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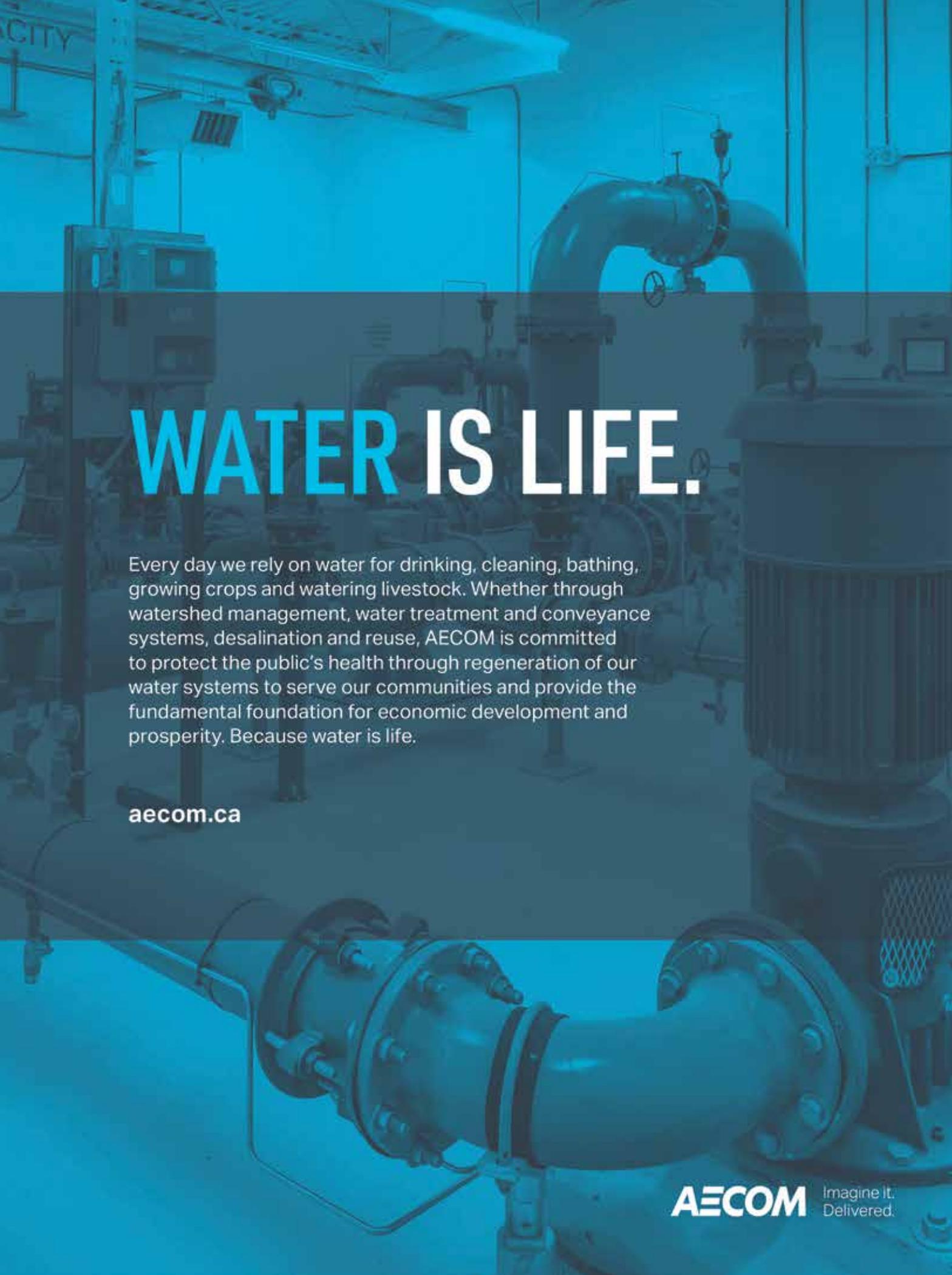
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Transformative Irrigation

BY ANDREW MACKLIN

THE CANADA INFRASTRUCTURE BANK (the Bank) has always felt like one of those funding tools that really could help the water sector, but only as an absolute last resort. There is money there to get water infrastructure built, that we know, but the cost of doing that sort of business has never had a ton of appeal. The thought of giving up such an important municipal revenue stream just to get the new infrastructure built just isn't all that palatable.

One community took advantage of the opportunity, the Town of Mapleton is Ontario, which could provide an example for why it might be a good idea after all. But we'll have to wait a few years to see how that situation plays out.

In early October, Prime Minister Justin Trudeau announced a more targeted approach to the Bank's priorities for project evaluation and investment, a new Growth Plan. It identified five categories where investments would be made in the short-term future, with \$9.5 billion expected to be spent in those five areas. Four of them were pretty well expected based on the Bank's original mandate (zero emission buses, energy retrofits, broadband, and clean power), but a fifth caught many people by surprise: agriculture-related infrastructure.

In the summary of the Growth Plan, the Bank identified that it was ear-marking \$1.5 billion that "will initially focus on transformative irrigation infrastructure projects, which are high priorities." It also stated that it could lead to upwards of "700,000 acres of newly irrigated land, which can lead to [...] improved

water resource management" among other things.

At surface level, this is a very good announcement. There is a demonstrated need for large-scale support of agricultural development, especially in western Canada, and this provides real government funding to support an infrastructure initiative that could ultimately help the entire country.

But with everything that the Bank does comes due diligence, and that will be key to whether or not this truly is a positive project for everyone involved. There are significant concerns with agricultural runoff including fertilizers, pesticides, manure, and nitrogen leaching into our watersheds. Bringing these new farmlands online, without addressing the impacts that farming has on our lakes, rivers, and oceans would have serious environmental and fiscal impacts in the medium and long term.

It will be important in the months ahead for the Canadian water industry to make its voice heard as the Bank continues with this 'transformative' investment opportunity. Spending the money without addressing the issues will create an even bigger financial headache for municipal, provincial, and federal budgets in the future.

Let's hope the Bank does its due diligence on investing in the agriculture sector and sets an example for the rest of the country to follow. **wc**

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New Criteria in Drinking Water Standard Tighten Lead Leaching Allowance from Plumbing Products

NEWLY PUBLISHED CHANGES to NSF/ANSI/CAN 61, the drinking water product standard required in the United States and Canada, further restrict the amount of lead that can leach from plumbing products.

According to NSF International, the significantly more rigorous requirements were approved after nearly three years of exploring various testing methods to reduce lead leaching from endpoint devices that dispense drinking water, as well as from other plumbing components.

“Aggressive lead-monitoring programs are being carried out in schools, day care centres, and communities in an ongoing public health protection effort,” said Jessica Evans, director of standards development at NSF International. “As facilitator of the standards that became the foundation of the U.S. Safe Drinking Water Act, NSF International

is pleased to have been a part of this important update to reduce lead from our drinking water.”

The more stringent pass/fail criteria for certification to the standard will require the maximum amount of lead leaching to be reduced from five micrograms (μg) to one μg for plumbing endpoint devices that dispense drinking water such as faucets. The standard will also require the maximum amount of lead leaching from three μg to 0.5 μg for other plumbing components such as connector hoses and small shut-off valves.

“These new lower requirements for lead leaching into drinking water are important changes that add extra levels of protection for families,” said France Lemieux, chair of the Joint Committee on Drinking Water Additives—System Components and head of the Materials and Treatment Section of Health Canada’s Water and Air Quality Bureau Health Canada. *wc*

ABOUT THE COVER

With new stormwater regulations coming, residential developers will need to find ways to use water to improve the value of their build. For more on this story, turn to page 12.

Coming up in the next issue:
JANUARY/FEBRUARY

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Government of Canada Invests in Equipment to Respond to Environmental Spills

UNDER THE OCEANS PROTECTION PLAN, the Government of Canada is investing in the Canadian Coast Guard to ensure it has modern equipment needed to respond to environmental spills quickly and effectively.

This investment will allow the Canadian Coast Guard to continue protecting Canada's waters, coasts, and coastal communities from marine pollution.

"Under the Oceans Protection Plan, we are providing our dedicated Canadian Coast Guard members across Canada with the best equipment possible," said Bernadette Jordan, minister of fisheries, oceans, and the Canadian Coast Guard.

Following an open competitive process, Public Services and Procurement Canada, on behalf of the Canadian Coast Guard, has awarded a \$1.7-million contract to Can-Ross Environmental Services Ltd. of Oakville, Ontario for the acquisition of

10,000-feet of environmental response equipment known as Tidal Seal Boom. The contract includes options for an additional 8,200 feet.

"The Tidal Boom will ensure the Coast Guard can continue to respond quickly and efficiently in the event of an environmental emergency," said Jordan. "These investments will help strengthen the Coast Guard and ensure it remains a world leader in ocean protection and marine environmental response."

"We are committed to protecting Canada's waters through the Oceans Protection Plan," added Anita Anand, minister of public services and procurement. "This contract is an example of how we are stimulating the Canadian economy while helping the Coast Guard better protect our oceans and coastlines by strengthening its capacity with modern and effective equipment to safely and effectively address emergency situations." **wc**

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Key partnerships with OCWA and other utilities were key to the project in Petawawa, according to Public Works Director David Unrau.

WACO Interiors Inc.

Municipal Co-digestion

How a provincial initiative is helping reduce GHG emissions by diverting organic waste from landfills to WWTPs. **BY SIMRAN CHATTHA**

IT'S NO SECRET that wastewater treatment plants consume a significant amount of energy and that they contribute significantly to the total amount of greenhouse gas (GHG) emissions emitted in Ontario.

In a 2017 report, the Environmental Commissioner of Ontario notes that “municipal water and wastewater systems account for 32 per cent of reported municipal GHG emissions; almost half of that comes from energy-intensive sewage treatment.”

The Environmental Commissioner of Ontario also notes that this number doesn't represent the true amount of GHG emissions since GHG emissions from wastewater, like methane, are typically understated or not reported.

Municipalities are starting to realize that status quo can't continue since they

are becoming more aware that GHG emissions are leading to the greenhouse effect, which is what is ultimately leading to global warming. This awareness has led a number of towns and cities in Ontario—like Stratford, Toronto, Kingston, and Hamilton—to declare a climate emergency.

There's an opportunity for municipalities to reduce GHG emissions at wastewater treatment plants (WWTPs) by increasing energy efficiency and/or capturing the energy generated by wastewater so that it can be reused on site. An alternative approach is also available, which is that municipalities can reduce GHG emissions by diverting organics from landfills through co-digestion at WWTPs.

This is where the Ontario Clean Water Agency's (OCWA) and Ontario

Water Consortium's (OWC) Municipal Co-digestion Initiative comes in.

