

# Making Waves

2017 in review



SOUTHERN ONTARIO WATER CONSORTIUM

LE CONSORTIUM POUR L'EAU  
DU SUD DE L'ONTARIO

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SOWC has made waves this past year. Projects are underway, researchers are engaged, industry partners are on board, and students are gaining invaluable experience. Take a look at our numbers below and read the pages ahead to see for yourself.



\$9M+

CONTRIBUTIONS ALLOCATED  
TO AWT PROJECTS



95

RESEARCHERS RECEIVED  
EXTERNAL FUNDING RELATED  
TO SOWC INFRASTRUCTURE



49

INDUSTRY PARTNERS



299

EXAMPLES OF SOWC  
INFRASTRUCTURE AS A KEY  
RESOURCE IN ACADEMIC  
RESEARCH PROJECTS



46

RESEARCHERS LEADING  
AWT PROJECTS



221

PUBLICATIONS OR OTHER  
RESEARCH OUTPUTS RELATED  
TO SOWC INFRASTRUCTURE



300+

ANTICIPATED INDUSTRY  
JOBS RESULTING FROM  
AWT PROJECTS



548

CITATIONS RECEIVED  
FOR PEER-REVIEWED  
PUBLICATIONS RELATED  
TO SOWC INFRASTRUCTURE



72

GRADUATE STUDENTS  
EXPECTED TO BE ENGAGED  
IN AWT PROJECTS



We were actively seeking locations to establish our trailer pilot unit for demonstration and would have taken the research & development to Singapore or the US if the opportunity at the SOWC Guelph wastewater pilot facility and the AWT program hadn't emerged.

Youngseck Hong,  
New Technology Research Lead  
Suez Water Technologies & Solutions



# Message from the Executive Director

The wave element of SOWC's logo suggests energy, the building of momentum. It's an apt metaphor for SOWC's activities in 2017.

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Thanks to the Advancing Water Technologies (AWT) program, created in 2016 with [support from the Federal Economic Development Agency for Southern Ontario](#), we have been able to commit funding to 60 collaborative technology development projects. This contribution of more than \$9 million to company-led projects is expected to leverage more than \$10 million direct investment from 49 industry partners.

The projects will also engage 46 researchers across our member institutions – a goal of the program when it was designed, giving researchers the opportunity to work on applied projects that address technical barriers identified by partner companies. As a result, the program has been particularly attractive to early- to mid-career academics, and more than 72 graduate students or post-docs are anticipated to be supported in working directly with a company. The impact of this activity on skills development, ongoing collaborative partnerships, and nurturing potential highly-skilled employees in this sector will be tremendous.

SOWC has built on nine AWT projects related to resource recovery and value generation from wastewater that has helped create significant momentum in implementing “net zero energy” facilities. A large AWT project with Suez Water Technologies & Solutions built the foundation for a partnership with Ontario Clean Water Agency and the City of Stratford to create Ontario's first biological hydrolysis anaerobic digester to send clean renewable natural gas to the grid.

We were also able to drive some critical projects and engage key experts in 2017, with continued support from Ontario's Business Growth Initiative through the Ministry of Research and Innovation. Highlights this past year include being named as part of the province's new Cleantech Sector Strategy in February, and receiving a commitment of additional funding as a Cleantech Accelerator in the coming year. We'll continue to drive opportunities for adoption of net zero energy facilities and for water technologies to play a role in greenhouse gas reduction initiatives.

SOWC's wave is growing. Because of the support of our major funders, financial contributions from our host and partner institutions, and ongoing investments of industry, we can focus on executing the amazing initiatives that we've created and build the momentum for the next wave.

## **Brenda Lucas**

Executive Director  
Southern Ontario Water Consortium

# Our Story

SOWC is a catalyst for business-led collaborations in the Ontario water sector. It leverages unique physical assets for technology development and demonstration, and the water-related expertise of more than 400 researchers across its 10 world-class member post-secondary institutions.

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SOWC is dedicated to advancing the commercialization of innovative water technologies through facilitating access to real-world testing facilities, introducing companies to academic expertise, and funding industry-led collaborative projects to develop and demonstrate new products and services. Established in 2011, SOWC was created with support from the Federal Economic Development Agency for Southern Ontario (FedDev Ontario), the Ontario Ministry of Research, Innovation and Science (MRIS), contributions from member postsecondary institutions, the City of London and the City of Guelph, and a major matching contribution from IBM Canada.

Together with our partners, SOWC created and commissioned a suite of unique facilities in 2014. In 2016, the organization received a new \$12-million funding commitment from FedDev Ontario to create the Advancing Water Technologies (AWT) program. 2017 saw a major focus on the implementation of AWT, and execution of industry-led collaborative technology development projects. SOWC also benefited from new funding from MRIS through its Business Growth Initiative.

## **Vision**

Our vision is for SOWC to be an important driver in establishing Ontario's leadership in the development and adoption of water technologies and processes that will solve water challenges both locally and globally.

## **Mission**

To support and foster collaboration among Ontario companies and post-secondary institutions to drive technology development and adoption and enhance economic development through the growth of the water sector in Ontario.



