MISSISSAUGA

WOODLAND MANAGEMENT PLAN

January 1, 2024 – December 31, 2033



Preface

We acknowledge the lands which constitute the present-day City of Mississauga as being part of the Treaty and Traditional Territory of the Mississaugas of the Credit First Nation, The Haudenosaunee Confederacy, the Huron-Wendat and Wyandot/Wyandotte Nations. We recognize these peoples and their ancestors as peoples who inhabited these lands since time immemorial. The City of Mississauga is home to many global Indigenous Peoples.

As a municipality, the City of Mississauga is making concerted efforts to continue to learn and work with indigenous peoples to steward this land, provide space for Indigenous peoples within their territory, to recognize and uphold their Treaty Rights and to support Indigenous Peoples. We formally recognize the Anishinaabe origins of our name and continue to make Mississauga a safe space for all Indigenous peoples.

The City of Mississauga's Woodland Management Program comprises 207.3 hectares, which is 0.7% of the total land area in the City, and includes only those woodlands that are actively managed, with potential for more to be added in the future. These woodlands are mainly located in residential neighborhoods and managed by the City. To ensure the efficient coordination of people, materials, money and technology, the Woodland Management Plan was established to outline the resource management and forestry activities that need to take place within the City's Managed Woodlands over the next ten-year period. These activities, such as invasive species control, thinning, tree planting, and monitoring, are fundamental in preserving the resources of the forest and its sustainability. The plan is due to be reviewed in 2028 and renewed in 2033 to guarantee the long-term health of the City's forest.

The goal of this management plan is to ensure the long-term improvement of woodland health, vigor and longevity. To achieve this, the plan emphasizes maintaining ecological integrity and creating the foundation for a successful woodland management program. This will include complying with local and international standards of forest certification to demonstrate accountability and ensure the best standards of forest management are followed. This will help ensure the City is a leader in municipal woodland management and a beacon of urban forest management.

The Woodland Management Plan (WMP) establishes longer-term (10+ years) management objectives while identifying specific areas where active management will occur within the 2024-2033 operating period. Should circumstances arise where a change to the plan may be necessary, any



alteration will be consistent with the principles of sustainable forestry. Additions or deductions from the woodland management areas will be added as an addendum to this plan.

Annual work plans and annual work reports will be produced outlining the scheduling and implementation of management activities. These work plans and reports will provide the necessary linkage between the work proposed in the Woodland Management Plan, management accomplishments, and the financial resources allocated through the annual budgeting process.



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1. Purpose and Scope

The City of Mississauga is a vibrant urban centre that is home to over 780,000 residents, and the population is expected to keep increasing. This means that the City's natural and treed areas are facing increasing pressure from urban stresses and the impacts of climate change, making the need to protect them ever more important. Fortunately, these woodland areas are becoming increasingly appreciated and valued for their contribution to the environment, such as air and water filtration, respite from summer heat and winter winds, refuge for flora and fauna biodiversity, as well as providing a living classroom for all ages and backgrounds to explore the outdoors.

The City of Mississauga is responsible for the management of the natural resources on City owned lands. The goal of this management plan is to ensure the long-term improvement of woodland health, vigor and longevity. To achieve this, the plan emphasizes maintaining ecological integrity and creating the foundation for a successful woodland management program. This will include complying with local and international standards of forest certification to demonstrate accountability and ensure the best standards of forest management are followed. This will help ensure the City is a leader in municipal woodland management and a beacon of urban forest management. The Woodland Management Plan (WMP) establishes longer-term (10+ years) management objectives while identifying specific areas where active management will occur within the 2024-2033 operating period.

Proper urban forest management can optimize certain benefits of an ecologically self-sustaining woodland which provides safe public access and enjoyment within the bounds of the managed carrying capacity of the lands; education of the public to the positive aspects of urban woodlands; and the critical role these woodlands play in providing a mentally, emotionally, and physically stimulating environment within the urban context. At the same time a woodland management plan can minimize the impact of public use.

This technical document has a primary objective of organizing sustainable management activities within the City's 36 Certified Woodlands and formalizing the planning process, with an emphasis on sound resource stewardship to maximize the benefits while recognizing that this area provides for other uses. Management will be guided under the umbrella of forest certification and will ensure that the many benefits that urban woodlands provide can be sustained.

Forest certification is a voluntary process by which forest management organizations can

be independently assessed and certified according to a set of predetermined standards set by organizations such as the Forest Stewardship Council (FSC) and the Sustainable Forestry Initiative (SFI). Forest certification helps to ensure that forests are managed in a sustainable and responsible manner, helping to conserve biological diversity, protect the land and water, promote healthy ecosystems, and provide benefits to local communities.



2. Historical Perspective

Prior to European settlement the lands where the City of Mississauga is situated were the traditional territory and home to the Mississaugas of the Credit First Nation, The Haudenosaunee Confederacy, the Huron-Wendat and Wyandot/Wyandotte Nations. The descendants of these Indigenous Peoples continue to live in the City and surrounding areas and care for the lands just as their ancestors cared for them.

The history of forest cover in Mississauga is a long and complex one (2019 Peel Archives). Surveys done between 1806 and 1819 by the order of the General Surveyor of Canada in Toronto Township (modern day Mississauga) indicate that the area was heavily forested. By 1940, 97.2% of the woodlands had been cleared due to settlement of the lands. The amount of clearing caused worsening flooding conditions along ravines impacted by only a few hours of rain. In response, the County of Peel introduced Bylaw number 1094 in 1949 to restrict and regulate the cutting of forests in the county, to protect the remaining forest cover and prevent further flooding.

Since the early 1970s, Mississauga has been acquiring and protecting forested lands throughout the City to establish an urban forest. The woodlands were often lands either unsuitable for agriculture or had been heavily logged in the past. The mature mid-tolerant trees (i.e. Oak, Hickory, Walnut etc.) seen today at many of these sites suggests that these woodlands were cleared of timber in the late 1800s and early 1900s. Former owners of many of the woodlands also recognized the benefits of trees and took on the practice of planting new trees and increasing forest cover. Examples of early plantings can include the White Pine found at Painters Green Woodland estimated to have occurred in the late 1800s with reforestation efforts continuing into the 1950s with the Harding Waterfront Estate, and the 1980s with Birchwood Park.

In 2014, the City of Mississauga developed the Urban Forest Management Plan, establishing the One Million Trees Program which set a goal of planting one million trees city-wide by 2032 and reaching a canopy target of 20% city-wide. Since then, there has been a larger and more coordinated push for tree planting, involving City staff, contractors and volunteer groups.

The 1980-90s ushered in an era of silvicultural management in Mississauga's woodlands such as those that occurred at the 26- hectare Cawthra Woods. The Ontario Ministry of Natural Resources (OMNR) created a prescription with the aim of creating a high-quality hardwood stand with increased regeneration and periodic thinning every 10-15 years. Staff from the Ontario Ministry of Natural Resources and Forestry (MNRF)

marked the trees for removal and the woodland was thinned from February to March 1994. Since then, management activities in Cawthra Woods and other City woodlands have continued, encompassing the management of trails, hazardous trees, and the reduction of invasive species. In 2021, City council approved an Invasive Species Management Plan which guides non-native invasive species management across Mississauga, and outlines management strategies such as aerial spraying and controlled burns. These efforts will help to protect and conserve the City's woodlands for future generations.



3. Administration & Planning

The City's Parks, Forestry and Environment Division is responsible for the management of the forest, including the maintenance of trails and other infrastructure, the care of the forest ecosystem, protecting and enhancing the woodlands within the Natural Heritage System and addressing public-related matters. They ensure that the forest is properly maintained and that its resources are utilized in a sustainable manner. Numerous City plans provide direction to this WMP. Figure 1 illustrates the planning hierarchy, and the plans are further described in the following section.

3.1 Relevant Legislation and Guidelines

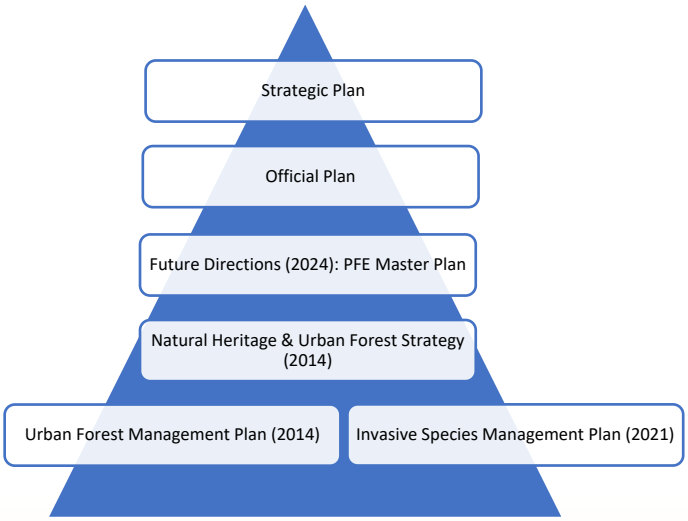


Figure 1

Official Plan - In accordance with the Planning Act, the City of Mississauga has developed an ambitious Official Plan that sets out a strategic vision for the future of the City. The Plan's Living Green pillar is designed to protect, enhance, restore, and expand the Natural Heritage System (NHS), encourage stewardship and enhancement of other areas within the Green System, and protect life and property from natural and human induced hazards. This includes protecting natural areas and features, reducing pollution, and conserving and re-using natural resources, as well as promoting land use compatibility and aesthetic beauty.

3.1.1 Natural Heritage & Urban Forest Strategy

The City's Natural Heritage & Urban Forest Strategy is the overarching document for both natural heritage and the urban forest throughout the City that includes 26 strategies with respect to planning, management, engagement, partnerships and tracking. These strategies provide direction to this Woodland Management Plan.

3.1.2 Invasive Species Management Plan and Implementation Strategy

Many recommendations of this Woodland Management Plan are based on the recommendations of the City's Invasive Species Management Plan and

implementation strategy, which is focused on prevention, early detection, rapid response strategies and provides a framework for non-native invasive species management in Mississauga. In the Plan, invasive non-native species, which are considered to be the second greatest threat to biodiversity after habitat loss, have been identified as terrestrial plants and insects that threaten the urban forest. The Plan prioritizes invasive plant species into two categories based on the threat they pose to the ecological integrity of the City's NHS and the anticipated management objectives for each.

3.1.3 Woody Debris Management Strategy

Following severe flooding in August 2009 which seriously affected many properties adjacent to Cooksville Creek, the City developed a Woody Debris Management Strategy to establish protocols and standards for the purposes of appropriately managing debris accumulation and debris related problems, especially related to loose debris that may block stormwater drains. Management activities in woodlands adjacent to watercourses will have regard to the procedures outlined in the strategy.

3.1.4 Parks and Forestry Master Plan

The City's Parks and Forestry Master Plan strategically outlines a set of guiding recommendations to direct the Parks and Forestry division and its management of parks and natural areas. Key recommendations from the plan that will guide this Woodland Management Plan include protecting and enhancing natural areas, providing outdoor recreation opportunities, enhancing woodland experiences, promoting community engagement and stewardship, and achieving climate change resiliency.

3.1.5 Public and Private Tree Protection By-laws

Mississauga is committed to protecting and preserving its urban canopy through both public and private tree protection by-laws. These by-laws help conserve trees, which promote a range of environmental benefits such as improved soil and water conservation, carbon storage, shade, temperature regulation and increased wildlife habitat. This Woodland Management Plan seeks to ensure compliance with these by-laws.

3.1.6 Urban Forest Management Plan

Mississauga's Urban Forest Management Plan (UFMP) 2014-2033 is an outcome of the Natural Heritage & Urban Forest Strategy. It serves to ensure a similar vision, guiding principles, objectives, and targets for Mississauga's urban forest. The Plan focuses on the operational, technical, and tactical aspects required to implement the broader strategies related to the urban forest as well as the natural heritage system. It also identifies a range of activities to address current and future issues related to the health, growth, and sustainability of the urban forest.

The UFMP provides input to a woodland management plan by providing a clear direction on how to manage and protect the urban forest for the future.

3.1.7 Protection of Critical Habitats and Species at Risk

This Woodland Management Plan is closely aligned with a range of federal and provincial regulations for conservation and protection of critical habitats and species at risk. This includes the Fisheries Act 1985, Species at Risk Act 2002, Migratory Birds Convention Act 1918, Endangered Species Act 2007, and the Fish and Wildlife Conservation Act 1997. These laws ensure that the City's woodlands remain protected and preserved for future generations.

3.1.8 Provincial Guidelines

Forest management activities will conform to guidelines noted in professional documents such as "A Silvicultural Guide to Managing Southern Ontario Forests" (OMNR 2000), the "Ontario Tree Marking Guide, Version 1.1" (OMNR 2004), and the "Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales" (OMNR 2010), as well as other guides specific to individual species and forest communities. Ensuring compliance with these documents is essential for achieving sustainable and ecologically responsible forestry practices.

