Greening the Landscape Research Consortium: Phase 1 (2021-2024)

Background: Launched on July 1st, 2021, the **three-year pilot phase** of the *Greening the Landscape Research Consortium* focused on building strategic partnerships particularly with municipalities, whose purchasing power plays a key role in shaping the market in nursery stock, soils, landscaping, and tree care services.

As a **public-private research consortium funded by paid membership**, the pilot centered on **five member-selected case studies**:

1. Best Practices for Tree Establishment and Maintenance (Soils)
2. Enhancing Climate Readiness in Urban Forest Management
3. A Pathway to Building Nursery–Municipal Partnerships
4. Public Perceptions of Tree Planting and Management
5. Training and Tools

The key findings and deliverables from the five case studies are available through a shared Member SharePoint site. **Access to this SharePoint and materials is available for a one-time fee of $5000.**

Purpose: While these materials were valuable to support members of the *Greening the Landscape Research Consortium* during the pilot phase, they also serve as **an important resource for others who could not participate.** The information can help you:

- Make informed, climate-smart decisions for planting lists.
- Improve urban soil quality to increase the survivorship of trees.
- Inform and strengthen Urban Forest Management Plans.
- Develop educational materials for clients and the public.
- Help new staff understand the key challenges of urban forest management across the entire value chain.
- Strengthen engagement with landowners and media.
- Better understand the climate impacting urban forests.

Best Practices for Tree Establishment and Maintenance

A comprehensive approach to improving the survival, establishment, and long-term performance of urban trees.

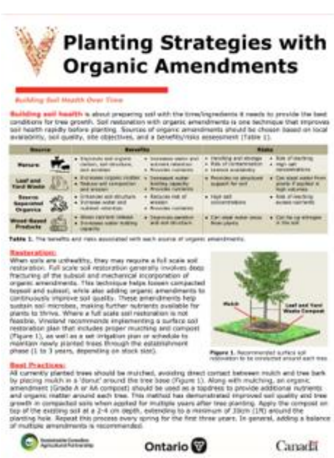
Key Deliverables include:

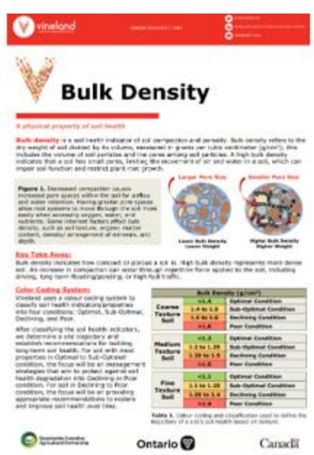
Report One: Fundamentals of Tree Establishment explores the biological and operational factors behind successful tree establishment. It focuses on four key pillars: tree ecophysiology, plant quality, rooting environment, and post-planting care, and offers best practices for species selection, nursery stock quality, site preparation, and maintenance in urban environments.

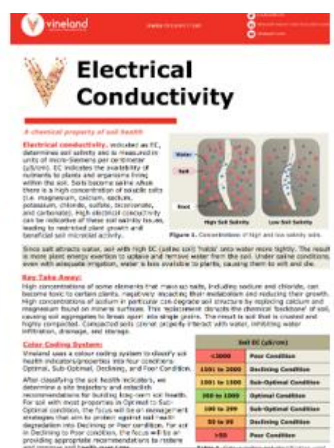
Report Two: Soil Health and Quantity highlight the foundational role of soil in supporting tree health covering key soil health indicators physical, chemical, biological, and hydrological and the impact of soil volume and quality on tree performance. The report provides guidance on urban soil assessment, restoration strategies, and soil volume calculations based on tree size and water needs.

