City of
Pitt Meadows

Urban Forest

Strategy & Implementation Plan

DRAFT #1

City of Pitt Meadows
THE *Natural* PLACE

Acknowledgements

The City of Pitt Meadows acknowledges that its urban forest and all related activities occur on the traditional and unceded territory of the qʔiċəyʔ (Katzie) First Nation. We recognize, honour, and respect the past, present and future of Indigenous people on this land and are committed to reconciliation as we grow and maintain the urban forest.

This Strategy and Implementation Plan was prepared by McElhanney in partnership with the City of Pitt Meadows and was made successful with input from the community and rights-holders.

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Key Terms and Acronyms

ALR – Agricultural Land Reserve

Biodiversity – All the different kinds of life you will find in one area; the variety of animals, plants, fungi, and even microorganisms like bacteria that make up our natural world.

Ecosystem services – The aspects of ecosystems that provide benefits to living creatures, such as: water capture and filtration; air pollutant absorption; cooling and shading; carbon sequestration; biodiversity.

Green infrastructure – The natural vegetation, soils, and bioengineered solutions that collectively provide the community with a broad array of products and services for healthy living.

Natural assets – natural features of the environment that provide ecosystem services to a community and therefore provide financial or intrinsic value.

OCP – Official Community Plan

Permeable area – Areas that allow water to percolate into soil to filter out pollutants and recharge the water table. Impermeable areas don't allow water to penetrate, forcing the water to run off.

Soil cell – A modular suspended pavement system that uses soil volumes to support large tree growth.

Stormwater management – The processes within a system that are designed to absorb, and/or redirect rainwater, especially from large flow events like downpours or storms.

Tree canopy cover – The area covered by all deciduous and coniferous tree crowns (i.e. area occupied by leaves as viewed from above), as measured from the air, expressed as a percentage of total land area.

UCB – Urban Containment Boundary

Urban forest – Includes all the public and privately-owned trees, shrubs, and low growing vegetation in the urban and rural areas of Pitt Meadows. For the purpose of this strategy, the urban forest refers to the trees within the UCB.

Urban heat island effect – When closely packed buildings and paved surfaces that make up our cities amplify and trap heat far more effectively than natural ecosystems and rural areas, which are often shaded by trees and vegetation and cooled by evaporating moisture. Cities also generate their own heat, which is released from sources such as furnaces, air conditioners, and vehicles, adding to the urban heat island effect.

Executive Summary

Pitt Meadows is challenged with maintaining and growing its urban forest in the face of progressing climate change and growing pressures from housing and transportation needs. The City's tree canopy cover within the Urban Containment Boundary has decreased by over 3% since 1996, and intervention is needed to prevent further loss of trees in the Urban Containment Boundary. The purpose of this Urban Forest Strategy is to frame a plan that will increase canopy cover and grow the urban forest by 2050.

The Official Community Plan section 3.9 provides the basis for the vision of this Strategy:

Vision: To create a diverse, resilient, and beautiful urban forest on public and private lands.

This Urban Forest Strategy includes a list of goals, objectives and actions designed to build resiliency into the future urban forest through the City's management practices and policies. This document is intended to guide short- and medium-term actions and should be revisited and updated in the next 5-10 years.

Strategy Goals:

1. PROTECT the existing urban forest canopy from further decline.
2. MANAGE the existing urban forest in parks and on publicly-owned lands.
3. GROW the urban forest canopy cover.
4. PARTNER with the community to foster stewardship and ownership over the shared urban forest.

1. Introduction

The City of Pitt Meadows was incorporated in 1914 on the flat lands between the Pitt River and Fraser River. Prior to this, the area was populated solely by qʔicəy̓ (Katzie) members of the Coast Salish people, who have lived and prospered in this area for thousands of years. By the late 1800's, a small community had formed, with industry consisting primarily of logging and farming. In the early 1900's, Japanese-Canadian settlers arrived in the area and formed a significant community in Pitt Meadows until they were sent to farms and internment camps in BC's Interior during the Second World War. The Japanese-Canadian settlers were followed by Dutch settlers, who arrived shortly after the Second World War. Under the direction of Dr. Jan Blom and Pitt Polder Ltd., they were successful in diking the lowland areas, transforming swamp lands into functioning fertile farmland.

This city, of approximately 19,800 citizens, is situated at the base of the Coast Mountain foothills and is characterised by abundant agricultural land, creeks, rivers, and dikes. Prior to settlement, the land in this area consisted of floodplain with forested raised areas and provided wild habitat across the entire city boundary. Now, the City of Pitt Meadows has a compact urban centre with many parks and recreational facilities, and much of the land in Pitt Meadows is active farmland within the Agricultural Land Reserve (ALR). In order to preserve the ALR land for farming, this Urban Forest Strategy focuses mainly on growth and management within the Urban Containment Boundary (UCB). There may be opportunities for improvement within the ALR, and those can be coordinated with the goals of this strategy.

The UCB is a conceptual line determined by Metro Vancouver that generally coincides with the ALR boundary. The City favours development within this boundary and discourages development outside of it to preserve land for farming and environmental protection. The City's UCB is generally bordered by Lougheed Highway to the north, the Fraser River to the south, agricultural land to the west, and the Golden Ears Bridge to the east. Serving the region as a critical transportation corridor, Pitt Meadows is challenged with transportation impacts on the environment, compounded by increasing climate change and other challenges related to land use demands.

Public engagement indicates that the urban forest is highly valued by the community, and its growth offers great opportunities, if properly managed.

2. Background

The urban forest in the City of Pitt Meadows' UCB has decreased from 20% in 1996 to 17% in 2020, based on historical orthoimagery. What remains faces challenges to stay healthy from development pressures, traffic, lack of space for roots, and increasing impacts from climate change such as hotter, drier summers and more intense storms. Along with increasing climate resiliency and their intrinsic values, there are numerous social, environmental, and economic benefits to trees and the urban forest canopy that are important to preserve for future generations.

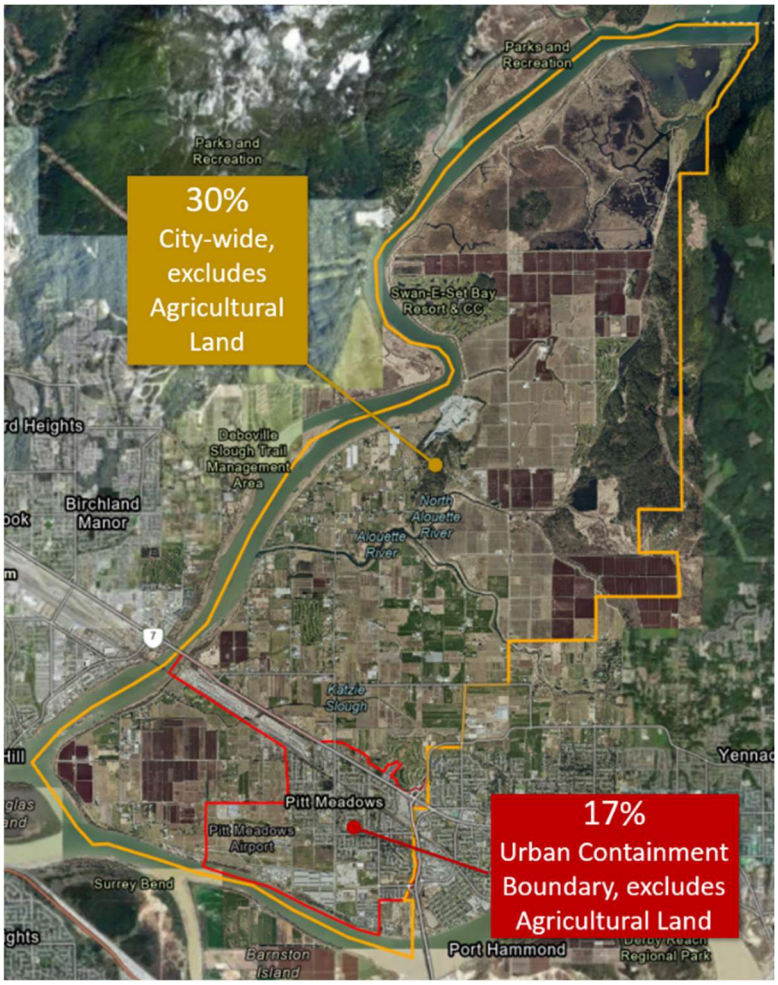


Figure 1. Tree canopy cover areas across the City and within the Urban Containment Boundary, excluding ALR.

The City of Pitt Meadows currently has a canopy cover of 30% overall and 17% within the UCB, excluding land within the ALR (Figure 1). Within the UCB, there are 285 hectares (705 acres) of ALR land and of that, 201 hectares (498 acres) are in lands designated as *Airport* in the Official Community Plan (OCP). These *Airport* lands are not eligible for tree planting due to their status as an aerodrome and the restrictions required for safe flight clearance. Figure 2 further breaks

these percentages down into ownership between public and private lands and their respective contributions to canopy coverage percentages (public lands include City-owned lands and road right-of-ways, parks, and school properties).

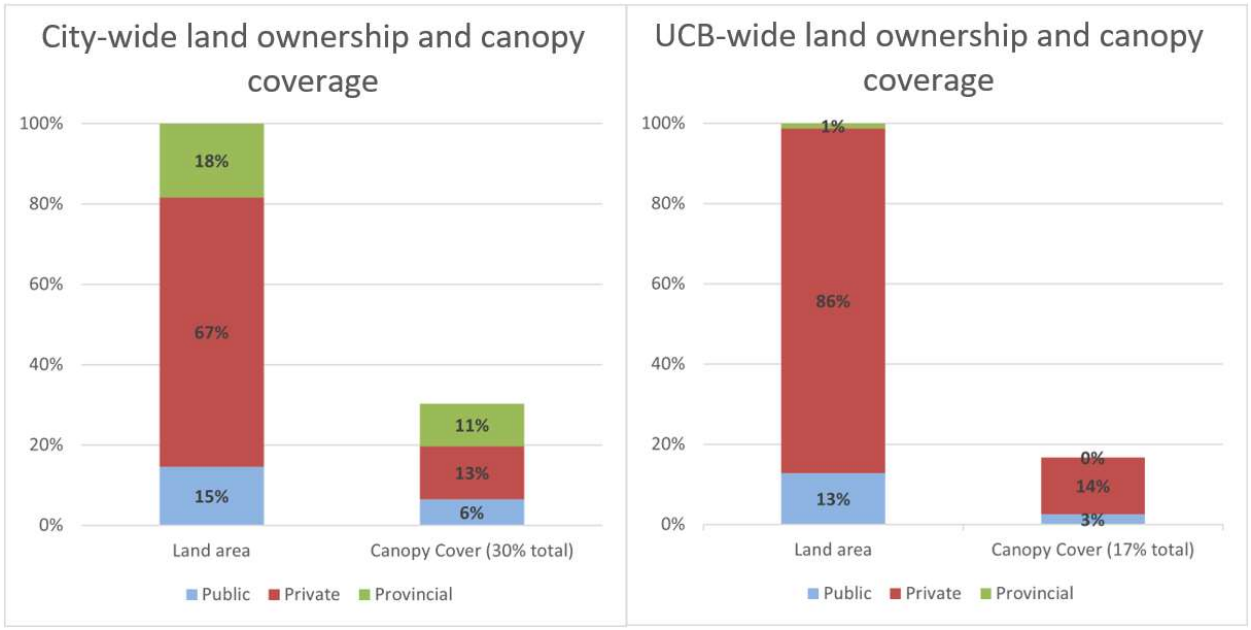


Figure 2. Proportions of land ownership and canopy cover within the City and the Urban Containment Boundary.

The intent of this Strategy is to assess the urban forest in Pitt Meadows and provide recommendations for targets, goals, actions, and implementation to increase and manage the urban forest in the UCB. Suggestions for lands outside of the UCB are provided that may contribute to the goals of this strategy; however, these lands will not be subject to the same targets.

3. Benefits of an Urban Forest

An urban forest works to benefit a city in many ways (Figure 3).

