WELCOME

Eastern Subwatersheds Stormwater Management Retrofit Study

Online Information Session #2

June 15 to July 13, 2018

Eastern Subwatersheds Stormwater Management Retrofit Study

- This study is one of seventeen projects in the City's Ottawa River Action Plan.
- The purpose of the study is to develop a long-term plan to improve stormwater management within existing urban areas of the Eastern Subwatersheds.

Storm Sewer Outlet to the Ottawa River

Objective of Information Session

This second and last online Information Session is an opportunity for you to review and comment on the findings and recommendations for stormwater management in the Eastern Subwatersheds area.

Please provide any ideas, comments or suggestions you may have.

Your feedback is important to us!

Why is a Retrofit Plan Required?

- Urban development within the Eastern Subwatersheds took place with little or no management of stormwater.
- During rainfall, stormwater runoff from hard surfaces like roofs, roads and parking lots is transported in storm sewers and discharged directly into nearby tributaries or the Ottawa River.
- Uncontrolled stormwater runoff carries pollutants and leads to significant increases in the volume of runoff and higher peak flows in streams.
- This degrades water quality, increases erosion, damages aquatic habitat, threatens infrastructure and contributes to closures at Petrie Island beach.

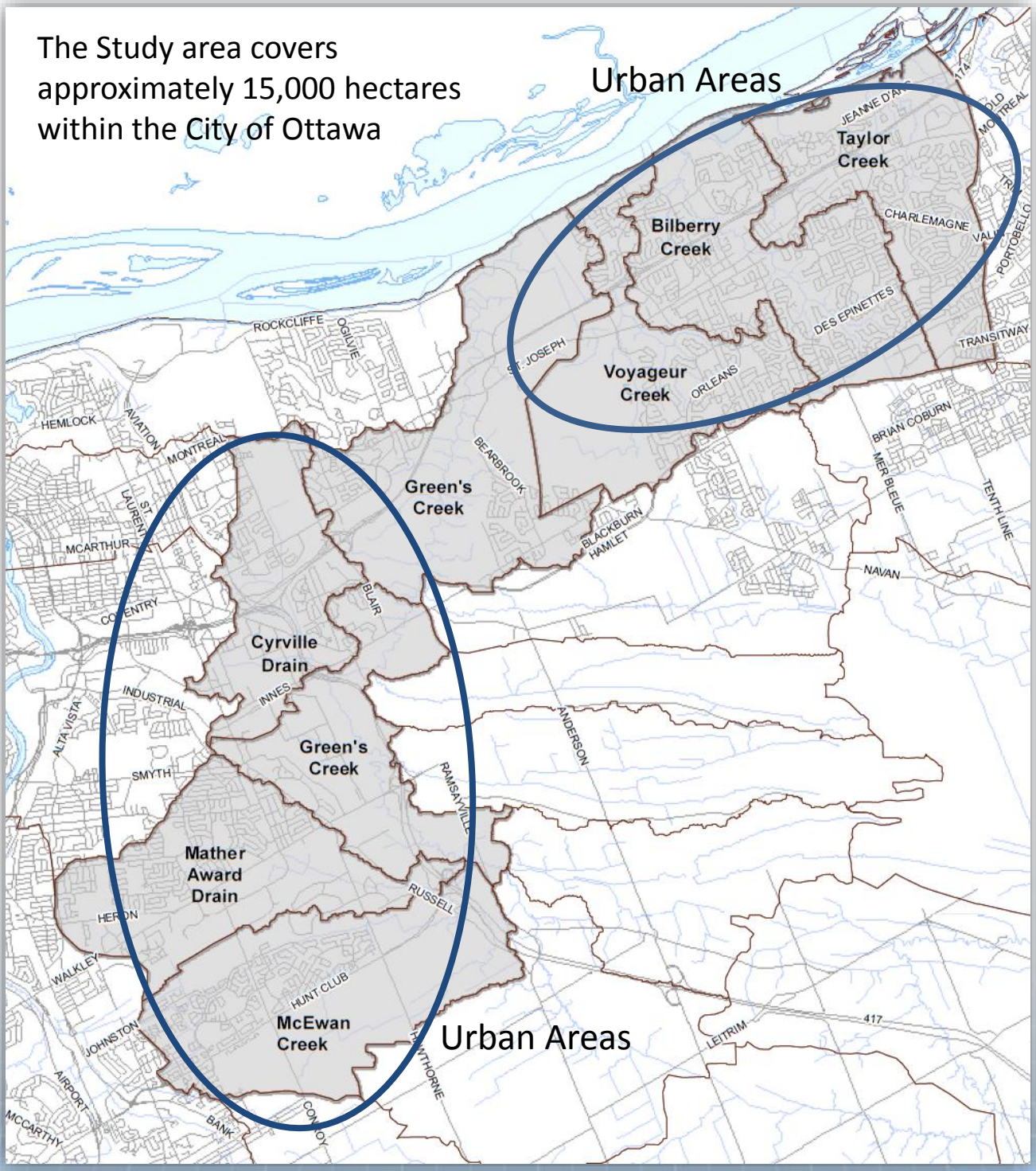
Storm Sewer Outlet

Example of Stormwater Management Measure

No-swimming Sign at Petrie Island

Study Area

The Study area covers approximately 15,000 hectares within the City of Ottawa



Objectives

1. Reduce flood risk to public health and safety and to property along the Creek corridors.
2. Reduce erosion impacts in the Creek corridors that are detrimental to property, infrastructure and stream habitat.
3. Preserve/re-establish a more natural hydrologic cycle.
4. Improve water quality in the Creeks and the Ottawa River by reducing the impact of runoff.
5. Reduce the impacts of runoff on Petrie Island Beach.
6. Protect, enhance or rehabilitate natural features and functions along the Creek corridors.
7. Increase public awareness of stormwater management and public involvement.

Petrie Island Beach

Erosion Site along Green's Creek

Surface Flooding in Orleans

The Study is focused on the urban areas within the subwatersheds of:

- Green's Creek (urban area)
- Cyrville Drain
- Mather Award Drain
- McEwan Creek
- Voyageur Creek
- Bilberry Creek
- Queenswood Catchments
- Taylor Creek

Existing Conditions

Built Environment:
