Maple Ridge

URBAN FOREST MANAGEMENT PLAN

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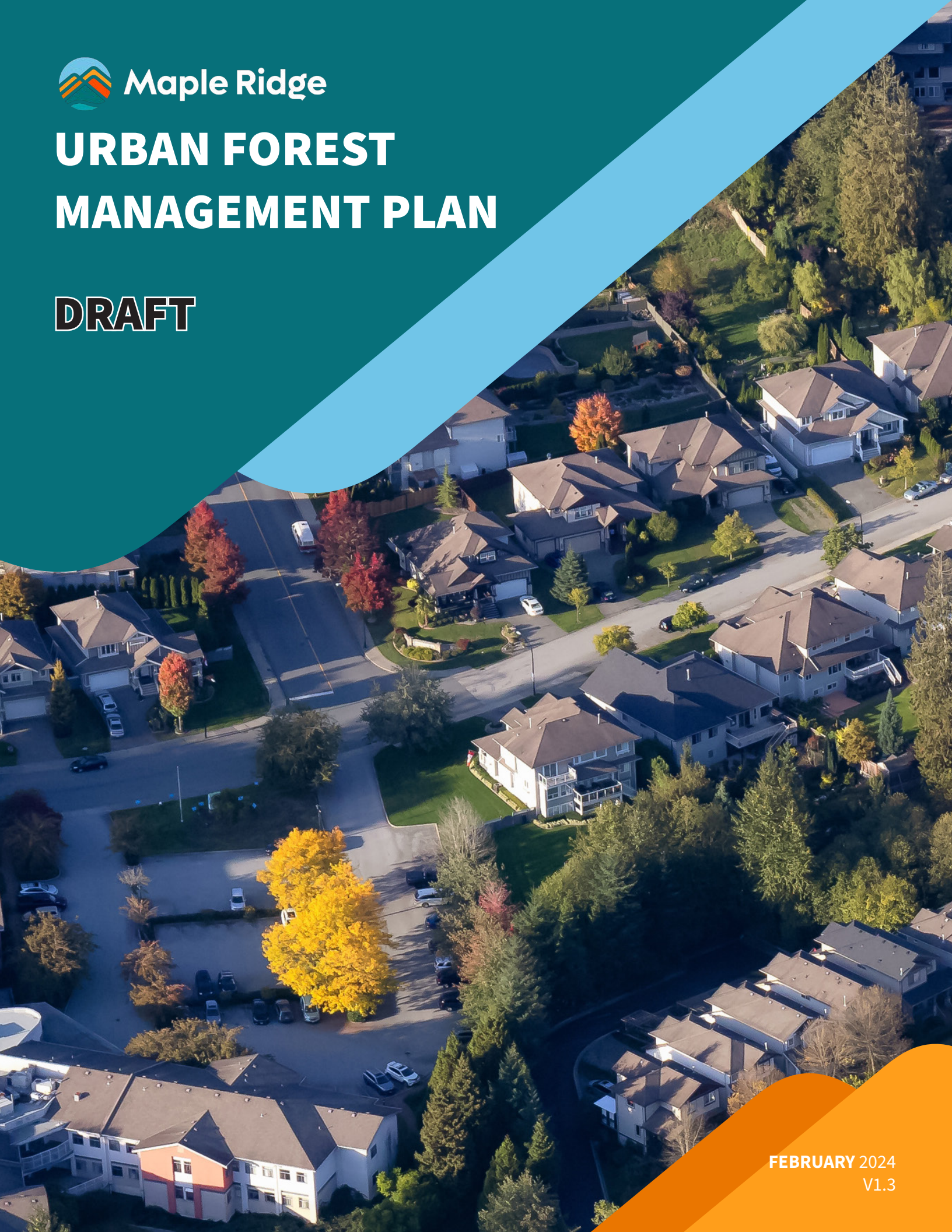

FEBRUARY 2024
V1.3

Land Acknowledgment

The City of Maple Ridge recognizes that we are located on the traditional and unceded territory of the q̓iċəy̓ (Katzie) and qʼʷaːn̓ƛʼən̓ (Kwantlen) First Nations and are grateful to be on this territory.

Project Acknowledgment

Diamond Head Consulting Ltd. (DHC) prepared this report for the City of Maple Ridge. DHC acknowledges the participation and support of the City of Maple Ridge Council, staff working group and the Parks, Recreation & Culture Advisory Committee in the preparation of this document.

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Strategy at a Glance

Maple Ridge, renowned for its abundant urban forest and natural areas, stands as one of the most forested communities in Metro Vancouver. However, its urban forest faces escalating challenges, such as intensifying urban heat islands, prolonged droughts, emerging pests and invasive species, and increasing space constraints due to densification. In response to these challenges, Maple Ridge has developed its first-ever Urban Forest Management Strategy to guide the planning and management of its invaluable urban forest resources in the decades to come.

Maple Ridge's Urban Forest Management Strategy establishes a clear vision for the next 20 years. It delineates goals and strategies that will guide urban forest management to achieve a thriving, resilient and climate adapted urban forest.

The 20-Year Vision

Maple Ridge boasts a thriving, resilient and climate adapted urban forest that is essential to community health and well-being, provides high-value recreational opportunities, supports ecological health and biodiversity, offers cost-effective climate solutions, and improves livability for all residents.

Canopy Cover Target

Achieve 40% tree canopy cover in the urban area by 2045.

Goals

The Urban Forest Management Strategy is driven by four goals with associated strategies and actions to achieve the Strategy's vision and target:

Priority Actions

[to be added in the next version]

Glossary

Biodiversity

The number and types of plants and animals that exist in a particular area, and the relationships that exist between them. Biodiversity includes diversity differences in genes, species and ecosystems.

Canopy cover

A measure of the extent of the urban forest based on the amount of ground covered by the foliage of trees when viewed from above.

Ecosystem services

The many and varied benefits to humans provided by the natural environment and from healthy ecosystems. Recreation potential, shade, water filtration, and pollination are all examples of ecosystem services associated with the urban forest.

Green infrastructure

Natural assets such as forests, streams, wetlands, vegetation, soils and bioengineered or landscape design solutions that exist now and that have the potential to be incorporated into sites, streets, and neighborhoods that collectively provide the community with a broad array of products, services, and benefits that are crucial to health, livability, cost saving, and sustainable development.

Tree equity

When all people experience the benefit of trees and the urban forest in proportion to their needs.

Urban forest

All trees and their ecosystems within the municipality, including trees in private yards, public parks, conservation areas, environmental buffers, open spaces as well as those along boulevards and roadways, and in wetlands, natural areas, and the City's vast woodland communities.

Urban forest program

A set of activities performed by the City and community partners to plan, grow, manage, protect, and steward the urban forest, as well as all related policies, equipment, resources and knowledge.

1 Introduction

The City of Maple Ridge's lush urban forest is a defining characteristic of the municipality's identity. The city has abundant and easily accessible natural areas, as well as ornamental trees lining parks, gardens, and streets. Beyond serving as aesthetic and recreational attractions, Maple Ridge's urban forest is an indispensable natural asset crucial to the community's overall well-being. Trees and forests provide shade and cool urban heat islands, filter air and water pollutants, enhance mental and physical health, support biodiversity, and store carbon to reduce greenhouse emissions.

However, Maple Ridge's urban forest is being put under increasing stress from the impacts of climate change including drought, extreme weather, pests, and diseases. Moreover, urban development to accommodate a growing population might present challenges in meeting the Official Community Plan's policy to "promote the retention of urban and mature trees and of natural forests and woodland areas".

To respond to these challenges, the City of Maple Ridge has developed a comprehensive Urban Forest Management Strategy to guide its current and future efforts to protect and enhance the urban forest.

The Strategy includes the following sections:

1. **Introduction**: introduces the Urban Forest Management Strategy and outlines its structure
2. **Understanding the Urban Forest:** defines Maple Ridge's urban forest and its key components, describes the benefits it provides, and the importance of managing it
3. **The State of the Urban Forest**: describes the historical context of Maple Ridge's urban forest and summarizes its current condition
4. **Urban Forest Management Framework**: describes the regulatory context for urban forest management and provides an overview of the municipal management program
5. **What We Heard**: summarizes important community values collected from the public engagement conducted for this project
6. **Planning for the Future: Vision, Goals and Targets**: presents a 20-year vision of the urban forest, and describes projected canopy cover changes over time and a recommended canopy target
7. **Achieving Our Goals: Strengths, Challenges, and Strategies**: presents the four strategic goals, related challenges and strengths, and accompanying strategies to move towards the vision and goals
8. **The 20-Year Action Plan**: provide a system for tracking progress on implementation of the goals and strategies.

2 Understanding the Urban Forest

What is an urban forest?

Maple Ridge's urban forest is a network of natural and urban landscapes that includes a diverse range of trees and associated ecosystems. This network includes trees along boulevards, within parks, on private properties such as gardens and yards, and in natural forests. The urban forest serves as 'green infrastructure' that delivers benefits to support the community's overall health, resilience, and well-being.

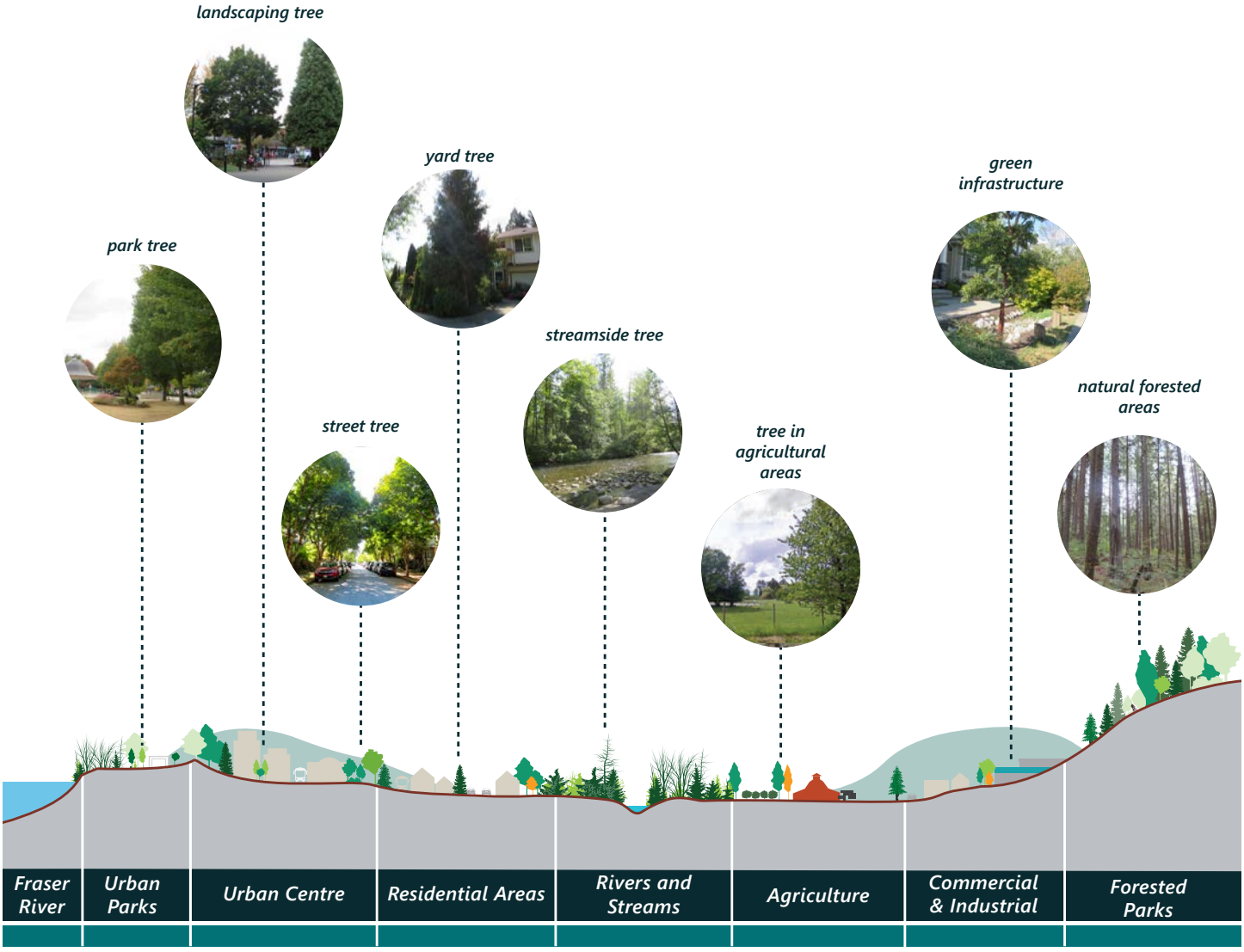


Figure 1. Components of Maple Ridge's urban forest

Why is the urban forest important?

Urban forests are vital ecosystems that significantly enhance the quality of life for both residents and wildlife in urban areas. As cities grapple with the escalating climate crisis, the importance of green spaces in maintaining the livability of cities like Maple Ridge has become more pronounced. A single tree can provide a shady spot for a family picnic, but it is the collective power of an urban forest that effectively combats the urban heat island effect, cooling urban areas during scorching summer heatwaves. Trees act as natural air conditioners, releasing water vapor during respiration that cools the surrounding air. When it rains, urban forests play a crucial role in stormwater management. The canopy, bark, and roots of trees intercept and absorb rainwater, mitigating the intensity of runoff and reducing the burden on drainage systems.

The urban forest is an interconnected network of urban trees and natural areas that provides crucial habitat for wildlife and places for people to recreate and relax. Forests dampen sound, preserving quiet green spaces in the heart of the city where humans recreate and wildlife live[1]. Wildlife relies on healthy urban forests for suitable habitats[2]. Forests provide critical shade and soil stabilization for sensitive habitats including salmon-bearing streams.

These and many other benefits of urban forests are sometimes called ecosystem services. In this document, ecosystem services refer to the things trees do for human society and the environment, often at no direct cost. There are four main types of ecosystem services[3]:

Cultural

The intangible benefit derived from ecosystems. This includes aspects related to beautification, sense of place, mental and physical health, spirituality, and tourism.

Regulating

Natural processes that offer immediate benefits, like pollination that allows plants to produce fruit and reproduce, or tree absorbing and storing carbon from the atmosphere, purifying the air, preventing soil erosion, and offering shade.

Supporting

Natural processes that provide indirect benefits by creating the conditions for other services to occur, such as photosynthesis and decomposition. These processes enable the conversion of light to energy for plants and facilitate the breakdown of organic matter, returning vital nutrients to the ecosystem.

Provisioning

The direct products of trees and forests, such as medicines, fruits, mushrooms, clean water, wood, and plant fibers.

Urban forest benefits

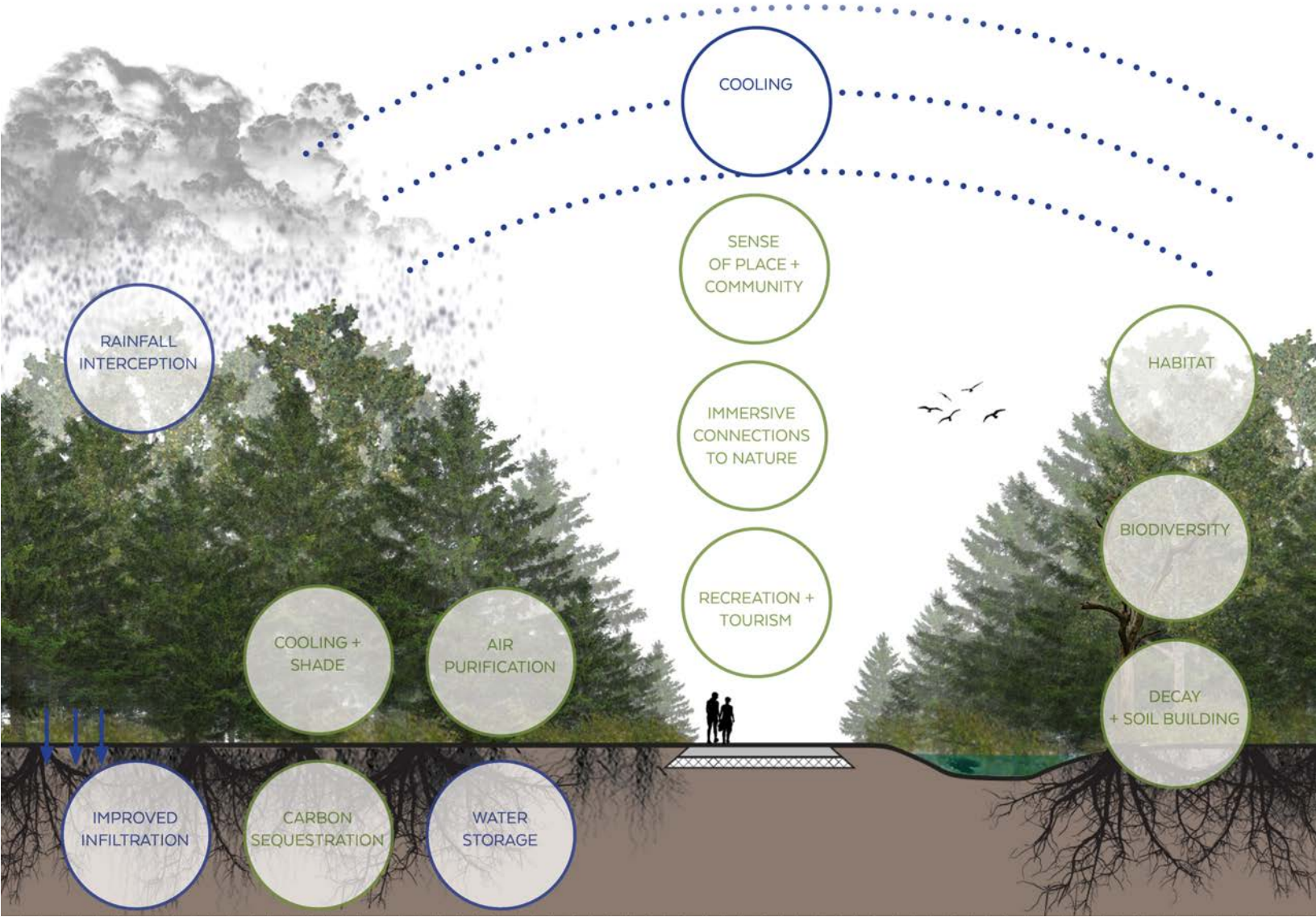
Benefits are provided at multiple scales, from individual trees to native forest stands, and throughout the urban forest. Many of the ecosystem services urban forests provide are related to the size and health of trees[4]. For example, large, healthy trees provide more shade or filter more pollutants from air and water. Similarly, a large, healthy forest is better at cooling the air through evapotranspiration or providing good habitat for native biodiversity. Some of these benefits are described in more detail below.

Healthy people healthy communities

Trees and forests have positive effects on the mental and physical well-being of individuals. Within the urban forest, opportunities are presented for quiet contemplation and exercise. Exposure to greenery has been found to reduce stress levels, enhance performance at work, and potentially expedite recovery during hospital stays[5,6,7]. Having a nearby park or natural areas has been linked to a higher likelihood of individuals achieving recommended levels of physical activity[8].

Financial value

The urban forest stimulates the local economy. Visitors are drawn to Maple Ridge to explore its forested natural areas, and in the process, they contribute to the local economy by patronizing nearby businesses. Urban trees help local shops outperform commercial districts with lesser trees by encouraging people to stay longer and spend more[9]. High cover of trees is associated with the rise of neighbourhood properties in studies from Finland to Florida[10,11,12].



A sense of place

In Maple Ridge, the abundance of trees and forests are integral to people's perception of the City. These forests and trees hold deep significance for individuals and communities that contribute to cultural benefits like strong civic and identity pride[13].

Clean air and water

Trees and forests capture rain and stormwater runoff that is then filtered by roots and surrounding soils[14,15]. Some of this filtered water reemerges in streams, lakes, wetlands, and ponds – or even from a tap or hose. The urban forest contributes to improved air quality by absorbing pollutants such as carbon monoxide, road particulates, and nitrogen dioxide while releasing oxygen[16,17].

Climate resilience

One of Maple Ridge's key strategic objectives is to be a climate resilient City. With climate change ushering hotter drier summers, warmer winters, and more intense rainfall, the City aims to alleviate some of these effects through a healthy and robust urban forest. The urban forest takes in carbon dioxide and stores carbon in wood, plant tissues, and soils, helping to limit global climate change[16,18]. At the local level, trees and forests do much more to help adapt to climate change impacts. Through evapotranspiration, trees release water through their leaves and cool the surrounding air. Summer shade keeps streets, sidewalks, and buildings comfortable[19]. Urban areas with minimal vegetation experience temperatures several degrees warmer than areas with over 40% canopy cover, and that difference can be life threatening during a heat wave[18].

Habitat and biodiversity

Our urban forest serves as a biodiversity reserve[20]. Trees, both in their living and dead states, provide habitat for many plants, animals, fungi, and microbes. Intact forests with complex habitats support an even wider array of life, including iconic species such as salmon, eagles, and bears. Having a wide variety of biodiversity is crucial for safeguarding ecosystem services that enable human life in the city, like the cycling of nutrients and pollination of gardens. Animal residents of the urban forest also benefit from many of the same ecosystem services that humans appreciate, including access to clean water and forest foods[21].

Impacts of Climate Change

The climate in our region is changing. Generally speaking, climate change will result in wetter, milder winters and much hotter, drier summers[22] and these changes will have multiple impacts on our region and forests. Hotter summers are likely to increase the urban heat island effect, whereby concrete and asphalt store thermal energy during the day and release it at night, preventing urban areas from cooling once the sun goes down. Exposure to elevated temperatures over a long duration is particularly dangerous to people vulnerable to heat stress, such as seniors, those without homes or adequate shelter, infants, and individuals with respiratory illnesses[23]. Warmer, drier summers also create drought conditions that make vegetation and dead woody fuels drier. This means that, when fires do start, there is more fuel available to burn, fires grow more quickly and the intense fires are more difficult to put out.

Forest health is also impacted by climate change because urban trees may need more irrigation to survive and water shortages will mean this water needs to come from alternative sources than the region's reservoirs[24]. In the future, forests may also be impacted by an increased incidence of damaging pests. Shorter, milder winters mean that fewer pest species will die off, allowing populations to increase and new species to survive in the region [22].

BY THE 2080s, PROJECTED CHANGES* TO:

TEMPERATURES
Average daily maximum temperature increase of 5°C. Milder winters. Summer extremes of 40°C (1-in-20 hottest day).

EVAPOTRANSPIRATION
Increased rates of evaporation and transpiration from waterbodies, soil and plants.

PRECIPITATION
More rain throughout year, except in summer. Longer summer dry spells. Amount of snow decreasing.

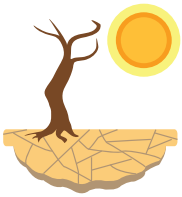
MELTWATER
Faster snowmelt. Earlier peak spring flows and flooding. Lower late-summer flows.

GROWING SEASONS
Longer and warmer growing season, increasing by 108 days.

VARIABILITY
More frequent and unseasonal extreme weather

WILL LIKELY CAUSE

SPECIES DISTRIBUTION SHIFTS
Forest species may shift northward and upslope as heat and moisture conditions exceed their tolerance.



LESS MOISTURE AVAILABILITY
Evapotranspiration rates will increase relative to precipitation, resulting in drier soils and vegetation.

LONGER FIRES SEASONS AND LARGER FIRES
Fires may occur more often and burn larger areas. Fire risk is expected to increase based on warmer, drier summers.

MORE PESTS AND INVASIVE SPECIES
Pests may reproduce more rapidly and more often. Trees and ecosystems may be more vulnerable to attack and invasion.

LONGER, WARMER GROWING SEASONS
Longer growing seasons may support more growth, species diversity and potentially more carbon sequestration.

MORE EXTREME WEATHER EVENTS
Heat, extreme precipitation, freezing rain, heavy wet snow, flooding, landslides, windstorms and other events may happen more often leading to more tree damage.

* Projected changes based on modeling for Metro Vancouver using the Intergovernmental Panel on Climate Change's Representative Concentration Pathway 8.5 scenario (RCP8.5), which represents a high emissions pathway with limited mitigation of greenhouse gas emissions by the end of this century (or "Business as Usual").

Why do we manage the urban forest?

Management of the urban forest is essential to sustain the health and longevity of urban forests. Trees, much like other types of city assets, require maintenance to maximize the benefits they provide and ensure a long service life. Strategic care can prolong a tree's life, enhancing its ecological, social, and economic contributions. Large mature trees provide more wildlife habitat, are more effective at cooling, and become beloved landmarks for the community. However, large trees in urban settings also carry potential risks – such as dead or broken branches or lifting sidewalks – that need to be managed for public safety. Proper planning and management can minimize risks, maximize benefits and extend a tree's life.

Urban forests require management for:

Tree health and risk

Urban forests need regular inspection, pruning and maintenance to promote good health and structure and prevent hazards from occurring.

Biodiversity

Urban forests are less diverse and more fragmented than natural ones. Management is necessary to maintain connectivity and support diverse species.

Wildfire

Forests contain woody fuels that can carry wildfire. Planning and management of urban vegetation can mitigate wildfire risk.

Access and Equity

The community benefits from urban forests are maximized when they are accessible and healthy. Proper planning and management ensure these forests are nearby and well-maintained.

Climate Change Mitigation and Adaptation

Urban forests help in climate change mitigation and adaptation but are also affected by it. Management is key to enhancing their resilience to environmental stresses like heat, drought, and pests.

Effective urban forest management minimizes risk and maximizes the benefits trees provide to the community.

Who manages the urban forest?

Many partners play a role in the planning, planting, management, protection, and stewardship of Maple Ridge's urban forest (Table 1).

Table 1. The urban forest is managed by different organizations and individuals

Who manages the urban forest?	What do they manage?
City of Maple Ridge	Trees and forests along streets, in parks, in conservation areas, and on other City property. The City also regulates the removal and replacement of trees on private lands.
First Nations groups	Maple Ridge is the ancestral and unceded homelands of the Katzie First Nation and Kwantlen First Nation. As part of the journey towards reconciliation, it is important for the City, local organizations, and residents to understand the historical and ongoing impacts from colonial settlement and their traditional knowledge and practices for more equitable, inclusive, and sustainable practices.
Residents/landowners/property developers	Manage trees and forests on private land. Residents also advocate for, benefit from, and participate in the stewardship of trees and forests on public lands through committees, community organizations, and as individuals.
NGOs	Such as the Alouette River Management Society (ARMS) and Kanaka Education & Environment Partnership (KEEPS), offer educational and stewardship opportunities to local communities and individuals and support greening and ecological restoration in Maple Ridge.
Utility companies	Plants, prunes, and removes trees near utility lines.
Private industry arborists and landscape companies	Provide tree-related professional services such as tree planting, pruning, and risk assessment.
Educational institutes	Manage, plant, harvest, and research trees and forests on their lands, such as the UBC Malcolm Knapp Research Forest and BCIT Woodlot.
Metro Vancouver	Manages forests and vegetation in regional parks. It also provides regional-level urban forestry resources and guidance for member jurisdictions, and identifies, protects, and manages lands with high biodiversity and natural heritage value.
Province of British Columbia	Manages forests and vegetation on Provincial land. Regulates watercourses and their riparian areas and the Agricultural Land Reserve. The Province also monitors forest health, provincial wildlife and habitat regulations, and is responsible for native forest climate change adaptation strategies. The BC Parks manages the Provincial Parks within Maple Ridge, such as the Golden Ears Provincial Park.
Government of Canada	Provides funding for climate adaptation and mitigation, and regulates invasive pests, plants, and diseases.

What types of urban forest assets are found in Maple Ridge?

The type of trees and forests managed in Maple Ridge vary depending on where they are located along a continuum of rural to urban land uses. The Rural-to-Urban Transect was designed as a tool to better integrate the environment into urban design[25]. The Transect categorizes a range of typical land uses and the types of natural and landscaped features that can be prioritized within them along a natural to human habitat continuum. Figure 2 uses the Transect to illustrate where the different types of urban forest assets are usually found, and how they are managed, across different land uses in Maple Ridge.

In rural areas, native forest ecosystems are managed for habitat and ecosystem health. Management in suburban areas with low-density residential development focuses on yard trees, street trees and park trees to offer shade, provide habitat for urban wildlife, incorporate stormwater features, and to create a greener neighbourhood look. As land use becomes increasingly urban, the focus shifts to developing compact, walkable neighbourhoods with street trees, parks, plazas, and green infrastructure such as green roofs and walls, rain gardens, and below-ground infiltration.

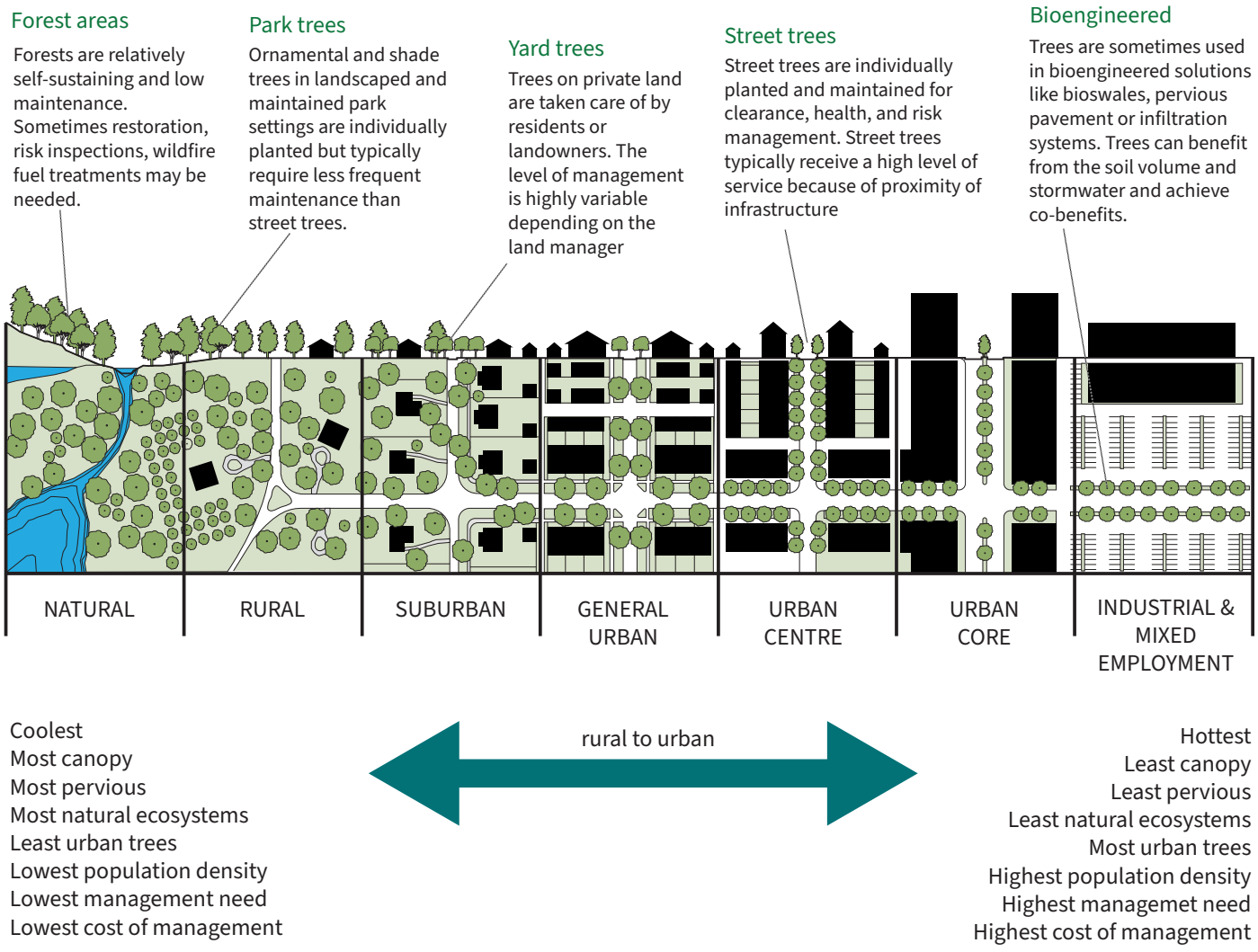


Figure 2. The Rural-to-Urban Transect provide a framework for understanding the range of different land uses and their characteristics in terms of the built and natural environment typically found within them

Maple Ridge's climate and geography

Maple Ridge has a temperate climate, marked by mild, wet winters and warm, dry summers, due to the influence of Pacific Ocean. Rainfall is abundant in the autumn and winter months. While temperatures in Maple Ridge generally remain moderate, occasional extremes bring an element of unpredictability to its otherwise mild climate. Summer drought can lead to conditions that cause tree mortality raise the risk of wildfire. Climate change is expected to increase summer drought conditions and the frequency of extreme events.

The geography of Maple Ridge is a mix of rugged mountainous terrain, rolling hills, and plains carved out by the Fraser River. The Alouette River, Kanaka Creek and their tributaries form riparian corridors throughout Maple Ridge. This varied topography is covered by a range of soil types, from the fertile sediments of the river valley to the more challenging, rocky soils of the higher elevations.

Maple Ridge is within the Coastal Western Hemlock (CWH) biogeoclimatic zone, as defined by the British Columbia Ecosystem Classification System[26]. The climate and geography of Maple Ridge supports lush, dense forests primarily composed of coniferous trees including western hemlock, western Redcedar and Douglas-fir. Broadleaf trees like bigleaf maple, red alder, and black cottonwood grow in riparian areas and mixed in with coniferous trees in younger forests. Industrial logging activities cleared much of Maple Ridge throughout the 1900s (Figure 3). During this period, local historical records indicated two large fire that started due to logging operations[27,28]. Disturbed lands have since been developed or regrown into secondary forests, forming the rural and urban landscapes of Maple Ridge today (Figure 4).