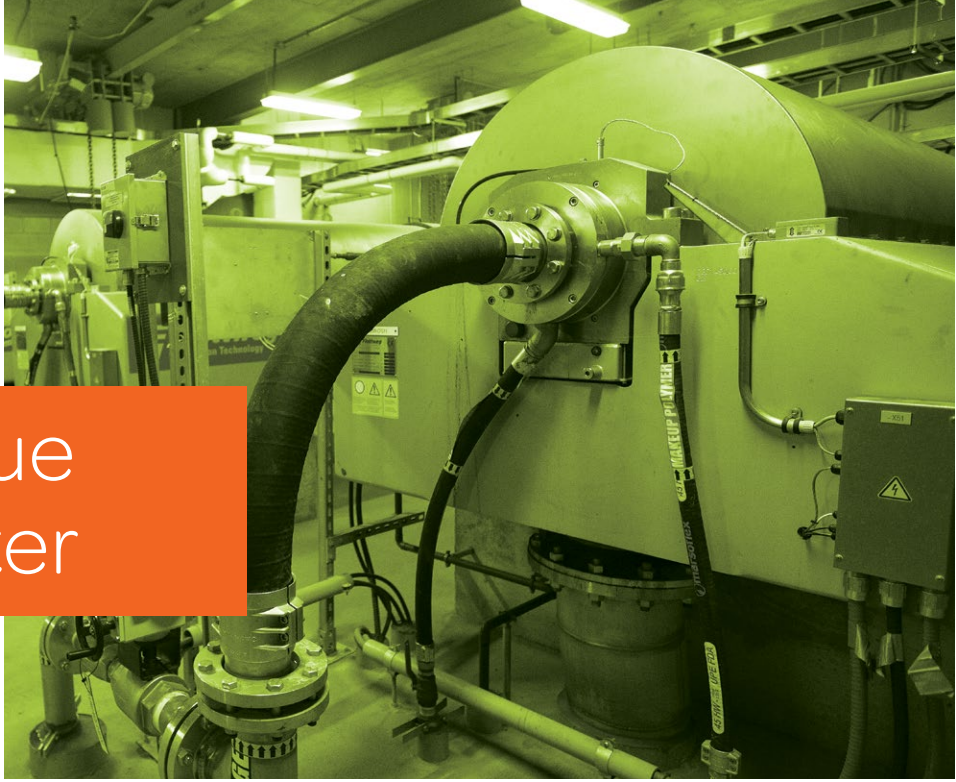
# What We Do

SOWC **supports the growth of the water sector** by connecting industry and academic expertise and resources in a unique and constructive way, and influencing public policy, to advance technologies to commercial success.

SOWC **supports industry** in advancing water technologies so they can more quickly and effectively realize commercial success locally and globally. We are able to connect companies to unique resources because of our consortium of academic partners (including research expertise, unique infrastructure and public-sector funding) and our dedicated knowledge of the water sector.

SOWC **supports researchers and academic institutions** in applied, collaborative, industry-relevant research projects. Our critical mass, focus on advancing innovation and technologies, and credibility with industry set us apart.

# Generating Value from Wastewater



SOWC has undertaken new efforts this year to highlight the potential for innovative technologies to enable resource recovery from wastewater treatment and help to reduce emissions of greenhouse gases (GHGs).

There are myriad ways to reduce inputs and increase valuable outputs of water, solids, and energy from the wastewater treatment process. Facilities that use a process called anaerobic digestion generate methane and CO<sub>2</sub> or biogas which is a greenhouse gas. This gas can be captured and used to generate heat, electricity, or transportation fuel, or it can be cleaned and sold to gas suppliers as renewable natural gas (RNG). Various technologies can help to make this process more efficient, and enhance the production of RNG. And adding in a high carbon source such as food waste organics at the anaerobic digestion stage can further increase the RNG produced.

Ontario has technology leaders in this field, and globally recognized academic expertise. A significant number of AWT projects are with novel technologies for wastewater treatment, dewatering and biosolids management (including generating RNG).

And it is a great fit with the province's goals for reducing greenhouse gas emissions and recovering resources from organic waste.

In 2016 and 2017, SOWC received financial support from Ontario Ministry of Research and Innovation's Business

Growth Initiative (BGI) as a Cleantech Accelerator. The BGI is designed to increase the province's global competitiveness by building on Ontario's existing strengths to shift the province towards new areas of economic growth in the knowledge economy and in high-potential innovation sectors including cleantech.

SOWC established an expert "Value Generation from Biosolids" Working Group to support this initiative. In addition to guiding the Collision Days and Net Zero event (read more about these initiatives on pages 24 and 25), the Working Group has supported these key initiatives:

- A detailed assessment of wastewater management practices and the disposition of biosolids from wastewater treatment plants in Ontario by Professor Wayne Parker and Associate Research Professor Chao Jin of University of Waterloo
- Submission of public comment on the province's development of a framework and action plan for organics, to encourage an integrated approach to biosolids and solid waste management
- A survey of asset management planning practices in Ontario
- Development of an online tool for calculating the greenhouse gas emissions reduction potential of process changes and incorporation of new technology in wastewater treatment plants.



# Generating Renewable Natural Gas from Wastewater Treatment

## “Value Generation from Biosolids” Working Group

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### **Phil Sidhwa**

President,  
Orgatec Energy Inc. (Working Group Chair)

### **Youngseck Hong**

New Technology Leader,  
Suez Water Technologies & Solutions

### **Ted Mao**

VP Research,  
Trojan Technologies

### **Bill Mullin**

Business Development Manager,  
Biorem

### **Sheng Chang**

Associate Professor,  
University of Guelph

### **Wayne Parker**

Professor,  
University of Waterloo

### **Don Hoekstra**

Director of Innovation, Technology,  
and Alternative Delivery,  
Ontario Clean Water Agency

### **Sangeeta Chopra**

Director, Process Optimization  
and Technical Services,  
Ontario Clean Water Agency

## The Stratford Net Zero Project

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The City of Stratford, the Ontario Clean Water Agency (OCWA) and SUEZ Water Technologies & Solutions (Suez) are teaming up on a project to significantly reduce the emission of harmful greenhouse gas (GHG) emissions. The project uses new technology to optimize the existing Stratford Water Pollution Control Plant and increase the production of methane gas by adding compost and source separated food waste. The resulting methane gas is then converted into renewable natural gas – a clean, carbon-neutral energy source – and fed back into the local gas distribution system. In addition to producing a renewable energy source, the project supports the province’s strategy for a waste-free Ontario by diverting waste from the City’s landfill.

