Appendix A

Stormwater Management Strategy

Town of Halton Hills

Final Report

Prepared for:

Town of Halton Hills

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With: **Watson & Associates**

May 2019

Project No. TPB178007

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Submitted to:

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Amec Foster Wheeler Environment & Infrastructure is committed to achieving sustainability through balancing economic growth, social responsibility and environmental protection. Learn more at: http://amecfw.com/aboutus/sustainability.htm.

1.0 INTRODUCTION

The Town of Halton Hills retained Amec Foster Wheeler and Watson & Associates in February 2017 to identify, evaluate, and recommend alternative approaches to develop a sustainable stormwater management funding strategy, based on a sustainable level of service that will meet the Town's current and future needs.

This study includes: an assessment of the Town's current stormwater management program and expenditures, identifying life cycle analysis costs, identifying funding and data gaps; benchmarking against programs of similar municipalities, and the development of alternative stormwater management programs and associated costs, based on varying level of services and addressing the funding gaps.

The main purpose of this study has been to assess the potential for implementation of a sustainable stormwater funding strategy, for funding the Town's program of stormwater services (e.g. relating to storm sewer pipes, catchbasins, manholes, stormwater management facilities, outfalls, inlets, and creeks/channels). Through a review of available data and reports, and using a series of interviews and discussions, the study has involved a consultation process with Town staff to determine whether a new funding strategy makes sense for the Town, based on current and potential program needs, community priorities, ability of other funding sources to sustain and achieve local and regional objectives, and internal support for establishing a new revenue stream. This preliminary assessment has been designed to:

- *Recommend a sustainable stormwater funding strategy;*
- *Build internal vision and understanding of existing and future stormwater program needs;*
- *Outline next steps so that the Town can better understand the challenges and investment needed to move the idea forward.*

To facilitate the assessment of the feasibility of a new funding source for the Town of Halton Hills, the Amec Foster Wheeler Team designed a series of questions to help identify key stormwater activities and challenges. These questions provided a structure for the review of current conditions and future needs for the Town, in the delivery of stormwater services. The following sections summarize the answers to the questions and review of additional supporting documentation.

2.0 CURRENT SERVICES

Town staff was asked to answer questions about stormwater-related services currently being provided and to note areas of specific concern. Based on a review of Town staff's responses and follow-up discussions with Town staff, current stormwater related services were identified. The primary stormwater functions and the departments that support each function were determined and have been summarized in Table 1. The following describes the existing services as currently understood:

a) Asset Management:

Storm Sewer Management System: The Town of Halton Hills currently manages over 190 km of storm sewer lines and over 9,200 storm sewer structures (maintenance holes, catch basins, inlets, etc.). The storm system infrastructure is mapped by the Town in GIS. As part of this study, the current Town GIS data has been assessed for connectivity, duplicate records, and gaps, and these gaps have been filled for the purposes of this report. The assumptions used to populate the gaps are documented in Appendix A. The Town may ultimately choose to review and confirm the gap filling as a later exercise. The data for this report currently remains in a separate dataset from the Town's data. It was noted as part of the CCTV condition survey that if there are maintenance issues identified that require immediate attention, they are given to Transportation and Public Works Maintenance operations staff to address.

- A CCTV condition assessment was performed on the storm sewer pipes across the Town between 2009 and 2012. The Town regularly uses CCTV technology, to assess pipe conditions, as part of the regular capital program or pavement management program.
- Storm sewer structures are assessed as part of the mainline inspection process and defects recorded as noted. Major "bridge culvert" structures (span greater than 3 m) are visually inspected on a two year cycle as part of the OSIM (Ontario Structure Inspection Manual) Inspection Program and significant structural defects noted.
- Most typical repair needs are coordinated with Road and Storm line rehabilitation projects to ensure coordination of infrastructure projects. Major repairs and replacement are scheduled in the 10 year Capital Budget.

Creeks: The storm sewers within Halton Hills discharge to the numerous creeks within the urban area of the Town. Accordingly, the creeks are part of the stormwater conveyance system within the Town. In the Georgetown and Acton urban areas there are Black Creek and Silver Creek, both tributary to the Credit River, and there are six Sixteen Mile Middle branch creek tributaries (three large and three small) at the southern limits of the Town which includes the Premier Gateway development area.

The Transportation and Public Works – Operations and Maintenance Department is responsible for managing the Town's system of creeks to provide for the safe conveyance of stormwater runoff.

- In new development areas this involves establishing the limit of flood susceptible areas and ensuring that new development does not encroach into these areas. For established areas, this involves monitoring the effect that upstream development has on the flow of water through these areas and, where a potential problem is identified, ensure that appropriate mitigating works such as stormwater management facilities or conveyance improvements are implemented.
- Creek inspection and assessment is done by the Conservation Authorities
- None of the Stormwater Management Capital Projects planned for 2017-2026 are creek management projects.

Stormwater Management Facilities: The Town currently has 40 public stormwater management facilities that require inspection and routine maintenance.

- Stormwater management facilities are built to temporarily retain the increased stormwater runoff from upstream development and release it into surface water bodies at a controlled rate. Many stormwater management facilities also have quality control devices installed to remove pollutants (oils, herbicides, and other contaminants) before urban runoff discharges into the creeks. Left untreated these pollutants could have a detrimental effect on the quality of water in the creeks.
- Sediment builds up in these ponds over time and needs to be removed. The Town visually inspects the stormwater management facilities for sediment (no level measurements) and inspects the inlet and outlet appurtenances. Cleaning (dredging) should be scheduled when sediment build-up is 50% of the stormwater management facility volume (an average of once every 15-20 years).

Table 1 Stormwater Services Summary - Town of Halton Hills, ON

Major Functional Areas	Transportation and Public Works (TPW)			Planning & Sustainability	Recreation and Parks (RP)	Corporate Services	
	Development Engineering (DE)	Operations & Maintenance (O&M)	Design and Construction Engineering (D&C)		Corporate Asset Management (CAM)	Finance (FIN)	GIS
Administration							
General Program Planning & Management	x	x	x	x			
Special Programs							
Public Outreach and Education		x					
GIS/Database Management			x		x		x
Regional Cooperation		x			x		
Climate Change Monitoring				x			
Public Technical Assistance				x			
Finance/Overhead							
Financial Management (budgets)	x	x	x	x	x	x	x
Asset Management	x		x		x		x
Overhead/Indirect Cost Distribution						x	
Contract Procurement	x	x	x		x	x	
Stormwater Quality Management							
Watershed Master Planning	x			x			x
Erosion and Sediment Control	x	x	x				
SW Site Plan Review	x						
Hazardous Waste Management		x					
Street Sweeping		x					
Spill Reporting, Response and Clean-up		x					

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Major Functional Areas	Transportation and Public Works (TPW)			Planning & Sustainability	Recreation and Parks (RP)	Corporate Services	
	Development Engineering (DE)	Operations & Maintenance (O&M)	Design and Construction Engineering (D&C)		Corporate Asset Management (CAM)	Finance (FIN)	GIS
Illicit Discharges/Illegal dumping		x					
Engineering and Planning							
Internal Engineering Design			x				
Contracts Management			x				
Design Criteria Development & Enforcement	x		x				
Field Data Collection (survey/operat'l data)	x		x				x
Infrastructure Inspections	x		x				x
Master Planning				x			
Operations and Maintenance							
SW System Inspections		x					
SW Conveyance Maintenance		x					
SW Facilities Maintenance		x					
Emergency Response		x					
Regulation and Enforcement							
General Permit Compliance	x						
Code Enforcement							
Floodplain Management	x			x			
Erosion Control Program	x		x				
Capital Improvements							
Major/Minor Capital Improvements			x				
x - indicates department identified first in program assessment questionnaire							

The Town's stormwater infrastructure has an estimated replacement cost of approximately $155,000,000 (reference the details in Table 2: Stormwater Asset Value by Type). Note that this does not include a value for the Town's creeks.

A fundamental approach to calculating the cost of using a capital asset and for the provision of the revenue required when the time comes to retire and replace it is the "sinking fund method." This method first estimates the future value of the asset at the time of replacement, by inflating the current value of the asset at an assumed annual capital inflation rate. A calculation is then performed to determine annual contributions which, when invested in a reserve fund, will grow with interest to a balance equal to the future replacement cost. The contributions are calculated such that they also increase annually with inflation. Under this approach, an annual capital investment amount (lifecycle funding amount) is calculated where funds are available for short-term needs while establishing a funding plan for long-term needs. Annual contributions in excess of capital costs in a given year would be transferred to a "capital replacement reserve fund" for future capital replacement needs. This approach provides for a stable funding base, eliminating variances in annual funding requirements, particularly in years when capital replacement needs exceed typical capital levy funding. This is of particular importance given the age profile of the Town's stormwater infrastructure assets and the increase in funding requirements that is expected over the long-term to sustain these assets. A lifecycle contribution approach would allow the Town to set money aside over the short term to mitigate the need for more aggressive tax or user fee increases in the future. Please refer to Figure 1 below for an illustration of estimated lifecycle replacement needs of the Town's stormwater infrastructure assets, and Figure 2 for an illustration of the "sinking fund method". Figure 1 is an illustrative example. The "sinking fund method" was applied to the Town's asset inventory to calculate the recommended annual lifecycle funding amount. However, due to differences in age and expected useful life of the Town's various stormwater assets, it would be difficult to incorporate the Town's entire stormwater asset inventory into this type of graph.

Figure 1: Age-based Assessment of Infrastructure Replacement Needs (constant $2017)

