PROJECTS, POLICY, AND INNOVATION

SEPTEMBER/OCTOBER 2022

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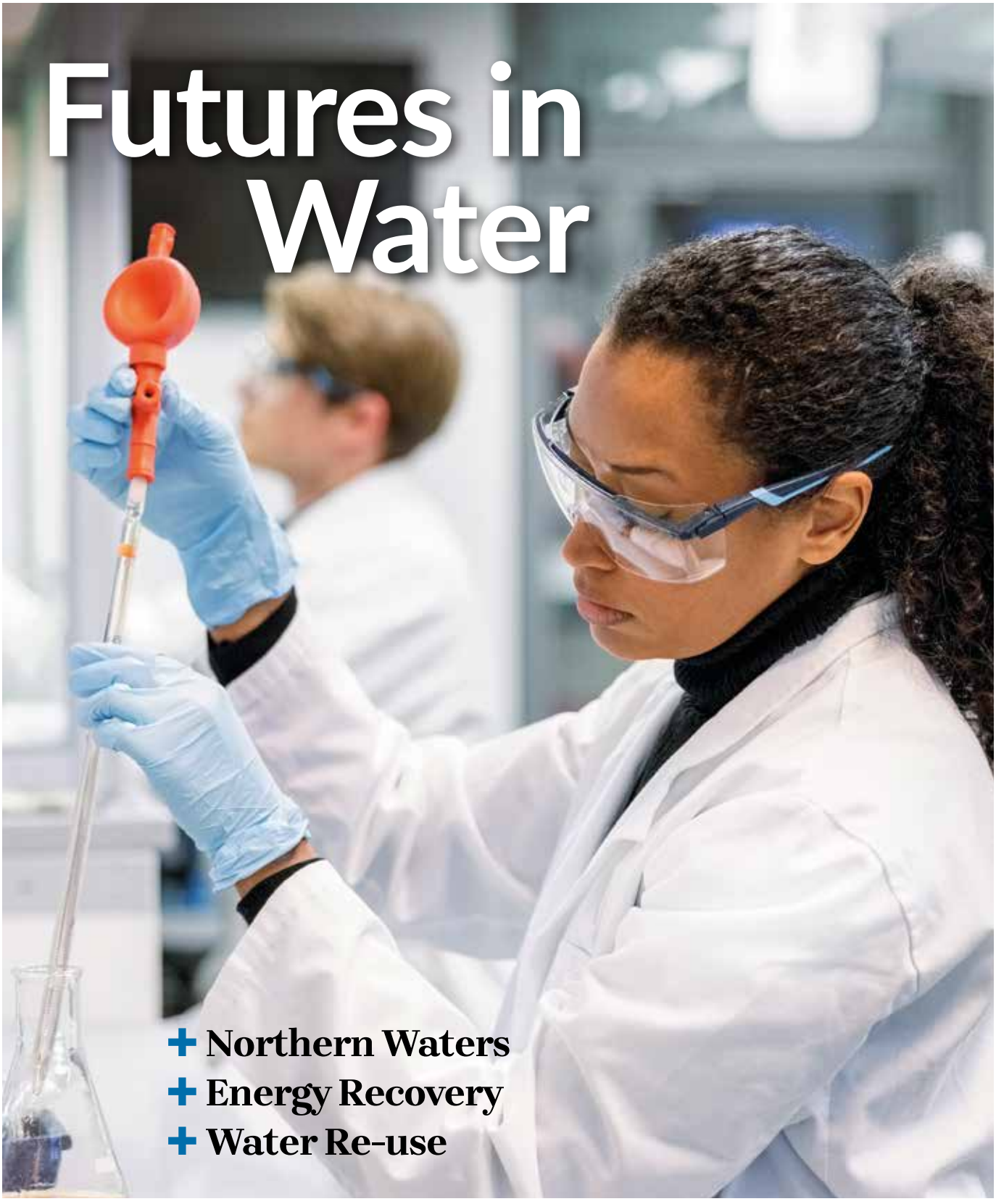

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actualmedia

Water Canada is published six times a year by Actual Media Inc.

actualmedia.ca

ACTUAL MEDIA INC.
150 Eglinton Ave. E, #806, Toronto, ON, Canada M4P 1E8
Phone: 416-444-5842

Subscription/customer services:
416-444-5842 ext. 1

Water Canada subscriptions are available for $39.95/year or $64.95/two years.

Printed in Canada.

Due to worldwide supply issues, Water Canada is not able to print on our usual environmentally friendly FSC stock. We are working to rectify this situation as soon as possible.

Undeliverable mail return to:
150 Eglinton Ave. E, #806, Toronto, ON, Canada M4P 1E8

Canadian Publications Mail Product Sales Agreement 40854046

ISSN 1715-670X

Divining futures

BY JEN SMITH

ON A RAINY SATURDAY NOT SO LONG AGO, I DID A BASEMENT CLEANOUT. I SPENT the entire day wading through the things I just couldn't get rid of—the holiday decorations, camping supplies, and too-small snowshoes—attempting to sift and sort my family's life into manageable packages.

In this controlled chaos, I came across my childhood memories box. It holds my report cards and earliest drawings, school pictures and an assortment of birthday greetings from friends whose faces I've long since forgotten. I rifled through the piles, pulling out half-crumpled tests and dog-eared photos. And there, sandwiched between the pages of my grade two journal was a sheet of paper. At the top was the question: What do I want to be when I grow up? At the bottom, written in the tentative hand of little me just learning cursive: A writer.

How many of us have the same story? If you think back on your earliest memories, did you want to be a doctor? A lawyer? A professional basketball player? And if you didn't become those things, was there something in that childhood wish that translates into part of what you do now? Are you good at fixing things, speaking in front of crowds, or solving complicated problems? Are you a dreamer, idea maker, or fearless innovator?

Wanting to be a writer stuck with me throughout high school, into university, and as I stepped out into my career. The trajectory changed, there were a couple of detours along the way, but the same little girl who wanted to tell stories for a living is still inside me. I am comprised of stories, so full that they sometimes overflow and spill out of me.

It's been a long time since I've thought about what I wanted to be when I grow up, and being at our first ever Downstream professional networking event in June (pg. 18) brought back those memories with a vengeance. I felt it all. The in-betweenness of student and professional, open to the possibilities, propelled by passion and drive into the unknowns. I was in awe of early-career professionals blowing in on winds of idealism, scientific discovery, critical analysis, and hope, as they looked to find direction, connection, and maybe even a detour that might forge new paths they hadn't previously considered when carefully plotting out their futures.

I found myself thinking of them as I set aside my newly organized childhood memories box, hoping that one day, in the not-so-distant future, they'd come across their own childhood box of memories and in it discover markers of who they've become and see the common strands that had run alongside them as they went from childhood to career. And like me, they'd choose to let go of those birthday cards and lesser works of art, but hang on to that single sheet of paper, the mostly-fulfilled prophesy made by an eight-year-old them, as a testament to the hard work, dedication, and deeply-rooted passion, that led them to where they are now and to the road they will follow on their paths to success. WC

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DON HOLLAND
PG. 8

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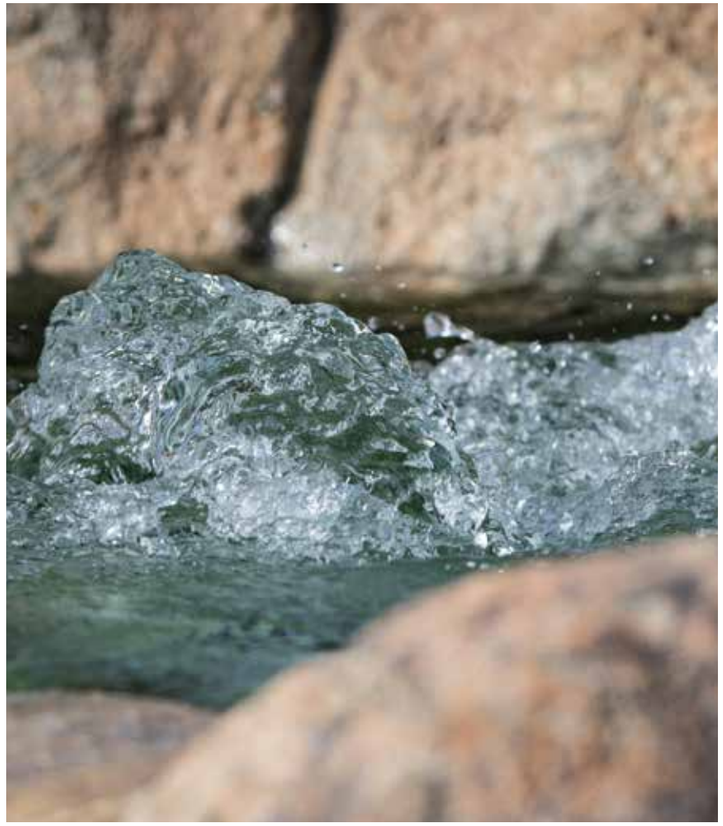
ABOUT THE COVER

Encouraging the next generation of water warriors, innovators, and advocates, Water Canada's Downstream event seeks to connect early-career professionals with experts and leaders in the water sector.

