THE COMPLETE WATER MAGAZINE

JANUARY/FEBRUARY 2015

WATERCANADA

Building On Inside the Renewal of Our Critical Water Assets

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(page 8)



How Can We Achieve Resilient Infrastructure? (page 17)

Overcoming Winter Water Woes (page 26)

Quebec Village Takes on Big Oil (page 30)

How Can Cities Achieve Water Sustainability?

Canada has an estimated \$88 billion water and wastewater infrastructure deficit—and it's growing. Current approaches to water infrastructure are often inefficient, costly, and inadequate. Canadian communities must adopt a new vision for city governance: an environmentally and financially sustainable model for coexisting with water. This vision is close to reality in some cities. The Blue Economy Initiative's report, *Blue City: The Water Sustainable City of the Near Future*, outlines what it looks like and how others can achieve it.

Issues explored

- What exactly would a city look like if water really mattered? What are the physical, social, and cultural features of the Blue City?
- Which cities are already successfully implementing "blue" practices?
- How can municipal drinking water, wastewater, and stormwater infrastructure become visible and valued?
- How can a city achieve financial sustainability and why is this so integral to ensuring the longevity of water systems?

Halifax, Nova Scotia introduced pressure and leakage management initiatives, leading to annual operating cost savings of \$600,000.

BLUE

Economy Initiative

> In Guelph, Ontario, water use has declined by 17 litres per capita per day from 2007 to 2011 because of its water conservation programs.

Edmonton, Alberta has met or exceeded benchmarks every year since it introduced performance-based regulations in 2002.

About the authors: Kirk Stinchcombe and Louise Brennan are sustainability specialists at Econics, a Victoria, British Columbia-based company.

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Blue City: The Water Sustainable City of the Near Future is a visionary report built on compelling commentary from 17 well-respected Canadian water professionals on the topic of sustainable water and cities.

Want to learn more? Download the full, complimentary report at blue-economy.ca

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THE COMPLETE WATER MAGAZINE



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April 20-22, 2015, Delta Kananaskis

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Details and tentative program are available on the website:

www.esaa-events.com/watertech

Presentations for this year will cover some of the following areas:

- Water Resources and Water Quality
- Groundwater-Surface Water Interaction/Management
- Watershed Modelling, Planning, and Management. Data Collection, Monitoring, and Testing
- Protection and Sustainable Management of Water Resources
- Emerging Contaminants

- Facility Operations, Industrial Issues, and Technologies
- Industrial Wastewater Treatment/ Produced Water
- · Coal-bed Methane Development
- Deep Well Injection
- Integrated Research
- Regulatory Issues, Including Saline versus Non-Saline Water

Topics new for 2015

· Emerging Contaminants, Oilsands Water Issues, and Pipeline Safety and Spill Response



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CEWA SONEIA



BY RACHEL PHAN

THE PAST 12 MONTHS have been a whirlwind of activity for myself and the Water Canada team. We've moved offices, attended dozens of water-related events, and of course, published six great issues. Personally, 2014 was a year of growing pains, time management juggling acts, and highly intensive learning.

It isn't surprising that I learn the fastest and absorb the most by talking with water experts like you at industry events. At one particular event this fall, I really began to notice how segregated the water community can be. Conferences and events are often split into niche categories—technical, academia, business, municipal without many opportunities for professionals to connect and communicate with people outside of their areas of expertise.

Water Canada is the complete water magazine and prides itself on bringing together the disparate sectors in the Canadian water industry. This is a major reason why we've re-introduced our Water's Next awards program. By recognizing and celebrating water champions from all sectors of our country's water and wastewater industries, we are hoping to break down these ever-present silos and introduce you to the best and brightest from across the water spectrum. One of our goals is to provide the champions—people and technologies that have meaningful and far-reaching impacts in the Canadian water sphere—with a broader audience by featuring their achievements in the pages of this magazine. We will also honour their work at a gala dinner held in conjunction with the Canadian Water Summit in Vancouver this June.

Talking wastewater treatment to a hydrogeologist or explaining reverse osmosis to a wetland restoration specialist may seem difficult for some, but we make it our job to bridge the gaps and explain the connections. The Water Canada team will continue the conversations—highlighting your successes and celebrating champions—throughout 2015. wc

Contact Rachel at 416-444-5842 ext. 116 or email rachel@watercanada.net

water[•]s next

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For daily news and discussion, visit

🕒 @CanadianWater 🛛 🕞 /WaterCanada



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WARREN WISHART Warren is the manager of CWN's Canadian Municipal Water Consortium. PG 20



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ABOUT THE COVER

Along with the building of brand new infrastructure like Canada's five biggest water projects (page 8), there are coast-to-coast examples of cities reusing and rehabilitating existing assets. The century-old Tansley Bridge in Burlington, Ontario has been repurposed to become a new piece of water conveyance infrastructure—just in time to meet the demands of a growing urban population.

Credit R.V. Anderson Associates

NEXT ISSUE: MARCH/APRIL

- More Water and Wastewater Infrastructure Coverage
- What is AquaHacking?
- A New Phosphorus Offset Program

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British Columbia Needs Source Water Protection Now

BY RANDY CHRISTENSEN

THE IMPERIAL METALS MOUNT POLLEY mine tailings disaster on August 4, 2014 released more than 17 million cubic metres of metals-laden fine sand, toxic sludge, and water into one of British Columbia's most productive sockeyeproducing lakes. It was certainly one of the worst environmental accidents the province has ever experienced.

Four months later, the cleanup is far from over. At the end of November, Environment Minister Mary Polak said that, in a few months, the spring freshet would bring millions of cubic metres of water flooding down into the Mount Polley mine site, threatening cleanup operations of the tailings pond breach. Polak also noted that Imperial has only managed to complete two per cent of the cleanup, and the job will take years to complete.

This disaster should be a wake-up call for the federal and B.C. governments, as well as the province's citizens. The federal and provincial governments have slashed away at environmental protections, including environmental assessment laws and funding for inspections, leading to the oversight of projects like mines.

The Guardian newspaper reported that since 2012, British Columbia's Ministry of Environment had issued five notices of violation to the Polley mine, including one in May 2014 for allowing waste to build up past capacity. But notice of the potential problem did not spur action to prevent the Mount Polley breach.

In August, the B.C. government ordered an independent investigation into the pond breach, and a third-party review of all 2014 dam safety inspections for every permitted mine's tailings pond in the province. The report is expected at the end of January 2015.

While this hopefully will address the immediate threat from tailings ponds, an issue that must be addressed in the longer term is the clear and immediate risk to drinking water posed by lax oversight. Immediately after the Mount Polley spill, hundreds of people were under a "do not use" order for almost a week. A "do not use" order currently remains in place for the areas directly affected by the tailings pond breach. Many are still skeptical about the safety of the water coming out of their taps even now that the government has lifted the "do not use" order.

The best way to be sure the drinking water is safe is to protect it from contamination in the first place. Source water protection was one of the key recommendations from the Walkerton Inquiry. Today, Ontario is doing source water protection planning, but British Columbia is not.

At its most basic, source water protection means keeping the sources of drinking water as clean as possible by designating certain watersheds as drinking water protection zones and imposing higher standards on activities that could threaten those water sources. Among other things, source water protection planning requires governments to assess threats to water in designated areas and ensure there are emergency response plans in place.

Back in 1999, a year before Walkerton, the B.C. auditor general found source water protection was not integrated and that improvements were needed to protect the integrity of the province's drinking water. The auditor general's report concluded that, while the evaluated drinking water sources naturally provided good water, almost all faced risks from human activities that were not being adequately managed. Fifteen years later, not much has changed.

The danger that mining projects pose to drinking water sources is just one example of why British Columbia needs to adopt source water protection as an official water management policy. From agriculture to fracking to forestry, industrial activity has consequences for drinking water safety that need to be consistently managed. If British Columbia implemented source water protection planning, industrial operations in watersheds-like the Mount Polley mine-might be forced to upgrade their practices, introduce emergency planning, and accept extra inspections. New projects in watersheds would have to be built to a higher standard to comply with source water protection plans. Projects that pose too great a risk to source water would be less likely to be built at all.

What we have now are vastly differing levels of drinking water protection for people across the province. Vancouver and Victoria have exclusive control of their watersheds. In Vancouver, that means no industrial activity and that people cannot even enter the watershed unaccompanied—in other words, extraordinary source water protection. Communities that have taken initiative and developed drinking water protection plans to address threats to local drinking water can't get provincial approval for their plans. Small communities like Likely, British Columbia, which was affected by the Mount Polley disaster, remain at the greatest risk without province-wide source water protection planning in place.

With much fanfare, the B.C. government has announced that its new Water Sustainability Act will allow the creation of water sustainability plans. However, since making the announcement, the government has not started the process. Worse still, the plans as they are currently being proposed will not adequately address major threats to drinking water sources, such as tailings ponds. Accidents like Mount Polley show us just how vulnerable (and valuable) drinking water sources are and drive home the point that we need plans in place to protect them. There's no better time to get started than right now.



Randy Christensen is the author of Ecojustice's highprofile Waterproof reports. He has also fought court battles to ensure that citizens wiful right to know what's in

have a meaningful right to know what's in their water and to protect Canada's wild places and species-at-risk.

Online at **WATERCANADA.NET**



BLOG: Imbrium's Reagan Davidson looks at how combining green LID measures with traditional grey solutions offers enhanced environmental solutions. *bit.ly/stormMGMT*



VIDEO: A video posted by the Petitcodiac Watershed Alliance shows raw sewage entering New Brunswick's Petitcodiac River on December 10, 2014. *bit.ly/NBrawsewage*



BLOG: Ontario now has a direct line to ministers' mandate letters. Brenda Lucas and Brian Mergelas write about how the water sector can use this information wisely. *bit.ly/ONh2o*

TRENDING



What's water worth to you? How do you put a price on water? Try algorithms. bit.ly/h2oworth



WINNER

One lucky reader has won passes to Legoland. Congratulations to **Mark Gimson**, business development and marketing manager of Singer Valve, who provided the correct answer when we asked how many litres of water it takes to produce one five-ounce cheeseburger.

Canada's Top 5 Water Projects

A look at five of Canada's big-ticket water assets.

