Additional Environmental Services 2021 Research Highlights

Research Project	Partner(s)	Research Benefit
RESEARCH THEME: PUBLIC HEALTH		
ONGOING: Substances of concern passive sampling program at select water and wastewater facilities within York Region	Trent University	Allows the Region to establish a baseline understanding of probable emerging contaminants, such as pharmaceuticals and personal care products.
RESEARCH THEME: SAFE DRINKING WATER		
ONGOING: Cyanotoxin control strategies in drinking water	Drinking Water Research Group, Hamilton, Union Water, Durham, and Niagara	Research is evaluating effectiveness of granular activated carbon and other treatment processes to remove cyanotoxins, as well as developing monitoring tools for improved response to harmful algal blooms growing in proximity to water intakes. Several articles have been submitted/published in 2021, to *Environmental Science and Engineering* and other peer reviewed journals.
COMPLETED: Biofiltration research by Drinking Water Research Group (DWRG)	University of Toronto's Drinking Water Research Group (DWRG)	DWRG (University of Toronto) has summarized its recent biofiltration research (nutrient removal, monitoring tools, Nitrosodimethylamine (NDMA) formation potential, dissolved organic and pH consumption). Findings have been submitted to peer-reviewed journals.
ONGOING: Monitoring and mitigation of mussel impact to treatment facilities	University of Toronto's Drinking Water Research Group	Research on protecting water/wastewater treatment equipment. York Region is providing water samples from several water treatment plants.
ONGOING: Distribution pipe loop pilot to investigate chloramine residual loss	University of Toronto's Drinking Water Research Group, and Town of Newmarket	Using a pipe loop in place at Queensville Wells 1 & 2, this research investigates chloramine decay in the distribution system pipe due to impacts associated with pipe type and flow rate.

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COMPLETED: Microplastics sampling	Health Canada, McGill University, and Town of Georgina	Sampling completed on raw, treated water and within the distribution system. Work done in partnership with McGill University. Data to be used to support Health Canada's guideline development on microplastics.

RESEARCH THEME: WASTEWATER TREATMENT

Research Project	Partner(s)	Research Benefit
COMPLETED: Use of micronutrients to reduce odour	Internal Research	As a result of the research, the Region has implemented a new Operational Strategy at treatment lagoons, which has been successful in reducing odour related complaints and will be continued in future.
ONGOING: Microplastics in sewage sludge exploration and detection	York University (Lassonde School of Engineering)	Measuring new approaches to address microplastics and their impact on wastewater treatment systems and advance understanding of their prevalence and fate.
COMPLETE: Optimization of membrane performance during cold weather conditions	University of Waterloo (Civil Engineering Department)	The study provided insights into strategies to mitigate fouling of tertiary membranes under low temperature and high flow conditions. Study findings to appear in several peer-reviewed journals.

RESEARCH THEME: CLIMATE CHANGE ACTION AND ENERGY CONSERVATION

Research Project	Partner(s)	Research Benefit
COMPLETED: Energy Efficient Design of York Region bus facility	Internal Research	Research demonstrates how to integrate stringent energy efficiency standards into the expansion of a regional bus storage, repair, and operations facility.
NEW: Carbon Sequestration in Grassland Soils Across A Restoration Gradient in the Lake Simcoe Watershed	Lakehead University	5- year study on carbon sequestration in restored and naturally occurring prairie lands. Samples of soil and prairie plants will be taken from three Region properties, including the reconstructed prairie at the Holland Landing Lagoons, Bendor and Graves Tract and Nobleton Tract. The research will quantify each site's ability to naturally remove carbon dioxide from the atmosphere.

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RESEARCH THEME: HEALTHY FORESTS		
NEW: Trees and their socio-ecological effects	University of Toronto	Project will improve understanding of the social and ecological benefits of urban trees by quantifying how much social and ecological benefit is lost when trees are removed.
NEW: Greening the Landscape Consortium	Vineland Research and Innovation Centre	Public-private collaboration leads urban greening research by setting priorities reflecting industry needs and supporting economic success.
NEW: Ecosystem Services Valuation	Toronto Regional Conservation Authority	A review of the methodology and results for the quantification and valuation of core services, carbon storage and sequestration, avoided runoff, air pollution removal, and oxygen production, for York Region green infrastructure assets. Additionally, a review of new potential services to be measured (non-core). The quantification of ecosystem services informs levels of service goals for asset management.
COMPLETED: Urban soil improvement	Vineland Research and Innovation Centre	Research to improve survivability of trees planted in the Region's road right-of-way.
ONGOING: Biological controls for dog-strangling vine	Silv-Econ Ltd., and Agriculture and Agri-Food Canada	Tests biological control informing management of the invasive species dog-strangling vine and protects York Region forests and biodiversity.
ONGOING: Automation of woodland cover re-assessment	Ecopia Ltd.	Applying innovative technology that may provide a more efficient and cost-effective method to map woodlands. Supports monitoring of Regional Official Plan woodland cover target.
RESEARCH THEME: MINIMIZING WASTE AND CIRCULAR ECONOMY		
ONGOING: Food waste grinder project	University of Waterloo (GHD and Ontario Clean Water Agency are subcontractors), Markham Inter-Church Committee for Affordable Housing (MICAH), and AET Group Inc., and City of Markham	Research to evaluate impacts of food waste grinders in a multi-unit residential building. In 2021, baseline data was gathered, a resident survey was conducted, and staff are now studying water usage, wastewater and solid waste characteristics with the activation of the food waste grinders.

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RESEARCH THEME: DIGITAL INNOVATION		
ONGOING: Definition of a Smart Utility: How to Be a Digital Utility and the Framework for an Intelligent Water System	Water Research Foundation, Stantec, City of Toronto and several United States Utilities	Research to guide transformation to a digital utility, which will help staff leverage data and technology to improve our business capabilities.
ONGOING: Big data analytics and machine learning for improved wastewater sewer system response forecasted rainfall events	Corporate Services - Data Analytics and Visualization Services Team	Results can be used to direct inflow and infiltration reduction programming and remediation projects in a timely manner, while increasing our ability to better manage extraneous flows during or immediately after major rainfall events.

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