The project builds on a previous project by Suez (formerly GE Water and Process Technologies) as part of the Advancing Water Technologies program. SOWC facilitated the introduction to OCWA, which brought forward Stratford as a suitable municipal partner in the project.

The project has received funding from the Ontario Centres of Excellence through a program called Target GHG, which is dedicated to projects that reduce GHGs and increase energy efficiency. There are direct benefits for the City of Stratford and surrounding municipalities and it could be a model for other municipalities across Ontario and Canada, many of which have untapped potential to produce renewable natural gas and significantly reduce harmful GHG emissions.



## Advancing Water Technologies

The Advancing Water Technologies (AWT) program was created by SOWC to enhance the Ontario water cluster and continue to build Ontario's reputation for water excellence around the world. The program is funded by the Federal Economic Development Agency for Southern Ontario (FedDev Ontario).

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AWT helps companies in Ontario leverage SOWC's network of academic expertise and world-class facilities to develop and demonstrate water technologies, providing financial contributions to industry-led R&D projects that will result in globally competitive and market-ready products and services. AWT has supported existing industry-academic partnerships and actively encouraged and facilitated new ones.

Since the launch of the program in 2016, SOWC has contributed over \$9 million to fund 60 projects. We anticipate this funding will leverage over \$10 million from the participating companies and will result in 300+ industry jobs. The following pages highlight the 60 AWT projects that have been awarded funding.



01 / Demonstration of an online photonic sensor to guide treatment changes to minimize disinfection by-products in drinking water

**Industry Lead**

A.U.G. Signals

**Member Institution**

University of Toronto

**Research Lead**

Ronald Hofmann

02 / Development and optimization of an innovative ozone saturation system applicable to residential, commercial and industrial potable water treatment and “clean in place” applications

**Industry Lead**

Aclarus

**Member Institution**

Fleming College

**Research Lead**

Brent Wootton

03 / Design and optimization of a pico hydro turbine for inline water disinfection systems

**Industry Lead**

Formarum

**Member Institution**

University of Toronto

**Research Lead**

Amy Bilton



Pilot projects like this are a huge investment for early commercialization companies, like ours, to make. Having access to science partners, as well as funding, is absolutely critical.

Els Vanbeckevoort,  
Co-Founder and CEO  
of SanEcoTec Ltd.



04 / Reducing populations of harmful bacteria by using a silver-stabilized hydrogen peroxide disinfectant as part of a drinking water treatment process

**Industry Lead**

SanEcoTec Ltd

**Member Institution**

Queen's University

**Research Lead**

Steven Liss



We think this is a true accelerator for technology to be able to reach the real-test environment quickly.

Cindy Dongxin Hu,  
A.U.G. Signals Ltd.



Without SOWC, we certainly wouldn't have been able to complete the project in the two-year time frame.

Rick VanSant,  
President & CEO of  
UV Pure Technologies



05 / Design and validation of third generation UV water purification systems for enhanced treatment of drinking water, reuse and wastewater

**Industry Lead**

UV Pure Technologies

**Member Institution**

Fleming College /  
Queen's University

**Research Lead**

Brent Wootton /  
Hans-Peter Loock

06 / Development of a pico-turbine energy harvester for water networks

**Industry Lead**

Formarum

**Member Institution**

University of Toronto

**Research Lead**

Amy Bilton

Based on tracking to date, the equivalent of 21 FTEs were directly supported by the AWT program in 2017.

07 / Assessment and field demonstration of silicate corrosion inhibitors for the reduction of lead release in drinking water distribution systems

**Industry Lead**

National Silicates  
Partnership

**Member Institution**

University of Waterloo

**Research Lead**

Peter Huck

08 / Pilot installation to optimize performance of the TILT-MBBR ultrafiltration system for the treatment of municipal wastewater

**Industry Lead**

H2Flow Equipment Inc.

**Member Institution**

Fleming College

**Research Lead**

Brent Wootton



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09 / Full scale BioCord demonstration project for cold temperature ammonia removal in a wastewater treatment lagoon

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**Industry Lead**

Bishop Water Technologies

**Member Institution**

Western University

**Research Lead**

George Nakhla

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10 / Electrodialysis in wastewater treatment applications

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**Industry Lead**

GE Water (now SUEZ Water Technologies & Solutions)

**Member Institution**

McMaster University

**Research Lead**

Younggy Kim

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11 / Integrating soil properties into a wave propagation model for acoustic condition assessment of water-filled metal pipes

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**Industry Lead**

Blue Planet Environmental

**Member Institution**

Fleming College

**Research Lead**

Brent Wootton

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12 / Water disinfection by metallic alloy foam in a continuous flow-through bed

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**Industry Lead**

CNEM Corporation

**Member Institution**

University of Guelph

**Research Lead**

Emily Yi Wai Chiang  
& Rafael M. Santos



Having the SOWC with us at the discussion table with the municipality was extremely valuable because it helped the municipality view the demonstration as an opportunity to evaluate a potential solution rather than view it as just a sales pitch.

Kevin Bossy,  
CEO of Bishop Water Technologies

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13 / Application of high density DNA sequence analysis to improve onsite wastewater treatment processes

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**Industry Lead**

Waterloo Biofilter Systems

**Member Institution**

McMaster University

**Research Lead**

Herb Schellhorn

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14 / Optimizing aeration to improve the nutrient- and organics-reducing performance of a BioCord™ fixed-film technology

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**Industry Lead**

Bishop Water Technologies

**Member Institution**

Western University

**Research Lead**

Martha Dagneu



The grant itself has been immensely helpful. It's a stepping stone to get us out of an academic lab and into a real, field application.

