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City of Greater Sudbury

Stormwater Funding Study

Assessment of Funding Options

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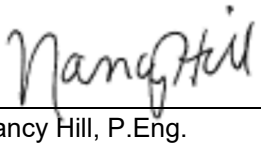

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Table of Contents

page

1. Introduction 1
1.1 Stormwater Funding Needs' 1

2. Funding Options 5
2.1 Dedicated Tax Levy 5
2.1.1 Rate Analysis 6
2.2 Stormwater Rate – Land Use 7
2.2.1 Parcel Analysis 8
2.2.2 Land Use Analysis 12
2.2.3 Rate Analysis 14
2.3 Stormwater Rate – Impervious Area 16
2.3.1 Parcel Analysis 17
2.3.2 Residential Properties 18
2.3.3 Billing Unit Analysis 21
2.3.4 Base Charges 22
2.3.5 User Fee Exemptions 23
2.3.6 Rate Analysis 23

3. Comparison of Funding Options 26

4. Conclusions and Recommendations 30
4.1 Considerations for the City of Greater Sudbury 30
4.2 Recommended Next Steps 31

List of Figures

Figure 1: Breakdown of Total Surface Area (m2) by Property Type 10
Figure 2: Areas of the City with Unknown Parcel Data 11
Figure 3: Share of Stormwater Revenues from Different Property Types 15
Figure 4: Example of Impervious Areas 16
Figure 5: Comparing Proposed Sudbury Stormwater User Fees for Single Family Detached Homes with Existing Fees in Other Ontario Municipalities 30

List of Tables

Table 1: Summary of Proposed Steps towards a Fully Funded Stormwater Program 1
Table 2: Estimated Program Revenue Requirements 3
Table 3: Summary of Required Increases in Taxes to Achieve Different Funding Levels 6
Table 4: Property Owners with Largest Assessed Value 6
Table 5: Tax-Exempt Properties with Large Assessed Values 7
Table 6: Parcel Summary for the City of Greater Sudbury 9
Table 7: Run-off Coefficients – City of Greater Sudbury Design Manual 12
Table 8: Analysis and Proposed Billing Units for Each Property Type 13
Table 9: Stormwater Rate for Different Property Types under Different Funding Levels 14
Table 10: Parcel Analysis Results 17
Table 11: Distribution of Single-Family Homes and Sampling Counts 19
Table 12: Benchmarking Single-Family Detached Homes in Ontario 20
Table 13: Statistical Sampling Counts for Other Residential Properties 21
Table 14: ERU Billing Unit Analysis Results 22
Table 15: Annual Stormwater User Fee Charges – ERU Option 25
Table 16: Rating the Three Funding Models for Sudbury 26
Table 17: Advantages and Disadvantages of Three Funding Models for Sudbury 27
Table 18: Residential vs Non-residential Contributions for Three Funding Models 28
Table 19: Summary of Rates for Three Funding Options 29

1. Introduction

Like many municipalities across Canada, the City of Greater Sudbury (the "City") is reviewing its current stormwater funding model, which is mainly supported by the general tax levy (property taxes). The City's Stormwater Asset Management Plan identified required stormwater funding levels which are greater than current funding levels. The City is therefore investigate funding options that provide a sustainable and reliable source of funding for its stormwater management program.

AECOM presented and discussed the range of stormwater funding options with City staff. Based on the information provided, the City chose to complete a quantitative analysis of the following three funding models for the City of Greater Sudbury:

- Dedicated Tax Levy;
- Stormwater Rate based on land use; and
- Stormwater Rate based on imperviousness using the equivalent residential unit (ERU) rate model.

This report summarises the quantitative assessment of the three funding options listed above.

1.1 Stormwater Funding Needs'

Through the asset management plan and review of recommended projects in the City's watershed management plans, the annual cost of a fully funded stormwater program for the City of Greater Sudbury was identified at $19.9 million. A number of steps were also identified where the City could incrementally work towards a fully funded stormwater program. These steps, which focus on first increasing catch basin cleaning to remove the amount of sediment in the downstream system and receiving waterbodies, are outlined in the following table.

Table 1: Summary of Proposed Steps towards a Fully Funded Stormwater Program

Step	Title	Amount	Breakdown
1	Current program	$14.7M	$6.8M O&M + $2.5M asset renewal + $5M upgrades + $355k NDCA
2	Increased CB cleaning in sensitive areas	$14.8M	$6.8M O&M + $2.5M asset renewal + $5M upgrades + $355k NDCA + $144k CB cleaning
3	Biannual CB cleaning in all areas + annual CB cleaning in sensitive areas	$15.4M	$6.8M O&M + $2.5M asset renewal + $5M upgrades + $355k NDCA + $728k CB cleaning
4	Fully funded O&M	$16.7M	$8.85M O&M + $2.5M asset renewal + $5M upgrades + $355k NDCA
5	Fully funded O&M and capital renewal	$18.4M	$8.85M O&M + $4M asset renewal + $5M upgrades + $509k NDCA
6	Fully funded (O&M, renewal & upgrades)	$19.9M	$8.85M O&M + $4M asset renewal + $6.5M upgrades + $509k NDCA

Three of the six funding levels were used to determine and compare proposed rates for the three funding models assessed (i.e., Dedicated Tax Levy, Rate using land use, ERU based rate). The three selected funding levels, which represent three different levels of service, used for comparing rates are:

- Step 1: Current Program - $14,700,000;
- Step 4: Fully funded O&M - $16,700,000; and
- Step 6: Fully funded O&M, renewal & upgrades - $19,900,000.

The three levels of service (current, O&M funded and fully funded) and three funding models (dedicated tax levy, tiered flat fee based on land use and ERU rate based on imperviousness) are shown in the following table**.** The ongoing administration costs of a stormwater user fee must be accounted for and is included in the following table to show the total funding needs. It should be noted that there will also be a cost to implementing a new stormwater funding program and this will be outlined in a subsequent Technical Memorandum.

Table 2: Estimated Program Revenue Requirements

Funding Items	Annual Stormwater Management Program Revenue Requirement								
	Current Program			Fully Funded O&M			Fully Funded		
Total Funding Needs*	$14,700,000			$16,700,000			$19,900,000		
	Tax Levy	**Land Use**	**ERU**	**Tax Levy**	**Land Use**	**ERU**	**Tax Levy**	**Land Use**	**ERU**
On-going Rate Administration Cost	$12,500	$56,250	$112,500	$12,500	$56,250	$112,500	$12,500	$56,250	$112,500
Total Program Revenue Needs	**$14,712,500**	**$14,756,250**	**$14,812,500**	**$16,712,500**	**$16,756,250**	**$16,812,500**	**$19,912,500**	**$19,956,250**	**$20,012,500**

* Excludes development related needs funded through development charges

Rate administration costs reflect the incremental costs of a new stormwater charge on the bill (i.e. over and above the current billing and accounting system costs) and does not include items that would be considered part of the stormwater program (such as capital planning, project management, etc.). Generally, these include direct costs for engineering/ accounting support as well as indirect costs for computer, training, and other overhead related to the following:

- Billing, customer service, and collections;
- Credit application reviews and site inspections; and
- Database management (e.g., changes to impervious area, rate schedules, credits, owner/address information, etc.).

The estimated rate administration costs shown in the previous table are based on the experience of other Ontario municipalities with stormwater user fees such as Guelph, Kitchener and Waterloo. They reported that it takes the equivalent of approximately 0.5 to one FTE (full time employee) to administer a stormwater utility. We typically budget one FTE for an SFU type stormwater rate, which is a little more complex than an ERU type stormwater rate. Therefore, we have estimated 90% of an FTE to administer an ERU based stormwater rate, 45% of an FTE to administer a Land Use based stormwater rate and 10% of an FTE to administer a dedicated tax levy. It should be noted that the estimated FTE rarely represents one single person but more likely portions (e.g. 5-25%) of several people's time working in billing, development services, communications/call centre, utilities, IT, budgets, accounting, legal etc. that adds up to 10%-90% of one FTE. It is assumed that an existing utility billing system would be used. If a new billing system is required, implementation and annual administration costs would be higher.

With all of these assumptions, the annual rate administration cost represents between 0.1-0.8% of the total stormwater program requirements for the various funding options and service level scenarios. It is premature in a feasibility study such as this to accurately estimate rate administration costs, so this number would be reviewed in a next phase of work when the City further investigates implementation.

2. Funding Options

Based on information provided in the City's Stormwater Asset Management Plan and subsequent discussions with City staff, the City chose to complete a quantitative analysis of the following three funding models:

- Dedicated Tax Levy;
- Stormwater Rate based on land use; and
- Stormwater Rate based on imperviousness using the equivalent residential unit or ERU rate model

2.1 Dedicated Tax Levy

A dedicated levy can be administered specifically to raise revenue for stormwater services, such that a fixed property tax rate is applied and itemized on the property owner's annual tax bill, as is done in the Cities of Langley and Delta in British Columbia for stormwater management (SWM). A by-law would be required to dedicate these funds specifically to SWM. As with the general tax fund, money to support the SWM program comes from the City's overall tax rate and is not dedicated until the annual budget is set each year. Tax-exempt properties generally do not contribute to dedicated tax levies. Some municipalities charge a core service fee or tax-like payment to tax-exempt properties.