Land use in the study area is primarily single family residential. There are about 650km of storm sewers, 90 storm sewer outfalls and 24 existing stormwater management facilities in the study area.

Hydrology:
Average imperviousness ranges from about 29% for Voyageur Creek to about 38% for Mather Award Drain and 49% for Cyrville Drain. When it rains, stormwater runs off very quickly, resulting in high peak flows and velocities that erode creek banks.

Stream Processes:
Many of the Eastern Subwatersheds' headwater streams have been eliminated or piped. Bank erosion is common along many reaches, with the most active erosion taking place along Bilberry, Voyageur and Taylor Creeks.

Water Quality:
Water quality is characteristic of many urban watercourses: the levels of bacteria, chlorides, nutrients and heavy metals in the creeks exceed the Provincial Water Quality Objectives.

Aquatic Ecology:
There is a variety of cool and warm water fish species in Taylor, Bilberry and Voyageur Creeks. The urban tributaries to Green's Creek have warm water species present.


Degraded water quality


Yellow Perch


Erosion

How Was the Study Carried Out?

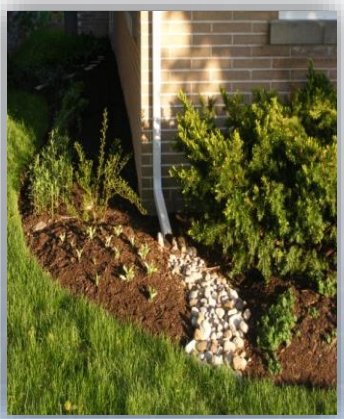
The Retrofit study has been conducted as a Master Plan under the Municipal Class Environmental Assessment (EA) process. It examined how stormwater management can be applied to existing communities. Four types of retrofit measures were considered in the Study:

Lot Level Measures reduce runoff where it is generated ("on the lot") by promoting infiltration and evapotranspiration.

Conveyance Measures collect and accumulate runoff from individual lots and transport it to the drainage system's outlet, usually the closest creek or river. They are generally located within the road right-of-way and include such measures as bioretention, swales, and perforated pipes.

End-of-Pipe Measures are larger-scale facilities such as ponds and constructed wetlands that store and treat the accumulated runoff collected by the conveyance system.

Stream Rehabilitation improve a stream's ability to receive urbanized runoff while at the same time enhancing its natural features and functions.



Roof Downspout Redirection
(Lot Level Measure)

Bioretention/ Bioswales
(Conveyance Measure)

Constructed Wetland
(End-of-Pipe Measure)

SWM Retrofit Scenarios

Three initial SWM retrofit scenarios, made up of different combinations and levels of implementation of retrofit measures, were considered for evaluation and comparison to the existing condition. The results of this initial evaluation are provided in the first online information session.

