

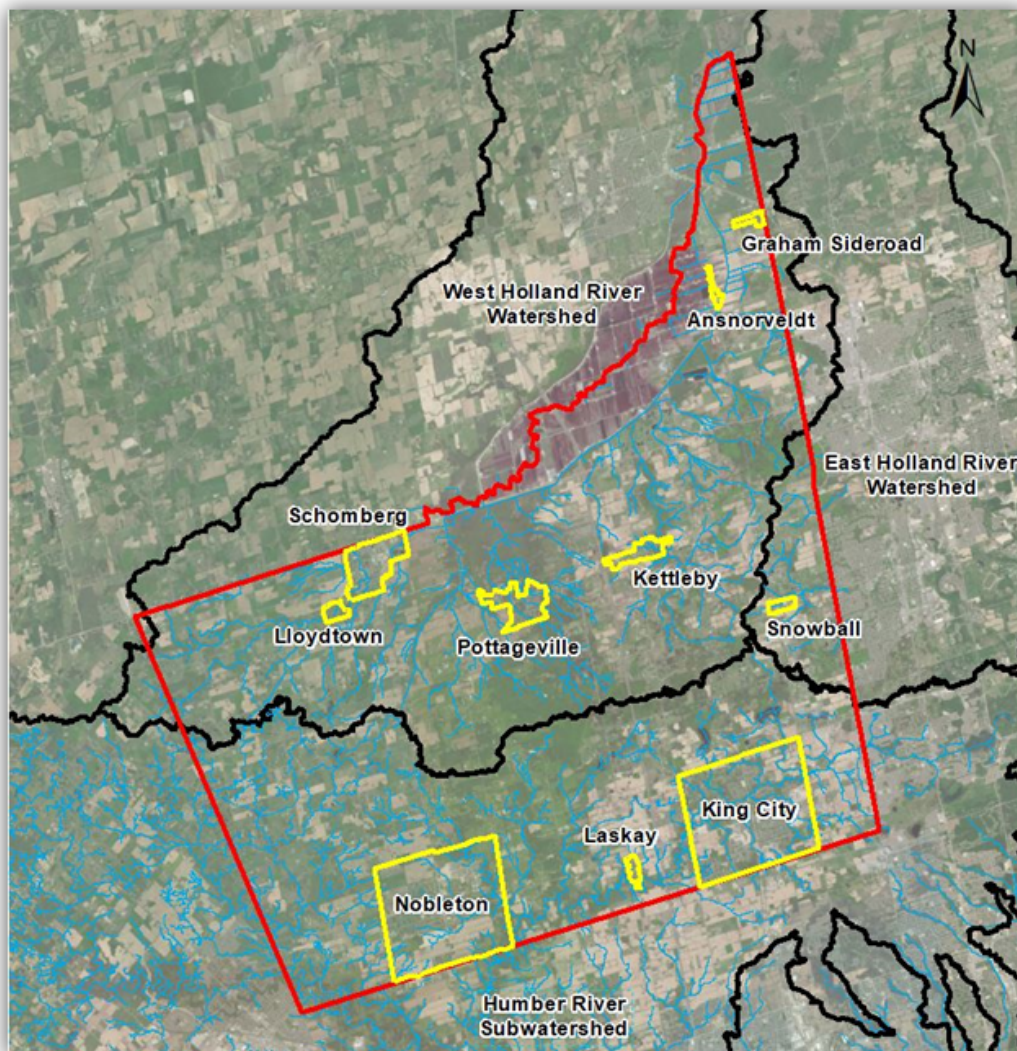
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## *APPENDIX O*

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### *SWM Levy Study Report*

## Township of King Stormwater Management Levy Assessment Draft Report



## STATEMENT OF QUALIFICATIONS AND LIMITATIONS

The attached Report (the “Report”) has been prepared by Civica Infrastructure Inc. (the “Consultant”) at the request of, and for the exclusive use of, The Corporation of the City of Hamilton (the “Client”) in accordance with the terms of an agreement between the Consultant and the Client, including the scope of work detailed therein (the “Agreement”).