Nine factsheets complement the reports by offering clear, accessible information on specific soil health indicators and planting strategies. These include:

- *What is Soil Health?*
- *Soil Health Indicator – Organic Matter*
- *Soil Health Indicator – Particulate Organic Matter*
- *Soil Health Indicator – Soil Respiration*
- *Soil Health Indicator – Bulk Density*
- *Soil Health Indicator – Soil pH*
- *Soil Health Indicator – Electrical Conductivity*
- *Soil Health Indicator – Saturated Hydraulic Conductivity*
- *Planting Strategies with Organic Amendments*


Planting Strategies with Organic Amendments


Bulk Density


Electrical Conductivity

Strategies for Enhancing Climate Readiness in Urban Forest Management

This case study offers a comprehensive approach that supports building climate-resilient canopies through informed species selection and site planning, supported by reference sheets for more location-specific recommendations.

Key Deliverables include:

Final Report: Climate Change and the Urban Canopy provide an overview of climate change impacts relevant to urban forestry, emphasizing the importance of anticipating heat stress, drought, and novel pests and diseases. It introduces a climate lens for tree selection and planning, with a focus on identifying species that can tolerate projected future conditions across different regions of Ontario.

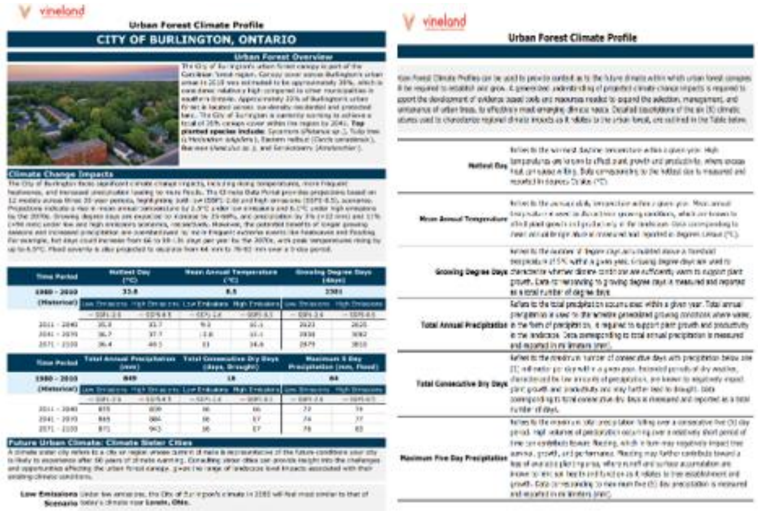
A set of **Reference Sheets** accompanies the report, offering practical, region-specific tools to support climate-informed urban tree selection. Each city's Climate Reference Sheet set includes two key components:

1- Urban Forest Climate Profile (Two-Page Sheet)

This summary outlines the city's current and projected climate conditions relevant to urban tree planting. It includes:

- Current and future USDA Plant Hardiness Zones
- Key climate variables such as temperature increase, precipitation changes, drought trends, and heat days
- Urban-specific stressors like urban heat island effects
- Regional climate implications for tree health and survivability

- A brief interpretation of what these shifts mean for urban forest planning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Urban Forest Climate Profile

CITY OF BURLINGTON, ONTARIO

Urban Forest Overview

Climate Change Impacts

Future Urban Climate: Climate Sister Cities

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Urban Forest Climate Profile

Hottest Day

Mean Annual Temperature

Growing Degree Days

Total Annual Precipitation

Total Consecutive Dry Days

Maximum Five Day Precipitation

2- Climate-Ready Planting Lists

This document provides a curated list of recommended tree species that are projected to perform well under the city’s future climate conditions. It includes:

- Species organized by size and canopy structure
- Notations on species with specific tolerances (e.g., drought, salt, compacted soils)
- A climate-adapted palette that balances biodiversity, resilience, and long-term canopy goals

A pathway to Building Nursery Municipal Partnership

Explores how formal agreements between municipalities and nurseries can improve the urban tree supply chain reliability. These partnerships ensure that high-quality, climate-resilient tree species are grown to meet municipal planting needs.

Key Deliverables include:

Final Report: A Pathway to Building Nursery-Municipal Partnerships outlines the rationale, structure, and best practices for successful grow contracts. The report addresses common challenges like limited species availability, climate mismatch, and quality issues t and offers guidance on contract models, timelines, species forecasting, and considerations for procurement and risk management to align nursery production with municipal demand.

various challenges and opportunities affecting large scale tree production, with particular focus on trees produced for municipal planting projects.