The Response: Municipal Co-digestion Initiative

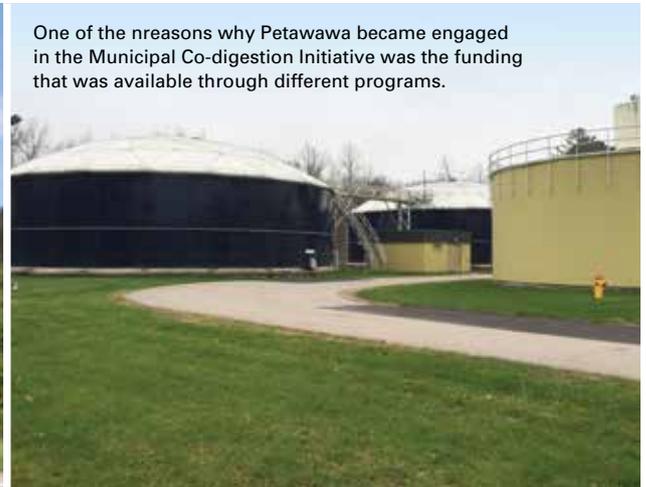
To promote the reduction of GHG emissions and diversion of organics, among other objectives, OCWA and OWC launched the Municipal Co-digestion Initiative in 2016.

“The initiative has brought municipalities, industry stakeholders, utilities, and regulators together to shape policy, programs, and projects,” says Indra Maharjan, director of innovation, technology, and alternate delivery at OCWA.

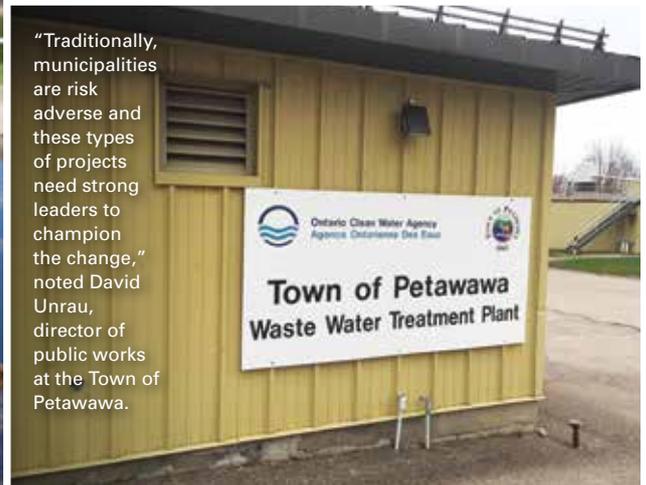
So far, the City of Stratford, Town of Petawawa, and City of Cornwall are engaged in the Municipal Co-digestion Initiative. Each municipality has had its own reasons for joining the initiative.



The City of Stratford was one of the first municipalities to get engaged in the Municipal Co-digestion Initiative.



One of the reasons why Petawawa became engaged in the Municipal Co-digestion Initiative was the funding that was available through different programs.



"Traditionally, municipalities are risk adverse and these types of projects need strong leaders to champion the change," noted David Unrau, director of public works at the Town of Petawawa.

"Stratford is an innovative municipality and it's always looking for ways to innovate and reduce costs," says Maharjan. "This project stemmed from energy conservation efforts in WWTP starting 2013. We then explored utilization of biogas as means of GHG reduction and identified multiple

which includes planning a sustainable future for Stratford's resources and environment," says Ed Dujlovic, director of infrastructure and development at the City of Stratford. "The co-digestion project has been identified as a project that will assist in achieving the City's goal for this priority."

Municipalities can support the province's priorities by using co-digestion to divert organic waste from landfills and reduce emissions.

co-benefits of larger project with inclusion of co-digestion."

Stratford's involvement in the Municipal Co-digestion Initiative is helping the City make progress on its strategic priorities. "One of the Strategic Priorities for the City of Stratford is developing our resources,

of Petawawa project are the willingness of council to explore alternative energy sources, the funding made available from FCM and LCEF, and finally the excess digester capacity," says David Unrau, director of public works at the Town of Petawawa.

At the same time, Unrau notes

that undertaking a co-digestion project requires a paradigm shift for municipalities. Instead of thinking about WWTPs as a cost centre, municipalities can start thinking about a WWTP as something that can be cost neutral or as something that can generate revenue.

"Traditionally, municipalities are risk adverse and these types of projects need strong leaders to champion the change," says Unrau. "Key partnerships with OCWA and other utilities bring access to strong diverse team and overcome the many challenges presented. The Town of Petawawa has all these ingredients and is excited to present the final business case to Council for its consideration."

A third municipality that's engaged in the Municipal Co-Digestion Initiative is the City of Cornwall. In Cornwall's case, municipal co-digestion came up during discussions about what net zero means and how its wastewater treatment plant could contribute to the UN's Sustainable Development Goals.

“The plant sees that solar energy to create food and the plant takes the result of that process through food waste and sewage turning it into energy that displaces non-circular energy and puts the remaining waste biosolids back into the ground as being an inspiring project,” says Carl Goodwin, director of environmental services at the City of Cornwall. “Transforming a WWTP into a net zero resource recovery facility through co-digestion can be achieved working with strong partners like OCWA and other utilities.”

Regulatory requirements to consider for municipal co-digestion projects

Before Stratford kicked off its project, it had a number of regulatory requirements to consider because it was planning on importing outside organic wastes for co-digestion at its WWTP. In particular, Stratford needed to follow the Municipal Class Environmental Assessment (Class EA) and it needed a comprehensive Environmental Compliance Approval.

To move the project forward, Stratford submitted a single comprehensive Environmental Compliance Approval application that included the following components:

- Environmental Compliance Approval (Waste Disposal Site).
- Environmental Compliance Approval Amendment (Air and Noise).
- Environmental Compliance Approval Amendment (Industrial Sewage Works).

Stratford also needed to keep specific regulations in mind as it was developing its project. These include:

- Regulation 347 (Waste Management, Reg. 347) since this is the regulation that “imported organic wastes are regulated under,” according to the Co-digestion Handbook that came out of the Getting to Net Zero Energy Wastewater Treatment workshop co-hosted by OCWA and OWC in February 2020.
- Regulation 419 (Air Pollution—Local Air Quality) since waste processing equipment can create air and noise pollution, according to the Co-digestion Handbook.

All the environmental approvals that Stratford received were for

its particular site. However, “the municipality’s experience with approvals and permissions provides an excellent template for the process and requirements that other municipalities can expect in undertaking similar projects,” notes the Co-digestion Handbook.

“Since co-digestion is new concept to the province, the regulatory process is learning curve for all,” adds Maharjan. “Hence, we worked early on with MECP’s Innovations Units and Approvals Branch and were successful in getting ECA approval for Stratford.”

Financing municipal co-digestion projects

Along with regulatory requirements, financing is naturally another important consideration for municipal co-digestion projects.

In the case of Stratford, its project is expected to cost \$22.5 million. As noted in the Co-digestion Handbook, the project has a few revenue sources including:

- A \$5-million investment through the Target GHG Fund. This fund was provided by the Ontario government through the Ontario Centres of Excellence (OCE); however, it no longer exists.
- A \$5-million matching contribution for OCE funding to be provided by Stratford, OCWA, and SUEZ Water Technologies & Solutions.
- An ongoing revenue stream that will be available through an RNG sales through a contract with Fortis BC.
- Project financing from a public financier.

In the case of Petawawa, it’s “proceeding with the 30 per cent design engineering for a proposed co-digestion project with OCWA. Existing anaerobic digestors will be upgraded with Anaergia’s sludge screw thickeners and high solids SMART mixers. Captured biogas will be used to generate electricity.”

At this time, the project is expected to cost \$7 million. So far, a \$2.7-million grant has been approved for capital installation through the Government of Canada’s Low Carbon Economy Fund (LCEF). According to the Co-digestion Handbook, “additional project financing is currently being explored.”

Municipal co-digestion in the provincial landscape

Over the past few years, the Government of Ontario made a number of commitments related to organics management and reducing GHG emissions. For example, the Food and Organic Waste Framework notes that “keeping food and organic waste out of landfills can help us fight climate change by reducing greenhouse gas emissions” and that “keeping food and organic waste out of the disposal stream is a high priority for the province.” Reducing GHG emissions is also a key part of the Ontario government’s Made-in-Ontario plan. Municipalities can support the province’s priorities by using co-digestion to divert organic waste from landfills and reduce emissions.

There are also technological considerations at the provincial scale. “The Province of Ontario has academic expertise and an emerging ecosystem of technology companies with strengths in technologies to optimize and enhance anaerobic digester performance to maximize capacity and the production and recovery of valuable resources,” notes the Co-digestion Handbook. “Technology solutions can be pre- or post-anaerobic digester and also within the anaerobic digester itself.”

This is where organizations like OWC come in. “Successful commercialization of innovative water technologies requires not only matching solutions to problems but often an instigator who can connect the dots,” notes Rahim Kanji, industry partnership manager at OWC. “Brokers like OWC link opportunities, stakeholders, and drivers and we play a key role in the water technology innovation ecosystem to accelerate technology commercialization in Ontario.”

Going forward, municipal co-digestion is an approach that can help municipalities and the province achieve multiple goals and objectives. **wc**



Simran Chattha is the associate editor of Water Canada.

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Wilfred Laurier students out in the field conducting research on stormwater management.



Dr. Clare Robinson (Western University).

PHOTO: CLARE ROBINSON/WESTERN UNIVERSITY



Wilfred Laurier student (left) and Dr. Kevin Stevens from Wilfred Laurier University (right) collect samples from a nearby wetland.

The Future of Stormwater Management

What will updated guidelines need to consider for the future of stormwater management? BY NICK MOCAN

STORMWATER MANAGEMENT IN ONTARIO has come a long way since the flood control efforts of the early 1970s. At that time, communities were concerned with preventing loss of life and property because of the type of devastation left behind by Hurricane Hazel. It flooded the Greater Toronto Area (GTA) in 1954, claimed 81 lives, and caused unprecedented damage to properties and infrastructure.

In 1991, the Government of Ontario released additional guidelines regarding water quality treatment of stormwater. These guidelines further evolved in 1994 and 2003 to promote a treatment-train approach, incorporating small-scale, low impact development (LID) techniques for stormwater management (SWM).

However, despite the efforts of some local agencies who have adopted their own updated SWM guidelines, there have been no official updates to the Provincial guidelines for nearly 20 years.

With changing weather and climate conditions, development pressures, and new and innovative approaches, what will these updated guidelines need to consider for the future of stormwater management?

Greening stormwater infrastructure

Traditionally, stormwater was managed using grey infrastructure approaches like stormwater management ponds, dry detention basins, and oil-grit separators. However, innovative approaches to SWM

known as low-impact development—or LID—have been gaining a foothold. LID practices, which include rain gardens and bioretention systems, manage stormwater by mimicking the natural processes under pre-development conditions that infiltrate and treat runoff.

