the Hamilton Conservation Authority.

Conservation Halton and the Hamilton Conservation Authority form the Halton-Hamilton Source Protection Region. They bring together watershed partners whose common goal is the protection of Lake Ontario and groundwater sources of municipal drinking water that serve 95 per cent of the region residents. Collaborative review and discussions are fostered by facilitating regular meetings of the source protection committee and municipal partners. These in turn support necessary and proactive science and policy updates, with final review and approval by the province of Ontario.

It is important to note that there are several pieces of legislation in Ontario that help protect sources of drinking water through a multi-barrier approach from source to tap. Several municipalities not only implement local policies as required by the *Clean Water Act,* but also provide residents with treated drinking water per stringent legislative requirements of the *Safe Drinking Water Act*.

Conservation Halton has a watershed restoration program as well, to carry out projects to restore and maintain natural features such as wetlands and stream channels. These projects are often in collaboration with community partners and private landowners, resulting in multiple benefits, including the protection of drinking water sources. Some examples are ongoing restoration projects at the Courtcliffe Community Park in Carlisle, City of Hamilton, Ontario. This property is located in a "highly vulnerable aquifer" delineated under Ontario's *Clean Water Act*. These aquifers are groundwater sources that could relatively easily be impacted by the release of contaminants on the ground surface.

The Courtcliffe Park Committee worked with the City of Hamilton and Conservation Halton to restore grassland, forest, and wetland habitat in the park and establish walking trails and wildlife boxes. A small floodplain wetland and a wetland back water feature were also successfully developed. Between 2015 and 2018, Conservation Halton partnered with Trout Unlimited Canada to carry out large scale restoration works including the replacement of undersized creek crossings with properly sized spanning bridges. This reduces the back water effect on Bronte Creek and Mountberg Creek resulting in improved water quality, better sediment transport, and flow conveyance.

Also at Courtcliffe Park, Conservation Halton, Trout Unlimited Canada, and the Courtcliffe Park Committee collaborated with the assistance of volunteers from Niagara College, Scouts Canada, and the Ted Knott Chapter of Trout Unlimited Canada to install "sediment mats" in sections of Bronte Creek. This innovative project involves using Christmas trees to form mats that trap sediment in the flowing creek. Bronte Creek eventually flows into Lake Ontario, interestingly at a location within the Burlington and Oakville "intake protection zones." These zones are delineated under the *Clean Water Act*, to protect the Lake Ontario sources for municipal drinking water systems owned by the Regional Municipality of Halton.

Restoration projects result in resilient landscape conditions, which in turn supports the resiliency of our surface water (such as creeks and streams) and groundwater resources.

Climate change, greenspaces, and drinking water connections

According to the United Nations, water is the primary medium through which we feel the impacts of climate change. Water quality changes, aquatic habitat loss, flooding and drought are some of these impacts. Greenspaces provide critical carbon sequestration, which in turn helps mitigate some of the climate change impacts on water resources. Conservation Halton owns a significant network of conservation parks. In addition to serving as carbon sequestration areas, these parks provide a safe and healthy way for people to enjoy the outdoors, as we continue to live through a global pandemic.

> Watershed management allows us to take proactive, preventative, and restorative measures that benefit communities.

The Kelso Conservation Area/Glen Eden is one of these parks and forms part of the Niagara Escarpment Park System. It is a major, all season recreational park for watershed residents and Greater Toronto Area visitors. Nestled within the Kelso park are the Kelso municipal drinking water wells owned by the Regional Municipality of Halton. These wells take water from an underground aquifer water source which is then treated to serve parts of the Town of Milton with safe, clean tap water.

The *Clean Water Act* requires that wellhead protection areas be delineated around municipal drinking water wells. The Kelso wellhead protection areas partly overlap the sustainably managed and protected Kelso park. Road signs signifying the "drinking water protection zone" for the Kelso municipal supply wells were installed on Highway 401 by the province of Ontario in 2017, close to Kelso park, to raise awareness and support a preventive approach to protecting drinking water sources.