Funding a municipal SWM program through a dedicated tax levy offers several advantages, including:

- Property-tax-based revenues are already accepted as the primary existing source of revenue for municipalities;
- Can be used to fund all SWM program activities; and
- The billing system already exists and is well established.

Funding a municipal SWM program through a dedicated tax levy presents several disadvantages, including:

- Charges are based on a property's assessed value, which does not typically correlate with its runoff contribution and is therefore considered inequitable.
- There is no incentive for property owners to reduce stormwater runoff and pollutant discharge which could potentially reduce City costs in the operation and renewal of the stormwater system and prevent environmental degradation.
- Tax-exempt properties, even those that are major producers of stormwater runoff, contribute very little (i.e., through payments in lieu of taxes) or nothing to support the SWM program. Properties eligible for payment in lieu of taxes include Canada Post, Canadian Broadcasting, City of Greater Sudbury, Laurentian University, Liquor Control Board, National Defence Canada, Ministry of Natural Resources and Forests, Ontario Minister of Infrastructure, Public Works Canada, City of Sudbury, Sudbury Hospital Services, Ministry of Tourism & Culture and Transportation Ministry.
- If the City were to primarily fund its stormwater program through a dedicated tax levy, then it would result in an increase in taxes or a decrease in funding in other areas. Council and residents are sensitive to tax increases and the ability to increase funding is constrained.

2.1.1 Rate Analysis

If the City were to develop a dedicated tax levy, then the required tax increases and typical contribution from the average single-family detached home in Sudbury for each funding level are outlined in the following table. The values are calculated based on an average assessed value of $272,709, a tax rate of 1.34% and an assumption that the entire stormwater budget is funded through property taxes (i.e., no federal grants).

Table 3: Summary of Required Increases in Taxes to Achieve Different Funding Levels

Budget	Avg Res Contribution from Taxes	% Increase in Funding	Required % Tax Increase
$ 14,655,000	$185	0%	0.00%
$ 14,798,850	$187	1%	0.05%
$ 15,382,575	$194	5%	0.25%
$ 16,705,000	$211	14%	0.71%
$ 18,359,000	$232	25%	1.28%
$ 19,900,000	$251	36%	1.81%

It is important to note that the average residential contribution for single family detached homes in other areas of Greater Sudbury (e.g. Valley East, Unorganized etc.) and for different residential forms (e.g. multi-residential) will be different due to different tax rates and different average assessed values.

The owners of properties with the largest assessed value that are not tax exempt would be the most affected if stormwater funding is increased based on an assessed value model (i.e. general tax levy or dedicated tax levy). These property owners should be consulted if the City considers significant increases to stormwater funding based on assessed value.

Table 4: Property Owners with Largest Assessed Value

Property Owner	# of Properties	Total Assessed Value
Vale Canada Ltd	428	$244,833,300
Hoop Realty Inc	1	$178,924,000
Glencore Canada Corp	146	$93,074,400
Zulich Enterprises Ltd	23	$73,197,000
Dalron Leasing Ltd	111	71,812,700
Panoramic Properties Inc	31	$51,750,009
Calloway REIT Inc	191	$49,204,000
2667974 Ontario Inc	191	$48,056,027
2046735 Ontario Ltd	3	$47,657,000
Riocan Holdings Ontario Inc	1	$42,041,000
Choice Prop Ltd Partnership	4	$39,266,000

It is important to note that the following property owners have tax-exempt properties with large assessed values that would not contribute to stormwater funding except in cases where they provide payments in lieu of taxes (PILT).

Table 5: Tax-Exempt Properties with Large Assessed Values

Property Owner	# of Properties	Total Assessed Value
City of Greater Sudbury	2090	$365,461,700
Health Sciences North	6	$294,530,000
Laurentian University	3	$257,459,000
Greater Sudbury Housing	173	$144,675,000
Rainbow District School	35	$96,575,000
Cambrian College	1	$84,948,000
Public Works Canada	3	$71,134,000
Sudbury Catholic District	20	$57,355,000
Sudbury Finnish Rest Home	7	$33,727,000

2.2 Stormwater Rate – Land Use

A stormwater rate is a financing mechanism that allocates costs to individual properties based upon a “user pay” formula. The principal advantage associated with a stormwater rate (except for the flat fee option) is that all parcels can be assessed a user fee that reflects their relative stormwater contribution to the municipal SWM system, including tax-exempt properties. This method is similar to the manner in which other public utilities charge tax-exempt property based on usage (e.g. water and sewer utility fees).

The fee for a stormwater rate is typically applied on a monthly or occasionally annual basis. The revenue generated through a stormwater rate can be used for any SWM program related costs.

The basic calculation for a stormwater rate is simply the municipal SWM program expense divided by the number of billing units within the municipality. Some municipalities, such as the cities of Edmonton, Vaughan, London and Newmarket have decided that land use and sometimes property size is an appropriate approximation of a property’s impact on the stormwater system and should form the basis for determining the number of billing units per property and hence a property’s stormwater fee. This was explored for the City of Greater Sudbury and the results are presented in this Section (Section 3). Another approach (ERU based stormwater rate) which uses impervious area measurements was also explored and those results are presented in the next Section (Section 4).

Determining stormwater rates using a land use approach could be based on land use only or on land use and property size. Estimating the amount of runoff using land use/property size is based on the following formula:

Stormwater Run-off = (Area of property) x (Average ratio of rainfall landing on that type of property that becomes runoff)

When applying this approach to the City of Greater Sudbury, it became apparent that there are many large properties, including mines, where only a small portion of the property is developed. It was therefore decided that applying industry standards of run-off rates to the entire area of properties would not be appropriate for the City of Greater Sudbury. It was then decided to explore a more simplified land use rate structure that is only based on property type. Average property sizes and typical run-off coefficients (C) are then used to estimate the amount of runoff from a given property. The parcel analysis below (**Section 3.1**) shows the number and area of parcels in the City by land use. The following section (**Section 3.2**) on “Land Use” outlines typical run-off coefficients for different land uses.

2.2.1 Parcel Analysis

In order to determine the total number of billing units for the City of Greater Sudbury for a land use-based stormwater rate we identified the number of parcels/dwelling units and the total land area for the following property types:

- Residential (1-4 units);
- Residential (>4 units) strata/condo;
- Residential (>4 units) apartment;
- Farm;
- Commercial;
- Industrial;
- Mixed Use;
- Institutional;
- Railway corridor;
- Undeveloped;
- Undeveloped mine;
- Natural resource extraction (ex. Mine, water treatment facility etc.);
- Railroad yard; and
- Other.

The data used for this analysis was derived from the City's Geographic Information System (GIS) and Municipal Property Assessment Corporation (MPAC) data provided by the City. The number of properties were broken down by those that are lakefront and those that are not lakefront. This would allow the City to apply a discount to lakefront properties as recognition that they may drain directly to a lake.

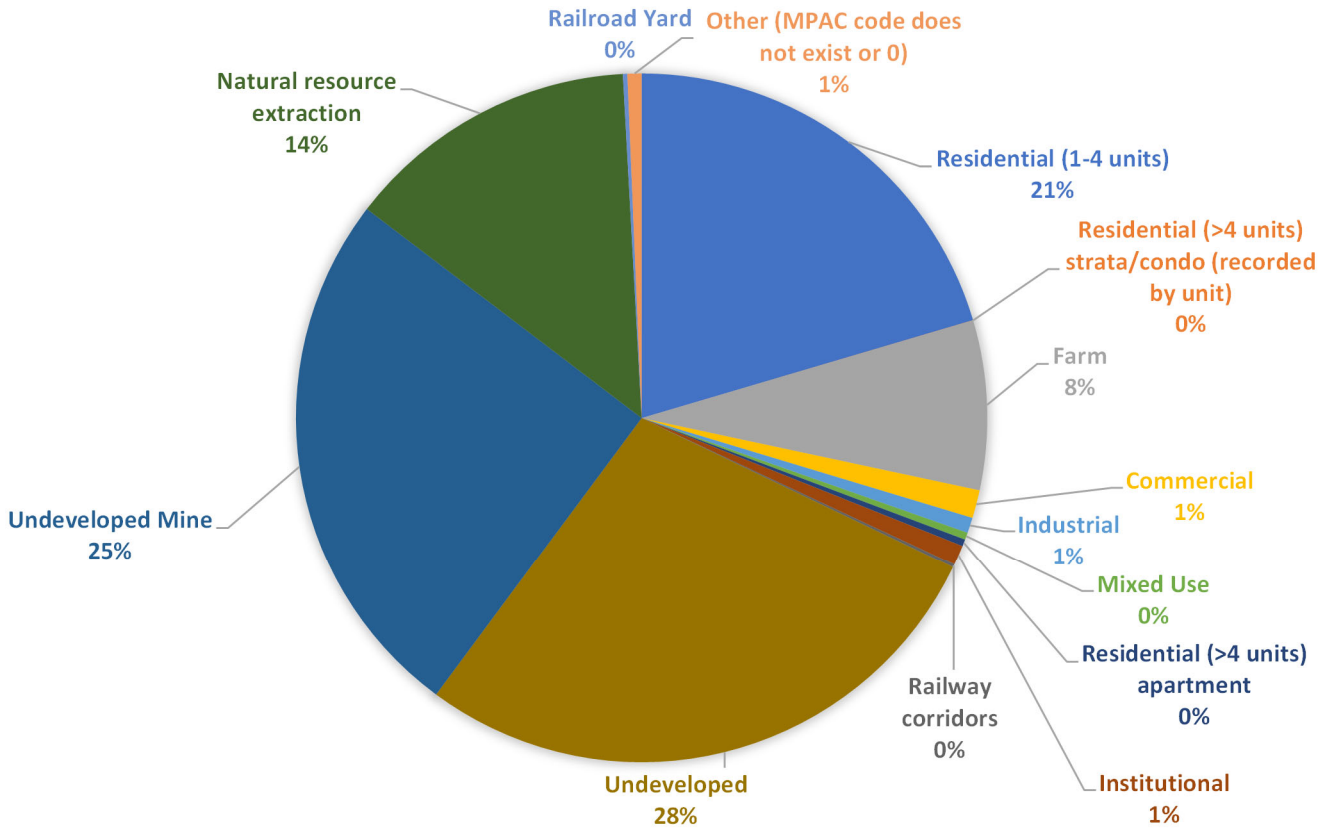
The parcel summary is provided in the following table. It should be noted that in the property type titled "residential (>4 units) strata/condo" the number of parcels is actually the number of dwelling units. This will be important if the City wishes to levy a stormwater fee to each condo owner, rather than one large combined fee to the entire strata.

