



City of
Peterborough

To: Members of the Committee of the Whole

From: W.H. Jackson, Director of Utility Services

Meeting Date: September 21, 2015

**Subject: Report USDIR15-003
Approval of the Stormwater Quality Management Master Plan**

Purpose

A report to advise Council of the results of the Stormwater Quality Management Master Plan Class Environmental Assessment and request Council to endorse the recommendations of the Master Plan and to permit staff to access existing Sewer Surcharge Reserve Funds to begin implementation of the Master Plan.

Recommendations

That Council approve the recommendations outlined in Report USDIR15-003 dated September 21, 2015, of the Director of Utility Services, as follows:

- a) That the presentation from XCG on the Stormwater Quality Management Master Plan be received;
- b) That Council endorse the Stormwater Quality Management Master Plan as detailed in Appendices 1 and 2 of Report USDIR15-003 including any staffing increases necessary to the success of the Master Plan;
- c) That the existing Sewer Surcharge Reserve Fund be renamed to the Wastewater Reserve Fund and be made available to support operating and maintenance costs for the City's stormwater and sanitary sewage systems.
- d) That staff begin implementing the recommendations of the Stormwater Quality Management Master Plan as detailed in Appendix 2 of Report USDIR15-003 using existing Sewer Surcharge Reserve Funds as appropriate;

- e) That staff review the existing Sewer Surcharge system and develop a comprehensive Wastewater Rate system that may incorporate a stormwater User-Rate if appropriate to fund the stormwater and sanitary sewage systems and report to Council at a future meeting on the results and implementation of the Wastewater Rate system; and
- f) That By-law Numbers 1983-46 and 93-18 be repealed and replaced with a new By-law so that the definition of “sewage” is included in the By-law as it is written in the *Municipal Act* and so that existing Sewer Surcharge Reserve Funds are available to support operation, maintenance and enhancement of the City’s entire stormwater and sanitary sewage infrastructure.

Budget and Financial Implications

Endorsing the Stormwater Quality Management Master Plan (the “Plan”) has no direct financial implications. Implementing the recommendations of the Plan, however, will require additional capital and operating funds. Tables 1 and 2 detail the Capital Costs and Operating Costs respectively of the Plan recommendations. Future Capital and Operating Budgets will include additional funds for these projects.

Table 1: Capital Costs

No.	Capital Improvement Recommendation (\$2014)	Amount
1*	Existing System Restoration to satisfy MOE Certificate of Approval (sediment removal and other corrective measures) (one time cost)	\$ 2.1M
2	Measures to Improve Existing Systems Performance (one time cost)	\$ 2.0M
3*	Annual Capital Maintenance Costs to satisfy current regulatory requirements (Recurring costs) - Wet Pond Sediment Removal - Dry Pond Sediment Removal - Main Cell Sediment Removal	\$134,000 \$ 51,000 \$ 82,000
4	Total Capital Improvement Costs	\$ 4.4M

*No.1 and No.3 are proposed to be funded from the existing Sewer Surcharge Reserve until such time as the proposed Wastewater Rate System is implemented

Table 2: Operating Costs

No.	Operation and Maintenance Recommendations (Recurring costs, \$2014, will increase as new facilities are developed)	Operating Cost	
		Existing	Future
1	Storm Sewer Cleaning and Flushing (current practice and cost)	\$ 150,000	\$ 150,000
2	Street Sweeping (current practice and cost)	\$ 700,000	\$ 700,000
3**	Minimum Annual Maintenance at Existing Systems to satisfy MOE Certificate of Approval (new cost)	Not funded	\$ 84,000
4**	Community Outreach and collaboration with agencies, organizations and institutions (new cost)	Not funded	\$ 80,000
5	System Surveillance Program (new cost)	Not funded	\$ 120,000
6	Total Future Annual Operating Costs	\$ 850,000	\$1,134,000
Difference			+ \$ 284,000

**No.3 and No.4 are proposed to be funded from the existing Sewer Surcharge Reserve Fund until such time as the proposed Wastewater Rate System is implemented

The Plan also identified a need for new infrastructure to correct existing large scale untreated stormwater discharges at four locations (see Appendix 1, New Infrastructure) in the City. The Plan does not recommend specific infrastructure types, nor does the Plan seek approval for any new facilities. Future Capital budgets may include development of plans for these locations, but further consultation, planning and Council approval is required prior to proceeding with new facilities. Table 3 provides budgetary estimates for new facilities.

Table 3: New Facility Costs (\$2014)

No.	Potential Future New Infrastructure Costs	Amount
1	New Infrastructure	\$ 2.3M
2	Additional Future Operating Cost	\$59,000

To fund the current and proposed costs for the operation, maintenance and improvement of the municipality's stormwater drainage infrastructure, the Plan recommends development and implementation of a 'User-Rate'. The User-Rate system may replace current tax levy amounts used to fund ongoing stormwater management operations and provide the necessary funding to implement the measures recommended in the Plan. A further report on this issue will be submitted to Council.

Aligning the bylaw definitions with provincial legislation and direction from Council will provide staff the means to access existing reserve funds to support implementation of the Plan and to ensure compliance with Provincial legislation.

Background

1. Previous Council Report

A previous staff report (USDIR14-001 Draft Stormwater Quality Management Master Plan) and presentation from XCG was provided to Committee of the Whole on February 18, 2014. Council was not asked to endorse the recommendations of the Plan at that time. Council directed the draft Stormwater Quality Management Master Plan be published for public review and staff report back with the final results.

Following Council's direction the draft Stormwater Quality Management Master Plan was made available for public review and comment Report USDIR15-003 and presentation represent the final recommendations based on results of this public review.

2. Project Purpose

The purpose of the Project was to create a Stormwater Quality Management Master Plan (the "Plan") to guide municipal policies, decisions and operations of stormwater management infrastructure from stormwater quality and legislative requirement perspectives.

The study included an extensive inventory of the City's existing stormwater quality management infrastructure (stormwater management ponds typically) and a thorough review of City policies and procedures was undertaken and evaluated. Locations where stormwater quality controls are non-existent or insufficient have been identified and recommendations for improvement provided. An implementation plan has also been developed for a long term sustainable program and a protection strategy, as a means to a cleaner environment.

The study provided answers to many unknowns in the stormwater system (e.g. level of treatment provided by the system, maintenance needs, costs and operations) and provided a measure of certainty for future budgeting, upgrades, new facilities and maintenance of existing infrastructure, allowing the City to take a proactive approach to management of City-owned stormwater quality controls.

3. What is Stormwater Quality Management?

Stormwater Quality Management is the practice of treating stormwater to reduce or remove pollutants carried by the stormwater runoff. Stormwater that flows across lawns and roadways will be conveyed to the local creeks and channels and eventually the Otonabee River through the City's stormwater system. This stormwater runoff will contain salt, pesticides, fertilizers, oils, pet waste and other untreated waste products.

Typically, stormwater quality is controlled through the use of wet ponds, infiltration systems, constructed wetlands and various vegetative practices.

The Plan will serve to guide repair, upgrades, maintenance and construction of infrastructure throughout the City to improve the quality of stormwater runoff.