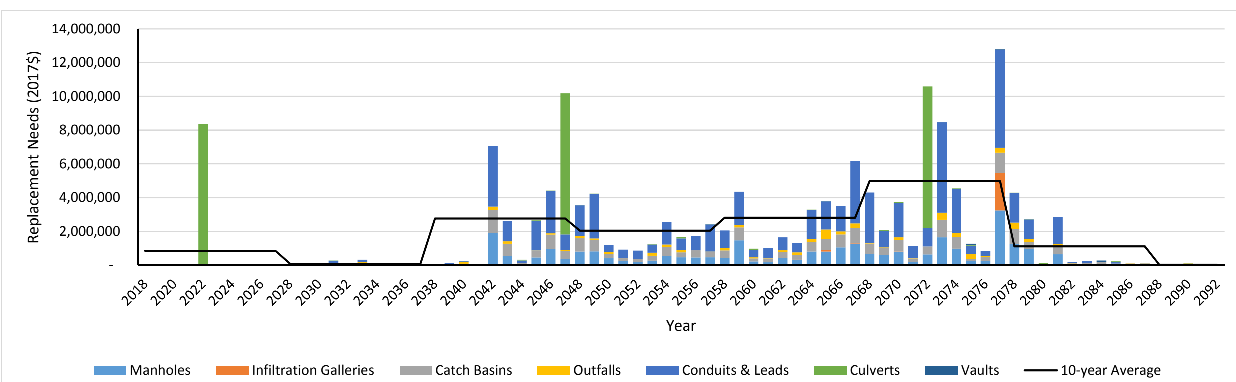
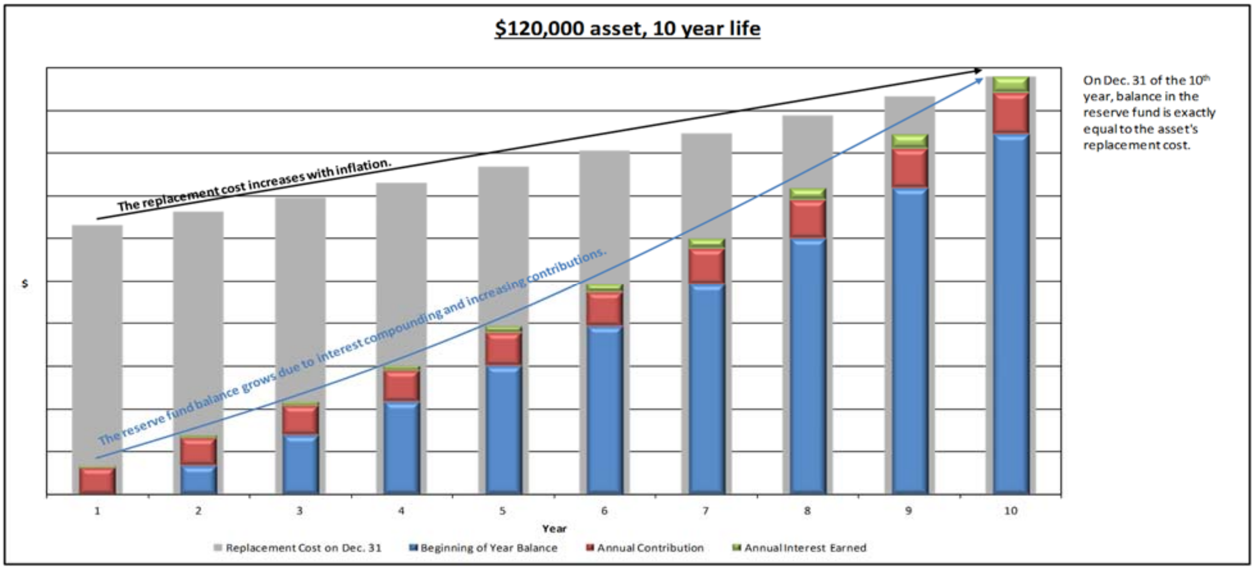


Figure 2: Sinking Fund Method - Lifecycle Funding Amount



Within the industry, considering the estimated useful life of each asset type, for storm sewer infrastructure, the target Life Cycle funding amount would be $3.1 M. This has been calculated using the sinking fund method described above. The calculated lifecycle funding amount represents 2.4 % of total asset value (excluding Stormwater Management Facilities) to be invested annually in capital rehabilitation or replacement. This capitalization should be set aside to provide funding to ensure on-going effective performance of the systems in place. Note that the existing asset values do not include new infrastructure or upgrades to existing infrastructure which are the results of new development. Furthermore, this calculation method is an approximation and does not explicitly take into account lifecycle activities such as rehabilitation or major maintenance. It is expected that a more detailed examination of lifecycle activities and costs related to the Town's stormwater infrastructure will be undertaken through the Town's asset management efforts.

The following is a summary of the Town's current stormwater infrastructure value by asset type. Note that "Storm Lines" in the Town's GIS database include all sewers and catch basin leads, and storm points" includes all maintenance holes, oil-grit separator (manhole type), catch basins, rear yard catch basins, ditch inlet catch basins, and vaults (oversized manholes).

Table 2 Stormwater Infrastructure Value by Type		
Stormwater Asset Type	**Replacement Value**	**Annual Lifecycle Contribution**
Storm Lines[1]	$62,469,655	$1,408,179
Storm Points[2]	$50,665,241	$1,142,086
Stormwater Management Facilities	$24,947,188	$-[4]
Stormwater Management Infiltration Galleries	$2,370,000	$53,424
Outfalls	$5,680,000	$128,037
Culverts[3]	$8,751,435	$429,297
Total	**$155,083,519**	**$3,165,786**

Notes:

1. Storm Lines include all sewers and catch basin leads
2. Storm Points include all maintenance holes, oil-grit separator (manhole type), catch basins, rear yard catch basins, ditch inlet catch basins, and vaults (oversized manholes).
3. Culverts in ROW for driveways only, assumed 450 mm diameter
4. Stormwater management facilities are primarily a land-based asset and therefore do not require full replacement

The following is a brief summary of the assets (2017). A detailed summary is provided in Appendix A.

Table 2.1 Summary of Stormwater Assets		
Asset	**Quantity**	**Range of Unit Prices**
Manholes	3194	$3,000 to $30,000
- MH - Oversized Manholes[1]	9	$40 000 to $80 000
- MH - Oil and Grit Separators	33	$40 000 to $80 000
Infiltration Galleries	158	$15,000
Catch Basins	5524	$3500 to $5500
Outfalls	282	$15,000 to $70 000
Conduits and Leads	7546 (190 km)	$120/m to $7000/m
SWM Facilities (ponds)	40	N/A
Culverts	2404	$350/m

Notes:

1. Oversized manholes are any greater than 3600 mm diameter, and/or all box manholes.

b) Operations and Maintenance (TPW):

- Maintenance and operation of stormwater assets is primarily the responsibility of the Transportation and Public Works Operations & Maintenance staff.

- General Drainage System repairs are addressed as they are identified. Any video inspection performed (capital or pavement management program) is reviewed for critical repairs.
- Sediment accumulation inspection or surveys for Town-owned stormwater management facilities are carried out. Large cleanouts are proposed under future capital projects. Moving forward, this budget will need to be adjusted for the longer term as larger facility cleanouts will significantly exceed the current budget level and many facilities require retrofits in addition to clean out activities.
- Ditch maintenance is performed in a reactive manner by O&M staff, who respond, as needed, to issues found through routine inspections or via citizen complaints. Budget is $80,000 a year. There is occasional work required on Municipal Drains, on private property.
- Catch Basin (CB) cleaning is critical in keeping inlets open to maintain flow in storm drains during wet weather. This work is managed by Operations & Maintenance staff and the service level has historically been to clean out all CBs on a five year cycle, or approximately 1,100 catch basins annually (5,524 total catch basins in Halton Hills). The cost of this service is included in the department's operating budget and is performed by Public Works. In recent years, the Town has experienced increased costs related to collection and disposal of the material from the basins and future annual costs may need to be adjusted: currently $15,000 per year for contracts, plus $27,000 for Town staff/labour,` and there is one vacuum truck. Disposal costs are expected to continue to increase due to increased environmental controls and changing MECP legislation for material management and waste management.
- There are over 2,400 culverts in the Town inventory that have a total length of 25,004 metres. Over the past five years, approximately 14 culverts have been replaced annually. There is an annual inspection program, but maintenance is complaint-driven first, then by inspection findings.
- Small culvert replacements are completed by O&M staff if the road crossing or driveway culverts are not too large (typically 750 mm diameter) and are not in Conservation Halton or CVC regulated areas. There is a need to have more specific data on condition of culverts throughout the Town, particularly in the urban areas.
- Storm sewer is either newly constructed (i.e. new subdivisions), and/or partially replaced in existing roads, annually through Roads, and not currently in the list of stormwater budget items.
- Street sweeping is a key service for control of grit, small solids and general debris to protect water quality by eliminating discharge through the drainage system. This service is budgeted as a roadway maintenance cost and is carried out by Transportation and Public Works Operations & Maintenance staff/equipment. There are three sweepers in-house. The budget is $62,500 per year.
- Grate cleaning is the responsibility of the Operations & Maintenance staff and is performed as time allows (the Town maintains a list of 'hot spots' for priority cleanout).

- The Town annually inspects and cleans all of their oil and grit separators (OGS). The Town database records that there are 20 public oil and grit separators (17 Stormceptors and 3 Vortechnics units) in the Town, however there is not a database of every Stormceptor/management facility in the community including privately owned and maintained facilities; once available it would assist in management of the whole system for the future. Some public Stormceptors (primarily oil/grit separator systems) are on Town property and some are in the roadway right of way. These facilities are inspected annually.
- Flood emergency response is addressed primarily by Transportation and Public Works Operations & Maintenance staff with its main task to stabilize conditions and support the more general community response; the Town works with CVC, GRCA, and Conservation Halton on notification protocols.
- Field inspections of inlets, outlets, grates, and stormwater management facilities are carried out by O&M staff. The Conservation Authorities carry out field inspections of creeks. O&M are occasionally called upon for ice jams at Glen Williams in particular.
- TPW currently maintains the LID stormwater infrastructure, e.g. bioswales, and has published LID Maintenance Guidelines, in June 2014. The operation and maintenance of LID infrastructure over its lifespan is not well known due to lack of implementation and records. The Town will need to budget for this work with a degree of uncertainty.
- Historically, CCTV has been done in advance of resurfacing projects and tied to the roads program. There is CCTV data from 2006-2013 +/-, and there have been 71 varying lengths of storm sewer repaired or replaced based on the CCTV inspections.
- Operations & Maintenance staff performs system locates on stormwater in-ground systems, as requested.
- There is no centralized work order system to evaluate or track system O&M activities.

c) Development Oversight:

- The Development Engineering division in the Transportation and Public Works Department oversees the review and approval of new subdivisions and site plans. Engineering staff review simple stormwater management (SWM) facility designs but may contract peer review for review of complex SWM designs. Development Engineering oversees inspection of SWM facility construction on Site Plans, and inspection of SWM facility construction on new subdivisions.
- Growth in the Town is steady with some pent up demand. The residential growth rate for the next ten years (i.e. mid-2017 to mid-2027) is approximately 785 new housing units annually in Halton Hills. Furthermore, it is anticipated that by 2031 there may be as many as 30,356 more residents in the Town from a current population estimate of 61,161. The level of effort required to review large Environmental Impact Reports and Functional Servicing Studies in accordance with standards required through the Town's Watershed Studies can be onerous.