Study finds 'young' groundwater



Getty Images

The results of a recently published study of ancient groundwaters have important implications for such practices as carbon sequestration and deep underground storage of waste from nuclear power and oil and gas production, says University of Saskatchewan researcher Dr. Grant Ferguson PhD.

The paper describes the surprising findings in the Paradox Basin, located in southeastern Utah and southwestern Colorado, where the research team found unexpectedly young groundwater at a depth where conventionally much older aquifers are located.

"We expected to find that groundwater would get progressively older as you go deeper," said Dr. Jennifer McIntosh PhD, from the University of Arizona. "Instead, we found million-year-old groundwater, which is relatively young, about three kilometres beneath the surface in sediments that are hundreds of millions of years old."

This research shows landscape evolution can effect a dramatic change in the subsurface environment in a few million years—a short period in geological time, McIntosh said. The study is useful because the same techniques can be applied to characterize sites elsewhere to learn how they are connected to the atmosphere and the surface, she said.

The team plans to extend this work to other regions including the Canadian Prairies, where Ferguson said geological events, such as rise of the Rocky Mountains 80 million to 50 million years ago, and glaciation that covered much of North America starting about 2.8 million years ago would have had created massive hydrological changes.

Stormwater management ponds not as helpful as believed

Getty Images

Relying on stormwater management (SWM) ponds to restore the depleting wetlands is not sustainable and lacks the critical ecosystem services vital for biodiversity, a new study found.

With the continued losses of wetlands projected and emphasis on the underestimation of provincial wetland loss, the study captures the contributions of SWM ponds in a changing network of water bodies and the effects of land use and land cover in this change.

Waterloo researchers led by Waverley Birch examined wetland loss, SWM pond creation, and land use-based trends in seven southern Ontario municipalities within the most populated ecozones in Canada from 2002 to 2010 using a geographic information system.

"Wetland loss contributes to loss of ecosystem services in Ontario, with the likelihood of natural disasters such as droughts and floods becoming more common in urban areas," Birch said.

The findings show that the total number of created SWM ponds was 1.6 times greater than the number of wetlands lost for all municipalities combined and that an overall rate of 0.13 per cent of wetland area was lost per year.

"This is concerning because of the low proportion of wetlands left in these areas and the fact that the average SWM pond was smaller than the average lost wetland, which poses a big environmental challenge," Birch said.

First Nations water operator program at Yukon University

Getty Images

Yukon University has started to deliver ISC's Circuit Rider Training Program (CRTP) for First Nations water and wastewater systems operators, in addition to its existing role in delivering the Yukon Water and Wastewater Operator Program (YWWOP), which is open to all operators in the region.

The CRTP provides First Nations water and wastewater operators with hands-on training on their own community water systems and training to obtain their certification. The program also provides 24/7 emergency response services to First Nations in the region who manage community systems.

Yukon University's enhanced role in First Nations water and wastewater system operator training also supports the institution's commitment to partnering with First Nations, helping to advance reconciliation, and continuing to develop northern expertise.

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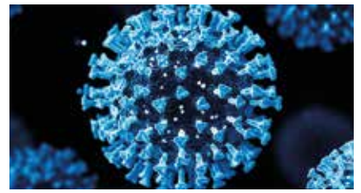

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Data-driven Decisions

Future-proofing groundwater sustainability BY DON HOLLAND

GROUNDWATER IS THE WORLD'S LARGEST freshwater resource. But because it's deep underground, signs of overuse aren't always obvious. And with population growth and increased demands for water on the rise, groundwater resources are becoming vulnerable.

Convenient and inexpensive groundwater access has boosted agricultural economies and underpinned the growth and sustainability of food and energy supply for regional and urban communities for many years. Advancements in technology have allowed communities to form in areas otherwise inaccessible due to lack of supply and poor quality of groundwater sources. The depletion of aquifers can mean more than just a lack of water supply: It can also result in damage to complex groundwater systems, ecosystems, and our ability to recharge sources. Without sustainable management a groundwater crisis is inevitable.

The climate change accelerator

This case for change is even more urgent when we consider the impacts of climate change on our water resources. Called a "risk multiplier" by UN human rights expert, David R. Boyds, climate change is making a big problem even bigger: with extreme weather events like droughts and floods becoming more regular occurrences, and their multi-tiered fallouts.

The latest Intergovernmental Panel on Climate Change (IPCC) report re-emphasized that the frequency and intensity of all extreme weather event have been increasing, and that these climate hazards and contamination risks will continue to compound if we are unable to limit global temperature rise.

We are already seeing the effects of increasing occurrence of drought in arid areas such as California, where many underground aquifers in its Central Valley have been identified as critically overdrawn. Alarmingly, NASA scientists are projecting that some basins could run out of groundwater as early as the 2030s.

Water economics for water resilience

Groundwater resources are precious and crucial and are fundamental to building future water resilience. Working with global data from the insurance sector in 10 key regions across the globe, GHD launched a new report with projected data for 2022 to 2050 on the estimated future losses from water risk (droughts, floods and storms). GHD's Aquanomics report analyzes and models the future economic impact of water losses in key regions in Australia, Canada, China, the Philippines, the United Arab Emirates, the United Kingdom, and the United States.

The Aquanomics model estimates that between 2022 and 2050, droughts, floods, and storms could take $7.4 CAD trillion from global gross domestic product (GDP), with $139 CAD billion in total GDP loss attributable to water risk in Canada alone (with flooding making up almost half of the country's estimated total direct losses.)

The impacts of these risks are already testing the resilience of vulnerable locations where water quality is an issue, including remote or underserved populations, such as many Indigenous communities. Effective water management is becoming a priority for these at-risk areas, but we also need to work more proactively to embed this approach in less at-risk areas before scarcity becomes a distinct possibility.

We can't afford to wait for this to happen. To effectively change our course, we need to act now and use strategic and adaptive planning approaches widely to manage what we do have and minimize the investments we will inevitably have to make to prevent a crisis from becoming a reality.

An integrative approach

Policymakers and industry will need to work hand-in-hand with communities to integrate water recycling and groundwater replenishment strategies that work for all. An integrated water management (IWM) approach allows us to holistically consider the entire water cycle, identify a mix of solutions, and ensure we bring maximum benefit at an affordable cost to both consumers and

Aquifer depletion can result in damage to complex groundwater systems, ecosystems, and our ability to recharge sources.

The delivery of clean drinking water to remote small communities must consider the unique environment where they reside. Location: Bonaparte First Nation community along Hat Creek near Cache Creek, B.C.

commercial water users.

This approach could deliver resilience and sustainability across our water systems and especially help communities meet the challenge of depleting groundwater resources in an equitable manner. Prioritizing integration of groundwater and surface water regulation and management, and selecting projects that address both community and utility goals, are two potentially effective approaches.

We are also looking for pathways to leverage data, innovation, and modern technologies for continuous future-proofing efforts. Some ways in which utilities and governments can do this include using geographic information systems (GIS), mapping processes, and digital tracking systems to increase understanding and capability of groundwater systems to stop depletion and degradation, while paying careful attention to quality. And utilities can now view the performance of their assets in real-time, enabling fast action and forward planning via a fleet of devices connected to utility infrastructure.

The future of water

The effective, holistic management of all water resources, including groundwater, means starting to plan before a crisis occurs. We can no longer use twentieth-century tools and approaches to solve twenty-first-century challenges. Instead, data projection needs to be the cornerstone for future-proofing groundwater infrastructure. We must test, diversify, and invest if we are to avoid the future economic and social implications of water shortages on a global scale. In Canada, the distribution of people and communities requires that the breadth of solutions to deliver water needs to consider the environmental setting (i.e. climate, groundwater quality, and supply) and the communities sustainability plan. We have had the opportunity to serve the local First Nations communities in Canada to assess, advise, and design small-scale drinking water systems to provide access to clean, resilient and safe drinking water. Often the systems require unique and customized designs to accommodate the local setting.

