

# CLEAN RESOURCES

ENVIRONMENTAL INNOVATION

ENVIRONMENTAL INNOVATION - WATER INNOVATION

## Development of an Adaptive Monitoring and Management Framework for Environmental Substances of Concern in Wastewater

The City of Calgary (The City), makes regular investments in wastewater treatment and infrastructure to manage effluent quality, meet regulatory requirements and to protect the Bow River. This project is designed to characterize environmental responses to environmental substances of concern (ESOCs) introduced via The City’s wastewater into the Bow River Watershed, to better understand potential impacts. Research in a semi-controlled setting at the Advancing Canadian Water Assets (ACWA) facility at Pine Creek Wastewater Treatment Plant will be conducted in parallel to the Bow River, to produce data which will allow development of models to guide The City in operating and managing infrastructure in a cost-optimized manner

### STUDIES TO DETECT & CHARACTERIZE ENVIRONMENTAL CHANGES DUE TO ESOCs



### FUNDING DETAILS



**RECIPIENT:**  
University of Calgary – Kelly Munkittrick



**PARTNERS:**  
The City of Calgary, NSERC, Alberta Innovates, Environment & Climate Change Canada, River Watch Institute of Alberta, Innotech Alberta



**TOTAL BUDGET:**  
\$1,918,330



**AI FUNDING:**  
\$199,500



**PROJECT DATES:**  
JUL 2021 –  
AUG 2024



**PROJECT TRL:**  
Start: DNA  
End: DNA

## APPLICATION

The City of Calgary will make use of results to modify monitoring programs, optimize treatment systems and plan for infrastructure upgrades. The monitoring and investigative tools developed will be used for evaluating the effectiveness of future capacity and/or technological upgrades. Key staff from Partner organizations will be engaged throughout the project to ensure study designs are relevant and resulting data are useful.

## PROJECT GOALS

The main goals of this program include:

- Establishment of effective indicators for evaluating wastewater impacts that can guide optimization of wastewater treatment, with the consideration of the role that climate change (increasing flood/drought conditions) may play in influencing the validity of said indicators;
- Identification and verification of areas of potential concern in the Bow River Watershed within Calgary, in a templated manner that can be replicated by other Albertan municipalities; and
- Engagement with multiple departments within The City of Calgary, stakeholders and local Indigenous communities to develop communication and knowledge translation tools specific to evaluating effects of municipal wastewater effluent.

## BENEFITS TO ALBERTA

The execution of this project creates opportunities for proactive identification of environmental degradation and treatment technology development for the protection of Alberta's freshwater resources. This project leverages the full potential of globally unique stream mesocosm infrastructure in Alberta to simulate current and future climate change scenarios and allow for more robust risk assessment of complex organic pollutants in these conditions. Assessment tools evaluated from the completion of this project will serve to empower policy makers and end-users alike that seek to manage and characterize environmental impacts of the largest single aquatic pollutant source in the province.



**5 Publications**



**12 Students  
Trained**

## CURRENT STATUS

### JUL 2022

Historical ESOC analyses and stream chemistry characterization has been completed. Three sets of fish caging experiments and benthic invertebrate collections have been completed in ACWA streams and lower trophic level experiments are currently underway. Bow River invertebrate collections and wild and caged fish exposures have been completed and are under analysis. Microbiome samples were taken from the fish caging experiments and a major field campaign is scheduled for July 2022.