

City of Ottawa

Stormwater Funding Option Review

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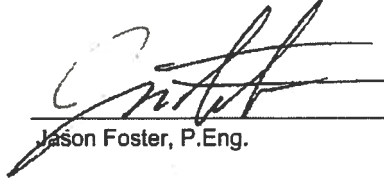
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1. Background

The City of Ottawa (City) retained AECOM Canada Limited (AECOM) to conduct a funding options review for the renewal, maintenance and operation of its stormwater system.

Currently, the City's stormwater programs are funded by a sewer surcharge, which is based on the volume of municipal potable water consumed by a customer. The amount of water a given site consumes does not typically correlate with the demand that it puts on the City's stormwater system. In addition, approximately 15% of properties do not have water and wastewater services, and subsequently do not contribute to stormwater funding through the existing sewer surcharge, even though they may generate stormwater run-off that is managed by the City's stormwater system. In other words, there is not a strong correlation between the amount that a property pays towards stormwater and the services that they receive using the current funding mechanism; and therefore the current stormwater funding program is considered inequitable and not based on the principles of "user-pay".

In addition, a given property or even a large number of properties can reduce the amount they contribute to the sewer surcharge by reducing water consumption. This would result in decreased revenues for the City's stormwater program without a corresponding decrease in costs resulting in an unsustainable stormwater funding program.

In order to evaluate the equity of existing and proposed funding mechanisms, AECOM performed a land use analysis using data primarily obtained from the City of Ottawa. The measure of equity was based on impervious ground cover, which comprises hard surfaces (e.g., rooftops, driveways, and parking lots) that prohibit infiltration of rainfall into the soil. Imperviousness is one of the factors that have the largest influence on the amount, quality and rate of stormwater runoff produced during a storm event. Imperviousness is also a good measure to use since the City's database has total area and impervious area for the majority of developed property parcels.

The preliminary results of the equity analysis were presented to City staff during a meeting at City Hall on October 14, 2015. The meeting was also used to present various funding options for consideration by City staff. The funding options were presented with high level advantages and disadvantages to enable the City to select a few preferred options that would be further developed. The funding options were reviewed in light of the feedback received during the public consultation that was conducted February-April 2016. In order to further refine the options based on this feedback, the City provided an improved set of data on April 29, 2016, with additional categories/variants. The revised equity analysis and the various funding options reviewed with the City are summarized in this memo.

2. Equity Analysis

A user pay approach would mean that a property pays the proportion of the costs to operate, maintain and renew the system that is in line with the proportion of the demand that they place on the system. For example, one can determine the demand that a property places on the potable water system as it

is based on a fixed cost (i.e. constructing the water system to their property) and a variable cost (i.e. the amount of water they consume).

The stormwater system is fairly similar in that there are fixed costs (i.e. constructing the stormwater system to service a property, annual inspections, etc.) and a variable cost (i.e. the volume, rate and quality of run-off from the site). However, the stormwater system is more challenging, particularly in the City of Ottawa, for the following reasons, outlined below.

- The volume and rate of run-off from a given site depends on a variety of factors, including the imperviousness of a site, the slope (steepness and orientation), type of vegetative cover (i.e. grass vs trees), whether the ground is saturated or frozen, and implementation of stormwater Best Management Practices (BMP's).
- The quality of run-off from a site depends on the activities conducted on the site (i.e. a surface parking lot that has run-off from vehicles versus a bank with underground parking that only conveys roof run-off) , as well as the implementation of any BMP's.
- Rural property owners do not always have a direct connection to the City stormwater system but do have ditches along their frontage that convey any overland flow.
- Rural areas pay for particular portions of the stormwater system themselves such as the renewal of driveway culverts and municipal drains.
- Fixed costs do not change regardless of system variables and credits/rebates.

To address fixed costs, established stormwater rates (also known as utilities) have ensured that they get a base amount of funding through the following methods:

- A portion of the stormwater system is funded through general taxes (i.e. in the City of Victoria 20% of their funding comes from general revenue);
- Every property pays a base amount as a stormwater fee; or
- Credits are capped. Even if you reduce your load on the system, you can only reduce your stormwater fee by up to 45% (i.e. City of Waterloo).

To address variable costs, it would be difficult and costly to ensure that every property pays the exact "right" amount of the variable costs based on a user pay system (i.e. measure the peak flow, volume and quality of run-off from each site per year). Therefore we have developed ways to approximate the load that a property places on a system. One of these proxies is impervious area, as impervious area is strongly linked to the rate and volume of flow as well as the quality of run-off from a site. In general, the higher the imperviousness, the greater the load the property places on the stormwater system.

Most stormwater utilities use imperviousness (which is sometimes approximated by averages for different land uses) as a factor to help determine the amount a property should pay towards stormwater. Some municipalities have gone further to add additional factors to determine stormwater rates; such as:

- Frontage (City of Victoria uses this to help pay for street sweeping costs);
- Presence of stormwater BMPs (Cities of Waterloo, Kitchener, Mississauga, and Edmonton offer credits);
- Land use (City of Victoria charges a premium for particular land uses and for the presence of parking lots); and
- Whether there is a direct connection or not to the stormwater system

Since imperviousness is the most common factor used to determine stormwater rates, we used this as the base proxy for our analysis into the equity of the City of Ottawa's current and potential future stormwater funding programs. Total imperviousness provides a representative measure of the

demand that a given property places on the City’s stormwater system, and allows for comparison of residential and non-residential parcels as well as rural and urban parcels. The objective of this analysis was to determine the equity of the current funding system based on water consumption and to compare it with the equity of two alternate funding systems; one based on impervious area and one based on assessed property value (i.e., Current Value Assessment [CVA] with and without the weighting factors). The calculation based on “weighted” assessment estimates the amount that would be paid if stormwater was funded from property tax, applying the appropriate tax ratios and tax rules, such as excluding exempt properties but including farmland and forested land. The calculation based on un-weighted assessment estimates the amount that would be paid if a separate stormwater fee was established, using assessment value as the attribution basis for recovering the costs.

2.1 Residential vs. Non-residential

The results of the residential versus non-residential equity analysis show that residential properties account for approximately 67% of the total imperviousness within the City and currently fund approximately 73% of the stormwater programs via the current water consumption-based billing system. If CVA (fee with no weighting factor) were used as a basis for stormwater funding, a greater equity gap would be observed, with residential properties funding 75% of the stormwater programs compared to their 67% imperviousness contribution. The graphs below summarize this equity analysis.

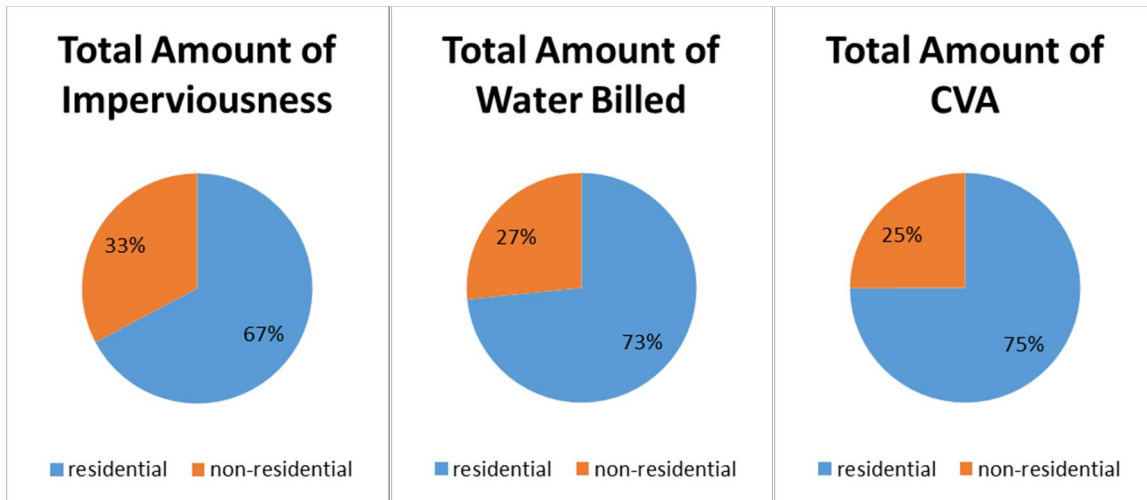
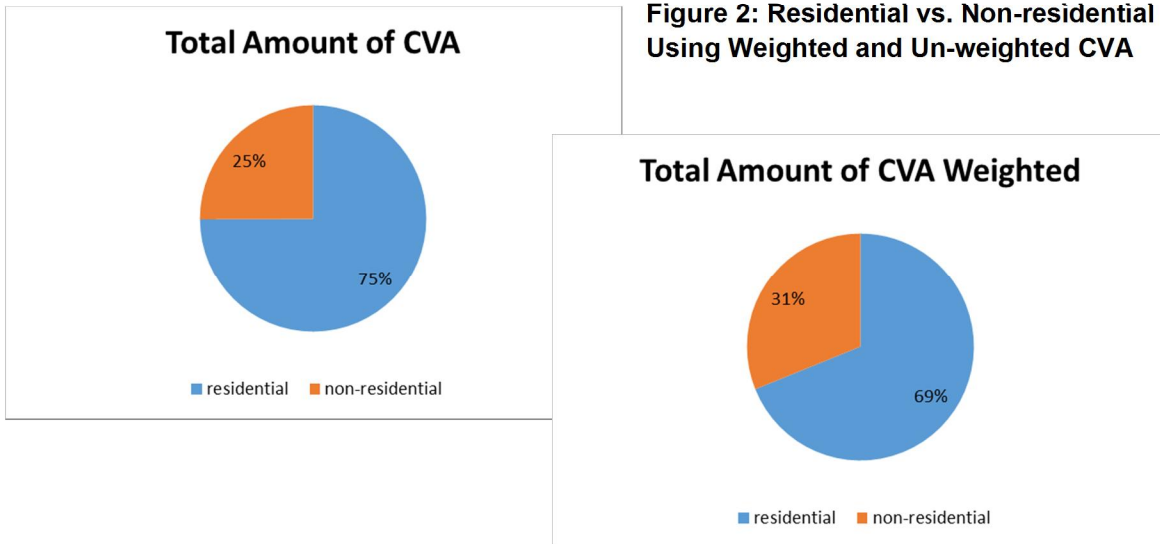


Figure 1: Residential vs. Non-residential Equity Analysis Graphs

The graphs in **Figure 1** use the imperviousness data provided by the City. It has been highlighted during the analysis the existing imperviousness data should be verified, and that the process of data verification could shift the breakdown of residential and non-residential imperviousness. As part of the implementation of a stormwater rate, this data would need to be checked for quality and as a result the values shown in **Figure 1** may change.

