To:	Parks, Recreation and Cultural Services Committee	**Date:**	October 31, 2019
From:	Todd Gross Director, Parks Services	**File:**	10-6550-07/Vol 01
Re:	**The Public Tree Management Strategy 2045: A Plan for Managing Richmond's Public Urban Forest**		

Staff Recommendation

1. That the Public Tree Management Strategy 2045, as detailed in the staff report titled "The Public Tree Management Strategy 2045: A Plan for Managing Richmond's Public Urban Forest," dated October 31, 2019 from the Director, Parks Services, be endorsed; and

2. That the Council Policy for the Public Urban Forest, as detailed in the staff report titled "The Public Tree Management Strategy 2045: A Plan for Managing Richmond's Public Urban Forest," dated October 31, 2019 from the Director, Parks Services, be endorsed.

Todd Gross
Director, Parks Services
(604-247-4942)

Att. 2

REPORT CONCURRENCE		
ROUTED TO:	**CONCURRENCE**	**CONCURRENCE OF GENERAL MANAGER**
Law Engineering Sustainability Development Applications Policy Planning Building Approvals	☑ ☑ ☑ ☑ ☑ ☑	*[signature]*
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	INITIALS: CJ	APPROVED BY CAO *[signature]*

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Staff Report

Origin

The purpose of this report is to present Council with an update to the existing Urban Forest Management Strategy (2001) and set the goals and objectives for the sustainable stewardship of all City owned trees through the Public Tree Management Strategy 2045 (the "Strategy") (Attachment 1) and a Public Urban Forest Policy (Attachment 2) for Council's consideration.

This report supports Council's Strategic Plan 2018-2022 Strategy #2 A Sustainable and Environmentally Conscious City:

> *Environmentally conscious decision-making that demonstrates leadership in implementing innovative, sustainable practices and supports the City's unique biodiversity and island ecology.*
>
> *2.1 Continued leadership in addressing climate change and promoting circular economic principles.*
>
> *2.2 Policies and practices support Richmond's sustainability goals.*
>
> *2.4 Increase opportunities that encourage daily access to nature and open spaces and that allow the community to make more sustainable choices.*

This report supports Council's Strategic Plan 2018-2022 Strategy #4 An Active and Thriving Richmond:

> *An active and thriving community characterized by diverse social and wellness programs, services and spaces that foster health and well-being for all.*
>
> *4.3 Encourage wellness and connection to nature through a network of open spaces.*

This report supports Council's Strategic Plan 2018-2022 Strategy #6 Strategic and Well-Planned Growth:

> *Leadership in effective and sustainable growth that supports Richmond's physical and social needs.*

Background

In 2001, the Urban Forest Management Strategy was adopted by Council as the guiding document for the management of trees on public lands under the jurisdiction of the City of Richmond. The primary objectives of the 2001 strategy were to outline standardized arboricultural management practices and respond to the then emerging issues of tree selection for sites under overhead power lines, tree replacement ratios, general pruning practices and tree removal criteria. The document reflected the best management practices and service level expectations at that time.

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In the intervening years, the City has experienced rapid growth, densification and redevelopment, particularly in the City Centre area and along arterial roads. The number of trees the City is managing has increased dramatically through development and expansion of the parks and open space system. Newer City parks, such as Terra Nova, the Garden City Lands and Railway Greenway, are sites where there have been significant tree plantings in recent years. The increased number of trees the City is managing, the constraints of growing healthy trees in an urban environment and the effects of climate change are emerging as significant challenges. Consequently, an update to the strategy was undertaken.

This update to the 2001 Urban Forest Strategy is intended to set the direction for City policy and management practices for the trees on public land through to 2045. Adoption of this Strategy will demonstrate the City's continued commitment to maintaining a healthy urban forest and the prudent management of this valuable natural asset.

The Public Urban Forest

The City's entire urban forest is broken into two distinct categories: trees on public land and those on private property. City-wide, the urban forest contains approximately 360,000 trees.

For the purposes of the proposed Strategy, the public urban forest is defined as trees growing on City owned land in parks, medians and boulevards in streets, road rights of way, civic properties and natural areas. This also includes many of the trees located on Richmond School District No. 38 lands managed and maintained by the City. Richmond's public urban forest does not include trees located on land managed by Vancouver International Airport (YVR), Ministry of Transportation (MOTI) Roadways, Vancouver Fraser Port Authority properties nor trees located in the Agricultural Land Reserve on private property. The public urban forest is comprised of approximately 100,000 trees. Within this area, the City has formally inventoried approximately 19,000 trees in parks and natural areas and approximately 37,000 street trees for a total of 56,000 trees. The remaining 44,000 trees, predominantly growing in natural areas, are managed less intensively than those in parks and streets and thus have not yet been inventoried.

The urban forest is measured in two ways: actual numbers of trees and canopy area (the combined area of all the City's tree canopy). While actual numbers of trees is an important metric for measuring success, the size and volume of the tree canopy is the more significant metric for several reasons. For example, large, mature trees with dense canopies will provide more ecosystem services (e.g., shading, stormwater management, carbon sequestration and removal of pollutants) than younger trees with much smaller canopies. To provide the maximum benefit, a healthy urban forest should have a significant, contiguous urban tree canopy cover.

The following table outlines the proportions of areas of public land on which the urban forest is located and the overall percentage of canopy coverage.

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Table 1: Area Proportion of Public Land Canopy Summary

Canopy Location	Total Land Area (ha)	Canopy Area (ha)	Percent Canopy Cover within Location	Percent of Public Land Canopy
Parks/Schools	728	177	24%	35%
Roads	1,553	237	15%	46%
ROWs	289	96	33%	19%
Total Public Land	**2,570**	**510**	**20%**	**100%**

The Benefits of Trees

The City's public urban forest is managed as a civic infrastructure asset which increases in value and in the benefits it provides over time. As a natural resource and legacy for future generations, it provides numerous services, and health and wellness benefits such as:

- Enhancing urban environments by providing shade, beautification, a sense of place and recreational opportunities;
- Providing ecosystem services which moderate the effects of extreme heat, winds and precipitation; and
- Supporting biodiversity by providing habitat and a food source for urban wildlife.

Supporting Plans and Strategies

The Public Tree Management Strategy supports aspects of the following City strategies and plans:

- Parks and Open Space Strategy (POSS): An update to the Urban Forest Strategy was identified as an outcome of this POSS. An update would recognize the value of the ecological network, manage the urban forest to maximize ecosystem services and develop a deeper awareness of the benefits of the urban forest with the public.

- Official Community Plan (OCP): Street trees are identified as a key community asset to be protected and enhanced. New tree planting, developing a Public Realm Planting Master Plan and the protecting and enhancing existing trees are listed as key objectives of the Plan.

- Ecological Network Management Strategy (EN): Hubs, sites and corridors on public land throughout Richmond contain significant stands of trees. Preserving, maintaining and planting trees at these locations will increase the ecosystem services these lands provide.

- Integrated Rainwater Resources Management Strategy: Trees, landscaping and open spaces are identified as key components to improving water quality, minimizing erosion and reducing peak flows during storm events. The goals and outcome of this strategy directly tie into those of the EN and POSS including enhancement of natural habitat and riparian areas to manage stormwater runoff and water quality.

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- Community Energy and Emissions Plan (CEEP): It is broadly recognized that trees provide climate adaptation and mitigation benefits as defined above. The Strategy will be an important input into the new Community Energy and Emissions Plan that is currently underway.

- Metro Vancouver: Metro Vancouver has published reports and guiding documents related to management of the urban forest in the emerging context of climate change. The City will reference these resources when considering the implementation of the arboricultural best management practices, such as tree species and site selection.

Community Consultation and Stakeholder Input

The Strategy benefitted from an extensive public consultation review, feedback from the Advisory Committee on the Environment (ACE) and workshops with City of Richmond staff.

Public Consultation

In fall 2017, the public was asked to share their views of Richmond's public urban forest through the City's *Let's Talk Richmond* public consultation portal and a booth at the Richmond Harvest Fest hosted at the Garden City Lands in September 2017. A total of 138 people chose to respond with a completed survey. The survey presented a range of questions regarding the public perception of the current public urban forest, what changes they would like to see and how they would rate the trees on their street or what they valued in an urban forest.

Generally, residents were very supportive for having more trees planted in City parks and streets. Residents responded that they valued trees for their role in reducing the effects of pollution, supporting habitat for native plants and animals, heritage and beautification factors and that they provide a pleasant environment for people to gather and socialize. Concerns raised ranged from the aesthetics of trees, conflicts with utilities, managing leaf litter and increasing species diversity and native tree plantings. A sample of the survey has been included in an Appendix of the Strategy.

Advisory Committee on the Environment (ACE)

Staff formally presented to ACE at two meetings (October 2017 and January 2019) and several times by way of an update when presenting on other Parks-related topics. The Committee also provided feedback by submitting one completed *Let's Talk Richmond* survey which summarized their collective input.

Overall, the Committee expressed very strong interest in tree and urban forestry issues within the community and showed support for the Public Tree Management Strategy and the direction it was setting for the future public urban forest.

Staff Workshops and Review

In September 2018, two staff workshops were conducted to garner a cross-departmental input for the development of the Strategy. The goals of the workshops were to define common challenges for working around, maintaining and protecting City trees and identify opportunities for

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improving Richmond's urban forest management and tree protection practices. Additionally, input was provided on measures to improve existing tree retention protocols and methods to encourage more planting on public land.

Analysis

Strategy Overview

The Public Tree Management Strategy has a 25-year outlook which aligns with the City's projected population growth rate and development patterns as envisioned in the City's Official Community Plan. Staff recommend using a 25-year timeframe as it is a reasonable period which reflects the expected growth rates of trees in our climate, and the results of revised tree management practices (see below) should become apparent within this timeframe.

The vision for the City's public urban forest is embodied in the following vision statement:

> *Richmond's public trees are managed as a high-value, civic asset. Richmond trees are beautiful, resilient and sustainable and are supported by the community for the benefits they provide.*

Strategy Goals, Targets and Objectives

The goals of the Public Tree Management Strategy are:

- Conserve and protect the public urban forest;
- Manage and maintain a healthy and safe public urban forest;
- Enhance and expand the extent and health of the public urban forest; and
- Educate and engage with the community on the benefits of the public urban forest and provide opportunities for community stewardship.

Through the process of developing the Strategy, the following targets and objectives were set for each of the four goals:

Table 2: Goal – Conserve and Protect

Target:	30% of City trees have a diameter greater than 40 cm by 2045.
Objectives:	The urban forest is valued as an integral part of the City's civic infrastructure.
	City tree conservation and protection is prioritized and implemented on all City and urban development projects.

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Table 3: Goal – Manage and Maintain

Target:	**Tree mortality is less than 3.5% for City trees less than 10cm diameter by 2045 and maintenance practices maximize the healthy life-span of mature trees.**
Objectives:	All inventoried City trees are managed within a preventative maintenance program.
	City tree care and maintenance operations are based on industry best management practices and standards to ensure continuous improvement.
	City tree care and maintenance operations are continuously adapted to climate change.
	City tree risk is managed to maintain public safety.