Clare Armstrong,  
Manager of Research and Development  
at Electrokinetic Solutions (EKS)



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15 / Evaluation and assessment of an innovative integrated technology for the processing of municipal wastewater biosolids into a Class A fertilizer

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**Industry Lead**

Walker Environmental

**Member Institution**

Fleming College

**Research Lead**

Brent Wootton

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16 / Pilot-scale testing of the ElectroKinetic Solutions-Wastewater Technology (EKS-WWT) for removal of solids from raw municipal wastewater

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**Industry Lead**

Electrokinetic Solutions Inc.

**Member Institution**

University of Guelph

**Research Lead**

Bassim Abbassi



17 / A performance evaluation of the Vortex Force aeration device in wastewater applications

**Industry Lead**  
IPEX

**Member Institution**  
University of Guelph

**Research Lead**  
Sheng Chang

18 / Validation and optimization of a pilot-scale proprietary Forward Osmosis process for industrial wastewater treatment, recovery and reuse

**Industry Lead**  
Forward Water Technologies

**Member Institution**  
University of Toronto

**Research Lead**  
Vladimiro Papangelakis

19 / Evaluation and assessment of the ability of an advanced engineered wetland to treat glycol de-icing and anti-icing fluids from airport wastewater streams

**Industry Lead**  
Stantec Consulting Limited

**Member Institution**  
Fleming College

**Research Lead**  
Brent Wootton

20 / Pre-commercial small-scale testing program for ElectroKinetic Reclamation - Dewatering Technology (EKR-DT) of oil sands tailings

**Industry Lead**  
ElectroKinetic Solutions

**Member Institution**  
Western University

**Research Lead**  
Julie Shang



This project has the potential to make a breakthrough in the relatively new field of forward osmosis in wastewater treatment.

Professor Vladimiro Papangelakis

Based on tracking to date, the equivalent of 17 FTEs of company staff time were dedicated to AWT projects in 2017.

21 / Photocatalytic filter media for treatment of organics in water

**Industry Lead**

Line-X Coatings

**Member Institution**

Western University

**Research Lead**

Paul Charpentier

22 / Electrochemical treatment and recovery of industrial wastewater: developing electrode materials, electrochemical process, and application

**Industry Lead**

PW Custom Fabrications

**Member Institution**

McMaster University

**Research Lead**

Charles-François de Lannoy

23 / Ultraviolet light photocatalysis for chemical-free tertiary organics treatment

**Industry Lead**

H2nanO

**Member Institution**

University of Waterloo

**Research Lead**

William Wong

24 / Development, optimization and validation of an innovative onsite water reuse technology to treat greywater

**Industry Lead**

Greyter Water Systems

**Member Institution**

Fleming College

**Research Lead**

Brent Wootton



It's nice to have other hands and eyes involved in your development. They think differently and there's been certain things that we've had to pivot on and think about because they've been brought up by the CAWT.

Mark Sales,  
co-founder and CEO, Greyter





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25 / Pathogen and micropollutant control for water reuse using advanced ultraviolet-based technologies

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**Industry Lead**

Trojan Technologies

**Member Institution**

Western University

**Research Lead**

Ajay Ray

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26 / Optimized inspection and asset management solution for low impact development practices

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**Industry Lead**

Civica Infrastructure Inc.

**Member Institution**

University of Guelph

**Research Lead**

Ed McBean

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27 / Advanced water treatment technology for enhanced oxygen delivery and aerobic processes in flowing waters

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**Industry Lead**

WCI Environmental Solutions Inc.

**Member Institution**

Ryerson University

**Research Lead**

Andrew Laursen & Vadim Bostan

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28 / Development and full-scale validation of a commercial greywater reuse technology

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**Industry Lead**

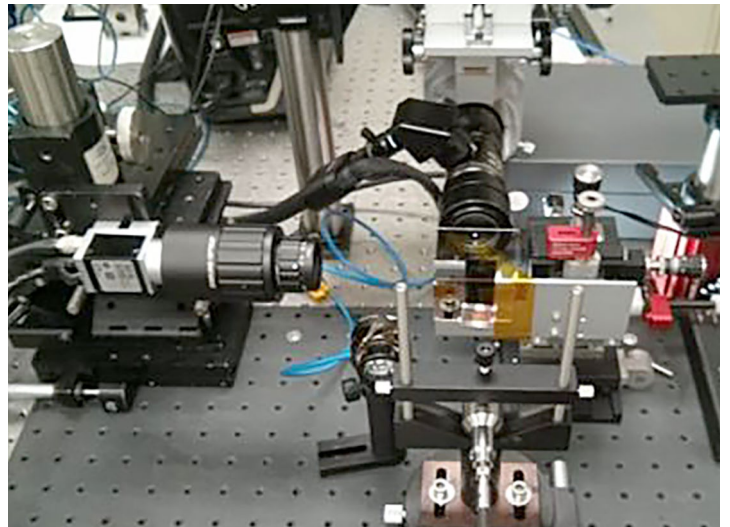
Greyter Water Systems

**Member Institution**

Fleming College

**Research Lead**

Brent Wootton



29 / Development and validation of a complete greywater treatment system for multi-residential and commercial applications

**Industry Lead**  
Interpump Supply

**Member Institution**  
Fleming College

**Research Lead**  
Brent Wootton

30 / Validation of a real-time integrated microfluidics and high-frequency microwave sensing pathogen detection device

**Industry Lead**  
QuantWave Technologies Inc.

**Member Institution**  
Fleming College

**Research Lead**  
Brent Wootton

31 / A novel Raman based sensor for cost-effective monitoring of nitrate and phosphate in water

**Industry Lead**  
Honeywell

**Member Institution**  
University of Toronto

**Research Lead**  
Elodie Passeport

32 / Developing a rapid, in-situ, and real-time E. coli detection platform using magnetic bio-inks

**Industry Lead**  
Ecoli Sense

**Member Institution**  
McMaster University

**Research Lead**  
Ishwar K. Puri & Fei Geng



The AWT program is an excellent way to bring together academia and industry. Everyone benefits: the company gets to leverage lab expertise toward developing an end product; the university gets to hire a postdoctoral fellow to carry out research.

