

Terms of Reference: Growing Medium

Purpose:

This Terms of Reference (ToR) provides guidance for topsoil and/or growing mediums to be used to prepare a site for planting.¹ The ToR has the following objectives:

- To address the need for a topsoil/growing medium management system which addresses soil health, on-site re-use, and importation, beyond engineering specifications.
- To define growing mediums and requirements for its use during site reinstatement.
- To ensure adequate analysis of on-site topsoil or imported topsoil and other mixtures intended for use as a growing medium.

Required in Support of:

This document is to be read in conjunction with:

- Town of Caledon and Region of Peel Official Plan policies
- Town of Caledon Development Standards Manual
- Town of Caledon standard development details and notes
- Town of Caledon Site Plan Control Manual Information Package
- Any applicable Conservation Authority standards and guidelines
- Greenbelt Plan technical guidelines (if applicable)
- Niagara Escarpment Commission standards and guidelines (if applicable)
- Oak Ridge Moraine standards and guidelines (if applicable)
- Ontario Topsoil Preservation Act
- Canadian Fertilizer Act
- Canada Fertilizer Quality Assurance Program and the Canadian Compost Standards Program
- Ontario Provincial Standard Specifications (OPSS)
- OMAFA Publication 841, Guide to Nursery and Landscape Plant Production and IPM
- Agriculture Canada: Canadian System of Soil Classification 3rd Edition
- Critical Ground: Why Soil is Essential to Canada's Economic, Environmental, Human, and Social Health (Senate Canada)
- Other documents Staff require during the Preliminary or Pre-consultation meeting

Through a Preliminary Meeting or Pre-Consultation Meeting, Town staff will confirm whether a **Soil Assessment Report** (see Section G) is required.

Applicability:

The Soil Assessment Report is a supporting document which may be required as information for the implementation of landscape designs or restoration plans. It is intended to be used to assess the suitability of base topsoil or imported topsoil and/or growing mediums for site reinstatement, and for site restoration in Parks, on public lands and in natural heritage areas.

- Always required for site restoration in natural heritage areas and development of publicly owned lands, including but not limited to parks, storm water management ponds, trails and streetscape trees.
- Landscaping and tree planting on lands owned by or intended to be transferred to the Town.
- Restoration of disturbed soils (see definition in Section F) in natural heritage areas, owned by or intended to be transferred to the Town.



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- Applies to where undisturbed or base topsoil may not be suitable for re-use and imported topsoil or growing mediums are required.
- May be requested by Town staff on a site-specific basis.

Prepared By:

- The Soil Assessment Report shall be prepared by a qualified Soil Scientist or an approved equivalent.
- All soil and growing medium tests shall be conducted by soil laboratories accredited by The Ontario Ministry of Agriculture, Food and Agribusiness (OMAFRA).

Definitions:

A-Horizon: The top layer of a soil profile as per the Canadian System of Soil Classification; contains a mixture of mineral and organic matter.

Amendment: Material added to a Base Topsoil to produce a Growing Medium. Amendments include but are not limited to compost (organic), fertilizer, biological and pH adjustors.

Base Topsoil: Topsoil that has been harvested from the project or other site that is known to have, or can be modified or amended to have, a physical (texture), chemical and biological make-up that is suitable to the type of plants to be installed, as specified by the landscape designer and determined through laboratory testing.

Bulk Density: Soil bulk density is the mass of dry soil in a given volume of soil, inclusive of air space. Bulk density measurements are used to determine the compactness of soil.

Compacted Soil: Soil in which external pressure or mechanical disturbance has reduced pore space, leading to increased bulk density. This densification limits root penetration and restricts the movement of air, water, and nutrients, thereby negatively affecting soil structure and plant growth.

Compost: Compost is stabilized organic matter that is a solid, mature product produced by an aerobic composting process.

Cone Penetration Resistance Test: An in-situ test of soil compaction that uses a cone penetrometer – an instrument that uses a load cell or strain gauge coupled with an analog dial or pressure transducer to measure the maximum resistance to pushing the instrument's metal conical tip of standard dimension into a thoroughly wetted soil profile at a constant rate.

