

WATER CANADA

Frozen

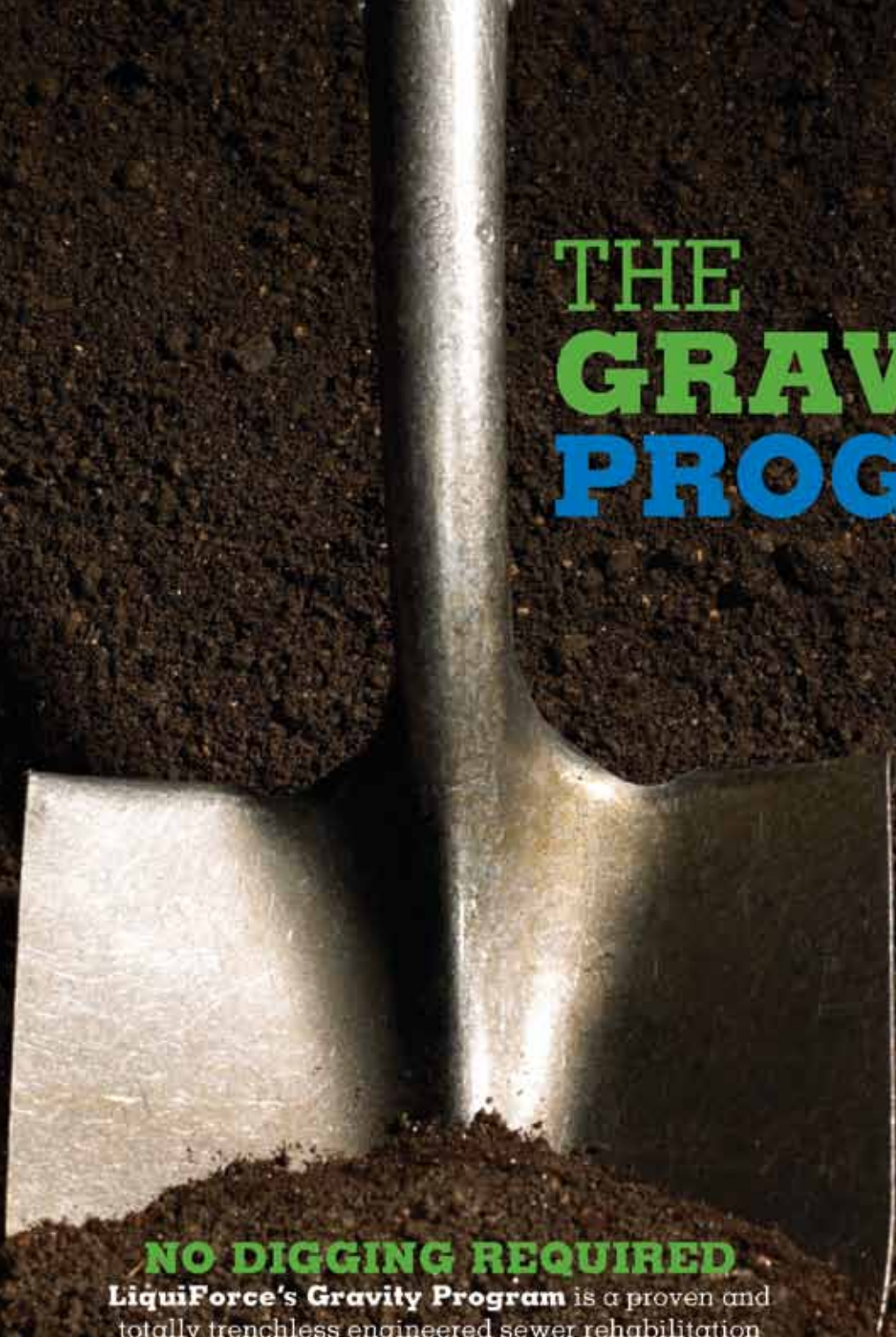
Managing Water Under Harsh Conditions

**2016
Top Water
Projects**
(page 8)

**Canadian Clean-Tech
Targets Phosphorus**
(page 20)

**Guelph Gets Ready for
the Next Deep Freeze**
(page 24)

**The Shoal Lake
Shuffle** (page 42)



THE GRAVITY PROGRAM

NO DIGGING REQUIRED

LiquiForce's Gravity Program is a proven and totally trenchless engineered sewer rehabilitation program that provides an as-new sewer system from house to treatment plant with 50-year+ design life and 50% savings.

It's fast, non-disruptive, environmentally friendly and stops I&I all, without digging.

*Compared to conventional digging.

CONTACT US TO JOIN THE GRAVITY TOUR

1-800-265-0863 • www.liquiforce.com

GRAVITY: a path to sustainability, an alternative that works!

GRAVITY
LiquiForce

FEATURES

8 Top Water Projects

Insights into Canada's top five water, wastewater, and hydroelectric projects.

14 Hospital Checkup

Health-care facilities are reducing their footprint in support of a healthier environment.

BY SAUL CHERNOS

20 Plan P

Can Canadian clean-tech save Lake Erie?

BY EVE KRAKOW

WASTEWATER

18 Path of Resistance

Are Canadian wastewater treatment plants impacting the persistence of antibiotic-resistant bacteria?

BY KARA NEUDORF

STORMWATER

30 Calm Before the Storm

Small-town Ontario bands together to get storm ready.

BY ROB WALTON

CONVEYANCE

24 Frozen

After a crippling cold spell, Guelph insulated itself to frozen pipe damage with a new frozen pipes policy.

BY LAURA MOUSSEAU AND BRIGITTE ROTH

SPECIAL FEATURE

26 Water Wattage

Water Canada partners with IESO to discuss wastewater treatment and energy efficiency.

BY KATHERINE BALPATAKY



8



14



17



20



36

COLUMNS

17 Groundbreakers

Cave Springs Cellars' solution to wastewater.

BY NATHANIEL DAVID JOHNSON

31 Liquid Assets

A new spin on an old concept expanding hydro-electricity in Ontario.

BY NEIL HARRIS
AND AARON ATCHESON

32 Fine Print

Ensuring the sustainability of British Columbia's new water law.

BY OLIVER BRANDES, DEBORAH CURRAN, AND ROSIE SIMMS

36 Rules and Regs

The costs of delivering water services in the Far North.

BY DAVID ALBISSER
AND CHRIS GREENCORN

42 H2opinion

While governments sidestep responsibilities for Shoal Lake, the community endures one of Canada's longest-standing boil water advisories.

DEPARTMENTS

5 Editor's Note

Canada may be ready for a national water strategy.

BY KATHERINE BALPATAKY

6 Comment

SCOTT JASECHKO AND TOM GLEESON share the implications of new research on recharge rates of global groundwater.

7 Front

The social media fallout of Montreal's wastewater discharge.

38 People and Events

Jobs, awards, moves, and the latest coverage.

Register by Jan. 30 and bring
a young professional for free.
See website for details.

7th Annual

canadian water summit

2016

June 23

Hilton Toronto

The Business of Water

Water is a critical resource for many industries and businesses. For packaged goods, food and beverage, mining, technology and manufacturing, water is part of the corporate balance sheets and water resource management is an opportunity for innovation.

Join your peers on June 23, 2016, in downtown Toronto as we talk about the use, reuse, value and cost of water across all major sectors of the Canadian economy.



Fred Keating,
humourist
(emcee)



Roy McGregor,
acclaimed author
and journalist
(speaker)



Glen Murray,
Minister of the
Environment and
Climate Change
(invited)

2016 Sponsors and Supporters



EDITOR

Katherine Balpataky

ASSOCIATE PUBLISHER

Lee Scarlett

PUBLISHER

Todd Latham

ART DIRECTOR & DESIGNER

Donna Endacott

ASSOCIATE EDITOR

André Voschart

CONTRIBUTING WRITERS

David Albisser, Aaron Atcheson, Oliver Brandes, Saul Chernos, Deborah Curran, Tom Gleeson, Chris Greencorn, Neil Harris, Scott Jashechko, Nathaniel David Johnson, Eve Krakow, Laura Mousseau, Kara Neudorf, Eva Pip, Brigitte Roth, Rosie Simms, Rob Walton

ADVERTISING

Lee Scarlett lee@watercanada.net
Todd Latham todd@watercanada.net

ADVISOR

James Sbrolla



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

ACTUAL MEDIA INC.

147 Spadina Avenue, Unit 208
Toronto, ON, Canada M5V 2L7
Phone: 416-444-5842

Subscription/customer services: 416-444-5842 ext. 117

Water Canada subscriptions are available for \$39.95/year or \$64.95/two years and include the annual Buyer's Guide issue.

©2016 Actual Media Inc. All rights reserved. The contents of this publication may not be reproduced by any means in whole or in part, without prior written consent from the publisher.

Printed in Canada.



Undeliverable mail return to:
147 Spadina Avenue, Unit 208
Toronto, ON, Canada M5V 2L7
Canadian Publications Mail Product
Sales Agreement 40854046
ISSN 1715-670X

Proud member of:

Canadian Association on Water Quality
Canadian Water Resources Association
Ontario Ground Water Association
Water Environment Association of Ontario
Water Environment Federation



Dust Off the National Water Strategy

BY KATHERINE BALPATAKY

IN DECEMBER, I attended a lecture by Thomas S. Axworthy, distinguished senior fellow of the Munk School of Global Affairs, who among his many accolades served as principal secretary to Prime Minister Pierre Trudeau. Axworthy spoke of the need for a national water strategy in Canada. He argued that globally—both historically and currently—water scarcity and food security issues have led to political instability, bloody conflicts, and worse; and while Canada is blessed with an apparent abundance of freshwater, we are not immune.

His proposal is centred around eight pillars: “Begin with an ethic of responsibility to others, to future generations, and to nature”; the strategy should be led by First Nations and Inuit ethics, and their leaders need to be at the negotiating table; a future carbon tax should invest money back into renewables, energy, and water projects; advance water mapping and monitoring, particularly for groundwater; water and wastewater treatment should be a major part of the federal government’s infrastructure spending; promises to address First Nations boil advisories should be addressed; revitalize Canada-U.S. water collaboration; and finally, pull together the scattered pieces of federal government responsibilities for water under a new central water agency.

To the water wonk, these ideas sound prudent. Although some might argue Axworthy isn’t saying anything new, timing is everything in politics. And so it is no coincidence his strategy parlays the current priorities established under COP21, the recent Speech from the Throne, and the Liberal government’s

electoral promises for climate change, infrastructure, and First Nations reconciliation. The priorities are consistent; however, in Axworthy’s strategy, the decisions that follow focus on the interdependence of food, energy, climate, and water. It is an opportunity for our leaders to establish a vision that unifies the groups that will ultimately be part of the solution.

In this issue of Water Canada, we explore some of these same challenges and local solutions from experts across the country. On **page 6**, doctors Jasechko and Gleeson outline the importance of mapping and monitoring groundwater resources to inform water management decisions about energy and food production, and domestic use based on their global research. On **page 26**, Ontario experts discuss the significant opportunities for improving energy efficiency in wastewater treatment and what’s needed to ensure this is a priority for upgrades. Digging into First Nations water challenges on **page 42**, Eva Pip from the University of Winnipeg explains the history of the First Nations community of Shoal Lake and why failed coordination between three levels of government has prevented progress.

If the sun, moon, and stars have finally aligned to tackle our aging infrastructure, climate change, and First Nations water challenges, then I look forward to seeing the plan set in motion. But I also hope these objectives—each with significant implications for water—consider the inter-relationships. Our contributors are reminders that Canada has no shortage of success stories to build upon. wc

Contact Katherine at
416-444-5842 ext. 116 or
email katherine@watercanada.net

@CanadianWater

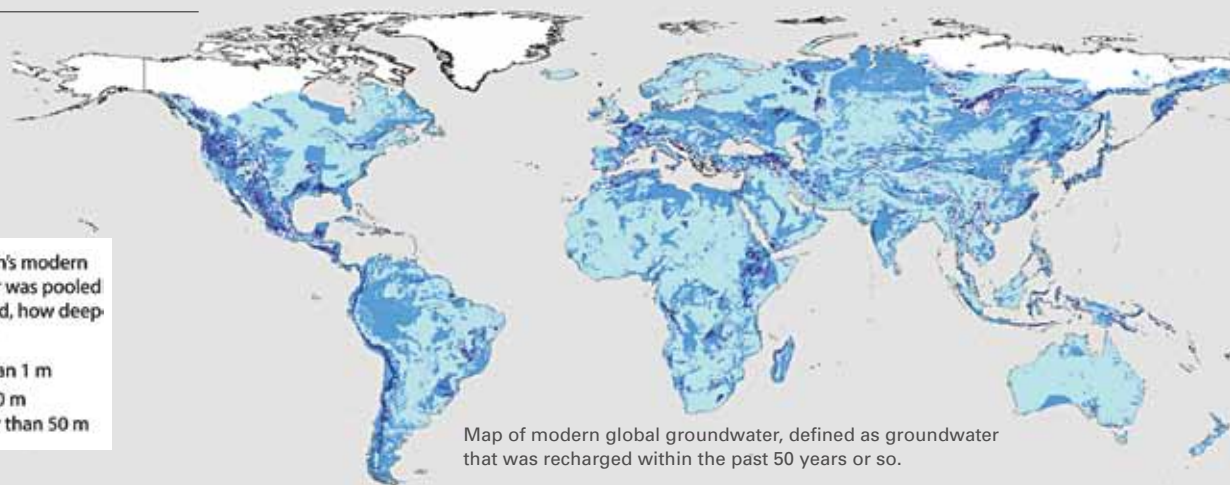
WaterCanada



All back issues of Water Canada are available for download at library.actualmedia.ca

If all the Earth's modern groundwater was pooled above ground, how deep would it be?

Less than 1 m
1 m - 50 m
Greater than 50 m



Map of modern global groundwater, defined as groundwater that was recharged within the past 50 years or so.

FEATURE CONTRIBUTORS



TOM GLEESON

Tom is a groundwater specialist and assistant professor at the University of Victoria.

PG 6



SCOTT JASECHKO

Scott is an isotope hydrologist and assistant professor at the University of Calgary.