Ian D'Souza,  
Scientist, R&D at Honeywell's Cambridge, Ontario site



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33 / Dynamic simulator for energy and process optimization in wastewater utilities

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**Industry Lead**

Hydromantis Environmental Software Solutions

**Member Institution**

Western University / University of Toronto

**Research Lead**

Martha Dagnev / Prasanth Nair

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34 / Design and construction of portable detectors using fluorescent-based aptasensors for detection of priority contaminants in water

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**Industry Lead**

Environmental Bio-Detection Products Inc. (EBPI)

**Member Institution**

University of Waterloo

**Research Lead**

Simarjeet Saini

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35 / Applying machine learning classifiers to acoustic leak detection data

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**Industry Lead**

Echologics, a Division of Mueller Canada Ltd.

**Member Institution**

University of Waterloo

**Research Lead**

Alex Wong & Kumaraswamy Ponnambalam

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36 / Improved high frequency water quality data collection: reliable real-time fault detection and data analysis

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**Industry Lead**

Primodal Systems Inc.

**Member Institution**

McMaster University

**Research Lead**

Emil Sekerinski



The link that SOWC creates between industry and universities is essential, and the funding gave momentum to that connection. This AWT project brought together a very complementary set of skills, which speaks to the SOWC's extensive network.

Martha Dagnev,  
Western University



These partnerships with universities and colleges let us draw on expertise that we don't necessarily have in house.

Kevin Laven,  
Vice-President of Technical Services, Echologics.



37 / Integrating soil properties into wave propagation model for acoustic condition assessment of water-filled metal pipes

**Industry Lead**

Echologics, a Division of Mueller Canada Ltd.

**Member Institution**

Queen's University

**Research Lead**

Ian D. Moore

38 / Development of a novel hydrant based urban water distribution monitoring system

**Industry Lead**

Pattern Discovery Technologies Inc.

**Member Institution**

University of Waterloo

**Research Lead**

Sriram Narasimhan



39 / Integrated Watershed Telemetry System: enhanced hydrologic data collection, logging and communication for watershed-scale monitoring

**Industry Lead**

Solinst Canada Ltd.

**Member Institution**

University of Waterloo

**Research Lead**

David Rudolph

40 / Development of an integrated toolkit for predicting influent quality of wastewater treatment plants

**Industry Lead**

Hydromantis Environmental Software Solutions

**Member Institution**

McMaster University

**Research Lead**

Zoe Li

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Without the AWT program, the process of this commercialization would be much slower.

Tianyi Guo,  
General Manager  
of Forsee Instruments



41 / Prototype development and field validation of an in-line E-coli analyzer for drinking water

**Industry Lead**

Forsee Instruments

**Member Institution**

McMaster University

**Research Lead**

Chang-qing Xu

42 / Validation of RESOLVE airborne aquifer imaging technology for enhanced source-water management and protection

**Industry Lead**

CGG Canada Services Ltd.

**Member Institution**

University of Guelph

**Research Lead**

Beth Parker



43 / In-situ SPE concentration and toxicity assessment system to monitor source water quality, evaluate treatment technologies, and improve water quality

**Industry Lead**

Environmental Bio-Detection Products Inc. (EBPI)

**Member Institution**

University of Toronto

**Research Lead**

Ronald Hofmann & Robert Andrews

44 / Development and validation of a prototype nutrient analyzer for continuous water sample analysis and real-time response to water quality variations

**Industry Lead**

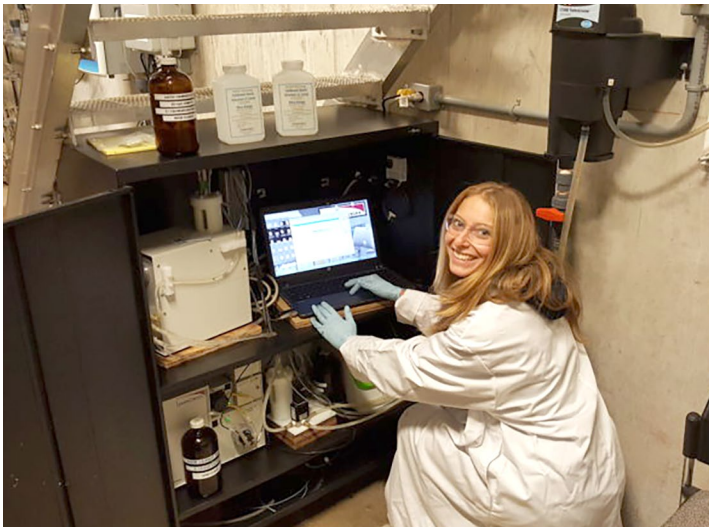
A.U.G. Signals

**Member Institution**

Ryerson University

**Research Lead**

Christopher Wellen



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45 / Development of an oxidative organic monitoring tool for source and treated drinking waters

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**Industry Lead**  
MANTECH Inc.

**Member Institution**  
University of Toronto

**Research Lead**  
Robert Andrews

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46 / Development of a machine based acoustic device for municipal pipeline condition assessments

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**Industry Lead**  
Echologics, a Division of Mueller Canada Ltd.

**Member Institution**  
Fleming College

**Research Lead**  
Brent Wootton

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47 / Analytic toolkit to quantify building water and energy losses with solutions recommender

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**Industry Lead**  
LeapFrog Energy Technologies

**Member Institution**  
McMaster University

**Research Lead**  
Dean Mountain

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48 / Development of new tests and applications for detecting bacteria in water for use in instruments from TECTA-PDS

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**Industry Lead**  
Pathogen Detection Systems (PDS)

**Member Institution**  
Queen's University

**Research Lead**  
Stephen Brown & Steven Liss



These partnerships are critical. It's prohibitive as a small company to do it by ourselves. This is a great way to find very smart, knowledgeable research groups that can develop the experimentation and help us commercialize the technology.