Monitoring the health of the watershed is key to assessing climate change impacts and identifying adaptation and mitigation measures. It is anticipated that air temperatures and rainfall will increase in the region, due to climate change. Conservation Halton carries out a comprehensive, long-term monitoring program for various parameters including aquatic life, stream, wetland and groundwater quality and flow/levels at various locations across the watershed.

Climate data such as air temperature, wind speed, and solar radiation are also collected at a few locations. The data collected is assessed to produce knowledge such as watershed report cards, which in turn inform decision making that support the environment and socio-economic considerations. For example, monitoring helps with early identification of potential drinking water source issues which can then be assessed, projections made, and actions taken accordingly.

Watershed management allows us to take proactive, preventative, and restorative measures that benefit human and ecological communities. Nature based solutions rooted in science, allow us to protect and restore what protects us: nature. As we continue to live through climate change, it is increasingly important to use a watershed management approach to ensure our drinking water is protected both now and for generations to come WC

The authors acknowledge Conservation Halton staff Stephanie Bright for content review and Kent Rundle for information about the Courtcliffe Park restoration projects. The authors also acknowledge Kim Barrett, Andrea Dunn, Glenn Farmer, and Jacek Strakowski for details about the monitoring program.

Chitra Gowda is the senior manager of watershed planning and source protection at Conservation Halton.

Barbara Veale is the director of watershed management and planning at Conservation Halton.

APPOINTED

ANDREW MACKLIN

Andrew Macklin, the editorial director of Actual Media and editor of Water Canada, ReNew Canada and the Top100 Projects Report, has departed the company to pursue an executive communications role with WSP Canada.

Macklin was hired by Actual Media in 2016. He led many important editorial and event projects between 2016 and 2020, as well as product launches for the company. As the editorial director, he oversaw industry-leading content creation, curation, and delivery for Actual Media's readers, visitors, and followers in the water, infrastructure, and environment sectors.

"Andrew was an important part of Actual Media's growth and a valued member of the executive" said **Todd Latham**, president of Actual Media. "He will be sorely missed, but our entire team is happy for him and we're excited that we'll continue to work with Andrew in his new role."

HASSAAN BASIT

The Ontario government has created a working group to help implement changes to conservation authorities. **Hassaan Basit**, president and CEO of Conservation Halton, will chair the new group that will provide input on the development of proposed regulations under the *Conservation Authorities Act*. The group will also provide input on how conservation authorities are governed.

"As we move forward together, we want to build stronger relationships with conservation authorities so we can work together to ensure consistent best practices, good governance, and appropriate accountability to best serve the people of Ontario," said **Jeff Yurek**, minister of the environment, conservation, and parks.

"I'd like to thank Hassaan Basit for the discussions over the last few weeks which helped inform some recent amendments to the legislative changes to ensure conservation authorities have the tools they need to protect their communities," added Yurek. "I look forward to continuing our positive and constructive dialogue towards our shared goals."

LLOYD BRYANT

WWF-Canada announced that **Lloyd Bryant** has been named the new chair of its Board of Directors. Bryant is the retired president and CEO of HP Canada. He has served on WWF-Canada's board since 2014.

"I'm excited to step into this new role on the WWF-Canada Board of Directors as we embark on an ambitious strategic plan to secure greater numbers of stable and increasing wildlife populations," said Bryant. "We know that creating change in conservation doesn't happen overnight but with a ten-year plan that includes habitat protection and recovery, building nature-based solutions for climate change, reducing industrial stressors, and engaging Canadians in actions to support wildlife, we are bringing the sustained commitments and efforts that are needed for wildlife to recover."

Julie Gelfand also joins WWF-Canada as a director, bringing over 35 years of experience in the field of environment, sustainable development, and corporate social responsibility for government, NGOs, and the private sector. She was the federal commissioner of the environment and sustainable development from 2014 to 2019. Currently, Gelfand is a Distinguished Fellow of the Munk School of Global Affairs and Public Policy.