Table 4: Goal – Enhance and Expand

Target:	**Increase canopy cover over the public realm from 20% to 30% by 2045.**
Objectives:	Public urban forest canopy cover increases to enhance community and ecological health benefits.
	Standards for City tree planting infrastructure and species selection are continuously adapted to climate change.

Table 5: Goal – Educate and Engage

Target:	**Engage 1,000 people per year on the role and value of Richmond's public urban forest.**
Objectives:	The City regularly updates the public about the urban forest's critical role in community health and wellness.
	Public activities that harm City trees are minimized.
	Stewardship opportunities are provided for people to connect with the urban forest.
	City project designers, planners and the consulting arborist community are educated about City Tree Management Protocols.

Each objective is accompanied by a number of proposed actions and timeframes for implementation which will help the City reach the four set targets. The timeframes for achievement vary from the near term (2020) to longer timeframes as well as continuous re-evaluation and monitoring. For additional information for the targets, actions and timeframes, please see Chapter 5 of the Strategy.

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Public Urban Forest Canopy Targets

The City currently plants a significant number of trees every year. The Strategy sets an aspirational yet achievable target of a city-wide average 30 per cent public urban forest canopy (from the current 20 per cent overall average). In support of this target, more trees will be planted on public land thereby increasing the public tree canopy.

The City replaces approximately 300 trees removed every year due to decline, development impacts or storm damage. However, this number can vary substantially from year to year depending on weather events and construction projects.

The City also plants new trees on public land through Capital Projects or development related activity (off-site contributions associated with new developments secured through Servicing Agreements). Considerations for sites identified for new trees include existing site conditions and constraints such as utilities (above and below ground), existing programmed spaces (e.g., sidewalks, driveways, sports fields, pathways, playgrounds, etc.), available soil volumes, future capital improvements (e.g., road expansion), etc.

The following table summarizes the current and projected tree planting density, the potential number of sites in park and street locations and the projected public urban forest canopy target.

Table 6: Public Urban Forest Canopy Cover Targets

Location	Current Number of Trees Per Hectare (ha)	Estimated # of Tree Planting Spots	Target Number of Trees Per Hectare (ha)	Target Canopy Cover (%)
Parks	37	10,000	55	40
Streets	19	20,000	30	20
City-wide Public Urban Forest Canopy Cover Target:				30

It is estimated that the canopy cover target will be achieved by 2045.

Climate Change and the Urban Forest

Climate change in our region is projected to result in warmer, drier summers, fewer frost free days, more frequent extreme rainfall and storm events and rising sea levels. Richmond's public urban forest will be impacted by these changes. When urban forests perform poorly, the adverse impacts of climate change can be magnified; these include infrastructure damage, higher maintenance costs, tree loss and reduction of the overall canopy. The Strategy provides direction on a number of climate change-specific responses the City can take to improve the health, longevity and overall resiliency of our existing public urban forest. These responses include:

- Increasing the diversity of trees planted;

- Consideration of adverse impacts on native species thus limiting planting opportunities;

- Consideration of more frequent or severe drought or storm events (e.g., extreme weather);

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- Planting to mitigate the urban heat island effect; and

- Increasing the public tree canopy area.

Current Public Urban Forest Management Practices

The Urban Forestry Section of Parks Operations manages the public urban forest. City arborists and other staff receive professional training and certification through the International Society of Arboriculture (ISA). Ongoing training is required to maintain certification and ensures arboricultural best management practices are implemented to maintain trees managed by the City. The following is a brief summary of current management practices.

Tree Pruning and Maintenance

The City's current maintenance model provides resources to only prune those trees identified through service requests. Typical requests for maintenance address storm damage, adverse impacts from development or for general maintenance. Accordingly, some trees may not be serviced until they are adversely impacted. Between January 2016 and December 2018, staff responded to approximately 5,100 urban forestry service requests ranging from simple enquiries to tree pruning or removal. On average, approximately 300 trees are removed and approximately 2,168 trees are pruned per year.

Tree maintenance practices have evolved with the emergence of environmental and habitat issues such as nesting birds. Staff monitor and hire Qualified Environmental Professionals (QEPs) to ensure nesting birds are not adversely impacted by tree maintenance activities. This includes altering work plans in response to nesting seasons or the presence of bird nests.

Tree Compensation Fund

When City-owned trees are adversely impacted, the City collects tree compensation monies to offset tree replacement costs resulting from those impacts. Adverse impacts to public trees include unauthorized cutting or removal (as defined by the Tree Protection Bylaw No. 8057) or impacts from development activities. Since its inception in 2004, the fund has collected approximately $3.8 million.

- Unauthorized Tree Work: Unauthorized work includes City trees which are pruned, removed or otherwise adversely impacted due to work conducted by the members of the public. Parks staff inspect the impacted tree(s) and coordinate with Tree Preservation Group staff to determine the value of a fine. The fine's value is based on a number of factors including the tree's size, age and condition at time of impact. Fines are applied and deposited into the Tree Compensation Fund.

- Development Impact: Sometimes, development activity, both on and off-site, results in tree removal. When tree removals are associated with redevelopment, the City seeks replacement planting for on-site trees at a 2:1 ratio with the first recourse to always replace trees within the development site. For trees which cannot be planted on-site, cash-in-lieu tree compensation monies are contributed to the City by the developer. While some trees maybe lost due to development activity, the tree replacement ratio ensures

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there is a net increase of trees in the public urban forest. Relocating healthy trees onto City land is also a viable practice with all associated relocation costs borne by the developer.

Contributions to the Tree Compensation Fund are utilized to fund replacement and re-location (e.g., tree spading) tree planting projects and young tree watering for up to three years after planting. Staff propose to review the current cash-in-lieu compensation process and increase the rate from the current $500 per tree to $750 to reflect the current cost to plant new trees (based on a cost recovery model).

Tree Planting

The City plants many trees every year to replace those lost due to age or decline, storm damage, or development activities. Trees are also planted as part of Capital Projects approved by Council and as part of the development process. Servicing Agreements between the City and a developer typically secures City-owned off-site improvements, including tree planting in streets, parks and plazas. The majority of City tree planting projects are funded through the Tree Compensation Fund.

The following table summarizes the number of trees planted between 2013 and 2018.

Table 7: Number of Trees Planted between 2013 and 2018

Year Planted	Trees Planted by Parks	Public Trees Planted Via Servicing Agreements	Total Trees Planted
2018	1,858	518	2,376
2017	552	227	779
2016	509	202	711
2015	834	464	1,298
2014	412	322	734
2013	555	392	947

In 2015, the City planted, as part of the Railway Greenway project, 620 trees and in 2018, the City planted 1,310 trees on the Garden City Lands. In fall 2019 and early 2020, approximately 290 trees will be planted as part of the upgrades to London-Steveston Park and approximately 500 trees will be planted in the Railway Greenway and McCallan Park area between Granville Avenue and Westminster Highway. As part of this project, approximately 140 trees will be sourced from the City's own Gilbert Nursery. Of the trees the City has planted in parks and on streets in the past three years (1,326 total), only 12 trees died due to vandalism or disease.

The number of trees provided through Servicing Agreements is significant. Currently, the annual average provided to the City through this process is approximately 500 trees. Planting rates vary depending on the size of project and the area of public land adjacent to or fronting the development site. For example, approximately 1,200 trees will be planted by 2021 as part of a Servicing Agreement in Hamilton Highway Park. Staff work with proponent consultant teams to institute design and planting best management practices including adequate, uncompacted soil volumes, provision of irrigation and suitable tree selection according to the site conditions. Trees planted through development are maintained for a minimum of one year by the developer. Any

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trees which die during this period must be replaced and successfully established, for a minimum of one year, prior to the trees becoming the responsibility of the City and accepted as new City infrastructure assets.

New Tree Watering

Aside from selecting the right tree for the right location, initial watering after planting is a key success factor for any new tree. Establishment watering results in higher survival rates, as well as healthier and more resilient trees. Trees that are planted in locations that do not have irrigation are provided a slow release watering bag which is refilled periodically by staff throughout the growing season.

Information and Management Systems: LiDAR and GIS

In 2017, an image of the City's entire urban forest canopy was captured utilizing a remote sensing technology called LiDAR. The image created a 3D model of Richmond's forest canopy, buildings, roads and power lines. With this information, a public and private land tree count of approximately 360,000 trees was calculated. This information was also used to confirm the current canopy cover on public land (22 per cent) and established the baseline from which future change will be compared to. Staff intend to repeat this process every few years to monitor the rates of change. It should be noted that this information can be used for a number of other planning initiatives including calculating urban development rates and areas of pervious and impervious surfaces.

In the past two years, staff have developed a Geographic Information Systems (GIS) map inventory of all City parks and their assets as well as street trees. With mobile technology, individual and groups of trees have been classified and recorded as detailed in the following section.

Updated Public Urban Forest Management Practices

The Strategy sets out the direction for several new initiatives in response to emerging arboricultural best management practices and as an adaptive measure in response to climate change.

GIS Inventory

Establishing and maintaining a GIS inventory of the public urban forest is an industry-wide current best management practice. The inventory will be continuously updated as existing unclassified trees are captured, new trees are planted or existing trees are serviced. To further inform urban forest management, the information captured through this inventory will be used to:

- Monitor mortality and failure rates to identify problem planting sites, health issues or species to avoid;
- Monitor tree condition to inform succession planning for tree replacement;
- Track progress towards meeting the Strategy's targets; and

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- Communicate tree locations, benefits and health information internally and externally.

Proposed Preventative Maintenance Program

The Strategy proposes to transition the current management of the public urban forest from a demand driven system to a preventative maintenance program model. Essentially, this would entail that each City tree will be visited (inspected and, if required, maintenance work executed) a minimum once every five years for street trees and every 10 years for park trees.

Preventative maintenance of the public urban forest will optimize its value and the services it provides. While this program may increase the cost of managing the urban forest, it will ultimately reduce the number of service requests, reduce risk management, safety and liability concerns and help identify potential threats to the health of the urban forest. A demand driven system will still operate concurrently to responding individual requests or emergency pruning (e.g., storm damage or tree failure).

Tree Species Selection

The effects of climate change are becoming more apparent where trees that once thrived in Richmond now either struggle or die. For example, the Western Red Cedar, a native and important tree species in British Columbia's forests, has been observed to be struggling in certain areas where they once thrived. Adapting to this "new normal" means planting species that can thrive in these emerging climatic conditions. Metro Vancouver has recently published updated tree species resources which staff will be utilizing to inform tree species appropriate to Richmond's climate and soil conditions. Tree species selection criteria includes (but not limited to:

- Native vs. non-native;
- Deciduous vs. coniferous (evergreen);
- Disease resistance;
- Drought and pollution tolerance;
- Size and shape at maturity; and
- Existing species diversity at site.

Public Urban Forest Policy

The City does not currently have a Council adopted Policy pertaining to the public urban forest. The proposed Public Urban Forest Policy (Attachment 2) establishes the City's philosophy on the importance and function the urban forest in the community.

The purpose of the proposed Public Urban Forest Policy is to provide Council an opportunity to affirm the vision, goals and objectives presented in the Public Tree Management Strategy and confirm the City's position regarding the important role the public urban forest plays in our community. The policy will also serve to provide the public, Council and staff the decision-

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making framework concerning the management of City owned trees, the standards guiding the City's best management practices and the overall scope of work conducted by Parks Services.