Figure 3. 1920-1924 Allco headquarters camp, seen from the western slope of the Alouette River valley (source: Maple Ridge Museum)

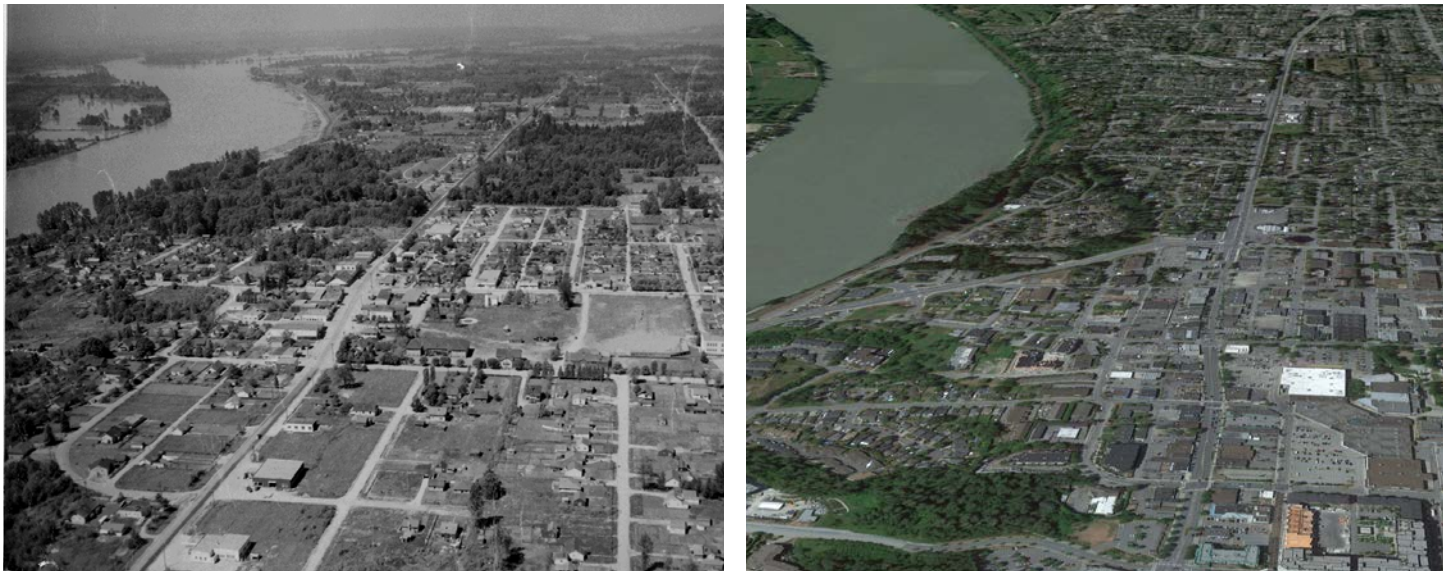


Figure 4. View west down Lougheed Hwy in 1948 (Maple Ridge Museum Archives) and 2022 (Google Earth) shows development of both cleared and forested land as the City grew and densified

A glimpse of the history of Maple Ridge

The land known today as Maple Ridge is traditionally known by its Halkomelem name, Z'wa?acstan, which translates to "place where the golden eagles are". Prior to European settlement, the land has been inhabited and cared for by the q̓iċəy̓ (Katzie) and q'ʷa:n̓ƛ'ən̓ (Kwantlen) First Nations for thousands of years. To this day, q̓iċəy̓ (Katzie) and q'ʷa:n̓ƛ'ən̓ (Kwantlen) First Nations maintain deep connections to their lands and the rivers, sloughs, creeks., and the wetlands that run through their territories.

Figure 5. Downtown Maple Ridge art mural titled The Mountain of the Golden Eagle created by Kwantlen First Nation artist, Brandon Gabriel (Source: City of Maple Ridge)

3 The State of the Urban Forest

This section describes the current state of the urban forest in Maple Ridge, providing a snapshot of its health, composition, distribution and the benefits it offers to the community.

Canopy cover

Canopy cover is the area covered by tree canopy (i.e., branches and leaves) when viewed from above (Figure 6). It is typically reported as a percentage of a specific area, such as a city, park, or neighbourhood, that is covered by tree canopy. Tree canopy is a common metric used by municipalities to measure and track the extent of the urban forest over time.

Maple Ridge's canopy cover was estimated using an approach that integrates 2022 aerial Ortho imagery and remote Light Detection and Ranging (LiDAR) data collected in December 2021. LiDAR technology employs laser light to map the ground surface, such as trees and buildings, from the air. LiDAR combined with orthoimagery can be used to create a precise map of tree canopy cover and t classify different types of trees (Figure 7).

It should be noted that the LiDAR data collected in 2021 did not cover the entire Official Community Plan (OCP) boundary (Figure 8). To address this data gap, consultants used a coarser resolution (5 meters) canopy map from the 2020 Metro Vancouver land cover. The accuracy of urban tree counts and canopy summaries may differ between the two data sources used.

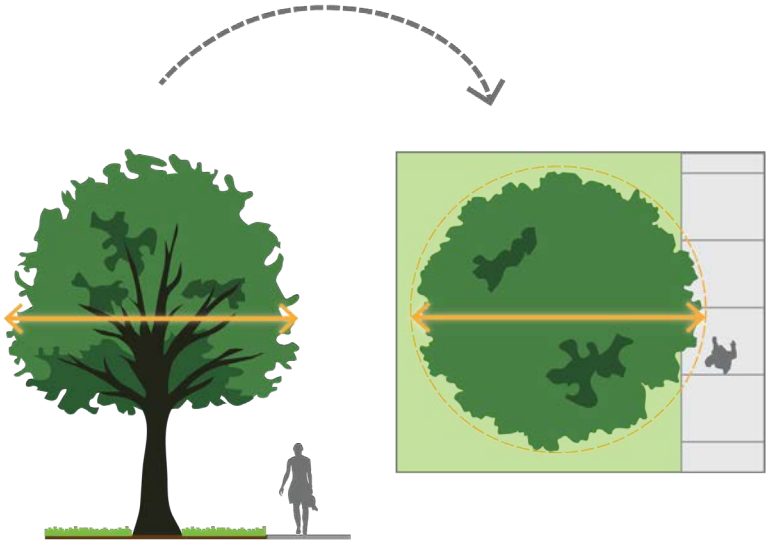


Figure 6. Illustration on tree canopy

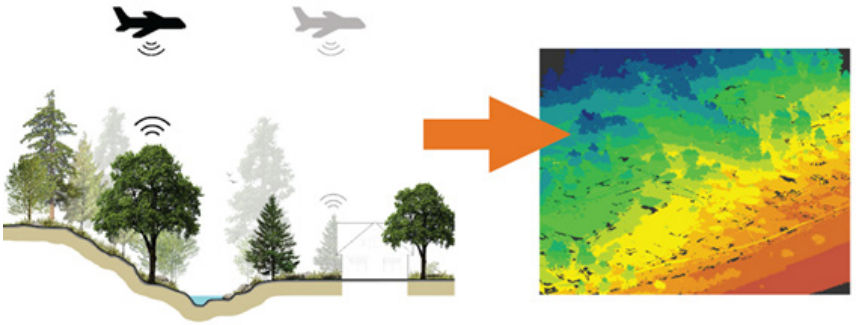


Figure 7. LiDAR data collection and tree canopy mapping process

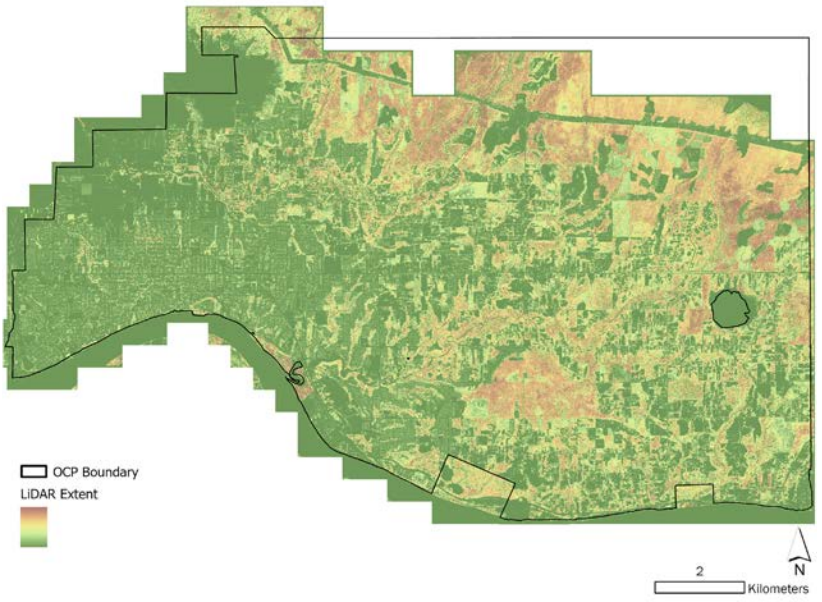


Figure 8. The areas where LiDAR data was collected in Maple Ridge

Current canopy cover

Within the Official Community Plan boundary

Canopy cover is summarized for the area within the Official Community Plan (OCP) Boundary (Figure 9). The OCP boundary illustrates areas where future growth and development will take place in Maple Ridge, thus where changes in the urban forest are most likely to occur.

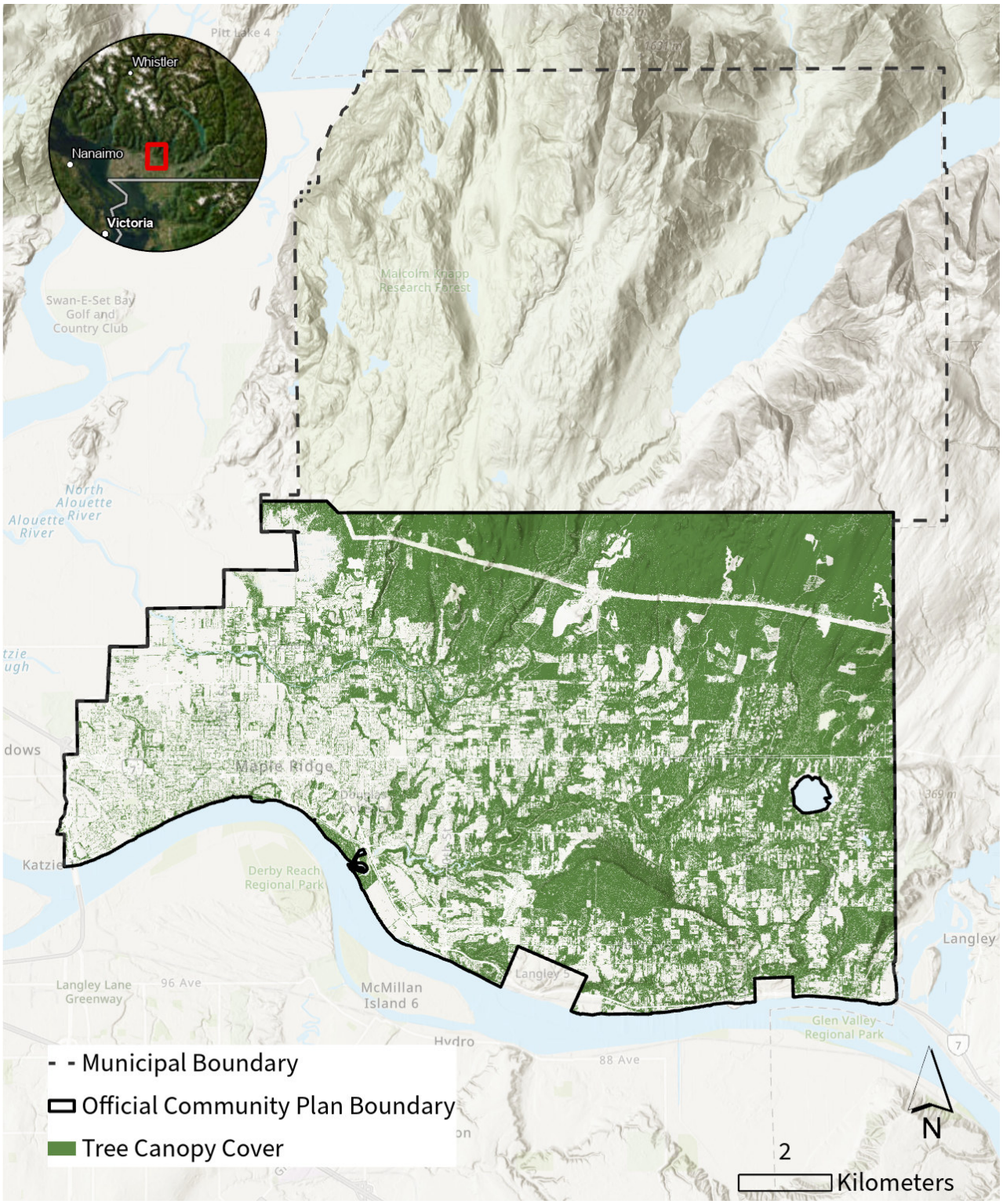


Figure 9. Official Community Plan boundary and municipal boundary and tree canopy cover mapped using December 2021 LiDAR and summer 2022 orthophotos.

As of 2022, Maple Ridge's urban forest canopy cover within the OCP boundary is estimated at **54%** (or **7,939 hectares** of area).

Within the urban areas, as defined by the OCP, the canopy cover stands at **38%**.

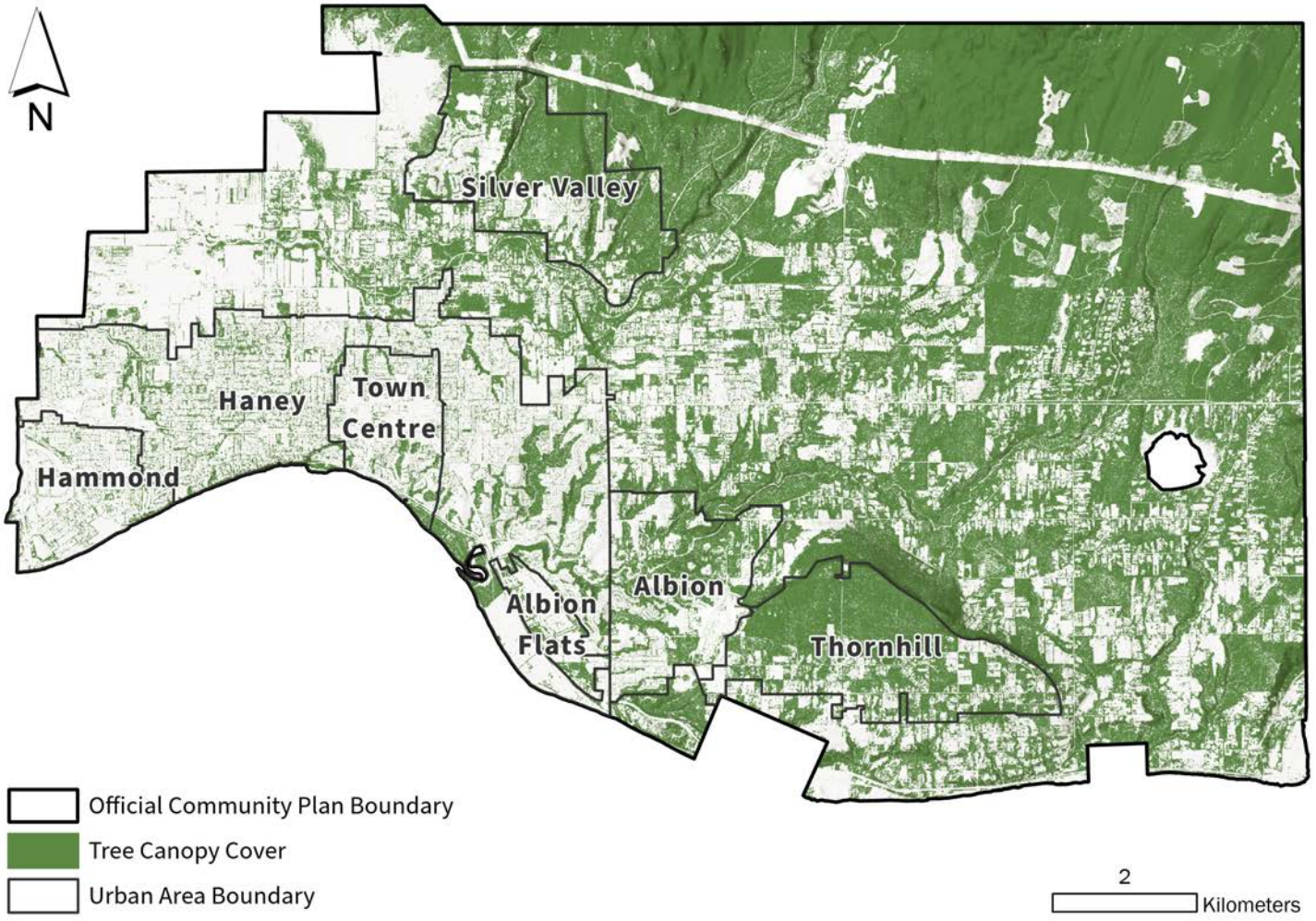


Figure 10. Maple Ridge's canopy cover derived from December 2021 LiDAR and summer 2022 orthophotos

Maple Ridge's canopy cover is higher than that of most municipalities in the Metro Vancouver region, thanks to extensive native forests in conservation areas and parklands. Within urban areas, the canopy cover stands at 38%, while non-urban areas average at 60%. Maple Ridge's urban tree canopy cover is above the regional average.

Metro Vancouver completed a region-wide canopy study in 2019. The methodology and scale used differed from the 2022 Maple Ridge study so the canopy cover results are not directly comparable. However, the Metro Vancouver results are useful for comparing all municipalities across Metro Vancouver. The 2019 Metro Vancouver study showed that Maple Ridge's canopy cover in the Urban Containment Boundary was 46%, well above the regional average of 32% (Figure 11).

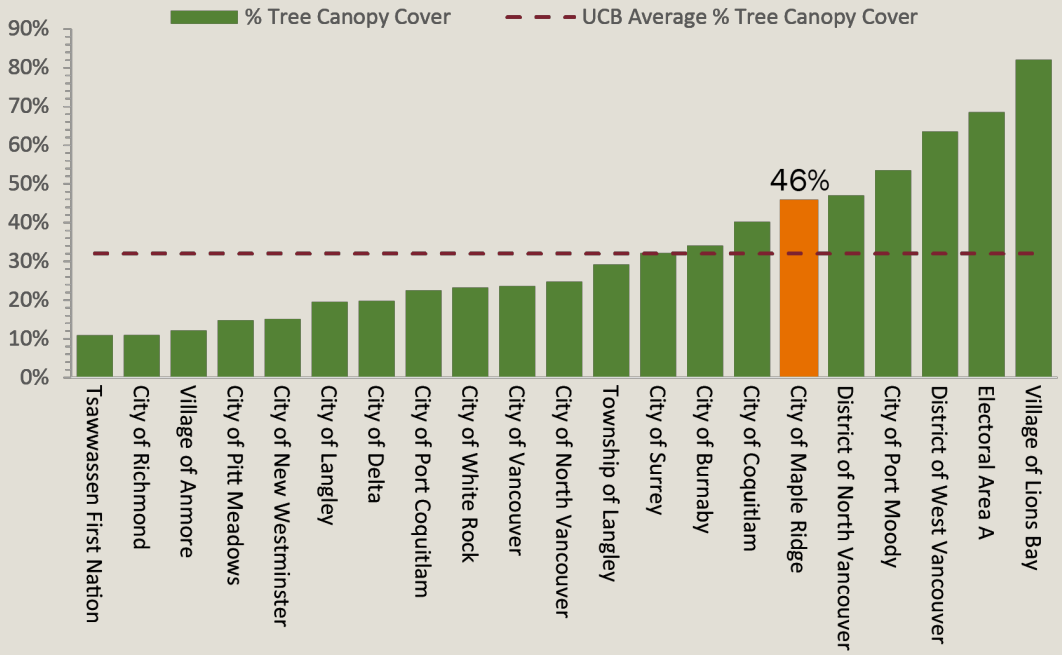


Figure 11. Canopy cover within the Urban Containment Boundary by Metro Vancouver member jurisdictions in 2014

By OCP land use

The OCP designates different uses of land in Maple Ridge, such as residential, commercial, and agricultural uses, as illustrated in Figure 12. Land use influences where and how trees can grow as the city develops and is therefore an important consideration for determining future canopy cover targets.

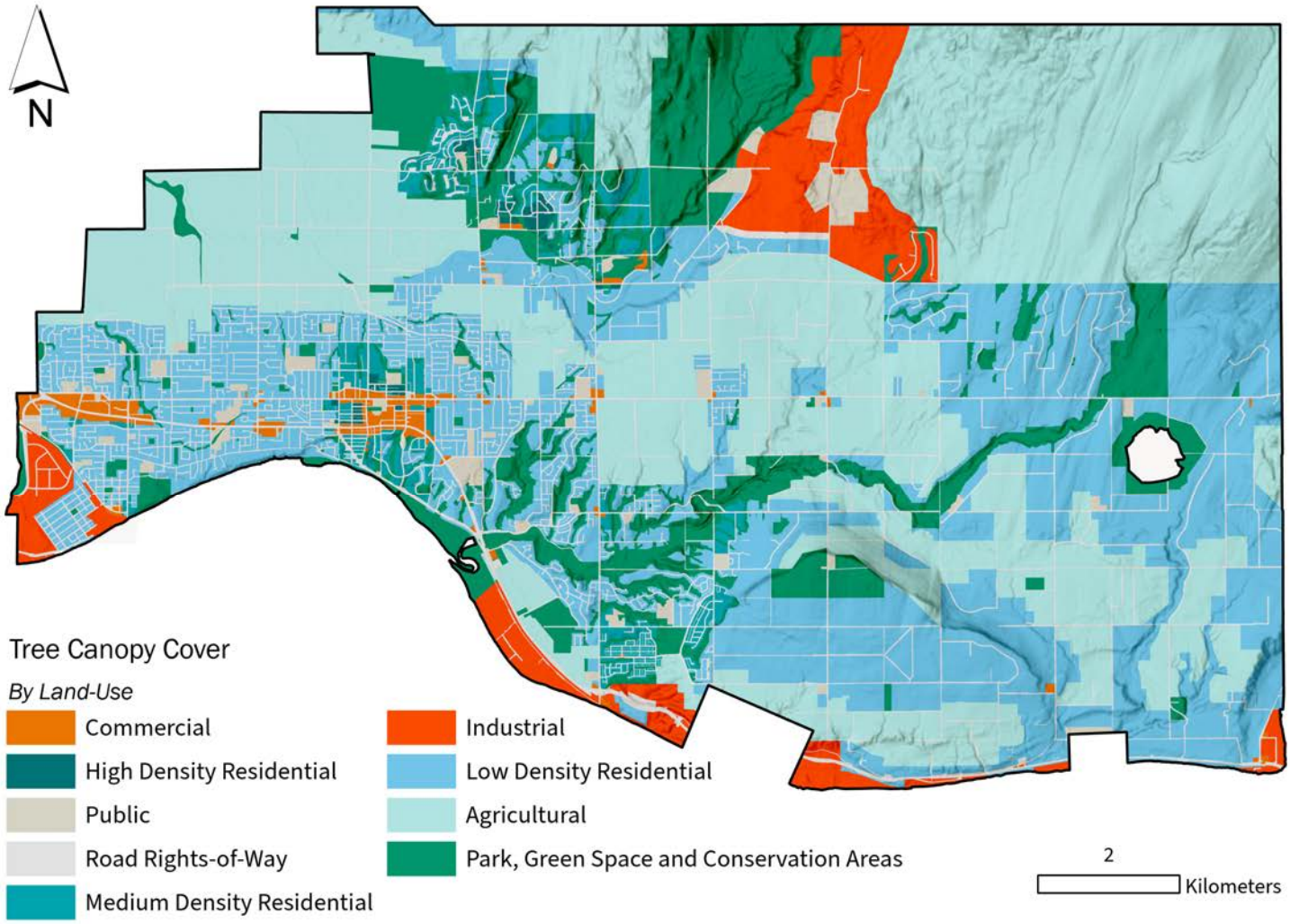


Figure 12. Official Community Plan land uses

The top three OCP land use designations—agricultural lands, low-density residential, and parks, green space, and conservation areas—have the highest canopy cover among all land uses (Figure 13). Collectively, they contribute to 92% of the canopy area within the OCP boundary. Parks, green space, and conservation areas have the most abundant urban forest, with 71% of canopy cover. In contrast, commercial areas have the lowest canopy cover at 12% (Figure 13).

In the non-urban area, most canopy cover is found on agricultural, low density residential, park, greenspace and conservation area, and industrial land uses (Figure 14). Tree planting policies or programs or development activity in agricultural lands, low density residential land uses and industrial land uses are likely to have the most significant impact on future canopy in the non-urban area.

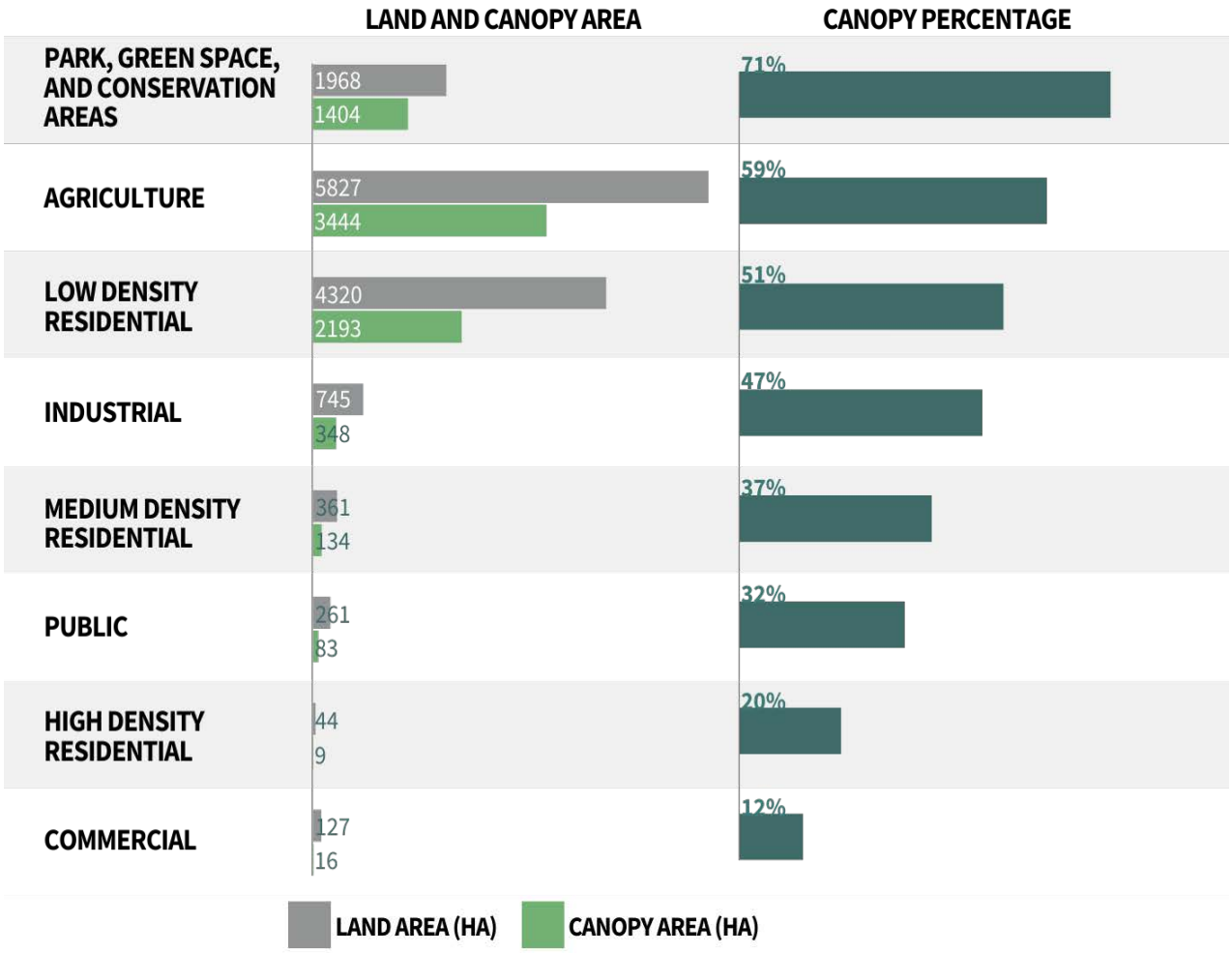


Figure 13. Land area (ha), canopy area (ha) and canopy cover (%) per OCP land use (excluding road rights-of-way)

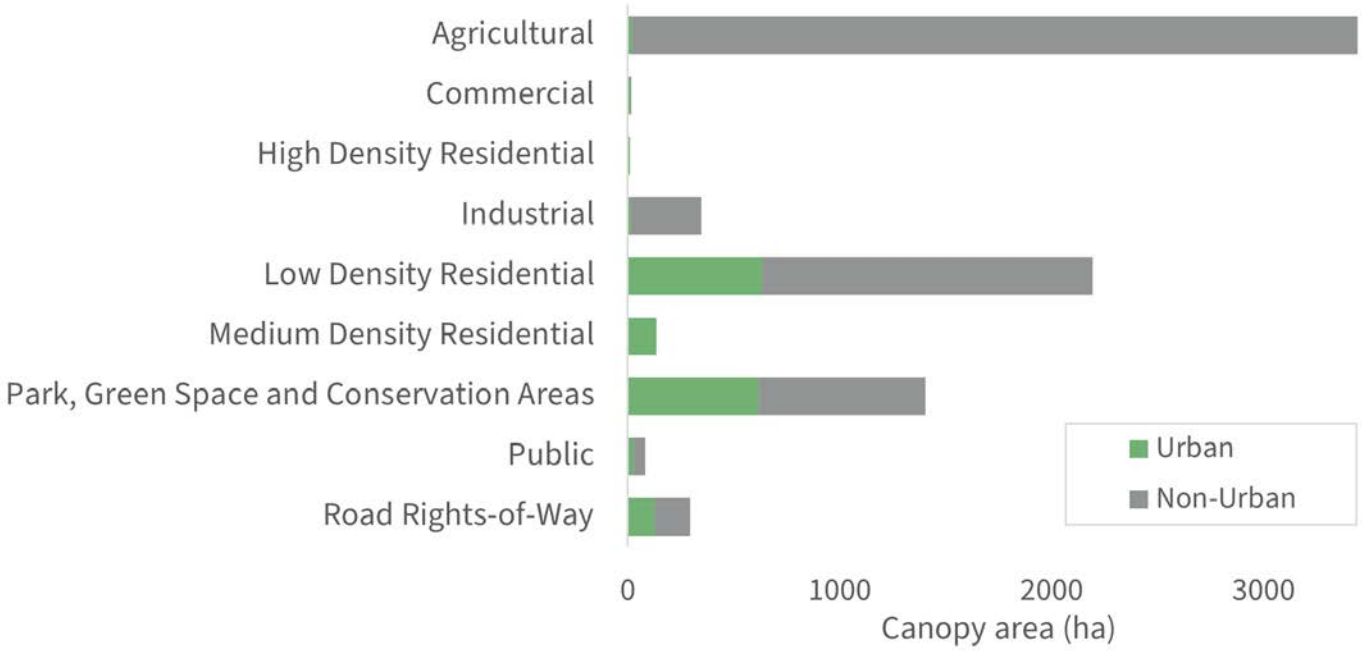


Figure 14. Canopy area (ha) per OCP land use and urban and non-urban lands

By ownership

Ownership classes indicate who is the primary caretaker of the urban forest. In Maple Ridge, the urban forest spans public and private land. Of the 7,939 hectares of tree canopy within the OCP boundary, 49% is found on private land, 31% is owned by federal/provincial governments such as the Golden Ears Park, 15% is managed by Maple Ridge, and 8% is owned/managed by Metro Vancouver such as Kanaka Creek Regional Park.

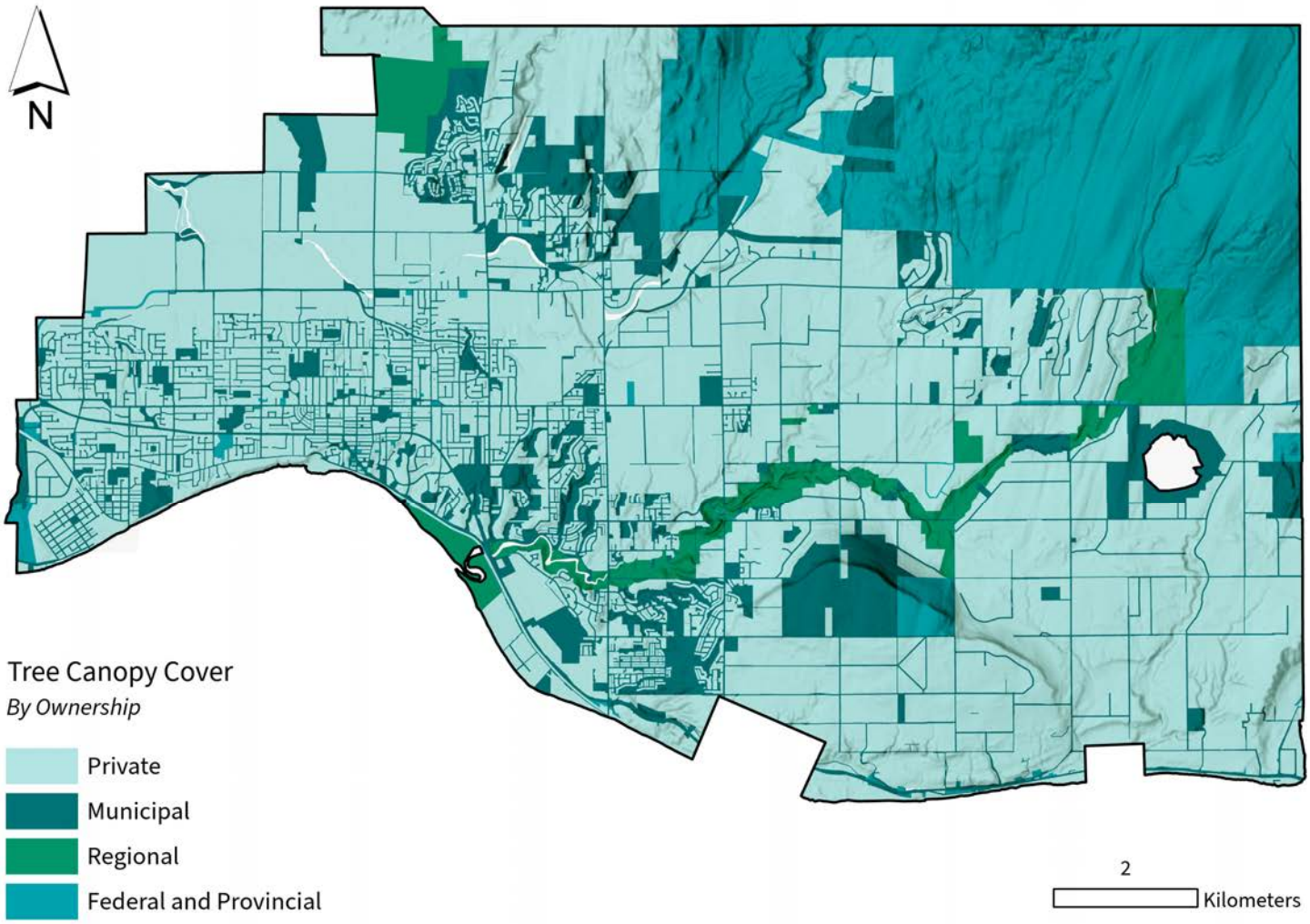


Figure 15. Ownership of land in Maple Ridge

The City manages 15% of the entire tree canopy. The majority (58% of City-owned canopy) is found in City-owned parcels other than parks and road rights-of-way, such as Thornhill and Silver Valley. Road rights-of-way account for 25%, while municipal parks make up 17% (Figure 16).