3.1. Social Benefits

Trees in urban spaces promote physically active lifestyles by offering appealing outdoor recreational spaces. Natural spaces that include trees have also been shown to reduce rates of heart disease, obesity, asthma, and diabetes; improve focus and mental wellbeing; lower stress

and blood pressure; and promote healing at hospitals[1]. Urban forests can also reduce rates of crime and violence[2]. Urban trees also perform air filtration services, providing communities with clean breathable air.

3.2. Economic Benefits

A single tree in an urban space can provide thousands of dollars worth of ecosystem services. Urban trees filter and store water, reducing stormwater runoff which relieves pressure on engineered stormwater infrastructure. The urban forest also reduces the urban heat island effect and regulates urban temperatures by shading buildings and pavement, which both reduces maintenance on those exposed surfaces and helps cities adapt to climate change[3]. Other services performed by the urban forest include pollution control, carbon capture and storage, and create attractive business districts and appeal for visitors[4].

Neighbourhoods and urban properties with more trees typically have increased property values and an overall benefit of increased shade and beauty[5]. Overall, the financial benefits provided by a single tree have been shown to outweigh the cost of maintenance[3].

[1] Ulmer, J. M et. al. (2016). Multiple health benefits of urban tree canopy: The mounting evidence for a green prescription. Health & Place, 42, 54-62.
[2] Parker, T. S. (2018). Trees and crime in urban areas: recommendations. *Forestry Research and Engineering, 2*(3), 127-129.
[3] Tree Canada: Benefits of Urban Forests https://treecanada.ca/resources/canadian-urban-forest-compendium/
[4] Wolf, K. L. (2003). Public response to the urban forest in inner-city business districts. *Journal of Arboriculture, 29*(3): 117-126.
[5] Natural Resources Canada: The State of Canada's Forests Annual Report 2019.

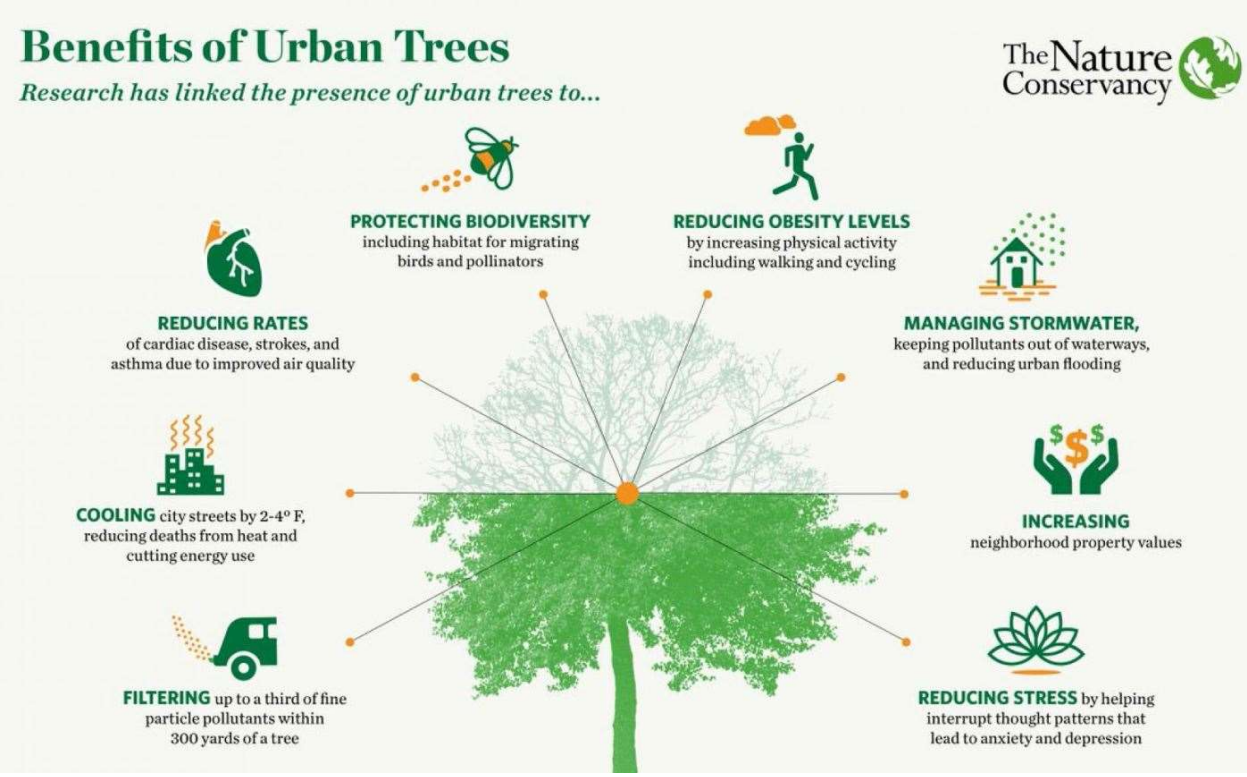


Figure 3. Benefits of urban trees[6]

3.3. Environmental Benefits

The urban forest is also a critical ecological feature for biodiversity. Urban trees provide important resting or roosting spaces for migratory birds, who then also control populations of pest insects such as mosquitoes and invasive insect species. Trees in streamside or forested areas, both live and dead[7], provide food and shelter habitat for insects, birds and other wildlife, including several at-risk or endangered species local to Pitt Meadows and the surrounding Lower Mainland. Eagles and herons require large trees to build nests in, and smaller migratory birds need trees to rest on as they travel between forested areas. Small mammals also require habitats with trees for shelter, protection and food. Many species which rely on trees to travel and survive also provide natural pest control services to human environments like agricultural fields and city cores, by feeding on pest rodents or insects. Trees that offer habitat for insects and wildlife also benefit surrounding lands by way of pollination services and fertilization of soils in natural areas.

[6] Nature United, formerly TNC Canada, (2018).
[7] Wu, C. (2016). Dead Wood Is Not Dead: The Ecological Functions and Management of Dead Wood. Partnership for Action Learning in Sustainability (PALS).

Establishing and maintaining an urban forest will require investments that are repaid over time. Cost inputs to the urban forest are high when trees are young and again later, when they are in decline (Figure 4).

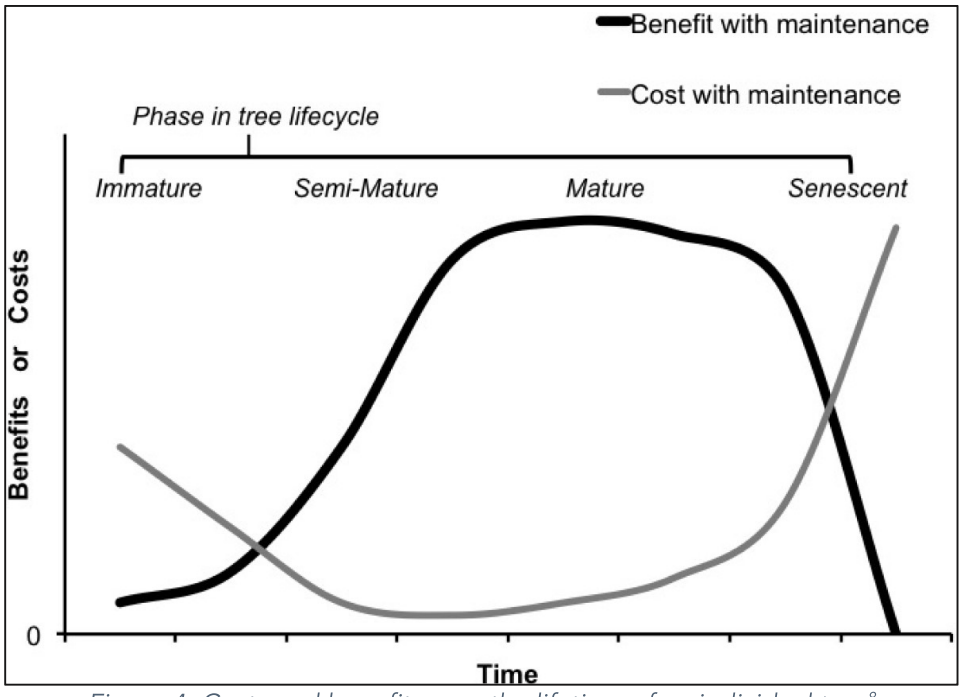


Figure 4. Costs and benefits over the lifetime of an individual tree[8]

[8] Vogt, J., Hauer, R. J., & Fischer, B. C. (2015). The costs of maintaining and not maintaining the urban forest: A review of the urban forestry and arboriculture literature. *Arboriculture & Urban Forestry, 41*(6), 293-323.

Exact costs will depend on the City's cost of typical tree maintenance, but the following scenario provides an example:

A maple tree is planted in a boulevard with sufficient rooting space and good quality soil at age 3 years. From age 3 to 7, seasonal watering with health inspections and annual pruning are conducted to improve the trees' form and safety, for a rough cost of $800 per year. From age 7 to 15, inspections and maintenance pruning are reduced to roughly $100 per year on average. After age 15, this maple tree will thrive on its own with minimal maintenance costs, and providing ecosystem services to the community, until it reaches "old age" or becomes too large for the space it was planted in, at approximately 50-70 years old (or older). At that age, the tree will require increased cost inputs to prevent hazardous conditions, until it is removed and replaced.

The above scenario demonstrates how the cost of initial inputs to establishing a healthy urban tree may be high, but they can result in many decades of significant low-maintenance benefits to the urban environment. On average, over a lifespan of 50 years, the cost of a tree is approximately $135 per year.

Planting trees in suitable locations and prioritizing proactive pruning and inspections will help maximize the benefits received from urban trees once they reach a mature age.

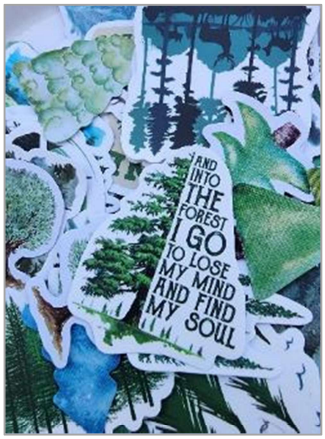
4. Public Consultation

Consultation and engagement efforts were completed to gain insight into resident knowledge and willingness to support the urban forest. The engagement methods and outreach efforts are summarized below:

- In-person informative booth at the Pitt Meadows Farmers' Market on September 5, 2023.

- Online survey (Have Your Say Pitt Meadows) where survey and mapping questions were provided, intended as the main feedback collection tool, from September 5 to October 5, 2023.

- Open-house at Pitt Meadows Family Recreation Centre on September 20, 2023.



