THE COMPLETE WATER MAGAZINE

SEPTEMBER/OCTOBER 2014

WATER CANADA

Time to Pay

Municipalities Get Creative to Finance Infrastructure

Can P3s Save Our Water and Wastewater Systems? (page 10)

Small Towns Chart New Pathways to Viability (page 14)

$8.00

WATER CANADA.NET

Could Canada Feed a Hungry World?

Global food demand is set to double by 2050, but the availability of fresh water is on the decline. With 3,300 km^3 of annually renewable water, Canada is one of only five countries in the world that can significantly expand its agricultural exports. Can we unlock this economic potential by developing a strategic approach to the way we use and manage water? The Blue Economy Initiative thinks so and outlines how Canada can do it responsibly in ***Better by the Drop***.

Issues explored

- Canada's most productive food-growing regions are our driest—and getting drier. Will we be able to expand production there?
- Based on water availability and the economic return on "water" investment, which crops should we grow and where?
- Some countries target certain crops for domestic production and decide what they'll import based on water availability. What lessons are there for Canada?
- Water for food, or water for fuel? What's the global impact of this trade-off, and what role can Canada play?
- Which regions are getting the "crop-per-drop" ratio right?
- What impact would an increase in food productivity have on the long-term health of our fresh water systems?

About the authors: Hans Schreier is a professor in the Faculty of Land and Food Systems at the University of British Columbia. Chris Wood is a journalist, author, and editorial consultant.

The Okanagan Valley produces **$85 million in wine grapes** and other fruit per year

Agriculture uses **70% of the water** in the region

Canadian beef production = about **$4.3 billion annually**

Southwestern Alberta is one of our **most productive**, but **driest regions**

Alberta produces **73% of Canada's beef**

Saskatchewan and Alberta produce **83-88% of our wheat**

Wheat takes **1,500 l/kg to produce,** compared to beef, which takes **16,000 l/kg**

Water levels in many rivers in the southern Prairies **are declining**

Brought to you by:

RBC Blue Water Project

CANADIAN WATER NETWORK
RÉSEAU CANADIEN DE L'EAU

Better by the Drop includes seven recommendations for how Canada could develop a deliberate and co-ordinated framework to guide our use of fresh water resources for food production. **Hungry to read more?** Download the full, complimentary report at **blue-economy.ca**

SEPTEMBER/OCTOBER 2014
VOLUME 14 NUMBER 5

WATER CANADA

THE COMPLETE WATER MAGAZINE

FEATURES

CONVEYANCE

WASTEWATER

DRINKING WATER

WATER RESOURCES

COLUMNS

DEPARTMENTS

canadian water summit 2015

June 25 Vancouver, BC

Save the date!

Next year the 6th Annual Canadian Water Summit will be held in beautiful British Columbia. To submit your presentation ideas and topic suggestions, please send an email to the CWS15 Advisory Committee via laura@watersummit.ca

The 2015 Advisors include Oliver Brandes, Robert Haller, Lorne Taylor, Anna Warwick Sears, Ingrid Stefanovic, and Wally Wells.

The 2015 prospectus is now available online.

Contact Todd Latham for information on exhibiting and sponsorship at 416-444-5842, ext. 111 or todd@actualmedia.ca

For pictures and presentations from the 2014 Summit in Toronto, visit watersummit.ca

Produced by:

actualmedia

innovolve group

Thank you to our 2014 major sponsors:

RYERSON UNIVERSITY
Everyone Makes a Mark

RBC
RBC Blue Water Project™

IBM

ONTARIO CLEAN WATER AGENCY
AGENCE ONTARIENNE DES EAUX

Holland
Let's work together

Coca-Cola Canada

WaterTAP
Technology Acceleration Project

WATER CANADA
THE COMPLETE WATER MAGAZINE

SEPTEMBER/OCTOBER 2014
VOLUME 14 NUMBER 5

EDITOR
Rachel Phan

ASSOCIATE PUBLISHER
Lee Scarlett

PUBLISHER
Todd Latham

ART DIRECTOR & DESIGNER
Donna Endacott

ASSOCIATE EDITOR
André Voshart

ASSISTANT EDITOR
Clark Kingsbury

CONTRIBUTING WRITERS
Roddy Bolivar, Mike Brady, David Caplan, Saul Chernos, Kristen Curtis, Bruce Lounsbury, Martin Lavoie, Whitney Matusiak, Aman Singh, Jennifer Stoneburgh, Adrian Toth, Travis Whiting, Stephanie Woltman

CIRCULATION MANAGER
James Watson, ADPIC
james@actualmedia.ca

ADVERTISING
Lee Scarlett lee@watercanada.net
Todd Latham todd@watercanada.net
Chris Tully chris@renewcanada.net

ADVISOR
James Sbrolla

actualmedia

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

ACTUAL MEDIA INC.
218 Adelaide Street W., 3rd Floor
Toronto, ON, Canada M5H 1W7
Phone: 416-444-5842 Toll Free: 1-877-663-6866

Subscription services: 416-444-5842 ext. 211

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

Printed in Canada.

MIX Paper from responsible sources FSC® C023656

Undeliverable mail return to:
218 Adelaide Street W., 3rd Floor,
Toronto, ON, Canada M5H 1W7

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

A Tale of Water and Woe

BY RACHEL PHAN

UPGRADING OUR NATION'S water infrastructure continues to put pressure on public officials who must balance the need for improvements against limited budgets. According to the 2012 Canadian Infrastructure Report Card, our municipalities need at least $80 billion to upgrade or replace current water and wastewater systems—a whopping number that helps fuel debates over full-cost recovery water pricing. Proponents for both sides of the debate—water as a valuable commodity versus water as a basic human right—are now watching with interest as an extreme case plays out in Detroit.

In late June 2014, the Detroit Water and Sewerage Department (DWSD) was estimated to be $5 billion in debt, leading to water shut-offs for 3,000 account holders every week since March. At one point, half of the city's 323,000 accounts were delinquent—amounting to $89 million owed in delinquent bills. After a month-long moratorium, the city resumed water shut-offs in late August.

While there has been an uproar over Detroit's decision to force water shut-offs, and understandably so, this isn't a cut-and-dried political story about a city out to get its own residents. It's a complex tale about infrastructure and what it takes to maintain and deliver that service. And in Detroit's defence, the city has made it very clear that its end goal is to get residents to either pay their bills or apply for assistance; ignoring the city is not an option.

The strategy can help the city make significant strides in closing its deep financial deficit. Hamtramck, Michigan had a $350,000 water-fund deficit, but after its own water shut-offs in summer 2013, the city's water fund now has a $1.8-million surplus. Detroit itself has collected $2.6 million from overdue water accounts between April and July, a significant increase from $503,000 collected in the same period in 2013.

Detroit's extreme example, however controversial, highlights the need for our municipalities to strike a balance between enforcement and service, and it is imperative that full pricing come hand-in-hand with assistance programs (DWSD currently has more than 17,000 customers enrolled in a payment plan program and has launched a new financial assistance program for the city's indigent population).

When it comes to the water challenges in our own backyard, Canadian communities are exploring alternative financing opportunities of their own to help fill in the water infrastructure deficit. Public-private partnerships are being considered to help fund the gap (*see page 10*), and one rural community in Ontario has spearheaded an innovative program for financing small systems (*see page 17*).

Canadian municipalities have financing options and the time is now to start exploring different funding avenues before the spectre of Detroit is no longer just a cautionary tale for Canadian cities, but a reality. WC

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

For daily news and discussion, visit
@CanadianWater /WaterCanada WaterCanada

FEATURE CONTRIBUTORS

RODDY BOLIVAR
Roddy is a water resource consultant specializing in policy and practice innovation to address water management challenges.
PG 17

JENNIFER STONEBURGH
Jennifer works with MaRS Cleantech, assisting cleantech companies access valuable resources and mentorship to develop disruptive, high-impact businesses.
PG 26

BRUCE LOUNSBURY
Bruce is the CEO of Newterra, a global provider of water treatment solutions.
PG 42

ABOUT THE COVER

Vancouver's Lions Gate secondary treatment plant will meet Canada's first national standards for wastewater treatment—the Wastewater Systems Effluent Regulations (*see page 19*). Smaller municipalities, however, are struggling to come up with the necessary funds to upgrade or replace existing water and wastewater facilities to meet these standards. While public-private partnerships may be the saviour of aging systems in Canada's big cities (*see page 10*), smaller communities must come up with their own innovative solutions to stay afloat (*see page 14*).

NEXT ISSUE: NOVEMBER/DECEMBER

- **Emerging and persisting contaminants**
- **How do we ensure that our water is secure?**
- **Alberta First Nations sue Ottawa over safe drinking water**

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

For daily news and discussion, visit

@CanadianWater

/WaterCanada

COMMENT

Credit: Brian Gartside

A Life-Changing Book

WHAT IF A BOOK could literally save your life?

The Drinkable Book is a compact and innovative water filter that also teaches proper sanitation and hygiene to people in developing countries (*pagedrinkingpaper.com*). It is hoped it can be used to help combat waterborne illnesses, which kill up to 3.4 million people every year.

Costing only pennies to produce the paper, each filter of The Drinkable Book is capable of giving someone up to 30 days' worth of clean water, and each book is capable of providing someone with clean water for up to four years. The technology uses a thick, sturdy sheet of paper embedded with silver nanoparticles, which are deadly for microbes like cholera, typhoid, and *E. coli*. Once water is passed through the filter, the bacteria count is reduced by more than 99.99 per cent, making the filtered water comparable to the tap water in much of North America.

Created by Theresa Dankovich and designed by Brian Gartside, The Drinkable Book first came from Dankovich's PhD project at McGill University, where she explored whether it was possible to use a paper filter to microbiotically purify water.

The duo have since teamed up with the not-for-profit organization WATERisLIFE (WiL) to produce the book. Each page is divided into two 4.5-by-4.5 inch filters, each capable of filtering 100 litres of water. The upper filter on every page is printed in English while the bottom filter is printed in the locally spoken language of the area. All of the words and pictures are printed using edible, food-grade ink.

"We went through several iterations on how to present the information, but ultimately went with a book," Gartside said. "The reason for that is portability. This makes it a perfect solution for remote areas affected by unsafe water, or for areas struck by natural disasters. The book format is an easy way for a single individual to be able to easily carry a large amount of these filters."

Ongoing testing is taking place with a short run of books in Kenya. Depending on how well the books are received by the local population, the team will make any necessary adjustments before rolling out the book in other areas. The ultimate goal of the project is to have a translated version of the book in each of the 33 countries WiL operates. —Kristen Curtis

SOUNDBITE

"I never drink the water."

Chief Ava Hill of the Six Nations of the Grand River on the lack of safe water in her community

FEEDBACK

Re: "Tapping In," July/August 2014:

I read with interest the article written by Ashlee Jollymore entitled "Tapping In," which appeared in the July/August 2014 edition of Water Canada magazine.

Rather than providing an American example of a bottled water ban, it would have been enlightening for Canadian readers of a Canadian publication to understand this issue from a Canadian perspective.

Over the past nine years in Canada since the issue came about, about 160 municipalities, school boards, and colleges and universities have formally rejected calls for bottled water bans while just five boards, 16 post-secondary institutions, and 35 local governments have approved them. Some of those organizations are now reversing their earlier decisions because of health and convenience concerns expressed by their publics.

The total number of boards, institutions, and governments that have considered a ban represents less than 10 per cent of all such entities in Canada. The issue has been in decline for a number of years now. Less than a dozen municipalities and post-secondary institutions are even considering the matter today.

Most elected officials and staff now know that, besides being the healthiest beverage option, bottled water has the highest recycling rate of any single-use, consumer packaged good in Canada, uses less water than any bottled beverage to produce, and is used exclusively at all times by emergency services personnel and the Canadian Red Cross.

—John B. Challinor II, Nestlé Waters Canada

TRENDING

Credit: Melissa Shavik

Nearly 1,000 dead fish were discovered in Prince Edward Island in early August 2014. What killed them? bit.ly/PEIfish

Credit: Government of Alberta

Five highly trained, specialized dogs have been chosen to help Alberta in its fight against invasive mussels—the first undertaking of its kind in Canada. bit.ly/musseldogs

TWEETS

"Interested in #water in #Canada?
You should be reading Water Canada magazine!"

Sarah Boon @SnowHydro

We love hearing from you! Tweet us **@CanadianWater**

Online at WATERCANADA.NET

Credits: Canadian Water Summit

BLOG: David Miller, president and CEO of WWF-Canada, on right, with Water Canada publisher Todd Latham, writes about his experience at the 2014 Canadian Water Summit and the lessons he's learned about water in cities. ***bit.ly/CWSmiller***

VIDEO: Why should Ontario's wineries care about water management? Watch the first video in the BLOOM Centre's four-part series on water and wine in Ontario. ***bit.ly/ontariowine***

BLOG: Canada is at the forefront of an opportunity to become a major player in the global food market. When it comes to agriculture, how should we manage our water resources? ***bit.ly/canfarm***

Here We Go Again

The return of Buy American restrictions in the water and wastewater sectors.

BY MARTIN LAVOIE

CANADIAN MANUFACTURERS of water and wastewater equipment still remember the *American Recovery and Reinvestment Act* (ARRA) of 2009, which imposed strict Buy American restrictions to all projects funded by the federal government. All iron, steel, and manufactured goods used in the construction and repair of public works and public buildings funded by the recovery act must be produced in the United States.