3.1.9 Relevant Laws

Other relevant legislation that will help guide stewardship of the woodlands are listed in Table 1.



Table 1 Relevant legislation that will help guide stewardship of the woodlands.

Legislation	Management implication
Federal Fisheries Act	Requirement to protect fish habitat
Federal Migratory Birds Convention Act	Protection of migratory bird nests during nesting season. The Canadian Wildlife Services' nesting calendar is between March 25 to August 15. Timing restrictions may need to be applied during this period for disruptive activities.
Federal. Species at Risk Act	Protected species list and associated management guidelines, critical habitat protections, permitting process.
Prov. Pesticide Act	Rules for pesticide use
Prov. Forestry Act	Definition of Good Forestry Practices, and rules for how property boundary trees are managed
Prov. Endangered Species Act	Protected species list and associated management guidelines, habitat protections, permitting process. Bat roosting season is April 1 to September 30. Timing restrictions may need to be applied during this period for disruptive activities.
Prov. Fish and Wildlife Conservation Act	Hunting & wildlife management limitations
Prov. Greenbelt Act & Plan	Protects farmland, communities, forests, wetlands, and watersheds in Ontario's Greater Golden Horseshoe. The Greenbelt Act, 2005 provides the authority for the creation of the Greenbelt Plan (2017).
Provincial Invasive Species Act	The legislative framework outlined establishes measures for identifying invasive species that pose a threat to Ontario's natural environment, and includes mechanisms for detecting the emergence of such species
Prov. Professional Foresters Act	Regulates practitioners of forestry. Requires silvicultural prescriptions be prepared by Registered Professional Foresters.
Prov. Weed Control Act	Maintenance of noxious weeds
Prov. Lakes and Rivers Improvement Act	Approvals for maintenance of water dams
Prov. Conservation Authorities Act	Check with local Conservation Authority to determine if any proposed activities require a permit, such as road construction in wetlands, or water crossings. The woodlands are located within the jurisdiction of three conservation Authorities (CA): Credit Valley Conservation Authority, Conservation Halton, and Toronto & Region Conservation Authority.
Prov. Planning Act	Owners must have regard to protecting landscape features such as forest cover

4. Description of City's Woodlands

4.1 Geographic Location & Area

The City of Mississauga's Certified Woodlands offer a unique and diverse experience to explore the Carolinian Forest Region. Spanning a total of 207.3 hectares (512 acres) across 36 properties, the woodlands are positioned at the northern limits of the deciduous Carolinian Forest and just south of the Great Lakes-St. Lawrence Forest Region. These properties range in size from 1 to 26 hectares and are mostly located in residential neighborhoods and parks (Map 1). They include only those woodlands that are on an enhanced maintenance and monitoring schedule, with potential for more to be added in the future. With a wide range of habitats and landscapes available, they provide the perfect opportunity to explore and appreciate the beauty of the urban forest.

4.2 Biophysical Description

Mississauga's Certified Woodlands are found within three distinct physiographic regions, five distinct landforms, three main soil profiles, and are home to 376 species of wildlife. An in-depth overview of each of these components is provided within this section.

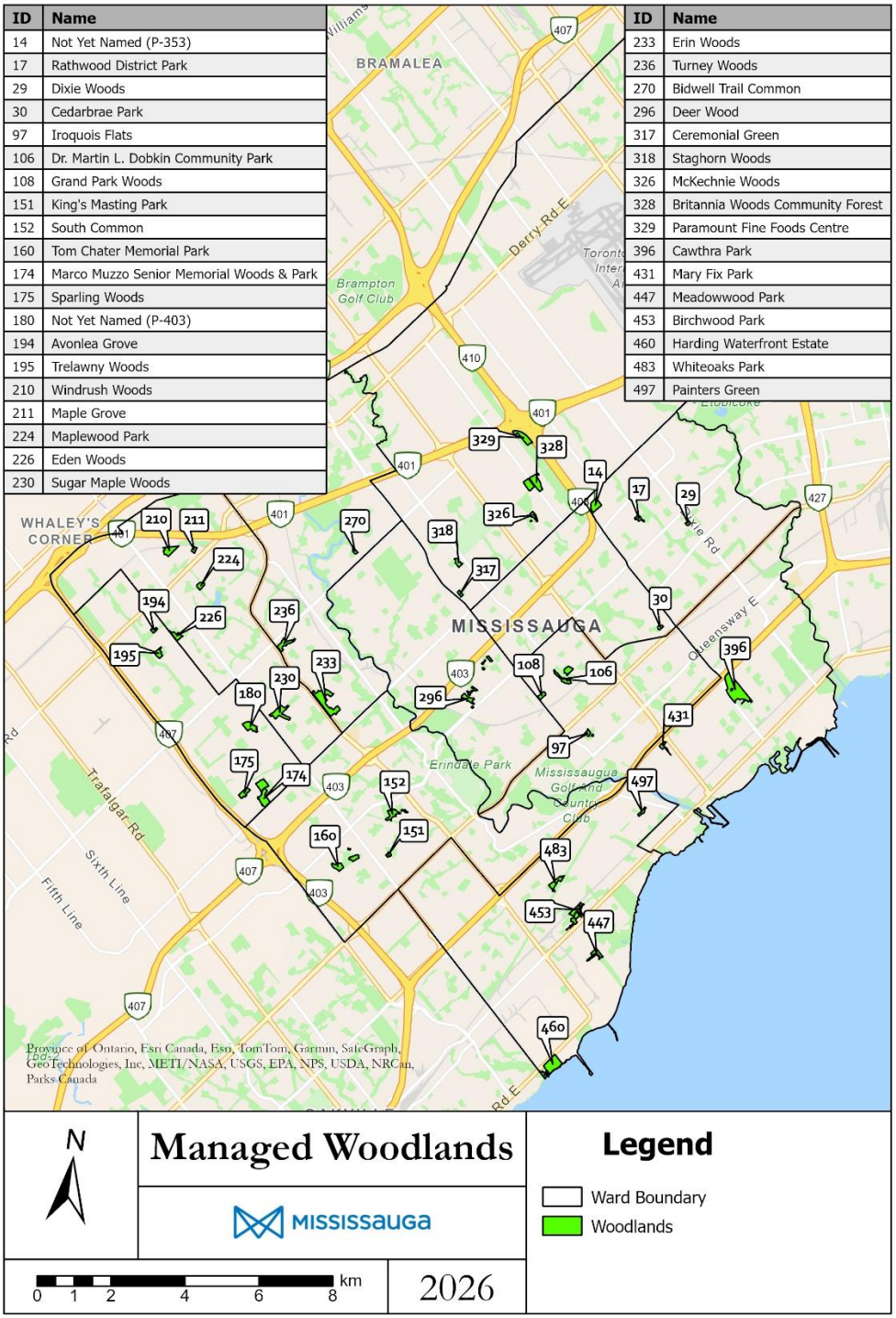
4.2.1 Significant Landforms

Ontario is home to a variety of landforms, as identified by Chapman and Putnam (1984). These divisions, which are based on bedrock, are further divided into 55 smaller physiographic regions. The City of Mississauga's Woodlands are located in three of these regions - Peel Plain, South Slope, and Iroquois Plain - which are bounded by the Niagara Escarpment, Oak Ridges Moraine, and Lake Ontario. These regions are generally characterized by flat topography and fertile soils, with rivers that feed into Lake Ontario. The Credit River, Etobicoke Creek, Sixteen Mile Creek as well as smaller streams associated with the west Lake Ontario Shoreline have watersheds associated with the Managed Woodlands.

Within the City's WMP, five landforms have been identified: sand plains, till moraines, drumlinized till plains, beveled till plains, and shale plains. Each of these landforms has unique characteristics that can significantly influence the growth and health of the forest. For instance, sand plains are more prone to drought and erosion, whereas till moraines create microclimates that are beneficial for certain species. Beveled till plains have an uneven topography which can affect drainage, and shale plains contain large amounts of clay which impedes drainage. Understanding the characteristics of each landform is essential for making informed forest management decisions.

ID	Name
14	Not Yet Named (P-353)
17	Rathwood District Park
29	Dixie Woods
30	Cedarbrae Park
97	Iroquois Flats
106	Dr. Martin L. Dobkin Community Park
108	Grand Park Woods
151	King's Masting Park
152	South Common
160	Tom Chater Memorial Park
174	Marco Muzzo Senior Memorial Woods & Park
175	Sparling Woods
180	Not Yet Named (P-403)
194	Avonlea Grove
195	Trelawny Woods
210	Windrush Woods
211	Maple Grove
224	Maplewood Park
226	Eden Woods
230	Sugar Maple Woods

ID	Name
233	Erin Woods
236	Turney Woods
270	Bidwell Trail Common
296	Deer Wood
317	Ceremonial Green
318	Staghorn Woods
326	McKechnie Woods
328	Britannia Woods Community Forest
329	Paramount Fine Foods Centre
396	Cawthra Park
431	Mary Fix Park
447	Meadowwood Park
453	Birchwood Park
460	Harding Waterfront Estate
483	Whiteoaks Park
497	Painters Green



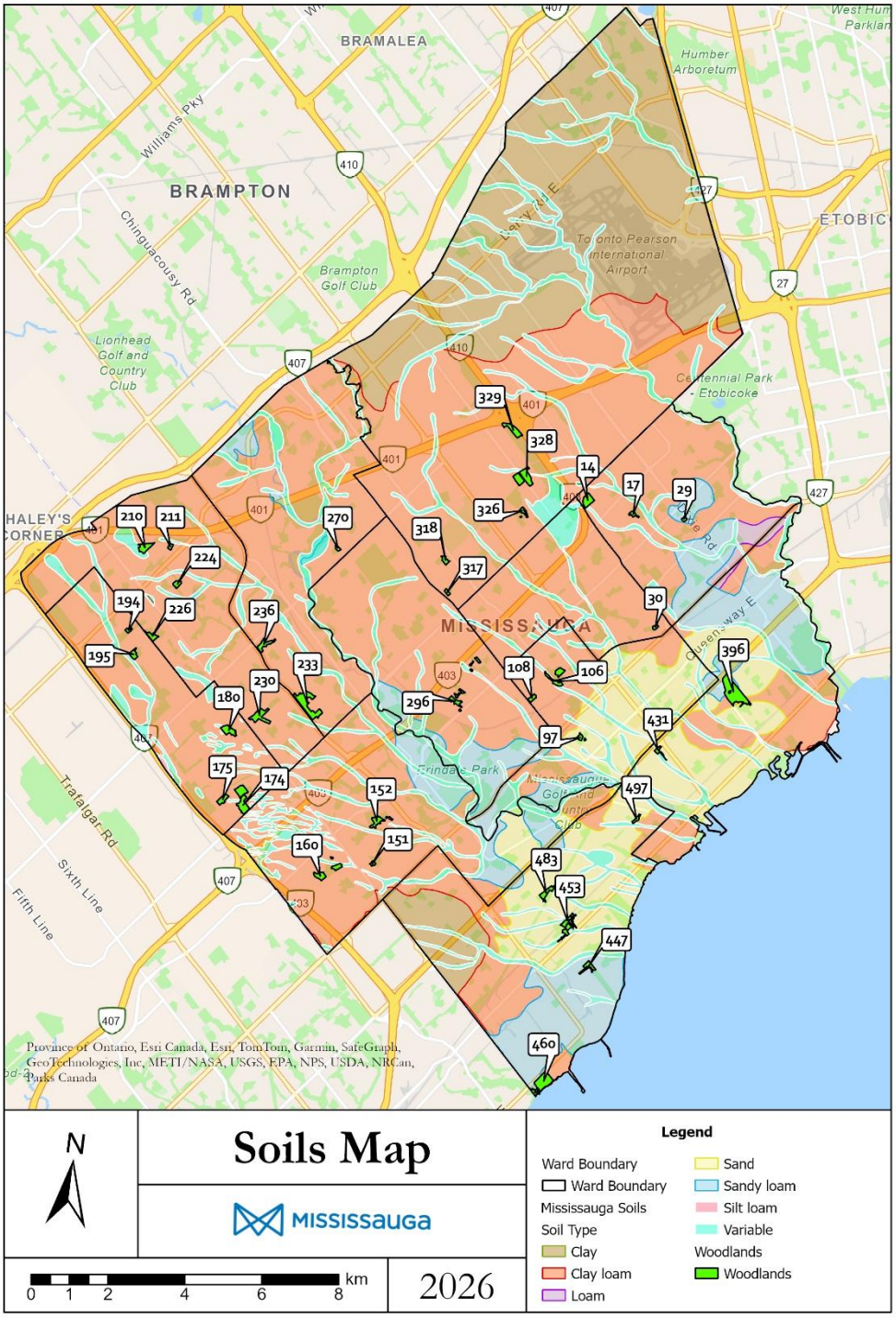
Map 1

4.2.2 Soils and Topography

Soil is an important factor in determining what plants will grow in a forest. In the City of Mississauga, the forested properties are composed of three main soil types, formed by glacial till, lake-bottom deposits, and windblown sand. Clay loam is the most common soil type, supporting 69% of the WMP area, while the balance of remaining forests grows on sandy loams and sands (Map 2). Clay soils tend to retain more water and be poorly drained, while the sandier soils have lower water retention and are better drained. This influences the type of trees that can be found, with oaks preferring the imperfectly drained soils and maples growing more often on the better drained sites. Soil drainage also has a strong influence on the understory and ground vegetation plant species. The topography of the forested properties is generally flat to gently rolling, with the occasional ravine. Elevations range from 75 meters to 205 meters above sea level and rarely deviate more than 20 meters on any given property. Understanding the soil and topography of these forests helps explain why certain trees are able to thrive in the City of Mississauga.