Lions Gate Secondary Wastewater Treatment Plant \$700 million

Location: North Vancouver, British Columbia

Owner: Metro Vancouver

DBF Team: Harbour Resource Partners—AECOM, Graham, CEI, SENA, Gracorp, and Michels Canada

Engineer: AECOM; CH2M HILL (subconsultant for process design development)

Other: Space2Place (public consultation, research and analysis, concept development); BTY Group (cost consultant); Golder Associates (geotechnical evaluations)

Architect: Miller Hull

Funding: Public

WHEN METRO VANCOUVER began the indicative design process (IDP) for the new Lions Gate secondary wastewater treatment plant (No. 68 this year), one of the first things it did was engage a variety of different community groups and put together a public advisory committee.

The existing treatment plant has served the North Shore municipalities of West Vancouver, the City, and the District of North Vancouver with primary-level treatment for 50 years. Upgrading such infrastructure is imperative to keep pace with population growth for decades to come, as well as meeting requirements for secondary-level treatment set out by the new Government of Canada Wastewater System Effluent Regulations, and British Columbia's new Integrated Liquid Waste and Resource management plan.

But due to a lack of developable land—an issue many urban centres are facing—Metro Vancouver honed in on a 3.5-hectare swath of former BC Rail land that is surrounded by a diverse mix of residential, commercial, and light and heavy industrial land in North Vancouver.

A rendering of the proposed new Lions Gate secondary treatment plant in Vancouver, which is expected to be fully commissioned and operational in 2020. Once the plant is in operation, the existing Lions Gate primary treatment plant

will be decommissioned and deconstructed.

"By looking at the location, you can see that it's very close to an established residential neighbourhood, and we knew that we wanted to work with the community so that any issues were addressed early on," said Andrea Winkler, policy coordinator for Metro Vancouver's public involvement with liquid waste and water services. "We also wanted to look at ways the plant could be positioned as a community asset."

In late 2012, Metro Vancouver—a collective partnership of 21 municipalities that plans and delivers regional scale services—established the Lions Gate Public Advisory Committee (LGPAC). This committee was composed of 11 representatives and eight alternates that represented the local residential community, businesses, and the broader North Shore community that the facility would be serving. "We met with that group regularly throughout the process

and they worked incredibly hard with Metro Vancouver," Winkler said. "We came to them with key decision points and they provided input."

But at the first public open house in early 2013, Winkler said it became apparent there were a number of people that wanted more detailed information and they wanted to be more involved. "So we created a community resource forum made up of about 40 members. We held workshops to go over more information on key decision points and get feedback."

Metro Vancouver's other intriguing strategic move was how it structured its design team. Rather than the traditional approach of having a big engineering team lead the way with subcontractors and consultants, it opted for a more integrated process delivery method. It attained about 12 prime contracts with a number of different entities—with the two largest being engineering and an architecture and community integration team.

AECOM and CH2M Hill made up the

engineering team, while architectural lead Miller Hull Partnership put together a design team of sub-consultants that encompassed architecture, sustainability, landscaping, community planning, resource management, environmental, noise and acoustic controls, and public art programming. "We were all effectively working for Metro Vancouver. And 7Group lead the whole collaborative process," said Scott Wolf of Miller Hull, a Seattle, Washington-based firm that specializes in sustainable infrastructure, and water, wastewater, and solid waste transfer stations that are integrated into communities.

To explore possible design options, nine concepts were created. "The purpose of that was to get out of the trap of looking for the perfect solution," said Matthew Woodruff of British Columbiabased Local Practice Architect Inc., a part of the design team. "What the nine solutions forced us to do was create and explore alternates."

The nine concepts, which demonstrated

different architectural and community integration on the site, as well as nine different engineering trains, became a tool for Metro Vancouver to get feedback on the design from its various departments and the public. "There are a lot of different ways to accomplish wastewater treatment on the technology and engineering side, but these concepts allowed us to look at the pros and cons of the different solutions and work with the engineering team to map some of those treatment trains to the architectural concepts," Wolf explained. From there, the teams took the strongest attributes from the nine models and established three concepts that were distinctly different development scenarios.

What emerged from this process, Woodruff said, "was that it leveled the playing field. Rather than having a big engineering firm control the process, all of these independent voices and the integrated design process opened the door for a more diverse way of thinking about the project."



TOP WATER PROJECTS

Once again, the best attributes of the three concepts were used to create the final indicative design. In comparison to more traditional campus-style plants, where chain link fences and trees are planted to keep people out, this urban design is inviting, compact, and energy efficient.

Renditions in the IDP report show how the facility flows. Wastewater enters the west end of the plant—where the solids are separated—and the water goes through primary and secondary treatment, becoming cleaner as it moves east toward the administrative end of the building, which has public engagement areas and a deck that's accessible to the community. And to increase public engagement, renowned Vancouver artist Ken Lum developed samples of integrated art that conveys awareness and provides more details on Metro Vancouver and the importance of treating wastewater.

Park-like landscaping around the building and a low-profile modular facade that allows maximum natural light into the building makes it difficult to identify it as a wastewater facility. "If you look at the scale of the plant and the cost of developing this community amenity, the park and planting cost less than half a per cent of the total cost of the project," Wolf said. "We think that was an incredibly smart decision and investment. It's relatively modest, but the pay-off is huge."

The indicative design also illustrates how the building divides rail lines and heavy industrial on the south side from the residential Norgate community and light commercial on the north side of the facility. This positioning has created an additional benefit, as it will act as a buffer between the two, decreasing noise pollution created by train shunting and rail activity that has been a long-time issue for the community.

The functionality of the plant is state-of-the-art, similar to what would be found in Hong Kong rather than North America. A co-generation system is incorporated to offset the facility's electricity need, and by capturing heat from the effluent it will be able to feed into the district energy system. Paul Dufault, senior engineer from Metro Vancouver, said the plant will effectively be energy neutral.

"When this project went to the board of directors at the end of the indicative design phase, the vote was unanimous," Wolf said. "I don't think there's ever been a project that the board has voted that way [...] it was certainly a result of the engineering and expertise, but also a result of creating a very transparent and engaging process."

Dufault said that the project is now moving into the design-build-finance phase, which they're expecting to happen in the summer of 2015. "Request for proposals will be early 2016 and awarded at the end of the year. And construction will start 2017."

The facility is slated to be operational by 2020, at which time Metro Vancouver will decommission and deconstruct the existing Lions Gate wastewater treatment plant.

This integrative design process was so intensely collaborative, roles became blurred at times, and the entire team—design and engineering—made contributions far beyond their individual areas of expertise. "We couldn't have come up with this outcome any other way," Wolf said. "Kudos to Metro Vancouver for trying something new and sticking their neck out for something nobody could point to. This was by far the most enjoyable process I've ever had on a project."

For Metro Vancouver, the result is something that not only provides exemplary wastewater treatment, but also a streamlined process through community engagement and complete transparency. In fact, it has published the minutes from all of its public meetings on its website, as well as a complete IDP report. Winkler said, "When you engage the community early on, you will see the benefits over and over again."

- Noelle Stapinsky

Seaterra Program \$788 million

Location: Southern Vancouver Island, British Columbia

Owner: Capital Regional District

DBF Team: Harbour Resource Partners— AECOM, Graham, CEI, SENA, Gracorp, and Michels Canada

Engineer: Stantec (engineering/planning services); Westland Resource Group, Associated Engineering, Kerr Wood Leidal Associates (consultants)

Other: Ernst & Young (business case); Stantec (business case and technical planning services); Levelton Consultants Ltd. (geotechnical) Legal: McCarthy Tétrault LLP

Funding: Public

- Federal Federal Building Canada Fund, Green Infrastructure Fund, P3 Canada: \$253.4 million
- **Provincial** Provincial Ministry of Community and Rural Development: \$248 million
- **Municipal** Capital Regional District: \$287 million

The Seaterra Program's goal is to implement an effective wastewater treatment solution for the municipalities of Victoria, Saanich, Oak Bay, Esquimalt, View Royal, Colwood, and Langford in British Columbia. Currently, wastewater from the core area and Greater Victoria receives only primary treatment before being dumped into the ocean via the Juan de Fuca Strait. In 2006, the BC Ministry of Environment mandated the region to bring in secondary wastewater treatment, and the Seaterra Program is responsible for ensuring that the region is in line with new federal standards by the end of 2020.

At this point, the program has been paused while the CRD looks at other possible options, including alternate locations, a decentralized system, and tertiary treatment. Work continues on the replacement of the existing Craigflower Pump Station and the design for the Arbutus Road Attenuation Tank.

Regina Wastewater Treatment Plant \$611 million

Location: Regina, Saskatchewan

Owner: EPCOR Utilities

Project/Construction Manager: Graham

DBFOM Team: EPCOR Water Services Inc., Graham, Lockerbie Stanley Inc./Aecon, Stantec, Gracorp Capital Advisors

Engineer: Stantec

Contractor: Graham, Lockerbie Stanley Inc.

Funding: P3

This treatment plant will increase the City of Regina's wastewater treatment capacity and modernize the facility through upgrades to the primary (nonorganic) and secondary (organic) treatment processes and the construction of a new tertiary treatment process. The new system will provide treatment capacity for a population of 258,000 and significantly reduce ammonia, nitrogen, phosphorous, E. Coli, and suspended solids levels from entering the water system.

In July 2014, the city and EPCOR Water Prairies Inc. reached financial close for the new treatment plant. EPCOR will design, build, finance, operate, and maintain the plant for 30 years.



which is \$43.5 million lower than budgeted. The project is \$248 million under budget for the entire 30 years, bringing the longterm costs down from \$858 million to \$611 million. "The competition generated through the P3 process allowed us to get the best deal possible," Regina Mayor Michael Fougere said. "This cost savings will bring down the taxpayers' portion of the bill, and our partnership with EPCOR will ensure we continue to provide safe and reliable wastewater treatment for the long term."

Construction will cost \$181 million.

Construction has begun, and as of August 2014, EPCOR is the wastewater provider for the City of Regina, taking on operations for the existing facility until the new facility is substantially complete in December 2016.