In 2010, both the Canadian and U.S. governments found a temporary solution to this trade issue: the signing of a temporary government procurement agreement, which stated that Canadian manufacturers would have free access to all programs funded under the U.S. Environmental Protection Agency (EPA) and Clean Water and Drinking Water State Revolving Funds. Even more importantly, the two governments also committed at the time to further explore the negotiation of a permanent agreement on government procurements. This would give Canadian manufacturers future protection under the rise of new Buy American provisions.

But with the recent introduction of new Buy American restrictions in the field of water and wastewater, hope has turned into disillusionment.

In January 2014, President Barack Obama signed the *Consolidated Appropriations Act*, which included $2.35 billion in planned spending on U.S. water and sewage treatment infrastructure. While these investments should be good news for Canadian manufacturers, the appropriations bill included provisions limiting the use of foreign-made materials for these projects, ultimately excluding Canadian companies from supplying future water and sewage treatment infrastructure.

In May 2014, the U.S. Congress also passed the *Water Resources Reform and Development Act*. The bill includes a *Water Infrastructure Finance and Innovation Act* that contains Buy American restrictions on iron and steel products. The Buy American language mirrors the provision included in the *Consolidated Appropriations Act*, which included Buy American provisions for the water and wastewater sectors.

The bottom line is that restrictions barring access to U.S. procurements for Canadian manufacturers will always find a way through in the U.S. Congress unless we find a way to cover federal funding to subnational governments in future trade agreements. Domestic politics and strong protectionist views held by many senators and congressmen, combined with intensive lobbying efforts from certain U.S. manufacturers wanting to close competition from foreign companies, will always have more weight in Washington than complaints from the Canadian "best friends and allies."

Canadian Manufacturers and Exporters is now calling on all levels of government—federal, provincial, and municipal—to work together and find an appropriate response to the rise of Buy American restrictions. In our view, the adoption of a reciprocity policy for all large infrastructure projects, from water and wastewater to public transit, would lead to a new round of negotiations between Canada and the United States. and would allow us to address the issues of federal funding and the imposition of Buy American policies. The timing is good now, with the federal government planning to spend more than $50 billion in the next 10 years to modernize Canada's infrastructure through the Building Canada Plan. Without reciprocity, Canadian objections to Buy American policies will always fall on deaf ears. WC

Martin Lavoie is the director of manufacturing policy at Canadian Manufacturers and Exporters.

growth & TRANSFORMATION

Challenging Conventional Approaches and Transforming How We Work

Practitioners • Policy-makers • Business
Government • Researchers

3 FULL DAYS OF PRESENTATIONS/WORKSHOPS/TOURS

LATORNELL CONSERVATION SYMPOSIUM

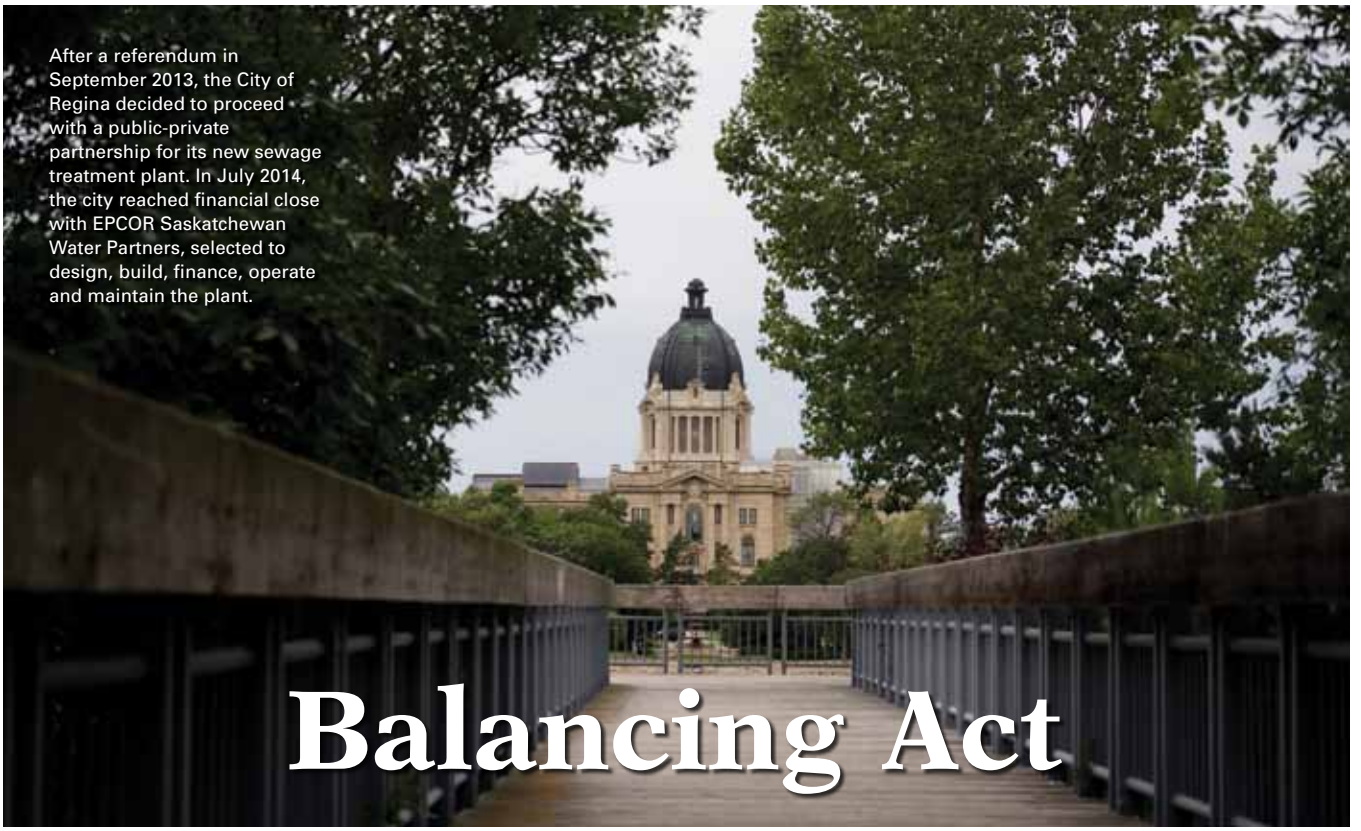
NOVEMBER 18–20, 2014 | ALLISTON, ON

LATORNELL
CONSERVATION SYMPOSIUM

REGISTER NOW

latornell.ca

Water • Watershed Management • Biodiversity • Climate Change • Great Lakes • Ecological Goods & Services



After a referendum in September 2013, the City of Regina decided to proceed with a public-private partnership for its new sewage treatment plant. In July 2014, the city reached financial close with EPCOR Saskatchewan Water Partners, selected to design, build, finance, operate and maintain the plant.

Balancing Act

How public-private partnerships may help repair Canada's water and wastewater systems given the financial dilemma faced by municipalities. BY DAVID CAPLAN

PROPERLY MAINTAINED WATER and wastewater systems underpin our quality of life. Most Canadians are unaware of the poor condition of these systems and the risks associated with our governments' lack of an adequate plan for long-term sustainability. If not addressed, this negligence will cause economic hardship and may also pose a threat to public health and safety and the environment.

In some municipalities, parts of water systems were built in the 19th century, with some dating back as early as the 1870s. In the City of Toronto, for example, half of the water network is at least 50 years old and almost 10 per cent is more than 100 years old. It was reported in May 2014 that 13 per cent of Toronto's drinking water contained unsafe levels of lead due to the dilapidation of water pipes that were installed in the 1950s.

Inefficiencies in our water and wastewater systems are costly. On top of the province's decaying municipal water and wastewater infrastructure, many drinking water distribution systems have leakage rates ranging from 10 to 50 per cent. On average, 25 per cent of every drop of water that is purified and sent through the system is lost through leakage. Municipalities spend a lot of money treating water that will never reach the end user. The impact is multiplied when you consider these systems are the top source of energy consumption for municipalities across Canada.

The risks of continued inaction are troubling. Toxic lead pipes, corroded water pipes, and broken sewer pipes are a potential source of drinking water contamination. Broken water and wastewater pipes can contaminate rivers and lakes, making them unsafe for drinking and recreation and threatening wildlife and fish stocks. Broken watermains often cause disruptions in traffic, significant property damage, and substantial costs.

These risks are not hypothetical or worst-case scenarios, but ongoing problems that currently threaten water and wastewater systems in Canada.

The scale of the infrastructure gap is staggering. Canada's municipal water infrastructure deficit currently sits at more than $80 billion. Many municipal systems require significant capital investments that most simply don't have in their annual budgets.

> The issue we have today is not with who owns what—but more so who pays for what.

So how do we repair an antiquated system given the financial dilemma faced by municipalities?

With a significant need for investment to update aging infrastructure and lack of budgetary capacity in municipalities to fund it, creative solutions are needed. Although many Canadians are (rightfully) concerned about the retention of public ownership over their water and

wastewater systems, solutions that marry the best of public-sector oversight with private-sector financial innovation and technical advances are required.

The question of public versus private ownership of water is divisive. Sustaining and improving water and wastewater systems while retaining public ownership of our water utilities is fundamental to protecting our drinking water and public health. The issue we have today is not with who owns what—but more so who pays for what.

With the financing gap, coupled with the concern over public ownership, how do we inject new capital into a sector that has long shuddered in fear of any private involvement?

Consider the example set by the Province of Ontario. Public-private partnerships (P3s) have been used by the Ontario government to inject private capital into the public health care domain for more than a decade. The result has been remarkable. The gap that once existed between the available public funds and the investments required for new and aging hospitals has decreased dramatically. The government, alongside health-care officials, managed to balance the injection of private financing models with the sensitivity over the public ownership of hospitals and health-care facilities.

P3s proved to health-care officials and local municipalities that they would retain ownership over their health care services and transfer financial and related construction risks over to the private sector. This, in turn, protected the taxpayer and ensured that the system is maintained and kept to a higher standard than what currently exists. The utilization of the P3 model also promotes full-system cost recovery and ring-fencing, which protects consumers from financial instability and guarantees that any money generated by the system stays within it to encourage regular re-investment and renewal.

Both full-system recovery and ring-fencing are critical in making the P3 model work for water and wastewater projects as it will help municipalities deal with the current economic conditions that call for tight budgets and decreased spending. The injection of private financing into the system would promote technological innovation that could make Canada one of the world leaders in clean water technology.

Following this example, Canadian municipalities need to consider adapting the P3 model to close the financing gap that currently exists in the water and wastewater sector. Municipalities like Victoria, Edmonton, and Regina are already leading the way in adapting the model for use in the water and wastewater sector. These municipalities were successful in implementing the P3 model despite fears it would kick-start the privatization of public infrastructure, loosen accountability, and begin the process of monopolizing water and wastewater entities. Victoria, Edmonton, and Regina were all able to prove that the P3 model would ensure the retention of public ownership; increase operational and financial transparency; and promote a fair, open, and efficient bidding process.

Regina consequently approved the use of the P3 model for its water and wastewater systems in September 2013, with 57 per cent of the population voting in support of a referendum on the issue. This process proved that a proper explanation and defense of the P3 model is crucial in the early stages of any project that involves a public utility—especially one as galvanizing as water and wastewater.

Those who are critical of applying the P3 model to public utilities claim the push for profit and a solid return on investment will lead to an increase in water rates, decrease in system reliability, and cuts to vulnerable users. However, properly structured and administered contracts provide protection to municipalities and ratepayers.

Putting aside the argument for P3s, it should be apparent that the water and wastewater systems need immediate attention in Ontario and Canada as a whole. Boil-water advisories, broken watermains, lead toxicity, and E. coli outbreaks will continue to occur if we do not address the antiquated water systems crumbling under our feet. WC

David Caplan is the vice-chair of Global Public Affairs. This article originally appeared in the September/October 2014 issue of ReNew Canada, the sister publication of Water Canada.

Construction of the City of Greater Sudbury's biosolids management facility began in July 2013. The major infrastructure project, which has been in the works for several years, is the city's first public-private partnership.

Credits: City of Greater Sudbury

L-R: Doug Nadorozny, chief administrative officer; Lorella Hayes, chief financial officer/ treasurer; Tony Cecutti, general manager (GM) infrastructure services; Greg Clausen, former GM infrastructure services; Councillor Ron Dupuis; Councillor Dave Kilgour; Mayor Marianne Matichuk; Rob Sampson, president, N-Viro, during the official groundbreaking ceremony for Greater Sudbury's biosolids management facility.

The Rise of Water P3s

Does Regina's P3 referendum mark a new era for water and wastewater P3s in Canada?

BY CLARK KINGSBURY

PUBLIC-PRIVATE PARTNERSHIPS (P3s) are still a relatively new concept in Canada, and employing them to deliver water and wastewater projects can be confusing for the general public. But with Regina's pro-P3 referendum in September 2013, is the public perception of water and wastewater P3s changing?

Looking at current examples from around the country, that certainly seems to be the case. For example, the City of Hamilton is hoping to issue a request for proposals (RFP) for its biosolids project by the first quarter of 2015. The project, which will treat biosolids processed by the city's wastewater treatment, was generally accepted as a P3.