Highlights of the Public Urban Forest Policy include the following:

- A definition of the Public Urban Forest as managed by the City;

- The City's mission statement to sustain and expand the urban forest to deliver multiple benefits to the community including resilience to climate change;

- The goals of the Public Tree Management Strategy;

- An overview of the core urban forestry practices performed by the City including planning, inventory, risk management, planting, watering, pruning, tree removal and integrated pest management; and

- A commitment to conduct the work to industry recognized best management practices per the International Society of Arboriculture.

<u>Next Steps</u>

Upon Council's approval of the Strategy, work will begin to activate the Five-Year Implementation Plan (the "Plan"). Actions will be implemented according to the stated timeframes outlined in the Plan, but periodically reviewed to allow for emerging priorities and resource management trends.

Priorities include an Analysis and Resource Assessment (the "Assessment") to identify the budget, staffing and equipment implications associated with the proposed transition from a reactive to a preventative maintenance model. There are also operational implications to increasing the number of trees the City plants in order to achieve the 30 per cent public tree canopy cover target which would also be considered in the Assessment. In 2020, staff will report to Council with options for implementing this new maintenance model, including any estimated budget impacts.

Also in 2020, staff will develop the criteria for a rating system for evaluating and prioritizing demand driven maintenance and removal requests. Further, staff will also review and quantify the data on past tree failures and risk claims to inform the development of a tree maintenance response plan for problem species or locations.

In the broader context, the Strategy identifies the need to develop a City-wide urban forest strategy for trees on both public and private land. Many of the same issues outlined in the Strategy also affect trees growing on private property. Taking a holistic approach to all 360,000 trees growing in Richmond will integrate the management goals of the Public Tree Management Strategy with those of the much larger private urban forest. A terms of reference for this city-wide strategy, which will describe the scope, key project stakeholders and a public consultation plan, will be prepared by staff for Council approval.

In the interim, Parks staff will work in concert with relevant City departments to support the management and health of the city-wide forest.

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Suggested next steps include:

- A comprehensive review of the Tree Protection Bylaw No.8057 be undertaken by staff and report back to Council on suggested changes;

- Review the cash-in-lieu process and increase the compensation rates in the Tree Compensation Fund;

- Consider the creation of a customer service focused "one-stop shop" approach for City tree related issues (both public and private trees); and

- Increase community engagement opportunities to instill a stewardship ethic in Richmond residents to protect and expand the public urban forest, including watering City boulevard and new tree plantings by residents.

Financial Impact

None.

Conclusion

The Public Tree Management Strategy sets the direction to increase the city-wide average to 30 per cent public urban forest canopy, to increase the rate of new tree planting, transition from a demand driven to a preventative maintenance program, and increase community stewardship and resident involvement in their public urban forest.

Updating our urban forestry management practices will position the City to better adapt to the effects of climate change and growth and change in the urban landscape. The goals, objectives and actions outlined in the Strategy will guide the City's decisions to ensure a healthy, beautiful and resilient urban forest is enjoyed by future generations of Richmond residents.

Adoption of the Public Tree Management Strategy and the Public Urban Forest Policy will signal to the community the City's strong commitment to growing the urban forest and taking a leadership role in the region by setting a benchmark for increasing the size of the urban forest.

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Att. 1: City of Richmond Public Tree Management Strategy 2045
    2: The Public Urban Forest Policy

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CITY OF RICHMOND PUBLIC TREE MANAGEMENT STRATEGY 2045

A Plan for Managing Richmond's Public Urban Forest

November 2019

Richmond

Acknowledgements

2045 VISION...

Richmond's public trees are managed as a high-value, civic asset.   Richmond trees are beautiful, resilient and sustainable and are supported by the community for the benefits they provide.

Executive Summary

Changing the way Richmond manages City-owned trees

Richmond's urban forest is key to developing a world class city and maintaining a livable environment for citizens. Trees are the keystone organisms of the urban forest and their management is a priority for the City. Trees are living, life-supporting natural assets that provide Richmond with benefits like shade, stormwater interception, air quality improvements, beautification and habitat. However, climate change, urban densification and technology are presenting new challenges and opportunities for managing public trees. In response, the City has developed the Public Tree Management Strategy to direct urban forest management until 2045. **This Strategy is focused on trees managed by the City only.**

The Strategy contains some key actions that will shift City tree management practices towards a more resilient and sustainable future:

Conserve and Protect

The City will target increasing the proportion of large diameter City trees (>40 cm diameter) from 18% to 30% of the population by 2045. The priority actions are to implement:

- City Tree Policy to guide City tree protection, removal, replacement and maintenance decisions.

- City Tree Management Protocol to update the process and standards that apply when City trees are affected by City capital and development related activities.

Manage and Maintain

The City will maintain tree mortality rates in young trees below 3.5% and maintenance practices will maximize the healthy life-span of mature trees. The priority actions are to:

- Expand the City's young tree watering program to include 3 years after planting, with 4th year trees watered if necessary.

- Shift from demand-based to preventative young tree pruning and establish a tree pruning cycle.

- Develop and implement a 5-year staffing, equipment and budget plan to enable the transition from demand to preventative maintenance.

Enhance and Expand

The City will target an increase in canopy cover **on public land** from 20% to 30% by 2045. The priority actions are to:

- Plant at least 850 shade trees per year (in addition to replacement and restoration tree planting).

- Develop a Public Realm Planting Master Plan to guide species selection, local diversity targets, planting character and planting schedules.

Educate and Engage

The City will enhance the existing stewardship opportunities and education to target engaging 5,000 people by 2025. The priority actions are to:

- Create an interactive City tree map linked to the City's tree inventory that reports individual tree data and ecosystem services.

- Provide stewardship opportunities such as tree or understory planting, invasive species removal and citizen science projects.

- Investigate opportunities to partner with homeowners in single-family neighbourhoods to care for newly planted trees in City boulevards.

- Investigate opportunities to work together with local First Nations and other levels of government to develop appropriate stewardship activities for native forests.

The Strategy's Action Plan provides the roadmap for growing an urban forest that is beautiful, resilient and sustainable and is supported by the community for the benefits it provides.

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1 The Public Tree Management Strategy

Planning the City's public urban forest of 2045

1.1 Introduction

The Public Tree Management Strategy (the Strategy) provides the framework for **managing trees on City property**. It is an update to the 2001 Urban Forest Strategy and summarizes the current state of the resource, the challenges ahead, and provides the direction to implement the City's vision for managing public trees out to 2045:

Richmond's public trees are managed as a high-value, civic asset. Richmond trees are beautiful, resilient and sustainable and are supported by the community for the benefits they provide.

The urban forest includes all of the trees, vegetation, soil and associated natural processes across Richmond's landscape. The urban forest functions as green infrastructure by providing services and benefits to the City. Trees are the keystone structure of the urban forest – there is no forest without trees. Richmond's public trees are an important part of the City's infrastructure assets.

The City of Richmond has a significant urban forest comprised of approximately 360,000 trees on public and private property in the city. Of those, it is estimated that approximately 100,000 are on public land, that is, on streets, parks and natural areas. The City maintains an inventory of 56,000 trees in streets and parks but has not inventoried trees in natural areas.

The Strategy's emphasis on **trees in the public urban forest** acknowledges the important role the City plays in maintaining healthy trees and a healthy community. The rapid pace of development and a changing climate is affecting the quantity and characteristics of Richmond's public trees. These changes demand a response and a renewed focus on the City's tree management practices.

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This Strategy incorporates best management practices, such as preventative tree maintenance and climate suitable species selection, that will improve the health and resilience of the City's trees. It recognizes the City's desire to expand the urban forest, and the benefits that the community will receive. Finally, it identifies the budget and resources required to deliver the program efficiently and meet the community's expectations for a well-managed urban forest on City lands.

Public trees are managed by the City Parks Department but the urban forest is enjoyed and cared for by everyone.

City of Richmond Tree Facts (as of 2019)

City Wide	
Richmond land area	12,760 ha
Richmond % canopy cover	12 %
Estimated trees citywide	350,000+
Public	
Public land area	2,570 ha
Public land % canopy cover	20 %
Public tree canopy area	510 ha
Trees inventoried (individual and groups)	56,000
Estimated tallest tree (poplar)	50 m
Largest diameter tree measured (sequoia)	2 m
Largest canopy spread measured (elm)	23 m

Richmond's Public Tree Management Strategy is for the public urban forest...

GREEN INFRASTRUCTURE

TREES IN URBAN STREETS

TREES IN PARKS + OPEN SPACES

TREES IN RESIDENTIAL STREETS

TREES IN UTILITY AND OTHER RIGHTS-OF-WAY

PARKS + NATURAL AREAS

URBAN RESIDENTIAL NEIGHBOURHOODS

URBAN CENTRES + INDUSTRIAL

RURAL

While the urban forest exists across public and private land, the Strategy is focused on the trees and green infrastructure in public streets and parks. Green infrastructure encompasses the components of the natural and built environment that provide ecosystem services such as drainage, water filtration, green space, and wildlife habitat.

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1.2 Urban Forest Policy Context

The 2045 Public Tree Management Strategy will work alongside Richmond's current environmental strategies to ensure that trees are a valued and integrated part of the City's natural assets.

Supporting Policies and Plans

The Official Community Plan, Regional Growth Strategy and high-level City Policies and Plans provide the broad context for why the City needs an urban forest and more comprehensive guidance for managing public trees (this Public Tree Management Strategy and Operations Manual).

The City's policies for managing public trees are comprised of several integrated components:

1. The Public Tree Management Strategy (this document);

2. The City Tree Policy;

3. The Public Tree Operations Manual (an internal departmental manual); and

4. The Public Parks and School Grounds Regulation Bylaw No. 8771 and the Tree Protection Bylaw No. 8057.

These components support the overarching vision, processes and regulations that govern public tree management and protection. Trees on private property in Richmond are maintained by the relevant landowner and their removal or replacement is regulated by Richmond's Tree Protection Bylaw.

City Environmental Strategies

The City's suite of environmental strategies work together to implement these higher level plans by guiding environmental protection, park and trail development, urban forest management, rainwater management and dike upgrades across the city.

These strategies integrate with one another and inform the land use tools used to effect change on the ground. Land use tools guide the form of development and can be employed to support the urban forest.

Regional Growth Strategy

Official Community Plan

City Policies and Plans

Associated City strategies

Ecological Network
Trails
Parks and Open Spaces
Integrated Rainwater Resource
Dike Master Plan

Public Tree Management Strategy

Tree-Related Regulatory Tools

Tree Protection Bylaw

Zoning Bylaw

Environmentally Sensitive Areas

Public Parks and Schools Grounds Regulation Bylaw

Riparian Areas Regulation

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3

1.3 Strategic Framework

The Public Tree Management Strategy outlines the plan for managing Richmond's public trees to 2045. The strategic framework for the plan is driven by the City's vision for Richmond as "... *the most appealing, livable and well-managed community in Canada"*.

The chosen planning horizon for the Strategy is 2018 to 2045, which reflects both the time it takes for trees to grow and aligns with the 2041 vision of Richmond's Official Community Plan.