For a look into the complete Top 100 list visit top100projects.ca

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Southeast Collector Trunk Sewer \$546 million

Location: York and Durham regions, Ontario

Owner: Regional Municipality of York

Project/Construction Manager: A JV of Hatch Mott MacDonald and AECOM (detailed design and construction management)

Contractor: Zublin/Strabag (prime contractor, tunnel contractor); Zublin (subcontractor, shaft temporary support and base plugs); Maple Reinders (subcontractor, facilities contractor)

Environmental Services: AECOM (integrated EA)

Tunnel Boring Machine Supplier: Caterpillar

Supplier: Armtec Holdings (precast concrete tunnel lining); Biorem (bio-filters and bio-scrubbers); Doka (formwork); BASF (ground conditioning); Miller Group (concrete and bentonite); Harris Rebar (rebar supply and installation)

Other: Monteith and Sutherland (survey); REA (health and safety); CRA (geotechnical and hydrogeological); LVM (geotechnical engineer, materials testing, quality assurance)

Funding: Public

Municipal \$546 million

Although this project has been in development since 2002, the environmental assessment was not approved until early 2010. The earth pressure balance tunnel boring machines, segmental precast concrete tunnel lining, and the bio-filters and bio-scrubbers used for odour control were all procured in advance by the owner. Hatch Mott MacDonald and AECOM (in a joint venture) completed the design of the tunnel, shafts, and surface facilities and are administering the construction contract. Project design involves a 15-kilometrelong, 3,000-millimetre-diameter tunnel with 17 access shafts ranging between four and 48 metres in depth and four to 14 metres in diameter.

In June 2014, the Regional Municipality of York celebrated a breakthrough as the final tunnel-boring machine completed work on the trunk sewer tunnel. "The Southeast Collector trunk sewer is an ambitious project, and after more than 10 years of work, it's gratifying to have it in the final stages of completion," York Region chairman and CEO Bill Fisch said. "Seeing the equipment in operation was quite interesting and provided the opportunity to see the positive outcome of this project."

The new Southeast Collector trunk sewer will accommodate additional sewer flows, enabling future and approved growth in both York and Durham regions in accordance with the province's *Places to Grow Act*. It will also allow the existing Southeast Collector to be inspected and repaired, as required. "For members of Council who have been involved with this project from the very start, the completion of the tunnelling operations is quite rewarding," said Town of Richmond Hill regional councillor Vito Spatafora, chair of environmental services with the region.

Construction is underway, with tunnelling completed and shafts and facilities being fitted. Live flows were commissioned by the end of 2014. The project is scheduled for completion by 2016.

TOP 5 PROJECTS



Hanlan Water Project \$450 million

Location: Mississauga, Ontario

Owner: Region of Peel

Engineer: CH2M HILL (prime constultant for detail design and contract administration); MMM Group (detailed design consultants); The Municipal Infrastructure Group (value engineering for preliminary design); GHD (value engineer); Parsons Brinckerhoff (value engineer)

Contractor: McNally International (Contract 1, Lakeshore and Dixie roads to Golden Orchard Drive); T2DMP (Contract 2, Dixie Road from Golden Orchard Drive to Eastgate Parkway); Technicore Southland Mole JV (Contract 3, Eastgate Parkway and Tomken and Cawthra roads)

Environmental Services: AECOM Other: AECOM (preliminary design report); WSP (consultant); SPL Consultants (geotechnical consultant, materials testing, inspection consultant); Golder Associates

(geo-rock engineering-mechanics)

Supplier: Dufferin Concrete, Dufferin Aggregates, Ontario RediMix and Holcim

Funding: Public

• Municipal Peel Region: \$330 million;

York Region: \$120 million

The Hanlan feedermain will run approximately 14.5 km from the Lakeview Water Treatment Plant on Lake Ontario to the Hanlan Reservoir and Pumping Station at Tomken Road and Britannia Road East. Part of the same project, the 1,500-millimetre-wide Mississauga City Centre Subtransmission Main will run approximately six km from the Hanlan pumping station to the intersection of Cawthra and Burnhamthorpe roads. As part of the York-Peel Water Agreement, Peel Region will provide water to York Region via the feedermain. In exchange, York Region will be funding 35.6 per cent of the feedermain costs.

Both the feedermain and the subtransmission main are undergoing installation. Construction began in 2011 and is scheduled to be completed by early 2017.

CONVEYANCE



What's Old is New

An abandoned bridge finds new purpose as a piece of

water conveyance infrastructure.

BY NATHANIEL ANDRES

TANSLEY BRIDGE was originally built in 1919 and supported a highway crossing Bronte Creek. In 1948, the highway was realigned following the construction of the adjacent highway bridge that services the general public in north Burlington, Ontario to this day. At the same time, the Tansley Bridge was decommissioned and its deck was removed. Four concrete piers, used to support the original structure, were left to stand freely for more than 60 years without a purpose.

In 2008, the South Halton Water and Wastewater Master Plan Update

identified several water and wastewater servicing strategies for the projected population and employment in South Halton up to 2021, including numerous capital projects. These projects were to service growth in the approved urban areas of Burlington, Oakville, Milton, and the Halton Hills. In total, the urban population in Halton Region is expected to increase to 548,000 by 2021.

A key consideration in the master plan update was the plan for expansion of the water supply system. It identified the need for two watermains to convey water across Bronte Creek, including one watermain in Zone 1 and another in Zone 3. These two watermains would interconnect the water distribution systems in Burlington and Oakville in order to provide increased conveyance capacity and system security to support growth.

With that, the region retained R.V. Anderson Associates (RVA) to conduct the Schedule C Class Environmental Assessment (EA) study, detailed design, and contract administration of the 900 and 1,200-millimetre-diameter



Zone 3 interconnecting watermain, which incorporated the existing concrete piers of the old Tansley Bridge.

Reuse of existing assets

The Class EA study identified three alternatives for constructing the Zone 3 watermain across the Bronte Creek Valley. The first alternative included tunnelling where the tunnel would have to be at least 300 metres long and the shafts would have to be at least 50 metres deep to tunnel from one side of the valley to the other. The issues with this method were the high cost, long construction time, and the large working areas around the tunnel entry and exit shafts, which would have greater impact on the environmentally sensitive valley.

The second alternative was to support the watermain from the existing Dundas Street Bridge. However, this technique would be difficult due to the complexity of supporting a 900-millimetre-diameter watermain on a bridge superstructure. Maintenance would be complicated and expensive.

The third alternative, which was ultimately the selected preferred option, was to support the watermain via a pipe bridge on the four original piers remaining from the former Tansley Bridge. This method had the least impact on the creek's environmental features and was found to be less expensive than the alternatives. It could also be implemented more quickly and stayed true to the cultural heritage of the area.

By repurposing the nearly 100-year-old piers, the region saved approximately \$3 million in capital costs in comparison to the other alternatives.

Pier rehabilitation

Although the piers survived as firm, rigid structures for almost a century, visual inspections found areas of spalling and cracks consistent with their age and use. Given the environmental constraints associated with accessing the piers from the valley floor, the help of Dartmouth, Nova Scotia-based climbing specialist Remote Access Technology was enlisted to ascend the piers and report on the

surface concrete. By using a bow and arrow technique from the valley floor, the field professionals were able to secure lines to climb to the top of each pier—each more than 30 metres

tall-and secured to rappel downward.

They collected data from surface condition to rebar confirmation. These investigations were conducted as part of the preliminary engineering phase of this project to confirm the strength and overall condition of the piers.

"Pier patching," or the cosmetic concrete repairs to the surface of each pier, was conducted by chipping down to sound concrete and installing concrete anchors that were used to tie the reinforcing steel for the placement of concrete. Once the concrete was placed and cured, the forms were removed and the complete surface area of each pier was covered in a cementitious coating to protect from water damage and salt spray from the adjacent highway bridge.

Cultural heritage

Given the rich history of the area, it was important that this project considered the past history of these piers before engaging in the detailed design process. Resource management consultants Unterman McPhail Associates were retained and discovered important details in their search, such as an 1850era map that showed Dundas Street as a principal communication road with a bridge over what was then called Twelve Mile Creek. They also uncovered that around 1885 a low-level steel truss bridge was built at the base of the valley and was in place until 1916. In that same year, construction for a new bridge structure began in order to improve upon the steep and winding road leading down to the valley floor. This bridge was then completed in 1920.

These were the beginnings of the Tansley Bridge and its four structural piers. This type of historical detail reinforced the uniqueness of this opportunity as a sustainable endeavour for the region.

By repurposing the nearly 100-year-old piers, the region saved approximately \$3 million in capital costs in comparison to the other alternatives.

> Thus, the design team deemed it important to incorporate parapet large walls with arch-shaped openings, an intricate cross-beam design, and recessed rectangular facings as homage to the region's history, giving the piers new meaning and purpose, while enhancing this environmentally sensitive area. By reusing the original piers, there were no adverse impacts, allowing existing and future communities to understand and value the history of their local community.

CONVEYANCE



Environmental impacts

Among the project's significant challenges was constructing over the Bronte Creek Valley due to the area's diverse habitat that contains several species at risk. Butternut trees, redside dace (a species of fish), and Atlantic salmon are among its inhabitants. The area is also officially designated as an environmentally sensitive area and an Earth Science Area of Natural and Scientific Interest. Regular communication with approval agencies and stakeholders, such as Ontario Parks, Conservation Halton, and the Ministry of Natural Resources, was pivotal in identifying risks early in the project and streamlining the approval process. These agencies were engaged through the permitting and construction phases to ensure the project would be completed with respect for the terrestrial and aquatic habitats within the sensitive Bronte Creek Valley.

Scaffolding was designed around each pier to contain concrete dust and debris to prevent their release to the natural environment during the pier rehabilitation process. Sediment controls were regularly maintained and reinforced to protect the watercourse. Scheduling took into consideration migratory bird patterns to prevent disruption during the nesting season.

The rehabilitation concept offered considerable savings in terms of a carbon footprint. Newly constructed piers would have required excavation and soil disposal, as well as significant amounts of new material, including concrete and steel. The restoration project remained with the bridge's existing footprint and involved no excavation in the valley.

In collaboration with Conservation Halton and Ontario Parks, a tree inventory was conducted. The construction plan was developed to minimize vegetation removal. For each tree removed, three trees and five shrubs were planted in its place. The newly planted and landscaped areas blend naturally into the surrounding environment, with carefully selected healthy and vibrant greenery that is sustainable in the specified areas.

Infrastructure renewed

The contractor, Varcon Construction, completed the project in October 2013 at a cost of \$9.5 million and the watermain is a part of an integrated water supply system that will help service existing and expanding growth areas within Halton Region.