On August 15th 2023, the Greening the Landscape Consortium Research Team distributed an invitation to all twenty-four (24) Consortium member organizations, inviting up to two members per organization to participate in the Fall 2023 Consortium Nursery Field Tour. A total of twenty-three (23) member representatives registered to participate during the four (4) week registration period, corresponding to an approximately 50% response rate.

On September 26th 2023, twenty-three (23) Greening the Landscape Consortium members attended the interactive field and greenhouse tour at NVK Nurseries. The tour featured nursery growers from four (4) local nurseries including South Pelham Nursery, Verbinnen's Nursery, Winkelmolen Nursery and the host NVK Nurseries and sought to provide insight as to the range of practices, processes and perspectives currently employed in tree production. The Nursery Field Tour highlighted various stages of the tree production process, featuring information and insights on (i) propagation, (ii) container production, (iii) tree liner production, (iv) field caliper tree production, (v) soil health in tree production and (vi) the business of tree production from both the NVK and visiting nursery growers' perspectives. Participants were invited to engage with the full range of tour content and themes, culminating in a 20 minute interactive Q&A led and moderated by the Consortium Program Lead, Rhoda deJonge. The event was followed by a one (1) hour lunch and networking session attended by tour participants and nursery representatives.

Figure 1. Overview of Consortium Nursery Field Tour event, conducted at NVK Nurseries on September 26th 2023. Images by Matthew Coker.

Public Perceptions of Tree Planting and Management

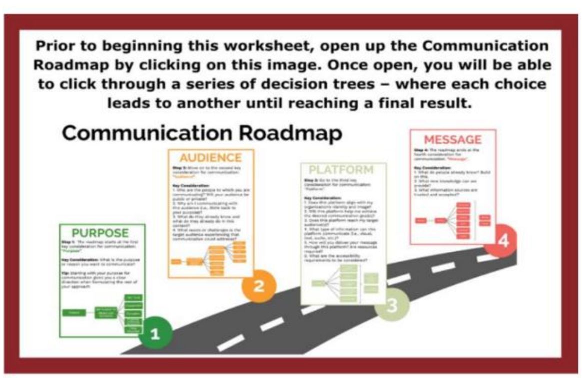
Identifies how urban residents perceive trees, planting initiatives, and municipal tree management. This case study identifies key opportunities to better engage, inform, and collaborate with communities.

Key Deliverables include:

Summary of Interview Findings highlights the insights gathered through structured interviews with Consortium members, uncovering key challenges in communication. These are organized into four central themes: *Audience*, *Purpose*, *Platform*, and *Message*. This report identifies both barriers, opportunities and strategies for more effective, evidence based public engagement.

Backgrounder an accompanying *Backgrounder* outlines core concepts such as perception and communication in the context of urban forestry. It emphasizes the interconnected nature of communication elements and serves as a primer on how to effectively influence perceptions through audience-specific messaging, intentional platform use, and clear communication goals.0

The *Literature Review Report* expands on these foundations by drawing from a broad range of interdisciplinary research. It offers practical guidance on messaging techniques (such as emotional or myth-busting framing), audience segmentation and platform selection including innovative tools like QR codes, comics, and e-tools. The report also provides communication strategies tailored for groups such as youth, landowners, and developers.