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February 26, 2021

**CIVICA Ref: KNG18-0003**

The Corporation of the Township of King  
2585 King Road  
King City, ON  
L7B 1A1

**Attention: Mr. Daniel Wilkinson,  
Environmental Project Manager, Public Works**

Dear Daniel,

**RE: Township of King Comprehensive Stormwater Master Plan and Stormwater Charge Assessment**

Civica Infrastructure Inc. (Civica) is pleased to submit the technical memo summarizing the work completed in the analysis to develop a stormwater charge.

This technical memo summarizes the research involved in understanding how a stormwater charge is developed and the various models used by different municipalities that have successfully implemented a similar charge. The analysis provides a summary of the various models, a simple cost estimate for capital and operations and maintenance projects. Using the cost estimate and background information (i.e. GIS land use information), an approximate range of charges was determined using the preferred model.

Do not hesitate to contact us for further clarification and/or comment.

Sincerely,

**CIVICA INFRASTRUCTURE INC.**

Karen Edgington, P.Eng.  
Project Manager

cc: Carolyn Ali, Township of King  
Mandy Paglia, Township of King  
Jonathon Kerschbaumer, Civica Infrastructure Inc.  
Encl. SWM Levy Assessment Technical Memo

## Document History & QA/QC

### Reviewer:

### Authorised for Release:

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Karen Edgington, P.Eng.  
Senior Project Manager  
Civica Infrastructure Inc.

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Alex Ding, M.A.Sc.  
Vice President of Operations  
Civica Infrastructure Inc.

## Revision History

Name	Date	Reason for Change	Version
SWM Levy Assessment	2021-02-26	Draft Submission	Version 1

## TABLE OF CONTENTS

<b>1.0</b>	<b>Introduction and Background .....</b>	<b>1</b>
1.1	Project Background .....	1
1.2	Background Information .....	1
1.3	Objectives.....	1
<b>2.0</b>	<b>Stormwater Levy Assessment .....</b>	<b>1</b>
2.1	Task 1: Implement CSWMMP Characterization Study.....	1
2.2	Task 2: Evaluate the Alternatives.....	2
2.3	Task 3: Establish a Recommended Approach .....	3
2.4	Task 4: Identify the Data Required for Asset Management and Capital Investments.....	10
<b>3.0</b>	<b>Conclusion and Recommendations .....</b>	<b>11</b>

## List of Tables

Table 1: Summary Table of Various Levy Models .....	4
Table 2: Runoff Level Group Categories .....	5
Table 3: Average Imperviousness and Property Size for Runoff Level Groups (Existing Conditions).....	6
Table 4: Average Imperviousness and Property Size for Runoff Level Groups (Future Conditions) .....	7
Table 5: Cost Analysis for Capital and O&M Program .....	9
Table 6: Approximate Annual Stormwater Charge.....	10

## **Appendices**

### **Document History & QA/QC**

### **Revision History**

## 1.0 Introduction and Background

### 1.1 Project Background

Civica was initially retained by the Township of King to develop the Comprehensive Stormwater Management Master Plan (CSWMMP). As additional scope, Civica was assigned the task of assessing the potential for implementing a stormwater levy to provide a dedicated funding source in support of stormwater related capital projects and operations and maintenance activities.

### 1.2 Background Information

As a part of the development of the CSWMMP, Civica was provided with a plethora of background information related to the Township of King and its stormwater management (SWM) infrastructure. This information included The Township of King Official Plan, GIS data of all SWM infrastructure, engineering design drawings of SWM facilities, SWM reports for the various development areas, etc.