4. Process

The Plan was completed following the Master Planning process as documented in the Municipal Class Environmental Assessment (MCEA) process. This is a typical process used by municipalities when developing broad, community wide plans for infrastructure works or improvements. The process culminated with the publication of the final draft of the Plan for public review and comment and now the final recommendations for Council consideration.

5. Problem/Opportunity Statement

The following Problem/Opportunity Statement was developed to guide the project:

Stormwater pollution affects our environment. In newer areas of Peterborough, there are 28 stormwater ponds under City ownership which collect stormwater. These stormwater ponds need regular maintenance to ensure they operate properly. As well, the City's design requirements for future stormwater ponds need to be reviewed.

Much of the older, urbanized portion of the City does not have specific measures in place to treat stormwater before it is discharged into local creeks and the Otonabee River. A strategy for improvement is needed.

Further to the Problem/Opportunity Statement the study team also established the following project goal:

The overall goal of the project is to develop a long-term plan for reducing the amount of pollution reaching local waterways.

We need to understand current conditions and evaluate alternatives. This will allow us to recommend a solution, or set of solutions, to manage stormwater across all of Peterborough. The project will consider areas that do not have stormwater management measures in place as well as areas with existing stormwater management features, such as stormwater management ponds.

6. Problems Identified

The study identified many gaps or deficiencies within the City's stormwater system. Roughly 75% of the City's urban area (lands developed prior to the 1990's Stormwater Management Design Manual published by the MOECC) has no stormwater quality

control. In the remaining area there are 28 City owned stormwater ponds, all of which require regular maintenance (monitoring, inspection, vegetation control) and less frequent major overhaul (dredging etc.). Current maintenance practices are limited and current regulatory requirements are at risk of not being met, although the study team did note that in general the ponds did serve to reduce pollutants reaching the receiving waters.

7. Development of the Master Plan

As with other EA studies, after the Problem/Opportunity Statement was confirmed a number of alternatives were developed to address the Problem/Opportunity Statement. These consisted of:

- a) **Status Quo:** maintain current practices, with an increase in maintenance operations to achieve regulatory compliance;
- b) **Opportunistic Source Reduction:** Use straightforward approaches to improve source and conveyance controls through improvements to municipal system maintenance operations, and through policy advancement to promote better design, and public outreach to promote source control on private property;
- c) **Aggressive System Retrofit:** Relies on an aggressive approach to end-of-pipe retrofits (i.e. New facilities), along with source and conveyance control measures, policy and public outreach measures; and
- d) **Progressive System Retrofit:** Places considerable emphasis on improving policies and design standards to promote improved urban design practices and innovation as well as inclusion of end of pipe improvements that are considered cost efficient.

These alternatives were then evaluated against a list of criteria and the results were made available for public and agency review and input from a Technical Advisory Committee. The Technical Advisory Committee (TAC) brought together professionals from the Ministry of Environment, Ministry of Natural Resources, Otonabee Region Conservation Authority, Trent University, Parks Canada and Canada Research Council.

Appendix 3 details the evaluation criteria, methodology and results. The preferred alternative was then refined and expanded to develop more specific recommendations, which were again made available for public and agency review and discussed by the technical advisory committee. Finally, the draft master plan was prepared and issued for public review.

Two public meetings were held during the study that resulted in significant input to the study and final Plan. Ongoing correspondence and dialogue with members of the public also provided valuable input to the project and has resulted in meaningful changes and commitments to the final Plan.

The study team also met with representatives of the Sacred Water Circle, a volunteer organization that has brought together Indigenous and non- Indigenous people to work together for the benefit of water. The initiative leads with spirituality, but also recognizes the necessity of working with science and policy to promote positive change in how communities live with water.

The recommendations made within the Plan represent current industry practices and are sensitive to the community perceptions and consultation result.

8. Plan Recommendations

The recommendations of the Plan cover all aspects of stormwater management and quality such as:

- an increase in system operation and maintenance activities to comply with existing legislation and Certificates of Approval;
- establish a User-Rate system to fund operation and maintenance of the stormwater system;
- major overhauls of some existing systems to ensure compliance;
- upgrades to a number of existing systems to improve treatment;
- identification of opportunities to provide treatment for untreated areas of the City; and
- new programs to improve upon existing surveillance and community outreach/education programs.

Appendix 1 provides a short summary of the Plan and Section 2 of Appendix 1 describes in detail the various Recommendations of the Plan.

9. Funding of Plan Recommendations

Implementation of the Plan Recommendations will require an increase in operating and capital funding. Included in the scope of the project for the Consultant (XCG) was a requirement to recommend a sustainable source of funding to support operation and maintenance of the City's stormwater infrastructure.

XCG has recommended several sources of funding to support these recommendations, including:

- general municipal revenue;
- grant or innovative funding measures as they come available;
- a Cash-in-Lieu policy for small development initiatives to support funding of larger more comprehensive treatment systems; and
- a stormwater User-Rate.

The first two funding sources are self explanatory and the third source is very similar to the existing program for Cash-in-Lieu of parking.

A stormwater User-Rate system has recently been implemented in a number of other municipalities such as Kitchener, Waterloo, Markham and Mississauga. The City of Windsor collects a comprehensive “Wastewater Fixed Charge” that supports both Sanitary and Stormwater infrastructure. Implementation of such a system would establish a reasonable and reliable source of funding to maintain and operate current and future stormwater management infrastructure.

If directed by Council, staff will assess the financial needs to operate and maintain the stormwater system and develop a long-term plan to finance the program based on a User-Rate system. At the same time staff believe the existing Sewer Surcharge rate should be combined with any stormwater funding into a comprehensive wastewater fund. Combining the funds would avoid duplication of funding sources, simplify the collection and reduce the burden on rate payers.

The stormwater funding component will likely include consideration of land-use types (industrial / residential), property size, impervious surface areas as well as an incentive program to encourage and assist property owners in implementing their own stormwater management practices. Council should expect a further report specifically on the makeup of the wastewater funding issue.

9. Legislative Requirements

9.1 Provincial

There is existing Provincial legislation that combines sanitary and stormwater into a single definition of wastewater. For example, the Water Opportunities Act defines “wastewater” as including stormwater and likewise, the Municipal Act, 2001, defines “sewage” as including stormwater and other drainage from land, and commercial wastes and industrial wastes that are disposed of in a sewage system. Other provincial legislation, (e.g. Ontario Water Resources Act), include definitions of “Sewage” and “Sewage” works that essentially reproduce the Municipal Act definition.

9.2 Municipal

In 1983 the City passed By-law 1983-46 to implement the collection of a sewer service rate. The by-law establishes the rate pursuant to the Municipal Act, 1980 and defines sewage works as “any public works for the collection, transmission, treatment or disposal of sewage or any part of such works within the boundaries of the City or any such works under the jurisdiction of the City pursuant to The Municipal Act...”. An updated by-law was passed in 1993 that has a similar definition.

It is clear from Section 9.1 that existing Provincial Legislation permits the Sewer Surcharge Reserve funds to be used to support the stormwater system. Historically, however, these funds have only been used to maintain and operate the sanitary sewer system. Accordingly, Council is now being asked to endorse the proposal to use the Sewer Surcharge funds to support implementation of the Plan which will mean that the

Sewer Surcharge funds would be used to operate and maintain both the sanitary and storm sewer systems until such time as a Stormwater Rate is established.