Table 6: Parcel Summary for the City of Greater Sudbury

Property Type	Sum of Non-lakefront and Lakefront Total Area of all Properties (m^2)	Number of Parcels	Average size (m^2)	Non-Lakefront Median Size (m^2)	Lakefront Median Size (m^2)
Residential (1-4 units)	389,278,431	51,248	7,596	697	3,388
Residential (>4 units) strata/condo (recorded by unit)	173,505	851	204	80	4,029
Farm	151,422,730	556	272,343	239,450	437,408
Commercial	25,107,861	1,147	21,890	1,958	22,163
Industrial	13,818,901	406	34,037	7,363	13,011
Mixed Use	6,391,687	344	18,580	803	159,989
Residential (>4 units) apartment	6,260,160	594	10,539	1,296	9,520
Institutional	17,879,989	363	49,256	7,790	142,150
Railway corridors	2,727,664	5	545,533	249,529	-
Undeveloped	533,701,474	7,343	72,682	1,403	1,056,985
Undeveloped Mine	481,331,500	331	1,454,174	358,367	8,077
Natural resource extraction	262,346,912	323	812,220	11,833	1,289,111
Railroad Yard	3,990,478	12	332,540	113,352	687,928
Other (MPAC code does not exist or 0)	12,548,038	45	278,845	2,020	184,283

The pie chart below shows the breakdown of total surface area (m^2) by property type.

Figure 1: Breakdown of Total Surface Area (m2) by Property Type



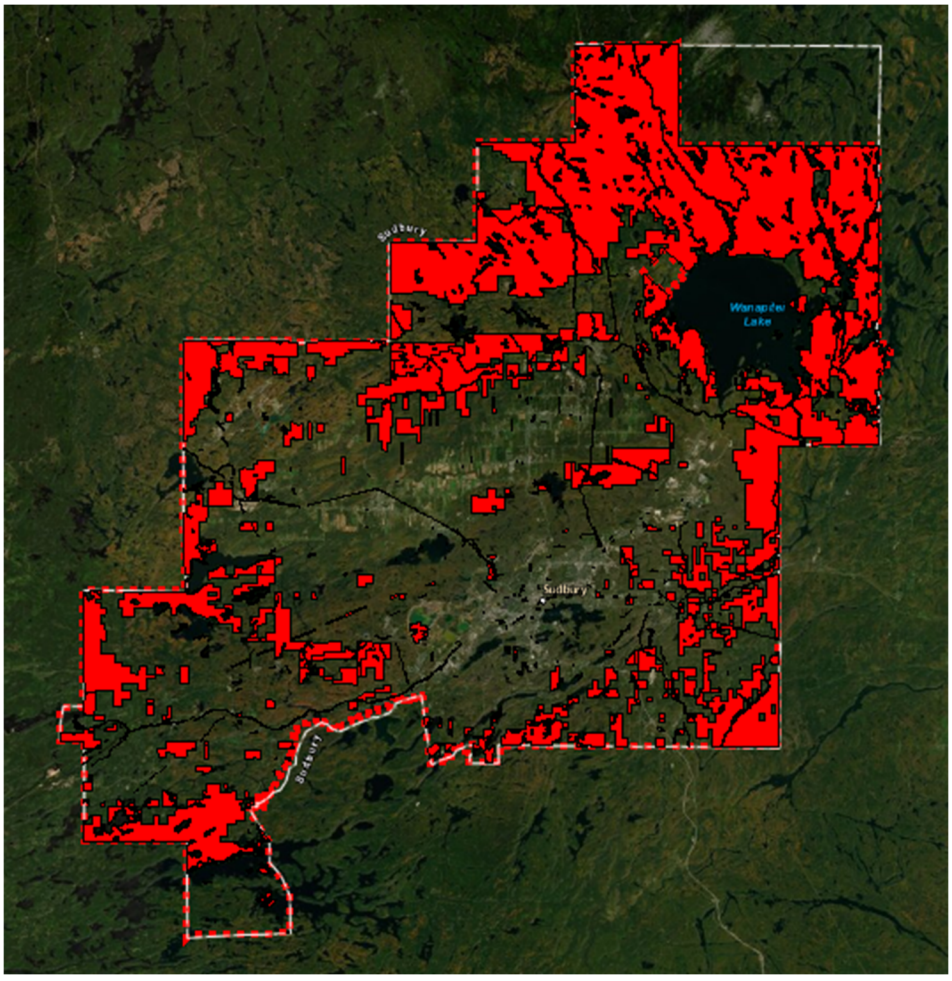
The following are notable highlights from the parcel analysis:

- It was suggested that lakefront properties receive a discount (e.g. 25%) since they may not be directly connected to the City's storm and ditch system. However, the previous table shows that lakefront properties are 2-200 times larger, on average, than non-lakefront properties. Therefore, if the City applied a flat rate based on land use and did not consider property size then lakefront properties would already be paying a much lower fee per square metre of property.
- Residential (1-4 units), which includes single family dwellings, duplexes, triplexes and quadplexes accounts for the majority of parcels (81%) in the City of Greater Sudbury but only accounts for 21% of the surface area.
- The "typical" single family property in Sudbury is larger than in most municipalities. The median property size for a residential property (1-4 units) that is not on a lake is 697 m^2 or 7,502 ft^2.
- 53% of the City is undeveloped (undeveloped mines as well as general undeveloped properties).
- 14% of the land is used for natural resource extraction (e.g. mines, drinking water etc.) and 8% of the land is designated as farms.
- There is a significant difference between the average size and the median size for a given property type. This indicates that there are some very large properties that "skew" the average.
- 0.7% of the properties by area do not have an MPAC code or use an MPAC code that no longer exists (i.e. 104, 367, 581, 584, 586). These properties are included in the parcel count of the category "other". These properties would need to be reviewed and assigned a land use if the City were to implement a land use based stormwater rate.
- 37 mining parcels are categorized as developed and 331 are listed as undeveloped. The accuracy of the parcel categorization has not been confirmed. It appears that some of the 331 "undeveloped" mines

show some signs of development by looking at aerial photography. The extent of development within the 37 mines categorized as “developed” will vary significantly between properties (e.g. from just a single access road to those with active mining). Therefore, the accuracy of estimating run-off from mining sites based on a land use formula may be questioned by property owners.

- Recreational properties/cottages are included within the residential category.
- There is a large variety in the type of properties that are classified as mixed use. These properties include mixes of residential and ICI, residential and farm, or farm and undeveloped. If the City were to implement a stormwater rate, then some manual reclassification may be required for properties classified as “mixed use”.
- It should be noted that we did not receive detailed parcel data for approximately 35% of the City of Greater Sudbury (see area outlined below in red). For this area, the only information received was owner information (i.e. Bell, CGS, CNOR, CNR, CPR, Crown, Gas, Hydro, NDCA, Railway, Vale, etc.). This area does appear to be largely undeveloped, however there is some mining activity. As these areas were not included in our analysis, we have conservatively underestimated the number of billing units in the City (see next section).

Figure 2: Areas of the City with Unknown Parcel Data



2.2.2 Land Use Analysis

To support estimating the amount of stormwater runoff from each of the property types, we have reviewed typical "run-off" coefficients for different land uses. The City of Greater Sudbury lists the following coefficients within their design manual.

