INFORMATION REPORT

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	May 3, 2021
SUBJECT/REPORT NO:	Wastewater Treatment Plant Bypass and Combined Sewer Overflow Reporting (PW19091(b)) (City Wide) **(Outstanding Business List)**
WARD(S) AFFECTED:	City Wide
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COUNCIL DIRECTION

Public Works Committee at its meeting on November 4, 2019 ((PW, Report 19-015, Item 4) (PW19091)) approved the following recommendation:

"(a) That staff be directed to conduct a formal engineering study to analyse the unmonitored combined sewer overflow locations and assess the feasibility and budget estimates for monitoring installations, and that staff report back to the Public Works Committee no later than June 1, 2020 with an interim Information Report and no later than December 31, 2020 with the results of the study;"

An interim report was provided in Report PW19091(a) at the Public Works Committee on June 17, 2020, which indicated the commencement of the formal engineering study noted in recommendation (a). This information report provides the results of the subject study.

INFORMATION

This report provides information in response to the Council direction noted above, providing conclusions of the formal engineering study to analyse the unmonitored combined sewer overflow locations and assess the feasibility and budget estimates for monitoring installations.

Background

The City of Hamilton (City), as part of the Ministry of the Environment, Conservation and Parks' (MECP) Procedure F-5-5 requirements, conducts annual reporting of its Combined Sewer Overflows (CSO). Currently, this reporting is completed using either monitored or estimated (computer modelled) data for each CSO location. Although all outfalls directly downstream of CSO tanks are fully monitored, there remain other outfalls in the combined sewer system not associated with CSO tanks, which are only monitored to detect a CSO (partially monitored) or are unmonitored altogether. The breakdown of monitored vs. unmonitored CSO locations is identified in Table 1 below.

Table 1 – CSO Location Monitoring Summary

Monitoring Status	# of CSO Locations
Fully Monitored (detection + volume)	12
Partially Monitored (detection only)	3
Unmonitored	15

The CSO Outfall Monitoring Feasibility Study (Study) was undertaken to determine the feasibility and estimated costs for fully monitoring the unmonitored and partially monitored locations. Two (2) of the partially monitored locations were studied in a separate assignment. The Study also supports the enhancement of real-time reporting of Wastewater Treatment Plant (WWTP) Bypasses and CSOs on the City's website (www.hamilton.ca/wastewatermonitoring).

More accurate detection and quantification of CSOs is beneficial for the City to mitigate potential under or over reporting of overflows to the MECP, as well as to identify targeted and higher value areas to undertake infrastructure improvements.

In many cases, monitoring at a CSO location is not technically practical or feasible. To record flows from these CSO sites, it is necessary to monitor the flows at upstream diversion structures within the wastewater collection system. There may be one (1) or more diversion structures associated with a single CSO location, therefore requiring one (1) or more flow monitoring stations to accurately measure CSO at each location. For the balance of this report these diversions structures are referred to as 'critical regulators'.

AECOM Canada Ltd. (AECOM) was retained as the consultant for the Study, which included a detailed inventory and an implementation strategy.

Detailed Inventory

A detailed inventory was completed using both desktop and field investigations, which identified a total of 128 critical regulators in the combined sewer systems associated with the studied outfalls. Identifying critical regulators in the system is important considering that the goal is to maximize accuracy in measuring only the combined sewage discharging from the final outfalls, avoiding inputs from direct stormwater connections downstream of critical regulators. AECOM updated an existing database of the subject critical regulators, confirming parameters such as pipe sizes, pipe connections, and weir types.

An industry best practices review was also completed to document the latest equipment technologies (for real-time flow and real-time water quality) and monitoring practices, including identification of pros/cons specific to Hamilton's CSO locations and future needs.

Using the results of the detailed critical regulator inventory, industry best practices review, and consultation with Hamilton Water's staff, AECOM presented preliminary recommendations for equipment selection and implementation considerations (i.e. weir construction and siting/installation of communications infrastructure).

Implementation Strategies

Using the information collected as part of the inventory phase and considering other ongoing related works such as the Real Time Control Phase 2 project, AECOM developed two scenarios for customized monitoring implementation strategies:

Scenario #1 - All 128 critical regulators associated with the studied outfall locations are monitored in real-time using permanent (hardwired) outstations and City's Supervisory Control and Data Acquisition (SCADA) system to receive detailed data from each critical regulator. It is estimated that implementing Scenario #1 could require a long term (10 years or more) staged design and capital construction plan.

Scenario #2 - An optimized scenario in which the goal is to maximize valuable CSO data by installing monitoring at certain critical regulators (estimated 24 locations) that are likely higher volume CSO contributors. The implementation would include a mix of permanent (hardwired) and long-term (battery powered) monitors using cellular data transmission based on proximity to existing infrastructure.

Scenario #2 can be delivered in a phased approach and can start producing data faster than Scenario #1. It is estimated that full implementation of Scenario #2 would require a medium term (four (4) to five (5) years to design and fully construct.

Feasibility study level cost estimates (Class C, +/- 25% to 30%) were prepared for implementation of Scenario #1 and Scenario #2 (Phases 1 and 2), which are summarized in Table 2.

Table 2

Scenario	Estimated Total Capital Cost	Estimated Annual O&M Cost
Scenario #1	$17,033,000	$782,500
Scenario #2	$1,344,500	$115,800

The estimated annual maintenance costs provided by AECOM assume work by an external party (i.e. contractor) and include general maintenance for chamber regulators and weirs, sensor calibration, cellular telemetry fees, and data hosting. Cost estimates shown exclude inflation assumptions for work that may be completed in a longer-term program, as well as asset replacement costs.

If at any time the City decides to assume the ongoing operations and maintenance of the proposed additional monitoring, additional staffing resources within Hamilton Water would be required, which have not yet been determined.

Conclusions

A formal engineering study was completed by AECOM in response to PW19091 recommendation (a) to analyse the unmonitored combined sewer overflow locations, including budget estimates.

AECOM's Study provides a professional opinion on recommendations for implementing real-time flow monitoring at the studied CSO locations, while also providing a detailed breakdown which would allow the City to further customize the implementation strategy as necessary to suit budget and/or timelines. Scenario #2 represents AECOM's recommendation for a best value monitoring strategy.

APPENDICES AND SCHEDULES ATTACHED

None