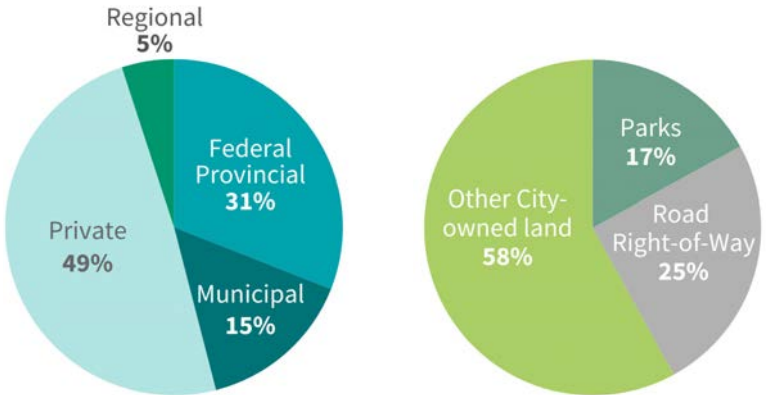


Figure 16. Proportion of canopy area by ownership (left) and by management unit within City-owned land (right)

By neighbourhood

The distribution of canopy cover across Maple Ridge's neighbourhoods varies. Generally, neighbourhoods located within the urban area boundaries tend to have a lower tree canopy cover, compared to non-urban areas. Figure 17 shows a noticeable gradient in tree canopy cover increasing from western neighbourhoods like South Alouette, Hammond, and West Maple Ridge to eastern neighbourhoods. Eastern neighbourhoods are primarily undeveloped or contain protected forest land thats supports higher tree canopy cover than the more developed urban or agricultural western neighbourhoods.

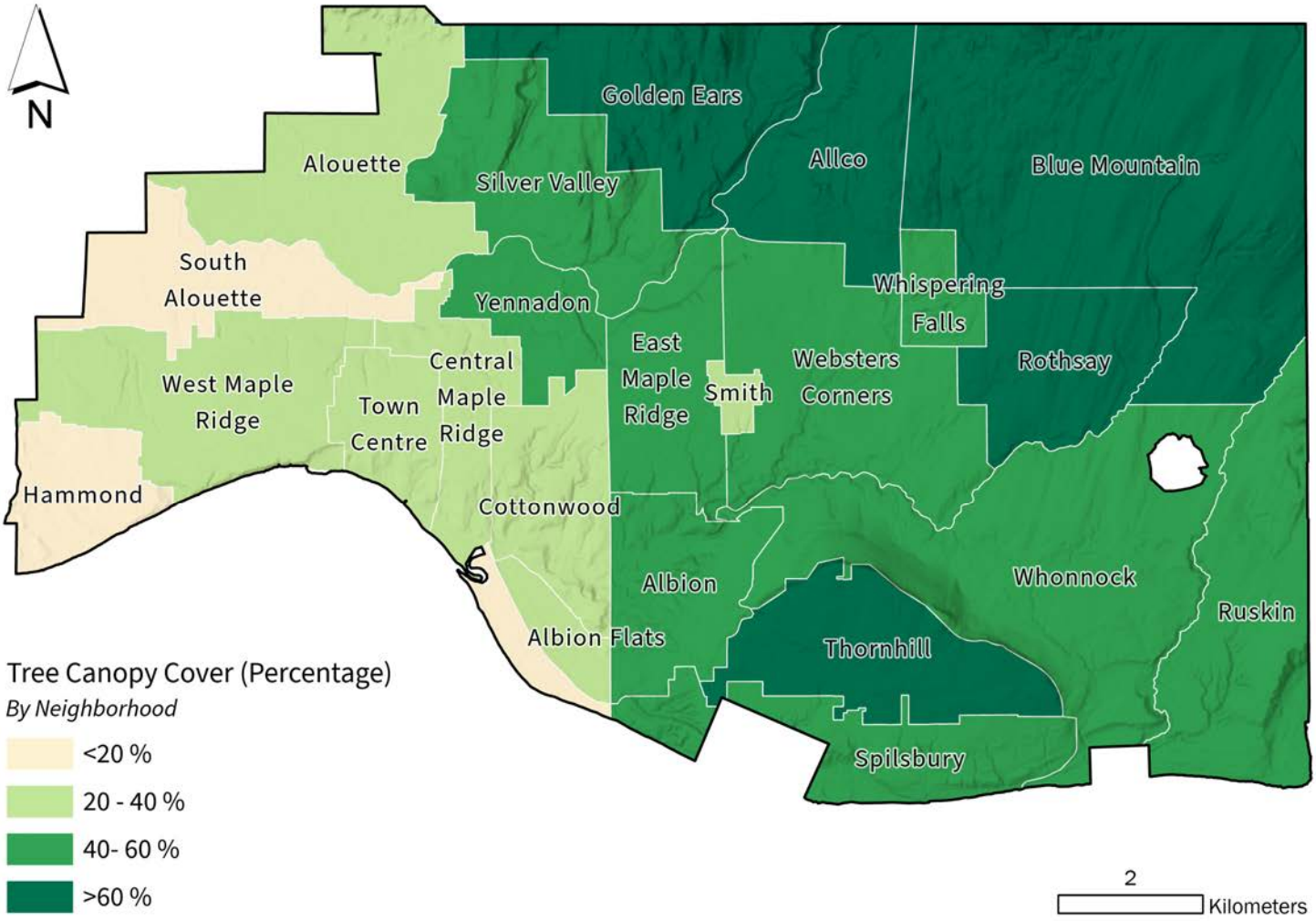


Figure 17. Tree canopy by neighbourhood

Canopy change over time

Canopy cover changes over time as trees are planted, grow, die, or are removed. Areas with canopy change were mapped using multiple years of satellite images (Figure 18 and Figure 19). Canopy loss is mapped from 2001 to 2022, while canopy gain is only mapped for 2022 due to data availability. Much of the loss and gain visible in the non-urban area is due to forestry or agricultural activities rather than land development. Loss and gain in the urban areas is mostly due to land development.

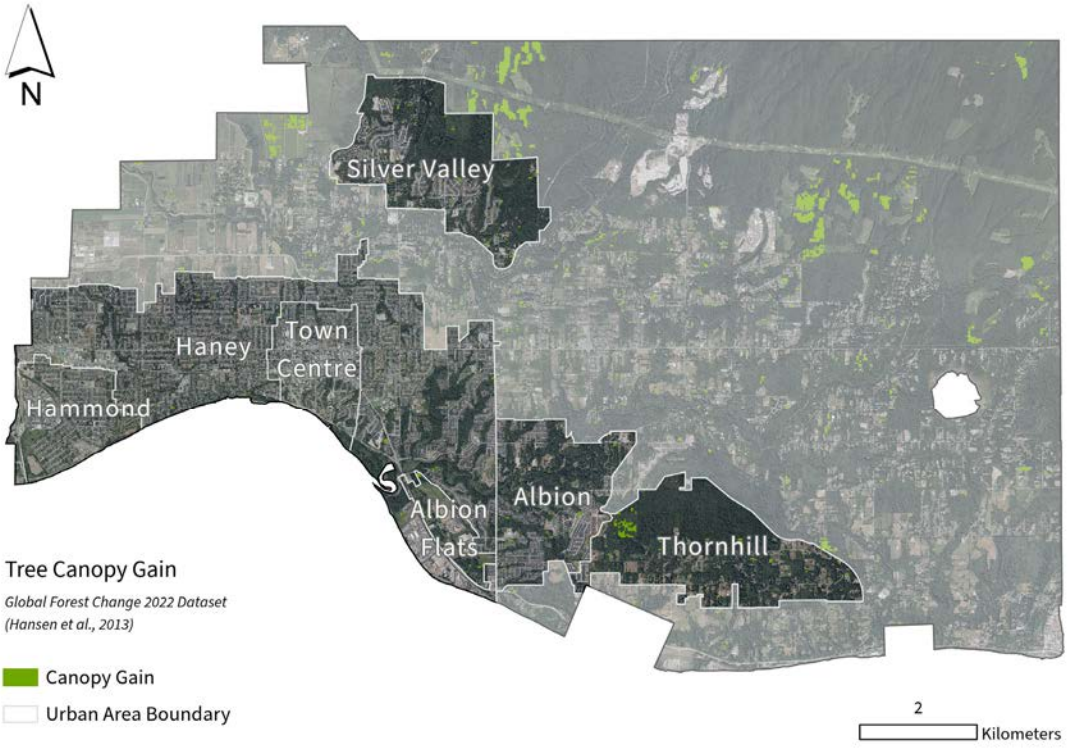


Figure 18. Canopy gain in 2022

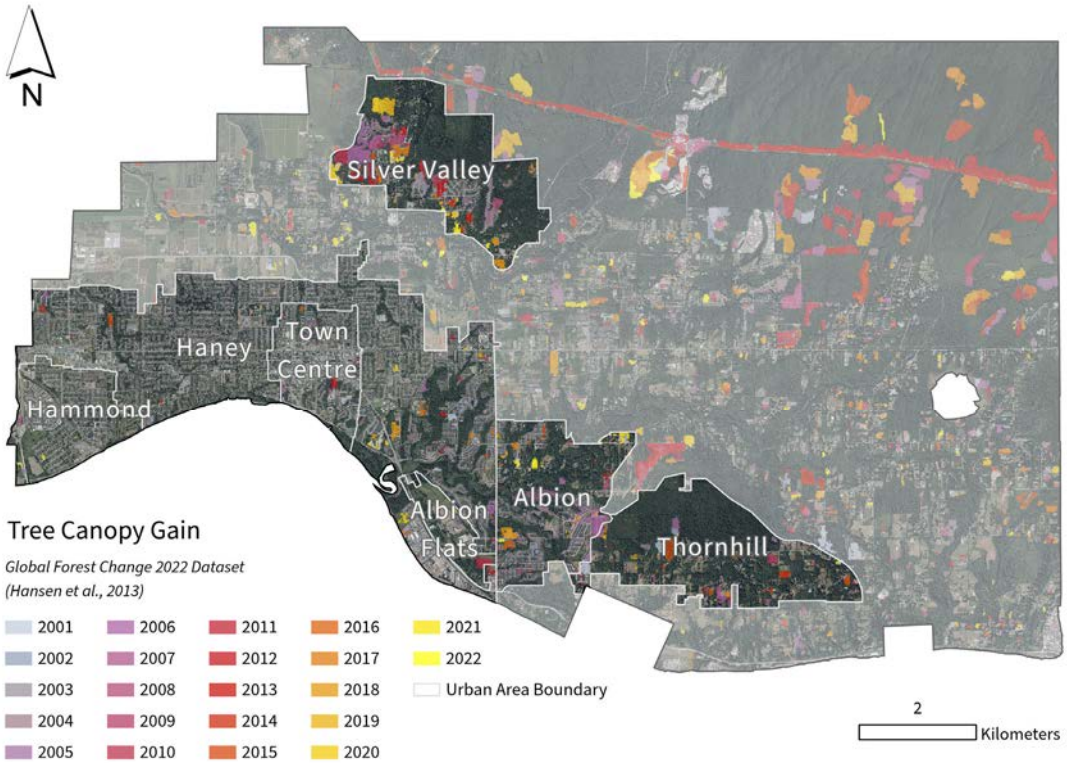


Figure 19. Canopy loss from 2001 to 2022

Satellite mapping suggests that Maple Ridge has experienced more canopy loss in urban areas overall than gain, primarily in Silver Valley (Figure 19). Since 2001, approximately 246 hectares of canopy was mapped as loss (Figure 20). The satellite mapping is coarse and therefore only shows large scale (> 1 ha) areas of loss or gain. As a result, these maps would underestimate the gain from urban tree planting post-development.

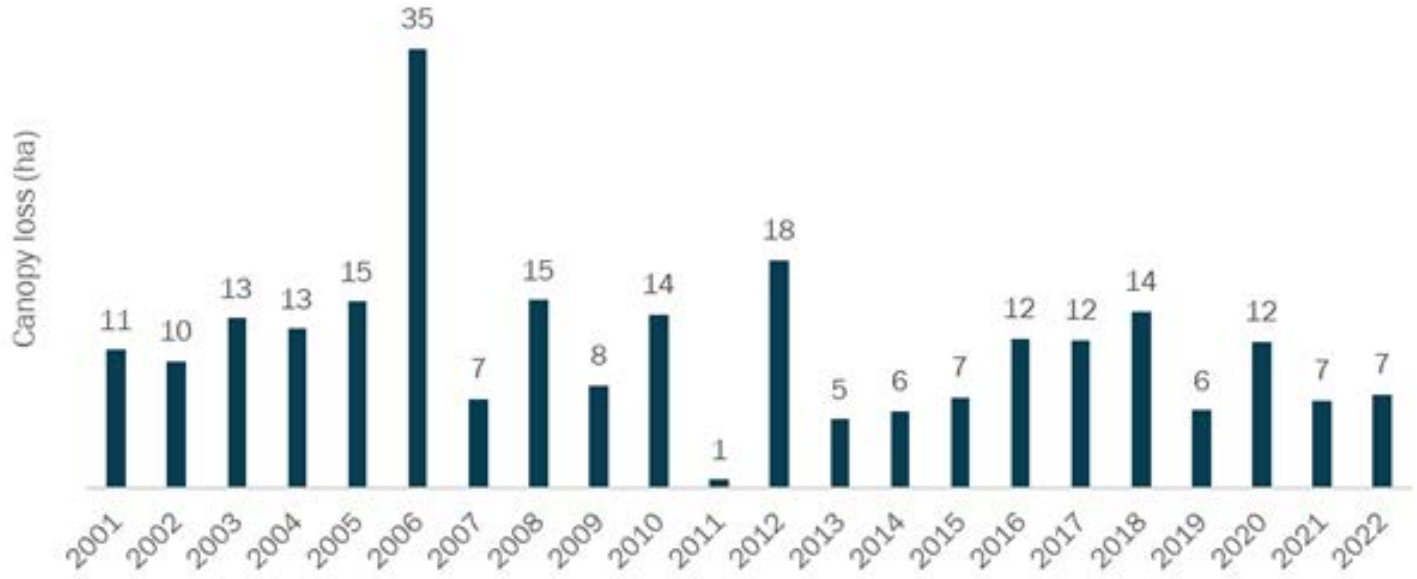


Figure 20. Extent of canopy loss within urban areas by year

Canopy change through the development process

The maps below illustrate how canopy loss and gain can be impacted by development. Initially, forested land that is cleared for development loses canopy. Once built, trees are planted as part of landscaping requirements. Initially, the trees are small and do not contribute much canopy cover. However, as these trees grow, the canopy gradually increased from 24% in 2016 to 27% by 2022. While development does often result in tree removal, it also creates opportunities to recover and grow canopy by creating planting sites and applying best management practices to support tree health and growth.

2011
Canopy cover (visual assessment*): 35%

*due to lack of data

2016
Canopy cover (i-Tree estimate): 24%

2022
Canopy cover (i-Tree estimate): 27%

Urban forest structure

Tree type

Maple Ridge's urban forest is primarily coniferous, accounting for 71% of the total canopy area (Figure 21). Coniferous trees and forests are more abundant outside urban areas or in parks, especially in federal or provincial-owned native forest stands, while deciduous trees are more abundant in urban areas, especially on City-owned and privately-owned land.

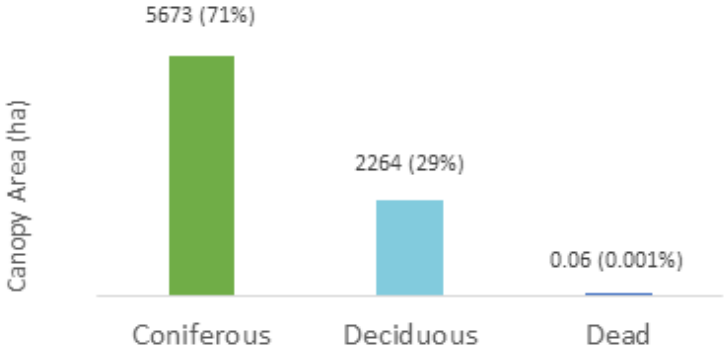


Figure 21. Canopy area by forest class

Tallest trees

Maple Ridge is home to some exceptionally tall trees. Trees over 50 metres in height make up roughly 3% of the tree population. The tallest tree in Maple Ridge stands at over 70 meters in height, making it taller than the 13-story Baptist Tower – the tallest building in Maple Ridge. Tall trees are found in mature forests along streams, in parks and conservation areas, especially in Silver Valley, Golden Ears, and Blue Mountain.

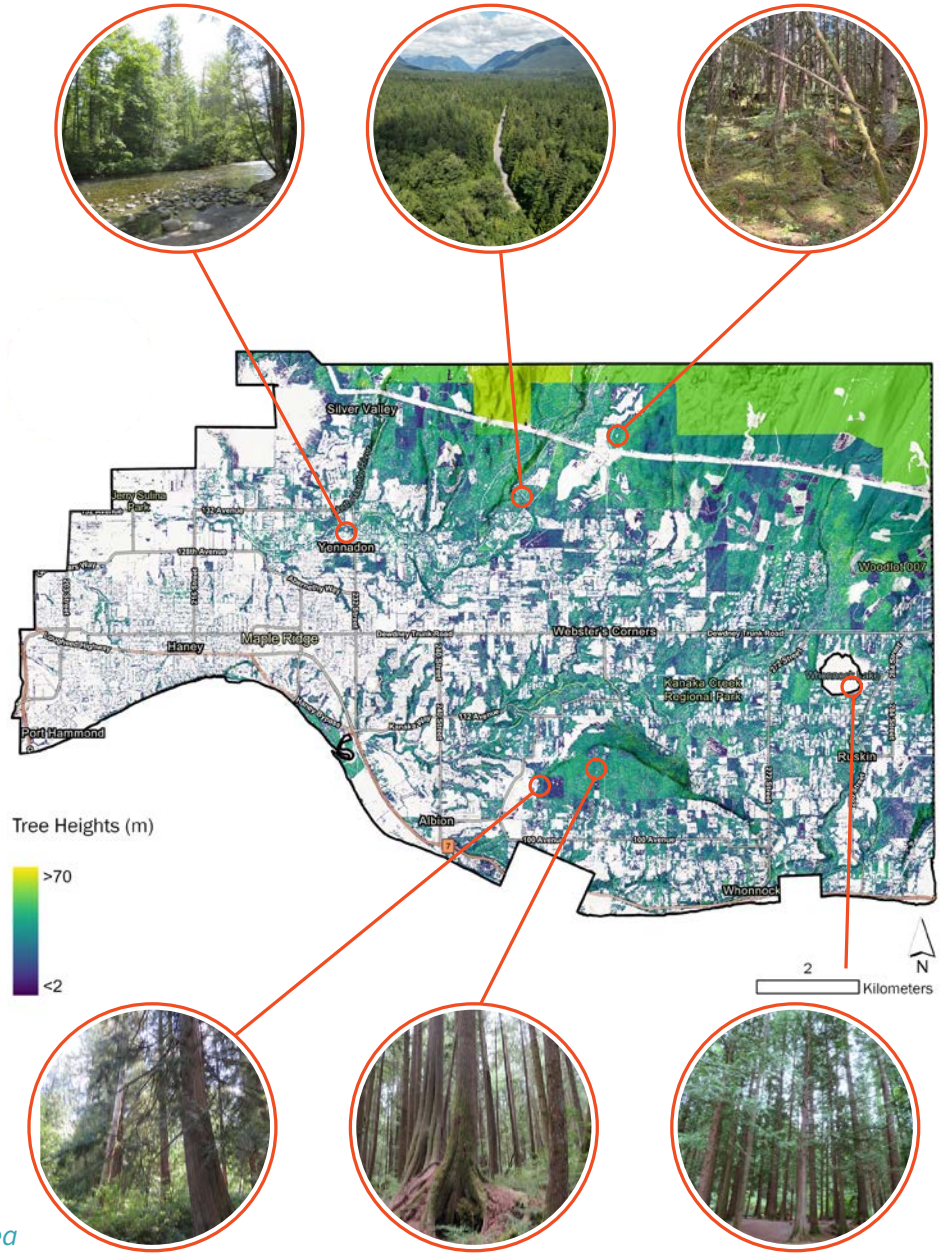
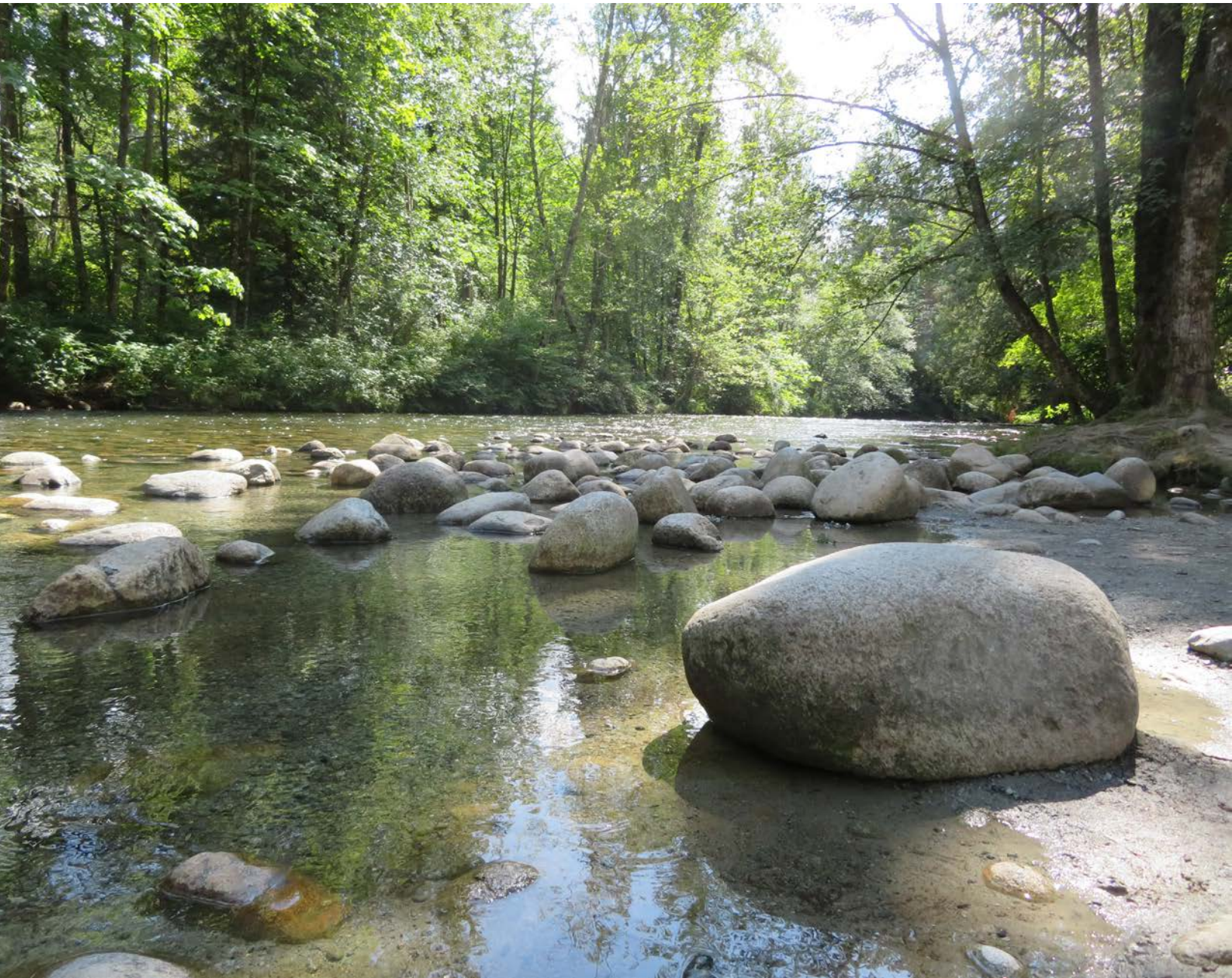


Figure 22. Tree heights within the OCP area

Structure by OCP land use in the urban area

The structure of Maple Ridge's forest varies by land use within the urban area. Agriculture and park land uses tend to have a high count of tall trees, likely because these lands have older forest areas that have not been recently disturbed (Figure 23). Medium density land use also has a high proportion of tall trees because a large proportion of the land use includes undeveloped forested land. Commercial, industrial and low and high density residential land uses are dominated by small trees because of replanting with development or regeneration following disturbance. Public land uses including schools, cemeteries, hospitals, and other institutional land uses contain trees of quite varied sizes.

These different forest structures provide insight into how the forest may change in the future. For example, canopy cover in low and high density residential areas is likely to continue to increase as young trees grow in size. By contrast, canopy cover in medium density residential areas is likely to decrease because tall trees will be impacted when forested areas are developed. Canopy cover targets need to account for these changes and predict the impact of future planting on the tree canopy in each of these land uses.



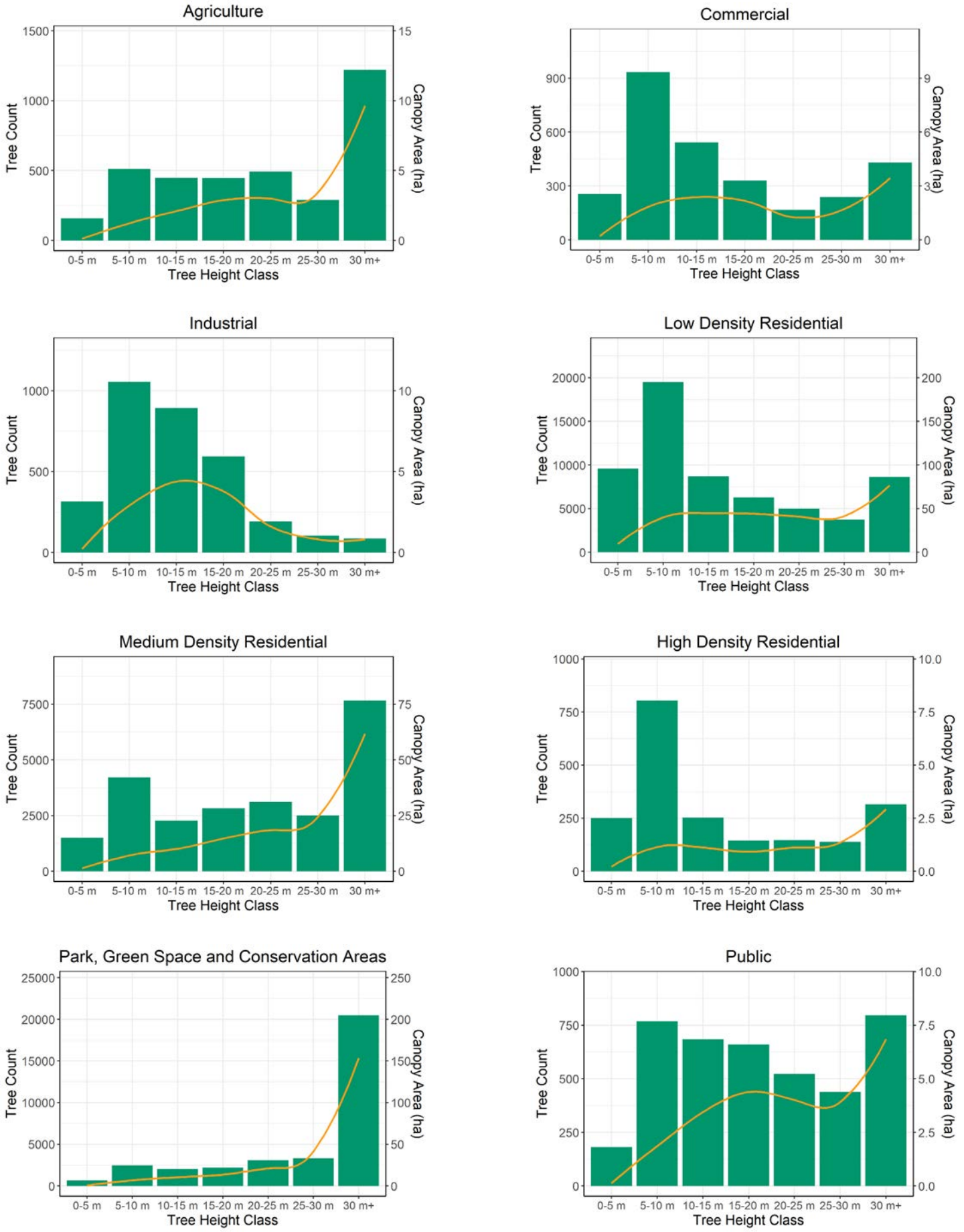


Figure 23. Forest structure plots of tree counts and canopy area by height class

Tree inventory

The City of Maple Ridge is in the process of updating its tree inventory. As of July 2023, the City maintains an inventory of 14,303 street and ornamental park trees. It is important to note that this inventory, while extensive, only covers a small fraction of the urban forest in the City because it does not include trees in forest stands. Inventory data also contains notable data gaps in Diameter at Breast Height (DBH, a measure of tree trunk size) (92% missing), condition rating (64% missing), and age information (3% missing). Therefore, the information presented in the following may not be an accurate reflection of Maple Ridge's street and park trees' conditions.

Maple Ridge has a diverse urban forest, with over 270 tree species across 70 genera recorded in its current inventory. The most common genera are maple (Acer), cherry (Prunus), sweetgum (Liquidambar), mountain-ash (Sorbus), and hornbeam (Carpinus) (Figure 24). At the species level, red maple is over-represented at 24% of the inventory. The dominance of maple, and particularly red maple, in the inventory is a vulnerability because it increases the risk of widespread damage from pests or diseases that specifically target maples.

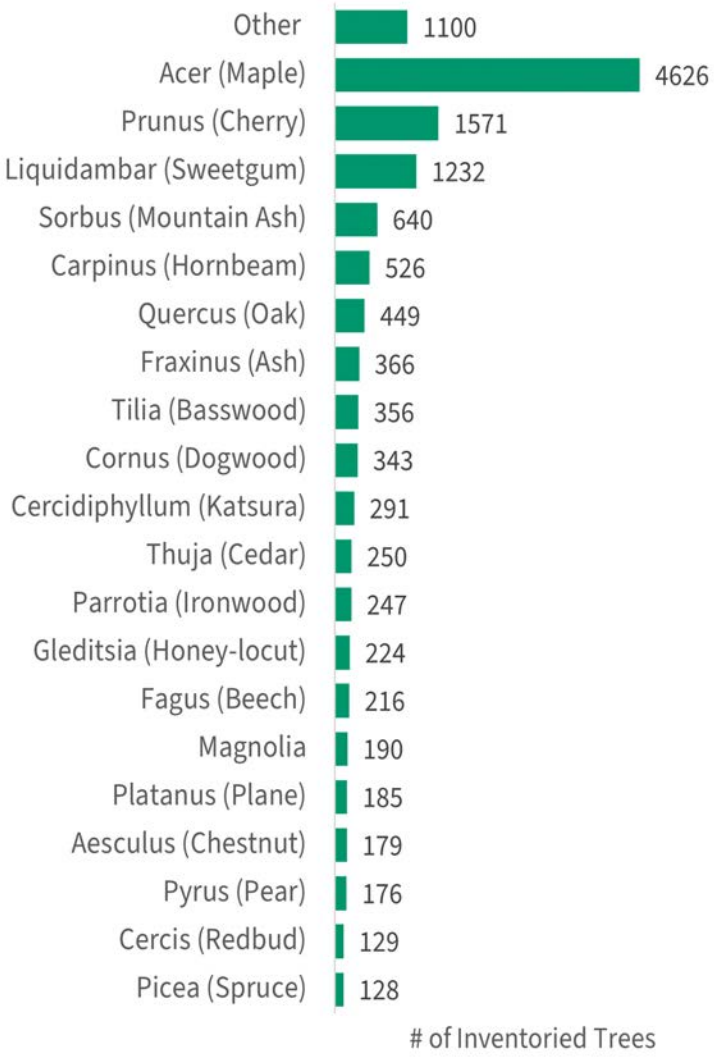


Figure 24. Counts of trees by genus

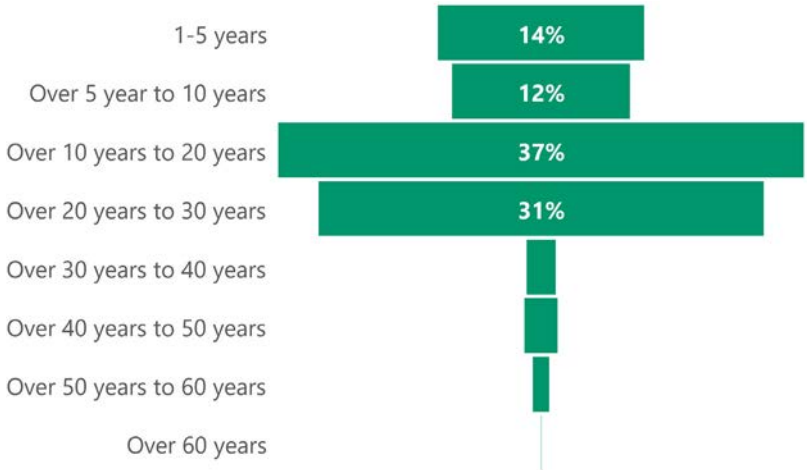


Figure 25. Approximate time of planting for trees in the inventory

In terms of age, inventoried trees are relatively young, with 68% planted within the past 10 to 30 years (Figure 25). Only 6% are older specimens, primarily found in parks in West Maple Ridge. Older trees tend to provide more canopy cover, and more benefits overall, but it is also important to have a high proportion of young trees in the population to ensure a relatively stable canopy cover over the long term. Ideally, Maple Ridge should see a higher proportion of trees enter older age classes as time passes.

Forest stands on and near City-owned lands

Forest stands on and near City-owned lands were mapped to identify large, predominantly municipally managed forest patches in Maple Ridge. Forest patches over 0.5 hectares in size located on or within 200 metres of a City-owned parcel are shown in Figure 26 and Figure 27. A total of 1,676 ha of forest stands comprised of 68% coniferous and 32% deciduous trees were found on or adjacent to City-managed lands.

The majority (71%) of these forest stands are mature, coniferous stands located outside the urban areas (Figure 27). Wihtin the urban area, most forest areas are deciduous or mixed and classified as young forest less than 80 years old. Though previously logged, these forests are characterized by large coniferous trees and shade-tolerant understory vegetation where canopy opens up. The remaining forests (478 hectares, 28%) are young and transitioning to mature stages, characterized by a more open forest canopy and distinct layers.

Many forest stands on and near City-owned lands are also environmentally sensitive areas that support locally and regionally important biodiversity and connect to other conservation lands, Regional and Provincial Parks.

Based on the mapped tree height, these stands can further be categorized into three successional stages:

- **Young and short stands**: approximately 10 to 25 meters tall, and usually are 20-45 years old. These stands usually feature self-thinning, canopy opening, and height differentiation.
- **Young and tall stands**: approximately 25 to 35 meters tall, and generally taller and denser than the young and short stands. More coniferous trees can be found in young and tall stands. They tend to be more mature and can extend to approximately 80 years old or more.
- **Mature stands**: approximately 35 to 45 meters tall and generally over 80 years old. Trees in mature stands are well established and large in size.