Robert Menegotto,  
President and CEO of MANTECH



49 / Real-time microbial monitoring system for drinking water quality

**Industry Lead**

Genemis Laboratories Inc.

**Member Institution**

University of Waterloo

**Research Lead**

William A. Anderson

50 / Development of a handheld, real time water quality testing device for pathogen detection in drinking water applications

**Industry Lead**

Nanolytix

**Member Institution**

Fleming College

**Research Lead**

Brent Wootton

51 / Development and application of DNA-aptamer-based technology to detect cryptosporidium parvum oocysts in drinking water resources

**Industry Lead**

CREM

**Member Institution**

University of Waterloo

**Research Lead**

Juewen Liu



I think people outside the country don't realize the extent to which Canadian researchers depend on industry and these partnerships.

Susan Glasauer,  
University of Guelph

52 / Enabling recovery and reuse of nutrients with residential septic systems

**Industry Lead**

Waterloo Biofilter Systems

**Member Institution**

University of Guelph

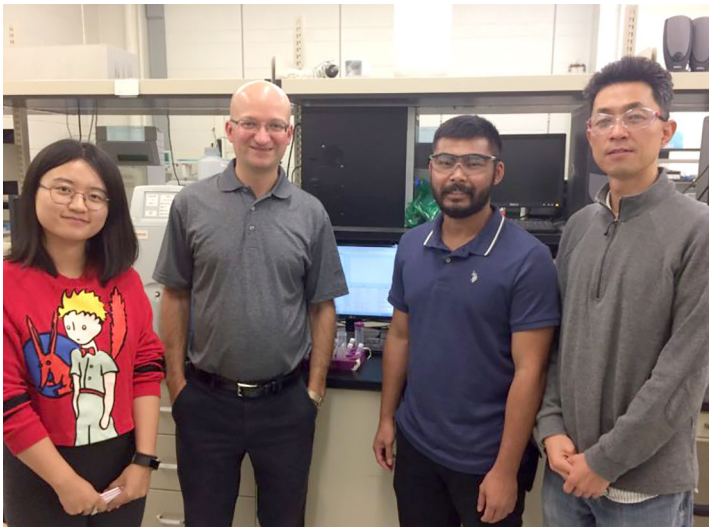
**Research Lead**

Susan Glasauer



Everything can work fine in a lab, but in the field new things can happen. Having the opportunity to adapt our lab results for a real water facility is a tremendous opportunity to generate the analytics that will allow us to advance our research and product.

William A. Anderson,  
University of Waterloo



53 / Development and validation of a model for automated process control of thermophilic pre-treatment systems for anaerobic digestion

**Industry Lead**  
inCTRL Solutions Inc.

**Member Institution**  
McMaster University

**Research Lead**  
Younggy Kim

54 / Demonstration of aerobic granular sludge formation in continuous-flow granulation systems

**Industry Lead**  
ETO Solutions Corp

**Member Institution**  
Ryerson University

**Research Lead**  
Steven Liss



55 / Valuation and full-scale demonstration of the Biological Hydrolysis Anaerobic Digestion (BH-AD) and ZeeLung MABR technologies for energy neutral wastewater treatment

**Industry Lead**  
GE Water (now SUEZ Water Technologies & Solutions)

**Member Institution**  
University of Guelph / McMaster University

**Research Lead**  
Sheng Chang / Younggy Kim

56 / Optimization and evaluation of thermal hydrolysis for full-scale anaerobic digestion

**Industry Lead**  
Greenfield Global Inc.

**Member Institution**  
Ryerson University

**Research Lead**  
Elsayed Elbeshbishy



Suez Water Technologies & Solutions invested more than \$1.2 million in capital and dedicated 3-4 FTEs in 2017 in support of the AWT related pilot programs.

Youngseck Hong, New Technology Research Lead  
Suez Water Technologies & Solutions



In addition to supporting my research, the grant gives my students the satisfaction of seeing their work applied in the real world.

Younggy Kim,  
McMaster University





We've never done work on municipal water so this is a fantastic chance for us to work with someone who has.

Christine Haas,  
President of Renix Inc.



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57 / Phosphorous removal from wastewater secondary effluent by Uninterrupted Ion Exchange (UIX)

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**Industry Lead**

Renix Inc.

**Member Institution**

Western University

**Research Lead**

Amarjeet Bassi

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58 / Development, optimization and validation of an innovative integrated anaerobic thermophilic digester for the treatment of organic waste and septage

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**Industry Lead**

SusGlobal Energy Corp.

**Member Institution**

Fleming College

**Research Lead**

Brent Wootton



The funding allows Trojan to branch out beyond its regular R&D stream and diversify its portfolio with projects that could yield long-term breakthroughs.

Domenico Santoro,  
Trojan Technologies



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59 / Integration of collection system, primary clarifier and fermenter for biosolids and wastewater quality management and control

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**Industry Lead**

Trojan Technologies

**Member Institution**

Ryerson University

**Research Lead**

Elsayed Elbeshbishy

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60 / Scale-up development of STARx systems (smouldering combustion) for the destruction of wastewater biosolids

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**Industry Lead**

Savron Solutions

**Member Institution**

Western University

**Research Lead**

Jason Gerhard



Someone has to invest in proving the technology at a pilot scale. When it works, everyone gets excited and they start lining up to do it on their site.

Jason Gerhard,  
Western University

# Workshops & Events

## Making “Net Zero Energy” Wastewater Facilities a Reality in Ontario

Can we create five “net zero energy” wastewater facilities in Ontario in the next five years? That was the question a group of municipal leaders, water technology companies and academic experts came together to answer in October 2017 at a workshop hosted by OCWA and SOWC.