Disturbed Soil: This includes all scenarios which are not explicitly excluded under the definition of Undisturbed Soils.

Drainage/Infiltration: The rate at which soil water moves through the soil transitioning the soil from saturated condition to field capacity. Most often expressed as saturated hydraulic conductivity, measured in depth over time. Poor drainage is defined as drainage which is slower than that to which plants can adapt.

Fertilizer: Amendment used for the purpose of adjusting soil nutrient composition and balance.

Fine Grading: The final grading of the soil to achieve exact contours and positive drainage, often accomplished by hand rakes, drag rakes or other suitable devices.

Finished Grade: The surface or elevation of a Growing Medium after consolidation, fine grading and settlement.

Graded Subsoil: Soil where the A horizon has been stripped and relocated; Cuts and fills deeper than 30 centimeters.

Growing Medium: Mixtures of topsoil, sand, compost and potentially other soil conditioning amendments that are produced off-site and imported or produced on-site through placement of a Base Topsoil layer and in-situ incorporation of an amendment layer, or through blending.



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O-Horizon: A layer consisting of organic matter occurring above or in place of the A-Horizon in areas with high organic matter deposition as per the Canadian System of Soil Classification.

Overly Compacted Soil: Soil where the measured bulk density or cone penetration resistance test value is greater than the root limiting threshold that corresponds to its texture classification.

Peds: Peds are aggregates of soil particles formed through pedogenic processes.

Scarify: Loosening of graded soil (i.e., subgrade) or existing subsoil to reduce compaction and improve infiltration and moisture retention prior to placement of topsoil or a Growing Medium, through soil fracturing, soil ripping or soil trenching.

Subgrade: Surface or elevation of subsoil remaining after completion of excavation work, or top surface of a fill or backfill, before placing the Base Topsoil or Growing Medium.

Topsoil: Naturally produced soil from the A or O horizon that has not been graded or intentionally compacted.

Undisturbed Soil: Soil where the original A and/or O horizon is intact and has not been previously stripped, excessively compacted or otherwise contaminated; the A horizon is at least 15 cm deep over subsoil horizons with acceptable compaction, if the area has been previously farmed; and/or existing vegetation growth is supported and appears to be in good health. Soils in existing forested areas are presumed to be undisturbed.

Soil Assessment Report – Terms of Reference:

The Soil Assessment Report shall confirm that the topsoil / growing medium meets the minimum standards necessary to support healthy establishment, growth, and long-term vegetation viability. It may be scoped from the requirements below at the discretion of the Town. Where the report is to be scoped, Town staff will indicate this and describe the requirements at the Preliminary or Pre-Consultation Meeting.

- The Town reserves the right to require additional soil analysis at any time. Such additional samples of materials are deemed necessary for verification of conformance to specification requirements.
- Analysis of topsoil, and growing medium **must be submitted within 45 days prior to installation**. Do not commence work until topsoil is accepted by the Town's Parks and Natural Heritage division.
- Submissions must be provided as a consolidated PDF not exceeding 25 MB.

Soil assessment criteria

Tables 1 and 2 provides the laboratory testing and compaction testing parameters and acceptance criteria. Table 1 provides parameters that shall be tested for and reported on in the Soil Assessment Report.

Table 1: Soil laboratory testing parameters and associated thresholds for acceptance

Parameter	Acceptance criteria ¹
Soil texture	Percentages of sand, clay and loam is site specific and may vary widely based on site conditions, whether on-site or imported soil or a growing medium is being used, and the type of vegetation to be planted. Soil texture to be determined as part of the analysis.



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Screening (incl. rocks & sticks)	< 25 mm particles, <10%
pH	5.0-7.5
Electrical Conductivity (EC)	<1.0mS/cm
Organic Matter Content ¹	3-7% by dry weight
Phosphorus (P)	10-15 ppm
Potassium (K)	80-120 ppm

1. The Town may specify alternative criteria on a site-specific basis
2. Testing is for Soil Organic Matter, not Soil Organic Carbon.