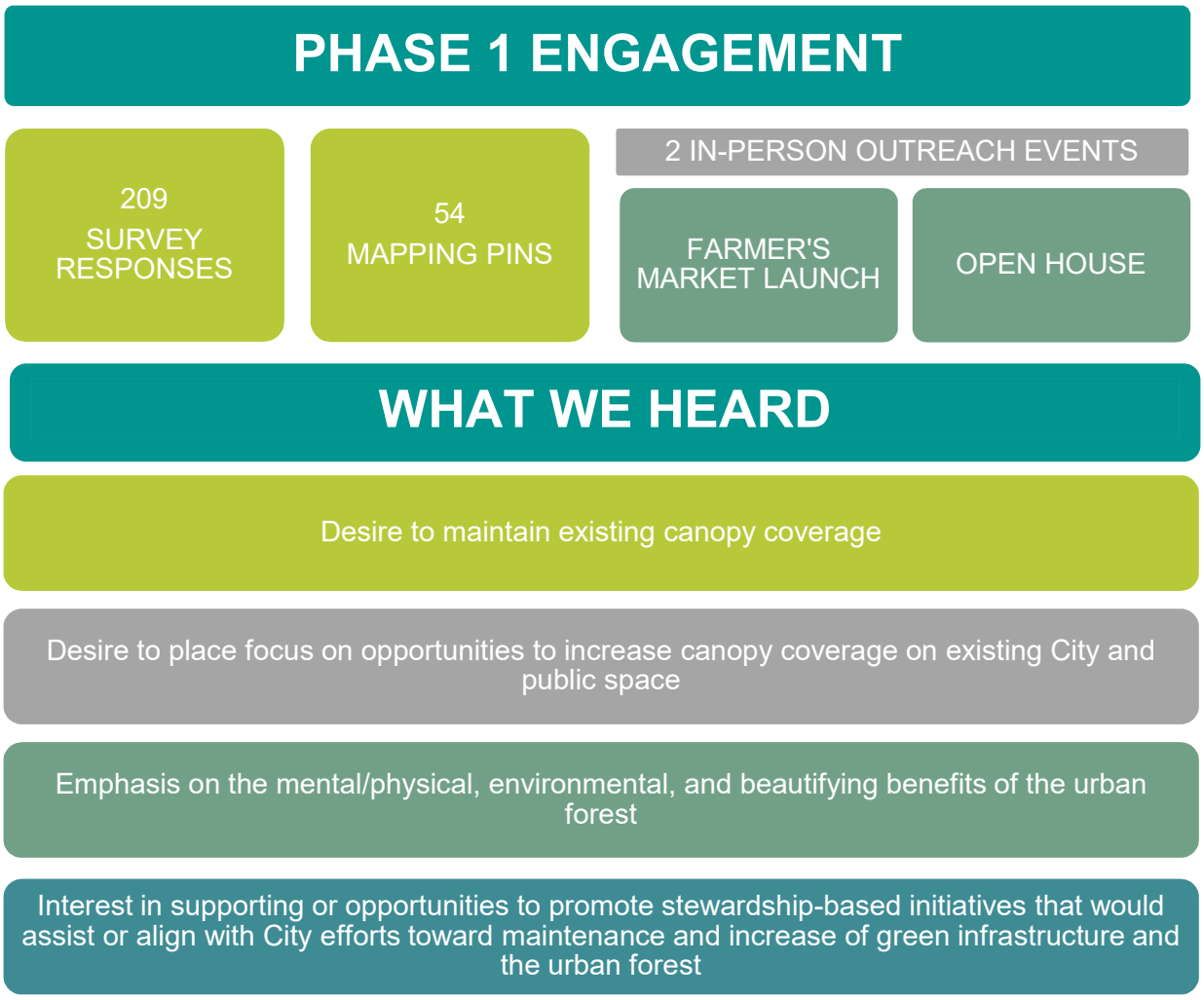
- Flyers provided to local schools to inform students of the online survey.

- Park signage along trail paths to encourage participation in the online survey opportunity.

- The qʼicʼəyʼ (Katzie) First Nation were contacted via a formal letter from the City at the onset of the engagement activities to notify them of this Strategy and to offer them first opportunity to participate in the project, and/or provide comment at any of the project stages.

Public consultation occurred during September 2023 for one month, during which feedback was primarily collected through a survey and online interactive mapping, where participants could pin locations where they believed there are current strengths and/or opportunities for improvement. In-person feedback was collected through the outreach efforts at the Farmers' Market and the Open House, where staff were present with informational and activity boards to provide information on the urban forest and the intent of the Strategy, to discuss and gather comments from the public, and to answer any questions related to the urban forest in the City.

Results of the consultation efforts yielded directions and understandings for the Strategy from the public, outlined in Figure 4 below. Pinned locations on the map identify specific areas where residents have identified valued places and where improvements are needed (see Appendix A).



5. Policy Context

5.1. Municipal and Regional Policies

The OCP is a long-range plan that sets out the community's vision, goals, and objectives for the future of the City of Pitt Meadows, and guides how the community will develop.

The Urban Forest Strategy is strongly supported by Objectives 3.3 and 3.9 the OCP, to support initiatives to address air quality and to protect and enhance the urban forest, and includes the following policies:

3.3.1: Initiate and support actions that improve air quality, such as encouraging low- and no-emission transportation options, increasing urban forest cover, and undertaking co-ordinated planning of land-use and public transportation.

3.9.1: Consider adopting an urban forestry strategy to protect, plant, and manage trees in Pitt Meadows to create a diverse, resilient, and beautiful urban forest on public and private lands.

3.9.2: Support the creation and implementation of a tree preservation bylaw.

3.9.3: Sustain and expand the urban forest through sound management strategies that enhance their potential as carbon sinks.

a. Retain and plant trees along boulevards and municipal properties, in parks and open spaces, to expand the urban forest and to help mitigate climate change.

3.9.4: Promote and encourage the protection and designation of culturally significant trees and wildlife trees.

a. Prioritize retention of healthy, mature vegetation during redevelopment wherever possible. Where significant trees cannot be reasonably accommodated in site planning (e.g., conflicts with utilities and services, or tree hazards), ensure integration and replacement of significant vegetation on site.

b. Work with the qʔic̓əy̓ (Katzie) First Nation to help identify areas of cultural importance and engage in mitigation actions.

Additional policies, under Objective 10.4, speak to reducing impermeable surfaces and improving onsite water management, and Objective 11.3 speaks to protecting the forested lands for carbon sequestration and expanding the use of green infrastructure to enhance long-term ecosystem services.

Metro Vancouver's *Metro 2050: Regional Growth Strategy* aims for an increase in total regional tree canopy cover within the UCBs from 32% in 2022 to 40% by the year 2050. Metro Vancouver states in their Strategy:

A canopy cover target of 40% is commonly adopted at the local level in cities around the world, and this number represents both an aspirational and achievable goal for the Metro Vancouver region.

Nature Canada's 2022 report "*Canada's Urban Forests Bringing the Canopy to All"* states that the broad, overall consensus is that cities should strive for a minimum tree canopy target of 30% to maximize health benefits, whereas other studies suggest that tree cover needs to approach 40% in order to achieve significant cooling benefits. Targets set across the Metro Vancouver region are highly variable, ranging between 20% and 60%. This reflects the many factors that influence target-setting including climate and geography, the pre-development land cover (e.g. grassland vs. forest) and constraints such as existing development densities and land use patterns. Tree canopy cover targets are difficult to specify broadly because the opportunities to create canopy are highly variable among cities. Targets should consider constraints to creating canopy such as development densities and land use patterns. It should also be noted that the urban tree canopy percentage is just one of many criteria to consider; age and species diversity, condition of trees and equitable distribution across neighbourhoods should also be considered.

To support the 40% tree canopy target identified in *Metro 2050*, the City is required to adopt a 'regional context statement' that:

a) *identifies local ecosystem protection and tree canopy cover targets, and demonstrates how these targets will contribute to the regional target; and*

c) *includes policies that:*

    i) support the consideration of natural assets and ecosystem services in land use decision-making and land management practices;

    ii) enable the retention and expansion of urban forests using various tools, such as local tree canopy cover targets, urban forest management strategies, tree regulations, development permit requirements, land acquisition, street tree planting, and reforestation or restoration policies, with consideration of resilience;

A regional context statement demonstrates how the City's existing plans and policies support the goals, strategies, and actions identified in Metro Vancouver's regional growth strategy.

Other related policies and regulations that can have direct or indirect implications on the urban forest are summarized below (Table 1):

Table 1. Pitt Meadows Urban Forest Strategy Policy Context

Policy Title	Regulatory Level	Description of Relevance
Develop with Care 2014	Provincial (2014)	Environmental guidelines for urban and rural land development including conservation measures for fish, amphibians, reptiles, and raptors.
Riparian Areas Protection Regulation	Provincial (2019)	Regulations to protect stream health and productivity; prohibits tree removal within the streamside protection and enhancement area.
Metro 2050 (Metro Vancouver Regional Growth Strategy)	Regional (2023)	Strategy and policies for establishing tree planting, coverage, and regulations to be achieved by member municipalities.
Metro Vancouver Climate 2050 Road Map for Nature and Ecosystems	Regional (2023)	Details potential municipal action toward land use policies to reduce climate impacts and mitigate risks.
Official Community Plan	Municipal (2022)	Long-range plan that sets out the community's vision, goals, and objectives for the future of the City of Pitt Meadows. Outlines high-level policies for the urban forest.
Zoning Bylaw	Municipal (2011)	Regulation of impermeable surfaces, lot coverage, and development setbacks.
Subdivision and Development Servicing Bylaw	Municipal (2019)	Specifies street tree planting requirements and planting details for new developments and subdivisions.
City of Pitt Meadows Strategic Plan	Municipal (2023)	Includes guiding principles for environmental/climate stewardship and the natural environment.
Environmental Inventory and Management Strategy	Municipal (2022)	Informs future planning and management of environment and natural assets.
Integrated Stormwater Management Plan	Municipal (2015)	Provides long-term strategies to protect and enhance watershed health by managing the quantity and quality of stormwater runoff.
Parks Recreation and Culture Master Plan	Municipal (2021)	Looks to identify opportunities to integrate green practices and technologies into the management of both indoor and outdoor facilities and spaces, including trails, parks and open spaces. Recommends strategies for ensuring that land is procured for park spaces and is sustainably managed.
Tree Preservation Policy on Municipally Owned Land	Municipal (2012)	To preserve healthy trees located on municipal land and to ensure replacement where removal of trees larger than 50 cm in diameter is required.
Parks Maintenance Policy	Municipal (2019)	Defines the maintenance plan or public parks, playgrounds, sports fields, and trails for service level expectations.
Boulevard Maintenance Bylaw	Municipal (2012)	Describes the roles of the property owner for maintaining the boulevard adjacent to the private property, including landscaping.

5.2. Regulatory Framework Gap And Comparative Analysis

The practices and bylaws of three comparable municipalities, Abbotsford, Delta, and Kelowna, were reviewed and assessed. These selected cities were considered to be similar to the City of Pitt Meadows for their land use and urban forest needs. Summary comparisons are provided in Table 2 below.

Table 2. Regulatory framework gap and comparative analysis

	City			
Regulatory Item	Pitt Meadows	Abbotsford	Delta	Kelowna
Tree Bylaw	None	✓	✓	✓
Tree protection requirements	None*	✓	✓	✓
Tree replacement requirements	Partial*	✓	✓	✓
Urban forest stewardship program	Informal	None	✓	✓
Recommended tree species list	✓	✓	✓	✓
Street Tree/Boulevard Design Standard	✓	✓	✓	✓
Specifications for root barrier	✓	None	None	✓
Minimum tree setbacks from sidewalk	✓	None	✓	✓
Soil cells permitted in streetscapes	Not specified	✓	No	✓
Natural asset inventory	✓	✓	None	✓
Natural asset strategy	✓	None	Partial	None
Biodiversity strategy	None	None	✓	None
Invasive species strategy	None	None	✓	None
Target canopy cover with a target date	Per this Strategy, Increase from 17% to 30% by 2050 (Strategy date: 2024)	Maintain 40% by 2045 (Strategy date: 2021)	Increase from 25% to 40%, no target date (Strategy date: 2020)	Increase from 16% to 20% by 2030 (Strategy date: 2011)

*Some development permit guidelines have recommendations for tree protection and replacement

The opportunity to develop a Tree Bylaw has been identified in the past, however one has not yet been adopted, with the intent being to first develop an Urban Forest Strategy (this document). Although the City of Pitt Meadows has not adopted a Tree Bylaw, there are regulations within the *Subdivision and Development Servicing Bylaw* that restrict tree removal

within riparian areas and several Development Permit Areas. The *Parks and Community Facilities Regulations Bylaw* also prohibits public tree removals within parks and trails.

In addition, urban forest strategies and other practices were reviewed from the City of New Westminster, the Township of Langley, and the City of Surrey. Some of the recommendations that would apply well to the City of Pitt Meadows have been incorporated into this Strategy, including: adopting a tree bylaw; building on the forest stewardship program; increasing the tree replacement reserve fund; further incorporating natural asset management into decision-making; and adapting to climate change.

6. Urban Forest Analysis

6.1. Brief History of Pitt Meadows' Urban Forest

Prior to the City of Pitt Meadows' establishment in 1914, much of the existing vegetation was mixed shrub and pine tree swamp, some shrub grasslands, and large areas of mixed woodland or conifer forest.[9] The current UCB sits on land that was historically occupied by some pine trees and tall shrubs, and some mixed coniferous forest.

Changes to the City's urban forest in the last 50 years can be seen in historical orthoimagery. Analysis was conducted for 1996, 2004, 2014, and 2020 (most current imagery to date) using methods based on the i-Tree Canopy tool[10] for classification. For each year, groundcover types were classified into seven categories under two main cover types: permeable (categories include: trees; grass/herbaceous/shrub; soil/bare ground, and water) and impermeable

[9] Environment Canada (1979). Vegetation of the Southwestern Fraser Lowland, 1858-1880.
[10] USDA Forest Service. (n.d.). i-Tree Canopy. https://canopy.itreetools.org/

(categories include: buildings; roads; and other, such as temporary structures e.g., vehicles or awnings) (Figure 5).