GLENN MACMILLAN

The Lake Simcoe Region Conservation Authority (LSRCA) announced that **Glenn MacMillan** took on a leadership role to oversee the conservation authority's planning, development, and restoration services portfolio.

"I'm thrilled that we were able to snap Glenn up from our neighbouring conservation authority," said **Mike Walters**, LSRCA's chief administrative officer. "Glenn brings 30 years of progressive experience from the Toronto Region Conservation Authority."

"He has had leading roles in development and stormwater review, the creation of innovations in stormwater and new standards for development submissions, as well as vast experience with urban stormwater restoration projects," added Walters. "He's an excellent addition to our team and as the new general manager, I'm confident he will be able to seamlessly transition into his new role."

KAREN RAS

Councillor **Karen Ras** was acclaimed as chair of Credit Valley Conservation (CVC) at the inaugural 2021 Board of Directors

meeting held on January 15, 2021. Ras was first elected chair in 2019 and has served on the CVC board since 2014.

"I'm honoured to be acclaimed as Chair of Credit Valley Conservation," said Councillor Ras. "I take great pride in the work we do to protect, connect, and sustain our local environment and I'm eager to help CVC work through the expected challenges of enacting the requirements of the updated *Conservation Authorities Act*."

The CVC Board of Directors also acclaimed Town of Oakville Councillor **Tom Adams** as vice chair. Adams has served on the CVC board since 2011 and has served as vice chair in 2013 and currently since 2019.

BONNIE LYSYK

TYLER SCHULZ

Ontario's Auditor General **Bonnie Lysyk** announced that **Tyler Schulz** has joined her executive team as acting assistant auditor general, commissioner of the environment. Schulz assumed the position on February 1, 2021.

"Dr. Schulz has been an invaluable member of our environment team portfolio since 2019," said Lysyk. "His experience and leadership will ensure our Office's environmental reports continue to make evidence-based and impactful recommendations."

"I look forward to working with Dr. Schulz in his new position to carry out those aspects of the Auditor General's mandate that involve reviewing the operation of the Environmental Bill of Rights and conducting audits of provincial programs intended to protect the environment," added Lysyk.

CATHERINE MCKENNA

TAMARA VROOMAN

Infrastructure and Communities Minister **Catherine McKenna** announced the appointment of **Tamara Vrooman** as chairperson of the Canada Infrastructure Bank, effective January 27, 2021.

"Tamara is an excellent choice for chair of the Canada Infrastructure Bank," said Catherine McKenna, minister of infrastructure and communities. "She brings a strong financial and infrastructure background, and important leadership skills to the role."

"Tamara is the CEO of the Vancouver International Airport, led Canada's largest community credit union through the 2008 financial crisis, and served as B.C.'s Deputy Minister of Finance where she steered the Ministry's $36 billion fiscal plan, resulting in three AAA credit rating upgrades," added McKenna. "She has the right background and experience, and she knows how to get things done."

CHRIS WHITE

SUE FOXTON

The Grand River Conservation Authority (GRCA) has appointed a new chair and vice chair.

Chris White, mayor of Guelph-Eramosa Township and councillor in Wellington County, has been appointed as the chair of GRCA. **Sue Foxton**, mayor of North Dumfries Township, has been appointed vice chair. Both White and Foxton were appointed by the GRCA Board of Directors at the General Membership Meeting on January 22, 2021.

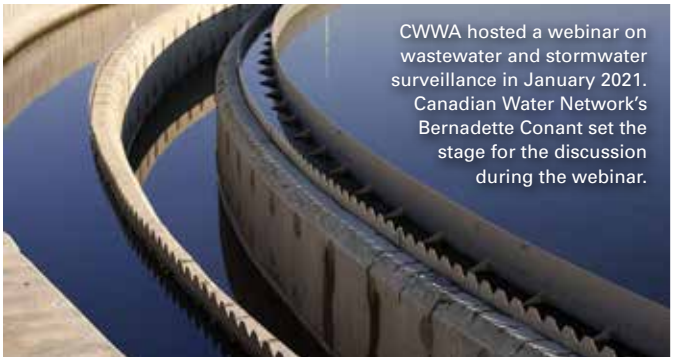
"The role of conservation authorities in Ontario has never been more important," said Chris White. "As a leading watershed management agency, we remain focused on the health, wellness, and sustainability of our communities. I look forward to leading our board, working with all levels of government and supporting GRCA staff as we continue to work on the recent updates to the *Conservation Authorities Act*."