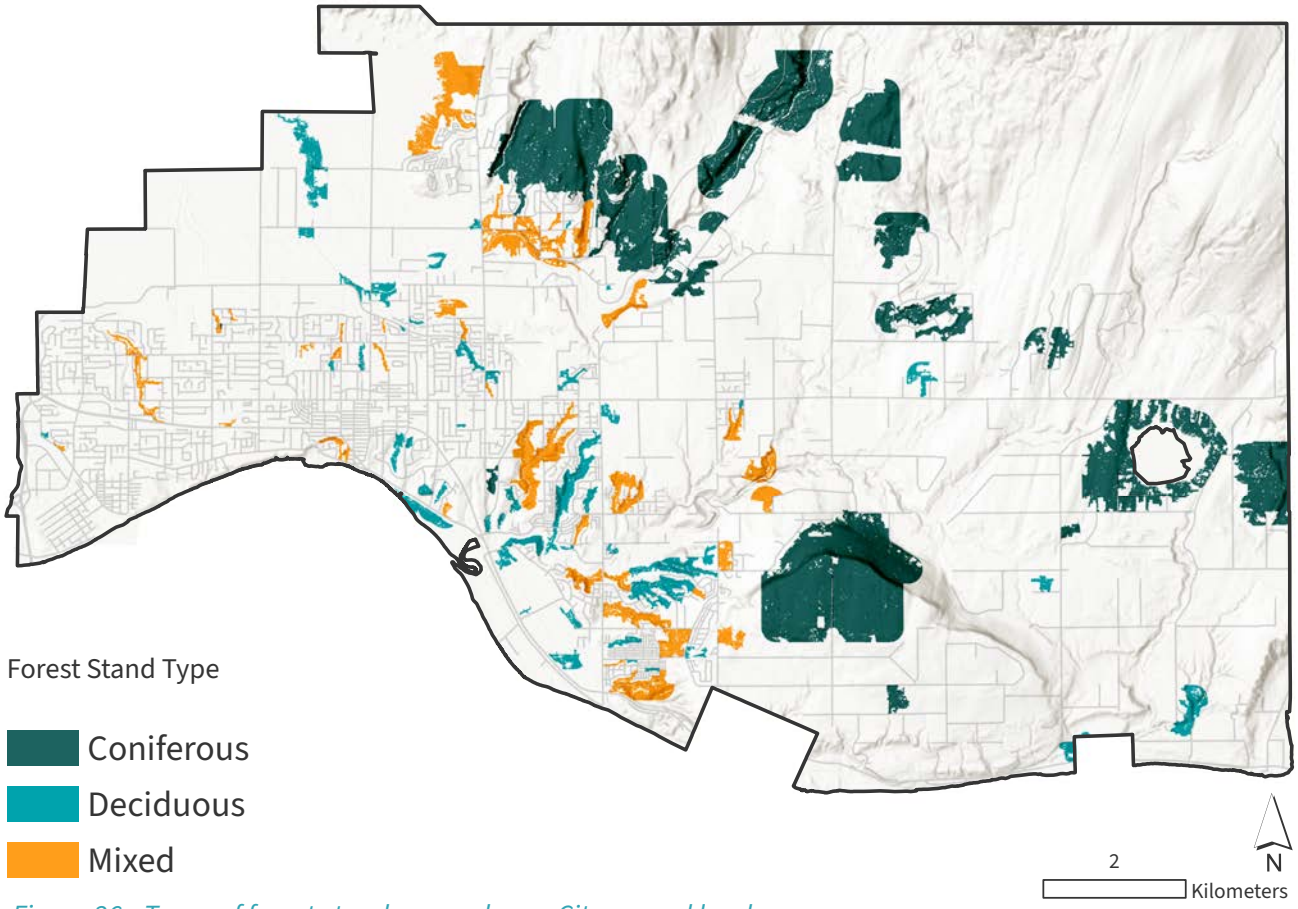


Figure 26. Types of forest stands on and near City-owned lands

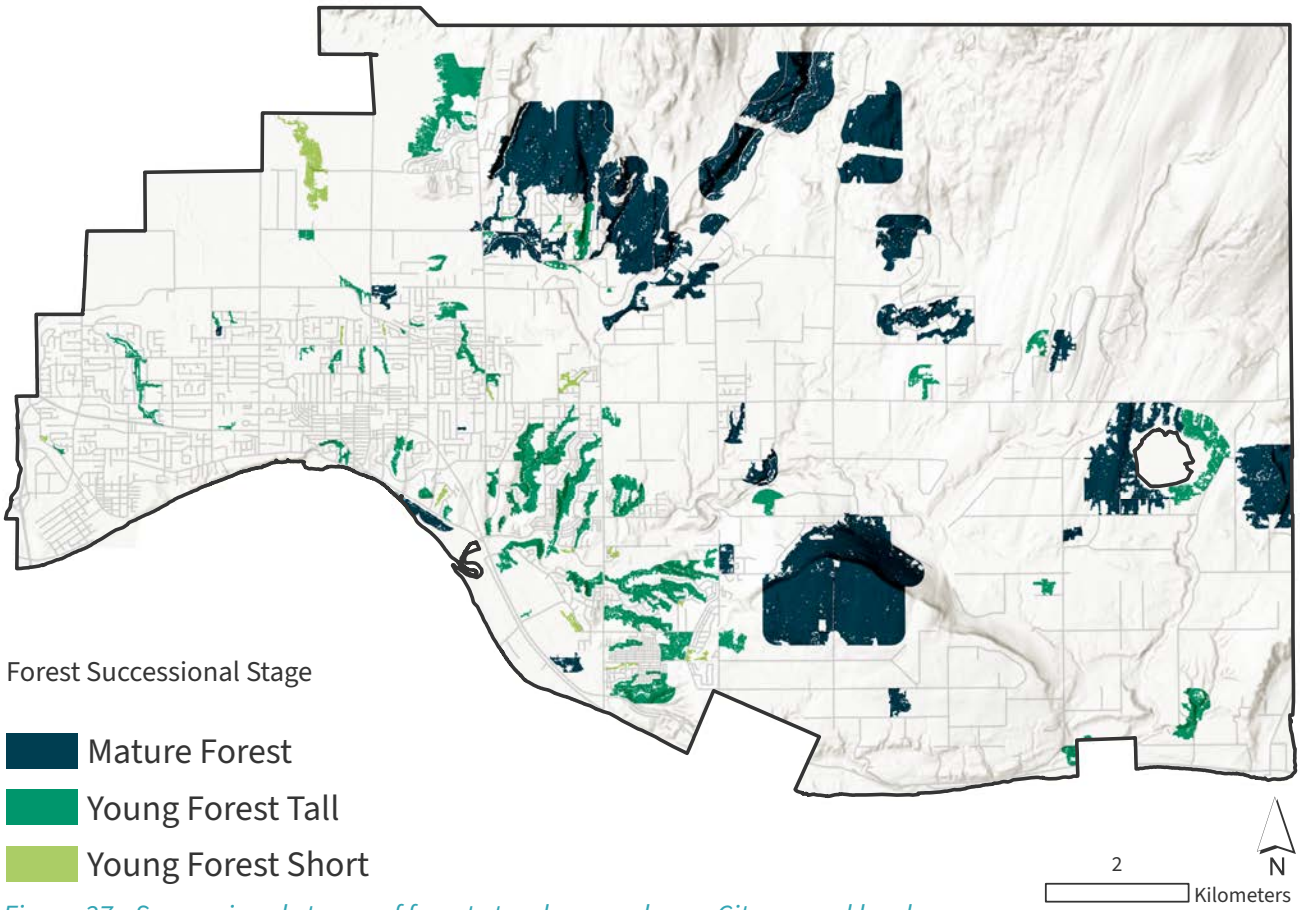


Figure 27. Successional stages of forest stands on and near City-owned lands

Metro Vancouver Nature and Ecosystems Roadmap

Metro Vancouver's ecosystems play a crucial role in the region's cultural, spiritual, and environmental fabric, contributing significantly to its livability and biodiversity. However, these ecosystems face threats from climate change, compounded by factors such as land development and invasive species. Metro Vancouver's Nature and Ecosystems Roadmap outlines 31 actions to protect and enhance the region's ecosystems organized under five strategic areas:

- Protecting, restoring, and enhancing the region's ecosystems;
- Connecting green infrastructure;
- Integrating natural assets into conventional asset management and decision-making processes;
- Supporting a resilient, robust, and healthy urban forest; and
- Advancing nature-based solutions to climate change.

The Roadmap sets targets to protect 50% of the region for nature and achieve 40% tree canopy cover within the Urban Containment Boundary. The Roadmap emphasizes the importance of rapid implementation to prevent future ecosystem loss and degradation while maximizing long-term carbon storage, resilience, and other co-benefits. Currently, approximately 40% of the region's land is protected, primarily in the form of parks and publicly-owned lands for conservation or recreation.

The region's rich natural environment, from the Fraser River Estuary to diverse habitats like forests, wetlands, and watercourses, forms a mosaic supporting biodiversity, of which Maple Ridge is an important part. The following map provides an overview of area within the City boundary that are classified by Metro Vancouver as sensitive ecosystems. These areas include ecologically significant and sensitive ecosystems such as wetlands, freshwater reservoir, and old forests.

Ecosystem services valuation

Valuing the benefits that the urban forest offers to the community in financial terms is one way to represent the importance of critical natural resources and inform urban forest planning and management. Some of the ecosystem services that the urban forest provides have been valued using the USDA Forest Services' i-Tree Canopy (https://canopy.itreetools.org/) and i-Tree Eco tools (https://www.itreetools.org/tools/i-tree-eco). i-Tree Canopy estimates ecosystem services values based on mapped canopy areas, while i-Tree Eco estimates values using tree inventory data for individual trees.

The urban forest within the OCP boundary provides an estimated $145 million of cumulative services in carbon storage, and $22 million of annually recurring benefits from carbon sequestration, stormwater management and air pollutant removal.

The i-Tree Eco assessment estimated that inventoried trees provide $548,000 worth of services from carbon storage, and $43,037 worth of annual services from carbon sequestration, stormwater runoff interception, and air pollutant removal. The structural replacement value of inventoried trees is approximately $15.6 million, reflecting the cost of replacing the 14,303 trees of equivalent size.

It is important to note that these ecosystem services estimates only focus on selected services of carbon storage and sequestration, stormwater management, and air pollution removal, and not the full range of services trees provide. For example, the latest research supports that trees provide significant value in public health savings and cultural benefits that are difficult to quantify. Additionally, the i-Tree Eco estimates are based on the City's incomplete inventory data (as of July 2023) and would underestimate the total value of trees managed by the City.

Table 2. Results of i-Tree Canopy assessment

i-Tree Canopy			
Ecosystem Service	**Service Estimate**		**Dollar Value ($)**
C stored in trees (t)	**609,919**	**$**	**145,496,200**
C Sequestered in trees (t/year)	**20,477**	**$**	**4,884,700**
Avoided runoff (L/year)	**2,210,060,823**	**$**	**6,720,200**
Removed air pollutants (kg/year)	**699,381**	**$**	**10,329,700**
CO removed annually (kg/year)	6,191	$	11,700
NO2 removed annually (kg/year)	62,462	$	24,300
O3 removed annually (kg/year)	442,074	$	1,687,300
PM10 (kg/year)	130,559	$	1,161,400
PM2.5 (kg/year)	34,128	$	7,441,300
SO2 removed annually (kg/year)	23,969	$	3,700
Total Annual Service Value		**$**	**21,934,600**
Total Non-repeating Service Value		**$**	**145,496,200**

Table 3. Results of scoped i-Tree Eco assessment using only the population captured through the City's tree inventory

i-Tree Eco			
Ecosystem Service	**Service Estimate**		**Dollar Value ($)**
C stored in trees (t)	**2,282**	**$**	**548,000**
C Sequestered in trees (t/year)	**87**	**$**	**20,900**
Avoided runoff (L/year)	**7,230,000**	**$**	**16,800**
Removed air pollutants (kg/year)	**1,177.0**	**$**	**2,337**
CO removed annually (kg/year)	-		-
NO2 removed annually (kg/year)	193.7	$	40
O3 removed annually (kg/year)	940.5	$	1,288
PM10 (kg/year)	-		-
PM2.5 (kg/year)	21.1	$	1,008
SO2 removed annually (kg/year)	21.7	$	2
Total Annual Service Value		**$**	**40,037**
Total Non-repeating Service Value		**$**	**548,000**
Total Structural Replacement Value		**$**	**15,600,000**

Tree equity

Equity is an important consideration in urban forest management because it explores how fairly the benefits of the urban forest, and related services, are distributed among people who need them. It is the concept that the urban forest and its benefits should be accessible to all residents, regardless of their socioeconomic status, race, or location. However, many cities' urban forests are not equitably distributed due to both past and present policies, land use and management decisions.

To assess tree equity, a metric developed by American Forests called the Tree Equity Score (TES)[29] was calculated by dissemination areas within the City of Maple Ridge. The calculation of TES considers:

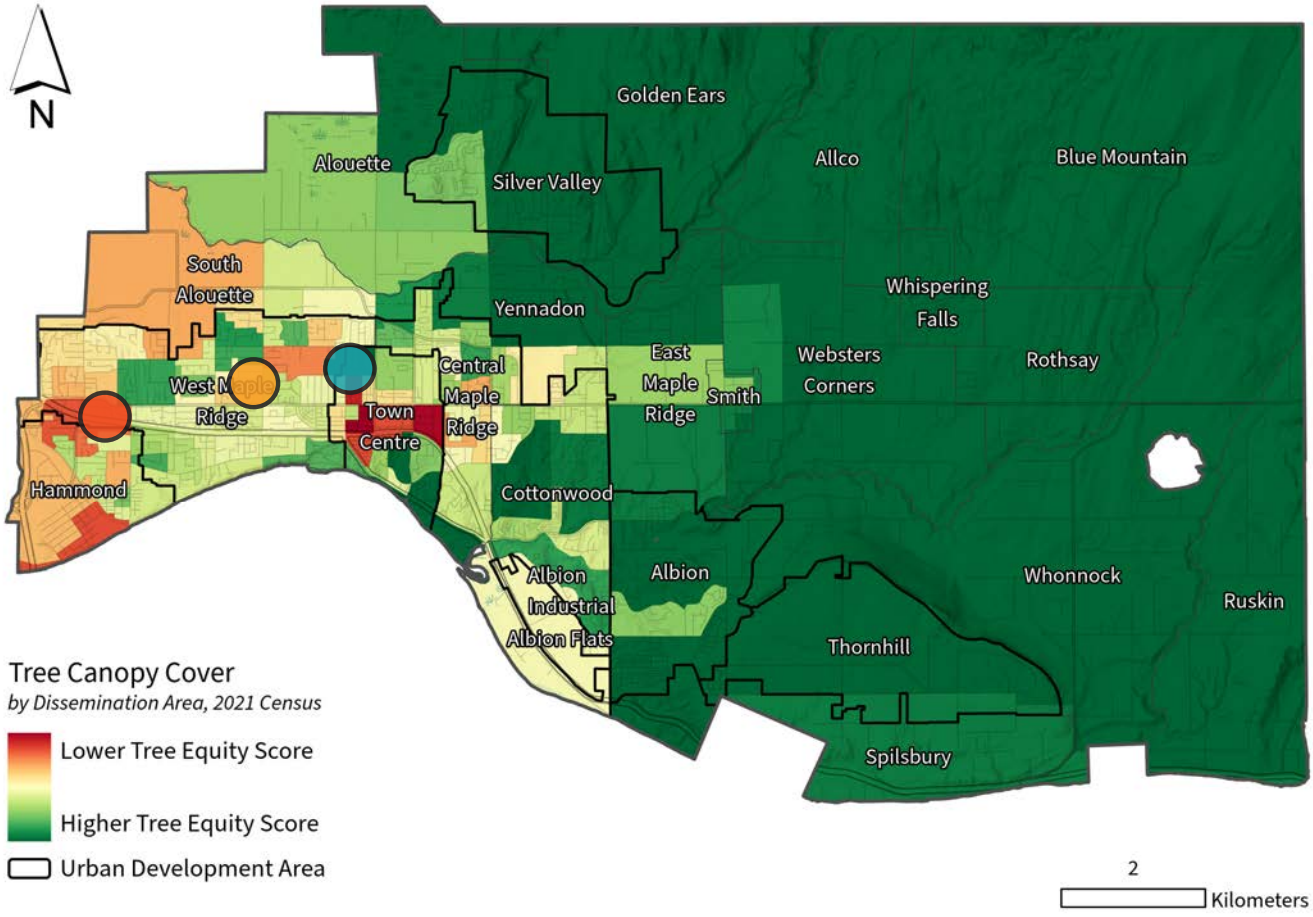
1. Tree canopy cover need (based on the gap between existing canopy cover and the canopy target)
2. Priority index (based on social factors relating to climate vulnerability, income, age, ethnicity, and employment) (Table 4)

Table 4. Priority index indicators used in the Tree Equity Score at the Census Dissemination Area Scale

Factor	Description
Climate	Average land surface temperature, as measured from remote sensing data
Income	Percentage of people living on incomes below 200% of the federally defined poverty line (< $40,000)
Age	Percentage of seniors (age 65+) and children (0-14)
Race and Ethnicity	Percentage of people who belong to visible minority groups, as defined by the Employment Equity Act and, if so, the visible minority group to which the person belongs
Employment	Percentage of the labour force that does not have a job, but are available and willing

A lower tree equity score means a greater need to improve tree equity.

Figure 28 illustrates tree equity score by dissemination area. Tree equity scores in Maple Ridge range from 58 to 100. Areas with scores of 100 indicate blocks with no canopy cover gap, while areas with lower tree equity scores indicate that there is a gap in tree canopy cover, and a population in need of more tree canopy. This information can inform where to prioritize implementation of this Strategy.



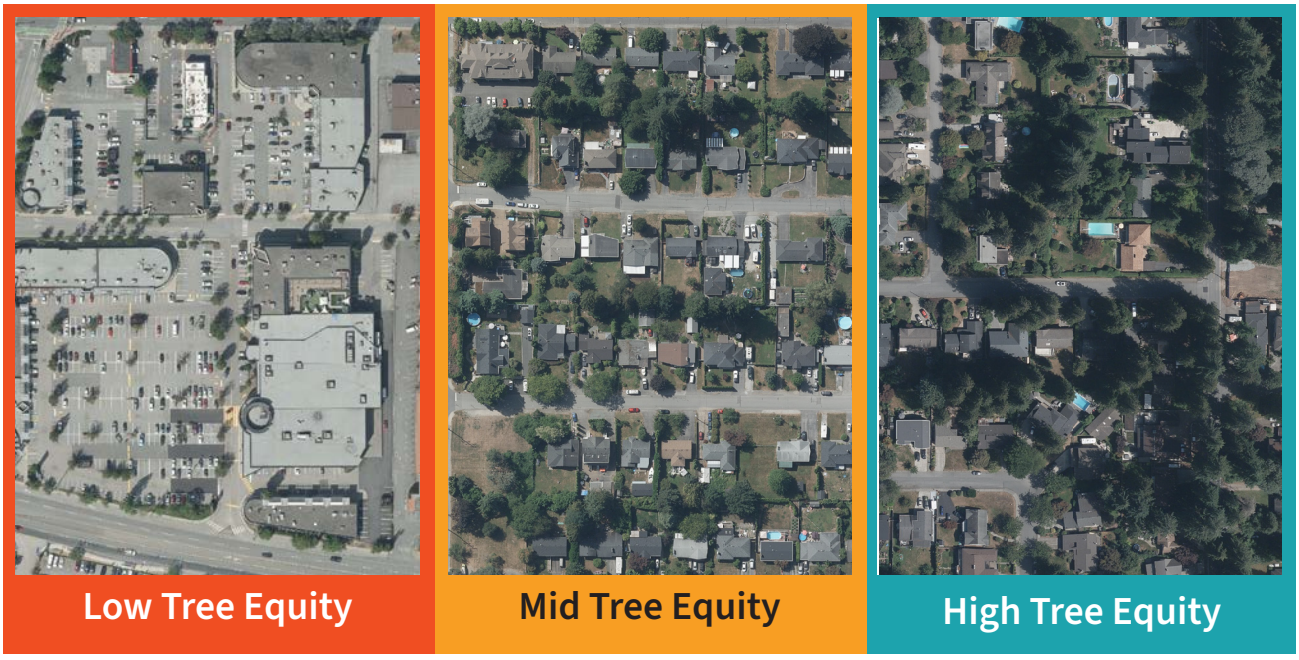


Figure 28. Tree equity scores for Maple Ridge by dissemination area using 2022 canopy cover and 2021 census data

Maple Ridge's efforts on increasing park equity

Maple Ridge's Parks, Recreation & Culture Master Plan is a comprehensive document that outlines the City's vision and strategies for delivering parks, recreation, cultural services over the next decade. The Plan has identified potential focus areas based on 11 key equity indicators, which are:

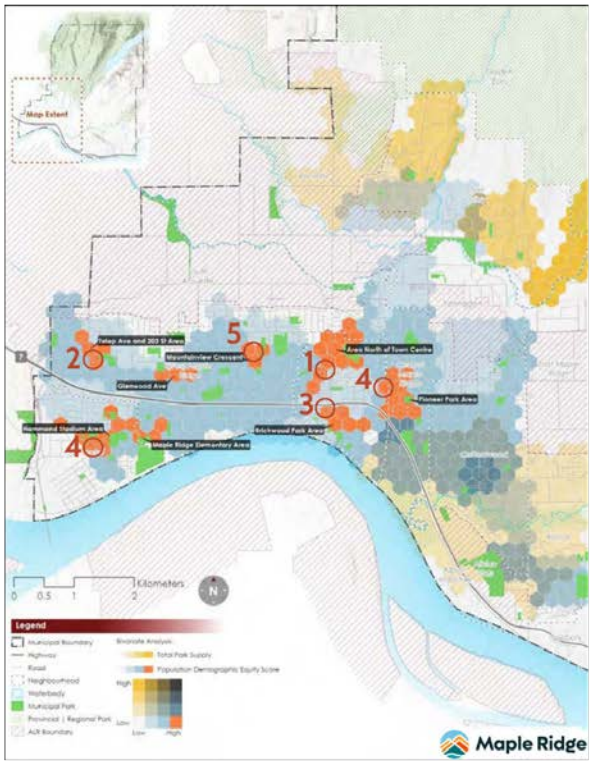
- Population density
- Projected Population Density (2031)
- Lone Parent Families Density
- Senior (Ages 70+) Population Density
- Aboriginal Identity Density (note: official Statistics Canada terminology)
- Recent Immigration Density
- Visible Minority Density
- Educational Attainment Density
- Median Household Income
- Labour Force Unemployment Density
- Tenure Rented Density

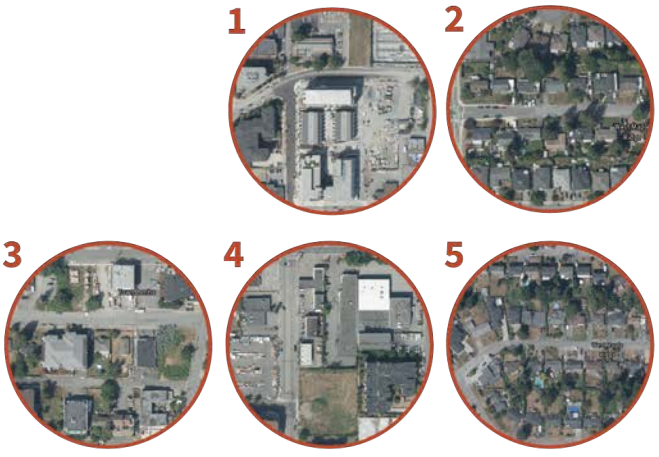
The park equity map illustrates areas characterized by varying levels of park supply, considering these equity indicators. Regions highlighted in orange signify areas with a higher concentration of equity-deserving groups but a relatively lower supply of parks. These areas require additional attention to enhance park supply, improve accessibility, and implement programs that foster stronger connections between the community and local parks.

Park equity, coupled with the tree equity score, provides information about where to increase tree canopy and park supply to improve equitable distribution and access to these resources. The map on the right provide some examples of priority areas with low levels of both park equity and tree equity. Incorporating equity is vital for enhancing community resilience to climate change and addressing other social and environmental challenges. It ensures that efforts to enhance parks and urban forest resources contribute to a more inclusive, healthy, resilient, and equitable community.

Examples of Priority Areas

with low park equity and tree equity





Tree canopy and urban heat

Climate vulnerability, assessed through land surface temperature, is an important consideration in calculating the tree equity score. Research has demonstrated that trees can effectively cool urban areas and mitigate urban heat islands, making cities more habitable and comfortable for residents, particularly during periods of extreme heat.

In the face of climate change, the frequency and intensity of extreme heat events are on the rise. The devastating heat dome experienced in late June and early July 2021, resulted in over 600 deaths and serves as a stark example of this reality. As climate change continues to bring more heat-related challenges, ensuring that communities have access to urban forests for cooling and other climate-resilience benefits becomes increasingly vital. Figures 29 and 30 illustrate the cooling effects of trees, underlining their importance in addressing climate vulnerabilities.

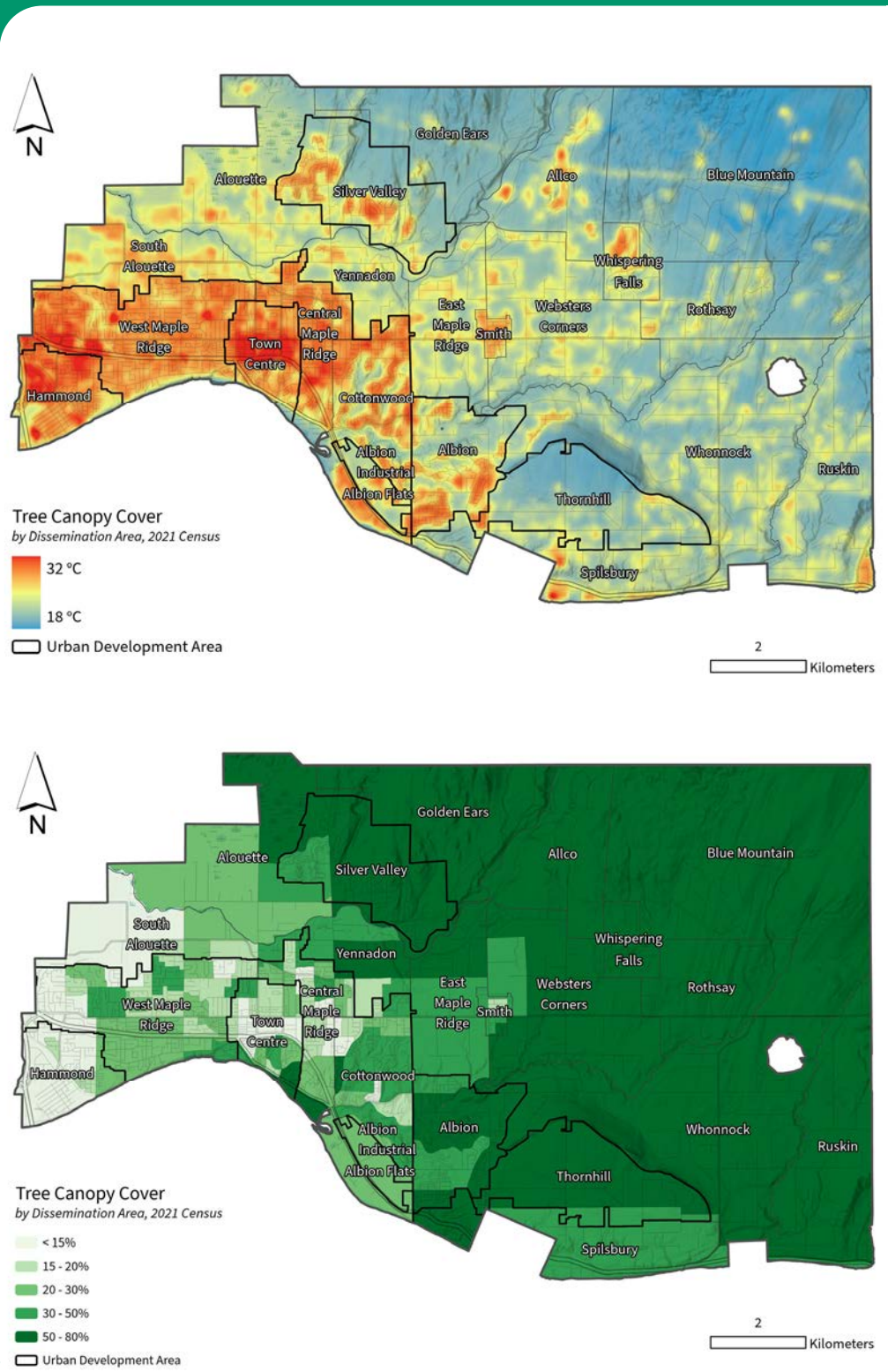


Figure 30. Tree canopy cover by neighbourhood area (based on 2021 census data)

4 Urban Forest Management Framework

Policies and plans that guide urban forest management

Urban forest management in the City of Maple Ridge is subject to a range of legislation, policies, standards, and guidelines. These policy tools help establish the strategic directions and framework that influence how trees and forests are managed within the city. This section provides an overview of the most relevant and critical documents informing urban forest planning and management in Maple Ridge:

1. Enabling legislation – gives cities the power to make regulations about trees
2. Guiding policies and plans – establish strategic visions and framework for Maple Ridge's trees, forests, and lands
3. Associated strategies – do not typically focus on trees and forests but influence the implementation and outcomes of urban forest policies
4. Bylaws and other policy tools – guide the implementation of the City's relevant guiding policies

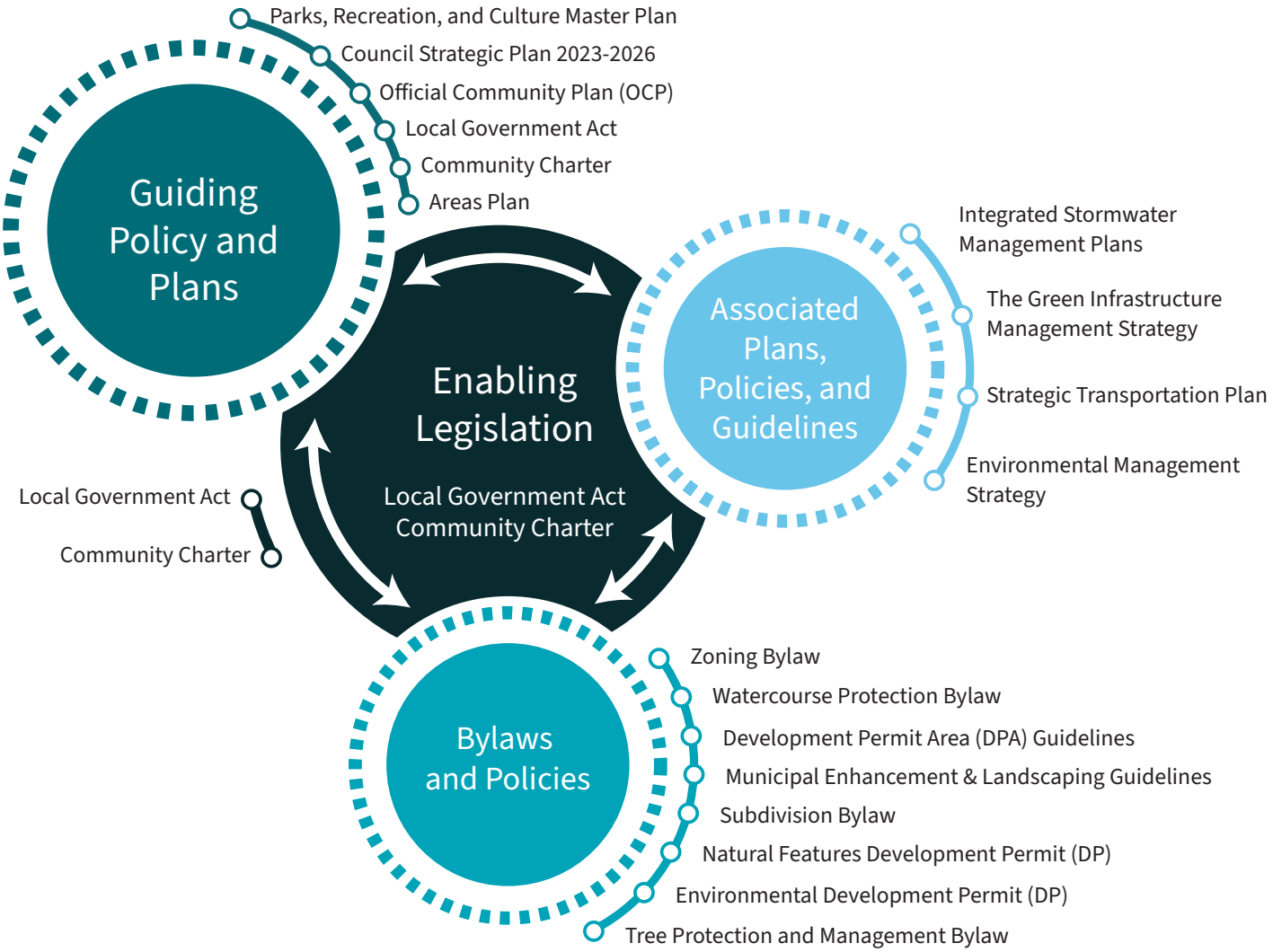


Figure 31. Policies and plans that guide urban forest management

Enabling legislation

In British Columbia, the Local Government Act and Community Charter grants municipalities authority to manage trees within their boundaries. This includes adopting official community plans which may include tree policies, passing bylaws to regulate tree removals, protection, and planting, and adjusting taxation and enforcing regulations.

Guiding policies and plans

Maple Ridge's **Official Community Plan (OCP)** outlines the long-term vision for the city's growth and development. It recognizes the importance of natural features, including trees and forests, in building the community's character and enhancing residents' quality of life and overall well-being. The OCP provides a range of goals and policies to promote and guide the preservation of mature trees, forests, soils, and vegetation. It also addresses the management of forests and woodland areas, enhancement of greenway corridors and connectivity, environmentally sensitive area protection, climate mitigation and forest fire hazard mitigation. These goals and policies provide a framework to guide the City's efforts on environmental protection and restoration while accommodating growth and development of the City.

The **Area Plans**, as part of the OCP, focus on unique contexts within designated areas, providing detailed guidelines for land use, density, form, character, and development pacing. Currently, Maple Ridge has Area Plans for four designated areas, including Albion, Hammond, Silver Valley, and Town Centre. Though each Area Plan may have distinct focuses, they all address issues relevant to urban forest management, such as preservation of existing trees and vegetation during development, creating landscaping areas, green space and corridors connecting parks and natural areas.