As a Stormwater Rate system is developed to support the ongoing operation and maintenance of the stormwater system, it would be a prudent step to combine sanitary and stormwater into a single “wastewater” category that would allow for greater flexibility in capital planning, funding and staffing.

10. Public Review of the Final Draft Master Plan

This project aims to improve the quality of stormwater discharge to local creeks, streams, the Otonabee River and Little Lake and to ultimately reduce the impact of stormwater runoff generated within the City of Peterborough. Based on the expertise of the Consultant and study team, the evaluation of alternatives and public feedback, a number of recommendations have been incorporated into the Plan.

The final draft of the Plan was made available for public and agency review for 45-days. During the review several agencies and members of the public provided their input. Comments received during the review were mainly focused on inquiries and concerns with respect to the four locations identified for potential new stormwater management facilities.

With respect to the four locations for potential new infrastructure, the planning process took into consideration, and reflects, the concerns heard during the study. The Plan therefore emphasizes the importance of further study and consultation prior to developing designs for new systems.

While most of the comments received throughout the study were focused on the possible new facilities, some comments were received that related to current maintenance and operation of various aspects of the City’s existing stormwater management system as well as the proposed funding mechanisms. Various encouraging suggestions were made with respect to funding mechanisms which have played a factor in developing the recommendations and will be considered as the future funding mechanisms are developed.

Comments also came from local agencies expressing an interest in participating during implementation of the Plan. Other comments received during the study focused on suggestions for emphasis on Low Impact Development and offers or requests to be involved in implementing the Plan.

Development of the recommendations in the Plan considered the feedback provided throughout the study and attempted to address the concerns and comments heard wherever it was reasonable to do so. As the recommendations of the Plan are acted upon, groups that have expressed an interest in participating or actually implementing some aspects will be considered as the City moves forward.

11. Next Steps

Full implementation of the Plan is expected to take a number of years and is detailed in Appendix 2. In the near future, assuming Council endorses the Plan, staff will begin developing the proposed User-Rate system, as well as preparing a detailed implementation program for the User-Rate and the Plan.

It will not be possible to proceed without additional staffing to coordinate and implement many aspects of the Plan, including the regulatory pond inspection, maintenance program and capital works requirements as well as the Outreach and Collaboration and the monitoring program. Upon Council's approval of the Plan, staff will assess the staffing requirements to support implementation. The CAO will have the delegated authority to increase (or decrease) permanent staff levels, provided any new positions can be accommodated within the City's overall, approved budget.

By endorsing the Plan and aligning the City's definition of "Sewage" and "Sewage Works" with provincial legislation, implementation of the immediate needs identified in the Plan can commence using the existing, available funding within the Sewer Surcharge Reserve Fund.

Recognizing the broad nature of the Plan it is appropriate to review the Plan every five years to confirm applicability of the recommendations. A detailed revision and update exercise is contemplated for the 10-year anniversary of the Plan to ensure applicable regulations, policies and guidelines are complied with. The detailed review and update will also provide an opportunity to formally update the Plan to reflect new technologies, community objectives and municipal priorities.

12. Council Approval Required

The recommendations included within the Plan do not require further study and approval under the Environmental Assessment Act. In light of this, formal Ministry of Environment and Climate Change approval of the Class EA study is not required and final approval of the Plan rests with City Council. **Further approval from Council will be sought for development of new infrastructure when the City is in a position to proceed with new facilities. Council approval of a detailed User-Rate funding system will also be sought and is expected in the first half of 2016.**

Summary

Approximately 75% of the urban area within the City receives no treatment of stormwater runoff. Of the 25% of the City that does receive treatment the systems are in various stages of condition and functionality.

The Stormwater Quality Management Master Plan has confirmed that generally the existing stormwater treatment systems do provide a measure of improved runoff quality; however these systems are in dire need of maintenance and in some cases major

overhaul. The Plan provides a long-term strategy to improve stormwater runoff quality throughout the City through:

- Maintenance of existing systems;
- Upgrades to existing systems;
- New systems (further study required);
- A surveillance program;
- Updates to the sewer use by-law;
- Development planning and design updates including an emphasis on low impact development;
- Community outreach programs, including a public awareness campaign and establishing collaboration and linkages with local agencies, organizations and interest groups; and
- Establishing a secure and stable funding mechanism to support maintenance and operation of the City's stormwater system.

Submitted by,

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Attachments:

Appendix 1 – Stormwater Quality Management Master Plan Summary
Appendix 2 – Stormwater Quality Management Master Plan Implementation Program
Appendix 3 – Stormwater Quality Management Master Plan Alternative Evaluation

Appendix 1: Stormwater Quality Management Master Plan Summary

1. Summary

The project included a water sampling program within local creeks and at the storm ponds. Results indicate that stormwater discharges are partly or possibly wholly responsible for pollutant concentrations in local creeks rising above Ministry of Environment and Climate Change (“MOECC”) accepted objectives (E.g. MOECC's Provincial Water Quality Objectives) during wet weather. The sampling data also indicate that the stormwater ponds are having the intended effect of reducing pollutant concentrations. As in many municipalities, older portions of the City do not have any direct form of stormwater treatment built into the drainage system; stormwater discharges untreated into local creeks or the river. The project has addressed this issue by looking at various short-term and long-term options for reducing the volume and contamination of stormwater across the City. As well, the project has examined opportunities for retrofit improvement of existing drainage systems, to identify locations where it may be feasible to install new and innovative forms of stormwater treatment.

2. Recommendations

A number of recommendations dealing with various aspects of stormwater quality management were developed as listed below.

- Improvements to maintenance and operation of existing stormwater ponds; including specific requirements for routine inspection, maintenance and record-keeping to maintain compliance with MOECC regulations.
- Removal of accumulated sediment from existing stormwater ponds that require it to maintain performance and compliance with regulations.
- Proposed modifications to some of the existing stormwater ponds, to improve their performance.
- Update to the City’s sewer-use bylaw governing allowable discharges into the storm sewer system.

Public Awareness and Outreach

- Public awareness and outreach program to improve local residents, businesses and property owner’s awareness of steps they can take to reduce stormwater volume and the amount of drainage pollution washed off their property.

Collaboration and Linkages

- Establish working group or forum for agencies, organizations and others with an interest in stormwater management that meets regularly (e.g. twice per year) to facilitate ongoing input, networking, discussion and action. This will help the City keep abreast of evolving information and research, including climate change and best practices for adaptation

System Surveillance

- A program of routine monitoring of pollutant concentrations in selected storm-sewer pipes (the larger ones) and in local creeks, to help track water quality trends.

Land Development Planning and Design

- New policies incorporated into the City's Official Plan, to promote better and innovative design in new land development projects to help reduce the environmental impact of urban drainage.
- Update to the City's engineering Design Standards to promote or require site design approaches that reduce stormwater volume and pollutant runoff, while maintaining good property drainage.