Severe weather events are even more frequent in present time as climate change continues to affect the natural environment. To properly manage stormwater, the infrastructure must be regularly inspected and maintained. The purpose of the stormwater charge is to fund the three major cost drivers for stormwater management, which are environmental protection, aging infrastructure and flood prevention. As hard surfaces in the Township increase, the runoff from properties also increases. This runoff can carry harmful contaminants with it and there has been a significant increase in the harm done to the Lake Simcoe ecosystem. The Township operates 28 SWM facilities, approximately 1500 culverts, 100 km of storm sewers, and 350 km of roadside drainage ditches. The condition of most of this infrastructure is unknown and is crucial to accurately determining a fair rate for users.

### 1.3 Objectives

The objective of this assessment was to obtain information on various stormwater levy models utilized successfully by various municipalities across the GTA and to select a suitable model that would reflect the land use distribution of the Township and support the stormwater infrastructure need as the current funding level is likely to fall short to maintain current service levels. Using the information, one stormwater levy model will be selected as the recommended approach for the Township. This will also include determining an approximate range of rates that the user will be charged, based on approximated yearly funding required for stormwater management related capital projects and operations and maintenance. Finally, Civica will also identify the missing SWM infrastructure data and recommend methods to obtain this information and recommend other relevant studies that may be required to determine a more refined and definite rate.

## 2.0 Stormwater Levy Assessment

### 2.1 Task 1: Implement CSWMMP Characterization Study

As a part of the CSWMMP, a characterization of the study area was completed. This characterization study identified features such as land use, natural heritage, hydrology, etc. This information was used to identify municipalities that had similar land uses and related natural features across the GTA such as Newmarket, Markham, Richmond Hill, and Mississauga.



The Township of King differs from the above municipalities that it is mainly rural areas. Most of the development occurs within the three (3) villages and seven (7) hamlets. The model used by the various municipalities were investigated and the following five (5) models were further analyzed:

- 1. Property Tax**
- 2. Flat Rate Fee**
- 3. Property Tax Class**
- 4. Pervious/Impervious**
- 5. Land Use Runoff Coefficients**

## **2.2 Task 2: Evaluate the Alternatives**

Five (5) potential methods used in different municipalities in the GTA that are suitable for implementing in the Township of King are as follows:

### **Method I: Property Tax**

The property tax model for collecting stormwater is the existing model used for capital funding and operations & maintenance of stormwater projects. An increase to property taxes would be proposed in order to meet the Township's stormwater infrastructure demands.

### **Method II: Flat Rate Fee**

Two different flat rates are determined for residential and non-residential (institutional, commercial, industrial) properties and are distributed evenly throughout the Township. The total number of residential properties and the total number of non-residential properties are tallied separately to determine the percentage of each property type in the Township. The total funding required for capital projects and operations & maintenance of the stormwater infrastructure is dispersed between the percentage of each property type in the Township and is then divided by the amount of properties in each category to determine a single flat rate for each property.

### **Method III: Property Tax Class**

Stormwater rates are determined by the property tax class of each property available from the Municipal Property Assessment Corporation (MPAC). Rates are calculated by taking the annual stormwater budget and dividing it into two separate residential and non-residential rates based on the percentage of each property type in the Township. The rates for each property type are then distributed based on the MPAC property valuation, where higher property values will have higher annual charges.

### **Method IV: Pervious/Impervious**

The pervious/impervious model utilizes aerial imaging and GIS tools to determine the percent impervious of each property based on the total area of hard surfaces that create runoff and contribute to the stormwater infrastructure. Two methods exist where the first method analyzes each property individually to determine the percent impervious, the second method calculates the average percent impervious of a

Single-family home property in the Township as a base value (SFU Unit) and is extrapolated to determine the percent impervious of all other property types based on property size.

**Example:** Average single detached 1.0 = 259 m<sup>2</sup> impervious area. Commercial site with 600 m<sup>2</sup> impervious area.