The Bronte Creek Valley has been rejuvenated with the addition of fresh vegetation and architecture—both old and new. The abandoned piers from the original 1919 bridge have been repurposed into a new piece of water infrastructure that will last for years to come. wc



Nathaniel Andres, P.Eng. is an associate and project manager with R.V. Anderson Associates Ltd.

Guide to Change

A three-step approach to achieving sustainable and resilient infrastructure.

BY DON NUSSER, MARK STIRRUP, AND BRANDON VATTER

THE WORDS "sustainable" and "resilient" have become widespread descriptors for infrastructure: resonating in brochures, ads, logos, business cards, magazines, and college curricula. These two words represent the current Holy Grail of our environmentally conscious society. More and more people want their communities, projects, and methodologies to be sustainable and resilient.

Of all the environmental issues associated with sustainability in North America, climate adaptation and resiliency have emerged with a degree of urgency. In the United States, Hurricane Sandy's recent impact on the metropolitan and rural coastline in the states of New York and New Jersey raised awareness of the shortfall in funding for public facilities repair. The primary impacts resulted from surface water runoff, rising sea levels (and the resulting wave forces and flooding), and unprecedented wind velocities. The extreme hurricane impacts renewed focus on regulators and the engineering community to design approaches and retrofits that harden infrastructure against these storms.

We can probably all agree that sustainability and resiliency encompass three broad areas of focus—the so-called "three-legged stool" of economic, environmental, and social factors. We can debate the more refined definitions of sustainability and resiliency until we are "green" in the face, but what matters is this: How do we actually achieve sustainable and resilient infrastructure projects as we move forward to improve our communities?

The generally accepted core sustainability considerations or factors are listed in table 1.

Sustainability approach and outcomes

The steps involved in achieving sustainable and resilient projects can be straightforward if you follow the steps below:

1 Start at the concept stage.

2 Answer the question: What elements can I include/modify in my project to make it more sustainable and resilient through each project stage, from design

to construction to life cycle?

Achieve the optimum balance of sustainability and resiliency at minimum cost ("knee of the curve"). Step 1: Start at the concept stage. It's simple. Don't wait until 30 per cent or 60 per cent design to ask how to incorporate sustainability or resiliency elements. For example, if the goal is to reduce combined sewer overflow (CSO) volume and stormwater separation is identified as the preferred alternative because of estimated positive benefits, ask the question right away: What needs to be done to make the CSOreduction stormwater separation project sustainable and resilient?

One ready answer is to recognize that separating stormwater may help to reduce CSO, but that separation will also create new stormwater pollution. Therefore, the proposed plan must also account for the costs associated with mitigating the stormwater pollution in a sustainable and resilient manner. For example, can green infrastructure be incorporated into a separation project to manage and treat stormwater to address water quality and water quantity impacts? Another example may be a street reconstruction project. Can the project incorporate complete street elements and manage stormwater to mitigate pollution while at the same time helping to transform a downtown area into an attractive and inviting space?

ECONOMIC FACTORS	ENVIRONMENTAL FACTORS	SOCIAL FACTORS
 Cost-effective construction Spur to economic growth Reduction of private/public impacts from storm events Ability to deliver infrastructure at the lowest life-cycle cost Longevity 	 Minimal carbon footprint Energy efficiency Greenhouse gas reduction Waste reduction Material recycling and reuse Use of local resources Climate adaptation Water quality 	 Biodiversity Community engagement Behavioural change Reduced health consequences

Table 1: Core Sustainability Factors

Table 2: Sustainability Checklist

ECONOMIC	ENVIRONMENTAL	SOCIAL
Plan for long-term	Manage	Use recycled
monitoring and	stormwater	materials
maintenance	and prevent	Use local
Stimulate	contamination	material
sustainable	Provide for	Use
growth and	deconstruction	renewable
development	and recycling	energy
Develop local skills	Reduce	Prepare for
and capabilities	greenhouse gas	short-term
Improve	emissions	hazards and
infrastructure	Preserve	long-term
integration and	habitat,	adaptability/
communication	greenfields,	climate
Improve	and surface	change
community	water	Improve
mobility, access,	Reduce energy	community
and safety	consumption	quality of life

Step 2: Include the right elements in your project to meet sustainability and resiliency goals. Create a checklist that includes the elements listed in table 2.

Numerous checklists and tools are now available to incorporate sustainable and resilient elements into our infrastructure projects, including LEED, ISI Envision, Greenroads, and GreenLITES. These include the classic "people-occupied" building construction approaches like LEED, but also address non-occupied systems, including water and wastewater, transportation, and other infrastructure. In addition to establishing planning and design concepts and principles for sustainability and resiliency in a project, a number of these rating systems also establish sustainability performance monitoring criteria over a project life cycle.

In one example, Hatch Mott MacDonald (HMM) utilized sustainability and resiliency rating tools for the Town of Oakville's Mid-Halton wastewater treatment plant expansion in the Regional Municipality of Halton, Ontario. HMM's analysis recommended the following:



Aboriginal Water & Wastewater Association of Ontario

Envisaged in 1983-1984 in the London, Ontario area by four First Nations Plant Operators to develop a resource centre for technical information as Operators assume greater control of their training requirements.

Today, AWWAO's goal is to attain assurance that First Nations Water and Wastewater Treatment Plant Operators are confident, efficient, and effective in managing the water and wastewater in their communities.

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Figure 1: Achieve Maximum Sustainability & Resiliency at Minimum Cost

- Take advantage of 65 different opportunities to reduce the overall footprint of mechanical, electrical, and lighting design.
- Install high-efficiency blower units for the activated sludge train to significantly reduce energy demand and life-cycle energy costs.
- Reduce offsite power consumption with solar generation of site electricity, plus cogeneration of energy (electricity and heat recovery) from biogas, and heat energy recovery from sanitary effluent.
- Harness the plant's outfall for microhydroelectric power generation.
- To properly manage and treat the stormwater runoff from the plant site, add low-impact development measures throughout the site, including low-flow wetlands, subterranean overflow galleries, and a cooling trench feature to reduce temperature gain into the waterways.
- Plant three trees for every tree removed.

Step 3: Achieve the optimum balance of sustainability and resiliency at minimum cost. Each element on a checklist of sustainable and resilient elements has capital and life-cycle costs associated with it. This ultimately ends up as total cost savings or cost additions to a project. Given the elements that you want to implement and their associated costs, including capital and life-cycle costs, you can then construct a curve similar to the example in Figure 1. The data can then provide the "knee of the curve" point that identifies the optimum balance of sustainability and resiliency goals at the minimum or optimum cost. This analysis makes it easy to compare both upfront capital cost and life-cycle cost to the company's goals in order to pick the sustainability and resiliency elements that provide the optimum balance for the community and stakeholders.

Achieving sustainable and resilient projects need not be difficult, and defining sustainability and resiliency doesn't have to be confusing or daunting. A straightforward stepwise process can be followed to achieve your community's sustainability and resiliency goals and objectives while balancing short- and long-term costs. After all, many of the costs incurred today will be paid by future generations, so we should take care to leave them assets and not liabilities. WC



Don Nusser is the VP of HMM. Mark Stirrup is an associate and principal project manager, and HMM's practice lead for combined and sanitary sewer overflow abatement. Brandon Vatter is an associate and watershed/wet weather technology expert for HMM.



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Operator Challenges

First Nations communities struggle to train—and retain—water operators.

BY HEATHER MURPHY, ELLIOTT CORSTON-PINE, AND EDWARD MCBEAN

PROVISION AND ACCESS to safe drinking water continues to be a challenge for First Nations communities in Canada. One common barrier to ensuring improved access to safe drinking water in these communities is the availability and presence of qualified and adequately trained operators. Discussions with Ontario First Nations operators suggest that more investments need to be made and governance structures improved to prevent boil water advisories, retain qualified staff, and improve overall working conditions for operators.

Several aspects that complicate the issue of ensuring qualified operation of water systems in small communities include:

1 Ensuring that operators are trained and certified to the appropriate level of the treatment system in place (i.e. Level 1 certification for a Level 1 plant)

• The training process can be timeconsuming and costly. When operator turnover rates are high, training costs are amplified.

2 Finding people who live in small communities that meet operator requirements (e.g. in Ontario, grade 12 or equivalent education is required)

- **3** Retaining operators
- Ensuring that, once trained, operators remain in the community as opposed to moving to find opportunities elsewhere.

• Poor retention occurs when funding for operations and maintenance is limited, such as when the chief and council do not, or cannot, compensate operators adequately.

According to the Neegan Burnside assessment in 2011, it is projected that in order to meet operation and maintenance requirements for all First Nations water systems across Canada, \$419 million is required annually. A significant portion of this budget is required for the salaries and training of certified operators. As of 2011, only 54 per cent of the 572 Canadian First Nations water systems had primary certified operators in place. Three per cent of systems did not have a primary operator and 19 per cent of systems did not have a back-up operator on staff. Findings also indicate that training is less accessible to those operators that are more isolated (see Table 1).

To investigate the issue of operator training and retention, a number of semi-structured interviews were conducted with First Nations operators and community leaders in eight communities in southern Ontario. The interviews focused on the following themes: operator retention, job satisfaction, certification, difficulty with operation of the treatment system, funding available for operation and maintenance, and operator challenges, as well as a history of boil water advisories over the past 12 months.

In four of the eight communities interviewed there was at least one drinking water advisory in the past 12 months. In three of these communities, the advisories occurred as a result of low-pressure events and watermain breaks and lasted between two and 10 days.

The water treatment systems in use in the communities interviewed ranged in age from four to 24 years old. Treatment systems varied in complexity from simple chlorination to slow sand filtration with chlorination to systems that employed UV, ozone, and/or membrane filtration technologies.

Operators interviewed in the eight communities are all certified and have been operators from periods ranging from one to 23 years. They all work full time as water treatment operators between 35 to 40 hours a week, but they are also on call 24/7 for emergencies. In total, 14 full-time operators and four part-time operators are employed in these eight communities. Sharing of responsibilities and hours between operators varies from plant to plant. In some communities, part-time





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operators are hired to work weekends. In another community, two operators alternate the weekend shift.

