

# Raising the Bar

Overlooking the City of London Greenway Wastewater Treatment Plant with supply pipes connecting to the SOWC Wastewater Facility on left.

## State-of-the-art wastewater facilities help set a new standard for research and innovation.

BY EVELYN ALLEN AND DEIRDRE HEALEY

**ONE OF THE MOST** significant barriers to the advancement of wastewater technologies has been accessing municipal wastewater treatment plants in order to test innovations in real-life scenarios.

“Ten years ago, there wasn’t too much available as far as access,” said Linda Gowman, chief technology officer at Trojan Technologies. “It was extremely difficult to do testing in a municipal wastewater plant. You had to build a relationship, get ministry approvals, find space, find electrical, and get plumbing put in. The logistics were quite daunting and expensive. It took a lot of time and effort.”

All this time and effort often slowed down the process of moving a technology to market, Gowman added.

Today that barrier to the advancement of wastewater technologies is shrinking thanks to a growth in the establishment of Canadian demonstration facilities with the infrastructure to provide industry and researchers access to wastewater in

active treatment plants.

“Having these facilities has certainly helped us by allowing us to engage in more thoughtful and long-term research projects that we think have the potential to change the marketplace,” Gowman said.

The Southern Ontario Water Consortium (SOWC) has two wastewater demonstration facilities—one in London and one in Guelph. The London Wastewater Facility is led by Western University and the City of London, and is located at London’s Greenway Pollution Control Plant. The Guelph Wastewater Facility is led by the University of Guelph and is located adjacent to the City of Guelph’s wastewater treatment plant. Within Canada, there are also accessible wastewater facilities in Calgary, Vancouver, and Edmonton.

Each site has its own strengths and focus. SOWC’s two facilities are set up to allow users to access a broader range of wastewater scenarios. This is

accomplished by providing real-time municipal wastewater at various flow rates and process streams, allowing users to install, test, demonstrate, and validate new wastewater treatment technologies from early-bench, pilot-scale to full-scale, ready-for-market products.

To ensure quick and efficient access to testing, the SOWC’s facilities also have the Ministry of the Environment and Climate Change’s pre-approval for water technology testing so there is no delay in waiting for approvals for projects.

At the London Wastewater Facility, users have access to seven process streams, including primary influent, primary and secondary sludge, and final effluent.

This site is also the only demonstration facility in North America with a full-scale flow rate. At the facility, researchers and companies can access flow rates as high as 4,500 cubic metres per day, which allows them to test and demonstrate



The City of London Greenway Wastewater Treatment Plant and supply pipes for the SOWC demonstration facility.



Pipes inside the Guelph Wastewater Facility supply effluent to test bays.



In-house lab capacity at the wastewater facility in Guelph.



A look inside one of four testing bays at the SOWC Wastewater Facility in London.

systems in a municipal environment at full capacity.

Users at the London site will also have outdoor access to some process streams with flows ranging from 1,000 to an impressive 90,000 cubic metres per day.

“The ability to access a 90,000 cubic metre flow rate is hugely important for us and it’s very hard to come by,” Gowman

Two of the bays are explosion proof so researchers and companies can work safely with sludge in these spaces.

Like London, the Guelph Wastewater Facility also has private workspaces. The facility houses five separate bays that companies can rent out and be totally independent for product development or client demonstrations.

For a company like Newterra, having access to real-time wastewater and a testing facility where they can do client demonstrations is integral to product development, clients’ education, and marketing their products.

“We are hoping to do some testing and demonstrating at the Guelph facility in the near future,” said Irene Hassas, Newterra’s director of strategic partnerships and government relations. “It will really benefit our research and development and product development divisions to have a separate area where we can bring in engineering and

consulting firms, our municipal clients, as well as land developers to see the systems in action.”

At the Guelph site, researchers and companies have access to six process streams with a maximum flow rate of 275 cubic metres per day. Having access to the variety of streams is essential for collecting a broad range of data on the performance of systems, Hassas said.

“It makes retrofitting and modernizing systems more efficient if we can know the performance of the system in any given scenario. It’s also helpful to have access to a variety of process streams for an unlimited amount of time,” she added.

