GROUNDED SOLUTIONS

Environmental Scan of Public Tree Compensation Practices
Final Report

Prepared for the Regional Municipality of York

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Disclaimer

This environmental scan provides an overview of public tree compensation practices among municipalities in York Region (Ontario), other selected jurisdictions in Ontario and select jurisdictions in western Canada. The information has been gathered through virtual and phone interviews, email, and review of online resources. The work has been undertaken by Margot Ursic who is a Planning Ecologist with expertise in urban forest planning. If there are any oversights, errors or inaccurate interpretations included in this report related to your jurisdiction please contact Margot at margot@groundedsolutions.ca.

Key Terms as Defined for This Report

"Caliper" means the measurement of trunk diameter of transplantable deciduous trees. Measured in millimetres (mm). In accordance with the Canadian Nursery Landscape Association (CNLA) standards, caliper must be the determining measurement when the caliper exceeds 40 mm. It must be measured no less than 15 cm above the ground level for trees with a caliper up to 100 mm. Trees 100 mm and larger caliper are to be measured 30 cm above the ground level. (Adopted from the Tree Technical Manual, City of Guelph 2019).

"Public tree" means trees that are under municipal ownership and/or management.

"Tree compensation" means the planting and establishment of tree(s) to recompense for the removal of one or more tree(s) and / or financial contributions made to support the planting and establishment of tree(s) to recompense for the removal of one or more tree(s).

"Tree replacement" means the planting and establishment of tree(s) to recompense for the removal of one or more tree(s).

"Woodland" means, land of at least 1.0 hectares (ha) with at least (a) 1,000 trees, of any size, per hectare (ha), (b) 750 trees, measuring over five centimetres (cm) in diameter, per ha, (c) 500 trees, measuring over 12 cm in diameter, per ha, or (d) 250 trees, measuring over 20 cm in diameter, per ha, but does not include a cultivated fruit or nut orchard or a plantation established for the purpose of producing Christmas trees. Trees are measured at 1.37 metres (m) from the ground. (Adopted from the Forestry Act, R.S.O. 1990, Ch. F. 26)

"Woodlot" means treed areas meeting the definition of "woodlands" of at least 0.2 ha and less than1.0 ha.

Acronyms

CIL	Cash-in-lieu
CTLA	Council of Tree and Landscape Appraisers
CRZ	Critical Rooting Zone
CVC	Credit Valley Conservation
DBH	Diameter at Breast Height
DCT	Direct Cost Technique
ISA	International Society of Arboriculture
LSRCA	Lake Simcoe Region Conservation Authority
NHS	Natural Heritage System
ROW	Right-of-way
RCM	Replacement Cost Method
RPAC	Regional Plant Appraisal Committee
TFM	Trunk Formula Method
TIPP	Tree Inventory and Preservation Plan
TPZ	Tree Protection Zone
TRAQ	Tree Risk Assessment Qualification
TRCA	Toronto and Region Conservation Authority
UFMP	Urban Forest Management Plan
VCP	Vegetation Compensation Plan

1 Introduction

York Region has a proactive program focused on the establishment, maintenance, and replacement of trees in its right-of-ways (ROWs) that's been growing for over two decades. York Region's long-standing street tree program focusses on the main arterial roadways that connect the nine local area municipalities (i.e., Yonge Street, Dufferin Street, Highway 7, Major Mackenzie Drive) and has over 70,000 street trees. The nine local area municipalities in the Region[1] are responsible for tree establishment, maintenance, and replacement along their municipal roads.

The Region's current practice involves receiving compensation from various stakeholders (in the form of replacement trees, financial compensation, or a combination thereof) when trees are removed in its ROW. The Region decided to undertake this environmental scan to have an improved understanding of what other comparable municipalities in southern Ontario and other parts of Canada are doing with respect to public tree compensation to see if there may be opportunities to improve its practices.

The purpose of this scan was to gather and summarize key aspects of public tree compensation practices from within York Region and select municipalities elsewhere in Ontario and western Canada to:

a. Understand the range of approaches being used within York Region
b. Understand the range of approaches being used outside York Region in southern Ontario and in select urban / urbanizing jurisdictions in western Canada
c. Identify the different types of compensation being sought for public trees, including how replacement plantings and financial compensation are being calculated, and
d. Use the scan as a basis for validating existing practices in the Region and / or considering opportunities to strengthen or otherwise improve them.

This report provides:

- the methods for undertaking the scan (Section 2)
- an overview of different tree replacement and compensation methods (Section 3)
- a summary of the key findings of the scan (Section 4), and
- detailed summaries of the results of the scan organized by the interview topics as follows:
    - policy, regulatory and guideline basis (Section 4.1)
    - tree replacement approaches (Section 4.2)
    - financial compensation approaches (Section 4.3)
    - approaches to wooded natural areas (Section 4.4)
    - approaches to public tree compensation without permission (Section 4.5)
    - key public tree compensation challenges (Section 4.6), and
    - public tree compensation management approaches (Section 4.7)
- concluding remarks (Section 5)

[1] The nine municipalities in York Region are the: City of Markham, City of Richmond Hill, City of Vaughan, Town of Aurora, Town of East Gwillimbury, Town of Georgina, Town of Newmarket, Town of Whitchurch-Stouffville and Township of King.

In the fall of 2022, York Region retained Grounded Solutions Services Ltd. to conduct an environmental scan of public tree compensation practices focused on street trees in municipal ROWs. The Region expressed interest in gaining an understanding of these practices among the local area municipalities in York Region and select municipalities elsewhere in Ontario and western Canada.

As much of the information is not readily available online or in other published sources, it was agreed to focus efforts on securing interviews with appropriate staff at targeted municipalities. A list of 11 questions was developed to guide the interview and research process (see Appendix A) and to enable consistent information gathering across multiple jurisdictions. One additional question was asked of the local area municipalities within York Region (i.e., Do you have any comments or suggestions related to working with the Region on municipal ROW tree protection and compensation matters?). The responses to this question have been provided to the Region in a separate internal memo for their consideration.

A list of municipalities that could be considered comparators to York Region was developed in consultation with the Region. Criteria for inclusion included one or more of the following:

- All municipalities within York Region
- Upper or single tier municipalities geographically close to York Region
- Largely urban or urbanizing jurisdictions with active urban forestry programs, and
- Municipalities known to undertake proactive public tree management.

Targeted outreach was made to more than 30 municipalities over December 2022 and January 2023. Ultimately, the report reflects data collected from:

- All nine local area municipalities in York Region and for the Region itself (i.e., so 10 in total)
- Ten (10) single or upper tier municipalities in southern and eastern Ontario
- Four lower tier municipalities in southern Ontario, and
- Three single or upper tier municipalities in western Canada.

The input gathered through this process, supplemented by the review of additional information provided by participants and gathered through online research, is summarized in this report. The more detailed individual municipal responses documented in completed questionnaires have been provided to the Region for their internal reference and records.

2 Overview of Tree Compensation Methods

The art and science of implementing tree compensation is a complex topic that is outside the scope of this project to research and review in detail. However, given the number of approaches and variable terms used in relation to tree compensation, this section provides a high-level overview of the types of tree replacement and compensation practices, with examples, to establish a common language for this report.

The following methods are described based on the research completed for this project with inputs drawn from multiple sources. The simplified descriptions and examples are provided for reference to ensure that the terms being used in the report are understood to mean the same thing by all readers.

2.1 Tree Replacement Methods

The following methods focus on how to calculate the number of trees that should be established to replace one or more trees being removed. While the preference is generally to establish new trees on the same property or in the same area as the tree removal is taking place, replacement can also occur elsewhere, although typically within the same municipality.

While the basic principle behind tree replacements is to ensure "no net loss" in the urban forest, some approaches allow for more time to achieve a no net loss than others. The following methods are listed from those that will result in the greatest to the least time lag to achieve "no net loss" in tree canopy.

Although the calculation used for the required tree replacements may be translated into a cost amount which allows for cash-in-lieu (CIL) of actual plantings (see Section 2.2), this sub-section focusses on methods for calculating the actual quantity of tree planting replacements.

The following four tree replacement methods were identified as those used by the municipalities reviewed for this scan:

1. Simple Ratio Method
2. Progressive Ratio Method
3. Aggregate Caliper Method and Discounted Aggregate Caliper Method
4. Leaf Area Replacement Method

Notably the terms "simple ratio method" and "progressive ratio method" were selected by the report author and are not established industry standards.

Each of these methods is described briefly with examples below. Discounting and/or depreciation factors can be applied to any of these methods and are discussed briefly in Section 3.3. For simplicity, the following examples assume no discounting applies.

1. SIMPLE RATIO METHOD: One tree replaced for one tree removed, irrespective of the size of the tree removed. For example, one 50 cm DBH white oak removed = one 5 cm DBH (or 50 mm caliper) tree to be planted.

2. PROGRESSIVE RATIO METHOD: A sliding scale of more than one tree replaced for one tree removed which increases based on the size of the tree removed (or in some cases, like the Town of Georgina, based on the species). An example from the City of Brampton is provided in Table 2-1.

Table 2-1. Example of "progressive ratio method" (City of Brampton 2018)

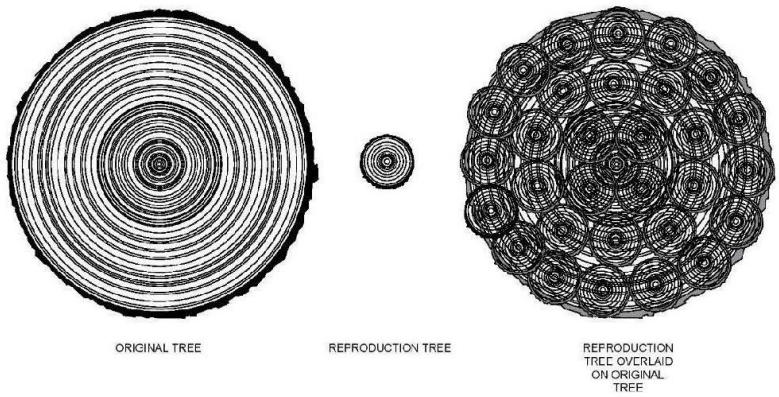
DBH (cm)	Ratio
15-20	1:1
21-25	2:1
36-50	3:1
51-65	4:1
>65	5:1

Based on the example, one 50 cm DBH white oak removed = three (3) x 5 cm DBH trees to be planted. Notably, there is typically a ceiling placed on this scale. In the example above, the highest ratio is 5:1 for >65 cm DBH trees so that even for trees of 120 cm DBH the ratio would not exceed 5:1.

Additional examples from the municipalities scanned for this project are included in Appendix B.

3. A) AGGREGATE CALIPER METHOD: The total caliper of the tree removed is replaced with small caliper trees totaling the same caliper as the tree removed.

In this case, one 50 cm DBH white oak removed = ten (10) x 5 cm DBH trees to be planted.



*as adapted from Figure 5.3, p. 58 of the "Guide for Plant Appraisal, 10th edition, 2nd printing

Figure 2-1. Illustration of the principle of the aggregate caliper tree replacement method

B) DISCOUNTED AGGREGATE CALIPER METHOD: The total caliper of the tree removed is replaced with small caliper trees totaling the same caliper as the tree removed, but there are adjustments to the replacement caliper based on the species and/or condition of the tree being removed.

In this case, one 50 cm DBH white oak in "fair" (or a "60%) condition rating removed = 50 cm DBH * 0.60 = 30 cm DBH to be replaced. This means six (6) x 5 cm DBH trees to be planted.

Note: Methods for discounting based on condition also vary. Some examples from the municipalities scanned for this project are included in Appendix C.

4. LEAF AREA REPLACEMENT METHOD: In this approach, every square metre of leaf area removed must be replaced by planting enough trees to replace the lost square metres of leaf area.

In this case, a silver maple (shading factor 0.83) with a crown length of 11 m and a crown width of 10 m (leaf area (LA) of 493 m^2) which has lost 25% of its crown due to storms is assigned a leaf area 370 m^2. An equivalent compensation leaf area would require 34 small caliper silver maples with a crown length and width of 2 m each and 100% of the crown healthy, so each tree with leaf area of 11 m^2.

2.2 Financial Compensation Methods

The tree care industry recognizes and provides several comprehensive methods to value trees in the Guide for Plant Appraisal by the Council of Tree and Landscape Appraisers (referred to as the CTLA Guide herein). Currently, both the 9th and the 10th editions (ISA 2019) are typically used in conjunction with supplemental information related to local nursery stock costs provided by a Regional Plant Appraisal Committee (RPAC). These methods are not described or assessed in this report, but interested readers are encouraged to refer to the published CTLA Guide (9th or 10th Edition) for details.

This section of the report provides high-level descriptions of the basic principle behind tree compensation and of the four financial compensation methods for trees identified through this scan and used by the municipalities considered.

"Tree appraisal" is the term used whereby a cost is determined to compensate for one or more trees being removed (i.e., referred to herein as "tree compensation"). The basic idea behind tree compensation is based on the principle of substitution and intended to ensure that the appropriate funds are provided to replace the tree(s) being removed. However, what is considered (or not considered) in the appraisal approach varies greatly depending on the method used.

- For example, some methods only account for the costs of purchasing and planting the replacement tree(s), whereas other methods account for additional related costs such as those associated with the mature tree stump removal, site preparation and/or post-planting maintenance for a specified period of time (typically two or three years).

An additional consideration for some methods accounting for the functions or services associated with the tree being removed. It remains both technically challenging and controversial to try and fully account for the functions or ecosystem services (e.g., shade, cooling, air purification) provided by a tree being removed, and to seek financial compensation for the estimated value of these services. However, there are some current and accepted methods that consider tree species, condition and location (i.e., site, contribution, and placement) in the valuation process.

Established methods range from simple calculations (e.g., a flat fee of $500 per tree removed irrespective of size, condition, etc.) to much more complex calculations that consider the tree size, condition, species and site context. The cost of removing the tree being compensated for and installing the new one may also be considered. Most of these valuations, particularly the more complex appraisals, are done by an International Society of Arboriculture (ISA) Certified Arborist experienced in tree appraisals or a comparably qualified tree professional.

Tree appraisals or valuations tend to be based on (1) the direct costs associated with replacing a tree and/or (2) consideration for some of the services which the tree provides (usually extrapolated based on tree size, condition, site context, etc.) This is sometimes referred to as "amenity value".

The four methods identified through this scan for establishing this cost are described below:

1. Simple Replacement Cost Method
2. Full Replacement Cost Method (RCM)
3. Trunk Formula Method (TFM)
4. Aggregate Caliper Cost Method

Notably the terms "simple" and "full" replacement method were selected by the report author and are not established industry standards.

Each of these methods is described briefly with examples below.

1. SIMPLE REPLACEMENT COST METHOD: Based on the cost of replacing the tree removed with nursery stock, usually in a similar or comparable location. This method typically includes the cost to supply the stock and its installation.

This method may be applied to:

   a. a simple ratio whereby one tree removed is compensated by payment for one tree planted irrespective of the DBH of the tree removed (e.g., one tree removed requires the replacement cost for one tree to be planted, for example, $750), OR
   b. a progressive ratio whereby one tree removed is compensated by payment for one or more trees planted based on the DBH of the tree removed and the method in place in the municipality (e.g., one 20 cm DBH tree removed requires the replacement cost for one tree to be planted, for example $750, but one 60 cm DBH tree removed requires the replacement cost for three trees to be planted, totaling three times the one tree cost at $2250).

2. FULL REPLACEMENT COST METHOD (RCM) also called DIRECT COST TECHNIQUE (DCT): Based on the cost of replacing the tree removed with nursery stock of the same or a comparable species, size and condition in the same or a comparable place.

Depreciation or discounting based on the condition and/or species of the tree being replaced (as noted above) may be applied (see Section 3.3). This method may include a + b OR a + c OR a + b + c below:

a. the cost of the replacement stock and its installation
b. the costs of the removal and cleanup of the tree being removed, and
c. the costs associated with post-planting maintenance and establishment (typically two years).

This method typically relies on guidance from the ISA CTLA Guide for Plant Appraisal (9th or 10th edition) and therefore is also referred to as the CTLA Replacement Method.

3. TRUNK FORMULA METHOD (TFM) also called TRUNK FORMULA TECHNIQUE: This valuation method is typically applied to large/mature trees in residential and urban settings considered too large to be replaced with one or more simple re-plantings and is based on guidance from the ISA CTLA Plant Appraisal Guide (9th or 10th edition[2]). It is not considered suitable for woodlands, woodlots or other treed natural areas.

This method bases tree value on the cost to purchase the largest commonly available tree from a nursery to the size of the tree being removed. Unit costs are based on the price per square cm of cross-sectional trunk area measured at DBH. This area is multiplied by the unit price. Wherever possible, the nursery tree should be the same species and cultivar as the appraised tree.

The value is then adjusted (i.e., discounted) according to the tree species, condition and location (i.e., site, contribution, and placement) based on the applicable CTLA guidance.

Although this method is more complex than the two above it is considered legally defensible because it is based on well-established arboricultural tree appraisal methods and refers to concepts from an internationally recognized, professional standard guidance document.

4. AGGREGATE CALIPER COST METHOD: This method builds on the aggregate caliper approach to tree replacement and adds some aspects of the other methods above in that it accounts for the size of the tree(s) being removed, may also consider tree condition and/or species to offset the costs of considering the total DBH being removed, and uses the per tree replacement cost as the basis for the valuation.

A brief description of the method is provided below with examples provided in Table 2-2.

- The DBH of the removal is measured and divided by the DBH of the intended or desired replacement specimen (typically 50 mm caliper stock represented as 5 cm) ("a" in the table

[2] Notably there has been much debate in the arboriculture profession about aspects of the CTLA Guide 10th Edition (Second Printing) (ISA 2019) and therefore some professionals are continuing to use the CTLA Guide 9th Edition.

below) and may be multiplied by the condition rating ("b" in the table below) or both the condition and species rating ("c" in the table below).

- Both the condition multiplier and species discount rate, where applied, are typically obtained from fixed, predetermined metrics (e.g., adapted from CTLA guidance but may vary by municipality).
- Replacement cost = the total costs for planting one replacement specimen (i.e., including planting, mulching, watering etc.). This number is usually updated annually based on previous year's costs, but also tends to vary by municipality.

Table 2-2. Descriptions and examples of aggregate caliper methods identified in this scan

Variations on the aggregate caliper cost method	Examples of municipalities where the approach is used
a) $\left(\left(\frac{DBH}{Replacement\ Tree\ DBH}\right)\right) * Replacement\ Cost$	City of Guelph*
b) $\left(\left(\frac{DBH}{Replacement\ Tree\ DBH}\right) * Condition\ rating\right) * Replacement\ Cost$	York Region Township of King
c) $\left(\left(\frac{DBH}{Replacement\ Tree\ DBH}\right) * Condition\ rating * Species\ Discount\ Rate\right) * Replacement\ Cost$	Town of Newmarket Town of Aurora

* In Guelph, discounting for condition and species is not incorporated. However, compensation is applied in accordance with the Private Tree By-law so trees smaller than 10 cm DBH, high risk and dead trees, and listed invasive shrubs/trees are exempt.

2.3 Discounting or Depreciation Factors

For any of the methods outlined above there can be exemptions from the calculation. For example, no compensation may be required for dead or high risk (may be referred to as hazardous)[3] trees.