Over time, urban forest management, urban development and climate change will impact the health, quantity and distribution of trees in the urban forest. The Strategy anticipates these impacts and responds with objectives and actions to be achieved over the next 27 years. The Strategy also provides metrics to monitor success over time and enable adaptive management to address the uncertainty associated with the long planning horizon.

Goals

Four goals capture the policy, practice and resource recommendations to provide a resilient and sustainable public tree resource for the future. The Strategic framework's four goals are:

1	**Conserve and Protect**
2	**Manage and Maintain**
3	**Enhance and Expand**
4	**Educate and Engage**

2 Urban Forest History and Benefits

This section describes the history of Richmond's urban forest and presents some of the ways the urban forest is valued.

2.1 History of the Urban Forest

Richmond's historic landscape was quite diverse and considerably different from what exists today. There were extensive bog ecosystems with species such as cranberry, blueberry, Labrador tea and sphagnum moss. On higher ground, grasslands predominated. Trees and forests were not in fact the predominant plant community at the time.

Forest vegetation occurred on the riverbanks and some higher ground. Forest types included spruce forest (spruce, willow, alder and crabapple), mixed wet (cedar, hemlock, spruce, alder, willow and yew) and mixed woodland (cottonwood, alder, willow and crabapple) and bogs often contained shore pine (North et al. 1979).

Agricultural and urban settlement significantly altered Richmond's landscape, changing hydrology, excluding fire and introducing new plant species. Richmond's present day urban forest is largely the result of the tree planting that has followed urban development in the last one hundred years. It is conceivable that the landscape today contains more trees than it did historically.

Richmond was incorporated as a municipality in 1879 and Steveston and London's Landing were the earliest subdivisions. Urban development was fairly slow until the 1950s. Early subdivision design sometimes retained trees on private land but did not typically include planting street trees (Cook, 2002).

In 1958, Desmond Muirhead Associates developed street tree planting plans for subdivisions. Their recommendation was to plant trees in diverse groups rather than linear style to provide variety (Cook, 2002). The plans identified shore pine to be widely planted to distinguish the municipality subregionally (Cook, 2002).

To implement these plans, the City established a Local Area Improvement Plan process that allowed neighbourhood associations to apply for street tree planting. Richmond Park, Gilmore Park and Burkeville subdivisions were planted at that time. The group planting style is evident in those subdivisions today.

From the 1960s, subdivisions typically included more vegetation. Westwind and Montrose developments included linear street tree planting. In the 1990s, there was an extensive City planting and beautification effort culminating in Richmond winning the 1999 Nations in Bloom award.

The City developed its first urban forest strategy in 2001, ahead of many municipalities. Today, Richmond's city-wide canopy cover is 12%. The City is planting hundreds of trees each year and all new developments are required to include street trees and landscapes as part of the approval process. More recently, new planting technologies such as soil cells and structural soil are available to improve tree growing conditions in built up areas of the city. Implementing new technologies and best practices in urban forestry has helped the City to increase the rate of tree planting to its highest level.

City parks were commonly established after the 1940s. Most parks in the

Fashions in tree planting

Common species used in the...

1950s:

shore pine, Douglas-fir, deodar cedar, paper birch, purple leaf plum, flowering crabapple, flowering cherry, Lombardy poplar, oak, tulip tree, monkey puzzle

1960s:

shore pine, flowering crabapple, tulip tree, purple leaf plum, oak, hawthorn, birch and horsechestnut

Since 2000:

maple, magnolia, cherry plum, oak, apple, dogwood, birch, beech, liquidambar, katsura, western redcedar, pine, spruce and hawthorn

Historically, Richmond was dominated by grassland, shrubland and cranberry bog. Forest ecosystems of western red cedar, hemlock and spruce were limited to isolated patches on Lulu Island and Sea Island.

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system are smaller neighbourhood or community parks. Richmond's largest protected natural area is the 80 ha Richmond Nature Park, acquired in the 1970s. Today there are 133 parks that protect 778 ha of open space. Other than the Nature Park, which contains remnant bog ecosystems, most parks contain a mix of native and introduced tree species often in manicured or old farm landscapes.

While most of Richmond's urban forest originates

after the 1950s, there are trees that date back to at least the early 1900s (City of Richmond, 2005). One example is highlighted in the photos below – the image on the left shows Minoru Race Track in 1951 and, on the right, the same site with City Hall today. The tree highlighted and possibly others, appear to have been retained when the area was redeveloped for the new City Hall. This tree has the largest canopy spread of any measured in Richmond today.

Aerial image of Minoru Race Track in 1951 (left) and City Hall in 2018 (right) at the same location with arrow pointing to a tree present then and now – this tree has the largest canopy spread of any in Richmond!

The aerial image above shows Richmond in 1935 – most of the landscape is farmland other than large areas of bog.

2.2 The Value of Richmond's Public Urban Forest: the Many Benefits of Trees

Richmond's trees and green infrastructure, just like roads, sewers and dikes, are performing a public utility function. When healthy and well managed, the urban forest produces 'ecosystem services' often defined in four distinct but inter-connected categories:

- **Cultural**: benefits that relate to how people value the urban forest in our way of life such as for beautification, sense of place, spirituality, recreation and tourism.

- **Provisioning**: direct products of trees and forests, such as fruits, nuts, or medicines.

- **Regulating**: benefits from the regulation of ecosystem processes like pollination, air and water quality, storm water flow, shade and cooling. With climate change, the role of trees to mitigate extreme heat and precipitation becomes increasingly important.

- **Supporting**: benefits from supporting habitat, biodiversity and enabling natural processes to occur that maintain the conditions to support life – supporting services are essential to the production of all other ecosystem services.

Some ecosystems services can be assigned a dollar value. In BC, the Municipal Natural Assets Initiative is piloting valuation approaches with several municipalities. The US Department of Agriculture (USDA) provides the i-Tree suite of tools, which enable valuations of some ecosystem services provided by trees. The Council of Tree and Landscape Appraisers provides methods for valuing tree assets. Valuations enable trees and green infrastructure to be accounted for in a city's asset management approach or when calculating compensation. Not all ecosystem services can be measured with the tools referenced above but new methods for valuing natural assets are likely to become available over the term of this Strategy.
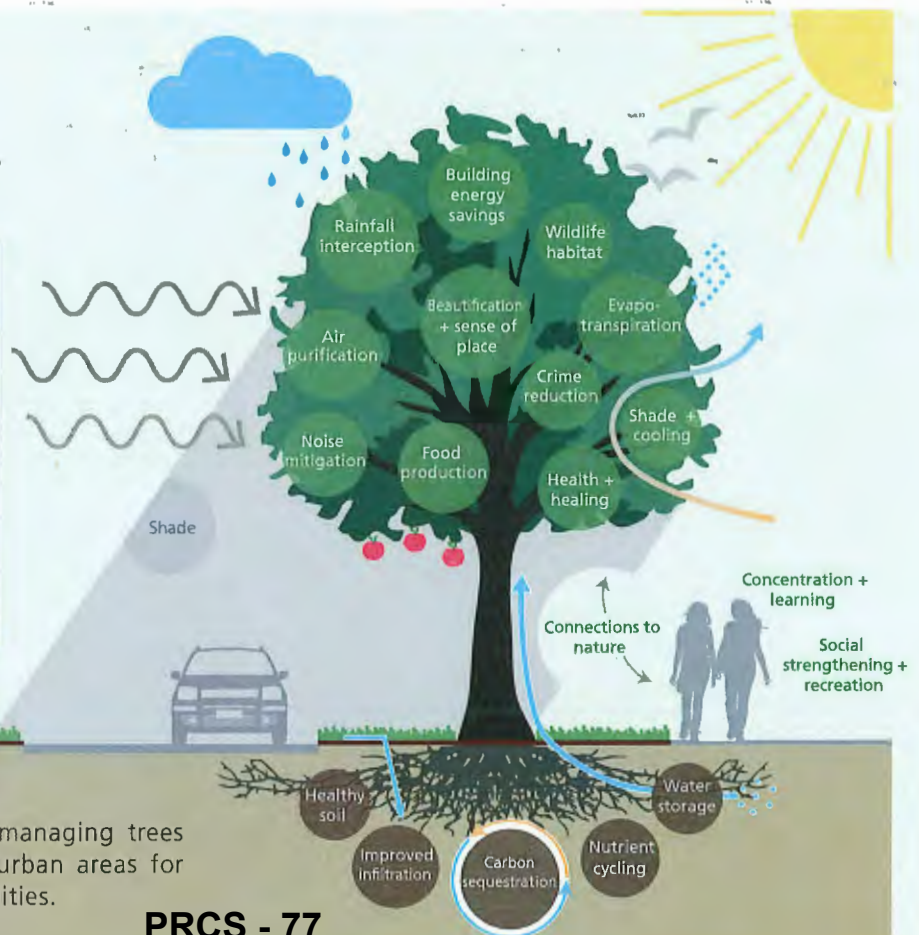

Urban forest benefits

The urban forest is a critical part of Richmond's appeal and livability.

Trees serve to:

- beautify and cool the city
- intercept rainwater
- remove pollutants
- provide habitat for wildlife
- connect people to nature

... among many other benefits.

Urban forestry is...

the art, science and technology of managing trees and natural systems in and around urban areas for the health and well being of communities.

Rainfall interception · Building energy savings · Wildlife habitat · Beautification + sense of place · Evapo-transpiration · Air purification · Crime reduction · Shade + cooling · Noise mitigation · Food production · Health + healing · Shade · Concentration + learning · Connections to nature · Social strengthening + recreation · Healthy soil · Water storage · Improved Infiltration · Carbon sequestration · Nutrient cycling

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Studies in Japan of *Shinrin-yoku*, or forest-air bathing, have linked the practice to improved immune system response, reduced stress and depression, and lower glucose levels in diabetics (Morita et al. 2007, Ohira et al. 1999)

Street and Park Tree Value

The City has inventoried 56,000 trees and tree groups in streets and parks. However, counts of tree canopies from Light Detection and Ranging (LiDAR) suggest that there are more than 100,000 trees on public land when natural forests are included. The City also manages an estimated 3,000 trees on Richmond School District sites.

Of the City's tree inventory, about 44,000 single trees have been measured for size and species in streets and parks. Consultants used i-Tree Eco to estimate the value of these trees. The i-Tree Eco program estimates structural value, carbon storage and sequestration, air pollution removal and avoided runoff. The structural value is a modified Council of Tree and Landscape Appraisers (CTLA) method for estimating the cost of replacing an existing tree with a similarly sized tree in the same location. The map below shows the location of inventoried trees in Richmond with the highest structural value.

2018 Structural and Functional Value Estimates[1] for Richmond's Inventoried Trees

BENEFIT	AMOUNT	$ VALUE
Structural value	44,057 trees	83,000,000
Total carbon storage	11,710 tons	410,000
Annual Pollution removal	4.9 tons	40,600
Annual Carbon sequestration	276.2 tons	9,670
Annual Runoff Avoided	25,130 m³	58,400
Annual Oxygen Produced	736.6 tons	Not assessed

1 These values are based on species and dbh in the tree inventory of 44,000 trees. Tonnes are 1,000 kg. Dollar values in i-Tree are carbon @$35/ton, avoided runoff @ $2.34/m³, pollution removal - CO @ $1,486/ton, ozone @ $6,741, NO² @ $1,006, SO² @ $366/ton and PM2.5@ $234,081/ton based on adverse health effects and US national median externality costs.