Funding Mechanisms

- Storm system user fee: The plan recommends that the City implement a separate "storm system user fee" that would apply to all properties (residential, commercial and industrial) that contribute storm drainage into the municipal drainage system. This fee could be based on property characteristics (lot size and amount of impervious surface) and would be used to provide dedicated funding for operation of, and improvement to, the municipal storm drainage system, and would thereby help the City meet the requirements of the Province's *Water Opportunities Act* (2010).
- Cash-in-lieu policy for small land development proposals: a policy that allows the City, in certain defined circumstances, to accept cash-in-lieu of installation of approved stormwater treatment systems on small development properties. This measure is intended to allow the City to develop a fund to pay for new stormwater facilities at strategic locations in the City, while minimizing the proliferation of small privately-owned stormwater treatment devices.

New Infrastructure

- The study included a City-wide review of potential locations where new stormwater treatment facilities might be installed, to improve stormwater treatment. A long list encompassing 16 locations was developed. Based on environmental and cost considerations, this was narrowed down to a short list of 4 candidate sites on City-owned properties identified as:
 - R5 at Bears Creek Woods Park;
 - R7 along the east side of Otonabee River between the river and Rotary Greenway Trail in the vicinity of Moir Street;
 - R10 in James Stevenson Park; and
 - R12 in Walker Avenue Park.

- These four sites, including preliminary concept layouts for each site, were presented at the second PIC held on June 13, 2013 at the Canadian Canoe Museum. During and after PIC #2, there were concerns about these proposed facilities clearly expressed by residents who live in the vicinity of the proposed sites. The public concerns included neighbourhood compatibility, loss of valuable parkland, public safety, loss of tree cover and potential for creation of mosquito breeding areas. The outcome was clear direction that further neighbourhood consultation and careful and considerate design analysis would be required to implement stormwater treatment facilities at any of these four selected locations.

Accordingly, the final recommendation of the plan is that subject to further analysis and public consultation, new facilities could be implemented at each of these four sites if it can be demonstrated that the planned facility fits with current uses of the location; fits within the neighbourhood setting; and is designed in conjunction with neighbourhood consultation to address the local community concerns that were expressed during this study

3. Costs

The following tables summarize the costs to implement the recommended program elements.

Table 1-1: Existing Infrastructure Renewal and Improvement	
Existing System Restoration to satisfy MOE Certificate of Approval (sediment removal and other corrective measures) (one time cost)	\$ 2.1 M
Measures to Improve Existing Systems Performance (one time cost)	\$ 2.0 M
Annual Capital Maintenance Costs to satisfy current regulatory requirements (Recurring costs)	
• Wet Pond Sediment Removal	\$134,000
• Dry Pond Sediment Removal	\$ 51,000
• Main Cell Sediment Removal	\$ 82,000
Total	\$ 4.4 M

Table 1-2: System Maintenance	
Annual maintenance at existing SWM ponds: Structured program to include routine inspections, landscape maintenance and routine removal of accumulated grit and sediment; accompanied by record-keeping system to allow for reporting and tracking of deficiencies.	\$ 84,000
Storm-sewer catch basin cleaning and sewer flushing program: Maintain existing CB clean-out program (increasing CB clean-out frequency is not a cost-effective means of pollution abatement)	\$ 150,000

Street-sweeping program Maintain existing program (based on use of 4 mechanical sweepers). Switching to regenerative-air/vacuum sweepers cannot be justified based on available research on net effectiveness of such sweepers. Mechanical sweepers required to remove winter road sand/grit.	\$ 700,000
Total	\$ 934,000 per year

Table 1-3: Additional Measures	
System Surveillance Program • Monitor major outfalls in dry weather for bacteria, metals, nutrients (20 outfalls, 6 times per year) • Monitor creeks in dry and wet weather (25 locations, 6 times per year)	\$ 120,000 per year
Public Awareness Campaign: Designed to promote Source Control and compliment infrastructure solutions by raising awareness and support • Develop objectives and key messages; E.g. inform general public of pollution sources and issues. • Target a broad audience, primarily property owners. • Promote source-control measures on private properties, e.g. rain barrels, vehicle maintenance practices, lawn maintenance, etc. • Integrated effort across City departments. • Cross-connect with Peterborough's Urban Forest Strategic Plan (June 2011) and Sustainable Peterborough • COST: Estimate \$80,000/year for one part-time staff and materials development.	\$ 80,000 per year
Total	\$ 200,000 per year

Appendix 2 – Implementation Program

The Stormwater Quality Management Master Plan (the “Plan”) identifies a number of different initiatives to be undertaken by the City to improve the long-term quality of stormwater runoff in the City. Given the broad nature of the Plan it is impractical to implement all aspects at once. Staff and XCG have therefore developed the recommended program described below.

Implementation and fulfillment of the capital works components of the Plan is expected to take a number of years. Operation and policy components of the Plan will also take a number of years to fully implement and will be an ongoing commitment on the part of the City. Implementation of the Plan recommendations is proposed to follow the schedule shown in Table 2-1:

Table 2-1: Implementation

Stormwater Quality Management Master Plan Implementation				
Item	Details	Start	End	Comment
1	User-Rate Study and Reporting	2015	2016	• Stormwater User-Rate development • Cash-in-lieu policy
2	Assess Staffing Needs and Recruit	2015	2016	• Funded through User-Rate
3	Official Plan Update	June 2015		• Specific policy section related to SWM
4	City Design Standards	Annual Process		• Promote LID • Refer to recent and emerging technical guidance documents • New design standards
5	Public Awareness	2106	Ongoing	• Raise awareness and support to promote source control and compliment infrastructure solutions
6	Collaborations and Linkages	2016	Ongoing	• Working groups or forums to facilitate ongoing input, networking, discussion and action
7	Existing Infrastructure Renewal and Improvement	2016	Ongoing	• Facility restoration • Measures to improve pond performance

Stormwater Quality Management Master Plan Implementation				
Item	Details	Start	End	Comment
8	System Maintenance	Ongoing		• Annual Maintenance at existing facilities • Storm-sewer catch basin cleaning and sewer flushing • Street-sweeping program
9	System Surveillance	2016	Ongoing	• Monitor major outfalls in dry and wet weather • Monitor creeks in dry and wet weather
10	Sewer Use Bylaw	2016	2016	• Review and update
11	New Infrastructure Planning and Development	2018	Ongoing	• Community consultation, planning and design for new facilities
12	Master Plan Review and Update	2020	2025 Ongoing	• Review plan and update to reflect industry best practices

The priority for the City is to implement those measures that are needed to maintain regulatory compliance (Items 7 in Table 2-1) at the existing stormwater pond facilities. These recommended measures and the associated estimated costs are presented in Table 2-2 below. A concurrent priority is for the City to implement routine inspections of the existing stormwater pond facilities.