There can also be discounting and/or depreciation factors which are integrated with the approach or added on to it (e.g., based on species or condition) that reduce the number of replacement trees required and/or the appraised value and costs being requested in compensation. Furthermore, some municipalities calculate tree replacement for all trees proposed for removal irrespective of their diameter, while others only consider trees above a specified minimum caliper or diameter at breast height (DBH) (e.g., Town of Aurora ≥5 cm DBH, City of Guelph ≥10 cm DBH, Town of Newmarket ≥20 cm DBH).

[3] The arboriculture industry is moving away from the use of the term "hazardous" as it relates to trees and moving towards the use of the term "high-risk", which has been used for this report.

Typical considerations for discounting or depreciation include:

- Tree condition (see examples in Appendix C)
- Tree species (e.g., highly invasive, likely to be subject to a terminal pest or disease), and
- Site context (this can include existing physical constraints to growth for the tree being removed, or other factors expected to limit its growth such as nearby infrastructure).

For example, York Region and King Township within the Region exempt the following from its compensation calculations (York Region, 2022):

- Tree-of-Heaven (*Ailanthus altissima*)
- European/black alder (*Alnus glutinosa*)
- Russian olive (*Elaeagnus angustifolia*)
- any tree of the genus ash (*Fraxinus* sp.) not under an Emerald Ash Borer treatment program, and
- any tree of the genus buckthorn (*Rhamnus* sp.).

An example outside of York Region is the City of Guelph which exempts the following invasive species from regulation in its Private Tree Protection By-law and also tends to apply the same exemptions to trees in its ROWs:

- Common buckthorn (*Rhamnus cathartica*)
- European or Glossy buckthorn (*Rhamnus frangula*)
- Black alder (*Alnus glutinosa*)
- Autumn olive (*Eleagnus umbellate*) and
- White mulberry (*Morus alba*).

Another approach to species-based discounting used by some jurisdictions (e.g., Town of Georgina, Township of King) that require progressive ratio compensation is to seek compensation at a lower ratio (e.g., 1:1) for invasive species whereas other species, referred to as desirable, are to be compensated at higher ratios (e.g., 3:1 or 4:1) (Township of King 2022, Town of Georgina 2016).

3 Key Findings of the Environmental Scan

The overarching finding of this environmental scan was the significant variability in the approaches taken by different jurisdictions within and outside of York Region in seeking replacement and / or financial compensation for the removal of trees under municipal ownership ("public trees"). However, a few common themes emerged in some aspects of the varied practices.

This section steps back from some of the specifics of the variable approaches and methods used and identifies some trends from the information gathered. However, the details and nuances of the variations within and between municipalities are not captured in this overview. Therefore, readers are strongly encouraged to examine Section 4 in conjunction with this section to gain a more complete understanding of the differences between municipal practices among the 27 jurisdictions reviewed for this scan.

This section summarizes common themes and key findings by the following topic areas:

- Policy, regulatory and guideline basis (Section 3.1)
- Tree replacement approaches (Section 3.2)
- Financial compensation approaches (Section 3.3)
- Approaches related to wooded natural / naturalized areas (Section 3.4)
- Approaches when municipal trees are removed without permission (Section 3.5)
- Key challenges related to public tree compensation (Section 3.6), and
- Approaches to public tree management (Section 3.7) with a focus on who undertakes the replacement work, if and when securities are held, and if tree compensation funds are kept in a distinct account.

The topic areas above reflect the questions asked during the scan (see Appendix A) and aligns with the topics and sub-sections in Section 4 to facilitate cross-referencing for those interested.

Graphs illustrating some of the trends and results have been included in this section. These graphs were based on the more detailed information summarized in the tables in Section 4 and present the information in a way[4] that allows trends to be illustrated.

3.1 Policy, Regulatory and Guideline Basis

The main finding related to the policy, regulatory and guideline basis for public tree compensation is that public tree by-laws are the most widely used tool for supporting public tree replacement and compensation among the municipalities scanned.

[4] The graphs included in this section are based on the information summarized in the tables in Section 4 of this report. To keep the graphs simple, more nuanced responses were dealt with as follows: "usually" was treated like a "yes", "N/A" (not applicable" was treated like a "no" and "sometimes" was given 0.5 in the appropriate "yes" category and 0.5 in the appropriate "no" category. In addition, for municipalities that employ more than one replacement and / or compensation method, only the predominant method applied to street trees was included in the graph.

Most municipalities (11 of 17) outside York Region rely on some type of public tree by-law to provide a legal basis for seeking tree replacement and/or financial compensation, with only one relying on a guideline alone (i.e., City of Brampton) and one relying on a guideline plus an Official Plan policy (i.e., City of Guelph).

Within York Region, there are a mix of approaches, as follows:

- The Town of Whitchurch-Stouffville relies exclusively on its tree by-law (see box below)
- Three municipalities rely on a public tree by-law and a guideline (i.e., the City of Vaughan, Town of Newmarket and Township of King)
- The Town of Richmond Hill relies on a guideline and an Official Plan policy
- York Region and the Town of East Gwillimbury rely on guidelines alone, although the Town noted they are planning on developing a public tree by-law shortly
- The City of Markham does not have a policy or by-law for public trees at present but is in the process of updating its tree by-law to include regulation of public trees

Summary of public tree by-laws among municipalities reviewed for this scan

WITHIN YORK REGION

- City of Richmond Hill Trees on City Streets By-law
- City of Vaughan Tree Protection By-law 052-2018
- Town of Newmarket Municipal Tree Protection By-law (2017-59)
- Town of Whitchurch-Stouffville By-law 2020-086-RE
- Township of King Municipal Tree By-law No. 73-54

Note: City of Markham's is in progress**

WESTERN CANADA

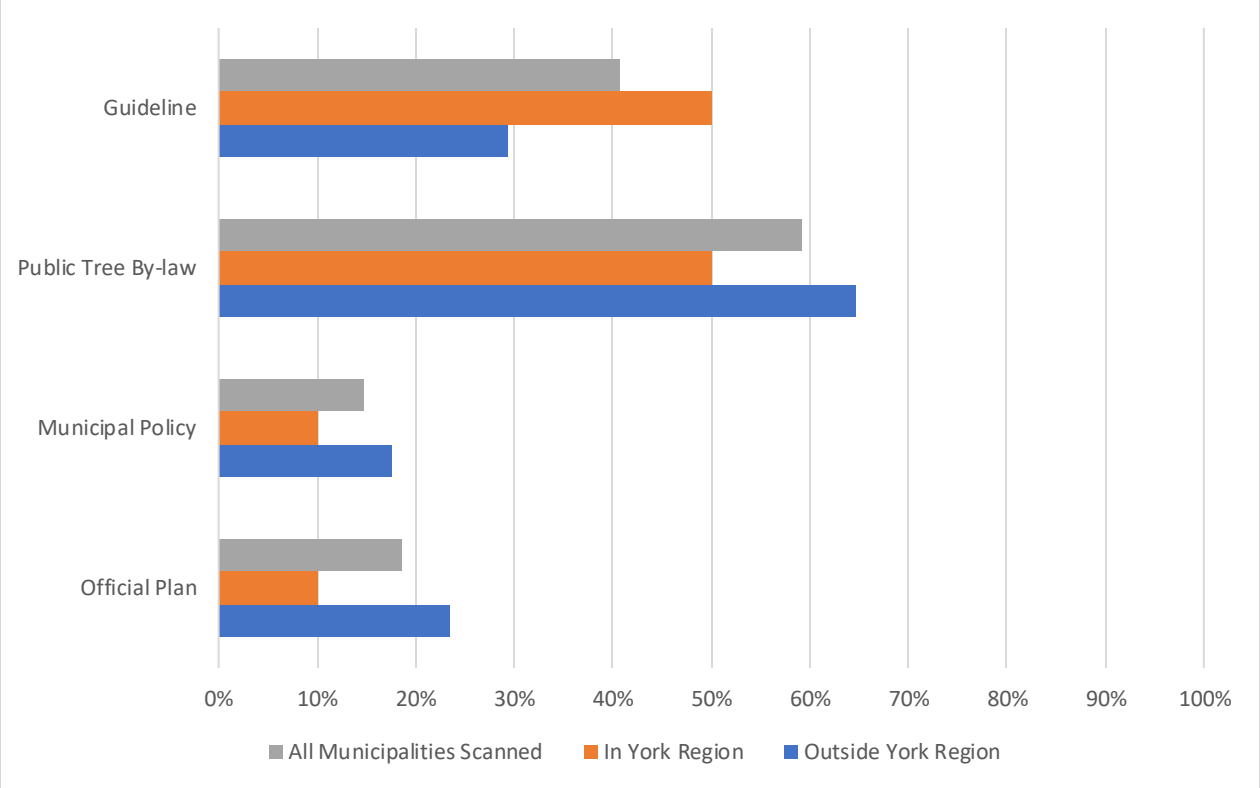
- City of Calgary Public Tree Protection By-law 23M2002
- City of Edmonton Public Tree By-law 18825

OUTSIDE YORK REGION IN ONTARIO

- City of Barrie Public Tree By-law 2009-098
- City of Hamilton Public Tree By-law 15-125
- City of London Boulevard Tree Protection By-law - CP-22
- City of Ottawa Tree Protection By-law 2020-340**
- City of Peterborough Tree Removal Bylaw 21-074**
- City of Toronto:
  - Municipal Code Ch. 813, Trees**
  - Municipal Code Ch. 658, Ravine Tree By-law
- City of Burlington Public Tree Bylaw 068-2013
- City of Mississauga Public Tree Protection By-law 0020-2022
- Town of Whitby Tree Protection By-law 4640-00

In municipalities with public tree by-laws, many of them indicated that these have been a key tool providing both a formal process and a legal basis for securing tree replacement and / or financial compensation. For example, the City of Ottawa has started to require tree compensation payments before issuing a tree permit, which has improved the success of obtaining compensation funds.

Many of these municipalities also noted that public tree by-laws (including municipal street tree and/or boulevard by-laws) provide a formal process and a legal basis for seeking and securing tree replacement and / or financial compensation when public trees are removed without permission or approvals in place.



Note: Several municipalities had more than one tool and so the percentages in each category may add up to more than 100%.

Figure 3-1. Overview of planning tools used to support public tree compensation among the 27 municipalities surveyed for this scan (10 in York Region and 17 outside)

A second key finding is that few municipalities have specific policies about tree replacement and / or compensation in their Official Plans.

As illustrated in Figure 2, few (only four of the 17) municipalities outside York Region have policies in their Official Plans that explicitly support and/or direct public tree compensation, and only one of the 10 municipalities in York Region (including the Region itself) has such a policy (see examples provided in Section 4.1.1).

A third key finding related to policies and regulations relates to the use of user fee by-laws are a widely used mechanism to keep the per tree replacement costs formalized in a regulation that is updated annually (so can reflect changes in costs).

Many municipalities who base their compensation on a per tree replacement cost have a per tree replacement amount included in a municipal fees by-law (and not in a tree by-law or another policy or guidance document) so that (a) the value is established in a clear and transparent location and (b) the value can be easily updated (e.g., to keep up with inflation) on an annual basis. Those few municipalities who have their per tree fee specified elsewhere (e.g., City of Guelph, Town of Aurora) intend to change this approach as part of their next by-law and / or tree compensation guideline update.

An overview of the per tree replacement costs from 2022 gathered from the municipalities reviewed where it was available is provided in Table 2-1. This table illustrates the range of costs – both within and outside York Region. More information about how per tree costs are applied in the tree compensation calculations in different municipalities are provided in Section 4.3.

Table 2-1. Range of per tree replacement costs among municipalities scanned

EXAMPLE MUNICIPALITY	PER DECIDUOUS TREE (2022 VALUES)
Ottawa	$400
Newmarket*	**$418.92**
Barrie, Burlington	$500
Guelph, Peterborough, Brampton, **East Gwillimbury**	**$550**
Toronto	$583
Markham, Richmond Hill	$600
Vaughan	$625
Whitby	$650
Hamilton	$670.96
King	**$900.00**
York Region	**$909.11 (deciduous), $834.36 (coniferous)**
Whitchurch-Stouffville	**min. $1,000**
London	$1,240 - $13,040**

*Municipalities in York Region shown in **bold**

** In London the approach is to charge the tree removal costs rather than the replacement costs, with the cost increasing progressively based on tree diameter (see Section 4.3).

3.2 Tree Replacement Approaches

Overall, approaches to tree replacement among the municipalities scanned were quite variable with multiple municipalities using a ratio-based approach and multiple using an aggregate caliper-based approach (see Figure 3-2 and Figure 3-3).

No municipalities scanned seek replacements for public trees based on the leaf area index replacement method.

OUTSIDE YORK REGION

Outside of York Region, more municipalities use a ratio-based approach than an aggregate caliper-based approach, but many use both, with ratio-based approaches tending to be more widely used for capital projects and aggregate caliper-based approaches tending to be more widely used for development projects.

Interestingly, five of the 17 municipalities scanned outside of York Region (i.e., City of Burlington, City of Hamilton, City of Saskatoon, City of Calgary and City of Edmonton) rarely seek tree planting replacements completed as it is their practice to almost exclusively seek financial compensation and then undertake the work directly or oversee the contracting directly. In addition, a few municipalities indicated a desire to explore and / or move in this direction to (a) simplify the process and (b) have better control over the quality of the stock, planting process and planting spaces (e.g., City of Barrie, City of Vaughan).

WITHIN YORK REGION

Within York Region, the approaches to tree replacement are more evenly split between ratio-based and aggregate caliper-based approaches, with ratio-based approaches tending to be more widely used for capital projects and aggregate caliper-based approaches tending to be more widely used for development projects.

ALL MUNICIPALITIES

In addition to the variability in the types of tree replacement methods used, there was also variability identified in how the ratio-based and aggregate caliper-based approaches were being applied, with no two municipalities taking an identical approach.

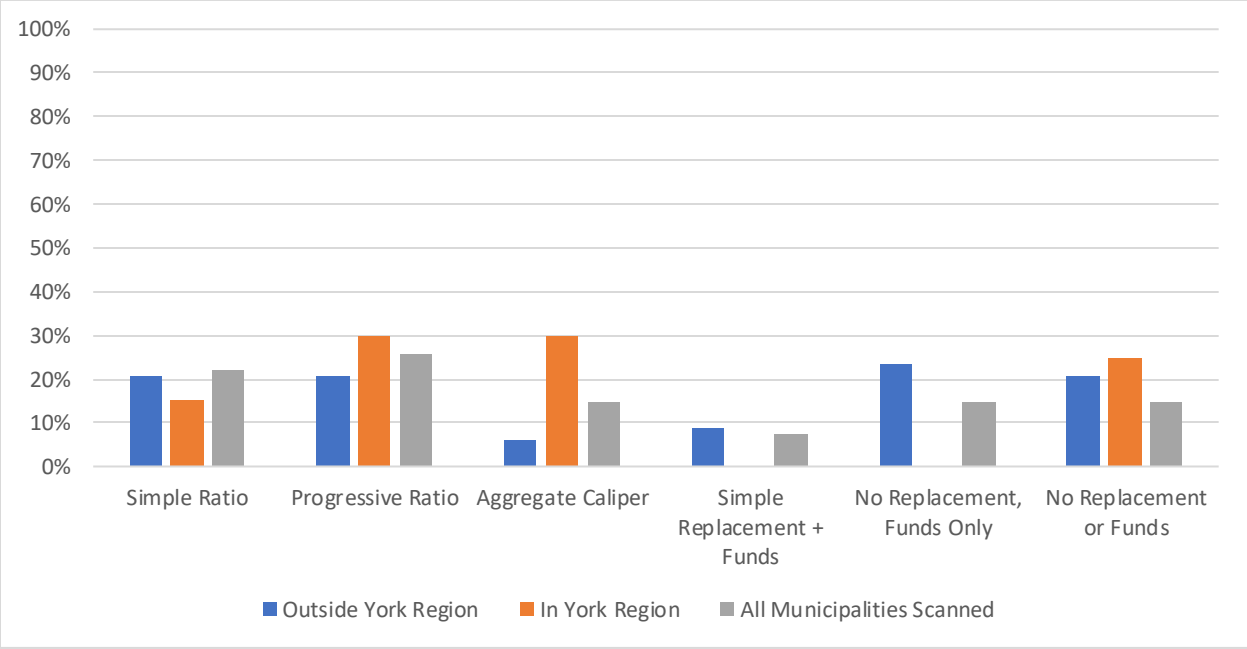


Figure 3-2. Overview of tree replacement approaches for capital projects among the 27 municipalities surveyed for this scan (10 in York Region and 17 outside)

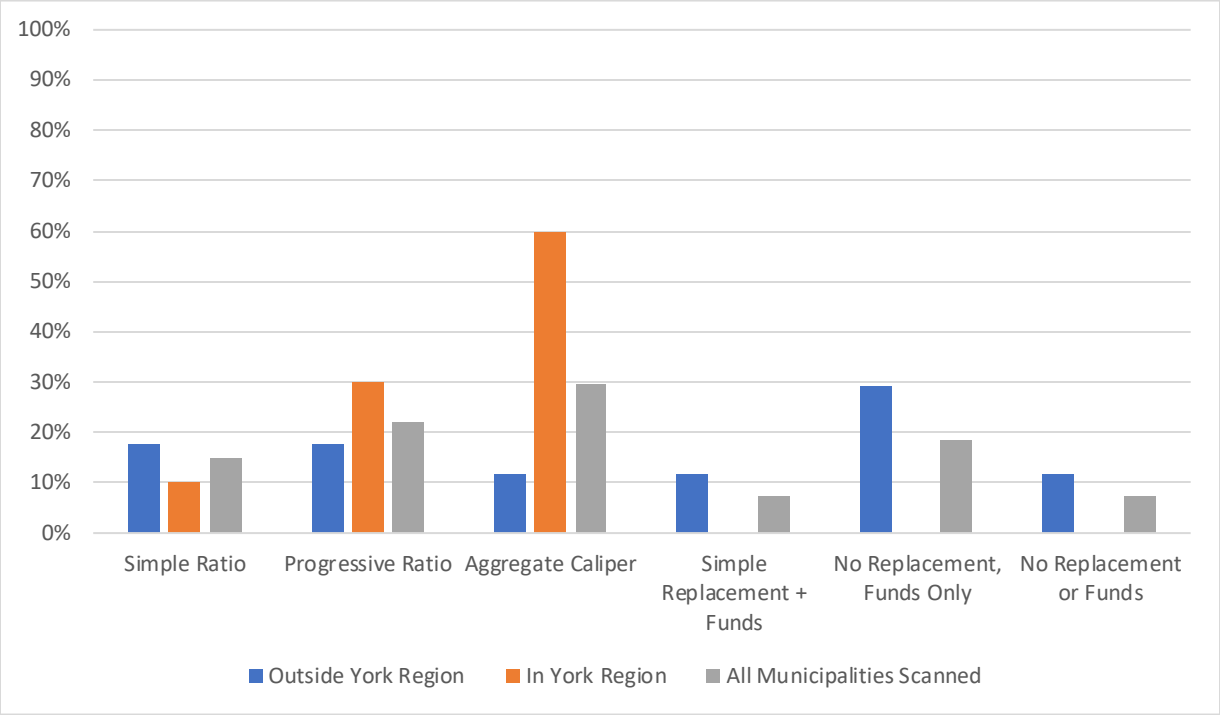


Figure 3-3. Overview of tree replacement approaches for development projects among the 27 municipalities surveyed for this scan (10 in York Region and 17 outside)

Although public tree replacement methods applied to capital and development projects were quite variable, some common themes emerged related to working with utilities. Most municipalities reviewed for this scan indicated challenges or a lack of success obtaining replacements for public trees removed by utilities as part of line clearing work (see Figure 3-4 and Section 4.2). Reasons identified for this challenge included:

- utilities works being exempt under the Municipal Act legislation that enables municipalities to pass tree by-laws, making any tree replacement (or financial compensation) voluntary rather than a legislated requirement
- insufficient resources to coordinate tree replacement with the various utility providers, each with their own priorities and requirements, and
- a desire not to add to the utility provider's work program and to let them move their work forward without additional complications.