4.2.3 Biological Diversity

Forests are essential for sustaining biodiversity and providing a multitude of invaluable ecological services. These complex ecosystems capture and store rainwater, help to prevent floods, provide erosion control, provide wind buffering, cool air temperatures, sequester atmospheric carbon into the soil, and reduce the amount of carbon dioxide and other pollutants in the air. Not only do they provide a home for a variety of wildlife, but they also offer many benefits to local communities. Sanctioned woodland trails provide opportunities for recreation and promote healthy lifestyles. To ensure the City's woodlands remain resilient and continue to provide these services, it is essential to conserve and improve them to adapt to challenges posed by a changing climate, pathogens, and non-native invasive plants and insects.


BRAMALEA
BRAMPTON
MISSISSAUGA
ETOBIC
HALEY'S CORNER
Williams Pky
Chinguacousy Rd
Brampton Golf Club
Lionhead Golf and Country Club
Humber Arboretum
Toronto Pearson International Airport
Centennial Park - Etobicoke
Trafalgar Rd
Sixth Line
Fifth Line
Erindale Park
Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, NRCan, Parks Canada
N
Soils Map
MISSISSAUGA
0 1 2 4 6 8 km
2026
Legend
Ward Boundary
Ward Boundary
Mississauga Soils
Soil Type
Clay
Clay loam
Loam
Sand
Sandy loam
Silt loam
Variable
Woodlands
Woodlands

Map 2

4.2.4 Critical and Significant Habitats for Wildlife

Critical wildlife habitat is defined in Ontario's Endangered Species Act as areas of land, water and air that are vital to the survival of threatened and endangered species. It includes areas that provide essential habitat components such as nesting, feeding, and resting sites, as well as corridors that enable movement of species between areas of habitat. Critical wildlife habitat is protected from activities that may cause harm to the species or its habitat. Significant wildlife habitat, in comparison, is ecologically important in terms of features, functions, representation, or amount, and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System. Criteria for determining significance can be found in the Significant Wildlife Habitat Technical Guide OMNR 2000 and Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E & 6E OMNREF 2015.

Critical wildlife habitats are important for the preservation of biodiversity and for supporting the ecosystems of many species. For example, many of the City's Woodlands provide ephemeral pools as potential habitats for amphibians and reptiles. Across the 36 Managed Woodlands, there are over 40 species of trees which provide food sources and shelter for many wildlife species. About half of the species of trees are important sources of edible fruit and nuts for wildlife. In the City's forests the most common species producing larger seeds and nuts that serve as food are ironwood, American beech, red oak, shagbark and bitternut hickories, American basswood, black cherry, bur oak, white oak, black walnut, and butternut, in decreasing order of abundance. These species account for almost (47%) half of the trees in the WMP properties.

The City of Mississauga is home to one of the longest-running urban natural areas inventories in Canada, having started in the late 1990s. This inventory has enabled the City to track the number and diversity of wildlife species in its Woodlands, and in conjunction with staff observations and volunteer documented observations from iNaturalist.org, the City has identified over 376 species of wildlife, including 17 reptiles and amphibians, 20 mammals, 155 bird and 734 plant species.

At the stand level, cavity trees, fallen trees, and snags (dead standing trees) provide wildlife with shelter and food. The current forest density offers, on average, 3 cavity trees, 41 snags, and 135 logs per hectare. The abundance and condition of these features indicate the quality of the wildlife habitat, with older forests typically boasting greater diversity and more habitat features.

4.2.5 Significant Wetlands

Non-forested wetlands make up around 1% of the City's WMP properties, while pockets of seasonally flooded areas are scattered throughout the City's woodlands. The provincial government has designated several of the forested wetlands in Cawthra Woods as Provincially Significant Wetlands due to their importance as habitat for the endangered Jefferson Salamander. These

wetlands combined with other environmental attributes have resulted in all but two woodland properties (Dixie Woods, Cedarbrae Park) to be designated as Significant Natural Areas (Mississauga a. 2022), and three of the properties are designated by local Conservation Authorities and the Provincial Government as Environmentally Significant Areas (ESA) (Deer Wood, Britannia Woods Community Forest, Cawthra Park). ESAs are areas where ecosystem functions or features warrant special protection (Mississauga b. 2022).

4.2.6 Species at Risk

More than 200 species of plants and animals are currently designated as 'At Risk' within Ontario's Endangered Species Act, thirty-one of which may be found within the City's WMP Woodlands. A search of the Natural Heritage Information Centre (NHIC), iNaturalist.org and the City's Natural Areas Survey databases was carried out in January 2023 to determine which species at risk have been observed within or near the 36 Managed Woodlands. The search returned twelve endangered species, twelve threatened species, and seven species of special concern species. It is likely that additional discoveries of flora and fauna that have been made in other woodlands throughout the City have not yet been documented at the properties covered by this Woodland Management Plan. Some of these findings may have only been made by chance when observers were present during the appropriate season. The rarity of such flora and fauna makes them easy to overlook. It is thus important to continue regular monitoring to ensure values are captured. Species at risk are listed in Table 2. Understanding these species at risk and their habitat requirements will help to tailor silvicultural prescriptions to conserve the species and address any necessary protection measures.

Table 2 Species at Risk that may occur in Mississauga's managed woodlands
Sources: NHIC. City of Mississauga Natural Area Study, Ministry of Natural Resources & Forests; and iNaturalist.org. Reviewed January 2023.

Species of Concern lives in the wild in Ontario, is not endangered or threatened, but may become threatened or endangered due to a combination of biological characteristics and identified threats	Threatened lives in the wild in Ontario, is not endangered, but is likely to become endangered if steps are not taken to address factors threatening it	Endangered lives in the wild in Ontario but is facing imminent extinction or extirpation
Birds • Common Nighthawk (Chordeiles minor) • Eastern Wood-pewee (Contopus virens) • Golden-winged Warbler (Vermivora chrysoptera) • Horned Grebe (Podiceps auritus) • Peregrine Falcon (Falco peregrinus) • Wood Thrush (Hylocichla mustelina) **Insects** • Monarch (Danaus plexippus)	**Birds** • Bank Swallow (Riparia riparia) • Barn Swallow (Hirundo rustica) • Bobolink (Dolichonyx oryzivorus) • Canada Warbler (Cardellina canadensis) • Chimney Swift (Chaetura pelagica) • Eastern Meadowlark (Sturnella magna) • Least Bittern (Ixobrychus exilis) **Reptiles** • Blanding's Turtle (Emydoidea blandingii) • Eastern Musk Turtle (Sternotherus odoratus) • Eastern Ribbonsnake (Thamnophis sauritus) • Northern Map Turtle (Graptemys geographica) • Snapping Turtle (Chelydra serpentina)	**Birds** • Henslow's Sparrow (Ammodramus henslowii) • Northern Bobwhite (Colinus virginianus) • Prothonotary Warbler (Protonotaria citrea) • Red-headed Woodpecker (Melanerpes erythrocephalus) • Yellow-breasted Chat (Icteria virens) **Plants** • American Chestnut (Castanea dentata) • Black Ash (Fraxinus nigra) • Butternut (Juglans cinerea) • Red Mulberry (Morus rubra) **Amphibians** • Jefferson Salamander (Ambystoma jeffersonianum) **Fish** • Lake Sturgeon (Great Lakes - Upper St. Lawrence River population) (Acipenser fulvescens) • Redside Dace (Clinostomus elongatus)

4.2.7 Areas of Natural & Scientific Interest

ANSI's (Areas of Natural and Scientific Interest) are areas that represent lands and waters containing important natural landscapes or features that are important for natural heritage, protection, appreciation, scientific study, or education. One Regionally Significant Area of Natural and Scientific Interest is located at Cawthra Woods. A Provincially Significant ANSI is one for which the site's representative natural features or landscapes are amongst the "best examples" of that feature in the province. Regionally Significant ANSIs are the “next best” natural areas that also meet the evaluation criteria. There are no other ANSIs in the City’s WMP at this time.

4.2.8 High Conservation Values

High Conservation Values (HCV) are defined as woodland values of outstanding and critical importance because of their high cultural, environmental, biodiversity, or landscape values. The identification and evaluation of high conservation value woodlands is often best undertaken after other natural heritage features have been identified (OMNR 2010). High conservation value woodlands may include intact forests with ‘old growth’ features, wetlands, riparian areas, and areas with high concentrations of rare, threatened, or endangered species.

The City of Mississauga’s Certified Woodlands contain a diverse array of forest communities and ecosystems. Some of these woodlands boast a variety of mature trees, habitat features, and ecologically significant functions and features, as well as species at risk. In some cases, these woodlands also possess provincially or regionally significant attributes.

Within HCV woodlands, active management should be limited to those activities that will protect or enhance the unique features of the woodland, and natural ecological functions should prevail as the agents of change (e.g., windthrow, natural succession). Active management might include controlling non-native invasive plants, felling hazard trees, and protecting the forest from fire and exotic forest pests. High Conservation Values identified in all other WMP properties will be considered in the planning stages to maintain them.

A preliminary evaluation of the City's Certified Woodlands to determine their high conservation values (HCV) has identified eight properties as having significant HCV (Table 3). Forest ecosystems are dynamic, and change is inevitable due to natural or human-induced disturbances. Thus, the location and extent of HCV within Mississauga’s woodlands are likely to vary over time, as some areas no longer meet the criteria while new areas achieve HCV status. To ensure an up-to-date listing of HCV properties, ongoing evaluations will be conducted.



Table 3. City of Mississauga High Conservation Value Woodlands based on preliminary assessment

Woodland	HCV category	Area (ha)	Significant Values
Cawthra Woods	1	25.65	Regionally Significant Area of Natural and Scientific Interest (ANSI) Confirmed habitat for Species at Risk (e.g., Jefferson salamander [Endangered])
Harding Waterfront Estate	1 , 3	15.1	Mixed conifer woodland along shoreline of L. Ontario, unique among Mississauga woodlands Critical stopover for migrating birds
Britannia Woods Community Forest	1	12.68	Critical stopover for migrating birds
Marco Muzzo Senior Memorial Woods & Park	1	13.91	Critical stopover for migrating birds
Painters Green	1	1.68	Butternut [Endangered]
Mary Fix	1	2.11	American chestnut [Endangered]
Birchwood Park	1	9.09	Butternut [Endangered]
Erin Woods	1	18.41	Critical stopover for migrating birds
Total		**98.63**	

HCV category 1: Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values.
HCV category 3: Forest areas that are in or contain rare, threatened or endangered ecosystems.

4.3 Forest Inventory

4.3.1 Vegetation Communities

A forest inventory is a fundamental tool for assessing the current state of a forest. The forest resources of the City's WMP woodlands were inventoried by Silv-Econ Ltd in 2022 to support development of this management plan. The City's WMP properties encompass a combined area of 207.3 hectares, composed of 202 hectares of forested land and about 5 hectares of non-forested wetlands and meadows (see Table 4). The forest inventory is divided into six forest types based on their dominant species: oak, maple, plantation, hickory, elm and willow, and walnut (Figure 2). These forests are further categorized into 21 Ecological Land Classification units based on their species composition and site conditions. The oak forests are typically growing on soils that are imperfectly drained, and the maple and plantation forests on soils with better drainage.