In general, the operators interviewed reported that they were satisfied and/ or enjoyed their job. When asked to elaborate as to why, the following thoughts were shared:

- Feel respected within the community;
- Have a sense of responsibility;
- Good working environment;
- System is easy to maintain, no large problems;
- Performing a service;
- Close to home/close to family in community; and
- Work is interesting and they enjoy learning new things.

Interestingly, none of the operators cited compensation as a reason for liking their position.

The operators interviewed reported only ever working in their current community, which suggested operator retention might not be a concern in these communities. However, it was discovered that at least 29 different operators have worked in five of these communities since they were commissioned (representing 69 years total). The existing operators were asked why previous operators chose to leave their positions and the following reasons were listed:

- Found higher paid employment;
- Not prepared for the responsibility of being an operator and not prepared to be on call 24/7;
- · Personal reasons/family reasons;

Table 1: Number of Systems with Certified Primary Water Treatment Operators in Canada

Zone	Characteristics of Zone	Percentage of Certified Primary Water Treatment Operators	
1-3	Communities between 50 and 350 k nearest service center and have yea	kilometres from the ar-round road access.	47 to 67 per cent
4	Communities with no year-round ro centre and experience higher trans	oad access to a service portation costs	26 per cent

- Personal disagreement with the chief and council;
- The chief and council let operators go because they were not certified; and
- Operators were "unsuitable" for work environment and removed by the chief and council.

Dismissal of operators occurs sometimes because they were not certified, suggesting that the community may have not had the funds to invest in operator training. This poses other challenges in operator retention. While the community may save money by hiring operators that are fully certified, they may not be able to retain those operators if compensation is inadequate. Investing in training of existing operators from the community itself may be worth the training investment, as opposed to hiring operators from the outside who may not want to stay longterm in the community. For instance, in two of the communities interviewed, band council and public works are working together to recruit youth from high school and offering them co-op summer positions at the water treatment plant. Once they finish high school they can take their operator and training certification and become employed by the community.

The operators interviewed were from relatively affluent and accessible communities in comparison to their northern counterparts. As a result, it was expected that these communities would represent best-case water systems. Yet the operators in these communities reported that funding and band council intervention are challenges that may interfere with operation and maintenance of the system. Until sustainable funding and training strategies are conceived and sound governance structures are in place that can allow operators to fulfill their responsibilities, safe water provision will continue to be a challenge in First Nations communities. WC



Heather Murphy is a post-doctoral research fellow at the University of Guelph. Elliott Corston-Pine is a First Nation from the Garden River First Nation and the facilitator of water needs of First Nations communities at the university. Edward McBean is a professor and Canada research chair in water supply security at the university.

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How one two-step program may help life-cycle efficiency and improve water quality.

BY NICK REID

MUNICIPALITIES throughout North America have substantial investments in their wastewater treatment systems, and of course as populations grow, utilities must consider investing in expansion. Recently, a sometimes overlooked protocol of optimization, the Composite Correction Program (CCP), has gained resurgence as a technique to ensure existing infrastructure is utilized to the best of its capacity.

In 1996, the Ontario Ministry of Environment and Energy, with matching support from the Government of Canada, funded The Ontario Composite Correction Program Manual for Optimization of Sewage Treatment Plants. The manual, adapted from a handbook published by the United States Environmental Protection Agency in 1989, describes how to apply the Composite Correction Program to economically improve the performance of existing municipal sewage treatment plants in Ontario.

The CCP, as developed by the U.S. EPA, is a two-step process. The first step is a Comprehensive Performance Evaluation (CPE) of the facility that examines four areas—operations, design, administration,

and maintenance—to identify performancelimiting factors that prevent the facility from achieving good economic performance. At this point, the potential to improve performance of the facility is reviewed and

the plant is either deemed "capable" or "not capable." If the facility is capable, then the second step is to address these limiting factors through a Comprehensive Technical Assistance (CTA) program. If the plant is deemed not capable, then the next step is to go to a process audit or design upgrade.

A Comprehensive Technical Assistance program involves systematically addressing the performance-limiting factors identified in the CPE that do

"It gives stakeholders the assurance that they are getting full value from their existing infrastructure, before laying out big dollars in capital expansions." —George Terry

> not involve capital works. A major component of the CTA is handson operator training and support to implement process control techniques and standard operating procedures

(SOPs) to improve process performance. In addition, empowering operating staff with enhanced skills in priority setting and problem solving fosters an ideal environment to improve performance.

Not every plant proceeds to a CTA, and that is not bad news either. George Terry, a senior process advisor, and his team of process specialists from the Ontario Clean Water Agency (OCWA) have experience with CPEs that validate that the facility is delivering satisfactory performance and capacity. In these circumstances, a CTA is not needed, but Terry said that "reports from the CPE assist the utility as backup in applying for funding to support their long-term capital plans for sustainability."

In 2012, the Ontario Ministry of Environment's Showcasing Water Innovation program provided an opportunity to continue to develop a watershed-wide wastewater optimization program to demonstrate improved performance at wastewater treatment plants in the Grand River watershed.

(bit.ly/grandriveropt)

The program also aimed to demonstrate good asset management to effectively tap the full potential of existing wastewater infrastructure and defer costly upgrades. Leveraging the principles of CCP, participating municipalities demonstrated latent capacity, higher effluent quality, and a deferral of infrastructure capital costs. For example, Haldimand County deferred more than \$10 million in capital infrastructure costs.

Optimization is a continuous process which invests in skills development, as well as the improvement of operators and managers to manage wastewater treatment processes more effectively. The goal of the optimization program is to achieve high quality wastewater effluent, economically, with existing infrastructure. The watershed-wide program is intended to give wastewater managers and operators at all of the wastewater treatment plants in the watershed the tools and approaches to improve effluent quality. Improved process control means improved effluent quality which, in turn, improves the health of the rivers in the Grand River watershed.

Using the Composite Correction Program is a fundamental part of optimizing total life-cycle costs in delivering wastewater services. It supports long-term thinking that stretches infrastructure spending, reduces operational costs, and improves product quality. "That's the real benefit of the CCP approach," Terry said. "It gives stakeholders the assurance that they are getting full value from their existing infrastructure, before laying out big dollars in capital expansions." WC



Nick Reid is executive director of strategic partnerships for OCWA.



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Spiking winter temperatures are having troubling effects on southern Ontario hydrology. BY CLARK KINGSBURY

AS THE 2014 POLAR VORTEX drifted south from the North Pole and settled over a large portion of central Canada and the eastern United States, it was easy for residents of southern Ontario to temporarily forget the looming shadow of global climate change as they suffered through record cold temperatures. However, last year's bitterly cold winter was an anomaly in the midst of a dramatic warming trend that has seen southern Ontario winter temperatures steadily rising for the last several decades. In fact, the changing climate may be affecting southern Ontario's winters more acutely than any other season, and the trend is having a troubling impact on the region's waterways.

Trevor Dickinson, a retired professor from the water resources engineering department at the University of Guelph, studies the impacts of climate change on winter hydrology. His research has revealed a steady rise in winter temperatures over the past 100 years, especially in the case of extreme minimums.

"It can vary a fair bit from station to

station, but when you look at the mean value for the stations, the extreme minimum temperatures may well have changed 3.5 to four degrees in the last hundred years, which is a huge amount," Dickinson said. "When we began to see that the lower temperatures have gone up quite a bit more than the upper temperatures, that suggested to us that the winter hydrology may have been impacted more than the summer hydrology."

One effect of warmer winter temperatures is a change in precipitation patterns, which has a direct effect on hydrology. A warmer winter in southern Ontario corresponds to more rain and less snow.

"Essentially the total amount of winter precipitation at the stations we've looked at hasn't really changed very much, but there's a shift from snowfall to rainfall," Dickinson explained. His data suggests that while the proportion of snowfall to rainfall changes depending on the monitoring station—Windsor still receives more rain in a winter than Ottawa does, for example—the trend of more rain and less snow holds true.

Another change that Dickinson has noticed is an increase in days where the temperature does not fall below zero degrees, or "frost-free days." Some of the southern-most regions of the province are currently experiencing as many as 25 frost-free days per year more than they would have experienced 100 years ago.

A third effect of warming winter temperatures is an increase in winter snowmelt, and the potential for midwinter thaws. Combine these melts with increased winter rain and an elevated number of frost free days and the hydrological impact is clear: more water is moving in the winter.

Lake Simcoe Region Conservation Authority hydrologist Lance Aspden said that while climate change seems to be impacting his watershed equally throughout all four seasons, warmer winter weather is having a clear effect on the region's hydrology.

"I think the big thing you're seeing in the winter is we're having an increased occurrence of these rain on snow events," Aspden said. "We're seeing more flow and warmer temperatures in the winter. The rain on snow events mean high magnitude, high volume water moving at fast velocities, carrying debris. There are a lot of implications from that on infrastructure."

Winter water flow of this magnitude can sometimes result in damage to bridge pilings, culverts, and roads, and may overwhelm municipal stormwater systems.

"We've designed a lot of our stormwater infrastructure to rapidly move water away from our urban areas," Aspden explained. "Now that type of infrastructure, we're going to be putting more water in it, and then we're going to be adding debris. I don't know if it will be able to handle the potential change in flow regimes that we're seeing."

Changing winter hydrology could have an important environmental impact as well. Aspden said that the water beginning to flow during the winter is typically nutrient rich.

"We had an event in 2009 where, in just a few days, we received 9.6 tonnes of phosphorous to the lake, which is 25 per cent of the target of 44 tonnes," he said. "For the quality of our lakes and rivers, there's a big implication from a loading perspective."

Road salt, which is most commonly used when temperatures hover around the freezing point, has also become a pressing concern in urban areas. An increase in road salt use means an increase in salt being washed into the water system, which can raise chloride levels in bodies of water.

"If you're in an area like Toronto or the Credit, and you've got rivers dumping into the lake, it may very well be that now you're getting flushing of salt and whatever else during the winter," Dickinson said. "Before, the main flush was in the spring."

Aspden agreed that the presence of phosphorous and chloride in regional waterways is of vital concern.

"In our watershed, we're already measuring water sometimes twice as saline as the ocean in some of our storm drains," he said. "The environmental impact of such high chloride rates is pretty devastating to a lot of aquatic organisms and other species."