"I think there is a good understanding that this is not just about funding, but a different procurement model that transfers risk and leverages the ongoing creativity and efficiency believed to be more present in the private sector," said Kelly Anderson of the Hamilton Public Works Department in an email. "In our case, the lack of council or community opposition is directly related to open communication between council and staff, which led to a collective understanding as to what P3 funding is and isn't."

Another P3 example is the City of Greater Sudbury, which entered into a P3 agreement with N-Viro, a Canadian-owned private consortium selected to design, build, finance, operate, and maintain (DBFOM) the facility. The city chose a P3 model for its biosolids management facility due largely to a lack of experience in the treatment of sludge. "The ability to transfer the construction and operating risks in an area where the city had no expertise made sense for the community," said Paddy Buchanen, Greater Sudbury's manager of accounting and deputy treasurer. Although the Sudbury project did face opposition from the unions, Buchanen said the protest died down after a few months, as the advantages of the P3 became more apparent.

> "As people begin to see P3 water projects come on stream, what they'll find is they're [being] delivered on time and on budget, and they're just better value for taxpayers."
> —John McBride, CEO of PPP Canada

Both of these projects follow the 2011 completion of the Lac la Biche Nutrient Removal Wastewater Treatment Facility in Alberta, and join projects in Kananaskis Country, Victoria, and Saint John, New Brunswick as examples of P3s being used across the country to fund water and wastewater projects.

While most of these projects have avoided controversy, Regina's referendum is a reminder that water P3s are still a sensitive issue.

Regina deputy city manager Brent Sjoberg said the P3 process gave the city a chance to work with experienced contractors from North America and abroad. The city was also attracted to the potential for innovation offered by P3s and the chance to work with a single consortium over the lifespan of the plant.

Opposition leaders, including CUPE Saskatchewan and Regina Water Watch, saw the proposed plan as a step toward the privatization of water, and worried that a P3 would cost the taxpayer significantly more than a traditional procurement method.

On September 25, 2013, just over 49,000 Regina residents went to the polls, with 57 per cent voting to proceed with the P3, and 43 per cent voting for a traditional procurement process.

Following the vote, the city resumed the P3 procurement process, which had been paused pending the result. Shovels are now in the ground in Regina, and Sjoberg said the plant will be completed by December 31, 2016.

For CEO of PPP Canada John McBride, dispelling rumours and clearly presenting facts is the best way for

municipalities to earn public support for water and wastewater P3s.

"If you went back 10 years ago in the health care sector, it was the same type of misinformation," McBride said. "People thought P3s for hospitals would mean the Americanization of the Canadian health care system. They thought you'd have to bring your credit card to the hospital. That kind of stuff has been proven not to be true, and as people begin to see P3 water projects come on stream, what they'll find is they're [being] delivered on time and on budget, and they're just better value for taxpayers."

McBride said he hopes the Regina referendum will help to move the national conversation away from P3s and toward more pressing questions: Is the project necessary? Can the municipality afford it? What is the most effective method of delivering it?

He contrasted Regina's referendum with Saint John, New Brunswick's Safe Clean Drinking Water project, a massive DBFOM project that has largely avoided controversy. "In the case of Saint John [...] there's no controversy at all," McBride said. "In Saint John, they're frequently under boil-water advisories, they put a significant amount of chlorine in their water; the project is needed! The debate is only about what's the most cost effective way of delivering it."

The Saint John Safe Clean Drinking Water project will include the construction of a 100-million-litres-per-day drinking water treatment plant, three new 11-million-litre storage reservoirs, and a number of other water transmission system upgrades. Although the official cost of the project won't be determined until a private partner has been found, it has been estimated at $220 million.

In an email, a representative from the City of Saint John said that "an extensive business case" [...] "clearly demonstrated that the private-public partnership approach is less costly, less risky, and will yield lower water rates in future years with the capital cost sharing that is available, and result in a substantially lower debt load for the Water and Sewerage Utility."

Although voices of concern have been heard in Saint John, including that of Paul Groody, the former commissioner of Saint John Water, who called pursuing a P3 a "costly, wasteful, avoidable mistake," reception to the model has been widely positive, and may represent a turning point in public perception.

"There's starting to be a critical mass of projects, so people can't say it doesn't work well," McBride said. "P3 is going to be a significant delivery option for water and wastewater. It's going to be another tool in the tool box for delivering water projects." WC

Clark Kingsbury is Water Canada's assistant editor.

Small Towns Thinking Big

How are smaller municipalities charting new pathways to viability?

It's not always about more money for new projects.

BY AMAN SINGH

WHILE CANADA is becoming increasingly urbanized, between 19 and 30 per of the population still lives in either rural or small-town areas. These areas face a very different reality than big city centres when it comes to servicing their citizens. Instead of meeting projected population growth, they face the challenges of upgrading old water and wastewater systems; meeting new standards and regulations for health, safety, and the environment; and providing acceptable levels of service while their population levels decline and the long-term prospects for industry are uncertain.

Unlike big cities, small towns often lack the rate base, ability to pay for qualified help, and the scale to qualify for funding arrangements like public-private partnerships (*see page 12*). So what's a small town to do? Whether it's from source to tap or from the drain back to the river, there are some new approaches being explored—some that deal with the way projects are commissioned or delivered, and others that address the operations side or the system overall.

Consolidation and delegation

One way for small towns to be more like big cities is for a group of them to take a regional approach to managing their water supply.

Robert Haller, executive director at the Canadian Water and Wastewater Association (CWWA) and former manager for the Town of Prescott, recalled complaining to provincial staff that his town was not viable—and being told in response to "get viable." Prescott, a town of more than 4,000 people in Eastern Ontario, found it daunting to come up with even the required one-third to qualify for additional funding to upgrade to a new secondary wastewater treatment plant. However, industry closures left the town with oversized treatment plants.

Haller, who was town manager at the time in 2004, started negotiations immediately with their two neighbouring townships, Edwardsburgh/Cardinal and Augusta, both of which had populations around 7,000 and were turning away industries and jobs because of a lack of water capacity. With Prescott running two plants at half capacity, it looked like a win-win situation. After 10 years and three different town mayors, they have finally overcome political disagreements and arguments over cost-sharing and capital billing to reach a water-sharing agreement. "Having water flow across municipal boundaries," Haller said, "is all part of aligning regional economic interests, and common interests must prevail in the end."

In Atlantic Canada, where populations are both aging and declining at higher percentages than the national average, moves have been made to disband multiple smaller councils and create

Along with limited funds, Cape Breton Regional Municipality also struggles with having numerous small communities, including Dominion (pictured here), and dozens of wastewater outlets that must be combined into just a few treated output sites. The CBRM must now explore new options—including consolidation—to remain viable.

larger regional municipalities. Pursuing administrative efficiencies is not new to the area. Ron Delaney, manager of wastewater operations with the Cape Breton Regional Municipality (CBRM), recounted that the amalgamation—mandated in 1995 by the province—brought 67 small municipalities into the existing regional municipality and saved many of them from declaring bankruptcy. Practically speaking, though, Delaney said he finds he's still wrestling with the reality on the ground, which for him means trying to upgrade and build eight treatment plants to meet strict effluent discharge guidelines set out by the Canadian Council of Ministers of the Environment (*see* "Running Out of Time" *on page 19*). The project covers a vast geographic area and involves the installation of 9.4 kilometres of new collection piping as well as the construction of lift stations and diversion chambers to convey wastewater for treatment to the Battery Point wastewater treatment plant. He has to drive long distances between the various installations, splitting his time and expertise. It's a good case in point that, while consolidation can be effective for administrative purposes, it's not always possible to consolidate actual operations.

However, looked at another way, consolidation in regard to the delegation of operations can be a useful way of increasing the viability of maintaining water infrastructure in more rural areas. It would allow a town to put those cost-savings toward future upgrades instead of maintaining full-time on-site resources.

> Unlike big cities, small towns often lack the rate base, ability to pay for qualified help, and the scale to qualify for funding arrangements like public-private partnerships.

In Ontario, the Ontario Clean Water Agency (OCWA) uses a hub and spoke structure and neutral third-party status to assist with resource sharing. It has the freedom and flexibility to effectively deploy resources, including specialty equipment, without having to come to sharing agreements between all of its clients. OCWA itself can even finance small amounts of short-term capital and can work with Infrastructure Ontario and the Ontario Financing Authority to access low-interest funding.

Unfortunately, "there are no other organizations quite like OCWA in other provinces," said Nick Reid, OCWA's executive director of strategic partnerships. "The closest (would be) SaskWater."

Optimization

Another viability challenge for smaller towns is when decisions around upgrading, replacing, or repairs need to be made with potentially costly solutions. A basic starting point for making good decisions is to ask how much water needs to be produced, how much wastewater needs to be treated, and what the current capacity is. But it's difficult to answer any of these questions without knowing what current assets consist of and what shape they're in.

Neil Thomas, water and sewer engineer at the City of Fredericton and past CWWA president, pointed out that some smaller communities still don't meter all of their customers, and some have never had the resources to do a full in-house inventory, including fire hydrant mapping, record drawings, line drawings, and paper records. To determine how much water a municipality has to treat, if it has an old leaky system and a lot of groundwater gets in, wet-weather flows could be exponentially increasing the amount of water that needs treatment. A better first step in this case might be to explore how wet-weather flows could be reduced. Gathering this documentation could be the beginning of an asset management plan, which could enable both long-term maintenance planning and help to develop longer-term finance and capital plans. While developing a comprehensive asset management plan may seem overwhelming for small operations, it forms the foundation for cost-effective solutions in the future.

In Ontario, OCWA is planning to offer an additional resource to help make efficiency gains. In partnership with the Ontario Power Authority, they currently offer a program to do electrical audits of water and wastewater systems with the goal of identifying areas where demand can be reduced. Those savings can be folded back into facility improvements,

and the process of going through the process review and infrastructure review as part of the energy audit can feed into recommendations for capital planning. In conjunction with this, Thomas said, "OCWA has started an initiative to help with financial planning and rate-setting—based on projections, to help determine viability."

Innovation, emancipation, transformation

Delaney said he hopes the CBRM can become an independent utility like Halifax Water, which would give it the advantage of operating separately from the tax base and removed from local council. It would still need to be held accountable—for example, through a regional water board or provincial review board like the Nova Scotia Utility and Review Board.

In the long term, what might help small communities is a revamp of the funding process itself. Thomas noted the current system, with its mostly one-time project commitments, doesn't incorporate any incentives to truly consider long-term requirements or planning for sustainable operations. And beyond that, it may even encourage communities to overestimate their needs in order to secure a larger amount of money. If a community builds a larger facility than needed, it becomes expensive to maintain and unprofitable to operate when faced with a declining user base.

"Rather than making money available on an *ad hoc* basis," Thomas said, "[federal and provincial levels] should tie it to a requirement to have a long-term asset management plan that includes full-cost recovery."

Provincial funding should also be linked to a thorough examination of all existing operations to ensure any limiting inefficiencies have been resolved and that the utilization is as close to optimal as possible. "Conditions [for funds] need to be tied toward incentivizing change and innovation," Haller said. "Perhaps show that you have considered the regional basis and a life-cycle assessment."

With a move toward collaborative watershed governance in some provinces like Alberta, the timing might be right to pursue how watershed management can be more closely aligned with other regional economic initiatives. A more cohesive vision, combined with changing the criteria to access funding, could be effective if it motivates and assists entities to transform themselves into self-sustaining operations that have the capacity to develop and implement robust asset management plans tied into long-term financial planning. These plans may be assisted by some of the efficiency tactics or structural streamlining already being used in small communities to become—or stay—viable in a landscape increasingly dominated by urban giants. WC

Aman Singh is the manager of business consulting at GHD.

Shared Expense

Introducing an innovative community program for financing small rural systems.

BY RODDY BOLIVAR

ELIMINATION OF long-standing provincial funding in the mid-1990s led the County of Oxford in Southwest Ontario to develop its own funding support program for existing residents—a program funded by the county's existing utility customers.

In the county's experience, the capital cost is always a significant concern for existing residents when projects to provide municipal services to existing communities are considered. In 2001, the county developed the Community Servicing Assistance Program (CSAP). At the time, the program provided a 25-per-cent grant up to a defined maximum of $7,500 per water or wastewater service to owners of existing residential properties where a servicing project was implemented. In 2012, the maximum cost to residents was adjusted to $9,500 per water service and $12,500 per wastewater service, with a yearly inflation increase.

The servicing challenges facing the County of Oxford are, perhaps, typical of rural areas across Canada. Known as the "Dairy Capital of Canada," Oxford's land area is 202,000 hectares and the predominately rural countryside includes a few urban centres and many small villages. Responsible for 18 community water systems and 11 community wastewater systems across eight municipalities, the county has considerable experience with small-systems planning and operations.

Ongoing challenges for Oxford include concerns for aging private well and septic systems, development pressures from outside cities like London and Kitchener, community revitalization and economic development goals, and long-term sustainability of both the water resources that support services and the financial resources that provide those services.

Community focus

Funding for the CSAP originates from the county's existing utility customers. Initially with much discussion, it was decided that existing customers will receive the two following benefits from the program:

- Enhanced groundwater protection for the aquifers servicing the municipal systems by expanding service areas; and
- Improved long-term sustainability of all the county's systems through a larger customer base.