Table 7: Run-off Coefficients – City of Greater Sudbury Design Manual

RUN-OFF COEFFICIENTS	
DESCRIPTION OF AREA	**RUN-OFF COEFFICIENT**
Commercial - Downtown Commercial - Neighbourhood	0.70 - 0.95 0.50 - 0.70
Industrial - Light Industrial - Heavy	0.50 - 0.80 0.60 - 0.90
Residential - Single Family Residential - Semi Detached Residential - Row Housing/Town Housing Residential - Suburban Residential - Apartment	0.35 - 0.75 0.40 - 0.75 0.60 - 0.75 0.25 - 0.55 0.50 - 0.70
Institutional	0.40 - 0.75
Unimproved	0.10 - 0.30
Parks/Cemeteries	0.10 - 0.25
Playgrounds	0.20 - 0.35
Railroad Yard	0.20 - 0.35

Using the City's GIS and available aerial photography, we reviewed actual levels of imperviousness (which would lead to stormwater run-off) for existing properties of different land uses in the City of Greater Sudbury. Based on the run-off coefficients in the design manual and our review of different parcels in the City of Greater Sudbury we have assigned the following run-off ratios for the following land-use types.

- Residential (1-4 units) and other = 0.35;
- Residential (>4 units) apartment and condo= 0.65;
- Farm = 0.05;
- Commercial = 0.70;
- Industrial = 0.50;
- Mixed Use = 0.70;
- Institutional = 0.55;
- Undeveloped properties, railway corridors = 0;
- Natural resource extraction (ex. Mine, water treatment facility etc.) = 0.15; and
- Railroad yard = 0.15.

Stormwater rates by land use were calculated using the steps outlined below.

1. Use the City's GIS to determine the total area for each type of land use.

2. Estimate the total amount of stormwater run-off from each land use using the total area and estimated run-off coefficients.
3. Divide the total run-off by the number of properties to determine the average run-off for each property by land use.
4. Use the percentage of total run-off to determine the percentage of stormwater revenue that each property should contribute (by land use).
5. Assign one billing unit to each residential property that has 1 to 4 dwelling units.
6. Assign billing units to each land use type based on their relative run-off.
7. Add up all the billing units for all the properties in the City
8. Divide the amount of required revenue by the total number of billing units. This gives you the stormwater rate for 1 billing unit.
9. Assign a rate to each parcel based on the number of billing units and the rate per billing unit.

We determined the average and median property sizes of each land use. By applying a typical runoff coefficient to these properties, we are able to determine the amount of run-off relative to a median residential property. For instance, if a property has 10 times the estimated run-off than the average residential property then it will be charged 10 billing units and 10 times the amount that a residential property will be charged. The resulting billing units and rates for the different property types are shown in the following table.

Table 8: Analysis and Proposed Billing Units for Each Property Type

Property Type	Avg Impervious % Based on Land Use (Estimated not Measured)	Total Area of all Properties (m^2)	Estimated Total Impervious Area	% of total run-off	Number of Parcels	avg % total run-off per property	# of billing units per parcel
Residential (1-4 units)	35%	389,278,431	136,247,451	68.9%	47,654	0.001%	1
Residential (>4 units) strata/condo	100%	173,505	173,505	0.1%	850	0.000%	0.1
Farm	5%	151,422,730	7,571,136	3.8%	539	0.007%	4.9
Commercial	70%	25,107,861	17,575,502	8.9%	1,125	0.008%	5.5
Industrial	50%	13,818,901	6,909,451	3.5%	399	0.009%	6.1
Mixed Use	70%	6,391,687	4,474,181	2.3%	341	0.007%	4.6
Residential (>4 units) apartment	65%	6,260,160	4,069,104	2.1%	585	0.004%	2.4
Institutional	55%	17,879,989	9,833,994	5.0%	348	0.014%	9.9
Railway corridors	0%	2,727,664	-	0.0%	5	0.000%	0.0
Undeveloped	0%	533,701,474	-	0.0%	6,526	0.000%	0.0
Undeveloped Mine	0%	481,331,500	-	0.0%	224	0.000%	0.0
Natural resource extraction	15%	53,232,574	7,984,886	4.0%	296	0.014%	9.4
Railroad Yard	15%	3,990,478	598,572	0.3%	9	0.034%	23.3
Other (MPAC code does not exist or 0)	35%	6,689,787	2,341,425	1.2%	37	0.032%	22.1
Total		1,692,006,740	197,779,207	100%	58,938		

The following key observations were made while developing the table above:

- Railyards are extremely large and would result in high stormwater rates based on the proposed methodology;
- The median number of billing units for property types range from 1 to 23 billing units;
- The largest industrial properties usually have quite a large amount of forested land. The largest industrial land uses tend to be associated with mining, so they were reclassified under the tier “natural resource extraction”. These land uses included smelter/ore processing, water treatment, gravel pit and other.

- The run-off factors used for the calculations could be modified to change the # of billing units per property type.

2.2.3 Rate Analysis

The previous analysis identified a total of 69,175 billing units. As previously noted, the City may not receive full payment by each parcel due to credits (if the City wishes to implement a credit payment) as well as non-payment. We have also included all schools and there are varying legal opinions as to whether schools are required to pay stormwater fees in Ontario. The City may also elect to grant exemptions to some property owners (e.g. certain types of non-profits). Therefore, the number of billing units should be reduced, if the City decides to pursue this funding methodology and whether it plans to charge schools and offer a credit program.

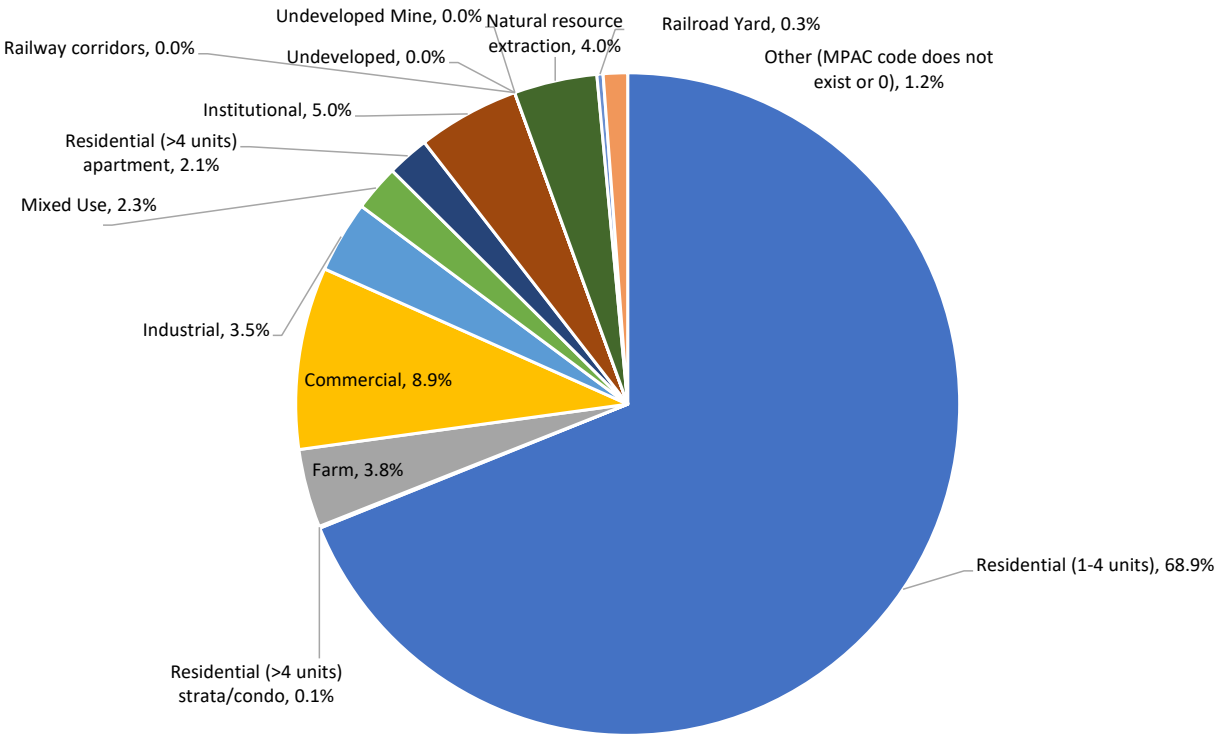
A summary of the stormwater rates by land use for the three funding levels is provided in the following table.

Table 9: Stormwater Rate for Different Property Types under Different Funding Levels

	Fee per property		
Property Type	Existing Budget $14,711,250	Full O&M $16,761,250	Fully Funded $19,956,250
Residential (1-4 units)	$212	$242	$288
Residential (>4 units) strata/condo	$15	$17	$21
Farm	$1,041	$1,190	$1,417
Commercial	$1,158	$1,324	$1,576
Industrial	$1,283	$1,468	$1,747
Mixed Use	$972	$1,112	$1,324
Residential (>4 units) apartment	$515	$589	$702
Institutional	$2,094	$2,395	$2,851
Railway corridors	$0	$0	$0
Undeveloped	$0	$0	$0
Undeveloped Mine	$0	$0	$0
Natural resource extraction	$1,999	$2,286	$2,722
Railroad Yard	$4,928	$5,636	$6,711
Other (MPAC code does not exist or 0)	$4,689	$5,363	$6,385

The following figure shows the portion of stormwater revenues that would be derived from each of the property types if only land use was used as the basis of a stormwater rate.