In Ontario, initiatives like the Sustainable Technologies Evaluation Program (STEP) are leading the charge to incorporate LID practices across the land development industry. This partnership between several Ontario conservation authorities works with partners to assess and research new SWM techniques. In the future, engineers should expect to use tools like STEP’s Low Impact Development Life Cycle Costing Tool more often to evaluate the feasibility of

incorporating green infrastructure into their designs.

In the next 20 years, it may not be a question of whether a development has green infrastructure at all, and instead what types of green infrastructure it incorporates. However, traditional stormwater management solutions will certainly not disappear. Grey SWM infrastructure will still serve an important role in capturing and detaining large volumes of runoff, particularly in the dense urban landscapes that characterize many parts of the GTA. The next generation of guidelines will likely expand further on how to integrate conventional and LID approaches for stormwater management to provide social, environmental, and economic benefits to communities.

A holistic approach

It's no secret that the best solutions for any problem result from a multi-disciplinary approach. Stormwater management problems are no different. Engineers have traditionally applied basic hydrologic and hydraulic principles to solve SWM challenges. However, the key to optimizing these systems lies in a strong understanding of hydrologic and hydraulic interactions and relationships with local ecology, geomorphology, and hydrogeology. We can expect future innovations in SWM to be advanced by drawing on the expertise of multi-disciplinary teams of practitioners and researchers.

What will these updated guidelines need to consider for the future of stormwater management?

For example, engineers might leverage the expertise from disciplines such as geochemistry and hydrogeology to identify techniques to optimize SWM pond designs. They may also pursue further collaboration with landscape architects and ecologists to design and enhance the natural features of grey and green stormwater infrastructure. Unveiling a typical future SWM pond

design may reveal targeted vegetation plantings that better manage erosion, reduce suspended solids, and selectively uptake problematic pollutants like chlorides. The future of SWM pond designs rely on these field studies now to identify opportunities for future infrastructure. For green infrastructure like bioretention systems, experts in biology and geochemistry might be involved from day one working on how to bind, trap, or uptake nutrients using optimized soil and vegetation characteristics.

An increase in green infrastructure will also drive the need for engineering firms to attract and train team members that are scientifically literate and capable of designing, operating, and maintaining these solutions. This may include hiring staff that come from non-traditional engineering backgrounds, or in some cases, have no engineering background whatsoever. Developing the skillset needed as a civil engineer in the future may involve taking additional courses or gaining certifications that round out traditional engineering expertise with proficiencies in ecology, soil chemistry, or geomorphology.

Fast-tracking innovation

Implementing any type of stormwater management infrastructure comes at a cost. That's why fast-tracking research towards innovative approaches will be critical to lower the traditionally high up-front cost of LID techniques.

Currently in Ontario, financial incentives for developers to incorporate green SWM infrastructure are few and far between.

Across the province, colleges and universities have been developing and refining innovations in SWM technologies. Engineering firms are in a unique position to bring these innovations into practice as key players in both design and communication with developers about their needs. For instance, firms can incorporate research and monitoring for LID practices at their project sites to learn about how these systems perform

under varying development conditions. For engineering firms without dedicated research facilities and staff, partnering with schools and other organizations can help offset the costs of engaging in research. These partnerships can also cultivate important research skills for in-house staff through opportunities for experiential learning and involvement in field and lab activities. Executing successful research programs will require more than just engineers—they will need experienced technical staff who are comfortable in the field, lab, and on stage presenting at conferences.

We can also expect climate change to be a major driver of innovation in SWM. Future-proofing SWM designs and retrofits for future climate conditions will be critical. While it is uncertain about how these changes will affect rainfall timing and intensity, engaging in research and development now can identify ways to cope with projected scenarios. For example, enhanced water quality treatment through targeted vegetation plantings may be required to handle increased volumes of runoff into SWM ponds during the winter. Changing rainfall patterns may also affect the storm events that grey and green infrastructure are designed to control. This, in turn, will drive the need for innovative ways to develop resiliency in new and retrofitted systems.

The stormwater management solutions of the future will be holistic systems that integrate both grey and green infrastructure to protect communities and the natural environment. These systems will be designed by engineers who go beyond traditional design techniques to create solutions that consider their sustainability, cost, and long-term resiliency in a changing world. Through research and development, as well as collaborating with and learning from other fields, engineers will be able to leverage what they've learned over the past 20 years to shape the direction of stormwater management for the next 20. WC

Nick Mocan is the president of Crozier Consulting Engineers.

All levels of government play an important role in ensuring that communities have access to clean, safe drinking water.

Shared Responsibility

What's happening at the federal and municipal levels to ensure communities receive safe drinking water? BY SIMRAN CHATTHA

DRINKING WATER is a shared responsibility.

That was one of the main messages that came out of the Window on Drinking webinar, which was hosted by Water Canada and the Canadian Water and Wastewater Association (CWWA) on August 20, 2020.

The webinar included an update from Health Canada on its Water Quality Program. Health Canada also presented on its guidance for Monitoring the Biological Stability of Drinking Water in Distribution Systems.

In addition to the federal activities relating to drinking water, Water Canada and CWWA hosted presentations that looked at water quality in buildings. The presentations focused on questions such as: Where does municipal responsibility end? Where does the property owner become responsible? What does the law say versus a moral or practical obligation?

During the webinar, Water Canada

and CWWA were joined by a number of industry leaders, including:

- Steve Craik from EPCOR.
- Renée Grosselle from the City of Winnipeg.
- Judy Macdonald from Health Canada.
- Diane Medeiros from Health Canada.
- H el ene Ralay from the City of Montreal.
- Anne Vezina from Health Canada.

Health Canada's Water Quality Program

Anne Vezina kicked off the Window on Drinking Water webinar with updates on Health Canada's Guideline development process. According to Vezina, the steps in the guideline development process include:

- 1 Setting the priorities, which includes scoping the assessment, communication, and endorsement.
- 2 Conducting a risk assessment.

- 3 Undertaking a peer review by internal and external experts.
- 4 Obtaining reviews and endorsements from provincial and territorial partners as well as other government departments.
- 5 Publishing the draft guidelines and undertaking public consultations.
- 6 Leading a second review by provincial and territorial partners as well as other government departments. This step also includes impact considerations and endorsement.
- 7 Obtaining internal approval from within Health Canada.
- 8 Publishing the final guidelines.

"The timeline between the priority setting and publication of the final guidelines depends on the complexity of the file," noted Vezina. "A simple guideline can take two years to develop and a complicated guideline can take up to four years to develop."

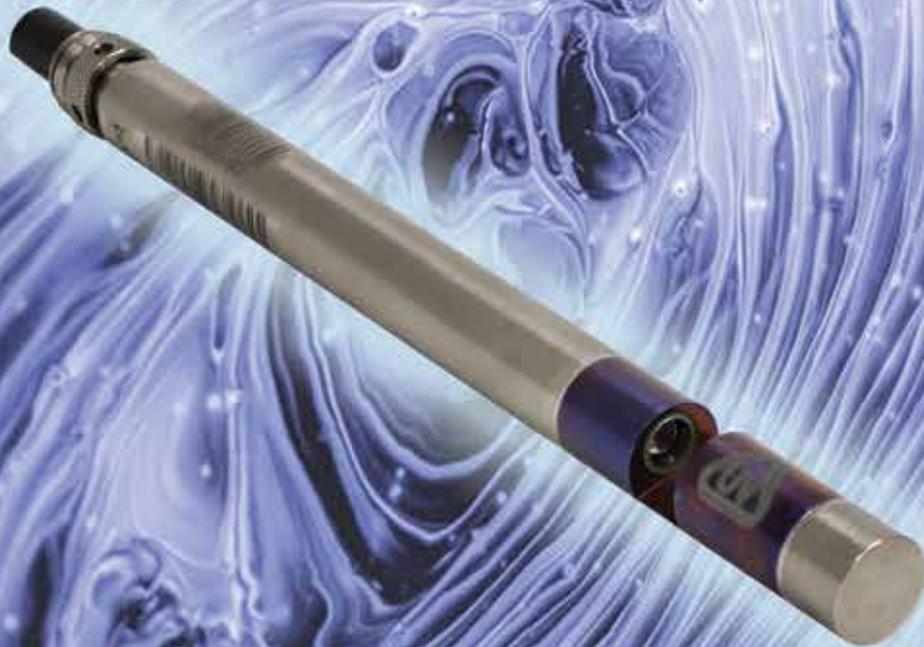


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According to Steve Craik, there are a number of reasons why utilities might want to go beyond their current responsibilities. For example, “there are clear regulatory drivers” for addressing Lead in drinking water.

- 1 Presence of microorganisms in biofilm, corrosion by-products, silt, and sediment.
- 2 Type and availability of nutrients (e.g. organic carbon, ammonia, phosphate, etc.).
- 3 Pipe material and condition.
- 4 Type and concentration of disinfectant residual.
- 5 General distribution system conditions (e.g. water temperature, pH, etc.).

Sharing the responsibility of drinking water quality

Sharing the responsibility of drinking water quality was a topic that was discussed by a number of presenters during the Window on Drinking Water webinar. One of the presenters that spoke about this was Steve Craik from EPCOR.

During his presentation, Craik raised the question about who is responsible for water quality at the tap. He noted that the traditional utility view has been that utilities “provide water up to the service connection and [are] responsible up to that point.” He also noted that “utility funding models and rate regulation do not readily allow utilities to invest in assets that are not utility owned.”

The environmental and public health regulators view aligns with the traditional utility view, according to Craik. “The point of compliance is usually set at the water treatment plant or in the distribution system,” he said.

At the same time, there are a number of reasons why utilities might want to go beyond their current responsibilities. According to Craik, these include: regulations, ethical reasons, practical reasons, and customer care.

“Lead is the great example [since] that’s one where there are clear regulatory drivers,” said Craik. “Sampling procedures move the point of compliance to the tap and measure the impact of the service line and premise plumbing. [...] If lead concentrations are high, the utility may need to implement corrosion control and/or replace lead service lines.” wc

Vezina also spoke about how COVID-19 is affecting the program. She noted that the work of the program continued as employees shifted to working from home.

“However, face-to-face meetings have been replaced by conference calls of much shorter duration, reducing our capacity to get documents reviewed by the Federal-Provincial-Territorial Committee on Drinking Water,” noted Vezina. “Also, the publication of drinking water guidelines and guidance documents was delayed to give priority to COVID-related publications. In addition to this, some staff got re-assigned to support the COVID crisis, which created some delays for specific files.”

Monitoring the biological stability of drinking water in distribution systems

During the webinar, Judy MacDonald and Diane Medeiros also provided updates from Health Canada. In particular, they focused on monitoring the biological stability of drinking water in distribution systems.