Table 2 provides ideal compaction rates using either Bulk Density or Cone Penetration Resistance tests. Bulk Density uses a laboratory testing method while Cone Penetration Resistance tests can be undertaken on site. Soil compaction must be tested once the topsoil / growth medium have been placed in its final location and as such, the results of compaction testing would not be included in the Soil Assessment Report. However, the Soil Assessment Report must make recommendations for compaction management based on the soil texture identified in the laboratory testing, or the recommended soil texture resulting from amendments / blending.

Table 2: Soil compaction specifications – Bulk Density (BD) and Penetration Resistance²

Bulk Density		Penetration Resistance			
Soil Texture	Ideal BD for plant growth (g/cm ³)	Soil Texture	Surface Resistance PSI	Surface Resistance kg/cm ²	Surface Resistance Kpa
Sands, loamy sands	<1.6	Sandy – loamy sand, sandy loam, sandy clay loam and sandy clay	≤260	≤18.3	≤1793
Sandy loams, loams	<1.4				
Sandy clay loams, clay loams	<1.4	Silty – loam, silty loam, silty clay loam, and silty clay	≤260	≤18.3	1793
Silts, silt loams	<1.4				
Silt loams, silty clay loams	<1.4				
Sandy clays, silty clays, clay loams	<1.1	Clay – clay loam	≤225	≤15.8	≤1551
Clays (>45% clay)	<1.1				

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Soil Assessment Report Format

This section provides the required format for the Soil Assessment Report with a description as to what should be outlined under each section.

1. Introduction

1. Purpose of the report

- Identify the project and provide a concise overview of its scope.
- State the reason for the report (e.g., required in support of landscape restoration, tree planting, park development, or municipal acceptance of natural heritage lands).

2. Soil use and source summary

- Summarize the intended use of the soil (e.g. tree planting, landscaping, ecological restoration).
- Identify the soil source(s), such as on-site re-use, imported topsoil, or engineered growing medium.

2. Site Description and Mapping

All mapping listed in this section may be provided as separate maps, or on a single overlay map as long as all aspects remain legible.

1. Location and project area

- Provide a description of the site and the proposed development.

2. Soil context

- Provide an overview of the site with reference to [Ontario Soil Survey Reports and Publications – Soil Associations of Southern Ontario \(2011\)](#).
- If there are limitations for the purpose of this report (such as scale and other land uses) identify these and clarify how they will be addressed through the report.
- Provide mapping showing the following, and georeferenced using the same basepoint as the engineering drawings:
 - North arrow and scale bar.
 - Development area.
 - Areas where base topsoil would be removed from.
 - Areas of base topsoil retention (i.e. areas to remain undisturbed and protected through ESC or similar fencing).
 - Stockpile area(s).
 - Areas to be topsoiled and vegetated.

3. Soil disturbance history (if known)



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- Provide an overview of disturbed soil throughout the site, if available. Where the soil disturbance history is unknown, describe the existing site conditions with reference to the definition of Undisturbed Soil.

3. Soil Analysis

Soil analysis is required for all base topsoil stockpiles kept for on-site re-use, as well as any imported topsoil and growing mediums. Analysis must be undertaken no more than six (6) months prior to topsoil or growing medium installation. The results of the analysis will determine whether amendment is required, and the extent thereof.

1. Sampling approach

- Describe sampling methodology and identify sample grid/spacing size.
- Test samples shall be an amalgamation of at least three samples taken randomly from physically separate locations on each stockpile.
- Where multiple stockpiles are sampled, reference the stockpile locations/numbers as per the soil context plan.
- Samples shall be carefully mixed, recorded, labelled and otherwise documented prior to delivery to the testing laboratory.
- Provide the date of sampling and weather conditions.