Figure 3: Share of Stormwater Revenues from Different Property Types



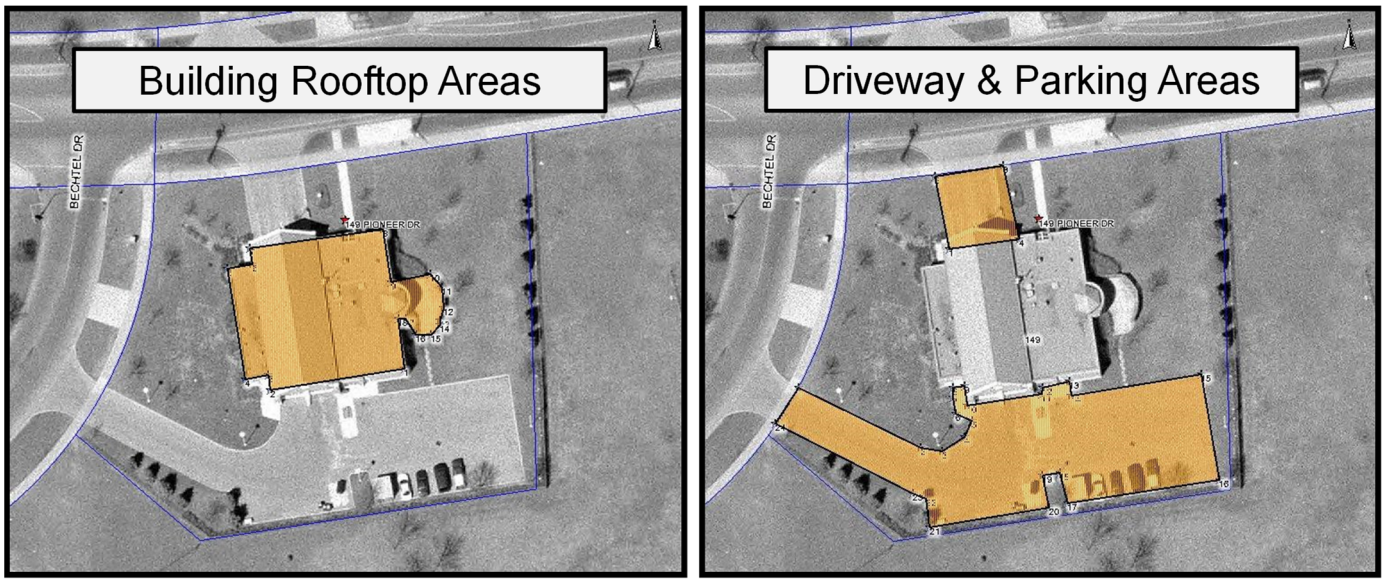
The following key observations were made while developing the figure above:

- This funding model charges the same rate to every property regardless of actual imperviousness. Small commercial properties will pay the same as large commercial properties.
- Because there are many residential properties, they end up contributing the most to stormwater revenues (70%). Likewise, the large mines end up contributing very little (4%) as they have relatively fewer number of parcels.
- The run-off factors used for the calculations could be modified to change the number of billing units per property type.

2.3 Stormwater Rate – Impervious Area

A variable rate based on impervious area accounts for the contribution of stormwater runoff from each property to the local drainage system (e.g. ditches, sewers, and waterbodies). The area of impervious ground cover (e.g. rooftops, driveways, and parking lots) is commonly used as the basis for a stormwater rate because impervious area is a common indicator of stormwater flow and pollution discharge potential. **Figure 4** illustrates the impervious area for a non-residential property, highlighting the building footprint in the left panel and the driveway and parking areas in the right panel. The sum total of these areas within the lot boundary represents the total impervious area for this property.

Figure 4: Example of Impervious Areas



Canadian cities with variable stormwater rates based on impervious area include Kitchener, Waterloo, Saskatoon, Mississauga, Guelph and Victoria. A stormwater rate based on measured impervious area offers a more equitable funding mechanism than other funding sources, because fees assessed to each parcel of land are based on runoff contribution to the municipal SWM system rather than property value or land use.

Developments that disconnect their impervious areas from the storm sewer/drainage system (e.g. by discharging onto pervious surface areas or into porous media), incorporate source controls or private stormwater management facilities prior to discharge to the municipal collection system should be charged less than developments that do not adopt best management practices. Cases such as these can addressed through an effective credit policy. This highlights the ability of users to reduce fees by implementing initiatives that reduce their stormwater impact.

The use of impervious area as the basis for setting a stormwater rate is supported by standard manuals of practice. These manuals confirm the use of impervious area as a technically sound, fair and equitable basis for allocating SWM program costs, and include:

- Water Environment Federation. User-Fee-Funded Stormwater Utilities. This manual was prepared by the Water Environment Federation's Task Force on User-Fee-Funded Stormwater Utilities and summarizes stormwater rate implementations throughout the U.S.
- Florida Stormwater Association (2003). Establishing a Stormwater Utility in Florida - 2003 Edition. This manual was developed from the state with the largest number of stormwater rate implementations in the U.S.

A stormwater rate based on measured impervious area is a relatively new concept in Canada, but has been extensively implemented throughout the U.S. There are more than 1,500 stormwater user fees across the U.S. and over 700 of these are based on measured impervious area.

The simplest method for an impervious based stormwater rate is the Equivalent Residential Unit (ERU) method. Under the ERU method the average impervious area per residential dwelling unit is designated as the base unit for the user fee structure. The base unit represents the stormwater discharge potential of the average residential dwelling and its associated lot. If a commercial parcel has four times the impervious area of the base unit, then the commercial parcel would be billed four times the monthly flat fee for residential dwelling units.

Under the ERU method all residential properties are charged the same fee and non-residential properties are charged based on actual measured impervious area. The average residential impervious area is determined by a statistical sampling of measured impervious area for all types of residential dwelling units to determine the average ERU size (i.e., square meters of impervious area for the average residential dwelling). The average ERU size then becomes the base billing unit. Each residential property (regardless of density) is assigned one stormwater billing unit. The charge for non-residential properties is determined by dividing the measured impervious area by the average ERU size.

An ERU based stormwater rate was recently implemented by the City of Guelph. The cities of Kitchener, Waterloo and Mississauga implemented a more complex stormwater rate (called a tiered single-family unit or tiered SFU), where there are different rates for different types of residential properties (e.g. large single detached home, condo, duplex etc). In consultation with City staff, it was decided to explore and quantify the simpler ERU model for the City of Greater Sudbury.

2.3.1 Parcel Analysis

A parcel analysis identifies and characterizes properties with respect to their stormwater impact, as indicated by impervious area. A parcel refers to any contiguous property, lot, or land tract under single ownership. An analysis to identify and characterize the amount of impervious area by parcel type forms the basis for determining the stormwater charge for a property, and ultimately affects how much revenue a stormwater user fee can generate.

For this study, a parcel database was compiled based on tax assessment data, parcel data, and aerial photography. All spatial information and data attributes were obtained from the City and organized for the purposes of this study. The various data sources were used to establish the parcel distribution, number of residential dwelling units, and estimated impervious area by parcel type, as shown in **Table 10**.

Table 10: Parcel Analysis Results

Parcel Type	Number of Parcels		Dwelling Units (d.u.)		Estimated Impervious Area (m²)		
	Count	%	Count	%	Total	%	Avg/d.u.
Detached	45,235	71.2%	45,235	65.9%	12,824,852	41.1%	283.5
Semi-Detached	2,491	3.9%	2,491	3.6%	432,464	1.4%	173.6
2-Plex	2,206	3.5%	4,412	6.4%	527,346	1.7%	119.5
3-Plex	436	0.7%	1,308	1.9%	121,944	0.4%	93.2
4-Plex	415	0.7%	1,660	2.4%	149,721	0.5%	90.2
5-Plex	73	0.1%	365	0.5%	26,397	0.1%	72.3
6-Plex	66	0.1%	396	0.6%	23,827	0.1%	60.2
7+ Unit Apartments	414	0.7%	11,781	17.2%	1,088,177	3.5%	92.4
Condominium	851	1.3%	851	1.2%	99,696	0.3%	117.2

Parcel Type	Number of Parcels		Dwelling Units (d.u.)		Estimated Impervious Area (m²)		
	Count	%	Count	%	Total	%	Avg/d.u.
Townhouse	161	0.3%	161	0.2%	19,706	0.1%	122.4
Residential Subtotal	**52,348**	**82.3%**	**68,660**	**100.0%**	**15,314,130**	**49.1%**	**223.0**
Non-residential (Industrial/Commercial/Institutional)	4,319	6.8%	N/A		15,878,203	N/A	
Miscellaneous/Mixed Use	1,278	2.0%			incl. above		
Non-residential Subtotal	**5,597**	**8.8%**			**15,878,203**	**50.9%**	
Undeveloped	5,623	8.8%			0	0.0%	
Total	**63,568**	**100.0%**			**31,192,333**	**100.0%**	

This information was segregated into 13 land use categories (10 residential and 3 non-residential). The impervious area estimates were based on the assessment data from the Ontario Municipal Property Assessment Corporation (MPAC), and recent orthophotos viewed through online mapping systems. The methodology for estimating impervious area varied somewhat for detached residential and non-residential properties and is described separately below.