2.2 CVA - Weighted versus Un-weighted

To determine if using the weighted assessed value would make a significant difference to the equity analysis, we determined the residential/non-residential breakdown of all properties using the weighted and un-weighted assessed values. As can be seen in **Figure 2**, weighted assessed values to improve the equity to rate payers, but there is still a gap between impervious area and weighted assessment value. Farmland and forested land are excluded from the un-weighted CVA data on the left, but inclusion of these parcels only results a 0.5% shift.



2.3 Rural vs. Urban

The City’s stormwater cost allocation analysis shows that the City spends approximately 20% of its stormwater budget within the rural areas (i.e. ditch and culvert maintenance). The results of the equity analysis showed that rural parcels account for approximately 10% of the total amount of imperviousness within the City of Ottawa; however, they currently fund approximately 1% of the city-wide stormwater costs via the water consumption-based billing. These results show that urban properties contribute the majority of the funding for both the urban and rural programs. The graphs below summarize this equity analysis.

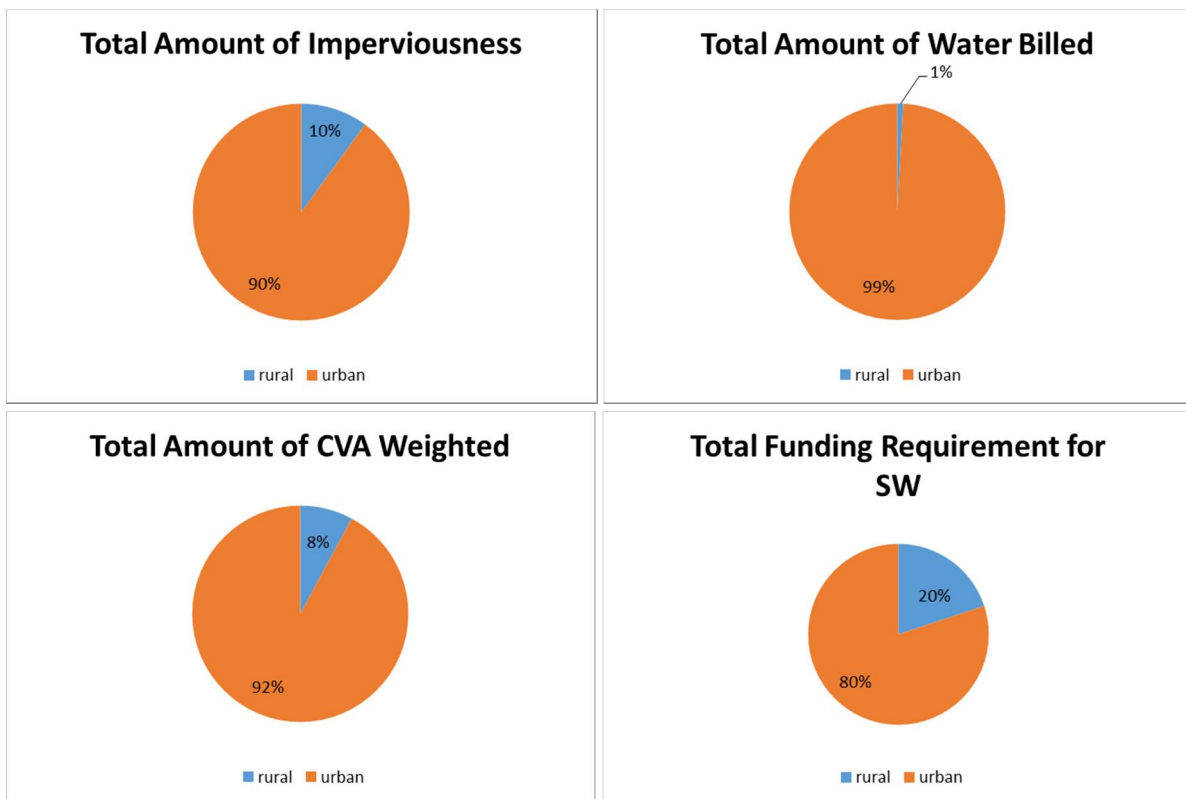


Figure 3: Rural vs. Urban Equity Analysis Graphs

2.4 Considering Assessed Value (CVA)

If CVA (with weighting factor) were used as a basis for stormwater funding rather than water billing, the overall equity gap between rural and urban properties would decrease, as would the equity gap between residential and non-residential land use types. However, it is important to note that it would not resolve the overall gap between residential and non-residential properties or equity between individual properties that have the same imperviousness but are valued differently based on external factors such as proximity to the City centre. Of particular note, multifamily residential units would pay

a relatively high stormwater rate compared to their small “footprint” when compared to larger single family homes.

The same conclusions were drawn with respect to the current water consumption-based billing. The 5,653 residential parcels sampled for the equity analysis were evaluated by comparing their assessed value with their imperviousness and by comparing their potable water consumption with their percent imperviousness to demonstrate the equity gap on a parcel by parcel basis.

The results of this analysis for sampled residential properties are summarized in the graphs depicted in **Figure 4** and **Figure 5**. The green slices in these graphs show the percentage of parcels where a property would pay approximately the same (i.e. +/- 25%) under an impervious based system as they would under the current water billing system or a weighted CVA-based funding system. This gives an indication of the equity of the various systems on a per parcel basis. It also gives an indication of the number of properties that would see a significant change in the amount that they contribute to the City's stormwater program, if the City changed the way it charged for stormwater.

Under the current water billing system, approximately one quarter of the sampled parcels contribute an amount to stormwater funding that is proportional to their demand on the stormwater system (based on imperviousness) compared to 36% under a hypothetical CVA-based system (weighted). Therefore the majority of the parcels (73% under the current water billing system and 64% under a hypothetical weighted CVA-based system) would contribute an amount of stormwater funding that is not at all representative of their demand on the stormwater system based on imperviousness. Some parcels greatly over-contribute and some parcels greatly under-contribute. We therefore conclude that the current billing system and a possible weighted CVA-based system are not equitable on a parcel by parcel basis.

Figure 4: Distribution of Residential Sampled Parcels by % of Total Water Billed / % of Total Imperviousness