PG 6



NATHANIEL DAVID JOHNSON

Nathaniel is a freelance writer and photographer in Fort Erie, Ontario.

PG 17



KARA NEUDORF

Kara is a postdoctoral fellow at Dalhousie University in Halifax.

PG 18

ABOUT THE COVER

Deep frost and extreme temperature changes put stress on water pipes, causing cracks, water geysers, road closures, service disruption to customers. Band-aid repairs can have dramatic economic consequences for municipalities.

NEXT ISSUE: MARCH/APRIL

- **Solutions for Water Challenges in First Nations Communities**
- **Water Sustainability and the Financial Sector**
- **Upper York's Innovative Sewage Solution**

PLUS Regular columns, including Rules & Regs, Groundbreakers, Fine Print, and Liquid Assets.

To inquire about advertising, contact lee@watercanada.net

Ground Control

New research on recharge rates of global groundwater.

BY SCOTT JASECHKO AND TOM GLEESON

OF ALL THE VOLUMES of fresh and unfrozen water, groundwater is the greatest. Groundwater is the water sitting between sand grains, sandwiched by clay layers, and flowing through cracks in rock. Every day, billions of humans use groundwater pumped from wells to drink and water crops. In spite of humanity's reliance on groundwater, we haven't really known just how much groundwater there is.

Our research project confirmed that the global volume of groundwater is immense. Groundwater makes up more than 99 per cent of all fresh and unfrozen water on the planet. For perspective, if one was to extract all of Earth's groundwater (we don't suggest doing this) and pool it on top of the land like a flood, the height of that pool would cover all the continents with 180 meters of water.

But there's a problem: it takes a long time for rain and melting snow to replenish this resource. Until recently, we didn't know just how much groundwater is replenished on human time scales. We've learned that less than six per cent of global groundwater is recharged in one human lifetime, and this renewal is greatest in places where lots of rain falls and in areas surrounded by steep mountains.

Unfortunately, many people that depend on groundwater to sustain their livelihoods also live in regions where groundwater is renewed very slowly or not at all. There are several implications of this ongoing body of groundwater research.

- 1 We know groundwater is a critical resource, and we need to set long-term goals to successfully manage it. The best goals would ensure aquatic ecosystems and future generations are allocated a share of global groundwater.
- 2 Groundwater is vulnerable to pollution and to climate change. Current climate warming driven by fossil fuel burning by humans is changing precipitation patterns in many regions. Changing precipitation is likely to impact groundwater renewal rates in many regions.
- 3 Nearly all of us depend on groundwater—for drinking water, to grow food, to produce energy, and to manufacture building materials. It sustains the flows of many rivers and the levels of many lakes. This invisible water resource deserves our attention.



We love hearing from you! Tweet us [@CanadianWater](https://twitter.com/CanadianWater)

TWEETS #Flushgate

The social media outfall of Montreal's wastewater discharge.

When news of Montreal's plans to discharge eight billion litres of wastewater into the St. Lawrence River broke, social media exploded. Baptized as #flushgate, the issue impelled tens of thousands of Canadians to publish their opinions online. Political grandstanding between the Montreal Mayor and former federal Environment Minister may have triggered the public's interest, but it evolved into a discussion about Canada's aging infrastructure and whether secondary treatment of wastewater good enough. —Staff

A timeline of some of the #flushgate Twitter posts:

Oct. 13

Save The River! @savetheriver
Surfers, kayakers show their love for the St. Lawrence ahead of sewage-dump plans #flushgate #NotASewer <http://www.cbc.ca/1.3266851>

Oct. 17

Sarah M. Comtois @sarahmcomtois
When even the conservatives order to halt plan to dump raw sewage in the St. Lawrence <http://fw.to/6JmEwZe> #flushgate #lowpoint

Oct. 19

Dominic Tremblay @Dominic_Tremb
Résultat final de l'élection ! #Elxn42 #Trudeau #flushgate #polmtl

Oct. 17

Élyse Caron-Beaudoin @ElyseCaronB
Since when is Harper concerned with St-Lawrence River? Playing his last cards with #flushgate <http://globalnews.ca/news/2264516/aglukkaq-says-she-just-learnt-about-montreals-plan-to-dump-wastewater/> ...

Oct. 21

#FlushGate @SauvonsLeFleuve
The Protectors of the St-Lawrence River: https://m.youtube.com/watch?v=mn_0EY5URUA ... Have you watched this, @DenisCoderre? #FlushGate #EauxUsées #PoIMTL

Oct. 22

Sarah Dörner @sarahdörner
19. But maybe now after #flushgate, there will be a willingness to pay.

Oct. 25

#FlushGate @SauvonsLeFleuve
100 municipalities that dump sewage into the river ! <http://www.cbc.ca/m/news/canada/montreal/all-the-quebec-municipalities-that-dump-sewage-in-rivers-1.3286562> ... I #FlushGate #EauxUsées #SaveOurRiver #polMTL #MTLpoli

Oct. 23

#FlushGate @FlushGate
68% des Québécois se disent inquiets ! #flushgate #eauxusées <http://www.journaldemontreal.com/2015/10/23/68-des-quebecois-craignent-le-deversement-des-eaux-usees-de-montreal-dans-le-fleuve> ...

Oct. 29

Sarah Dörner @sarahdörner
@KevinMirise to answer that question, one must first ask why we don't have biological treatment normally now.

Oct. 30

Kevin Mirise @KevinMirise
@SarahDörner #archaea microbes would attach to the #flushgate contaminants & continue metabolizing them in the waste plume in the river

Nov 9

Korice Moir @WaterPuppetry
Retweeted Thomas Daigle Hold up. A wee correction. None of this should be flushed. Not now, not later. #flushgate

Nov 7

Bernadette Conant @bconantcwn
So. Who says #sewage stories aren't audience grabbers. #Montreal's #flushgate was actually trending in Canada this evening....

Online at WATERCANADA.NET



BLOG: Water Canada speaks to acclaimed author Marq de Villiers about his new book *Back to the Well*. bit.ly/deVilliersWELL



BLOG: Citizens in Vancouver set out to shame water hogs through the "Don't Be a Grasshole" Facebook group. bit.ly/GrassholeBlog



VIDEO: Christiaan Weizel's Earth Porn, featuring the lovely Alberta Water. bit.ly/ABNaturevids



BLOG: Water Canada's publisher, Todd Latham shares the highlights from his water tour of Germany. bit.ly/WasserLatham

If you missed this story, you can read about it at bit.ly/WCFlushgate

The Top 5 Spotlight

Insights into Canada's Top five Water and Wastewater, and hydroelectric projects.

FOR THE PAST 10 YEARS, Water Canada's sister publication, ReNew Canada, has produced the Top100 Projects report for Canadian infrastructure projects, ranked by project value. The Top100 is an industry touchstone, examining how Canada's mega-projects are funded and which firms are working on them. As a beneficiary of these efforts, Water Canada reports on the top five water and wastewater developments projects in Canada, and this year, we are adding a list of the top five hydroelectric generation developments—which claimed four of the top five spots on the Top100.

Top five water and wastewater projects in Canada:

- ① **#66** Lions Gate Secondary Wastewater Treatment
- ② **#74** Regina Wastewater Treatment Plant
- ③ **#79** Bonnybrook Wastewater Treatment
- ④ **#82** North End Sewage Treatment Plant Biological Nutrient Removal Upgrade
- ⑤ **#83** Annacis Island Wastewater Treatment Plant Expansion



Credit: Metro Vancouver

66 Lions Gate Secondary Wastewater Treatment Plant \$700 million

2015 Rank: 68

Location: North Vancouver, British Columbia

Owner: Metro Vancouver

Engineer: AECOM; CH2M (sub-consultant for process design development)

Consulting Architect: Miller Hull

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

Funding: P3

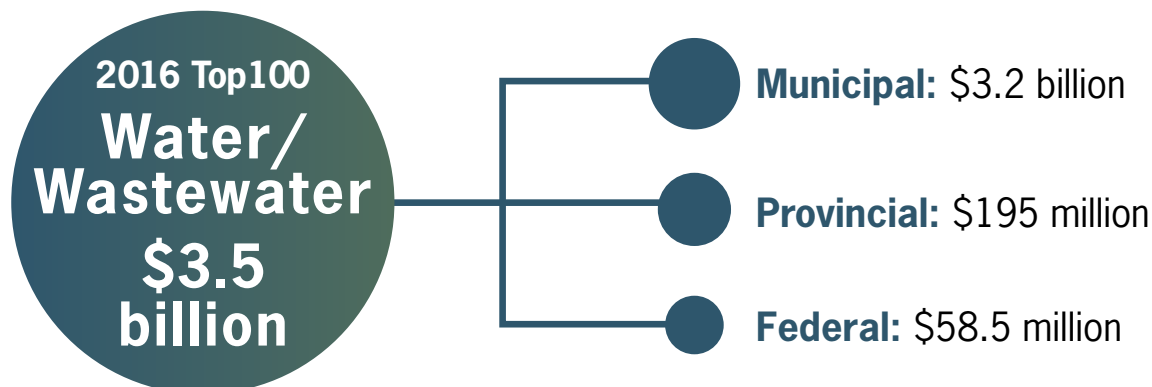
Financing

The Greater Vancouver Sewerage and Drainage District has issued an RFQ to design, construct, and partially finance the plant and to manage its operation for up to one year.

This greenfield secondary treatment plant will replace an existing primary treatment plant. New federal and provincial regulations require the upgrade of all primary treatment plants. The existing primary plant removes only 40 to 60 per cent of suspended organic matter in the wastewater which, after primary treatment, is discharged directly into Burrard Inlet—a matter of concern for some environmentalists—and is located on land leased from the Squamish Nation. The new secondary plant will be able to remove over 90 per cent of organic matter and will be located two kilometres east of the existing plant. Metro Vancouver will use a design-build-finance (extended warranty and holdback) delivery model and other conveyance upgrades using the conventional design-bid-build delivery model.

The new plant is scheduled to be operational by the end of 2020, and the existing primary plant will be de-constructed once the new plant is in service.

Total Investments in Canada's Top100 Water and Wastewater Projects



Credit: Rick Rudill



74 Regina Wastewater Treatment Plant \$611 million

2015 Rank: 75

Location: Regina, Saskatchewan

Owner: City of Regina

DBFOM Team: EPCOR
Saskatchewan Water Partners—
EPCOR Water Services,
Graham Group, Lockerbie
Stanley/Aecon, and Stantec

Legal: Norton Rose Fulbright

Other: Aon (risk/insurance advisor to
authority); BTY Group (independent certifier)

Funding: P3

• **Federal** P3 Canada
Fund: \$58.5 million

This treatment plant will increase the City of Regina's wastewater treatment capacity and modernize the facility through upgrades to the primary (non-organic) 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. The Province of Saskatchewan has raised effluent standards to improve water quality and the environment, and to meet these new standards, a new wastewater facility is required. The new facility will be substantially complete in December 2016.



Credit: City of Calgary

79 Bonnybrook Wastewater Treatment Plant D Expansion

\$600 million

NEW

Calgary's largest of three wastewater treatment plants, Bonnybrook, is undergoing an expansion that includes a number of features that are unique to Canada. When construction of the Plant D expansion is completed in 2022, the facility will service a population of 1.275 million people, increasing its current capacity to an additional equivalent population of 325,000 people. Ryan Roberts, VP of water at Stantec in Calgary, said, "The project is challenging because there is a lot of overlap between existing areas and with parts of the existing plant that must maintain in operation." He said the delivery had to be coordinated with a team of about 150 people, including the construction manager, design engineers, contractor, and plant operations and maintenance personnel, in light of daily operations, changing weather conditions, and limited space to operate.

The Plant D Expansion will be composed of new and retrofit wastewater treatment processes including the largest grit management system of its kind worldwide (by Hydro International), primary and secondary clarifiers, a biological nutrient secondary treatment system, and tertiary disk filtration to help further reduce total phosphorus loading to the river. The city is also upgrading the ultraviolet disinfection system to serve the entire plant—approximately 1,390 million litres per day. The expansion includes Canada's first municipal full-scale example of pre-processing digestion using thermal hydrolysis process (THP), to hydrolyze secondary sludge prior to anaerobic digestion. This process will increase biogas production to be processed with a new four-megawatt turbine for energy recovery and production.

The project also added components to protect critical infrastructure from river

Consulting Architect: Stantec

Other: Hanscomb (owner's design stage cost consultant)

Funding: Public

and overland flooding, and flooding from too much sewage. "We were literally just starting this project when the flood June 2013 happened," Roberts said. In response to damage incurred during the Calgary flood, the project added a flood berm and new in-bed diffuser outfall that will replace the open channel outfall where the treated sewage exits back to the river. "You go from an enclosed conduit and having one big discharge to one that gets buried below the river bed where you separate it into hundreds or thousands of smaller ports that diffuse the discharge across the entire river width," he said. The new system increases the diffusion of the effluent, prevents water from backing up the system during flood events, and has significant environmental benefits.

Detailed design for the expansion is underway and initial construction work should start in 2016. Phase 1 and 2 are scheduled to be completed by 2022.

82 North End Sewage Treatment Plant Biological Nutrient Removal Upgrade

\$569.4 million

NEW

Location: Winnipeg, Manitoba

Owner: City of Winnipeg

Project/Construction

Manager: KGS Group
(owner's advocate/consultant)

Legal: Blake,
Cassels & Graydon

Funding: Public

• **Provincial**

\$195 million

• **Municipal**

\$374.4 million

The Province of Manitoba has issued the City of Winnipeg an Environment Act License requiring the treatment of nutrients (such as nitrogen and phosphorus) among other requirements at this treatment facility. The implementation of a nutrient-removal process will require a major plant expansion and, given the age of the infrastructure and the complexity of phasing the construction, several new facilities will be constructed. The addition of wet weather treatment processes associated with combined sewer overflow control must be considered in the overall nutrient-removal process design and operational effluent disinfection for wet weather. The upgrade is to be completed by December 2019.