City tree structural value (replacement cost) — ~ $83 million

Annual management cost ~ 1.5 million

Map of High Value Trees in Richmond

Large-diameter sequoias, elms and maples make up the very high value trees in Richmond. Other high value specimens include oaks, deodar cedar, London plane, pine, Douglas-fir, tulip tree and western redcedar.
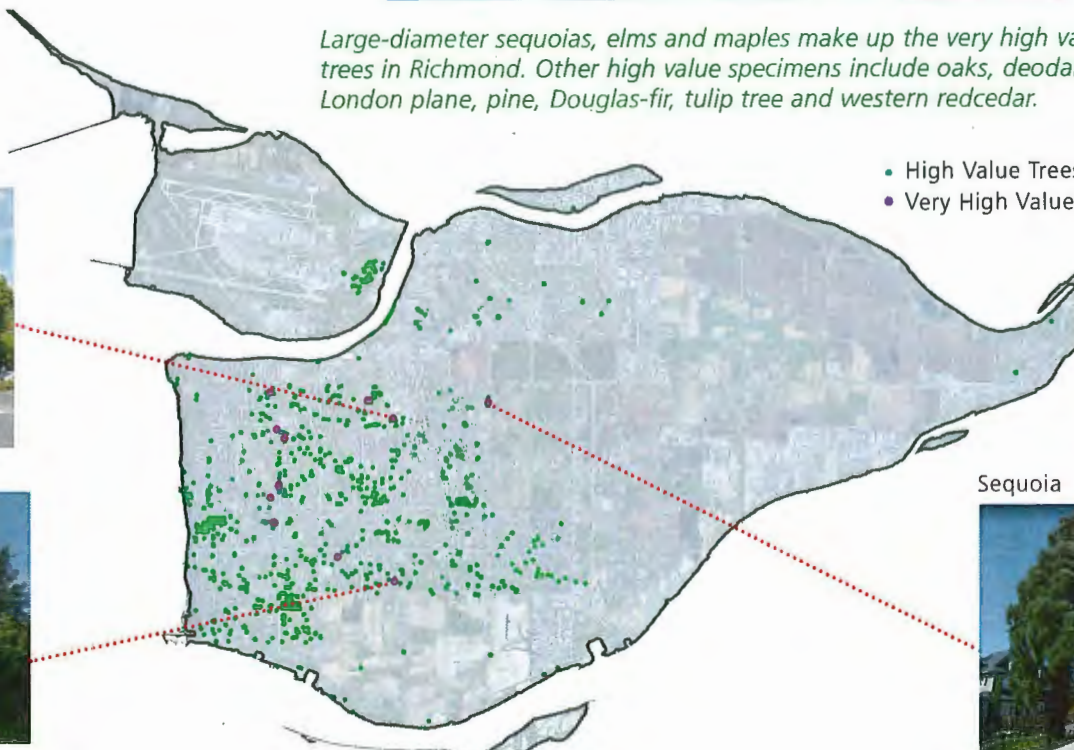
Elm at City Hall (see page 7 for more information)

Maple

Sequoia

• High Value Trees
• Very High Value Trees

10

2.3 What We Heard from the Public

In 2017, the public was asked to share their views on Richmond's urban forest through the City's *Let's Talk Richmond* public consultation portal and at Richmond Harvest Fest, a public event held at the Garden City Lands on September 30th, 2017.

A survey asked people to comment on their satisfaction with trees in their local area. A total of 138 people responded.
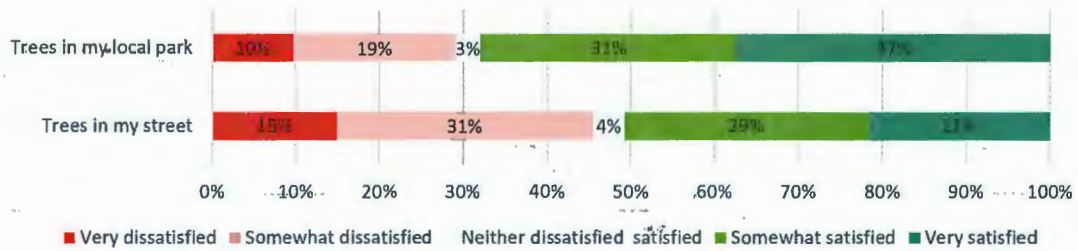
The majority of survey respondents (68%) were satisfied with the trees in their local park. However, respondents were divided on their satisfaction with trees in their street (46% were dissatisfied, and 51% were satisfied; see graph below).

The survey also showed six pictures ranging from low to high canopy cover and with uneven or uniform street tree planting styles. People were asked to indicate which photo was most similar to their street now, and then which photo they would most prefer their street to look like. Some of the survey highlights are listed below.

What respondents streets look like today:

- 45% said uneven street tree planting akin to the diverse group planting style promoted in the 1960s (see page 6).
- 25% said uniform tree planting with small or young trees.
- 20% said they had no trees in their streets.

How satisfied respondents were with the trees in their local area...

What most respondent's streets look like today...

~14% canopy cover (45% of respondents)

~10% canopy cover (25% of respondents)

<2% canopy cover (18% of respondents)

What most respondents would prefer their streets to look like...

>90% canopy cover (43% of respondents)

~14% canopy cover (26% of respondents)

~30% canopy cover (22% of respondents)

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What respondents would prefer the trees in their streets to look like:

- 43% said large trees, uniformly planted resulting in very high canopy cover.
- 26% said uneven group tree planting style already common in Richmond.
- 22% said medium trees, uniformly planted.

What respondents most valued about the urban forest:

- Regulating stormwater run-off and mitigating flooding.
- Reducing air pollution.
- Supporting habitat for native plants and animals.
- Heritage and beautification.
- Pleasant places for people to interact and socialize.

Reasons why respondents were dissatisfied with trees in their streets or parks:

- Recent tree removals or damage to trees.
- Lack of tree cover.
- Utilities conflicts, leaves clogging drains and problems caused by tree roots, such as uneven sidewalks.

Opportunities for improvement raised by respondents:

- Increase canopy cover and uniform large or medium tree planting in streets.
- Reduce conflicts with utilities.
- Improve tree protection and maintenance including managing leaf litter in the fall.
- Increase species diversity but plant native tree species whenever possible.

Kids were asked to draw their favourite tree at Richmond Harvest Fest 2017. Visible themes in the drawings included colour, play, food and wildlife habitat.

PRCS - 81
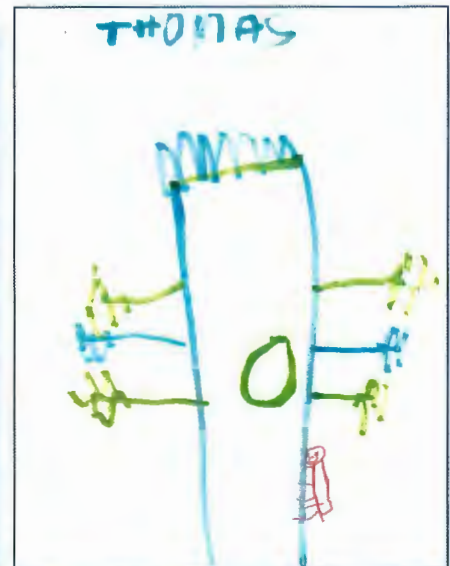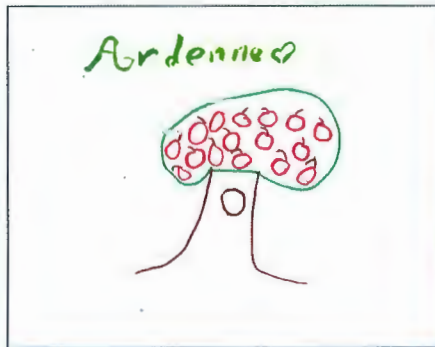
3 Status and Trends

This section describes the current state of Richmond's urban forest and how it is changing. Several methods were used to analyze past and present urban forest status including LiDAR, historical aerial photos, vegetation maps, and the City's tree and habitat inventory data.

LiDAR is flown with a laser sensor shooting pulses down to the ground surface to create a 3D model of the ground below. The City collected LiDAR data in August 2017 to measure the extent of Richmond's tree canopy and permeability.

The points can then be classified into different features like trees, buildings, roads, powerlines and so on. Some of the products of the LiDAR used in this section include canopy mapping, impermeable area mapping, and tree heights. LiDAR collected in the future will enable detailed canopy change monitoring. The City will conduct flights every few years to monitor the change.

Example image of a LiDAR point cloud (in three dimensions, showing raw data that will be processed to generate a map of tree canopy.

3.1 Tree Canopy

Tree canopy is a common metric used to describe the extent of a city's urban forest and a tool to monitor its change over time. To visualize it, imagine looking down from an aerial view at the green layer of tree crowns (leaves and branches) below.

City-Wide Tree Canopy

Canopy cover across the city was 12% based on 2017 LiDAR capture. This estimate includes public and private properties, as well as land areas in the Agricultural Land Reserve and Vancouver International Airport.

While there isn't a precise means to estimate Richmond's pre-contact forest cover, historical vegetation mapping suggests that roughly 1,600 ha (~12%) of Richmond supported deciduous-coniferous forest, with additional cover in forested bog areas. The remainder of the approximately 11,200 ha (~88%) of the city supported grass or shrub cover.

The map below summarizes the tree canopy by census dissemination blocks. Canopy cover is concentrated in Richmond's residential neighbourhoods, parks, natural areas and fallow farmland that has regenerated to forest.

Public Tree Canopy

Tree canopy over public land averages 20%. Within parks canopy cover is higher, averaging 24%, while on street boulevards canopy cover is lower, averaging 15%.

This Strategy sets a target to increase canopy cover over the **public realm** from 20% to 30% by 2045. This target is aspirational yet realistic in that it aims to plant out two-thirds of the potential sites in the City presently (factoring in that utility conflicts will eliminate up to one third of potential planting sites).