- Another 20 Town-owned SWM facilities are anticipated to be constructed and assumed through the new development proposed in Halton Hills over the next few years. The Town will have to operate and maintain the assets over their lifespan.
- In the older part of Town, it can take more time and effort to review plans as the problems and constraints are more complicated.
- Grading Plans are reviewed by a technologist as part of their overall responsibilities but there is no Town-wide requirement in place to prevent building or redeveloping in areas with known stormwater or groundwater problems.
- The stormwater system design standards need to be updated and require more in the way of low impact development practices in order to provide more protection from localized flooding and creek erosion.

d) Capital Projects:

- Capital stormwater management projects typically are focused on several key issues across the Town. These are: a) Creeks erosion; b) Major/Minor System projects (inlet structure and culvert replacements, stormwater management facility refurbishments); and c) Flood abatement, targeting urban flooding and emergency system repairs.
- Currently, the amount of available resources drives how many stormwater projects are programmed each year or each forecast period (currently in the $500k-$1M per year range). The Town's 10 Year Capital Budget and Forecast for Storm Water Management for the years 2017 through 2026 includes 24 projects with a total estimated cost of $6.67M. The majority of these projects will deal with large culvert replacements or capacity improvements, SWM facility retrofits, and erosion control issues. The majority of capital design and construction work is contracted and the work is managed by Engineering staff, though some in-house design work is performed for small size projects.

e) Complaint Response:

- Staff from various Town departments including Transportation and Public Works and Recreation and Parks is often tasked with following up with local residents and businesses on stormwater-related complaints and questions (generally through or direct calls to O&M or Development Engineering).
- The complaints typically involve lot-to-lot drainage issues, ponding water (and concern about mosquitoes/West Nile Virus) and impacts from construction activities. A significant amount of staff time is dedicated to addressing these community concerns.

f) Environmental Education on Stormwater:

- Community education is an important activity and the Town is using such tools as web-based information, marking stormwater catch basins and supporting other regional environmental education initiatives. No dedicated outreach or education staff exists today but the staff support this effort and it is recognized that more effort is needed in this area across the broader Halton Hills community.
- There is a greater awareness of stormwater due to insurance claims, flood risk awareness, and greater environmental awareness e.g. climate change

Current Stormwater Expenditures: Current services are generally supported by general tax revenues. Stormwater costs are not tracked specifically by department, but for planning purposes the major stormwater management specific costs have been identified and the current annual cost of service (2017) is estimated at $1,344,000 broken down as follows (ref. Appendix C):

- Capital Storm Water Management Improvements - $714,000.
- Operations and Maintenance Stormwater Operating Budget - $476,328. This includes maintenance and operation of key portions of the storm drainage systems including: bridges, culverts, catch basins, inlets/outlets, creeks and the underground storm sewer pipe network.
- Engineering Department Stormwater staff budget in support of capital improvements and stormwater engineering activities – Approximately $153,587 including management time and overhead (pensions & benefits).

3.0 DRIVERS FOR CONSIDERATION OF A NEW FUNDING STRATEGY

When asked about what the drivers are that have led to the consideration of a potential new dedicated funding source, the following were identified:

- The Town has goals to maintain competitive property taxes; to improve reserves and reserve funds; and to develop and implement a more predictable infrastructure investment approach. These goals need to be met, while the Town is dealing with aging infrastructure and an expectation that service levels will be maintained, during a period when costs are rising faster than revenues. To help address the Town's budget concerns, one of the financial objectives is to assess the viability of alternate funding sources/mechanisms, and their implementation, to fund a steady investment in infrastructure and relieve the stress on the general property tax based funding.
- There is a growing understanding that there is a gap in funding between the current level and the amount necessary to address outstanding issues in stormwater management (erosion, system aging, flooding, and water quality). The first step in the process is to better understand and quantify the size of the gap and the financial resources that may be required to address increased maintenance and capital improvements that are necessary to most efficiently address quantity controls, quality impacts, and asset management needs for its existing stormwater infrastructure (valued at $155,000,000).
- The increased frequency of major storm events in Southern Ontario (ref. July 8, 2013 storm which hit Mississauga and west Toronto) is a growing concern. Halton Hills has been fortunate that such events have not impacted the Town as significantly as other communities in Southern Ontario but the risk remains. Recent research and data on climate change suggests that storm patterns are changing and that "short, intense and flashy storms are replacing the long drawn-out rainfall events of the past." (David Philips Environment Canada, Toronto Star July 20, 2007.) "In Canada by 2050, a 24 hour storm event, which now has a return frequency of about 40 years, is projected to occur once every 20 years" (Weather and Climate in Southern Ontario, M. Sanders, University of Waterloo, 2004.)
- The climate change adaptation plan currently being developed by the Town will include three scenarios ("low-carbon economy"; "business as usual / continued rise in emissions"; and "middle of the road"), projected to 2100 using local historical data and localized UN climate models. The data produced by the Town study will enable the Town to assess the impacts to existing infrastructure and to public safety from the potential increase in storm intensity and be prepared to fund additional infrastructure upgrades and emergency support functions to meet the changing weather conditions.
- Shifting to a new funding format will provide the Town with an opportunity to set levels of service and funding amounts that can appropriately maintain existing assets and accommodate growth. The funding model will be tied directly to the services provided by the Town and will allow for implementation of a long term strategy that supports the goal of establishing a more sustainable stormwater infrastructure plan.

The combination of maximizing the life of existing assets through increased inspection and maintenance; dealing with impacts from more intense and frequent storm events; and building capacity to manage stormwater as the Town continues to grow are stressing current stormwater budgets. The need to have in place a sustainable funding structure to effectively manage these challenges is critical. The implementation of a new funding model can provide the structure to meet these needs as long as it is developed to fund program priorities in a manner that equitably and reasonably distributes the public cost of stormwater services across the service area.

4.0 PROGRAM PRIORITIES

What stormwater program priorities should guide the Town in the next three to five years?

From discussions with Town staff and review of applicable Town documents, several key themes have been identified with regard to setting stormwater priorities:

- The need for additional resources to address growing stormwater capital improvement and operating issues including:
    - Creek erosion control issues – amount of projects undertaken each year is limited by available capital funds. An improved level of service could allow additional improvements to be completed each year.
    - Maintenance backlog - an improved level of service is needed to deal with a maintenance backlog for stormwater management facilities and to expand the storm inlet structure improvement program.
    - Stormwater design standards have been recently updated –should further take into consideration the change in intensity of storm events. This would likely be done in conjunction with the Town's climate change adaptation plan and modelling exercise.
    - Innovative approaches such as installation of low impact development best practices and other Green Infrastructure initiatives should be considered in an updated set of design standards. Green Development Standards (2014) are up for renewal in 2018. Improved standards should also consider enhanced inspection and enforcement capabilities.
    - Asset management - as the Town's stormwater assets are aging, a more proactive approach is needed to fund the repair and replacement of assets as they reach their useful design life. This information can be used to develop and implement a work order management system.
    - Asset management - lack of resources to keep up with filling data gaps, maintaining the information, and program creation
    - Emergency services – severe weather events are increasing and require significant support from Engineering and Operations & Maintenance staff. An emergency response team/plan should be established and funding provided to meet this increasing need.
    - Localized flooding – most local flooding appears to be the result of undersized pipes or culverts. A complete analysis of infrastructure capacity is needed, especially in the older sections of the Town. Need for a Stormwater Master Plan, focused on water quality, and erosion and flooding (i.e. Master Plan approach as per neighbouring municipalities; see below).
    - Water quality protection – stormwater quality issues need to be better quantified and plans developed for protection of local surface water bodies.
    - Prepare a Stormwater Master Plan
    - Align with Corporate Asset Management

- Need for a climate change adaptability plan (currently under development by the Town)
- Need for greater education; environmental stewardship

5.0 POTENTIAL PROGRAM ENHANCEMENTS

What significant program improvements would the Town like to make?

Preliminary program enhancements identified by staff include:

- ***Preventive Maintenance*** needs to be more proactively planned to ensure assets are appropriately managed to increase reliability, extend service life, and support stormwater service delivery, as cost-effectively as possible. Prioritizing maintenance needs will help to provide a more reliable and functional municipal drainage system and reduce the need for costly emergency or temporary repairs.

  Specific areas of maintenance that could be improved with additional dedicated resources include:

  - Routine maintenance of outfall structures
  - Winter program water quality management enhancements
  - Storm inlet structure improvement program
  - Rural ditch maintenance
  - Addition of equipment and operators to support emergency and in-house maintenance activities
  - Adding a work order system to track and evaluate operation and maintenance activities
  - Winter program for improved storm water drainage on road allowances (ie: there are many drainage problems where urban roads have rural cross-sections

- ***Implementation of Capital Projects*** in a manner which will allow maximum benefit and efficiency by prioritizing projects where multiple objectives can be achieved. A process needs to be implemented that will consider project recommendations from the various planning activities now on-going in a more holistic manner and provide funding to prevent a backlog in needed improvements. Currently the needs for culvert replacement, pipe and inlet upgrades, major stormwater management facility refurbishment and retrofits, emergency stormwater system repairs, and creek erosion issues all compete for, and are addressed with, limited capital funding. Having additional funds to implement additional erosion control projects, address system capacity and integrity issues, and begin to implement water quality protection, environmental stewardship, and climate change management strategies will improve the performance and resiliency of Town creeks, extend the life of valuable capital assets, and minimize flooding impacts.

- ***A Stormwater Master Plan*** is required to comprehensively establish the prioritization scheme that will provide an objective approach to planning and implementing projects. The Master Plan process would allow stakeholders to be involved is setting the appropriate levels of service expected by the community and would provide a transparent forum to set program goals and funding targets.

- ***Development Standards*** need to be updated to address stormwater impacts from continued growth and redevelopment. New standards will allow for the inclusion of best practices such as low impact development approaches and calculations of runoff based on consideration of increased rainfall events to be designed into new development projects. As new standards are implemented, the Town should also review the need for increased inspection and enforcement of stormwater management facility implementation.

6.0 FUNDING OPTIONS

What funding options are currently available? Which program elements might a user fee support?

Halton Hills, like many of its Ontario municipal neighbours, is facing financial challenges due to the need to continue to provide quality services, as costs are rising faster than revenues. It has established a long-term financial plan to ensure operating and capital budget expenditures are managed in a manner that provides flexibility while minimizing financial risk. This means that currently most Town programs are being funded annually with some adjustments to recognize cost of living and/or inflationary impacts. This presents a challenge to funding increased stormwater service needs, as the Town is already committed to maintaining current services and supporting asset management plans, while funding capital and operating costs for other high-priority capital initiatives. With a property tax levy funding model, the need for funds required for stormwater services continue to compete with funding needs in other service areas. Additionally, as will be discussed in more detail later in this section, the property tax levy is not the most optimal way to recover costs from a “user-pay” principle approach.

These financial constraints and other considerations have led to the question of whether other funding options are available for stormwater services.

An important question with respect to establishing a stormwater funding structure is identifying the underlying charging parameters that most closely relate to the benefits of service received. In this regard, there are several approaches which have been used by municipalities in various North American jurisdictions. A brief commentary is provided for each type of funding structure:

Property Taxes – this is the predominant funding approach used by most municipalities throughout Ontario. The net expenditures for the service are added to the tax levy and recovered from properties based on the assessed value of each property. There is no clear relationship between the benefits of service received by a property and the basis for paying the cost for the service, other than ability to pay.

Flat Rates **–** Generally, the total cost for the service is divided by the number of properties to provide a "per property" charge. The rate may be varied by type of user to denote some variation in the service received (e.g. modification for non-permeable land area). Since this structure is typically also dependent on the use of service benefit factors to modify flat rates, the level of service received and cost of service may not necessarily directly correlate.

Land Area – Generally stormwater rates recognize a relationship between the volume of runoff water which may be generated from the land based on the size of the property. While area is a key factor for the total amount of runoff generated by a property, this approach does not directly reflect the impervious fraction of land which differentiates between properties and more accurately estimates the net runoff from the property into the municipal storm system. Similar to the modified flat rate approach above, modifications of land area for storm water runoff can produce a charging basis closer to the benefits of service received.