MAILE LONO-BATURA

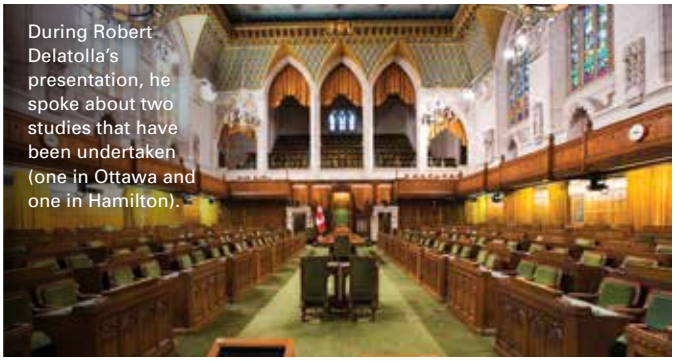
The Water Environment Federation (WEF) has selected **Maile Lono-Batura** as director of sustainable biosolids programs, a new position established to help WEF members and the water sector advance the beneficial use of biosolids.

"Biosolids are a central product of the wastewater treatment process, a vital part of resource recovery and circular economy, and beneficial for communities in many ways," said WEF President Lynn Broaddus. "WEF is increasing our investment in biosolids programs and is thrilled to add Maile's expertise and experience to our team."

In the director position, Lono-Batura will serve as WEF's lead for all biosolids activities. In doing so, she will act as a central coordinator on national biosolids issues for the organization's members and the larger water sector. WC



CWWA hosted a webinar on wastewater and stormwater surveillance in January 2021. Canadian Water Network's Bernadette Conant set the stage for the discussion during the webinar.



During Robert Delatolla's presentation, he spoke about two studies that have been undertaken (one in Ottawa and one in Hamilton).

Wastewater and Stormwater Surveillance

The Canadian Water and Wastewater Association (CWWA) hosted a webinar on Wastewater and Stormwater Surveillance as part of its NWWC webinar series.

A number of industry experts joined the webinar in January 2021. Experts included: **Beth Weir** from York Region, **Bernadette Conant** from the Canadian Water Network, **Robert Delatolla** from the University of Ottawa, **Mark Servos** from the University of Waterloo, and **Asim Qasim** from York Region.

Bernadette Conant from the Canadian Water Network kicked off the webinar and set the stage for the discussion. "I think the wastewater and COVID issue is a pretty strong example of the potential for wastewater not to be sort of a receiving tool but wastewater as a proactive tool to support public health decisions," she said. "What we're talking about today is really wastewater surveillance and testing as a public health tool."

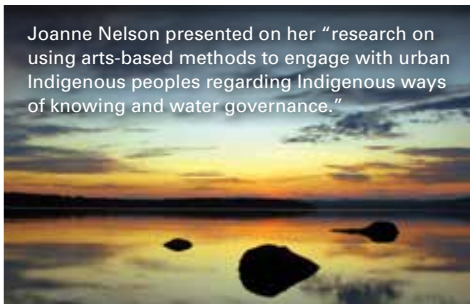
Following Conant's presentation, Robert Delatolla presented on work that's been done around wastewater surveillance of COVID-19 in Ottawa and Hamilton.

When the study in Ottawa commenced, the research team "started to sample at eight different locations within the treatment train really to answer the question of where is the best location to monitor and track or identify the signal, that genetic code of COVID-19 within the wastewater," said Delatolla. "Out of all those spots, we ended up focusing on and seeing that it was the primary sludge where we can get this really strong signal and reliable signal, the highest sensitivity we're able to attain out of the six locations."

The remaining speakers also provided updates on the work they have been doing. WC

The Second Annual Water Research Roundup was hosted by POLIS Water Project in February 2021.