There are approximately 30,500 water customers and 27,500 wastewater customers in the County of Oxford. A modest yearly fee of $10 per water customer and $10 per wastewater customer contributes $580,000 annually to the program reserve fund (approximately two per cent of the total water and wastewater yearly revenue).

Since 2001, 21 projects have been completed, providing services to more than 2,400 properties. The total cost of projects completed as of 2012 is $38.3 million, of which $6.6 million—17 per cent—was paid through the program.

The proportion of program funding to date is indicative of the careful and cost-effective planning of projects completed by the county including

extending systems and use of new technologies, such as directional drilling, variable grade small diameter sewers, and alternative service levels. In some instances, however, servicing costs and associated draws on the program reserve can be high. For instance, the county is currently considering wastewater servicing alternatives in the community of Princeton in the Township of Blandford-Blenheim where, under some alternatives, the total grant amount would approach 50 per cent of project costs.

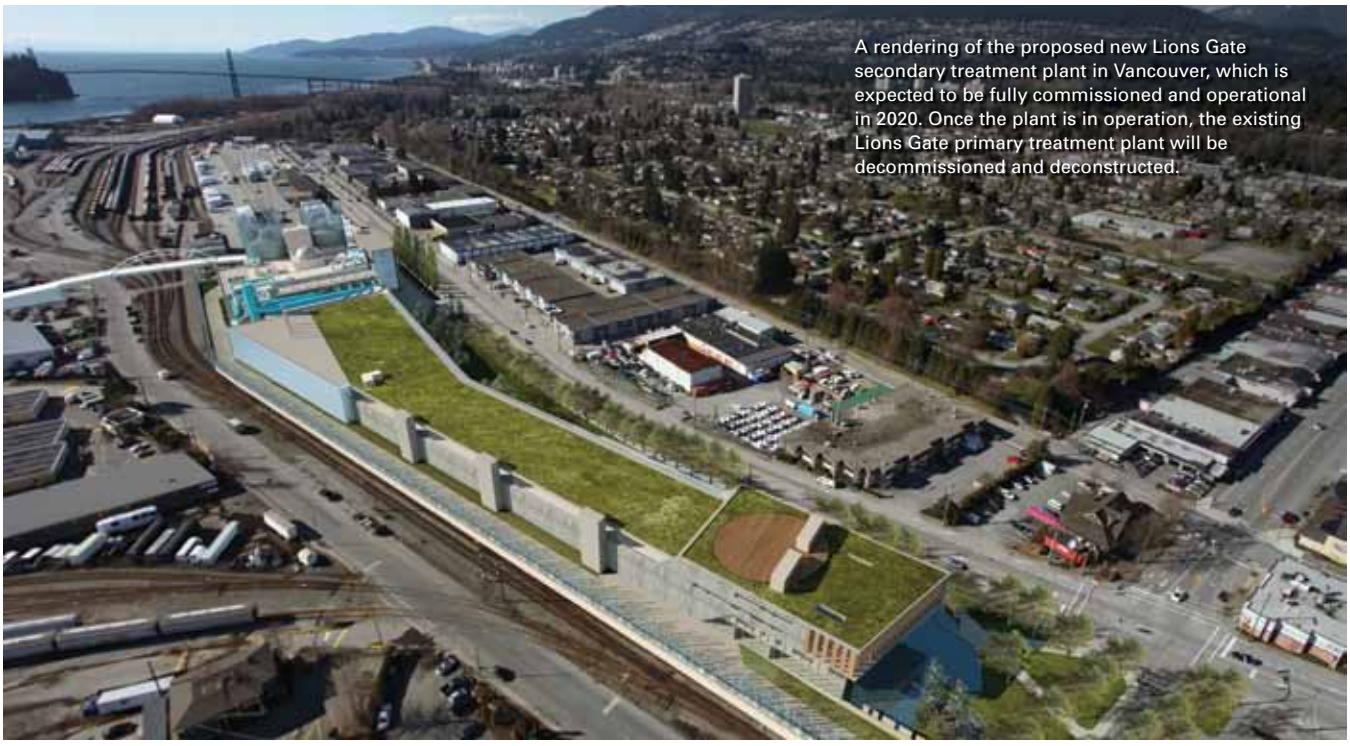
Lessons learned

Implementation and administration of the CSAP along with the new small systems projects and upgrades to the many existing small systems in Oxford have provided many challenges for county staff. The following are lessons learned:

- Even with the grant, affordability is still an issue with residents. The county has developed alternatives for payment of the property owner's share of costs—a lump sum payment within 30 days of notice, payment of 50 per cent within 30 days before financing the remainder over five years with interest, or financing the entire amount over 10 years with interest.
- While capital cost is an important consideration for residents, long-term operating costs are studied carefully by the county and presented to residents as part of the alternatives analysis process. Also, the county has found the total community cost of the do-nothing alternative—individual private system rehabilitation and replacement over time—is a valuable piece of information for a community participating in the decision-making process.
- With a large number of existing systems, extension of transmission/collection capacity across considerable distance is one of the servicing alternatives frequently considered by the county. With a number of transmission mains in place, the county has experienced operational issues, which have required some effort to rectify and contribute to decision-making for new projects.

Like many jurisdictions across Canada, the demand has been very high for extension or standalone decentralized water and wastewater services for the small communities in the County of Oxford over the past 13 years. CSAP, as well as the efficient use of existing infrastructure and new technology and service standards where applicable, have produced several made-in-Oxford solutions to the county's small systems servicing challenges. WC

Roddy Bolivar, P.Eng., is a water resource consultant specializing in policy and practice innovation to address water management challenges.



Credit: Metro Vancouver

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

Running Out of Time

Who's paying to implement the Wastewater Systems Effluent Regulations?

BY WHITNEY MATUSIAK

ON JULY 8, 2012, Environment Canada published the Wastewater Systems Effluent Regulations (WSER) under the *Fisheries Act*, a set of national wastewater effluent quality standards to be achieved through secondary treatment. While Canadian wastewater operators are on board with a national wastewater policy, the question remains: Who's picking up the cheque?

June 30, 2014 was the application deadline for transitional authorizations, described by Environment Canada as "the conditions under which such a system may continue to operate with a risk-based timeline to meet the national effluent quality standards." In other words, it's a compliance snooze button. The clock will begin ticking again in January 2015 with an aggressive WSER compliance schedule attached: 2020 for high-risk, 2030 for medium-risk, and 2040 for low-risk wastewater systems. This gives operators extra time to draft strategy and amend designs, but more likely to find and prioritize funding.

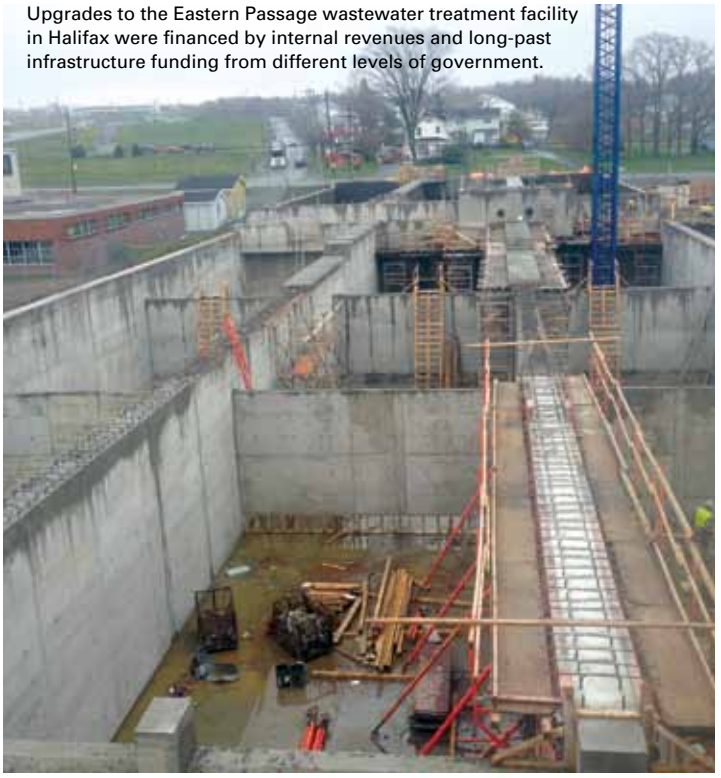
At a national price tag of $5.5 billion over 54 years, Environment Canada estimates the costs to wastewater system owners and operators to be $3 billion in capital costs, $1.7 billion in operating and maintenance costs, and $748 million in monitoring and reporting-related costs. It goes on to say that "while the estimated costs of the regulations are significant, the overall quantified benefits are almost three times this amount, totalling $16.5 billion. This results in a net benefit of $11 billion and a benefit-to-cost ratio of over three to one for the country as a whole." But during the WSER development process, the Federation of Canadian Municipalities (FCM) posed this concern: "The mandate to upgrade wastewater systems comes with no supporting financing."

> "The mandate to upgrade wastewater systems comes with no supporting financing."
>
> —Federation of Canadian Municipalities

Still today, James Campbell, the communications coordinator of Halifax Water, echoed the funding concerns. "We know guidelines and regulations change, and we're happy to comply with those, but there are a number of realities to face when those change," he said. "It's a costly undertaking."

Campbell also highlighted major challenges for coastal municipalities. "[Halifax has] a large harbour here, which historically, for well over 100 years, had been a sewer outfall." This is not uncommon on Canada's coastlines. In the past, there had seemingly been little need for centralized treatment plants along the coastline because dilution seemed to be sufficient.

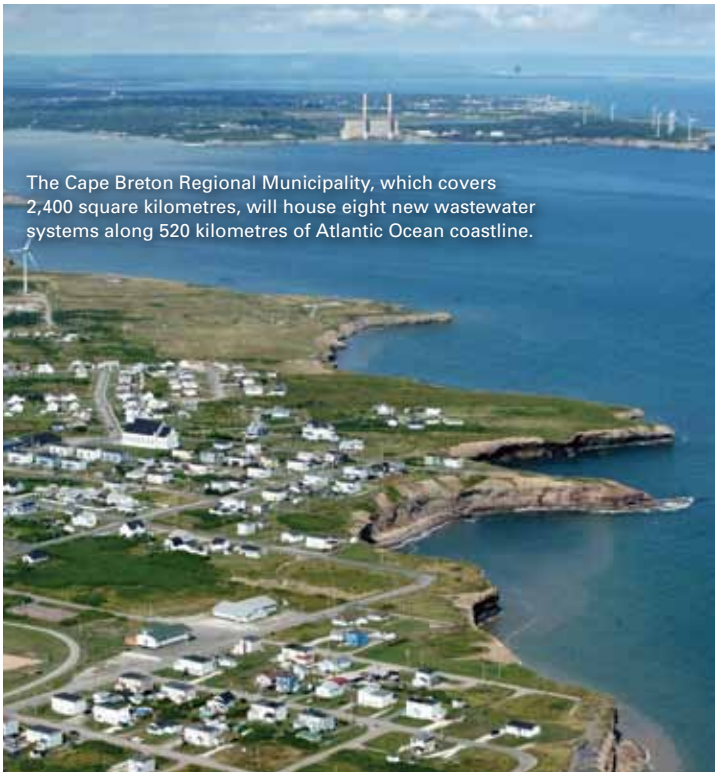
But Halifax Water was able to avoid the proverbial poop storm having forecasted



Credit: Maple Reinders Mokrm Joint Venture

Upgrades to the Eastern Passage wastewater treatment facility in Halifax were financed by internal revenues and long-past infrastructure funding from different levels of government.

Did you know 850 of Canada's wastewater treatment systems aren't operating at secondary treatment standards?



Credit: Cape Breton Regional Municipality

The Cape Breton Regional Municipality, which covers 2,400 square kilometres, will house eight new wastewater systems along 520 kilometres of Atlantic Ocean coastline.

the legislative change when their wastewater strategies were taking shape. "We're not in a position to wait," Campbell said. "We're going to soldier on and get the job done and hopefully some funding will come down." Their 2009 Harbour Solutions Plan and Eastern Passage wastewater treatment facility upgrade was financed by internal revenues and long-past infrastructure funding from different levels of government. Now, Halifax Water's 2013 Integrated Resource Plan predicts a $2.6-billion price tag over 30 years. From that budget, they will undertake two WSER-driven plant upgrades budgeted at $595 million to address compliance issues. But like previous wastewater capital works, the 2013 plan makes the assumption of absentee WSER funding. With community education and tough financial decision-making ahead, Halifax Water is moving forward and looking to proposed rate increases to ease the financial burden.

Unfortunately, Halifax Water's financial resourcefulness is harder to muster in municipalities with more extreme infrastructure and economic hardships. The Cape Breton Regional Municipality (CBRM) is facing astronomical costs where their direct discharge sewer outfalls outnumber centralized wastewater treatment systems along their entire coastline, and the financial burden simply can't be offloaded onto their aging population.

"Not a whole lot of thought was put into what the cost in some areas would be to get up to these standards," said Ron Delaney, CBRM's manager of wastewater operations. CBRM has more than 50 raw sewer outfalls needing centralized treatment facilities, which in turn require upstream collection pipes, pumping stations, and the technology to achieve WSER's effluent equality standards. In CBRM, it's not just about plant compliance, but about the wastewater network as a whole, and it's not clear if Environment Canada's funding accounts for works of that scale.