2.3.2 Residential Properties

In order to determine the average impervious area for residential properties it is important to consider the wide range of housing types and development densities across Sudbury. Residential properties include both single unit and multi-unit housing.

There is a further distinction between residential properties and dwelling units. The definitions of the various property classifications are based on the property codes assigned by the MPAC and may differ from the zoning designations currently used by the City for land use planning or taxation purposes. For the purposes of this study, the following definitions were applied:

- Detached: These reflect single family detached homes, which are freestanding residential buildings not attached to any other dwelling or structure, except its own garage or shed. As shown in the previous table, there are approximately 45,235 such properties/dwelling units in Sudbury.
- Semi-Detached: A building that is divided horizontally into two separate dwelling units on two distinct properties. Each unit is individually owned. The approximate count is 2,491 properties/dwelling units.
- Duplex Unit: A building that is divided horizontally into two separate dwelling units (i.e., two self-contained household units that share a common wall and have separate entrances) under single ownership. The approximate count is 2,206 properties and 4,412 dwelling units.
- Tri-, Quad-, Five-, and Six-plex Units: Buildings that comprise three, four, five, and six self-contained dwelling units under single ownership. The approximate count is 990 properties and 3,729 dwelling units.
- Apartment Unit: A building or complex of buildings with multiple apartments comprised of seven or more self-contained dwelling units under single ownership. The approximate count is 414 properties and 11,781 dwelling units.
- Condominium Unit: A building or complex of buildings comprised of three or more self-contained dwelling units that are individually owned. Common areas and facilities within the property are jointly owned and controlled by an association of owners. The approximate count is 851 properties/dwelling units.
- Townhouse/Row House: A building with three or more self-contained dwelling units that are individually owned (i.e. freehold). The approximate count is 161 properties/dwelling units.

Given the large number of residential properties within Sudbury, it was not feasible within the project scope to measure the impervious area for each parcel. As a result, the study team performed a statistical sampling of selected properties within the residential land use category. The objective of the sampling process was to estimate the average impervious area per dwelling unit with a 95 percent confidence that the value is within 10 percent of the average impervious area for all residential properties. The impervious area for each sampled parcel was calculated using GIS software to view and manipulate the spatial data provided by the City.

The number of parcels with single-family detached homes in each ward was identified. To reduce sampling bias, the assessed value and age of these properties was correlated to identify a relationship similar to the overall characteristics of Sudbury. Parcels were randomly selected to represent the fraction that should be collected in each ward by the range of property values. The sample size for impervious area measurements was 338. As a result of this sampling approach, the average impervious area for single-family detached homes was determined to be 284 m^2 (3,057 ft^2). The relative imperviousness ranged from 1% to 89%, with an average of 37%. The geographic distribution of single-family detached homes and statistical sampling counts is shown in **Table 7**, confirming that the samples appropriately match the proportion of homes by ward.

Table 11: Distribution of Single-Family Homes and Sampling Counts

Ward	Single Family Homes		Impervious Area Samples		
	Count	%	Count	%	Δ
1	3,427	8%	28	8%	-0.7%
2	4,821	11%	32	9%	1.2%
3	3,832	8%	30	9%	-0.4%
4	3,471	8%	27	8%	-0.3%
5	3,513	8%	29	9%	-0.8%
6	4,568	10%	33	10%	0.3%
7	4,628	10%	32	9%	0.8%
8	3,097	7%	26	8%	-0.8%
9	4,865	11%	32	9%	1.3%
10	2,779	6%	20	6%	0.2%
11	3,679	8%	28	8%	-0.2%
12	2,555	6%	21	6%	-0.6%
Total	**45,235**	**100%**	**338**	**100%**	**0.0%**

Table 12 compares the average impervious areas for detached homes with other cities in Ontario where we have done statistical sampling. It should be noted that the Sudbury has an above average impervious area of single family detached homes as identified in Table 8 below.

Table 12: Benchmarking Single-Family Detached Homes in Ontario

Ontario Municipality	Sudbury	Ajax	Barrie	Guelph	Thunder Bay	Waterloo	Brantford	S. Ste Marie	Kitchener	Stratford	Markham	Hamilton	Mississauga	Ottawa
Population (2016)	161,531	119,700	141,400	131,800	107,900	105,000	97,500	73,400	233,200	31,500	329,000	536,900	721,600	934,200
Land Area (ha, 2016)	363,000	6,700	9,900	8,700	32,800	6,400	7,200	22,300	13,700	2,800	21,200	111,700	29,200	279,000
Approx. Property Count	63,600	37,900	49,100	41,900	44,300	31,800	34,400	29,300	64,400	10,100	79,500	166,800	206,800	318,300
Parcel Type		**Average Impervious Area of Single-Family Detached Homes (m^2)**												
Detached	284	229	236	250	303	266	259	328	259	283	294	301	267	249

For the remaining residential properties, impervious area measurements were obtained for 557 samples representing 2,631 dwelling units. For each category, sampling aimed to capture approximately 300 dwelling units, or 10% of the total number of dwelling units. The categories of Multifamily Units and Condominiums are a unique case in that parcels include many dwelling units within multiple buildings (however, the difference is that each Condo unit is separately owned). The distribution of samples is shown in **Table 13**, with the number of samples and corresponding dwelling units for each residential category. The final two columns show the total number of dwelling units and the percentage that were included in the sampling effort.

Table 13: Statistical Sampling Counts for Other Residential Properties

Parcel Type	Number of Impervious Area Samples	Number of Dwelling Units Sampled	Total Dwelling Unit Count	Percentage of Dwelling Units Sampled
Semi-Detached	249	249	2,491	10%
2-Plex	151	302	4,412	7%
3-Plex	44	132	1,308	10%
4-Plex	42	168	1,660	10%
5-Plex	8	40	365	11%
6-Plex	7	42	396	11%
7+ Unit Apartments	25	1,166	11,781	10%
Condominium	14	515	851	61%
Townhouse	17	17	161	11%
Total	**557**	**2,631**	**23,425**	**11%**

The average impervious area for each residential parcel category sampled ranged from 60 to 284 m^2 of impervious area per dwelling unit. The average impervious area for all residential properties was determined to be 223 m^2 (2,110 ft^2) per dwelling unit. The total estimated impervious area for all residential properties in Sudbury was estimated to be approximately 15,314,100 m^2, or roughly 49% of the total impervious area (excluding public rights-of-way).

2.3.3 Billing Unit Analysis

The basic calculation for a stormwater user fee is simply the stormwater program expense divided by the total number of billing units within the municipality. With the ERU option, the average impervious area for all types of residential dwelling units represents the base billing unit. Charges for residential properties are based on assigning one stormwater billing unit to each residential dwelling unit, regardless of density. Given the wide variability in impervious area statistics for non-residential properties, the impervious area for each non-residential property must be measured. The charge for non-residential properties is determined by dividing the measured impervious area by the average ERU size.

The first five columns in the following table repeat the parcel and impervious data that were previously shown but then add columns to present billing unit data. The average impervious area for all residential properties was determined to be 223 m^2 (2,400 ft^2) per dwelling unit in Sudbury. The third column from the right shows the ERU factor that was applied to each residential property type. Under the ERU billing unit method, all residential dwelling units, regardless of property type, would be charged one equivalent residential unit (1 ERU) per dwelling unit. The final two columns show the distribution of ERU billing units by parcel type. There are a total of 68,660 residential billing units.

For non-residential properties, the number of ERU billing units is determined by dividing the impervious area by the ERU base area (i.e., 223 m^2). For the estimated 15,878,000 m^2 of non-residential impervious area in Sudbury, the corresponding number of non-residential ERU billing units is 71,203 resulting in a total of 139,863 billing units for all properties.