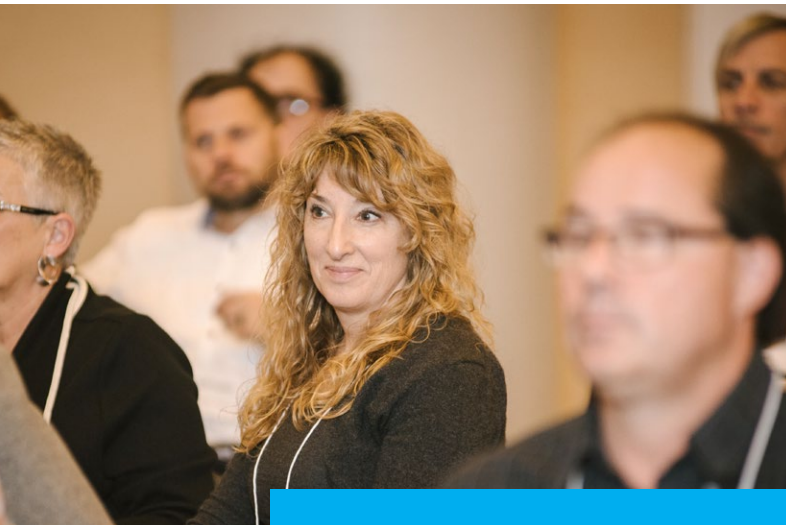
For a wastewater plant to be considered a net zero facility, the energy produced by the plant has to balance the energy consumed in the wastewater treatment process. This means adapting treatment processes to reduce the energy required for treatment, as well as capturing the biogas produced during treatment and using it for heating onsite or converting it to electricity, transportation fuel, or renewable natural gas.



The good news is a number of Ontario technology companies are actively developing technology solutions to implement net zero facilities. Provincial government planning and policy are also aligning to support these facilities, with a new regulation for asset management planning, a framework emerging for organics management and funding programs now available for innovative technologies and municipal infrastructure projects.

But there is still work to do – and this was the focus of the discussions at the OCWA/SOWC workshop. The group reviewed the approach the City of Stratford is taking with their net zero wastewater project (see story on page 7) and began to identify the opportunities and challenges facing municipalities thinking about implementing net zero facilities in their communities.

The next few years will be a critical period, and the event demonstrated the strong interest among municipalities in advancing this goal. While achieving full net zero is not feasible in all municipalities, moving towards net zero goals – driving efficiencies in energy consumption and investigating options for energy capture and reuse – are universally beneficial. SOWC looks forward to continuing its leadership in creating these opportunities through working with OCWA, the province, municipal leaders, academics and technology providers.



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## Collision Days

This past year, 24 graduate and post-doctoral students from eight post-secondary institutions were selected to participate in SOWC's industry-student engagement series called Collision Days.

The participating students were nominated by their academic supervisors and came from civil, chemical and environmental engineering and biology programs and had the opportunity to present their theses to give our industry participants a glimpse of current research. The students benefited from insights and advice from practitioners, researchers, senior management and human resource experts. Seven student participants were also provided support to attend the 2017 WEAO Technical Symposium & OPCEA Exhibition in Ottawa.

Three full-day events were hosted:

- Suez Water Technologies & Solutions and Lystek co-hosted an event at the City of Guelph Wastewater Treatment Facility and SOWC Pilot Facility,
- The Ontario Clean Water Agency co-hosted an event at South Peel's GE Booth Wastewater Treatment Facility, and
- Trojan Technologies co-hosted an event at its London headquarters and the SOWC London Wastewater Facility at Greenway Pollution Control Plant.

Here's what some who attended had to say about the experience:

"These engagement events give an opportunity for graduate (Masters and Doctorate) and Post-Doctoral students to have direct exposure to the latest in cutting-edge topics and technology related to capturing value from biosolids. The days really enhance their understanding of the expert capacity in this field in Ontario."

**Student participant**

"The three-minute thesis and career panel session in particular was beneficial. It was good to have a variety of views and experiences shared during the career panel."

**Student participant**



I am grateful for this entire learning experience through SOWC as I believe the academic setting alone would not have equipped me with the array of valuable technical feedback from seasoned professionals, and lessons on the latest emerging technologies and innovations applied by industries.

**Student participant**

"It was a great to see what other people in the region are working on. The networking was a great opportunity to discuss and get in contact with the people in the same field who are working on similar projects. The panel discussion was fantastic because they had a great deal of wisdom to share and I was able to relate to the challenges of entering today's job market."

**Student participant**

"I was inspired, and really impressed with the breadth and depth of the research presented by the students. Recovering value from biosolids is such an emerging area – we couldn't have gathered these many students of this calibre on this topic five years ago."

**Linda Gowman, Chief Technology Officer, Trojan Technologies**

# Partnering with Ontario Clean Water Agency

## Working Together to Support Water Innovation

For the past few years, SOWC and the Ontario Clean Water Agency (OCWA) have worked closely to support the development of innovative water and wastewater technology solutions. From testing and demonstration to piloting and first customers, each organization has a complementary role to play in collaborating with companies, end users, government, and other partners to “clear the path” to advance innovation in the water industry.

OCWA was established in 1993 as an agency of the Province of Ontario with a mandate to provide water, wastewater and other related services to clients in a manner that protects human health and the environment, and encourages the conservation of water resources. It has over 180 municipal, institutional, commercial and First Nation clients across the province and operates more than 800 treatment facilities and associated collection and distribution systems.