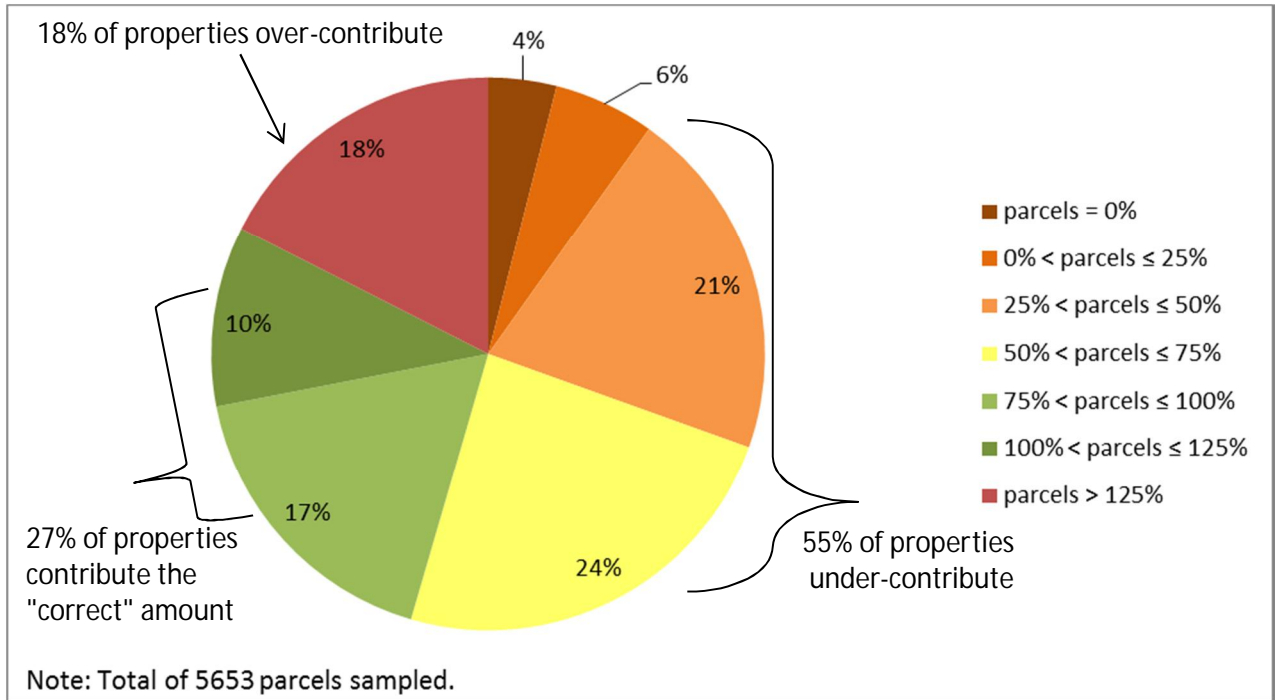
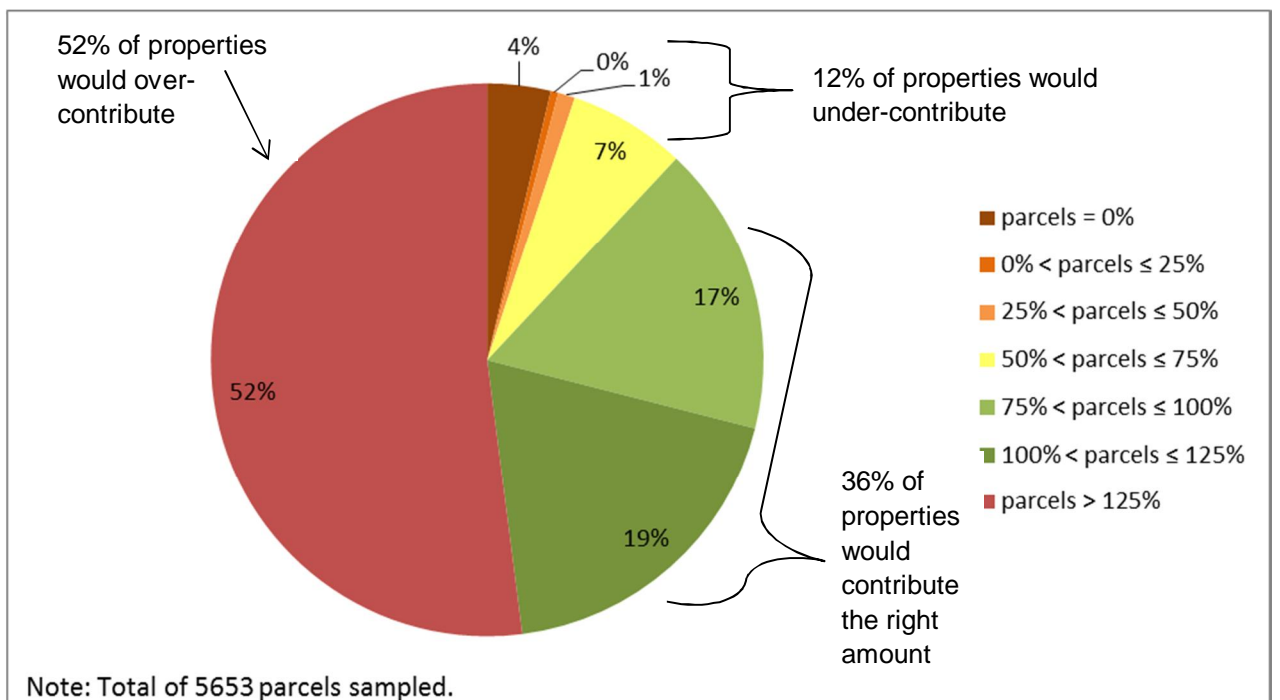
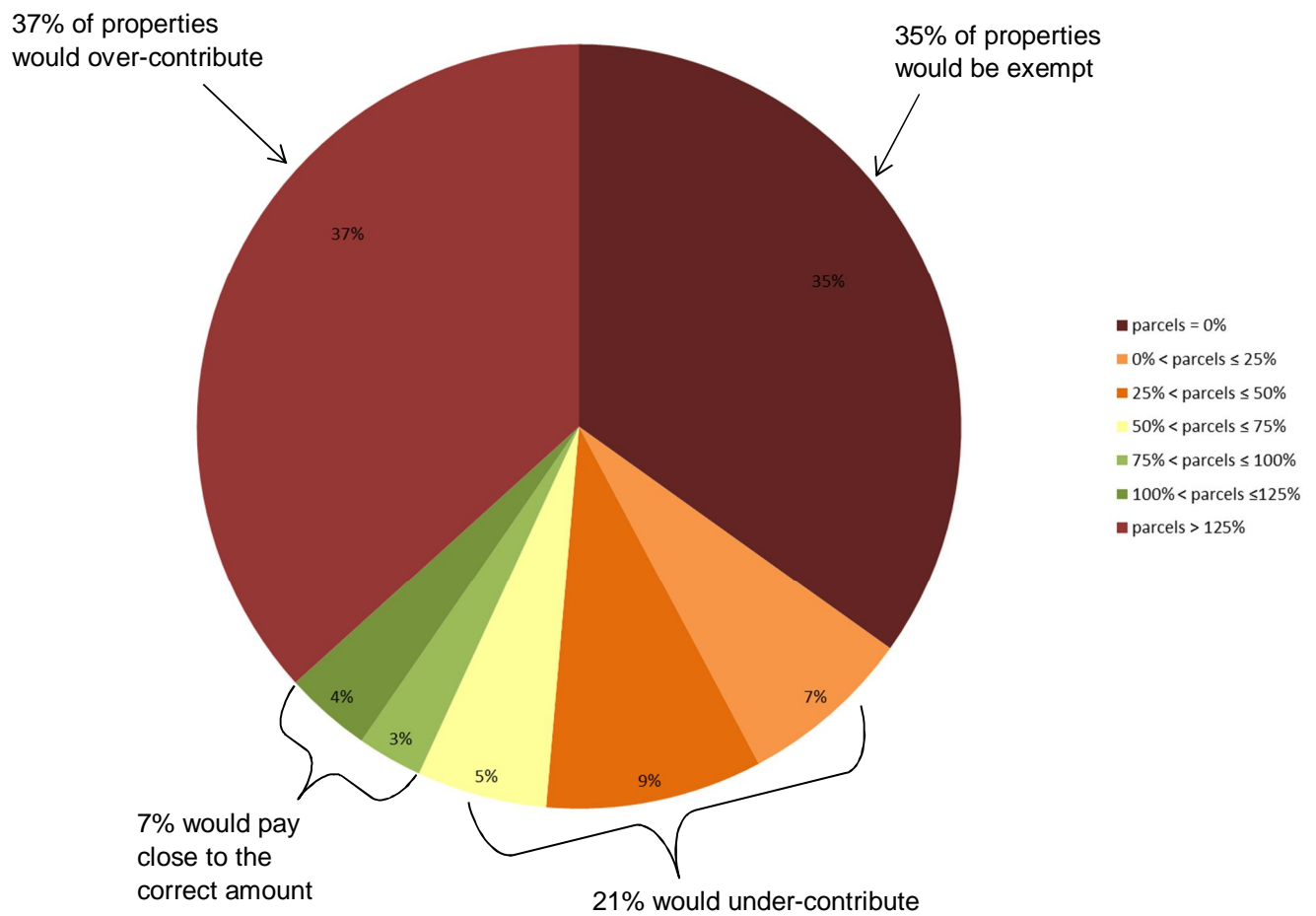


Figure 5: Distribution of Sampled Parcels by % of Total Weighted CVA / % of Total Imperviousness



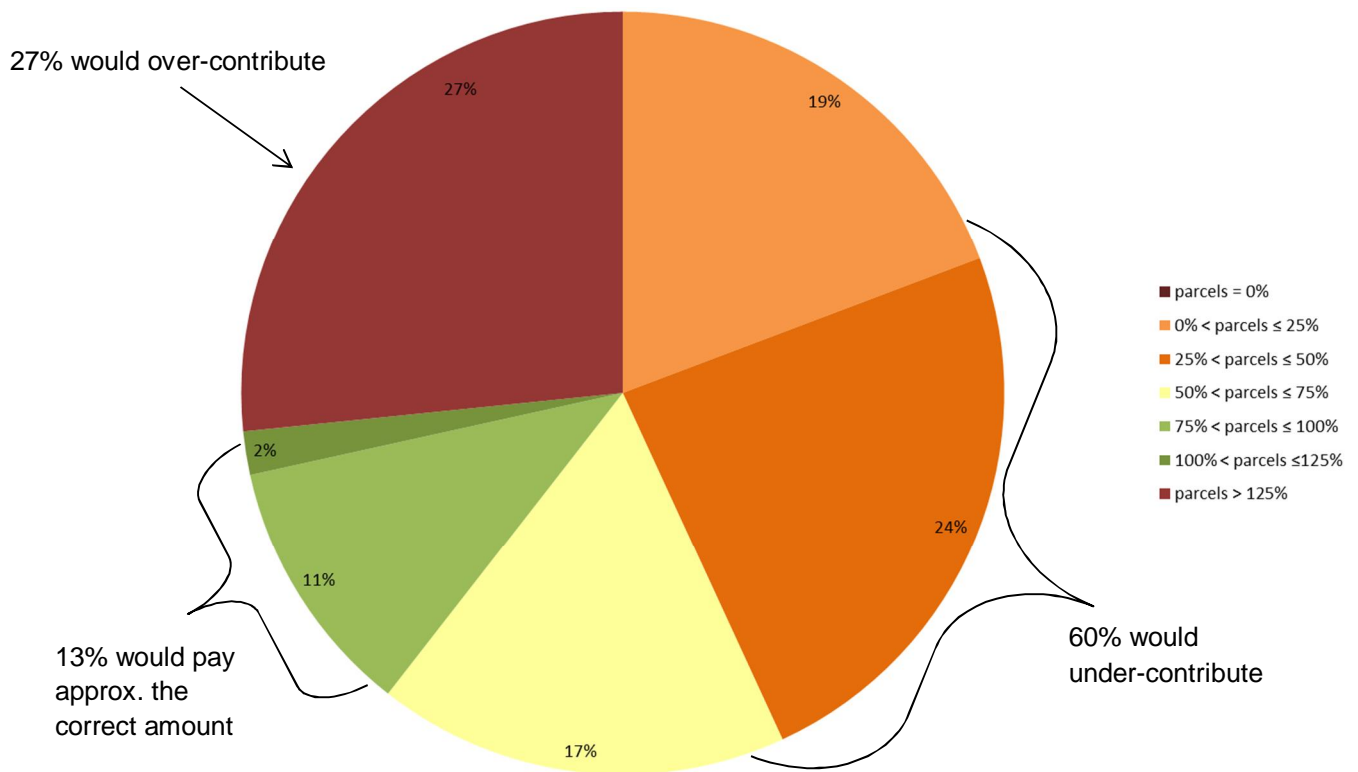
A second sample set of 109 non-residential properties was developed to compare non-residential properties of various business types under a CVA based billing system. The imperviousness of these properties was verified through measurement and the CVA was reviewed for accuracy. If these non-residential properties were charged for stormwater based on their assessed value (weighted CVA) then 35% wouldn't pay a fee at all (since they are exempt) and 37% would pay more than they should (when using imperviousness as a measure of equitable billing). This can be seen in **Figure 6** below.

Figure 6: Distribution of Sampled Parcels by % of Total Weighted CVA / % of Total Imperviousness



If these non-residential properties were charged for stormwater based on their non-weighted assessed value (CVA) then 27% of the properties would significantly overpay, 13% of the properties would pay approximately the right amount and 60% would significantly underpay when comparing to their imperviousness. This is shown in **Figure 7** below.

Figure 7: Distribution of Sampled Parcels by % of Total CVA / % of Total Imperviousness



2.5 Properties without a Direct Connection

A few municipalities also consider whether a property has a direct connection (i.e. storm service) to determine stormwater rates. Municipalities that charge a lower rate for properties without a direct connection include:

- London, ON (25% reduction),
- Victoria, BC (approx. 60% reduction); and
- Waterloo, ON (45% reduction).