In 2023, the City of Maple Ridge endorsed the **Parks, Recreation, and Culture Master Plan**, a comprehensive document that outlines the City's vision and strategies for delivering parks, recreation, cultural services over the next decade. The Master Plan specifically recommends to "undertake an Urban Forest Management Strategy to more broadly guide preservation of the tree canopy in Maple Ridge and responsible recreation use of forested areas within the city". Additionally, the Master Plan includes other strategies and recommendations that will influence or facilitate the implementation of the Urban Forest Management Strategy. For example, it recommends developing a Park Acquisition Strategy and sustaining Neighbourhood Park provision at 0.69 hectare per 1,000 residents.

The **Council Strategic Plan 2023-2026** outlines the City's collective vision and priorities over the next four years. It recognizes the importance of a healthy natural environment and the vital role of tree sand forests in Maple Ridge. The Plan also emphasizes the imperative to protect the health of the natural environment as a strategic priorities, Climate Leadership and Environmental Stewardship.

Associated strategies

The **Environmental Management Strategy**, initiated in 2012 as directed by the OCP, aimed at preserving and enhancing Maple Ridge's natural assets. The Strategy includes goals and strategies supportive of protection and management of trees in Maple Ridge. Developing a Tree Protection and Management Bylaw is one of the high priority actions.

The **Green Infrastructure Management Strategy** aims to provide a roadmap for incorporating green infrastructure into various aspects of city planning and management, such as municipal operations, capital projects, area plans, and development design practices. The urban forest is recognized as existing natural/green infrastructure assets. The Strategy include specific actions supportive of urban forest management, such as evaluating natural capital services (ecosystem services) offered by green infrastructure and drafting municipal asset management policy that integrate green infrastructure along with traditional capital assets in capital investment decisions and municipal finance planning.

The **Integrated Stormwater Management Plans** provides a comprehensive review of watersheds and drainage systems in Maple Ridge, as well as guidance and information on protecting and enhancing the overall health and natural resources of these watersheds and drainage systems. These plans recognize green infrastructure (including trees) as an integral part of sustainable stormwater management and present recommendations specifically relevant to the urban forest, such as retrofitting street trees in developed areas to reduce runoff, especially during wet winter months.

The **Strategic Transportation Plan** is a strategic document providing guidance on Maple Ridge's transportation policies and infrastructure investment over a 30-year period. It recognizes the traffic calming effect of street trees and other features and includes provisions for streetscape and pedestrian realm enhancement to promote active transportation.

How trees are regulated in Maple Ridge - Bylaws and other policy tools

Refer to Appendix 1 for more detail.

KEY

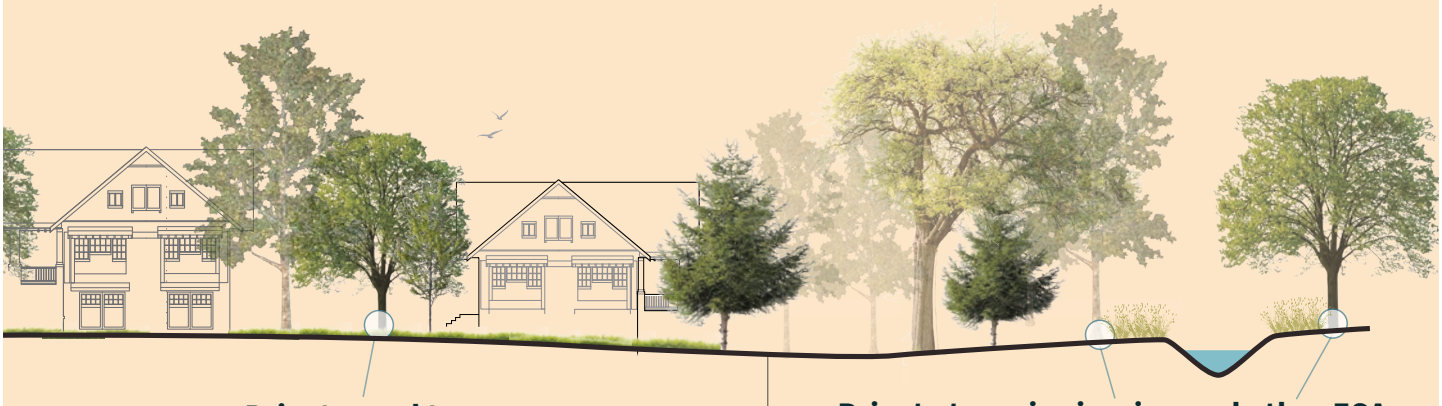
Public | Private

Urban forest management theme	Trees in City-owned forests and other conservation areas	Trees in landscaped parks	City-owned street trees
Planting new trees	Trees are occasionally planted in conservation areas as stewardship opportunities arise.	New trees are planted in parks as they are built and developed.	Street trees may be planted by a developer as required during subdivision, following the **Subdivision Bylaw**. Exemptions may be given to development in rural areas. **Subdivision Bylaw**, **Street Tree Specifications**, and **Design and Construction Documents** defines the installation specifics such as tree size, type, and location, as well as soil type, volume and quality.
Protecting trees	**Tree Protection and Management Bylaw** protects trees of 20 cm DBH or higher in Conservation Area or on City owned properties.	The **Tree Protection and Management Bylaw** forbids removal or damage of any park trees or trees on a highway unless the work is undertake by or on behalf of the City.	**Tree Protection and Management Bylaw** forbids removal or damage of any street trees unless the work is undertake by or on behalf of the City. Tree protection fencing is required for newly planted trees by developers during or prior to construction, as required by the **Street Tree Specification**.
Replacing trees	No formally adopted policy guides the replacement of trees in City-owned forested land or conservation areas.	No formally adopted policy guides the replacement of trees in landscaped parks.	**Street Tree Specifications** specifies that developers shall replace all trees that die, are damaged, or have failed to grow satisfactory as determined by the Certified Arborist during the warranty period.
Maintaining trees	**Infrastructure Inspections Policy Manual** defines inspection area, cycle and priority for trees in parks and along streets and trails.	**Infrastructure Inspections Policy Manual** defines inspection area, cycle and priority for trees in parks and along streets and trails.	**Subdivision Bylaw** requires a minimum 1 year of maintenance period by developers before handing over to the City. **Infrastructure Inspections Policy Manual** defines inspection area, cycle and priority for trees in parks and along streets and trails.

How trees are regulated in Maple Ridge - Bylaws and other policy tools

KEY

Public | Private



Private yard trees	Private trees in riparian and other ESAs
Zoning Bylaw defines the minimal % of lot area to be landscaped with a permeable surface, as well as other tree planting related requirements for landscaping and screening purposes (e.g., planting native, water-conserving species, max. spacing of trees, and dimension of landscape strip by land use)	The Municipal **Enhancement and Landscaping Standards** specify guidelines on landscaping and planting to be followed by developers and contractors, as part of the **Environmental Development Permit** requirements.
The **Tree Protection and Management Bylaw** restrict tree removals based on lot size and tree density. For lots smaller than 0.5 ha, removals of "permit trees", "significant tree" and vegetation in a **Significant Tree Stand** requires a tree permit. For lots larger than 0.5 ha, tree permits are required if there are fewer than 40 trees per ha on site. Trees larger than 70cm in DBH is more strictly protected. For sites with large-scale development/clearing, **Tree Protection and Management Bylaw** may require an arborist report or a tree management plan. Other plans, such as Groundwater Impact Assessment, may be required as per the site condition. Tree protection barriers and fencing are required by **Tree Protection and Management Bylaw**. **Zoning Bylaw** also specifies requirement on tree and shrub protection.	**Environmental** (including **Natural Features and Watercourse Protection**) **Development Permit (DP)** applies to development on site with natural features or in environmentally sensitive areas and may impose additional requirements, such as a tree review, an environmental impact assessment or an arborist assessment on unique or mature tree stands or where tree stands have an average DBH > 25cm within environmental DPAs outside of setback areas. The **Tree Protection and Management Bylaw** forbids removing trees of any size in Conservation Area without a tree permit.
Replacement planting is required by the **Tree Protection and Management Bylaw** according to the size of removed tree(s). Cash-in-lieu is required if replacement planting is not feasible. Incentive for tree retention on lots larger than 0.5 ha. **Zoning bylaw** allows density bonus for RS-2 Single-detached suburban residential for tree preservation via park dedication.	Replacement planting is required by the **Tree Protection and Management Bylaw** according to the size of removed tree(s). Cash-in-lieu is required if replacement planting is not feasible. Incentive for tree retention on lots larger than 0.5ha. The **Environmental DP** application may require tree management strategy including replacement and enhancement of removed/damaged trees within DPAs.
Tree Protection and Management Bylaw forbids topping of trees except for special circumstances and requires verification by City Arborist before permitting removal of a hazardous tree.	Trees of any size can't be pruned without a Tree Permit The **Environmental DP** application process requires a 3- to 5-year maintenance agreement for replaced trees.

Urban forest management program

The Facilities, Parks and Properties department within the Parks, Recreation & Culture Division manages the City's street and park tree assets. These assets include over 14,000 intensively managed trees along streets and in parks, 210 hectares of tree canopy in municipal parks, 295 hectares of tree canopy shading over streets, and 695 hectares of canopy found on other City-owned properties. The core urban forestry team consists of an urban forestry supervisor, a field arborist, and a grounds worker. Together, they are responsible for tree planting, young tree care, emergency and hazard mitigation, service call responses, risk inspections, and tree removals on City-owned properties, including street rights-of-way, municipal parks, and other City-owned land.

PROGRAM OVERVIEW

CONTEXT

Population: 90,990
(2021)

Land area: 268 km^2

Density: 340 per km^2

ASSETS BEING MANAGED

14,303
inventoried street and park trees

~215 km
trails

295 ha of canopy over
roads

210 ha of canopy in
city parks

295 ha of canopy over
other city properties

RESOURCE AND CAPACITY

3 core urban forestry staff

1 urban forestry supervisor

1 field arborist

1 grounds worker

Approx. Annual Operational Budget

$385,000
(annual average, excluding staffing costs)

Budget Average per Person

$4.2

The City receives an average of 808 tree related service requests per year, based on data from 2018 to 2022. A significant proportion of these service requests are related to boulevard trees (accounting for 39%-49% of the total received service requests), green belt trees (21%-31%), and park trees (23%-27%). The volume of tree related service requests has been increasing steadily since 2018, reaching its peak in 2021. During the same period, the proportion of boulevard tree-related requests has been on the rise, while the percentage of greenbelt or parks has remained stable or slightly decreased (Figure 33).

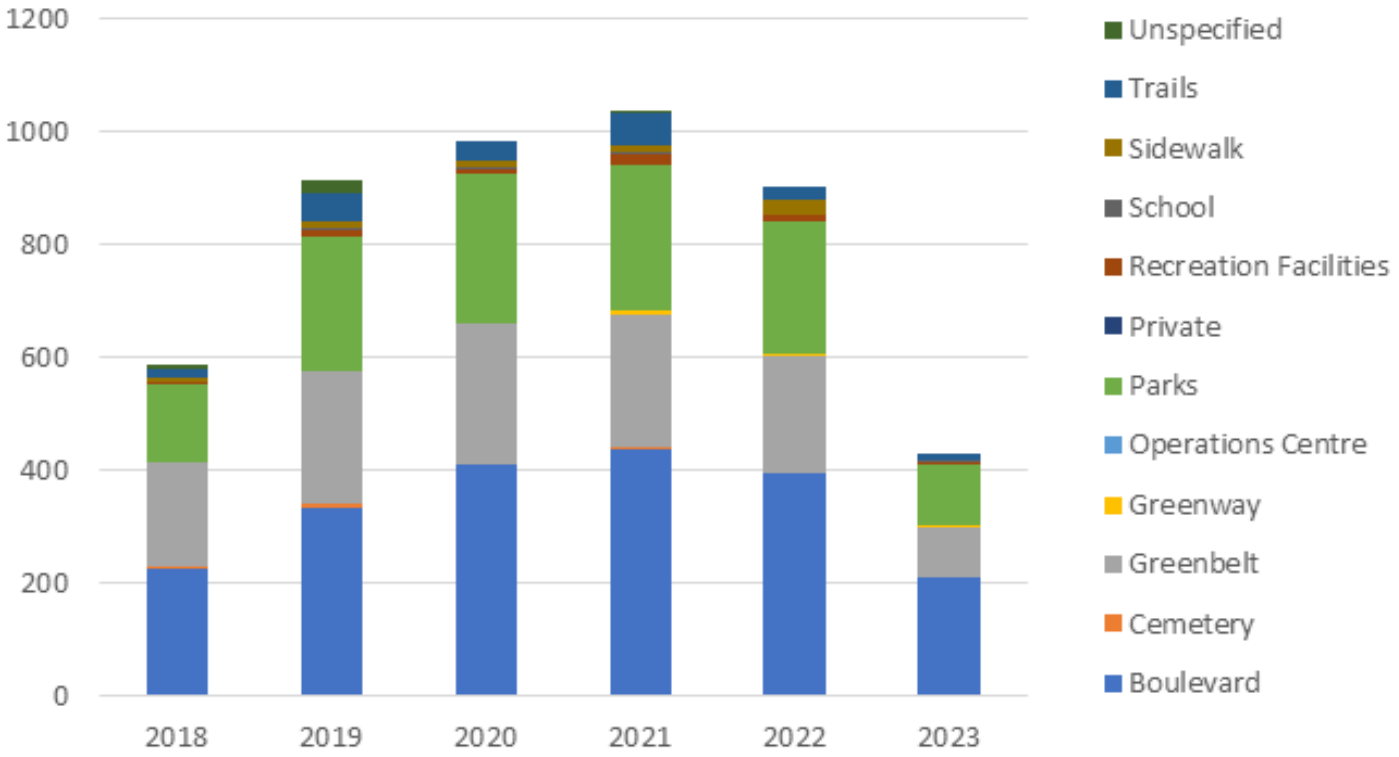


Figure 32. Tree related service requests from 2018 to 2023

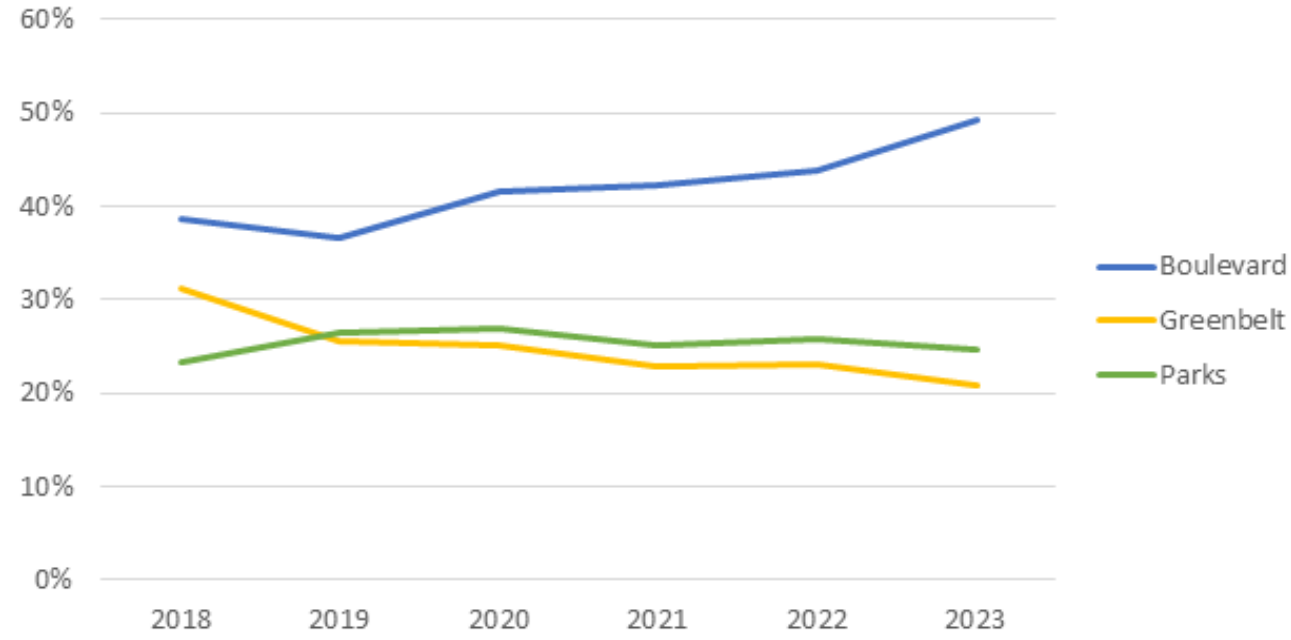


Figure 33. Proportion of boulevard, greenbelt, and park related service requests from 2018 to 2023

Urban forest report card

The Urban Forest Report Card provides a summary of the assessment of each indicator in Maple Ridge's urban forest management program against an optimal outcome. It provides a comprehensive assessment of areas where the City is performing well and where the Urban Forest Management Strategy should guide efforts for further improvement. Appendix 2 contains a more detailed summary of the report card.

PLAN AND ADAPT	Poor	Fair	Good	Optimal
Awareness of the urban forest		●		
Interdepartmental and municipal agency cooperation		●		
Clear and defensible urban forest assessment and goals	In progress			
Relative tree canopy cover	Insufficient data			
Municipality-wide management plan	In progress			
Municipal infrastructure asset management		●		
Municipal-wide biodiversity or green network strategy	●			
Municipal urban forestry program capacity		●		
Funding to implement a strategy		●		

PLANT	Poor	Fair	Good	Optimal
City tree planting and replacement program		●		
Development requirement to plant trees on private land			●	
Streetscape and servicing specifications and standards for planting trees		●		
Equity in planting program delivery		●		
Forest restoration/native species planting		●		
Selection and procurement of stock in cooperation with nursery industry		●		
Ecosystem services targeted in tree planting projects and landscaping		●		

MANAGE	Poor	Fair	Good	Optimal
Tree inventory	In progress			
Knowledge of trees on private property	In progress			
Natural areas inventory	●			
Age/size cohort distribution of inventoried trees	Insufficient data			
Species diversity of inventoried trees	Insufficient data			
Climate suitability of inventoried trees	Insufficient data			
Knowledge of health condition of inventoried trees	●			
Maintenance of inventoried trees				●
Emergency response planning	●			
Tree risk management		●		
Pest and Disease management		●		
Waste biomass utilization		●		
Carbon footprint tracking		●		

PROTECT	Poor	Fair	Good	Optimal
Regulate protection and replacement of private and City trees			●	
Regulate sensitive ecosystems, soils or permeability through private development			●	
Internal protocols guide City tree or sensitive ecosystems protection		●		
Standards of tree protection/care observed		●		
Cooperation with utilities		●		

PARTNER	Poor	Fair	Good	Optimal
Citizen involvement/neighbourhood action			●	
Involvement of land holders		●		
Urban forest research			●	
Regional collaboration		●		

5 What We Heard

Public engagement is key to the success of an effective urban forest management strategy. The City of Maple Ridge has initiated a two-phase engagement process to ensure that a diverse range of voices and perspectives contribute to the Strategy's development, and that the community's values and needs are reflected in the Strategy. The first phase, completed in October 2023, aimed to understand the community's values, vision, and priorities. The second phase of engagement will take place after the draft Strategy is developed. It will offer the community opportunities to provide feedback on the draft Strategy. The section below highlights the public engagement outcomes and Appendix 3 provides a complete summary.

Phase 1 Engagement highlights

Who we heard from

The first phase of engagement reached more than 2000 people, including 255 survey participants, 12 Parks, Recreation, and Culture committee members, 225 open house attendees, 85 mapping tool submissions, and 1500 people from the project page's engagement analytics.

Of the 255 survey participants, the majority have resided in Maple Ridge for 10 or more years. The most represented age group is between 35-96 years old.

Urban forest vision

Participants were asked to imagine how they would like the Maple Ridge's urban forest to look like in 20 years. The overwhelming consensus was a desire to have more trees in the city to prioritize a healthy urban forest composed of mixed and native tree species that will be climate resilient and can provide wildlife habitat and biodiversity. Other ideas raised were:

- Increasing accessibility to green spaces
- Integrating urban forest with urban planning
- Preserving large or mature trees
- Promoting community
- Providing food
- Managing stormwater
- Ensuring safety against wildfire

Figure 34. Word cloud showing the most common words used by respondents to describe their vision of the urban forest for the next 20 years

Imagine it is the year 2050, what do you want the Maple Ridge's urban forest to look like?

"An urban forest that is healthy, vibrant, well-maintained, full of animals such as birds and habitats for other animals like rabbits, coyotes, and squirrels. Lots of shade to keep the road and grass and streets cool."

"I would like native species of plants and trees, less grass and more wildflowers. A mixture of plants, bushes and trees that support insects and animals. If a photo was taken from the air, you would see at least 75 percent trees and only 25 percent roads and housing."

"Beautiful, natural integration of nature into the urban environment."

"Healthy, robust and resilient!"

"Mix of trees that attract all different birds and wildlife."

Urban forest places

Residents were asked to reflect on places they valued and places that needed improvement in the City. A total of 85 locations were shared by participants, including 44 places (Figure 35) of value and 41 places (Figure 36) needing improvements. Most places valued were concentrated in parks, along trails, and in unprotected greenspaces and natural areas. Reason provided for places of values were strong ties to site, large trees, wildlife and biodiversity value, and general aesthetic value. On the other hand, people recognized places of improvement in or around the Haney area and the Town Centre, calling for more trees, especially in parking lots and parks characterized by extensive lawn coverage.

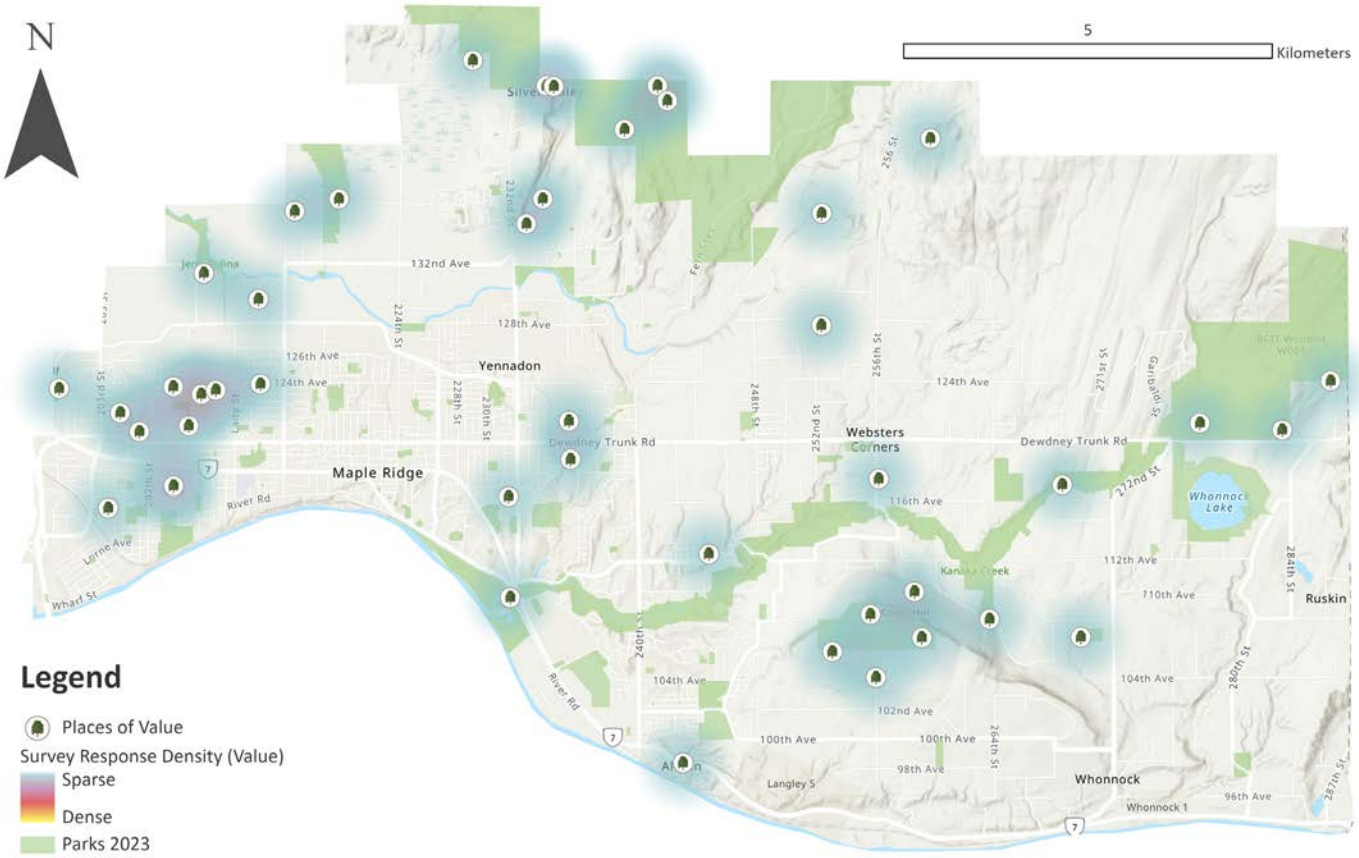


Figure 35. Places of value identified in urban forest through the online mapping tool and through the in-person open houses

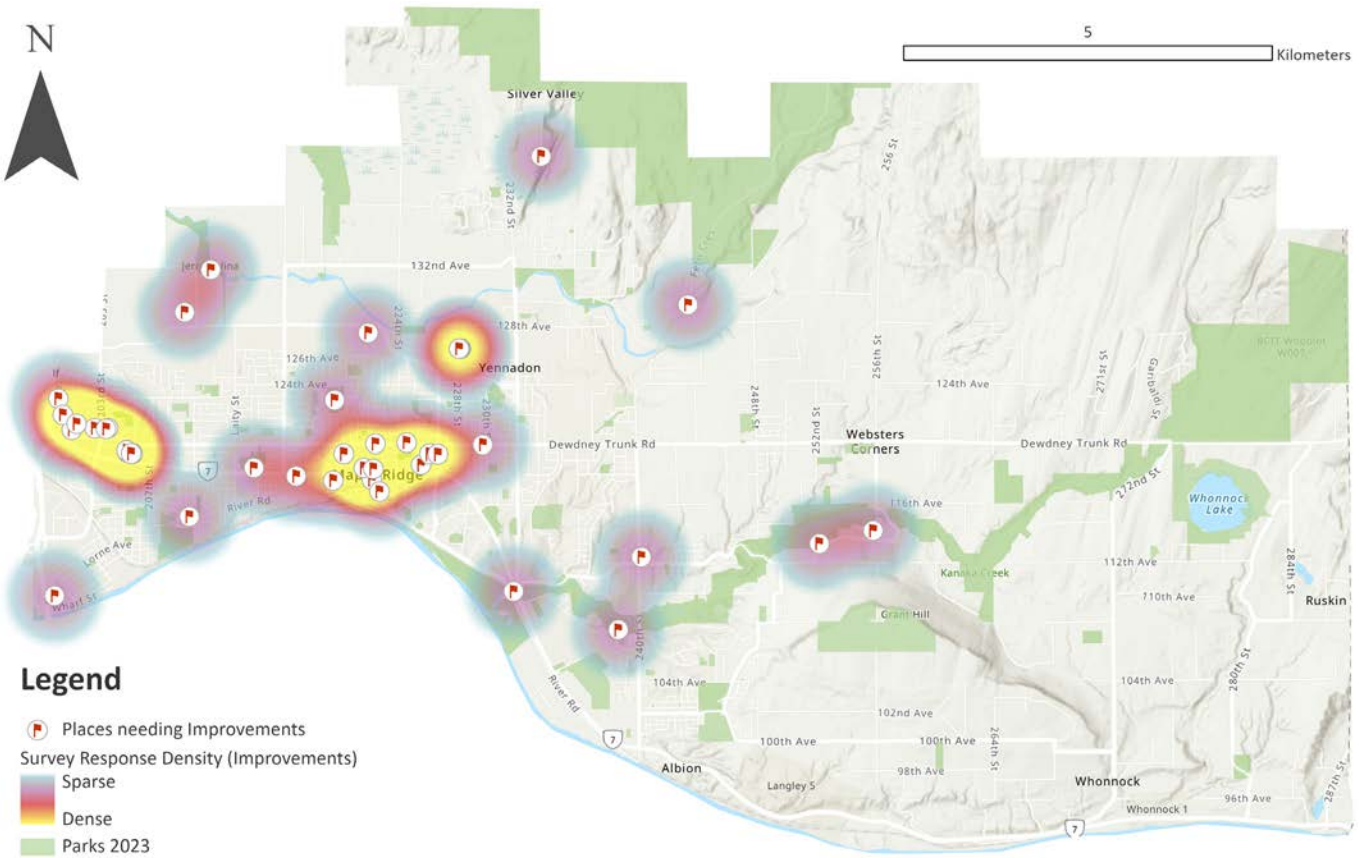


Figure 36. Identified urban forest places needing improvements through the online mapping tool and through the in-person open houses

Priority actions for tree regulations

Survey participants reported mixed levels of support for potential changes to tree policy on private property (Figure 37). Most respondents were supportive of policy changes that would prevent significant canopy loss, retain healthy or very large trees, protect trees from damage, or provide cash for the City to plant a tree when it is not possible to plant a replacement tree on-site. Participants were more opposed to policy changes that would generally allow property owners to remove trees with the provision that they replaced them, or retained some on the property.

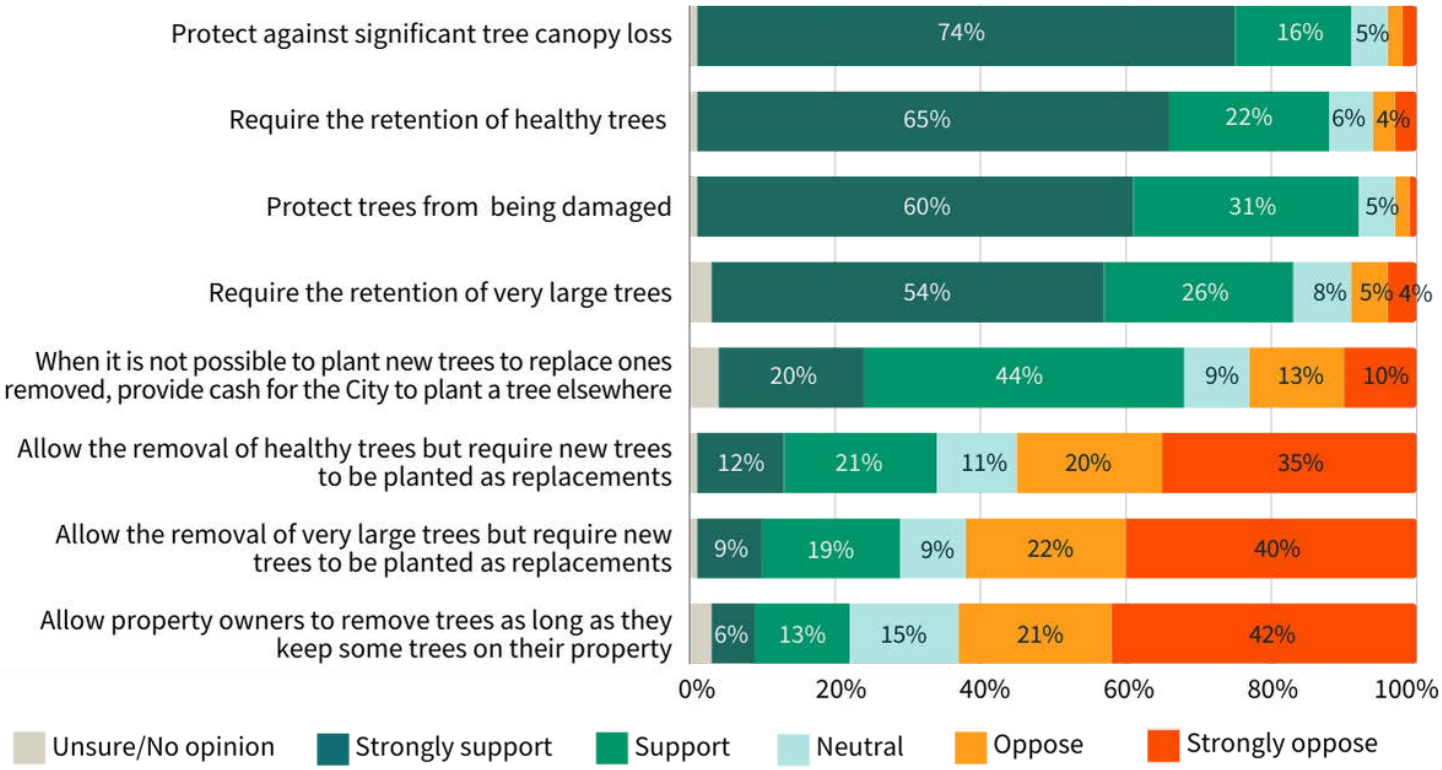


Figure 37. Survey participants' levels of support for tree regulations of private property

Satisfaction with current service levels

When asked about the City's current urban forest management, residents expressed varying degrees of satisfaction (Figure 38). While many appreciated the City's response to storm and debris cleanup, there were more neutral or dissatisfied responses to other levels of services such as pest and disease control and tree pruning. Participants were most dissatisfied with the level of public education and tree protection and preservation provided by the City. To provide the level of service that respondents preferred, 73% supported increasing the amount of funding allocated for urban forest management.