MacDonald noted that there are many reasons for why it’s important to care

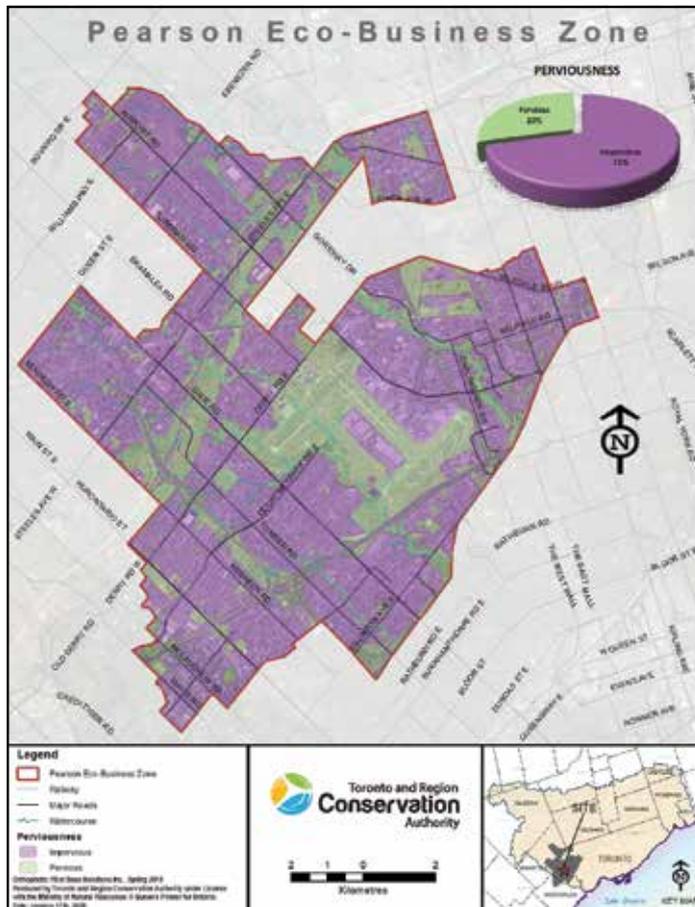
about distribution systems and the quality of water that goes through these systems.

“In some senses, the distribution system can be thought of as a reactor,” said MacDonald. “It’s this complex and dynamic environment. There are a number of interactions among a number of players like microbes, nutrients, and particles. We also know that there are biofilm deposits present. When all of these things come together, what we have is the possibility for significant deterioration of water quality.”

“If this water is consumed, it would pose both direct and indirect risks to the consumer that result in gastrointestinal illnesses and exposure to metals,” added MacDonald. “The goal of monitoring drinking water quality in the distribution system is to minimize these changes in water quality from the treatment to the consumer. This concept is called ensuring biological stability.”

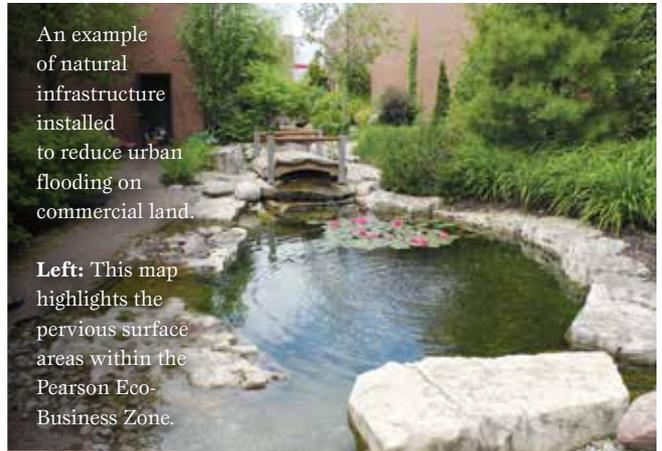
Diane Medeiros from Health Canada noted that Health Canada has a document out for consultation that looks at five causes of water quality deterioration:

Simran Chattha is the associate editor of Water Canada.



An example of natural infrastructure installed to reduce urban flooding on commercial land.

Left: This map highlights the pervious surface areas within the Pearson Eco-Business Zone.



Natural infrastructure placed in a parking lot to assist with bioretention and reduce stormwater impacts.

Building the Case

Creating a business case for natural infrastructure. BY ALYSSA KELLY AND ERIC MELITON

FLOODING IS A CRITICAL ISSUE facing Canadian municipalities that will only become more challenging as we continue to experience the effects of climate change. A 2019 Council of Canadian Academies report quotes damage to physical infrastructure caused by extreme weather as Canada's top risk and in 2019, for the first time in history, the Bank of Canada listed climate change as one of six vulnerabilities to Canada's financial system. Considering that extreme weather, including floods, is Canada's primary climate change risk, stormwater and flood management is an important strategy for enhancing our climate resiliency.

Urban centres like Toronto are particularly vulnerable to flooding, and

with a seasonal bombardment of news headlines warning of rising flood costs and impending infrastructure damages, this seems impossible to ignore. And rightly so—the Greater Toronto Area has seen a significant increase in flooding over the past ten years, coinciding with rising average temperatures. In 2019, the Insurance Bureau of Canada reported that insured losses from severe weather in Ontario reached \$1.3 billion in 2018, after exponential increases since the early 1980s, when average insured losses were only \$400 million per year for all of Canada.

There are many reasons why urban areas across Canada are seeing more flooding. Older neighbourhoods were constructed in floodplains and some regional topography shows development

in low-lying areas prone to flooding, simply due to the nature of how water flows. However, three important factors are the main drivers of increased flooding in urban centres like Toronto: more precipitation as a consequence of climate change, aging and insufficient infrastructure capacity and the abundance of concrete, asphalt, and other hard surfaces. These impermeable areas prevent water from seeping into the ground as it naturally should, forcing it to flow overland into storm sewers, many of which are old and have limited capacity. To reduce these effects, introducing permeable features like plants and soil to soak up water would help protect cities from floods—like taking a step towards re-establishing the power of the forest or

wetland that once stood where our cities do now. This is natural infrastructure; the use of vegetated systems to manage stormwater and restore some of the hydrological functions of natural areas.

Why businesses should care about flooding

The need to consider the effects of climate change, including flooding, also extends to businesses. Physical damage to assets and local infrastructure, employee physical and mental wellbeing, supply chain risks, threats to water quality, and the implementation of stormwater charges can all result in unexpected costs or disruptions to business operations, both on a local and global scale. Flooding and climate change have trickle-down consequences, from a systemic, global level to the scale of the individual employee.

Here are the potential risks to businesses as a result of climate change:

Risk of physical damage

- Physical damage to a company’s assets (office buildings, warehouses, fleets, inventory, etc.).
- Damage to public infrastructure (flooded roads, impaired bridges) disrupting transportation, goods movement and accessibility.

Employee wellbeing

- Employee productivity decreases as a result of mental health concerns around residential flooding. A 2013 study by the Conference Board of Canada found that absenteeism cost the Canadian economy \$16.6 billion in 2012.
- Nineteen per cent of the national population live in an area that is at risk of flooding.

Stormwater charges

- Financial costs from government implementing stormwater fees.
- Risks to the supply chain.
- Raw material availability, quality, and changes in cost, as well as labour issues and shipping/delivery disruptions.

Threats to water quality

- Contamination implications from urban flooding can affect process water sources used in manufacturing.

- Heavy metals, bacteria, chloride from road salt, oil, and grease are commonly found in rivers and lakes near urbanized areas from sources such as tire wear, industrial spills, or pavement deterioration.
- The impacts of combined sewer overflows (CSOs).
- When intense rainfall overloads the capacity of combined sewers, this mix of raw sewage and contaminated stormwater is diverted past treatment facilities, directly into surrounding rivers and lakes.

Natural infrastructure as a solution

Natural infrastructure is a valuable method of reducing stormwater runoff and lowering flood risk. It’s a strategy that incorporates natural land features in development and reintroduces these features into urban areas to allow water to infiltrate into the ground rather than run into storm sewers. Natural infrastructure can range from conserving features like wetlands to implementing permeable pavements to allow water to soak into the ground.

The types of natural infrastructure vary from naturally occurring landscapes to more engineered technology, which can include: wetlands; urban forests; grasslands; gardens and native landscaping (rain gardens, urban agriculture containing native species); mangrove forest restoration (coastal regions); green roofs; blue roofs; bioswales; bioretention areas; soakaways; riparian buffers; permeable pavements; and rainwater harvesting vessels.

The opportunity

The public sector has been active in promoting natural infrastructure on public lands, but even so, a large percentage of the land in a given municipality is privately owned. The prevalence of private land, particularly industrial and commercially owned, has led experts in the field to stress the

importance of private sector involvement in natural infrastructure propagation; however, this has generally been difficult to achieve. A lack of understanding in the business sector as to the causes of urban flooding, and minimal awareness of natural infrastructure as a solution, have, up until now, been limiting factors on the predominance of natural infrastructure on corporate lands.

The private sector is, therefore, a key stakeholder in addressing the issue of flooding and climate vulnerability in urban areas, and despite its lack of prevalence, there are a host of benefits businesses can reap from on-site implementation of natural infrastructure. Not only can natural infrastructure lower flood risk and improve water runoff quality, it has been shown to provide building energy savings, increase property values, and can be used to gain municipal stormwater charge credits. From another perspective, this also presents the private sector with the opportunity to take a leadership role in creating resiliency in their communities and demonstrate corporate social responsibility to consumers, employees, and investors. In fact, climate resiliency

The Insurance Bureau of Canada reported that insured losses from severe weather in Ontario reached \$1.3 billion in 2018

is becoming an increasingly important metric of environmental, social, and governance (ESG) criteria used by investors to evaluate businesses.

The path toward natural infrastructure adoption

Partners in Project Green (PPG), a program of Toronto and Region Conservation Authority, is in the unique position of convening municipalities, the not-for-profit sector, and the business community to identify and implement sustainability solutions.

PPG’s Water Stewardship performance area seeks to promote best practices in stormwater management and

flood resiliency, and has supported multiple successful implementations of natural infrastructure projects on corporate properties, mitigating the permeable surfaces in the Pearson Eco-Business Zone.

Working as a liaison between the conservation community and the private sector presents a unique opportunity to provide information for businesses on flooding issues in the GTA, on the multiple benefits of natural infrastructure, and to support the business case for companies to act. This will improve climate change resiliency not only for the participating company but the surrounding community as well. The recent publication of PPG's white paper entitled: *The Business Case for Natural Infrastructure: How corporations can invest in nature for climate resilience* seeks to utilize this strategic position to assist businesses achieve both economic and environmental resiliency.