Table 14: ERU Billing Unit Analysis Results

Parcel Type	Number of Parcels	Dwelling Units (d.u.)	Est'd Impervious Area (m^2)		ERU Factor	ERU Distribution	
			Total	Avg/d.u.		Count	%
Detached	45,235	45,235	12,824,900	283.5	1.00	45,235	32.3%
Semi-Detached	2,491	2,491	432,500	173.6	1.00	2,491	1.8%
2-Plex	2,206	4,412	527,300	119.5	1.00	4,412	3.2%
3-Plex	436	1,308	121,900	93.2	1.00	1,308	0.9%
4-Plex	415	1,660	149,700	90.2	1.00	1,660	1.2%
5-Plex	73	365	26,400	72.3	1.00	365	0.3%
6-Plex	66	396	23,800	60.2	1.00	396	0.3%
7+ Unit Apartments	414	11,781	1,088,200	92.4	1.00	11,781	8.4%
Condominium	851	851	99,700	117.2	1.00	851	0.6%
Townhouse	161	161	19,700	122.4	1.00	161	0.1%
Residential Subtotal	**52,348**	**68,660**	**15,314,100**	**223**		**68,660**	**49.1%**
Industrial/Comm/Institutional	4,319	n/a	15,878,203	n/a	n/a	71,203	50.9%
Miscellaneous/Mixed Use	1,278		incl. above			included above	
Non-Residential Subtotal	**5,597**		**15,878,203**			**71,203**	**50.9%**
Undeveloped	5,623		0				
Total	**63,568**		**31,192,303**			**139,863**	**100.0%**

2.3.4 Base Charges

In this section, the base charge is determined for the various stormwater user fee options. There are a number of factors that may affect the overall base charge determined as part of a user fee, and the following definitions are helpful to clarify these:

- Adjustments: These are typically requested through an appeals process in cases where the property owner feels their charge is incorrect (e.g., assigned to the wrong rate category, incorrect impervious area due to misinterpreted surface cover or newly installed materials). If approved, the individual fee would be adjusted accordingly. These adjustments are typically a small percentage of all properties (<0.5%) and rarely warrant a change to the overall stormwater rate base charge.
- Credits: This would apply if a municipality decides to implement a credit program with their stormwater rate. Some municipalities only have a credit program for non-residential properties. If a credit program exists then they are typically requested through an application process and if approved, would result in a reduced fee for individual property owners that have installed, operate and maintain eligible facilities or practices on their property or do not have a connection to the City's stormwater management system. In some jurisdictions, credits can be awarded for reducing the amount of impervious area on a property if a fee adjustment policy does not already account for this. In Canada, the overall impact of awarding credits is typically in the range of 0-4% of the total stormwater program revenue, although some American cities have seen impacts of up to 7% of total revenue. Ideally, the total amount of credits awarded would be removed from the revenue requirement in the base charge calculation.
- Incentives: These are often included in a credit program, but do not reduce fees charged to individual property owners; rather, they are often represent discounts offered to offset the purchase price or installation costs of stormwater management facilities implemented by property owners (e.g., rain barrels, rain gardens, etc.). The City can also offer technical assistance for the design, installation, and inspection of facilities. Although these items add to the overall program cost, they are generally a small

proportion of the overall budget (<0.5%) and rarely warrant a change to the overall stormwater rate base charge.

- Exemptions: This includes eligible land uses that are not included in the rate calculation (e.g., public transportation rights-of-way that are considered part of the City's drainage system) or for landowners which the City does not have the legislative authority to charge a user fee. For exemptions, the impervious area of exempt properties would be removed from the assessable total billing units in the base charge calculation. Additional details on exemptions are described in the next section (**Section 4.6**).
- Subsidies/Grants: This would include selected properties for which Council may decide to use City tax funds to pay the charge on behalf of the property owners (e.g., economically disadvantaged homeowners, charitable organizations, or places of worship).

2.3.5 User Fee Exemptions

As noted earlier, the base charge for a stormwater user fee is determined by dividing the annual cost of the municipal stormwater management program by the total number of billing units. For a feasibility study, it is common not to modify values used in this rate equation to account for incentives, adjustments, and subsidies/grants. For a user fee credit program, the total credit amount would be removed from the rate revenues (i.e., the numerator in the rate equation). For exemptions however, the impervious area of exempt properties would be removed from the total stormwater billing units (i.e., the denominator in the rate equation).

For municipalities that have implemented a rate, public transportation rights-of-way are considered to be part of the drainage system (i.e. overland flow routes and utility corridors) and therefore not included in the rate calculation.

Rate exemptions also include properties that the City does not have the legislative authority to charge a user fee. Sections 9 and 11, and Part XII of the Ontario Municipal Act authorize the City to impose, by by-law, a fee or charge to property owners for services provided by a municipality, including stormwater management. This authority is limited in two respects:

- Section 2 of Ontario Regulation 584/06 provides that a fee or charge cannot be used for capital costs that could otherwise have been raised through the Development Charges process; and
- Where provisions exist in other legislation that expressly exempt entities from paying these charges, then the City cannot legally impose these fees.

It is important to note that tax-exempt status does not exempt the property owner from a user fee. For example, land owned by a religious organization and used as a place of worship, a hospital or a university will be exempt from property taxation but is not considered exempt from user fees or charges under the Municipal Act. Legislation establishing municipalities also does not provide an exemption from municipal user fees and charges. That is, the City of Greater Sudbury would be required to pay the stormwater user fee, as it does for water/sewer fees. Ontario Regulation 584/06 establishes that the federal and provincial Crown are not required to pay municipal user fees and charges. Further, some hold the legal opinion that in Ontario colleges and public school boards are not required to pay municipal user fees and charges. However, many of them do pay water and sanitary utility fees.

These common Ontario stormwater rate exemptions have been accounted for in the base charge calculations below, as an estimated 4% reduction in the total amount of billing units.

2.3.6 Rate Analysis

Detailed annual stormwater charges for the ERU user fee option are shown in the following table for the current program, the full O&M program and the fully funded (i.e. capital and O&M) program. The total rate funded program costs (i.e. excluding DC's) and base rates are shown in the top rows of the table, followed by average annual charges (rounded to the nearest dollar) estimated for the various parcel types.

The base rate calculation assumes a collection rate of 97% and is expressed on a monthly basis. This accounts for 3% unrecognized revenue, which includes allowances for credits, billings errors, exemptions and non-payments. This collection rate is a typical value used in the feasibility stage and would need to be refined during implementation. The potential lost revenue due to credits and incentives would need to be adjusted as the credit policy, if any, is being developed.

The first two columns in the following table show the number of billing units and dwelling units for each property classification. For the ERU billing unit method, residential properties are assigned 1 billing unit for each dwelling unit and non-residential properties are assigned billing units based on the measured impervious area divided by the average ERU size (223 m^2). The remaining columns show the corresponding user fee charges by service level.

The average single-family detached homeowner would pay the following with the ERU user fee option under the following three program alternatives:

- Current: $113 per year;
- O&M fully funded: $128 per year; and
- Fully funded: $154 per year.

These numbers are based on statistical sampling and assumptions about credits and exemptions. If the City chose to implement an ERU based stormwater rate, then the numbers would be refined based on additional non-residential impervious measurements and further investigation into potential credits and exemptions.

Table 15: Annual Stormwater User Fee Charges – ERU Option

Billing Units (ERU)	Number of Dwelling Units per Property	Estimated Impervious Area (m^2) per Property	Stormwater Program Item	Stormwater Management Programs		
				Current	Interim	Sustainable
			Program Cost	$14,712,500	$16,712,500	$20,012,500
			Base Rate ($/ERU/mo)	$9.40	$10.70	$12.80
			Representative Property	Charge	Charge	Charge
Single Unit Residential						
1.0	**1.0**	**283.5**	**Detached**	**$113**	**$128**	**$154**
1.0	1.0	173.6	Semi-Detached	$113	$128	$154
Multi-Unit Residential						
2.0	2.0	239.1	2-Plex	$226	$257	$307
3.0	3.0	279.7	Triplex	$338	$385	$461
4.0	4.0	360.8	4-Plex	$451	$514	$614
5.0	5.0	361.6	5-Plex	$564	$642	$768
6.0	6.0	361.0	6-Plex	$677	$770	$922
28.5	28.5	2,628.4	7+ Unit Apartments	$3,215	$3,659	$4,378
1.0	1.0	117.2	Condominium	$113	$128	$154
1.0	1.0	122.4	Townhouse	$113	$128	$154
Non-Residential						
12.7	n/a	2,836.9	Ind'l/Comm (average)	$1,433	$1,631	$1,951
12.7	n/a	2,836.9	Misc/Mixed Use (average)	$1,433	$1,631	$1,951
0.0	n/a	0.0	Undeveloped (average)	$0	$0	$0
12.7	n/a	2,836.9	Tax Exempt (average)	$1,433	$1,631	$1,951

Note that the value shown in the table above represents the average for non-residential properties. The actual charge to non-residential properties would vary greatly depending on the impervious area of a given property.

Undeveloped properties show zero charge based on imperviousness. Typically, a property is defined as “undeveloped” if it has not been cleared and has zero impervious surfaces (e.g. covered with shrubbery). Properties that are vacant but have been cleared and have run-off from compacted gravel or an old building slab would be charged. If the City chooses to implement a variable stormwater rate, then it will need to clearly define “imperviousness” as this forms the base for all future charges.

As noted previously, an estimated number of individual exemptions (across all parcel types) have been accounted for in the base charge calculation. For instance, a credit policy could be implemented to recognize properties that implement on-site stormwater best management practices to reduce the load on the public system.

3. Comparison of Funding Options

After reviewing the full range of stormwater funding options, the City decided to complete a quantitative assessment of the following three funding options:

- Dedicated Tax Levy;
- Stormwater Rate based on Land Use (also mimics a tiered flat fee); and
- Stormwater Rate based on Impervious Area (Equivalent Residential Unit option).

These options were selected because they are all relatively easy to administer on an on-going basis (i.e..with existing staff) and can theoretically meet all stormwater funding needs. A brief summary of the three funding models are described below.

1. **Dedicated tax levy**: based on assessed value (part of the property tax bill) but revenues are dedicated to stormwater. Tax exempt properties do not contribute, and no credits are given to properties who decrease their impact on the City's stormwater system.
2. **Land Use Based Rate**: all properties contribute based on their land use. The fee is based on a roughly approximated average (not measured) impact, and a credit system may be possible. Unlike the ERU this is not a variable rate but results in a tiered flat fee.
3. **ERU variable rate**: all residential properties contribute the same amount, which is based on the City's average residential impervious area. Non-residential properties are charged based on their individually measured impervious area. A credit system for properties that reduce their impact on the system is possible.