Municipalities that indicated they sometimes or usually had success in this regard (i.e., City of Hamilton, City of Burlington), attributed their success to:

- developing and sustaining relationships with the various utility providers
- leveraging "green" commitments within the organization (e.g., Metrolinx develops and implements tree replacement plans within its corridors in accordance with its own Vegetation Management and Tree Compensation Program), and
- in some cases, working out tailored agreements with the local utility provider.

For example, the City of Hamilton, which has a substantial public tree establishment and replacement program (i.e., about 9,000 trees planted annually) commented that their success in obtaining public tree compensation is largely based on the relationships developed over time with various utilities and rail companies.

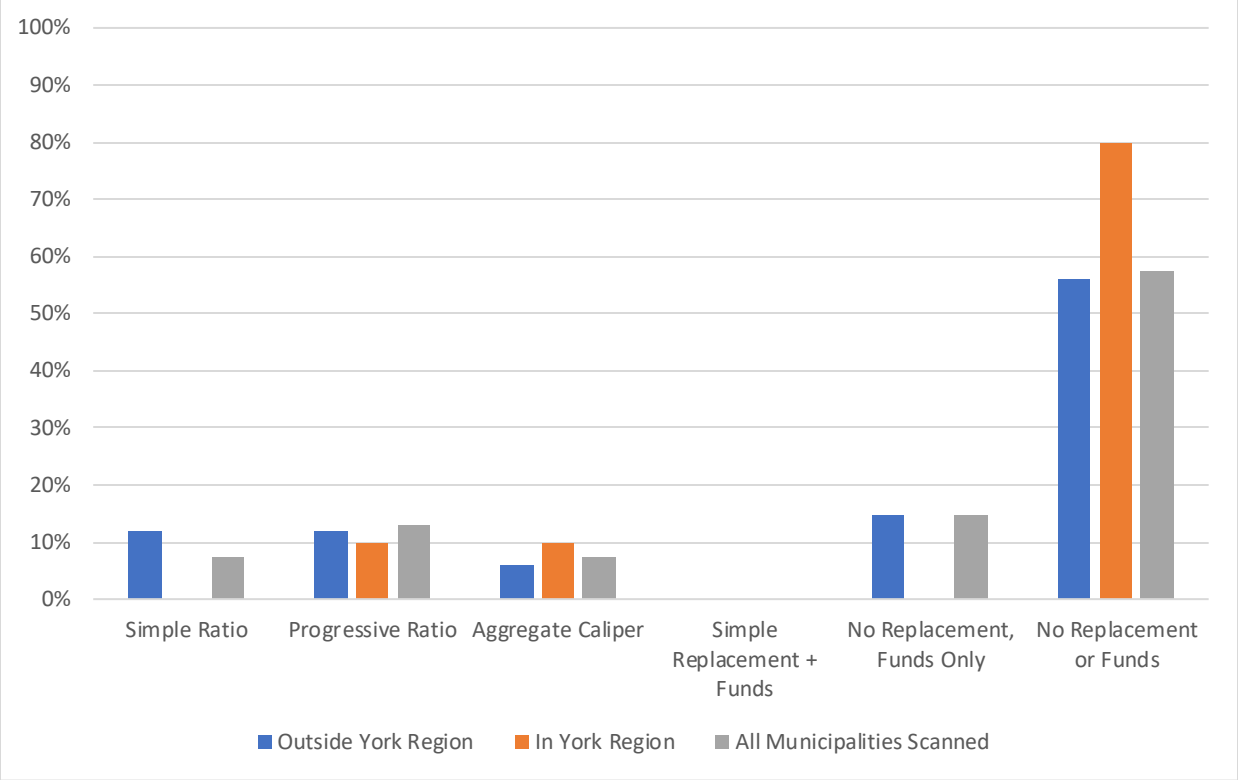


Figure 3-4. Overview of tree replacement approaches related to utilities works among the 27 municipalities surveyed for this scan (10 in York Region and 17 outside)

3.3 Financial Compensation Approaches

As with tree replacement approaches, approaches for seeking financial compensation were found to be quite variable among municipalities. However, as illustrated in Figure 3-5, Figure 3-6 and Figure 3-7 financial compensation is more widely sought and secured for development projects than for capital projects and is rarely secured in relation to utility works.

With respect to getting financial compensation for public trees:

- Outside York Region: most (14 of 17) secure it in relation to development projects, 6 of 17 secure it for capital projects, and 8 of 17 secure it some of the time in relation to utilities works.
- Within York Region, all (10 of 10) generally seek to secure it in relation to development projects, less than half (4 of 10) secure it for capital projects, and none secure it in relation to utility works.

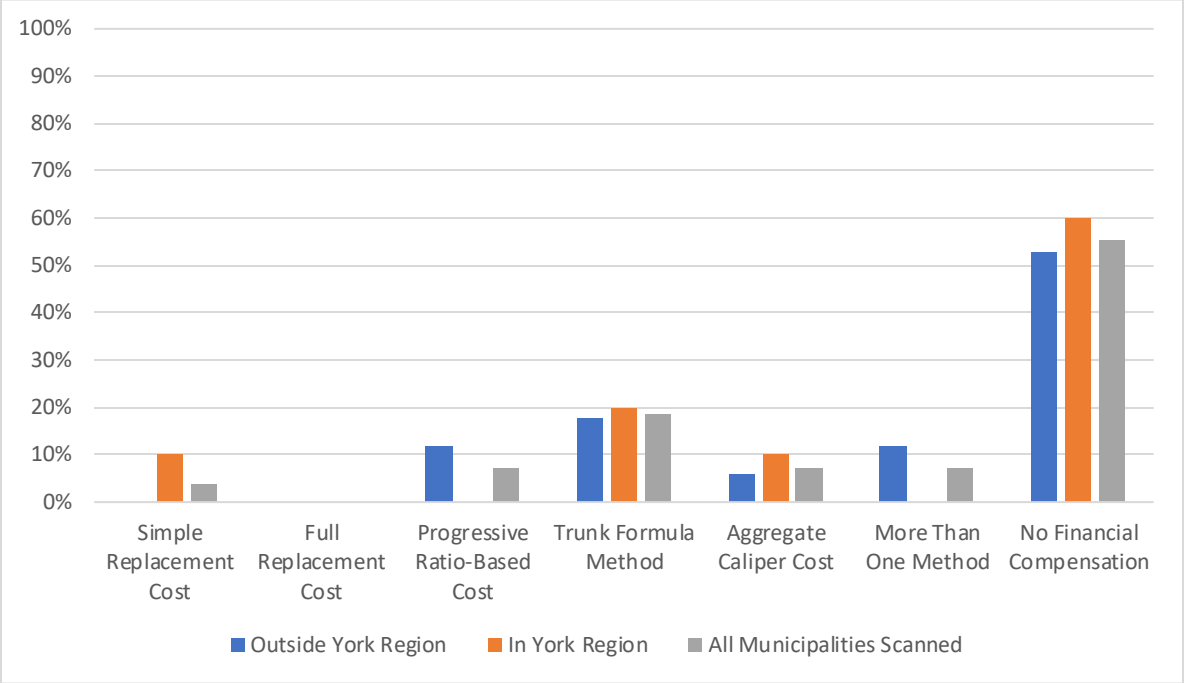


Figure 3-5. Overview of tree compensation approaches for capital projects among the 27 municipalities surveyed for this scan (10 in York Region and 17 outside)

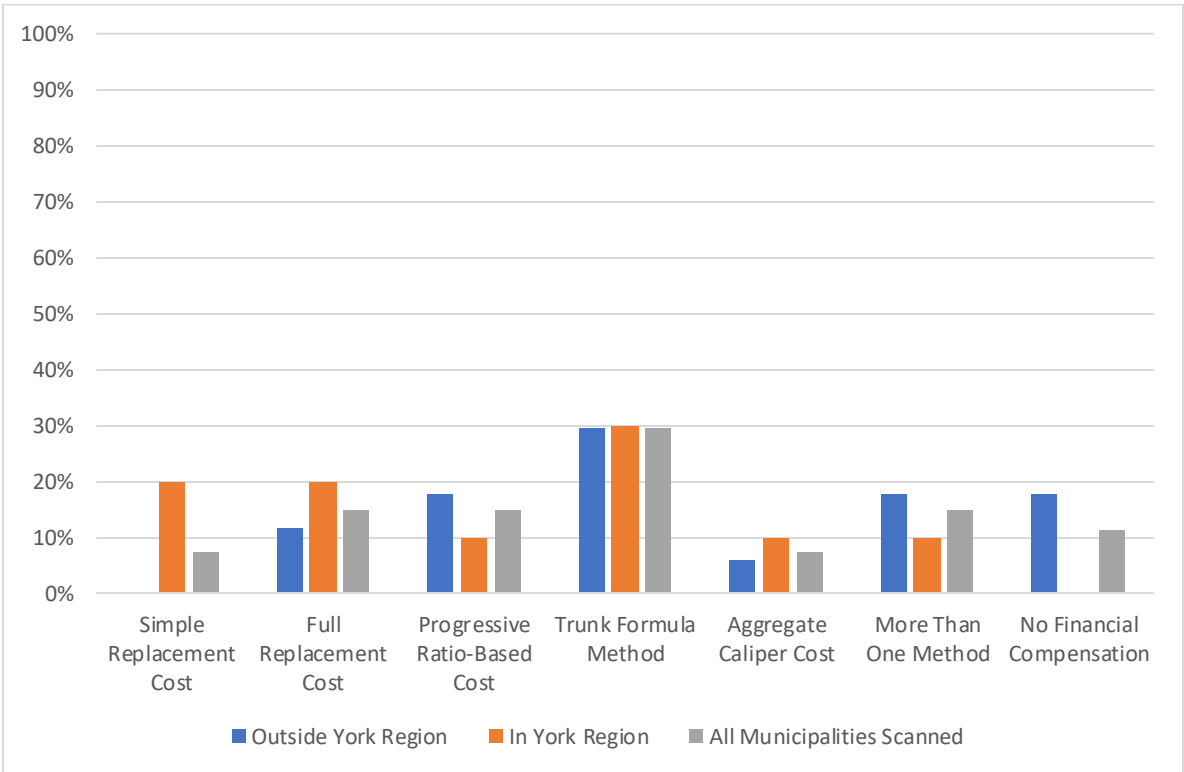


Figure 3-6. Overview of tree compensation approaches for development projects among the 27 municipalities surveyed for this scan (10 in York Region and 17 outside)

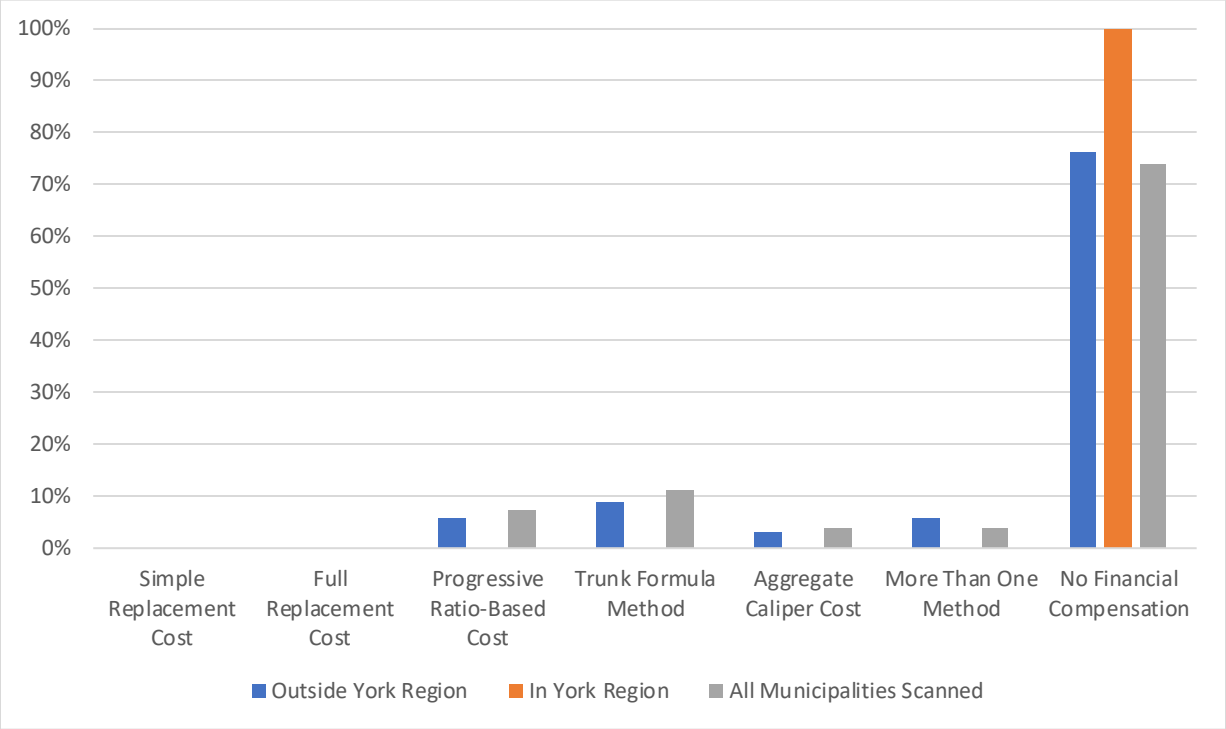


Figure 3-7. Overview of tree compensation approaches related to utilities works among the 27 municipalities surveyed for this scan (10 in York Region and 17 outside)

As with tree replacement approaches, approaches for seeking financial compensation are quite variable among municipalities. Several municipalities also use different approaches for different contexts.

- Approaches range from simple per tree replacement costs (e.g., $500 charge for a public tree removal) to complex cost calculations based on the ISA CLTA Plant Appraisal Guide (9th or 10th edition).
- Several municipalities build on the aggregate caliper approach and use the total number of trees to be planted multiplied by the established per tree replacement cost. However, approaches to discounting vary as do per tree replacement costs.
- Furthermore, although many municipalities cite the ISA CLTA Plant Appraisal Guide (9th or 10th edition) as a source of guidance, this guidance is applied in different ways as it relates to species, condition ratings, base replacement costs for trees, etc.

3.4 Approaches for Trees in Naturalized Areas

As with individual tree replacement and compensation, the municipal approaches to seeking replacements and compensation for trees in naturalized wooded areas in ROWs identified in this scan were variable.

Different replacement approaches identified included:

- Treating the trees the same as if they were individual trees in a ROW (e.g., Township of King, York Region)
- Using area-based replacement per square metre either at a 1:1 ratio (e.g., City of Guelph, City of Ottawa) or greater (e.g., Town of Whitby, City of Vaughan)
- Using an area-based replacement per linear metre (e.g., City of Toronto - 1 tree per 5 m of hedge length; City of Saskatoon – 1 tree per 3 m of windbreak)

3.5 Approaches for Public Tree Removals without Permission

Not surprisingly, the municipal approaches to seeking replacement and compensation for public trees in ROWs removed without permission were also quite variable.

Most municipalities interviewed indicated their approach often depends on the specific circumstances of the removal(s).

For example, they might be less likely to pursue compensation for removal of a single juvenile tree in front of a house and more likely to pursue a violation such as the removal of a single or grouping of healthy, mature tree(s).

Possible responses to unapproved removals ranged from seeking tree replacement(s) to seeking the replacement tree(s) plus financial compensation. For municipalities with public tree by-laws, seeking the replacement tree and/or financial compensation, plus a fine for violating the by-law is also an option exercised by some in cases where it is deemed appropriate.

3.6 Key Challenges to Public Tree Compensation

Almost all of the municipal staff interviewed identified the limited or lack of space for establishing replacement trees as the primary barrier to implementing successful compensation for public trees approved for removal.

Specific comments included:

- Above and below-ground ground space increasingly becoming limited with urban intensification
- Less public realm and pervious areas with urban intensification
- Competing hard structures (e.g., above and below-ground utility lines, internet cable, etc.)
- Competing land uses even in softscape or permeable spaces (e.g., other park uses)
- Challenges around installing and maintaining trees in some right-of-way settings (often related to limited space)

The only municipalities that did not identify space as a primary barrier were the Region of Waterloo and County of Simcoe whose jurisdictional areas area almost entirely rural (with ROW trees in the urban areas being the responsibility of single tier and local area municipalities within their boundaries).

Other key challenges identified by municipal staff interviewed included:

- inadequate resources to request / seek and oversee and / or undertake ROW tree replacements, and
- gaps in policies and / or regulations (e.g., old language or lack of a public tree by-law) limiting their abilities to seek and obtain tree replacements and / or financial compensation.

Furthermore, several municipalities who have been successful in obtaining financial compensation noted that they already had, or would soon be, running out of space on municipal/public lands to accommodate more trees. This was the primary impetus for the City of Toronto to develop and implement a Tree Planting Strategy with strategies and support for tree establishment on both public and private lands.

3.7 Public Tree Compensation Management

Key findings related to managing public tree replacements and related financial compensation based on the responses to questions asked of municipal staff are summarized below.

MUNICIPAL CONTROL OVER ROW PLANTINGS

In general, more municipalities oversee ROW tree planting / replacements (either by undertaking the work themselves or, more typically, by overseeing the contracts) than giving this responsibility to others.

- Outside York Region, 13 of 17 municipalities assume this responsibility for capital projects, and 9 of 17 assume this responsibility for development projects.
- Within York Region, 8 of 10 municipalities assume this responsibility for capital projects, but only 2 of 10 assume this responsibility for development projects.

SECURITIES

In cases where the municipality is the one primarily responsible for the tree replacement contracts, they do not hold securities (as this would be holding securities against themselves).

Some types of securities are, however, almost always held for tree replacement when a party other than the municipality is overseeing the ROW tree plantings (e.g., as part of a development application). These are usually held as part of overall project securities and rarely as a standalone item.

DISTINCT ACCOUNTS FOR TREE COMPENSATION FUNDS

Almost all municipalities who collect financial compensation where replacement tree planting cannot be accommodated on site or are to be planted by the municipality have a separate account specifically established for these funds and which is primarily or entirely allocated to tree establishment.