A well-functioning environment works as a system, with trees, soil, rivers, valleys, and peaks, each playing a role in the water cycle. A well-functioning urban water cycle must also have multiple collaborators, each playing their part. In order to address the issue of flooding in the GTA, the private sector must play a role in, and benefit from, the solution. Natural infrastructure is a simple way of growing businesses into attractive, marketable, and environmentally and socially responsible organizations, resilient to the effects of climate change and prepared for the future. *wc*

This article originally appeared in the July/August issue of ReNew Canada.



Alyssa Kelly is the primary author of *The Business Case for Natural Infrastructure: How corporations can invest in nature for climate resilience*.

Eric Meliton is a program manager of Partners in Project Green, a program of the Toronto and Region Conservation Authority.

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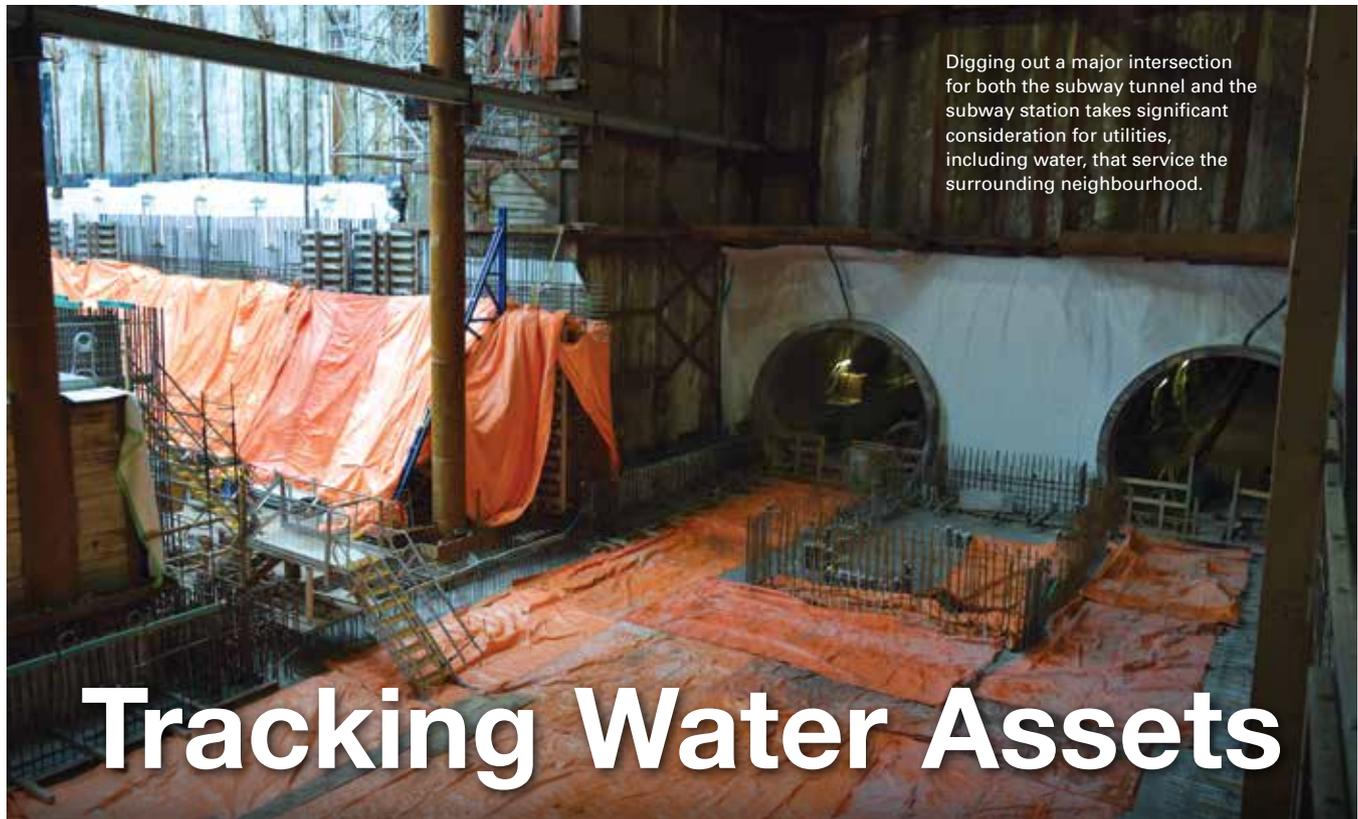
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Digging out a major intersection for both the subway tunnel and the subway station takes significant consideration for utilities, including water, that service the surrounding neighbourhood.

Tracking Water Assets

Toronto Water protects its water infrastructure during massive construction project. **BY BRIAN BELL**

TO MEET THEIR MANDATES, water utilities must not only know where their assets are and how they relate to each other, but also how they relate to the infrastructure and operations of other departments and agencies, such as transportation and transit.

Nowhere is this more important than in a large public construction initiative like the building of the Eglinton light rail transit (LRT) in Toronto. This is where the biggest water system in the country meets the largest transit infrastructure build in the country. That's a lot of moving parts.

Toronto Water, a division of the City of Toronto, is one of the largest water, wastewater, and stormwater utilities in North America, (with approximately 6,000 kilometres (km) of watermains) servicing more than three million residents and businesses. It maintains and services assets worth approximately \$28 billion, including: four water and four wastewater treatment plants, 4,100 km of sanitary sewers, 5,000 km of storm sewers, and

1,400 km of combined sewers.

Metrolinx is a Crown agency that manages and integrates road and public transport in the cities of Toronto and Hamilton and their suburbs and is currently building the Eglinton Crosstown, an LRT corridor across Toronto. It will cost \$5.3-billion construction cost, have 25 stops, run 19 km, and has a completion deadline of 2022.

Not wanting to jeopardize its strategic emphasis on customer service and commitment to excellent water delivery and reliability, Toronto Water had to figure out how to manage its assets with this extensive construction project that intersects with existing water infrastructure across the city. To accomplish this, Toronto Water had to develop a streamlined way to collaborate internally but also with outside partners like Metrolinx, as its construction requires Toronto Water to move a large number of assets temporarily or permanently.

When any infrastructure is being moved, the new locations must be recorded and

communicated internally and externally to provide service continuity and prevent damages to in-service assets. It is essential that these asset changes are systematically catalogued and tracked, and the traditional mark-up process or documentation in paper logbooks wasn't nearly sufficient for a project of this scale.

Significant projects and operations require accurate, detailed knowledge of asset locations and relationships. In short, organizations need location intelligence. They need geographic information system (GIS) technology. Moreover, to realize a more complete and accurate view of its infrastructure and improve operational awareness, Toronto Water saw the advantages of collaborating internally, so that all stakeholders, from planning to operations to the field crews on the ground, could both access and contribute to the organization's GIS.

This was a cultural shift.

Toronto Water has been using Esri solutions for 10 years. Historically, the Infrastructure Management group was



A look at the digital representation of the water infrastructure that appears at one of the intersections along Eglinton Ave. impacted by the LRT construction.

responsible for its GIS. However, the lens through which they view GIS gave a planning perspective rather than a more holistic one that included operations and construction. As such, operations had to depend on infrastructure planning for their location intelligence. Conversely, the planning group did not have access to the most up-to-date construction information, resulting in less than optimal operational awareness as well as lag times required to digitize Records of Alterations (ROAs) and as-built drawings.

Significant projects and operations require accurate, detailed knowledge of asset locations and relationships.

To improve operational awareness, efficiency and collaboration, Toronto Water expanded its GIS practice beyond planning to the operations group, which has been instrumental in coordinating with Metrolinx. Operations is now using a connected network and mobile apps so field crews can contribute in near real-time data and as a result, give both planning more up-to-date information

and operations more complete awareness of their assets and infrastructure as the Eglinton Crosstown LRT develops.

The distribution and collection group worked with both Metrolinx and Toronto Water field staff to digitize and track changes as to where assets are and how they will be affected by construction, on dedicated map layers, which are then easily shared with all stakeholders.

This means staff can redline assets that will be affected by construction and plan their operations in such a way as to minimize customer impact. Further, they routinely conduct test shuts in advance of construction to validate which customers will be impacted and notify such customers appropriately.

“The Geometric Network has given the operations department the ability to define relationships between assets and how different assets interact with each other as well as perform critical functions like upstream tracing, valve isolation and customer notification,” notes Arash Farajian, policy, planning and project consultant at Toronto Water.

Field crews are now able to contribute

to Toronto Water’s GIS and are directly involved in this feedback process. In contrast to when operations had to rely on Planning for its GIS capabilities, crews now help improve the completeness of Toronto Water’s location data with daily updates to assets. If a main break occurs after hours along the construction route, emergency crews do not need to rely on old, possibly inaccurate data. They can access Toronto Water’s GIS and its Metrolinx layer to accurately assess the situation and resolve the problem efficiently, even if those assets have been temporarily adjusted due to the construction.

Toronto Water has seen that effective management of its location information has improved its ability to collaborate internally and coordinate with outside partners and, in doing so, meet its strategic goal of providing excellent water delivery and reliability to customers, despite an ongoing huge construction site nearby. WC



Brian Bell is the director for utilities at Esri Canada.



New community partnerships have led to community-focused governance of the Cowichan Watershed.

Taking steps towards reconciliation and watershed governance.

BY ROSIE SIMMS AND OLIVER BRANDES

IN THE COWICHAN AND KOKSILAH watersheds on eastern Vancouver Island, a quiet transformation is unfolding. Outside of the limelight and driven by community champions, over the past decade the Cowichan Watershed Board (CWB) has taken exceptional steps to change how water is managed and governed. With perseverance, patience, and partnerships, the CWB is strengthening local capacity and influence, and building a foundational partnership with the Cowichan Valley Regional District (CVRD) and Cowichan Tribes that actively expresses “reconciliation in action.”

The Cowichan example is just one of many bright lights in British Columbia and beyond where watershed governance has shifted from aspiration to present-day reality, thanks to leadership from Indigenous nations, local governments, community groups, and local champions to drive change.

Watershed governance squarely confronts the pressing question: How can those who live and work in a watershed—with their different, and

sometimes conflicting, priorities, perspectives, needs, and opinions—work together to share responsibility and keep water and surrounding lands healthy and resilient? It is about shifting away from a centralized, top-down approach to new forms of decision-making for water and land that:

- Adapt to local priorities and context.
- Respect and draw on Indigenous laws, authority, and knowledge.
- Embrace a “whole-of-watershed” approach, which means integration between different authorities to move beyond silos and link land and water.
- Are informed and driven by local capacity and expertise.
- Give those affected by decisions a say by building local “power.”

Systemic change of this nature is daunting, emergent, and often messy. No blueprint exists for exactly how to achieve governance transformation. Yet, through several years of research and direct work with communities, Crown governments at all levels, Indigenous nations, and watershed entities—we

have identified tangible milestones for watershed partners to strengthen their role in decision-making to improve outcomes on the land and in the water.