Unfortunately, there are no easy fixes to these problems. The Lake Simcoe Region Conservation Authority has started the Smart About Salt initiative, which aims to promote responsible salt management planning to contractors and municipalities. But while such programs often result in small-scale improvement, the overarching issue of steadily warming Ontarian winters may be beyond reversal. WC



Clark Kingsbury is Water Canada's assistant editor.





Effective year-round management of urban water systems will help offset winter woes. BY KATHRYN ROSS AND WARREN WISHART

WINTER-RELATED ISSUES disrupt communities across Canada every year and the impacts from extreme weather events, like ice storms, are compounded as we endure one polar vortex after another.

The socioeconomic and environmental costs due to extreme winter weather are staggering: the 2014 Toronto ice storm cost the city \$106 million and, in 1998, the Quebec, Ontario, and New Brunswick ice storms cost \$3 billion combined. More recently in November 2014, Buffalo was blasted by the lake-effect snow phenomenon, which buried residents under 170 centimetres of snow on the first day of the extreme weather event. Snow continued to fall in Buffalo for two days, which led to risks of melting with rising temperatures and the potential for major flooding.

Watermain breaks, mid-winter melt events, and flooding are all concerns for water managers as winter approaches. There is a growing recognition that water management is an all-season job, and effective year-round management of water systems in an urban environment will help offset winter hardships.

As outlined in Canadian Water Network's (CWN) 2014 Canadian Municipal Water Priorities Report, fullcost recovery and risk management are two central components of an effective water management plan, and they help keep our water systems better prepared when the next extreme winter weather event comes our way.

Full-cost recovery is defined as considering the true costs of operating and maintaining all the elements needed to achieve sustainable water systems, and how to pay for them effectively and equitably. The resulting investment can be done more effectively and efficiently as a result of this consideration and increase reliability in the water system. It's important to recognize water management costs are not exclusive to the summer months. In 2014, Winnipeg experienced the coldest winter since 1898, leading to the highest number of frozen water pipes in the last three decades. From January to June 2014, there were 679 watermain breaks in Winnipeg—a 76 per cent increase from the same period in 2013, resulting in a combined \$10-million cost for repairs to watermains and frozen services.

Halifax Water has done an exemplary job implementing full-cost recovery techniques within their water loss control program. Although their program was not specifically targeted at lowering the impacts of winter weather, Halifax Water has noticed a reduction of watermain breaks. "Since beginning our formal water loss control program in 1999, our annual watermain break rate has reduced from 250 to 300 to about 200 to 250 today," said Reid Campbell, director of water services at Halifax Water. Campbell noted that some of this reduction is related to milder Halifax winters and in areas where they have implemented pressure reduction.

"The monitoring we have in place with our system gives us a tremendous ability to determine the root cause of many watermain breaks which leads us to looking at preventative strategies," he added. "Most importantly perhaps, we have the ability, in most instances, to detect watermain breaks almost as soon as they happen and before they progress into something more catastrophic." Campbell said this allows Halifax Water to repair watermain breaks quickly so that it minimizes service interruptions to their customers.

In addition to full-cost recovery, risk management is the other key component to an effective water management plan when we consider winter impacts on our water systems. Risk management is an essential piece of an integrated water management plan. This means identifying the full range of key drivers and associated risks that impact progress in municipal water management. There are fundamental differences between seasons when managing flooding challenges in Canada: summer can be a time of high intensity rainfall events, often more localized and characterized by rain on the ground, while winter brings regional melting events characterized by rain on snow, or melting snow over ice.

Developing an integrated risk management framework assists in managing the wide range of possible flooding events and is a key priority for water managers. This means prioritizing concerns, actions, and investments of a full suite of interrelated risks. Going one step further, the goal for water managers of today is to move beyond examining drivers and risks and begin drawing links between them. At a first glance, watermain breaks are primarily associated with aging infrastructure and extreme changes in temperature. By looking at watermain breaks in an integrated risk management framework, we recognize that they are also related to potential public health issues, public safety, and increased costs, as well as loss of revenue.

Managing water systems is an allseason effort, especially in Canada where we experience extreme winter weather events that can greatly impact our water systems if not managed properly. Developing an integrated risk management framework combined with addressing the real costs of the systems we need are two strategies that, if employed on a year-round basis, will help offset winter hardships. WC

Kathryn Ross is the media and public relations coordinator at CWN. Warren Wishart is the manager of CWN's Canadian Municipal Water Consortium.





THE FUTURE is notoriously difficult to predict. But if the past is anything to go by, the coming decades could bring a lot of change. Since the early 1980s, worries over chlorine by-products have been replaced by *Giardia* and *Cryptosporidium* concerns. Ultraviolet disinfection and membrane filtration have also emerged on the scene. Meanwhile, tragedies like Walkerton focused attention on source control and operator training.

So what might the next 35 years hold? Peter Huck, chairholder in water treatment with the Natural Sciences and Engineering Research Council of Canada, and Peter Gleick, president and co-founder of the Pacific Institute, pinpointed five key trends.

1 Fewer chemical treatments

Get ready to reduce your reliance on chlorine. Huck said he foresees municipal treatment following the lead of industry, where membrane filtration is supplanting chemical treatments.

He also said he sees opportunities for various nano-treatment approaches. Whether it's using magnetic nano-absorbents to remove metallic pollutants or photocatalytic nanoparticles to inactivate waterborne viruses, tiny tech is poised to make a big splash. Peter Huck, the Natural Sciences and Engineering Research Council of Canada chairholder in water treatment, said new monitoring technologies make it possible to categorize the components of natural organic matter in drinking water.

Water Forecast

The global population is expected to reach nine billion by 2050. How will municipal leaders provide citizens with enough safe, clean water?

BY JOSH MARTIN

2 Better monitoring technology

New sensor and monitoring technology, coupled with data transmission and analysis, could help us respond more efficiently to problems in distribution the least robust component of the system, according to Huck. "It's going to be much easier to install in-situ monitoring devices at various points in the distribution system and measure water quality for a couple of key parameters in real time," he said.

Better monitoring technology also means we'll be able to detect more contaminants. Some may be new contaminants; others we simply weren't able to measure before. That will mean updating water quality laws, Gleick predicted—and taking a different approach. "We have to move from a narrow, linear, single-contaminant thinking to thinking about multiple contaminants and synergistic effects and non-point-source problems," he said.

3 Decentralized, dual systems

Meanwhile, as urbanization trends continue, distribution networks will become longer and longer. Under our current model, each new subdivision development extends pipelines farther from a central treatment plant, increasing the risk of something going awry along the way.

How will we ensure safe water for sprawling cities? Huck said he envisions decentralized treatment. "We'll do partial treatment at an existing treatment facility and then additional treatment closer to the point of consumption," he explained. "And this will do away with a lot of distribution system water quality issues."

A decentralized approach may also help municipalities implement dual water systems: one for potable water and one for cleaning streets, watering gardens, flushing toilets, and so forth. While all water would be treated at the main plant, only drinking water would get an extra dose of treatment before it reaches the kitchen tap. According to Huck, dual systems would reduce the costs for treatment facilities and shrink their energy footprint.

4 Floods, storms, and droughts

Gleick said water planners aren't prepared for extreme weather. "We built our water systems under the assumption that tomorrow's climate was going to be the same as yesterday's," he said. While we may not know how exactly climate change will play out, Gleick said he believes we know enough to prepare for the changing dynamics of our hydrologic system.

As the frequency and intensity of storms grow, so will the risks of flooding and runoff. That raises two issues. First, will water treatment plants be prepared to handle the extreme changes in source water quality created by significant or sudden rainfall? Second, is the plant itself vulnerable? Flood-proofing your facility could mean everything from relocating sensitive equipment to upper floors, building barriers around the plant, or, in extreme situations, moving the entire facility somewhere safer.

Water availability will be another major factor. Changes in rainfall, snowfall, and snowmelt patterns will affect the flows in local watersheds. Meanwhile, increasing demand from farms and cities will overstretch the system as prolonged droughts become commonplace across much of Canada. Climate shifts may also bring long-term changes in baseline water quality, such as increases in total organic carbon.

The bottom line? Huck said we need robust water systems that can deal with sudden changes and compensate when weaker parts of the system are threatened. If there's a decline in source water quality, for example, we need to be able to beef up treatment. In times of drought, we need better water recycling measures.

5 Shortfalls in supply

Shortfalls in availability will require

tapping into other sources of water. That could mean more stormwater capture, rainwater harvesting, and wastewater reuse, particularly in more populated areas like Southern Ontario. "Treated wastewater can be used for all sorts of things, up to and including potable drinking water," Gleick said. "Treated wastewater is an asset. It's a new source of supply." Right now, the biggest challenges to reuse aren't technical. What's holding us back is public perception and, to a lesser extent, legal restriction.

On the demand side, we'll need water protection laws, Gleick said. Take the steel industry in the United States as an example. In the 1920s, manufacturers used 200 tonnes of water to make one tonne of steel. New laws prohibiting the dumping of wastewater into rivers and streams changed the way the industry did business. Today, it takes just three or four tonnes of water to produce a tonne of steel. "If we can satisfy our demands with less water, we reduce the pressure on our ecosystems," Gleick said.

In Canada, British Columbia's 2014 *Water Sustainability Act* leads the way. The new act protects minimum flows in watersheds, and water licence applicants now have to consider the volume and timing of water flow required for aquatic ecosystems.

Although the future holds significant challenges, Gleick is confident we're up for it. "We live in a period of time when different innovative ideas are being explored, where a lot more attention is being given to water than 10 or 20 or 30 years ago," he said. "I think we're moving in the right direction." wc



Josh Martin is a freelance writer based out of Waterloo, Ontario.





An oil company sues a Quebec village for passing a water-protection bylaw. BY DAVID ROBITAILLE

RISTIGOUCHE-PARTIE-SUD-EST (hereafter "Ristigouche"), a small municipality of 168 inhabitants located in Gaspésie, Quebec, is facing a lawsuit of \$1.5 million by Gastem, a local private oil exploration company. This sum is more than five times the community's annual budget. The reason? The municipal council wanted to protect citizen's rights to both safe drinking water and a healthy

In this "David vs. Goliath" lawsuit, the short-term profits perspective of a private company is directly adverse to the sustainable development of the community and to the power of the population to protect its water.

environment against the risks of drilling.