PROMOTING TREE PRESERVATION

It was broadly acknowledged that in the context of approved capital and development projects tree removals were often "necessary" to accommodate the project. However, some municipal staff noted that in some cases they deny requests for municipal tree removals. Some examples are as follows:

- In cases of requests for public tree removals outside the development process (e.g., driveway widenings), public tree by-laws were noted by several municipalities as providing a potential basis for denying requests and / or working with landowners to seek alternative approaches (e.g., City of Peterborough). Notably, public tree removals being requested (or happening without permission) due to driveway widenings was noted by several urbanizing municipalities as a more widespread issue (e.g., City of Burlington, City of Markham).
- In some jurisdictions tree compensation guidelines provide a basis for denying requests to remove public trees. For example, the Town of Aurora's Tree Removal/Pruning and Compensation Policy (2015) includes specific criteria that must be met for tree removal "intended to prevent the indiscriminate removal of public trees".
- Many municipalities noted that, for the most part, their wooded natural areas are protected as part of their Natural Heritage Systems and that staff typically work with staff internally and/or the proponents in these cases to avoid any removals of public trees in these settings (see Section 4.4).

4 Detailed Results of the Environmental Scan

This section summarizes the detailed results of the scan gathered through the interviews and research related to public tree compensation practices, primarily focussed on trees in municipal ROWs.

The information has been organized into topics (aligned with the interview questions provided in Appendix A) as follows:

- Policy, regulatory and guideline basis (Section 4.1)
- Tree replacement approaches (Section 4.2)
- Financial compensation approaches (Section 4.3)
- Approaches related to wooded natural / naturalized areas (Section 4.4)
- Approaches when municipal trees are removed without permission (Section 4.5)
- Key challenges related to public tree compensation (Section 4.6), and
- Approaches to public tree management (Section 4.7) with a focus on who undertakes the replacement work, if and when securities are held, and if tree compensation funds are tracked in a distinct account.

For each topic, the results of the scan are summarized in two tables as follows:

a. Tables labelled "4-XA" include the results from the 17 municipalities reviewed outside York Region, and
b. Tables labelled "4-XB" include the results from the 9 municipalities within York Region[5] plus York Region itself.

Source: York Region Official Plan Cover

[5] We were able to secure interviews and / or obtain written responses to the interview questions with the appropriate staff at York Region and all local area municipalities except for the Town of Georgina for which the responses to questions were gleaned or inferred where possible from information on the Town's website.

4.1 Policy, Regulatory and Guideline Basis

York Region was interested in gathering information on what, if any, policies, regulatory tools (mainly public tree by-laws) and / or guidelines different municipalities have in place to support and / or require seeking compensation for public trees required / approved to be removed. As a result, the following question was asked of municipalities included in this scan.

QUESTION: Are there any policies, by-laws or guidelines that formalize / outline your municipality's approach to public tree compensation that you can share or point us to?

Results from the municipalities scanned outside York Region are summarized in Table 4-1A while findings from the municipalities in York Region (including York Region itself) are summarized in Table 4-1B.

Notably, some of these planning tools also provide a basis for seeking tree replacement and/or financial compensation when public trees are removed without authorization (discussed further in Section 4.2.2).

Only policies, by-laws and guidelines specifically and explicitly intended for public trees have been included in the tables below. Broad policies and guidance related to, for example, enhancement of the urban forest as a whole or specifically intended for trees on private property have not been included.

4-1A. Formal guidance for public tree compensation in municipalities scanned outside York Region

Municipality	Official Plan Policy*	Municipal Policy	Public Tree By-law	Guideline	Specific Policies, By-laws and/or Guidelines**
IN ONTARIO, UPPER AND SINGLE TIER MUNICIPALITIES					
City of Barrie			X	X	• Tree Protection Manual (2019) – see below – Section 4 includes compensation requirements for trees within or adjacent to a ROW; Section 7 includes method for tree appraisals • City of Barrie Public Tree By-law 2009-098
City of Guelph	X			X	• City requires a "Vegetation Compensation Plan" for tree removals within and outside the Natural Heritage System in its Official Plan • Tree Technical Manual (City of Guelph 2019) – specifics about tree compensation
City of Hamilton			X		• Public Tree By-law 15-125
City of London	X		X		• Official Plan policies 399_4, 399_5, 399_6 (see below) • Boulevard Tree Protection By-law - CP-22 • Note: Also supported by standard contract documents

Municipality	Official Plan Policy*	Municipal Policy	Public Tree By-law	Guideline	Specific Policies, By-laws and/or Guidelines**
City of Ottawa			X		• Tree Protection By-law 2020-340 (which includes regulation of all City-owned trees, including trees in city-owned natural areas as well as specific private trees)
City of Peterborough			X		• Tree Removal Bylaw 21-074 which regulates all trees of at least 7.5 cm DBH on public and private lands (but note only seek compensation for trees ≥15 cm DBH)
City of Toronto			X		• Municipal Code Ch. 813, Trees (Public and Private) • Municipal Code Ch. 658, Ravine Tree By-law • Note: The Official Plan (Ch. 3), Toronto Green Standards, v4 (2021) and Committee of Adjustment conditions all provide support for street tree plantings and direct the provision of adequate rooting area and soil volumes (30 m^3) but do not explicitly support or direct tree compensation as the by-laws do.
Region of Peel	X				• Region of Peel Official Plan (2022) policies 2.14.43.9 and 2.14.43.11
Region of Waterloo					• Has regional private woodland by-law and generally leaves public tree by-laws to local area municipalities.
Simcoe County					• None. The County leaves tree replacement and compensation to the Towns and Townships, and focusses tree-related resources on management and maintenance of the County's extensive woodlands.
IN ONTARIO, LOCAL AREA MUNICIPALITIES					
City of Brampton (Peel Region)				X	• Tableland Tree Assessment Guidelines (City of Brampton 2018) • Note: These guidelines are generally working well to obtain the specified tree replacement and/or compensation on public lands.
City of Burlington (Halton Region)		X	X		• Tree Protection and Canopy Enhancement Policy. RPF-01-22, approved by Council Feb. 15, 2022 • Burlington Public Tree Bylaw (068-2013)
City of Mississauga (Peel Region)	X		X		• Official Plan speaks to allocating adequate soil volumes as part of development and infrastructure projects, regulating trees on public and private lands, and replacement/cash-in-lieu (policy 6.3.45 - see below) • Public Tree Protection By-law 0020-2022
Town of Whitby (Durham Region)			X	X	• Tree Protection By-law 4640-00 (2000) captures trees on some public property, mainly Open Space and Environmentally Sensitive Areas (under review) • Tree Protection Requirements for New Development (Town of Whitby 2020)

Municipality	Official Plan Policy*	Municipal Policy	Public Tree By-law	Guideline	Specific Policies, By-laws and/or Guidelines**
OUTSIDE ONTARIO, SINGLE TIER MUNICIPALITIES					
City of Saskatoon		X	(in progress)		• Council Policy C09-011: Trees on City Property (2010) • Note: Public Tree By-law is in progress (slated for Q4 2023)
City of Calgary			X		• Public Tree Protection By-law 23M2002
City of Edmonton		X	X	X	• Public Tree By-law 18825 (2021) – introduced permitting process for construction around City trees (within 5 m of boulevard and open space trees; within 10 m of natural stands), and established fine system for unauthorized damages and removals • Corporate Tree Management and Tree Reserve Procedure. Policy C456C (2020) – establishes principle of "equitable compensation" • Guidelines for Evaluation of Trees (2020, updated 2023) • Natural Stand Valuation Guidelines, Draft (2023)

* Official policies that specifically and explicitly speak to public tree compensation are provided in Section 4.1.1 for ease of reference.
** Online links to the policies, by-laws and guidelines cited in this table are provided in Section 6 (Sources).

4-1B. Formal guidance for public tree compensation in municipalities scanned within York Region

Municipality	Official Plan Policy*	Municipal Policy	Public Tree By-law	Guideline	Specific Policies, By-laws and/or Guidelines**
City of Markham			(in progress)		• NO. There are currently three different by-laws that apply in part to City trees but no specific public tree by-law and no policies or by-laws for City trees • Note: The City is currently updating its private Tree By-law to include public/City trees to ensure a consistent approach to protection and compensation
City of Richmond Hill	X		X		• Official Plan includes policies for tree replacement and/or the equivalent in compensation (see policy excerpts in Section 4.1.1) • Trees on City Streets By-law
City of Vaughan			X	X	• Tree Protection Protocols (2018) – note compensation approach being updated to align with 2022 tools (e.g., Forestry Public Tree Evaluation Instructions V1.0) • Tree Protection By-law 052-2018 – regulates trees ≥20 cm DBH on public and private lands
Town of Aurora				X	• Tree Removal/Pruning and Compensation Policy (Town of Aurora 2015) - in need of updating but still useful – primarily intended for private lands but is also applicable to municipal lands and projects

Municipality	Official Plan Policy*	Municipal Policy	Public Tree By-law	Guideline	Specific Policies, By-laws and/or Guidelines**
Town of East Gwillimbury				X	• Parkland Design Standard Manual (PDSM 2022), Section 1.4.2 • Note: The municipality finds requirements in their manual helpful but not sufficient "teeth" when there is push back. As such, Town is currently in the process of developing a scoped Private Tree By-law (i.e., focused on lots 0.2 ha and up) that will reference the park standards and thereby give them more legal weight and adding the tree compensation fees into their fees by-law.
Town of Georgina		X			• Town of Georgina Policy OID-01 is primarily for private lands but does set some standards / precedents for tree compensation • Note: Town is considering development of a Town tree cutting by-law, including potential regulation of Town trees
Town of Newmarket			X	X	• Municipal Tree Protection By-law (2017-59) • Tree Preservation, Protection, Replacement and Enhancement Policy (2005)
Town of Whitchurch-Stouffville			X		• Town By-law 2020-086-RE
Township of King			X	X	• Municipal Tree By-law No. 73-54 – in place but outdated and challenge to enforce • Tree Management Plan (TMP) (2022) – current guidance, follows York Region's compensation approach except for trees <20 cm DBH

York Region				X	• Available at www.york.ca/standards
					  ○ Street Tree and Forest Preservation Guidelines (January 2022)
					  ○ Tree Removal Compensation Rate – annual rates (January 2022)
					• Supplemental internal references: Tree Removal Calculation Table Template (Excel doc) and Tree Planting Cost Calculator (determines replacement rate)
					• Note: York Region has a Forest Conservation By-law which applies to private lands but not a private tree by-law or a public tree by-law as these have generally been considered under the purview of the local area municipalities.

* Official policies that specifically and explicitly speak to public tree compensation are provided in Section 4.1.1 for ease of reference.
** Online links to the policies, by-laws and guidelines cited in this table are provided in Section 7 (Sources).

4.1.1 Public Tree Compensation Policies in Official Plans

Policies that speak explicitly to public tree replacement and compensation from the municipalities reviewed as part of this scan are cited below.

The London Plan (City of London 2021)

399_4 Where, having considered all options, there are no reasonable alternatives to tree removal, the following shall apply to allow for development that conforms with the policies of this Plan:

- *a. A tree inventory will be prepared to record all trees over ten centimetres in diameter, measured at a height of 1.4 metres above the ground. All trees that are identified as species at risk shall be inventoried regardless of their size.*
- *b. Trees will generally be replaced at a ratio of one replacement tree for every ten centimetres of tree diameter that is removed. Guidelines, municipal standards, or by-laws may be prepared to assist in implementation of this policy.*
- *c. Trees should be replaced on the same site, however, if inadequate land is available on the site from which the trees are removed to accommodate the replacement trees, a cash-in-lieu fee by-law may be established by the City.*
- *d. The City will use funds from fees identified in policy 4.c. above, for programs and projects that support the Urban Forest Strategy.*
- *e. Street trees required as part of the planning and development approvals process may be counted as replacement trees as required by these policies.*

399_5 Trees that are removed as a result of new municipal development or infrastructure works, will be replaced using the approach identified in 4.a. and 4.b. above and where space permits. Where sufficient land does not exist, the City may plant the required trees on other lands, or contribute cash-in-lieu as described in 4.c. above.

399_6 Individual municipal trees that are removed in connection with City maintenance operations shall be replaced on a one-to-one basis.

Peel Official Plan (Region of Peel 2022)

2.14.43.9 Promote and support tree planting and landscaping initiatives on all lands within the Region, including Regional road rights-of-way …

2.14.43.11 Adopt policies, bylaws and guidelines that require protection of trees on Regional lands, and that, where tree removal cannot be avoided, require tree replacement and compensation.

Mississauga Official Plan (City of Mississauga 2021)

6.3.45 Where tree replacement cannot be accommodated on-site, the City may require cash-in lieu for replacement trees elsewhere or replacement plantings at a location approved by the City.

Richmond Hill Official Plan: Building a New Kind of Urban (July 2010, Office Consolidation to August 2021).
3.2.1.2 Lands South of the Oak Ridges Moraine excerpts:
28. For each tree that is removed from Town property or from Town or Regional street rights-of-way, a sufficient number of trees will be replanted based on an appropriate methodology to the satisfaction of the Town to replace the lost tree value.
29. The Town shall promote the planting of native species. The planting of invasive species shall not be permitted.

4.2 Tree Replacement Approaches

Trees within municipal ROWs may need to be removed for a wide range of public and private sector activities. These include: (a) municipally-led capital infrastructure projects (e.g., road widenings, expanded sidewalks and/or active transportation facilities), (b) private development projects (e.g., subdivisions and site plans), (c) private requests outside the development process (e.g., a driveway widening), and (d) utility installations (related to capital or development projects) or infrastructure upgrades/expansions.

Where public trees must be removed from ROWs due to any of these circumstances, municipalities can and do seek replacement for this municipal asset. In most cases this involves a requirement for some form of Arborist report and/or some type of Tree Inventory and Preservation Plan (TIPP) so that the number of public trees to be removed are clearly documented, and the municipality can permit or approve the proposed removals. However, there are a wide range of approaches used to calculating the replacement trees required.

QUESTION: When trees are approved for removal in a municipal ROW, is compensation requested or required? If so, can you elaborate on the type(s) of compensation requested or required? **Municipal staff were specifically asked to comment on public tree replacement in the context of (a) capital projects, (b) development projects, (c) other (e.g., removals for driveway widenings), and (d) utility works.**

Responses from the municipalities scanned outside York Region are summarized in Table 4-2A while findings from the municipalities in York Region (including York Region itself) are summarized in Table 4-2B.

Notably, in cases where some or all of the required tree replacements can be accommodated within the subject area (or an alternate and agreed to location), many municipalities accept a combination of tree replacements and financial compensation. The different types of financial compensation sought by the municipalities interviewed for this scan are summarized in Section 4.3.

4-2A. Summary of public tree replacement approaches and contexts among municipalities scanned outside York Region

Municipality	Capital Projects	Development Projects	Outside Development	Utilities	Replacement Approach(es) and Comments
IN ONTARIO, UPPER AND SINGLE TIER MUNICIPALITIES					
City of Barrie	No	Yes	Yes	No	• City typically asks for financial compensation rather than tree replacement as the City typically takes responsibility for overseeing the replacement by a contractor • Seek (a) cost for value of the tree removed + (b) cost for a replacement tree (see Section 4.3)
City of Guelph	Yes	Yes	Yes	Rarely	• For trees ≥10 cm DBH: ○ Capital (roads) projects and utilities: Seek at least 1:1 ratio-based replacement where trees can be accommodated ○ Development projects (both where City is the proponent and private): Aggregate caliper with discounts for condition and species ○ High risk and dead trees, and specified invasive trees** are exempt
City of Hamilton	No	No	No	Rarely	• Note the City does not typically request tree replacements; in almost all cases financial compensation is sought because the City takes care of the plantings (usually through City-retained contractors) in municipal ROWs • Financial compensation can be harder to get from utilities companies and so the City accepts replacement plantings where financial compensation is not provided • Note: This is comparable to the approach taken by the municipalities scanned from western Canada below (Saskatoon, Calgary, Edmonton)
City of London	Yes	Yes	Yes	No	• Capital and development projects: For all trees ≥10 cm DBH, combination of aggregate caliper and ratio-based - one tree per 10 cm DBH removed • For municipal maintenance: 1:1 ratio-based replacement • Note: City projects are exempt under by-law but all are replanted
City of Ottawa	Yes	Yes	Yes	No	• For capital and development projects: ○ Up to 49 cm DBH removed: Replace the tree + pay the full replacement method (at $400 per tree) (based on ISA CTLA Guide, 10th edition). ○ ≥50 cm DBH removed: Replace the tree + pay the TFM valuation (based on ISA CTLA Guide, 10th edition). Discounting for species and condition as per guidance. • In the case of a development, credits towards (or discounting of) tree replacements may be provided if an enhanced planting / landscaping plan is submitted. This is determined on a case-by-case basis

Municipality	Capital Projects	Development Projects	Outside Development	Utilities	Replacement Approach(es) and Comments
					• To date there has been little success in securing compensation from utilities but the City is working to improve relationships with utilities and explore opportunities for obtaining compensation
City of Peterborough	Sometimes	Yes	Yes	Sometimes	• Currently simple ratio-based method (i.e., seek 3:1 in all cases) but shifting towards a progressive ratio-based approach (see Appendix B). • No discounting for species or condition • In the case of utilities, have an understanding with Bell but not Hydro
City of Toronto	Yes	Yes	Yes	Sometimes	• Typically seek a simple ratio-based replacement of 3:1 in all contexts – so capital projects, development projects, and outside development • Take a more flexible approach with utilities and aim for 3:1 but accept 1:1 or 2:1, and in some cases do not get any replacements. Depends on the utility, the situation and the relationship and/or process in place
Region of Peel	Sometimes	N/A	N/A	No	• For trees ≥15 cm DBH, progressive ratio method (lean on City of Brampton 2018) (see Appendix B) • Exempt high-risk, diseased and dead trees • Currently rely heavily on local area municipalities but are working to build capacity at the Regional level
Region of Waterloo	Yes	Yes	N/A	No	• Simple ratio-based replacement (i.e., 2:1 or 3:1 depending on available space). • Do not discount for any species or condition except for dead trees which are exempt
Simcoe County	No	No	No	No	• County does not plant or deal with ROW trees in the rural areas, and rarely has situations where they need to deal with removals
IN ONTARIO, LOCAL AREA MUNICIPALITIES					
City of Brampton	Yes	Yes	Yes	Yes	• For trees ≥15 cm DBH, progressive ratio method (see Appendix B) • Exempt high-risk, diseased and dead trees • Generally seek and obtain compensation related to utilities through Public Utilities Coordinating Committee (PUCC) process
City of Burlington	Yes	Yes	Yes	Usually	• Aggregate caliper with discount for condition in all cases • Utilities: Seek and usually get aggregate caliper or close to it but do not charge tree permit fees; variable arrangements with different providers but generally based on building relationships

Municipality	Capital Projects	Development Projects	Outside Development	Utilities	Replacement Approach(es) and Comments
City of Mississauga	Yes	Yes	Yes	Yes	• "Caliper-based and ratio-based" (assumed to be equivalent to progressive ratio-based, as described in Section 2 of this report and similar to Brampton)
Town of Whitby	Sometimes	Yes	Sometimes	No	• TFM method (based on ISA CTLA Guide, 10th edition) used wherever compensation is sought for public trees. Calculate value first then extrapolate number of tree replacements from the value based on per tree replacement cost (currently $650 per 60 mm caliper tree) • For capital projects only seek replacement where trees can be accommodated. • For removals outside the development process only seek replacement where the tree by-law applies
OUTSIDE ONTARIO, SINGLE TIER MUNICIPALITIES					
City of Saskatoon	No	No	No	Sometimes	• Always seek and obtain financial compensation (not replacement trees) as City Forestry either does the work themselves or oversees contracts to do it, except where removals are required for utilities • For utilities seek and obtain replacements in some cases
City of Calgary	No	No	No	Sometimes	• Always seek and obtain financial compensation (not replacement trees) as City Forestry either does the work themselves or oversees contracts to do it, except where removals are required for utilities • With utilities, depends on the provider; get tree replacements with some, compensation with some, and neither with some
City of Edmonton	No	No	No	Sometimes	• Always seek and obtain financial compensation (not replacement trees) as City Forestry either does the work themselves or oversees contracts to do it, except where removals are required for utilities • In some cases, for capital projects (e.g., parks projects), Forestry staff leave it to that department to undertake their own replacements and do not seek financial compensation • Utilities have a "blanket permit" through the tree by-law but are still expected to go through the compensation process although some do, and some do not