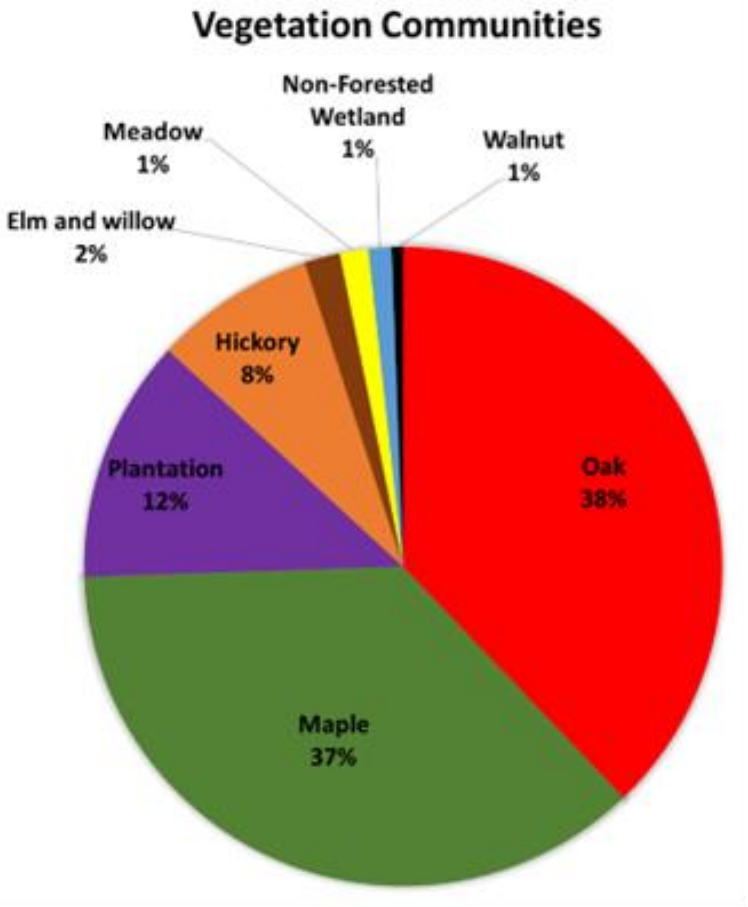


Figure 2 Forest Communities as a Percent of Total Forested Area

Table 4: Area by Forest Community / Land Class

Forest Community / Land Class[1]	Area (ha)	% of Total
Oak	79	38.0%
Fresh - Moist Oak - Sugar Maple Deciduous Forest Type	44.3	21.4%
Fresh - Moist Red Oak - Sugar Maple Deciduous Forest Type	13.4	6.5%
Fresh - Moist Oak - Maple Deciduous Forest Type	9.9	4.8%
Dry - Fresh Oak Hardwood Deciduous Forest Type	7.8	3.8%
Fresh - Moist Bur Oak Deciduous Forest Type	1.7	0.8%
Fresh - Moist - Bur Oak Deciduous Forest	1.6	0.8%
Maple	76	36.4%
Dry - Fresh Sugar Maple - Beech Deciduous Forest Type	36.5	17.6%
Dry - Fresh Sugar Maple - Oak Deciduous Forest Type	21.4	10.3%
Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type	8.7	4.2%
Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type	4.9	2.4%
Dry - Fresh Sugar Maple - Hickory Deciduous Forest Type	2.6	1.2%
Dry - Fresh Sugar Maple - Ironwood Deciduous Forest Type	1.5	0.7%
Plantation	26	12.4%
Mixed Plantation	19.2	9.3%
White Pine Coniferous Plantation Type	5.2	2.5%
Deciduous Plantation	1.2	0.6%
Hickory	17	8.2%
Fresh - Moist Shagbark Hickory Deciduous Forest Type	17.0	8.2%
Elm and willow	4	1.8%
Fresh - Moist White Elm Lowland Deciduous Forest	2.8	1.3%
Fresh - Moist Willow Lowland Deciduous Forest Type	1.0	0.5%
Walnut	1	0.6%
Fresh Moist - Black Walnut Lowland Deciduous Forest Type	1.2	0.6%
Wetland	2.4	1.2%
Meadow	3.0	1.4%
Total	**207.3**	**100**

[1]Source: 2022 City of Mississauga Forest Inventory.

4.3.2 Description of Forest Communities

The following is a general description of the six forest types found across the 36 WMP properties.

Oak

Oak dominated woodlands are some of the most diverse in the City, boasting 32 species of trees. These forests, ranging in age from 80 to 130 years, have the highest density of trees and saplings and boast a good diversity of tree regeneration - including native species like sugar maple and black cherry. However, the lack of oak species in the regeneration layer, coupled with a relatively intact canopy and shady understory, poses a problem for sustaining this oak forest type. Without silvicultural intervention, Mississauga's oak-dominated forests will naturally revert to a maple dominated forest in the coming decades. Although invasive non-native species are numerous, most coexist with native vegetation, and the oak-dominated woodlands have the highest abundance of habitat features like mast (nuts for wildlife forage), woody debris and snags, as well as a good amount of cavity trees, similar to the maple forest type. The soil is clay-loam with drainage varying from well to imperfectly drained depending on the topography. Conservation of this forest type will require targeted and specialized management to ensure the oak canopy is sustained.

Maple

The sugar maple dominated forests are home to an array of tree species including American beech, black cherry, red oak, and the endangered Butternut tree. Growing on a variety of soil textures from clay to sand, these forests are typically found in more well-drained soils. Home to over 27 tree species, this forest type is the most diverse, second to the oak forest type. An occasional ephemeral pool is present and provides breeding habitat for amphibians. Trees in this forest type range in age from 90 to 150 years, although trees of all ages can be found as a result of past storm damage and silvicultural thinning events that created canopy gaps. The overstory is generally intact with a shady understory, and the overstory is very well-structured with a proportional number of trees in all size classes. Tree regeneration amongst saplings and seedlings is abundant and diverse, offering good sustainability to maintain the diversity seen today. European buckthorn is generally not a significant competitor to desired tree regeneration in this forest type, partly a result of the City's efforts to control buckthorn, however it should not be overlooked as it could become problematic should any canopy gaps be created.

Plantation

Plantations found in the City's WMP properties boast an impressive age structure, ranging from newly planted to over 70 years. The White Pine at Painters Green is believed to have been planted as far back as the late 1800s, making them some of the oldest planted trees in the City. White pine is the most common species found in the plantations along with over 18 other species both natural and planted,



making them incredibly diverse ecosystems. The younger age classes of trees in the plantations make them some of the healthiest among the forest types. These forests are often supported on sandy-to-sandy loam soils and are typically well drained. Unfortunately, European buckthorn is a dominant species in the regeneration layer, which has few desirable species. The plantations also lack habitat features such as shrubs, cavity trees, wood debris, and snags. Despite this, there are some canopy gaps that offer opportunities to promote sustainability of the forest.

Hickory

Shagbark hickory, a species which reaches its northern limit in Mississauga's woodlands and is the dominant canopy in a few areas on several properties. While its associates such as Sugar maple and Bur, Red, and White oak may be less abundant, scattered specimens of Apple, Basswood, Black cherry, Elm, Hawthorn, Bitternut hickory, Ironwood, White pine, and Willow can still be found on these clay loam sites. These woodlands, which are typically around 80 years old, have been overrun by the invasive European buckthorn, which makes up over 80% of the regenerating trees. In an effort to restore the forest and remove the buckthorn, the City has been focused on tackling this issue through its invasive species removal and tree planting program. These forests are well structured, with a good balance of small, medium, and large-sized trees which is desirable for wildlife. However, there is room for improvement; there are some scattered wood debris to benefit soil development and provide habitat for specialized plants, but cavity trees and standing dead trees are lacking. In addition, canopy gaps need to be created to promote growth in desired tree regeneration.

Elm and Willow

The lush woodlands of Elm, Willow, Manitoba maple and Silver maple form the dominant trees of this forest type. Other minor species such as Apple, Ash, Sugar maple, Red and White oak, Trembling aspen, White pine, and Buckthorn also inhabit this area, which is typically located in floodplain or poorly drained areas. These woodlands are typically middle aged, around 50-year-old, and are full of canopy gaps. Regeneration is heavily dominated by Buckthorn and Ash, with few other species present. European honeysuckle is also a rampant invader in this habitat, and invasive species control and restoration planting are necessary to preserve the natural balance of this forest type. Additionally, coarse woody debris and cavity trees are notably absent, although there are scattered dead standing trees. Most of the trees in this forest type are in the pole size class (1O-24cm DBH).

Walnut

Cedarbrae Park woodland is home to a unique stand of Black walnut, estimated to be around 80 years old. The canopy is intact, with a mix of six species, including Sugar maple, Norway maple, Black cherry, Elm, Manitoba maple and Bur oak - though the trees are of lesser quality, with numerous major defects such as decay. Despite this many large trees dominate the forest. Tree regeneration is lacking and

consists mostly of Ash and a moderate amount of raspberry. Growing on an imperfectly drained, clay loam site, this forest type is unique in comparison to many of the City's forest types, as it is relatively free of buckthorn and instead has a heavy presence of garlic mustard. There is also an abundance of cavity trees for wildlife nesting, denning and escape, and there is a good amount of wood debris for soil development. Standing dead trees are generally lacking.



4.3.3 Forest Age Distribution

The City's Certified Woodlands are heavily weighted to old age, with most of the area in the 81-120-year age classes (Figure 3; Map 3). This is a common feature of the forests in southern Ontario and is the result of land settlement and logging practices that took place in the late 1800s and early 1900s. Younger forests tend to be a result of planting efforts. Through sustainable management strategies, the age class distribution is expected to become more regulated and evenly distributed over time.

The old age of the forest has led to an abundance of wildlife habitat. Not only do older forests contain more snags (wildlife trees), cavity trees, and wood debris than younger forests, but they also have some imposing tree specimens, some of which have been standing for hundreds of years. Exploring these old forests on official trails is a unique experience offered to City residents, as it gives insight into the history and evolution of the natural heritage in Mississauga.

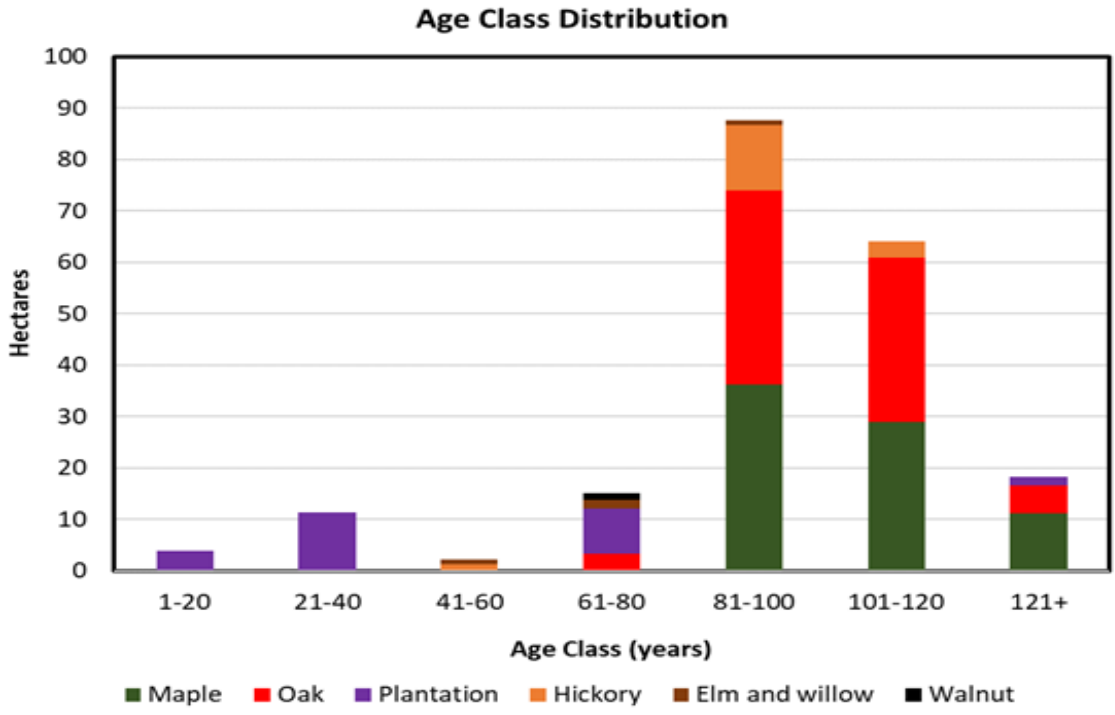
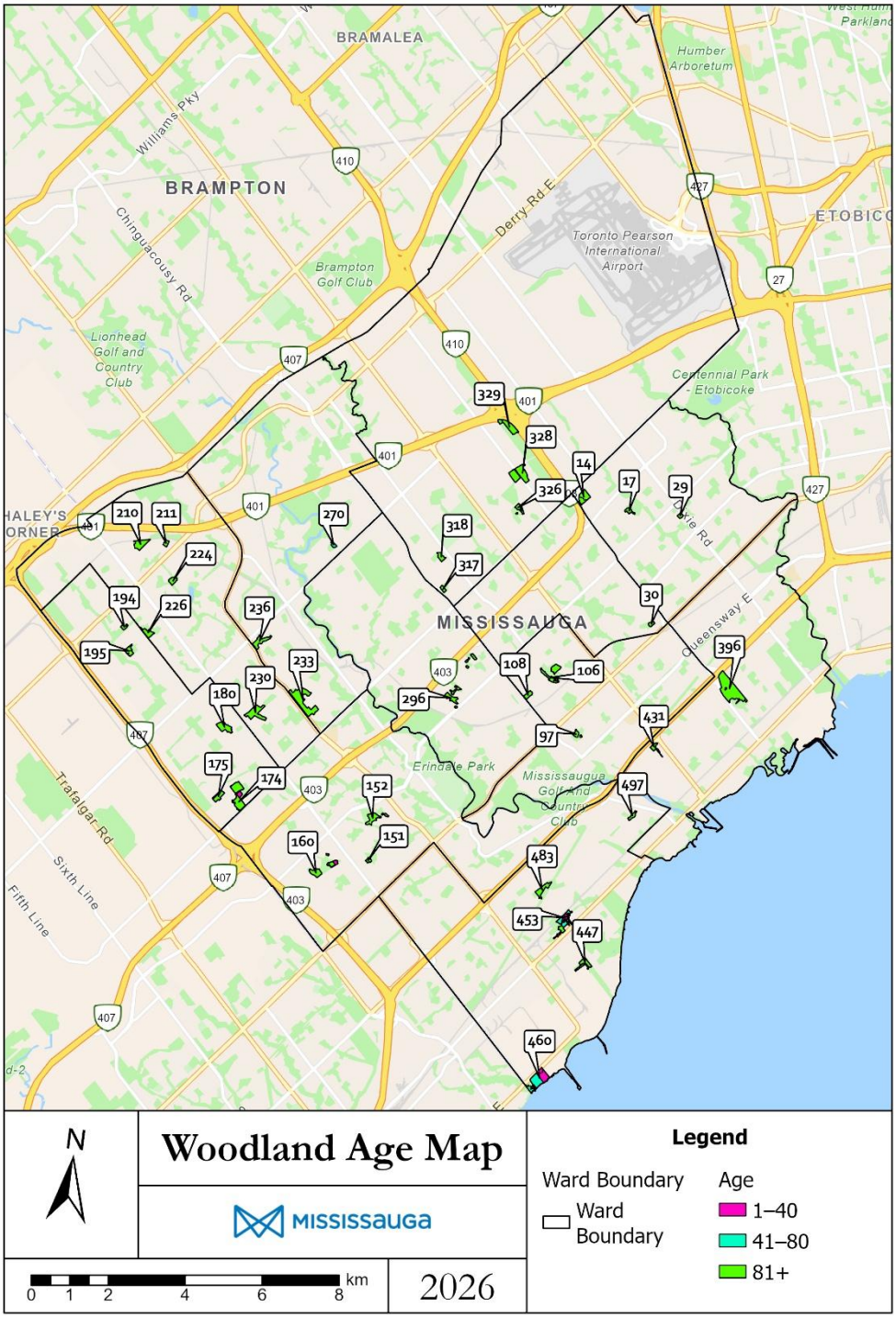