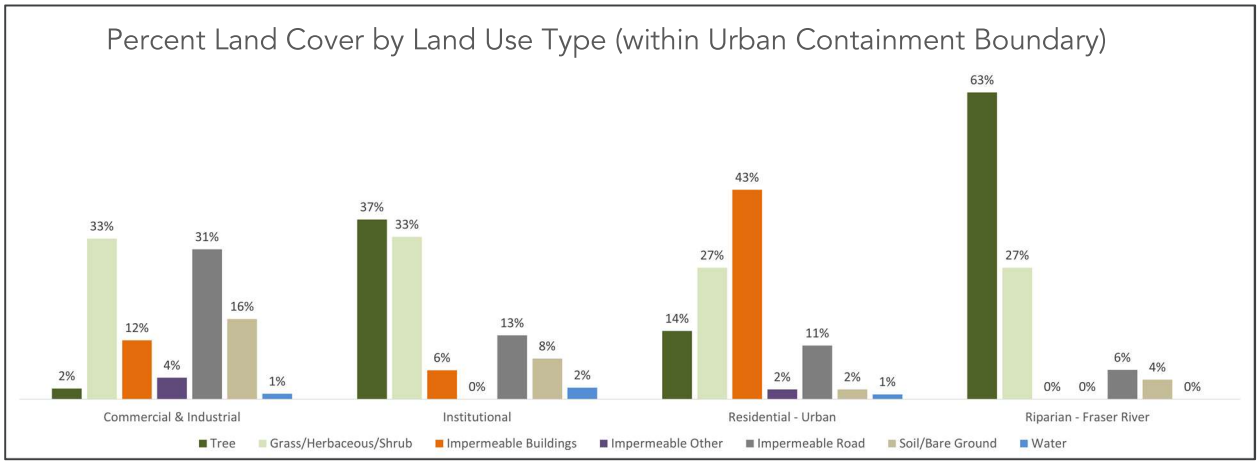


Figure 5. Land cover by use type within the Urban Containment Boundary (excluding ALR), from 2020 orthoimagery.

The results show a general decline in tree canopy cover in the past three decades, with a low point around the year 2004. Imagery from 2004 also shows a temporary rise in soil/bare ground area, likely due to land clearing for residential neighbourhood developments south of Airport Way, a highway commercial development west of Golden Ears Way, and several industrial developments between the Canadian Pacific Rail and Lougheed Highway. Also evident is a relative abundance of grass/herb/shrub cover compared to other types of ground cover – the abundance generally declined over time, with corresponding increases seen in bare soil and impermeable surfaces (Figure 6).

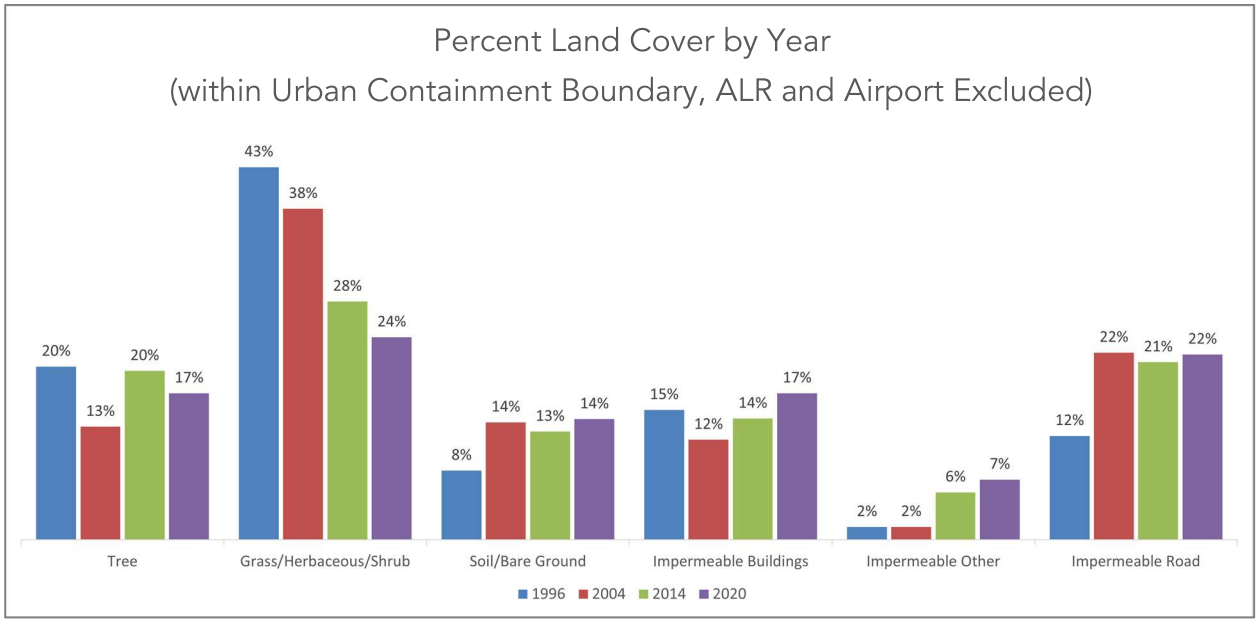


Figure 6. Percent Land cover by year within the Urban Containment Boundary based on orthoimagery.

An example of urban tree canopy loss is shown in Figure 7 below. Various land use changes in this area between 2004 and 2020 have resulted in canopy cover reduction, with a corresponding increase in impermeable surfaces (buildings and roads).

Figure 7. 2004 and 2020 orthoimagery showing an example of increase in impermeable surfaces and a decrease in tree canopy cover.

Trees along areas where land use have remained constant, such as municipally-owned boulevard trees and trees within newly established neighbourhoods, have seen canopy cover increases related to maturing tree growth.

Another notable observation, as seen in Figure 8, is the decline in complex permeable surfaces (trees, with shrubs, herbs, and soil/bare ground) from 71% to 55% between 1996 and 2020. The same period saw an increase in impermeable surfaces (pavement, buildings, roads) from 27% to 39%. This trend has led to lower available space for new tree planting, less space for existing trees to grow to maturity, and decreased ability for stormwater interception and retention in the landscape.

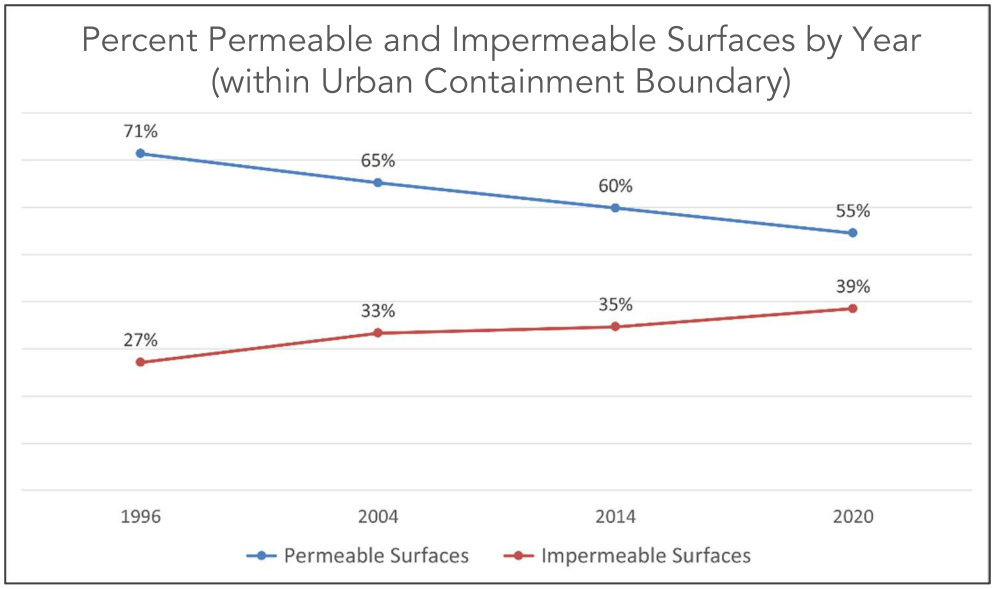


Figure 8. The decline of permeable surfaces with an increase of impermeable surfaces.

6.2. Pitt Meadows' Current Urban Forest

As of 2020, the City of Pitt Meadows' tree canopy cover in the UCB was 17% (Figure 9), lower than the Metro Vancouver regional average of 25% and below the regional target of 40% by the year 2050 (Metro Vancouver, 2022). Total tree canopy cover in the entire municipal boundary of Pitt Meadows varies, depending on whether ALR is included or excluded.

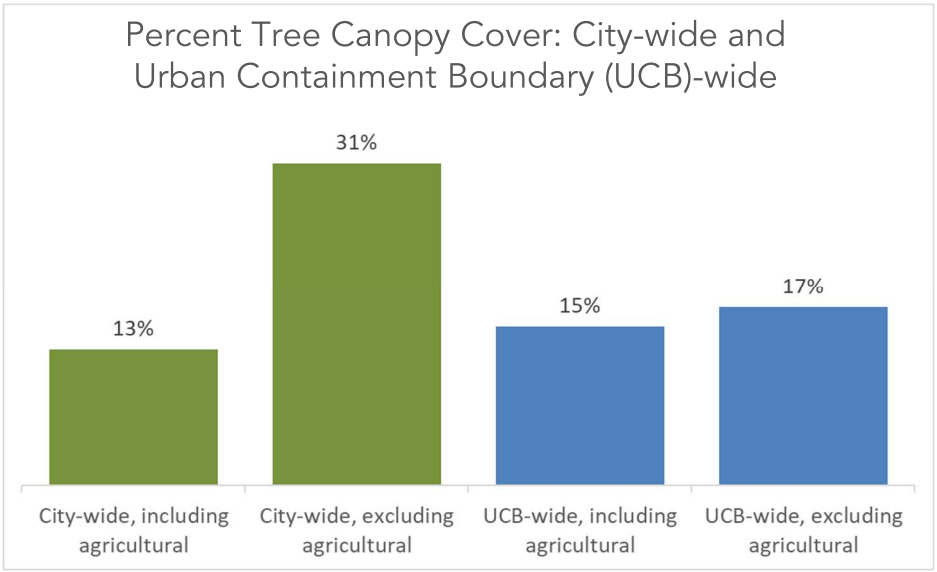


Figure 9. Tree canopy cover percentage across the city and within the Urban Containment Boundary.

A broad review of the City's current urban forest was conducted onsite within the UCB on the dates of May 19th and November 16th, 2023. Visual assessment methods were used to sample boulevards, parks and riparian areas (both in and outside of the UCB, for riparian areas only)

and collect estimated data on species composition, tree age, size, and health and structural conditions.

6.2.1. Urban forest health

Health and structure assessments of trees in the urban forest are based on ratings per *the International Society of Arboriculture (ISA) Guide to Plant Appraisal, 10th Edition (2020)*. Ratings are summarized as follows:

- Poor: tree is declining in health, and/or has significant structural defects that could cause death in the short or medium term;
- Moderate: tree health is impacted by ongoing pathogen, infection, or stress, and/or structure has non-significant defects that could contribute to health decline in the long term; or
- Good: tree is healthy with no significant structural defects.

It was found that overall, the health and structural condition of the current urban forest is, based on high-level estimate from visual assessment sampling: 10% poor health and/or structure, 55% moderate health and/or structure, and 35% good health and/or structure. It was found that boulevard trees are prone to mower and trimmer damage and excessive crown pruning. Infections from native fungal species were common in riparian areas, on rural lands, and on natural forested lands; however, at a level which might be considered 'normal' when compared to wild forest stands in this region. Excessive crown pruning was also prominent on agricultural lands and on the airport lands, indicating the need for selection of appropriate species and planting locations to avoid conflicts with utilities or other critical infrastructure.

6.2.2. Tree species diversity

The distribution of tree species found in Pitt Meadows has been affected over time by climate change. Species that used to thrive and were dominant in parts of the local forest – like western redcedar, western hemlock, Sitka spruce, pacific yew, and pacific crabapple[11] – are now uncommon except in shaded forest areas. Some western redcedar trees that remain in the urban environment are beginning to show observable signs of long-term damage from the changing climate.