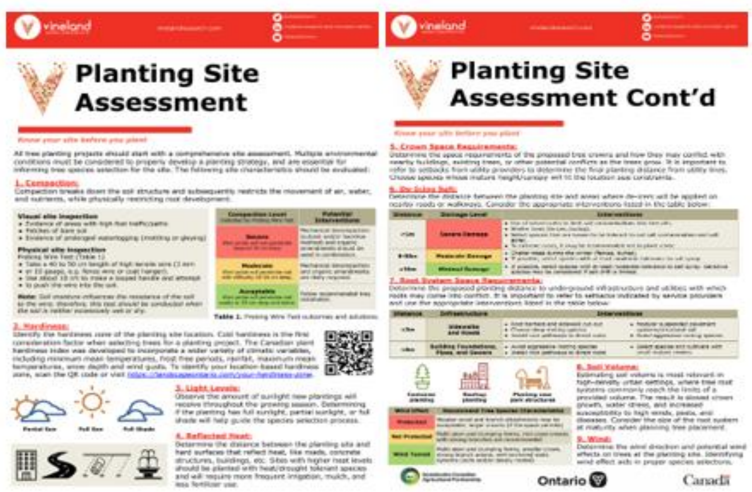


Communication Roadmap was developed to guide urban forestry professionals in crafting messages to positively influence diverse audiences. It provides a step-by-step process that incorporates four key communication principles and serves as a framework for developing tailored communication materials and collaborating smoothly with communication experts.

5.Training and Tools

This case study emphasizes site-specific assessment, soil health, proper planting techniques, and stock type suitability. It aims to equip municipalities, nurseries, landscapers, and tree planting organizations with practical tools and knowledge to enhance urban greening initiatives. By creating standardized, accessible training materials, that supports more informed, consistent, and successful tree planting practices across Ontario. These resources are designed for public, contractor and staff education. **Key Deliverables include:**

Tree Planting Site Evaluation – A detailed guide to assessing nine critical site characteristics, including compaction, de-icing salt, hardiness zones, light levels, root space, soil volume, wind exposure, crown space, and reflected heat. Recommendations support informed species selection and site-specific planting strategies.



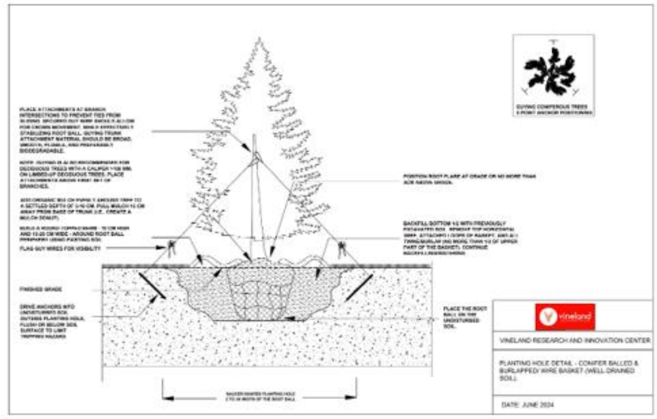
Soil Sampling Guide – A step-by-step fact sheet outlining how to collect representative soil samples that reflect spatial, temporal, and profile diversity. Includes methods for sample storage and submission for laboratory analysis to support soil health-informed planting.

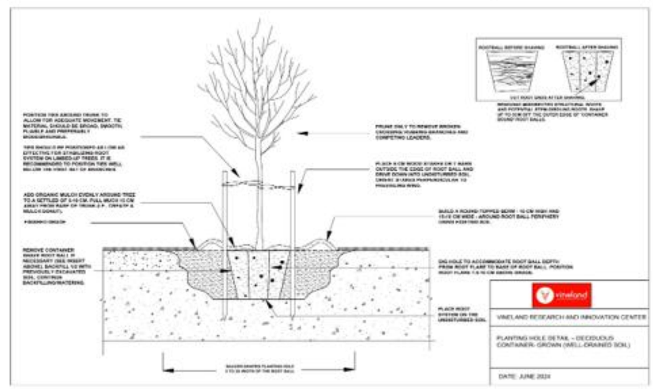
How-to Planting Guides (Bare Root & Container Trees) – Outlines best practices for planting different tree stock types, including root preparation, proper hole dimensions, mulching, staking, and aftercare.

Tree Planting Detail Drawings – A suite of schematic diagrams showing proper installation techniques for various tree types and soil conditions, including:

Conifer – Balled & Burlapped: Poorly Drained Soil / Well Drained Soil

- Deciduous – Balled & Burlapped: Poorly Drained Soil / Well Drained Soil
- Deciduous – Bare Root: Poorly Drained Soil / Well Drained Soil
- Deciduous – Container: Poorly Drained Soil / Well Drained Soil





These technical visuals support contractors and practitioners in applying standardized planting methods across diverse urban sites.