** City of Guelph exempts the following invasive species: *Rhamnus cathartica* (Common buckthorn), *Rhamnus frangula* (European or Glossy buckthorn), *Alnus glutinosa* (Black alder), *Eleagnus umbellate* (Autumn olive) and *Morus alba* (White mulberry) as per the Private Tree Protection By-law

4-2B. Summary of public tree replacement approaches and contexts among municipalities within York Region

Municipality	Capital Projects	Development Projects	Outside Development	Utilities	Replacement Approach(es)
City of Markham	Yes	Yes	Yes	Sometimes	• City currently uses progressive ratio method (called the Markham Aggregate Caliper Method (MACM)) and CTLA 9th edition valuation, BUT is moving towards aggregate caliper discounted for condition (like York Region) • Leans on ISA CTLA Plant Appraisal Guide 9th edition, but does not follow any one method fully to keep it simpler and remove subjectivity around factors like location/site context
City of Richmond Hill	Yes	Yes	Yes	Rarely	• General: Uses TFM approach (based on ISA CLTA Guide, 10th edition) for calculating tree replacements. (Considered comparable to aggregate caliper with discounts). • Capital projects: "Trees removed as a result of capital need to be replaced. We have a no net loss of trees with respect to city lead projects." • Development and Private Projects: "Aim to replant elsewhere close-by in the municipal ROW, if not possible due to space/other constraints, ISA valuation, tree replacement planting and removal fees charged, tree planted elsewhere in the City in the municipal ROW." • Utilities: Do not have many examples of dealing with utilities, but would treat it the same way as any other project that impacts trees and would seek replacement or compensation
City of Vaughan	Yes	Yes	Yes	Rarely	• Currently using progressive ratio method, but transitioning to TFM (based on ISA CLTA Guide, 10th edition) for calculating tree replacements and financial compensation (which includes discounting for species, condition and location). • Utilities: Always seek tree replacement but usually do not get them.
Town of Aurora	Sometimes	Yes	Sometimes	Rarely	• Compensation required for trees ≥5 cm DBH • Capital projects and outside the development process: Simple ratio-based replacement (i.e., 1:1), where it can be accommodated. • Development projects: Aggregate caliper replacement (called aggregate inch replacement) method discounted for condition and species, similar to CTLA TFM method but simpler

Municipality	Capital Projects	Development Projects	Outside Development	Utilities	Replacement Approach(es)
Town of East Gwillimbury	Rarely	Yes	N/A	No	• Wherever tree replacement is requested it is based on: ○ Aggregate caliper replacement (called aggregate inch replacement) method ○ No discounting for condition or species, but poor condition, high risk and dead trees are exempt ○ E.g., 1 healthy 30 cm DBH tree removed = 5 x 6 cm caliper trees
Town of Georgina	Yes	Yes	N/A	Sometimes	• Where replacement tree replacement is requested, it is based on either: ○ the progressive ratio method based on species (i.e., 1:1 for invasive or pioneer species, 3:1 for non-native desirable species and 4:1 native, desirable species), OR ○ TFM CTLA 10th edition for "special status" trees (e.g., heritage, cultural, historic or celebration trees ≥70 cm DBH) • Note: These responses have been assumed to apply to public trees based on Policy OID-01 for private trees
Town of Newmarket	Yes	Yes	Yes	No	• Capital projects: Generally simple ratio method (i.e., 1:1) • Development projects: aggregate caliper with discount for condition and species (as per Town's Tree Preservation, Protection, Replacement and Enhancement Policy, 2005) • Outside development process: TFM based on CTLA Plant Appraisal Guide 9th ed., including consideration for species and condition
Town of Whitchurch-Stouffville	No	Yes	Yes	Rarely	• Generally simple ratio method (i.e., 1:1) (or consider transplanting if tree is 23 cm DBH or smaller) • Note: "Town has not had any utilities request a removal to date, but would seek the same as a development application (e.g., 1:1 replacement)

Municipality	Capital Projects	Development Projects	Outside Development	Utilities	Replacement Approach(es)

Township of King	Yes	Yes	N/A	Sometimes	• Recent change from requesting replacement at a 3:1 ratio irrespective of size.
					• For trees <20 cm DBH:
					  ○ "native or desirable trees" – replaced at a 3:1 ratio
					  ○ "invasive or non-desirable trees"– replaced at a 1:1 ratio
					  ○ Note: "native or desirable" trees listed in the Township's Tree Management Plan (TMP) (2022)
					• Same as York Region for trees ≥20 cm DBH:
					• Aggregate caliper method (discounted based on condition)
					• Exempt specified invasive species and ash not under treatment**
					• Not currently getting compensation from all utilities but working towards collecting from all

York Region	Yes	Yes	N/A	Sometimes	• For all trees irrespective of DBH
					  ○ Aggregate caliper method (discounted based on condition)
					  ○ Exempt specified invasive species and ash not under treatment**
					• For capital works, all tree planting is budgeted on a project-by-project basis and Forestry is involved in the detailed design process to optimize replanting opportunities

** As per the York Region Street Tree and Forest Preservation Guidelines (York Region 2022), exempt trees include Tree-of-Heaven (*Ailanthus altissima*), European/black alder (*Alnus glutinosa*), Russian olive (*Elaeagnus angustifolia*), any tree of the genus ash (*Fraxinus* sp.) not under an Emerald Ash Borer treatment program, and any tree of the genus buckthorn (*Rhamnus* sp.).

4.3 Financial Compensation Approaches

Where public trees must be removed from ROWs due to any of these circumstances and, for whatever reason, cannot be replaced in or close to the same site, many municipalities in Ontario, and beyond, seek financial compensation for the loss of this municipal asset. Typically, these funds are placed in an account or fund specifically earmarked for tree establishment activities (see Section 4.4). However, financial compensation is not always sought and when it is there are variable approaches used to calculating it, as summarized in the following two tables.

QUESTION: Where replacement trees cannot be accommodated in the municipal ROW, is financial compensation (in addition to or in lieu of tree replacement) accepted instead? If so, please elaborate on how the fees are determined. **Municipal staff were specifically asked to comment on public tree compensation in the context of (a) capital projects, (b) development projects, (c) other (e.g., removals for driveway widenings), and (d) utility works.**

Responses from the municipalities scanned outside York Region are summarized in Table 4-3A while approaches among the municipalities in York Region (including York Region itself) are summarized in Table 4-3B.

4-3A. Summary of public tree financial compensation approaches and contexts among municipalities scanned outside York Region

Municipality	Capital Projects	Development Projects	Outside Development	Utilities	Financial Compensation Approach
IN ONTARIO, UPPER AND SINGLE TIER MUNICIPALITIES					
City of Barrie	No	Yes	Yes	No	• City seeks (a) cost for value of the tree removed as per CTLA 9th edition (see Example 1 below) + (b) cost for a replacement tree (currently $500 for deciduous trees and $400 for conifers based on the cost of planting a standard nursery stock tree (including purchase, delivery, installation, warranty, and administration) • No discounting for species or condition beyond the valuation method except for ash trees and high risk or dead trees which are exempt
City of Guelph	No	Usually	No	No	• For development projects where the City is the proponent: Cash-in-lieu based on average wholesale replacement cost x 2.5 to account for installation and minimum 2 years maintenance (currently $550/tree)
City of Hamilton	Usually	Yes	Yes	Usually	• For trees ≥10 cm DBH, the following fee structures are considered for development and most utilities projects: o Small projects (~ <25 trees): Appraised as per {CTLA] TFM o Medium projects (~ 25 - 100 trees): All trees in fair to good conditions are charged aggregate formula of $90 per cm o Large projects (~>100 trees): 1:1 replacement value based on our cost of street tree fee (currently $670.96) • For capital projects: If the land has been purchased for the intent of the project then no loss of canopy fees are calculated. The above fee structures are only for pre-exiting City lands

Municipality	Capital Projects	Development Projects	Outside Development	Utilities	Financial Compensation Approach
City of London	No	Yes	Yes	No	• Cash-in-lieu for replacement tree plantings is no longer requested or accepted. The funds required are strictly revenue to offset the tree removal fees • Progressive diameter-based costs as per Schedule A of the tree by-law ranging from $1,240 to $13,040 per tree (see Example 2 below) • Dead trees and buckthorn are exempt and will be removed at no charge. • High risk trees are discounted.
City of Ottawa	Yes	Yes	Yes	No	• For capital and development projects, based on per tree replacement cost (currently $400/tree) ○ Up to 49 cm DBH removed (no minimum): Full replacement method of 2:1 - one for the tree being removed and one for the tree being planted, so $400 x 2 = $800 (based on CTLA Replacement Method, 9th edition) ○ ≥50 cm DBH removed: One payment ($400) for the tree being planted + valuation calculated using Trunk Formula Method (TFM) (9th edition) for tree being removed, including consideration of species and condition ○ No discounts beyond what is built into the CTLA TFM
City of Peterborough	No	Yes	Yes	No	• For trees >15 cm DBH. Currently seek 3:1 at $550/tree (so $1650/tree removed) but shifting towards a progressive ratio-based approach (see Appendix B). • No discounts or exemptions
City of Toronto	No	Yes	Yes	Rarely	• Seek (a) appraised value (based on TFM, CLTA Guide 9th ed.) + (b) actual basic tree replacement cost (currently $583/tree, but due for review – intended to include sourcing, delivery, installation and two years of maintenance) • No discounting for species or condition beyond the valuation method except for crabapple trees (have a special policy – will replace with a permit but without additional charges) and high risk or dead trees which are exempt
Region of Peel	No	No	N/A	No	• Do not seek financial compensation
Region of Waterloo	No	No	N/A	No	• Do not seek financial compensation; leave this to local area municipalities
Simcoe County	N/A	N/A	N/A	N/A	• County does not do any ROW tree establishment or maintenance, so does not seek compensation
IN ONTARIO, LOCAL AREA MUNICIPALITIES					
City of Brampton	Yes	Yes	Yes	Sometimes	• For trees >15 cm DBH, progressive ratio-based

Municipality	Capital Projects	Development Projects	Outside Development	Utilities	Financial Compensation Approach
					○ Per tree replacement fee (currently $550) x number of tree replacements required (e.g., 1 healthy 40 cm removed requires 3 x 70 mm caliper tree replacements, so 3 x $550 = $1650) • Trees that are highly invasive, high risk or dead are exempt • Tree permit fees not charged for capital projects or utilities
City of Burlington	Yes	Yes	Yes	Sometimes	• Aggregate caliper cost method with discount for condition ○ e.g., 20 cm DBH tree removed = 4 x 50 mm caliper at $500/tree (per current fees by-law) so $2000, but if tree in fair condition 60%, so $1200 • High risk trees, highly invasive species and dead trees are exempt
City of Mississauga	Yes	Yes	Yes	Sometimes	• Per tree replacement fee (currently $825.87, HST exempt). Fee equals cost of the contractor to plant, water and mulch for 2 years • High risk trees, highly invasive species and dead trees are exempt
Town of Whitby	No	Yes	Rarely	No	• TFM method (based on ISA CTLA Guide, 10th edition) used wherever compensation is sought for public trees. Includes use of the per tree replacement cost (currently $650 per 60 mm caliper tree) • Note: $650 = $500 typical price per tree installed + HST + contingency
OUTSIDE ONTARIO, SINGLE TIER MUNICIPALITIES					
City of Saskatoon	Yes	Yes	Yes	Sometimes	• TFM from CTLA Plant Appraisal Guide 10th edition, as outlined in detail in the Guidelines for Evaluation of Trees (2023)
City of Calgary	Yes	Yes	Yes	Sometimes	• TFM from CTLA Plant Appraisal Guide 9th edition
City of Edmonton	Yes	Yes	Yes	Sometimes	• For "shelterbelts" (e.g., windbreaks) – use per linear metre compensation pricing, usually 3:1 (e.g., 1 tree per 3 linear metre) • For individual trees – costs for tree replacement (based on CTLA TFM, 9th ed.) + equipment + labour + disposal + administration fee

EXAMPLE 1 TREE VALUATION: City of Barrie, Tree Protection Manual (2019)

Deciduous	500	5	100	/cm DBH
Conifer	400	2.5	160	/m Height

Address	Species	Ht (m) DBH (cm)	Base Value Current Price	Value Indices Species	Location	Health	Current Price per cm^2 or Ht	Current Growth Value	Tree Value
1 NoStreet	Colorado Spruce	3	$ 400.00	1	0.9	1	$ 160.00	432.00	$ 432.00
1 NoStreet	Green Ash	30	$ 500.00	0.9	0.9	0.75	$ 100.00	1,822.50	$ 1,822.50
1 NoStreet	Sugar Maple	40	$ 500.00	1	0.9	0.5	$ 100.00	1,800.00	$ 1,800.00

EXAMPLE 2 TREE REPLACEMENT FEES: City of London, Boulevard Tree Protection By-law (CP-22), Schedule A: Tree Removal, Restoration and Replanting Fees

Tree Size (DBH)	Fees				
<10cm	$ 1,240	61cm-70cm	$ 4,440	141cm-150cm	$ 11,290
11cm-20cm	$ 1,890	71cm-80cm	$ 5,490	151cm-160cm	$ 11,640
21cm-30cm	$ 2,240	81cm-90cm	$ 5,840	161cm-170cm	$ 11,990
31cm-40cm	$ 2,590	91cm-100cm	$ 7,190	171cm-180cm	$ 12,340
41cm-50cm	$ 3,740	101cm-120cm	$ 9,040	181cm-190cm	$ 12,690
51cm-60cm	$ 4,090	121cm-130cm	$ 9,390	>191cm	$ 13,040
		131cm-140cm	$ 10,940		

4-3B. Summary of public tree financial compensation approaches and contexts among municipalities within York Region

Municipality	Capital Projects	Development Projects	Outside Development	Utilities	Financial Compensation Approach(es)
City of Markham	Yes	Yes	Yes	No	• Simple replacement cost (currently $600/tree) • Note: 2022 Report to Council indicates a volume discount for street trees: $600 each for 1st 10 trees; $500 for trees 11-20, $460 per tree over 20
City of Richmond Hill	Yes	Yes	Yes	No	• 2023 public tree compensation costs (see Appendix D) include: planting fee + removal fee + valuation of tree being removed: o Planting/Replacement Fee (currently $600) o Removal Fee (which ranges from $240-$1430 depending on DBH) o Appraisal Value (TFM valuation based on CTLA Plant Appraisal Guide, 10th edition, which includes discounting for species, condition and location/context)
City of Vaughan	Yes	Yes	Yes	No	• Currently using a complex method that includes labour costs (see Appendix D), but transitioning to TFM (based on ISA CLTA Guide, 10th edition) for calculating tree replacements and financial compensation • Includes basic tree replacement cost – was $550 per tree since 2018 but recently updated in the City's fees and charges by-law to $625 per tree. • Note: The City has developed a fillable form that includes ratings to facilitate the valuation process and help ensure consistency and defensibility (available on request)
Town of Aurora	No	Yes	Sometimes	No	• Applies to trees ≥5 cm DBH • Aggregate caliper replacement (called aggregate inch replacement) method discounted for condition and species to get total caliper • Costing: 2.5 times the cost of nursery stock (includes delivery, planting, preparation of a mulching bed and a 1-year guarantee)
Town of East Gwillimbury	No	Yes	Sometimes	No	• Simple replacement cost (currently about $550) • Note shifting to seeking full replacement cost (as per PDSM section 1.4.2c**) and increasing cost with inflation

Municipality	Capital Projects	Development Projects	Outside Development	Utilities	Financial Compensation Approach(es)

Town of Georgina	No	Yes	N/A	No	• Where compensation is requested, it is based on either:
					  ○ the progressive ratio method based on species (i.e., 1:1 for invasive or pioneer species, 3:1 for non-native desirable species and 4:1 native, desirable species) multiplied by the per tree replacement fee (noted at $450 per tree) OR
					  ○ for "special status" trees (e.g., heritage, cultural, historic or celebration trees ≥70 cm DBH) TFM (as per ISA CTLA most current edition, so 10th ed.)
					• Note: These responses have been assumed to apply to public trees based on Policy OID-01 for private trees and inferred from responses from other neighboring jurisdictions

Town of Newmarket	No	Yes	Yes	No	• As per Public tree By-law (2017-59) (clause 9.3) and 2023 fees by-law
					• 2023 fees for tree compensation on public lands (from fees by-law) includes inspection fee + (appraised value x 2) + (tree and stump removal fee) + tree planting fee:
					  ○ Tree inspection/review fee: $470.25 per tree
					  ○ Valuation: TFM value (as per ISA CTLA 9th ed) x 200% +15% Admin. Fee + HST
					  ○ Tree removal: min. $779 or Actual Cost + 15% Admin. Fee + HST
					  ○ Stump removal: min. $260 or Actual Cost + 15% Admin. Fee + HST
					  ○ Tree planting on Town-owned Lands: $418.92 per tree
					• The Town also collects a fee per 60 mm tree not planted (so $418.92) and has issued fines to residents who top City trees
					• Note: Town's real costs are generally about $1500 per tree

Town of Whitchurch-Stouffville	No	Yes	Yes	Rarely	• Based on the TFM for each individual tree (i.e., ISA CTLA Plant Appraisal Guide 9th ed.) OR $1000, whichever is greater (see Appendix D) • The Town does not typically get requests for tree removals from utilities but would request the same compensation as a development application (i.e., 1:1 replacement or financial compensation of $1,000 per tree)

Municipality	Capital Projects	Development Projects	Outside Development	Utilities	Financial Compensation Approach(es)
Township of King	Yes	Yes	N/A	No	• For trees <20 cm DBH: o Based on required 1:1 or 3:1 ratio x per tree replacement cost • Same as York Region for trees ≥20 cm DBH: o Aggregate caliper method (discounted based on condition) for the number of replacement trees x per tree replacement cost o Per tree replacement cost based on 50 mm caliper trees and includes supply, installation with mulch, watering 14 times annually for three years, and a 3-year warranty at a cost of $900/deciduous tree or $825/coniferous • In addition, high value trees (as defined by the Township) are given special consideration and may result in a higher compensatory rate based on an arborist report and market value assessment
York Region	No	Yes	N/A	Rarely	• Based on the York Region Street Tree and Forest Preservation Guidelines (2022): o Aggregate caliper method (discounted based on condition) for the number of replacement trees x per tree replacement cost. o Per tree replacement cost based on 50mm caliper trees and includes supply, and installation, with a 2-year warranty including watering 14 times annually, re-installation of mulch and end of warranty maintenance at a cost of $909.11/deciduous tree or $834.36/coniferous tree. Note the per tree replacement cost is updated annually.