Utility Rate – this approach imposes a charge based upon the metered volumes of water consumed by constituents as measured through water meters. This is used by municipalities that recover stormwater service costs within water and wastewater rates. While this approach provides a segregated revenue source (i.e. user rate funded vs tax funded) and stormwater is traditionally included within the definition of wastewater, there is no correlation between potable water consumption and stormwater runoff. Moreover, not all benefiting landowners may be included in the recovery of water and wastewater fees, whereby rural or private service customers without municipal water meters would be exempt for such fees.

Runoff Coefficient – For this approach, the fraction of rainfall that migrates as stormwater runoff from a property (or surface) is approximated by a hydrologic runoff coefficient. These coefficients are used by engineers as part of a formula for calculating the amount of runoff from a property. Generally, very grassy or vegetated lands have a low runoff coefficient whereas lands with large amounts of hard surfaces (parking lots, buildings, etc.) have a high runoff coefficient. Applying these factors to a flat rate or a land area fee structure would provide a calculation which takes the class of the property and the estimated runoff volume into account when determining the charge. Under this approach a runoff coefficient could be developed for various property classes and imposed on a property specific basis based on the constituents land area and calculated impervious area, or on a flat rate basis reflecting the characteristics of the broader property class (e.g. residential, non-residential, etc.).

Impervious Area of the Properties – very similar to the run-off coefficient approach however this approach is based on the actual measured (or sampled) amount of imperviousness for each property as opposed to a property type. To calculate this rate structure, a very detailed analysis of each property must be undertaken by GIS and aerial mapping measurements.

The spectrum of options identified above can be assessed against a number of criteria to identify the pros and cons of each option. Assessment criteria in this regard often include the following:

“Ease of Calculation” criterion is trying to capture the relative data intensity required to support a given rate calculation. In the presence of good data, any given rate structure can be calculated with relative ease, but the difficulty lies in the ability to obtain and maintain a comprehensive and accurate data source.

“Linkage between Fee Paid and Benefit Derived from Services” measures how closely the fee paid by any given property owner reflects the benefits of service received. Although all Town residents benefit from a well-functioning stormwater system, property owners with more impervious areas on their properties produce more stormwater runoff, and hence place higher demands on the Town’s infrastructure. Under the current funding model utilized by the Town, property owners with higher water consumption pay more for stormwater services, even though there is no clear link between water consumption and stormwater service benefits. A more direct linkage between the fee paid and the benefit derived from services is considered desirable, and rate structures that provide this are therefore preferred.

"Cost of Administration" – although a rate structure that is well supported by data and provides a tight relationship between the ultimate fee and benefits received by the person paying them may be more desirable, the costs of administering such a rate structure typically rise. This is an important consideration because any increase in the costs of administering a rate structure would have the effect of diverting funding from actual stormwater system needs. Therefore, the degree that service costs are recovered from benefiting parties needs to be measured by the costs of implementation.

"Users' Control over Charging Mechanism" – this metric considers how much control a property owner has over the amount they have to pay. More control in this regard is considered a positive attribute, and therefore rate structures that provide the property owner with a greater degree of control are ranked higher. Under the current funding model for example, property owners have a relatively high degree of control, since their stormwater bill can be influenced by changing water consumption. On the other hand, under a funding model that charges flat rate per property, the property owner would have little control over the charge for service.

The table below provides for the spectrum of options for stormwater cost recovery and ranking of each relative to various service criteria discussed above.

Table 3 Options for Stormwater Cost Recovery

Type of Charge	Rate Options/Basis of Calculation	Ease of Calculation	Linkage between Fee Paid and Benefit Derived from Services	Cost of Administration	Users' Control over Charging Mechanism
Property Taxes	Tax rate applied to assessed value	Easy	Low	Low	Medium
Flat Rate per Property	$ / property	Easy	Low	Low	Low
Utility Rate	$ / m^3 of water consumption	Easy	Low	Low	High
Run-off Coefficient by Property Type	$ / unit (varied by type)	Medium	Medium	Medium	Low
Impervious Area Sampling by Property Type	$ / unit (varied by type)	Medium	Medium	Medium	Low
Run-off Coefficient by Actual Land Area per Property	$ / impervious hectare	Hard	High	Medium/High	Medium
Impervious Area Sampling by Actual Land Area per Property	$ / impervious hectare	Hard	High	Medium/High	Medium
Actual Impervious Area per Property	$ / impervious hectare	Hard	High	High	High

Generally, moving from the top to the bottom of the table tightens the relationship between the fee paid and benefits derived from the service. However, the costs to populate the "denominator" for the calculation also increases as you progress down the table.

Evaluation of Pros and Cons by Type of Charge

<u>Property Taxes</u>
Property taxes are presently utilized by the Town to fund stormwater service needs. Property taxes are considered easy to calculate since this is a funding model currently in use and hence data is readily available to support rate calculations. Similarly, the cost of administration is considered low since the Town already maintains a tax database and has the resources in place to maintain and update it as needed. Property assessment is not considered a good proxy for the benefits that a given property receives from the Town's stormwater system. Furthermore,

property owners have some control over how much they pay, as they may choose a property with a different assessment.

Flat Rate per Property

Charging a uniform flat rate per property would be the easiest approach both computationally and administratively. Data on the number of properties is readily available through the Town's tax database, and determining an appropriate flat fee would simply entail dividing the net costs of the stormwater system by the number of properties. From an administrative perspective, a flat rate approach would be quite inexpensive, as each year the number of properties would simply be adjusted for any subdivisions/severances that take place. However, this type of rate structure provides no direct link between the fee paid and the benefits derived from the stormwater system, as it does not capture any property characteristics and simply treats everyone the same. Additionally, property owners would not have any control over how much they pay, since every property owner would be paying the same amount.

Utility Rate

Similarly to property taxation, utility billing is an established mechanism within the Town of Halton Hills (through Halton Region), and therefore consumption data is readily available to support rate calculations. Cost of administration is also considered low, since this would be no different than the current annual updates to water and wastewater rates. Volumetric utility rates provide customers with a high degree of control over how much they pay, by giving them the option of adjusting water consumption patterns. A weak area of the utility rate approach is its disconnect from system benefits. There is little evidence of a correlation between water usage and imperviousness of properties.

Runoff Coefficient by Property Type

This rate structure would group properties into categories (e.g. low-density residential, commercial, industrial, etc.) and subsequently runoff coefficients would be applied to the assumed land area within each category to come up with impervious hectares within each category, and within the Town as a whole. The relative share of total impervious land would drive the share of system costs that are borne by each property category. The share of costs attributed to a category would then be spread evenly over the number of properties within. As such, all properties within a single category (e.g. low-density residential) would pay the same fee (either per property or per unit of water consumption), but this fee would be different from the fees paid by other categories. Such an approach recognizes that there are distinct physical differences between different types of development and property types. For example, residential properties tend to have a smaller proportion of impervious area relative to commercial properties. Users' control over the charging mechanism in this case depends on whether the rate is applies by property (low degree of control) or by unit of water consumption (high degree of control). There is an improvement of the linkage between costs and benefits as compared to the rate structures described above. Data requirements and therefore calculations are considered somewhat more difficult, since impervious area needs to be calculated for each property category. Administratively it becomes somewhat more difficult and expensive to maintain such a rate structure, because the relative distribution of costs between property categories would need to be recalculated each year to account for the effects of continued development in the Town.

Impervious Area Sampling by Property Type
This approach is very similar to applying run-off coefficients by property type. However, instead of making assumptions on appropriate run-off coefficients, imperviousness characteristics would be determined for each property category by means of statistical sampling from the Town's GIS database. The ranking of this approach would be the same as for the above (run-off coefficient by property type) albeit there is a possibility that the link between costs and benefits would be slightly improved.

Runoff Coefficient by Actual Land Area per Property
Taking the Runoff Coefficient by Property Type approach a step further, this method would apply run-off coefficients to each individual property's land area, thereby estimating each property's impervious area. Summing the impervious areas of all properties would facilitate the calculation of a rate pre impervious hectare, which would then be applied to each property's estimated impervious area (as opposed to using an average value across the entire Town). The data requirements to support these calculations are greater, as the land area of each property would have to be known. The Town's tax database contains size information for all properties, however the annual costs of maintaining the property database updated could potentially be significant. Since each property's size would be taken into account individually, the linkage between the fee and the benefits derived from the system would potentially be greatly improved. Furthermore, property owners would exercise some control over the charging mechanism through their choice of property.

Impervious Area Sampling by Actual Land Area per Property
Borrowing elements from the previous two rate structures discussed, this approach would apply run-off coefficients determined through statistical sampling to each property's actual land area.

Actual Impervious Area per Property
As the heading suggests, this approach would require actual measurement of the impervious area of each property, either physically, through GIS, or through a combination of both. Each property owner would then pay an amount directly proportionate to the amount of impervious area on his or her property, and as such the link between costs and benefits would be very strong. Property owners would also have a high degree of control over the amount they are required to pay, since they have direct control over pertinent site characteristics such as the amount of paved cover (size of driveway, patio, etc.). On the other hand, the desirable attributes of this rate structure come at a significant cost both from an initial data acquisition and rate calculation perspective, as well as from the annual maintenance perspective.

A survey of Ontario municipalities with specific stormwater rates was undertaken to compare funding structure approaches. Of the 13 municipalities surveyed, the majority use a flat rate approach, modified for stormwater runoff. Of the remaining municipalities, only one imposes a utility rate.

Table 4 Summary of Ontario Municipality Stormwater Rate Structures

Municipality	Type of Rate Based Structure	Rate Categories
Markham	Flat Rate Charge per Property	Residential
	Current Value Assessment	Non-residential
Ottawa	Residential - Flat Rate per Property (by property type, Urban & Rural)	Residential (RS) and Multi-Residential (RA) - Urban/Rural
	Non-Residential - Tiered Flate Fee (based on CVA, Urban/Rural)	ICI - 8 CVA ranges/categories - Urban and Rural
Aurora	Flat Rate Charge per Unit	Residential and condominium properties
		Non-residential and multi-residential properties
Richmond Hill	Flat Rate Charge per Property	Residential and farm properties
		Industrial, commercial, multi-unit, and condominium properties
Hamilton	Utility Rate (based on water consumption)	Residential - 2 tiers (based on monthly consumption)
		Non-residential
London	Flat Rate Charge per Property	Land area 0.4 hectares or less
		Residential land area 0.4 hectares or less without a stormdrain within 90m
	Rate per hectare	Land area above 0.4 hectares
Middlesex Centre	Flat Rate per Property	Base rate for all properties within settlement areas
	Rate per Hectare	ICI customers - for all hectares above the threshold of 0.4 ha
St. Thomas	Flat Rate per Property	Residential & commercial/institutional under 1,800 m^2 land area
	Rate per Hectare	Commercial/institutional over 1,800 m^2 land area & all industrial
Vaughan	Flat Rate Charge per Property	3 Residential categories
		Agricultural/vacant
		3 Non-Residential categories
Waterloo	Flat Rate per Property (by property type & size)	3 residenital categories & 3 multi-residential categories
		3 institutional categories & 4 industrial/commercial categories
Kitchener	Tiered Flat Fee (based on property type and size of impervious area)	10 residential categories
		6 non-residential categories
Guelph	Flat Rate Charge	Residential - applied to every detached home, townhouse, apartment, and condo
	Rate per Equivalent Residential Unit (ERU) based on impervious area (ERU multiplier = impervious area/188 m2)	Industrial, commercial, and institutional properties
Mississauga	Tiered Flat Fee (based on roofprint area)	5 categories for Single Residential properties
	Rate per m^2 of impervious area (impervious area individually assessed for each property)	Multi-residential & non-residential properties

To answer the question of the feasibility of dedicated stormwater funding strategy in Halton Hills, one must first define what services would be funded and at what level. Stormwater services are currently funded from the property tax levy. The majority of stormwater management costs are related to capital improvement projects and system operation and maintenance activities. Approximately $1.34M is currently budgeted from tax revenue to support these key services.