The company has had the opportunity to test and demonstrate at a municipal plant in the past and received excellent collaboration and support. However, there were time constraints due to seasonal changes and the plant’s commitment to other projects.

“With the Guelph facility, we can do continuous monitoring of how our system is performing,” she said. “This

## Canadian demonstration facilities provide industry and researchers access to wastewater in active treatment plants.

said. “It’s like having a real-life test track. Being able to test on such a full range of capacity is ideal because it means we don’t have to go anywhere else.”

In addition to the wide range of flow rates, the London facility also has four large fully enclosed bays. This allows for users to work independently of one another and have complete privacy.



enables us to put a system in place that has been retrofitted or requires testing and monitoring and determine how it performs throughout different seasons and with different process streams and

companies in monitoring and testing.

"This is ideal for us because we need continuous monitoring with our new generation of systems so we can do any necessary tweaking," Hassas said.

"Having staff at the site who can help us is great because it will mean we don't have to be there every day."

Users also have access to a trove of analytical equipment in a high-tech lab located

at the University of Guelph. There is also specialized lab infrastructure on site, including a dedicated sludge room with explosion-proof lights, fume hood, methane gas detector, and additional ventilation. This is helpful for companies looking to do work with sludge at the wastewater treatment plant.

"This type of specialized space is needed right now because there has been a real shift in wastewater treatment toward

biosolids reduction and processes like nutrient and biogas recovery," Gowman said. "Today wastewater isn't just seen as waste, it's also seen as a resource."

The Guelph site also has infrastructure in place for companies and researchers interested in testing and demonstrating systems related to wastewater and the impact on biotic life. There is an ecotoxicology bioassay lab within the facility, and SOWC's mobile field trailers are fully equipped and can be taken to any site for ecotoxicology testing. This mobile equipment allows for researchers and companies to do on-site testing of the water flowing out of a treatment plant, for example, and assess the impact on the biotic life downstream.

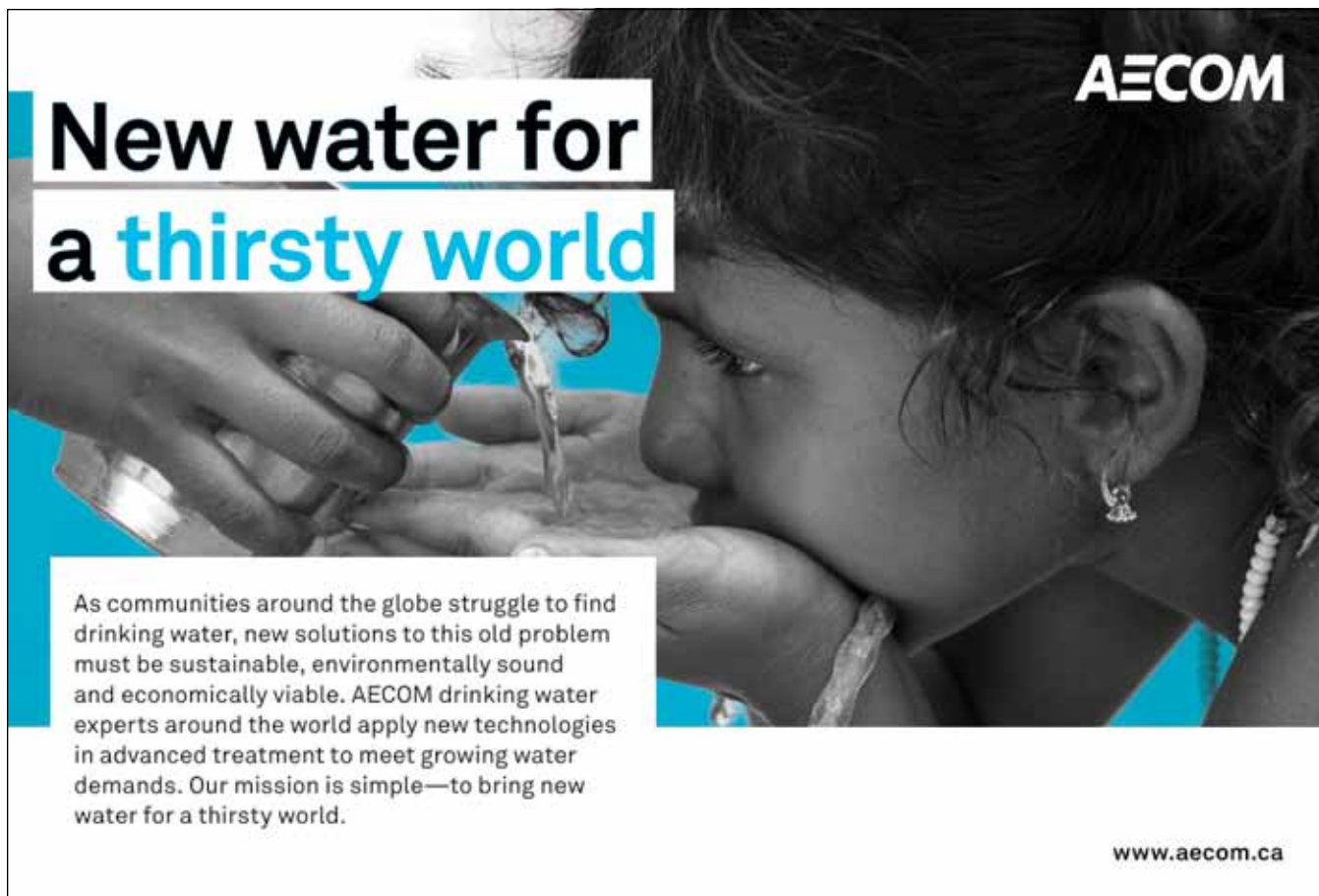
Established in 2014, SOWC's London and Guelph facilities are fairly new. However, the newest addition to the Canadian landscape of wastewater facilities is the Advancing Canadian Wastewater Assets Research Wastewater Treatment Plant in Calgary, which