In the spring of 2011, Gastem met on a few occasions with the authorities of Ristigouche and informed them about its intention to explore the grounds. In July 2012, the company obtained a drilling permit from the Natural Resources Minister of Quebec and proceeded to prepare the grounds and began the construction of some infrastructure, notably a drilling platform and a tailing pond.

Environmental concerns

In the winter of 2013, citizens of the municipality were informed that the drilling site chosen by the company was very close to their homes and their artesian wells. Truly concerned about the risks associated with drilling and oil exploitation, a large majority of citizens—92 out of 168—signed and deposited a petition to the municipal council. This petition asked that elected representatives pass a bylaw to protect their water, health, river, and global environment against the drastic consequences that an oil leakage would have on their territory.

Local governments are not obliged to wait for an ecological disaster to regulate an activity that may cause damages to the environment and to public health. The Quebec Court of Appeal recently ruled that the precautionary principle allows governments to regulate private industries' activities that present a risk of polluting the environment, even if there is no uncontested scientific proof that damages will or can occur. This precautionary principle is now recognised in public law in Canada, as well as in Quebec, as a non-written guiding principle that can be used by judges in the interpretation of the law.

Bylaw adoption

Despite the principle that Canadian municipalities can only exercise the powers delegated by provincial government—since the *Constitution Act* of 1867 gives provinces the power to regulate "[m]unicipal institutions"— many local governments in Canada are benefiting off large powers granted by

provincial laws. In 2005, the Quebec Legislative Assembly adopted the *Municipal Power Act* that "assigns general [...] regulatory powers in various areas of jurisdiction to local municipalities [...] in order to give them more flexibility" and, should we say, more autonomy. In virtue of that law, local municipalities have jurisdiction over many fields impacting citizen lives, including the environment.

In March 2013, in accordance with the powers delegated to municipalities by the province of Quebec, and considering the legitimate preoccupations and expectations of its population, the Ristigouche municipal council adopted a bylaw regulating oil exploration and exploitation.

"In the absence of any provincial law protecting water, a majority of residents firmly took their stance to council demanding protection of their drinking water," said Mayor François Boulay. Among others measures, the bylaw forbade any drilling within a perimeter of two kilometres from drinking water sources and required companies to provide information to the municipal council regarding any chemical, organic, or mechanic process that could alter the quality of water. Also required is the submission of an environmental study attesting that planned activities do not present any risk of contaminating the drinking water and a cautionary provision of \$1 million in the event of a leakage or other damages to the environment. All the conditions imposed on private oil companies have been adopted to ensure the respect of the citizens' fundamental rights to safe drinking water as well as their rights to consultation, participation, and information regarding the development of their territory.

Government and private oil interests vs. common good

Gastem is now suing the municipality of Ristigouche and alleging that the municipal bylaw prevented it from pursuing the exploration in which it had invested \$1.5 million. The company is claiming compensation without having investigated the feasibility of their project on other sites within the said municipality. Since then, the Government of Quebec adopted its own bylaw that forbids any ground drilling within a limit of 500 metres from drinking water sources, removing this topic from municipal jurisdiction. With this new provincial bylaw, Gastem would still be prevented to pursue its activities. However, the company is not suing the provincial government and the provincial government has not offered any support to the Ristigouche municipality.

When the government aligns its interests with those of private oil companies against the common good and collective rights of communities, from which it hold its mandate, citizens must rely on each other to enforce their rights.

Boulay said it was "unequivocally preposterous" that inhabitants of a rural community "should not have the democratic right to legally protect their water." He added that, as the single most important resource to life, water should be more valued than "the thirst for profit of private sector investors." Instead, he said, the government continues to look the other way.

For more on Ristigouche, visit solidariteristigouche.ca wc

David Robitaille is a professor of constitutional and human rights law at the University of Ottawa.









From Knowledge to Action

The 2015 Connecting Water Resources conference hopes to inspire change and action in all sectors of Canada's water industry. BY CLARK KINGSBURY

IN THE CANADIAN WATER INDUSTRY, the new year means a new round of national and international conferences that offer industry professionals the chance to learn, collaborate, and pursue action in a constantly changing sector.

One of Canada's premier water industry conferences, Connecting Water Resources (CWR) 2015, will take place March 10 to 12 in Ottawa. Organized by the Canadian Water Network (CWN), the 2015 edition of the conference will be the third in its current format, with prior editions taking place in 2011 and 2013. The conference's theme, From Knowledge to Action, highlights the organizers' emphasis on high-level networking and strategic planning in order to pursue action, as opposed to an education- or training-oriented conference directed at the operational level.

"Our whole ethos is really about providing the best and most effective opportunity for people that want to get somewhere, as opposed to trying to educate or change minds," said Bernadette Conant, executive director of the CWN. "We're very committed to the idea that you have to do something that leads people to actionable results, not just spark a dialogue. That's not enough for us."

This year's conference will be split into three days, broken down into plenary discussions, concurrent breakout sessions, and networking receptions. Morning plenary discussions on days one and two will be succeeded by concurrent breakout sessions following the three conference tracks.

The first track, Blue Cities: Moving to the Systems We Need, will investigate what drives municipalities to adopt innovative water management practices as sustainability, resiliency, and livability become increasingly sought after aspects of planning and policy-making in Canada. This shift is especially important in the face of climate change, accelerating urbanization, and a steadily growing population.

The second track, Resource Development and Agriculture: Securing Our Future, will look into water risks affecting the agriculture sector, as well resource development sectors such as oil, gas, and mining.

The final track is Small and Aboriginal Communities: Solutions that Fit. This track will explore how to confront the water management needs of smaller or First Nations communities while addressing the realities of politics, finance, economics, and governance structures that don't match up with Canada's larger cities.

"There will be concurrent sessions in each of the conference tracks in the afternoon, and what we've done is established teams in each of those tracks made up of lead mentors, academic and end-user mentors, and a team of students and new professionals," Conant explained.

The teams will be tasked with identifying what they think are the best

opportunities to translate knowledge into action. To do so, they will begin work before the conference, participate in discussions during the conference, and report their findings based on research and conversation during Thursday morning's plenary sessions.

CWR 2015 will have both domestic and international speakers, including representatives from South Africa, Singapore, and the United States. The speakers will focus on tangible lessons learned from past experiences.

"Whether it's a start-up in Silicon Valley or a project here in Canada, people want to know 'How did you get there? How did that work? How did it actually happen?" Conant said. "There is of course a Canadian focus, but we try to bring perspectives from all over the place. I think the community here needs to hear from [these speakers]."

The international flavour of the featured speakers serves to underscore the diversity of attendees the Connecting

Water Resources conference attracts.

In both 2011 and 2013, the conference welcomed approximately 300 attendees, and the CWN is expecting about 400 for the 2015 edition, from all corners of the water sector. In particular, attracting students and ameliorating the student and new professional experience at the conference was an improvement the CWN wanted to make.

"We've thought about how to incorporate [students and new professionals] when a lot of the design of the conference is around wisdom, and insights, and understanding how things are done," Conant said. "We have people with a significant amount of experience on the podium, so how do you combine those two things?"

The CWN also made it an explicit goal to achieve a 50 per cent podium presence for women at Connecting Water Resources 2015, and is working with the Canadian chapter of the International Women's Forum, which will have a presence at the conference on Thursday.

But the CWR 2015 organizers don't want to just attract attendees from all corners of the water industry.

"So many issues important to people outside of water are actually water issues," Conant said. "Are you a councilor worried about sustainable city management? Well, a big part of that is water. Water management decisions often reflect priorities like public health, economic prosperity, and political autonomy."

Conant's vision for CWR 2015 is simple: "Our hope is that people will leave the conference with new collaborations in development, or with larger ideas which are brought forward to Canadian Water Network who might say 'We'll take this one on and help it move forward."" wc

Clark Kingsbury is Water Canada's assistant editor.



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RULES & REGS

A Sense of Community

Do we really need a national association?

BY ROBERT HALLER

WE BELIEVE the Canadian Water and Wastewater Association (CWWA) is an important organization, but I regularly ask the question: "What if we ceased to exist?" Would someone try to recreate a similar national organization? We believe the answer is "yes." There is a clear need for a strong voice in Ottawa for the municipal water and wastewater sectors, and the federal government needs us to gather the expert consultation it requires. Yes, these services are delivered locally and legislated primarily at the provincial level, but the national influence has been growing steadily, from the Drinking Water Guidelines to the Wastewater System Effluent Regulations, and of course, the infrastructure funding we all demand.

Meanwhile, federal departments and agencies are leading national level work on climate change, safety and security, biosolids, and many more issues that affect our industry. You, as a water professional, need to know what is being considered and have an avenue to provide proactive input and reactive comments.

To stay healthy, any organization must adapt to new realities. It is certainly no different for the CWWA. In our new economy, membership cannot be taken for granted nor can we expect loyal conference attendance. The inherent competition between associations for your membership and event attendance has become much more real in an age of fiscal restraint with limits on training and travel. We must think very carefully about everything we do, why we do it, how we do it, and who we do it for. Yes, you need to be a part of your provincial association first, but we offer an additional value proposition.

Our focus is to be relevant to municipal utility professionals and serve their needs. Beyond being an advocate in Ottawa, we encourage nation-wide knowledge sharing that supports utility leadership. We also facilitate national dialogue on shared issues and coordinate cooperative projects to respond to these common challenges.

Our advocacy work is conducted through our technical committees, made up of our members-the industry experts. For 2015, these committees will be conducting a review of all of our current position statements and commencing the development of new positions to support our members in this ever-changing environment. There is always room for more participants. As for national dialogue and cooperative efforts, we work very closely with our many partner associations across Canada and the United States, as well as with our federal counterparts. Together, we are a stronger voice for water in Canada.

We have also been rethinking our CWWA event strategy. We have traditionally run multiple conferences each year, isolating topics like water quality or wastewater or efficiency. Not only is this a tremendous strain on our association resources, it creates a challenge to our members who have interest in multiple fields and also to our corporate sponsors that serve all of these fields. In 2015, we are introducing the one annual national conference on October 25 to 28, 2015. We will all gather in Whistler. British Columbia for our first consolidated conference. Work is well underway to develop a wideranging program with multi-disciplinary streams, all with a strong focus on our utility leadership. We hope to see you in Whistler! wc



Robert Haller is the executive director of the CWWA.