[11] Environment Canada (1979). Vegetation of the Southwestern Fraser Lowland, 1858-1880.

Approximate species that make up the current urban forest are listed in Table 3 below. Note, species lists presented below are representative rather than comprehensive.

Table 3. Approximate tree species composition by land use type

Tree Species	Land Use Category			
	Urban residential, Institutional, Commercial and Industrial	Agricultural Areas and the Airport	Natural riparian areas	Rural residential, golf courses and natural forest lands
Conifers	60% Conifers: Western redcedar *(Thuja plicata*), excelsa red cedar (*Thuja plicata 'Excelsa'*), Douglas-fir (*Pseudotsuga menziesii*), pine species (*Pinus spp.*), western hemlock (*Tsuga heterophylla*)	50% Conifers: Ornamental / orchard species, western redcedar *(Thuja plicata*), excelsa red cedar (*Thuja plicata 'Excelsa'),* Douglas-fir (*Pseudotsuga menziesii*), and western hemlock (*Tsuga heterophylla*)	20% Conifers: Natural regenerated western redcedar *(Thuja plicata*), Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), grand fir (*Abies grandis*) and Sitka spruce (*Picea sitchensis*)	80% Conifers: Natural regenerated western redcedar *(Thuja plicata*), Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), grand fir (*Abies grandis*) and Sitka spruce (*Picea sitchensis*)
Deciduous	40% Deciduous: Maple species (*Acer spp.*), oak species (*Quercus spp.*), sweetgum (*Liquidambar styraciflua*), beech (*Fagus spp.*) species, London plane (*Platanus × acerifolia*), hornbeam (*Carpinus betulus*)	50% Deciduous: Ornamental species orchards, maple species (*Acer spp.*), red alder (*Alnus rubra*)	80% Deciduous: Natural regenerated stands dominated by black cottonwood (*Populus trichocarpa*), red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*) and paper birch (*Betula papyrifera*)	20% Deciduous: Natural regenerated stands dominated by black cottonwood (*Populus trichocarpa*),, red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*), and paper birch (*Betula papyrifera*

6.2.3. Age distribution

During the visual assessment, tree ages were categorized following BC forestry standard age classes. High-level estimated percentage breakdown is as follows:

a. (Yg) Young trees in the first third of their life expectancy: 60%
b. (Mi) Middle-aged trees in the second third of their life expectancy: 30%
c. (Ma) Mature trees in final third of life expectancy: 7%
d. (Om) Over mature trees in decline: 2%
e. (Ve) Veteran trees with major physiological decline, surviving beyond the typical age range for the species: 1%

The age of the City's urban forest is assessed as being highly populated by young trees (Figure 10). This situation could be attributed to the removal of more mature trees due to redevelopment or conflicts with infrastructure. While young trees have the most potential to provide services in the future as they mature, they provide the least immediate benefits. The

City's tree age distribution is currently skewed toward a young tree population, with its distribution of semi-mature trees at ideal levels. This means the City has a higher proportion of young trees and not enough mature trees, which can be improved by focusing maintenance efforts on semi-mature trees that have the best chance of surviving into a mature age.

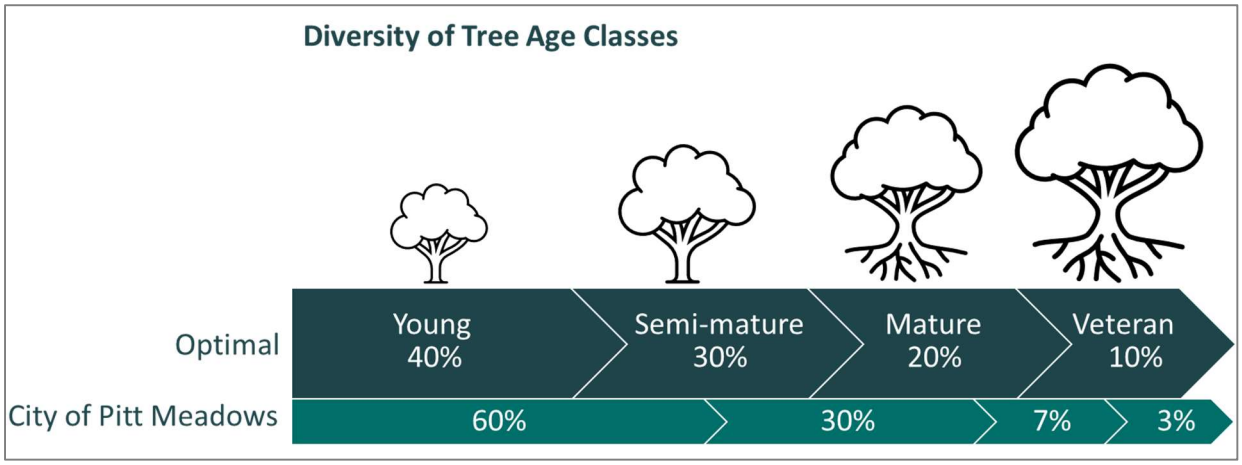


Figure 10. City of Pitt Meadows tree age, compared to optimal tree age class distribution[12].

Adopting a 40-30-20-10 guideline to encourage diversity across age size and classes (Figure 11) would allow tree populations to realise a successional dynamic similar to a balanced forest stand. Along with species diversity, these elements combine to foster population stability over time.

Planting new young trees is the primary way to grow the City's canopy cover, but to achieve the 40-30-20-10 age distribution will require strategic and balanced resource allocation toward managing the large abundance of young trees and newly-planted trees alongside maintenance for semi-mature trees.

6.2.4. Residential density and tree density

One-third (33%) of the land base in the UCB consists of residential lots. The City's OCP categorizes residential lots by the following density of housing units:

1. Low density lots hold up to 30 housing units per hectare (e.g. single-family houses, duplexes);

2. Medium density lots have 31 to 100 units (e.g. townhouses), and

[12] Richards, N. A. (1983). Diversity and stability in a street tree population. *Urban Ecology*, *7*(2), 159-171.

3. High density lots have a minimum 101 units per hectare (e.g. apartment buildings).

Out of all residential lots in the UCB, low density lots contribute the most to the urban canopy cover, as illustrated in Figure 11. As a proportion of the current 17% canopy cover within the UCB, low density residential lots make up nearly 25% of that coverage, while medium and high density residential lots make up 18% and 15%, respectively.

Residential zones largely consist of low density lots (75% total area), far outweighing medium (18%) and high density lots (7%). Low density lots also possess the highest tree density: being typically larger lots with less building coverage, these lots have shown a relatively higher number of trees per lot.

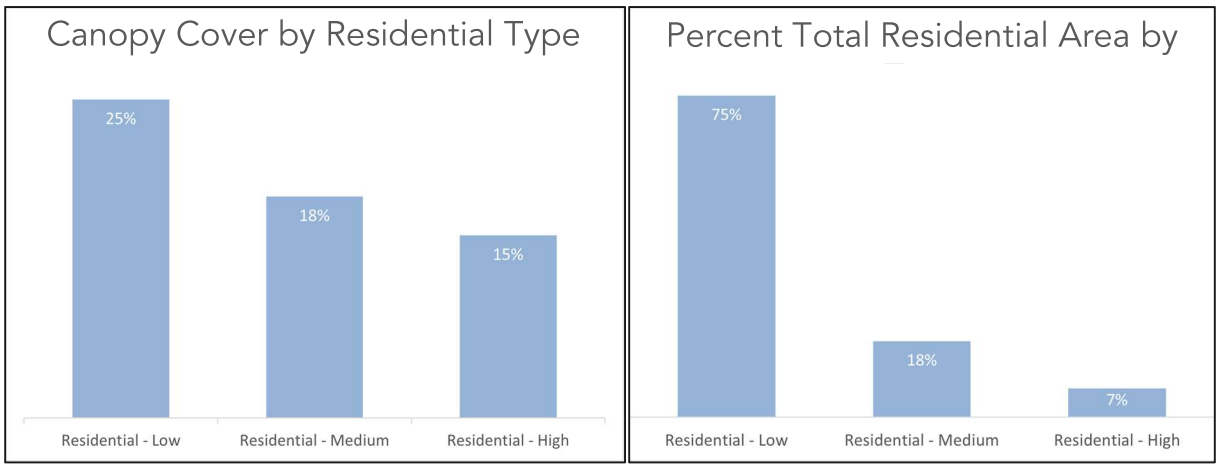


Figure 11. Percent tree canopy cover and percent total area for low, medium, and high density residential lots within the Urban Containment Boundary.

The difference in canopy cover can be seen in Figure 12 below: low density residential zones have greater canopy cover from a larger number of mature trees and are situated further from wider road rights-of-way.

Figure 12. Canopy cover along low density residential lots (top row) and high density residential lots (bottom row), from two representative locations.

This lot density distribution is important to note, as low density lots are currently being encouraged, through recent provincial legislation, to be redeveloped to higher densities, therefore the number of trees per hectare in the UCB overall can be negatively impacted with the added pressure of the current housing crisis within the Province. Current industry practice has been to achieve tree preservation and replacement requirements through the rezoning and development processes, however if rezoning is no longer required to increase density as a result of the provincial housing legislation, other ways to encourage retention and/or replacement on residential lots will be needed.

7. Challenges And Opportunities

7.1. Challenges

7.1.1. Land use

The City of Pitt Meadows' UCB contains a mixture of residential, commercial, industrial, and agricultural land and most areas within the UCB have been recently developed. This leaves limited opportunity for tree planting through redevelopment requirements, and with the provincial regulations to densify residential lands, tree planting requirements may be difficult to prioritize. As such, the City may need to focus a substantive amount of its efforts on tree planting opportunities within publicly-owned lands.

7.1.2. Climate change

A robust tree canopy combats many aspects of climate change, such as the urban heat island effect, caused by the sun's heat radiating from constructed and impermeable surfaces. During summer heat waves, community members, especially more vulnerable individuals, need shaded spaces to stay safe and cool.

Establishing increased tree canopy cover will be challenged by climate change, due to threats such as:

- pests and invasive species;
- fires;
- longer and warmer growing seasons;
- extreme weather fluctuations;
- species distribution shifts (due to temperature and seasonal shifts); and
- less moisture availability.

Changing climate can impact the health of established trees and newly planted trees. Species selection and timing of planting for new trees is critical to their successful establishment. For existing trees, maintenance costs may increase as certain native species, such as red alder (*Alnus rubra*) and western redcedar (*Thuja plicata*), that struggle to survive in a hotter and drier environment. These native species may start to die and become hazardous, and they may need to be replaced. Therefore, developing an appropriate species list that is adapted to climate change is recommended.

7.1.3. Flood risk and preventative maintenance

The impact of potential floods to the urban forest is likely to be minimal, but the urban forest has potential to assist with stormwater management. Floods are likely to become more frequent or extreme, or both, as climate change progresses, and a total of 85% of municipal land in the City of Pitt Meadows is located within the Pitt and/or Fraser River floodplain.

Natural stormwater management will reduce the load on municipal stormwater infrastructure, improve urban forest health and resiliency, and improve social and aesthetic benefits of the urban forest to the community. Trees absorb and filter stormwater, and the greatest potential arises when trees are placed in permeable boulevards or planting beds that are designed to receive water running off from surrounding paved areas or buildings. Runoff directed into these planting beds will be absorbed or filtered by trees and vegetation, before flowing into underground stormwater catchment. It is important to choose tree species that are adapted to the quantity of water expected for specific areas. Species typical of wetter environments, like

willow (*Salix sp*) and birch (*Betula sp*), will absorb more water than other species but they are less drought tolerant than drier-environment species like pine (*Pinus sp*).

A major flood could cause some tree losses in specific high-flow areas, such as along river banks and near dikes. Preventative maintenance on dikes, typically within riparian areas, could also require tree removal. Trees removed during these works, or lost to flood, should be replaced within the City, targeting a nearby location, or within another riparian area, taking into consideration the requirements of the *Dike Maintenance Act* and not compromising the structural integrity of the dikes.