Future program costs: As described, the stormwater program will need additional resources over the next several years to more fully address:

- More proactive maintenance for an aging stormwater management system,
- SWM pond inspection and maintenance,
- Increase frequency of catchbasin cleaning,
- Implement a CCTV inspection program
- Development Plan Review
- Master planning to prioritize and implement the various recommendations coming from key planning initiatives, system inspections, capacity analysis, and water quality assessments,
- Promote Green Infrastructure for stormwater management,

- Increased funding for a backlog of capital improvement projects related to creek erosion, pipe and culvert upgrades, system capacity issues, and emergency system repairs.

The cost to increase the current level of service to meet the expected growing needs is difficult to project without more detailed information, but it is clear from discussions with Town staff and review of recent studies, that the investment could be significant: For discussion purposes, order of magnitude costs have been assigned to each of the key potential program enhancements at a moderate level of service to provide some guidance on the potential cost for future program needs:

Operations and Maintenance, Studies, Training

- Preventive Maintenance: one new three person maintenance crew with equipment and supplies – annual cost $225,000.
- SWM pond inspection and maintenance – budget $175,000
- Increase catchbasin cleaning budget by $42,000 (double the current program)
- Increase resources for Stormwater Plan review and inspection – budget $100,000
- Budget for Stormwater Master Plan - $75,000 for 2-3 years
- Implement GI – training, use current resources

Capital Expenditures

- Implement CCTV program – budget for five (5) years at $250,000 per year
- Address findings of CCTV program – budget $100,000
- Capital Improvements – increase the budget on stormwater improvements needs by $700,000 to address system capacity issues and upgrades, e.g. bridges and culverts, SWM facility retrofits, erosion projects, flooding projects

Gaps include storm sewer repair from the CCTV footage. Replacement of storm sewer infrastructure based on age also needs to be considered/programmed into the future capital program (unless the useful life greatly exceeds the forecast length e.g. 10 years or 25 years).

Using these estimates, the first year of the new enhanced program would include cost increases for capital, planning, and operation and maintenance totaling $1.39 M.

Having a dedicated source of funding, and not relying on available property tax revenue, would allow the Town to better assess and plan for implementing these important initiatives, as the cost to the community for various alternative approaches can be clearly demonstrated, debated and approved, as appropriate.

For demonstration purposes only, and considering the potential costs to support the key program needs as identified above, if current tax supported capital and operating expenditures ($1.34M as detailed in section 2 above) were increased by 104% in future years to support an enhanced program of services, a 3.1% increase in the property tax would be required to generate that additional $1,390,000 in revenue. As the resource needs become more defined, the Town will need to assess whether it can afford to raise taxes to fund enhanced stormwater program activities, if it can reprioritize other funding needs and move financial resources to stormwater, or if a dedicated utility fee will be a better financial and planning tool for meeting the community goals.

The Town does not currently have an impervious data layer for existing land use and will need to develop more information to support the decision on a preferred option for establishing a rate and billing a utility fee. However, using rates set for other communities as guidance, we can provide a rough estimate of potential rates for an average home in Halton Hills.

At this time, most municipalities continue to fund stormwater management needs within the property tax rate. A number of municipalities have however either implemented or are considering implementing separate user rates to recover costs related to stormwater management. Table 5 below lists Ontario municipalities that recover stormwater management costs through dedicated funding mechanisms and typical annual charges for a selection of property types.

Table 5 Municipal Comparison - Typical Annual Stormwater Charges (2018)

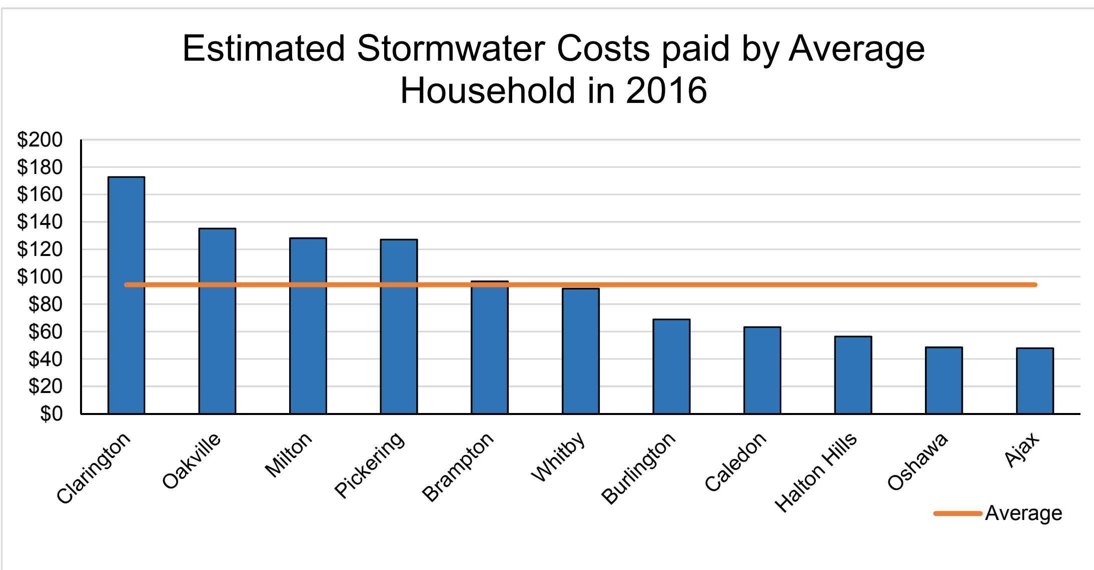
Municipality	Residential (Single Detached)	Non-Residential (Small)	Non-Residential (Large)
Aurora	$60.12	$763.56	$763.56
Guelph	$55.20	$176.17 (based on 600 m^2 impervious area)	$11,240.54 (based on 38,283 m^2 impervious area)
Hamilton[1]	$80.50 (265 m^3 annual water consumption & 20 mm meter)	$283.70 (1,000 m^3 annual water consumption & 25 mm meter)	$1,262.67 (4,706 m^3 annual water consumption & 50 mm meter)
Kitchener	$164.76 (Residential Medium - footprint between 106-236m^2)	$315.24	$15,625.80 (based on 38,283 m^2 impervious area)
London	$189.96 ($142.68 if no storm drain within 90m)	$189.96	$7,541.94
Markham	$47.00	$308.00 (based on $1.10 million of current value assessment)	$9,016.00 (based on $32.2 million of current value assessment)
Middlesex Centre[2]	$178.56	$178.56	$2,390.48
Mississauga	$104.00	$233.71 (based on 600 m^2 impervious area)	$14,911.73 (based on 38,283 m^2 impervious area)
Ottawa	$116.85	$966.44 (based on $1.1 million of current value assessment)	$12,824.25 (based on $32.2 million of current value assessment)
Richmond Hill	$67.84	$197.10	$197.10
St. Thomas	$111.36	$111.36	$7,317.56
Vaughan	$49.20	$43.93	$17,333.47
Waterloo	$134.28 (Residential - Medium)	$344.76	$13,141.56

[1] 2018 Combined Wastewater & Stormwater Rates allocated by relative share of 2018 budgeted operating, capital, and debt servicing expenditures

[2] Stormwater rates are imposed in 'settlement areas' as defined in the municipality's Official Plan.

As shown by the range of rates in the above table, each fee is unique and set to reflect a community's specific priorities, needs, and land use, making it difficult to set expectations using neighboring rates. However, if we use this information as a benchmark, the range for a fee needed to fund the entire $2.73M program (existing and enhanced services) would likely be in the $50 - $150 range annually for a typical single family property.

To provide further context, the following table compares a number of municipalities that have not yet established dedicated funding models for stormwater services. The table draws on information collected from the 2016 Financial Information Returns administered by the Ministry of Municipal Affairs. The average household's contribution to funding stormwater services is estimated based on total stormwater expenditures (capital and operating) divided by total weighted assessment and multiplied by the average assessment per household. The table below demonstrates that when compared to most municipalities in the sample, the Town is funding stormwater services at a lower level. With a shift to the optimal $2.73M program, the Town's funding level for stormwater services would be more closely aligned with the average of the municipalities in the sample.



The Town's 2017 Net Levy Requirement is $45.2M, of which approximately $1.34M is attributable to the Town's current stormwater program. As such, the average single family detached dwelling with a CVA (current value assessment) of $520,248 currently pays approximately $57 annually towards the Town's stormwater program. With the program enhancements of $1.39M as identified above, the annual "stormwater bill" for an average single family detached dwelling would increase to $117, if the Town maintains the current approach of funding stormwater services from the general tax levy.

In comparison, based on a preliminary review of parcel characteristics found in the Town's tax roll database, the typical low density residential dwelling would be charged approximately $50 annually under a tiered flat rate to achieve the target stormwater program funding level of $2.73 million. This would be lower than the $117 annual tax bill estimated in the previous paragraph due to a shift of cost recovery from residential to non-residential properties. This type of shift is typically observed when municipalities shift towards funding stormwater services through a rate structure that provides a better nexus between the price paid and benefits received.

7.0 POTENTIAL CHALLENGES TO IMPLEMENTING A STORMWATER FUNDING MECHANISM

What are the major hurdles to going forward? What tools and data sources are needed to establish a fee-for-service approach?

In order to adopt and implement a new funding source, the community and its leaders need to (1) be sure that there is a real and compelling reason to support new funding, (2) be clear on the objectives, and (3) understand how it might ultimately impact various parts of the community. The major hurdles typically are political and relate to the time and resources needed to educate the public and Town decision-makers on what services are already being provided and funded, what gaps exist in meeting current and future service expectations, what the solutions being proposed would accomplish and at what cost.

Stormwater projects are competing for support against more visible, usually higher priority infrastructure projects related to roads, transit, community buildings, and parks. To raise awareness and visibility of the stormwater program challenges, the program needs an advocate or advocacy group which will champion the issue. Once a program advocate or group has been identified, they need to be given the support at the highest level of the organization to objectively, and publicly, develop the case for an enhanced program of services, estimate investment needs over a 10-20 year planning period, and evaluate the rate structure and methodology that could support a sustainable funding approach.