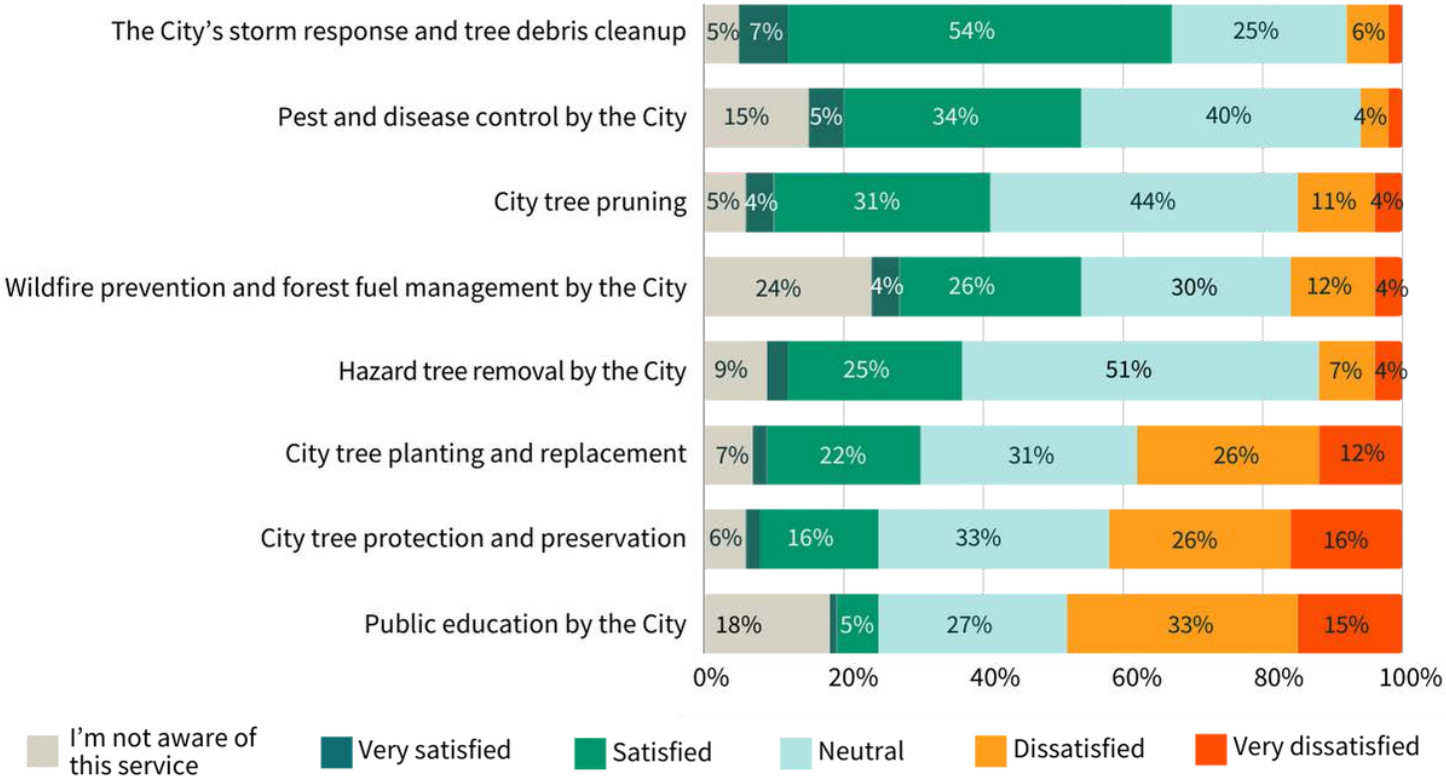
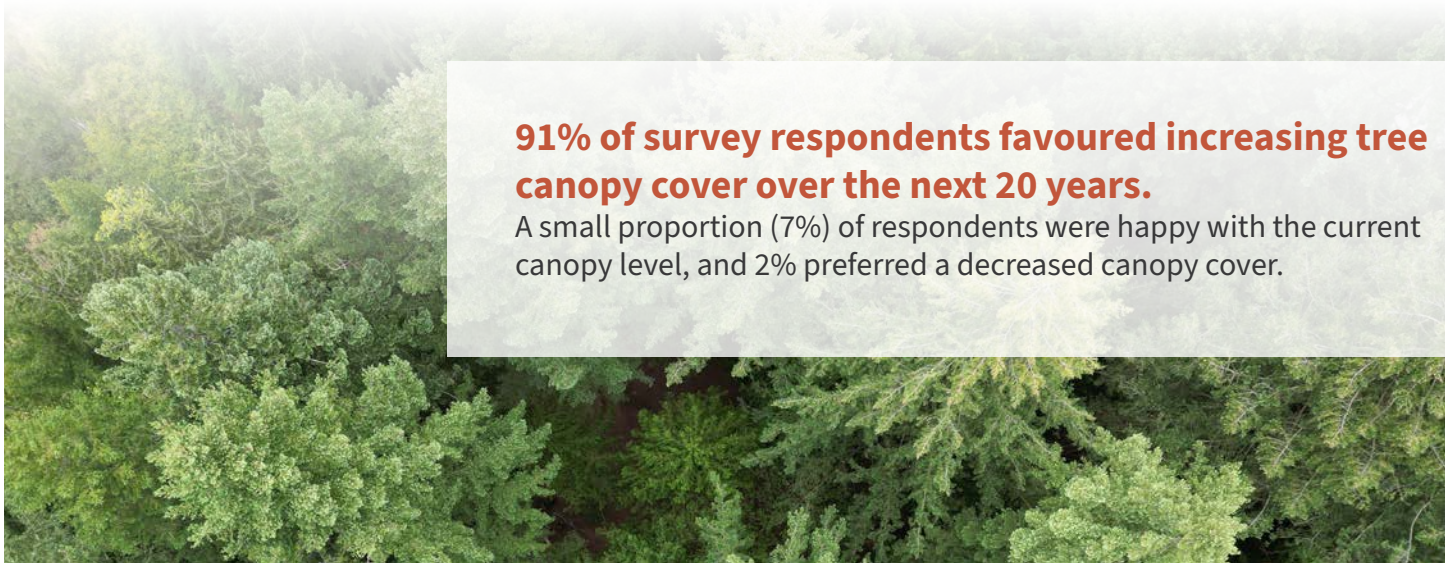


Figure 38. Satisfaction levels with current service levels for tree City-owned trees (street trees, trees in parks, and trees in conservation areas)



91% of survey respondents favoured increasing tree canopy cover over the next 20 years.

A small proportion (7%) of respondents were happy with the current canopy level, and 2% preferred a decreased canopy cover.

6 Planning for the Future: Vision, Goals and Targets

The urban forest vision

A 20-year vision for Maple Ridge's urban forest has been drafted based on findings from community and staff engagement, and policy and background review. The vision guides the Strategy's action plan:

Maple Ridge boasts a thriving, resilient, and climate adapted urban forest that is essential to community health and well-being, provides high-value recreational opportunities, supports ecological health and biodiversity, offers cost-effective climate solutions, and improves livability for all residents.

Urban forest goals

Four goals will guide the City's work towards achieving the vision. These goals cover thematic areas where specific strategies and actions are outlined for implementation.

The urban forest target

Factors considered in setting a canopy target

Canopy cover can serve as a valuable performance measure to track progress towards achieving overarching vision and goals for the urban forest. Setting a specific canopy target offers a clear and measurable aim for the city to strive towards. This target not only connects the vision to a measurable metric but also serves as a driving force behind the implementation of the Urban Forest Management Strategy.

Determining an appropriate canopy target is not a one-size-fits-all endeavor. Currently, there is no consensus on what constitutes an optimal level of canopy cover. Communities, including Maple Ridge, vary significantly in terms of character, values, climate conditions, development patterns, population, and land use. Therefore, the most effective approach to setting a canopy target involves a nuanced understanding of the community's context, tailoring the goal to align with their specific needs and characteristics.

Setting a canopy target relies on a comprehensive understanding of the current conditions of the urban forest and a foresight into how canopy cover is likely to change over time. To decide the canopy scenarios for Maple Ridge, the following steps were taken:

1. Measure current canopy cover across all OCP designated land uses
2. Identify where and how much development is expected to occur and how canopy cover in each area will likely change in 20-year timeframe
3. Forecast canopy cover across all OCP designated land uses based on the anticipated development and possible urban forestry actions related to tree protection, planting, and replacement.

Recognizing the unique challenges and opportunities for urban forest management in Maple Ridge, including the city's development patterns, existing land uses, and community aspirations, **three distinct canopy scenarios** were developed:

Scenario 1 Status Quo

Assumes no changes to current policies and practices, 30% of forested areas within urban areas are developed under current zoning, and tree retention, removal, and replacement follows trends from previous years.

Scenario 2 No Net Loss

Assumes no changes to current tree retention requirements, but planting requirements and incentives are increased in selected areas zoned for commercial, industrial, residential, parks and green spaces, road rights-of-way, and other public uses (e.g., schools, and civic services).

Scenario 3 Canopy Gain

Assumes enhanced tree retention requirements on large-scale development sites and increased planting efforts. This scenario aims not only to mitigate development related tree loss but also to achieve a net canopy gain.

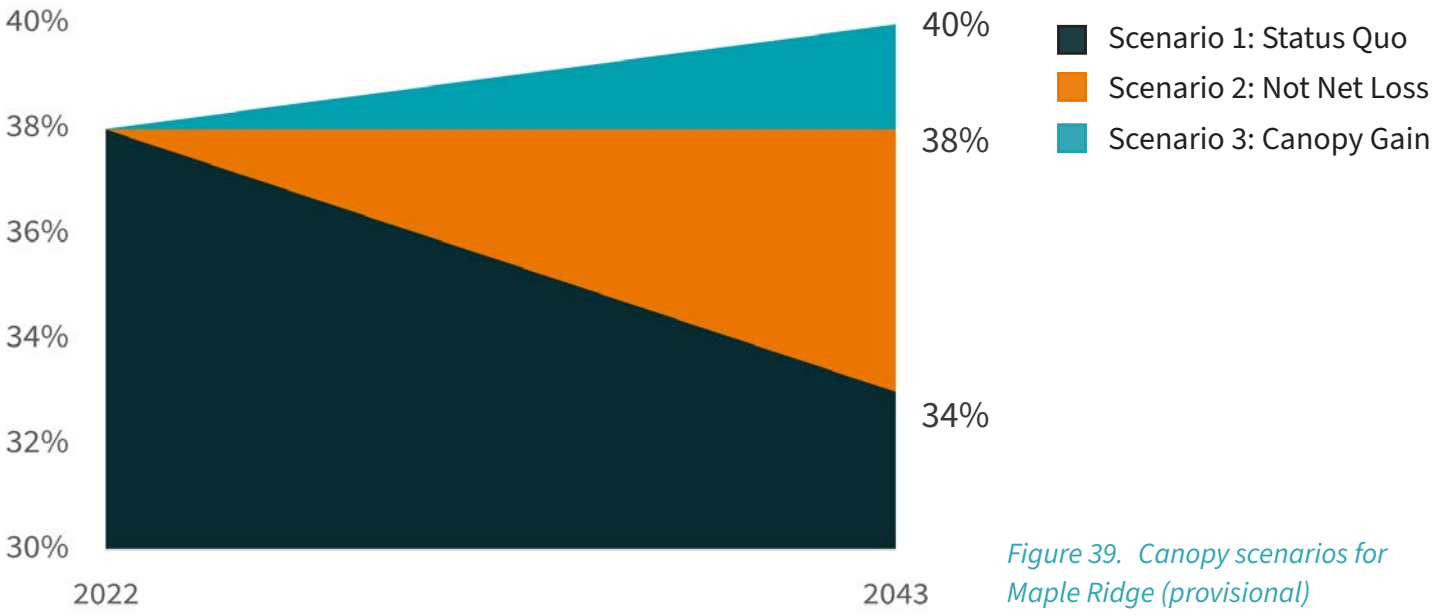


Figure 39. Canopy scenarios for Maple Ridge (provisional)

CURRENT CONDITION

Canopy cover: **38%**
Anticipated canopy loss from now to 2050: **193 ha**

SCENARIO 1

status quo
gradual decline

~55 ha canopy replaced

- 4%

projected by 2050: **34%**

~330 private tree + ~90 public tree planting per year (assuming 50-65 m² canopy area per tree 25 years after planting)

SCENARIO 2

no net loss
stable/small gain

~160 ha **canopy replaced** *with gains in* **industrial, low-density residential, parks and green space, institutional, and roadways**

No change

38%

~1240 private tree + ~370 public tree planting per year (assuming 50-65 m² canopy area per tree 25 years after planting)

SCENARIO 3

net growth
gain

~253 ha **canopy replaced** *with gains in* **commercial, industrial, low-density residential, parks and green space, institutional, and roadways**

+ 2%

40%

~1980 private tree + ~370 public tree planting per year (assuming 50-65 m² canopy area per tree 25 years after planting)

Maple Ridge's canopy cover target

Maple Ridge has set a target to increase its canopy cover from 38% to 40% by 2045.

7 Achieving Our Goals: Strengths, Challenges, Strategies

Overview of Urban Forest Goals and Strategies

GOAL 1: PROTECT AND EXPAND

- **Strategy 1** Update bylaws, policies and guidelines to protect and expand the urban forest
- **Strategy 2** Protect and restore forest lands to support biodiversity and healthy ecosystem functioning
- **Strategy 3** Plant trees to expand the urban forest to improve climate resilience and equity

GOAL 2: INTEGRATE AND ADAPT

- **Strategy 4** Integrate urban forest management planning into City and regional strategic initiatives
- **Strategy 5** Achieve funding and staffing levels sufficient to implement the Urban Forest Management Strategy
- **Strategy 6** Track and report progress and changes to inform adaptive management

GOAL 3: MANAGE AND SUSTAIN

- **Strategy 7** Align levels of service for urban forest management with best practices
- **Strategy 8** Manage trees for health and public safety

GOAL 4: ENGAGE AND PARTNER

- **Strategy 9** Engage the community to enhance stewardship of the urban forest
- **Strategy 10** Foster partnerships with external groups to implement the Strategy

GOAL 1: Protect and Expand the Urban Forest

This goal emphasizes preserving Maple Ridge's abundant urban forest resources, particularly the mature canopy in existing forested lands, while also expanding the urban forest in more developed areas. Preserving these natural assets alongside urban development requires innovative strategies to maintain existing trees and ensure new ones have sufficient soil and space, safeguarding them against construction damage.

Our strengths

Commitment to the natural environment and green infrastructure: Maple Ridge shows a strong commitment to protecting and expanding the natural environment through policies like the tree bylaw and development policies. This Urban Forest Management Strategy and the recently completed Green Infrastructure Management Strategy serve as comprehensive frameworks, guiding the integration of green infrastructure into municipal operations, capital projects, and development design practices. Urban trees and forests have the potential to play a greater role in stormwater and heat mitigation throughout the city.

Public and policy support: Community surveys highlight a deep appreciation for the natural environment, indicating strong public support for urban forestry initiatives. Strategic plans, such as the Climate Action Plan, further provide a robust foundation for enhancing climate resilience and equity through tree planting and urban forest expansion.

Rich urban forest resources: The city is home to a rich urban forest, especially within existing forested lands, crucial for biodiversity, clean air, water, and recreational spaces. The City acknowledges the importance of preserving natural areas and wildlife corridors and enhancing recreational networks through careful planning.

Our challenges

Climate change impacts: The urban forest is under threat from invasive species and the impacts of climate change, such as extreme weather and temperature fluctuations. Urban forests are susceptible to impacts from summer drought, heat waves, windstorms, and new pests and diseases. Increased frequency of summer drought has increased mortality of young and old trees. Species such as western redcedar and western hemlock are dying throughout the Pacific Northwest. Warmer temperatures and stressed trees also favor insect pests, which may lead to more frequent and severe pest outbreaks. These impacts necessitate adopting more climate-resilient urban forestry planning tools and practices to ensure that existing forests are climate resilient and continue to deliver the benefits needed by the community.

Availability of climate-adapted nursery stock: In selecting and procuring climate-adapted nursery stock, cities face the challenge of predicting future climate conditions and trialling tree species expected to thrive in these conditions. Limited availability of diverse, climate-resilient nursery stock can be a barrier, as nurseries may not always grow the needed varieties.

lancing development with conservation: The city is at a pivotal juncture where population growth and housing needs necessitate more housing development and supporting infrastructure. While redevelopment in largely built-up or impervious areas may provide chances to enhance tree canopy, greenfield development inevitably involves site clearing. To preserve the City's distinctive tree character and relatively high tree canopy cover, the city must explore innovative policy tools and approaches to address potential canopy loss resulting from greenfield developments.

Ensuring adequate space and soil for trees: As urban areas become more compact, the expansion of buildings and paved surfaces reduces the available area for soil and vegetation. Balancing the growth of trees in these increasingly dense settings, without causing issues or conflicts with infrastructure, becomes more complex. Urban planning must navigate a variety of goals to create livable and healthy spaces for residents. These goals can sometimes conflict, particularly in areas with limited space. For instance, the same area required for tree growth might be needed for constructing new accessible pathways. When such conflicts arise, city planners need to prioritize needs and devise innovative strategies to achieve the best possible outcomes. Choosing the right tree species and locations is also essential to prevent future issues and ensure trees have a long and healthy life.

Maintaining biodiversity: Biodiversity describes the diversity of genes, lifeforms, and ecosystems on earth. Biodiversity underpins many important ecosystem services provided by urban forests. Trees play a critical role in supporting high levels of biodiversity because they provide structure for many organisms and different habitat needs. To ensure the preservation of native habitats and ecosystems, future planning needs to maintain forest environments and connectivity between habitats as the city continues to grow and develop. When trees cannot be accommodated in urban spaces, other forms of greening and green infrastructure can be encouraged with development to support biodiversity.

Implications of recent legislation change on the urban forest

The Government of British Columbia's proposed legislation, Bill 44: Housing Statutes (Residential Development) Amendment Act, 2023, will bring about a transformation in single-family neighbourhoods, compelling municipalities with populations exceeding 5,000 to allow small-scale, multi-unit housing on traditional single-family and duplex lots. The legislation aims to streamline zoning processes, addressing long-term housing needs, and promoting affordable housing. However, it may also pose challenges for tree retention and replacement when lots with a single home are converted to multiple dwellings with larger building footprints and high lot coverage.

Strategies to achieve our goal

Strategy 1. **Update and enforce bylaws, policies and guidelines to protect and expand the urban forest**

Strategy 2. **Protect and restore forest lands to support healthy ecosystem functioning**

Strategy 3. **Plant and expand the urban forest to improve climate resilience and equity**

Country Lane Development

is a innovative urban development project in Maple Ridge that allows for higher housing density while nurturing an abundant tree canopy cover. The project features smaller lots with laneway parking, reduced front and back setbacks, and the addition of more building floors (up to three floors). These measures ensure the floor area per house remains uncompromised while preserving adequate space for yard and street trees.

Tree density requirements

Maple Ridge has requirements to regulate the growth of the urban forest through several bylaws, such as the Tree Protection and Management Bylaw (or "Tree Bylaw" for short). The Tree Bylaw requires a minimum of 40 trees per hectare on all private lots either through retention of existing trees or planting replacement trees. Other cities in Metro Vancouver use tree density requirement to ensure a certain level of tree canopy is maintained on private lots. For example, the Township of Langley requires a minimum of 30 replacement trees per acre (i.e. 74 trees per hectare) through its Subdivision and Development Servicing Bylaw.

At maturity,

40 small trees per hectare represents ~10% canopy cover

~ 25m² per tree

40 medium trees per hectare represents ~20% canopy cover

~ 50m² per tree

40 large trees per hectare represents ~40% canopy cover

~ 100m² per tree

Examples of new tools for tree retention

Seattle offers a compelling example of rebalancing zoning codes in favour of tree retention. Seattle has implemented a system called "Exceptional Tree Zoning". Exceptional trees are designated heritage trees or trees meeting a species-specific size threshold decided by order and receive additional protection during development review. Seattle's zoning codes mandates deviations from height and setback to retain exceptional trees. It is clear to developers that they will be required to retain large and mature significant trees. Guides and rules have been set up for developers to understand how they can vary from zoning code for retention of an exceptional tree.

Similarly, Ottawa recently updated its zoning code, introducing a requirement for a "minimum aggregated soft landscape area". These permeable areas have defined minimum lengths and widths to be sufficient for supporting the growth of trees, even in cases where development results in initial removals of large trees.

Ottawa's R4 Zone Aggregated Soft Landscaped Area

Example of landscape incentives

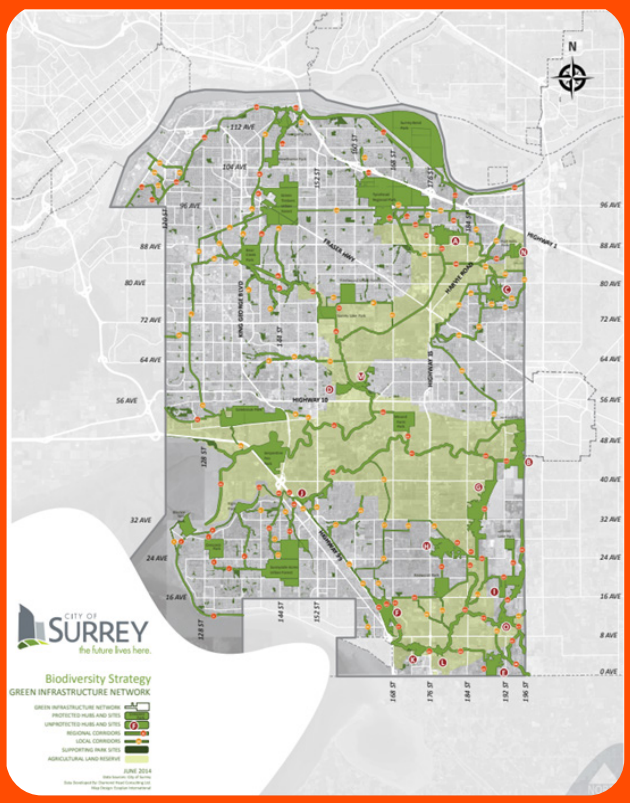
The Toronto Green Standard is the City of Toronto's sustainable design requirements for new private and city-owned developments. Initially introduced in 2005 as a voluntary standard, the Standard now has been structured into a tiered program that offers a combination of mandatory and voluntary elements. Projects that fulfill higher tiers of performance are eligible for a refund on development charges paid to the City. The Toronto Green Standard support urban forestry practices through requirements on:

- Soil volume on site and in adjacent public boulevard
- Tree placement and spacing
- Watering and maintenance of trees after installation

The Standard also requires all new developments to increase tree canopy, soil volumes, and tree watering, promote native species, and exclude invasive species. Additional tree planting or ecological restoration is voluntary and can be used to qualify for a development charge refund.

What is a biodiversity conservation strategy?

Biodiversity Conservation Strategies provide long-term plans to protect and restore ecosystems. It is a common tool for municipalities to guide their efforts on the protection and restoration of critical ecosystem values and functions. The City of Surrey has implemented a Biodiversity Conservation Strategy with supporting policies to preserve biodiversity over the long term. The Strategy establishes a Green Infrastructure Network (GIN), a connected system of protected areas, including forests, wetlands, parks, watercourses, agricultural land, and urban environments, functioning as important habitats and connecting corridors. Policy and management recommendations in the Strategy also support the City's other strategic initiatives on environmental protection, green infrastructure and sustainable development.



What is a forest management plan?

Unlike an urban forest management strategy that addresses the management of urban forests at a city-wide scale, a forest management plan is focused on a specific forest area and the operational management needed to maintain values such as public safety and ecological health.

A forest management plan typically establishes long-term management values and objectives to guide operational management decisions about the level of maintenance service provided in a specific forest area. It also includes standards and guidelines on monitoring and reporting requirements, such as forest health reporting and monitoring, renewal and protection, and wayfinding and trail standards.

Importance of soil volume and quality for tree health

Soil volume is crucial for the health of the urban forest because it directly impacts the availability of essential nutrients, water, and oxygen to the trees. Bylaws, like subdivision and servicing bylaws, play a crucial role in guaranteeing sufficient soil volume for street trees. The table below summarizes the recommended minimum soil volume for street trees in the Metro Vancouver's Tree Regulation Toolkit[30].

TREE SIZE	APPROXIMATE SURFACE AREA (M^2) OF SOIL REQUIRED PER TREE (ASSUMING 1 M SOIL DEPTH)		
	On ground	Under hardscape soil cells*	Under hardscape structural soil**
Small tree canopy (spread ≤ 6 m)	8	x1.1	x5
Medium tree canopy (spread ≤ 10 m)	20	x1.1	x5
Large tree canopy (spread > 10 m)	35	x1.1	x5

*Soil cells are 92% soil, **Structural soil is 20% soil

In a dense urban environment, the minimum soil volume is not always feasible. Alternative solutions such as structural soils, soil cells, and stormwater retention methods can support healthy tree growth. **Structural soils** are a mix of mineral and organic matter that meet engineering requirements while allowing root growth. They can provide a bridge between soil volumes for growing trees. **Soil cells** are used in high pavement areas to provide growing space to trees that are otherwise contained in an inhospitable landscape.

Soil amendments are another increasingly important part of planting site creation. Soil amendments include familiar organic and inorganic fertilizers and mulches, and innovative additions like beneficial soil bacteria, mycorrhizal fungi, and biochar. More cities are trialling soil amendments to improve soil quality and tree growth outcomes.

From left to right:
Bioswale provides supplemental watering to landscape trees installed in private on-site parking (Surrey)
Soil cell installation to extend planting site volume (Winnipeg)
Structural soil installation to bridge planting strip with soil behind sidewalk (Vancouver)

GOAL 2: Integrate and Adapt the Urban Forest Management Strategy

This goal aims to embed the urban forest vision, goals, and targets into broader city and regional planning for enhanced understanding, support, and coordinated implementation. Commitment to ongoing monitoring and adaptation is critical, alongside ensuring sufficient staffing and funding for the urban forest program. This approach lays the groundwork for the successful execution of the Urban Forest Management Strategy.

Our strengths

Policy and regulatory framework: Maple Ridge possesses a robust policy and regulatory foundation that supports the integration of urban forest management into city and regional strategic initiatives. The commitment to climate resilience and biodiversity aligns with regional goals, fostering opportunities for collaborative and integrative efforts.

Integrated planning across City departments: Adopting comprehensive planning and policy approaches, and continuing to have strong interdepartmental collaboration, improves the likelihood that the Urban Forest Management Strategy will be implemented successfully.

Opportunities to broaden regional collaboration: Regional initiatives, such as Metro Vancouver's Nature and Ecosystem's Roadmap, Urban Forest Climate Adaptation Initiatives and Regional Ecosystem Connectivity Initiatives, may present opportunities to leverage regional partnerships for urban forest management.

Our challenges

Incomplete integration: While existing frameworks are strong, they may not be fully integrated across all city and regional initiatives. The necessity for actions like incorporating canopy targets into the Official Community Plan (OCP) and establishing sub-canopy targets by land use suggests gaps in the current integration of urban forest goals into broader city planning and regional strategies.

Resource limitations: Maple Ridge's urban forest resource is managed by a core team of three staff. Existing funding and staffing levels may not suffice to support the ambitious goals of the Urban Forest Management Strategy. The necessity to review life-cycle costing and establish dedicated budgets for tree planting underscores the current resource constraints.

Monitoring and reporting gaps: While some elements like canopy cover are now well-monitored, there is no formalized program to collect data to track performance on implementation or monitor change in the urban forest. The absence of formalized monitoring program could hamper adaptive management decisions.

Strategies to achieve our goal

Strategy 4. **Integrate urban forest management into City and regional strategic initiatives**

Strategy 5. **Achieve funding and staffing levels sufficient to implement the Strategy**

Strategy 6. **Track and report progress to inform management decisions**

Funding opportunities

The **Federal Government's Two Billion Trees (2BT) program** aims to motivate and support new tree planting projects. By 2031 up to $3.2 billion will have been invested in tree planting efforts to plant two billion trees across Canada. While the 2BT program does not fund tree planting for private individuals, it can support municipalities under various funding streams.

Tree Canada's Community Tree grants support community greening, innovation and stewardship initiatives. Grant recipients, of which municipalities are eligible, receive funding and technical support to help start, upgrade, or achieve their greening goals.

The **Green Municipal Fund's Growing Canada's Community Canopies (GCCC) initiative** is a new program that will support tree planting in and around communities across Canada for climate resilience and other scoial and environmental benefits. The initiative will launch in Spring 2024 and will provide tree-planting grants and strategic grants for planning and operational support to local governments and groups partnering with them. The initiative is funded by the Government of Canada's 2 Billion Trees (2BT) program and is a partnership between the Green Municipal Fund and Tree Canada.

Integration with Green Infrastructure

Bioretention street swales in Silver Valley exemplify the successful integration of trees as a crucial element of green infrastructure. This not only enhances the aesthetic appeal of the neighbourhood but also with broader strategic initiatives in Maple Ridge, particularly those centered around climate action and the management of green infrastructure.

GOAL 3: Manage and Sustain the Urban Forest

This goal emphasizes optimizing the benefits of trees while managing risks. It involves proactive care, such as regular pruning and health checks, and efficient responses to emergencies and service requests. Currently, Maple Ridge often reacts to issues as they arise, but the aim is to become more proactive, aligning with industry best practices for a healthier, longer-lasting urban forest.

Our strengths

Progress in natural asset management: Maple Ridge's Green Infrastructure Strategy focuses on integrating natural assets like forests, streams, and bioengineered solutions into urban areas to enhance community health, livability, and sustainable development. The City is working to improve its natural asset management approaches. While the urban forest is not currently integrated into the City's asset management system, the City recognizes trees as valuable natural assets and is exploring ways to advance natural asset management.

Commitment to urban forestry and green infrastructure management: Maple Ridge demonstrates a strong dedication to urban forestry, with initiatives underway to align service levels with best practices. The city's ongoing efforts to update its tree inventory and a robust tree maintenance program lay a solid foundation for future urban forest management.

Our challenges

Reactive approach to management: The City currently operates on a reactive basis for most urban forest services. This approach may lead to delayed or inefficient care, affecting the overall health and longevity of the urban forest.

Threats to forest health: Climate change is bringing warmer, driers summers and increasing the frequency and severity of extreme weather events. At the same time, forest pests and invasive species may be more successful and abundant under warmer, milder conditions. These impacts are likely to increase the cost and complexity of urban forest management as trees will need more water to establish, more soil volume to maintain health and reach maturity, more frequent pruning to ensure they have good structure to resist damage. Forested areas may also need more management to mitigate wildfire risk, remove invasive species, and restore forest canopy in riparian areas to maintain stream health.

Resource and capacity limitations: The City faces constraints in resources and staffing that limit capacity for tree pruning and risk inspections. The City needs more funds and staff to transition from a reactive to a proactive urban forest management cycle effectively.

Limited risk management: Current service levels may not fully cover the management of risks associated with trees, especially in dealing with invasive species, pests, and the impact of extreme weather. A more comprehensive risk management policy is required to ensure tree health and community safety.

Lack of integrated asset management and inventory data: The City needs to improve integration of the urban forest into its asset management system, developing a comprehensive tree inventory and tracking key data like tree mortality and planting rates, to enhance decision-making based on the urban forest's value and condition.

Strategies to achieve our goals

Strategy 7. **Align levels of service for urban forest management with best practices**

Strategy 8. **Manage tree risks for tree health and community safety**

Impacts of extreme weather events

On November 4, 2023, a powerful windstorm swept through the Province of British Columbia, including Maple Ridge. The windstorm resulted in severe tree losses and damages to private properties, leaving at least one Maple Ridge family homeless in its wake. A colossal tree fell and crashed onto the family's rental home.

Significant tree losses and damages were reported across Metro Vancouver region. After a long and dry summer, trees are in inferior health, making them susceptible to extreme weather events like the powerful windstorm. This catastrophic event serves as a poignant reminder of the importance of proactive urban forest management and emergency planning.

Threats to Maple Ridge's forest health

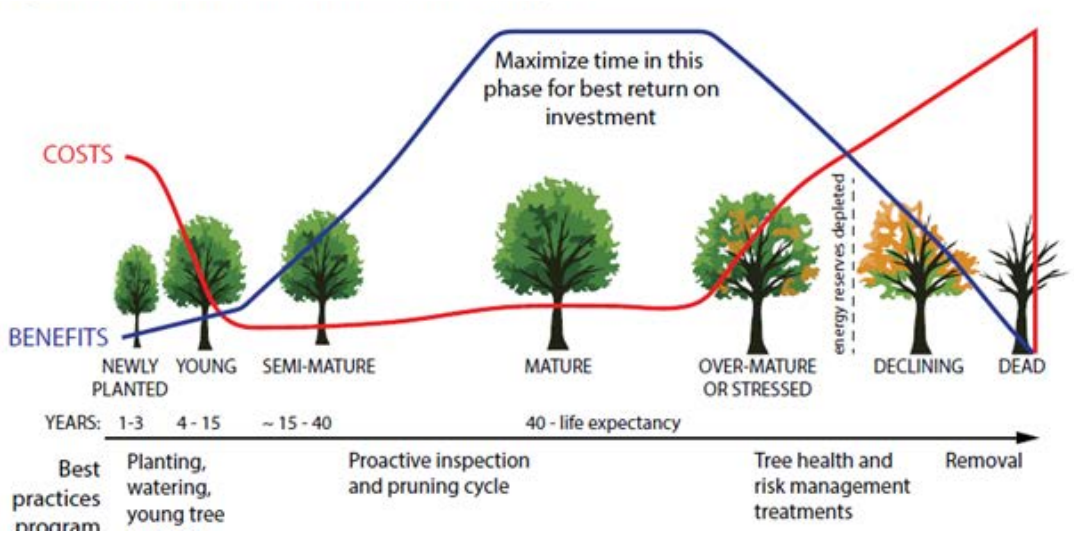
Climate change is anticipated to increase the range of pests and diseases, and invasive species that can survive in Maple Ridge. Understanding the urban forest's vulnerability relies on reading patterns in decline but also planning for pest management. Some of the known forest health threats to Maple Ridge's forest area described in the following.

Name	Common hosts	Description
Asian long-horned beetle	Maple, poplar, birch, willow, elm, suspected other hardwoods	Wood-boring beetle leaving large galleries and tunnels in sapwood and heartwood. Damage creates a loss of water and nutrient transportation inside the tree, killing it. Multiple arrivals have been recorded in central Canada and the eastern and midwestern United States.
Sooty bark disease	Maple, horse chestnut, pacific dogwood, flowering plum	Mat-forming fungus producing branch and foliar dieback. Notable for negative human health impacts from prolonged spore exposure causing inflammation of the lungs. Established in Washington; does well following hot summers.

Name	Common hosts	Description
Emerald ash borer	Ash	Wood-boring beetle. Larval feeding in the cambium and phloem layers girdles the tree, causing mortality. Established in eastern Canada, observed in Oregon.
Lymantria moth	Various	Defoliator insect threatening most native and introduced broadleaved species and some conifers. Annual detections with active provincial eradication program in place.
Ramorum blight	Oak, rhododendron, arbutus, other shrubs and trees	Oomycete (fungus-like) organism responsible for "sudden oak death" syndrome in large parts of Oregon and California. Varied pathology based on lifestage and host, with worst damage (mortality) on oak species.
White pine blister rust	Five-needled pines	Fungus introduced to BC circa 1910. Attacks western white pine and other five-needled pines, generally causing mortality. Resistant cultivars have been trialed since the 1980s to help protect and reintroduce native five-needled pines to natural ecosystems.
English ivy	Various	Imported garden plant now considered invasive. Ground cover which climbs trees and gains significant weight, sometimes causing branch and stem breakage. Can smother seedlings.
Himalayan blackberry	Various	Imported garden plant now considered invasive. Smothers native understorey plants and tree saplings.
Western hemlock looper moth	Western hemlock, Douglas-fir	Defoliating insect targeting western hemlock trees. Long population cycles every 10-12 years with 2-3 years of activity. Defoliation in successive years can cause widespread tree mortality, as has occurred in the Lower Mainland since 2020.
Armillaria root disease	Douglas-fir, spruce, lodgepole pine, western white pine, western hemlock, western redcedar, Garry oak	Aggressive root fungus causing death and decay. Several related species of fungus impact native and ornamental trees. White rot causing a rapid loss of wood strength, sometimes leading to sudden tree failure. Soil rhizomorphs remain infectious for several years.
Laminated root disease	Douglas-fir, true firs, mountain hemlock, western hemlock, western larch, Sitka spruce	Root fungus targeting Douglas-fir, often causing root dieback and separation of annual growth rings. De-lamination leads to high rates of windthrow, often with little remaining root plate. Spreads via root contact.
Annosus root disease	Western hemlock, true firs, Douglas-fir, western redcedar, Sitka spruce	Root fungus targeting western hemlock, often causing sudden tree failure due to spongy decay pockets. Spreads via spores on wind.
Brittle cinder fungus	Maple, oak, beech, horse chestnut, alder	Crust-forming fungus that spreads through spores as well as root contact. Brown rot causing a loss of tensile strength in wood, sometimes causing shattered or snapped stems near tree base or from roots. Spreads via airborne spores and root contact.