83 Annacis Island Wastewater Treatment Plant Expansion \$550 million

NEW

Location: Delta, British Columbia

Owner: Metro Vancouver

Engineer: Brown and Caldwell (lead) with Stantec, EIC Solutions, and Klohn Crippen Berger; Hatch (tunnel design)

Contractor: North American Construction; Kenaidan Contracting (computer control system and laboratory building)

Other: JJM Construction and Geopac Inc. (prepare the ground and relocate utilities)

Funding: Public

• **Municipal**
\$550 million



Credit: Metro Vancouver

When this Stage 5 project by Metro Vancouver is complete, the Annacis Island facility will serve 1.5 million people in 14 Metro Vancouver municipalities. The previous expansion, Stage 4, was done in the late 1990s, and the plant currently serves much of Burnaby, Coquitlam, Maple Ridge, New Westminster, Port Coquitlam, Port Moody, Delta, Surrey, Pitt Meadows, Langley, East Richmond, a small part of Vancouver and White Rock. The expansion is to be built in eight stages, with the last stage to be finished around 2036. Stage 5 will add more of the process units

that were implemented during the Stage 4 upgrade; however, this stage will now include a LEED-certified office building for the control staff and will be designed to meet regulations related to earthquake requirements set by the 2010 National Building Code.

“Where Stage 4 was built to a seismic standard of a 1/475 earthquake event, the new 2010 Building Code upgraded this to a 1/2475 event,” said Jeff Chan, Metro Vancouver’s division manager for wastewater treatment plant liquid waste services. The new requirements had

implications for site preparation, with measures related to ground hardening since the motion of an earthquake can cause saturated soils in a riverbed to liquify. Chan said the current expansion added between 8,000 to 9,000 seismic stone columns to reinforce the earth. The design will also meet new requirements for sea and river level rise due to climate change. “We had to position the treatment plant at an elevation level that would allow us to continue to discharge into the river by gravity under rising seawater level conditions,” Chan said.

“ I’m excited to build on Maxxam’s position as scientific leader in the industry. We will continue to provide award-winning data quality and defensibility to our clients and regulators. ”



Maxxam welcomes Donna Garbutt as new Chief Executive Officer

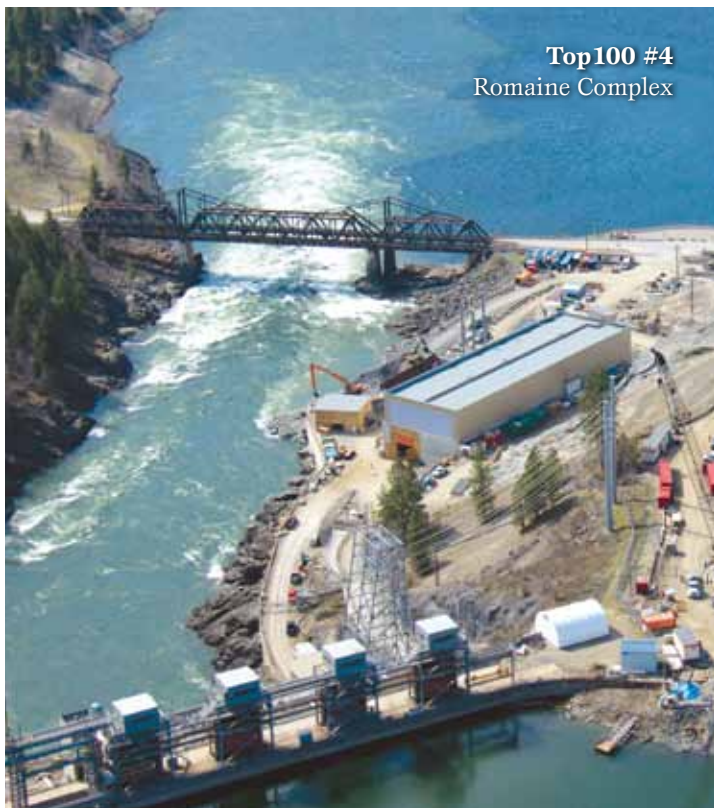
Donna brings a wealth of experience to Maxxam. Most recently, she held executive management positions for Schlumberger, including President of Schlumberger Canada. Donna is taking over from Jon Hantho, who successfully positioned Maxxam to take advantage of long-term growth opportunities and to continue to deliver strong performance for customers and employees.

For more information about Maxxam and Donna, please visit maxxam.ca or follow us on Twitter or LinkedIn.

Success Through Science®
maxxam.ca

Maxxam
A Bureau Veritas Group Company





Top100 #4
Romaine Complex

Top Five Hydroelectric Projects

Hydroelectric generation projects claimed four of the top five spots on the 2016 Top100 list, and topped the total investments made as compared to other energy projects in Canada. Hydroelectricity is controversial, yet it is the backbone of Canadian energy production. Among its benefits, hydropower is highly efficient, renewable, reliable, produces minimal CO2 emissions, and its operations have a very long lifespan. Hydro dams are also utilized for flood control, water supply, irrigation, and the reservoirs often provide new recreational spaces. However, large hydroelectric dams also alter the rivers' natural flows impacting water quality, biodiversity, and navigability; and their construction causes flooding of land that reduces forest cover, wildlife habitat, and sometimes First Nations traditions or agriculture. Flooding large areas can also make mercury available up the food chain. Those who are mindful of climate change caution that river flows may not be as reliable as they once were in the future, and that increased evaporation of water in reservoirs will need to be addressed to reduce water consumption.

XCG
Environmental Engineers & Scientists

xcg.com



Toronto • Kitchener • Kingston
Edmonton • Halifax



Since 1990, XCG Consulting Ltd. has provided innovative and practical environmental solutions for our clients in the fields of:

- Municipal Infrastructure
- Wastewater & Water Treatment
- Water Resources
- Site Assessment
- Solid Waste
- Remediation & Risk Assessment
- Hazardous Materials Management
- Training & Operations

Visit xcg.com for more information.

2 Site C Clean Energy Project \$8.775 billion

2015 Rank: 1

Location: Near Fort St. John, British Columbia

Owner: BC Hydro

3 Muskrat Falls Project \$7.65 billion

2015 Rank: 2

Location: Muskrat Falls,
Newfoundland and Labrador

Owner: Nalcor Energy; Emera
(Labrador-Island Transmission Link)

4 Romaine Complex \$6.5 billion

2015 Rank: 3

Location: Havre-Saint-Pierre, Quebec

Owner: Hydro-Québec

5 Keeyask Hydroelectric Project \$6.5 billion

2015 Rank: 4

Location: Lower Nelson River, Manitoba

Owner: Keeyask Hydropower Limited Partnership (KHLP)

28 Renovations to Beauharnois Generating Station \$1.6 billion

2015 Rank: 29

Location: Beauharnois, Quebec

Owner: Hydro-Québec

Top100
Canada's Biggest
Infrastructure Projects

For a look into the
complete Top100 list,
visit top100projects.ca



PENTAIR WATER PURIFICATION

Insist on Genuine Pentair Products



AQUAMATIC · AUTOTROL · FLECK · PENTEK · STRUCTURAL

Proudly Serving the Canadian Market

waterpurification.pentair.com

© 2015 Pentair Water Purification, LLC. All rights reserved.

Providence St. Peter Hospital in Washington has transitioned its grounds into a “healing environment,” including a salmon-rearing wetland.



Lake Ontario provides drinking water for over four million people. The University Health Network and programs like Toronto Region Conservation Authority-led Greening Health Care run programs to reduce hospital impacts on the Lake.



Read about the radioactive contaminants that go down the drain with hand washing at bit.ly/radioactiveWC



Hospital Checkup

Health-care facilities are reducing their footprint in support of a healthier environment.

BY SAUL CHERNOS

HOSPITALS ARE GROUND ZERO for healing the sick, curing disease, and saving lives. So it is unsettling to think of hospitals as less than exemplary stewards of air, land, water, and potentially contributing to human illness. The expression “physician heal thyself” comes to mind as health-care facilities strive to become enlightened users of water and energy and resourceful at managing and limiting toxic emissions.

Gary Cohen was writing a guidebook for grassroots environmentalists in the 1990s when he noticed some hospitals were burning their own garbage and emitting dioxins, mercury, and other pollutants. Realizing hospitals were among his country’s worst polluters, Cohen helped start Health Care Without Harm, which joined a broad nationwide movement that saw the number of incinerators decline from 4,500 to roughly 70 within a decade. A typical challenge, Cohen recalls, involved a Detroit hospital that closed one incinerator in a relatively affluent suburb yet maintained another in an inner-city neighbourhood. “They had

an asthma awareness program and we asked if they were aware how absurd it was that they were raining toxics down on their neighbours at that very same time,” Cohen said. “It seemed crazy that health-care providers were so out of touch with their own environmental footprint that they were actually contributing to disease in the service of their mission.”

Another early success was phasing out mercury in thermometers and blood pressure measuring devices. Health Care Without Harm asked a leading manufacturer to switch to mercury-free alternatives it was already producing. “We pointed out the enormous environmental contamination,” Cohen said. “Mercury being taken up in fish, pregnant women eating the fish, and kids being born with enough mercury in their bodies that it was impacting their brain development.” Rebuffed by the manufacturer, Health Care Without Harm spent a decade steering demand toward safer devices. More recent legislative victories in Europe and a global treaty calling for a

full phase-out by 2020 has energized the organization’s mission to heal health care.

“Hospitals and the health-care sector represent 18 per cent of the (U.S.) economy and are major consumers of fossil fuels, toxic chemicals, and industrial agriculture,” said Cohen, who as president has steered his organization to adopt a collaborative approach with other health-care institutions rather than pointing fingers. “Given that hospitals operate within the Hippocratic oath to do no harm, we’ve been able to leverage their economic clout and their mission to clean up their own house,” he explained, outlining a current effort to help facilities adopt clean energy, reduce waste, procure green products, and source food free of antibiotics and other additives.

The Canadian Coalition for Green Health Care, a key partner, is similarly engaged north of the border. Formed in 2000 by a repertoire of health-care organizations, the coalition helps facilities reduce their footprint. Executive director Linda Varangu recalled an

assignment that predated the coalition to assess the disposal of biomedical waste. "There wasn't a standard at the time," she explained, adding that her research exposed her to a broader picture. "You'd visit a hospital and be exposed to cleaning chemicals that were potentially not that nice. Patients would have disposable products used on them and their hospital food. I saw huge potential for making positive change."

Coalition members now account for 40 per cent of hospital beds in Canada. "Every facility is on its own timetable and is unique in what it can and cannot do," Varangu said. She acknowledged that greening operations can be challenging when budgets are tight. However, the coalition has an ace up its sleeve—the efficient use of water, energy, and other resources can reduce long-term costs.

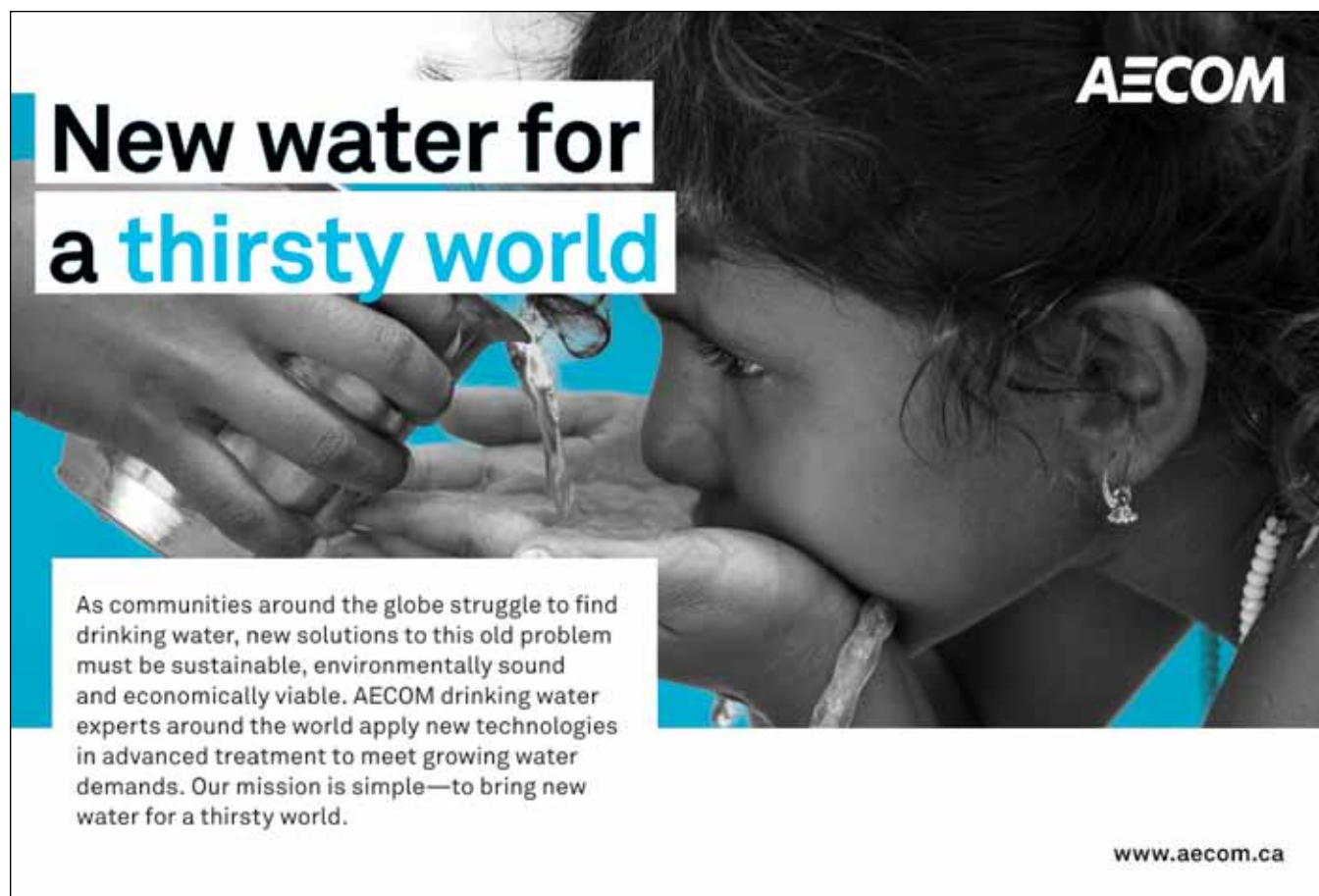
As director of environmental compliance, energy, and sustainability with the University Health Network (UHN), Edward Rubinstein oversees

four merged hospitals in downtown Toronto and knows it's difficult to change old practices. "Hospitals are big and a lot of them are old," he said. "They're energy intense, with high ventilation requirements, so that's been a major focus. We've also reduced our consumption of water." UHN has also been prodded from outside. A City of Toronto sewer use bylaw mandating pollution prevention planning "encouraged us to better document chemicals being brought into our organization so we could figure out where to focus our attention," he said, adding that UHN has scrubbed some chemicals, including nonylphenol ethoxylates, which are used in industrial laundry detergents yet are bioaccumulative and toxic to aquatic organisms.