Reliable data is the foundation for decision-making that enables adaptive responses to a wider range of possible futures. This accelerates effective, holistic management of water resources without compromising future generations and places water utilities and organizations in a far better position to make decisions.

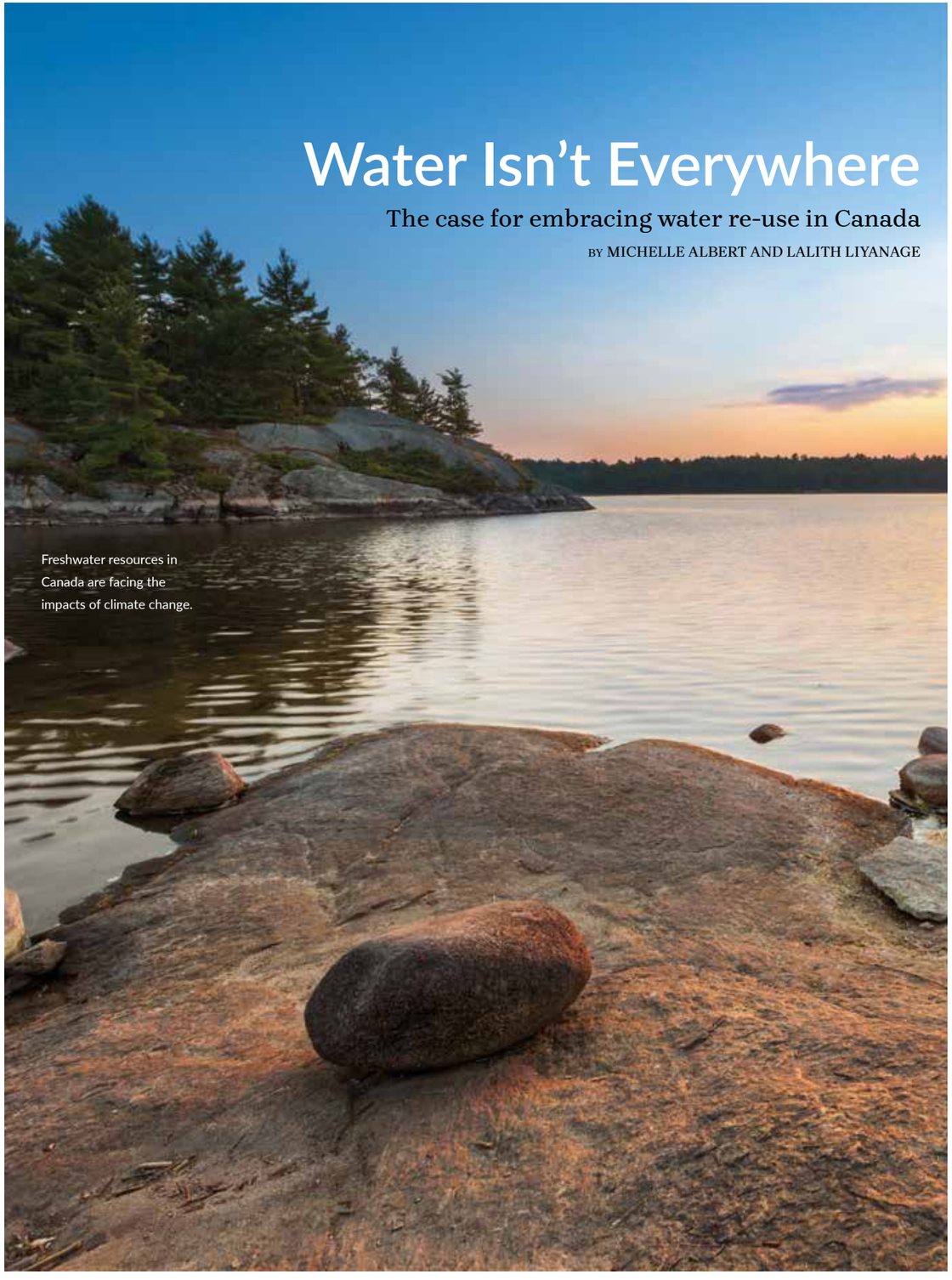
In this way, addressing groundwater management is incorporated within the wider context and integrated into a sustainable water system: A system that will allow us to generate more economic value from the water we use and address future stressors such as climate change. Ultimately, promoting and protecting the well-being of the environment and communities in which we all live. WC

Don Holland has more than 20 years of experience in wastewater process engineering, conveyance, organics management, construction management, and project management.

Water Isn't Everywhere

The case for embracing water re-use in Canada

BY MICHELLE ALBERT AND LALITH LIYANAGE



Freshwater resources in Canada are facing the impacts of climate change.

Getty Images

Treated wastewater can become a resource in its own right.

As Canada's climate continues to worsen, more regions of the country are likely to undergo prolonged stretches with limited access to freshwater.

THERE IS A PERCEPTION THAT CANADA HAS an abundant freshwater supply. In some regions of the country, where drought conditions do not exist, this is certainly the case. There are, at times, large volumes of freshwater available.

But this is by no means the case for the entire country. In some parts of Canada, we are, in fact, in a water deficit. Like so many other regions of the world, we struggle at times to provide the freshwater resources needed for human and animal consumption, to keep food growing, and for cleaning and bathing activities.

Many water sources such as rivers, lakes, and groundwater wells within urban areas are already stressed due to increasing demands from agriculture, industry, and population growth. In addition, many climate change models predict lower seasonal flows within rivers, lower recharge of lakes and groundwater due to reduction in snowcap accumulation, and faster melting rates. Any further demand on freshwater will increase existing stress levels and may likely degrade the useability of existing water sources beyond acceptable levels.

Re-use of treated wastewater will significantly reduce the demand for freshwater and also eliminate or reduce the discharges, thereby reducing the contaminant loadings to the freshwater sources.

Canada's history with water re-use

To date, water re-use has been at a minimum in Canada. There have been projects completed for agricultural and industrial applications, such as applications of low-level treated wastewater in situations where public exposure is minimized like dust control or forestry, the concept of water-reuse at the municipal level has yet to be embraced.

Still in its infancy in additional applications, we have seen some interesting pilot projects using water re-use that are helping to break the stigma around its adoption. In August 2020, the University of Calgary's Advancing Canadian Water Assets (ACWA) partnered with Village Brewery and Xylem Inc. to produce Alberta's first beer made with reused water. The limited-edition Village Blonde Ale was brewed from cleaned wastewater resources using water provided by ACWA under guidance from the Alberta Health Services' Safe Healthy Environments.

Examples like these are few, as there are many barriers to furthering the adoption of water re-use, including agency overlaps and unclear regulations. This makes it difficult to determine how to proceed with water re-use efforts at the pilot scale and commercial scale as it becomes a question of who exactly needs to give final approval for such a project and what regulation does it currently fall under? This is compounded by the perception issue around just how clean the water really is and whether it meets a threshold for human consumption.

Yet this shouldn't be an issue in some Canadian jurisdictions, especially those with elevated standards for wastewater treatment. For example, in Ontario, wastewater is treated to a very high standard. So high that it could be re-used and not discharged directly to the environment. But instead, a resource (clean water) is essentially being created and not used to its full potential.

Introduction of new technologies

With jurisdictions across the country looking to invoke stricter water standards and the need for some industries to restrain their water use, new technologies have helped to create higher-quality wastewater.

Getty Images

The wastewater industry has been innovative in adopting technologies, such as the use of membranes, reverse osmosis systems, and advanced oxidation, which are providing that higher-quality product from the raw wastewater stream. These technologies are stepping up to meet the demanding regimens put in place by governing bodies as they look to reduce the flow of contaminants and identify and destroy new pathogens.

The pandemic has also brought forth the implementation of technologies previously only introduced in the medical field. For example, the use of medical fluorescence scanning technology, like rapid assessment pathogen identification (RAPID) high sensitivity fluorescence scanners, helps to identify very low concentrations of pathogens downstream in filtration systems, and provides more rapid results for pathogen detection in stored purified recycled water systems.

As these technologies are demonstrated, and create proven, cost-effective results for highly purified water re-use, the hope is that it will become a more viable solution here in the Canadian market.

Pilot projects like Village Brewery and Xylem Inc.'s beer made with reused water are still too few and far between.