"The west coast is facing the same problem," Delaney said. "But they have lots of studies, lots of data. They're more of a 'have' area, we're more of a 'have not' area." Fred Nenninger, Metro Vancouver's director of utility planning and wastewater treatment plant upgrades, confirmed their progress and said that Metro Vancouver has the conceptual plan for their new Lions Gate secondary treatment plant underway. He said, "Everything in the [upstream] system is there, just downstream, at the plant, it needs to go from primary to secondary treatment."

Meanwhile, Delaney lamented that "right now [we have] no plan on paper to address all these outfalls." He predicted that CBRM will need eight brand new WSER-compliant wastewater treatment plants at an estimated cost of $150 million—and the cost of collecting the wastewater will be almost twice that amount. The province is in dire financial straits, too, which limits access to certain federal funds that require matching contributions.

Funding the design and construction of a complete wastewater network is something with which system operators in non-coastal provinces can only sympathize. Tony Van Rossum, chair of the Canadian Water and Wastewater Association's wastewater and stormwater committee and environmental services engineer at the City of London, said that "except for the East and West coasts, the regulation didn't have much of an impact on municipalities in between, having had secondary treatment for a number of years." London's six wastewater treatment plants are all operating at a secondary treatment level, and have been since 1980.

During the WSER development, while many central Canadian wastewater operators were debating regulations around the wastewater plant, Delaney and other coastal operators were looking at bigger issues on a network level. "Regulations are being changed again by these forward-thinking people in central Canada," Delaney said. "The funding provided to us in no way looks at if should we go back to where the source of the pollution we are trying to treat originates."

Environment Canada responded to speculated funding shortfalls by renewing the Building Canada Fund and maintaining other funding staples including the Gas Tax Fund and the Green Infrastructure Fund, support mechanisms the FCM promotes on its website (*fcm.ca*). But municipalities are still facing impossible circumstances. Today's infrastructure demands extend well beyond waste and wastewater infrastructure.

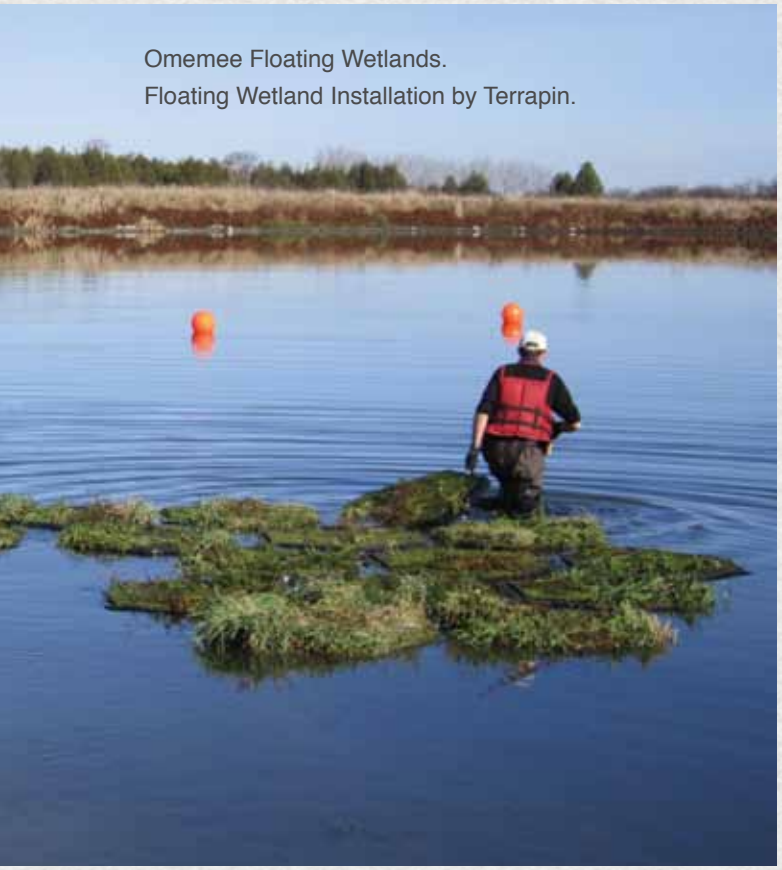
"Last year, CBRM didn't do any capital works because we're a cash-strapped region," Delaney said. And it's not looking good for this year either. Exhaustive applications, competing infrastructure demands, and reluctant—but mandatory—provincial and municipal funding partnerships are all but anchoring progress. WC

Whitney Matusiak is a water resources engineer with GeoProcess Research Associates. She also works as a freelance writer and editor.

WRAIN

WATER RESEARCH AND INNOVATION NETWORK

Bringing you the future of water innovation today



Omemee Floating Wetlands.
Floating Wetland Installation by Terrapin.

Over the years, there has been a growing need to address the issue surrounding water treatment and conservation in Ontario. While there are several technologies available that address these challenges, the biggest obstacle a company faces is bringing these technologies into the market, where their full potential can be utilized and explored. To address this issue, The Water Research & Innovation Network (WRAIN) was established. WRAIN is the innovation arm of the Economic Development department at the City of Kawartha Lakes, and its main objective is to accelerate market adoption of new water and wastewater treatment technologies. This is done by facilitating access to pilot and demonstration sites, as well as providing business development support, marketing solutions, and strategic planning to new and existing water technology companies. WRAIN is a collaborative effort by industry leaders, economic development professionals, research centres, and all levels of government, working together to identify and solve water issues in the City of Kawartha Lakes and in Ontario. WRAIN also involves a joint-effort by more than 30 companies, with Fleming College's Centre for Alternative Wastewater Treatment (CAWT), as well as being responsible for addressing water quality in 250 lakes and rivers, operating and maintaining six wastewater plants, and 21 water treatment facilities.

"The challenge isn't innovation, but commercialization," says Kirk Wong, WRAIN's Project Manager. "It is one thing to have a great piece of technology, but it is another to get that technology into the hands of the end users in order for it to benefit them and to protect our water resource as a whole." This is what WRAIN is trying to address. It helps companies commercialize innovative products and services, including real time data monitoring systems, phosphorous removal, aquatic weed control, greywater solutions, and alternative industrial and residential water and wastewater treatment.

One of the many ongoing projects is currently taking place with Anaergia, a global leader in offering sustainable solutions to generate renewable energy and convert waste to usable resources.

Anaergia states, "Our collaboration with WRAIN has been instrumental in finding a pilot plant location, and building relations with local businesses for support. Having access to a demonstration site gives us the opportunity to perform tests subject to a variety of 'real world' situations. When evaluating new technologies, this exposure is invaluable to our research and development efforts while allowing us to showcase the technology to potential end-users."

"Providing companies with the opportunity to pilot their technology has proven to be a constructive

method," says Numair Uppal, WRAIN's Economic Development Officer. "This aids companies to analyze and modify their technology in order to effectively respond to the changing environment of an operational facility." This concept is the foundation behind WRAIN's strategic plan and has proven to be effective with companies such as Terrapin.

"WRAIN has played a key role in the recent success of our Ministry of the Environment funded Showcasing Water Innovations project for our PhytoLinks floating treatment wetlands," says Josh Clark, Senior Project Manager for Terrapin. "WRAIN's assistance with this project has allowed us to accelerate the development and refinement of our PhytoLinks product, both by facilitating access to full scale pilot project demonstration locations, and through the development of top quality marketing materials highlighting our success. Testing our technology at full scale in real world municipal infrastructure has taught us things that we simply could not have learned in smaller bench scale test sites and has helped us immensely in making our technology even better. We would highly recommend that other companies faced with the challenge of getting new water and wastewater technologies to the market speak to WRAIN about pilot project opportunities."

Companies such as Real Tech Inc. have also taken advantage of this opportunity. "WRAIN allows companies like Real Tech the ability to pilot test new technologies or applications in a real world environment," says Drew Evans, Vice President of Operations for Real Tech Inc. "WRAIN is a great example of how Ontario leads the way in fostering water innovation and we look forward to continuing to work with WRAIN with Real Tech's innovative water quality monitoring solutions."

Recently, WRAIN has had the opportunity to partner with NanoStruck Technologies Inc., a Canadian company specializing in ecological water remediation and precious metal recovery through the use of patented technologies and proprietary nano-biotechnology derived from renewable feedstock, like crustacean shells and plant fibres. This collaboration between NanoStruck and WRAIN further solidifies the company's commitment to ecological and cost effective solutions for water purification, restoration, and global contamination problems, thus greatly reducing the City of Kawartha Lakes' water footprint.

The Water Research & Innovation Network understands the needs of companies and how to effectively pilot and commercialize innovative water and wastewater technologies into the Ontario market. WRAIN members can help you achieve your business goals. As your single source for business development, marketing, and technical advice, WRAIN works with you to continuously improve product performance and provide your company with a responsive demonstration site to effectively perfect your water and wastewater technology.

Real Tech Inc. installation at the Lindsay Water Treatment Plant. Left to right: Andrew Glover; President and Drew Evans; Vice President of Operations.

As of summer 2014, there are boil water advisories in 250 rural communities in Newfoundland and Labrador.

Rural Resilience

Researchers uncover and tackle Newfoundland and Labrador's rural drinking water woes.

BY KRISTEN CURTIS

Case Study: Woody Point, Newfoundland

WOODY POINT was one of the researchers' case study communities, answering the survey and taking part in the team's regional workshop. Its mayor, Ken Thomas, said the biggest water-related problem facing his municipality of 300 people is the aging infrastructure, which is about 50 years old. "Unfortunately, the government waits until [an] emergency happens, then they fund it," he said. "Prevention and maintenance are a lot less expensive than remedial assistance after a disaster."

The town has applied to the provincial government's capital works funding to repair its water infrastructure. If the proposal is accepted, the town will pay 10 per cent of the cost while the province will cover the remaining 90 per cent.

"If a little more funding was available, it would go a long way," he added. "[But] we understand there are a finite number of funds for an infinite number of projects."

He said the province is now playing catch-up with the water infrastructure of rural municipalities to make up for the years when there was not enough funding to go around. "We have a lot of small delivery systems as opposed to large ones as you would see in larger cities. So, [the provincial government] [has] to Band-Aid their way through it and upgrade a certain amount every year or so." WC

RURAL COMMUNITIES, especially those with 1,000 residents or fewer, face a number of challenges when it comes to drinking water, including aging water infrastructure, limited budgets, long-term boil water advisories, and untrained water operators. These often lead to system maintenance problems and water contamination.

In Newfoundland and Labrador, these challenges are being addressed by a team of community-based government and academic researchers informally known as Rural Resilience. The group is committed to solving rural and regional development issues, and one of its key goals is to discover policy and governance solutions for sustainable drinking water systems in smaller municipalities and local service districts in Newfoundland and Labrador.

Since February 2013, the team has conducted its research, surveying smaller communities and speaking to residents, mayors, and councillors to determine their greatest drinking water-related problems and concerns.

"Often communities thought they had no issues with their water supply when data from the [provincial] Department of Environment and Conservation proved that 85 per cent of those communities actually did have issues in the past three years," said Sarah Minnes, a PhD student who is the project co-ordinator and a researcher for the project.

One of the team's findings was that some smaller municipalities had untrained or undertrained water operators. "When we asked what the highest level of training [their] water operators had, 28 per cent had an untrained water operator," said Kelly Vodden, an associate professor of environmental policy at Memorial University, who also serves as an advisor to the Municipalities of Newfoundland and Labrador and as a researcher for the project.

Many small-town water operators do not know how to properly use new equipment, and since many towns only have one water operator, they are unable to allow operators to leave for training. And as a result of limited budgets, many municipalities often have unpaid volunteer water operators. Fortunately, Vodden said some communities are working together to hire an overseer that will visit each community to provide training.

But even with trained water operators, many rural communities in Newfoundland and Labrador must also deal with long-term boil water advisories. In summer 2014, there were boil water advisories in 250 communities—249 of which were communities with populations

of 1,000 people or fewer. For some, these advisories have been in place for more than 20 years. Due to the longevity of this problem, Vodden said, "Not everyone takes those steps to boil their water."

In an effort to ensure the drinking water of residents is actively monitored and this information is readily available, the province has a communication tool called the Drinking Water Quality Index (DWQI). Unfortunately, it offers no ratings or information for communities on a water advisory or those with high chemical concentrations. The team found that, rather than a community receiving a negative water quality rating, the apparent practice was to simply not rank the water at all. As a result, 72 per cent of community rankings made between 2009 and 2012 were not issued a meaningful DWQI score.

The research team believes filtration would help with organic chemical compounds, but small communities cannot afford such expensive systems. In provinces like Ontario, water filtration is mandatory, but in Newfoundland and Labrador, it is not. While the province recognizes filtration should be mandatory, the funding to provide filtration could pose a problem in requiring filtration through policy or regulation.

Vodden also said the province does not have a mechanism to monitor local watersheds, so regulation is turned over to cash-strapped municipalities. While there are a few independent watershed groups around the province, none of them receive any provincial funding—unlike other provinces.

Under the province's *Water Resources Act*, section 39 requires municipalities to pay a $100 fee to become a protected public water supply area. Once a municipality is designated as such, it can create regulations about its water supply, but once the area becomes officially protected, the municipality is responsible for its care and protection.