2. Soil chemical and physical analysis

- At minimum, soil laboratory tests shall include the soil parameters as set out in Table 1 of this ToR. Additional parameters may be requested by the Town or voluntarily tested for if the Contractor suspects limitations or proposed vegetation has special requirements. List the parameters used in the laboratory testing.
- Note the intended use of the topsoil to the testing laboratory as well as the acceptance criteria provided in Table 1.
- Provide the following details for the independent soil testing facility: name, address, and telephone number.

3. Soil Test Results

- The Town has the right to reject any material source.
- Soil test results shall be included in the Soil Assessment Report. Attach lab certificates as appendices.
- Table 1 provides optimum ranges. Where test results indicate that the topsoil / growing medium does not meet these and/or is not suitable for its intended purpose, the Contractor shall take the necessary remedial action or use another suitable source.

4. Soil Suitability Assessment

1. Comparison to municipal performance criteria

- The parameters listed in Table 1 include minimum testing requirements. Additional testing may be undertaken voluntarily or may be requested by the Town on a site-specific basis.



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- Failure to provide appropriate documentation of test results may be considered grounds for rejection of the topsoil/growing medium.
- Reference the standards applied for:
 - Soil testing
 - Assessment as a growth medium
- Identify the deficiencies as per the soil tests (e.g. pH, salt impacted, nutrient deficient).
- Should the base topsoil not meet the requirements of this specification, and it cannot be sufficiently amended, additional topsoil or a growing medium shall be imported. The imported topsoil / growing medium shall be subject to inspection and testing by the Contractor.
- Do not commence work until topsoil or growing medium source is accepted in writing by the Town.

2. Suitability for intended vegetation/use

- Soil amendments are to be tailored to existing or expected site conditions for the local area, and target vegetation cover, functional objectives or ecological community, particularly when planting in natural heritage areas.³
- Where approved plantings or ecological community requires specific soil characteristics, note these requirements and identify amendment requirements. E.g. soil for salt sensitive plants should have lower EC; woodland plants may require higher organic matter inputs.
- Consider the natural soil conditions typical of the target vegetation community (e.g. organic-rich soils for woodland edges).
- If no vegetation plan has been finalized, assess general soil suitability based on the intended land use (e.g., passive recreation, pollinator meadow, roadside planting), and flag any constraints that may limit future planting success (e.g. excessive compaction, high nutrient levels, low pH).
- Note any mismatch between current soil properties and the reference ecosystem or planting list and highlight if remediation may not be practical within project scope. If remediation is not practical, imported topsoil or a growing medium of suitable quality shall be required.

5. Recommendations

Recommendations shall be provided under each of the following headings. Specifications and limitations have been included below to guide the development of recommendations.

1. Soil amendment or blending needs

- Identify specific amendments that would be required. Artificial amendments for pH are not acceptable – natural pH buffering should occur using organic amendments.
- Hydrated lime shall not be used to stabilize growing mediums or promote soil aggregation. If already imported, such soils / growing mediums shall be removed and replaced with unlimed alternatives.
- Soil amendments and imported topsoil or growing mediums used for blending shall be free from clay subsoil, fresh manure, uncomposted biosolids, peat moss, sawdust, commercial wood products, stones >25mm, weed stolons or seeds, plastic and other inorganic contaminants, and chemical contaminants.



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- No plant material including noxious weeds, rhizomes, or undesirable grasses shall be included in growing mediums.
- EC values above 1mS/cm should prompt further evaluation, mitigation (e.g., rinsing or blending), and/or delayed planting.
- Indicate off-site treatment, disposal, or further testing requirements for contaminated or unsuitable soils.
- Table 3 provides an overview for timing and type of amendments that can be undertaken.

Table 3: Timing for and type of soil amendments and blending

Amendment	Timing
Imported topsoil / growing medium	Blend prior to placement
Sand / clay / other soil textural fixes	Blend prior to placement
Compost / organic matter	Apply during blending or after placement
Mulch	After placement or during planting
Slow-release nutrients ¹	After placement or during planting
Biological Inoculants (optional)	During planting

1. Applied nutrients should not be in such quantities as will lead to root burn. When applied during planting, nutrients should ideally be placed outside of the root zone.