Table 2-2 Existing SWM Ponds: Required Measures (Item 7, Table 2-1)

Facility	Description of Works or Measures Required	Estimate of Capital or One-time Cost
#2: Heritage Park Pond	Clean out accumulated sediment from both forebays. Estimated volume of material to remove is 1,000m ³ .	\$280,000
#3: Cunningham Pond	Clean out accumulated sediments from both forebays. Estimated volume of material to remove is 400m ³ .	\$145,600
#3: Cunningham Pond	Confirm with facility constructor that pond liner and under-drain system installed per facility design report.	No cost attributed
#3: Cunningham Pond	Monitor liquid level during spring, summer and fall to determine if required normal water level and permanent pool volume are achieved and maintained	\$8,750

#9: Chemong Park Plaza Pond	Remove accumulated sediment from forebay to restore to original design. Estimated volume of material to remove is 150m ³ .	\$79,450
#12: Hemlock Street Pond	Confirm that C of A. 3-1040-95-006 applies. If so, the facility requires expansion to achieve detention volume of 1,243m ³ .	\$112,700
#15: Foxmeadow Pond	Remove accumulated sediment from main pond cell and from forebay to restore to design volume and depth. Estimated volume of material to remove is 150m ³ .	\$73,850
#15: Foxmeadow Pond	Correct erosion problem along forebay berm to restore it and minimize further problems.	\$51,660
#17 Fairview Estates Pond	Remove material from main pond to restore original design volume. Volume of material to remove estimated at 2,500m ³ .	\$555,800
#19: Loggerhead 1	Remove accumulated sediments from forebay within 2 years. Estimated volume of material to remove is 300m ³ .	\$109,900
#21: Glenforest	Modify outlet control structure to raise NWL to design elevation of 236.00m, to increased permanent pool volume from current 1,140m ³ to design value of 3,200m ³ .	\$134,960
#21: Glenforest	Remove accumulated sediment from forebay to restore to original design depth of 1.5m. Estimated volume of material to remove is 400m ³ .	\$133,000
#23: Wentworth Street	Remove accumulated sediment from forebay to achieve minimum depth of 1.0m per original design. Estimate of volume of material to remove is 100m ³ .	\$58,100
#25: Stewart Drive	Confirm implementation status of facility inlet modification proposed in February 2011 report by D.M. Wills.	Not cost attributed.
#27: College Park Pond	Clean out accumulated sediment from the forebay. Estimated volume of material to remove is 400m ³ .	\$138,600
#27: College Park Pond	Clean extended detention outlet (perforated 1500-mm CSP riser pipe) to lower normal water level to design value.	\$2,000
#28: Airport Road Plunge Pool	Clean out accumulated material from the sediment trap. Estimated volume of material to remove is 10m ³ .	\$20,160
#29 Major Bennett Pond	Remove accumulated sediment from Forebay No. 1. Estimated volume of material to remove is 50m ³ .	\$27,650
#29 Major Bennett Pond	Remove accumulated sediment from Forebay No. 3. Estimated volume of material to remove is 600m ³ .	\$172,200

#29 Major Bennett Pond	Inspect 2400mm manhole on 900-mm outlet pipe just north of Fisher Drive, and check steel weir plate for blockage of 290mm orifice (to restore normal water level).	No cost attributed.
Total of Above Items		\$2,104,380

In order to implement the measures necessary to ensure compliance an increase to operating and capital revenue is required. To facilitate funding of the program, the Plan recommends the City establish a “user-rate” system. This system is expected to be similar in nature to the current Sewer Surcharge paid by home owners and could be a function of property characteristics. Development of the User-Rate system will begin after Council provides direction to proceed. The recommended system is expected to be presented to Council in the first half of 2016 for approval.

In 2015, it is also proposed that current operation and maintenance practices continue and staff will assess the staffing needs to implement the Plan. It is proposed that an update to the Official Plan be incorporated into the current Official Plan update program and an update to the City’s Design Standards is recommended to be undertaken, in 2015.

Increased inspections, surveillance and maintenance programs will begin in 2016, funded by the proposed User-Rate system. In 2016, the recommended capital works necessary to maintain compliance of existing facilities will begin. Sediment removal from existing ponds will be an annual ongoing requirement, although due to many years without a formal program in place there is an immediate need to complete sediment removals in several stormwater management ponds. The following ponds are considered to be top priorities for sediment clean-out:

- Chemong Park Plaza Pond (Forebay over 70% full)
- Wentworth Street Pond (Forebay over 70% full)
- Foxmeadow Pond (Forebay over 60% full)
- Major Bennett Pond (Pond is almost full)

In order to prepare for the pond clean-outs the City will need to prepare specifications and tender documents. It is recommended that the City develop a standard procedure document to support pond clean-out projects.

Another priority is for the City to undertake routine pond facility inspections and to document and report the inspection results. Since the MOECC has recently been stepping up enforcement activity with respect to municipal stormwater ponds, including random unannounced inspection in which MOECC staff require that the municipality provide available documentation on operation and maintenance activities, this is a priority for the City and will begin in 2016, provided adequate funding is available.

The Plan also calls for the City to implement a testing and sampling program to sample stormwater quality at a number of large diameter outfalls throughout the year. Several of the recommended locations for testing also showed some levels of contamination during the study that suggested an emphasis be placed on sampling from these specific locations. The sampling program is suggested to begin in 2016.

City staff will begin developing the Community outreach and collaboration program in 2016 as well as the public education component of the Plan.

Beyond 2016, the City will continue the sediment cleanout as identified in the Plan. Upon completion of the urgently needed sediment removal the City will begin to implement the system improvement measures (existing ponds) in 2017 and 2018.

In 2018 the City will begin the process to plan new facilities including community consultations, in the locations identified in the Plan. It will take a number of years to complete the consultation, design and construction of each facility.

As part of the master plan process it is important to schedule regular review and comprehensive updates to the Plan. The first review of the Plan is anticipated for 2020, and every five years thereafter, and if necessary a comprehensive update will begin in 2025.

Appendix 3 – Alternatives Considered and the Evaluation Summary

Stormwater Quality Management Master Plan Alternatives

Four alternatives were developed to base a long-term plan to improve stormwater quality within the City. These alternatives are summarized in Figures A2.1 – A2.4. Each alternative is intended to form an overall strategy for managing the City' storm drainage infrastructure, with respect to the objective of reducing and minimizing the pollutant load delivered to local creeks and the Otonabee River.

Alternative No. 1 “Maintain Current Effort”

- This alternative is based on maintaining current programs, and proceeding with SWM pond sediment clean-outs that are required to maintain compliance and performance. This alternative does not include retrofit end-of-pipe installations. In the Class EA context, this alternative is effectively the “do nothing” option.

Alternative No. 2 “Opportunistic Source Reduction” (Conveyance Control Added)

- This alternative is based on using relatively straightforward approaches to improve source and conveyance controls through improvements to municipal system maintenance operations, and through policy advancement to promote better design, and public outreach to promote source control on private property. As with Alternative No. 1, this alternative does not include new end-of-pipe facility installations.

Alternative No. 3 "Aggressive System Retrofit"

- Alternative No. 3 is based on implementing an aggressive approach to end-of-pipe retrofits (i.e. new end-of-pipe facilities for untreated outfalls), along with the source- and conveyance control measures, policy advancement and public outreach included in Alternative No. 2.

Alternative No. 4 "Progressive System Improvement"

- This alternative places considerable emphasis on improving policies and design standards to promote improved urban design practices and innovation, so that over time, stormwater control and pollutant reduction are achieved City wide. This alternative also includes those end-of-pipe retrofit facilities that are considered as cost efficient, in order to make use of the best opportunities.