Asset Management Principles for Urban Forests

Trees in Maple Ridge's urban forest are natural assets that provide value that exceeds the cost of their management. Trees require more early- and end-of-life care than they do in healthy middle age. As long as trees can reach healthy maturity, the benefits they provide will offset the costs of management and provide a net service value to the community. This cycle of life and death with associated costs and benefits of trees is illustrated below. Timely and effective urban forest asset management will create conditions for trees to live long, healthy lives that maximize the return on investment and prolong the time until asset removal and replacement.



Magnitude of costs and benefits over the tree life cycle

The City of Vaughan's Asset Management Plan categorizes urban forest assets and provides financial and technical guidance for their effective management. The Plan consists of four components:

1. **State of the urban forest** that details tree asset quantities and replacement values
2. **Levels of services** with qualitative and technical performance indicators
3. **Lifecycle management strategy** describing the operational and capital activities to maintain and manage urban forestry assets to ensure they are in a condition to provide the level of services identified
4. **Financial strategy** that forecasts operational and capital expenditures to fund the identified lifecycle activities

The integration of urban forestry assets provides evidence-based decision-making, promoting responsible and sustainable tree asset lifecycle management while ensuring financial sustainability. To transition to a 7-year proactive tree maintenance program in Vaughan will require an annual operating investment of $1,162,000 (phased in over 4 years), and a one-time capital investment of $35,000.

GOAL 4: Engage and Partner on the Urban Forest Management

This goal acknowledges the importance of collaboration in urban forest management. It recognizes that nearly half of Maple Ridge's canopy cover is on private land, making engagement with community members, First Nations, landowners, and local organizations crucial for the Urban Forest Management Strategy's success. The aim is to build lasting, healthy relationships with these stakeholders, leveraging their collective knowledge, resources, and commitment for a more comprehensive approach.

Our strengths

Community partnerships: Maple Ridge has a track record of successful collaborations with external partners and enjoys strong community interest in protecting and enhancing the urban forest. The existing culture of collaboration within municipal departments and with groups outside the government demonstrates the city's readiness to foster effective partnerships for urban forest management.

Public interest and support: The community shows a high level of interest and support for urban forest initiatives. This existing public engagement provides a solid base for enhancing stewardship and expanding partnership opportunities to include a wider range of stakeholders.

Existing partnerships: The City's proximity to the Malcolm Knapp research forest, along with longstanding collaborations with other research and education institutes, provides a valuable opportunity to participate in research that will support adaptive management of the urban forest.

Our Challenges

Engagement gaps: Despite the high level of public interest, there might be gaps in effectively engaging all stakeholders, particularly private landowners who control a significant portion of the urban canopy. Developing comprehensive communication and stewardship plans is necessary to bridge these gaps and ensure widespread community involvement.

Resource allocation for partnerships: Building and maintaining partnerships require dedicated resources and strategic planning. The city needs to assess and provide the necessary resources to support these collaborations effectively.

Lack of public education materials: Homeowners, developers, and other property owners may lack clear guidelines and educational resources about their roles in tree care and urban forest management, leading to missed opportunities for stewardship.

Collaboration and coordination with other land managers: A significant portion of trees are situated on land beyond the direct control of the city. The involvement of diverse stakeholders adds complexity to urban forest management landscape. Enhancing coordination with entities like utility companies, neighbouring municipalities, and educational institutions is crucial for harmonizing urban forest management efforts. Currently, some connections exist but they could be strengthened and expanded to better support implementation.

Strategies to achieve our goal

Strategy 9. **Engage the community to enhance stewardship of the urban forest**

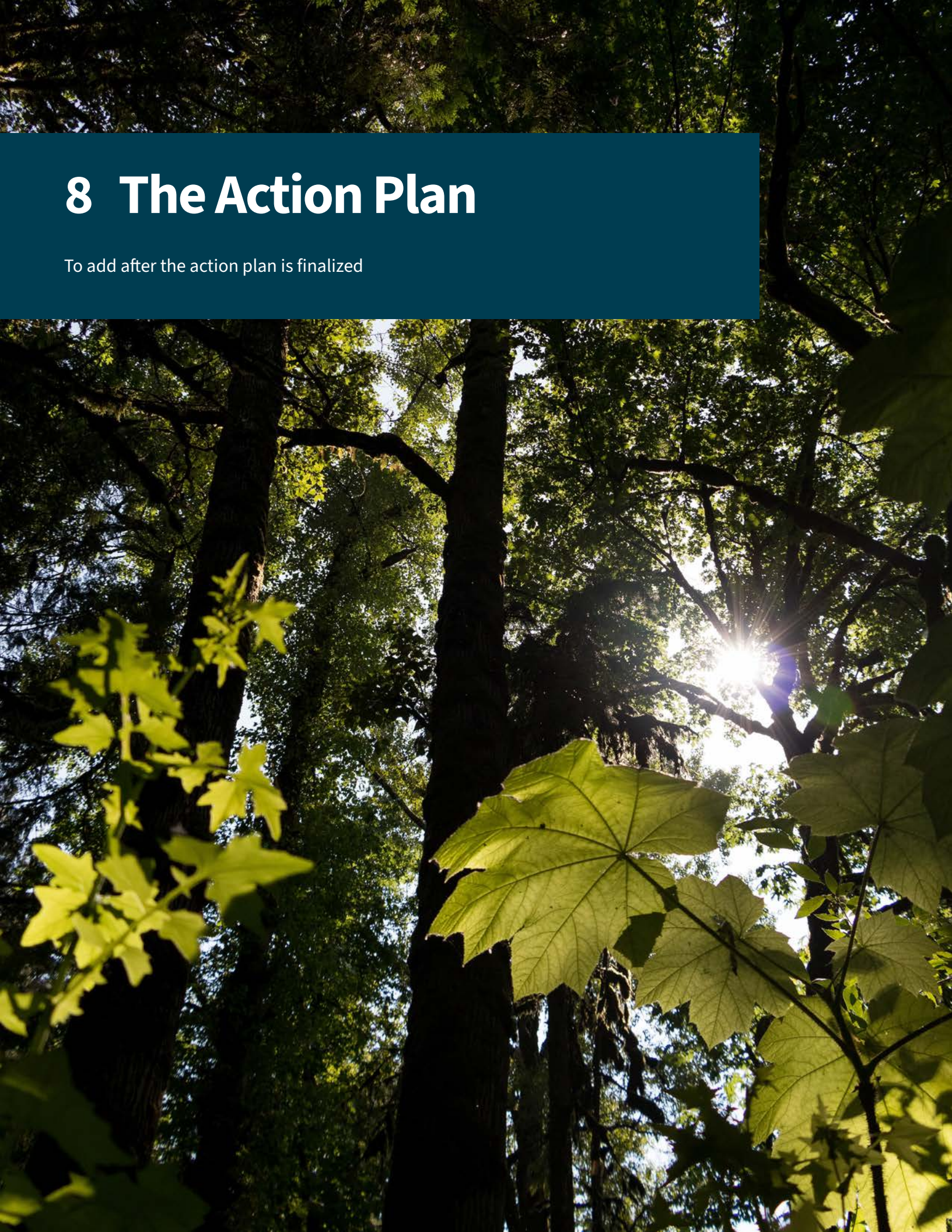
Strategy 10. **Foster partnership with external groups to implement the Strategy**

Planting trees on private land: Kelowna's NeighbourWoods Program

Kelowna has adopted five canopy cover targets for different parts of the city in its Official Community Plan. Recognizing that many of the available planting sites are located on private property, the City developed a partnership tree program – NeighbourWoods – in 2010 following the adoption of its Sustainable Urban Forest Strategy. The program is simple: the City coordinates with local nurseries to determine an annual tree list that is available for residents to order. The City takes orders from residents and uses its buying power to secure the trees at a lower cost than would be available to individual homeowners. At least six different species have been available in recent years at a cost of less than $50 per tree for a 6- to 12-foot-tall sapling. Homeowners are responsible for retrieving the tree from the City and installing it on their property. The City's Urban Forestry team provides printed and online extension resources to explain tree planting and other common questions. 6,500 trees have been planted on private land by the program since 2010.

8 The Action Plan

To add after the action plan is finalized



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10 Appendices

Appendix 1: Overview of Bylaws and Other Policy Tools Guiding Urban Forest Management in Maple Ridge

Maple Ridge's urban forest is regulated through a series of bylaws, guidelines, and policies. The **Tree Protection and Management Bylaw** is one of the primary policy tools that the City uses to regulate tree removal and replacement on both private and City-owned land.

On private land, the urban forest is regulated through a combination of **Zoning Bylaw, Watercourse Protection Bylaw, Development Permit Area (DPA) Guidelines**, and the **Municipal Enhancement & Landscaping Standards** (required for the **Environmental Development Permit** applications). The **Zoning Bylaw** defines the minimal landscaped areas and permeable surface, varying by the zoning for different uses. The **DPA Guidelines** establishes additional requirements on tree and vegetation retention, landscaping, overall character and form in areas designated as DPAs by the OCP. For example, the **Watercourse Protection Bylaw** imposes additional tree removal restrictions in watercourse protection DPAs.

Trees on City-owned land, such as streets and parks, are subject to **Subdivision Bylaw, Street Tree Specifications, and Design Criteria Manual**. The **Subdivision Bylaw** specifies requirements on street tree planting as part of the subdivision application. The **Street Tree Specifications** provide detailed planting requirements and guidance, such as soil volume and quality, tree size, species selection, and spacing, for street tree planting for subdivision projects. The **Design Criteria Manual** applies to street tree planting required for municipal projects.

Development Permit Areas (DPAs) in Maple Ridge, established through the OCP, play a crucial role in shaping land use, development, and environmental protection. These areas often are subject to stricter tree retention and landscaping requirements for environmental health and livability. For example, the **Natural Features DPAs** are established for the "preservation, protection, restoration, and enhancement of the natural environment for lands designated by the OCP or lands within 50 meters of the top-of-bank of a watercourse or wetland identified as a natural feature of the OCP." Additionally, the City requires an **Environmental Development Permit (EDP)** for any clearing, building, or development-related activity in areas within 50 meters of a watercourse or wetland area or conservation areas, with greater than 15% of slope, or within a floodplain to further regulate development activities and limit impacts on existing trees and vegetation.

Appendix 2: Phase 1 Engagement Summary

Contents

Scope of the Engagement

Maple Ridge is developing an Urban Forest Management Strategy (the Strategy) to manage and grow the urban forest over the next 20 years. Maple Ridge strives to have a thriving, climate-adapted urban forest that is essential to community well-being, provides high-value recreational opportunities, supports ecological health and biodiversity, offers cost-effective climate solutions, and improves livability for all residents.

Two phases of public engagement are planned to inform the Strategy. The first phase occurred in September – October 2023, aimed to collect the community's input on a long-term strategic urban forestry vision and supporting goals for urban forest protection and management. The second phase will take place after the Strategy is drafted, focusing on gathering opinions about the draft strategy.

Objectives for public engagement

Objectives for the first phase of public engagement are:

- To inform the public about
    - The status of our urban forest
    - The role of our urban forest in the community, including the unique environmental, economic, and social value of Langley's urban forest
    - The opportunities and challenges for the urban forest management, particularly due to ongoing development and climate change
- To consult the community to:
    - Identify and acknowledge their concerns and aspirations for the City's urban forest
    - Develop a long-term vision and goals for the strategy that capture the community's perspective on the City's urban forest

Engagement activities

The public was invited to provide input through a 15-min online survey, a mapping tool hosted on the project page, and 3 in-person open houses. The project team presented to the Parks, Recreation and Culture Committee in September 2023 and sought input from committee members. Details on engagement opportunities for Phase 1 in Table 1.

Table 1. Summary of engagement opportunities in Phase 1 Engagement

Date	Engagement Activity	Participants
September 23, 2023	*Booth at Memorial Peace Park during Haney Farmers' Market*	~150
September 27, 2023	*Booth at Maple Ridge Park during National Tree Planting Day*	~60
September 27, 2023	*Presentation with the Parks, Recreation, and Culture Committee*	12
October 5, 2023	*Booth at Albion Community Centre*	~15

Communication tactics used

Information on engagement opportunities was communicated via several online platforms to reach as many people as possible. Promotional materials used are in the appendix. The platforms used included:

- Project page on Engage Maple Ridge
- Maple Ridge's social media accounts: Facebook, Instagram, X, LinkedIn
- Postcard handouts,

Who we heard from

We have engaged more than 2,000 people in the first phase, which includes 255 survey respondents, 12 members from the Parks, Recreation, and Culture committee, 225 people who attended the in-person open houses, over 15 people through the in-person and online mapping tools (85 submissions), and more than 1,500 people from project page's engagement analytics.

Survey demographics

Of the 255 survey respondents:

- 97% reside in Maple Ridge
- 84% are homeowners, 15% are renters
- Most respondents live in Central (17%) and West (17%) Maple Ridge (**Figure 1**)
- 69% are 35-64 years old (**Figure 2**)
- 60% of respondents have lived in the City for 10 or more years (**Figure 3**)

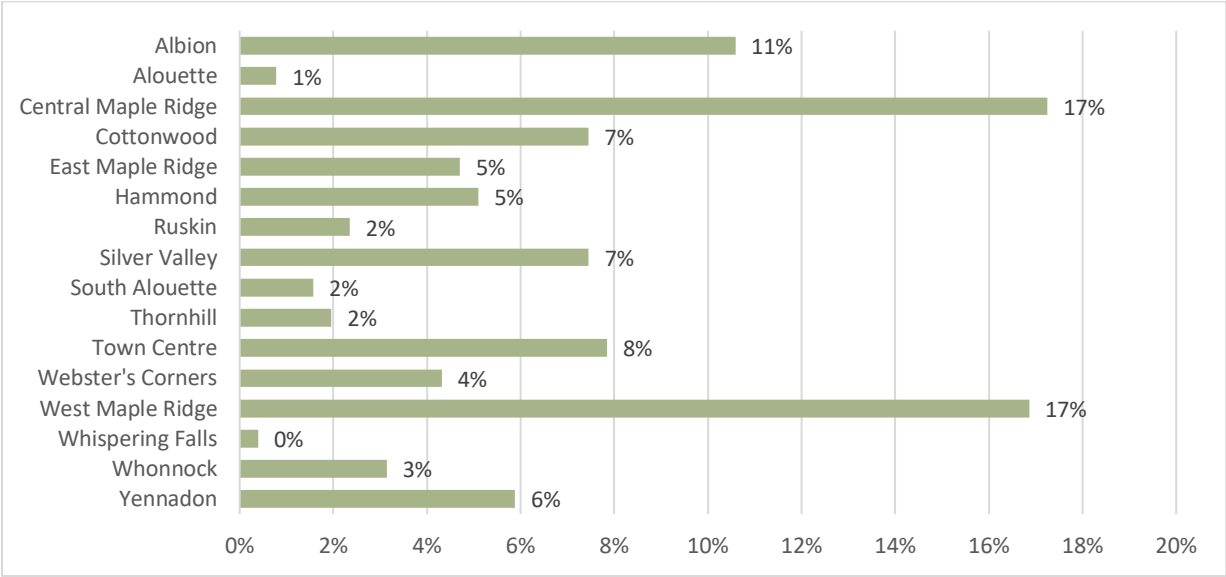

Figure 1. Where survey respondents reside (total respondents = 255)

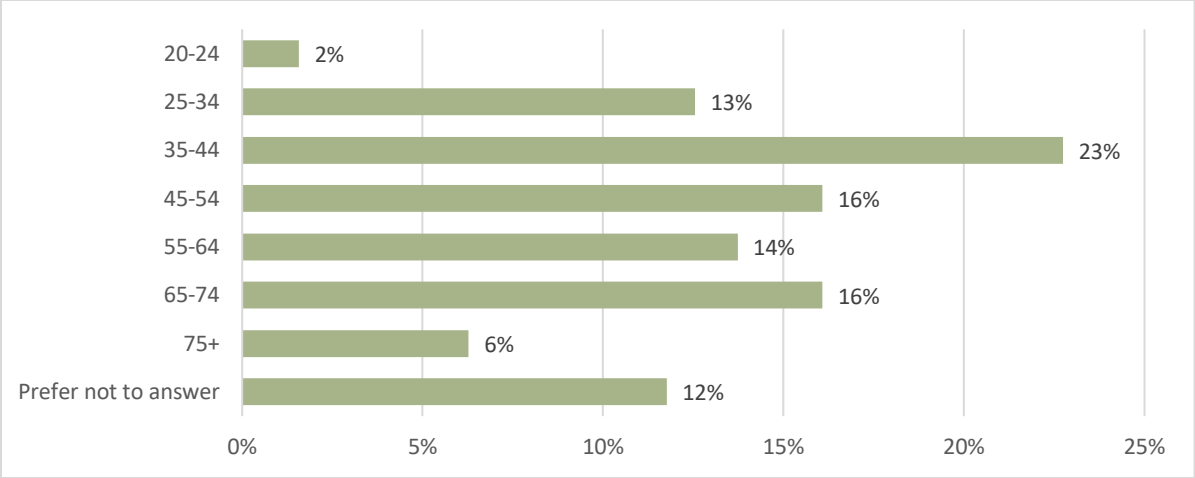

Figure 2. Age distribution of survey respondents (total respondents = 255)

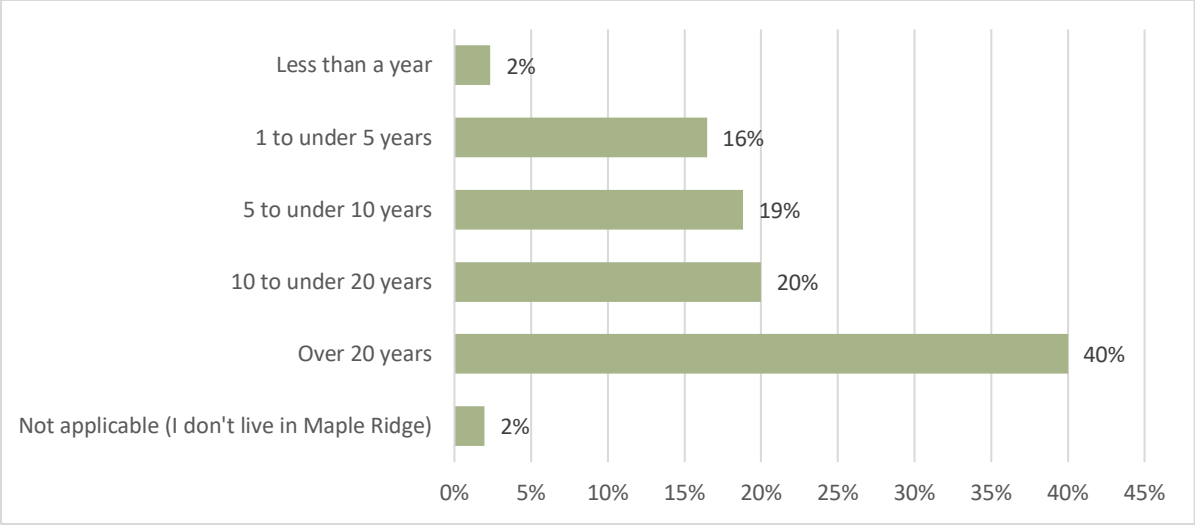

Figure 3. Duration of respondents' residence in the City (total respondents = 254)

What We Heard

Results from the first phase of public engagement are summarised in this section and structured around the following topics:

- Understanding how the Urban Forest is valued and developing a vision for the next 20 years
- Important urban forest places
- Preferences for street trees (size and distribution)
- Priorities for urban forest management and tree regulation
- Satisfaction with and preferred urban forest levels of service
- Community stewardship of the urban forest

Understanding how the urban forest is valued and the vision for the next 20 years

Survey respondents were asked to rank the benefits they valued in the urban forest (**Figure 4**). The most important urban forest benefits were **climate change resilience** (shade and cooling of streets and buildings, flood protection, and role in carbon cycle storage), **environmental benefits** (such as rainwater management, air purification, and wind protection), and **ecological benefits** (habitat and food for native plants and animals). Ranking lower in importance are **economic**, **cultural interest**, and **health and social benefits**.

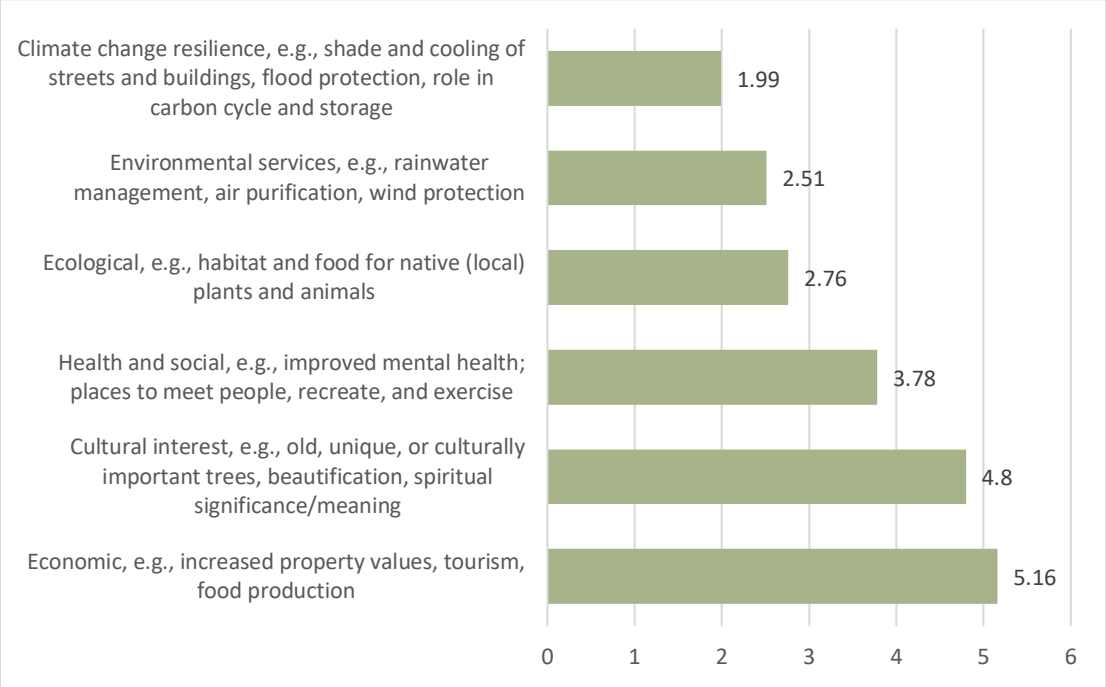

Figure 4. Respondents' ranking of urban forest benefits (total respondents = 255)

Members of the Parks, Recreation, and Culture Committee (the Committee for short hereafter) were invited to share their impression of Maple Ridge's urban forest (**Figure 5**). They used words such as "**sustainable**", "**abundant**", "**beautiful**", "**clean**", "**diverse**" and, "**enriching**" to describe the current values they appreciate about the urban forest.

Figure 5. Description of Maple Ridge's urban forest from 6 Committee members.

Survey participants were asked to share their vision for Maple Ridge's urban forest in 20 years (**Figure 6**). The overwhelming consensus was a **desire for more trees in the City**, (251 respondents). Respondents stated that they would like to see a **healthy** (20 respondents) urban forest with an **increased tree canopy** (149 respondents). Respondents emphasized the importance of having **mixed and native tree species** (59 respondents) as they wish Maple Ridge's urban forest to be **climate resilient** (40 respondents) and can provide for **wildlife habitat and biodiversity** (29 respondents). Respondents also valued the **accessibility of recreational green spaces** (17 respondents) and the **aesthetics** (19 respondents) of a healthy forest. Some 39 respondents expressed a strong desire to have the urban forest **integrated with urban planning**, citing examples of how current developments treat trees as a decorative addition instead of being carefully planned to maximize their health and benefits. Additionally, respondents want to see the City to **preserve larger or mature trees** (21 respondents) and **prevent tree removals** (10 respondents).

Figure 6. Word cloud showing the most common words used by respondents to describe their vision of the urban forest for the next 20 years (total respondents = 255)

Canopy cover preferences

When asked about their preference for canopy cover change over the next 20 years (**Figure 7**), 91% of respondents desired an increase in tree canopy cover. However, a small proportion (7%) of respondents were happy with the current canopy level, and 2% preferred a decreased canopy cover.

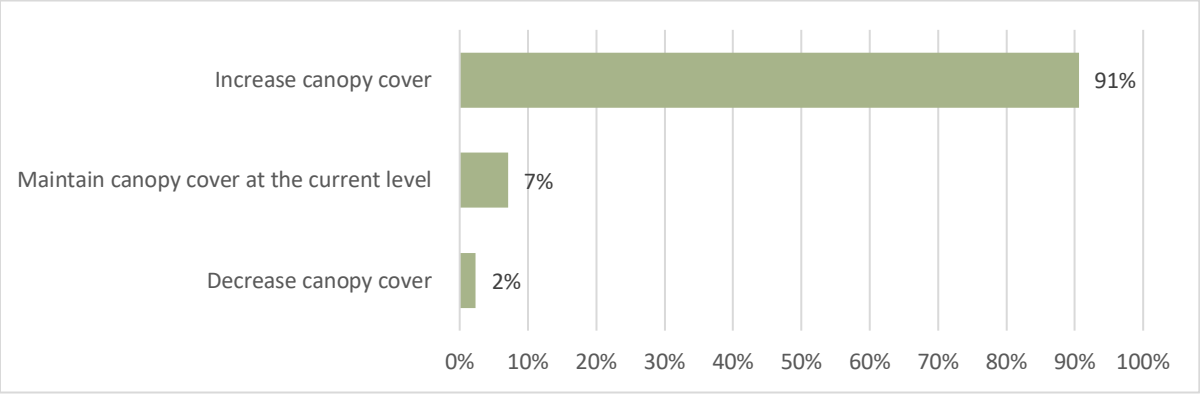

Figure 7. Respondents' preferences for canopy cover change in Maple Ridge over the next 20 years (total respondents = 255)

Important urban forest places

Community members used the mapping tool, either through the online platform or at the in-person events, to identify significant urban forest places that they valued or believed need improvement. A total of 85 locations were identified, with 44 (52%) places of value and 41 (48%) places needing improvements.

Places of value

Places of value were fairly spread out across the City but were mostly concentrated within the Haney region (13 submissions), Golden Ears Provincial Park (8 submissions), and Thornhill region leading towards Kanaka Creek (7 submissions). Submissions were in parks, along trails, or in unprotected greenspaces or natural areas (**Figure 8**). The most common reasons that respondents valued these locations included strong ties to a familiar recreational site or otherwise large trees (18 submissions). People also shared their appreciation for the greenness along trails and roads during their commute (5 submissions), being able to see or support wildlife habitat (3 submissions) as well as general beauty and aesthetic value (2 submissions).

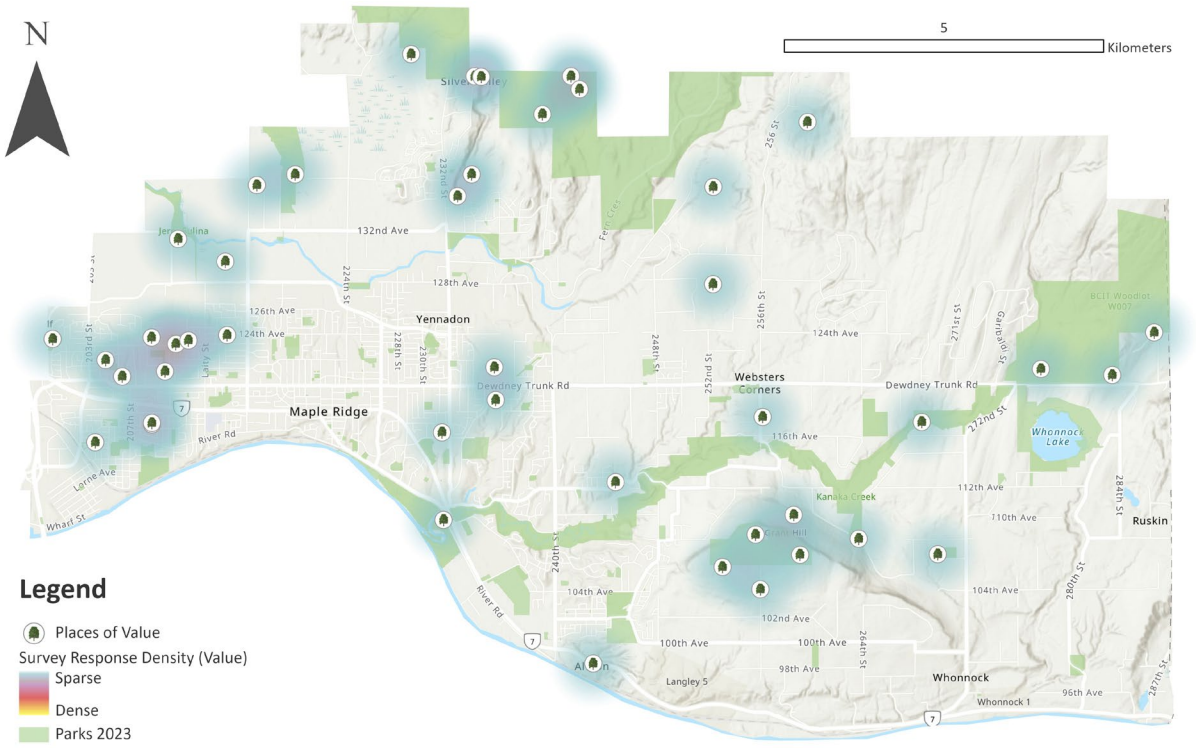

Figure 8. Places of Value identified in the urban forest through the online mapping tool and through the in-person open houses (submissions = 44)

"We're lucky to have this great natural area so accessible off of DTR"

- Respondent on valuing a point within the BCIT Woodlot

Places needing improvements

Urban forest locations needing improvement are summarised in **Figure 9**. Out of the 41 submissions, most places were concentrated around the Haney area (17 submissions) and the Town Centre (9 submissions). These places were mostly lacking trees (10 submissions), specifically within in parking lots (4 submissions) and underutilized open spaces (4 submissions). Other places of concern include areas with future tree growth issues (4 mentions) where wrong trees were planted wrong place or trees having concerning growth structures.

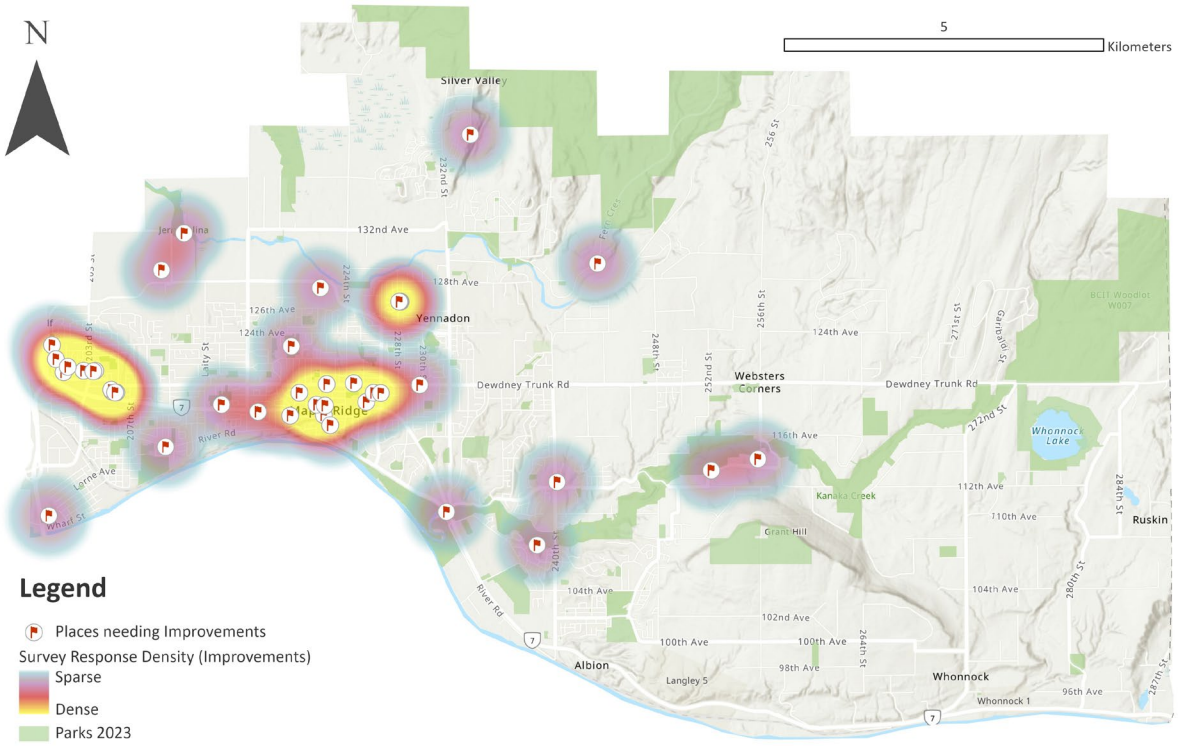

Figure 9. Identified urban forest places needing improvements through the online mapping tool and through the in-person open houses (submissions = 41)

The urban forest on your street

Survey respondents were asked to identify photos that most resembled their street and their preference for how they would like their street to appear (**Figure 10**). Most respondents (85%) currently live on streets without large trees resembling **Option A – few or no trees** (22%), **Option B – regularly spaced, small-sized trees** (18%), **Option C - regularly spaced, medium-sized trees** (22%), and **Option D – mixed spacing and species, medium-sized trees** (23%). The remaining respondents live on streets **resembling Option F – mixed spacing and species, large trees** (12%) and **Option E – regularly spaced, large-sized trees** (3%).

When asked which street respondents would prefer to live on, 54% indicated a preference for streets with **large trees** (options E or F). Only 3% of respondents would like to live on a street with **small trees** (Option B) and 1% would like to live on a street with **few or no trees** (Option A).

A. Few or no trees

B. Regularly spaced small trees

C. Regularly spaced, medium-sized trees

D. Mixed spacing and species (different types of trees), medium sized trees

E. Regularly spaced, large trees

F. Mixed spacing and species (different types of trees) large trees

Figure 10. Types of street planting presented to survey respondents (total responses = 255)

Respondents were asked if they were satisfied with the number of trees in their immediate neighbourhood (**Figure 11**). The large majority (71%) would like to see more trees. A small portion (20%) wanted to maintain the current number of trees, and an even smaller portion (5%) wanted to see fewer trees.