A demonstrated need

And the Canadian adoption can't come soon enough. As mentioned earlier, there are already parts of this country that struggle with having access to consistent freshwater resources. From drought-prone southern Alberta to larger metropolitan areas and large-scale industrial developments that require additional water sources for expansion, the need for treated wastewater re-use can't come soon enough.

And that's without factoring in the biggest threat to freshwater distribution: climate change. As Canada's climate continues to worsen, more regions of the country are likely to undergo prolonged stretches with limited access to freshwater. And as climate change modelling continues to predict which regions could be hit by shortages, a proactive water re-use solution could reduce the burden on impacted communities, creating a safe source for water when the situation demands it.

Water re-use is imperative for the future of Canada. While we do have vast freshwater resources available in some parts of the country, this is not the case for everyone. There are places that suffer from a lack of resources now, and that number will only grow in the years ahead.

We need to begin embracing water re-use technologies in Canada. Their demonstration in limited quantities here, and to a greater extent in other jurisdictions, prove that this is a viable option for us, so long as we introduce a functional structure of standards and governance. We look forward to the opportunity to help our governing bodies, along with our industry colleagues, to create the case for widespread adoption of water re-use in this country. WC

Getty Images

Michelle Albert is the Vice President, Water and Wastewater, East, at WSP in Canada.

Lalith Liyanage is a Director of Water and Wastewater, Alberta, for WSP in Canada.

Northern Waters

Water treatment challenges across Canada's territories

BY ANDREW SNOOK

WHEN SPRING ARRIVED THIS PAST YEAR IN the town of Hay River, Northwest Territories, residents weren't ready for what followed. River water levels reaching historic highs from heavy precipitation, winter snow levels, and spring breakup caused tens of millions of dollars in flood damage. One of the worst hit areas was the town's water treatment plant, which was severely damaged, with reports estimating $10 million in repairs and an additional $20 million for mitigation.

A boil water advisory was issued on May 12 for residents in Hay River, Enterprise, Kakisa, and K'atl'odeeche First Nation—an advisory that was in effect for 33 days.

Sadly, this wasn't the first time that the town and surrounding communities had been placed under these kinds of advisories. In fact, these same communities have been under four separate boil water advisories since 2020.

Hay River flooding

Even before the most recent flooding, the Town of Hay River was in the process of trying to get its aged water treatment facility replaced. In 2021, the Government of N.W.T. announced funding to put toward a feasibility study for the construction of a new plant. But the cost of the study is just a small piece of the funding challenge that faces towns like Hay River, which at approximately 3,500 residents, is considered a larger hub in northern Canada. For the much smaller communities spread out across extremely remote areas, this kind of task is exponentially more daunting.

Mayor of Hay River Kandis Jameson says while she's fortunate to reside in a larger northern community and is able to tap into significantly more resources and tax revenue, she "can't even imagine trying to deal with this issue if you are a small community. We have K'atl'odeeche First Nation who is across the river from us, and we have an agreement with them with our water treatment plant... if they were a standalone, I can't even imagine how they would deal with some of this. It would be nearly impossible."

While the Government of Canada has some significant funding programs available for communities in northern Canada, some of them are for shovel-ready projects—an impossibility for many smaller communities. Jameson says that "For most communities that don't have the capital dollars available, or land available to put down, you're going to run into roadblocks, and then you lose out on 75 per cent [of government-funded dollars], which is huge to any community."

Funding for water-related infrastructure for communities in northern Canada has always been a priority, but due to the effects of rapid climate change, it's become an even bigger necessity.

Rising water levels in lakes around Hay River is a major concern for Jameson.

"Your water treatment plant draws from the lake, and when we have high water, like we do, the turbidity levels increase," Jameson says. "We need to upgrade our water treatment plant. What's that look like for this community? Like millions of

The Government of Yukon

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dollars just to get the studies done and find out where the weaknesses are."

Yellowknife's thaw

While smaller, remote communities have several challenges related to managing water infrastructure, larger cities like Yellowknife also have their share of hurdles.

"Between the short construction season and issues with climate change, it's very costly to replace and maintain infrastructure up here. We have basically a four-month construction work season," says Wendy Newton, acting director of Public Works and Engineering at the City of Yellowknife.

Thawing permafrost is a major culprit in Yellowknife, impacting underground pipes and affecting the maintenance of the city's water infrastructure.

"We have areas and grounds that used to be thought of as more stable that are no longer stable," Newton says, adding that the disruptions can cause pipes to burst or force maintenance crews to service them years earlier than scheduled.

Iqaluit's capacity constraints

Further east in Iqaluit, the federal government has announced that it will invest $214 million through the Disaster and Mitigation Adaptation Fund to excavate and build a new reservoir next to Lake Geraldine, as well as fund improvements to the city's water distribution system.

"We've had a long-term water supply issue for about six years," explains Iqaluit mayor Kenny Bell. "We've been pumping from a local river into a reservoir because there's just not enough precipitation during the year. But now our city is growing to a point where our reservoir is becoming too small."

Once completed, this project is expected to help the city meet future capacity demands, support economic growth, and aid in the mitigation of present and future impacts of climate change.

The funding announcement came quickly after the City submitted its application in October 2021. At the time, there was significant press about the contamination of Iqaluit's drinking water. The City declared a state of emergency which lasted for close to two months, only to have the issue pop up again a little over a month later. When the complaints first arose in October, the City hired global engineering firm WSP to investigate, where it was discovered that an aged fuel tank had been polluting the water.

The funding came quickly—in only five months—and Bell says the plan for the new project is to fix the city's water supply for the next 75 years.

"It's a huge undertaking, and that's why we have such a large amount of money," he says. "But we want to make sure that we're not going to worry about the water supply here for a long time."

Bell, who is also the president of the Nunavut Association of Municipalities, which represents the 25 different communities within the territory, is currently working with the Government of Nunavut, Nunavut Tunngavik Inc. (NTI), and the Canada Infrastructure Bank on getting a draft MOU created to better understand all of the water-related infrastructure issues throughout the territory.

To counter a staffing shortage, Yukon invested in hands-off technologies that require less skills to operate.

When the City of Yellowknife built a new $30 million water treatment plant in 2015, staff knew finding professionals to operate it would be a big challenge.

Yukon accessibility

While the governments of N.W.T. and Nunavut share many similar challenges related to access to remote communities in their respective territories, the Yukon is in a more enviable position.

Most communities there are more accessible than their northern neighbours, which makes managing water infrastructure easier to maintain and service.

"The only fly-in community that we have is Old Crow," says Craig Van Lankveld, acting manager for Environmental Health Services for the Government of Yukon. "I think the Yukon is fortunate that we don't have a lot of the difficulties other places in Canada have because we're so connected."

Shared staffing shortages

While the Yukon has the advantage of being more connected, one area where all three territories struggle is securing qualified skilled workers to operate and manage water treatment plant operations.

"One of the major challenges to ensuring clean drinking water in northern Canada is maintaining adequate staffing levels in the industry," says Lisa Wiklund, communications and social marketing analyst for Yukon's Department of Health and Social Services.

Van Lankveld adds that staffing issues do not just exist across the territories, but across the industry as a whole.

"One of the downfalls of that is when you have a water plant that has a lot of treatment, a lot of distribution, and a lot of checks and balances, there is more monitoring that has to go on," he explains. "Classification and certifications to be able to operate those plants is relatively high, and that's not always an easy certification to get...sometimes that person is difficult to find."

In Yellowknife, finding companies to take on projects to maintain the water infrastructure is also extremely challenging. "We have a limited number of construction companies that want to work up here or can work up here, and because of the really short season we generally don't have the abundance of contractors looking for work the way other municipalities do," Newton says.

When the City of Yellowknife built a new $30 million water treatment plant in 2015, staff knew finding professionals to operate it would be a big challenge. To help counter that, Newton explains that the city focused part of its investment on hands-off technologies that required less highly skilled people to operate.

Purchasing problems

Another major hurdle for small communities in the north is a lack of purchasing power. They don't have the ability to coordinate their purchasing and buy in bulk for greater discounts because many aspects of individual water treatment plants differ significantly from one another.

"When your source water quality differs, then your level of treatment differs as well," explains Van Lankveld. "Your level of treatment, and what it requires to operate that plant, has a strong correlation with that."

Between staffing shortages, servicing remote locations, managing plant operations, and sourcing financing for new plants and badly needed upgrades, the governments and people working to keep residents' drinking water sources safe and secure have many challenges to overcome. And as climate change continues to rapidly affect the landscape of the north, the hurdles that Canada's territories face are not about to get any easier to navigate. WC

Andrew Snook is a freelance writer in the Toronto area.