An extensive screening process was conducted for the selection of potential locations for end-of-pipe control measures. Given the relatively small drainage area that would be treated by these facilities, as well as many local constraints, end-of-pipe facilities were excluded from the final scenario analyses.

Further review was subsequently undertaken and the retrofit scenarios were adjusted to preclude end-of pipe facilities. The following retrofit scenarios were carried forward:

1. **Lot level Implementation:**

   30% uptake of lot level measures
2. **Conveyance Implementation:**

   50% implementation of conveyance measures
3. **Lot Level and Conveyance Implementation:**

   A 30% uptake of lot level measures and a 50% implementation of conveyance measures.

Evaluation of Retrofit Scenarios

The retrofit scenarios were evaluated based on the following criteria:

- Water Quality
- Runoff Impacts at Petrie Island
- Flood Risk
- Erosion
- Hydrologic Cycle
- Open Space and Parks
- Natural Features
- Lifecycle Cost
- Complexity of Implementation

Hydrologic and hydraulic modeling was applied to estimate the relative effectiveness of each strategy in removing key pollutants such as **total suspended solids**, **total phosphorus** and ***E.Coli* bacteria**.

Modeling was also applied to estimate the reduction in bacteria levels in the Ottawa River at Petrie Island Beach.

Creek Erosion

Creek Crossing

Petrie Island

Results of the Evaluation

Criteria	Indicator	30% Lot Level	50% Conveyance	30% Lot Level and 50% Conveyance
Reduce Erosion Impacts	In-stream erosion potential	2	1	3
Natural Hydrologic Cycle	Runoff threshold event	2	1	3
	Watershed peakiness	2	1	3
Improve Water Quality	Total Suspended Solids (TSS)	2	1	3
Reduce impact of runoff on the beach	Instream E.Coli at outfall to Ottawa River	2	1	3
Reduce Flooding	Frequency of overtopping of watercourse crossings	2	1	3
Category A Total (Score x Weighting Factor of 4)		48	24	72
Timing to implement	Estimated implementation time for strategy to be operational	2	1	2
Degree of Control	Degree of implementation which City has control over	1	3	2
Community/User Health and Safety	Risk to community health and safety	3	2	2
Public /User Acceptance	Public acceptance	2	3	2
Open Space Areas/Parks	Impact on open spaces/parks	4	4	4
Category B Total (Score x Weighting Factor of 3)		36	39	36
Total Annual (Lifecycle) Costs	Relative total cost	4	3	2
Category C Total (Score x Weighting Factor of 3)		12	9	6
OVERALL SCORE (Sum of Category Totals)		96	72	114
Total Cost ($M)		12.8	194.4	221.3

Recommended Retrofit Plan

Based on the scoring and ranking of the three scenarios, Scenario 3 '**Lot Level and Conveyance Implementation**' was determined to be the preferred alternative.

The Preferred Retrofit Scenario includes the following:

- The retrofitting of 50% of streets with the addition of bioretention facilities or other conveyance measures as road rehabilitation projects are completed.
- A variety of lot level measures such as rain gardens and permeable pavers for up to 30% of residential, commercial, industrial and institutional lands.
- Selective stream rehabilitation along impacted reaches where there is erosion that threatens infrastructure or there are opportunities to naturalize urban streams. Projects are identified for Bilberry Creek, Voyageur Creek, Cyrville Drain, and Mather Award drain to address erosion sites.

The estimated lifecycle cost of this program will be $221.3 Million over 50 years.

Example of Bioretention on Sunnyside Avenue, Ottawa (Conveyance Measure)


Example of Rain Garden (Lot Level Measure)


Example of a Stream Rehabilitation

Benefits to the Creeks and the Ottawa River

Once implemented, the recommended retrofit plan will provide the following benefits to the receiving watercourses:

- provides improvement in pollutant removal of 24 to 30% of *E.coli* and 20 to 25 % removal of suspended solids at the outlets to the Ottawa River)
- results in an average reduction in storm runoff volume by 25%
- reduces frequency and duration of flows in the watercourses leading to reduced risk of erosion
- Ottawa River model predicts a 43% reduction in E.coli loading

Next Steps

- Prepare the Class EA report (Fall 2018)
- Environment Committee and City Council approvals (early 2019)
- 30-day public review of Class EA Report (early 2019)
- Begin implementation of retrofit plan (2019)