While hospitals across North America have made considerable if inconsistent strides to pacify local sewer systems, no mechanisms exist to prevent pharmaceutical residues from

being flushed down the drain when patients shower or use the bathroom. Pharmaceuticals in waterways are a long-standing concern. In 2011, Water Canada reported on research by Dr. Sébastien Sauvé at McGill University, who examined the brain tissues of brook trout exposed to a mixture of St. Lawrence River water and treated effluent from the City of Montreal. Looking for biomarker signs from antidepressant and antipsychotic medications, team members measured a slowed response in the brain tissue when exposed to the effluent. More recently, in 2014, researchers measured trace levels of metformin, ranitidine, and hydrochlorothiazide in southwestern Ontario waterways, and an Environment Canada assistant deputy minister disclosed to a senate committee that more than 165 individual pharmaceuticals and personal care products had been found in water samples nationally.

Wayne Parker, professor of civil and environmental engineering



AECOM

New water for a thirsty world

As communities around the globe struggle to find drinking water, new solutions to this old problem must be sustainable, environmentally sound and economically viable. AECOM drinking water experts around the world apply new technologies in advanced treatment to meet growing water demands. Our mission is simple—to bring new water for a thirsty world.

www.aecom.ca

at the University of Waterloo, has characterized effluent from hospitals and long-term care facilities and found pharmaceutical levels from institutions fractionally elevated over amounts in regular sewage. However, washrooms and bathing are unavoidable, so he said the best approach is properly disposing of surplus medications and prescribing only when truly needed. There's also the question of whether to treat institutional wastewater at-source before releasing it to the sewer system or discharging it directly. "Sewage treatment plants will remove some compounds," Parker said. "Acetaminophen is relatively well biodegraded in sewage treatment, but some other compounds don't tend to be very well removed in traditional plants."

Health Care Without Harm's Gary Cohen said a couple hospitals in Europe use constructed wetlands to filter their greywater prior to discharge into municipal systems. In North America, Kiowa County Memorial Hospital in

Greensburg, Kansas, uses bioswale filtration to address impurities in rainwater and in laundry, shower, and lavatory greywater. Providence St. Peter Hospital in Olympia, Washington, uses natural ponds to filter stormwater and has also cut its water consumption by 60 per cent over the past decade. However, facilities director Geoffrey Glass said filtering wastewater is costly and wouldn't offer the kind of long-term cost savings achieved by reducing water and energy consumption. "It would be a huge expense, and we have a very sophisticated sewage treatment plant in our water district," he said. "It would have to be mandated by a water authority before we would elect to do it."

Wetlands can work well where there's room. Providence St. Peter is enviably situated on well-preserved second-growth forest. However, Linda Varangu and Gary Cohen say hospitals are largely focused on the financial and operational constraints health providers routinely

face on an ongoing basis. "There are some real leaders who have undertaken great initiatives, and others who still need help," Varangu said. Cohen sees the road ahead as continuing the same struggle—getting across the message that health care isn't just about treating people with chronic disease, it's about supporting healthy communities. "It's a transition from a sick-care system to more of a community wellness strategy—that's a huge challenge." **wc**



Saul Chernos is a Toronto-based writer and frequent Water Canada contributor.



Read about hospitals, water, and radioactive waste, at bit.ly/RadioactiveWC



Aquatech's dewatering, pumping, filtration & dredging solutions are designed to meet the technical and environmental challenges our clients face in the construction, mining, industrial and municipal sectors of the industry.



Follow us on Twitter @AquatechDPP

1-877-907-7852 | AquatechDewatering.com

PUMPING • DEWATERING • FILTRATION • DREDGING

TORONTO • OTTAWA • LONDON • SUDBURY

24/7 EMERGENCY Response



OSPREY SCIENTIFIC INC.
SINCE 1994

HORIBA "LAQUA" Twin B-700 Series Compact Meters

pH • Conductivity (EC) • Sodium Ion (Na+) • Potassium Ion (K+) • Nitrate Ion (NO3-) • Calcium Ion (Ca2+) • Salt (NaCl)

LAQUAtwin's easy, reliable and quick measurement of these 7 parameters bring new dimension to your water quality testing.

- Accurate reading from only a single drop, in a few seconds.
- pH, conductivity, ions and salinity, 7 parameters, 9 models.
- Calibrate and measure at the touch of a button – the Smiley face will tell you when the result can be read.
- LAQUA twin is fully waterproof and dustproof. (IP67 rated)
- Carry case comes standard for handy portability

1-800-560-4402
www.ospreyscientific.com
sales@ospreyscientific.com

Innovation Uncorked

Cave Springs Cellars' solution to wastewater

BY NATHANIEL DAVID JOHNSON

AN INNOVATIVE water treatment system installed at Cave Springs Cellars is the first of its kind in a food and beverage company in Canada and a “pretty major achievement,” said Kevin Jones, president and CEO of BLOOM. Jones, Cave Springs president Len Pennachetti, and Wine Council of Ontario president Richard Linley spoke about the BioGill system during an event at the Jordan, Ontario winery.

“The Wine Council of Ontario helped us gain access to wineries,” Jones said, adding that his organization looks at opportunities to drive improvement around resource management, including water and wastewater. He said all wineries face the same problem when it comes to water management: “How do they manage water and wastewater in a more cost effective and sustainable way?”

A pilot project was proposed, and at a Wine Council sustainability committee meeting, Cave Spring's winery operations manager, Dave Hooper, stepped up and volunteered to host it. “We had a small, very poorly designed wastewater system,” Hooper said. “We'd let organic matter settle and deal with it the best we could. It was also right in the middle of our production area. I was tasked with coming up with a new system. It was a real challenge. We also wanted to get of the stink from the wastewater that was going stagnant.” The pilot project saw BLOOM, EcoEthic, and Australia-based BioGill team up with the winery, and Hooper said it showed good results. The winery, which is unique in that it is on a municipal water-wastewater system, faced a surcharge from Niagara Region when the biological oxygen demand—the amount of dissolvable carbon in water—in wastewater exceed 350 ppm.

“That surcharge is what drove Cave Springs to look at an improved system,” Jones said. “With the BioGill system, the discharge is pretty close to clean water going into the sanitary system.”

“Our biological oxygen demand was in the 6,000-ppm range, and we saw it go below 350 ppm and even as low as 21 ppm, which is very low,” Hooper said.

The family-run winery will now put less of a load on the region's sanitary sewer system.

Construction on the BioGill system, housed in the winery's basement, started in April 2015, and the unit was first turned on on October 27. Based on the pilot project, Hooper said results won't be known for at least six weeks and tweaks will be made along the way. “We don't have a sense of how it's working yet, but we can play with and expand this system,” he added. *wc*

Nathaniel David Johnson is a freelance writer and photographer in Port Colborne, Ontario.

Credit: Nathaniel D. Johnson



Cave Springs Cellars winery operations manager Dave Hooper talks about the BioGill wastewater system installed inside the Jordan, Ontario winery. The system recently went into operation and is the first of its kind in Canada.

Credit: Nathaniel D. Johnson

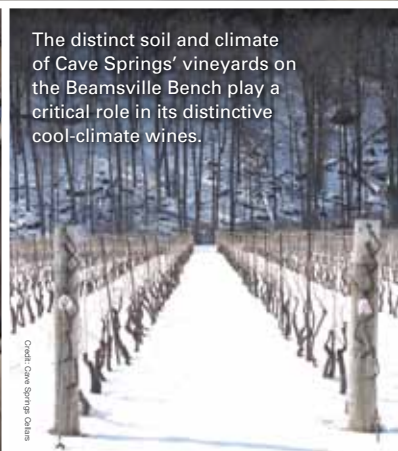


Wine barrels stored at Cave Springs Cellars.

Credit: Nathaniel D. Johnson

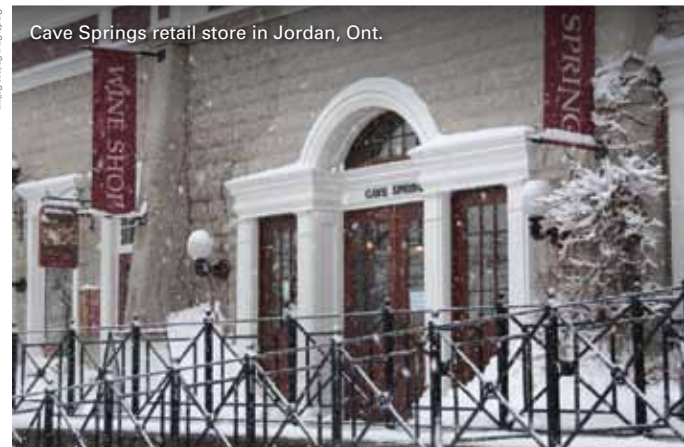


One of the BioGill chambers inside Cave Springs Cellars.



The distinct soil and climate of Cave Springs' vineyards on the Beamsville Bench play a critical role in its distinctive cool-climate wines.

Credit: Cave Springs Cellars



Cave Springs retail store in Jordan, Ont.

Some bacteria that are capable of causing serious disease are becoming resistant to the most commonly available antibiotics.

Path of Resistance

Are Canadian wastewater treatment plants impacting the persistence of antibiotic-resistant bacteria?

BY KARA NEUDORF

SINCE THE DISCOVERY of penicillin by Alexander Flemming and its clinical introduction in 1941, antibiotics have been used to successfully treat infectious diseases in millions of people and reduce patient mortality. The golden age of antibiotics occurred between the 1940s and '90s, when the majority of the antibiotics we use today were

discovered. However, the current reality is that bacterial antibiotic resistance has become an increasing threat to public health. The battle to mitigate this resistance is a global problem and is compounded by the fact pharmaceutical companies have curtailed investment into the development of new antibiotics.

Antibiotic misuse and overuse in

the health-care sector and agricultural industry has led to the development of antibiotic-resistant bacteria in several sectors and environments. The severity of the threat has been observed in recent outbreaks of antibiotic resistance, such as the multidrug-resistant shigellosis outbreak in the United States and Puerto Rico between May 2014 and February

Complete Solutions. Clear Value.



OPERATIONS & MAINTENANCE

CAPITAL SOLUTIONS

RESILIENCY PLANNING

CAPITAL FINANCING

2015. There have been efforts to help control the misuse of antibiotics, such as the European Union's policy to improve the regulation of clinical prescriptions and the use of antibiotics in animal husbandry. However, they often do not consider other potential reservoirs for antibiotic-resistant elements, such as agriculture, health-care settings, and wastewater treatment plants.

Breeding grounds for growth

Excreted gut bacteria, which include antibiotic-resistant bacteria, are transported to wastewater treatment plants through domestic sewer lines. The rich organic nutrients within a

specifically designed to remove emerging contaminants like antibiotic residues and antibiotic-resistant bacteria. Upgrades to facilities present the ideal timing to investigate the magnitude of antibiotic-resistant bacteria in different treatment plant effluents and explore options for mitigating release of antibiotic-resistant bacteria. It is essential we identify the role of the treatment process and how it could be promoting antibiotic resistance.

Understanding the risk

A multidisciplinary research team—including Rob Jamieson and Lisbeth Truelstrup Hansen from the University of Dalhousie; Anthony Tong from Acadia University; and Chris Yost from the University of Regina—was assembled to study this issue in wastewater treatment plants in Nova Scotia, Saskatchewan, Prince Edward Island, and Nunavut. The specific plants were selected in

include biological nutrient processes will be studied, and the team will examine samples throughout multiple treatment processes. Sampling in Regina will occur before and after a treatment plant upgrade to allow for a comparison of different treatment options using the same influent source. The research will also monitor the presence of antibiotic-resistant bacteria and genes in water systems receiving effluent discharges to assess the risk of human exposure to antibiotic-resistant pathogens after wastewater has left the treatment facility. In Nunavut and Prince Edward Island, for example, the treatment plant effluent is discharged into coastal bays where fishing and clam harvesting occurs.

Overall, this study will help us understand where and how antibiotic-resistant genes could persist in wastewater treatment facilities and the risk they pose to human and environmental health. This study will also help identify wastewater treatment processes that mitigate the release of these materials into the environment and will contribute to advancing our abilities to protect water security in Canada. WC

It is essential that we identify the role of the treatment process and how it could be promoting antibiotic resistance.

wastewater plant are ideal for microbial growth—ripe to provide conditions that facilitate transfer of resistance genes within microbial communities. Therefore, wastewater plants can facilitate the development of antibiotic resistance in pathogens.

Throughout Canada, there are thousands of wastewater plants that service different types of communities and employ various treatment processes. Recent improvements to treatment plants have focused on nitrogen and phosphorus removal, but the infrastructure is not

order to investigate different waste inputs and treatment processes. The project began in the summer of 2015 and involves collecting influent, effluent, and treatment water samples from the different plants. The abundance, diversity, and nature of the antibiotic resistance genes will be characterized to help identify mechanisms that control or drive the development of antibiotic-resistant bacterial communities in wastewater treatment facilities.

Both primary treatment systems and more complex tertiary plants that

Kara Neudorf is a postdoctoral fellow at Dalhousie University in Halifax.

Follow us at
twitter.com/WaterCanada



Providing sustainable water solutions to Ontario Communities for over 20 years.



TREATMENT, DISTRIBUTION & COLLECTION ENERGY & PROCESS OPTIMIZATION ASSET MANAGEMENT



Plan P

Can Canadian clean-tech save Lake Erie?