The Government of Yukon

FEATURE

Building Connections Downstream

Newly launched networking event brings current and future "water nerds" together BY CORINNE LYNDS

HAVE YOU EVER HAD A GREAT IDEA, AND thought: "Huh, somebody should really get on that!" Well, that's pretty much how *Water Canada's* Downstream program was born.

Past *Water Canada* editors, in conversation with industry partners, found themselves commiserating about how difficult it is to attract and retain young talent in the Canadian water sector. But how could we connect students with industry experts in a meaningful way?

Fast forward to June 2022, where we celebrated the successful launch of Downstream: A speed networking event designed to bring current and future generations of water industry professionals (affectionately, "water nerds") together to cultivate an inclusive, diverse, and thriving water sector.

The goal of Downstream is to immerse early career professionals in the industry to expand their personal networks and open them up to all the potential career paths within the water sector, in turn creating a thriving industry and beginning to close that ever-scary skills gap.

For Eric Meliton, manager of the Sustainability Office at Wilfrid Laurier University, sponsoring the inaugural Downstream event provided students "an experiential opportunity to interact with like-minded students and professionals from across Canada. With access to industry, non-profit, governmental, and academic perspectives, along with the opportunity to learn about cutting-edge research initiatives, we believe this will positively influence what students pursue next in both their academic and professional careers. Exposure to this at an earlier stage of professional development could result in more young professionals choosing to enter the water industry, something our institution and our Sustainability Office support fully."

The first in a series of networking events to be held across Canada, Downstream kicked off in Niagara Falls, Ontario, as part of *Water Canada's* 14th annual Canadian Water Summit. Generously sponsored by Wilfrid Laurier University, Downstream was the ultimate collaboration between industry and academia.

Making waves

Similar to speed dating, speed networking is designed to help early career pro-

THE DOWNSTREAM REPORT

To be released in September, the Downstream report, sponsored by Wilfrid Laurier University, aims to provide guidance to industry organizations looking to attract and retain fresh talent, and offer insight into ways we can continue to address an ongoing skills shortage in the environment and water sectors.

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fessionals and industry experts efficiently meet several quality contacts in a short period of time. The event was structured as seven 15-minute roundtable discussions facilitated by experienced water professionals *(see sidebar: Topics and Experts)*.

For an event like this to be successful, it is imperative to begin with an excellent match of experts and participants.

The team at *Water Canada* decided the best way to ensure quality connections were made was to create an invitation-only event where early career professionals were personally invited or recommended by program directors and industry organizations. Although this approach was much more laborious than simply putting out mass invitations at local post-secondary institutions and associations, the result was a targeted group of engaged students, motivated to learn and make connections.

"I was very impressed with the level of engagement of the young professionals and their focus on not accepting things the way they are," said David Unrau, director of public works at Town of Petawawa, and leader of the discussion on cleantech. "The future of the water sector is in good hands!"

To make the event as meaningful as possible for the students, the editorial team at *Water Canada* initiated many conversations with both our partners in academia and with the students themselves, to figure out which experts would be most beneficial. What we learned from those meetings is that while early career professionals know a lot about certain channels of the water industry, there are other areas in which they are not as knowledgeable.

We began our search for experts that would represent a variety of streams in the Canadian water sector. What we came up with was a group of experts that specialize in the following areas: Indigenous collaboration, emerging contaminants, career networking, cleantech, source water protection, opportunities in the north, and wetlands.

TOPICS AND EXPERTS

Collaborating with Indigenous Communities
Yogendra Chaudhry, ECO Canada

Emerging Contaminants
Robert Haller, Canadian Water and Wastewater Association

Making Meaning Connections
Farokh Laqa Kakar, Young Water Professionals

The Role of Cleantech
Indra Maharanjan, Ontario Clean Water Association

Protecting Source Water
Jon Radtke, Coca Cola

Opportunities in the North
Anna Naylor, Students on Ice

Reasons to Love Canadian Wetlands
Mark Gloutney, Ducks Unlimited Canada

WHAT'S IN A NAME?

To make Downstream events inclusive and to actively support diversity in the water sector, we have chosen to refer to participants as "early career professionals" rather than students or young professionals. This creates an opportunity not only for those currently in post-secondary education or recently employed in the water sector, but also for talented water professionals new to Canada who have the experience, but not the necessary contacts to get a foothold in the industry, and other professionals transitioning to the water sector from different career paths. With the goal of attracting skilled labour to the Canadian water sector, all early career professionals are welcome at Downstream events.

Streaming service

On the day of the event, experts lead participants through a series of roundtable discussions designed to address key issues like trends, challenges, and opportunities for early career professionals. And the feedback from experts and early career professionals alike was overwhelmingly positive.

Una Isherwood, a recent graduate from Sault College in Fish and Wildlife Conservation Technology, was invited to attend Downstream through her internship with Students On Ice's Blue Futures Pathways. She says that "The most exciting part of it all was meeting people who were also incredibly passionate about water and the environment, to ask people who had the jobs I dreamed of all the questions I could think of. I'm incredibly grateful for the opportunity and I would absolutely encourage anyone able to get a similar opportunity to grab it with both hands. You definitely won't regret it!"

The early career professionals weren't the only ones who found the event valuable. Yogendra Chaudhry, vice president of professional services and ESG at ECO Canada, and the expert who led the conversation on collaborating with Indigenous communities, was enthusiastic about the connections he made. "It was a valuable experience," he says. "It provided me with some useful insights on how we can enhance our engagement with students and young professionals."

As part of their invitation to Downstream, participants were also invited to take part in the full day of sessions at the Canadian Water Summit. This included a networking breakfast, panel discussion on Driving Diversity, and a keynote luncheon by Simon Jackson, founder of the Spirit Bear Youth Coalition.

What's on tap for Downstream?

The *Water Canada* team is ready to take Downstream on the road! First stop is the East Coast this November where we are partnering with the National Water and Wastewater Association's annual conference to bring this networking opportunity to the Atlantic provinces' future water experts.

In 2023, Downstream will be at the Wilfrid Laurier University campus in April where the networking event will be paired with a reception and tour of the university's Centre for Cold Regions and Water Science.

Downstream will also visit the nation's capital as part of the 14th Annual Water Canada Summit in partnership with the Canadian Water and Wastewater Association's Window on Ottawa in June. Early career professionals will once again have the opportunity to immerse themselves in the full conference experience.

And where Downstream goes after that... Well, it might be up to you! Cultivating a diverse and thriving water sector for future generations of water nerds to unite needs all hands-on deck to launch. If you are interested in participating in, or sponsoring future Downstream events, please reach out to corinne@actualmedia.ca for more information. WC

SAVE THE DATE

If you missed the first Downstream networking event in Niagara Falls, no problem. There is already a fall event lined up for this year, and two others scheduled for 2023:

November 2022 – Halifax as part of National Water and Wastewater Association Conference

April 2023 – Wilfrid Laurier University

June 2023 – Water Canada Summit, Ottawa

For more updates on future Downstream events visit: **www.watercanada.net/upcoming-events/**

REPRESENTING

Participants hailed from Wilfrid Laurier University, Toronto Metropolitan University, University of Toronto, Seneca College, Western University, and Waterloo University; and early career professionals were a mix of scholarship winners, and graduate and undergraduate students in chemical or civil engineering programs. A few of our participants were also interns from Students On Ice, Ontario Clean Water Association, and Ducks Unlimited Canada.

Corinne Lynds is the content director for Water Canada, Renew Canada, and the Environment Journal.

Hidden Hero

Zhiibaahaasing water operator's drive for safe drinking water

BY SAUL CHERNOS

IN OUR LAST ISSUE, WE SPOKE WITH SYSTEM OPERATORS ABOUT the challenges they face in providing their communities with clean drinking water. Some work for only a few days a week, earning wages barely above the legal minimum; others are almost permanently on call, fulfilling duties unrelated to water that leave them little time for professional development or even vacation. With threadbare budgets, operators sometimes supply their own equipment, borrow materials from neighbouring communities, and negotiate with managers who are juggling multiple, often competing priorities. And while situations often differ, operators and community leaders are finding their voice, working collaboratively towards common cause, and finding innovative solutions to complex problems.

Zhiibaahaasing First Nation, on Manitoulin Island close to the northern shore of Lake Huron, is surrounded by clean, fresh water. Yet this community of 86 people has been under a boil water advisory since 1992 for a reason which might seem surprising.