7.1.4. Sidewalks

A key issue identified in the City of Pitt Meadows is that tree roots are causing sidewalks to lift, which is a hazard to users. Addressing this issue will need to require case-by-case assessment: smaller trees will be better able to handle the root pruning and removal necessary to fix the lifted sidewalk areas. Larger trees, depending on the layout and size of their roots, may require removal and replacement in a different location. Prevention includes the installation of root barriers along sidewalks – and confirmation that they were installed with ideally an arborist inspection of installation before being buried. The other key prevention strategy is choosing the right tree for the right place: if there is only a small growing area, small tree species should be selected; and, trees should ideally be planted as far away from sidewalks and other built infrastructure as possible with respect to their mature root area size.

7.2. Opportunities

7.2.1. Potential Planting Areas

To set and implement a canopy cover target, land available for planting trees must be quantified. The area available for planting trees in the City's UCB was assessed by analysis of orthophoto (Figure 13a).

Potential planting areas are categorized as permeable and impermeable. Permeable areas (grass, shrubs, soil, bare earth) are readily available for tree planting with some preparation. Impermeable potential planting areas include temporary structures and pavement situated away from rights-of-way that may be feasible for conversion to tree canopy cover in future.

The analysis found that within the UCB, approximately 367 ha (907 acres), or 45% of land, is considered potentially available for planting, with 38% permeable and 7% impermeable area. For this strategy, the permeable area within the UCB of 38% shall be considered potentially plantable area. Impermeable areas would require removal of pavement or other existing built infrastructure and can be considered as potential future opportunities, but planting actions will be focused on permeable areas at this time.

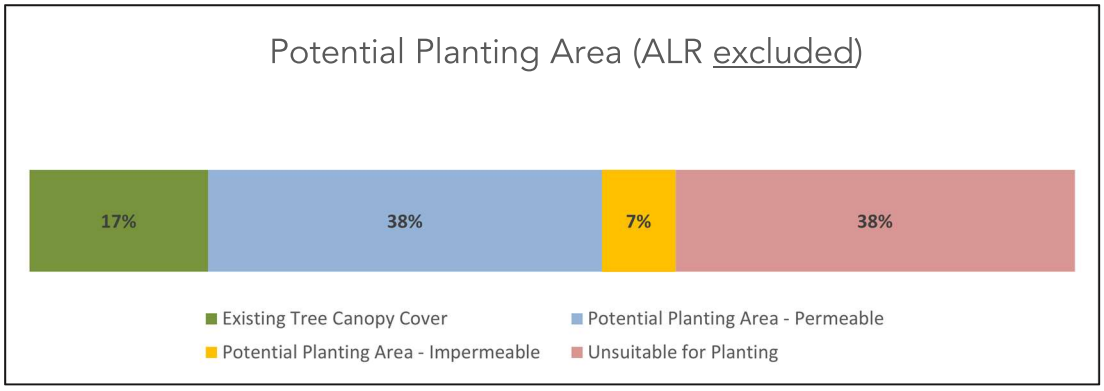


Figure 13a. Potential planting area within the Urban Containment Boundary. Areas designated as Airport and Agricultural Land Reserve (ALR) are excluded.

Figure 13b below further breaks down the total 38% potential planting areas according to land ownership types. The high percentage of permeable area in the UCB is somewhat influenced by lawns (both public and private), playing fields in parks, and previously cleared land. Some permeable areas in the UCB may not be feasible for additional tree planting, depending on the desired use of that space.

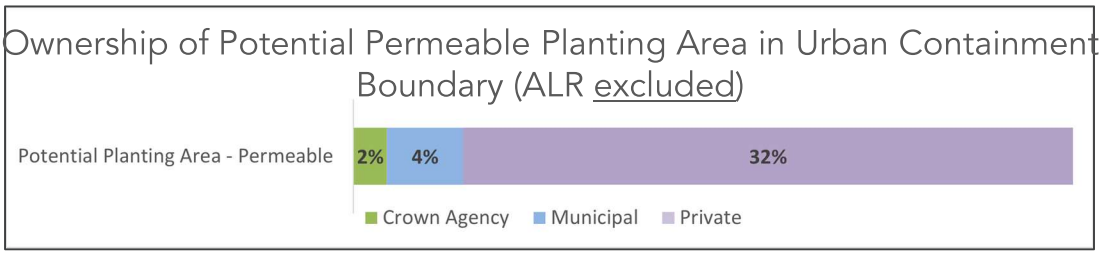


Figure 13b. Ownership of the total 38% potential planting area within the Urban Containment Boundary.

The total 38% potential planting area within the UCB is broken down by land use type in Figure 13c:

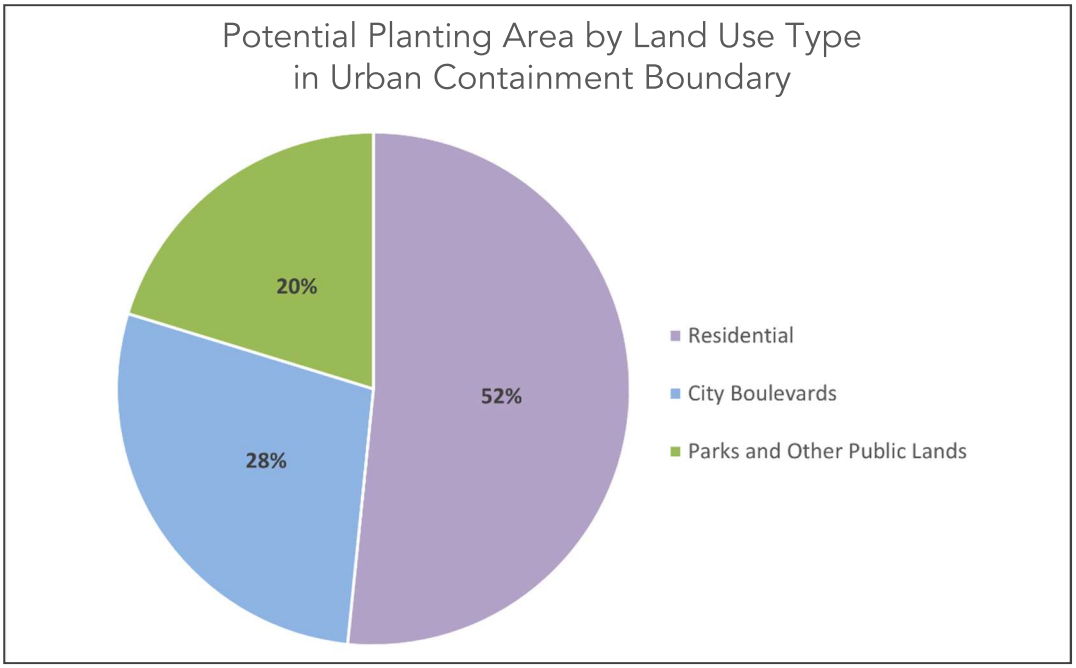


Figure 13c. Total potential planting area in the Urban Containment Boundary by land use type.

In order to increase the percent tree canopy coverage within the UCB, an increase in trees on private land is needed.

7.2.2. Parks and other Public Lands

Parks and other public lands may be the low hanging fruit for increasing canopy cover, but functional spaces must be maintained for field-based sports requiring turfs or lawns, and sports such as tennis, pickleball, and basketball, requiring semi-permeable paved courts. Opportunities for increasing canopy cover in these areas exist around park perimeters and the interfaces between courts, fields, and pavement, as well as along interior roads and exposed pathways. When strategically and densely treed, these areas can serve as connection nodes for biodiversity, in addition to providing a continuous network of sun and wind protection for the comfort of park users. Prospective parks that may suit this treatment include Harris Road Park,

Pitt Meadows Athletic Park, Eagle Park, Lions Fun Park, Bonson Park, and Mitchell Park. Parks that are currently low in tree density and high in grassy, herbaceous, and bare soil areas, where mass tree planting may take place, are listed in the priority locations identified in section 7.2.7.

School grounds, another type of public land, potentially offer an opportunity in terms of the benefit of planting trees, with 2.53 ha of potential planting area identified through the initial orthoimagery assessment, excluding sports fields, which represents 0.31% additional canopy cover in the UCB. School-aged children would be able to interact with nature more frequently, and they would have the benefit of more shaded areas in which to recreate during breaks. Planting on school sites would require further consultation and cooperation with the school district. A benefit of placing trees on school sites is that the open growing space allows for large tree species selection allowing for greater canopy cover.

7.2.3. Municipal Boulevards

Much of the City's streetscape is made up of front yards blended with the City right-of-way. Tree planting within municipal rights-of-way is achieved where space allows and where it does not interfere with underground utilities. As the focus on increased tree canopy progresses, homeowners could be encouraged to plant trees on the adjacent private property, and tree replacement/removal could be further regulated. Central boulevards could be considered where space allows. Upgrades to municipal boulevards and/or road rights-of-way can also include on-road cycling lanes and repositioning of sidewalks, or potentially multi-use paths where appropriate, aiming to maximize tree rooting space and provide tree canopy cover for cycling and walking along community corridors.

7.2.4. Street Trees and Roadways

Roadways need large and wide-spreading trees for shading, which requires more rooting space and greater setbacks from sidewalks and curbs. Roadway design that focuses on human-scale transportation modes, such as cycling and walking, could help the City navigate this conflict by: providing separated on-road cycling facilities within wider road rights-of-way; placing sidewalks closer to the roadside curb without placing pedestrians next to a vehicle travel lane; and planting boulevard trees along the outer sidewalk edge. This can potentially provide more space for tree growth and reduce conflicts between sidewalks and roots.

A treed central median could also be considered on wider roadways. A potential concern with this tree placement is the trees are subject to a greater heat island effect from the surrounding pavement. Careful species selection would be required for this scenario to ensure trees are tolerant of drought, heat and road pollutants.

Street trees planted in roadside boulevards need to be selected for optimal canopy size and shape, typical root growth patterns and behaviours, mature size relative to the growing space available, and they must be placed where they do not conflict with overhead or underground utility lines. Careful species selection should extend to the lower urban forest layers as well. Grass strips in boulevards provide minimal environmental benefit. Green strips being provided in the boulevard or in a central median may benefit from a switch from turf grass to a biodiverse mix of groundcovers and low shrubs or grasses. A selection of xeriscape-friendly species can further support lush, drought tolerant roadways.

Future implementation of the City's active transportation corridors may present some opportunities to modify current roadway designs and optimize tree canopy coverage. Efforts to provide canopy coverage over roadways should prioritize shading people first, i.e. sidewalks and cycling lanes, followed by vehicle travel lanes.

7.2.5. Residential Areas

Trees in residential areas can benefit the community the most, with climate control for citizens in their homes and the health benefits that trees and green spaces provide. In order to minimize negative health-related outcomes due to extreme heat, it is important for the most vulnerable people to have access to cooler environments. In a report prepared for Metro Vancouver on *Social Equity in Planning*, a case study was conducted on enhancing social equity through urban forest management (see Appendix B). This study identified priority planting areas by overlaying vulnerabilities to extreme heat with tree canopy cover. The recommendation is for municipalities to prioritize tree canopy retention and expansion when planning for their urban cores and consider leveraging the development approvals process to enhance tree planting for infill/redevelopment projects in high planting priority areas. It also recommends to target shoreline areas for tree planting and retention, given their role in preventing erosion, managing stormwater, and improving water quality.

7.2.6. The 3-30-300 Rule

The equity of access to greenery throughout places of living and working environments can be considered using the "3-30-300 rule" concept [13]. Under this concept, the criteria for minimum provision of urban trees in a community are:

- the ability to see three trees from every home;
- a minimum 30% tree canopy cover in every neighbourhood; and
- a maximum distance of 300 m from the nearest public park or green space.

With a notable increase in work-from-home arrangements in recent years, the application of these guidelines becomes even more relevant for residential zones. The average canopy cover for residential areas across the three residential density classes are summarized in Figure 14 below. Residential canopy cover falls short of the 30% canopy cover minimum.