SFU UNITS = Non-residential impervious area/SFU Area

Commercial SFU Units = 600/259 = 2.31

### **Method V: Land Use Runoff Coefficients**

Land use runoff models utilize design standards and guidelines to estimate the amount of runoff provided by each property in the Township. Design guidelines provide typical runoff or imperviousness coefficients for each land use in the Township that can be used to estimate the runoff volume of each property. The information required is the property type (or zoning) and the property size (area) to determine the volume of runoff contributed by the property. Each land use category from the design standards can be analyzed or the land use categories can be divided into tiers where similar land use runoff coefficients can be grouped together to minimize the total number of categories to be analyzed. The area of the property is multiplied by the standard percent impervious of the property type and is grouped into a tier based on the percent of runoff anticipated to be contributed by the property.

### **2.3 Task 3: Establish a Recommended Approach**

**Table 1** below, summarizes the advantages, disadvantages, the data required for development and a simple cost analysis.

**Table 1: Summary Table of Various Levy Models**

Method	Advantages	Disadvantages	Data Required	Cost Analysis
<b>Method I: Property Tax</b>	<ul style="list-style-type: none"> <li>- There is an established method for collecting funds.</li> <li>- Building a SWM reserve fund (money does not immediately go to a specified location).</li> <li>- Simple for municipality to implement.</li> </ul>	<ul style="list-style-type: none"> <li>- No capital plan to justify property tax increase.</li> <li>- Impact to public perception of raising property taxes.</li> <li>- Stormwater management projects compete for funding against other projects because of no defined or dedicated fund for SWM improvements.</li> <li>- Projects with more public visibility typically take priority over stormwater management funding.</li> <li>- More work required for budgeting process.</li> </ul>	<ul style="list-style-type: none"> <li>- Cost of capital plan.</li> </ul>	Implementation - \$ Administration - \$\$ Maintenance - \$ Average SWM Fee - \$\$
<b>Method II: Flat Rate</b>	<ul style="list-style-type: none"> <li>- Stable and predictable funding.</li> <li>- Simple to implement and background information is readily available.</li> </ul>	<ul style="list-style-type: none"> <li>- Unfair distribution as a small property will be charged the same as a large property.</li> <li>- Does not represent actual runoff contributed by each property.</li> </ul>	<ul style="list-style-type: none"> <li>- Cost of capital plan.</li> </ul>	Implementation - \$ Administration - \$ Maintenance - \$ Average SWM Fee - \$
<b>Method III: Financial (Richmond Hill)</b>	<ul style="list-style-type: none"> <li>- Information is readily available (MPAC data and land use information).</li> <li>- An established system is already in place (MPAC).</li> <li>- Minimal administrative fees.</li> <li>- Residents can contact MPAC for disputes rather than the Township.</li> <li>- Simple and easy to predict stormwater charges.</li> </ul>	<ul style="list-style-type: none"> <li>- Does not represent actual runoff contributed by each property.</li> </ul>	<ul style="list-style-type: none"> <li>- MPAC and land use zoning information.</li> <li>- Building type may be required and/or beneficial.</li> </ul>	Implementation - \$ Administration - \$ Maintenance - \$ Average SWM Fee - \$\$
<b>Method IV: Pervious/Impervious (Individual Lot Assess.)</b>	<ul style="list-style-type: none"> <li>- Property specific.</li> <li>- Defendable method (runoff versus imperviousness).</li> <li>- Provides incentive for properties to reduce runoff.</li> </ul>	<ul style="list-style-type: none"> <li>- Data/labour intensive.</li> <li>- Most complex to administrate.</li> <li>- Requires annual updating.</li> <li>- Requires additional staff to administer program.</li> </ul>	<ul style="list-style-type: none"> <li>- Aerial Imagery</li> <li>- Software (depending on method of calculating areas).</li> </ul>	Implementation - \$\$\$ Administration - \$\$\$ Maintenance - \$\$ Average SWM Fee - \$\$\$
<b>Method V: Land Use Runoff Scenarios</b>	<ul style="list-style-type: none"> <li>- Generalized categories require less work compared to Method 4.</li> <li>- Easier to apply across the municipality based on broad categories.</li> <li>- Flexible land use analysis in terms of categorizing.</li> <li>- Best reflects the actual runoff contributed by each property.</li> </ul>	<ul style="list-style-type: none"> <li>- Categories may be subjective.</li> </ul>	<ul style="list-style-type: none"> <li>- Zoning shapefiles.</li> <li>- Runoff coefficient or TIMP/XIMP standards.</li> </ul>	Implementation - \$\$\$ Administration - \$\$\$ Maintenance - \$\$ Average SWM Fee - \$\$\$