Erin Murphy-Mills provided an update on her research on understanding the external drivers of eutrophication in the western Lake Erie Basin.



Joanne Nelson presented on her "research on using arts-based methods to engage with urban Indigenous peoples regarding Indigenous ways of knowing and water governance."

Second Annual Water Research Roundup

As part of the Creating a Blue Dialogue webinar series, the POLIS Water Project hosted the Second Annual Water Research Roundup on February 4, 2021 to showcase student research on freshwater issues.

Erin Murphy-Mills, a PhD student, provided an overview of her research at the University of Waterloo. Her research has been focused on understanding the external drivers of eutrophication in the western Lake Erie Basin and their implications for water governance.

One of the reasons why she has been studying Lake Erie in particular is because "water quality provides globally-relevant context to assess water governance approaches. Lake Erie is an example of focused international attention to address water quality issues."

At this stage, Murphy-Mills has identified the external drivers of eutrophication. She is exploring the implications of the external drivers for governance. She believes that "the importance of coordination across scales and level is an expected finding and recommendation."

Following Murphy-Mills' presentation, **Joanne Nelson**, a PhD candidate at the University of British Columbia, provided an overview of her "research on using arts-based methods to engage with urban Indigenous peoples regarding Indigenous ways of knowing and water governance."

Nelson also spoke about using Indigenous storytelling as a methodology. She noted that "it is relevant for communicating Indigenous ways of knowing, and communicating Indigenous ontologies and epistemologies."

The webinar concluded with some remarks from **Rod Dobell**, professor emeritus of public policy at the University of Victoria, who participated as a discussant. WC

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Bi-national Opportunities

BY ANDREW MACKLIN

WITH NEW LEADERSHIP comes new opportunity. Or at least we can hope it does.

In 2020 we heard mayors from across the Great Lakes and St. Lawrence region, on both sides of the border, clamouring for funding to help protect the waters, as well as the communities impacted by their rising waters and damaging storms. Several organizations, including the Council for the Great Lakes Region (CGLR) and the Great Lakes St. Lawrence Cities Initiative, have done yeomen service in trying to push the need for increased funding.

Enter President Joe Biden, a man whose election platform included a call for greater resiliency, cleaner energy and, oh yeah, a $2 trillion investment in infrastructure. That's a lot of zeros.

President Biden's plans are a real reason for optimism. He is clearly committed to pushing a large-scale infrastructure spend forward in the short-term. Doing so could not only provide necessary economic stimulus for cities across the American landscape, but could also provide real job opportunities for the millions put out of work by the pandemic. The President has also been very clear about his focus on green infrastructure, and has set aggressive targets for reducing greenhouse emissions.

That could also open some doors for Canadian expertise to creep its way into the U.S. market. Green infrastructure and resilience initiatives are familiar territory for Canadian water companies and associations, and with such a large-scale effort to be executed with the $2 trillion spend, expertise will be stretched thin as they work to build new assets throughout the nation.

If we can get the federal government, along with the provincial governments in Ontario and Quebec onside, this could be an unprecedented opportunity to improve the quality of the Great Lakes in a number of ways. New intake and outtake infrastructure, dredging, chemical, and toxin removal are just a few of the areas that can be addressed with bi-national funding on green infrastructure. Imagine the possibilities.

The administration in the United States will have its work cut out for it. A Senate that is slightly in the hands of the Republican party, making it extra difficult to pass his aggressive infrastructure spend. An Environmental Protection Agency in desperate need of new expertise and leadership to chart the new path forward, and millions needing new employment opportunities.

There is no guarantee, at this point, of when and how much funding for water infrastructure will reach the shores of the Great Lakes and the St. Lawrence. But at least it looks like there is a real opportunity in the years ahead for real federal support in the U.S., which is much more than what can be said for the four years previous. WC

Note: This is my final column for Water Canada as I have moved on to a new opportunity in the infrastructure sector. Thank you for reading my insights for the past five years. I am sure we will cross paths again soon enough.