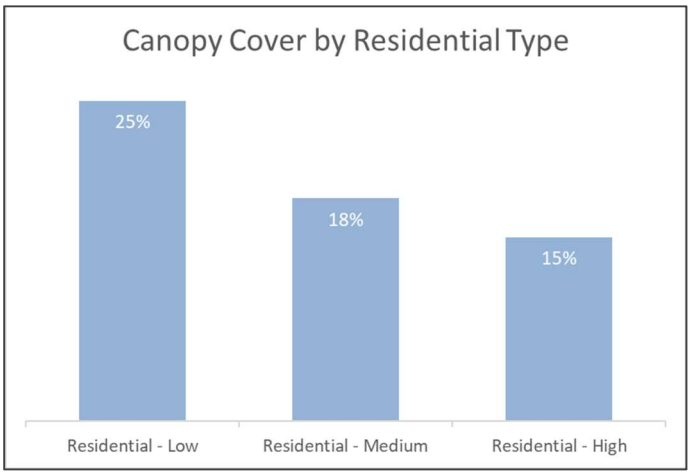


Figure 14. Canopy cover by residential density type

Medium and high density residential lots may more easily meet the 3-30-300 rule because the view for residents living on higher building floors may increase tree visibility as elevation increases. Dense housing strategies at the municipal level must still aim to include trees on every property for residents' wellbeing and to relieve some pressure on city services and infrastructure.

Much of the City's UCB is well-served when considering distance to parks. However, Figure 15 below identifies gaps which are currently underserved; i.e. communities that are beyond 300 m from a public green space. Although some areas are greater than 300m from a public green space, most areas are within a 5 minute walking distance, as shown by the orange radius, and

[13] Konijnendijk, C. C. (2023). Evidence-based guidelines for greener, healthier, more resilient neighbourhoods: Introducing the 3–30–300 rule. *Journal of forestry research, 34*(3), 821-830.

all areas are within a 10 minute walking distance, which is consistent with policy in the City's OCP.

Residents in neighbourhood areas not covered within the 300 m radius (Figure 15) would receive the most benefit from new installations of boulevard trees or other supplemental planting.

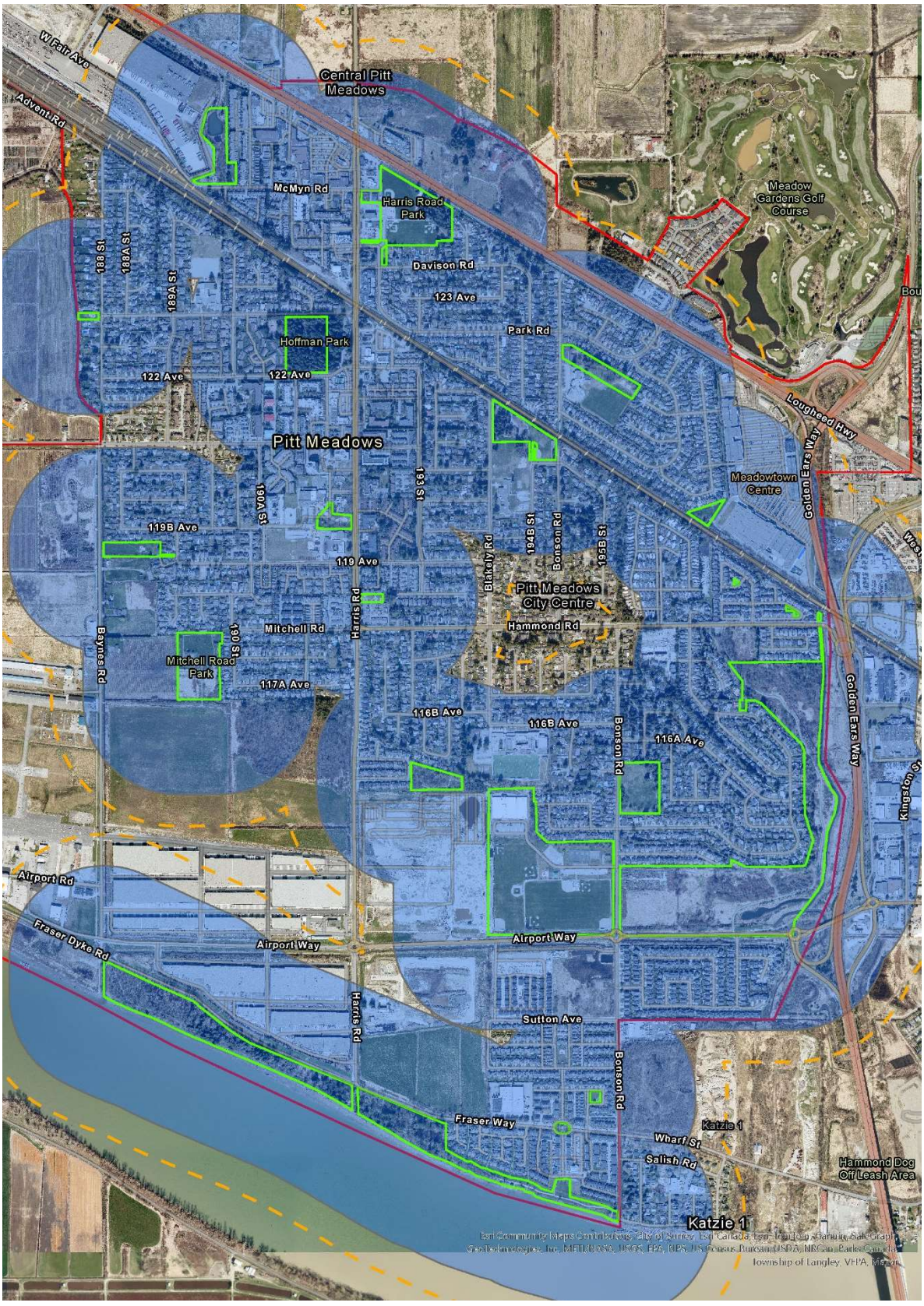


Figure 15. 300 m (blue shaded) and 400 m (orange dotted line) radius buffers from public parks.

7.2.7. Priority Locations

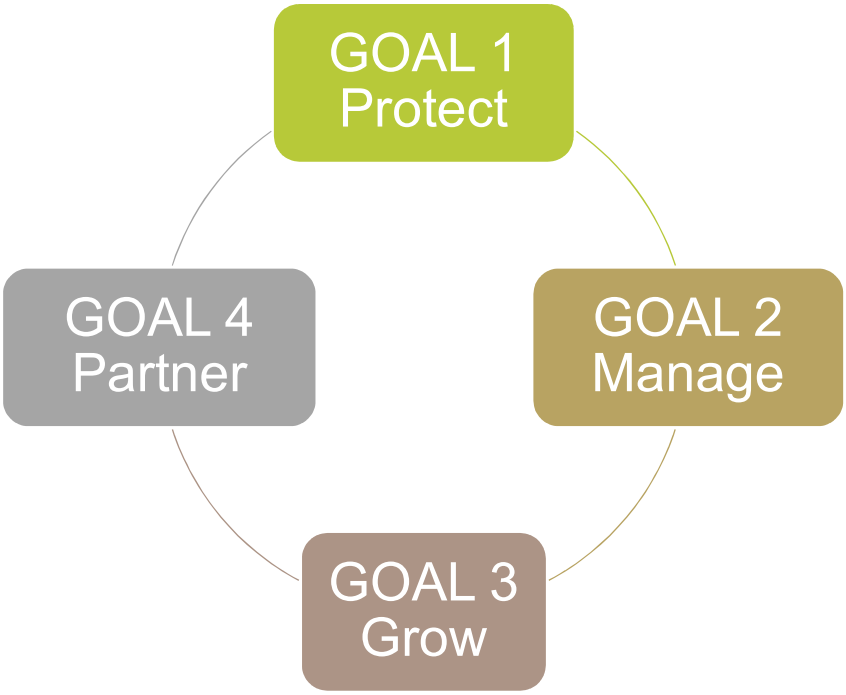
Based on assessments of LiDAR data and site observations, tree density and size are highest within institutional zones, including parks, open spaces, school yards, and other civic use sites. However, opportunities for additional tree planting exist. Potential planting spaces are determined by delineating areas of open space, currently occupied by grass/herb cover only.

General priority locations amounting to 15.9 hectares represent a potential 1.9% canopy cover gain within the UCB. The areas adjacent to Katzie Slough and Waterfront Commons Park also overlap with priority locations identified for revegetation in the *Environmental Inventory and Management Strategy*, with their selections based on their high ecological importance and community values (see Appendix C). Note that these priority locations are based on an initial assessment only and have not been reviewed at this time for site-specific feasibility and other possible constraints.

8. Goals And Actions

This Strategy sets a target of 30% canopy cover by 2050.

This strategy is intended to frame the City of Pitt Meadows' actions over the next decade. Long-term actions included here may extend beyond that timeframe, and it is recommended that this Strategy be reviewed and updated in approximately five years. These goals and actions will support progress towards the target.



Goal 1: PROTECT – Protect the existing urban forest canopy from further decline.

Action 1.1 – Develop and adopt a Tree Protection Bylaw.

- A Tree Protection Bylaw is anticipated to serve the following purposes:
    - formalize the tree removal and replacement permit process for private properties, including requirements for retention and replacement, and impose fines for unauthorized removal;
    - define terms such as: tree, significant tree, wildlife tree, heritage tree, and root protection zone;
    - implement a process for registering heritage trees for added protection;
    - identify replacement requirements by tree size and lot sizes;
    - strengthen provincial and federal regulations around tree removal during nesting season;
    - standardize protective measures required for construction or development activities including tree protection fencing details; and
    - specify provisional exemptions allowing staff to remove trees without a permit, if deemed necessary due to hazardous conditions.
- Prepare accompanying guidelines for developers for tree surveys, tree management plans, tree replacement plans, tree installation details, tree protection fencing, and tree permit requirements.

Action 1.2 – Develop a plan for mitigation or removal and replacement for known problem locations where street trees are damaging infrastructure or lifting sidewalks.

- Review excessive (Tier 3) settlement/heaving areas and provide options, including a cost analysis, for removing and replacing mature trees and replacing them with a different species, installed to prevent future interference with sidewalks or infrastructure, versus cutting back roots to try to retain the mature trees. This work has been initiated and this review should aim to expand on the current work.
- Provide an accompanying phasing plan for the known areas to guide timing of mitigative actions or replacements.

Action 1.3 – Review *Tree Preservation Policy on Municipally Owned Lands.*

- Review tree diameter triggering replacement requirements.

Goal 2: MANAGE – Manage the existing urban forest in parks and on publicly-owned lands.

Action 2.1 – Review and update the *Subdivision and Development Servicing Bylaw.*

- Review and update the design standards for sidewalks and boulevards in the *Subdivision and Development Servicing Bylaw*, including specifications for placement of trees and/or soil cell installation.

- Review the Recommended Tree Species list within the bylaw for appropriate trees for boulevards, parks, other open spaces and private yards.

  - Incorporate species that are more resilient to climate change and remove this list from the bylaw so it can be updated more frequently without having to amend the bylaw.
  - Include 'neo-native' or climate-resilient species selection and design for urban and natural trees as well as shrub and herb species which can help with canopy cover. Replacing sod or grass, which provide low ecological value, with a diverse mix of vegetation will improve the urban forest's health, biodiversity, visual quality, and habitat for pollinators.

- Develop green infrastructure guidelines to incorporate into development and capital projects.

Action 2.2 – Review and update the *Parks Maintenance Policy.*

- Review and update the *Parks Maintenance Policy* to incorporate recommendations of this Urban Forest Strategy into the Urban Forestry Program for maintenance activities, frequency of activities, and appropriate resource allocation.

Action 2.3 – Review and update the *Boulevard Maintenance Bylaw* for maintenance of trees on public property.

- Review and update the *Boulevard Maintenance Bylaw* to incorporate recommendations of this Urban Forest Strategy into the bylaw for maintenance activities.

Action 2.4 – Update the street tree inventory to better manage assets and include new public planting locations.

- Update the existing street tree mapping layer in GIS and include new public planting areas as they are planted.

Action 2.5 – Review and update the *Zoning Bylaw.*

- Review the *Zoning Bylaw* requirements and development permit guidelines for yard and open spaces for new developments, including restrictions on impervious areas and setbacks to underground structures to allow for root growth.

Action 2.6 – Consider conducting a natural asset valuation of the urban forest when making land use decisions.

- Measurement of the ecosystem services provided by the urban forest can inform its financial benefits and may inform future planning of the City's green and built infrastructure to meet future climate needs. Ecosystem services to consider may include: cooling, shading, improving air and water quality, sequestering carbon, increasing biodiversity, and managing stormwater runoff. Reviewing these costs and benefits can help inform decision-making.