Map of Richmond's City-Wide Tree Canopy
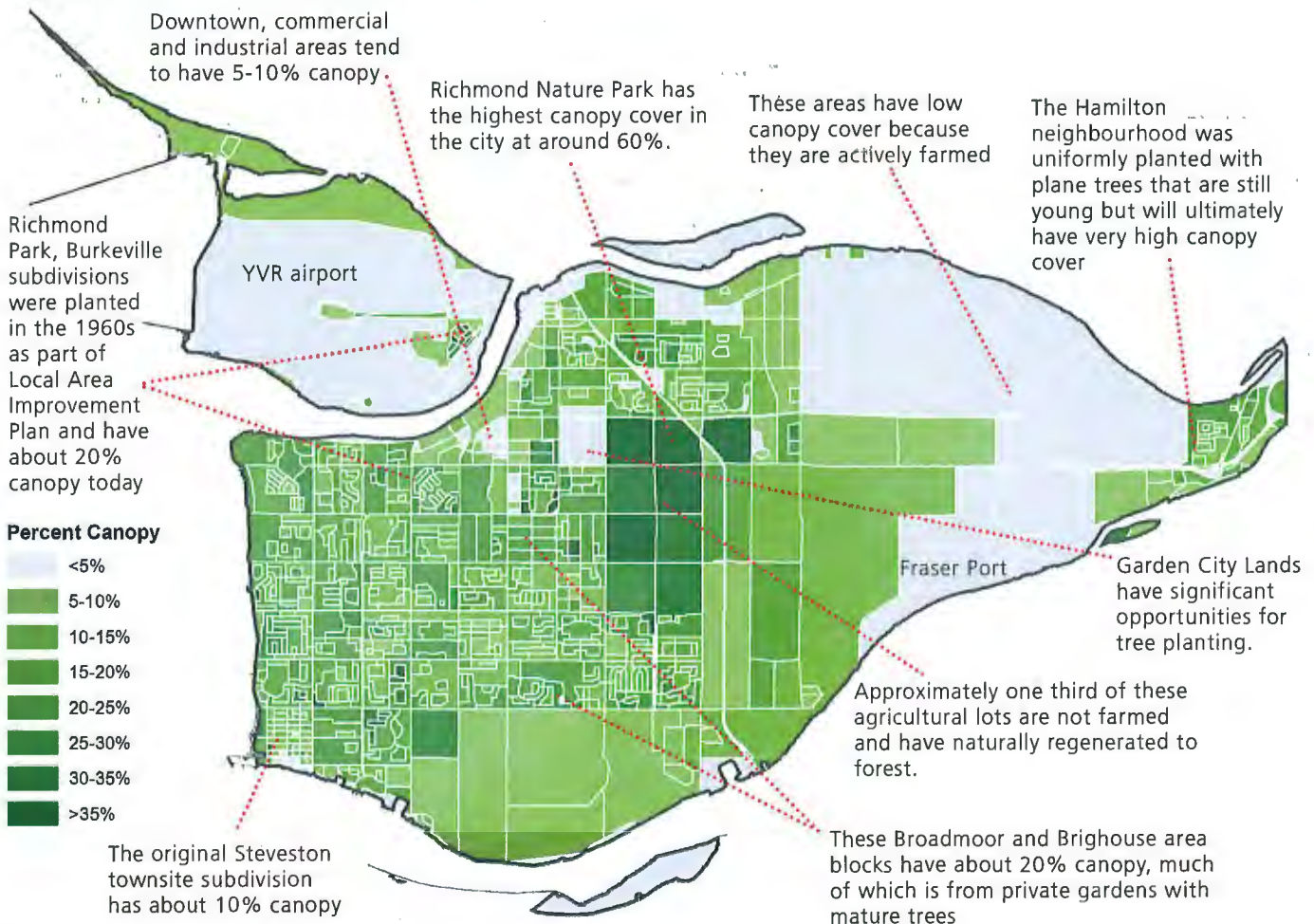
Regional Canopy Change

Changes in canopy cover globally are tracked by University of Maryland scientists using satellite imagery. The Global Forest Cover Change dataset maps forest loss between 2000 and 2017 (Hansen et al. 2013).

While this dataset cannot detect isolated individual tree loss, it is good for showing large-scale changes across the landscape. Province-wide, the area of canopy loss exceeds the area of canopy gain in more than 90% of BC municipalities.

In the map below, the green canopy for the region is sourced from Metro Vancouver's land cover classification data. The red areas showing loss are sourced from the Global Forest Cover Change data.

Richmond's Canopy Change

In Richmond, the areas showing red are mostly associated with agricultural use and cropping changes rather than actual tree loss. While some urban losses are visible – for example commercial and town home developments in City centre – in general the tree canopy has been relatively stable since 2000. Canopy changes not detectable in this dataset are typically planting and removal of individual or small groups of trees. Canopy losses in Richmond have primarily occurred on private land.

In Richmond, large areas are under the jurisdiction of the federal or provincial governments, including YVR Vancouver International Airport and Fraser Port, or are within the Agricultural Land Reserve. While some of these land uses preclude tree planting, the City can work with these agencies and landowners to plant suitable trees on adjacent city roads and properties where possible.

Map of regional canopy and canopy loss
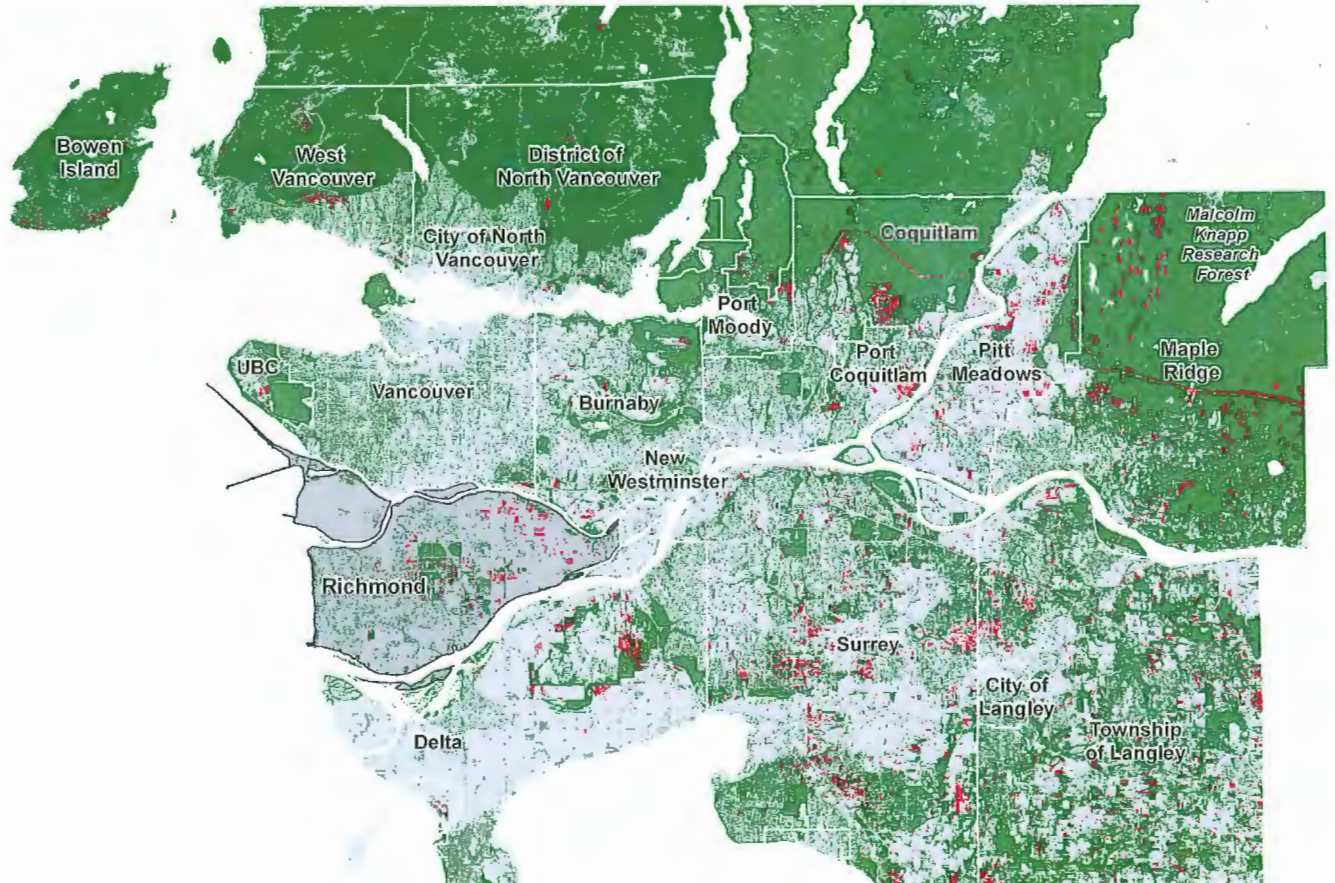
3.2 Richmond's Native Forests and Bogs

Richmond's natural areas today bear little resemblance to vegetation surveyed pre-1880s (see the map on page 17). Agriculture, urbanization, hydrological changes and peat mining have permanently impacted the landscape and altered ecosystems.

The 2002 habitat inventory identified 568 ha of bog and upland forest in Richmond that provides habitat for small mammals and birds such as woodpeckers, great blue heron, red-tailed hawks and barn owls. Approximately 120 ha of this native forest habitat is protected in Richmond's park system and most of the remainder is within the Environmentally Sensitive Areas (ESAs) Development Permit Area that applies to private land.

Present day bog habitats are dominated by paper and European birch or lodgepole pine. Dryland and riparian forest habitats include birch woodlands, black cottonwood and alder forests at the river's edge, and scattered stands of non-native trees like black locust, oak and maple. Understory vegetation in natural areas typically consists of a mix of native species, like salal, blueberry, ferns, and non-native species such as Himalayan blackberry.

Even though they have been affected by human settlement, Richmond's native forests and other ESAs provide essential habitat for urban biodiversity and critical ecosystem services. Bog habitats store carbon in the underlying organic soils. Native forests provide habitat for native bees and honeybees that pollinate hundreds of hectares of blueberries. Riparian forests help to moderate water temperatures by casting shade over aquatic habitats.

Enhancement and restoration in parks and ESAs are likely to improve the quality of Richmond's native forests over time. However, climate change and urban development will also place pressure on these natural areas and increase the risk of disturbance events like wildfire. The City monitors the health of and changes in natural areas with tools such as LiDAR.

The map below shows vegetation surveyed between 1858 and 1880. The 2002 habitat inventory is overlaid on the map to show the current extent of native vegetation relative to the past.

Richmond's largest remnant habitat areas are currently found along shorelines, in riparian areas, parks and greenways. Smaller habitat patches are found embedded within the matrix of urban and agricultural land uses.

Map of 1880s and 2002 habitats

Map legend

2002 Habitat Inventory

GRASS AND GRASSLIKE PLANTS

Tidal marsh: bulrush(br), sedge(s), cattails(ct).

Prairie*: grass(g).

Prairie grass with shrubs: grass(g), willow(W), hardhack(hh), crabapple(ca).

SHRUBS

Crabapple(ca).

Willow(W).

Mixed shrubs: Willow(W), crabapple(ca), hardhack(hh), rose(r).

SHRUBS/MOSS

Labrador tea: Labrador tea(lt), cranberry(cb), salal, pine(P).

Cranberry marsh*: cranberry(cb), pine(P).

Moss with scrub pine: sphagnum (m), scattered pine (P), hemlock, spruce.

WOODLAND

Mixed Woodland: Cottonwood(Cw), alder, willow, crabapple.

CONIFEROUS FOREST

Mixed wet: Cedar(C), hemlock(H), spruce, alder, [cottonwood], willow, yew, [crabapple], ferns.

Spruce: Spruce(S), willow(W), alder, crabapple, vine maple, briars.

Historic vegetation map (North et al. 1979)

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3.3 Soils and Permeability

Soil and water are essential for healthy tree growth. In urban areas, soils are often removed and replaced with much smaller amounts of topsoil or paved with impervious surfaces that water cannot pass through. These conditions impact tree health and resilience by restricting the volume of soil for roots to grow in and the amount of water available to trees.

Richmond's native soils are typically silt loam to silty clay loam textures originating from marine and fresh water sediments. Where peat bogs occur, the soils are organic. Richmond also has introduced soils in urban areas. Richmond's soils are poorly drained and have high water tables in most months but drought conditions can occur in summer. Richmond's high water table restricts the depth of rooting for trees and vegetation. This is a unique and challenging situation for tree planting.