In the meantime, the research team provides advice to Health Canada and other provincial agencies. "They are listening to us and our findings," Vodden said, adding that she hopes Newfoundland and Labrador—and beyond—will be willing to consider the team's findings and consider some of their recommendations.

She said the group has an upcoming presentation to talk to municipalities in other Atlantic provinces, and the team already did a comparison study between the water-related challenges in Kootenay, British Columbia and Kittiwake, Newfoundland and Labrador.

"It's hard to track policy impact," Minnes said. "Through our engagement with municipal leaders, we hope to raise water priorities to higher levels." WC

Kristen Curtis is a Toronto-based freelancer.

Credits: RainGrid

RainGrid Network's smart residential cisterns use intelligent controllers to remotely manage 90 per cent of rooftop runoff.

RainGrid co-founder and CEO Kevin Mercer, pictured with one of more than 5,000 RiverSafe RainBarrels installed by Washington, D.C. Environment.

Rainfrastructure

One company's solution for stormwater management provides economic benefits but faces an uphill battle for wide adoption.

BY JENNIFER STONEBURGH

URBAN FLOODING—increasingly prevalent with climate change—causes extensive economic, health, social, and environmental issues. Internationally, jurisdictions including Canadian municipalities are establishing stormwater utilities to mitigate the impact of changing precipitation patterns and increased urbanization. Both Saskatoon and Kitchener, Ontario along with more than 1,400 North American jurisdictions, have implemented stormwater utilities with rates correlated to property stormwater runoff.

Over the past decade, integrated water management systems (also referred to as low-impact development methods) have gained momentum, with a focus on handling water at or near where it falls. These systems provide effective stormwater management with lower capital and comparable operating costs, including land and maintenance fees. The market for this type of technology is so extensive it can support multiple companies, and continued momentum in the space is already generating competitors to help break down institutional and social barriers, and further accelerate adoption of this market-disruptive innovation affectionately referred to as "rainfrastructure."

One of the most promising systems in today's stormwater market is Toronto-based RainGrid, the birth child of environmentalist Kevin Mercer and engineer Stephen Braun, which supplies an intelligent network of residential stormwater cisterns. By automating the traditional distributed stormwater management technology of residential cisterns with real-time sensors and internet intelligence, RainGrid has created a stormwater smart grid at half the cost of conventional stormwater storage methods.

Inexpensive and reliable information and communication technologies have been revolutionizing industries—retail, electricity, finance—for 30 years, and it's looking to infiltrate the water sector. Integrating remote real-time cistern operations with predictive precipitation algorithms allows municipalities to capture, store,

and release stormwater as close to where it falls as possible. RainGrid cisterns are emptied en masse when inclement weather is predicted, ensuring sufficient storage capacity to eliminate or reduce overland flooding and property damage without the need to super-size pipes or retention pond networks.

To compete on a level playing field with conventional system expansion or end-of-pipe technology, point-of-source technologies must be rolled out on a neighbourhood or citywide scale. Even with fairly inexpensive cisterns and intelligent controls, a RainGrid network system is still a multimillion-dollar purchase for a municipality. The infancy of stormwater utilities and the typically long sales cycle inherent in municipal purchasing has consequently hindered acceptance and growth of an innovative stormwater technologies industry. Even RainGrid, which currently supplies cisterns to the prestigious Washington, D.C. RiverSmart stormwater program, faces a long path to system acceptance and integration in both Canada and the United States.

The reliance on homeowner acceptance of new stormwater technology and willingness to house it on their property is a new business model for municipalities, adding further complexity to the sales cycle and financing of the system. While networked stormwater cisterns may be more effective and efficient from an infrastructure operations and financing standpoint, if their rate of adoption is challenging, it may prove difficult to secure project financing. It can be a hard sell to utilities to introduce not only a new technology but also a new business model.

By replacing expensive and socially disruptive rebuilds of conventional stormwater methods with distributed, point-of-source solutions, the RainGrid system inherently blurs the divide between public and private, and although not impenetrable, this is posing a barrier for adoption.

To cope with this unconventional disconnect between public and private property, RainGrid's stormwater technology develops a public-private partnership (P3) between private property owners and their cities. Cities purchase, install, and maintain RainGrid cisterns as a municipal asset rather than expecting the property owner to purchase, install, and maintain the system. While the installation of publicly owned and managed infrastructure on private property is not a new concept, when similar business models are employed with gas lines, electricity wires, and water pipes built into homes, both the homeowner and municipality reap benefits. In exchange for hosting no-cost RainGrid network system installations, property owners receive reduced stormwater utility costs and access to stored rainfall to offset potable water demand for irrigation or internal building purposes.

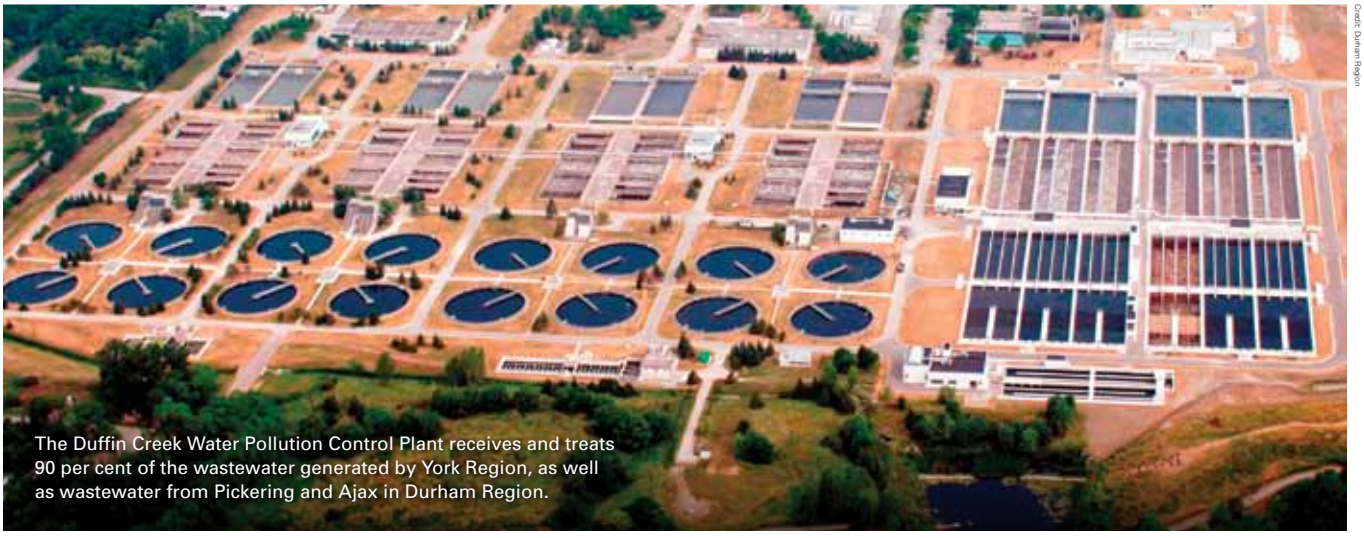
Despite stormwater damage being one of the largest source of insurance claims, there remains a disconnect between a landowners' behaviour and municipal responsibility. A general lack of knowledge concerning stormwater management challenges in society and the options available to mitigate disruptive weather further hinders the ability to finance the widespread deployment of new technologies like RainGrid.

The increased awareness and success of innovative P3s are sure to play in RainGrid's favour going forward—as is the rapid deployment by municipalities of stormwater utilities, such as those planned for Mississauga and Aurora, Ontario. Continued climate disruption, especially extreme weather events, will rapidly raise public and decision maker demand for economical environmental solutions to climate variable stormwater management. WC

Jennifer Stoneburgh works with MaRS Cleantech, assisting cleantech companies access valuable resources and mentorship to develop disruptive, high-impact businesses.

Cladophora washes up on Ajax's waterfront, sparking a battle between the town and its government.

Credit: Town of Ajax



The Duffin Creek Water Pollution Control Plant receives and treats 90 per cent of the wastewater generated by York Region, as well as wastewater from Pickering and Ajax in Durham Region.

Credit: Durham Region

Down for the Count

High phosphorus levels spawn family feud in Ajax, Ontario.

BY SAUL CHERNOS

THE DUFFIN CREEK Water Pollution Control Plant was supposed to enhance phosphorus removal when an expansion was completed in 2013. Built by the province in the 1980s and later transferred to Durham and York regions, the activated-sludge facility replaced multiple smaller, legacy systems that were discharging into local waterways and seriously impacting water quality. The $600-million project was designed, in part, to increase the volume of sewage the plant could handle, from the current daily flow of 340 million litres to 630 million litres. Infrastructure Canada, which provided some funding, declared the expansion would protect the environment, accommodate new commercial and residential development, and significantly improve local wastewater infrastructure.

The environmental group Ecojustice gave the plant a B+ rating, the second highest of a dozen facilities it ranked.

However, the plant's environmental star has faded significantly. For several years now, a pungent, green algae known as cladophora and commonly attributed to high phosphorus levels has appeared in mid-summer along nearby waterfront areas in Ajax in relative proximity to the plant. Even though Ajax is a member of Durham Region, the town had challenged the plan to increase the plant's capacity, and a local citizens group, PACT POW, formed around the issue. Federal Green Party leader Elizabeth May spoke at a rally the group held last summer, and a month later, Ecojustice clarified that its recognition was for overall sewage pollution management, including an end to combined sewer overflows, but the organization was not evaluating the plant's actual net impact on algae growth.

> Ajax says the plant bears the lion's share of the blame, while the plant's regional management attributes the phosphorus to outside sources, including runoff from Duffin Creek.

Phosphorus and cladophora are no

strangers to the Great Lakes. From the 1960s through the early 1980s, algal blooms were common in the lower Great Lakes. "That was mainly because we used phosphorus-containing detergents," said Andrew Sinclair, an environmental scientist with the surface water team at Stantec. This led to dead zones in Lake Erie, where high nutrient levels depleted oxygen levels. By the 1980s, however, phosphorus and corresponding algal blooms began to decline. Sinclair attributes the improved water quality to various factors, including a move to phosphate-free cleaners, improved wastewater treatment, and steps by industry to control pollution. However, while phosphorus levels have dropped in Lake Ontario, Lake Erie's concentrations have been rising, and cladophora has been reappearing in many areas of both lower lakes, especially in rocky areas near shore.

The beaches of Ajax have been no exception. The cladophora's dramatic odour has left the towns at odds with their regional government. Each side, backed by its bevy of experts, is holding its ground. Ajax says the plant bears the lion's share of the blame, while the plant's regional management attributes the phosphorus to outside sources, including runoff from Duffin Creek and from elsewhere in the watershed.

"We have one of the most beautiful, publicly owned waterfronts in the Greater Toronto Area, and it's been detaching from the rocks and washing up on shore," said Paul Allore, director of planning and development with the Town of Ajax. "Our residents use that waterfront for special events and recreational activities. It's seven kilometres long and there's bicycle paths, benches, and picnic tables. The town's invested significantly in it—it's part of our culture—and by August, the rotting stench is driving residents away."

Allore said his team has assessed area waterways, quantified the sewage-like odours, monitored local wildlife, and concluded the plant is responsible for 97 per cent of the soluble reactive phosphorus feeding the cladophora along the waterfront. "The science is behind us," he said. "We have a problem on our waterfront, and we strongly believe it's coming from the plant. Either the pipe needs to be extended further out into the lake, or additional treatment for phosphorus needs to be undertaken, or perhaps both."

John Presta, Durham's director of environmental services, sees it differently. "We think we're doing an excellent job protecting the environment," he said, describing ongoing monitoring of lake water and nearby tributaries. "It's clear from the facts—these aren't models or computer simulations but actual water quality results—that we're meeting the effluent requirements for the [Ontario] Ministry of Environment and there's no phosphorus hotspot coming from the effluent." He pointed, instead, to the numerous smaller creeks and rivers.

"When it rains," he said, "all that runoff, all that murky water, sediment, and everything, there's spikes of phosphorus loadings that go into Lake Ontario, and they hug the shoreline like a bathtub ring."

While cladophora benefits from nutrients like phosphorus, the algae tends to thrive in rocky areas close to shore.

It's been proven in other watersheds, Presta maintained, that wastewater plants produce just a fraction of the total phosphorus loading.

Lines in the sand? Perhaps, though the Ajax shoreline is largely pebbled. The plant is now in the throes of an environmental assessment as a follow-up to the expansion work, to provide additional detail regarding the outfall pipe and officially approve the capacity increase to 630 million litres. Earlier this year, Ajax filed a Part II Order with the environment ministry, requesting the assessment be bumped from a class one to a full one. "Essentially, that's a request for further environmental study to be done," said environment ministry spokesperson Kate Jordan. The request is currently under review, and she said the Ministry could deny the request for a full assessment, add conditions to those already imposed under the class assessment, grant a full assessment, or order mediation between the two parties.

Declining to address the Duffin Creek situation itself, Andrew Sinclair said phosphorus can result from non-point sources, such as lakebed sediment, flow from nearby creeks, and runoff from properties abutting the lake, as well as point sources like the outfall from a wastewater treatment plant. While cladophora benefits from nutrients like phosphorus, the algae tends to thrive in rocky areas close to shore. Sinclair even suggested climate change, noting that longer growing seasons and hot weather create great growing conditions for algae and other plants.

