



## TRACKING SARS-CoV-2 IN WASTEWATER SYSTEMS

### Identifying COVID-19 Hotspots Through Developing an AI-Based Monitoring System for Municipal and Non-Municipal Wastewater Systems

#### Why is Wastewater Tracking Critical?

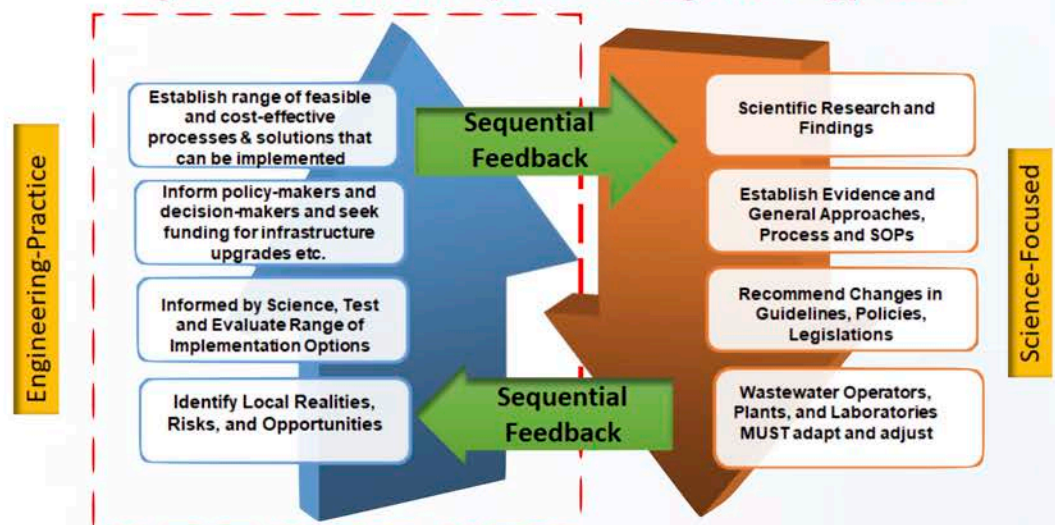
No matter how many COVID-19 tests are done, current methods suffer from severe limitations. Governments struggle to capture accurate COVID-19 infection rates of asymptomatic and mildly symptomatic individuals, delaying public health responses. Cutting edge global and domestic research confirms that COVID-19 can be reliably detected in the feces of affected individuals including those with mild to no symptoms – an area where clinical tests fall short.

A broad wastewater testing system may be able to constantly test and accurately report on the spread of disease within communities to address a crucial need not only for the current pandemic, but for future outbreaks.

#### The Importance of Monitoring Wastewater Systems

- Wastewater has been successfully used in the past to detect pathogenic enteric viruses, drugs use, pharmaceuticals, and others. The virus that causes COVID-19 has been detected in untreated wastewater in a number of jurisdictions worldwide, including the USA, the Netherlands, Spain, Italy, Turkey, Chile, Brazil, Ecuador, Pakistan, India, Japan, Australia and Israel. In some cases, retrospective analyses of wastewater showed that the presence of the SARS-CoV-2 could be detected even before community transmission had been identified through clinical testing.
- McMaster University's W. Booth School of Engineering Practice and Technology is developing a roadmap for best practices that could be adopted, through partners, across the province. This will determine the capacity of local facilities to detect COVID-19 earlier and more effectively, measure the effectiveness of future vaccines, and expand the scope of detectable harmful pathogens by employing bottom-up approach (Figure 1 and 2).

**Figure 1: Our Bottom-Up Risk Management Approach**

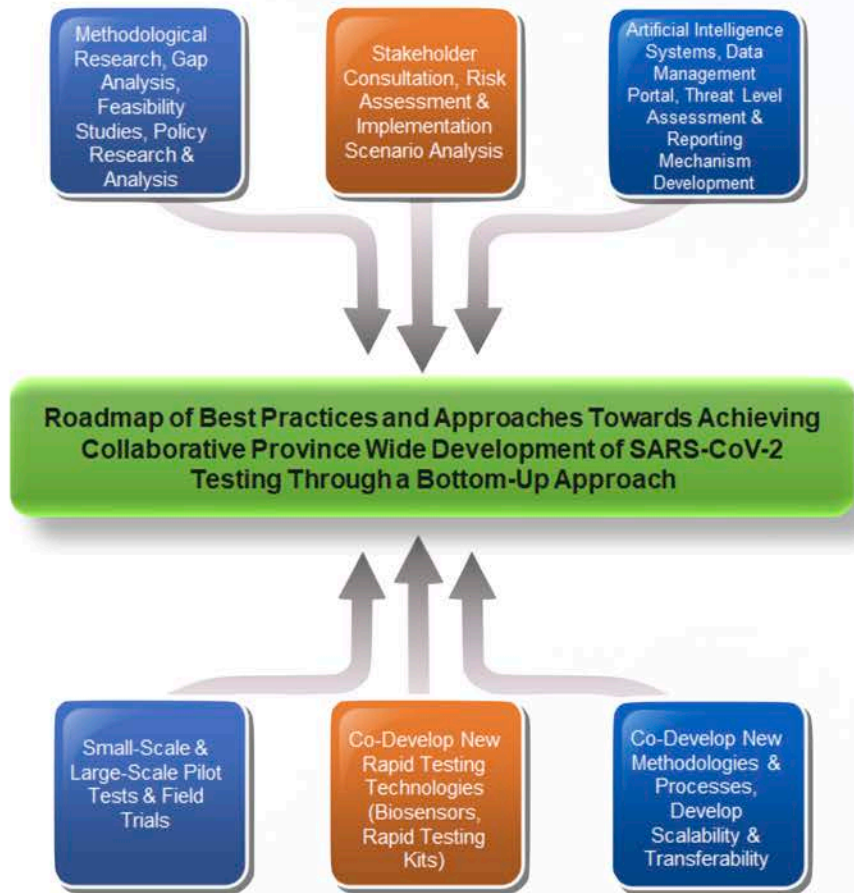


Given the Urgency and Need for Rapid Solutions and Risk Management, We Need to Start Bottom-Up Processes While the Science for Testing is Being Refined

## Our Key Research Questions

- 1) How can we optimize wastewater-based testing to track COVID-19 spread in the community and inform decision-making process?
- 2) How will potential waves of the current pandemic, future pandemics or emerging issues impact the "Business as Usual" for testing at wastewater industry? Are higher levels of laboratory security (e.g. L2 or L3) going to be needed and at what cost?
- 3) How can we develop a rapid test kit that can be employed for quick and reliable testing on the wastewater site?
- 4) How can we measure the effectiveness and durability of COVID-19 vaccine campaign using wastewater testing and tracking?

**Figure 2: Our Research Approach**



We look forward to working with our growing list of partners across Ontario to improve the province's COVID-19 response.

### Principal Researchers

### Growing List of Partners




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