The Stepping Stones Framework

The Stepping Stones Framework outlines seven steps towards building influence and momentum towards watershed governance. Meeting people where they are in their process, the Framework includes self-assessment questions for watershed groups and initiatives to identify their level of readiness, what their strengths are, and how they can move forward—whether they represent a local government, Indigenous nation, community group, or watershed entity.

At a glance, the seven steps are:

- 1 Champions and Commitment.** This first step involves building support within your organization or government for action on water and preparing for more intensive work down the road.
- 2 Projects and Pooling Knowledge.** This step entails getting out into the



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watershed via boots-on-the ground projects that enhance ecosystem health and knowledge and foster positive early partnerships and relationships with other governments and groups as a basis for longer-term collaboration.

3 Shared Visioning and Setting Priorities. This step involves co-creating a shared vision for the watershed and honing in on solutions needed to protect and wisely share water resources.

4 Use Local Resources and Authorities. This phase involves Indigenous governments, local governments, and non-profit organizations using their existing authority, mandates, and resources to support implementation of watershed goals and priorities.

5 Formalize an Advising Role and Exert Influence. At this step, with demonstrated expertise, a track-record of substantive achievements, applied local science and information, and proven credibility, collaborative groups can seek to formalize their role in advising decision-making and shaping the outcomes of policy and regulatory development by formal authorities such as Crown governments.

6 Collaborative Watershed Planning. This step involves taking a holistic, watershed-wide planning approach for dealing with interrelated land and water pressures, and addressing cumulative impacts. It entails identifying which legal and non-legal tools, across all levels of government, are needed to achieve goals and tangible improvements in ecological health, and community and economic resilience. Planning can be labour- and process-intensive.

7 Shared Authorities. This step ventures into often new territory by going beyond just an advisory role. At this stage, decisions are made by watershed entities that are formally mandated, local, and co-governed. Decisions are grounded in Indigenous or Crown laws, or both. Innovation is the name of the game here!

Of course, things are never as neat as seven simple steps, and the stepping stones are not linear. They can be pursued in tandem, repeated, or sustained. Projects like monitoring, for instance, are generally ongoing throughout the

planning and more advanced shared decision-making phases. And any stone is a good place to be. For some groups like small community organizations, doing effective “gumboots-on-the-ground” projects can be the most appropriate niche to fill to contribute to overall watershed health and resilience. No one-size-fits-all approach exists. The process looks different in different watersheds and must be adapted to local contexts, priorities, histories and cultures.

Stepping Stones in action in the Cowichan

Returning to Vancouver Island’s Cowichan watershed, how have the stepping stones been implemented or explored?

Crisis brings opportunity, and the catalyst for action in the Cowichan was the turn-of-the-century drought. The situation was ugly: Salmon had to be driven upstream in trucks because flows dropped so low. Fears ran high that the pulpmill would have to shut down (a major employer in the area) and that the Indigenous food fishery would be lost. From acrimony and tension, local champions realized a new path forward, especially in light of fact that issues were not going to get any easier with a climate in chaos.

The first step after this crisis was to develop a Cowichan Basin Water Management Plan. This is not a legally binding plan, but sets out a shared vision, goals, objectives, and actions. Although watershed planning is generally seen a later stage activity, in the Cowichan, planning provided the kickstart to build relationships and identify further projects and partnerships in the watershed.

In the case of the Cowichan, a key early insight was that making plans stick you need attention to governance. Too many plans sit on the shelf because we fail to figure out who will oversee implementation. The Cowichan Watershed Board (CWB) was formed in 2010 (under the wise leadership of real local champions) to provide direction for sustainable watershed management and to implement the Plan. From the outset, Cowichan Tribes and the Cowichan Valley Regional District (CVRD) have co-chaired the Board, each exerting their respective authority. Through this model, Cowichan Tribes

and the CVRD are developing strong partnerships and demonstrating a deep commitment to moving down the path of reconciliation—together.

Although it does not have formal (or regulatory) authority, the CWB is established as a trusted, legitimate leader on watershed issues, with several spheres of influence. Through an array of major watershed monitoring/restoration projects, the Board builds deep understanding of watershed health and dynamics. It generates linkages between different agencies often operating in isolation, and provides a key bridge between interests in complex water challenges (including for example, water management at the Cowichan Lake weir). Through partnerships, the Board generates significant funding for watershed governance and exerts influence on citizens, communities, and decisions like zoning and local government priorities in the region.

Today, guided by an interim letter of agreement signed in February 2020, Cowichan Tribes and the British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development are working together to jointly scope the benefits of a Water Sustainability Plan (under the provincial Water Sustainability Act) for the Koksilah Watershed. This bears watching as a space for further government-to-government planning innovation where a Water Sustainability Plan is envisioned as a longer-term goal to address local drought and land-water stresses.

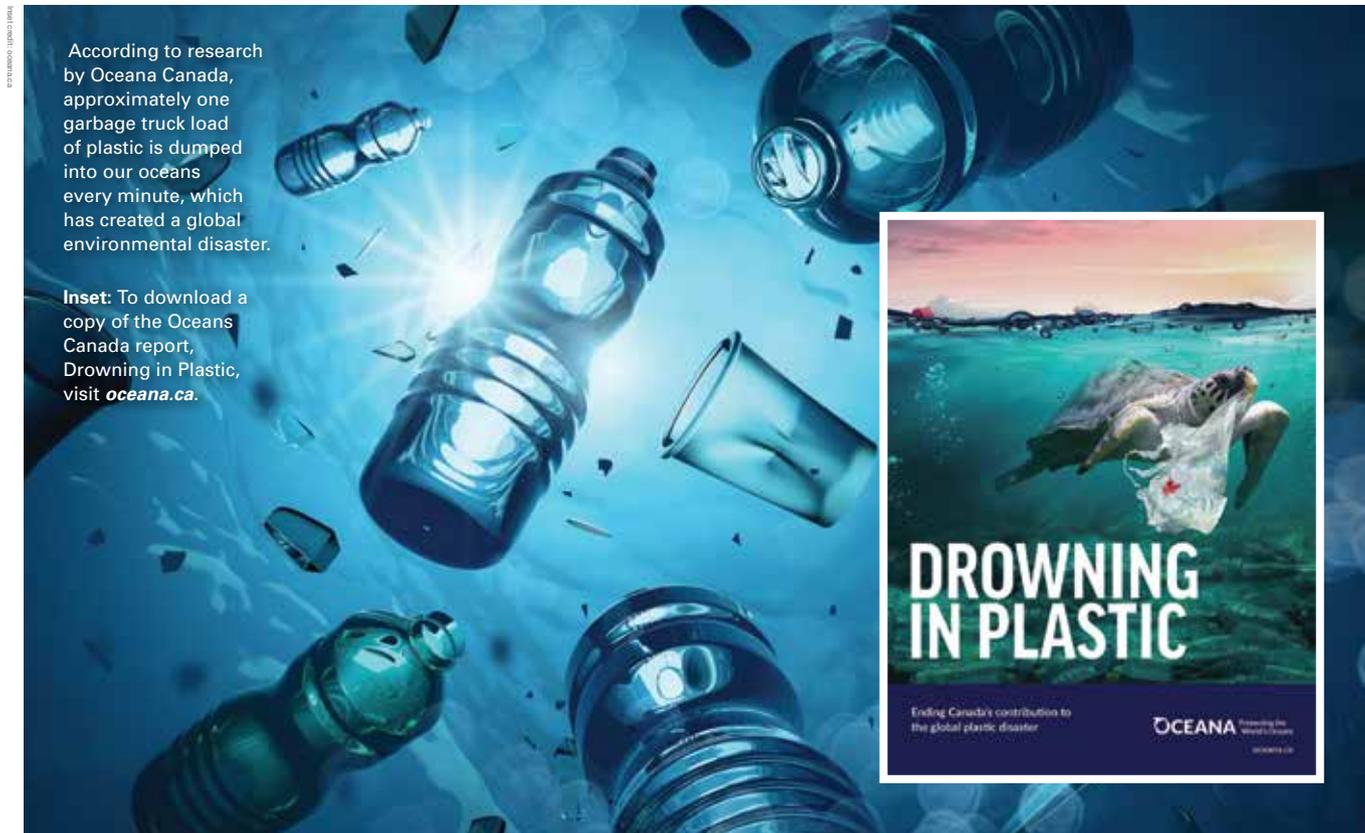
The Cowichan story illustrates perfectly that while there are clear milestones, the process of watershed governance is not linear. And, like all relationships, governance evolves, changes, and matures over time. wc

Rosie Simms is a researcher and project manager at the POLIS Water Sustainability Project.

Oliver M. Brandes is the associate director at the University of Victoria’s Centre for Global Studies and co-director of the POLIS Project on Ecological Governance.



To learn more about the Cowichan Watershed Board, visit poliswaterproject.org/polis-research-publication/pathways-partnerships



According to research by Oceana Canada, approximately one garbage truck load of plastic is dumped into our oceans every minute, which has created a global environmental disaster.

Inset: To download a copy of the Oceans Canada report, *Drowning in Plastic*, visit oceana.ca.

Drowning in Plastic

Calling for action on one of the world's greatest environmental disasters.

BY ANDREW MACKLIN

IN SEPTEMBER, Oceana Canada released a damning report that emphasized the disproportionate amount of single-use plastics consumed versus that of other countries. The figures were startling, and yet somehow not at all surprising, showing that Canadians use up to nine times more disposed plastics than India, and double that of many Scandinavian countries. The disastrous results of this consumption can be found throughout our cities, in our landfills, and along our shorelines.

At the same time as the report was released calling for, among other things, a ban on single-use plastics across the country, the federal government announced such a ban, with the plan to get rid of plastic checkout bags, straws, stir sticks, six-pack rings, cutlery, and food ware made from hard-to-recycle

plastics. The proposal from the federal government calls for these items to be banned by the end of 2021.

We sat down with Kim Elmslie, campaign director at Oceana Canada, to discuss the key drivers of the new report and the actions being called for.

With all of the water issues impacting Canadian oceans, why focus on plastics?

We started to see growing reports, as everyone has, about the impact that plastics were having on the ocean environment, additionally with being found in fish, found in marine mammals, in the stomachs of sea turtles. [...] We're at a point right now where, everywhere we look, we're finding plastic.

We knew that this was an issue that we

needed to work on and the time seemed to be now. This is the best time to get this done.

Some of the statistics you included in your report, when it comes to Canadian consumption, were pretty alarming.

Yes, especially when you look at the projected growth of plastics. By 2050, we're expecting to use four times the amount of plastics that we are using right now. Currently the estimates are 22 million kilograms of plastics are leaking into the ocean every day. So that's like a garbage truck full of plastic being poured into our oceans every minute, again and again and again. Now is the time, right now, that we have to act and change the trajectory of that, and change the future of that for the sake of our water.