OCWA works with clients to pilot and adopt new and innovative technologies with potential to address client challenges. This collaboration has introduced OCWA to companies that have a viable product ready for municipal pilot testing or adoption. OCWA has also been a resource and partner for AWT projects executed at client facilities. For example, Ontario-based Walker Environmental was awarded an AWT project with Fleming College to validate the effectiveness of introducing an innovative chemical pretreatment step prior to their advanced alkaline



SOWC played an active role in connecting Suez with OCWA and ensuring that relationships were created that didn't previously exist. That helped us establish an active partnership with OCWA and the City of Stratford that will enable the first North American installation of our Biological Hydrolysis system.

Geert-Henk Koops,  
Global Technology Leader ES Products  
Suez Water Technologies & Solutions

stabilization process. The project is expected to develop, assess, and optimize this integrated system's ability to process municipal biosolids and produce a “Class A” fertilizer at a low cost. OCWA is working with the project team to facilitate the demonstration at a wastewater treatment facility in the Town of Carleton Place.

In addition to helping companies to pilot and commercialize new technologies, OCWA and SOWC are working together to educate Ontario municipalities about emerging technologies by hosting workshops that bring technology companies, municipal end-users and researchers together to discuss what can be done to reduce barriers and facilitate the adoption of new technologies.

# Our Facilities

Along with its partner institutions, SOWC has created an integrated platform of state-of-the-art facilities for the research, development, testing and demonstration of water technologies. For complete descriptions of each facility, please visit [sowc.ca](http://sowc.ca)

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## Guelph Wastewater Pilot Facility (University of Guelph)

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The Guelph Wastewater Pilot Facility is a bench and pilotscale facility constructed adjacent to the City of Guelph's municipal wastewater treatment plant. The facility offers unique testing capacity for treatment technologies by providing direct access to municipal wastewater at flow rates up to 300 m<sup>3</sup>/day.

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## Sensor Fabrication Facility (McMaster University)

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This facility enables the development of automated, wireless, and distributed sensing of pathogens, chemicals, and elemental contamination. The platform provides infrastructure to design, prototype, and validate sensors.

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## London Wastewater Facility (Western University)

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This facility is located at the City of London Greenway Wastewater Treatment Facility. It creates unprecedented capacity for compliance testing and demonstration of technologies, enabling access to full-scale municipal flows from 1000 m<sup>3</sup>/day up to 4,500 m<sup>3</sup>/day indoors.

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## Watershed Monitoring Facility (University of Waterloo)

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State-of-the-art monitoring sensors and equipment are installed within the Alder Creek Watershed and Hopewell Creek Watershed in the Regional Municipality of Waterloo. Similar capacity is installed within the Mimico Creek Watershed in the City of Toronto, led by University of Toronto.

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## Drinking Water Facilities (University of Toronto, University of Waterloo, Wilfrid Laurier University)

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Multiple facilities are available for testing technologies that address emerging concerns in water treatment and effective use and reuse of water. They include mobile advanced oxidation process equipment, a mobile membrane pilot plant, and capacity for pathogen resilience characterization. In addition, the mobile ecotoxicology facilities at Wilfrid Laurier University and the innovative analytical techniques facilities at the University of Waterloo are ready to support associated activity.

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## New Partner Facilities (Fleming College and Queen's University)

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Fleming College's Centre for Advancement of Water and Wastewater Technologies comprises six outdoor research test cells and 20 ponds, an indoor pilot testing research facility and environmental chamber, and accredited analytical laboratory. Queen's facilities include a Coastal Engineering Laboratory, which is the largest university hydraulics laboratory in the country. The university is also home to the Queen's University Biological Station, and, in conjunction with CMC Microsystems, recently launched the Kingston Nano-Fabrication Lab.

# Who We Are



**Brenda Lucas**  
Executive Director

Brenda has led the implementation and development of the platform since SOWC was created in 2011. Brenda has 15 years of experience in the water policy and research community in Canada, developing networks and collaborative projects. She has previously worked with a private foundation, non-profit organizations and as a Senior Policy Advisor to two provincial Ministers of the Environment. She is a member of the Forum for Leadership on Water (FLOW Canada) and a member of the Board of Directors of the Ontario Clean Water Agency (OCWA).



**Rahim Kanji**  
Manager, Industry Partnerships

As Manager, Industry Partnerships, Rahim is the primary interface between SOWC and its industry partners, ensuring active liaison, outreach, user engagement and project development support. Prior to his engagement with SOWC, Rahim spent 10 years in various private and public-sector roles providing him with expertise in systems commissioning, technical sales, commercialization, industry liaison and project management. He has an undergraduate degree in Chemical Engineering and a Master's degree in Business, Entrepreneurship, and Technology, both from the University of Waterloo, and he is also a professional engineer (P.Eng.).



**Anna Ziolecki**  
Manager, Research Partnerships

Anna serves as the lead for activities related to funding and project development. Working closely with the Manager, Industry Partnerships and the administration of the lead partner universities of the SOWC, Anna manages the Advancing Water Technologies program. Anna has an academic background in the social sciences and more than ten years of professional experience in research administration. Prior to joining the SOWC, Anna worked as Research Officer at the University of Western Ontario and Research Funding Officer at the University of Windsor.



**Robert Nyman**  
Project Coordinator

Robert is the Project Coordinator for SOWC. In his role, Robert is responsible for SOWC's financial administration, office coordination, meeting and event planning, and supports the Executive Director. Robert has held positions in finance at the City of Toronto and in financial aid at the University of Waterloo. Robert's educational background consists of a Bachelor's degree in Legal Studies and a Master of Public Service degree, both from the University of Waterloo.

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## Southern Ontario Water Consortium

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[sowc.ca](http://sowc.ca)

Creative: [forgoodintent.com](http://forgoodintent.com)

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## Post-Secondary Members



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## Funding Partners



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SOUTHERN ONTARIO WATER CONSORTIUM

LE CONSORTIUM POUR L'EAU  
DU SUD DE L'ONTARIO