Figure 3 Age class distribution of the City's managed forests


BRAMALEA
BRAMPTON
MISSISSAUGA
ETOBICO
Humber Arboretum
Toronto Pearson International Airport
Brampton Golf Club
Lionhead Golf and Country Club
Centennial Park - Etobicoke
Erindale Park
Mississaugua Golf And Country Club
Williams Pky
Chinguacousy Rd
Derry Rd E
Clarkway Dr
Queensway E
Trafalgar Rd
Sixth Line
Fifth Line
HALEY'S ORNER
N
Woodland Age Map
MISSISSAUGA
km
0 1 2 4 6 8
2026
Legend
Ward Boundary
Ward Boundary
Age
1–40
41–80
81+

Map 3

4.4 Forest Health

A healthy forest is one that can provide all the services necessary to support its ecosystem. A variety of criteria is used to determine the health of a woodland. Four criteria are used in this management plan (Table 5) and measured as part of the forest inventory;

1. Overstory quality,
2. Dead tree abundance,
3. Abundance of desirable tree regeneration, and;
4. Abundance of invasive plants

The criteria can be tracked over time through updates to the forest inventory and can be used to help prioritize woodlands for management including activities such as hazard removals, invasive species control and tree renewal efforts. There are other attributes that could be incorporated into a forest health analysis, such as biological diversity measures, or number of trees having nesting holes for birds, however for the purposes of this plan, the selected attributes were best able to help prioritize woodlands for key management activities.

A summary of the health condition among all 36 Certified woodlands is illustrated in Figure 4 and Map 4. These results are based on the average condition rating among the four criteria. A description of the forest health metrics is summarized in Figure 5. By assessing these four criteria, the health of a forest can be tracked over time, and management interventions can be prioritized to improve the health of the forest.

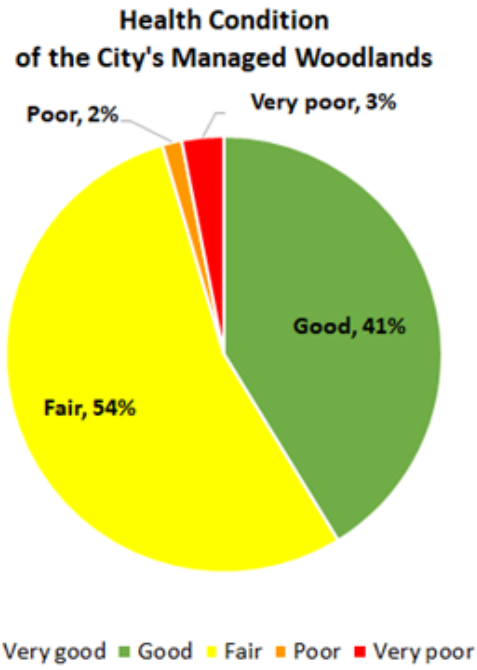
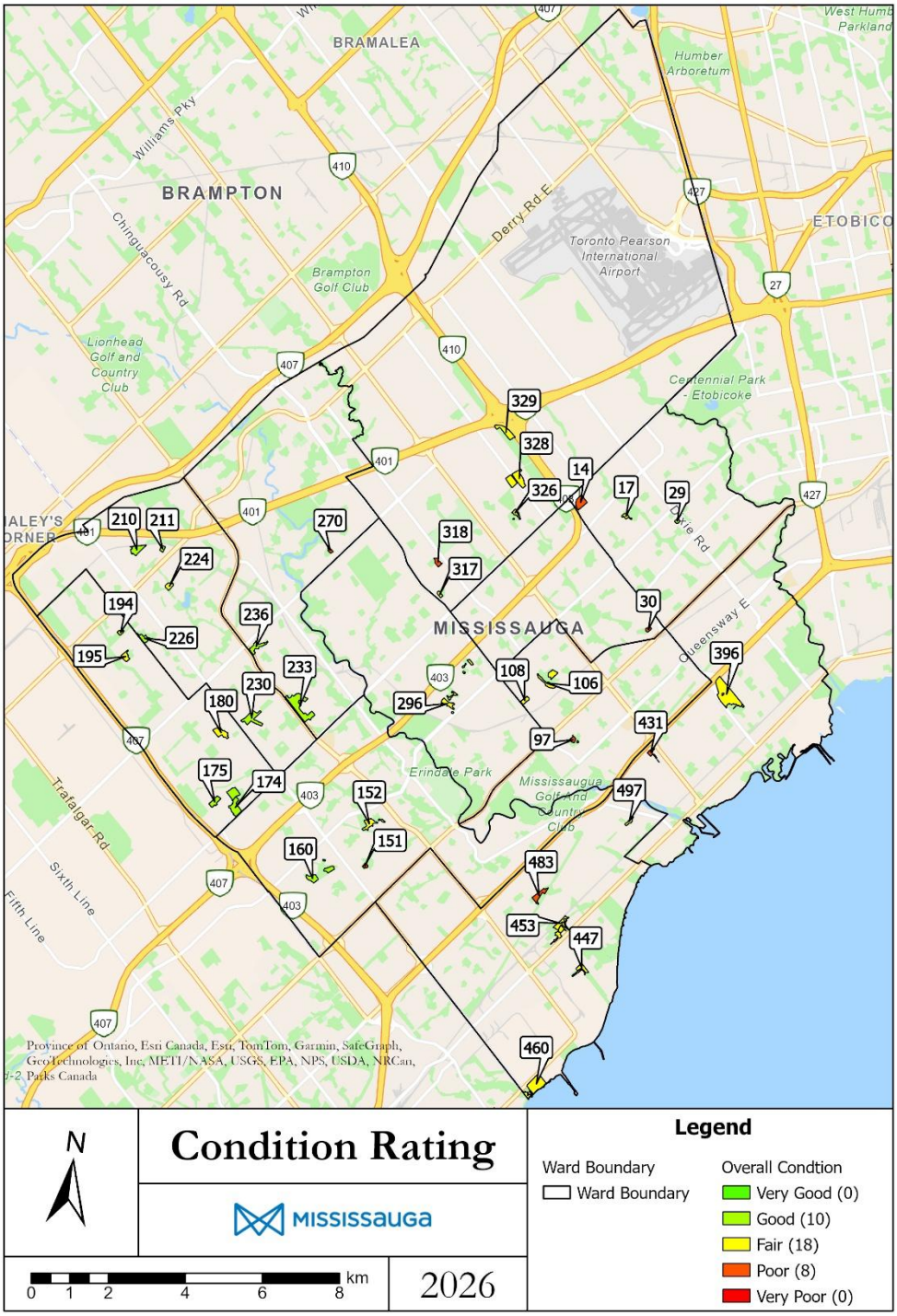


Figure 4 Health condition of the City's managed woodlands.

Table 5: Woodland health condition rating criteria.

Condition & Grade	Overstory quality (% AGS[1])	Dead tree abundance (% of trees that are dead)	Abundance of desirable tree regeneration[2]	Abundance of invasive plant species
1 - Very Good	≥90% AGS	≤10%	>4000 stems/ha	None present
2 - Good	80-89% AGS	11-19%	2000-3999 stems/ha	Few (patches<4m^2-2x2m)
3 - Fair	70-79% AGS	20-29%	1000-1999 stems/ha	Some (patches<25m^2-5x5m)
4 - Poor	50-69% AGS	30-39%	500-999 stems/ha	Many (patches<25-100m^2-10x10m)
5 - Very Poor	<50% AGS	≥40%	<500 stems/ha	Heavy (patches>100m^2->10x10m)

1. AGS = Acceptable Growing Stock (trees have few to no defects such as trunk rot and crown dieback)
2. Refer to the City's Woodland Regeneration Standards.


BRAMALEA
BRAMPTON
MISSISSAUGA
ETOBICO
Humber Arboretum
Toronto Pearson International Airport
Brampton Golf Club
Lionhead Golf and Country Club
Centennial Park - Etobicoke
Erindale Park
Mississauga Golf And Country Club
Williams Pky
Chinguacousy Rd
Derry Rd E
Trafalgar Rd
Sixth Line
Fifth Line
Queensway E
Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, NRCan, Parks Canada
N
Condition Rating
MISSISSAUGA
km
0 1 2 4 6 8
2026
Legend
Ward Boundary
Ward Boundary
Overall Condtion
Very Good (0)
Good (10)
Fair (18)
Poor (8)
Very Poor (0)

Map 4

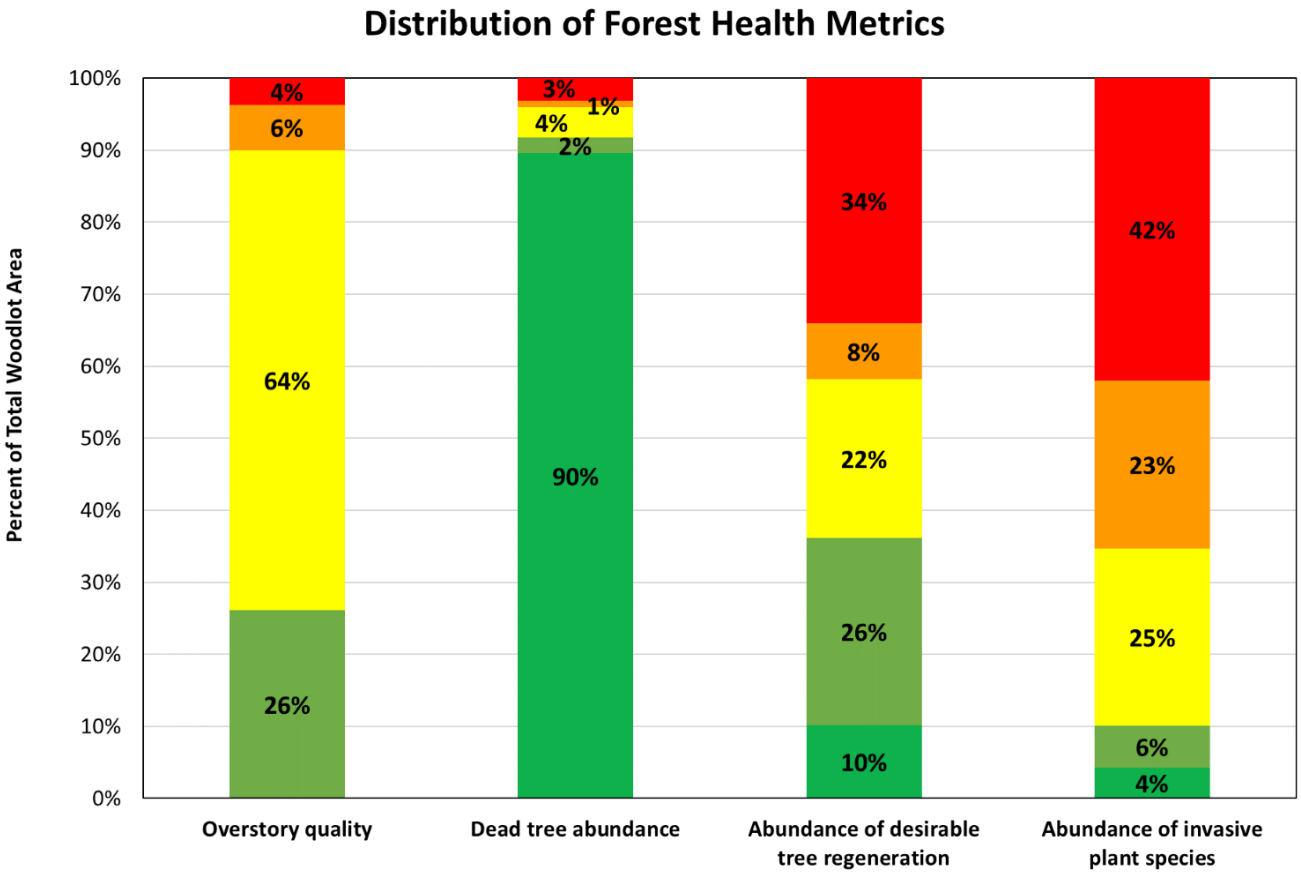


Figure 5 Distribution of forest health metrics among the City's managed woodlands