All alternatives have been formulated to include actions or measures that the City must implement to meet or continue to meet current regulatory requirements.

The following sections describe the components of each alternative.

Alternative No 1 – Maintain Current Effort

Regulatory Compliance

Sediment Removal from existing SWM ponds that were designed approved as stormwater treatment ponds, and which have measured sediment accumulation in excess of current MOECC guidelines

System Performance Improvement

Do nothing. (No end-of-pipe retrofits)

Pollution Source Control

Existing urban areas:

Maintain existing system operation & maintenance

- Street sweeping program
- Catchbasin cleaning
- Salt management program (winter road maintenance)

New urban development:

Designed in accordance with current MOECC and City guidelines

City Policies / Guidelines

Maintain current engineering standards including conformance with MOECC guidelines

Funding

1. Existing funding sources maintained to support existing operation and maintenance programs
2. General revenues for regulatory pond clean-outs

System Surveillance

Respond to complaints

Alternative No. 2 – Opportunistic Source Reduction

Regulatory Compliance

Sediment Removal from existing SWM ponds that were designed approved as stormwater treatment ponds, and which have measured sediment accumulation in excess of current MOECC guidelines

System Performance Improvement

Do nothing. (No end-of-pipe retrofits)

System Surveillance

Routine monitoring of major storm outfalls in dry weather: and investigate source of any exception contamination, especially bacteriological contamination.

Pollution Source Control

Existing urban areas:

Maintain existing system operation and maintenance

- Street sweeping program
- Catchbasin Cleaning
- Salt management program (winter road maintenance)

New urban development:

- Designed in accordance with current MOECC and City guidelines
- Promote innovative approaches through planning policies

Across City: Aggressive public education/outreach program, working with local environmental organizations, to promote actions on private properties such as rain gardens, green roofs, rainwater harvesting and similar measures.

City Policies / Guidelines

1. Maintain current engineering standards including conformance with MOECC guidelines
2. Use Official Plan policies to promote “low-impact development” (LID) design approaches in new development areas or on redevelopment properties.

Funding

1. Increased annual funding (source is general revenue) to allow intensified street sweeping including new vacuum/regenerative-air sweeper machines.
2. General revenues for purchase of new equipment
3. General revenues for regulatory pond clean-outs

Alternative No. 3 – Aggressive System Retrofit

Regulatory Compliance

Sediment Removal from existing SWM ponds that were designed approved as stormwater treatment ponds, and which have measured sediment accumulation in excess of current MOECC guidelines

System Performance Improvement

Comprehensive End-of-Pipe Retrofit Program:

- Construct new end-or-pipe treatment at feasible locations
- Modify existing SWM ponds to improve performance.

System Surveillance

- Routine monitoring of major storm outfalls in dry weather and wet weather
- Routine monitoring of conditions in local creeks to assess system impact and progress.

Pollution Source Control

Existing urban areas:

Maintain existing system operation & maintenance

- Street sweeping program
- Catchbasin Cleaning
- Salt management program (winter road maintenance)

New urban development:

- Designed in accordance with current MOECC and City guidelines
- Promote innovative approaches through planning policies

Across City: Aggressive public education/outreach program, working with local environmental organizations, to promote actions on private properties such as rain gardens, green roofs, rainwater harvesting and similar measures.

City Policies / Guidelines

1. Maintain current engineering standards including conformance with MOECC guidelines
2. Use Official Plan policies to promote “low-impact development” (LID) design approaches in new development areas or on redevelopment properties.

Funding

1. Increased annual funding (source is general revenue) to allow intensified street sweeping including new vacuum/regenerative-air sweeper machines.
2. General revenues for purchase of new equipment
3. General revenues for regulatory pond clean-outs

Alternative No. 4 – Progressive System Improvement

Regulatory Compliance

Sediment Removal from existing SWM ponds that were designed approved as stormwater treatment ponds, and which have measured sediment accumulation in excess of current MOECC guidelines

System Performance Improvement

Opportunistic End-of-Pipe Retrofit Program:

- Construct new end-of-pipe treatment at feasible locations **where cost efficiency is demonstrated** (cost per hectare treated).
- Modify existing SWM ponds to improve performance **where cost efficiency is demonstrated** (cost per hectare treated).

System Surveillance

- Routine monitoring of major storm outfalls in dry weather and wet weather
- Routine monitoring of conditions in local creeks to assess system impact and progress.

Pollution Source Control

Existing urban areas:

Maintain existing system operation & maintenance

- Street sweeping program
- Catchbasin Cleaning
- Salt management program (winter road maintenance)

New urban development:

- Designed in accordance with current MOECC and City guidelines
- Promote innovative approaches through planning policies

Across City: Aggressive public education/outreach program, working with local environmental organizations, to promote actions on private properties such as rain gardens, green roofs, rainwater harvesting and similar measures.

City Policies / Guidelines**1. Encourage Innovative Design:**

Review current engineering design standards including requirements for conformance with MOECC guidelines, to ensure adequate incentive for on-site runoff reduction and source control through innovative design.

2. Make it Part of the Planning Process:

Use Official Plan policies and other approval mechanisms (site plan approval guidelines, Secondary Plans) to explicitly require design measures to minimize stormwater runoff and ensure “low-impact development” (LID) design on all new development sites or on redevelopment properties to promote “low-impact development” (LID) design approaches in new development areas or on redevelopment properties.

Funding

1. Cash-in-lieu mechanism to facilitate property redevelopment while funding new end-of-pipe treatment facilities in appropriate drainage areas
2. Storm sewer rate charge to all property owners based on system usage (property characteristics), to fund regulatory pond clean-outs and long-term program of retrofit facility installation and system maintenance; including direct incentive (reduced rate) for implementing source-control on individual properties. Also used to increase funding for intensified street sweeping and CB cleaning programs; and to fund purchase of new equipment when required.

The alternatives being considered are “packages” of activities that represent various philosophies on how to address the problem and opportunity identified.

Evaluation Criteria

Table 3-1 Evaluation Criteria

Natural Environment	
N.1	Expected benefit to aquatic habitat conditions in local creeks
N.2	Expected benefit to water quality and aquatic habitat conditions in Otonabee River and downstream environment
N.3	Potential to improve local hydrology and water balance
N.4	Loss of terrestrial habitat due to loss of tree cover or other terrestrial features; or disruption or alteration to wildlife corridors
N.5	Potential impact to any species at risk or species of concern
N.6	Potential for groundwater contamination
Financial Environment	
F.1	Capital cost for recommended modifications to existing SWM ponds and for new end-of-pipe treatment facilities
F.2	Annual costs for operation and maintenance of recommended new facilities, including annual costs for system monitoring and surveillance program
F.3	Funding feasibility: ability of City to fund program
Socio-Cultural Environment	
C.1	Tree loss within public park lands
C.2	Loss of useable space within public parklands
C.3	Public health and safety: Potential for health/safety concerns about open water and mosquito breeding
C.4	Potential impact on archaeological resources as determined from study area review
C.5	Potential for impact on cultural resources (e.g. historical buildings)
C.6	Level of benefit to recreational water use through reduction in wet-weather bacteriological contamination along Otonabee River especially public bathing beaches
C.7	Temporary impacts due to construction, including traffic, noise, dust generation
Sustainability Considerations	
S.1	Comparative ability to make the Peterborough municipal drainage system more adaptable to expected increases in rainstorm intensity (e.g. through provision of additional storage volume, maximizing rainwater infiltration)