However there are other municipalities such as the City of Kitchener that charge every parcel whether they have a direct connection or not. This will be discussed further in the rate portion of the report.

A review of available funding options that could address funding equity and sustainable funding is included in the following section. The analysis was conducted on the basis of billing per dwelling unit, however, the City currently uses water based billing which results in one bill per account/water meter. A meter can supply several dwelling units or alternatively a property such as a parking lot may not have any meter.

2.6 Stormwater Cost Assessment

City of Ottawa staff went through a detailed internal review and assessment to allocate the 2015 budget costs to the urban stormwater and rural stormwater programs. The allocated costs include the costs incurred by the Environmental Services Department, debt servicing costs, capital reserve contributions, and other non-departmental costs such as billing, corporate management administration, program support, other revenue, and direct charges by Public Works for drainage. The 2015 budget stormwater program costs are summarized in **Table 1**.

Table 1: Stormwater Program Allocation Costs

Allocation Category	Urban Storm-water Program (\$ K)	Rural Storm-water Program (\$ K)	Totals (\$ K)
Environmental Services Department			
General Manager's Office	\$ 66	\$ 66	\$ 132
Wastewater Services	\$ 5,292	\$ -	\$ 5,292
Surface Water Management Services	\$ 2,938	\$ 1,064	\$ 4,002
Environmental Engineering Services	\$ 409	\$ -	\$ 409
Environmental Business Services	\$ 277	\$ 77	\$ 354
Other Non Departmental Costs			
Corporate Management Admin	\$ 2,360	\$ 317	\$ 2,678
Program Support	\$ 696	\$ 441	\$ 1,137
Direct Charges			
Public Works	\$ 3,703	\$ 2,039	\$ 5,742
Water Billing	\$ 206	\$ 131	\$ 337
Other Revenue - Wastewater	\$ (344)	\$ (218)	\$ (563)
Debt Servicing Costs	\$ 1,123	\$ -	\$ 1,123
Capital Reserve Contributions (Allocated Based on Capital Needs)	\$ 17,077	\$ 4,490	\$ 21,567
Total	\$ 33,803	\$ 8,407	\$ 42,209
% of Total Storm Programs	80%	20%	100%

As shown in **Table 1**, the rural stormwater program accounts for approximately 20% of the overall storm sewer program costs across Ottawa. These costs do not consider long range funding requirements for all of the City's stormwater infrastructure, as these funding requirements are still being developed by the City.

3. Initial Funding Options

The following options were presented to City staff during the meeting of October 14th, 2015: status quo, modifying the current system to charge all stormwater system users, tax-based system, and a stormwater rate. The options presented with high level advantages and disadvantages are summarized in **Table 2** below.

Table 2: Typical Funding Options Presented October 14th

	Option	Advantages	Disadvantages
1.	Status quo - current system used as is	§ No implementation required § Simplest to administer	§ Inequitable § Decreases in water consumption will reduce available funding but does not affect cost of delivering the service
2.	Tax-based system	§ Existing tax billing system	§ Inequitable § Exempt properties do not pay
3.	Modify current system - charge all users, including well systems	§ Improves equity in that all users contribute § Work within existing bylaw	§ Still many inequities as contribution does not reflect loading on the system § Affects those with a private service
4.	Stormwater rate – land use/averages	§ Improves equity	§ New bylaw § Changes to the billing system
5.	Stormwater rate – impervious measurements	§ Greatest equity of presented options § Encourages residents to reduce their imperviousness	§ New bylaw § Changes to the billing system § Requires GIS work to fill in missing imperviousness data and to review existing impervious data for quality

The tax-based system was not included in further analysis because at amalgamation, Council decided to move the stormwater funding from the tax bill to the water bill and charge it as a fee within the sewer surcharge. Furthermore, on a tax basis, exempt properties such as universities, hospitals and churches would not pay. **Table 3** presents the funding options initially assessed prior to the public consultation process.

Table 3: Funding Options Initially Assessed

No.	Option	Description
1	Flat rate – uniform rate	§ Residential units all pay the same residential flat rate § Non-residential units all pay the same non-residential flat rate
2	Hybrid – tax-based and stormwater rate	§ Rural users fund their program through a tax increase § Urban users fund their programs through a stormwater rate
3a	Stormwater rate – combined land use/averages	§ Residential R1, R2, R3, R3-S, R4-X, and R5 units pay the same as a single family unit stormwater rate § Residential R4 (apartments) units pay a fraction of the average single family unit stormwater rate § Non-residential units pay a stormwater rate based on the parcel size
3b	Stormwater rate – land use/averages	§ Residential users pay rate based on land use type: R1, R2, R3, R3-S, R4, R4-X, R5 § Non-residential units pay a stormwater rate based on the parcel size
4a	Stormwater rate – impervious measurements	§ Users pay a stormwater rate based on the total amount of imperviousness on their parcel
4b	Stormwater rate – land use /averages and impervious measurements	§ Residential users pay rate based on three tiers: tier I – single family detached, tier II – apartment, and tier III - other residential uses § Non-residential units pay a stormwater rate based on the total amount of imperviousness on their parcel

4. Public Consultation

The City undertook a public consultation process in March of 2016 to present and receive feedback on proposed changes to water, wastewater and stormwater funding and rates. The strongest feedback on stormwater rates was received from the rural communities. Comments from rural property owners included:

- A lack of belief that their properties create run-off;
- Ditches and culverts are considered part of the roadways and should be paid for by property taxes;
- The ratio of pervious to impervious area is higher in rural areas and for properties that are on a private well and septic system; and
- The rural areas receive a lower level of service than the urban areas.

We met with City staff following the public consultation process and concluded that:

- Properties with a formal (i.e. piped) sanitary service connection have a higher perceived level of service than properties without a formal service connection; and

- Many rural properties may be self-mitigating. In other words a portion of their stormwater runoff is contained on-site within their undeveloped pervious areas.

5. Revised Funding Options

Due to the feedback derived from the public consultation process and further discussions with City staff, certain funding options were discarded and 2 new funding options were analyzed. The revised options are outlined in **Table 4**.

Table 4: Funding Options Revised and Re-Assessed

No.	Option	Description
1	Flat rate – uniform rate	§ Residential units all pay the same residential flat rate § Non-residential units all pay the same non-residential flat rate
2	Stormwater rate – impervious measurements	§ Users pay a stormwater rate based on the total amount of imperviousness on their parcel
3a	Stormwater rate – Residential: land use averages Nonresidential: impervious measurements	§ Residential users pay rate based on land use type in four tiers § Non-residential units pay a stormwater rate based on the total amount of imperviousness on their parcel
3b	Stormwater rate – Residential: land use averages Nonresidential: impervious measurements Consideration for non-connected properties, location (rural vs urban), and land use (i.e., residential vs industrial, commercial and institutional or “ICI”)	§ Residential users pay rate based on land use type in four tiers § Non-residential units pay a stormwater rate based on the total amount of imperviousness on their parcel § Credits for properties with no sanitary sewer connection: § 30% credit for urban residential properties § 50% credit for rural residential properties § 30% credit for rural ICI properties
3c	Stormwater rate – Residential: land use averages Nonresidential: impervious measurements Consideration for non-connected properties, location (rural vs urban), and land use (i.e., residential vs industrial, commercial and institutional or “ICI”)	§ Residential users pay rate based on land use type in four tiers § Non-residential units pay a stormwater rate based on the total amount of imperviousness on their parcel § Credits for properties with no sanitary sewer connection: § 30% credit for urban residential properties § 50% credit for rural residential properties § 30% credit for rural ICI properties § Uses different Base Annual Rates for Residential and ICI properties

Options 3a – 3c provide increased equity to rural properties and properties with a lower perceived level of service (not directly connected to the sanitary sewer system). Options 3b and 3c provide credits to properties without a sanitary sewer connection based on land use and location.

Base annual stormwater rates were estimated for each of the funding mechanisms, these are summarized in **Table 5**. The detailed rate tables are included in **Table 8, Table 9, Table 10, Table 11, and Table 12**, which are appended to this report. The City reported that it currently has a 99.5%

collection rate on its water billing, so this collection rate was used to project revenues and determine required rates for future billing.

These rates assume that the total stormwater program revenue requirements do not change from the current level of expenditure and are based on 2016 budget figures. If the City of Ottawa has an infrastructure gap, meaning that it does not have sufficient funding to maintain the stormwater system in a sustainable manner, then this gap will not be addressed by switching to a new funding model using the rates below. Once the City quantifies its infrastructure gap, if any, then it will be able to determine what the rates should be to operate, maintain and renew the system sustainably in perpetuity.

The Municipal Property Assessment Corporation (MPAC) codes provided by the City were used to calculate the stormwater rates for the scenarios described. These were then translated back into land use codes for reporting. The reason for using MPAC codes is that the land use data in the GIS database is incomplete, incorrect and/or out of date. Considerable effort would be required to assess and improve the quality of the land use codes associated with individual Parcel Identification Numbers (PINs). Instead of making the effort to improve the land use data, the City could use MPAC codes to categorize parcels for billing.

Options 1 – 3a have a residential/non-residential funding distribution of 67% / 33%. Option 3b applies credits to properties without connection to the sewer system which shifts the funding distribution toward residential properties with a ratio of 68% / 32%. The reason for this shift is that a higher percentage of ICI properties are not connected (note credits are not provided to urban ICI). Option 3c applies credits for properties with connection to the sewer system but retains the 67% / 33% residential/non-residential distribution by using an alternate Base Annual Rate for non-residential properties.