The over story quality allows for potential improvement in this category through selection management. Although snags are well represented in most woodlands there needs to be a more concentrated effort to retain larger diameter snags to allow for improved wildlife features. There is an issue with both forest regeneration and invasive non-native species, as more than half the woodlands have a heavy abundance of invasives and a low.

4.4.1 Threats

Over the next 10 years, the City's Certified Woodlands will face numerous forest health threats and challenges. Some of these threats are well-known today (e.g. warmer climates, increase in extreme weather events, further habitat loss from expansions and encroachments, and invasive non-native species) and efforts at managing them are under way such as invasive non-native species management and tree protection measures. Other threats are emerging, and some lie entirely in the future. All will need to be assessed and mitigated appropriately to the extent possible over the life of this plan. A healthy forest will ensure resilience to changes in weather (e.g. temperature, and precipitation levels) and help hasten recovery from extreme events, will help with recovery from new species of insects and diseases that appear on the landscape, and will better provide societal benefits such as clean water, flood mitigation, air quality improvement and reduction in heat island effects. Establishing issue specific management plans may be required on an as needed basis.

4.4.1.1 A Changing Climate

Forests are dynamic ecosystems that are greatly impacted by climate and the environment around them. In the future, climate change is expected to result in warmer and less predictable weather, with more severe weather events and anomalies, such as sudden heat or frost in the spring. These changes will affect the variety of tree species, as well as their health and the structure of the forest. Additionally, the length, frequency, and severity of droughts will likely increase, leading to greater stress on trees and potentially causing the spread of disease and insects. It is important for us to be aware of the effects of climate change on forests so that we can take appropriate steps to protect them.

Climatically suitable habitats for most species are anticipated to shift northward and to higher elevations, but the actual movement of the species they support is expected to lag (McKenney et al. 2007). Some scientists propose assisting this migration by moving plants or seeds to emerging habitats sooner than would happen naturally. In the case of the City's Certified Woodlands, for example, this might mean planting a greater diversity of species and more southerly species as Sycamore (Platanus occidentalis), Sassafras (Sassafras albidum) and Tulip Tree (Liriodendron tulipifera) in suitable locations, which the City has already started proactively doing. Additionally, more frequent maintenance of risk trees may be required as well as targeted silvicultural activities to ensure a sustainable forest.

4.4.1.2 Non-Native Invasive Plants

Non-native invasive plants can quickly take over a forest site, crowding out native flora and often inhibiting establishment and growth of tree regeneration, which will affect the sustainability of the forest. A thorough assessment of invasive plants was completed through the forest inventory and through the City's monitoring programs



(Invasive Species Management Plan and Implementation Strategy) to identify problematic plants and priority areas for control. Table 6 lists the species, their average abundance and distribution among the woodlands. Control measures provide the greatest gains when directed to where forest tree regeneration would benefit from removal of invasive species, locations where removal would have a high likelihood of stopping spread, and where the plants threaten public safety.

Table 6: Invasive plant species found in the City's Certified woodlands. Details of these and other invasive plant species are provided at the Invasive Species Centre website and on other internet sites.

Species	Average Abundance	% of Managed Woodlands
Trees		
European buckthorn (Rhamnus cathartica)	Some	75%
Manitoba maple (Acer negundo)	Some	58%
Norway maple (Acer platanoides)	Some	11%
White mulberry (Morus alba)	Some	6%
Tree of Heaven (Ailanthus altissima)	Few	6%
Shrubs		
Honeysuckle (Lonicera spp.)	Some	42%
Spindletree (Euonymus europaeus)	Some	28%
Ground vegetation		
Garlic mustard (Alliaria petiolata)	Some	44%
Dog strangling vine (Cynanchum rossicum)	Some	25%
Goutweed (Aegopodium podagraria)	Many	6%
Phragmites (Phragmites australis)	Some	3%
Japanese knotweed (Fallopia japonica)	Many	3%
Periwinkle (Vinca minor)	Heavy	3%

4.4.1.3 Pathogens

Healthy ecosystems contain pathogens that are essential to the cycle of growth and decay, helping to ensure the ecosystem remains in balance. However, some of these pathogens can be damaging to woodlands, reducing biodiversity, and disrupting the delicate balance of the ecosystem by attacking species important to wildlife as food sources, and potentially endangering the animals that inhabit infected trees. By reducing the number of faunal predators, prey and other species, the delicate balance between them can be thrown off, resulting in further negative consequences for the health and sustainability of the woodlands. Table 7 lists the introduced pathogen species that are present and emerging threats. Management will adhere to best practices as they are developed.

Table 7: Invasive pathogens found within the City's Certified Woodlands, including those not yet present but should be monitored for. Details of these and other invasive pathogens are provided at the Invasive Species Centre website and on other internet sites.

Pathogen	Tree Species Impacted
Butternut canker (Sirococcus clavigignenti-juglandacearum)	Butternut
Beech bark disease (Nectria coccinea var. faginata)	American beech
Beech leaf disease (Anguinidae)	American beech
Oak wilt (Ceratocystis fagacearum)	All oak species – emerging threat
Thousand canker disease (Geosmithia morbida)	Black walnut

4.4.1.4 Non-Native Insects

Managing invasive non-native insects in the City's Certified Woodlands is of utmost importance given their ability to cause extensive damage. These insects often have fewer or no natural enemies or pathogens to limit their spread and the host plants may have no natural resistance. Examples of invasive non-native insects that have become prominent in woodlands through the City in recent years include the spongy moth and emerald ash borer (EAB). Details of these and others that should be on the lookout are listed in Table 8 and further described in the City's Invasive Species Management Plan and at the Invasive Species Centre website and on other internet sites.

If left unchecked, these insects can cause irreparable damage to woodlands. The following preventive and proactive measures are effective in managing these insects, and therefore protecting woodlands from their adverse impacts.

Table 8: List of non-native invasive insects that are found within the City's woodlands, including those not yet present but should be monitored for. Details of these and other non-native invasive insects are provided at the Invasive Species Centre website and on other internet sites.

Insect species	Tree species impacted
Spongy Moth (Lymantria dispar dispar)	Red oak, White oak, American beech, sugar maple, white ash, red maple, American elm, white pine, white spruce, and others.
Emerald Ash Borer (Agrilus planipennis)	All Ash species
Asian Longhorned Beetle (Anoplophora glabripennis)	maple, poplar, birch, willow, elms
Southern Pine Beetle (Dendroctonus frontalis)	All pine species
Hemlock Eoolly Adelgid (Adelges tsugae)	Eastern hemlock
Spotted Lantern Fly (Lycorma delicatula)	apple, cherry, plum, maples, birch

4.4.1.5 Fire

Species composition, canopy cover, ecological moisture regimes (wet, dry sites) and exposure all influence the moisture characteristics of forest fuel complexes and fire behaviour. Other factors that affect fire behaviour are stand age, height, and species composition of the understory. In general terms, deciduous forests have a low fire risk, conifer dominated forests have a high fire risk. Since most of the trees in the City's managed woodlands are deciduous, fire risk is considered low.

Despite this, there have been numerous small fires set by unsanctioned use including gatherings or encampments. Quick responses from Mississauga Fire and Emergency Services (MFES) have been able to address these fires.



5. Current Uses of Woodlands

5.1 Overview

The City of Mississauga's Certified Woodlands provide a range of recreational, environmental, and ecological services to residents and visitors; from outdoor recreation such as dog walking, hiking, and exercising, to moderating local climates, increasing air quality, capturing rainwater, and storing carbon. These woodlands serve as a refuge for trees that existed when the City was at its earliest stages of development, and they are also home to numerous species at risk. Though the uses of these woodlands have changed over time, maintaining these areas for the public's benefit, and sustaining the forest canopy and its wildlife habitat will be at the forefront of priorities.

5.2 Resource-Based Uses

The 36 woodlands represented in this plan have been managed with a focus on sustainability. Tree removals have generally been focused on hazards in residential areas, and the felled trees are often left in the woods to provide habitat and aid soil development. On the rare occasion that trees are harvested, it is done so sustainably, with the goal of promoting forest regeneration and health. While economic returns are a potential outcome of these initiatives, the most important goal is to ensure the forest's overall health and vitality. By continuing to implement sound silvicultural practices, the City can maximize the environmental value of its forests. The increasing demand for carbon offset markets in urban areas may create potential avenues for generating revenue from forested landscapes in the future.

5.3 Recreational Uses

The 36 woodlands within the management plan vary in terms of accessibility and safety for public use. Some woodlands, such as Cawthra Woods, are well used for passive recreation such as walking/hiking, nature appreciation, exercising, and leash-on dog walking, due to the presence of paved trails and park access. However, many of the 36 properties do not have trails and are currently not suitable or accessible for public use for a variety of other reasons. For example, the 6.5-hectare Oak-Maple deciduous forest located at Eglinton Avenue East and Tomken Road is not well used due to several factors: large distance from residential areas, difficult access through an unopened easement, numerous hazards such as dead and fallen ash trees, and thick understory of invasive buckthorn. Improvements to the safety and accessibility of the managed woodlands can result in valuable recreational amenity for the local community.

Non-permitted activities include the use of unauthorized vehicles, camping, feeding wildlife, hunting, fires and the collection of plants or animals. There are opportunities to enhance signage to clearly denote City ownership, contact information, rules of the forest, permitted and non-permitted uses, as



well as a helpful map outlining property boundaries.

Approximately 13 km of access trails have been established for recreational purposes in the WMP properties, ranging from paved to unpaved. These trails are also used for forestry operations, mapped, and shown on compartment maps. City staff maintain many trails regularly, but an assessment of their condition and associated infrastructure (e.g., culverts, signs, gates) is recommended. This would provide a comprehensive understanding of the condition of the trails, and identify and address any necessary repairs or replacements, with appropriate budgets.



6. Past Forest Management Operations

Forest management embodies a suite of activities including administration and planning, monitoring, forest inventories, and silvicultural management such as stand improvement thinning, tending to control competing vegetation, and understory planting to restore regeneration where it is lacking.

Although a detailed accounting of distant past activities has not been done, management of the forested properties in recent years has included a comprehensive City- wide woodland risk tree inventory. This work was undertaken in 2022, where trees were prioritized for risk management following ISA TRAQ standards (modified) with the intent to be systematically mitigated over time as operations allow. Other work completed include cutting and control of invasive species such as European buckthorn to make space for desirable tree regeneration, and planting of tree seedlings and saplings to restore forest cover. In the future, management activities will be documented to note property and activity type as well as expenditures and revenues.

Regular monitoring will help determine if the City is achieving the objectives set out in the management plan. Examples of monitoring activities include:

- Regular forest health monitoring for invasive non-native plant species and problematic insects.
- Inspections to support preparation of silvicultural prescriptions.
- Inspections for wildlife habitat values and species at risk during tree marking and establishing protection zones.
- Regular inspections of silvicultural operations.
- Regular inspections to identify hazards adjacent to neighboring properties, roadways, and trails.