Table 3-1 Evaluation Criteria

S.2	Potential reduction in local warming through improvement to tree cover or to green space
S.3	Comparative energy use and GHG emissions
S.4	Integrated watershed management: Long-term improvement to local and downstream surface water quality for sustaining water sources for beneficial uses such as drinking water supply
Technical Considerations	
T.1	Integration with Flood Reduction Program
T.2	Potential for conflicts with existing underground infrastructure
T.3	Potential for negative effects on wet-weather inflow to sanitary system
T.4	Flexibility to accommodate future urban growth
T.5	Acceptability of proposed works to regulatory agencies including ORCA and DFO
T.6	Practical applicability of proposed OP policies
T.7	Practical applicability of proposed Engineering Design Standards modifications
T.8	Time required for implementation
T.9	Implementation time: duration for implementation, and ability to implement in phases over time

Evaluation Methodology

A narrative description of the evaluation outcome follows the individual criterion tables.

Evaluation

Criterion Category: Natural Environment

The key consideration differentiating the alternatives is the degree to which each reduces stormwater pollution conveyed to local creeks and the Otonabee River, and resulting benefit to aquatic habitat and communities in those watercourses. Table A3-2 compares the alternatives with respect to the key considerations related to natural environment.

Table 3-2 Alternatives Comparison - Natural Environment

Natural Environment					
Alternative 1 Status Quo	- Will not provide any benefit to local creeks or Otonabee River - Does not address existing impacts - Does not address the problem statement				
Alternative 2 Opportunistic Source Reduction	- Minimal reduction in stormwater pollution and therefore minimal expected improvement in local water quality in creeks and Otonabee River - Presents potential for local groundwater contamination by stormwater infiltration measures				
Alternative 3 Aggressive System Retrofit	- Largest reduction in stormwater pollution and therefore most benefit to water quality in local creeks and Otonabee River - Larger negative effects than other alternatives, related to loss of tree cover, wildlife habitat and parkland area due to facility construction, and potential for groundwater contamination				
Alternative 4 Progressive System Improvement	Moderate stormwater pollution reduction and resulting benefits to local surface water quality				
	Favourable		Somewhat favourable, unfavourable or neutral		Not favourable

Based on this information, Alternative 3 and Alternative 4 are the most favourable in terms of effects on natural environment. While Alternative 3 presents greatest reduction over the long term in stormwater pollution, this alternative also poses potential for larger negative effects due to loss of tree cover, parklands areas and wildlife habitat (possibly including effects on species at risk) that is caused by construction of new end-of-pipe stormwater treatment facilities. There may also be higher potential for groundwater contamination. Alternative 4 may present a more favourable compromise.

Criterion Category: Financial Environment

Cost Summaries

Table 3-3 Cost Analysis Summary: Capital Costs

Component	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Existing Storm Ponds				
Required Measures	\$2.1M	\$2.1M	\$2.1M	\$2.1M

Table 3-3 Cost Analysis Summary: Capital Costs

Component	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Enhancements			\$2.0M	\$2.0M
New Treatment Facilities				
All Potentially Feasible End-of-Pipe Retrofits			\$40.8M to \$53.7M	
Potentially Feasible and Cost-Effective End-of-Pipe Retrofits				\$2.3 M
Totals for Above Components	\$2.1 M	\$2.1 M	\$44.8 to \$57.8M	\$6.4M

Table 3-4 Cost Analysis Summary: Annual Operating and Maintenance Costs

Component	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Existing Storm Ponds:				
Annual Operating and Maintenance	\$349,000	\$349,000	\$393,000	\$393,000
New Treatment Facilities:				
Annual Operating and Maintenance			\$450,000 to \$570,000	\$59,000
Municipal Source Control Measures:				
Street Sweeping Program				
SS.1: Existing Program	\$700,000		\$700,000	\$700,000
SS.2: Enhanced Program		\$1,300,000		
CB Cleaning Program				
Maintain Existing	\$125,000	\$125,000	\$125,000	\$125,000
System Surveillance Program by City:				
SU.1: Maintain Existing	Minimal			
SU.2: Major Outfalls Sampling		\$60,000		
SU.3: Major Outfalls and Creek Sampling			\$120,000	\$120,000
Public Education and Outreach Program	Minimal	\$80,000	\$80,000	\$80,000
Totals for Above Components	\$1.2 M	\$1.9 M	\$1.9 to \$2.0 M	\$1.5 M

Table 3-5 compares the alternatives with respect to the key considerations related to financial environment.

Table 3-5 Alternatives Comparison – Financial Environment

Financial Environment					
Alternative 1 Status Quo	• Lowest capital cost • Lowest annual costs				
Alternative 2 Opportunistic Source Reduction	• Same capital cost as Alternative #1 • Approximately 60% increase (\$0.7 M) in annual costs				
Alternative 3 Aggressive System Retrofit	• Very high capital cost (\$45 M to \$58 M) may not be affordable • Highest annual costs				
Alternative 4 Progressive System Improvement	• Modest capital cost (\$6.4M) is approximately \$4.3M than Alternatives 1 and 2 • Relative low increase in annual costs of approximately 30% (\$0.3 M)				
	Favourable		Somewhat favourable, unfavourable or neutral		Not favourable

In the financial category, Alternative 1 is most favourable simply because it minimizes future costs; however, this is in the face of providing minimal benefits.

Criterion Category: Socio-Cultural Environment

- Tree loss within public park lands.
- Loss of useable space within public parklands.
- Public health and safety: Potential for health/safety concerns about open water and mosquito breeding.
- Potential impact on archaeological resources.
- Potential for impact on cultural resources (e.g. historical buildings).
- Level of benefit to recreational water use through reduction in wet-weather bacteriological contamination along Otonabee River especially public bathing beaches.
- Temporary impacts due to construction, including traffic, noise, dust generation.

Table 3-6 Alternatives Comparison - Socio-Cultural Environment

Socio-Cultural Environment					
Alternative 1 Status Quo		No impacts because it is the “do nothing” approach			
Alternative 2 Opportunistic Source Reduction		Has minimal impacts because it avoids construction of any new stormwater treatment facilities			
Alternative 3 Aggressive System Retrofit		- Has the largest and most significant impacts on public parklands - Largest impacts due to construction activity - Has best potential benefit on reducing bacterial contamination at public beaches, although would not fully solve this problem - Some potential public health/safety concerns with having many additional pond facilities			
Alternative 4 Progressive System Improvement		- Has substantially less impact on parklands and less construction activity impacts than Alternative No. 3, but more potential impacts than Alternative No. 2 - Significant concerns about neighbourhood compatibility and loss of parkland have been expressed by residents in the vicinity of the four proposed new end-of-pipe pond facilities (see Appendix C for full description of the public concerns expressed at PIC #2 in June 2013)			
	Favourable		Somewhat favourable, unfavourable or neutral		Not favourable

In the socio-cultural category, Alternative 1 is most favourable, simply because “do nothing” has no impacts.