Table 5: Summary of Stormwater Rates for Assessed Revised Options

Land Use Type	Annual Rate Based on 99.5% Collection Rate (\$)					# of Parcels	# of D. Units	
	Option 1	Option 2	Option 3a	Option 3b	Option 3c			
Base Rate	\$ 74.50	\$ 0.4767/m2 impervious	\$ 118.40	\$ 126.90	Res \$ 125.40 Non-Res \$130.02			
R1 - Single detached residential	\$ 74.50	Varies; Avg=118.4	\$ 118.40	\$ 126.90	\$ 125.40	134,864	134,864	
R1 Urban N-C				\$ 88.73	\$ 87.78	6,410	6,410	
R1 Rural N-C				\$ 63.27	\$ 62.70	21,100	21,100	
R2 - Semi detached		Varies; Avg=66.12	\$ 66.12	\$ 70.83	\$ 70.00	16,359	16,359	
R2 Urban N-C				\$ 49.58	\$ 49.00	56	56	
R2 Rural N-C				\$ 35.42	\$ 35.00	10	10	
R3 - Row and Townhouse		Varies; Avg=54.25	\$ 54.25	\$ 58.17	\$ 57.48	101,819	101,819	
R3 Urban N-C				\$ 40.92	\$ 40.24	1,533	1,533	
R3 Rural N-C				\$ 25.62	\$ 28.74	80	80	
R4 - Apartments		Varies; Avg=21.31	\$ 21.31	\$ 22.83	\$ 22.56	3,108	87,403	
R4 Urban N-C				\$ 15.98	\$ 15.79	15	422	
R4 Rural N-C				\$ 11.41	\$ 11.28	36	1,012	
R4 X - Duplex, triplex, single dwelling w apt unit		Varies; Avg=54.25	\$ 54.25	\$ 58.17	\$ 57.48	5,771	10,056	
R4 X Urban N-C				\$ 40.92	\$ 40.24	52	91	
R4 X Rural N-C				\$ 25.62	\$ 28.74	419	730	
R5 - Mobile Home/park		Varies; Avg=118.4	\$ 118.40	\$ 126.90	\$ 125.40	9	180	
R5 - Mobile Home/park Urban N-C				\$ 88.73	\$ 87.78	5	100	
R5 - Mobile Home/park Rural N-C				\$ 63.27	\$ 62.70	43	862	
Residential Subtotal		\$ 28,540,672	\$ 28,540,672	\$ 28,540,672	\$ 28,874,019	\$ 28,540,672	291,689	383,088
Industrial/Comm/ Institutional		\$ 711.28	Varies	0.00403 * (imperv area in m2) * (base rate)	0.00402 * (imperv area in m2) *	0.00402 * (imperv area in m2) *	13,726	n/a
ICI Rural N-C	0.00282 * (imperv area in m2) * (base rate)			0.00282 * (imperv area in m2) *	0.00282 * (imperv area in m2) * (base rate)	5,789	n/a	
Other/Miscellaneous and Undeveloped	excluded from calculations					4,140	n/a	
Other Rural N-C	excluded from calculations					2,933	n/a	
Non-residential Subtotal	\$ 13,880,673	\$ 13,880,673	\$ 13,880,673	\$ 13,547,326	\$ 13,880,673	26,588	n/a	
Total	\$ 42,421,345	\$ 42,421,345	\$ 42,421,345	\$ 42,421,345	\$ 42,421,345	318,277	n/a	

Note:

1. N-C identifies properties not connected to the sanitary sewer system.

The funding options were reviewed by AECOM in consultation with the City of Ottawa's Billing and Assessment Group to identify implementation considerations. Their comments are included throughout the following sections.

The advantages and disadvantages of each option are summarised in **Table 7**.

5.1 Option 1 – Flat Rate

For the flat uniform rate method, the impervious base unit was derived from the statistical sampling of all residential land use types. The estimated base rates for this option were calculated by assigning all residential units a rate factor of 1, which corresponds to one billing unit per dwelling unit (flat rate for residential).

The flat rate for the non-residential parcels was determined by defining a proportional rate factor representative of the total impervious area attributed to non-residential uses. The factor was calculated by dividing the fraction of non-residential impervious area over total impervious area by the average impervious area per residential unit. This yielded a rate factor of 16.6 for the non-residential parcels (flat rate for non-residential). Parcels coded as O-Other land use were not included in the contribution calculations. Detailed calculations are included in **Table 8**.

If it is assumed that the City collects 99.5% of fees billed, a Base Annual Rate of \$74.50 is required to collect the \$42 million necessary to fund the current stormwater programs. The Base Annual Rate is multiplied by the rate factor and applied to a unit's bill as a fixed rate service. The annual flat rate for non-residential units is \$711.28.

The Billing and Assessment Group considers that this option is very easy to implement. All the data required are readily available and no software upgrades are required. The main disadvantages with this approach is perceived inequity.

The rate factors for this option are based on the assumption that all parcels in the City are billed a flat rate, with the exception of the parcels currently coded O-Other. If this is not the case, the non-residential factor and Base Annual Rate should be adjusted to account for the reduction of contributors. The rate defined is also based on the assumption that parcels that benefit from general tax exemptions are not exempted from paying the stormwater contribution. Farmland and forested land parcels are included in the analysis of the impervious rate options. These are included in the ICI land use category and have an insignificant impact on the rate calculations, accounting for less than 0.2% of the total impervious area.

The Billing and Assessment Group indicated that the flat rates should be applied based on the tax codes, such as RT, MT, NT for residential.

5.2 Option 2– Stormwater Rate – Impervious Measurements

Option 2 was developed to assess the implementation of a stormwater rate based on impervious measurements for residential and non-residential properties.

The total stormwater funding required was divided by the City-wide imperviousness measurement to generate a stormwater rate per impervious area in square meters. Based on a billing collection rate of 99.5%, a Base Annual Rate of \$0.48/m² of total imperviousness is required to collect the required \$42 million to fund the stormwater programs. Under this funding system, an average single family detached home would pay \$118.40 per year while a large shopping centre would pay approximately \$73,448 in annual stormwater fees. Detailed calculations are included in **Table 9** and rate examples are included in **Table 13**.

The City's database includes impervious measurements for the majority of developed urban parcels but currently does not include information for all parcels, particularly in the rural areas. Each parcel's imperviousness must be measured to implement this funding mechanism and to ensure equity.

Based on our discussion with the Billing and Assessment Group, it would be difficult to implement this method. Utility bills for parcels that do not currently receive water bills could be generated using the PIN to roll number relationship currently being generated by the City. However, the concern with this method is that it relies heavily on data generated by the City for analysis purposes rather than funding purposes. Its success would rely on the quality of the total imperviousness measurements. The City must be confident in the quality of the data collected and calculated since data that has not been closely controlled or reviewed would result in customer complaints associated with incorrect billing due to calculated impervious areas. Although this method could be implemented using the systems currently in place, it will require additional human and financial resources to maintain an accurate imperviousness database and to link this database to the water billing system. At this time, the imperviousness data in the City's database is incomplete. Considerable effort is required to complete the imperviousness database and review the quality of the data.

This method is advantageous in that it is generally considered to be the most equitable of all options assessed. In addition, a credit program could be adopted that provides an incentive for parcel owners to reduce the total imperviousness by implementing best management practices. Should the City wish to implement a credit system, additional human and financial resources would be required to manage the system. If the City chose to implement a credit program, a mechanism would be required to adjust rates to ensure that the funding mechanism continues to be self-sustaining.

5.3 Option 3 - Stormwater Rate – Land Use /Averages (Residential) and Impervious Measurements (Non-residential)

Option 3 is a stormwater rate based on the average imperviousness for each given land use with non-residential fees based on the total measured impervious area. The actual land use for a given property can be classified using the City's land use code or the MPAC property code. Land use codes are commonly used within the City and have been referred to in this document. The MPAC property code may be preferred since it identifies properties with multiple uses (i.e. mixed commercial-residential or mixed agricultural-residential), whereas some of the properties within the City's existing land use code database may be incorrectly coded and are typically only updated every 5 years. For our analysis, we primarily used MPAC property codes and translated them back to land use codes.

The average imperviousness for single family and mobile homes was found to be similar, as were R3 and R4-X, so tiers were added to the residential land uses to combine these types. A rate factor of 1 was applied to the combined R1/R5 residential category. Using statistical analysis, AECOM estimated this residential category to have an average impervious area of 248 m² per dwelling unit. The rate factors for the other residential types (R2, R3, R4, R5) were calculated by dividing the average impervious area of the dwelling units for a given residential type by the base impervious area for the combined residential uses (248 m²). This yielded the following rate factors for the other residential categories:

- Tier 1: 1.00
- Tier 2: 0.56
- Tier 3: 0.46
- Tier 4: 0.18

5.3.1 Option 3a – Base Option

Based on a billing collection rate of 99.5%, a Base Annual Rate of \$118.40 is required to collect the required \$42 million to fund the stormwater programs. Like Option 2, most residential dwelling units would contribute \$118.40 per year while R4 dwelling units would contribute \$21.31 per year. Similar to Option 2, non-residential users pay a stormwater rate proportional to the total impervious area on their parcel. To calculate the non-residential stormwater rate, the rate factor of 0.00403 is multiplied by the parcel's impervious area in meters square and by the Base Annual Rate of \$118.40. Detailed calculations are included in **Table 10**.

This option would be considered more equitable than Option 1 as different residential land uses would pay different amounts. However, there is also variability in the imperviousness between different properties with the same land use, as shown in **Figure 8**, which was generated by the City of Ottawa using the land use database. This option would charge the same rate to two dwelling units with the same land use, regardless of their size and imperviousness. Therefore some residents may consider it inequitable as a small house with a landscaped yard would pay the same as a large house with significant outdoor paved areas.