** Tree replacement cost is to be based on current year unit prices used by Parks for tree supply, delivery, planting, mulch bed, staking, watering bag with bi-weekly filling (April - October), weeding, maintenance, and replacement guarantee for two years (Town of East Gwillimbury 2022).

4.4 Approaches for Trees in Naturalized Wooded Areas

In some cases, trees and other woody vegetation in ROWs may be more naturalized in its form (e.g., trees much closer than 8 or 10 m on center, woody or herbaceous plants in the understory). This may be by design, or because the ROW has not been mowed or otherwise maintained, or because the edge of a wooded natural area has become established in the ROW over time.

York Region was interested to know what, if anything, other municipalities do differently in terms of requesting tree replacement (and/or financial compensation) where naturalized wooded areas with trees occur in ROWs and need to be removed.

QUESTION: Is compensation for removal of naturalized wooded areas in municipal ROWs treated the same as individual trees, and if not, what type of compensation is requested or required?

The results of the scan to this question are summarized for municipalities outside York Region in Table 4-4A and for municipalities within York Region (including York Region itself) in Table 4-4B.

4-4A. Summary of public tree compensation approaches for naturalized wooded areas among municipalities scanned outside York Region

Municipality	Compensation Requested or Required?	Approach(es) and Comments
IN ONTARIO, UPPER AND SINGLE TIER MUNICIPALITIES		
City of Barrie	Yes	• First step would be to identify methods for tree preservation. If there is no way to preserve the trees, we would ask for compensation based off the valuation (see Example 1 in Section 4.3)
City of Guelph	Yes	• Tree Technical Manual (City of Guelph 2019) outlines "area based compensation" and/or "mass plantings approach" where removals are permitted. But notes these are not intended for hedgerows or individual ROW trees which are to be compensated using the aggregate caliper method with discounts for condition and species
City of Hamilton	Sometimes	• Wherever trees are part of the City's Natural Heritage System an Environmental Impact Statement (EIS) or Linkage Assessment may be required. Through these reports, additional compensation (e.g., 2: 1) may be required to mitigate the negative impacts on these features and their functions
City of London	Yes	• Depends on circumstances - use both aggregate caliper and ratio-based approaches
City of Ottawa	Yes	• Approach not formalized; determined on a case-by-case basis. Generally, use approach that is area-based and seeks to restore natural / naturalized area being removed
City of Peterborough	Rarely but yes	• Rarely occurs but when it does through capital projects typically seek 1:1 area-based restoration.
City of Toronto	Yes	• Typically regulated under Municipal Code Ch. 658, Ravine Tree By-law which requires tree replacement / restoration. Approaches are variable depending on context:

Municipality	Compensation Requested or Required?	Approach(es) and Comments
		○ Area-based 1:1 (use 1950 – 3,000 tree stems per ha and 4,550-7,000 shrubs per ha) ○ Hedgerows: 1 tree / 5 m of hedge length ○ Progressive ratio-based method: ranging from 1:1 for ≤19 cm DBH and increasing for every 10 cm up to 15:1 for ≥150 cm DBH
Region of Peel	Rarely but yes	• In most cases these are part of the Regional Greenlands and/or local area NHS and so the NHS policies apply. Usually left to the local Conservation Authority permitting process to secure compensation when needed
Region of Waterloo	N/A	• Rarely have scenario trees on Regional lands in this context need to be removed
Simcoe County	N/A	• County does not do any ROW tree establishment or maintenance, so does not seek compensation
IN ONTARIO, LOCAL AREA MUNICIPALITIES		
City of Brampton	N/A	• Do not have naturalized wooded areas within the ROW; this is typically considered high-risk scenario for trees
City of Burlington	Rarely but yes	• Rarely deal with natural or naturalized areas in ROW as this is typically dealt with by Halton Region
City of Mississauga	Rarely but yes	• No formal policy. Lean on CVC and TRCA have ecological offsetting guidelines. Typically, a combination of some sort of tree replacement value (usually based on basal area) and a land-based area depending on the type of feature impacted
Town of Whitby	Rarely but yes	• Generally, they do not have removals in wooded natural areas. If so, typically regulated under the Region's Woodland By-law. In rare cases where not captured as above, would seek 1:1 area replacement as a minimum and likely a 10 m buffer. Note on Town lands not much space to accommodate new naturalization areas
OUTSIDE ONTARIO, SINGLE TIER MUNICIPALITIES		
City of Saskatoon	Yes	• Seek financial compensation (not tree replacement) and City undertakes restoration works. use area-based compensation, also usually 3:1 (note lean on provincial regulatory body who has guidance)*
City of Calgary	Yes	• Yes – but take different approach (not TFM) – typically area-based with a "no net loss" objective and seeking a restoration plan/works in the context of the feature / forest stand. Some guidance found in Habitat Restoration Project Framework (City of Calgary 2014)*
City of Edmonton	Yes	• Yes – Seek financial compensation (not tree replacement) based on Natural Stand Valuation Guidelines, Draft (2023) and City undertakes restoration works*

* All three municipalities interviewed from western Canada almost exclusively seek financial compensation over replanting (as the municipality undertakes or contracts the tree removals and replacement works) and base their approaches on the concept of "equitable compensation" or full cost recovery.

4-4B. Summary of public tree compensation approaches for naturalized wooded areas among municipalities within York Region

Municipality	Compensation Requested or Required?	Approach(es) and Comments
City of Markham	Rarely but yes	• The City rarely deals with this kind of scenario but tends to use the same approach as for individual trees (i.e., the progressive ratio method)
City of Richmond Hill	N/A	• Forestry staff were not aware of this situation arising in the Town
City of Vaughan	Yes, variable approaches	• To date, various approaches had been used with no standard to date, with examples of approaches used including: ○ "Scaled ratio" from City's Tree Protection Protocol so $550/tree with the number of trees that need to be planted depending on the DBH of the tree removed ○ Use of and adaptation of TRCA's Compensation Protocol, so $550/tree for trees ≥20 cm DBH and $200/tree for <20 cm DBH (see Example 1 below) ○ Use of the restoration approach aligned with TRCA restoration costing (see Example 2 below) • Recognize need for a consistent approach that is distinct from TRCA's as TRCA does not regulate tableland woodlands
Town of Aurora	Rarely but yes	• The Town uses a different approach from individual trees - scaled ratio replacement of whips and potted stock (see Example 3 below)
Town of East Gwillimbury	Rarely but yes	• This scenario is rare but when it occurs, trees mostly individually inventoried and cost replacement is based on the same species and nursery stock size to meet the Park Development tree planting details (PDSM Policy 1.4.2b, Town of East Gwillimbury 2022)
Town of Georgina	Rarely but yes (assumed)	• A Tree Enhancement Plan may be requested as part of the Tree Management Strategy to achieve the environmental goals of the Official Plan and/or Strategic Plan. • Note: This response has been assumed to apply to public trees based on Policy OID-01 for private trees
Town of Newmarket	Rarely but yes	• This scenario is rare in the Town but when it occurs, they seek the same compensation as for individual tree compensation (i.e., aggregate caliper discounted for condition, as per York Region)
Town of Whitchurch-Stouffville	N/A	• There has been discussion on an area-based removal compensation in the Town but to date there has been no need for this to be implement
Township of King	Rarely but yes	• This scenario is rare in King Township but when it occurs, they seek the same compensation as for individual trees (i.e., aggregate caliper discounted for condition, as per York Region)
York Region	Yes	• The Region seeks the same compensation as for individual trees (i.e., aggregate caliper discounted for condition)

Example 1: From TRCA's Compensation Protocol (2018) for replacement trees for natural and naturalized wooded areas

Table 3.1 – Removal and Compensation Table – Woodlot (TRCA Guideline for Determining Ecosystem Compensation Table C-1)

Category	DBH Range (cm)	Replication Ratio	# of trees per groupings TG-1, TG-2, TG-3, TG-5 & TG-6	Replacement Trees (# of trees x replication ratio)
1	0-10	1:1	310	310
2	10.1 to 20	1:3	36	108
3	20.1 to 30	1:10	10	100
4	30.1 to 40	1:15	9	135
5	40.1 to 50	1:20	11	220
6	50.1 to 60	1:30	2	60
7	60.1 to 70	1:40	4	160
8	70.1+	1:50	5	250
Total			387	1343

Table 3.2 – Monetary Valuation of Tree Compensation for Cash-in-lieu

Tree Size (cm DBH)	Quantity	Cost (per tree)	Total
0 to 20	418	$ 200.00	$ 83,600.00
>20	925	$ 550.00	$ 508,750.00
Total	1343		$ 592,350.00

Example 2: From TRCA's Compensation Protocol (2018) for replacement trees for natural and naturalized wooded areas

Costing Summary

	Service		Cost
1	Vegetation Management- Initial Application of Herbicide 1	$	2,750.00
2	Planting Design Development	$	320.00
3	Plant Material plus Installation 2	$	4,200.00
4	Transportation of Plants and Materials to Site	$	500.00
5	Maintenance Program (Includes 4 visits per year for 5-year period) 3	$	3,200.00
6	Monitoring and Reporting (includes 3 visits per year for 5-year period) 4	$	4,800.00
7	Warrantee/Guarantee Inspection	$	120.00
8	Replacement Cost of Plant Material 5	$	960.00
9	Bird House and Bat Box (4 total) plus Installation 6	$	630.00
10	Estimated Property Worth 7	$	78,400.00
	Total:	$	95,880.00

Example 3. Town of Aurora approach for wooded natural areas restoration and compensation

DBH of Tree Being Removed	Replacement Nursery Stock	Number of Replacements
5 – 10 cm	5 gal. pots	1
11 - 20 cm	45 mm deciduous OR 150 cm conifer	2
>20 cm	60 mm deciduous OR 175 – 200 cm tall conifer	3

Source: from Tree Removal/Pruning and Compensation Policy (Town of Aurora 2015)

4.5 Approaches for Public Tree Removals without Permission

Most municipalities who invest in the establishment and maintenance of trees in their municipal ROWs also have experience with situations where municipal trees are removed due to ignorance (e.g., the person did not know the tree was owned by the municipality) or intent. In these cases, York Region sought to understand if other municipalities seek the same or different types of tree replacement and/or financial compensation.

QUESTION: What compensation is required for trees removed from the municipal ROW without permission or approvals in place?

The results of the scan to this question are summarized for municipalities outside York Region in Table 4-5A and for municipalities within York Region (including York Region itself) in Table 4-5B.

4-5A. Summary of approaches for public trees removed without permission among municipalities scanned outside York Region

Municipality	Type of Compensation or Penalty	Specific Approach and Comments
IN ONTARIO, UPPER AND SINGLE TIER MUNICIPALITIES		
City of Barrie	Replacement and possible fine	• In Barrie if a tree is removed from the municipal ROW without approval then by-law may be called or a stop work order may be issued from a City inspector • In most cases, the owner would be fined for the value of the tree removed along with replacement cost for a new tree
City of Guelph	Replacement and sometimes financial compensation	• For encroachment: one or two 60 mm cal. tree(s) • For removals: TBD in consultation with City; typically use CTLA TFM method (for defensibility) • Note: Do not have a public tree by-law so treat it like a civil matter
City of Hamilton	Financial compensation	• Replacement fee for "typical" tree is based on the aggregate caliper cost method without discounting • Replacement cost for trees of "significant value" (e.g., historical, heritage, age, etc.) is as per full replacement method • For individual residents ("one-offs") generally do not pursue compensation. • For larger violations (e.g., development projects) undertake an appraisal using the CTLA's TFM (modified from 10th ed.) and issue a letter to the proponent that they are required to pay this amount
City of London	Fees and fines as per the public tree by-law	• Apply tree replacement fees as per Schedule A (see Section 4.3) in the by-law, plus a fine of up to $1000/tree unless they press charges (which is unusual)
City of Ottawa	Fees or fines as per the public tree by-law	• No formal approach, it depends. For individual trees typically issue a fine under the tree by-law. Have found laying charges very resource-intensive not always successful. Have had more success negotiating some type of compensation post-violation

Municipality	Type of Compensation or Penalty	Specific Approach and Comments
City of Peterborough	Replacement and fine as per the public tree by-law	• Usually charge for a single tree replacement based on current cost (i.e., $550) and also seek 1:1 replacement.
City of Toronto	Replacement plus financial compensation plus possible fine	• Typically violations go through compliance / enforcement. Apply: o the standard compensation ratio of 5:1 for a violation + contravention inspection fee + remedial action fee o PLUS may also need to pay a fine / penalty ($500 – 100,000) • Prefer to get trees back in ground but will accept CIL to plant elsewhere if needed
Region of Peel	Replacement only	• Seek replacement but not replanting off-site or financial compensation. No specific policy or by-law to support it
Region of Waterloo	Replacement only	• Progressive ratio-based replacement (i.e., 2:1 or 3:1 depending on available space); no monies sought
Simcoe County	N/A	• No compensation sought; cases on ROW tree removals are rare in the rural areas – know of two in past decade
IN ONTARIO, LOCAL AREA MUNICIPALITIES		
City of Brampton	Financial compensation	• For trees >15 cm DBH. Progressive ratio-based. Per tree replacement fee (currently $550) x number of tree replacements required (e.g., 1 healthy 40 cm removed requires 3 x 70 mm caliper tree replacements, so 3 x $550 = $1650)
City of Burlington	Financial compensation	• Typically seek compensation based on aggregate caliper-based cost method. Use stump diameter and assume tree was in good condition. Will not require replanting unless there is space and confidence they will not remove it again
City of Mississauga	Financial compensation	• Trunk Formula Method
Town of Whitby	Financial compensation	• Depends on scope of violation – at Town's discretion. May simply seek $650 replacement fee or for larger / more significant tree(s) may start with CTLA TFM valuation as a starting point for negotiation
OUTSIDE ONTARIO, SINGLE TIER MUNICIPALITIES		
City of Saskatoon	Financial compensation	• When have reasonable evidence of violation, ask for value using TFM based on CTLA Guide 9th edition • Seek full cost recovery including costs for tree replacement (based on CTLA TFM, 9th ed.) + equipment + labour + disposal + admin fee
City of Calgary	Financial compensation	• Start with TFM based on CTLA Plant Appraisal Guide 9th ed. as a starting point / basis for the fine and as way to educate as well • Usually hard to get full compensation value as Public Tree By-law doesn't include explicit support for securing it

Municipality	Type of Compensation or Penalty	Specific Approach and Comments
City of Edmonton	Financial compensation	• Public Tree By-law provides legal basis and structure for issuing fines in cases of violation, but can't seek financial compensation through by-law – so rely on Corporate Tree Management and Tree Reserve Procedure (in-house policy) and supporting guidelines for that

4-5B. Summary of approaches for public trees removed without permission among municipalities within York Region

Municipality	Type of Compensation or Penalty	Specific Approach and Comments
City of Markham	Remedial work and sometimes financial compensation	• Removal: Replanting ratio of 6:1 when tree removed without a permit (from 2022 Report to Council) or for CIL use aggregate caliper but assess health at 100% and apply $600/tree removed • Note: There is currently no public tree by-law to enforce this, but updates to their current tree by-law to include public trees are in progress
City of Richmond Hill	Fines as per the public tree by-law	• Fines outlined in the Trees on City Streets Bylaw (sec. 821.7.3) – if convicted of an offence … o Minimum $300 o For continuing or multiple offence(s), $500 to $10,000 per day/per offence up to $100,000
City of Vaughan	Replacement, financial compensation and possibly fines	• Currently under review but would expect to use TFM (based on CLTA Guide10th edition) approach as a basis for seeking compensation after the violation • Assume 100% condition in absence of actual tree as a more "punitive" approach to violations • Have a consolidated Tree By-law that regulates trees ≥20 cm DBH on both public and private property and so have legal basis for issuing fines for relatively minor offenses and ability to press charges • Note: Can be very difficult to win court cases after tree(s) are removed depending on evidence so generally prefer to seek compensation out of courts
Town of Aurora	Replacement and sometimes financial compensation	• Try to get 1:1 replacement, possibly fines in some cases
Town of East Gwillimbury	Replacement or maybe financial compensation	• This scenario is rare in the Town • For "one-offs" may simply seek 1:1 replanting • For more serious violations use TFM valuation (based on current ISA CTLA guidance, so 10th edition), as per applicable guidance (PDSM policy 1.4.2d, Town of East Gwillimbury 2022)

Municipality	Type of Compensation or Penalty	Specific Approach and Comments
Town of Georgina	Replacement only (assumed)	• Assumed no additional financial compensation or fine sought as there is no public tree by-law
Town of Newmarket	Replacement and fines	• Seek the typical tree compensation (as per Table 4-3B) • May also be subject to fines as per Public Tree Preservation By-law 2017-59 (so $400 to up to $100,000)
Town of Whitchurch-Stouffville	Fines as per the public tree by-law	• Apply the penalties as set out in By-law 2020-086-RE, Section 6.3: ○ 1st conviction – fine of $500 to $50,000 ○ 2nd conviction - fine of $2000 to $100,000 ○ Continuing offense of multiple offenses - fine of $2000 to $10,000 per day or per offense up to $100,000
Township of King	Replacement only	• Seek replacement based on aggregate caliper x per tree replacement cost, but in cases of violation do not provide any discounting for condition • No additional financial compensation or fine sought as the public tree by-law very old and hard to enforce
York Region	Financial compensation	• Seek financial compensation based on estimated aggregate caliper (usually based on stump diameter) x per tree replacement cost, without any discounting for condition (so based on "good" condition rating at 100%) Note: Replacements done by Region

4.6 Key Challenges to Public Tree Compensation

As part of this scan, municipal staff were asked what they found to be the greatest challenges or barriers to getting replacement trees "in the ground" in the context of municipal ROWs.

The answers to this question from the municipalities included in this scan from outside York Region are summarized in Table 4-6A and from the municipalities within York Region, including York Region itself, are summarized in Table 4-6B.

Table 4-6A. Summary of key public tree compensation challenges identified by municipalities scanned outside York Region

Municipality	Lack of space	Lack of policy basis	Lack of resources	Other Challenges and Notable Comments
IN ONTARIO, UPPER AND SINGLE TIER MUNICIPALITIES				
City of Barrie	X			People / residents abutting ROWs preferring no tree replacement.
City of Guelph	X	X	X	Lack of a public tree by-law makes it more difficult to seek CIL and prosecute unapproved removals/damage.
City of Hamilton	X	X		Do ask for 1.75 m ROW width but it is hard to get. Also, public tree by-law needs updating.
City of London	X			Getting enough soil is the biggest challenge in boulevard settings, and it is hard to augment for one-off replacements.
City of Ottawa	X		X	Note: Have seen some significant gains since their Director sent an internal email directing staff to look for alternative servicing routes where it can save trees (e.g., under driveways).
City of Peterborough	X		X	Sometimes try to plant nearby private front yard instead.
City of Toronto	X	X	X	Challenged to meet minimum soil/space requirements in ROWS and increasing loss of permeable areas. Regular conflicts with utilities and other structures such as retaining walls and curb as of right allowances. Lack of resources related to post-establishment maintenance and monitoring.
Region of Peel		X	X	Currently lack of staffing dedicated to urban forestry is the primary challenge.
Region of Waterloo				Generally, do not have issues finding space in the rural areas as intensification pressures in these areas are not so great. (Note local area municipalities deal with urban areas).
Simcoe County				Generally, do not have issues finding space in the rural areas as intensification pressures in these areas are not so great. (Note: Two single tier municipalities and 16 local area municipalities deal with urban areas).
IN ONTARIO, LOCAL AREA MUNICIPALITIES				
City of Brampton	X	X		Easements – City would like to plant / replace trees on these lands but Region not supportive in the past.
City of Burlington	X	X		Lack of specifications for dealing with situations where getting 30 m^3 below-ground is not possible; working on specs for "consolidated utility corridors" to make space for trees.
City of Mississauga	X			
Town of Whitby	X			Current set-back requirements with overhead and underground utilities create challenges / barriers.
OUTSIDE ONTARIO, SINGLE TIER MUNICIPALITIES				
City of Saskatoon	X			General decrease in extent of public realm, and more demand for driveways.
City of Calgary	X			
City of Edmonton	X			Try to use replacement process as opportunity to upgrade soil quality and/or volumes.