7. Ecological Foundations of Forest Management

The City of Mississauga manages a relatively small extent of what would have been a region-wide forest less than 200 years ago. Over time, these extensive forests have become fragmented and disconnected from each other to the current narrow scope of woodlands that are managed within Mississauga. When these woodlands were an interconnected landscape, they would have been influenced by areas of loss and natural deforestation, and periods of forest renewal. Some of these forces would include disturbance patterns caused by Indigenous peoples traditional practices. These natural processes caused by disease, storm, fire and anthropogenic would have provided a complex matrix of diverse forest age stands. The degree to which forest planting and subsequent management emulates the structural complexity, variability, and key features of natural regeneration through the forestry cycle determines the diversity and composition of the biotic community at stand and landscape levels (Franklin et al., 2002; Hansen et al., 1991; Spence et al., 1999).

Today, in a vastly shrunk and fragmented woodland complex, the City's aim is to conserve and promote diverse and resilient woodlands across the City. To do so, the City must minimize the risk of a natural loss such as fire. With smaller, isolated woodlands, these natural processes threaten entire woodland areas, or the removal of a species from a woodland property. To maintain species diversity, a healthy forest that is resilient to climate change, requires natural processes of loss and regrowth. These processes can be emulated through silvicultural management such as stand improvement thinning, understory planting with native species, and controlling invasive non-native plants. In addition, managing visitor and adjacent landowner use of these woodlands will need to be addressed to ensure long-term forest health.

7.1 Sustainable Forest Management

Sustainable forest management aims to maintain and enhance the environmental, social, and economic values of forests for the benefit of present and future generations. It involves conserving biodiversity and protecting forest health, while ensuring the procurement of wood-based products and ecosystem services (Natural Resources Canada 2022). The City of Mississauga woodlands are managed under the paradigms and guiding principles of sustainable forest management.

Maintaining forests sustainably requires a science-based methodology for assessment, decision-making and management planning, and requires a re-evaluation of methods with scientific advancements and changing environmental conditions. Laws, regulations, and policies are in place to promote sustainable management practices in all

provinces. Registered Professional Foresters and other forestry professionals are responsible for ensuring that these high standards are implemented in individual forests. It is these approaches that define international standards such as the Forest Stewardship Council (FSC) or Sustainable Forest Initiative (SFI) certification standards for forest management.

All City of Mississauga's woodland management activities will meet or exceed any applicable, generally accepted standards of sustainable forest management, as outlined in the MNRF's "A Silvicultural Guide to Managing Southern Ontario Forests", Natural Resources Canada's "State of Canada's Forests" and Forest Stewardship Councils "Principles and Criteria" for well-managed forests. This form of management maintains and enhances the long-term health of the forest ecosystem for present and future generations. It is the tool with which the City will manage its forests to improve their overall health.

7.2 Forests Having Old Growth Features & Interior Forest Habitat

Forest cover expansion is key to meeting nationally recognized standards to support healthy ecosystems; however, the quality of the forest is also critical, which is determined by the presence of forests with old growth features and interior forest habitat.

Old Growth is a term often used in forestry but has an indistinct meaning. The MNRF characterizes old growth features as high turnover of overstory trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris (2015). This provides a wealth of microhabitats for insects and wildlife. In the City of Mississauga, forests that contain old growth features are more likely to be 80 or more years old.

Interior Forest Habitat is the inner area of a forest that is at least 100 meters in from the forest edge (MNR 2005). Interior forests have a unique and rich biodiversity and is home to sensitive species that avoid the more disturbed edge environments and areas with high human usage. These areas have become increasingly rare as forests have become fragmented – smaller pockets of woodland may add up to a total that is more significant, but do not contain the interior habitat relied on by many species. About 3% (6.26 ha) of the City's Certified Woodlands is interior habitat, and is distributed across five properties including Cawthra Park, Harding Waterfront Estate, Marco Muzzo Senior Memorial Woods & Park, P-353, and Erin Woods.

Growing and enhancing the amount of forest with old growth features and interior forest habitat within the City is recommended as these criteria are a measure of the quality of the forest ecosystem being provided. The City will manage for old growth characteristics, however, given the pressures on its woodlands, it is unlikely that most of the woodlands would be considered undisturbed.



8. Strategic Direction & Recommendations

8.1 Vision

The City of Mississauga's WMP Woodlands will be a major system of City owned forested lands managed to maintain and enhance the structure and function of the forest, including ground and surface water, soils, vegetation, and wildlife, and ability to provide social and economic benefits.

The vision gives rise to three high-level goals for the plan – conserve natural heritage features and functions, community engagement and increased understanding of the woodlands' benefits, and provide opportunities for recreation – with specific objectives and actions following from each goal.

8.2 Goals, Objectives and Actions

GOAL 1: Conserve Natural Heritage Features and Functions

The City recognizes the ecological and biological importance of its WMP Woodlands and is committed to their conservation for the future. The key features and functions unique to the woodlands include,

- The Woodlands provide critical wildlife habitats including ephemeral pools which are crucial for reptiles, amphibians and insect breeding, cavity trees that are used for shelter and nesting by birds and various mammals including species at risk bats; migratory bird nesting habitat; denning and fawning habitat for larger wildlife and food sources from mast producing tree species such as American Beech, Red, White, and Bur Oak, and Shagbark and Bitternut Hickory.
- One Regionally Significant Area of Natural and Scientific Interest is located at Cawthra Woods. ANSIs are areas that represent lands and waters containing important natural landscapes or features that are important for natural heritage, protection, appreciation, scientific study, or education.

- Approximately twenty-five Species at Risk have been documented within a 1-kilometer radius of the WMP Woodlands.
- The WMP Woodlands are heavily weighted to the late seral 81-120-year age classes (Figure 3; Map 2). The old age of the forest has led to an abundance of wildlife habitat features including dead standing trees (snags), cavity trees, and coarse woody debris as well as some truly stately tree specimens, some of which have been standing for hundreds of years.

Objectives

1. Manage the woodlands to protect ecological features and improve ecosystem integrity and biodiversity, including Species at Risk
2. Implement best practices to prevent and mitigate impacts of invasive non-native species in the woodlands and restore native tree cover.
3. Manage the woodlands to increase ecological resilience and minimize the impacts of climate change.
4. Implement practices to ensure that adjacent and internal land uses do not negatively impact the woodlands.

Actions

Building on Current Initiatives

The City will continue to maintain and improve biodiversity based on the range of native species the Woodlands can support, and work to prevent the spread of non-native invasive species and address other threats. This involves developing forest management strategies that include appropriate silvicultural and other management activities. As well, plans and standard operating procedures will continue to consider the recovery of Species at Risk.

The City also intends to certify the WMP Woodlands according to Forest Stewardship Council (FSC) and/or Sustainable Forest Initiative (SFI) principles and criteria under the Eastern Ontario Model Forest (EOMF) Group Certificate. Certified forests are managed to strict standards which confirm that the forest is being managed in a way that preserves biological diversity and benefits the lives of local people and workers, consistent with International standards for well managed forests.

New Actions

As well as continuing current initiatives, the City will:

- Build upon the City's Climate Change Action Plan to assess the managed woodlands' vulnerability to climate change and develop an adaptation and mitigation plan.
- Evaluate High Conservation Value Forests (HCVF) on an ongoing basis and identify HCVF areas within the Woodlands.
- Establish priority areas/properties and a rolling schedule for controlling invasive non-native plants across the Woodlands.
- Identify priority areas for restoration planting and coordinate planting efforts to expand and connect these areas, in association with a rolling schedule for controlling invasive non-native plants. Establish standards for regeneration exclusion zones (fenced off sections to allow regeneration to not be trampled) to promote successful regeneration.
- Build upon the current Risk Tree Management Program to implement a rolling schedule for managing risk trees.
- Review best practices for conserving habitat features including dead standing trees (where they do not present a safety risk), cavity trees, and coarse woody debris and incorporate into standard operating procedures.
- Establish an accurate Geographic Information System (GIS) database of forest infrastructure, including property fabric mapping, trail network, culvert, gates, fencing, signs, culverts, and amenities to accurately reflect what is there and to facilitate future asset management. Standardize data storage standards. Incorporate collected layers into Asset Management Program. Analyze LIDAR data and apply to Woodlands including change analysis to visualize changes within and in proximity.
- Update the forest inventory as per the forest operations manual and establish a continuous fixed plot monitoring program to track tree growth and health.
- Implement regular inspections of all properties to:
    a. Inspect sanctioned trails to identify necessary repairs (e.g., removal of encroaching vegetation, fallen trees and repair areas of erosion).
    b. Inspect fences and gates for any necessary repairs and identify any unauthorized private gates that may need to be closed.
    c. Identify unauthorized activities that may be encroaching upon the woodlands and work with the



appropriate bylaw enforcement to mitigate them.

d. Inspect for risk trees and schedule mitigation as per the Risk Tree Management Program.

e. Utilize Global Positioning System (GPS) to map the location of unsanctioned trails and implement solutions such as closing ad-hoc trails, adding signage, installing fences, brush management and plantings to ensure public safety and protection of the forest ecosystem.

- Establish a maintenance schedule to,

a. Maintain and install new perimeter fencing, gates, and signage to minimize impacts from adjacent land uses and to promote effective woodland management.

b. Maintain a 1–2-meter buffer from fence lines to prevent damage to fences and allow ease of access for future perimeter inspections, retaining significant vegetation if found. Applications applied on a case-by-case basis.

c. Elevate vegetation above trails and encroaching vegetation.

d. Close unsanctioned trails through various mechanisms.

e. Remove large pieces of illegal dumping, such as tires and garbage bags, from known locations.

f. Coordinate removal of significant encroachments

g. Review and update the GIS database.

- Implement a 5-year operating plan, preparing annual budget requests, and issuing contracts to perform silvicultural work, invasive non-native species work and other planned activities.

GOAL 2: Promote Community Engagement and Understanding of the Forest's Benefits

The managed woodlands provide a range of environmental benefits such as improved soil and water conservation, carbon storage, shade, reduced air pollution, temperature regulation and increased wildlife habitat. The woodlands also contribute to a vibrant, safe, and connected community as expressed in the City's Strategic Plan and its five pillars for change: move, belong, connect, prosper, and green. The woodlands connect neighborhoods and residents to the natural environment and promote a green culture in support of a responsible and sustainable approach to the environment.

Objectives

1. Review and assess the environmental and social benefits of the managed woodlands.
2. Promote community involvement in stewardship of the WMP Woodlands.
3. Ensure the Woodlands continue to demonstrate leadership through science, innovation and promoting best practices.
4. Find meaningful methods to engage and incorporate Indigenous Peoples knowledge in stewarding the land.

Actions

Building on Current Initiatives

Mississauga residents have a great appreciation of the ecological and recreational benefits derived from the City's Woodlands. The results of the City's 2022 Woodland Management Survey suggest that residents are very supportive of management activities that enhance critical habitats for wildlife, promote environmental protection, and make the WMP Woodlands more resilient to climate change, among several other ecological services.

The ecological benefits of the City's WMP Woodlands have not been quantified. The City has measured the benefits of its street and park trees using such existing means as i-Tree, a suite of tools developed by the United States Forest Service, to analyze and calculate the benefits of trees. Among other features, it quantifies the value of ecosystem services provided by trees, such as removing pollution and sequestering carbon.

The City works to educate forest users, neighbours, and others about the environmental, social, and economic benefits the managed woodlands provide. In 2012 the City developed the Living Green Master Plan, its first environmental master plan. The plan developed several actions for the City and its partners to implement over a 10-year period, including public education and actions to conserve and enhance the Natural Heritage System across the City.

The City encourages volunteers to take part in initiatives aimed at increasing social and environmental benefits, such as litter clean up, invasive non-native taskforces, tree planting through the one million trees program and citizen science.

New Actions

As well as continuing current initiatives, the City will:

- Assess WMP Woodlands to quantify the ecological benefits and ecosystem services they provide. The most appropriate approach should be selected and applied to track the benefits over time.
- Bring together existing monitoring initiatives into a comprehensive monitoring framework that includes ecological and social values.
- Plan and implement a series of public outreach and forest education events such as woodland tours.



- Increase public awareness of invasive non-native species and their impacts on the health of the managed woodlands.
- Communicate transparently with adjacent landowners (including residents, schools, businesses, Indigenous Peoples and councillors) to notify of issues, management activities, outreach and to build relationships.

GOAL 3: Provide Opportunities for Recreation

The relationship between forests and human health have been well-documented (Barton and Pretty 2010, Donovan et al. 2013,). Public use can also inspire respect for the Woodlands and form a connection with nature.

Many of the WMP Woodlands, are well used for passive recreation and nature appreciation such as hiking, jogging, dog walking, bird watching, and cycling. However, 16 of the 36 properties do not have trails and are currently not suitable or accessible for public use for a variety of other reasons.