BY EVE KRAKOW

HARMFUL ALGAL BLOOMS have become increasingly frequent in Lake Erie. In 2011, the lake experienced its worst cyanobacteria bloom in decades, and in 2014, the City of Toledo, Ohio, declared a state of emergency for 500,000 citizens because of the presence of high levels of algal toxins in the city's drinking water supply. Excess phosphorus is the key culprit.

Given the lake's importance to the 11 million people who rely on it for drinking water, and the broader economic

impacts, governments in Canada and the United States have responded. In June 2015, the governors of Michigan and Ohio and the premier of Ontario signed an agreement to reduce phosphorus inputs to the western waters of Lake Erie by 40 per cent over the next 10 years, with an interim goal of a 20-per cent reduction by 2020. Federally, both countries have committed to updating their phosphorus load reduction targets for the Erie by February 2016. The results of these efforts will be relevant

to decision makers and water managers in other parts of the country, too, as phosphorus management is a key goal in Lake Winnipeg, the Fraser Valley, Lake Simcoe, and other watersheds where water quality is a concern.

Experts acknowledge that to achieve the reductions, more needs to be done to implement best management practices (BMPs) in the agricultural sector, and research continues to determine exactly what practices are most effective. However, contributions from wastewater

treatment plants, stormwater, combined sewer overflow discharges, and other point sources are also important contributors. As plans move ahead to meet the targets, decision makers will need to determine where investments are best placed and it is likely the answers will lead to a multi-barrier approach.

The Upper Thames River Conservation

areas may offer some attractive and innovative opportunities for achieving the new targets.

Sewage Solutions

Philip Abrary, president, CEO, and co-founder of Ostara Nutrient Technologies, said that while older phosphorus removal techniques use chemical precipitants, more modern techniques are biological, involving bacteria that feast on phosphorus. Ostara launched in

2005 with a technology developed at the University of British Columbia that removes phosphorus and nitrogen from waste streams by enabling nutrients to crystallize and grow into highly pure fertilizer granules. The granules are then dried and distributed under the brand name Crystal Green, formulated to release nutrients as plants grow. Abrary

said phosphorus resources are dwindling globally, so recovery is important.

Kevin Litwiller is the director of business development at Lystek International Inc., an Ontario company that enables plants to convert their waste into a federally registered fertilizer product. Developed in 2000 at the University of Waterloo, the Lystek system uses low-pressure, low-temperature thermal hydrolysis, making it simple to operate. He described the technology as an affordable solution that can be used by small or large municipalities and industries. "Instead of ending up with a Class B biosolid, you have a Class A fertilizer, so it doesn't have to be over-applied to land to get value out of it," he said. Their process kills all the pathogens and results in organic material that enriches the soil. A portion of the product can be fed back into anaerobic digesters to make them more efficient, resulting in a lower volume of biosolids and increasing biogas outputs for use as

Instead of ending up with a Class B biosolid, you have a Class A fertilizer, so it doesn't have to be over-applied to get value out of it.

Authority (UTRCA) has been working with municipal and agricultural partners to reduce nutrient inputs into the river since the 1970s. Karen Maaskant, a water quality specialist with UTRCA, said the organization has "been making incremental improvements that have looked good, but 40 per cent is a whole new level." New technologies in these



Sometimes the solution to an industrial problem is as simple as a yet-to-be discovered chemical process




GreenCentre's InnovationHouse is a collaborative portal connecting industry, entrepreneurs, researchers, and investors, which provides access to developing and early-stage chemistry technologies.

At InnovationHouse, industry has a confidential place to submit problem statements, access technology scouting services, and tap into our network of experts.

To join, simply follow a 30-second sign-up process, build your profile, and start collaborating in this interactive online community uniquely suited to your needs.

See for yourself. Sign up for InnovationHouse at gccinnovationhouse.com



An aerial view of Guelph's wastewater treatment plant that includes liquid storage for Lystek-treated biosolids, within the Grand River Watershed that drains into Lake Erie.

CHUCK LYNN

green energy. As well, the final product—liquid fertilizer—is typically injected four or five inches into the soil, greatly reducing nutrient runoff.

Greener greenhouses

Southern Ontario has the largest concentration of vegetable greenhouses in Canada. In its 2014-'15 report, *Small Things Matter*, the Environmental Commissioner of Ontario noted that 65 per cent of sampled greenhouse operations around Leamington, Ontario, were discharging wastewater with nutrient concentrations higher than provincial water quality objectives. Constructed wetlands are the most commonly used method to treat greenhouse wastewater discharge; however, there is potential for

new technologies to play a significant role in addressing greenhouse water pollution. In 2014, a project was announced by the Ontario Greenhouse Alliance, the University of Waterloo, and Ontario-based companies Soil Research Group (SRG) and AQUA Treatment Technologies to examine this water cycle. As part of the project, SRG looked at several demo sites and technologies in Southern Ontario, evaluating their effectiveness for managing and/or recirculating greenhouse wastewater. In a test site flower-growing operation in Niagara Falls, the technology was proven to remove more than 95 per cent of nitrogen and 60 per cent of phosphorous in addition to removing plant pathogens. If commercialized, the new technology

could be a solution for greenhouses that aren't recycling wastewater but want to treat it. The project was funded under the Canada-Ontario Agreement Respecting the Great Lakes Ecosystem.

Braving the storm

The International Joint Commission's LEEP report notes the significant loading of phosphorus into Lake Erie from urban areas, such as pet waste, lawn fertilizers, and the role stormwater plays in water quality impairments. Imbrium Systems is an Ontario-based stormwater treatment company that has developed a product called the Jellyfish Filter that uses membrane technology to filter out debris, oil, fine particles, and a high percentage of particulate-bound

Packaged Water Treatment Solutions for Arsenic, Iron, Man



AdEdge Water Technologies | 1-866-823-3343 | sales@a



An employee of the Lystek Southgate centre samples the market-bound liquid fertilizer.

Lystek technology is now featured in six Canadian facilities and a seventh project is underway in California. This vapour stack is part of the Southgate Organic Materials Recovery Centre in Southgate, Ontario.



pollutants, including phosphorus in residential, commercial, or industrial settings. The company has also developed a Sorbtive Media product that looks like coarse sand specifically designed to absorb and retain large amounts of dissolved phosphorus. Applications include green roofs, trench filters, rain gardens, permeable pavements, and proprietary filter systems. The technology allows developers to maximize land use.

"The majority of our work is in urbanized areas, either redevelopment or new construction," Imbrium director Scott Perry said. "Our technologies can be applied either in combination with detention ponds or wet ponds, for a treatment train approach, or instead of those systems." Perry said that he

believes a regulatory approach to guide stormwater improvements is necessary.

Remediation-ready

When nutrients have already entered the water body, Ottawa-based WCI Environmental Solutions offers a technology for treating lakes up to several hundred acres in size. Its Enhanced Oxygen System (EOS-2000) is a solar-powered innovation that causes more oxygen to be available to feed the microbes that eat the dead plants and algae, enabling them to continue this process and keep the water clean, instead of letting organic material build up.

Joseph Kennedy, the company's president, said microbes are nature's cleaning force. "Healthy aerobic microbial populations

are required for healthy soils and water," he said, adding that maintaining a highly aerobic state locks up the phosphorus present at the bottom of the pond or lake. His company has successfully treated a number of lakes, ponds, and sewage lagoons in Ontario, and has suggested using EOS-2000 to revive dead zones in Lake Erie. He notes that while chemical solutions may offer a quick-fix, they are harmful in the long run. "We need solutions that enhance and support natural processes, so that they're sustainable," he said. **wc**



Eve Krakow is a freelance writer based in Montreal.

ganese, Radionuclides, Nitrate, and Heavy Metals Removal



dedgetechnologies.com | www.adedgetechnologies.com

A man is clearing snow from his skating rink on the Speed River in Guelph, Ontario, Canada. This image is taken from the Heffernan Street foot bridge spanning the Speed River in downtown Guelph.



FROZEN

After a crippling cold spell, Guelph insulated itself to frozen pipe damage with a new frozen pipes policy.

BY LAURA MOUSSEAU AND BRIGITTE ROTH

IN MID-FEBRUARY 2015, Ontario was hit by record-setting low temperatures made worse by severe wind chill. Temperatures of -20°C persisted for weeks and frost depth crept to two metres. Water Services staff at the City of Guelph were suddenly inundated with calls from people who had no water; pipes were freezing all over the city, in both older and newer areas.

In a typical year, the city might receive 20 customer reports related to frozen pipes; but in 2014, the numbers jumped to almost 100, and in 2015, almost 400. This spike was unexpected in Guelph and many other cities in the region. Within two weeks, Water Services' workforce was nearly exhausted by the winter conditions. Between watermain breaks and the ever-increasing customer calls, staff was working around the clock to support affected customers. An emergency operations centre was activated and all non-essential work

was suspended. Staff from other city departments joined in to help develop and deliver support programs and respond to calls, and work continued until the end of April. By the end of the season, the 2015 freeze cost the city \$545,000 and \$80,000 in lost revenue from those instructed to run water as a preventative measure, as well as leaks and water main breaks.

Moving forward

Staff at Water Services held debrief meetings to review the event and identify areas for improvement. The result was a list of more than 50 recommendations and recognition that the city should develop a frozen pipes policy. Staff quickly began working on the policy to define response actions for customer service, resourcing, and how to prevent and manage interruptions.

The policy, approved by Guelph city council in November 2015, includes a

number of programs to prevent frozen pipes and support customers affected by frozen pipes. Policy measures include education and outreach with actions residents can take to help prevent household pipes from freezing, and a more formal prevention program aimed at homes and businesses with a history of frozen pipe issues.

Since Guelph relies on a finite source of groundwater for its water supply, the city cannot direct all residents to run water to avoid freeze-ups as this could create issues with available water supply for day-to-day use and firefighting. Instead, customers with a history of frozen pipe issues are enrolled in a program that directs them to run water if environmental indicators suggest the potential for freezing. At the beginning of 2015, there were almost 150 customers enrolled in this program. Those that enrolled succeeded in avoiding frozen

pipes this past winter. Now, an additional 376 customers, who experienced frozen pipes for the first time in 2015, have joined the program. To improve accuracy and reduce the need for unnecessary water use, Water Services will monitor a refined set of indicators modelled

In 2015, frozen pipes cost the city \$545,000, and \$80,000 in lost revenue.

on information provided by Centre Wellington. This includes tracking cumulative degree days and treated water temperature. If trigger limits are reached in 2016, these 525 customers will be advised to run one cold water tap until the threat of freezing abates.

One change identified through work with the local public health agency is that customers with temporary water

services provided by a hose from a donor neighbor will likely be able to use the temporary supply for both potable and non-potable uses. In the past, the city has not recommended hose water be used for drinking and cooking needs.

Instead, customers with temporary water were provided with vouchers to purchase bottled water. Now, a defined procedure, which includes tests for chlorine residual and water hardness, will mean most temporary lines will provide water for all required uses. Where testing cannot confirm that water is safe to drink, customers will receive vouchers to purchase bottled water.

Formal cost-recovery protocols are also defined in the new city policy. Customers running water as part of prevention activities and customers with temporary lines will be charged basic daily rates as well as a volumetric charge based on their average consumption for similar,

historical billing periods. This protocol is consistent with industry practice, and reinforces the value of water as a resource and of the service provided. **wc**



Laura Mousseau works on communications for Water Services at the City of Guelph and helped develop outreach and education aspects of the Frozen Water Pipe Policy. Brigitte Roth is the quality management services representative for the city and co-lead the development of the policy.



To read the Guelph's policy for frozen pipes, visit guelph.ca/frozenwater

Net Zero Water for Buildings and Sites

Online Training

February 29th to April 22nd

Attend this 8-week online self-paced course and learn how your projects can push the boundaries of sustainable water use.

"The resource materials for this course are fantastic."

- Pliny Fisk III, Co-Director/Co-Founder,
Center for Maximum Potential Building Systems

greenroofs.org/education

Presented by:



Course development sponsored by:




Approved for continuing education units by:








Settling tanks at the G. E. Booth Wastewater Treatment Facility in Mississauga.



Lucyna Mroczek, Ontario Clean Water Agency (OCWA) and Tom Casher, GHD.



Indra Maharjan, OCWA.



Jim Nardi, OCWA.



Experts at the October 22, 2015 roundtable hosted by Water Canada and IESO.



Jeff Riggs, IBM.



Brenda Lucas, Southern Ontario Water Consortium.

Wastewater Wattage

Improving the energy efficiency of wastewater treatment

BY KATHERINE BALPATAKY

LAKE ONTARIO GLISTENED outside the biosolids training room in the G. E. Booth Wastewater Treatment Facility in Mississauga. A group of water experts assembled by Water Canada and the Independent Electricity System Operator (IESO) gathered there to talk about energy efficiency in the wastewater sector.

For the past four years, the IESO saveONenergy program for homes, businesses, and industrial facilities has provided incentives, audits, rebates, training, and support through local distribution companies to boost energy conservation across Ontario. While

certain business sectors and types of institutions have readily taken advantage of the program, other sectors, including water utilities, have not. Given recent signals among federal and provincial governments that more would soon be done to put a price on carbon in order to meet climate change objectives, the need for municipalities to examine opportunities for energy savings has never been more clear.

When asked about the level of energy efficiency in the province's wastewater treatment, the group explained that the range was huge—from massively

inefficient to net-zero usage and everything in between. Given that water treatment and conveyance can consume 60 per cent of a typical municipality's energy budget, one might ask why energy efficiency isn't more of a priority. Shared opinions from the group were that there are no easy fixes, that the capacity to make the necessary changes is not always available, and that the data on energy use and associated costs are rarely made available to those in charge of operations.

"There's no question the focus in wastewater treatment is now on energy," GHD VP Tom Casher said. "However,

it's a very complex road to get there. If, for example, you owned a commercial building and you spent X dollars switching to LED lighting, then you might see a 30-per-cent savings; but in wastewater treatment, it comes down to monitoring and optimizing major electrical equipment like blowers; looking at different treatment technologies like chemically enhanced primary clarifiers to maximize solid loadings to digesters for increased gas production and energy recover; and so on. It's very complicated with no simple answer." Observations made by some of the experts would suggest that a very high percent of wastewater treatment plants outside of the GTA do not have an energy strategy in place. This is largely due to the fact that smaller municipalities have fewer staff who juggle many responsibilities, and staff lack the specialized energy-related training.