Instead of their water being conveyed by underground pipe, it is delivered by truck from the community's small treatment plant. "You can make great water in a water plant," Zhiibaahaasing operations and maintenance supervisor Jonathan Riberdy says. "But once you truck it, it turns into a whole new ball game because you have potential contamination from hoses, cisterns, and tanks, so you can't be 100 per cent sure that the water is safe."

Water safety woes

Small rural communities like Zhiibaahaasing often rely on individual wells, augmented as needed with UV or other household-scale protective systems, and these are generally more cost-effective than large-scale plants. However, while Manitoulin is the largest freshwater island in the world, radon gas deep in its aquifer nixes that possibility. Until 2020, Zhiibaahaasing was managing well enough with a small-scale treatment facility that drew water from the lake rather than the ground. While not a perfect system, it had "lots of little issues that needed to be rectified...but was otherwise a great little package plant and was doing its job," Riberdy says.

The trouble started in July 2019, when heavy rains sent Lake Huron water levels high enough that waves were rapidly eroding the shoreline and beginning to breach the plant. Riberdy consulted with Indigenous Services Canada (ISC), which provides base funding for First Nations services, and devised an emergency fix. With his Chief's approval, Riberdy hired a private contractor (E. Corbiere & Sons Contracting) from nearby M'Chigeeng First Nation to build a berm to surround the facility. "We worked until 3 o'clock in the morning that first night to make sure that the building was secure, and we carried on for weeks, working 16-hour days to ensure the safety of the water plant," Riberdy says.

The emergency berm fared well enough, but rapid snow melt the following spring drove Lake Huron levels up yet again and water seeped onto the plant's floors. The final straw came when a powerful wind storm damaged the plant and a structural engineer advised that it be decommissioned. "It was May 2020, in the middle of COVID, and Zhiibaahaasing suddenly had no water," Riberdy recalls.

Small-scale solutions

Zhiibaahaasing's situation, while precarious, proved something of a watershed moment. Community leaders had long pressed ISC and its predecessor, the Department of Indian Affairs and Northern Development, for a full-scale treatment plant, complete with a small tower and piped distribution that would finally deliver certifiably potable water. For now, however, the sudden, urgent need for water diverted attention away from a long-term solution to simply restoring service for the community.

Riberdy guided the way, bringing in BI Pure, a Surrey, B.C. company that builds standardized water treatment plants inside large shipping containers. Installed in late 2020, the sea can plant not only includes chlorination, filters to catch larger contaminants, and UV disinfection to eliminate smaller pathogens, but it also has a filling station for delivery trucks. "It was the fastest way to get us water during COVID," Riberdy says. "If we were to have built a building, we would have had to go through design and engineering, which takes a couple of years. The sea can was already engineered and built. All we had to

Johnathan Riberdy (submitted)

Jonathan Riberdy

A HERO-IN-THE-MAKING

Johnathan Riberdy (submitted), Getty Images

Perhaps surprisingly, 37-year-old Jonathan Riberdy didn't plan on a future in water. He was already midstream in a career as a personal support worker with Mnaamodzawin Health Service, serving Manitoulin's six First Nations. When Zhiibaahaasing's operations and maintenance supervisor decided to retire, Riberdy, who lived in the community, was urged to apply for the job. "They wanted to get someone young into the field to take care of the water," he says.

Riberdy received initial training and guidance from the operator he was replacing and liaised closely with training personnel from the Ontario Clean Water Agency (OCWA) even as he learned to drive heavy equipment, studied his new field, and wrote exams to achieve the required certifications: Operator-in-Training (OIT), followed by Level 1, and then the provincial Entry Level Drinking Water Course (ELC). "I wanted to level up as fast as I could, and that's exactly what I did," Riberdy says.

Certifications in hand, Riberdy approached the job with gusto, now serves as a director for the Aboriginal Water and Wastewater Association of Ontario (AWWAO) and as a project manager for Swim Drink Fish Canada, which monitors beaches for safety and promotes their protection.

Kevin Woestenenk, OCWA's operations and maintenance team lead for Manitoulin Island, describes Riberdy as highly community oriented and persistent in his efforts to help secure the emergency water treatment facility. "He'll fight to the end for it," says Woestenenk, whose own role with OCWA includes mentoring and supporting First Nations water operators, sometimes even filling in for them when needed. "Being as remote as they are on Manitoulin Island, Jonathan's by himself. The other First Nations in the area have their own operations and don't have bodies to spare, so he has to rely on us to back him up. But he has a positive attitude and wants the best for his community. He's in it for the long haul."

do was make a few adjustments to make sure it would work for our community."

For the six months it took to prepare, deliver, and install the sea can, Zhiibaahaasing devised an interim plan to secure water for drinking and other household uses. Riberdy arranged for Ayr, Ontario-based Bright Water Services to source water from another Manitoulin First Nation and truck it to residents three times a week — roughly the same regimen Riberdy had maintained with the band's own truck prior to the treatment plant's decommissioning.

Recognizing excellence

These efforts were all referenced when ISC awarded Riberdy its National First Nations Water Leadership Award in 2021. The award, in fact, seems to herald Zhiibaahaasing's long-awaited demand for federal assistance with respect to its water treatment needs.

In a public statement, Indigenous Services Minister Patty Hadju remarked that, "The expertise and commitment of water operators like Mr. Riberdy are vital in achieving our shared goal—ensuring that all First Nations communities have access to clean drinking water and maintaining strong water and wastewater infrastructure." Around the same time, ISC granted the community $2.9 million from its Green Infrastructure stream, a part of the joint federal and provincial Investing in Canada Infrastructure Program (ICIP), towards the cost of an eventual new system that will treat and deliver potable water.

Zhiibaahaasing First Nation is surrounded by freshwater yet has been under a boil water advisory since 1992.

"Water is life. Without water, we can't live. It's a necessity everyone needs, not a privilege."

Part of the problem, Riberdy says, has been that ISC has traditionally calculated funding according to a First Nation's size, and Zhiibaahaasing's population was below the threshold needed to qualify for the kind of plant needed to introduce piped water. However, the Crown agency has more recently enabled funding for even modest-sized communities when projects are deemed necessary.

Riberdy has adjusted his work duties for the next while so he can focus exclusively on selecting a suitable treatment system and getting it approved and ready for design. "Our water's clean, so I suspect it would be a slow sand filtration water plant, but there's no set-in-stone plan for size or for what kind of plant it will be," Riberdy says. Zhiibaahaasing also needs to hire a project manager experienced with large technical projects who can steer the First Nation through feasibility studies, commissioning, and eventual completion.

Riberdy is grateful that a resolution to his community's struggle for clean water appears in sight, and recognizes that it wouldn't have been possible without the ongoing support from his band manager, chief, and council, and from neighbouring communities. He's hopeful that the community can have clean, potable drinking water and be off the boil water advisory by 2024. "Water is life. Without water, we can't live. It's a necessity everyone needs, not a privilege. So the first time we turn our taps on and I can say we're off the boil water advisory and drink that water from that tap in my home will be a very emotional day for me."

While Riberdy and Zhiibaahaasing FN's story is inspiring, they are not alone in their struggle for clean drinking water and working conditions that match. Bita Malekian, an ambassador with Water Movement, an organization dedicated to bridging connections between Indigenous water system operators, says Riberdy's story is not uncommon. "Water Movement has met Indigenous operators throughout Canada who are often championing their roles with very little support," Malekian said. "They continue to rely on very little while being expected to bring critical thinking, innovation, and resiliency to their work every single day."

Malekian says ISC's National First Nations Water Leadership Award is a wonderful way to recognize the work these operators do and the challenges they overcome, but she calls for a federally proclaimed National Indigenous Water Operator Day. "With all the operational challenges operators face, the time to appreciate the sacredness of water seems to become increasingly lost," Malekian says. "We need to recognize all of these hidden heroes and provide a space for operators, experts, and troubleshooters to connect so they can discuss the unique challenges that face remote communities. Now, more than ever, having a national day to reflect will put the much-needed spotlight on the unique and ongoing challenges communities face, provide a space for Elders to share sacred water stories, and remind community members about those working tirelessly, day in and day out and without recognition, to ensure clean water is flowing through their taps." WC

If you missed the first part of the story, you can get caught up at watercanada.net/feature/water-operators-canada

Saul Chernos is a freelance writer with Water Canada.

As extreme weather events increase, so must the urgency to fight climate change.