"We have started to see a surge in wastewater technology advancements in Canada."

—Linda Gowman

changing parameters, such as a rise in temperature or level of contaminants."

Another beneficial component of the Guelph facility is the ability for researchers and companies to do on-site parameter testing. The facility has an equipped lab and sample preparation area within the building so companies and researchers can immediately analyze the performance of a system. There is also staff on hand to assist researchers and



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opened its doors this year (*see Moving Forward on page 12*).

With a flow rate of up to 500 cubic metres per day—split among up to three parallel lines—the Calgary facility provides the flexibility to install treatment systems independently or in tandem for comparative studies. The facility also has a set of 12 man-made streams on site that allows users to study the effects of actual wastewater effluent on living ecosystems in real time. Additional laboratory facilities are available to measure chemical and biological parameters around wastewater research.

Another facility, the Annacis Research Centre in Vancouver, has five process streams with a flow rate of up to 820 cubic metres per day. Established in 2011, this facility is equipped with laboratory facilities for research, education, and training. The site is currently focused on a number of projects, including using anammox bacteria to manage ammonia levels in wastewater, reclaiming water from treated sewage using membrane systems, and using the microwave peroxide process to disintegrate solids in wastewater and release nutrients.

Finally, one of the longest-standing facilities in Canada is the Edmonton Waste Management Centre of Excellence, which was up and running in 2003. This site is focused on research studies related to biological nutrient removal, nutrient recovery, wastewater treatments, such as advanced oxidation, removal of emerging trace contaminants, re-use membrane-filtered wastewater and anaerobic digestion, and biogas capture and utilization. The facility also caters to technology development in the areas of wastewater treatment, water re-use, solid waste management, and solid waste re-use.

It houses a Biological Nutrient Removal Pilot Plant that contains two parallel process units, allowing researchers to mimic actual plant operations and compare various treatment processes. Users also have access to a Hollow Fibre Membrane Pilot Plant, which is a demonstration-

scale facility assessing the filtration of effluent using a hollow fibre membrane ultrafiltration system.

By providing this cutting-edge infrastructure and equipment, SOWC's facilities, along with the other sites, are helping to ensure Canada continues to be a leader in water technology innovation.

"We have started to see a surge in wastewater technology advancements

in Canada," Gowman said. "The development of these research, testing, and demonstration facilities will definitely propel these technologies forward and keep us at the head of the pack." *wc*

Evelyn Allen is SOWC's manager of industry partnerships. Deirdre Healey is a freelance writer.



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