## **Development of User Fee**

The methodology used to determine the user fee was followed closely to that of the Town of Newmarket. The model follows a principal concept in stormwater management; imperviousness. Impervious surfaces don't absorb water, so surfaces like roofs, driveways, and parking lots contribute greater stormwater runoff to the environment. For this reason, the stormwater charge will be calculated on a user fee basis. Customers will be charged the amount it costs to provide them with stormwater services. Land use categories were developed to fairly estimate a rate for the runoff each land use contributes based on property size and imperviousness.

Newmarket received mostly positive feedback from their customers and feedback is expected to be similar from the residents of the Township of King. The model is seen as fair in that properties are charged fairly based on very important characteristics and it is not overly costly to the administrator. **Table 2** below summarizes the three (3) land use categories (low, medium, and high) developed from the various land use categories in the Township.

***Table 2: Runoff Level Group Categories***

<b>Runoff Level Group</b>	<b>Township of King Land Use</b>
<b>3</b>	Commercial
	High Density Residential
	Industrial
	Railway
	Roads
<b>2</b>	Rural/ Estate Residential
	Institutional
	Medium Density Residential
<b>1</b>	Agricultural
	Cemetery
	Golf Course
	Natural Heritage Feature
	Recreational/Open Space

All properties in the Township are separated into three runoff level groups. Natural areas are grouped into the low runoff level group, residential and institutional properties are grouped into the medium runoff level group, and industrial and commercial properties are grouped into the high runoff level group. GIS shapefiles containing existing land use parcel areas were used to determine the average imperviousness and average property size for each land use class. **Table 3** below provides a summary of this information. Similarly, the average imperviousness and average property size was determined for the future land use outlined in the Township of King Official Plan. **Table 4** below summarizes this information

**Table 3: Average Imperviousness and Property Size for Runoff Level Groups (Existing Conditions)**

Runoff Category/Level	Township of King Land Use	Area in Township	% Impervious	Average Impervious	Average Property Size (ha)	Average Property Size (for Group) (ha)
3	Commercial	85.09	0.9	93%	0.448	2.06
	High Density Residential	3.13	0.65		5.724	
	Industrial	59.95	0.9		0.442	
	Railway	12.66	0.5		1.644	
	Roads	618.27	0.95			
2	Rural/ Estate Residential	2483.85	0.14	27%	0.318	0.33
	Institutional	156.74	0.55		0.479	
	Medium Density Residential	1043.19	0.55		0.212	
1	Agricultural	17070.7	0	0.2%	2.65	4.48
	Cemetery	5.61	0.01		5.45	
	Golf Course	82.45	0.01		5.50	
	Natural Heritage Feature	13612.32	0			
	Recreational/Open Space	715.89	0.1		4.30	