Making the business case

Economies of scale can be a challenge for municipalities when they weigh the costs and benefits of upgrading wastewater systems. With energy prices at current values, it can take decades before the savings due to energy efficiency will cover the cost of new technologies. If the system is small and serves a small population, opportunities for savings are fewer, and it becomes even more challenging to justify major investments. "Clients are always looking for the energy bill to go down, but wastewater always varies," Cashier said. "You can actually have your electrical bill go up at a wastewater treatment plant, even though the plant's running more efficiently. So you need to be using more than your electricity bill to assess your energy efficiency." Given that upgrades will eventually be required for all water systems, there is an opportunity to install more efficient equipment—so long as energy is a priority in the procurement process. The group agreed that incentives like those of IESO help make the business case stronger and the risk easier to communicate.

Doing more with what you have

"People used to look at maintenance as a mechanic's role, but now maintenance is viewed as a more comprehensive management of the system, and everybody

has a role to play in supporting energy efficiency," said Jim Nardi, manager of the South Peel wastewater system.

"There is a great opportunity when it comes to optimization, but it requires a lot of work and training and support of the operators," said Lucyna Mroczek, process and energy specialist with OCWA. "[Operators] don't see the energy because they don't pay the bills. So you need to engage them; you need to put the processes in place so everyone is working together so there's incentives for everybody." She added that South Peel didn't expect to save as much money with no capital investment through optimization of their wastewater system—yet her team has saved the region \$8 million in avoided costs since 2010.

Addressing trade-offs

An increased level of public awareness of the importance of wastewater discharge to watershed health has led to a rise in pressures to improve the quality of discharge to keep it "swimmable, drinkable, and fishable." Among municipalities and regulators, there is an upward trend toward tertiary treatment as the basic standard, and even quaternary treatment for sensitive watersheds. However, such improvements to water quality have implications for energy use as well as for cost. In the assessment of various costs and benefits, energy use and the associated costs should be part of the discussion. Such trade-offs also need to be communicated to everyone involved in the decision-making process to ensure any added upfront costs associated with improving energy efficiency are supported.

Measuring up

Although there was general consensus that improving the way data are captured and used can lead to great gains in systems management and maintenance toward greater energy efficiency, there were mixed views on the value of benchmarking energy performance. Comparing the energy use of wastewater treatment plants is difficult because demand is based on many factors, such as the age of the system, technologies in use, operational and maintenance standards, regulatory water requirements (e.g., greater if

**KAESER
COMPRESSORS**

Efficient blower solutions ...



... at the leading edge of technology and performance.



KAESER COMPRESSORS
is one of the largest and most
successful suppliers of air systems,
with about 4000 employees world-
wide.

Our primary goal is providing
exceptional customer service
coupled with innovative products
and progressive system solutions.
With over 90 years of experience,
KAESER is the specialist.

**KAESER's extensive range of
premium products includes:**

- Rotary screw compressors
- Reciprocating compressors
- Portable compressors
- Compressor controllers
- Rotary blowers
- Vacuum pumps
- Compressed air dryers
and filters
- Air Audits & Turnkey Installations

www.kaeser.com

you are operating in Lake Simcoe) and quality of the influent. The American Water Works Association Energy Index for Waste Water Treatment Plants is one convention; comparisons of electricity consumption per volume of wastewater treated, electricity consumption per biological load removed, or avoided energy consumption and costs per

step toward energy conservation.

Agents of change

"I remember the first time I toured a wastewater treatment plant," said Geoff Riggs, business development manager at IBM. "We walked through the control room and there were red lights flashing everywhere; and the guy said, 'Oh, don't

Energy demand in wastewater treatment is based on many factors, such as the age of the system, technologies in use, operational and maintenance standards, regulatory water requirements, and quality of the influent.

year are other conventions that were discussed by the experts. The merits and shortcomings of each depend on their intended use and audience. All agreed that the concept of "benchmarking yourself" over time to understand why the plant was running more or less efficiently is a crucial first

worry about that, it's always flashing red.' This was a great introduction to the world of old-school operations." While there is no replacement for experience and knowledge, the group agreed that the next generation of operators are well educated, keen to utilize new technologies, and mostly aware of energy

efficiency. Anecdotes of the turnover rate of employees in wastewater operations was somewhere in the range of 30 to 50 per cent. "The younger staff are really engaged in energy," Nardi said.

Of course, being interested in energy efficiency is not enough. New and existing operators require proper training and support to use the tools at hand. "I'm always a believer that energy conservation should be a program concept rather than a project concept," Maharjan said. "We have to invest in people, process, and technology. This way, the people get smarter, the process gets smarter, and the technology has become more cost effective."

Next-gen solutions

The roadmap to energy efficiency is different for every wastewater treatment plant and every community. The group discussed many technologies and techniques being used that are currently outside the norm, such as chemically enhanced primary treatment




Innovative. Global. Future-oriented. Experience environmental technologies.



Register now online!
www.ifat.de/tickets/en

May 30–June 3, 2016

World's Leading Trade Fair for Water, Sewage, Waste and Raw Materials Management

Discover the potential of future-oriented strategies, products and services. Come along to the world's leading trade fair for environmental technologies and experience exciting live demonstrations for yourself—of complex processes and applications, machinery, systems and vehicles. Future-proof technology, up-close and practical.

Welcome to IFAT 2016!

IFAT worldwide—Visit the IFAT fairs around the globe:
IEexpo May 5–7, 2016
www.ie-expo.com

IFAT India September 28–30, 2016
www.ifat-india.com

IFAT Eurasia Spring 2017
www.ifat-eurasia.com

IFAT Environmental Technology Forum Africa Autumn 2017
www.ifatforum-africa.com

Follow us on:
 





Information: Canada Unlimited Inc. | Mississauga
 Tel. 905 813 1051 | neeta.correa@canada-unlimited.com



to remove biochemical oxygen demand (BOD), pursuing off-peak energy use, decentralized treatment upgrades, heat/energy co-generation, solar walls, and hydro-turbines. Yet they acknowledged that each comes with its own inherent risks, life-cycle considerations, and timelines for return on investment (which can be considerable). Such decisions require careful, meaningful engagement of operations staff throughout the entire process, as well as education of procurement staff, public works, municipal managers, and city councillors to ensure there is political support for major investments. The group agreed that there is a firm need for groups like the Southern Ontario Watershed Consortium, WaterTAP, and others to connect technology providers with end users, universities, and facilitator groups to enable learning of best practices across municipalities.

The new normal

"There's lots of excellent work going on

by some of the leading municipalities that are driven to conserve energy for whatever reason, to see those opportunities and seize them—whether it's incentives, energy costs, or they are just looking for efficiencies in their systems," said Brenda Lucas, executive director of the Southern Ontario Water Consortium. "I think we need to set the expectation that energy efficiency is business as usual."

"But you have to ask yourself, 'Who's going to get the benefits?'" said Irene Hassas, director strategic partnership and planning with Aslan Technologies. "The public will, of course; however, there is no guarantee that the benefits will be realized at the city level."

Lucas said establishing consistent priorities across municipalities that are integrated within a broader vision for infrastructure planning and funding would go a long way toward raising the bar for ingenuity. "As a province, we should almost expect a municipality to be looking for efficiencies whenever it

comes in for new expansion or upgrade work. We have to make sure that they are asking the right kind of questions," she said.

With political will, modern techniques, and shared learnings across the province, the capacity to conserve energy use across our water systems is there, and the savings could be significant. If the incentive or price signal due to energy prices, taxes is right, with some added support, municipalities have significant potential to achieve greater energy efficiency. **WC**

This article captures ideas shared in the second of two expert roundtables hosted by Water Canada and IESO. The results of the roundtable on opportunities in drinking water treatment and energy efficiency ran in the November/December 2015 issue of Water Canada.



Katherine Balpataky is Water Canada's editor.



SIMPLY THE BEST IN WATER STORAGE!

DESIGN Our bolted RTP (rolled, tapered panel) tank design is unmatched worldwide. It is the strongest, precision tank design that does not utilize cheap web stiffeners.

COATINGS Our LIQ Fusion 7000 FBE™ coating system and application technology is unmatched in water storage applications. It is a **STRONGER SYSTEM THAN GLASS COATINGS** and other epoxy powder systems. It is provided exclusively by one company, Tank Connection.

PRODUCT QUALITY Simply unmatched worldwide. Our facilities are ISO 9001 quality system certified. TC operates 5 storage tank manufacturing facilities in the U.S. and supports over 500 employees. Our storage products and services are requested globally because our quality is recognized as "the BEST" in the industry!

INDUSTRY EXPERTS IN STORAGE We are the leading experts in storage applications with more years of combined industry experience than any other tank company.

FIELD CONSTRUCTION PROCESSES Unmatched in quality and field safety. EMR .59








Request A Quote And "Get Connected" With Real Performance From The Market Leader, Tank Connection!





TANK CONNECTION AFFILIATE GROUP
3609 N. 14th St. • Parsons, KS 67357 • PH: +1 620.423.3010
www.tankconnection.com • sales@tankconnection.com



Calm Before the Storm

Small-town Ontario bands together to get storm ready.

BY ROB WALTON

EXTREME STORM EVENTS are appearing in the media with growing regularity. The reality is that many buildings and their supporting infrastructure are not designed to withstand such events without sustaining damage. After four such extreme rainfall events in Tavistock, Ontario, residents took action alongside East Zorra-Tavistock Township and Oxford County to flood-proof their homes and implement infrastructure upgrades.

In the past 25 years, there have been four extreme storm events causing extensive flooding damage in Tavistock: the first in 1992, then 2002, 2005, and 2006. Rainfall data for these events is not readily available, but the 2005 data captured by the Upper Thames River Conservation Authority calculated it to be a one-in-250-year storm. Property damage was extensive and there were more than 120 insurance claims filed for basement flooding for each event.

Hard lessons

After the 1992 storm, certain infrastructure upgrades were undertaken. The likelihood of such as recurrence was not considered to be high. However, after the 2002 storm struck, the county and township laid plans to work together to address the necessary changes—and there were many. There was a need to prevent storm and sanitary sewer surcharging, disconnect gravity connections from basements to storm

sewers, and manage drainage flows from agricultural lands adjacent to the urban area. Problems identified included a lack of overland flow routes and lot-grading issues. The township started a master drainage plan, and the county reviewed the sanitary sewer hydraulic grade line issues. But none of the infrastructure upgrades were implemented before the 2005 storm hit.

As one could imagine, the public's response was not positive. There were lawsuits from insurance companies representing landowners for the first three storms and all three settled out of court. The public unrest after the 2005 event was high, prompting an immediate response.

As a first step, the township and county pooled resources to hire an engineering consultant to provide residents with recommendations on how to flood-proof their properties. A flood prevention working group, composed of residents, township and county staff, and politicians, was formed to discuss the issues and progress toward solutions. Infrastructure upgrades were kicked into high gear, including public consultation under the Municipal Class Environmental Assessment process.

In terms of the investment made, the cost of the consultant was \$36,000; the township and county split the cost of a plumbing disconnect program totalling \$52,000. The township invested \$2.2 million in drainage system upgrades,

including one major pipe system and two stormwater ponds. The county also installed a third sewage pumping station to divert flows from the two existing stations and reconstructed small areas of the sewage collection system, which cost \$3 million. The total cost for the project was \$5.2 million, putting the cost per property around \$5,000.

Nature's test

On the evening of May 31, 2006, when the flood prevention working group was set to meet at the Tavistock Arena, a storm rolled in at about 6 p.m. It was a very intense storm, with residents reporting up to 175 millimetres of rain. All properties that had implemented the flood-proofing measures of the consultant avoided basement flooding, and there were no insurance lawsuits as a result of this storm.

While the costs for infrastructure renewal related to climate change can look unmanageable, municipalities must take a long-view approach, which considers the costs and benefits—ideally, before the storm hits. **WC**



A car washes away on Janelle Street in Tavistock, Ontario.

Courtesy: Rob Walton



Robert Walton is the director of public works for Oxford County. Tavistock is located at the north end of Oxford County, Ontario, at the headwaters of the Thames River.

Water Power

A new spin on an old concept expanding hydro-electricity in Ontario

BY NEIL HARRIS AND AARON ATCHESON

GREENBUG ENERGY INC. is taking a “reverse spin” on the concept of an Archimedean screw and has demonstrated that renewable energy investments in Ontario are no longer limited to wind and solar. Archimedes’ screw was invented by Archimedes of Syracuse (287 to 212 BC), an ancient Greek astronomer, engineer, physicist, and mathematician. It consists of a helicoid screw inside of a hollowed pipe and was historically used to pump low-lying water upward, often for irrigation purposes.

GreenBug uses the screw as a power generation mechanism for micro-hydro projects under the Independent Electricity System Operator’s (IESO) Feed-In Tariff (FIT) Program. The micro-hydro projects are strategically located alongside existing water control structure sites, such as dams and locks, to take advantage of existing water level differentials and flow speeds. Where possible, GreenBug has partnered with municipalities through project site acquisition and ownership, giving rise to the possibility of obtaining a per-kilowatt-hour (kW/h) community participation price adder under the FIT Program. The projects range from 60 to 300 kW of estimated capacity and are estimated to generate, at minimum, an internal rate of return of eight per cent. Under the FIT Program agreement, the length of the power purchase for these hydro-power developments is 40 years, as opposed to wind or solar that have a length of 20. This improves the financial viability of the projects in the long term, which is attractive to investors.

Hydro is not without its challenges. An assessment of the riparian rights of neighboring property owners is required, and in most cases, the proponent must work with the Ministry of Natural Resources and Forestry to secure access rights to the project site. This can be a slow and daunting process. Further, a FIT application itself is not an easy beast to manage. Thus, the involvement of legal counsel experienced in the area of water power is vital to ensure FIT application approval. GreenBug has one FIT waterpower project under development and numerous other applications under review by the IESO.

GreenBug was recently awarded the 2015 3M Environmental Innovation Award, an annual award established by the Royal Canadian Geographic Society in 2009, for their innovation contribution to environmental change. *wc*



Neil Harris and Aaron Atcheson practice within Miller Thomson LLP’s national projects group, with a focus on renewable energy projects. Miller Thomson represents GreenBug on its Ontario projects.