Still, he said, it's beneficial to cut down on fertilizers and take other actions at the personal and local level to reduce the phosphorus load. "We've got quite a bit better at point-source control and we've improved the quality of some of the products that were causing the issue to begin with. Now we have to start dealing with how we manage our land and grow our food. It's not necessarily straightforward, but that's the nature of the new beast of water quality management and watershed management." WC

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

Credits: Stephanie Woltman

Flooding in Whitewater Lake poses significant problems for landowners, but ecological goods and services programming can help alleviate flooding concerns.

Public Benefits

The creation of an ecological goods and services program in Manitoba will put landowners front and centre.

BY STEPHANIE WOLTMAN

THE MOST VALUABLE LAND in the Prairies is generally the land used for agricultural development, which unsurprisingly, also produces the most ecological benefits for the public. One challenge is to accurately distinguish a monetary value adequate enough to incent private landowners to produce these public benefits.

Ecological goods and services (EG&S) programming transforms the natural capital that exists on private land into functions that are beneficial for the public at large. The natural capital benefits produced include water purification, flood and drought protection, soil-erosion protection, climate regulation, maintenance of biodiversity, and habitat creation. The value of natural capital is one that is difficult to define and it is difficult to evaluate the current monetary benefits provided by an ecosystem. As part of my master's thesis project, I plan to categorize EG&S program components from across Canada and the United States and examine EG&S policy functions in Manitoba and Canada.

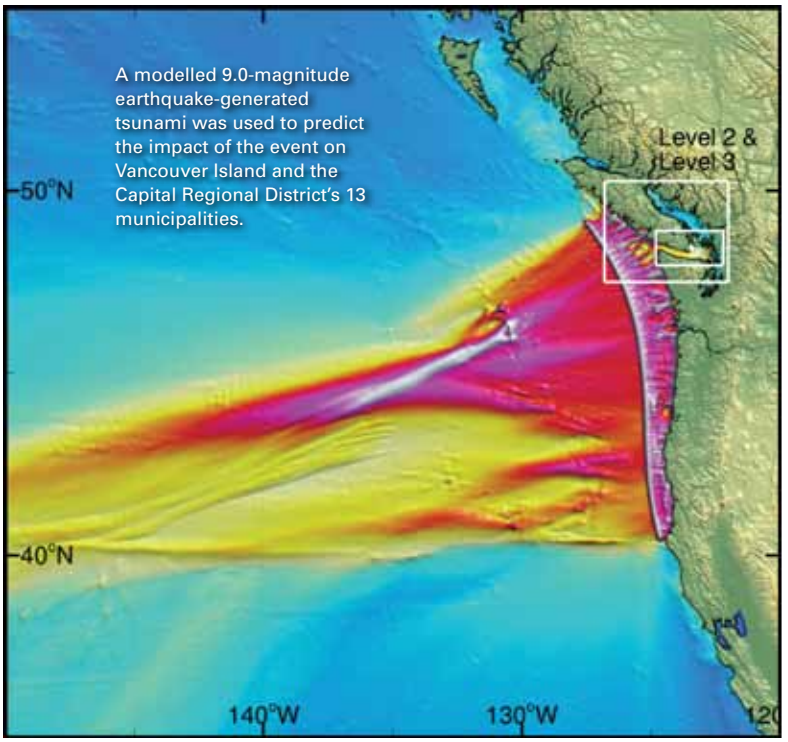
Whitewater Lake is located in Southwestern Manitoba, and as a lake with no natural outlet, it is a terminal basin in the watershed. Flooding of agricultural land around the lake's periphery has posed significant problems for surrounding landowners, but EG&S programming is a possible option to alleviate flooding concerns in the area by providing incentives for landowners to retain water in the upper reaches of the watershed. The Whitewater Lake area currently has various EG&S programming in place and has implemented innovative concepts like conservation auction incentives to implement land purchases, conservation agreements, or beneficial management plans.

Landowners will respond to a questionnaire to indicate where they wish to see EG&S funding appropriated. EG&S programs can be delivered in a variety of approaches including governmental regulations, cross-compliance approaches, voluntary actions, environmental marketing, and additional programs which provide remuneration. Remuneration for EG&S can be provided to landowners through direct payments (one-time payments and annual payments), payments as part of a market transaction, and payments in the structure of tax credits.

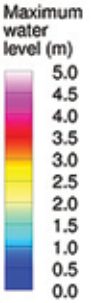
The area is also looking at developing a municipal watershed fund—an approach that's been modelled successfully in British Columbia through its regional conservation fund. This type of fund requires all landowners to pay a fee based on the acreage of their land, which is then directed into a specific conservation fund. The money in the fund can be used to pay landowners undertaking EG&S programming on their land. The development of this type of fund in the Whitewater Lake area will create a disincentive for landowners because it encourages landowners to avoid negative actions to their environment, allowing them to receive a larger return payment from the funding. Ideally, all landowners will pay into the fund, and the return will be provided to landowners who take actions to conserve or restore wetlands.

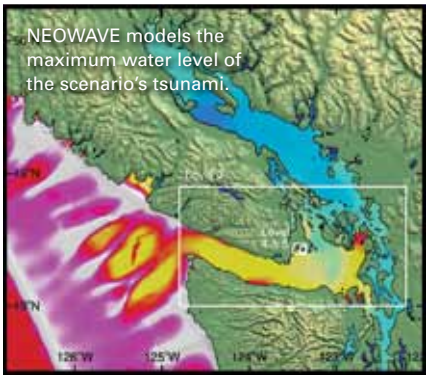
The Prairie pothole region in North America expands over 715,000 square kilometres of agricultural land, and the research to develop conservation incentives to preserve and restore wetlands is essential. The most successful policy solutions are developed at the grassroots level, and this project aims to develop an understanding of landowner preferences to guide the most efficient use of EG&S funding. Focusing on the Whitewater Lake area may deliver a valuable understanding of landowner perspectives, and this knowledge can hopefully be utilized across the region. WC

Stephanie Woltman is a Master of the Environment student in the Clayton H. Riddell Faculty of Environment, Earth and Resources at the University of Manitoba.



Credits: Capital Regional District





The Next Wave

Numerical modelling is helping tsunami emergency preparation in B.C.'s Capital Regional District.

BY MIKE BRADY AND TRAVIS WHITING

THE LAST MAJOR earthquake and tsunami off Vancouver Island was estimated to have occurred on Jan. 26, 1700. We know this because of evidence from the study of tree rings in the forests of the Pacific Northwest, contemporary written records of a tsunami hitting Japan, and through the oral traditions of the local First Nations. What we don't know, however, is how long it will be until the next one.

The Capital Regional District (CRD), which represents 13 municipalities, including the City of Victoria, located on the southern end of Vancouver Island, recognized the need to improve its earthquake and tsunami emergency preparation, planning, evacuation, and awareness programs. CRD's jurisdiction covers more than 1,000 kilometres of coastline and has more than 350,000 residents.

Knowing how to respond to the Big One begins with first understanding its potential impact. With this goal in mind, CRD commissioned AECOM to prepare a report outlining the potential inundation of its jurisdiction caused by a tsunami generated by a 9.0-magnitude earthquake. The report's findings are the result of integrating powerful computer modelling software and a comprehensive collection of geographical data of the local area, which has achieved a reliably accurate prediction of the potential tsunami's size, path, and duration.

Modelling the wave

The source of the threat is the Cascadia subduction zone (CSZ), part of which is located approximately 100 kilometres off Vancouver Island. Experts have estimated the CSZ is responsible for at least seven major earthquakes, including the one in 1700, over the past 3,500 years. If Japan's Tohoku earthquake and tsunami in 2011 is anything to go by, the impact of a future tsunami on the infrastructure and populations of urban areas could be significant.

The computer modelling software selected and used was NEOWAVE (Non-hydrostatic Evolution of Ocean WAVE). This software is a depth integrated model for wave propagation, transformation, breaking, and run-up developed by researchers at the University of Hawaii and University of Alaska under the supervision of Kwok Fai Cheung, who was the lead modeller for this project.

Digital elevation model

Understanding how the area's natural features would influence the tsunami was important in ensuring accurate results. A digital elevation model (DEM), consisting of topographic (land) and bathymetric (sea-floor) information was developed to capture the entire area of CRD coastlines, as well as other additional areas further south in the United States, including the Olympic Peninsula, the San Juan Islands, and portions of Puget Sound.

Developing the DEM required compiling data from multiple, sometimes-overlapping sources. Challenges encountered in this process included differences in both the coordinates and elevations used in Canada and the United States; the differing elevation data within the various sources; overlapping data with differing elevations; and shoreline discontinuities, all of which could have had a significant impact on the modelling results.

The software simulated a period of approximately eight hours after the onset of the earthquake. It provided values for maximum water level, maximum drawdown of water, maximum water flow speed, and the time to tsunami arrival and time to maximum water level along the entire CRD coastline.

Applying lessons learned

The modelling predictions generated by NEOWAVE resulted in a revised and significantly more accurate tsunami hazard line, which reveals the risk of flooding for various CRD communities, industrial areas, waterfront facilities, critical facilities, and highway infrastructure.

CRD's existing tsunami hazard line, devised in 2004, was based on limited coastline data, but with the report's updated and complete data, a continuous tsunami hazard line was created, varying from six metres on the exposed western coast to three metres along the sheltered eastern coast. (In comparison, the maximum water level for the Tohoku tsunami was estimated at 40 metres.)

Data from the modelling can be very useful in designing infrastructure identified within tsunami hazard areas. A significant amount of the damage observed in previous tsunamis was due to high uplift pressures and forces acting on the underside of floor slabs, bridges, and highways. The modelling may also help in providing insight into better design standards for coastal infrastructure that might be exposed to this type of tsunami loading.

The study's results have been used to guide CRD's emergency preparedness plans and public outreach and information programs. The modelling data was also used to update the mapping information in CRD's geographic information systems, which makes it easier for policymakers, municipal officials, and residents to better understand the warning signs and what to do. As a result, they will be better prepared to address emergency events. WC

Mike Brady is a professional engineer with more than 30 years of experience in B.C. Since 2007, he has been the manager of the Victoria office of AECOM. Travis Whiting is the senior manager of protective services and the emergency manager for the Capital Regional District.

AECOM

Shawn Gibbons
1150 Morrison Drive, Suite 302
Ottawa, Ontario K2H 8S9
Phone: 613.820.7728 x-263
Email: shawn.gibbons@aecom.com
www.aecom.com

AECOM provides comprehensive solutions for our clients and are experts in water, wastewater, water resources, watershed concepts and wet weather, as well as creating innovative, sustainable and integrated water systems. We offer integrated services for total project delivery, covering everything from initial environmental planning studies to detailed design, construction management and operations and maintenance training.

AECOM provides a blend of global reach, local knowledge, innovation and technical excellence in delivering solutions that create, enhance and sustain the world's built, natural, and social environments.

Hydrotech

Brian Mills
491 Pinebush Road
Cambridge, Ontario N1T 0A5
Phone: 519-650-1380
Toll-Free: 877-299-5999
Fax: 1-800-544-6651
Email: brian.mills@watergroup.com
www.hydrotechwater.com

Hydrotech is a global, market-leading manufacturer of water treatment equipment. Our softeners, whole home filters, drinking water systems and point-of-use products feature the latest technology, backed by the support of our field experts and customer service teams. Our in-house engineering and custom branding programs help you differentiate your business from your competitors with unique product designs and marketing material specific to your company and market. Call today to learn what we can do for your business.

XCG Consultants Ltd.

Michele Grenier, P.Eng
2620 Bristol Circle, Suite 300
Oakville, Ontario L6H 6Z7
Phone: 905-829-8880 ext. 249
Fax: 905-829-8890
www.xcg.com

XCG Consultants Ltd.—an environmental engineering firm that is committed to delivering innovative, practical and sustainable solutions. Built on a solid foundation of senior engineering professionals, XCG offers clients across a wide range of industry sectors comprehensive services in water and wastewater treatment, municipal infrastructure, water resources, site assessment and remediation, risk assessment, solid waste, and training and operations.

Xylem

Ethel Velentzas
300 Labrosse Avenue
Pointe-Claire, Quebec H9R 4V5
Phone: 514-695-0100
Fax: 514-697-0602
Email: wcdn.info@xyleminc.com
www.xyleminc.ca

Xylem Water Solutions is a leading water technology company focused on how water is used, conserved, and re-used. We move, treat, analyze, and return water to the environment. Xylem's product offering includes Flygt (pumping), Leopold (filtration), Sanitaire (aeration) and Wedeco (disinfection).

To be featured in this section, contact lee@watercanada.net

View a list of services for these companies at **watercanada.net/buyers-guide**

Make Change

Will the impact of insurance finally drive required adaptation?

BY ADRIAN TOTH

THE MEDIA has been inundated with extreme weather reports, and 2013 certainly supplied ample material—from flooding in Toronto and Calgary, to hurricanes in the Maritimes, to a record-breaking winter, and now, to massive droughts.