Table 4-6B. Summary of key public tree compensation challenges identified by municipalities scanned within York Region

Municipality	Lack of space	Lack of policy basis	Lack of resources	Other Challenges and Notable Comments
City of Markham	X	X	X	Currently lack of resources for post-planting oversight / maintenance is greatest challenge. Working on addressing policy gap by expanding tree by-law to include public trees.
City of Richmond Hill	X			
City of Vaughan	X	X	X	
Town of Aurora	X	X		Lack of space – driveway widenings are increasingly problematic; Town trees being removed with no place to put them back on site and less public space elsewhere. Lack of stronger / more explicit by-laws and guidelines – could use a Public Tree By-law and updated guidelines.
Town of East Gwillimbury		X		Not having the compensation requirements in a tree by-law is a recognized gap the Town is working to rectify in 2023.
Town of Georgina		X		Assumed lack of public tree by-law rather than limited space is a prime challenge in this smaller and more rural municipality.
Town of Newmarket	X			The most frequently encountered challenges are: the lack of interest in residents having and / or caring for a ROW tree, the desire for developers to reduce their risk management related to the two year warranty period on new tree plantings, and the lack of space.
Town of Whitchurch-Stouffville	X		X	Although the Town's new Public Tree By-law is recent and has been fairly effective to date, they have already experienced issues related to illegal encroachments into ROW tree areas such as hardscaping of the boulevard.
Township of King	X			Residents not wanting the tree in the boulevard near their residence.
York Region	X	X		ROWS in new developments often have less public realm space for trees due to intensification. In addition, the lack of clear definitions and compensation values for naturalized wooded areas presents a challenge for determining compensation where these situations arise.

4.7 Public Tree Compensation Management

Although many municipalities in Ontario (and elsewhere) have proactive street tree establishment and maintenance programs, each municipality manages removal offsetting and compensation funds in different ways. York Region Forestry staff were interested to know among the municipalities interviewed: who is primarily responsible for overseeing tree establishment / replacement contracts, if securities are typically held for replacement trees, and if tree compensation funds were allocated to a dedicated account.

QUESTIONS:

- ***Who is typically responsible for ensuring replacement trees are planted and receive post-planting care in the municipal ROWs (i.e., the project proponent - private or public - or the municipality)?***
- ***If an external party is responsible for the tree replacement, does your municipality hold securities for the replacement trees plantings on public lands?***
- ***If financial compensation is accepted, is it put in a distinct account for tree establishment?***

The answers to this question from the municipalities included in this scan from outside York Region are summarized in Table 4-7A and from the municipalities within York Region (including York Region itself) are summarized in Table 4-7B.

Table 4-7A. Summary of public tree compensation management approaches among municipalities scanned outside York Region

Municipality	(a) Capital Projects		(b) Development Projects		Distinct Account for Tree Compensation Funds?	Notable Comments from Municipal Staff Interviewed
	Responsible for Tree Establishment*?	Securities for Replacement Trees?	Responsible for Tree Establishment*?	Securities for Replacement Trees?		
IN ONTARIO, UPPER AND SINGLE TIER						
City of Barrie	Municipality	No	Municipality	No	Yes	City almost always arranges contractor to replace ROW trees. The only time private resident responsible is when the tree is small enough to transplant. In these cases they do ask for a security deposit which is released a year later after the transplanted tree has been inspected and passed.
City of Guelph	Proponent	Yes	Proponent	Yes	Yes	Occasionally City Forestry staff will undertake plantings on City lands related to use of CIL funds
City of Hamilton	Municipality	No	Municipality	No	Yes	City undertakes or contracts most ROW tree work and finds this is simpler and helps improve quality control.

Municipality	(a) Capital Projects		(b) Development Projects		Distinct Account for Tree Compensation Funds?	Notable Comments from Municipal Staff Interviewed
	Responsible for Tree Establishment*?	Securities for Replacement Trees?	Responsible for Tree Establishment*?	Securities for Replacement Trees?		
City of London	Municipality	No	Municipality	No	No	All funds are added to a revenue account that can be drawn against to support urban forestry work including plantings / replacements.
City of Ottawa	Proponent	Yes	Proponent	Yes	Yes	Note: In cases of infill and building permits where tree replacement is a condition of the permit there is no mechanism to hold a security, but the City does have infill Forestry Inspectors who follow-up to ensure works are completed as approved. They have been challenged to develop a standard approach to using tree valuation (e.g., CTLA TFM) as a basis to collect securities for tree protection.
City of Peterborough	Municipality	No	Municipality	No	Yes	Shifting to agreements for private landowners who want to remove City trees to put all costs on them for the works where they are being permitted – everything from getting Hydro clearance to tree removal including stump grinding.
City of Toronto	Municipality / Proponent	No / Yes	Municipality / Proponent	No / Yes		Three possibilities: (a) done by City staff – no securities, (b) contracts overseen by City staff (mainly capital) – no securities, or (c) by proponents (mainly development) – yes securities held.
Region of Peel	Proponent	No	Proponent	No	N/A	Region does not collect financial compensation for replacement trees therefore there is no account. This is left to local area municipalities.
Region of Waterloo	Proponent	Rarely	Proponent	Rarely	N/A	Region does not collect financial compensation for replacement trees therefore there is no account. This is left to local area municipalities.
Simcoe County	N/A	N/A	N/A	N/A	N/A	
IN ONTARIO, LOCAL AREA MUNICIPALITIES						
City of Brampton	Municipality	No	Proponent	Yes	Yes	

Municipality	(a) Capital Projects		(b) Development Projects		Distinct Account for Tree Compensation Funds?	Notable Comments from Municipal Staff Interviewed
	Responsible for Tree Establishment*?	Securities for Replacement Trees?	Responsible for Tree Establishment*?	Securities for Replacement Trees?		
City of Burlington	Municipality	No	Proponent	Yes	Yes	
City of Mississauga	Municipality	No	Municipality	No	Yes	
Town of Whitby	Municipality	No	Proponent	Yes	Yes	
OUTSIDE ONTARIO, SINGLE TIER						
City of Saskatoon	Municipality	No	Municipality	No	Yes	"Deferred Tree Replacement Account" with rules as outlined in the Council Policy C09-011: Trees on City Property (City of Saskatoon 2010)
City of Calgary	Municipality	No	Municipality	No	Yes	
City of Edmonton	Municipality	No	Municipality	No	Yes	"Tree reserve" with rules as outlined in the Corporate Tree Management and Tree Reserve Procedure (City of Edmonton 2020a).

* Where the proponent is responsible for the initial tree establishment it is assumed that in most cases the municipality assumes ownership after the initial planting, maintenance and warranty period has expired (typically two years) and takes on the maintenance of the street trees.

Table 4-7B. Summary of public tree compensation management approaches among municipalities scanned within York Region

Municipality	Capital Projects		Development Projects		Distinct Account for Tree Compensation Funds?	Notable Comments from Municipal Staff Interviewed
	Responsible for Tree Establishment?	Securities for Replacement Trees?	Responsible for Tree Establishment?	Securities for Replacement Trees?		
City of Markham	Proponent	Yes	Proponent	Yes	Yes	Do not currently have resources to do even capital works in-house, so all work is proponent-led. About ~1200 trees/year. Have list of +50 recommended species. City inspects 5 to 6 times over warranty period.

Municipality	Capital Projects		Development Projects		Distinct Account for Tree Compensation Funds?	Notable Comments from Municipal Staff Interviewed
	Responsible for Tree Establishment?	Securities for Replacement Trees?	Responsible for Tree Establishment?	Securities for Replacement Trees?		
City of Richmond Hill	Municipality	No	Municipality / Proponent	No / Yes	Yes	For site plans and single-family dwelling rebuilds, the City does not allow third parties to replace trees. Only City crews and City contractors remove and plant trees and they are covered under warranty. For new subdivisions, occasionally the developer will plant trees and the City will hold securities for two years for these trees.
City of Vaughan	Municipality	No	Proponent	Yes	Yes	The City does get some securities as part of overall development charges when external parties are overseeing planting contracts, but no formal practice around this. However, the City is shifting to overseeing most street tree contracts itself – particularly for larger developments, as ultimately they find this easier than trying to oversee multiple smaller contracts.
Town of Aurora	Municipality	No	Proponent	Yes	Yes	In some cases, for larger development projects, the Town collects funds from development proponent to have more control over the tree establishment contract and also be able to interact with homeowners directly.
Town of East Gwillimbury	Municipality	No	N/A	N/A	No	Prior to 2023 there wasn't substantial tree compensation activity or funds so no need for an account, however in 2023 the Town will be developing a mechanism to manage and track tree compensation funds (e.g., from recent construction of a distribution centre).
Town of Georgina	Proponent	Yes	Proponent	Yes	No	Assumed based on Policy OID-01 that the proponents take responsibility for Town tree establishment and care during the warranty period, and that securities are held, but that the Town does not have a distinct tree establishment fund.

Municipality	Capital Projects		Development Projects		Distinct Account for Tree Compensation Funds?	Notable Comments from Municipal Staff Interviewed
	Responsible for Tree Establishment?	Securities for Replacement Trees?	Responsible for Tree Establishment?	Securities for Replacement Trees?		
Town of Newmarket	Municipality	No	Proponent	Yes	No	Multiple accounts are used but yes, the moneys collected for tree compensation are allocated to tree-related works. "The amount of the security deposit shall be 20% of the value of all protected trees. The value of all protected trees shall be provided in the Arborist Report. Generally, the Town shall hold securities for tree protection up to final assumption of all the works" (Tree Preservation, Protection, Replacement and Enhancement Policy, 2005)
Town of Whitchurch-Stouffville	Municipality	No	Proponent	Yes	No	In its 2022 report to Council it was stated that: "The Urban Design Division collects securities for tree compensation and preservation through the SALT permit, with associated conditions". Staff noted that they are also reviewing their municipal accounting processes in 2023, so this may change.
Township of King	Municipality	No	Proponent	Yes	Yes	
York Region	Municipality	No	Municipality/ Proponent	No/Yes	Yes	The Region's preference is to receive funds and plant trees through its' annual Street Tree Planting and Establishment Activities contract or a separate contract; this is done for capital projects and for projects with the local area municipalities. However, in some cases (i.e., development projects) the proponent is required to plant. In these cases: (a) securities including the replacement tree values are held until project completion and/or (b) monies are received for the net amount as cash-in-lieu into a reserve fund.

Note: Where the proponent is responsible for the initial tree establishment it is assumed that in most cases the municipality assumes ownership after the initial planting, maintenance and warranty period has expired (typically two years) and takes on the maintenance of the street trees.

5 Concluding Remarks

The overarching finding of this environmental scan is that there is significant variability in the approaches taken by different jurisdictions within and outside of York Region in seeking replacement planting, financial compensation, or a combination of the two, for the removal of trees under municipal jurisdiction ("public trees"). However, it is worth noting that almost all the municipalities considered in this report are seeking and getting some type of tree replacement and/or financial compensation for public trees being removed in their right-of-way. This applies in the context of both development and capital projects. Furthermore, many of the municipalities seeking and getting tree replacements and/or financial compensation are generally having success obtaining more than a basic 1:1 tree replacement, and/or simple replacement costs for public trees removed.

This report provides some insights regarding the range and scope of different approaches being used for seeking and implementing public tree replacement and financial compensation among select municipalities within and outside York Region. It is hoped that this information will be of value to York Region and other municipalities to help validate the approaches they are already employing and / or identify alternative approaches that could strengthen their current public tree compensation practices.

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Appendix A. Environmental Scan Interview Questions

The following questions were developed to guide interviews with the municipalities and to inform the environmental scan.

FORMAL PUBLIC TREE COMPENSATION GUIDANCE / DIRECTION

1. Are there any policies, by-laws or guidelines that formalize / outline your municipality's approach to public tree compensation that you can share or point us to?

WHEN IS BOULEVARD TREE COMPENSATION REQUESTED/REQUIRED

2. When trees are approved for removal in a municipal ROW, is compensation requested or required in all cases or only in some cases? For example, is compensation sought for municipal trees removed for:
    - capital projects (e.g., works on municipal/public lands)?
    - development on non-municipal lands (e.g., private lands)?
    - other works (e.g., utilities upgrades)?

TYPE OF TREE COMPENSATION IS REQUESTED/REQUIRED

3. Can you elaborate on the type(s) of compensation requested or required for trees approved for removal from municipal ROWs (e.g., ratio-based, caliper-based, value based, more than one approach) for:
    a. capital projects (e.g., works on municipal/public lands)?
    b. development on non-municipal lands (e.g., private lands)?
    c. other works (e.g., utilities upgrades)?

4. Is compensation for removal of naturalized wooded areas in municipal ROWs treated the same as individual trees, and if not, what type of compensation is requested or required?

5. What compensation is required for trees ~~injured or~~ removed from the municipal ROW without permission or approvals in place? [Editorial note: Data ended up being collected on removals but not injuries and so this part of the question and this term have been excluded from the report]

6. Does the municipality accept any compensation discounting or exemptions based on:
    a. Tree species (e.g., invasive, ash trees not being treated)?
    b. Tree condition (e.g., poor condition, imminent high-risk / imminent hazard)?
    c. Other considerations?

7. Where replacement trees cannot be accommodated in the municipal ROW, is financial compensation (in addition to or in lieu of tree replacement) accepted instead? If so, please elaborate on how the fees are determined.

PUBLIC TREE COMPENSATION MANAGEMENT

8. Who is typically responsible for ensuring replacement trees are planted and receive post-planting care in the municipal ROWs (i.e., the project proponent - private or public - or the municipality)?

9. If an external party is responsible for the tree replacement, does your municipality hold securities for the replacement trees plantings on public lands?

10. If financial compensation is accepted, is it put in a distinct account for tree establishment?

PUBLIC TREE COMPENSATION CHALLENGES

11. Where replacement trees cannot be accommodated in the municipal ROW, what are the typical barriers / reasons? Some examples are provided below but feel free to amend or add.
    - Lack of physical space
    - Conflicts with other uses (e.g., utilities)
    - Lack of supporting policies / by-laws / guidelines
    - Lack of resources / capacity (e.g., to secure and / or implement)
    - Other barriers?

Appendix B. Examples of Progressive Ratio-based Tree Replacement Approaches

City of Peterborough

City of Peterborough. 2017a. Report USDIR17-008A: Replacing Private Trees as Part of Tree Conservation By-laws.

Trunk Diameter of Healthy Tree Removed	Number of Replacement Trees Required*
15 – 30 cm (DBH)	1
31 – 40 cm (DBH)	2
41 – 50 cm (DBH)	3
Greater than 50 cm (DBH)	4

* minimum size of replacement tree will be 6ft (2m) in height, (20 mm caliper) for deciduous trees and 4ft (1.3m) for coniferous trees

City of Toronto

City of Toronto compensation ratio summary for trees on City streets, 2022

(Source: MCC 813, Article II, Trees on City Streets)

CATEGORY	TYPE(S)	STANDARD TREE REPLANTING RATIO
Application - Destroy	Non-Construction and Construction (**with** Tree Value/Appraised Value)	1:1
Application - Destroy	Non-Construction and Construction (**without** Tree Value/Appraised Value)	3:1
Application – Appeal Process	Non-Construction and Construction (**with** appraised tree value)	5:1
Contravention – Destroy (No application submitted OR application submitted but permit decision OR councillor consultation outstanding)	Non-Construction and Construction	5:1

City of Brampton, Peel Region

City of Brampton. 2018. Tableland Tree Assessment Guidelines.

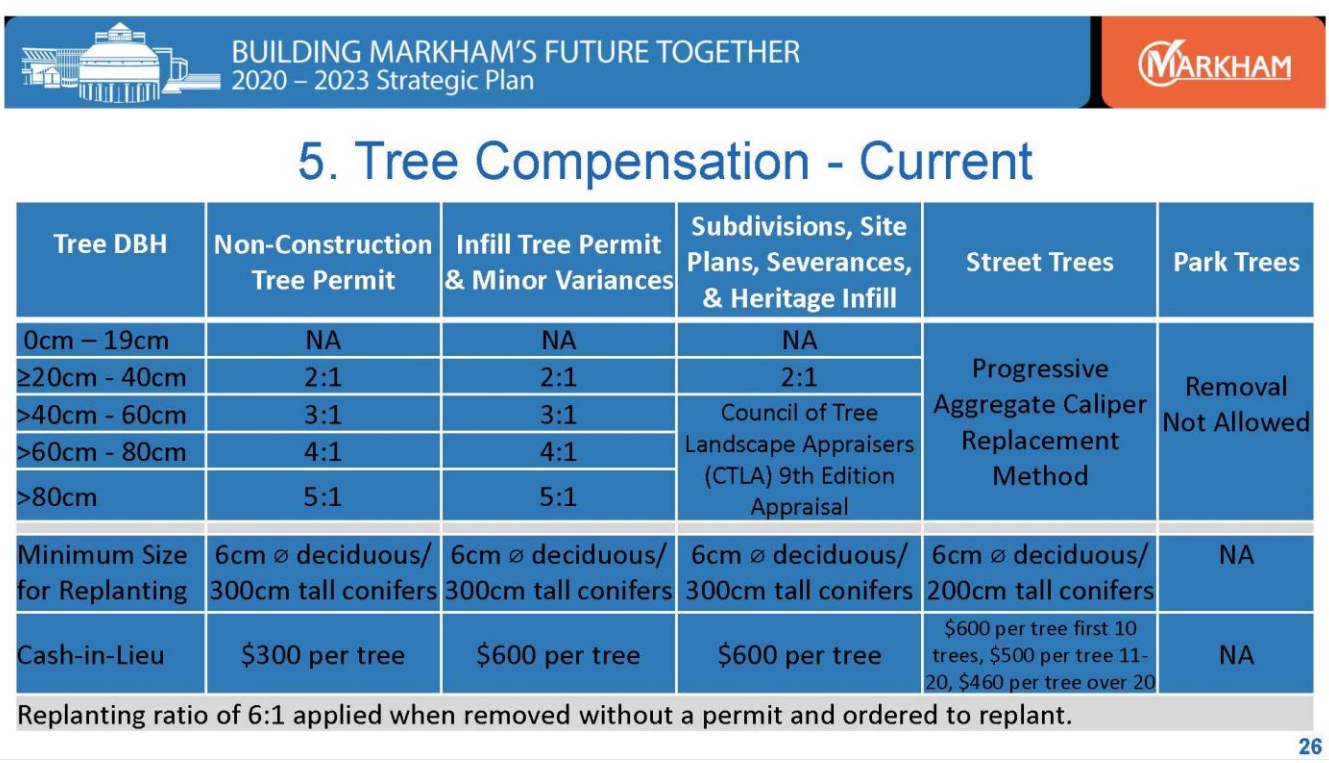
Tree Removal Compensation Ratio for Healthy Tableland Trees

DBH (cm)	Ratio
15-20	1:1
21-25	2:1
36-50	3:1
51-65	4:1
>65	5:1

Note 1: Trees in poor condition or dead exempt
Note 2: Trees <15 cm DBH in NHS and trees <30 cm DBH outside NHS not considered for compensation

City of Markham, York Region

Note: The table below reflects the current approach but the City is shifting to aggregate caliper with discount for condition, like York Region.