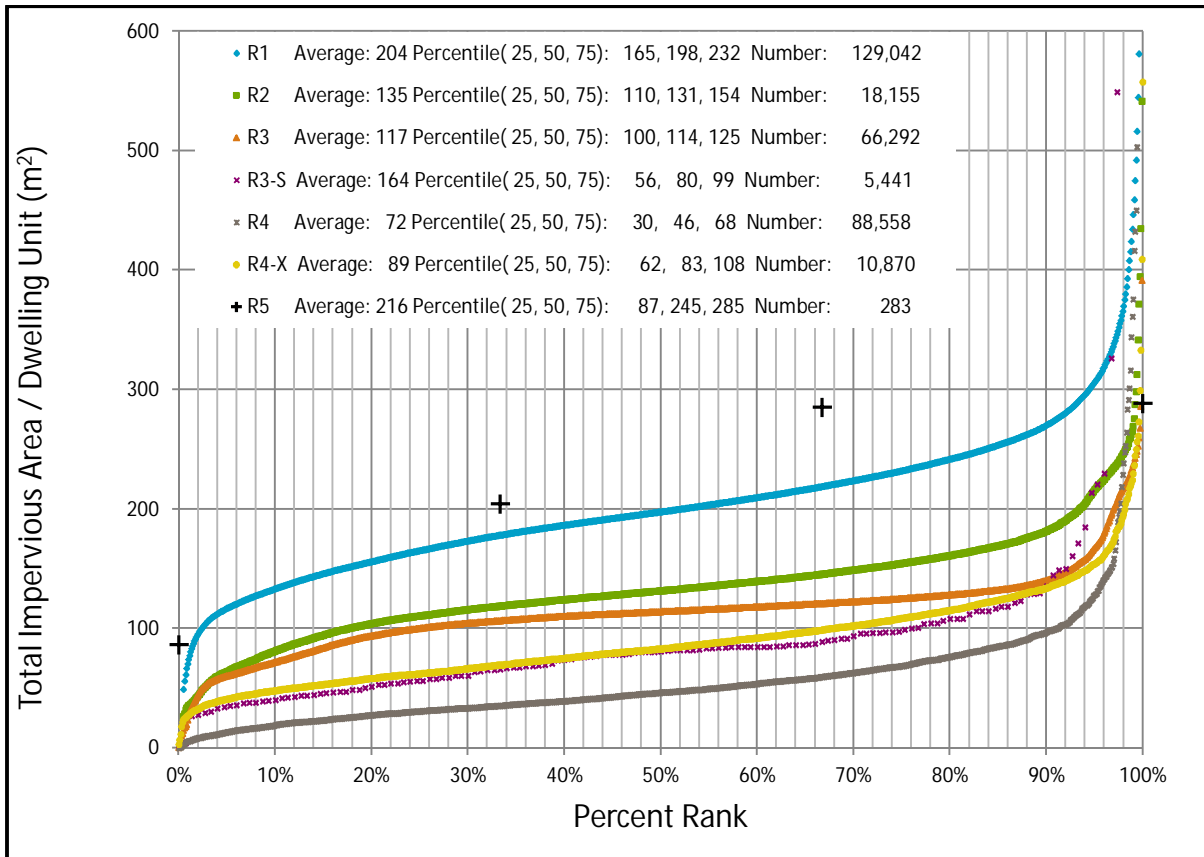


Figure 8: Distribution of Residential Properties by Total Impervious Area (Source: City of Ottawa)

Based on our discussion with the Billing and Assessment Group, it would be relatively easy to implement the billing for this option. Utility bills for parcels that do not currently receive water bills could be generated using the PIN to roll number relationship currently being generated by the City.

The success of this funding method relies on the quality of the data used to categorize a property. Land use data that have not been closely controlled or reviewed could result in customer complaints associated with incorrect billing resulting from inaccurate land use codes. Based on AECOM’s review of the data provided by the City, additional review is required to fill in gaps in the data and to correct land uses that were not properly coded. Alternatively, the City could use MPAC property codes which generally have a higher level of scrutiny and hence accuracy. Although this method could be implemented using the systems currently in place, it is associated with additional labour requirements to maintain an accurate land use database (if land use codes are used) and to link the land use/MPAC database to the water billing system.

This option also provides an incentive for non-residential parcel owners to reduce the total imperviousness by implementing best management practices. As noted for Option 2, this could lead to requests for a credit program but would allow for consideration of non-residential properties that have installed stormwater facilities such as detention ponds. Typically these

credits are only given when the property provides evidence of the construction (record drawings), operation (monitoring report) and maintenance (inspection report) of the facility.

The same limitations and requirements identified for Option 2 for the impervious database apply to Options 3a-3c. This option is more advantageous than Option 2 since it does not require quality control of the entire impervious data set and also reduces the potential of questions and complaints from residential users who could question the impervious area calculated for their parcels.

5.3.2 Option 3b – Reduced Rates for Properties without a Direct Stormwater Connection

During the public consultation process, it was communicated by rural residents that rural properties tend to be larger than urban properties with more green space in which to absorb any stormwater run-off from hard surfaces. It was therefore argued that rural properties without a direct connection were even less likely than urban properties without a direct connection to have any stormwater run-off from private property reach the road-side ditches. When we looked at the percentage of impervious surface for the average single family dwelling (R1) for the City of Ottawa, we found:

- Urban: 39%
- Village: 12%
- Greenbelt: 10%
- Rural: 7%

It should be noted that the percentages above are based on preliminary data provided by the City and the data has not been verified particularly in the rural areas, because the City does not have accurate GIS mapping of the rural areas. Also the percentages above indicate the ratio of impervious to pervious areas. It is not necessarily a good indication of total impervious area (i.e. square metres). For instance a rural property may have a ratio of imperviousness to pervious of only 10% and an urban property may have a ratio of imperviousness of 50% but if the rural property is 1 hectare (10,000 m²) in size and the urban property is only 400 m² in size then the rural property actually has greater impervious area. The rural property may (depending on the grades, soil and positioning of the property) contribute less to the municipal stormwater system than the urban property.

In recognition of the observation that rural areas have a larger pervious to impervious ratio on average, as would urban residents that have a private septic system requiring a larger pervious area for the septic bed, we developed another funding option for consideration that gives a discount to urban properties without a direct stormwater connection and a larger discount to rural properties without a direct stormwater connection.

Rural residential properties without a sanitary sewer connection receive a 50% credit on the Base Annual Rate and urban residential properties without a connection receive a 30% credit on the Base Annual Rate. Urban ICI properties do not receive a credit and rural ICI properties without a connection receive a 30% credit. As discussed with Option 3a, the City still needs to collect the \$42 million required to fund the stormwater programs, and therefore the rate for connected properties must increase to account for the lower contribution from properties without a direct

connection. As a result of the credits provided to not connected properties, the funding distribution changes from 67% residential and 33% non-residential (Option 3a) to 68% residential and 32% non-residential.

For the purposes of this analysis, rural properties are defined as those served by a volunteer fire department and urban properties are defined as those served by a paid fire department.

Based on a billing collection rate of 99.5%, a Base Annual Rate of \$126.90 is required to collect the required \$42 million to fund the stormwater programs. Most residential dwelling units would contribute \$126.90 per year while R4 dwelling units would contribute \$22.83 per year. Properties without a sanitary sewer connection would receive the credits outlined above. Similar to Options 2, and 3a, non-residential users pay a stormwater rate proportional to the total impervious area on their parcel. To calculate the non-residential stormwater rate, the rate factor of 0.00402 is multiplied by the parcel's impervious area in meters square and by the Base Annual Rate of \$126.90. Detailed calculations are included in **Table 11**, the rates in this table account for not connected credits.

5.3.3 Option 3c – Reduced Rates for Properties without a Direct Stormwater Connection

Option 3c is the same as Option 3b, the only change is that different Base Annual Rates for residential and non-residential properties are used in order to apply credits and retain a funding distribution of 67% residential and 33% non-residential. This can be seen in **Table 12**, where the Base Annual Rate drops to \$125.40, but the non-residential Base Annual Rate increased to \$129.37).

Based on a billing collection rate of 99.5%, a residential Base Annual Rate of \$125.40 is required to collect the required \$42 million to fund the stormwater programs. Most residential dwelling units would contribute \$125.40 per year while R4 dwelling units would contribute \$22.56 per year. Properties without a sanitary sewer connection would receive the credits outlined above. Similar to Options 2, and 3a, non-residential users pay a stormwater rate proportional to the total impervious area on their parcel. To calculate the non-residential stormwater rate, the rate factor of 0.00402 is multiplied by the parcel's impervious area in meters square and by the non-residential Base Annual Rate of \$130.02. Detailed calculations are included in **Table 12**, the rates in this table account for not connected credits.

6. Implementation Costs of Funding Options

Stormwater funding implementation and administration requirements for each of the six options developed above has been outlined and are summarized in **Table 6**. The labour costs associated with these requirements have been estimated in full-time equivalent (FTE) staff units. Based on

information provided by the City, the average cost for an FTE for the water billing group is approximately \$80,000. It is important to note that the estimated costs are additional costs and that they do not consider the existing costs of administering the tax or water billing systems.

The cost estimates below are based on the following assumptions:

- the City has decided on the option to be implemented and how properties will be classified (i.e. no further reassessment of options is included in the estimate);
- Aerial photography and digitization of impervious area for rural areas not included;
- Options will use the existing water billing system. The City would only need to modify existing billing systems rather than develop a new one. The flexibility of the existing billing systems will need to be reviewed in further detail to more accurately quantify the implementation effort required;
- The implementation work will be completed by internal City staff with an annual average labour cost of \$80,000 per year;
- The average staff member is only available to work 80% of the time in consideration of vacation, sick time, statutory holidays etc; and
- A credit program for on-site stormwater management facilities (e.g., BMPs) is not being considered at this time.

A BMP credit program would typically only be considered for Options 2 and 3. The cost of developing and maintaining a credit program will depend on the type of program (i.e. who is eligible and for what measures).

One of the significant costs of implementation is responding to inquiries once property owners see for the first time, a new fee on their tax or water bill. Ottawa has about 290,000 properties. It is assumed that between 5-20% will call in to inquire about the new fee, depending on the complexity of the fee and the extent and effort communicating the new fee structure to ratepayers in advance of initial billing. If the average call takes 5 minutes to address the concerns then the total amount of time required will be 1200 – 4800 hours. This corresponds to about 0.6 – 2.4 FTEs.

Based on the labour estimates in **Table 6**, Option 1 has an implementation cost of \$60,000 and \$20,000 for on-going running of the program. Option 2 is estimated to cost approximately \$272,000 to implement and is expected to incur \$50,000 for ongoing administration. Options 3a – 3c are expected to have similar setup and maintenance costs of approximately \$210,000.