**Table 4: Average Imperviousness and Property Size for Runoff Level Groups (Future Conditions)**

Runoff Category/Level	Township of King Land Use	Area in Township	% Impervious	Average Impervious	Average Property Size (ha)	Average Property Size (for Group) (ha)
3	Commercial	110.02	0.9	92%	0.448	2.06
	High Density Residential	1.25	0.65		5.724	
	Industrial	136.55	0.9		0.442	
	Railway	23.25	0.5		1.644	
	Roads	602.06	0.95			
2	Rural/ Estate Residential	2398.92	0.14	30%	0.318	0.33
	Institutional	150.02	0.55		0.479	
	Medium Density Residential	1364.09	0.55		0.212	
1	Agricultural	17083	0	0.2%	2.65	4.48
	Cemetery	5.01	0.01		5.45	
	Golf Course	82.45	0.01		5.50	
	Natural Heritage Feature	13327.6	0			
	Recreational/Open Space	657.63	0.1		4.30	

With the average property sizes and average impervious areas determined, an approximate cost estimate for stormwater related capital program and operations and maintenance activities was completed. A 20-year cost analysis was developed and can be seen in **Table 5**. The capital program cost estimate included any potential studies, inspections and condition assessment of all stormwater facilities and clean out and maintenance works for stormwater facilities. The operations and maintenance cost analysis included the estimated cost for staff, equipment, and materials. The cost estimate accounts for a three year ramp up period where after year three, the cost will increase 5% yearly for the capital program and 2% yearly for the operations and maintenance program.



Table 5: Cost Analysis for Capital and O&M Program

Capital Program																						Comments
Item	Description	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
1	Studies	\$50,000	\$50,000	\$50,000	\$25,000	\$26,000	\$27,300	\$28,665	\$30,098	\$31,603	\$33,183	\$34,842	\$36,585	\$38,414	\$40,335	\$42,351	\$44,469	\$46,692	\$49,027	\$51,478	\$54,052	Flooding studies, drainage feasibility assessments
2	Inspections and Condition Assessment	\$75,000	\$75,000	\$75,000	\$50,000	\$52,500	\$55,125	\$57,881	\$60,775	\$63,814	\$67,005	\$70,356	\$73,873	\$77,566	\$81,445	\$85,517	\$89,793	\$94,282	\$98,997	\$103,946	\$109,144	SWMF inspections, culvert inspections, CCTV inspection of sewers, MH inspections, condition assessment of assets
3	SD/SWM facility cleanouts and maintenance	\$300,000	\$300,000	\$300,000	\$300,000	\$315,000	\$330,750	\$347,288	\$364,652	\$382,884	\$402,029	\$422,130	\$443,237	\$465,398	\$488,668	\$513,102	\$538,757	\$565,695	\$593,979	\$623,678	\$654,862	SWMF cleanouts, culvert repair/replacement, storm sewer repair replacement
Total Capital Program		\$425,000	\$425,000	\$425,000	\$375,000	\$393,500	\$413,175	\$433,834	\$455,525	\$478,802	\$502,217	\$527,328	\$553,694	\$581,379	\$610,448	\$640,970	\$673,019	\$706,669	\$742,003	\$779,103	\$818,058	
Operations and Maintenance Program																						
Item	Description	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
1	Operations and Maintenance staff	\$120,000	\$122,400	\$124,848	\$127,345	\$129,892	\$132,490	\$135,139	\$137,842	\$140,599	\$143,411	\$146,279	\$149,206	\$152,189	\$155,233	\$158,337	\$161,504	\$164,734	\$168,029	\$171,390	\$174,817	2 FTEs and summer student
2	Equipment and materials	\$25,000	\$25,500	\$26,010	\$26,530	\$27,061	\$27,602	\$28,154	\$28,717	\$29,291	\$29,877	\$30,475	\$31,084	\$31,706	\$32,340	\$32,987	\$33,647	\$34,320	\$35,006	\$35,706	\$36,420	Vehicles, tools, equipment, materials
Total Operation and Maintenance Program		\$145,000	\$147,900	\$150,858	\$153,875	\$156,953	\$160,092	\$163,294	\$166,559	\$169,891	\$173,288	\$176,754	\$180,289	\$183,895	\$187,573	\$191,324	\$195,151	\$199,054	\$203,035	\$207,096	\$211,238	
Total Capital and O&M Program																						
Total Capital and O&M Program		\$570,000	\$572,900	\$575,858	\$578,875	\$580,453	\$583,267	\$586,127	\$589,085	\$592,085	\$595,102	\$598,138	\$601,192	\$604,264	\$607,353	\$610,460	\$613,585	\$616,728	\$619,889	\$623,066	\$626,259	