I think sometimes, when we think about plastics specifically in oceans, it can be seen as an ‘over there’ problem, one that plagues the coastlines on other continents. Can you provide some perspective on how severe the issue is on the Canadian coasts?

We had heard that too. We would see that messaging coming up on our social media that this really isn't a Canada issue; this happens in five riversheds in Asia and Africa. It's an 'over there' problem.

What we wanted to do with the study is to look at: what's our contribution to this problem? We were able to look through a lot of the research that's already been done on how Canadians are using plastics. Canada is less than 0.5 per cent of the global population, but we use 1.4 per cent of all plastics produced. Per person, we are using a lot more plastics than other people. We're also throwing more plastic waste away.

Our consumption is growing. If you look at all plastics, that's household

plastics as well as industrial, commercial, and institutional, every year we throw away about 125 kilograms per person. But then where does it go? Only nine per cent of plastics ever produced have been recycled. Between 1988 and 2016, four million tons of our plastics we produced we shipped over to other countries. And a lot of these countries don't have the facilities to deal with that amount of plastic. China has now stopped taking plastics. So, a lot of these plastics leached back into the oceans. And now we're seeing these plastics re-emerge from the oceans in the sea breeze, they're being rained down in the desserts, and they're showing up in fish.

We're finding these microplastics in everything. It's in our beer, our honey, in us. We've contributed to that, and now we need to contribute to the solution.

So what you are suggesting is that now, when we look at the plastics issues that are appearing on our

coasts, we need to recognize that this is a problem of our own design?

Yes. Some of that plastic that is showing up on our shorelines can move, in the same way that we've shipped our plastic overseas it's now ending up in the ocean.

We've seen the five gyres in the ocean, the big plastic garbage packages, those are everyone's plastics that are there.

It is all of our problem, globally. It is a shared ocean. So we need to have that federal leadership here in Canada that says that we're going to stop this unabated use of single-use plastic.

Nobody is looking to go to the grocery store to buy everything encased in plastic. It's usually the only choice that we have.

This isn't something that, as individuals, we've created.

Based on the research you have done, what are the calls-to-action that you are asking for in order to curb the problem?

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The first thing that we want to see is strong federal legislation. This is a ban on the unnecessary use of single-use plastics. And the government has made this commitment and recently re-affirmed the commitment in the speech from the Throne. But we know how laws can be. They can be strong or they can be weak. For this ban, we want a strong ban. Something that is at least on par with what we have seen in Europe.

Secondly, we talk about the reduction of plastics. This can happen through [...] the plastic-free option. Right now, mostly our option is only going to be a plastic option. So we need some sort of plastic-free option. Imagine what it would look like if you went into the grocery store and every aisle had either a plastic or a plastic-free option. I think a lot of people would take the plastic-free option. And this is a great place where corporations can lead and develop that.

Then we also want to have policies or infrastructure around reducing plastics.

This is the refillables that are out there. The Beer Store (in Ontario) is a great example of a refillable program that is working. You get your beer bottles, you get your bottle deposit, you take them back, The Beer Store operates as an ad hoc recycling depot. The glass and aluminum containers are reused and refilled multiple times, much more than a plastic bottle which is only going to be down-cycled. Even during COVID-19 we saw that. The Beer Store stopped taking returns, so the bottlers started running out of bottles. Fortunately, they were able to fill that gap and we didn't run out of beer. But it showed that circular system that we are not just pumping out endless bottles for people to deal with. Here is a system where the product is used as it's supposed to and it continues in that circle.

And then finally, we need to stop the export of plastic. The government has made commitments on that and they've signed a global convention. But it has been delayed in implementing it. We need to step that

up so that we're not taking our waste and making it someone else's problem.

What can the Canadian water industry do to support the action items you have outlined in your report?

In the short-term, it would be to show support for the federal ban on single use plastics. At oceana.ca we have a petition calling on the government to honour their commitment. And anything we can look to, with innovation, that moves us away from the use of plastics. WC

Andrew Macklin is the managing editor of Water Canada.



The Oceana Canada report, *Drowning in Plastic: Ending Canada's contribution to the global plastic disaster*, can be found at oceana.ca

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Overcoming Social Challenges

Is your water management as diverse as your communities?

BY ELAINE HO

WATERSHED MANAGEMENT strives to improve the health of aquatic ecosystems as much as it does the economic, cultural, and biophysical health of our communities. Although ecological, economic, and social challenges may be considered distinct, they are inextricably connected, which can present dilemmas when attempting to reconcile each aspect within a single resource management framework. To add to this complexity, identification and definition of these challenges are influenced heavily by who is involved in these activities.

To assess how well diversity is considered in water management, we first need to identify the underlying assumptions of our approaches. For example, the question 'what do we measure to understand watershed health' should raise questions such as whose definition of health is used, who determines priorities, why certain groups were not engaged, what the implications of exclusion might be, and

whether it needs to be rectified. Ultimately, whether incorporating diverse perspectives would change anything depends on the context in question and the engagement approach that is used.

In one example from the Muskoka River Watershed (Ontario), managers tested a criteria-based ranking process for selecting water monitoring indicators that encouraged them to think beyond their usual scope. A different set of indicators resulted from using this method compared to their conventional approach. In addition, once these managers undertook a process to identify and characterize end users of their Watershed Report Card, the program was completely redesigned. As a result, the new Report Card (in 2018) is a model of communication and innovation, delivering key information in different ways that are relevant to diverse audiences.

While many of us recognize the importance of diversity, methods for

bringing forward diverse perspectives in water resource management are often unclear. One approach is illustrated by the Grand Expressions art exhibit, a partnership between a graduate student at University of Waterloo and an after-school program, Music for the Spirit and Indigenous Visual Arts, based at Six Nations of the Grand River (Canada's largest reserve by band membership).

Intent on bringing Indigenous youth perspectives to local water managers in a culturally relevant way, Grand Expressions consists of water-themed artwork and stories by 12 youth. The exhibit is one aspect of research that received national recognition from the Canadian Water Resources Association in May 2019, and Grand Expressions is nominated for a 2021 Canada Clean50 Project Award. The virtual tour is on display at THEMUSEUM (Kitchener, Ontario) until January 2021.



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WaterCanada.net/Downstream

As part of the creation process, the young artists were asked to reflect on their relationships with the river (locally, the Grand River, Southern Ontario's largest river system). For one young girl, the river represents the Missing and Murdered Indigenous Women and Girls across Canada, as domestic abuse and Canada's murdered peoples result in a water use many will not recognize: a means of disposal for bodies.

Many, if not most Canadians would suggest this perspective is extreme and therefore invalid, nor is the issue a water quality issue; however, the issue is real, impacting thousands of Canadian and Indigenous families who have lost mothers, daughters, and sisters in unimaginable ways. We accept the need to manage sources of wastewater,

political infrastructure. As such, if we strive for excellence and relevance in our communities, we need to recognize our management practices are not representative of the diverse people that live in our watersheds. Three actions to make management more relevant and meaningful to the people it is meant to consider are described below.

Establish underlying principles and values

One approach for engaging with community members infrequently (this is a resource-intensive undertaking), but meaningfully, is to implement strategies for collecting community member values, recommendations, and watershed priorities (including problems they identify and solutions they propose). The feedback provided by community members can then be used to generate a list of principles and values that can steer priority-setting and should be considered in any management decision and the design of any projects or programs moving forward.

Grand Expressions and other projects within the study collectively generated a set of 10 principles and values (view at granderiestudy.ca/results). On a regional scale, management agencies (e.g., municipalities) and the private sector may take this a step further by converting their principles and values into a formal water resource charter for local community members. Either of these approaches would ensure diverse perspectives are considered in day-to-day activities without the need for constant engagement.

Recognize different forms of knowledge and communication

Both the Muskoka example and the Grand Expressions project illustrate different approaches for bringing forward diverse perspectives—using criteria to determine priorities, stakeholder identification, mapping, and/or characterization, and using universal forms of expression to celebrate and collect different lines of evidence.

Citizen “science” initiatives—i.e., community monitoring, surveying, and crowdsourcing observations (e.g., using we-based or smartphone apps like iNaturalist and EDDMapS)—may be useful and have the potential to fill capacity gaps. These initiatives engage community members in problem identification and can form the basis for co-created or community-led solutions. Other forms of knowledge include memories, and cultural teachings, which emerge through interviews, focus groups, and co-created initiatives like Grand Expressions.

Co-create shared spaces

Inclusivity involves inviting previously disengaged persons/groups into a space that was not designed for them. Instead, shared spaces imply the creation or redesign of an entirely different social environment that is equitable to all parties involved. The Grand Expressions virtual exhibit is an example of a co-created shared space, where community members defined the timing and communication of personal experiences and cultural knowledge (i.e., via artwork) while also providing interpretation (i.e., written stories) for those who are unsure how to understand the format of messaging. This approach is challenging because it requires flexibility and power-sharing to create a sense of ownership within the community. In a co-creative process, relationship-building should be prioritized above efficiently achieving management's desired outcomes.

There are many other approaches that have been explored around the world (often under the umbrella of equity-based action). The approach that will provide the greatest benefits for management and the community is one that engages with both to identify shared goals, needs, and solutions. In this way, diversity and collaboration can be the basis for tackling increasing complex challenges facing each of our watersheds in the future. wc

Methods for bringing forward diverse perspectives in water resource management are often unclear.

nutrients, and other pollution, but what criterion precludes addressing social priorities like these? Do we ignore a difficult problem because it is not conceived in the dominant value system?

Of course, this does not suggest that water management agencies should tackle the national crisis of Missing and Murdered Indigenous Women and Girls. Rather, the key lessons gleaned from the Grand Expression project are that (1) there are valuable perspectives shared by many community members that are not brought to light in current management practices, and (2) the criteria by which we assess which values or priorities are represented in management programs and decisions are not equitable. The relevance of the issue described above to management is not in its connection with water, but in the opportunity to build relationships by recognizing these perspectives are valid.

We know many of our management systems, including the knowledge, values, and priorities we promote, are largely founded on century-old social-

Elaine Ho is a PhD candidate at University of Waterloo, and a student of the Collaborative Water Program held at The Water Institute at UW.



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APPOINTED



JACKIE OBLAK

The Niagara Peninsula Conservation Authority (NPCA) announced that **Jackie Oblak** has been elected chair of the Public Advisory Committee.

“The Public Advisory Committee acts as an important liaison between Niagara, Haldimand, and Hamilton residents and the NPCA,” said Oblak, “I plan to support the PAC through encouraging participation, respectful dialogue, and sharing of perspectives. I look forward to working with, and learning from, this amazing group of people.”

Oblak now serves as chair of the Committee, in addition to her position as the PAC’s environmental sector representative. Her extensive volunteer and committee experience includes previous roles as vice chair of the Ottawa Forests and Greenspace Advisory Committee and chair of the Torbolton Forest Advisory Committee.