Great *Tech*spectations

Using innovation to solve climate change BY NEELAM SANDHU

DEVASTATING FLOODS, HEATWAVES, droughts, and storms are among the *new norm* of extreme weather events impacting the planet and billions of people around the globe. In Canada, 2021 was the year we became familiar with the term "weather whiplash," with Environment Canada remarking in their summary of the year's weather: "Not in 26 years... has there been anything comparable to this year, where Canadians endured such a stream of weather extremes." Last fall's COP26 conference, where nations committed to stepping up their actions to tackle climate change, highlighted the severity of the crisis and the urgency with which we must act.

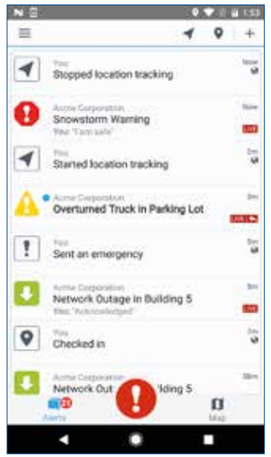
Across the west of the country last summer, 1.3 million animals and six people died, and more than 15,000 had to evacuate their homes during unprecedented floods making clear the immediate risks and challenges posed by climate change. The crisis is no longer an issue for tomorrow, it is a reality we are living today.

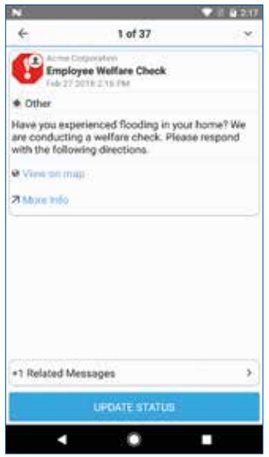
While we cannot change the past, we can, with collective and immediate efforts, begin to reverse the impact of our actions. Tackling the issue requires the urgent and combined effort of governments, organizations, and individuals. And leveraging technology will be integral to our fight to protect people, wildlife, and our planet.

Technology in a time of crisis

To effectively respond to climate events, organizations and communities need the help of advanced technologies both to help reduce carbon emissions and to build resilience against the consequences of climate change. One such technology is BlackBerry AtHoc, a critical event management solution that provides communities with a secure and intelligent networked communications infrastructure.

Getty Images





BlackBerry AtHoc, a critical event management solution.

A critical event management solution can ingest information from a range of sources, including cyber, IT, weather, physical security, and Internet of Things (IoT) sensor systems. During a crisis, the technology can autonomously invoke predefined alerting protocols allowing the appropriate response teams to collaboratively respond. The response can include communications to targeted audiences, designed to alert them to the crisis, account for their safety, and gather situational intelligence during the crisis and through the recovery phase.

As a society living with the results of climate change, it is important that we begin to leverage autonomous technologies to enable public safety. Technologies can be used to monitor the environment for signs of impending danger, such as flood risks, and proactively alert communities to risks so timely action can be taken. These technologies can gather significant amounts of data, continuously, and take intelligent action based on the data.

Getty Images, BlackBerry

As a society living with the results of climate change, it is important that we begin to leverage autonomous technologies to enable public safety.

Flood-prevention and protection

Earlier this year, BlackBerry partnered with the University of Windsor to deploy a first-of-its-kind flood prevention and water quality monitoring solution in Canada. The innovative technology provides autonomous year-round monitoring and an intelligent early warning system, collecting and processing large amounts of sensor data, and generating alerts based on the data insights.

Its proven benefits include its ability to identify both seasonal and unseasonal water-related risks and generate significant cost savings for governments, utility companies, and local communities. Using the solution, local municipalities were estimated to save up to $1 million annually in operating expenses, in addition to the environmental, safety, health, and other benefits of early warning flood mitigation and clean water; a result that no doubt played a part in Frost & Sullivan presenting BlackBerry AtHoc with its 2021 Technology Innovation Leadership Award, recognizing its excellence in providing situational awareness and actionable intelligence to keep people safe.

Reinforcing how widespread the issue is, a study published earlier this year in the International Journal of Disaster Risk Science, led by researchers at the University of Waterloo, found that Indigenous communities in particular are at a higher risk of climate change-induced flooding and that 81 per cent of Canada's 985 Indigenous land reserves have some flooding exposure that have impacted either the population or residential properties. The study also found that 98.3 per cent of the 809 populated Indigenous reserve areas are exposed to some form of flood hazard.

With such stark figures, it's imperative that safe water management be added to the federal priority list. With the right investments, public/private partnerships and an all-hands-on-deck approach, collectively we can choose to make Canada a leader in this space before it's too late.

The Water Innovation Challenge

This past January, in partnership with the University of Waterloo's Water Institute, BlackBerry launched a first-of-its-kind innovation research challenge for professors and students.

The Water Innovation Challenge invited new applications of BlackBerry technologies to address water-related challenges, including the cybersecurity of water systems, water emergencies, and Internet of Things (IoT) water management solutions.

In support of a mutual commitment to help ensure the availability and sustainable management of water, the Water Innovation Challenge seeks to catalyze new research and technological innovation that advances the sustainability and water related United Nations Sustainable Development Goals (SDGs). Water resilience is critical for economic development, climate change, and healthy ecosystems.

Protecting our planet's future

If the past two years have taught us anything, it's that we must be increasingly ready to adapt and respond to crisis. And for this to happen, we must continue to birth and deliver new innovations and forge strong partnerships that leverage technologies to address water management and security if we are to leave a lasting legacy for our grandchildren and our grandchildren's grandchildren. WC

Neelam Sandhu is BlackBerry's senior vice president and chief elite customer success officer and chairs the Consumer Technology Associations Artificial Intelligence Committee.

Getty Images

From Dirty Water to Clean Energy

Warming up to wastewater BY LYNN MUELLER

CANADIANS HAVE THE SECOND HIGHEST WATER consumption in the world and generate almost 12.7 trillion litres of wastewater a day, much of which is heated before it runs down the drain. If we are going to live up to our commitment to achieve net-zero emissions by 2050, capturing the energy generated from the hot water we use will be an important contributor.

Getty Images

Capturing the heat from day-to-day water use can result in big savings.

CASE STUDIES

Used in new construction and retrofits, several residential and commercial buildings and district energy systems worldwide have recently started to utilize SHARC's wastewater energy transfer system to meet their sustainability goals.

National Western Center, a 250-acre innovation campus hub in Denver, will source nearly 90 per cent of its heating and cooling from a recycled source of thermal energy and prevent 2,600 metric tons of carbon dioxide from being emitted into the atmosphere each year.

Lake Louise Inn, a hotel located on a UNESCO Heritage site has reduced its laundry water heating energy demand by as much as 45 per cent and propane requirement by 32,000 litres per year. It will reduce emissions by over 80 tonnes of CO2 each year, taking the equivalent of 17 cars off the road.

The Seven35 building in North Vancouver is a multi-award-winning development. Using wastewater recovery, best suited for stand-alone buildings, the two-story (60 townhomes) complex reduced CO2 emissions by approximately 90 per cent (49.6 tonnes per year) and its annual energy cost by 75 per cent.

303 Battery project in Seattle, and its installed wastewater energy transfer system, has contributed to the residential tower being the first multi-family tower in the world certified as Net Zero Energy by the International Living Future Institute.

National Western Center's SHARC system.

Around the world, and more recently in Canada and the U.S., cities are realizing that the water leaving our homes and offices—specifically, warm and hot wastewater—is an astoundingly powerful source of energy. One estimate is that Americans flush 85 trillion litres of wastewater or 350 billion kilowatt-hours of energy into the sewers each year—roughly enough to power 30 million U.S. homes.

In Canada, where commercial and residential buildings make up 17 per cent of the annual carbon emissions, capturing the thermal energy from wastewater could remove up to 54.7 million metric tonnes of greenhouse gases annually, the equivalent to taking 18.6 million cars off the street.

A recent study published by the Water Research Foundation of Water Resource Recovery Facilities, estimated that the thermal energy in U.S. sewage systems is 851 trillion British Thermal Units (BTU) per year, or 28,200 mega-watts, and concluded that "Wastewater recovery has tremendous potential, comparable to the current 32,972 mega-watts of small scale solar electrical generating capacity in the U.S."

To take advantage of this previously untapped resource, governments, cities, and building contractors and managers are taking steps to install wastewater energy transfer systems.

And while these systems have immense potential to lower energy consumption and decrease greenhouse gas emissions and energy cost saving, the wastewater energy transfer industry is not common practice.

Yet.