2. *Mixing, scarification, or preparation methods*

- Grade subgrade to eliminate low spots, ensuring positive drainage. Remove debris >50mm.
- Disturbed subsoil should be ripped or scarified to a minimum of 150mm prior to topsoil replacement to improve rooting depth and drainage.
- Install topsoil or growing medium only when subgrade and materials are friable – not when saturated, frozen, or overly dry.
- Topsoil shall maintain a heterogeneous structure with clods and voids; excessive screening is not permitted.
- A minimum topsoil placement depth of 300 mm is required on all sites. Provide recommendations for increased topsoil placement depth based on intended site use (e.g. storm water management pond, natural heritage sites, etc.).
- Fine grade the surface to ensure positive drainage and smooth finish. Raise finished surface 50-75mm above surrounding grade to allow for settlement.
- Use tracked or large-tired equipment. Avoid repeated passes and do not use blowers or pumps to place soil.
- Where compaction rates as specified in Table 2 are not met after topsoil / growing medium installation, additional scarification shall be required to meet these rates. Note that this would not be specified in the Soil Assessment Report, however, recommendations in this regard should be included based on the soil texture of the final soil mix.



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3. *Monitoring or follow-up testing (if needed)*

- Include recommendations for the following, if deemed necessary:
 - Post-placement infiltration tests, if required based on site conditions, soil texture and targeted vegetation or ecological communities.
 - Remedial actions for soils that do not meet performance criteria, this can include post-placement soil tests (Table 1), applying additional amendments as required, and replacing topsoil if required.
- The Town may require follow-up testing to verify compliance with design specifications.

4. *Special Considerations*

- For arboriculture applications, refer to the Town's Landscape guidelines on minimum soil volumes for trees.
- Identify site-specific soils from inventory maps suitable for different vegetation types and their depth placement.
- Recommend soil habitat zones appropriate for the intended vegetation communities or ecological targets.

6. **Conclusions**

- Describe how the report has met the requirements identified in the applicable municipal or regional standards, including sampling, testing, and evaluation criteria.
- Identify whether the on-site topsoil or imported topsoil / growing medium is suitable in the intended restoration or planting areas.
- If soils are not suitable as-is, summarize the type and extent of amendments required to bring the soil into conformance.
- Identify any concerns or risks that may impact long-term plant establishment (e.g. high salinity, compaction, low infiltration, invasive seed content) and whether further monitoring or mitigation is recommended.
- Briefly state any limitations of the report (e.g., lab turnaround time, sample representativeness, weather conditions during sampling) that could affect interpretation.

7. **Appendices**

- Lab results
- Sampling location map
- Photographs (if applicable)
- Credentials of Qualified Person



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Reference and Related Documents:

- *City of Brampton. Landscape Specifications Section 02911- 1 – Site Topsoil and Finish Grading.*
- *City of Mississauga (2002). Subdivision Requirements Manual Specifications Section 02212 - Topsoil and Finish Grading.*
- *City of Vaughan. Urban Design, Planning and Growth Management - Construction Specification for Topsoil/Growing Medium.*
- *Credit Valley Conservation (2017). Healthy Soils Guideline for the Natural Heritage System.*
- *Landscape Ontario Horticultural Trades Association (2004). Chapter 5: Topsoil Guidelines in Landscape Guidelines.*
- *Ontario Ministry of Agriculture, Food and Agribusiness (2014). Publication 841, Guide to Nursery and Landscape Plant Production and IPM.*
- *Toronto and Region Conservation Authority (2012). Preserving and Restoring Healthy Soil: Best Practices for Urban Construction, Version 1.0.*
- *Urban Tree Foundation (2014). Section 32 9100 Planting Soil.*

Version History:

VERSION	APPROVED BY	REVISION DATE	DESCRIPTION OF CHANGE	AUTHOR
1		2023	Original document	John
2		July 2025	Suggestions and wording updates	Eva
3		August 2025	Reworked ToR	Anèl