Credit: GreenBug Energy Inc.



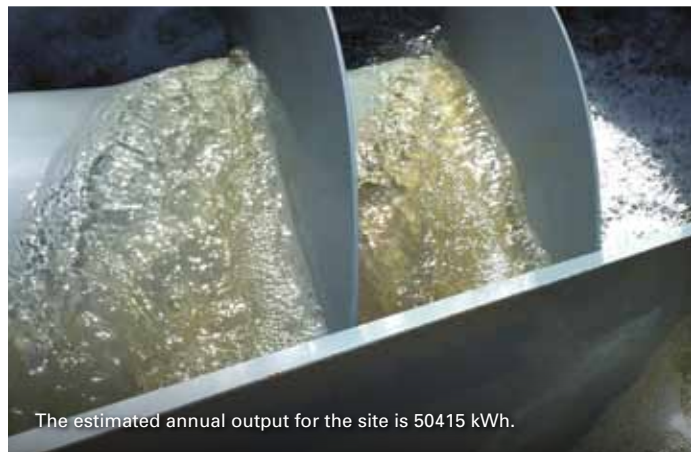
Brian Weber, VP Operations standing at water exit end of screw generator at Fletchers Horse Farm



The Fletchers Horse World had an old mill building and dam on the property that was last used to produce DC electric power a long time ago.



GreenBug’s Archimedes screw systems encompass site-specific designs for the flow regimes of the and grid connection.



The estimated annual output for the site is 50415 kWh.

Awash with Opportunity



Logs floats near
Beaver Cove
on Northern
Vancouver Island.

Ensuring the sustainability of British Columbia's new water law.

BY OLIVER BRANDES, DEBORAH CURRAN, AND ROSIE SIMMS

BRITISH COLUMBIA has a once-in-a-lifetime opportunity to significantly improve its water law and management regime. In May 2014, the province enacted the *Water Sustainability Act*, which provides an unprecedented opportunity to modernize British Columbia's water laws. While the act has several promising features, many of the critical details of the legislation have yet to be developed. Effective supporting regulations and ensuing implementation are needed to put the "sustainable" in the *Water Sustainability Act*.

A recent report from the POLIS Water Sustainability Project, *Awash with Opportunity: Ensuring the Sustainability of British Columbia's New Water Law*, provides an in-depth analysis of the act and the five core regulations required to bring its sustainability aspects into full effect:

1 Groundwater licensing

When the province brings the act into force, it will license and apply pricing to nondomestic groundwater use for

the first time. For British Columbia's groundwater regulations to be successful, the province must:

- Address Aboriginal water rights and title and consultation obligations;
- Begin filling in the many gaps in data on British Columbia's groundwater resources; and
- Issue initial groundwater licences with five-to-10-year specified end dates until it is established that existing uses are sustainable.

2 Environmental flows

Environmental flow regimes provide the foundation for healthy and functioning aquatic ecosystems and the human communities that depend on these ecosystems. The act adds a host of new ways to protect environmental flow regimes, including the requirement for decision-makers to consider the environmental flow needs of streams in licence decisions. Leading jurisdictions

protect environmental flow regimes through specific standards and regulations—an approach that ensures that the process for considering flows is transparent and that thresholds are ultimately enforceable.

3 Monitoring and reporting

Systematic water monitoring and regular water use reporting are essential to assess aquatic ecosystem status and maintain an accurate understanding of existing water diversions in relation to water availability. For monitoring and reporting regulations to be effective, they must require licence holders to:

- Play a more substantial role in data collection, including providing baseline data on water quality and quantity; and
- Monitor withdrawals and regularly report that information to the province.

4 Water objectives

Land-use activities in British Columbia,

including mining, forestry, and energy projects, have an array of impacts on water quality and quantity. The act has the potential to better integrate water issues into land-use decisions through the new authority it creates to set water objectives through regulations. For water objectives to be effective, they must be specific and measurable, and required for consideration by all relevant decision-makers, legally enforceable, regularly reviewed, and specifically linked to ecological function and ecosystem health.

⑤ Planning and governance

Water and watershed planning is critically important to articulate a sustainable vision for a watershed and its future uses. The act includes a comprehensive planning regime, with water sustainability plans and their ability to provide tailored solutions to regional issues at its core. Critical to success is not only to develop such plans but also to implement them. Governance provides this important link to translate plans into action.

- The act contemplates the possibility of shared and delegated decision-making, which offers significant potential for improved partnerships, co-governance with First Nations, and innovative decision-making.

- This potential must be fulfilled by government committing to completing three water sustainability plans and piloting innovative watershed governance arrangements within the first five years of the act coming into force.

Water Law Reform: An Ongoing Process

Fully implementing the *Water Sustainability Act* is an important step toward improving water stewardship and water governance in British Columbia. But implementation is just the first step in a much longer path. In partnership with First Nations, licensees, watershed organizations, and other stakeholders, the province will ultimately need to continue to evolve its water law regime and approach to

governance, to ensure water resources are sustainably managed and shared equitably—now and into the future. WC



Oliver Brandes is the co-director of the POLIS Project on Ecological Governance. Deborah Curran is Hakai professor in environmental law and sustainability at the University of Victoria and program director with the university's Environmental Law Centre. Rosie Simms is the water law and policy researcher/coordinator for the POLIS Water Sustainability Project.

Waterproof Security

Protect your water assets with Wilson Bohannon rustproof padlocks. They've been securing water and wastewater operations for over 150 years.

www.padlocks.com
(800) 382-3639



Download **FULL ISSUES** and **ARTICLES** from past editions.



library.actualmedia.ca

WaterPOD Containerized Treatment Units



Small footprint water treatment units designed for the removal of heavy metals and other contaminants from drinking water.



www.adedgetechnologies.com



The **BCWWA** is an industry association that provides:

- Operator training
- Cross connection control certification
- Events & seminars
- Job board
- Quarterly magazine
- Advocacy for the industry

Become a member today!

www.bcwwa.org



**Innovative
Technology You
can Depend on**

Filter Housings

Filter Cartridges

Systems & Components

Contact Mia

our Canadian sales specialist
mia@neologicsolutions.com
860.615.9848



Your NDE experts since 1972



WATER MAIN INSPECTION
Find out how our tools are used to inspect your water mains.



**WASTE WATER
PIPELINE INSPECTION**
Find out how our tools can help save you money.



**NUCLEAR PLANT COOLING
WATER PIPELINES**
Find out how safe your pipes are.

**“Good Decisions Start
with Good Information.”**

1-800-661-0127
PICACORP.COM

Stormwater Treatment

Jellyfish® Filter Manhole



Features and Benefits:

- Small footprint & fewer cartridges
- Low driving head (18-inches or less)
- High treatment flow (5 l/s per HI-Flo cartridge)
- Qualifies for LEED credits
- Rinseable & reusable cartridges
- Verified Field Performance

Jellyfish Filter is manufactured and sold under license:

Ontario – Hanson Pipe and Precast Inc.
(519)-622-7574
Quebec – Lecuyer (514)-861-5623

For Sizing or Design Assistance contact us at: info@imbrumsystems.com
Tel: 888-276-8626



BiOMaxx
WASTEWATER SOLUTIONS
The Evolution of Wastewater

- Complete Package Wastewater Treatment Plants
- Low Operational & Maintenance Costs
- Small Footprint; Ideal For New Or Retrofit
- Removal of TSS, TP, TKN, BOD, CBOD & FOG; FULL Regulation Compliance
- Automatic Wet Well Washers; Odour & Corrosion Control
- Full Wastewater Flow Monitoring & Assessment

The Single Source Solution for All Your Wastewater Needs

#1-7163 Vantage Way,
Delta, B.C. V4G 1N1
TEL: **604-940-5556**
TOLL FREE: **1.855.940.5556**
www.biomaxx.ca

BLACK & VEATCH

Black & Veatch knows the best and most advanced ways to clean, move, control and conserve water. That's what makes us world leaders in water.

50 Minthorn Blvd
Suite 501
Markham, Ontario
905-747-8506

www.bv.com/water

TOP QUALITY



F-440 F-550 F-400N

Variable Area Flowmeters
QUALITY • FUNCTION • PERFORMANCE

Blue-White Industries, Ltd.
5300 Business Drive, Huntington Beach, CA 92649 USA
fax: 714-894-9492 • sales@blue-white.com
714-893-8529 • www.blue-white.com

Top100
Canada's Biggest
Infrastructure Projects

The 2016 report is now available!

Attend the gala dinner in **Toronto** on **Feb. 25**.
For details contact elena@actualmedia.ca

top100projects.ca

BODY GLOVE
WATER FILTER SYSTEMS
FILTERED. CLEANER. BETTER.
www.bodyglove.waterinc.com



CERTIFIED FOR WQA SUSTAINABILITY

- Certified by the Water Quality Association •
- Sustainable Management by Manufacturer 3M •
- 70% Recycled Product Packaging •
- Biodegradable Shrink-Wrapped Labeling •
- Unique and Easy Recycle Program for Used Cartridges •

WaterInc.com

WATER CANADA
THE COMPLETE WATER MAGAZINE

Water Canada has access to an audience of more than 30,000 water leaders across Canada.

Reach the decision makers in key markets.

Contact us today.

Lee Scarlett
Associate Publisher
e: lee@watercanada.net
t: 416-444-5842, ext. 114

watercanada.net

THE VOICE OF CANADA'S
MUNICIPAL WATER &
WASTEWATER SERVICES

**ARE YOU
A MEMBER?**

Why We Need You

We are stronger with you than without you! If we are to speak on behalf of the utility sector in Canada, the more members we have, the more powerful our voice. And you need to have input into what we are saying on your behalf.

**WHY WAIT?
JOIN TODAY**

www.cwwa.ca/membership



Already a member?
Sign up for
our newsletter
www.cwwa.ca/newsletter

www.cwwa.ca info@cwwa.ca
T. 613-747-0524

1010 Polytek Street Unit 11,
Ottawa, ON, K1J 9H9

RULES & REGS



Ashley Rivers, supervisor of pump houses and lift stations for the City of Yellowknife, shows the interior of a membrane filter.



Water treatment plant operator Blaine Kelso completes maintenance on a membrane filter rack in Yellowknife.



View of Great Slave Lake, Yellowknife, from the roof of the water treatment plant.

Northern Exposure

The costs of delivering water services in the Far North.

BY DAVID ALBISSER AND CHRIS GREENCORN

LET'S FACE IT—designing, building, and continuously operating reliable, affordable, and sustainable water and wastewater systems anywhere is challenging. In Canada's Far North, however, this challenge is magnified several times over. Remote and harsh environments demand robust solutions, yet experienced cold climate engineers, affordable contractors, and skilled operators are routinely in short supply. The challenges of operating water services in the North are many:

- **Depth of frost penetration:** Because of the deep cold penetration, most linear infrastructure is in the frost zone, which can cause freeze-up problems. To combat this, the City of Yellowknife recirculates water in both mains and private water services 24 hours a day with six pump houses. However, the constant circulation adds to the complexity of the system.

Extreme care and attention is placed on the design, replacement, and extension of the water system. If not done properly, it could leave "short circuits" or "stagnant water" in the system. Water that is not circulating or moving creates a high potential for freezing and increased maintenance costs.

- **Permafrost and differential settlement of infrastructure:** Many areas of town have unstable ground conditions due to the freeze and thaw of permafrost. This creates various maintenance issues for both the potable water and sewer systems.

- **Maintaining 2°C:** Yellowknife heats water to maintain a 2°C temperature throughout the system to minimize the potential for freeze ups. The costs to achieve this temperature increase are significant.

- **No easy fix:** A repair completed during cold weather is almost double the cost of a repair completed in the warmer months. In many cases, ground-thaw equipment is needed to excavate a pipe for repair or replacement. Cold weather is harder on equipment, which can lead to breakdowns and affects response time to breaks.

- **Length of exposure:** Northern climates consist of long, cold winters and short summers. Average yearly temperatures range from -1°C to -5°C in the southern reaches of the region. This length of exposure naturally increases operation and maintenance costs as workers are operating under freezing conditions over 50 per cent of the calendar year.

There is no doubt that for the past few decades improvements in water and wastewater infrastructure have benefited many Northern communities—in part due to regulatory demands. However, strict and inflexible regulations have also put Northern communities in a position of non-compliance. There is pressure to resolve the problems at hand, yet neither the financial nor human resource capacity to do it.

The unique challenges of operating and maintaining water and sanitary sewer systems in Northern climates makes delivery of those services a challenge. Robust yet simple engineering solutions are needed. Operators require frequent training and education, administrative competence and support, and political backing. There is also a need to better educate community members about the unique challenges associated with Northern infrastructure and the associated costs to deliver what many southern Canadians consider basic services. **wc**



Chris Greencorn is the director of public works and engineering for the City of Yellowknife. David Albisser is the water and waste services manager for the City of Whitehorse.



The green choice

Our industry-leading trenchless watermain solutions provide a green alternative to open-cut.



BEFORE **AFTER**

1,500 km
of
underground
watermain
restored

Not a single tree uprooted





On average, FER-PAL saves

18,950⁺ tons
of **greenhouse gases** annually

Stay ahead of the curve with FER-PAL

p: 416-742-3713 e: info@ferpalinfrastructure.com
ferpalinfrastructure.com

SAVE THE DATE

Don't miss the Canadian Water and Wastewater Association's 2016 events

WINDOW ON OTTAWA
JUNE 8-9, 2016



ALBERT AT BAY SUITES HOTEL, OTTAWA, ON

Hear the latest on federal and national initiatives impacting the water and wastewater sector.

THE NATIONAL WATER & WASTEWATER CONFERENCE



NOVEMBER 13-16, 2016

MARRIOTT EATON CENTRE, TORONTO, ON

WWW.CWWA.CA

APPOINTED



Rob Gledhill

Blue-White Industries recently elected **Rob Gledhill** as company president. Rob has been with the company for more than 25 years and has had experience in all phases of production and marketing. He was instrumental in the development and launch of Blue-White's Pro-Series and Proseries-M lines of metering pumps and flowmeters.