All three options are a dedicated and transparent funding source. The sections below describe typical differences with respect to:

- Ability to secure sustainable funding levels;
- Customer acceptance;
- Effort to set-up and administer;
- Equity; and
- Environmental benefits.

Table 16: Rating the Three Funding Models for Sudbury

	Tax Levy	Land Use/Tiered Flat Fee	ERU
Ability to secure sustainable funding levels	Difficult with tax increase sensitivities	Yes	Yes
Customer acceptance	Difficult with property tax sensitivities and perceived inequity	Concerns with a new "fee"	Concerns with a new "fee" but seen as equitable
Effort to set-up and administer (typical)	<$100k set-up <$50k annual admin	$100k-$200k set-up $50k-$100k annual admin	$150k-$250k set-up $75k-$150k annual admin
Equity	No	Somewhat	Good
Environmental benefits	None	Some	Good

An overall summary of the advantages and disadvantages of the three funding models are outlined in the following table.

Table 17: Advantages and Disadvantages of Three Funding Models for Sudbury

	Advantages	Disadvantages
Dedicated Tax Levy	▪ simple ▪ could likely be administered by existing staff on an on-going basis ▪ can fund all existing and future activities within the City's stormwater program ▪ use existing billing system ▪ dedicated stormwater funding source	▪ inequitable: no correlation with a property's impact on the stormwater system ▪ associated with the general tax levy, so will be subject to tax sensitive scrutiny ▪ a credit system cannot be applied to properties that install on-site stormwater measures ▪ tax exempt properties will not contribute
Land Use Based Rate	▪ relatively simple ▪ could likely be administered by existing staff on an on-going basis but will require billing resources ▪ can fund all existing and future activities within the City's stormwater program ▪ outside the general tax levy, so will not burden City revenues from property tax ▪ a credit system can be applied to properties that install on-site stormwater measures ▪ all properties (including tax exempt properties) will contribute ▪ sustainable and dedicated stormwater funding source	▪ will require some effort to set-up, particularly with respect to the billing of properties that do not currently receive a utility bill (e.g. well and septic system). ▪ inequitable: minor correlation with a property's impact on the stormwater system ▪ no incentive for non-residential properties to reduce the imperviousness of their properties ▪ potential resentment towards a new "fee"
Imperviousness Based Variable Rate (ERU)	▪ relatively simple ▪ could likely be administered by existing staff on an on-going basis but will require billing resources ▪ can fund all existing and future activities within the City's stormwater program ▪ outside the general tax levy, so will not burden City revenues from property tax ▪ a credit system can be applied to properties that install on-site stormwater measures ▪ all properties (including tax exempt properties) will contribute ▪ sustainable and dedicated stormwater funding source ▪ equitable: the fee is proportional to the amount of stormwater runoff generated on-site ▪ provides incentive for non-residential properties to reduce the imperviousness of their properties	▪ will require some effort to set-up, particularly with respect to the billing of properties that do not currently receive a utility bill (e.g. well and septic system) and the impervious area measurement of non-residential properties ▪ if a credit or rebate program is implemented resources will be required to administer ▪ potential resentment towards a new "fee"

As part of the ERU rate analysis, we estimated the amount of impervious area on residential properties compared with non-residential properties. We determined that residential properties are responsible for approximately half the impervious area in the City of Greater Sudbury. Currently residential properties contribute approximately 70% of the tax levy and therefore contribute approximately 70% of the current stormwater funding. In other words, residential properties "overpay" for stormwater management. The ERU funding model acts to rectify this by rebalancing the breakdown of stormwater funding to closely resemble imperviousness contributions. The breakdown of stormwater funding contributions for the three funding options are outlined in the following table.

Table 18: Residential vs Non-residential Contributions for Three Funding Models

	Imperviousness	Tax Levy	Land Use Based Rate	ERU Based Rate
Residential contribution	49%	70%	71%	49%
Non-residential contribution	51%	30%	29%	51%

Credit programs, which are usually considered for any stormwater rate can also help increase the fairness of a stormwater funding model by reducing the fee for properties that implement and maintain on-site stormwater measures.

The following table provides a summary of the rates for different property types under the three different funding options at three different service levels.

Table 19: Summary of Rates for Three Funding Options

Property Type	Existing Funding Level			Fully Funded O&M			Fully Funded		
	Tax Levy#	**Land Use Based Rate**	**Impervious Based Rate (ERU)**	**Tax Levy**	**Land Use Based Rate**	**Impervious Based Rate (ERU)**	**Tax Levy**	**Land Use Based Rate**	**Impervious Based Rate (ERU)**
Residential – single detached	$185*	$212	$113	$210*	$239	$128	$250*	$288	$154
Residential – condo	$325*	$15	$113	$369*	$17	$128	$440*	$21	$154
Residential – apartment (whole building)	$2,931*	$515	$3,215*	$3,330*	$582	$3,659*	$3,968*	$570	$4,378*
Farm	$11*	$1,041	$1,433*	$12*	$1,176	$1,631*	$15*	$1,413	$1,951*
Institutional (assumed tax exempt)	$0*	$2,094	$1,433*	$0*	$2,366	$1,631*	$0*	$2,843	$1,951*
Commercial	$1,102*	$1,158	$1,433*	$1,252*	$1,308	$1,631*	$1,492*	$1,572	$1,951
Industrial	$1,102*	$1,283	$1,433*	$1,252*	$1,450	$1,631*	$1,492*	$1,742	$1,951
Undeveloped	$11*	$0	$0	$12*	$0	$0	$15*	$0	$0

* Indicates that this is only an average and the actual value will vary by property

The tax levy is based on Sudbury tax rates. Would differ for Valley East and other areas.

4. Conclusions and Recommendations

4.1 Considerations for the City of Greater Sudbury

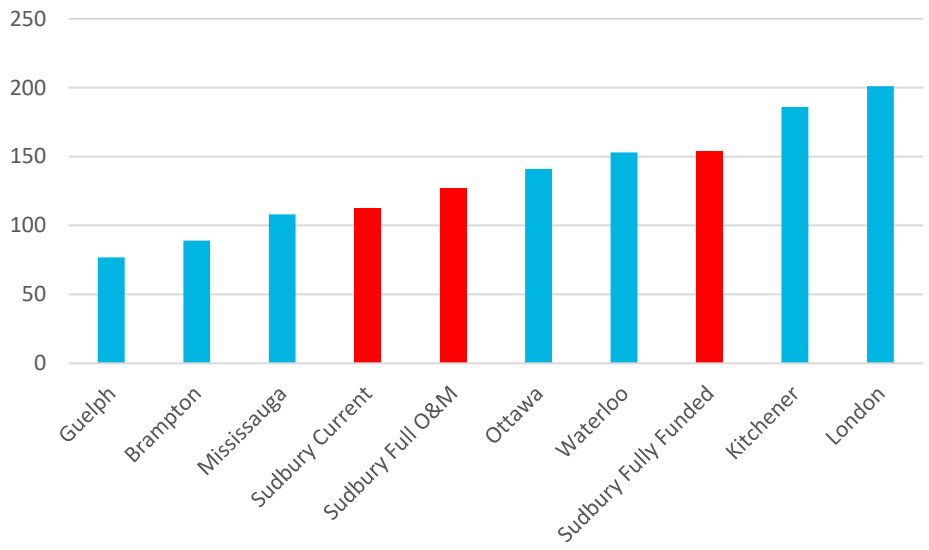
Due to the City of Greater Sudbury's unique nature (e.g. mines within City boundaries and a very large range of property sizes), we believe that an ERU based stormwater rate would provide the right balance between equity and simplicity.

We have estimated that the average single-family detached homeowner would pay the following with the ERU user fee option under the following three level of service alternatives:

- Current: $113 per year;
- O&M fully funded: $128 per year; and
- Fully funded: $154 per year.

The following graph outlines rates for average detached homes in other Ontario municipalities with stormwater fees. As can be seen in the graph, $128 (estimated rate for Sudbury with a fully funded O&M program) would be an average rate when compared with other Ontario municipalities with a stormwater user fee.

Figure 5: Comparing Proposed Sudbury Stormwater User Fees for Single Family Detached Homes with Existing Fees in Other Ontario Municipalities



We recommend that the City try to achieve the "middle" proposed funding level of $16.7M in order to have a fully funded maintenance program. This is a 14% increase from the existing stormwater program of $14.7M. This would result in the average detached home paying approximately $128 per year towards stormwater management. The exact rate would be determined once the exact billing units and any exemptions are determined (which is typically done in a second or implementation phase of a stormwater rate). We recommend that City staff, with our support, present the ERU based stormwater user fee option to internal and external stakeholders for feedback and validation.

4.2 Recommended Next Steps

It is recommended that through consultation with City staff, the following steps are taken:

- Confirm the preferred funding model(s) to be presented for external consultation;
- Conduct external consultation; and
- Select and finalize a preferred funding model and move forward with implementation.

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