Objectives

1. Review existing and planned trails within and in proximity to Woodlands.
2. Ensure recreational opportunities within Woodlands do not cause damage to woodland health.
3. Ensure that infrastructure and facilities are managed to protect the woodlands and keep visitors safe.

Actions

Building on Current Initiatives

Approximately 13 km of sanctioned trails have been established for recreational purposes in the WMP Woodlands, ranging from paved to unpaved. These trails are well-used for passive recreation. The City has also initiated a Risk Tree Management Program to improve public safety across all the City's woodlands including those that are the subject of this Woodland Management Plan.

New Actions

As well as continuing current initiatives, the City will review all existing and planned trails within proximity to managed woodlands. Support an exceptional and safe visitor experience by:

a. Review and establish criteria and standards for trail systems within the Woodlands.

b. A rolling schedule for hazard tree management and invasive species management (also actions for Goal 1)

c. Complete a civil asset inventory of fencing, gates, signage, trail condition, ad-hoc trails, parking lots and other amenities to inform maintenance and management requirements and associated budgets. Establish a rolling schedule for asset inventory update, maintenance, and replacement (also actions for Goal 1)

d. Build on existing public programming to facilitate a connection with nature, respect for forests and biodiversity, education opportunities, and stewardship.

9. Implementation

Forest management activities will be guided by the principles of sustainable forestry. The Plan will be implemented through a series of successive five-year operating plans and annual work plans. It will be reviewed at the ten-year mark to ensure that it is responding to the changing needs of the Woodlands. The actions outlined above are expected to be completed by the time of the ten-year review, at which point actions may be refined and new ones developed as needed.

Regular monitoring of the WMP properties will help determine if the City is achieving the plan's goals and objectives and help to refine the City's actions. Examples of monitoring activities include:

- Annual forest health monitoring for invasive plant species and problematic insects
- Inspections to support preparation of silvicultural prescriptions
- Inspections for wildlife habitat during tree marking and establishing protection zones
- Regular inspections of silvicultural operations
- Regular inspections to identify hazards adjacent to neighboring properties, roadways, and trails.





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Glossary

Advanced regeneration: trees that have become established naturally under a mature forest canopy and are capable of becoming the next crop after the mature crop is removed.

Afforestation: The establishment of a forest or stand in an area where the preceding vegetation was not forest.

Age class: One of the intervals into which the range of age classes of trees in a stand are divided into for classification and use. Individual trees measured in diameter at breast height (1.3 m from ground level) and separated as follows:

- Seedlings……. tiny sprouts
- Saplings……. 1-9 cm
- Polewood……. 10-25 cm (4-10”)
- Small Tree……..…. 26-37 cm (11-15”)
- Medium Tree……. 38-49 cm (16-20”)
- Large Tree……..…. 50-61 cm (21-24”)
- Extra Large Tree…… ≥ 62cm (≥25”) .

AGS (Acceptable Growing Stock): trees that exhibit form and appearance that suggests they can reasonably be expected to maintain and/or improve their quality and can be expected to contribute significantly to future crops in the form of vigorous, high quality stems.

All-aged stand: A stand that contains trees of all ages and sizes, also referred to as an “uneven-aged stand”.

ANSI - areas of natural and scientific interest: Areas of land and water containing natural landscapes or features that have been identified by the Ontario Ministry of Natural Resources and Forestry as having life science or earth science values related to protection, scientific study or education.

Basal area:

• of a tree: the cross-sectional area of the bole of a tree, 1.3 m above the ground. Basal area = diameter of tree (cm) squared, times 0.00007854. (Expressed in m2).

• of a stand of trees: the sum of all the individual tree basal areas for a given land area. Commonly expressed as m2/ha.

Biodiversity: the variety and variability (in time and space) among living organisms

Blowdown (windthrow): Uprooting by the wind. Also refers to a tree or trees uprooted.

Bole: The main trunk of a tree.

Canker: Dead area of a branch or stem caused by fungal or bacterial attack.

Canopy: An almost continuous layer of foliage formed by the crowns of larger trees. Shades the layers of vegetation below.

Canopy closure: The degree to which the canopy blocks sunlight from the forest floor in a given area.

Canopy gap: A hole in the forest canopy that lets light penetrate to the forest floor. Caused by fallen trees, fire, harvesting, logging, disease, insects, wind, cutting or other disturbances. Provides the open, sunlit conditions that many tree species need to germinate and grow.

Cavity Tree: A standing tree, dead or alive, that has a hole or holes where wildlife can make nests or dens or escape predators.

Clearcut: an area on which the entire timber stand has been harvested.

Co-dominant trees: trees with crowns forming the general level of the crown cover and receiving full light from above, but comparatively little from the sides; usually with medium size crowns.

Compartment: a group or stand of trees that is sufficiently uniform in species composition, arrangement, condition, management history, or age class to be a distinguishable unit.

Conifer: a tree belonging to the order Coniferae, usually evergreen with cones, needle- shaped leaves and producing wood known commercially as ‘softwood.’

Connectivity: The extent to which conditions exist or should be provided between separate forest areas to ensure habitat for breeding, feeding, or movement of wildlife. Connected forest lands also provide enhanced opportunities for recreational activities such as hiking and cycling.

Conservation: the wise use of natural renewable resources.

Crown closure: the time at which the available crown space has become fully occupied.

Cutting cycle: the planned interval between major harvesting operations in the same stand. A 20-year cutting cycle indicates a harvest is done once every 20 years.

DBH: diameter at breast height: the diameter of a tree outside of the bark at roughly breast height.

Deciduous: a term applied to trees (commonly broad-leaved trees) that drop all their leaves sometime during the year.



Diameter limit cutting: A form of high grading where all high-quality trees down to a certain diameter, generally measured on the stump, are removed. Generally, diameter limit cutting is not considered good forestry practice, and it is not allowed under the MFTIP even if permitted within a municipality.

Dominant trees: trees with crowns extending above the general level of the crown cover and receiving full light from above and partly from the side; larger than the average trees in the stand, with crowns well developed, possibly somewhat crowded on the sides.

Ecology: the science that deals with the interaction of plants and animals with their environment.

Ecosystem: a functional unit consisting of all the living organisms (plants, animals and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow.

Even-aged forest: A forest in which all the trees, or at least the dominant majority, are within 20 years of the same age.

Fish habitat: spawning grounds and nursery, rearing food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.

Forest Certification: Third party recognition that the management of the forest lands meets approved standards for well-managed forests.

Forest health: The perceived condition of a forest associated with factors such as age, structure, composition, function, vigour, presence of unusual levels of insects and disease, and resilience to disturbance.

Forest inventory: A survey of a forest area that describes and quantifies the physical characteristics of the trees and plants, including the species present, the abundance of each species, and other measures such as height, diameter and quality. An inventory may be done prior to the preparation of a management plan, the development of a specific work prescription, or for the purposes of establishing a value for a forest stand.

Forest structure: The ages and sizes of the layers of plant vegetation within a forest. Layers may include ground vegetation, shrubs, young trees, canopy trees and super-canopy trees.

Forestry: the science, art and practice of managing and using for ecological, economic, and social benefit the natural resources that occur on and in association with forest lands.

Genetic diversity: the diversity of genes among members of the same species or population.

Good forestry practices: The proper implementation of Harvest, renewal and maintenance activities known to be appropriate for the forest and environmental conditions under which they are being applied and that minimize detriments to forest values including significant

ecosystems, important fish and wildlife habitat, soil and water quality and quantity, forest productivity and health and the aesthetics and recreational opportunities of the landscape.

Hectare (ha): an area measure of 10,000 square meters. Basic unit of land area.

Herb/Herbaceous: A non-woody flowering plant.

Indicator species: Species of plants used to predict site quality and characteristics.

Integrated Vegetation Management (IVM): The maintenance of destructive vegetation at tolerable levels, by the planned use of a variety of preventive, suppressive, or regulatory tactics and strategies that are ecologically and economically efficient and socially acceptable. It is implicit in IVM that the actions taken are fully integrated into resource planning and management.

Invasive species: an invasive species is a non-native plant or animal that threatens the survival of native species.

Landscape: all the natural features, such as fields, hills, forests, and water that distinguish one part of the Earth's surface from another part; usually that portion of land or territory which the eye can comprehend in a single view, including all of its natural characteristics.

Mast: The fruit and seeds produced by trees and shrubs. Mast species are those tree species producing mast (e.g. oak, beech, cherry). Soft mast are fleshy fruit such as berries. Hard mast are shelled nuts such as acorns.

Natural regeneration: the renewal of a forest stand by natural seeding, sprouting, suckering, or, layering seeds may be deposited by wind, birds, or, mammals.

Old growth: an older forest that shows little or no evidence of human disturbance.

Overmature: That period in the life cycle of trees and stands when growth or value is declining.

Overstory: That portion of trees in a forest forming the upper or upper-most canopy layer.

Pioneer species: The first tree species to establish in an open site such as an abandoned agricultural field, or site following major stand-replacing disturbance or a species planted to prepare a site for such successor species and therefore, a nurse crop.

Prescription (stand prescription): A stand prescription is a planned treatment of a forest site designed to change the current stand structure or condition to one that meets forest management objectives.

Pruning: The removal, close to the branch collar, of side branches (live or dead) and multiple leaders from a standing tree. Pruning is generally done on plantation trees to improve the tree or its timber, or on urban and rural trees to improve their aesthetics or health.

Reforestation: the natural or artificial restocking of an area with forest trees.



Regeneration: Seedlings or saplings existing in a stand produced through natural or artificial means.

Releasing: Removing the vegetation near a tree that might compete with it for sunlight, water and nutrients which in turn increases a tree's growth rate and chances of survival.

Removal cut: one or more cuts in the shelterwood system that releases established seedlings. The last removal cut is called the final removal cut.

Residual basal area: the basal area per hectare of trees left standing after harvest.

Riparian area: the area adjacent to rivers and streams identified by vegetation, wildlife and other qualities unique to these locations.

Selection silvicultural system: a periodic partial-cutting, controlled by basal area, using vigor and risk characteristics to determine individual tree selection. An uneven- aged silvicultural system.

Shade tolerance: the capacity of a tree or plant species to develop and grow in the shade of and in competition with other trees or plants.

Shelterwood: the cutting method that describes the silvicultural system in which, in order to provide a source of seed and/or protection for regeneration, the old crop (the shelterwood) is removed in two or more successive shelterwood cuttings. The first cutting is ordinarily the seed cutting, though it may be preceded by a preparatory cutting and the last is the final cutting. Any intervening cutting is termed removal cutting. An even-aged stand results.

Silvicultural System: A planned series of treatments for tending, harvesting, and re-establishing a stand.

Silviculture: the art and science of producing and tending a forest; the theory and practice of controlling forest establishment, composition, growth and quality of forests to achieve the objectives of management.

Snag: A standing dead tree that is decaying which can provide habitat for many species.

Stand: A contiguous group of trees sufficiently uniform in age class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit. Each stand has a unique identifying stand number.

Stocking: A relative measure of the quantity of trees in a stand. Can be expressed in terms of crown closure, and number of trees, basal area or volume per hectare.

Succession: The gradual supplanting of one community of plants by another.

Super-canopy trees: Individual trees that extend above the overstory forest canopy.



Tending: Any treatment designed to enhance growth, quality, vigour, and composition of a stand after establishment. Tending often includes controlling competing vegetation and invasive plants and intermediate thinning.

Thinning: partial harvesting in an immature stand to increase the growth rate of the leave trees. The goal is to foster quality growth, improve composition, promote sanitation, and recover and use material that would otherwise be lost to mortality.

Tolerance: the capacity of a tree or plant to develop and grow in the shade of (and in competition with) other trees or plants; a general term for the relative ability of a species to survive a deficiency of an essential growth requirement (light, moisture, nutrient supply).

Tree marking: selecting and marking trees to be harvested and trees to be left to grow. Selected trees are usually identified with coloured paint on the tree trunk at DBH and at the stump. Normal colours used in Ontario are: orange/yellow for stem removal and blue for residual stems.

UGS (Unacceptable growing stock): UGS trees may also be of poor form/low quality/significantly diseased and cannot reasonably be expected to improve in quality.

Underplanting: The planting of young trees (seedlings or saplings) under an existing stand. Underplanting is often used to establish regeneration in a stand where natural regeneration is absent or sparse.

Uneven-aged forest: A forest with trees of all ages and sizes, usually with at least three age classes.

Vernal (Woodland) pools: Temporary pools of water that generally appear in the spring from snowmelt or heavy spring rains and sometimes also form in the fall of the year which are generally found in small depressions in the forest and generally have no defined inlet or outlet. They are integral to the health and survival of many amphibian species as they do not contain fish who would predate the eggs.

Wetland: land that is seasonally or permanently covered by shallow water or land where the water table is close to or at the surface. In either case, the presence of abundant water has caused the formation of hydric soils and has favored the dominance of either hydrophytic or water-tolerant plants.

Windthrow (Blowdown): Tree or trees felled or broken off by wind.