Action 2.7 – Re-assess the Urban Forest Strategy after five years for an update on the current status of the forest canopy coverage and review prioritization of action items.

- Review ongoing action items and current tree canopy coverage in more detail to determine if action items need to be adjusted or re-prioritized.

Goal 3: GROW - Grow the urban forest canopy cover.

Action 3.1 – Increase tree canopy cover with a focus on public parks and public spaces.

- Focus tree planting activities in public parks with less existing canopy cover.
- Seek partnership with School District 42 for tree-planting activities on school grounds.

- Consider opportunities to plant large trees that have a need for large rooting areas.

- Consider neighbourhood equity considerations (see Appendix B), which may help to inform priority planting locations.

Action 3.2 – Increase tree canopy cover with a focus on private properties.

- Encourage planting on private lands, through education on the benefits of trees and informing residents of potential funding opportunities on the City website.

- Consider incentivizing tree planting in neighbourhoods that are under-served by parks and in areas with less existing canopy cover.

- Consider neighbourhood equity considerations (see Appendix B), which may help to inform priority planting locations.

Goal 4: PARTNER - Partner with the community to foster stewardship and ownership over the shared urban forest.

Action 4.1 – Educate the community on the importance of the urban forest and how they can help to protect it.

- Develop and install educational signage for protection of features such as newly restored natural areas, conservation areas, areas with newly planted trees, sensitive fish habitat, and riparian areas.

- Provide online resources on City website for citizens to support healthy urban habitat (e.g., lists of tree, shrub, and garden flowering herb species to plant to support pollinators).

- Provide online resources for financial incentives on City website, for landowners looking to plant trees on their property. This would both educate the community and help grow the urban forest.

- Consider a Tree Adoption program: providing community members with the opportunity to contribute at a small scale. The main task would be to keep adopted tree water bags full during summer, thereby lowering maintenance burdens on Parks staff. Community members could also adopt a street and care for the watering needs of all trees on that street (this could be integrated with the Adopt-a-Block program). This program would complement the existing requirements under the *Boulevard Maintenance Bylaw*.

Action 4.2 – Partner with post-secondary school institutions for planting, surveying, and/or monitoring projects.

- Initiate communication with post-secondary institutions offering forestry and environmental stewardship programs to partner on joint research projects that could benefit the City and the students/program.

Action 4.3 – Expand on partnerships with non-profit organizations and the qʔicəyʔ Katzie First Nation to increase planting in riparian areas on public lands through restoration events.

- Explore grant opportunities for planting along riparian areas on public lands. Collaborate with the qʔicəyʔ Katzie First Nation to identify priority locations, ensuring planting locations avoid interference with the structural integrity of the dikes.

Action 4.4 – Partner with agricultural and rural communities to increase tree canopy cover on areas outside of the UCB.

- Balance the agricultural needs and protection under the *Right to Farm Act* to allow the space for crops without overly shading farmland with trees and without impeding the conveyance of water.

- Partner with the agricultural community, landowners, and interested parties to explore riparian restoration and planting along the drainage systems to help manage invasive species and improve water quality, without impeding the ability to clear and maintain the drainage systems. Other factors may include height restrictions and unintended seed dispersal, which may also need to be considered when reviewing potential planting locations. Priority areas could be those that would benefit from shading to reduce invasive species, such as Parrott's feather (see Appendix D).

- Explore opportunities to encourage or incentivize the restoration and/or maintenance of ecological services or farmland to mitigate climate change impacts.

- Assist in exploring and promoting agrisilviculture, integrating trees and other large woody perennials into farming systems, where possible and beneficial to the farm and the environment.

Ongoing Action Items

Parks staff have been maintaining trees, parks, and gardens throughout the City, to an expected level of service, as laid out within the *Parks Maintenance Policy*. In addition to this work, education, outreach activities, and coordination of special events have been achieved with the existing staff resources. Ongoing activities that must be continued to protect and grow the urban forest include the following:

Maintain forest stewardship activities by partnering with local stewardship groups.

- Continue to lead existing programs (such as Earth Day Planting, BC Hydro funded planting, Rose Grabenhorst Garden planting, Green Team Canada events), and other planting, invasive vegetation removal, and terrestrial restoration efforts.

Review current practices for managing beaver habitat.

- Consider targeted areas for preventing tree loss due to beaver activity and incorporate restoration efforts into the *Parks Maintenance Policy*.

9. Implementation Plan

This Implementation Plan sets out high-level timelines and associated budget considerations for the goals and actions identified in this Strategy in order to achieve the targets. This high-level summary is intended to guide the City's specific steps to achieve these goals and targets. These actions and their associated timelines will then be incorporated into either the *Parks Maintenance Plan* or other work plans, or a newly created maintenance plan specific to urban forest activities and actions, and carried out in business planning and operations activities.

Existing: 17% in total UCB, excluding ALR. Target: 30% in UCB, excluding ALR.

To achieve a 13% increase of canopy cover by 2050, an estimated 11,600 trees must be planted, divided into priority or potential planting areas in Figure 16 below. This tree canopy coverage estimate is based on the total number of trees currently in the UCB, and the total canopy cover area, to give an average canopy cover area per tree.

This target equates to an estimated 460 trees per year. The estimated number of trees required for percent canopy coverage is based on the measured average canopy cover per tree, and the location and function of available space, including ideal tree planting densities. Tree planting densities are higher for parks and forested sites and lower in streetscapes and residential areas.

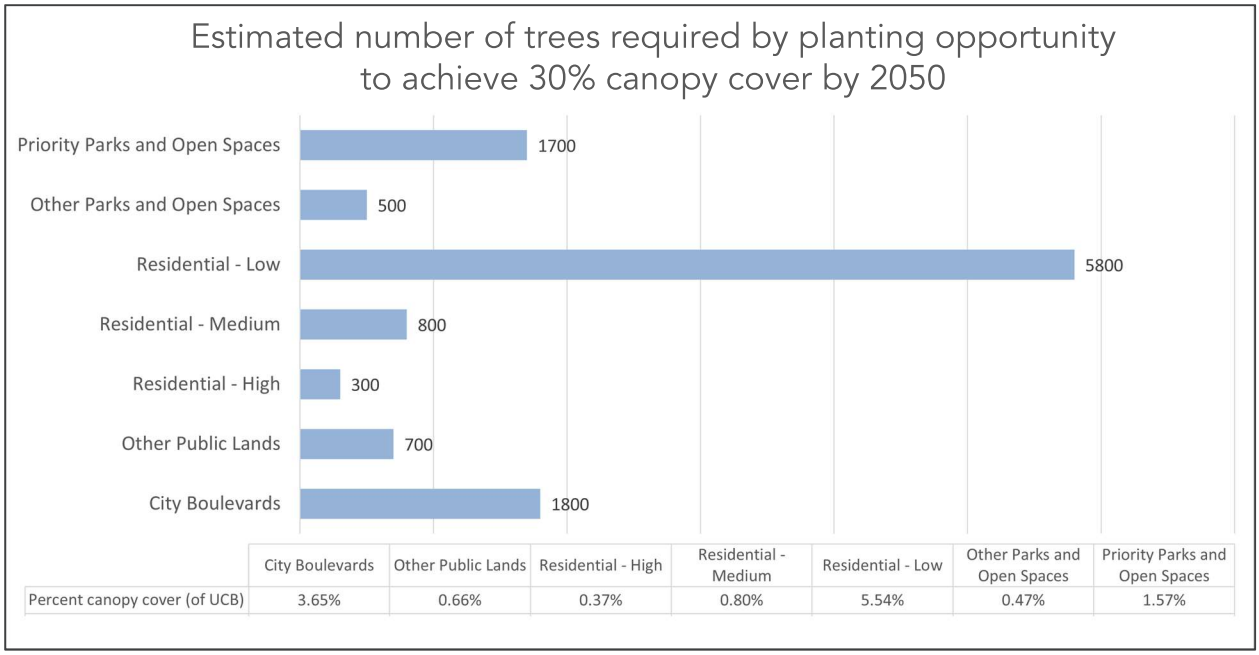


Figure 16. Estimated breakdown of tree quantities required to achieve 30% canopy cover.

9.1. Schedule Of Action Items

Table 4 below provides a summary of key action items as listed by their intended timeframe:

Table 4. Schedule of key action items

Short-term actions (1 to 5 years)	
Protect - Action 1.1	Develop and adopt a Tree Protection Bylaw.
Protect - Action 1.2	Review and update plan for mitigation or removal and replacement for known problem locations where street trees are damaging infrastructure or lifting sidewalks.
Manage - Action 2.1	Review and update the *Subdivision and Development Servicing Bylaw*.
Manage - Action 2.2	Review and update the *Parks Maintenance Policy*.
Manage - Action 2.4	Update the street tree inventory to better manage assets and include new public planting locations.
Grow - Action 3.1	Increase tree canopy cover with a focus on public parks and public spaces.
Partner - Action 4.1	Educate the community on the importance of the urban forest and how they can help to protect it.
Medium to long-term actions (6 to 10 years)	
Manage - Action 2.7	Re-assess the Urban Forest Strategy after 5 years for an update on the current status of the forest canopy coverage and review prioritization of action items.
Protect - Action 1.3	Review *Tree Preservation Policy on Municipally Owned Lands*.
Manage - Action 2.3	Review and update the *Boulevard Maintenance Bylaw* for maintenance of trees on public property.
Manage - Action 2.5	Review and update the *Zoning Bylaw*.
Manage - Action 2.6	Consider conducting a natural asset valuation of the urban forest when making land use decisions.
Grow - Action 3.2	Increase tree canopy cover with a focus on private properties.
Partner - Action 4.2	Partner with post-secondary school institutions for planting, surveying, and/or monitoring projects.
Partner - Action 4.3	Partner with non-profit organizations and the qʔc̓əy̓ Katzie First Nation to increase planting in riparian areas on public lands through restoration events.
Partner - Action 4.4	Partner with agricultural and rural communities to increase tree canopy cover on areas outside of the UCB.

9.2. Budget Implications

As a city of approximately 19,800 people, the City of Pitt Meadows will need to consider priorities in this Strategy for effective implementation. Limited budget and limited staff will require a focus on key priorities, such as protecting the existing urban forest canopy. Potential tree-related permit fees, bylaw fines, and cash-in-lieu of replacement tree contributions could

support the administration costs of the tree protection program. However, additional ongoing funding and staffing for planting, maintenance, and bylaw administration will be required to achieve the targets outlined in this Strategy.

Options should be explored for external funding to subsidize new tree plantings. Parks staff may partner with local stewardship groups to run forest stewardship events; however, staff time will be required for coordination, and funds will be required for materials and labour, although community members who attend the events may supplement the labour requirements.

For planting and maintenance, the cost of a tree varies over time, with more investment required upfront to realize the benefits in the future. Cost inputs to the urban forest are high when trees are young and again later, when they are in decline. The current cost to install a tree is approximately $800, with maintenance and watering required for the first five years, and then ongoing minimal maintenance required for the remaining 50 plus years. On average, over a lifespan of 50 years, the cost of a tree is approximately $135 per year. As mentioned above, the overall financial benefit of trees has been shown to outweigh the costs.

9.3. Monitoring Framework

This Strategy is intended to inform future policy, work plans, budget proposals and stewardship efforts. Monitoring progress will require tracking of performance indicators to help measure implementation progress. The following quantitative key performance indicators will be used to track progress on goals and actions included in this Strategy (Table 5). Note, not all actions are listed in the monitoring framework table below, only those with need for monitoring. Monitoring review summaries should be published on the City website on the same page as the adopted Urban Forest Strategy.

Table 5. Monitoring Framework

Quantitative Indicator	Measurement Frequency	Method
Increase canopy cover to 30% in the Urban Containment Boundary by 2050	Every 5 years	LiDAR analysis
Mitigation plan for trees damaging infrastructure	Every 2 years	Work history: record of actions conducted per the mitigation plan
Update street tree inventory	Every 2 years	Work history: annual review of monitoring and additions, update with missing areas, if any
Plant trees in focus areas / priority locations	Every 2 years	Work history: Data summary of planted tree quantities per year, their locations, species, and size at time of planting.