Table 6: Implementation and Administration Requirements

No.	Option	Implementation and Administration Requirements	Estimated Labour Cost
1	Flat rate – uniform rate	<ul style="list-style-type: none"> § 2 weeks to set-up a new line item on the tax bill, if desired § 3 weeks to determine the new stormwater rates based on SW budget and # of billing units § 1 week to assign stormwater rate to all parcels § 2 weeks to add tax-exempt properties (anticipated that they will pay the stormwater fee) § 1 week to document procedures for new staff and subsequent billing cycles § 4 weeks to prepare communication to property owners on the new stormwater line item on tax bill § 2 weeks of work over a month for test billing § 4 people for 4 weeks to respond to billing questions on the new rate § 2 weeks each year to determine the new stormwater rate per unit of CVA based on total CVA and total revenue requirements (i.e. stormwater budget) and confirm any new tax exempt properties that need to be added to the stormwater fee § 1 week each year to assign stormwater rate to all parcels § 2 people for 4 weeks each year to respond to billing questions 	<p>Setup: 0.75 FTE Maint.: 0.26 FTE</p>

No.	Option	Implementation and Administration Requirements	Estimated Labour Cost
2	Stormwater rate – impervious measurements	<ul style="list-style-type: none"> § 24 weeks to measure impervious area for all parcels and conduct quality review of data § 3 weeks to determine the new stormwater rates based on SW budget and # of billing units § 6 weeks to assign stormwater rates based on imperviousness § 4 weeks to modify existing water rate by-law § 4 weeks to create utility bills for properties that don't currently receive a water bill § 5 weeks to finalise the master billing file (account matching etc.) § 2 weeks of work over a month for test billing § 4 weeks to document procedures for new staff and subsequent billing cycles § 6 weeks to modify and communicate new processes to collect and input imperviousness data for all new development § 6 weeks to prepare general communication to property owners on the new stormwater line item § 6 weeks to prepare information and communicate to properties that will be significantly impacted by the new rate (i.e. malls, airport etc.) § 12 people 8 weeks to respond to billing questions on the new rate § 4 weeks each year to review and update database as properties develop or when properties contest their impervious calculation § 4 weeks each year to determine the new stormwater rates § 2 weeks each year to add new properties that are not captured through the water bill (i.e. no water meter) § 2 people for 8 weeks each year to respond to billing questions § 2 months every 5-10 years to review rate factors (not budgeted here) § Implementing a credit program would require additional resources (not budgeted here) 	<p>Setup: 3.4 FTE Maint.: 0.62 FTE</p>

No.	Option	Implementation and Administration Requirements	Estimated Labour Cost
<p>3a & 3b & 3c</p>	<p>Stormwater rate – impervious measurements (non-residential) and land use/averages (residential)</p>	<p>§ 12 weeks to measure impervious area for all ICI parcels and conduct quality review of data</p> <p>§ 4 weeks to update MPAC property codes or land use codes (res) and conduct quality review of database</p> <p>§ 3 weeks to determine the new stormwater rates based on SW budget and # of billing units</p> <p>§ 5 weeks to assign stormwater rates based on imperviousness/land-use</p> <p>§ 4 weeks to modify existing water rate by-law</p> <p>§ 4 weeks to document procedures for new staff and subsequent billing cycles</p> <p>§ 4 weeks to create utility bills for properties that don't currently receive a water bill</p> <p>§ 4 weeks to finalise the master billing file (account matching etc.)</p> <p>§ 2 weeks of work over a month for test billing</p> <p>§ 6 weeks to modify and communicate new processes to collect and input imperviousness/land use/MPAC data for all new development</p> <p>§ 6 weeks to prepare general communication to property owners on the new stormwater line item</p> <p>§ 6 weeks to prepare information and communicate to properties that will be significantly impacted by the new rate (i.e. malls, airport etc.)</p> <p>§ 6 people 8 weeks to respond to billing questions on the new rate</p> <p>§ 4 weeks each year to review and update database as properties develop or when properties contest their impervious calculation or land use/MPAC code</p> <p>§ 4 weeks each year to determine the new stormwater rates</p> <p>§ 2 weeks each year to add new properties that are not captured through the water bill (i.e. no water meter)</p> <p>§ 2 people for 7 weeks each year to respond to billing questions</p> <p>§ 2 months every 5-10 years to review rate factors (not budgeted here)</p> <p>§ Implementing a credit program would require additional resources (not budgeted here)</p>	<p>Setup: 2.6 FTE Maint.: 0.58 FTE</p>

7. Summary of Funding Options

Based on the assessment completed by AECOM, Options 1 to 3c all offer a more robust funding mechanism to the City than the current sewer surcharge and water billing system. Option 1 is the easiest option to implement, but is also considered to be one of the least equitable.

Of the options considered, Option 2 is the most equitable but also the most data-intensive, would likely result in the most queries and complaints about impervious measurements and whether their property (particularly in rural areas) drains to the municipal stormwater system and could result in the most requests for a credit program. Option 3 was developed as an alternative to balance equity and ease of implementation. The results of the options analysis are summarized in **Table 7**.

In consideration of feedback received during the public consultation process, Options 3b and 3c were added to reduce the rates for properties not connected to the public sanitary sewer system.

To understand the financial implications for a given property associated with each of these options, AECOM has reviewed a dozen typical properties and calculated the stormwater rate that would be applied based on each system. The stormwater allocations for existing conditions (status quo) were considered to be 18% of total funds raised from water/sewer rates.

Table 13, which is appended to this brief, includes the stormwater rates for the sampled properties. As shown in **Table 13**, Options 2 to 3c generally result in increases for the non-residential parcels, while Option 1 results in increases for rural residential users and reductions for the majority of other users.

To successfully implement a stormwater rate for users, AECOM believes that it is important to reduce the sewer surcharge currently applied to utility bills and to notify users that this change has occurred.

As previously noted, the current water billing funding mechanism is not considered to be equitable or sustainable. A funding system based on assessed value was reviewed as part of the equity review. It was concluded that the status quo and the CVA-based systems were not equitable. Based on discussions with the City, AECOM reviewed alternative funding options which are all considered sustainable funding sources. As indicated in **Table 7**, Option 3 appears to offer the most favourable options in terms of equity, ease of implementation, and setup costs. The desired option for the City of Ottawa should be reviewed with City staff and elected officials.

Table 7: Advantages and Disadvantages of the Revised Funding Options

No.	Option	Advantages	Disadvantages
1	Flat rate – uniform rate	<ul style="list-style-type: none"> § Existing billing system § Funding dedicated to infrastructure § Low effort to implement and maintain billing system § Sustainable funding source 	<ul style="list-style-type: none"> § Inequitable/ no relation to service provided § No incentive to reduce their load on the system
2	Stormwater rate – impervious measurements	<ul style="list-style-type: none"> § Most equitable/user-pay § Dedicated funding § Can be used for all SW functions § Provides incentive to reduce loading on the system § Sustainable funding source that is not affected by water consumption trends 	<ul style="list-style-type: none"> § “New fee” § Large fee change to some properties (compared to flat rate charge) § Higher set-up and administration cost: significant human and financial resources required to collect and review total impervious data § Potential for complaints if customers disagree with the impervious measurements or whether their property drains to the municipal stormwater system (particularly in rural areas) § Credit program would certainly be requested by users who implement best management practices. Human and financial resources required to administer credit program
3a	Stormwater rate – impervious measurements (non-residential) and land use/averages (residential)	<ul style="list-style-type: none"> § More equitable/ user- pay § Relatively easy to implement for residential users § Dedicated funding § Can be used for all SW functions § Provides some incentive for non-residential users to reduce loading on the system § Sustainable funding source that is not affected by water consumption trends 	<ul style="list-style-type: none"> § “New fee” § Large fee change to some properties (compared to flat rate charge) § Moderate set-up and administration cost: human and financial resources required to collect and review total impervious data for non-res properties § Potential for complaints if customers disagree with the impervious measurements § Credit program would certainly be requested by non-residential users who implement best management practices. Human and financial resources required to administer credit program
3b	Stormwater rate – impervious measurements (non-residential) and land use/averages (residential); varying credits for properties with no sanitary sewer connection	<ul style="list-style-type: none"> § More equitable/ user- pay § Relatively easy to implement for residential users § Dedicated funding § Can be used for all SW functions § Provides some incentive for non-residential users to reduce loading on the system § Sustainable funding source that is not affected by water consumption trends § More equitable than Option 3a 	<ul style="list-style-type: none"> § “New fee” § Large fee change to some properties (compared to tax-based charge) § Moderate set-up and administration cost: human and financial resources required to collect and review total impervious data for non-res parcels § Potential for complaints if customers disagree with the impervious measurements § Credit program would certainly be requested by non-residential users who implement best management practices. Human and financial resources required to administer credit program § Higher Base Annual Rate than Option 3a
3c	Stormwater rate – Option 3b with frozen residential / non-residential funding ratio	<ul style="list-style-type: none"> § More equitable/ user- pay § Relatively easy to implement for residential users § Dedicated funding § Can be used for all SW functions § Provides some incentive for non-residential users to reduce loading on the system § Sustainable funding source that is not affected by water consumption trends § More equitable than Option 3a 	<ul style="list-style-type: none"> § “New fee” § Large fee change to some properties (compared to tax-based charge) § Moderate set-up and administration cost: human and financial resources required to collect and review total impervious data for non-res parcels § Potential for complaints if customers disagree with the impervious measurements § Credit program would certainly be requested by non-residential users who implement best management practices. Human and financial resources required to administer credit program § Higher Base Annual Rate than Option 3a § Alternate billing Base Annual Rate used for residential and non-residential

Appendix A

Rate Tables

Table 8: Option 1 – Flat Rate

Land Use Type	Number of Parcels	Dwelling Units (d.u.)	Est'd Impervious Area (m ²)		Rate Factor	Annual Service Flat Rate (\$)	Annual Service Flat Rate Based on 99.5% Collection (\$)	Funding Distribution (%)
			Total	Avg/d.u.				
Tier I - Single Family Detached (R1 & R5)	162,431	163,517	40,612,829	248.4	1.0	74.13	74.50	29%
Tier II - Semi detached (R2)	16,425	16,425	2,278,148	138.7	1.0	74.13	74.50	3%
Tier III - Multi Family Residential (R3 & R4 X)	109,674	114,309	13,009,613	113.8	1.0	74.13	74.50	20%
Tier IV - Apartments (R4)	3,159	88,837	3,971,014	44.7	1.0	74.13	74.50	16%
Residential Subtotal	291,689	383,088	59,871,603	156.3		28,397,969	28,540,672	67%
Industrial/Comm/ Institutional	19,515	n/a	29,118,379	n/a	9.5	707.73	711.28	33%
Other/Miscellaneous and Undeveloped	7,073		excluded from calculations		excluded from calculations	excluded from calculations	excluded from calculations	excluded from calculations
Non-residential Subtotal	26,588	n/a	29,118,379	n/a	n/a	13,811,269	13,880,673	33%
Total	318,277	n/a	88,989,982	n/a	n/a	42,209,238	42,421,345	100%
					Base Annual Rate (\$)	74.13	74.50	

Notes:

1. Dwelling units for R4 and R5 were estimated. Other, miscellaneous and undeveloped parcels (O-Other) were excluded from the calculations.