Criterion Category: Sustainability Considerations

- Comparative ability to make the Peterborough municipal drainage system more adaptable to expected increases in rainstorm intensity (e.g. through provision of additional storage volume, maximizing rainwater infiltration).
- Comparative energy use and GHG emissions.
- Potential reduction in local warming through improvement to tree cover or to green space.
- Integrated watershed management: Long-term improvement to local and downstream surface water quality for sustaining water sources for beneficial uses such as drinking water supply.

Table 3-7 compares the alternatives with respect to the key considerations related to sustainability.

Table 3-7 Alternatives Comparison – Sustainability

Sustainability Considerations					
Alternative 1 Status Quo		Lowest improvement in the adaptability and sustainability of the municipal drainage system			
Alternative 2 Opportunistic Source Reduction		Provides only marginal benefits in terms of the above sustainability considerations because of inherent limits of a distributed source-control approach and practical limits on how widely source control can be implemented			
Alternative 3 Aggressive System Retrofit		- Provides the greatest increase in the adaptability of the system to projected climate change and sustainability of downstream surface water quality, because this alternative includes the largest number of new stormwater retention and treatment facilities to address existing untreated storm discharges - Negative effects include loss of greenspace and tree cover due to new facility construction			
Alternative 4 Progressive System Improvement		Provides modest gains in the adaptability of the system to projected climate change, and helps with sustaining surface water quality, but to a lesser degree than Alternative No. 3			
	Favourable		Somewhat favourable, unfavourable or neutral		Not favourable

In the sustainability category, Alternative 3 is the most favourable, primarily because the aggressive approach to providing additional end-of-pipe stormwater facilities provides greater sustainability of good water quality conditions by providing greater reduction in water pollution from urban drainage. However, this advantage is partly offset by loss of greenspace and tree cover that would result from construction of end-of-pipe treatment facilities.

Criterion Category: Technical Considerations

The Technical considerations are:

- Integration with Flood Reduction Program.
- Treated service area: amount of system service area that receives direct stormwater treatment.
- Potential for conflicts with existing underground infrastructure.
- Potential for negative effects on wet-weather inflow to sanitary system.
- Flexibility to accommodate future urban growth.
- Acceptability of proposed works to regulatory agencies including ORCA and DFO.
- Practical applicability of proposed OP policies.

- Practical applicability of proposed Engineering Design Standards modifications.
- Time required for implementation.
- Implementation phasing: ability to implement in phases over time.

Table 3-8 Alternatives Comparison – Technical Considerations

Technical Considerations					
Alternative 1 Status Quo	• Minimal negative impacts because the “do nothing” approach does not involve construction of new works or other system modifications. • No technical advantages such as better adaptability to future growth or improvement in development design standards				
Alternative 2 Opportunistic Source Reduction	• Provides the advantages of better design standards coupled to better OP policies, so that new development is better designed • Has advantage of easier than some of the other alternatives implementation • Avoids any technical issues involved in construction of new treatment facilities • Practical and feasible extent of implementing source control may be very limited • Presents some potential for worsening water infiltration into sanitary sewers if stormwater infiltration applied as source control				
Alternative 3 Aggressive System Retrofit	• Presents the largest technical challenges because it includes the implementation of many (14 or more) new end-of-pipe stormwater treatment projects. By far the longest implementation time requirement				
Alternative 4 Progressive System Improvement	• Provides the advantages of better design standards coupled to better Official Plan policies, so that new development is better designed • Relatively low technical challenges associated with proposed new treatment works; and substantially less implementation time than needed by Alternative No. 3				
	Favourable		Somewhat favourable, unfavourable or neutral		Not favourable

In the Technical category, Alternatives 2 and 4 are favourable, with Alternative 4 being considered the most favourable. Alternative 4 provides the technical advantages of Alternative 2, while avoiding some of its technical drawbacks.

Table 3-9 Alternatives Comparison Summary Table

Criteria Category		Alternative 1 Status Quo	Alternative 2 Opportunistic Source Reduction	Alternative 3 Aggressive System Retrofit	Alternative 4 Progressive System Improvement
Natural Environment					
Financial Environment					
Socio-cultural Environment					
Sustainability Considerations					
Technical Considerations					
	Favourable		Somewhat favourable, unfavourable or neutral		Not favourable

Additional Narrative Information**Alternative 1: Must Consider Problem/Opportunity Statement****Alternative 3: Must Consider Costs and Benefits**

Because there is such clear and significant cost difference between this and the other alternatives, a central issue is whether the resulting benefits are worth the cost. The most aggressive and ambitious alternative, Alternative 3, presents very high capital cost (over \$40 million) that may make it less affordable than the other alternatives and/or unaffordable to the municipality. Such high cost is very difficult to justify partly because it is difficult to quantify what the demonstrable benefits would be from installing this system of end-of-pipe retrofit stormwater treatment facilities. Beyond intermittent bacterial pollution at public swimming beaches at Beavermead Park and Roger's Cove Park, there are no known, significant water pollution problems directly attributable or solvable by improving municipal stormwater treatment in Peterborough. Furthermore, the bacteriological contamination at the public swimming beaches would not be entirely solved by Alternative 3.

Alternatives 2 and 4: Top Choices

- In the case of Alternative 2, benefits are largely attributable to effects of increased public education and outreach, as well as direct improvements in municipal operations related to road maintenance. The gains that will be provided by Alternative 2 are likely to be modest and take a long period of time.

- Alternative 4 captures all of the benefits of Alternative 2. Alternative 4, with capital cost for SWM pond enhancements and new end-of-pipe retrofit projects of approximately \$4.3 million and annual operating and maintenance costs approximately \$300,000 higher than the “do nothing” alternative, appears to be an affordable approach. This alternative would also see the highest percentage of lands positively affected through implementation.
- Alternative 4 is based on working towards long-term improvement by incorporating specific stormwater policies within the new Official Plan, and promoting Low Impact Development design approaches through updated City Engineering Design Standards. As well, it incorporates a Cash-In-Lieu program that would be used to fund a well-defined set of projects that includes four new end-of-pipe facilities as well as enhancements at a number of the existing ponds.

Public Feedback on Potential New Facilities

Through the public consultation process, the consulting team became apprised of significant public concerns about the proposed new pond facilities that are a component of Alternative 4.

Concept layouts for each site were presented at the second PIC held on June 13, 2013 at the Canadian Canoe Museum.

There were concerns about these proposed facilities clearly expressed by residents who live in the vicinity of the proposed sites. The public concerns included neighbourhood compatibility, loss of valuable parkland, public safety, loss of tree cover and potential for creation of mosquito breeding areas.

The outcome was clear direction that further neighbourhood consultation and careful and considerate design analysis would be required to implement stormwater treatment facilities at any of these four selected locations. This important outcome has been reflected in the final recommendations on the preferred approach, as discussed in the following section of this report.

Preferred Alternative

Based on the discussion above, it is recommended that the City proceed with Alternative 4 as the recommended approach for the long-term management of stormwater quality. The recommended solution is clear that new facilities will not be planned and constructed until further consultation with adjacent neighbourhoods has been completed and systems are designed that are sensitive to the neighbourhood concerns.