Andrew Macklin is an executive communications specialist at WSP Canada and former managing editor of Water Canada.

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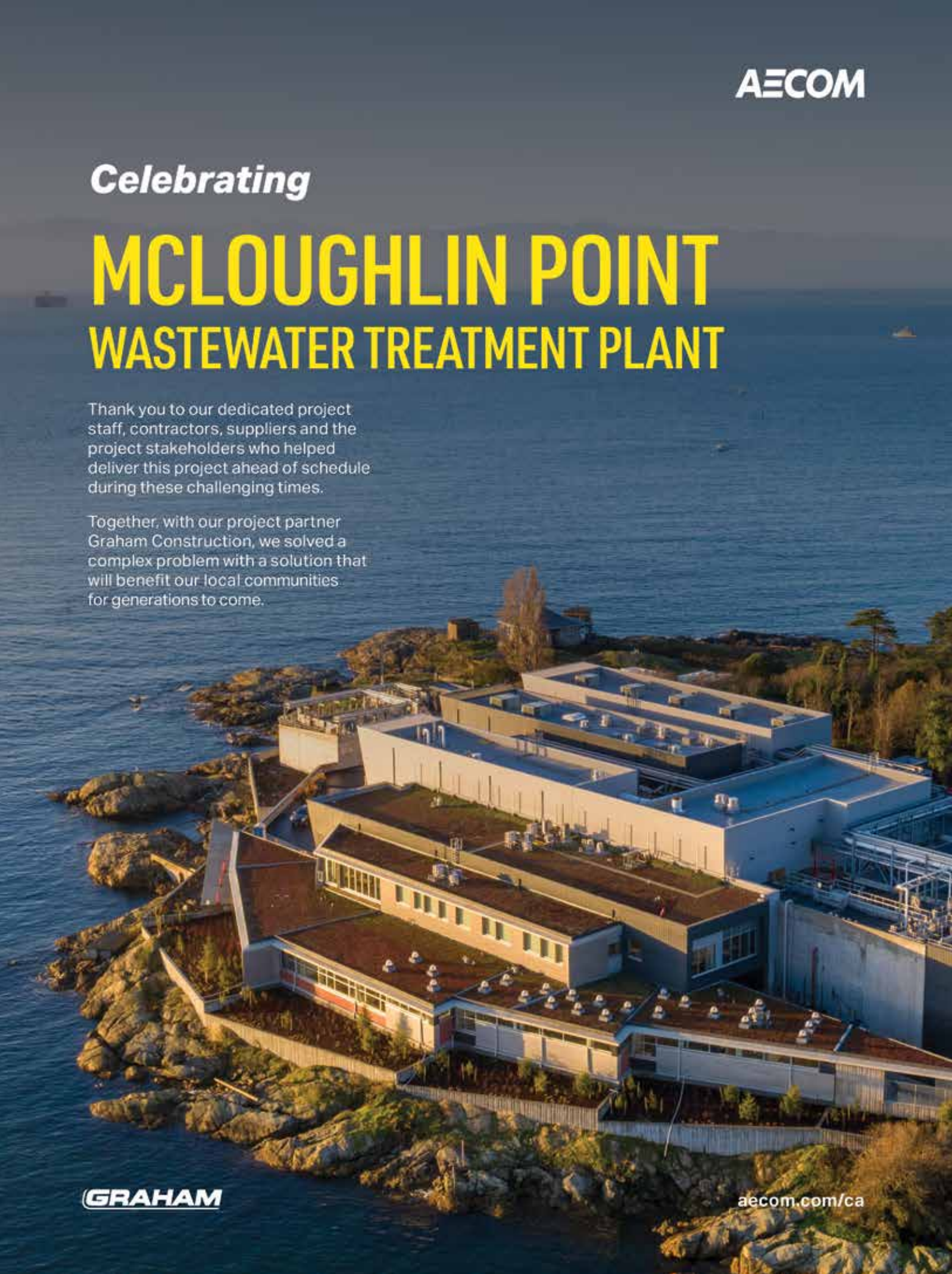

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