Using the cost estimate above, the rate for each runoff level group was determined. A distribution of 60%, 35%, and 5% was assigned for the high level, medium level and low level runoff groups, respectively. This meant the land uses contributing the most runoff would be charged more.

Since the stormwater charge is based on property size and the runoff level group rate, the equation below shows how the stormwater charge is calculated for an individual property.

**Equation 1:**

$$\text{Stormwater Charge} = \text{Size of Property} \times \text{Runoff Level Group Rate}$$

Based on this equation, the larger the property and the higher the group rate a property falls under, the higher the charge is.

Using the runoff level group rates determined by Newmarket, the rates were adjusted to achieve the necessary revenue outlined in the cost analysis. Under existing conditions, the rates were adjusted, and an approximate rate for each runoff level group was determined, as illustrated in **Table 6** below. It must be noted, the average annual fee in **Table 6** is based off the average property size and that the annual rate will vary depending on the actual size of the property.

**Table 6: Approximate Annual Stormwater Charge**

		Low	Medium	High
Year 1	Runoff Level Group Rate Per Square meter	0.001306	0.006384	0.0127671
	Average Size in square meters	44570	3363	20645
	Average Annual Fee	\$ 58.20	\$ 21.47	\$ 263.58
Year 20	Runoff Level Group Rate Per Square meter	0.002611	0.012767	0.0255342
	Average Size in square meters	44570	3363	20645
	Average Annual Fee	\$ 116.39	\$ 42.94	\$ 527.15

## 2.4 Task 4: Identify the Data Required for Asset Management and Capital Investments

There are many factors that drive the ability for the Township to determine an accurate, fair and defensible stormwater charge. Identifying stormwater infrastructure and its condition is fundamental for developing a more detailed long-term asset management plan. A culvert inspection program should be performed for all non-structural culverts along all rural roadways and a CCTV program for all storm sewers owned by the Township, beginning with the oldest storm sewers. All SWM facilities owned by the Township should be surveyed and inspected to determine the functionality of the facility based on its intended design and current design standards. Collecting this information will allow the Township to prioritize all stormwater infrastructure for operation & maintenance and allow consideration for updating The Township 2016 Asset Management Plan. In detailed design stage of individual developments, the downstream affects of the development should be analyzed and any upgrades required to the stormwater infrastructure shall be distributed with the developer.

### 3.0 Conclusion and Recommendations

The SWM Levy models presented each provide advantages and disadvantages for implementing a Stormwater Levy in the Township of King. Implementing a model that recognizes average imperviousness cover on typical land use classifications is the most practical method for the Township to implement that will minimize administrative fees and present a reasonable Stormwater charge for residence of the Township. Executing the average runoff coefficient model minimizes the amount of background information required to determine a stormwater charge because existing and proposed landuse classifications are available for the Township and would not require additional staff to maintain and operate the Levy program.

Implementing a SWM Levy creates transparency in the budget for operating & maintaining stormwater infrastructure, while increasing the actual efficiency of operating & maintaining stormwater infrastructure. Fair costs are distributed through the Township based on property size and use will go directly to urgent flooding or stormwater deficiencies rather than following the process to obtain council approval. Budgets for dedicated maintenance programs such as culvert cleaning, pipe inspection, and channel restoration will be implemented to create an improved natural environment in the Township. It is recommended that the Township engage residents to provide insight on the benefits and value of having a dedicated fee for stormwater maintenance. Public consultation events will assist in informing residents that their property taxes are already subsidizing the cost of operating & maintaining SWM facilities.