The map below summarizes impermeability by city section. Other than on agricultural land, Richmond's urban forest canopy tends to decrease with increasing impermeability. Once impermeability exceeds about 50%, canopy cover becomes more limited.

Urban Tree Planting Challenges

The urban parts of the city have much higher impermeability than agricultural areas because of the coverage of roads and buildings. Impermeability in urban areas is likely to increase as neighbourhoods densify with larger building coverage and parking to accommodate more people. Areas with more buildings, asphalt and concrete surfaces also tend to be hotter because they absorb more heat. To sustain a public urban forest canopy in areas with high impermeability, planting sites need special improvements like structural soil or soil cells that allow for adequate soil and rainwater storage for tree roots under paved areas.

Map of Richmond's impermeable cover

Areas with the highest impermeability include city centre, commercial and industrial lands. These areas have canopy cover of 5-10%.

Agricultural and natural areas are the most permeable

Port industrial lands are predominantly impermeable

Residential neighbourhoods are typically 40-60% impermeable

Percent Impervious

- < 5%
- 5-10%
- 10-20%
- 20-30%
- 30-50%
- 50-75%
- 75-100%

PRCS - 87
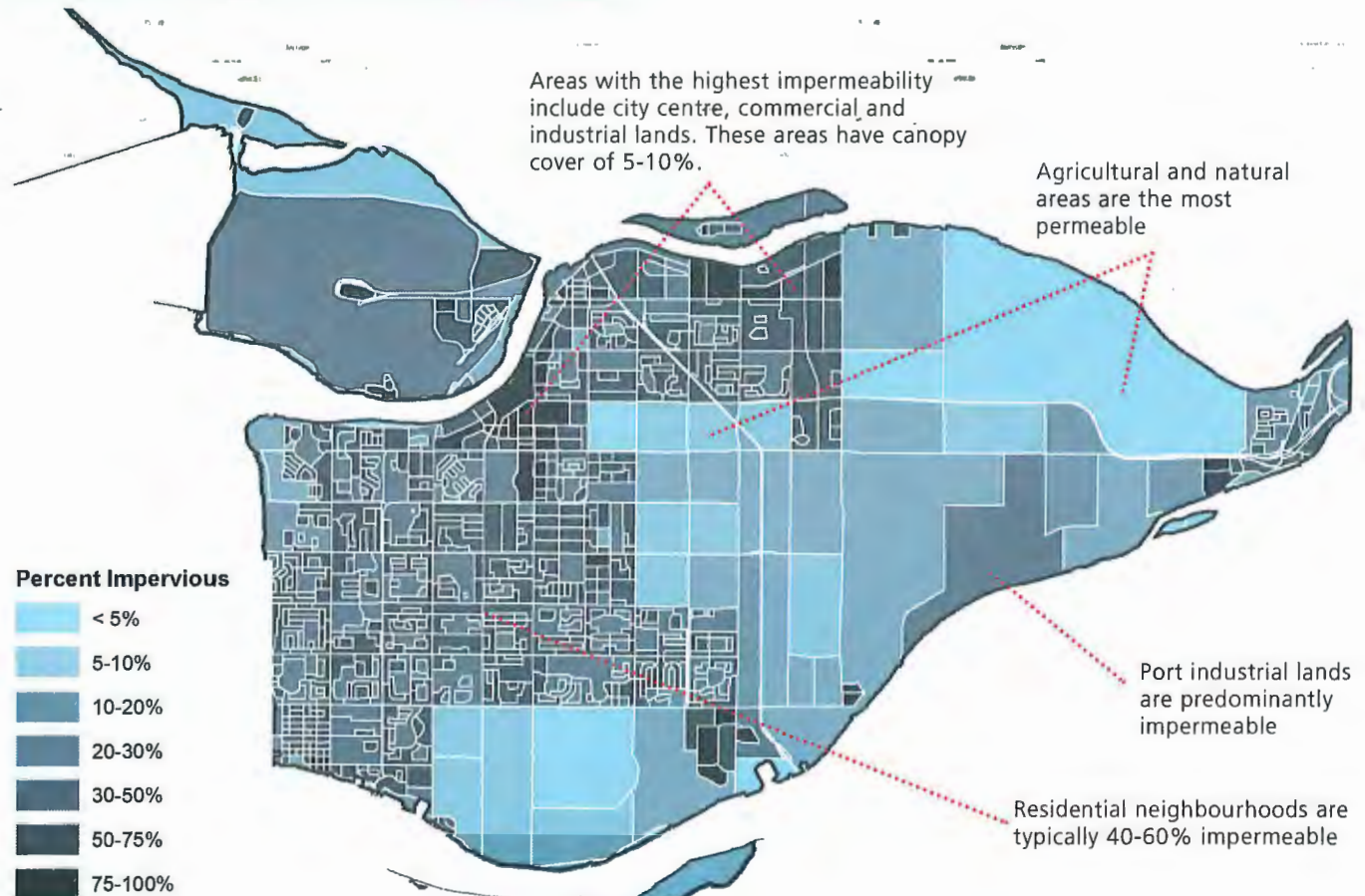
3.4 City Trees: the Urban Forest Today and Tomorrow

This section reports on several metrics useful for describing the status of the City tree population and its future trends. The City recently collected an inventory of its trees on streets and in developed parks (i.e., outside natural areas) so they can be mapped to monitor tree health and assist in scheduled maintenance. More than 56,000 trees have been inventoried and numerous additional tree stands are found in our parks.
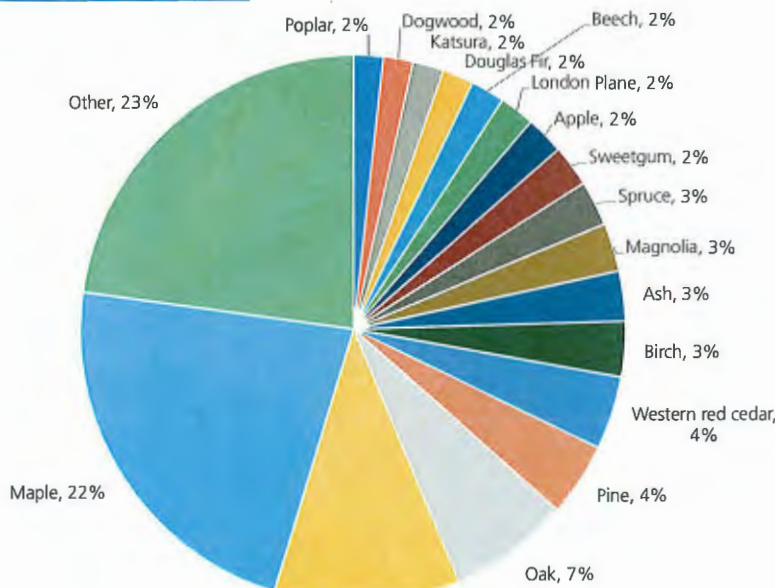
Tree Diversity

The diversity of an urban tree population is a useful indicator of vulnerability. In general, the more homogenous a population is in terms of species or genetic diversity, the more vulnerable it will be to pest and disease attack and impacts of climate change. Similarly, a population that lacks age and life-expectancy diversity will go through cycles of mass removals. When trying to reduce vulnerability and grow a resilient tree population, several types of diversity are important to consider.

Tree type and dominance

The pie graph shows the most common trees planted in Richmond. The 10-20-30 rule-of-thumb recommends that populations have no more than 10% of any species, no more than 20% of any genus and no more than 30% of any family

Richmond's Most Common Street and Park Trees

(Santamour, 1990). However, recent guidelines for a sustainable urban forest suggest that 5-10-15 diversity rule should be targeted city-wide (Leff, 2016). Richmond's tree inventory has a very high proportion of maple (22%) relative to other types of trees, and cherry/plum is also prominent (11%).

To understand which types of trees are dominant in terms of size, the relative *basal area* (cross-sectional area of all the trees stems) and *leaf area* (square metres of leaf surface) are useful measures. The genera that are both common in number and large in size are providing most of the ecosystem services in Richmond's streets and parks (excluding natural areas).

The maple genus is by far the most common and largest contributor to leaf and basal area on public land. Cherry/plum and oak are also large contributors relative to other genera.

With 40% of Richmond's tree population comprised of only three genera (maples, cherry/plum and oak), Richmond's tree canopy is vulnerable to disease or disturbance affecting these trees. **Diversifying the types of trees used in the City is necessary to reduce vulnerability in the tree population and a priority for future tree planting plans.** Diversity can be increased by using alternative species in new planting locations and by strategically replacing species in some locations when trees reach the end of their lives.

Poplar, 2% | Dogwood, 2% | Katsura, 2% | Douglas Fir, 2% | Beech, 2% | London Plane, 2% | Apple, 2% | Sweetgum, 2% | Spruce, 3% | Magnolia, 3% | Ash, 3% | Birch, 3% | Western red cedar, 4% | Pine, 4% | Oak, 7% | Maple, 22% | Other, 23%

Age and size distribution

Age and size diversity are important for maintaining a relatively stable urban forest population over time. Using size as a proxy for age, the 40:30:20:10 guideline (Richards, 1989) recommends a breakdown by tree age class shown on the graphic below.

Richmond has a good proportion of young trees to support future canopy growth. However, there are fewer mature and old trees than are recommended by the guidelines due to Richmond's young urban forest. The size distribution of the City tree population reflects both the City's increased planting efforts over the last 20 years and the removal of some older trees due to hazard and development. **Retention of existing large trees on City property should be prioritized whenever possible.**

Genetic and structural diversity

Genetic diversity between individuals is important for adaptation to pests, disease and future climate. While we do not have an easy way to measure genetic diversity among urban trees, we can assume that urban forests are less genetically diverse than native forests because of clonal nursery cultivation. This creates vulnerability if genetically identical individuals are all susceptible to a pest or disease. **Increasing the genetic diversity of nursery stock should be prioritized.**

Structural diversity is especially important for habitat and includes having a variety of tree sizes, layers, ages, decay classes, woody debris and understory plants. Most streets and developed parks have low structural diversity compared to native forests. Often risk to people or property means that it is not suitable to have decaying trees, debris or understory in urban areas. **Structural diversity should be enhanced in natural parks or locations where there are few people or targets, to improve the habitat value of an area and ultimately the resilience of Richmond's biodiversity.**

Tree Health and Planting Rates

Richmond's public urban forest is generally in good health based on the inventory data collected to date which shows a relatively low incidence of pests and diseases. Birch bronze borer is killing birch across the region and drought is impacting some trees but overall population mortality rates are relatively low.

The most common reasons for removing trees on public land are in response to storm damage, end-of-life decline, disease or conflicts with development such as road widening and upgrades, driveways or new utilities or facilities. **The City removes approximately 300 trees per year and is planting about 850 new and replacement shade trees[1] per year as well as mass plantings for forest restoration in parks.** However, this number can vary substantially from year to year depending on weather events and construction projects.

1 Shade trees are young trees installed at a larger size (e.g., > 3 m height height or > 4 cm caliper) and are typically what are planted into streets or landscaped parks. Shade trees tend to account for the largest proportion of City planting and maintenance budgets.