Table 9: Option 2 – Stormwater Rate – Impervious Measurements

Land Use Type	Number of Parcels	Dwelling Units (d.u.)	Est'd Impervious Area (m ²)		Average Annual Stormwater Rate (\$)	Annual Rate Based on 99.5% Collection (\$)	Funding Distribution (%)	
			Total	Avg/d.u.				
Tier I - Single Family Detached (R1 & R5)	162,431	163,517	40,612,829	248.4	117.81	118.40	46%	
Tier II - Semi detached (R2)	16,425	16,425	2,278,148	138.7	65.79	66.12	3%	
Tier III - Multi Family Residential (R3 & R4 X)	109,674	114,309	13,009,613	113.8	53.98	54.25	15%	
Tier IV - Apartments (R4)	3,159	88,837	3,971,014	44.7	21.20	21.31	4%	
Residential Subtotal	291,689	383,088	59,871,603	156.3	28,397,969	28,540,672	67%	
Industrial/Comm/ Institutional	19,515	n/a	29,118,379	n/a	13,811,269	13,880,673	33%	
Other/Miscellaneous and Undeveloped	7,073		excluded from calculations		excluded from calculations	excluded from calculations	excluded from calculations	
Non-residential Subtotal	26,588	n/a	29,118,379	n/a	13,811,269	13,880,673	33%	
Total	318,277	n/a	88,989,982	n/a	42,209,238	42,421,345	100%	
					Base Annual Rate (\$/m2 impervious)	0.4743	0.4767	

Notes:

1. Dwelling units for R4 and R5 were estimated. Other, miscellaneous and undeveloped parcels (O-Other) were excluded from the calculations.

Table 10: Option 3a – Stormwater Rate – Non-Res Imperviousness, Res Land Use Averages

Land Use Type	Number of Parcels	Dwelling Units (d.u.)	Est'd Impervious Area (m ²)		Rate Factor	Annual Stormwater Rate (\$)	Annual Rate Based on 99.5% Collection (\$)	Funding Distribution (%)	
			Total	Avg/d.u.					
Tier I - Single Family Detached (R1 & R5)	162,431	163,517	40,612,829	248.4	1.00	117.81	118.40	46%	
Tier II - Semi detached (R2)	16,425	16,425	2,278,148	138.7	0.56	65.79	66.12	3%	
Tier III - Multi Family Residential (R3 & R4 X)	109,674	114,309	13,009,613	113.8	0.46	53.98	54.25	15%	
Tier IV - Apartments (R4)	3,159	88,837	3,971,014	44.7	0.18	21.20	21.31	4%	
Residential Subtotal	291,689	383,088	59,871,603	156.3		28,397,969	28,540,672	67.279%	
Industrial/Comm/ Institutional	19,515	n/a	29,118,379	n/a	0.00403 * (imperv area in m2) * (base rate)	13,811,269	13,880,673	33%	
Other/Miscellaneous and Undeveloped	7,073		excluded from calculations		excluded from calculations	excluded from calculations	excluded from calculations	excluded from calculations	
Non-residential Subtotal	26,588	n/a	29,118,379	n/a	n/a	13,811,269	13,880,673	33%	
Total	318,277	n/a	88,989,982	n/a	n/a	42,209,238	42,421,345	100%	
						Base Annual Rate (\$)	117.81	118.40	

Notes:

1. Dwelling units for R4 and R5 were estimated. Other, miscellaneous and undeveloped parcels (O-Other) were excluded from the calculations.
2. No credits for properties without a direct sanitary sewer connection.

Table 11: Option 3b – Stormwater Rate – Non-Res Imperviousness, Res Land Use Averages – Credits Based on Sewer Connection and Location

Land Use Type	Number of Parcels	Dwelling Units (d.u.)	Est'd Impervious Area (m ²)		Rate Factor	Annual Stormwater Rate (\$)	Annual Rate Based on 99.5% Collection (\$)	Funding Distribution (%)	
			Total	Avg/d.u.					
Tier I - Single Family Detached (R1 & R5)	162,431	163,517	40,612,829	248.4	1.00	126.26	126.90	40.4%	
Tier II - Semi detached (R2)	16,425	16,425	2,278,148	138.7	0.56	70.48	70.83	2.73%	
Tier III - Multi Family Residential (R3 & R4 X)	109,674	114,309	13,009,613	113.8	0.46	57.88	58.17	15.34%	
Tier IV - Apartments (R4)	3,159	88,837	3,971,014	44.7	0.18	22.71	22.83	4.70%	
Residential Subtotal	291,689	383,088	59,871,603	156.3		28,729,649	28,874,019	68%	
Industrial/Comm/ Institutional	19,515	n/a	29,118,379	n/a	0.00402 * (imperv area in m2) * (base rate)	10,407,116	10,459,413	24.7%	
Other/Miscellaneous and Undeveloped	7,073		excluded from calculations		excluded from calculations	excluded from calculations	excluded from calculations	excluded from calculations	
Non-residential Subtotal	26,588	n/a	29,118,379	n/a	n/a	13,479,589	13,547,326	32%	
Total	318,277	n/a	88,989,982	n/a	n/a	42,209,238	42,421,345	100%	
						Base Annual Rate (\$)	126.26	126.90	

Notes:

1. Dwelling units for R4 and R5 were estimated. Other, miscellaneous and undeveloped parcels (O-Other) were excluded from the calculations.
2. Credits:
 - 30% credit for urban residential properties without a direct sanitary sewer connection.
 - 50% credit for rural residential properties without a direct sanitary sewer connection.
 - 30% credit for rural ICI properties without a direct sanitary sewer connection.
3. The Base Annual Rate is increased from Option 3a to offset credits and maintain \$42M annual funding.

Table 12: Option 3c – Stormwater Rate – Non-Res Imperviousness, Res Land Use Averages – Credits Based on Sewer Connection and Location

Land Use Type	Number of Parcels	Dwelling Units (d.u.)	Est'd Impervious Area (m ²)		Rate Factor	Annual Stormwater Rate (\$)	Annual Rate Based on 99.5% Collection (\$)	Funding Distribution (%)	
			Total	Avg/d.u.					
Tier I - Single Family Detached (R1 & R5)	162,431	163,517	40,612,829	248.4	1.00	124.77	125.40	39.9%	
Tier II - Semi detached (R2)	16,425	16,425	2,278,148	138.7	0.56	69.65	70.00	2.70%	
Tier III - Multi Family Residential (R3 & R4 X)	109,674	114,309	13,009,613	113.8	0.46	57.20	57.48	15.16%	
Tier IV - Apartments (R4)	3,159	88,837	3,971,014	44.7	0.18	22.45	22.56	4.65%	
Residential Subtotal	291,689	383,088	59,871,603	156.3		28,397,969	28,540,672	67%	
Industrial/Comm/ Institutional	19,515	n/a	29,118,379	n/a	0.00402 * (imperv area in m2) * (base rate)	10,663,195	10,716,779	25.3%	
Other/Miscellaneous and Undeveloped	7,073		excluded from calculations		excluded from calculations	excluded from calculations	excluded from calculations	excluded from calculations	
Non-residential Subtotal	26,588	n/a	29,118,379	n/a	n/a	13,811,269	13,880,673	33%	
Total	318,277	n/a	88,989,982	n/a	n/a	42,209,238	42,421,345	100%	
						Base Annual Rate (\$)	124.77	125.40	
						Non-Residential Base Annual Rate (\$)	129.37	130.02	

Notes:

- Dwelling units for R4 and R5 were estimated. Other, miscellaneous and undeveloped parcels (O-Other) were excluded from the calculations.
- This option is the same as Option 3b however the residential/non-residential funding distribution have been frozen at the ratio 67% / 33% developed in Option 3a.
- Credits:
 - 40% credit for urban residential properties without a direct sanitary sewer connection.
 - 60% credit for rural residential properties without a direct sanitary sewer connection.
 - 0% credit for urban ICI properties without a direct sanitary sewer connection.
 - 40% credit for rural ICI properties without a direct sanitary sewer connection.
- The Base Annual Rate is increased from Option 3a to offset credits and maintain \$42M annual funding.

Table 13: Stormwater Rate Examples for Selected Parcels

Description	Urban/ Rural	Land Use (2010)	Bill Unit	Parcel Size (m2)	Impervious Area (m2)	Water Billed 2014 (m3)	Annual Stormwater Rate (\$)					
							Status Quo	Option 1	Option 2	Option 3a	Option 3b	Option 3c
Single family detached	V	R1	1	2,108	231	312	202	75	110	118	125	125
Semi-detached	U	R2	1	325	136	106	69	75	65	66	71	70
Row and townhouse	V	R3	2	289	0	146	47	75	106	54	58	57
Apartment 11 units	U	R4	11	855	703	1,810	107	75	335	21	23	23
St. James the Apostle Church	V	I5	0	3,612	784	111	72	711	374	374	398	408
Centre Jules Leger	U	I1	0	44,515	17,847	3,900	2,525	711	8,508	8,508	9,069	9,292
Hair Studio	V	C3	0	783	326	397	257	711	155	155	166	170
Cedarview Mall	U	C2	0	6,188	5,262	3,562	2,306	711	2,508	2,508	2,674	2,740
St. Peter High School	U	I1	0	69,990	26,901	7,700	4,985	711	12,824	12,824	13,670	14,006
Government of Canada Woodline Building	U	OF	0	17,113	12,928	8,415	5,448	711	6,163	6,163	6,569	6,731
Place d'Orleans	U	C1	0	171,406	154,076	46,185	29,901	711	73,448	73,448	78,293	80,219
Masterloy Products	R	M1	0	34,978	0	1,439	932	711	3,932	3,932	4,191	4,294

Note:

1. Village (V), rural (R), and greenbelt (G) were considered to be rural.
2. Values in red represent a stormwater contribution increases of 25% or more compared to the status quo.
3. Values in green represent a stormwater contribution decrease of 25% or more compared to the status quo.
4. All selected parcels have connections to the sanitary sewer system.

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