In Water Canada's July/August 2014 edition of Rules & Regs, the Canadian Water and Wastewater Association's climate change chair, Hiran Sandanayake, spoke to the efforts of the committee in advocating for infrastructure preparedness and adaptation. In conjunction with Health Canada, one of the committee's first projects was to conduct an initial survey among 100 municipalities (large, medium, and small) regarding climate change impacts and levels of preparedness of water and wastewater utilities. Interestingly, as recently as 2012, one of the findings of the survey indicated that "Canadian water and wastewater utilities are not expecting to be greatly impacted by the effects of climate change." It also found that, "while large utilities seem to be better prepared, climate change planning and adaptation does not seem to be a high priority. A lack of tools to assess the impact of climate change seems to be a major hurdle in allowing utilities to appropriately assess their vulnerability."

It's now two years later and the situation has clearly changed. Recent extreme weather events bring a real dimension to the future impacts of climate change. Though we tend to subconsciously downplay these future impacts as distant problems, we need to act now to be prepared for that future.

In the meantime, these severe weather impacts have already motivated Canadian insurance companies to make extensive changes to insurance coverage. The Insurance Bureau of Canada (IBC) said climate change impacts and aging municipal sewers and storm sewers were key factors in driving up insurance premiums. The IBC estimated the June floods in Calgary, combined with the flash floods in Toronto in July, cost Canadian insurers a record $3.2 billion in losses in 2013. As a result, the insurance industry wants to see provinces and municipalities updating its infrastructure, restricting residential developments in flood-sensitive areas, improving flood mapping, and updating building codes to lessen the impacts of future storms on both businesses and homeowners.

But the IBC isn't just making demands; it's trying to assist with the solutions. It has developed and is testing the Municipal Risk Assessment Tool (MRAT), which will help identify where municipalities might best direct their money. With the MRAT, the IBC hopes to identify the neighbourhoods that could be hardest hit in a storm or flooding. Three cities—Coquitlam, British Columbia, Hamilton, and Fredericton—are participating in a pilot project to implement the new system this year. The MRAT will give city engineers a new picture of where infrastructure is currently vulnerable and where it will be vulnerable in 2020 through to 2050. (*For more on the MRAT, a Water's Next 2013 winner, visit bit.ly/WatersNextMRAT*)

The deficit in spending on municipal infrastructure in Canada was estimated by the Federation of Canadian Municipalities to be at $55 billion. Identifying the priorities where investment is most-needed is a great first step and makes this looming challenge much more manageable. Considering new technologies and the cost savings over the entire life cycle of an asset can make this challenge an opportunity for the Canadian economy. WC

Adrian Toth is the Canadian Water and Wastewater Association's technical services manager.

APPOINTED

John St. Marseille

John St. Marseille has joined the City of Cornwall as general manager of infrastructure and municipal works. John's experience includes more than 21 years of municipal and environmental consulting engineering.

Roman Martiuk

Roman Martiuk has been named chief executive officer of the Walkerton Clean Water Centre. He was previously Chief Administrative Officer of Orillia, and held similar positions in Belleville, Burlington, and Georgina, Ontario, and Prince Albert, Saskatchewan.

Roman Martiuk

Babak Razavi is UV Pure's new director of sales for export markets. He will focus on accelerating and enhancing the availability of UV Pure products and services worldwide. Razavi has nearly 20 years of experience in global business development.

Anaergia Inc. appointed **Andrew Benedek** as chairman and chief executive officer. Benedek founded Anaergia and previously served as the company's chairman and chief technology officer. He previous founded ZENON Environmental and served as its CEO until it was acquired by General Electric in 2006.

CONTRACTS

AECOM has been awarded contracts for three research projects by Canada's Oil Sands Innovation Alliance. The projects will help advance the environmental performance of oil sands producers in Alberta.

"We are honoured to play a role in helping develop new water-management solutions for Canada's oil sands operations," said AECOM's chief executive of environment, **Matthew Sutton**.

The Municipality of Dysart has renewed its contract with ASI Water to operate and maintain the wastewater collection and treatment system for the Community of Haliburton. This is the third time the contract has been renewed, extending the partnership until 2019.

The Ontario Clean Water Agency has awarded a three-year biosolids management contract to Terratec Environmental Ltd., a provider of residuals management throughout North America.

The newly merged GHD and CRA companies have landed their first joint tunnelling project in Canada to assist the Region of Peel in Ontario with the installation of a new watermain in the City of Mississauga for a total value of approximately $1 million.

Duplicating the infrastructure alongside the existing watermain under Burnhamthorpe Road between Confederation Parkway and Cawthra Road will support growth in the area, and will also allow the region to undertake a condition assessment of the existing watermain. To further improve the water infrastructure, other strategic interconnections will also be added between the new watermain and the current distribution system. To minimize the public impacts, the feedermain will be installed exclusively by tunnelling. These works are part of the region's master plan to ensure that infrastructure and related services are able to meet the needs of projected growth.

H2O Innovation announced $12 million in new contracts, primarily in the mining and municipal sectors, in July. The new contracts brought the company's total order backlog for water treatment projects to $40.5 million. The new contracts include: the design, fabrication, and commissioning of a treatment plant for mining sites in British Columbia and Quebec; municipal projects in Florida and Colorado; and an agreement to provide a 1.0 MGD UF system to treat effluent at the San Francisco Airport's Mel Leong tertiary treatment plant.

"We are delighted to have secured these new contracts at the beginning of our new fiscal year," said president and CEO of H2O Innovation **Frédéric Dugré**. "In the company's history, we have never reached this level of order backlog."

AWARDED

Bishop Water Technologies and the City of London received the 2014 Exemplary Biosolids Management Award from the Water Environmental Association of Ontario for Technology Development.

The City of Cranbrook, British Columbia was presented with the AWWA Water Industry Award in July, recognizing 50 years of support for the programs and goals of the AWWA. The award was accepted by public works director **Joe McGowan**, who has held his position for 16 years.

HONOURED

Professional Engineers Ontario has given its G. Gordon M. Sterling Engineering Intern Award to **Heather Murdock**, a junior civil engineer working from the Montreal office of Hatch Mott MacDonald (HMM). The award was established in 2010 to support the leadership development of future leaders within the engineering profession. Murdock joined HMM in August 2012 after graduating from Queen's University and continues to gain considerable experience in water management and transportation related projects.

EVENTS

Canada's Parliamentary Secretary for Infrastructure and Communities Peter Braid speaks to a Canada-wide audience of 200 public works leaders, highlighting the key provisions of the New Building Canada Plan.

Credit: American Public Works Association

Chris Hadfield, Canadian astronaut and former commander of the International Space Station, speaks about his space experiences and team leadership in a presentation titled "The Sky is Not the Limit."

Incoming CPWA president Kealy Dedman announces the 2014 winners for the CPWA National Public Works Week Awards.

Ron Fleming of CPWA's Newfoundland/Labrador chapter honours outgoing president Darwin K. Durnie for four years of leadership at CPWA.

2014 APWA International Public Works Congress & Exposition Toronto, ON

From August 17 to 20, the American Public Works Association (APWA) congress returned to Canada. Hosted by the Ontario Public Works Association, this year's congress was attended by more than 5,000 delegates from across North America. "The Best Show in Public Works" remained true to its name, offering numerous education sessions that addressed current public works issues, as well as networking opportunities and an extensive gathering of exhibitors.

In one session, "Sustainable Infrastructure: An Integrative Design Process Model," **Scott Wolf**, a partner with Seattle-based Miller Hull Partnership, talked about the process of designing the new $400-million Lions Gate secondary wastewater treatment plant for the District of North Vancouver. The firm had been selected to lead the architectural and community integration team, and the intent was to deliver a modern and attractive treatment plant.

Wolf with co-presenter **Matthew Woodruff**, a project manager and architect with Matthew Woodruff Architecture Inc., outlined the objectives of the Lions Gate project, including a detailed community engagement plan. The team worked with local stakeholders to identify issues early and narrow down the desired plant design. To refine the concept, the team started with nine facility options, and the options were graded on multiple criteria. The list was then refined to three potential build scenarios, and from there, a preferred option was selected.

The rigorous process was ultimately successful, uniting practical needs with aesthetic concerns.

The Canadian Public Works Association (CPWA) also held a luncheon during the congress where keynote speaker **Peter Braid**, Parliamentary Secretary of Infrastructure and Communities, talked about the New Building Canada Plan and the Federal Gas Tax Fund. The luncheon was the final official duty for outgoing CPWA president **Darwin Durnie**; **Kealy Dedman** of the City of Guelph was introduced as the new CPWA president the following day.


Team XCG consists of Tom Williams, Water Canada publisher Todd Latham, Grant Walsom, and Tanya Smith.


Chris Goode with Ontario's Ministry of the Environment and Climate Change.


Longest drive prize winner Marnie Taylor.

Credits: ONEIA

Go Green on the Green 2014 Milton, ON

Milton's Royal Ontario Golf Club played host for the second time to ONEIA's Go Green on the Green golf day on July 16, 2014. More than 120 attendees participated in a great day of golfing and networking on a sunny and cool summer day that was interrupted by a brief surprise rain shower.

The sold-out event started with a morning program, sponsored by RWDI, during which staff from the approvals team at the Ministry of Environment and Climate Change presented an update on the latest developments in their modernization of approvals process. After the networking lunch, attendees took off in their carts for a shotgun start at 1 p.m. at their designated hole, playing a challenging course and stopping to compete in the putting contest, sponsored by Tervita.

Credits: ESAA

Skip Kerr (far left), with his team and special guest Lisa "Long Ball" Vlooswyk, won the "Water Hole" that Water Canada sponsored at the ESAA tournament

19th Annual ESAA Golf Tournament

Red Deer, AB

The 19th Annual Environmental Services Association of Alberta (ESAA) Golf Tournament was held on July 18, 2014 at the Alberta Springs Golf Resort near Red Deer, Alberta. The 144 participants enjoyed a round of golf, as well as prizes, good food, and networking opportunities. One highlight of the day was when Lisa "Long Ball" Vlooswyk joined the participants on Hole No. 1. A record $16,000 was raised for charity, bringing the total to $92,000 raised for charities like the Environmental Artworks Foundation of Alberta, Muscular Dystrophy Canada, and the Ilsa Mae Research Fund.

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

Decentralized Treatment Equals Financing Flexibility

BY BRUCE LOUNSBURY

Decentralized treatment systems are operator-friendly, offering automation, remote monitoring, and control.

Credit: Grant Biermann

NEW TECHNOLOGIES present opportunities to supplement and even replace centralized sewage treatment with modern decentralized systems that have smaller capital price tags, lower operating costs, equal or better treatment standards, and a level of flexibility unknown to conventional systems. They also present the opportunity for self-financing sewage treatment infrastructure without the usual political resistance to most big-ticket capital projects that, unlike roads and bridges, taxpayers can't see to appreciate.

Modern decentralized systems can dramatically reduce capital costs by 40 per cent (and often much more) while eliminating many of the headaches associated with aging infrastructure like leaking sanitary sewers.

Respected organizations are coming around to this view, including the U.S. Environmental Protection Agency. One of the papers featured on its website includes a section on how "decentralized wastewater treatment can be a sensible solution for communities of any size and demographic. […] Where they are determined to be a good fit, decentralized systems help communities reach the triple bottom line of sustainability: good for the environment, good for the economy, and good for the people."

From a business perspective, decentralized systems also offer distinct financing advantages—one being that the systems are scalable. For instance, a subdivision with multiple phases can be serviced by adding modular units that can be installed to meet capacity requirements as they are needed. Revenues from taxes or user fees can begin to flow almost immediately, creating new options for public-private partnerships. This way, developers can transform water and sewer infrastructure from a liability into an asset that generates a steady income stream.

Modular units employed in a decentralized system provide municipalities with flexibility in redeploying units to meet changing needs. Portability also presents the opportunity for new financing options because a lender or leasing company has a truly securable asset.

The high cost of infrastructure replacement, demands for more stringent environmental standards, and increasing public dialogue are beginning to get the attention of decision-makers. But to date, adoption of scalable, decentralized systems is far from the mainstream and typically only occurs when circumstances require an "unconventional" approach. A good example is a lakeside village in upstate New York that had 360 connections—the equivalent of 1,270 persons—each on individual septic systems.

A plan using a conventional sequencing batch reactor, pumping uphill to a plant a mile away, carried an estimated cost in excess of $10 million. Alternatively, a decentralized membrane bioreactor system, estimated to cost 40 per cent less, included two modular treatment plants, each of which fit inconspicuously on vacant building lots. This decentralized approach resulted in lower operating costs and excellent effluent quality that allowed direct discharge into the environment.

The power generation industry's evolution to include smaller non-utility generators as energy contributors to the grid is a model that foreshadows the future of the water treatment industry.

Decentralized sewage systems involve far less infrastructure and can be rapidly deployed. Their collection systems also require significantly less energy. The bottom line is that they save time and money.

Decision-makers for municipalities and developers would be well advised to revisit traditional thinking and explore new funding and cooperative financing models made possible by decentralized treatment solutions. WC

Bruce Lounsbury is the CEO of Brockville, Ontario-based Newterra, a global provider of water treatment solutions.

Have a response? Send your letters to the editor to **rachel@watercanada.net**

His decision to cut energy costs by 70% with LED high bay lighting was a great idea. And a great start.

Once you start seeing the benefits of our incentives for LED high bay lighting, you'll want to start upgrading your motors, fans, pumps and compressors to higher efficiency systems as well. When you do, you'll be joining water and wastewater treatment facilities across Ontario who are already enjoying the energy savings that our programs deliver.

Take a look at their stories and our incentives at
saveonenergy.ca/water-canada