Matrix Solutions Inc. has appointed **Daron Abbey**, M.Sc., P.Geo., **Sam Bellamy**, P.Eng., **Henri de Pennart**, Ph.D., P.Biol., and **Manas Shome**, Ph.D., P.Eng. as principals of the company. Daron Abbey, principal hydrogeologist, provides technical leadership in the areas of problem conceptualization and evaluation of risk-based studies. Sam Bellamy, principal water resources engineer, is an expert in the development and application of hydrologic and integrated



Daron Abbey Sam Bellamy Manas Shome



surface/groundwater models. Henri de Pennart, principal scientist, specializes in environmental impact assessments, integrated monitoring programs, and aquatic spill. Manas Shome, principal water resources engineer, is an expert in hydrology and hydraulic engineering and frequently services as an expert witness at regulatory hearing.



Dianne Saxe

The Environmental Commissioner of Ontario team has welcomed the newly appointed Environmental Commissioner, Dr. **Dianne Saxe**—chosen with unanimous agreement of Ontario's Legislative Assembly. Her appointment took effect December 1, 2015. Saxe is one of

Canada's most respected environmental lawyers, with 40 years' experience in environmental law and litigation. She has been rated as one of the world's top 25 environmental lawyers, according to Best of the Best, 2008, as well as Toronto's first Environmental Lawyer of the Year, according to Best Lawyers. As a certified specialist in environmental law, and the only practitioner with a Ph.D. in environmental law, she is considered Canada's leading author on environmental law, and is an acclaimed public speaker. Awards have included the Ontario Bar Association Distinguished Service Award and the Osgoode Hall Lifetime Achievement Gold Key.

Yukon Premier **Darrell Pasloski** has appointed **Loralee Johnstone** as the new chair of the Yukon Water Board. "Loralee Johnstone brings many years of experience working with industry as the YESAB manager in Mayo, and on the board of YESAB where she worked closely with First Nations and Yukon communities as



she conducted assessments of numerous high profile developments,” Pasloski said. “We will look to her to lead the Yukon Water Board through the exciting challenge of implementing the Mine License Improvement Project with our First Nations partners.” Johnstone’s tenure as board chair commenced on December 11, 2015.

HIRED

City of Guelph CAO **Ann Pappert** announced the selection of **Scott Stewart** as the city’s new deputy



Scott Stewart

CAO of infrastructure, development, and enterprise services. Pappert said, “Scott is an accomplished senior municipal leader with a proven track record. He is known as a consultative and collaborative leader and a champion of strong relationships with community, business and stakeholders. His experience is broad and includes

transportation, planning, building, business, capital works, engineering, and waste management.” Prior to joining the City of Burlington, Stewart spent more than 22 years in municipalities across the Greater Toronto and Hamilton areas including Hamilton, Peel Region, Mississauga, and Brampton.

AWARDS

World-renowned Canadian polar marine mammal scientist **Dr. Ian Stirling** has won the Weston Family Prize for Lifetime Achievement in Northern Research. For more than 40 years, Stirling has studied the ecology and behaviour of arctic marine mammals, particularly polar bears, which has led to a new era of ecological understanding of the Arctic. Stirling was presented with the \$50,000 prize at ArcticNet’s 2015 Annual Scientific Meeting, the largest annual gathering of Arctic researchers in Canada, held this year in Vancouver. Geordie Dalglish, director of the W. Garfield Weston Foundation



Ian Stirling

and chair of its Northern Committee, said his research “has led to findings that are significant to the preservation and management of arctic marine mammals.” The annual Weston Foundation prize, launched in 2011, recognizes a leading northern researcher in natural science and is the largest award of its kind. The Weston Family Prize is administered by the Association of Canadian Universities for Northern Studies.

water's next awards 2016

Celebrating Canadian water leaders and champions

watersnext.ca  @WatersNext

Join us next year in Toronto on June 23, 2016.

Nominations for Water's Next 2016 opened on October 30, 2015.

To participate, contact Lee Scarlett

P: 416-315-2042

E: lee@watercanada.net

Thank you to our 2015 sponsors



2nd Canadian German Conference on Water and Wastewater Management

Toronto, ON

On November 24, 2015, the Canadian German Chamber of Industry and Commerce (CGCIC) hosted a conference to discuss innovations in water and wastewater management at the Ontario Investment and Trade Center in Toronto. **Anna-Lena Gruenagel**, senior manager of business development at the CGCIC and **Rob McMonagle**, senior advisor of the Green Economy at the City of Toronto, welcomed participants. **Lora Field**, a senior

advisor at the Ontario Ministry of Economic Development, Trade and Employment and **Fritz Holzwarth**, managing director of Wasser Berlin e. V. shared their views on recent policy developments affecting water utilities. Panel discussions moderated by **Katherine Balpataky**, editor of Water Canada, **Kevin Jones**, president and CEO of BLOOM, and **Peter Gallant**, president and CEO of WaterTAP explored case study examples of innovation.



Guests and speakers of the Canadian German Conference on Water and Wastewater Management visits the Sherbourne Common Park.

Credit: TK

“Talk is relatively inexpensive. Action takes more real effort both of mind and of pocket book, and is usually less noisy.” —Arthur Latornell

2015 A.D. Latornell Conservation Symposium

Alliston, ON

In the grand tradition of A.D. Latornell Conservation Symposiums, the 2015 event, in Alliston, Ontario, delivered another action-oriented program aimed at advancing environmental conservation across Ontario. The theme for 22nd conference was “Weathering Change: Navigating a new climate.” Speakers, technical sessions, and exhibitors showcased some of the best practices of conservation authorities, consultants, technology providers, researchers, and students for addressing resiliency to climate change. The event continues to advance Arthur Latornell’s leadership and vision.

LATORNELL
CONSERVATION SYMPOSIUM

Weathering Change

THANK YOU PARTNERS

THE LATORNELL CONSERVATION SYMPOSIUM WISHES TO
ACKNOWLEDGE OUR 2015 PARTNERS WHOSE GENEROUS
SUPPORT MADE OUR EVENT POSSIBLE

Partners include:

- RBC Foundation
- RBC Blue Water Project
- Conservation Ontario
- University of Guelph
- Water Canada
- Ontario (Ministry of Natural Resources and Forestry)
- Ontario (Ministry of Agriculture, Food and Rural Affairs)
- Hutchinson Environmental Sciences Ltd.
- alset
- Notawasaga Inn Resort
- A.D. Latornell Endowment Fund
- EcoHealth Ontario
- Forests Ontario
- IBC Insurance Bureau of Canada
- Burnside
- Ontario Biodiversity Council
- Notawasaga Foundation
- Ducks Unlimited Canada
- vanEssen Instruments

WWW.LATORNELL.CA



Water Technologies Symposium 2016

April 6 - 8, 2016, Fairmont Banff Springs

Registration is open!

Building on the enormous success of the previous eight Water Technologies Symposiums, the Environmental Services Association of Alberta (ESAA) is pleased to announce WATERTech 2016 — the 9th annual Water Technologies Symposium. WATERTech 2016 will be the premier water technology transfer event for environmental professionals.

Details and agenda are available on the website
www.esaa.org/watertech

Sessions this year will deal with the following topics:

- Water Resources and 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
 - Oilsands Waste Issues
 - 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
- ... and special streams dealing with Hydraulic Fracking Water Issues, Water Conservation and Urban Development.

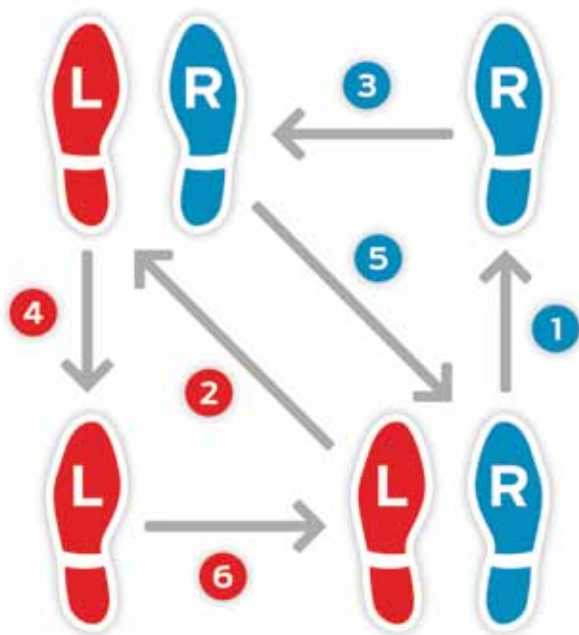


THE *Fairmont*
BANFF SPRINGS

www.esaa.org/watertech

ENVIRONMENTAL SERVICES ASSOCIATION OF ALBERTA
ESAA 

The Shoal Lake Shuffle



While governments have sidestepped responsibilities for Shoal Lake, the community has endured one of Canada's longest-standing boil water advisories. BY EVA PIP

WHEN THE AQUEDUCT for the City of Winnipeg's water supply opened in 1919, the water quality was arguably one of the best in the world. Drawn from Shoal Lake, on the Manitoba-Ontario border, the water showed many desirable characteristics of a near-pristine Precambrian Shield basin: low total dissolved solids, low nutrient levels, and low to undetectable levels of pollutants like heavy metals and synthetic organics. The approximately 150-kilometre-long aqueduct was an engineering marvel, and the 90-metre altitude difference between Shoal Lake and the lower elevation of Winnipeg allowed for a gravity feed system that did not require pumping. It was well worth the \$17-million cost. For nearly 100 years, the water received only minimal treatment—it was screened, chlorinated (after 1937), and fluoridated (after 1956).

At the time, the water source was considered to be too remote to require much protection. There was no road access and only a small service railway line to the area. The area was sparsely populated by First Nations people, yet it is they who unwittingly inherited an injustice that persists to this day.

During the initial construction, the course of the Falcon River, which drained dark boggy waters into Shoal Lake near the aqueduct intake, was rerouted and

a dyke was constructed to prevent the discoloured waters from entering the aqueduct. First Nations Band No. 40 was cut off from the mainland access, and although a road was promised, it remains just a promise to this day. Meanwhile, human activities around the lake and larger watershed, such as cottage development, logging, gold mining, diamond drilling, and agriculture, have had unavoidable consequences for the lake. By 2009, a full-scale water treatment plant opened to supply Winnipeg with treated water. Forgotten in the chronicle was Shoal Lake Band No. 40, which has now endured a 17-year boil water advisory, and has been forced to use bottled water on an indefinite basis.

Water quality in Shoal Lake is not what it used to be. Nitrogen and phosphorus from watershed activities spawn periodic noxious and toxic algal blooms. Coliform bacteria often exceed safe levels. The protozoan parasites *Cryptosporidium* and *Giardia* appear unpredictably and are resistant to chlorination—the cysts must be filtered out or boiled. Dissolved organic matter from logging runoff creates turbidity and depletes dissolved oxygen. But all of these pale in comparison with the next looming threat: the zebra mussel, now indisputably present in nearby Lake Winnipeg.

Less than five per cent of Shoal Lake is in Manitoba. The situation makes for a political morass of interlocking jurisdictions and protocols. The City of Winnipeg controls the immediate vicinity of the aqueduct. Various departments in ministries in both Manitoba and Ontario hold responsibilities for the lake. The federal government oversees First Nations affairs, and the International Joint Commission, which oversees international treaties with the United States, is involved because Shoal Lake is replenished from the Lake of the Woods system at Ash Rapids. The result is a century-old jurisdictional tangle. There are sundry agreements, such as a Shoal Lake Tripartite Agreement and the Shoal Lake Watershed Management Plan.

But at the end, Shoal Lake Band No. 40, which is surrounded by water, cannot drink it. **wc**

Eva Pip is a professor at the University of Winnipeg, specializing in water quality. She has been researching water quality in Shoal Lake since 1983



Progress for Shoal Lake!
Read about it:
bit.ly/ShoalFreedomWC

CORROSION 2016

Collaborate. Educate. Innovate. Mitigate.

March 6-10, 2016 | Vancouver Convention Centre | Vancouver, BC, Canada



The **World's Largest Corrosion Conference & Expo**

Exhibitors at **CORROSION 2016**

- **Build** key business partnerships with **7,000+ decision makers**
- **Reach** new audiences from **70+ countries** across **15 unique industries**
- **Showcase** your products, services, and technology alongside **400+ companies**
- **Gain** increased **exposure** through company listings **online and in print**

To reserve your booth space, visit [**nace.org/exhibit3**](http://nace.org/exhibit3)

Awarded One of TSE's **Fastest 50 Growing Tradeshows**

Trade Show Executive's
FASTEST 50
AWARDS & SUMMIT

OFFICIAL MEDIA PARTNERS



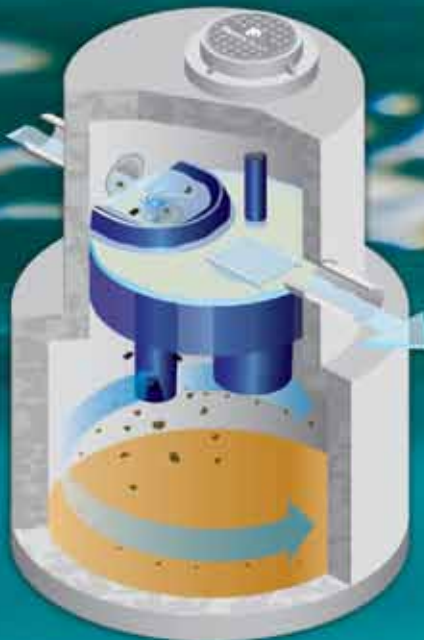
CoatingsPro



**The fastest way to determine the most appropriate size
Stormceptor® for your site.**

PCSWMM for Stormceptor

New Online Stormwater Design Software



Stormceptor® – the recognized leader in stormwater treatment – now supported with online sizing software that is based on the U.S. EPA's Storm Water Management Model.



- Localized rainfall data allows for region-specific designs
- Unit sizing based on your specific site conditions, including a variety of particle size distributions and targeted removal %
- Easy-to-use online system allows for a quick turn around
- Summary report includes projected performance calculations. Specification and standard drawings are also available online.

Start using the FREE PCSWMM for Stormceptor software today.

www.imbrium.com/PCSWMM
(888) 279-8826 | (416) 960-9900