Throughout her career, Oblak has worked on projects in climate change adaptation, source water protection, environmental land use planning, species at risk protection. She was involved in initiating the Hastings Prince Edward Land Trust.



TOM LYNCH-STAUTON

The Nature Conservancy of Canada (NCC) has announced that **Tom Lynch-Staunton** is joining the organization as its new regional vice president.

“As someone who has both worked in and enjoys the outdoors, I have a strong passion for conservation and stewardship of our natural areas,” said Lynch-Staunton. “As a former rancher,

there is a lot of pride in seeing a healthy and functioning ecosystem with abundant biodiversity as a result of the care of the land we provided. I hope to build upon the great work Bob has accomplished, and I am very excited to be once again working with a great team in conservation.”

Lynch-Staunton joins NCC after holding senior roles with the Canadian Cattlemen’s Association, and most recently, with Alberta Beef Producers and as head of government relations and policy. Lynch-Staunton has been a mentor in the Cattlemen’s Young Leaders program and has sat on various councils and advisory boards, including the Edmonton Food Council and the Canadian Roundtable for Sustainable Beef, where he chaired the National Beef Sustainability Assessment and Science Advisory Committees.



MICHAEL WALTERS

The Lake Simcoe Region Conservation Authority’s (LSRCA) Chief Administrative Officer/Secretary Treasurer **Michael Walters** is retiring

after a long career dedicated to protecting and restoring the Lake Simcoe watershed.

Walters served the conservation authority for over 36 years, the last six at the helm as chief administrative officer. “On behalf of the board of directors, I want to congratulate Mike on his much-deserved retirement, and thank him for his many years of service to the Authority,” said **Wayne Emmerson**, chair of LSRCA. Emmerson is also the chairman and chief executive officer of York region.

For decades, Walters has worked in LSRCA’s science, research,

stewardship, and environmental programs and services. His extensive background in integrated watershed management, climate change adaptation, stormwater management, and low impact development was the impetus behind a number of important and innovative LSRCA initiatives. These include phosphorus offsetting, urban restoration, low impact development, and stormwater management programs.



JP GLADU

The First Nations Major Projects Coalition (FNMPC) of the Coast Salish Territory in Vancouver, British Columbia announced the appointment of **JP Gladu** as a strategic advisor.

Gladu is a member of the Sand Point First Nation in Ontario and is the former CEO of the Canadian Council for Aboriginal Business. His role within FNMPC will focus on expanding the organization’s First Nation membership outside of British Columbia. He will assist also in broadening connections between FNMPC and members of the business community in Canada where common interests align.

“I am pleased to welcome JP Gladu to the FNMPC team,” said FNMPC Board Chair Chief **Sharleen Gale**. “In his role as a strategic advisor, JP complements and enhances the depth of the FNMPC leadership team furthering our position to develop and deliver solutions that advance the growth of our members.”

“[JP’s] extensive background brings a wealth of direct experience to help assist FNMPC in further delivering our mandate to help our members broaden their connections to the business community on matters where we have shared interests,” added Chief Gale. wc

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One of the advanced tertiary treatment technologies used to transform wastewater into potable water was ACWA's Reverse Osmosis membrane system.

Turning Waste(water) into Gold

BY LEE JACKSON

WATER IS ESSENTIAL TO LIFE. Growing populations are currently expected to decrease their per capita volume of clean water, unless they find ways to do more with the same or less. Technologies currently exist that can turn wastewater directly into safe, drinkable water. Yet barriers exist to making this commonplace in Canada.

Recently, a partnership between Advancing Canadian Wastewater Assets, Village Brewery, Xylem Technologies, and Alberta Health Services turned wastewater to potable water and then into beer. The project was announced publicly on Earth Overshoot Day—August 22, 2020—a poignant context when the global population consumed nature's budget for 2020. Brewing beer created a direct potable reuse example that certainly grabbed peoples' attention—good and bad. Comments on social media ranged from “disgusting—I'll never drink your beer again” to “fantastic idea.”

Market demand creates 'pull' for an undeveloped good or service. Undoubtedly, the largest barrier for many people—the lack of pull—derives from the “yuck” factor, something the launch promotion materials addressed head on. The yuck factor is the root of an educational challenge to change the notion that direct potable reused water is not safe.

Regulators have legal authority and thus provide 'push,' which motivates technology

developers to innovate and create new solutions in accordance with regulations. In Canada, the siloing of water management and lack of direct potable reuse regulations means there is little incentive to develop direct potable reuse solutions.

Why is this example the first direct potable reuse in Alberta, and possibly Canada? How was the lack of a framework overcome? In the case of turning waste(water) into gold (Village Blonde was brewed), the push barrier was overcome by a shared vision and collaboration among the four parties. It also came from the fact that Alberta Health Services was already two years into developing a provincial framework for water reuse. Successful approvals had previously been granted for reuse, such as car washes, that was expanded to include direct potable reuse through development of a Water Safety Plan.

To many Canadians, the idea that our water is, or ever could become, in short supply is nonsense. After all, many of us live on or near the Great Lakes. Despite the water prosperity currently enjoyed by many Canadians who live in large cities with centralized infrastructure, far too many Canadians in remote communities today are on boil water advisories, in some cases exceeding a decade, or even do not consume advisories.

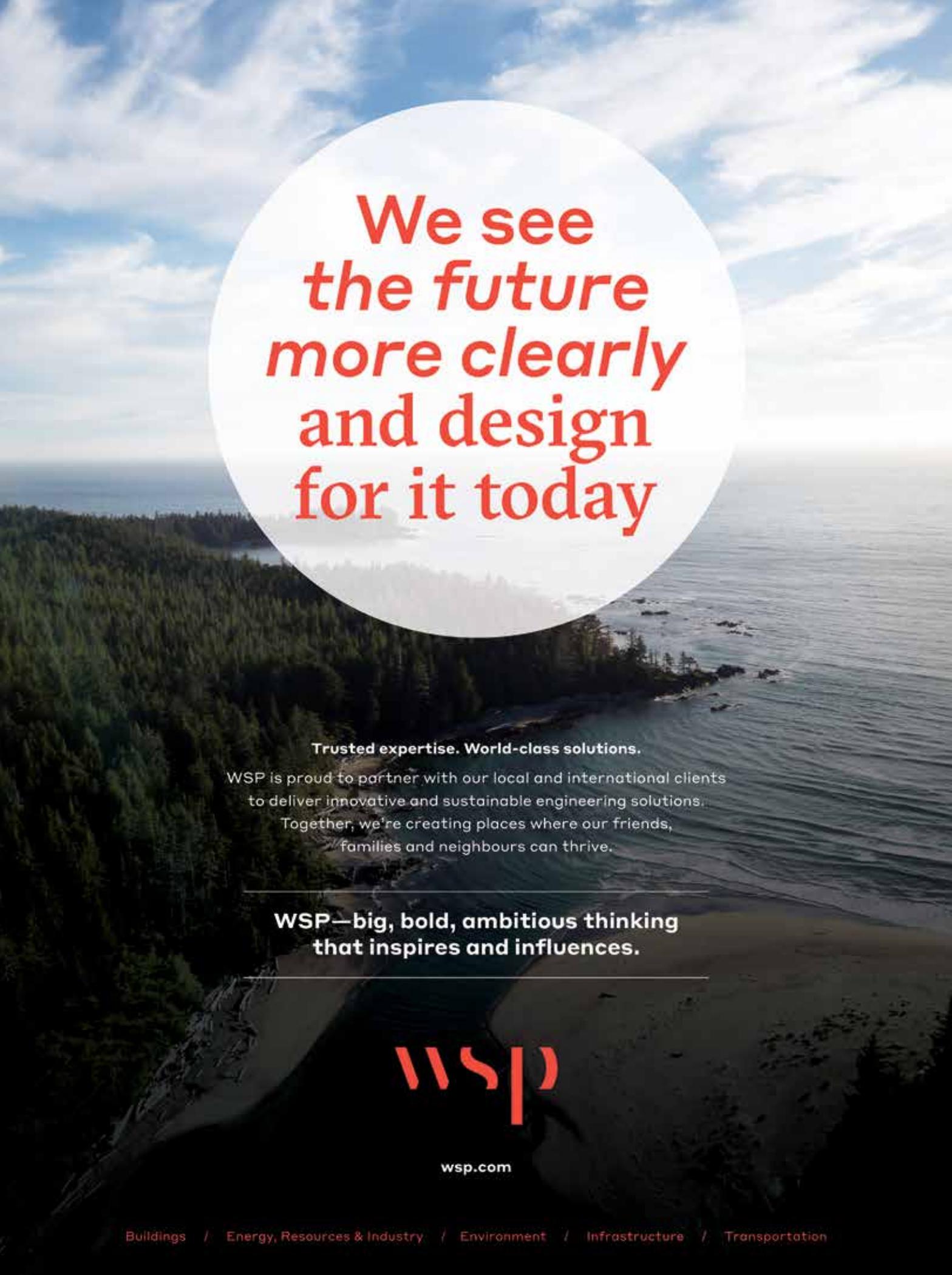
UNICEF and the World Health Organization suggest that globally, 33

per cent (2.2 billion) of global citizens currently lack access to safe drinking water. The UN also predicts that water demand will increase by 70 per cent by 2050 when we are ~9.5 billion people. As the global population grows and the effects of changing climate alter water cycles, direct potable reuse options could help many communities.

As a homebrewer for nearly 30 years, I understand how important my water is to making good beer. Just as clean water is to sustaining life. Now that there is an Alberta example of turning the worse water (raw sewage) into the best water (drinking water), I argue that we need a collective sense of urgency, among regulators, researchers, technology developers, and the public to accelerate the development of reuse solutions, including direct potable reuse. We need to devise solutions for water scarcity today while there still options. We need to increase peoples' awareness and literacy for water challenges and possible solutions. Success will require collective action. **WC**



Lee Jackson is a professor in the Department of Biological Sciences at the University of Calgary. He is also the scientific director of Advancing Canadian Wastewater Assets.



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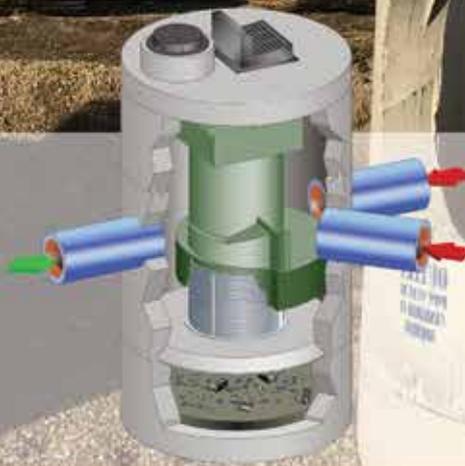
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