Cool tech

The technology in wastewater energy transfer system is surprisingly simple. A heat pump is used to capture and transfer the wastewater's warmth—which maintains a constant temperature of about 17.6° C—to the clean water stream, warming the clean water that will be then used in showers, washing machines, dishwashers, and radiators. Operating in a closed-loop system, the wastewater energy transfer system takes full advantage of wastewater's warmth, while ensuring that the dirty water does not come in contact with the treated water.

The recovered thermal energy is used for hot water production at an average year-round efficiency of 400 per cent compared to producing hot water using conventional means. By recycling the thermal energy in the wastewater, natural gas use is also offset, significantly reducing carbon dioxide and operational costs.

Hot commodity

Not just for warming cold water, wastewater energy transfer systems are great for summertime use as well. Buildings that have wastewater energy transfer systems installed can reverse their heat pumps and use the sewage to dissipate excess heat, reduce air-conditioning costs, and save freshwater used in cooling towers.

Working in the same way geothermal heat pumps do to help reduce heating and cooling costs, but without the expensive and disruptive digging deep beneath buildings to take advantage of the earth's heat, a wastewater energy transfer system relies on manmade heat yielded from shallow underground pipe systems that already have been built.

This is where SHARC Energy comes in.

SHARC Energy's systems recycle thermal energy from wastewater, generating one of the most energy efficient and economical systems for heating, cooling, and hot water production for commercial, residential, and industrial buildings.

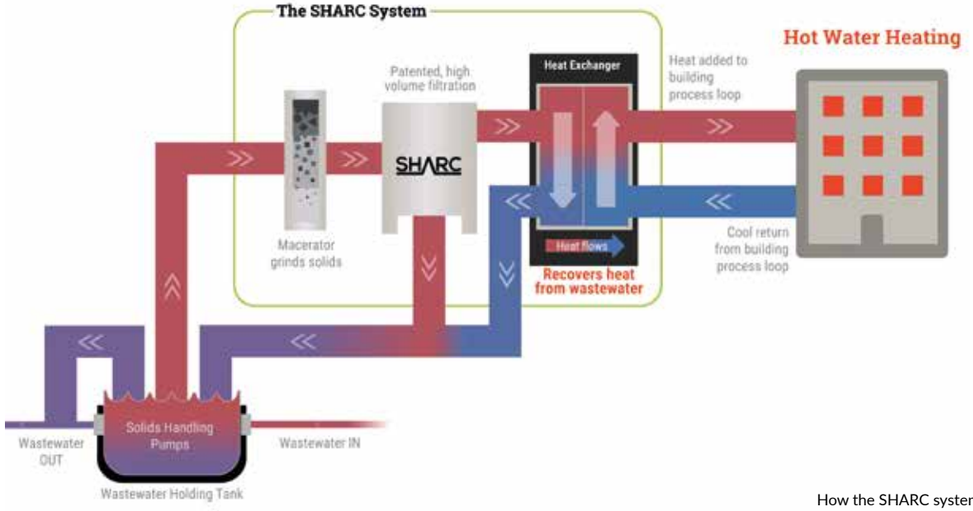
One of the first wastewater energy transfer systems in North America is in Vancouver where SHARC's technology has been used by the False Creek Neighbourhood Energy Utility to capture waste thermal energy from sewage to provide 70 per cent of its space heating and hot water to buildings in Southeast False Creek, parts of Mount Pleasant, False Creek Flats, and Northeast False Creek.

The utility began operations in 2010 and has rapidly expanded to serve over 6.4 million square feet of residential, commercial, and institutional space. And in accordance with the 2018 NEU expansion plan, Southeast False Creek, Mount Pleasant, the False Creek Flats, and Northeast False Creek will join the system, increasing the service area to over 22 million square feet.

Converting energy from wastewater is an untapped industry. More advocacy and education is necessary for policymakers, building contractors and operators to fully appreciate the benefits of dirty water as a source of clean energy. WC

Lynn Mueller is the CEO of SHARC Energy, based in Vancouver, British Columbia. Lynn, a recipient of Clean50 Lifetime Achievement Awards and has been perfecting the science of wastewater energy recovery for over a decade.

SHARC Energy



How the SHARC system works.

Capturing the thermal energy from wastewater could remove up to 54.7 million metric tonnes of greenhouse gases annually, the equivalent to taking 18.6 million cars off the street.

Appointments

Angela Coleman

Conservation Ontario's Board of Directors have announced the appointment of **Angela Coleman** as the new General Manager, effective September 19, 2022.

"We're very pleased to have Angela join us as the General Manager here at Conservation Ontario," said Alan Revill, Chair of Conservation Ontario's Board of Directors. "Angela brings enthusiasm, creativity, and a wide range of experience to the position of General Manager. She's demonstrated effective and dynamic leadership skills in her previous position and we are confident that she will lead us towards a bright future."

Ms. Coleman comes to Conservation Ontario from the South Nation Conservation Authority in Finch, Ontario where she is the Chief Administrative Officer, and will be taking over for Conservation Ontario's outgoing General Manager, Kim Gavine, who retired on June 30.

CIMA+ has announced the appointment of **Gérard Geoffrion**, corporate director, as chairman of the board, succeeding Réal Plourde who served as Chairman since 2019.

Gerard Geoffrion

Denis Thivierge

At a special meeting of the board of directors on July 25th, it was also confirmed that **Denis Thivierge** would immediately take up duties as president and CEO of the company.

Geoffrion stated that he was honoured to succeed Plourde: "Réal Plourde is a visionary. Under his leadership, our governance has stood out for its transparency, the integration of independent members and the rigour of its interventions. By successfully combining these elements, we implemented a bold growth plan that has made CIMA+ one of the most prominent companies in its sector. In my new role, I will continue in this same direction, guided by these same values."

Thivierge also paid homage to Plourde: "François Plourde will have profoundly marked the history of CIMA+ and brought the Company into a new era of prosperity. His contribution has been just like him: unifying and honest, guided by the values of our business. With the strong support of Mr. Geoffrion, I am pleased today to be able to continue along the path laid out by François." WC

INTRODUCING

Canadian Infrastructure Products

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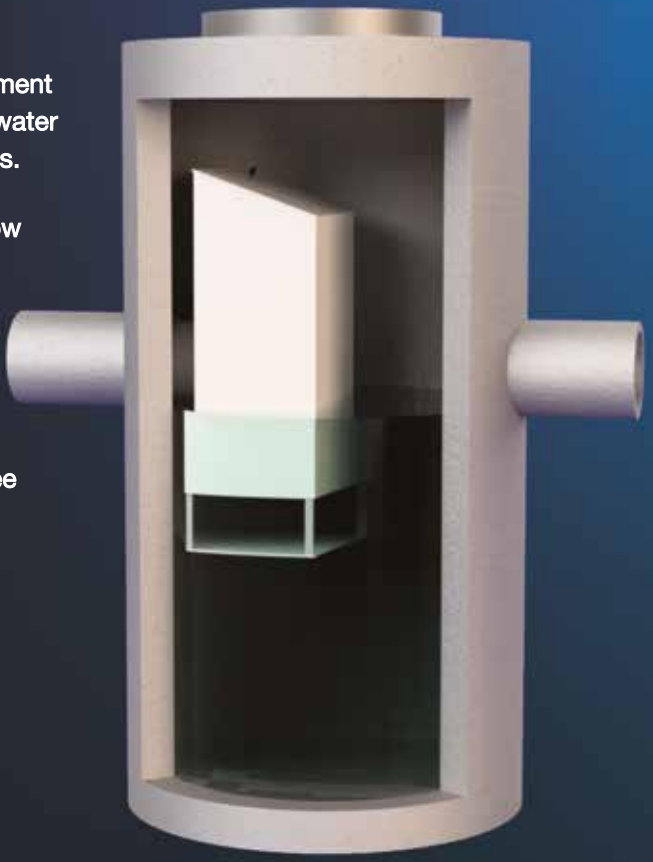

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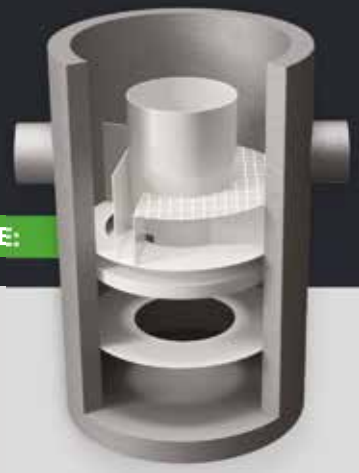

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