The tools and data needed to more fully assess and develop a user fee would include:

- More detail on the specific program priorities for the next 10 years;
- Costs in support of performing the level of service for each enhanced program area;
- Information on parcels, impervious area, or other data that can be used to develop a rate structure in support of equitably distributing the cost for services across the community;
- A process for presenting ideas and preliminary recommendations to stakeholders that will allow an opportunity for education and outreach and meaningful feedback; and
- A system for setting, delivering, and maintaining a billing database for the fee.

8.0 IMMEDIATE NEXT STEPS

What are the immediate next steps should a decision be made to move forward with a full feasibility and implementation project?

In reviewing the information gathered to-date on Halton Hills's stormwater management program, it is clear that challenges to effectively managing and financing a comprehensive stormwater program will escalate as the system ages, storm intensity increases, and capacity and water quality issues become more critical. The financial implications are potentially significant and priorities will need to be established to balance Town budgets and stresses on current taxes while supporting effective maintenance and operation of the stormwater management system.

The next step for the Town in moving forward with establishment of a new funding source is to develop a recommended program approach and evaluate the financial options and impacts of implementing the program. Using the information gathered during this preliminary assessment, the first requirement will be to present these findings to Town Council and, with their consent and feedback, move forward with a process to examine the specific details with a wider group of stakeholders.

In order to consider the impacts to the community of a dedicated stormwater fund, it will be critical to work through several key policy and program issues in a deliberate process that allows for well-reasoned development of recommendations with ample opportunity for stakeholder and Town leadership input and involvement. Key policy issues needing to be further assessed include:

- Program priorities for the next 5-10 years
- Desired levels of service and annual costs
- Data to support billing for stormwater fees using impervious area or other site specific data to support a rate structure
- Potential credit and incentive programs
- Appropriate bill delivery and collection system
- Methods and opportunities to educate the community on services and needs

To allow the Town the best opportunity to make an informed decision about implementing a stormwater fund before effort is expended on developing data for a final billing file and adopting a rate ordinance, it is recommended the project be broken into two phases. The first phase would be to perform a Stormwater Funding Feasibility Study. The goal of the Feasibility Study is to develop a recommended program of services, rate structure, policy considerations (e.g. exemptions, credits, bill delivery), and a preliminary rate to provide the Town leadership with sufficient information to make an educated decision on proceeding with final adoption and implementation of a stormwater fund. The Feasibility Study includes an assessment of the Town's land use and GIS-based data layers, along with an assessment of potential billing system options. This assessment includes an evaluation of whether there is sufficient existing data to support the preferred rate methodology and identifies key data and billing policy issues which will need to be resolved prior to billing and implementation. The Feasibility Study would include recommendations, if necessary, for improvements to the data management systems to ensure the integrity and efficiency of the stormwater fee system.

Upon completion of the Feasibility Study, Town Council would then have sufficient information to assess impacts and decide if it supports proceeding with final fee refinement and implementation. At this point, the second phase of the project would begin and would include such services as supporting the master account file development, assisting with merging the stormwater data with the billing files, and providing public outreach and customer service support.

The time required for the entire two-stage Funding Study is typically 12 to 18 months, depending on the level of stakeholder involvement planned and on the availability of existing data to support the rate development and billing. We note that the time would be closer to the 12 month estimate given the analysis undertaken as part of this strategy study.

Beginning the Feasibility Study in mid-2019 would allow for final recommendations to be made in mid-2020, in time for inclusion in the 2021 budget discussions.

9.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The Town of Halton Hills currently manages over 190 km of storm sewer lines, over 9,200 storm sewer structures (maintenance holes, catch basins, inlets, oil and grit separators, etc.), and 40 stormwater management facilities.

Existing stormwater management services are provided primarily by Transportation and Public Works, in conjunction with Planning and Sustainability, Recreation and Parks, and Corporate Services. Current services are generally funded by general tax revenues. The annual cost of service (2017) is estimated at $1.344 M.

The cost to increase the current level of service to meet the expected growing needs for each of the key potential program enhancements at a moderate level of service (Preventive Maintenance, SWM pond inspection and maintenance, catchbasin cleaning, implement a CCTV program, Stormwater Plan review and inspection, Stormwater Master Plan, Implement Green Infrastructure and training, Capital Improvements) has been estimated at $1.39 M.

At this time, most municipalities continue to fund stormwater management needs within the property tax rate. A number of municipalities have however either implemented or are considering implementing separate user rates to recover costs related to stormwater management.

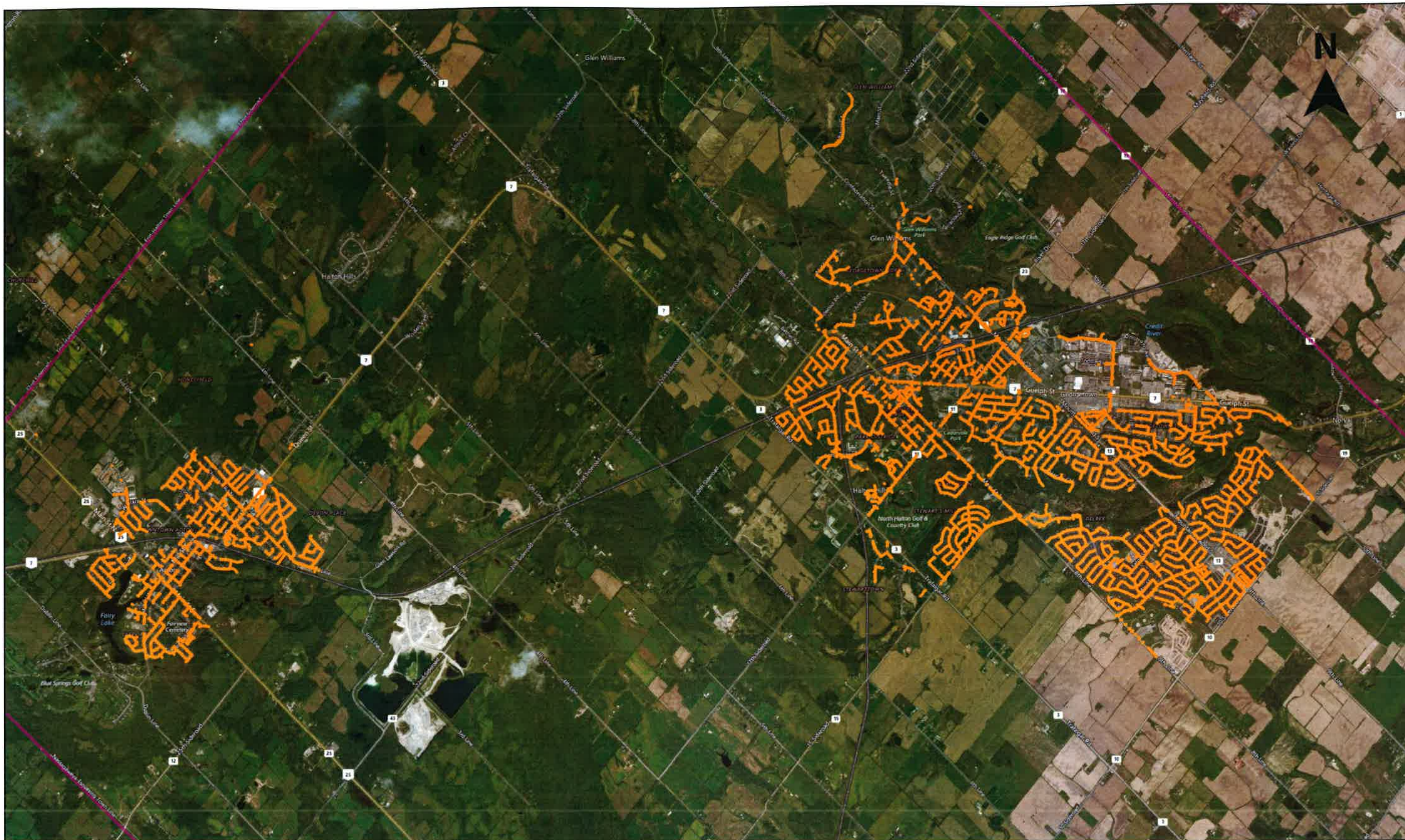
Recommendations

That the Town establish a sustainable stormwater funding strategy, which embraces the user-pay structure versus a tax levy.

The next step for the Town in moving forward with establishment of a new funding source is to develop a recommended program approach and evaluate the financial options and impacts of implementing the program.

In the interim, and in the immediate future, it is recommended that the Town establish a dedicated stormwater reserve fund, regardless of the sustainable funding model which ultimately may be utilized. This would allow the funds to be segregated for their intended use for stormwater management, so that these funds do not need to compete with other corporate initiatives. Additionally, a dedicated reserve fund would provide for a stable funding base, eliminating variances in annual funding requirements. This is accomplished by allowing an accumulation of funds during periods of lower capital replacement needs, and enabling draws on the reserve fund during periods of higher capital replacement needs. It is noted that to the Town could consider merging the existing SWM facility maintenance fund, into this dedicated stormwater reserve fund.

Once a funding mechanism has been selected by the Town, and approved by Council, the fund can be adapted to be part of the new funding mechanism.



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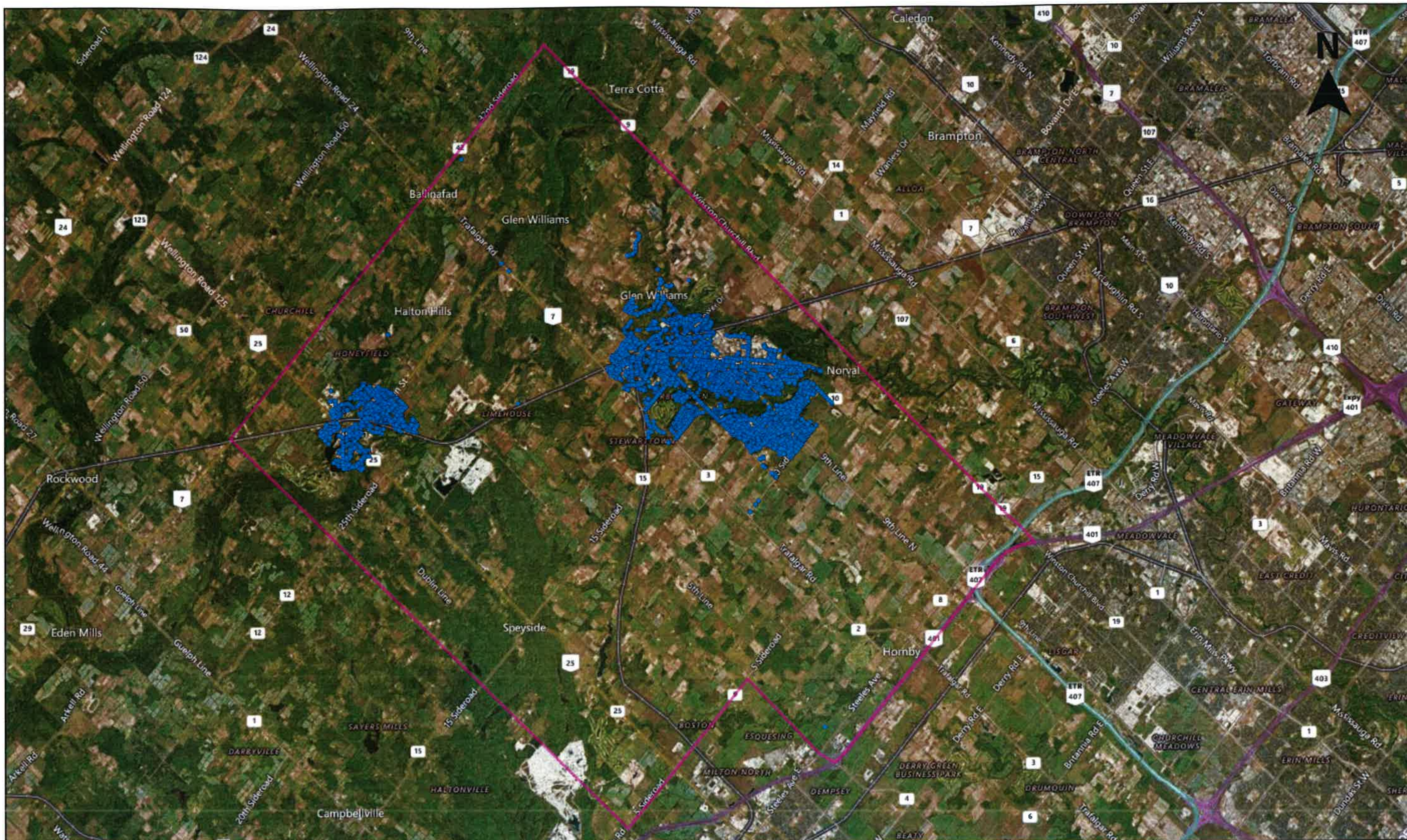
TOWN BOUNDARY