BUILDING MARKHAM'S FUTURE TOGETHER
2020 – 2023 Strategic Plan

MARKHAM

5. Tree Compensation - Current

Tree DBH	Non-Construction Tree Permit	Infill Tree Permit & Minor Variances	Subdivisions, Site Plans, Severances, & Heritage Infill	Street Trees	Park Trees
0cm – 19cm	NA	NA	NA	Progressive Aggregate Caliper Replacement Method	Removal Not Allowed
≥20cm - 40cm	2:1	2:1	2:1		
>40cm - 60cm	3:1	3:1	Council of Tree Landscape Appraisers (CTLA) 9th Edition Appraisal		
>60cm - 80cm	4:1	4:1			
>80cm	5:1	5:1			
Minimum Size for Replanting	6cm ⌀ deciduous/ 300cm tall conifers	6cm ⌀ deciduous/ 300cm tall conifers	6cm ⌀ deciduous/ 300cm tall conifers	6cm ⌀ deciduous/ 200cm tall conifers	NA
Cash-in-Lieu	$300 per tree	$600 per tree	$600 per tree	$600 per tree first 10 trees, $500 per tree 11-20, $460 per tree over 20	NA
Replanting ratio of 6:1 applied when removed without a permit and ordered to replant.					

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Source: City of Markham. 2022. Tree Preservation By-law Review and Update. Report to General Committee. Meeting date May 24, 2022. 12 pp. Accessed 2022-12-12 at: Tree Preservation By-law Review and Update (escribemeetings.com)

Appendix C. Examples of Tree Condition Ratings

City of Barrie

Tree Condition Ratings from City of Barrie Tree Protection Manual (2019), adapted from ISA CTLA Plant Appraisal, Guide, 9th edition.

Table 4. Tree Health / Condition Value Indices

Condition Description Condition Values	Index for use in formula
Excellent. Perfect specimen. Excellent form and vigor for species. No pest problems or mechanical injuries. No corrective work required. Minimum life expectancy 30 years beyond the time of inspection.	1.0
Good. Healthy and vigorous. No apparent signs of insect, disease, or mechanical injury. Little or no corrective work required. Form representative of species. Minimum life expectancy 20 years.	0.75
Fair. Average condition and vigor for area. May be in need of some corrective pruning or repair. May lack desirable form characteristics of species. May show minor insect, disease, or physiological problems. Minimum life expectancy 10 years.	0.50
Poor. General state of decline. May show significant mechanical, insect, or disease injury, but death not imminent. May require major repair or renovation. Minimum life expectancy 3 years.	0.25
Dead or Dying. Dead, or death clearly imminent within 3 years as a result of severe mechanical, insect, or disease injury.	0%

City of Guelph, Tree Assessment Criteria

Assessment Criteria

Condition	General	Structure	Health	Action
Excellent	☐ ***Near perfect form, health and vigour*** ☐ Life expectancy: exceptional	☐ Crown: balanced, symmetrical ☐ Root: good root flare, no defects ☐ Trunk: no defects ☐ Branch: no defects, no deadwood	☐ Crown vigour: LCR 100%, no decline ☐ Leaves: normal size and colour ☐ Shoot extensions: ☐ Stress factors: no pest, disease or abiotic signs or symptoms	☐ None
Good	☐ Slightly imperfect form, health and vigour; ***similar to a tree in excellent condition with some minor defect(s)*** ☐ Life expectancy: average	☐ Crown: lacking natural symmetry ☐ Root: minimal defects ☐ Trunk: less than 25% bark missing, good scar closure, good taper / flare ☐ Branch: Good branching habit	☐ Crown vigour: LCR 90-100% ☐ Leaves: normal size and colour ☐ Shoot extensions: average growth ☐ Stress factors: insignificant pest, disease or abiotic signs or symptoms	☐ None
Fair	☐ ***Tree is in decline and has defects*** ☐ Life expectancy: limited without intervention	☐ Crown: asymmetrical ☐ Root: obvious damage, girdling, defects, poor closure ☐ Trunk: less than 30% bark missing, good scar closure, good taper / flare, lean, co-dominant stems ☐ Branch: Pruning damage, included bark.	☐ Crown vigour: LCR 70-90%, decline and dieback ☐ Leaves: chlorotic, smaller ☐ Shoot extensions: Stunted growth ☐ Stress factors: obvious pest, disease or abiotic signs or symptoms	☐ Possibly requires minor remedial actions (i.e., dead wood trim, crown thinning) ☐ No service request but flag with Inspector Arborist
Poor	☐ ***Poor growth and/ or form and / or in severe decline*** ☐ Life expectancy: one season	☐ Crown: reduced size, major balance issues ☐ Root: major defects and / or root girdling ☐ Trunk: more than 50% bark section missing ☐ Branch: poor attachments, severe pruning or topping, storm damage, decay ☐ Probable potential for structural failure	☐ Crown vigour: LCR <70%, decline and dieback; especially on structurally important branches ☐ Leaves: chlorotic, small ☐ Shoot extensions: little evidence of growth ☐ Stress factors: severe pest, disease or abiotic signs or symptoms	☐ ***Service request***; candidate for removal or requires extensive remedial actions (i.e., monitoring) to prevent failure
Dead	☐ ***No live parts***	☐ Probable potential for structural failure	☐ No signs of new growth of any tree parts	☐ ***Service request***; candidate for removal
Hazard[1]	☐ Likely or imminent potential (typically within one year) for any one part or whole tree structural failure ***and*** hitting (target) person, property or structure (within specified timeline[2]).	☐ Potential for structural failure	☐ Poor or dead condition of one or all parts of tree	☐ ***Service request***; removal or hazard abatement required

Defects:

- Poor taper
- Co-dominant stems
- Multiple attachments
- Included bark
- Cracks / splits
- Hangers
- Loose, cracked bark
- Girdling
- Wounds / seam
- Decay
- Cavity
- Conks / mushrooms / bracket (pathogens)
- Bleeding / sap flow
- Borers / ants / termites
- Cankers / galls / burls
- Previous failure
- Excessive end weight
- Bow, sweep
- Deadwood / stubs

[1] Risk assessment to be carried out as per Best Management Practices: Tree Risk Assessment. 2017. Smiley, E., Matheny, N., and Sharon, L. International Society of Arboriculture. Champaign, Il.
[2] To be determined by Inspector Arborist during tree evaluation.

Town of Whitby, Tree Assessment Criteria

Figure 8: Physical Deterioration (Condition) Rating Criteria *, **

Assessment of tree condition considers health, structure and form.

Rating Category	Condition Components			Percent Rating
	Health	Structure	Form	
Excellent	High vigor and nearly perfect health with little or no twig dieback, discolouration, or defoliation.	Nearly ideal and free of defects.	Nearly ideal for the species. Generally symmetric. Consistent with the intended use.	81% to 100%
Good	Vigor is normal for the species. No significant damage due to disease or pests. Any twig dieback, discolouration, or defoliation is minor.	Well-developed structure. Defects are minor and can be corrected.	Minor asymmetries / deviations from species norm. Mostly consistent with the intended use. Function and aesthetics are not compromised.	61% to 80%
Fair	Reduced vigor. Damage due to insects, disease may be significant and associated with defoliation but not likely to be fatal. Twig dieback, defoliation, discolouration, and/or dead branches may comprise up to 50% of the crown.	A single defect of a significant nature or multiple moderate defects. Defects are not practical to correct or would require multiple treatments over several years.	Major asymmetries / deviations from species norm and / or intended use. Function and / or aesthetics are compromised.	41% to 60%
Poor	Unhealthy and declining in appearance. Poor vigor. Low foliage density and poor foliage colour are present. Potentially fatal pest infestation. Extensive twig and / or branch dieback.	A single serious defect or multiple significant defects. Recent change in tree orientation. Observed structural problems cannot be corrected. Failure may occur at any time.	Largely asymmetrical / abnormal. Detracts from intended use and / or aesthetics to a significant degree.	21% to 40%
Very Poor	Poor vigor. Appears to be dying and in the last stages of life. Little live foliage.	Single or multiple severe defects. Failure is probable or imminent.	Visually unappealing. Provides little or no function in the landscape.	6% to 20%
Dead	n/a	n/a	n/a	0% to 5%

***** as adapted from Table 4.1, page 44 of the "Guide for Plant Appraisal, 10th edition, 2nd printing
****** percentage ratings are for illustrative purposes only, and intended to be used with sound appraiser judgement

City of Vaughan, 2022 Guidance to Plant Condition (from ISA Ontario)

Forestry Public Tree Evaluation Instructions	VAUGHAN
City of Vaughan	
Version: 1.0	Issue Date: 21MAR2022

Appendix 2: Guide to Judging Plant Condition

	Factors Condition	Points
ROOTS		
Root anchorage 5[2]	*No problem*[3]	5
Confined relative to top S	*No apparent problem(s)*	4
Collar soundness S,H[2]	*Minor problem(s)*	3
Mechanical injury S,H	*Major problem(s)*	2
Girdling or kinked roots S,H	*Extreme problem(s)*	0 or 1
Compaction or water-logged roots H[2]		
Toxic gases & chemical symptoms H		
Presence of insects or diseases H		
TRUNK		
Sound bark & wood, no cavities S, H	*No problem*[3]	5
Upright trunk (well tapered) S	*No apparent problem(s)*	4
Mechanical or fire injury S,H	*Minor problem(s)*	3
Cracks – frost, etc. S,H	*Major problem(s)*	2
Swollen or sunken areas S,H	*Extreme problem(s)*	0 or 1
Presence of insects or diseases H		
SCAFFOLD BRANCHES		
Strong attachments S	*No problem*[3]	5
Smaller diameter than trunk	*No apparent problem(s)*	4
Vertical branch distribution	*Minor problem(s)cm*	3
Free of included bark	*Major problem(s)*	2
Free of decay and cavities S,H	*Extreme problem(s)*	0 or 1
Well-pruned, no severe heading back S, H		
Well-proportioned – tapered lateralsalong branches S		
Wound closure H		
Amount of dead wood or fire injury SH		
Presence of decay, insects or diseases H		
SMALLER BRANCHES & TWIGS		
Vigor of current shoots, compared to that	*No problem*	5
of 3-5 previous years H	*No apparent problem(s)*	4
Well-distributed through canopy H	*Minor problem(s)*	3
Normal appearance of buds – color,	*Major problem(s)*	2
shape & size for species	*Extreme problem(s)*	0 or 1
Presence of weak or dead twigs H		
Presence of insects or diseases H		
FOLIAGE		
Normal appearance – size & color H	*No problem*	5
Nutrient deficiencies H	*No apparent problem(s)*	4
Herbicide, chemical or pollutant	*Minor problem(s)*	3
Injury symptoms H	*Major problem(s)*	2
Wilted or dead leaves H	*Extreme problem(s)*	0 or 1
Presence of insects or diseases H		
TOTAL POINTS		**/25 = %**

Total Points	Condition	Rating
23 – 25	Excellent	90 – 100
19 – 22	Good	70 – 89
15 – 18	Fair	50 – 69
11 – 14	Poor	25 – 49
05 – 10	Very Poor	06 – 24

[1]Give one rating for each Factor. The items listed under each Factor are to be considered in arriving at a rating for that Factor.
[2]S – item is primarily structural
H – item is primarily health
S, H – item may involve both structure and health
[3]A rating of "5" indicates no problems found having done a root-collar inspection and/or climbing the tree to inspect the trunks and major limbs

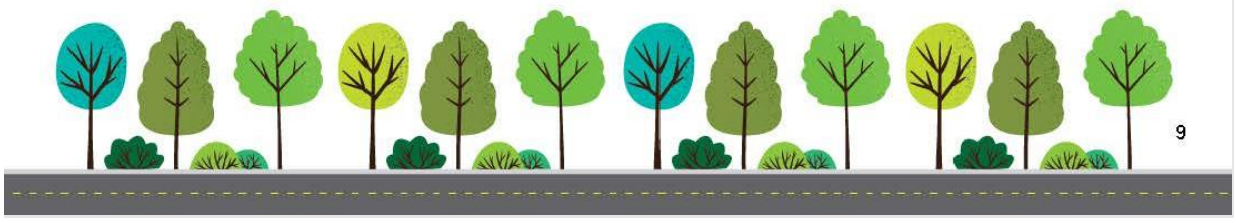
Source: ISA Ontario

York Region Street Tree and Forest Preservation Guidelines (2022), Tree Condition Ratings

2.1.3 Tree Condition Rating

The following condition ratings shall be considered the Region's standard for tree assessments to be utilized in the Inventory. The percentage listed, in relation to the condition rating, are used to determine the required compensation as described in section 2.4 of these Guidelines.

Condition Rating	Percentage	Criteria
Good	100%	Growth occurs mostly as extensions from the terminal bud with little epicormic branching. Shoot growth usually exceeds 10cm. Full, symmetrical crown. No sign of active decay, chronic or acute insect attack, large open wounds, tissue necrosis, dieback, or chlorotic foliage, not leaning, falling or about to be uprooted.
Satisfactory	80%	Growth occurs mostly as extensions from the terminal bud. Epicormic branching may be heavy providing that the growth is healthy and abundant. May have a partially leaved or disfigured crown (>74% crown density), combined with a few dead branches or limbs, or small open wounds and small trunk tissue necrosis. Tree health will likely not decline further in the next 5 years.
Potential trouble	60%	Growth occurs mostly as epicormic branching or basal sprouts. Usually no growth from terminal buds. New growth may be thin with small buds showing lack of vigour. May improve or decline in health over the next 5 years. May have a partially leaved or disfigured crown (50-74% crown density). These trees usually have a combination of problems which may include poor form or lean, chronic, or acute insect attack, small trunk tissue necrosis, small stem scars, twig dieback, dead branches, exposed roots, or root ball, and/or animals burrowing in to rooting area. Infection may be present in its early stages.
Declining	40%	Declining in health. Crowns have significant twig dieback and dead branches. Usually describes trees having large trunk tissue necrosis, large stem scars. Foliage discolouration is often associated with this condition as is moderate to heavy top dieback and epicormic branching (<50% crown density). Chronic fungal infection or insect infestation may be present. These trees may require major corrective pruning, or replacement.
Death imminent	20%	Symptoms as in Declining but more acute. Will likely die within 5 years. Will require replacement or removal.
Dead	0%	No leaves, brittle twigs, dry buds.



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Appendix D. Examples of Public Tree Removal and Replacement Fees

City of Richmond Hill, 2023 Tariff of Fees By-law

Fee#	Description of Services - Parks Miscellaneous Services	Unit of measurement	2023 Fees	HST (Y/N)
4	Tree Replacement Fee		$ 600.00	N
5	Boulevard Tree Planting Fee (60mm calliper tree)		$ 600.00	N
6a	a) Boulevard Tree Removal Fees (DBH = Diameter at Breast Height)	DBH = Diameter at Breast Height	<10 cm DBH $240 + ISA Plant Appraisal Value	N
6b	b) Boulevard Tree Removal Fees (DBH = Diameter at Breast Height)	DBH = Diameter at Breast Height	10-20 cm DBH $480 + ISA Plant Appraisal Value	N
6c	c) Boulevard Tree Removal Fees (DBH = Diameter at Breast Height)	DBH = Diameter at Breast Height	21-40 cm DBH $950 + ISA Plant Appraisal Value	N
6d	d) Boulevard Tree Removal Fees (DBH = Diameter at Breast Height)	DBH = Diameter at Breast Height	>40 cm DBH $1,430 + ISA Plant Appraisal Value	N

City of Vaughan, 2018 Public Tree replacement Formula (Note: Being updated to Trunk Formula Method)

Table 4: Tree Replacement Formula for Public Trees

Tree Description			Standing Tree Value-Opportunity Costs					Operations Costs		
Tree#	Species	Diameter (cm)	Tree Value Multiplier [1]	Installation Costs [2]	Species Rating [3]	Tree Quality Rating [5]	Total Opportunity Cost	Tree Removal [4]	Tree Costs [2]	Total cost
Ex.	Silver Maple	25	5	$ 356.00	56.00%	90.00%	$ 1,077.31	$ 330.54	$ 550.0	$1,764.10

1. The multiplier divides the basal area of the proposed tree by that of a 50 mm tree (20) and then by four (Y=(T1/ta)/4, ta=50 mm tree)
2. The installation costs is the average contracted planting cost of the most recent contract, plus 15% administration costs.
3. The species rating is based on the latest Ontario tree rating and used as a value qualifier.
4. The tree removal cost is based on field data from Vaughan forestry operations.
5. The tree quality value is based on the health of the tree and is a modifier between zero and one.

Town of Whitchurch-Stouffville, 2022 Fees and Charges By-law

TOWN OF WHITCHURCH-STOUFFVILLE
FEES AND CHARGES BY-LAW NUMBER 2022-117-FI
SCHEDULE "M"

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SERVICE AREA: PUBLIC WORKS - ADMINISTRATION and ROADS

DEPARTMENT: PUBLIC WORKS

Item	Goods / Services Provided	Unit of Measure	2022 Rate (before Tax)	Rate at Effective Date of By-law (before Tax)	Mid-Year Rate (before Tax)	Mid-Year Effective Date	Admin Cost	HST 13% (Y/N)	Additional Description	New/ Revised (other than indexation)
10.	Trees:									
a)	Tree Preservation Security	Per Tree	$1,020.00	$1,000.00				N	Based on the Trunk Method of Appraisal as determined by the Council of Landscape Appraisers Guide to Plant Appraisal, 9th edition (as amended) or a minimum $1,000 per tree if the Tree Method Appraisal is determined to be under $1,000. Applicable to trees in the Town's road allowance and on Town property only. Release of the security will be conducted thirty-six (36) months after occupancy has been approved to the Developer/Resident and a post-construction inspection of the tree is conducted by the Town's Certified Arborist and it is determined no removal, damage or injury to the tree has occurred	Revised
b)	Tree Removal Compensation	Per Tree	$1,000.00	$1,000.00				N	Based on the Trunk Method of Appraisal as determined by the Council of Landscape Appraisers Guide to Plant Appraisal, 9th edition (as amended) or a minimum $1,000 per tree if the Tree Method Appraisal is determined to be under $1,000. Applicable to trees in the Town's road allowance and on Town property only	
c)	Arborist Inspection Fee	Per Hour	$78.34	$79.52				N	Where an inspection is undertaken in order to determine compliance with this By-law or the conditions of any permit. Applicable to trees in the Town's road allowance and on Town property only	