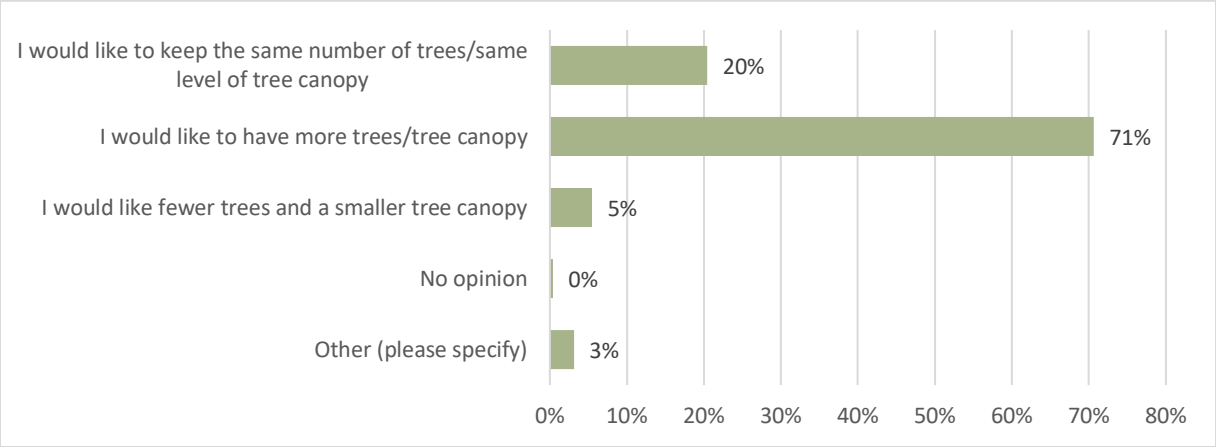

Figure 11. Respondents' preference of number of tree canopy

Respondents who selected the "other" option also wanted more trees in their neighbourhoods. Specifically, they were content with the number of trees on private property but wished to see an increase in trees on City-owned land within their neighbourhoods.

Priorities for urban forest management and tree regulations

Survey respondents were asked to rank areas for tree planting (**Figure 12**). The top ranked location is along local residential streets (average ranking score at 2.67). The subsequent locations with similar rankings are along trails and greenways (3.39), in City parks (3.43), on private land (3.46), and along major arterial roads (3.51). Participants believed that planting in forested conservation areas could be in the lowest priority, compared to the other locations (4.55).

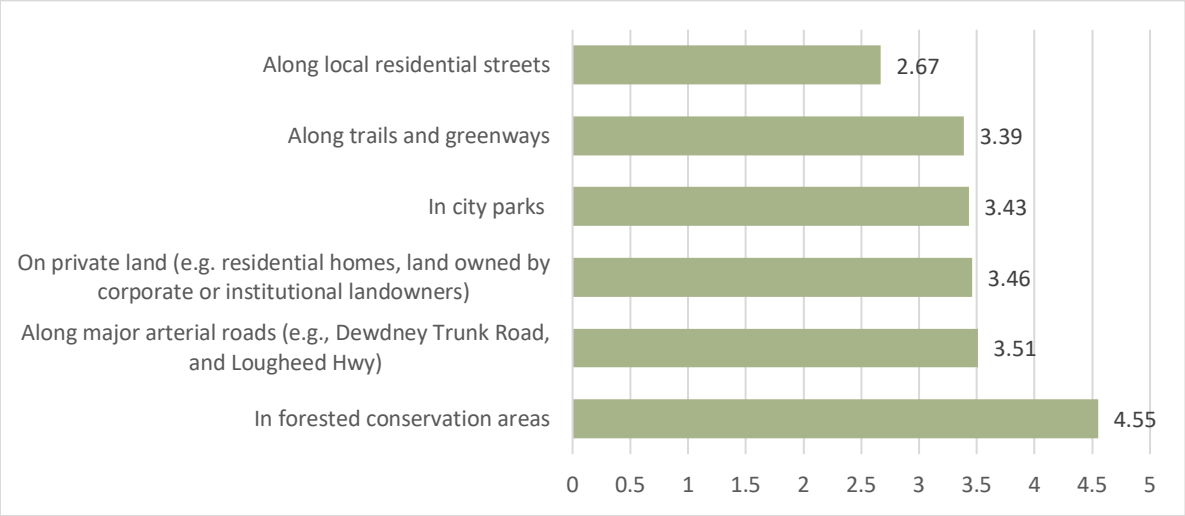

Figure 12. Areas where trees are missing (total respondents = 255)

Priority actions on for tree regulations

Survey respondents showed mixed levels of support for tree regulations on private property (**Figure 13**). Of the eight regulations, respondents were the most supportive of significant tree canopy protection (91% support, 4% oppose), healthy tree retention (87% support, 7% oppose), tree protection from damages (91% support, 3% oppose), and retention of very large trees (80% support, 9% oppose). Low levels of support was shown towards regulations that allow tree removals more easily, such as allowing tree removals so long as they keep some on their property (19% support, 63% oppose), allowing the removal of large trees with replacement trees (28% support, 62% oppose), and allowing the removal of healthy trees with replacement trees (33% support, 55% oppose).

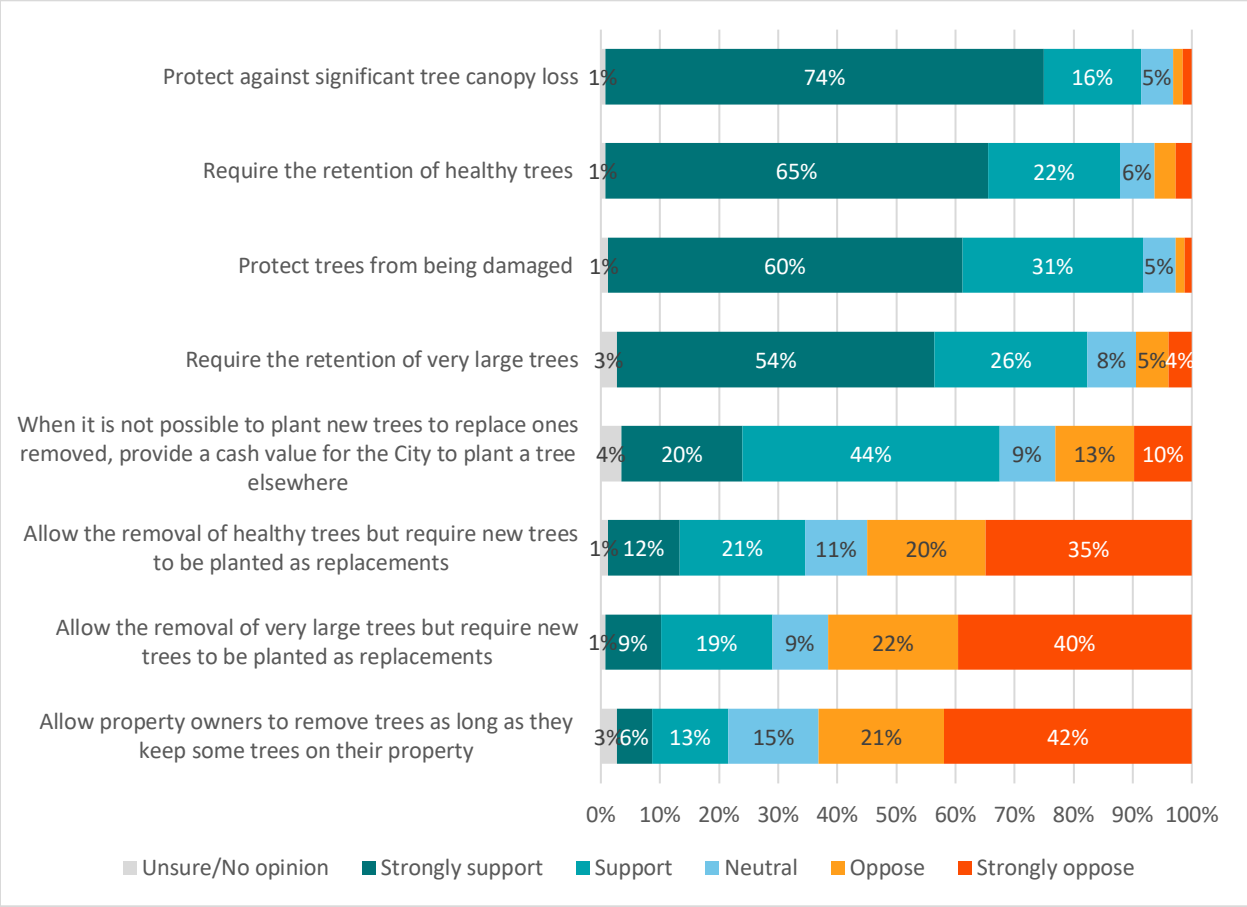

Figure 13. Respondents' levels of support for eight tree regulations on private property (total respondents = 255)

Tree regulations on private property

Respondents were asked to share thoughts on the extent to which trees (with diameters 20cm or larger) are protected by the Tree Protection and Management Bylaw (**Figure 14**). Most respondents (52%) felt that trees were insufficiently protected. Some (20%) thought that trees are adequately protected. Only 10% thought that trees were overly protected.

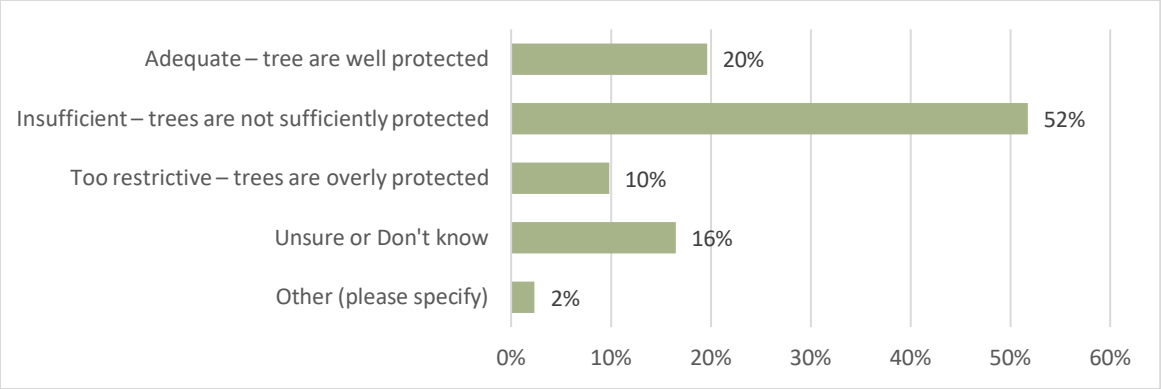

Figure 14. Respondents' preference for tree protection on private property (total respondents = 255)

Urban forest service levels

Service levels describe how the City of Maple Ridge maintains City-owned trees. Survey respondents were asked to rank satisfaction levels with current service levels for street trees, trees in parks, and trees in conservation areas. The overall feedback indicates varying degrees of satisfaction with the urban forest service provided by the City (**Figure 15**).

Respondents expressed the highest level of satisfaction with the City's response to storm and debris cleanup (61% satisfied, 8% dissatisfied). They were moderately satisfied to neutral with the pest and disease control (39% satisfied versus 15% dissatisfied, 40% neutral). Respondents held a neutral stance regarding hazard tree removal (51% neutral) and wildfire and forest fuel management (30% satisfied versus 16% dissatisfied, 44% neutral). However, dissatisfaction was prevalent in other areas of urban forest services. Notably, public education provided by the City received the lowest satisfaction rating (6% satisfied, 48% dissatisfied). Additionally, respondents were dissatisfied with City tree protection and preservation (18% satisfied, 42% dissatisfied) and City tree planting and replacement (24% satisfied, 38% dissatisfied).

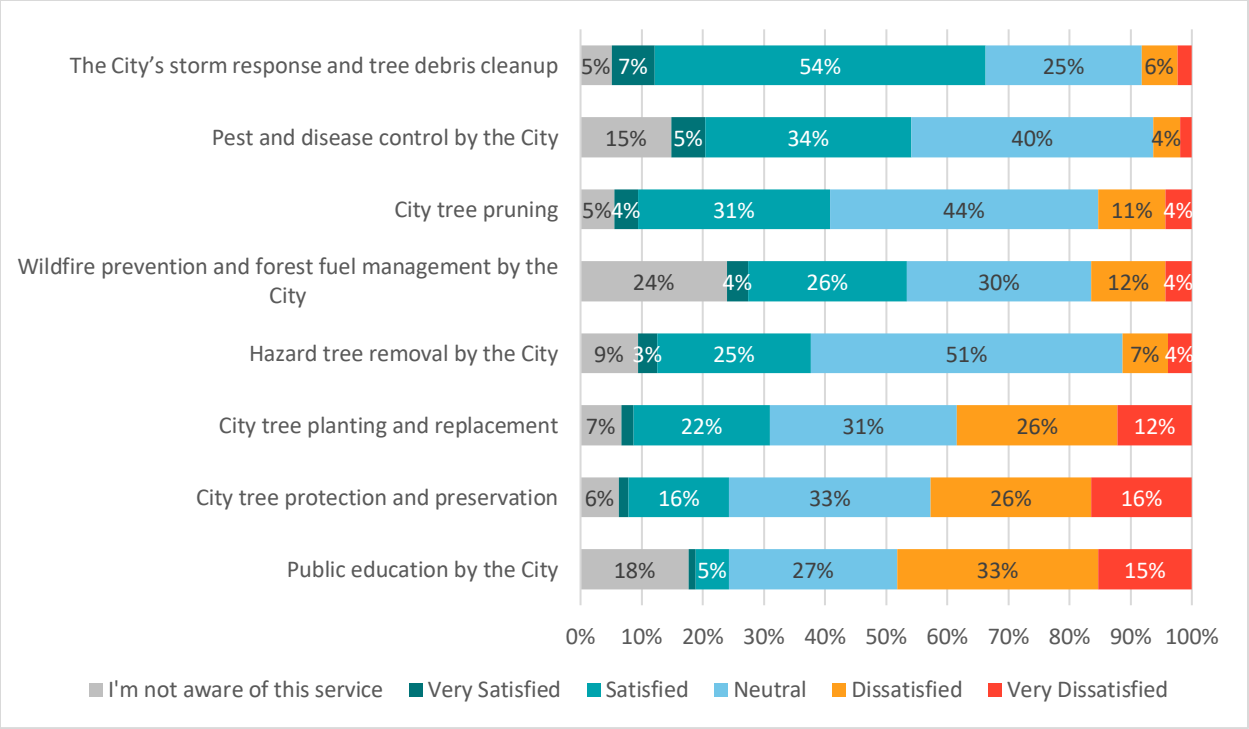

Figure 15. Satisfaction levels with current service levels for City-owned trees (street trees, trees in parks, and trees in conservation areas) (total respondents = 255)

In terms of funding for supporting urban forest service levels (**Figure 16**), most respondents (73%) would like to see the City to allocate increased funding to improve urban forestry services. A smaller proportion preferred maintaining the current funding level (8%), while a minority advocated for reducing the funding allocation (2%).

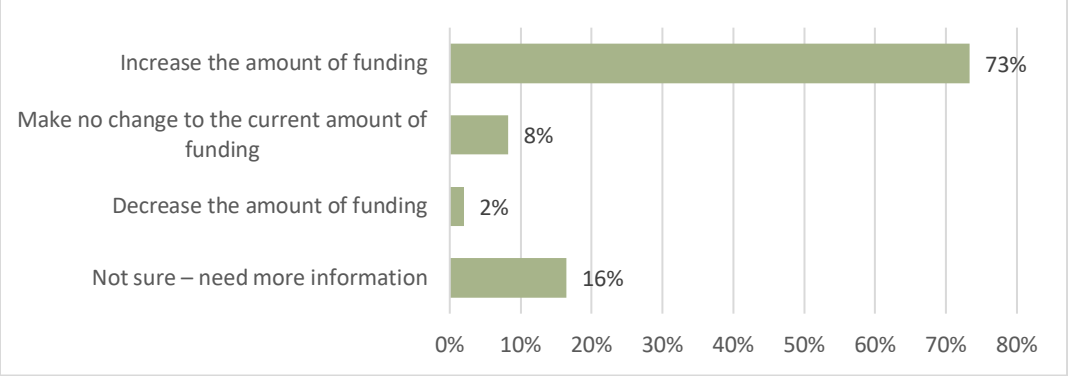

Figure 16. Respondents' preferences on funding allocation for urban forest services

Community stewardship

Community stewardship refers to the involvement of community members in caring for or contributing to the urban forest on City or private lands. Most respondents (92%) had participated in at least one

urban forest stewardship activity (**Figure 17**). The top attended stewardship activities were maintaining trees on personal property (71%), planting trees on personal property (55%), and watering street trees (38%). Other activities that respondents have participated in included assisting others with tree needs, removing hazardous or sick tree on personal property, planting trees in volunteer programs, reporting a tree for inspection. Only 8% had not been involved in any urban forest stewardship activities.

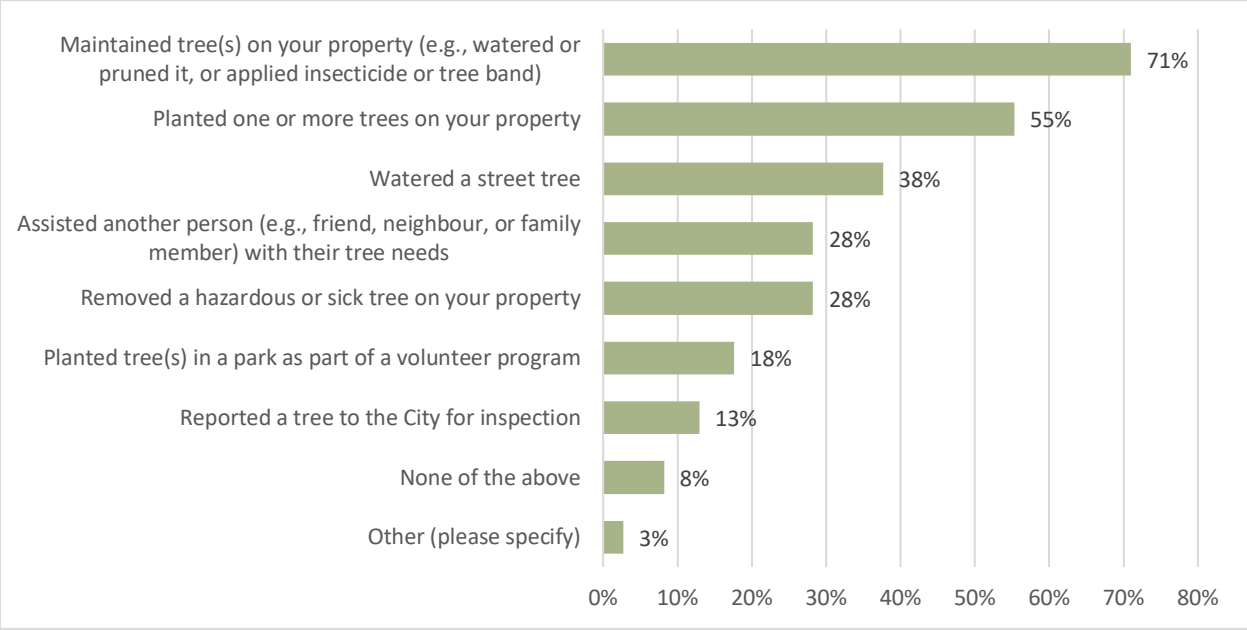

Figure 17. Stewardship activities that respondents have participated in the past 5 years (total respondents = 255)

Barriers to participating in stewardship activities

Respondents cited various reasons that restricted their participation in stewardship activities (**Figure 18**). While 44% of participants reported no barriers, 22% felt they did not have enough information about stewardship opportunities, which was the top voted barrier. Other barriers included not having enough space for a new tree (19%), needing permission from a strata or landlord (17%), having enough trees on private property (15%), having physical or mobility challenges (14%), being too costly (11%), and taking too much time (9%). Only 2% expressed disinterest in stewardship activities related to the urban forest.

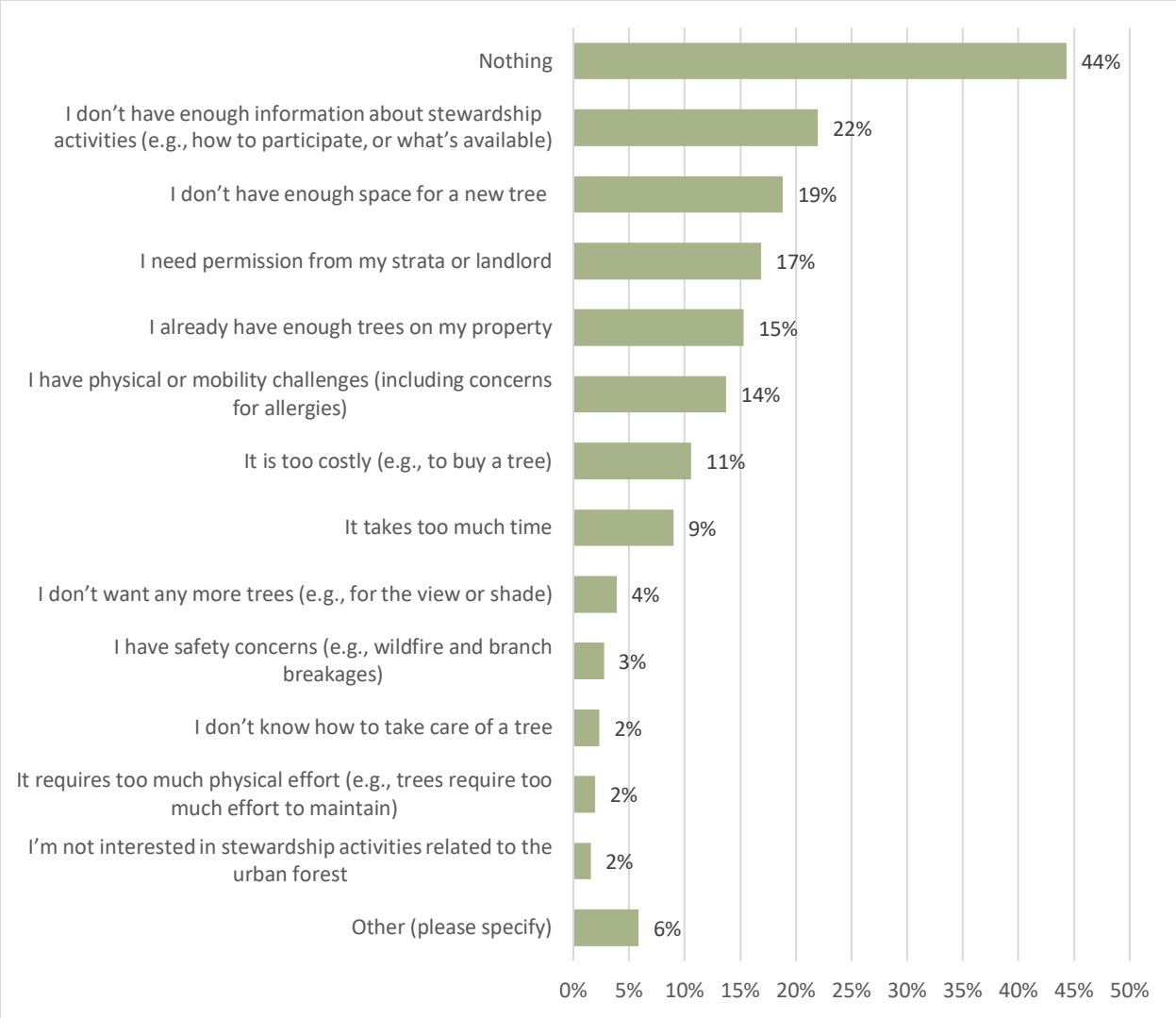

Figure 18. Barriers preventing respondents from participating in stewardship activities (total respondents = 255)

Public interest for urban forest stewardship activities

Respondents generally showed a strong interest in supporting and nurturing the urban forest in Maple Ridge (**Figure 19**). Most participants expressed willingness to volunteer planting trees on City property (89%) and participating in urban forest stewardship activities (71%). Additionally, 65% of respondents were willing to help with watering trees in the streets (65%) and on private property (50%). Forty-five percent (45%) also committed to plant trees on their property.

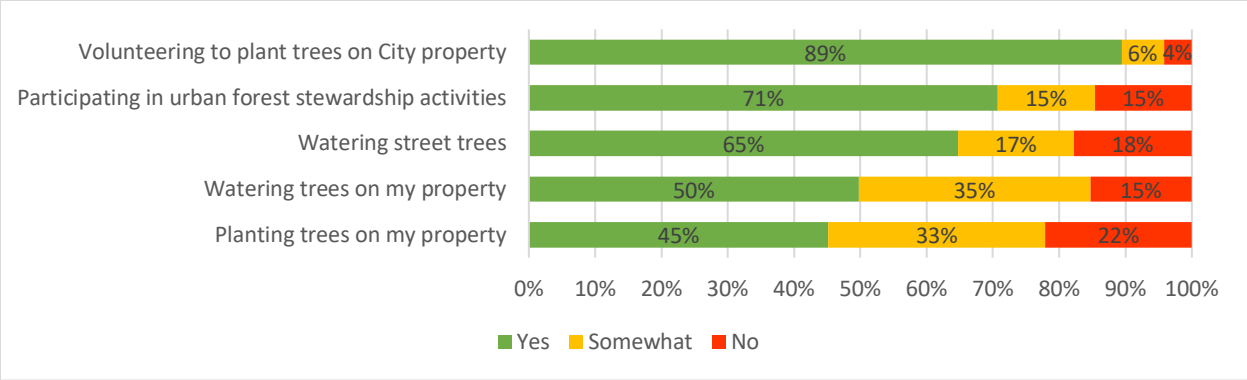

Figure 19. Respondents' interest in supporting the urban forest (total respondents = 255)

Public education Interests

When asked about what people would like to learn about tree maintenance, the most popular subjects included improving their yard to provide habitat for birds and pollinators (48%), pruning trees (40%), and managing tree pests and disease (40%). Additionally, 36% of respondents expressed an interest in learning how to choose the right tree for their yard (36%) and how to keep trees healthy during construction (28%). Only a small portion had no interest in learning about trees (4%).

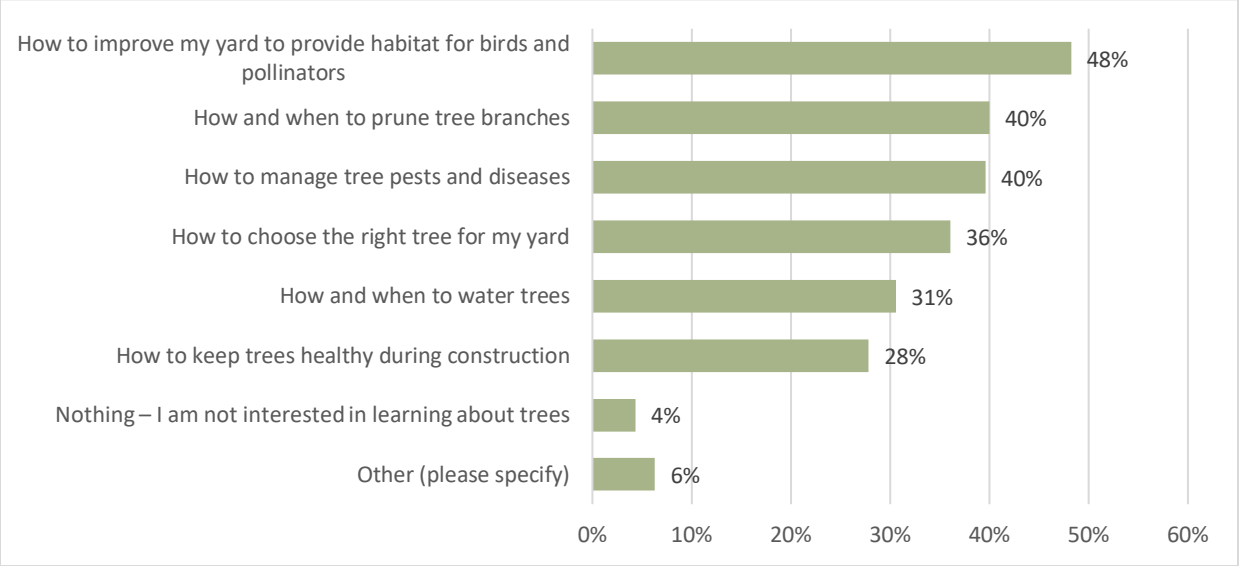

Figure 20. Respondents' preferred topics for learning about tree maintenance (total respondents = 255)

Interest in tree sale/voucher

Respondents were asked about their interest in a tree sale or tree voucher program where they could buy a tree at a discounted price (**Figure 21**). A significant 57% expressed strong interest in such a program, while an additional 18% indicated some interests. On the other hand, 13% expressed no interest, and 12% either have no opinion or find the question not applicable to them.

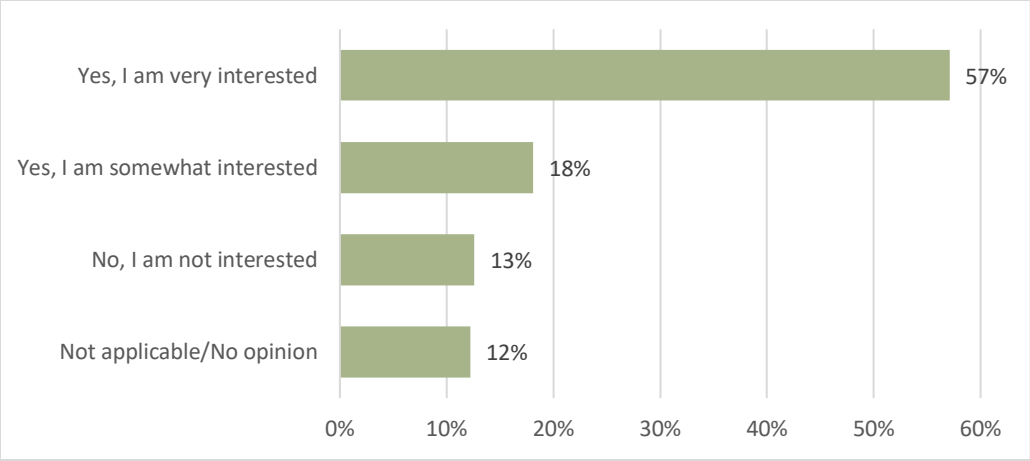

Figure 21. Respondents' interests in a tree sale or a tree voucher program among Maple Ridge residents (total respondents = 254)

Synthesis of Feedback

The feedback collected from the survey, mapping tool, and Committee presentation has been synthesized into key statements in the tables below. Each key statement ("What we heard") is followed by an explanation of how the feedback will inform the ongoing development of the UFMS for the following urban forest themes:

- Implement and adapt
- Protect and expand
- Manage and sustain
- Engage and partner

Summary of feedback for the urban forest planning and long-term vision

What we Heard	How it will be considered
• Respondents value their greenspaces. They appreciate the accessibility to their recreational sites. • Survey respondents envisioned Maple Ridge to have healthy and mature trees of diverse, climate-resilient, and native species • Respondents would like to see the harmonious coexistence between the community and wildlife.	The project team will incorporate these inputs when drafting the UFMS vision and goals to emphasize the benefits most valued by the community.

Key themes for implementing and adapting the urban forest for enhance efficiency and resilience

What we Heard	How it will be considered
Respondents are unsatisfied with the current levels tree protection.	The project team will consider strategies aimed at enhancing tree protection and preservation,

Most respondents would like to increase the funding allocated to improve the service levels for the urban forest management	The project team will strive to achieve adequate funding and staffing levels to support the implementation of the Strategy
Many respondents are advocating for the retention of large and healthy trees, many indicating strong support	The draft Strategy will consider including a canopy target for the next 20 years as a policy objective into the OCP and in new and existing local area plans The draft Strategy will also make recommendations about policy updates for improved tree retention outcomes.

Key themes for protecting and expanding the urban forest for to maximize benefits and enhance resilience

What we Heard	How it will be considered
The top 3 locations where respondents wanted more trees planted are along local residential streets, trails and greenways, and in parks.	The draft Strategy will consider strategies to expand the urban forest in identified locations
Respondents were either dissatisfied or neutral about service levels regarding city tree planting and replacement.	The draft Strategy will include recommendations to update bylaws and other policies, and new guidelines on retention/removal decisions, and protection requirements and procedure.
• More respondents were dissatisfied than satisfied by current levels of tree protection and preservation efforts • Many respondents think that the bylaw does not sufficiently protect tree	
In line with preserving large mature trees, respondents are against the idea of replacing cut trees with new trees. When replacing tree is not possible, participants are in favour of cash-in-lieu for off-site planting.	The draft Strategy will consider recommendations aimed at protecting and restoring forest lands to support healthy ecosystem functions.

Key themes for managing and sustaining the urban forest for to maximize benefits and enhance resilience

What we Heard	How it will be considered
Respondents had mixed levels of satisfaction for current urban forest service levels: • Respondents were satisfied with storm and debris cleanup • Respondent expressed dissatisfaction for public education, protection and preservation, and tree planting and replacement • Respondents were mostly neutral about pest and disease control, wildfire and forest fuel management, and hazard tree removal	The draft Strategy will share information about services provided by the City and consider recommendations to improve services with the greatest dissatisfaction. In particular, trying to align service levels for urban forest with best practices and prioritizing tree risks for tree health and community safety.

Key themes for engaging and partnering for inclusive urban forest management

What we Heard	How it will be considered
A small portion of respondents are unaware of the City's role and responsibilities on public education, yet among those who know of this service are dissatisfied.	The draft Strategy will reassess the platforms best used to share information on potential public education opportunities.
The large majority of respondents have participated in urban forest stewardship activities in the past five years. However, there are barriers hindering more support for stewardship activities. The top 3 are: • Not having enough information on how to participate • Not having enough space for a new tree • Needing permission from their strata or their landlord to plant trees	The draft Strategy will consider ways for the City to encourage urban forest stewardship, including education on tree planting and tree care, and offer incentives.
Survey respondents want to help! They are most interested in supporting the urban forest through: • Volunteering to plant trees on City property • Participating in stewardship activities • Watering trees on street and in their property Survey respondents are also enthusiastic about having a tree sale or a tree voucher program aimed at the residents of Maple Ridge.	
Respondents are also eager to learn. The most interested topics are: • Improving habitat for birds and pollinators in their yard • Pruning tree branches • Managing trees for pest and diseases	The draft Strategy will provide recommendations to guide tree planting and maintenance, and also consider providing guidance on other topics of interests

Next Steps

The findings from the first phase of community engagement will inform the development of the draft UFMS, including a long-term vision and priorities for implementation. Phase 2 of public engagement is expected to occur in January of 2024 to gather feedback on the draft Strategy.

Appendix 1 Sample Communication and Promotional Materials