STORM SEWERS AND LEADS

STORMWATER FINANCIAL STRATEGY	FIGURE 1A - URBAN STUDY AREA	amec foster wheeler	Scale: 1.5 km
TOWN OF HALTON HILLS			Project Number: TPB178007S



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TOWN BOUNDARY

MANHOLE

STORMWATER FINANCIAL STRATEGY

TOWN OF HALTON HILLS

FIGURE 1B - HALTON HILLS STUDY AREA

amec foster wheeler

Scale: 4.5 km

Project Number: TPB178007S

N
Raylawn Crescent
Duncan Dr
Gower Rd
Gower Ct
Moultrey Crescent
300 mm
MH diameter reference and DWG
01-00110-03
250 mm
CB diameter reference
300 mm
DWG 01-00111-03
250 mm
CB diameter reference
525 mm
DWG 01-00111-03
525 mm
DWG 01-00111-03
525 mm
U/S pipe diameter DWG 01-00112-03
Legend
CATCHBASIN
MANHOLE
STORM SEWERS AND LEADS
TOWN PROVIDED DIAMETER
AMECFW DIAMETER
AMECFW ADDED STORM SEWER
STORMWATER FINANCIAL STRATEGY
TOWN OF HALTON HILLS
FIGURE 2 - DIAMETER GAP FILLING
amec foster wheeler
Scale:
35 m
Project Number: TPB178007S


N
Prince Charles Dr
Mountainview Rd S
McIntyre Crescent
Dale Gate
Campbell Gate
Gibbons Pl
Legend
CATCHBASIN
MANHOLE
STORM SEWERS AND LEADS
Town Provided Year of Construction
AMECFW Year of Construction
STORMWATER FINANCIAL STRATEGY
TOWN OF HALTON HILLS
FIGURE 3 - YEAR OF CONSTRUCTION GAP FILLING
amec foster wheeler
Scale:
50 m
Project Number: TPB178007S

STORMWATER FINANCIAL STRATEGY

TOWN OF HALTON HILLS

FIGURE 4 - DUPLICATE MANHOLES IDENTIFIED

amec foster wheeler

Project Number: TPB178007S

APPENDIX A

ASSET COST SUMMARY

Table 1 – Summary of asset present value and replacement cost						
Infrastructure	**Present Value ($)**	**Replacement Cost ($)**	**Total Assets**	**Units**	**Unitary Present Value ($/Unit)**	**Unitary Replacement Cost ($/Unit)**
Manholes	29,701,003	6,581,133	3236	Assets	9,178.3	2,033.7
Infiltration Galleries	2,370,000	309,013	158	Assets	15,000.0	1,955.8
Catch Basins	20,964,238	8,027,337	5524	Assets	3,795.1	1,453.2
Outfalls	5,680,000	1,287,623	282	Assets	20,141.8	4,566.0
Conduits and Leads	62,469,655	14,137,789	190	km	328,959.9	74,448.4
SWM Facilities	24,947,188		40	Assets	623,679.7	-
Culverts	8,751,435	7,410,813	2404	Assets	3,640.4	3,082.7
Vault	200,000	23,937	3	Assets	66,666.7	7,979.0
Total	**$ 155,083,518**	**$ 37,721,725**				

Table 2 – Halton Hills manhole structure inventory cost summary		
Halton Hills GIS Manhole Size (mm)	**Con Cast 2017 Price ($)**	**Notes**
1200	2919.7	
1500	5599.8	
1800	6768.2	
2400	12874.9	
3000	20068.2	
3600	27261.5	Extrapolated from smaller MH diameter prices
Oversized MH – Incoming Pipe Size ≤ 600	40000.0	Cost based on a combination of supplier 2017 pricing and tender analysis of bids on projects within the last 5 years in the Greater Halton Hills area
Oversized MH – Incoming Pipe Size > 600	80000.0	Cost based on a combination of supplier 2017 pricing and tender analysis of bids on projects within the last 5 years in the Greater Halton Hills area
OGS (Vortechnics)	40000.0	These oil/grit separator units are hydrodynamic separators
OGS (Stormceptor)	40000.0	Cost based on a combination of supplier 2017 pricing and tender analysis of bids on projects within the last 5 years in the Greater Halton Hills area

Table 3 – Manhole and catch basin lid cost summary	
Con Cast MH and CBMH Lid	**Price ($)**
Maintenance Hole Frames and Covers OPSD 401.010	580.2
Catch Basins Frames and Covers OPSD 400.020	600.5

Manhole Assumptions

- Manhole prices from Con Cast Pipe, 2017, are dependent on the height (depth) of the catch basin
- Assume all MH are 3.48 m in height (depth)
- Assume 75 Year life span of Manholes
- The install price has been assumed to be the addition of the unit and lid prices multiplied by 2

Table 4 – Catch basin structure and lid cost summary				
Con Cast Style	**Halton Hills GIS CB Name**	**Con Cast 2017 Price ($)**	**Con Cast Lid Price ($)**	**Install price ((CB + Lid) x 2) ($)**
600 x 600 Single Inlet	Lawn	1164.6	600.5	3530.2
600 x 600 Single Inlet	Single	1164.6	600.5	3530.2
600 x 1450 Twin Inlet	Double	1672.0	1201	5746.0
600 x 600 Ditch Inlet	Ditch Inlet	1164.6	517.5	3364.2
600 x 1200 Ditch Inlet	Ditch Inlet Twin	1890.5	836.2	5453.4

Table 5 – Outfall structure cost summary	
Outfall Pipe Diameter	**Cost ($)**
150	15000
200	15000
250	15000
300	15000
375	15000
450	15000
525	15000
600	15000
675	15000
750	15000
825	15000
900	20000
975	25000
1050	30000
1200	35000
1350	40000
1500	45000
1650	50000
1800	55000
1950	60000
2250	65000
2400	70000

Outfall Structure Assumptions

- Outfalls with a storm sewer pipe which is less than 900 mm diameter are assumed $15000 as they are precast, based on OPSD, industry standard
- Outfalls with a storm sewer pipe greater than or equal to 900 mm are increased linearly by $5000 for each pipe size increase as they are cast in place

Table 6 – Storm sewer cost summary		
Diameter	**Con Cast Class 100-D Price ($/m)**	**Installed Price (Con Cast Price x 1.5) ($/m)**
300	79.70	119.55
375	98.30	147.45
450	101.30	151.95
525	129.00	193.50
600	170.90	256.35
675	259.60	389.40
750	343.50	515.25
825	443.40	665.10
900	478.40	717.60
975	549.70	824.55
1050	632.00	948.00
1200	791.50	1187.25
1350	1017.40	1526.10
1500	1243.10	1864.65
1650	1490.00	2235.00
1800	1799.40	2699.10
1950	2085.90	3128.85
2100	2393.40	3590.10
2250	2721.10	4081.65
2400	3182.30	4773.45
2550	3585.00	5377.50
2700	3980.60	5970.90
3000	4876.90	7315.35
4000	7864.60	11796.85

Table 7 – Lead cost summary – Sample AFW project 2017 bid estimates					
Diameter	**Average Contractor Unit Price**	**Unit**	**Contractor A**	**Contractor B**	**Contractor C**
			Unit Price	**Unit Price**	**Unit Price**
150	$ 229.32	m	$ 156.59	$ 184.10	$ 347.28
200	$ 259.88	m	$ 163.68	$ 261.40	$ 354.56
250	$ 252.29	m	$ 178.03	$ 205.00	$ 373.84

Table 8 – Infiltration gallery cost summary	
Unitary Cost ($/Asset)	**Notes**
15000	Cost based on a general costing information guidelines from the MOECC and 2010 CVC/TRCA LID Design Guidelines

Table 9 – SWM facility cost summary		
Depth (m)	**Unitary Cost ($/m³)**	**Notes**
2	60	Cost based on a review of stormwater management facilities constructed in the Greater Golden Horseshoe area (Halton Hills, Kitchener, Brantford Burlington, Hamilton) in the last 5-10 years. Facilities include wetlands, and wet ponds, with volumes determined through MOECC design criteria. Principal elements for costing are earth excavation and landscaping. Land cost is not included.

Table 10 – Culvert cost summary	
Unitary Price ($/m)	**Notes**
350	Cost based on supplier 2017 pricing data

Culvert Assumptions

- The length has been assumed to be 10 m if no length has been provided
- The culvert material has been assumed to be CSP for all culverts
- The life span of a CSP culvert has been assumed to be 25 years prior to replacement
- The diameter has been assumed to be 450 mm
- The Town provided replacement schedule of culverts is 100/year
- Assumed the year of construction to be 1997 (20 years old) if no year was provided or year provided was 1901

Table 11 – Large Oversize MH cost summary		
Incoming Pipe Size (mm)	**Unitary Cost ($/unit)**	**Notes**
Oversize MH – Incoming Pipe ≤ 600	40000.0	Cost based on a combination of supplier 2017 pricing and tender analysis of bids on projects within the last 5 years in the Greater Halton Hills area, these vaults were categorized separately from those in the Manhole GIS layer
Oversize MH – Incoming Pipe > 600	80000.0	

Oversize MH Assumption

- Rectilinear/box MH chamber

APPENDIX B

GIS DATA SUMMARY

GAP FILLING

Gap filling of the Town provided storm GIS data was undertaken to establish the year of construction of the storm infrastructure and the diameter of the storm sewers and leads as these parameters were deemed vital to the assessment. Additionally, duplicate entities were found in the GIS data and were screened for removal. The Town provided confirmation regarding specific areas that are not owned by the Town and infrastructure in these areas was subsequently screened as well. The following gap filling measures were used to update the GIS data where it was incomplete.