PURCHASED

Ottawa-based Clearford Water Systems Inc. has purchased a controlling 91-percent interest in UV Pure Technologies Inc. The UV Pure leadership team will remain shareholders of the company.

"Clearford and UV Pure know each other well, having worked together commercially since 2012," said UV Pure president and CEO **Rick VanSant**. "Clearford is a long-standing UV Pure customer that uses our patented UV disinfection systems as the final stage in its wastewater treatment solution."

APPOINTED

AdEdge Water Technologies has named **Chad Miller** as product manager for the Biottta fixed-bed biofiltration technology. He will lead efforts related to the sales, design, and marketing of the new product launch.

Miller has been a member of the water treatment industry for nearly 20 years, providing services and application support for ion exchange, adsorption, membranes, filtration, advanced oxidation, and other treatment approaches. He has been working as project manager for AdEdge since 2009.

AWARDED

The Federation of Canadian Municipalities announced the winners of its annual Sustainable Communities Awards on November 17.

Amongst the winners were the Town of Okotoks, Alberta, which was recognized for its Water Conservation, Efficiency and Productivity Plans; and the City of Kingston, which was recognized for its Emma Martin Park Groundwater Remediation Project.

REALIGNED

EPCOR has announced that **John Elford** will become senior VP, water Canada, and that **Stephen Stanley** will lead the company's business development activities in Canada and the United States in the role of senior VP, commercial services, effective January 1, 2015.

Currently, Elford is divisional VP of electricity distribution and transmission operations, while Stanley is senior VP, water Canada.

RETIRED



Henry Flattery, the director of sustainable market development at Hamilton Kent, has retired from the company after 12 years. In his announcement, Flattery pledged pledged to continue his work against the inflow/

infiltration that is affecting sanitary sewer collection systems.

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PEOPLE & EVENTS



Seven seconds—that's how long you have to grab someone's attention. Even after that's done, you still need to recapture their attention every seven minutes. This was a key insight shared by **Dave Biggs**, a leader on public engagement, at a recent seminar hosted by GHD.

He demonstrated how to do this in an increasingly crowded and competitive online environment using real world examples from around the country. These cases also emphasized how barriers to participation could be lowered, and what makes people feel like their participation is a valuable investment of time.

His presentation was preceded by a talk by **Daniel Epstein**, who spoke about how to understand what drives human behaviour, particularly decision-making. He revealed that our brains are designed to make a good enough decision as fast as possible, and that most of our behaviour is based on habit. Knowing this, he talked about how you can make it easier for people to make decisions, and for them to change their habits.

The seminar on stakeholder consultation was capped off by a joint presentation by **Adrian Coombs** (York Region) and **Ian Dobrindt** (CRA), who used the Upper York new sewage solution EA process as a case study of what implementing a strategic engagement plan entails, and to illustrate lessons learned about what works and why.

"There's still a need for the personal touch," Coombs said, with Dobrindt emphasizing the need to always keep in mind what you are trying to accomplish while knowing your limits and how flexible you can be.

Taken together, the seminar gave municipal managers from around the GTA a comprehensive look at how to better understand what influences behaviour and decision-making so

Session speakers from left to right: Ian Dobrindt, CRA-GHD; Adrian Coombs, York Region; Dave Biggs, MetroQuest; Roop Lutchman, GHD (facilitator); Colin James, GHD (host); Daniel Epstein, Daniel Epstein & Associates LTD

GHD Stakeholder Seminar Toronto, ON

that these understandings can be applied when it comes to stakeholder consultation and engagement for better project outcomes.

Colin James, GHD's practice group leader, hosted the seminar and commented that "going through a meaningful consultation process was important, not only because we live in an inclusive, social democratic society, but because it can also save significant time and expense down the road."

This seminar was part of a GHD series about critical issues that affect cities, towns, and regions, and the people and projects that make them more liveable. It aims to give project managers the most up-to-date information, along with the opportunity to learn from and network with their peers.

Presentations from the seminar are available online at www.ghd.com/ stakeholderconsultation.



John Thompson, director of environmental services with the City of Barrie, and Nick Reid, executive director of strategic partnerships at OCWA, participate in a Dragon's Den-inspired panel.

World Water-Tech Toronto, ON

Approximately 175 members of the international water-tech community were in attendance at World Water-Tech North America on November 12 to 14. One highlight of the conference was the Dragons' Den-inspired technology showcase, where eight companies pitched their innovative products and services to a panel of industry experts. "Dragons" included **John Thompson**, director of environmental services at the City of Barrie, **Eric Apps**, co-founder of Aluvion, and **Nick Reid**, the executive director of strategic partnerships at OCWA.

PEOPLE & EVENTS



The CWWA teamed with the Global Poverty Project to bring comedian Ron James to Window on Ottawa to perform and to launch their initiative to achieve universal sanitation by 2030.

Window on Ottawa Ottawa, ON

This year's Window on Ottawa event by the Canadian Water and Wastewater Association took place on November 19 to 20. Some of the hot topics addressed by expert panelists included infrastructure adaptation to climate change and impacts on budget, flushables, and a much-anticipated presentation by Environment Canada's **James Arnott** on Wastewater Systems Effluent Regulations.

Rachel Phan, the editor of Water Canada, spoke about ways to communicate with the public about the value of water. She was joined by fellow panellists **Louise Brennan** of Econics, **Warren Wishart** of Canadian Water Network, **Michele Giddings** of Health Canada, and **Terence Nelligan** of Statistics Canada.

As a way to unwind and celebrate World Toilet Day, attendees were treated to a side-splitting performance by comedian **Ron James** on the first night of the conference.

More news items can be found at watercanada.net/ topics/news



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2014 Latornell Conservation Symposium Alliston, ON

The 2014 Latornell Conservation Symposium took place at the Nottawasaga Inn Resort & Convention Centre in Alliston, Ontario, from November 18 to 20. Focused on the conference theme of Growth & Transformation, the event explored a dizzying array of environmental issues from around the province, including a number of notable water issues. Presenters spoke on groundwater monitoring, LID developments, wetland restoration, the effect of climate change on winter hydrology, and source water protection, to name just a few.



David Miller, president and CEO of WWF-Canada, holds up the November/December 2014 issue of Water Canada after his speech.

Exhibitors at this year's Latornell Conservation Symposium included Solinst Canada, Kisters North America, Ducks Unlimited Canada, and of course, Water Canada.

Phil Stefanoff, business development director for Kisters North America, and Matt Ables, VP of operations for Kisters North America, were exhibitors at this year's Latornell event.

Wednesday's lunch featured keynote speaker **Ziya Tong**, co-host of the Discovery Channel's Daily Planet, while WWF Canada president and CEO **David Miller** addressed the crowd at lunch on Thursday.



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PEOPLE & EVENTS





Water Canada publisher Todd Latham (centre) with Toronto mayor John Tory (left) and Toronto city councillor Denzil Minnan-Wong. The three talked environment, transit, and infrastructure at a VIP reception in Don Mills that was held to recognize supporters of both the Tory and Minnan-Wong campaigns.



ONEIA Environment Industry Day Toronto, ON

On November 18, 2014, ONEIA held the 14th edition of Environment Industry Day, the association's annual day of dialogue with MPPs at the Ontario legislature. Minister of Environment and Climate Change **Glen Murray**, in his opening address, called for improved dialogue around solutions between his ministry and groups such as ONEIA. The minister was followed by a "deep background" panel that explored the dynamics in the new legislature and offered practical advice to the teams of ONEIA members that met throughout the day with MPPs. The association and the environment and cleantech sector was recognized in the legislature as a "bright light" in the Ontario economy.



Funding Shift

Ontario municipalities must fund growth-related capital infrastructure through user charges.

BY FRANK CLAYTON

MUNICIPAL WATER AND WASTEWATER providers in Ontario fund growth-related water and wastewater infrastructure through development charges. The occupants of new residential and nonresidential development ultimately bear the bulk of the cost of the infrastructure system expansion. In contrast, private and electricity utilities typically price their services to cover all current and capital costs and generate a profit.

The economic consequences of relying on development charges to fund growth-related water and wastewater infrastructure are threefold: it fosters economic inefficiency through overconsumption of water and wastewater over the entire user base; it diminishes housing affordability; and it creates inequity between water and wastewater users residing in the existing building stock and the occupants in new development.

Shifting the source of funding of growth-related water and wastewater infrastructure to user charges would have a number of economic benefits to the wider community:

Better matching of infrastructure costs and the beneficiaries of urban economic growth: The theoretical underpinning for imposing development charges "that growth pays for growth" lacks credibility given that the expansion of municipal infrastructure contributes to economic growth and the benefits of growth are spread over the larger community including existing property taxpayers.



Increased economic efficiency through reduced consumption of water and wastewater over the entire user base: Applying higher full-recovery charges would encourage all water and wastewater consumers to reduce their consumption to the benefit of the environment, result in a more efficient use of existing infrastructure and lessen the need for the building of new infrastructure.

Increased housing affordability: Eliminating development charges for water and wastewater purposes would lower the cost base of building new homes and, ultimately, housing prices.

More equitable treatment of water and wastewater users residing in the existing building stock and the occupants in new development: The shift in financing of growth-related infrastructure to user charges would also remove a significant inequity in the existing financing system. The occupants of new housing now pay part of the capital cost of maintaining the existing infrastructure, but existing users do not contribute to the funding of growthrelated infrastructure.

There have been suggestions that development charges should be regarded as a land use planning tool to encourage more compact, dense growth and discourage lower density development on the urban fringe.

There is no need to compromise development charge revenues by providing development charge subsidies to promote these goals. Under the pervasive provincial planning regime that exists in the Greater Golden Horseshoe, the types of developments that are built are obliged to be in accordance with the goals of the growth planning regime to promote land use efficiency.

I recommend that the funding of growth-related water and wastewater infrastructure in Ontario be done with user charges rather than development charges and that this change be phased in over a period of five years.

I further recommend that municipalities establish independent utilities to fund and operate water and wastewater services on a business basis like other utilities operating in the province. The new water and wastewater utilities should have the power to issue debt based upon the utility's financial situation separate from a municipality's debt.

Once the water and wastewater operations of municipalities are re-invented on a business basis, there is, of course, no reason for municipalities to own and operate these utilities. wc



Dr. Frank Clayton is a senior research fellow at Ryerson University's Centre for Urban Research and Land Development

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