Storm Sewer/Lead Diameter

The storm sewer and storm lead diameter data provided by the Town ranged in size from 100 mm to 101000 mm with several storm sewer diameters sized as 99XXX, such as 99375. The diameters that were greater than 99000 mm had 99000 subtracted from the diameter as it was assumed these used Town specific syntax, with 99000 added to the diameter, and were not the actual dimensions of the diameter. Additionally, diameters provided that were not a nominal metric diameter, such as 381 mm and 533 mm, were assumed to be an equivalent conversion from imperial units to metric. As such, they were converted to the nominal metric diameter dimensions, such as 375 mm and 525 mm. Finally, diameters that were multiples of 25 mm and were also not nominal metric diameters were converted to the nearest nominal diameter, such as 400 mm was converted to 375 mm.

The storm sewers and storm leads that were lacking a diameter in the GIS data required gap filling. The process for updating the diameter was as follows; the connecting manholes, catch basins, and outfalls provided in the GIS data were referenced for the diameter of the subject storm sewer or storm lead and the diameter was updated based on this info. For storm sewers and storm leads where this procedure was inconclusive, the Town's as built and proposal drawings were consulted for the diameter. If both of these failed to yield a diameter then the upstream diameter or the downstream diameter were applied to the storm sewer, dependent on the number of catch basins attached to the storm sewer. Several catch basins connected to a storm pipe would suggest an increase in conveyance and the downstream diameter, which was likely larger than the upstream diameter, was chosen. Catch basin leads which lacked a diameter were assumed to be 250 mm if the aforementioned process did not yield a diameter.

Year of Construction

The year of construction of the storm infrastructure was largely complete as provided by the Town, however similar to the storm sewer diameters, gaps were found that required updating. To simplify the process, the storm sewers and leads were used as a basis for establishing the year of construction for all other storm infrastructure. The connecting infrastructure (manholes, catch basins, etc) were referenced to establish a year of construction. Drawings were consulted if the connecting infrastructure did not yield the necessary info. Should neither of those two processes fail to provide a year of construction then the adjacent infrastructure in proximity to the subject storm sewers, not necessarily connected, was referenced. Finally, the year of construction was assumed to be 1990 if it could not be verified through the aforementioned means.

Duplicates

Duplicate entities such as manholes, outfalls, and catch basins, were found in the GIS data. These entities shared a common geospatial location and attributes which was assumed to be an inaccurate representation of the infrastructure. The names of the entities were screened to locate the duplicates. While several of them shared a common name, they were often geospatially located at difference locations. However, the duplicate entities found at the same geospatial location were removed from the data as to not overestimate the present infrastructure.

Infrastructure Not Owned by the Town of Halton Hills

The Town provided confirmation that the entities located in the community of Norval, east of Georgetown, were not owned by the Town of Halton Hills. These entities were subsequently removed for the assessment.

Table 1 - Manhole Quantities and Distribution		
Parameter	**Sub-Name**	**Quantity**
CBMH	CB Manhole	368
	Catch Basin Manhole	25
DCBMH	CB Manhole Double	50
	Dble CB Manhole	7
Ditch Inlet	CB Manhole Ditch Inlet	17
	DitchInlet CB Manhole	1
MH		2735
OGS (Vortechnics)		14
OGS (Stormceptor)		19
Total		**3236**

Table 2 – Manhole Size and Type Distribution	
Manhole Size (mm)	**Quantity**
1200	2808
1500	231
1800	102
2400	40
3000	12
3600	1
Oversized MH	9
OGS (Vortechnics)	14
OGS (Stormceptor)	19
Total	**3236**

Table 3 – Manhole Year of Construction Distribution		
Construction Range		**Quantity**
1951	1955	0
1956	1960	25
1961	1965	8
1966	1970	374
1971	1975	430
1976	1980	207
1981	1985	341
1986	1990	295
1991	1995	489
1996	2000	425
2001	2005	516
2006	2010	115
2011	2015	11
Total		**3236**

Table 4 – Storm Sewers and Leads Diameter Distribution		
Diameter (mm)	**Quantity**	**Total Length (m)**
<200	27	403
200	185	3030
250	3648	31264
300	1408	38259
375	636	30772
450	370	18680
525	305	16836
600	241	11177
675	156	8439
750	164	8636
825	94	4828
900	95	4926
975	24	1300
1050	81	3838
1200	36	2209
1300	1	58
1350	27	1851
1500	30	1688
1650	4	343
1800	5	454
1950	6	467
2100	0	0
2400	1	40
3000	1	145
4000	1	259
Total	**7546**	**189901**

Table 5 – Storm Sewers and Leads Year of Construction Distribution		
Construction Range		**Quantity**
1951	1955	0
1956	1960	39
1961	1965	21
1966	1970	967
1971	1975	1141
1976	1980	528
1981	1985	690
1986	1990	759
1991	1995	1220
1996	2000	901
2001	2005	1025
2006	2010	250
2011	2015	5
2016	2017	0
Total		**7546**

Table 6 – Catch Basin Distribution		
Parameter	**Sub-Name**	**Quantity**
CB	-	4638
DCB	-	672
Ditch Inlet	Ditch Inlet	189
	Ditch Inlet Twin	3
Lawn	-	22
Total		**5524**

Table 7 – Catch Basin Year of Construction Distribution		
Construction Range		**Quantity**
1951	1955	0
1956	1960	20
1961	1965	23
1966	1970	687
1971	1975	829
1976	1980	391
1981	1985	576
1986	1990	563
1991	1995	877
1996	2000	650
2001	2005	707
2006	2010	194
2011	2015	7
2016	2017	0
Total		**5524**

Table 8 – Outfall Year of Construction Distribution		
Construction Range		**Quantity**
1936	1940	4
1941	1945	0
1946	1950	0
1951	1955	0
1956	1960	3
1961	1965	5
1966	1970	17
1971	1975	26
1976	1980	21
1981	1985	19
1986	1990	51
1991	1995	34
1996	2000	36
2001	2005	53
2006	2010	7
2011	2015	6
2016	2017	0
Total		**282**

Table 9 – SWM Facility Year of Construction		
Parameter		**Quantity**
Total Ponds		40
Total Area (ha)		51.37
Construction Range		**Quantity**
1976	1980	1
1981	1985	0
1986	1990	3
1991	1995	3
1996	2000	12
2001	2005	17
2006	2010	2
2011	2015	1
2016	2017	1

Table 10 – Culvert Year of Construction Distribution		
Construction Range		**Quantity**
1905	1950	5
1951	1955	0
1956	1960	13
1961	1965	0
1966	1970	8
1971	1975	6
1976	1980	14
1981	1985	3
1986	1990	3
1991	1995	5
1996	2000	2343
2001	2005	2
2006	2010	1
2011	2015	1
Total		**2404**

Table 11 – Infiltration Galleries Year of Construction Distribution		
Construction Range		**Quantity**
1951	1955	0
1956	1960	0
1961	1965	0
1966	1970	0
1971	1975	0
1976	1980	0
1981	1985	0
1986	1990	7
1991	1995	2
1996	2000	0
2001	2005	149
2006	2010	0
2011	2015	0
2016	2017	0
Total		**158**

Table 12 – Vault (Assumed to be Large Rectilinear Manhole Chamber) Year of Construction Distribution		
Construction Range		**Quantity**
1951	1955	0
1956	1960	0
1961	1965	0
1966	1970	0
1971	1975	0
1976	1980	0
1981	1985	0
1986	1990	0
1991	1995	0
1996	2000	1
2001	2005	1
2006	2010	1
2011	2015	0
2016	2017	0
Total		**3**

APPENDIX C

EXISTING PROGRAM AND BUDGET FORECAST INFORMATION

Major Operations & Maintenance Cost Categories	Contracted Costs	Labour costs	Labour Notes	Total
Street sweeping	$62,500	$25,554	.33 FTE	$88,054
Catch basin Cleaning	$15,000	$26,927	.33 FTE	$41,927
Storm sewer flushing & reaming				
Street sweeping waste recycling				
General Stormwater O&M (Road Operations)				
SWM infrastructure minor maintenance	$34,100	$40,406	.6 FTE	$74,506
ditch maintenance	$80,000	$46,816	.6 FTE	$126,816
storm sewer repairs	$12,600	$13,329	.2 FTE	$25,929
outfall clearing		*$3,750*	0.05 FTEs	$3,750
watercourse maintenance/cleaning				
Oil and grit separator system cleaning	$15,000	$26,927	*.33 FTE*	*$41,927*
Complaint response/emergency support				
(spills, dumping, localized flooding)				
Pond maintenance	$24,400	$41,519	.6 FTE	$65,919
Parks: SWM facility/watercourse maintenance		$7,500	.1 FTE	$7,500
(inspections, debris removal, minimal mowing)				
CCTV				$0
O&M subtotal	**$243,600**	**$232,728**	**3.15 FTEs**	**$476,328**
Engineering/Design				
Oversight of Engineering Projects/Planning, Design, EA		$34,294	.25 FTE	$34,294
(WR Program Manager, Technologists)		$60,914	.66 FTE	$60,914
(Manager of Dev Engg)		$27,435	.2 FTE	$27,435
(Director of Engg)		$8,444	.05 FTE	$8,444
SWM design incl. minor in-house (LID, repairs)				
GIS Support		$7,500	.1 FTE	$7,500
Sustainability Support		$7,500	.1 FTE	$7,500
Stormwater Planning/Management		$7,500	.1 FTE	$7,500
Eng subtotal		**$153,587**	**1.45 FTE**	**$153,587**
Capital budget				
SW Management Study				
SW Management Pond Restoration				
Bridges and Culverts	$714,000			$714,000
Capital subtotal	**$714,000**	**$153,587**		**$867,587**
	$957,600	**$386,315**	**4.6 FTEs +/-**	**$1,343,915**

Town of halton Hills
Storm Services Capital Budget Forecast
2018-2026
Current (2017) Dollars

	Project	Year											Total
		1	2	3	4	5	6	7	8	9	10	11	
Line	Description	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
	Capital Expenditures												0
	Storm Pond Retrofits		75,000	150,000		450,000	250,000	250,000	250,000	250,000			1675000
	Flooding and Erosion Projects		150,000	150,000		400,000							700000
	Culvert Replacements	500,000	250,000	625,000	100,000	600,000							2075000
	Studies		150,000										150000
	CCTV					250,000	250,000	250,000	250,000	250,000			1250000
	Storm Sewer Repair From CCTV Program												0
	Strategic Maintenance		60,000	60,000									120000
	Fleet												0
	Total Capital Expenditures	500,000	685,000	985,000	100,000	1,700,000	500,000	500,000	500,000	500,000	-	-	5,970,000