Preferred Tree Age Diversity

	Young <20 cm	Semi-mature 20 to 40 cm	Mature 40 to 60 cm	Old >60 cm
Richmond ideal	40%	30%	20%	10%
Richmond actual	48%	31%	14%	7%

PRCS - 89
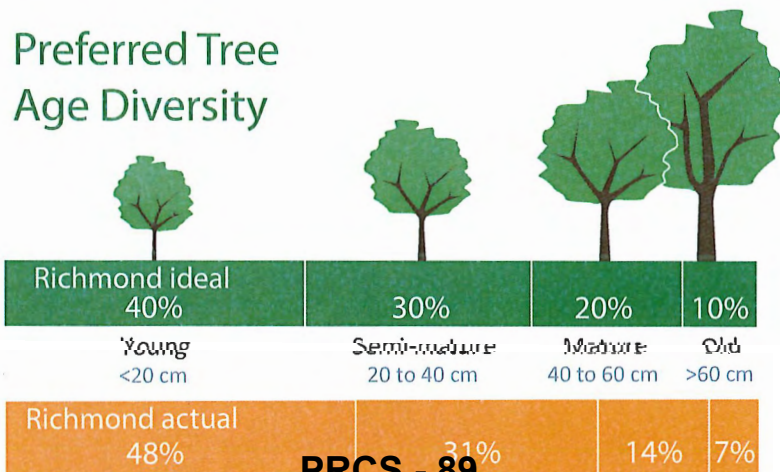
City Tree Distribution

Richmond's 56,000 inventoried trees and uninventoried natural area trees are distributed across streets and parks, and are most abundant in residential rather than agricultural parts of the city.

Map of street tree density by block

This residential block has below average street tree density and has space for street trees

Street Tree Density

Richmond has approximately 1 City street tree for every 6 people. In terms of planting density, Richmond's streets are planted at an average density of 3 trees per 100 m, or 19 trees per ha. For comparison, Vancouver has approximately 1 street tree for every 4 people and an average of 6 street trees per 100 m, or 49 street trees per ha.

Street trees (within the City's rights-of-way) are absent in some locations because private landscaping is near the edge of the street and doesn't leave space for a public tree. Roads in agricultural areas often lack sidewalks or defined boulevards for street tree plantings. In other locations, underground services, overhead power and telephone lines, or the extent of impervious surfaces limit the space for planting new trees.

An analysis of planting opportunities found that at least 20,000 new trees could be planted in streets, which would increase median tree density to 30 trees per hectare. Residential streets present a significant opportunity to increase the City's public urban forest canopy.
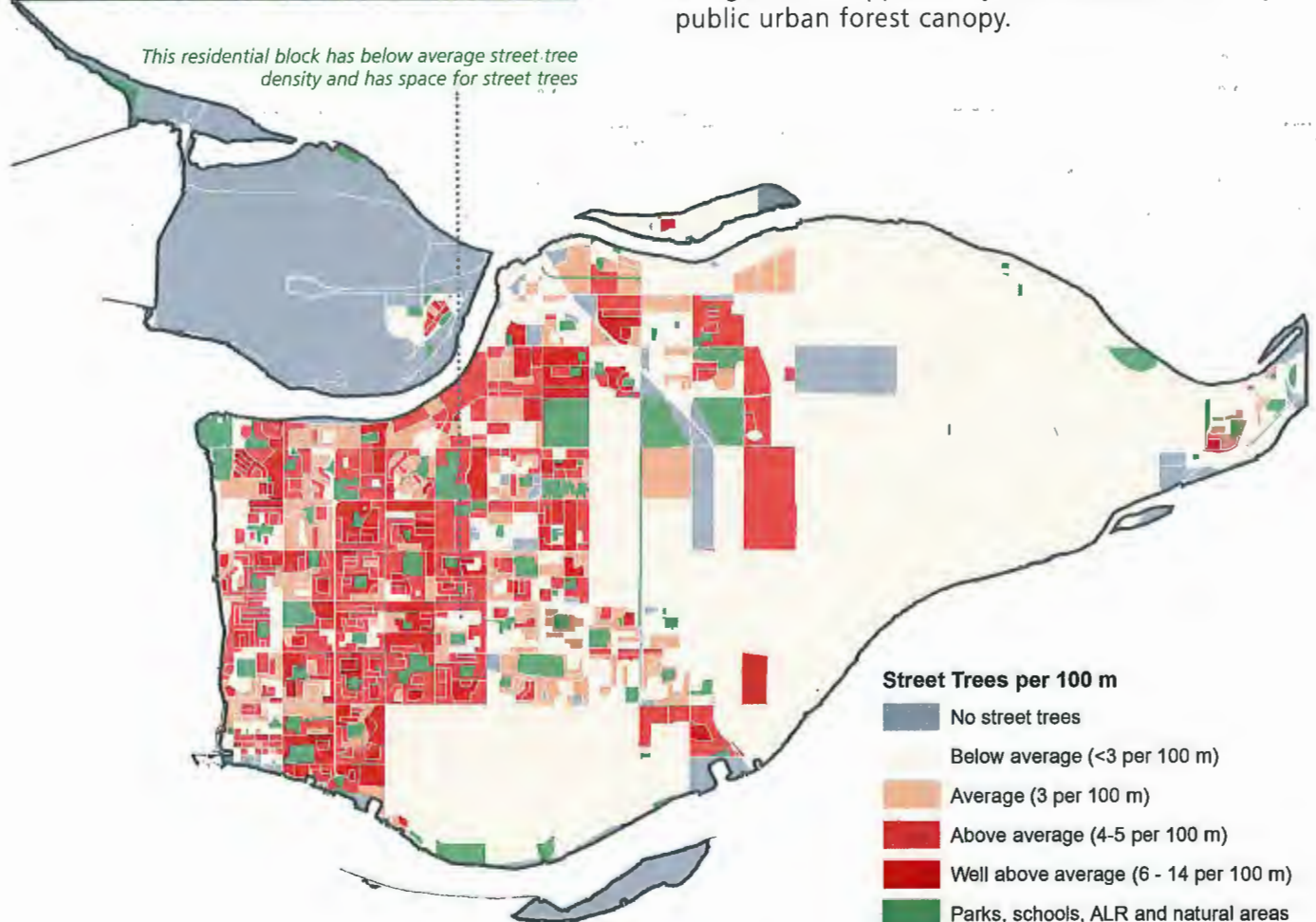
Street Trees per 100 m

- No street trees
- Below average (<3 per 100 m)
- Average (3 per 100 m)
- Above average (4-5 per 100 m)
- Well above average (6 - 14 per 100 m)
- Parks, schools, ALR and natural areas

PRCS - 90

Park Tree Density

Tree density in parks is largely determined by park use. For example, parks with extensive sports fields support a relatively low density of trees. By contrast, natural area parks often have very high tree density.

Park tree density is highest in Richmond Nature Park, and lowest in the Garden City Lands.

Map of number of trees by park

It is recommended that City parks with available open space be considered for tree planting as a high priority. Across all parks, the median tree density is 37 trees per hectare. Most Richmond parks have space for additional trees. An analysis of planting opportunities found that at least 10,000 new shade trees could be planted in parks, which would increase median tree density to 55 trees per hectare. Planting in parks will help to move canopy cover from 20% towards the 30% target for Richmond's public realm. Other park uses will need to be considered as part of these plans. For example, tree planting in Garden City Lands will be mostly around the perimeter to preserve native bog ecosystems and existing agriculture land uses inside the park.

Park Trees per Hectare

	< 25
	25 - 50
	50 - 100
	100 - 150
	> 150

The median tree density in parks is 37 trees/ha   *Richmond Nature Park is almost entirely forested*   *Garden City Lands has very few trees*

22

PRCS - 91
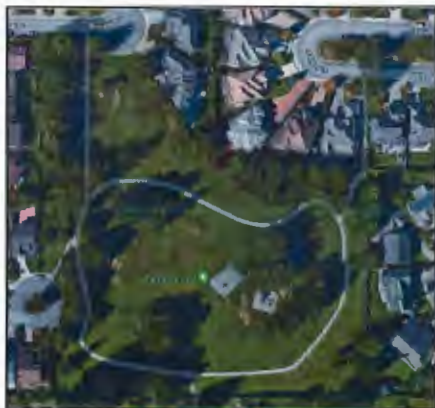
City Planting Opportunities

Richmond's plantable spots have been estimated by identifying the permeable spaces on public land that could potentially support shade trees.

Roads have approximately 20,000 potential shade tree planting spots. The map below shows where these opportunities are concentrated in the roads around each block. Many opportunities are on the public right-of-way attached to private residential landscapes.

This analysis does not account for utility conflicts. It is expected that further analysis of constraints will reduce the total opportunities by up to one-third, therefore the annual planting target aims to plant out approximately 20,000 of

these sites over the next 25 years. As well, forest restoration or new parkland planting may provide mass planting opportunities that have not been captured by this analysis.

In parks and schools, approximately 10,000 potential shade tree planting spots have been identified outside active uses (e.g., sports fields). The map below shows the number of opportunities in each park.

Map of tree planting opportunities by park
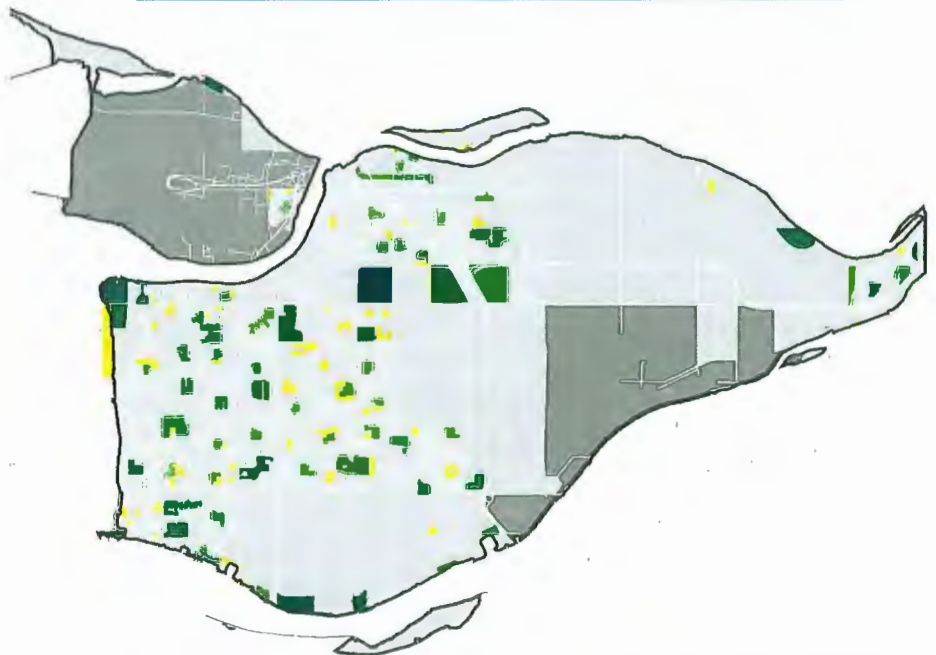
Map of street tree planting opportunities

Planting opportunities

- 0-20
- 20-50
- 50-75
- 75-100
- 100-500
- 500-1000
- >1000
- Federal jurisdiction
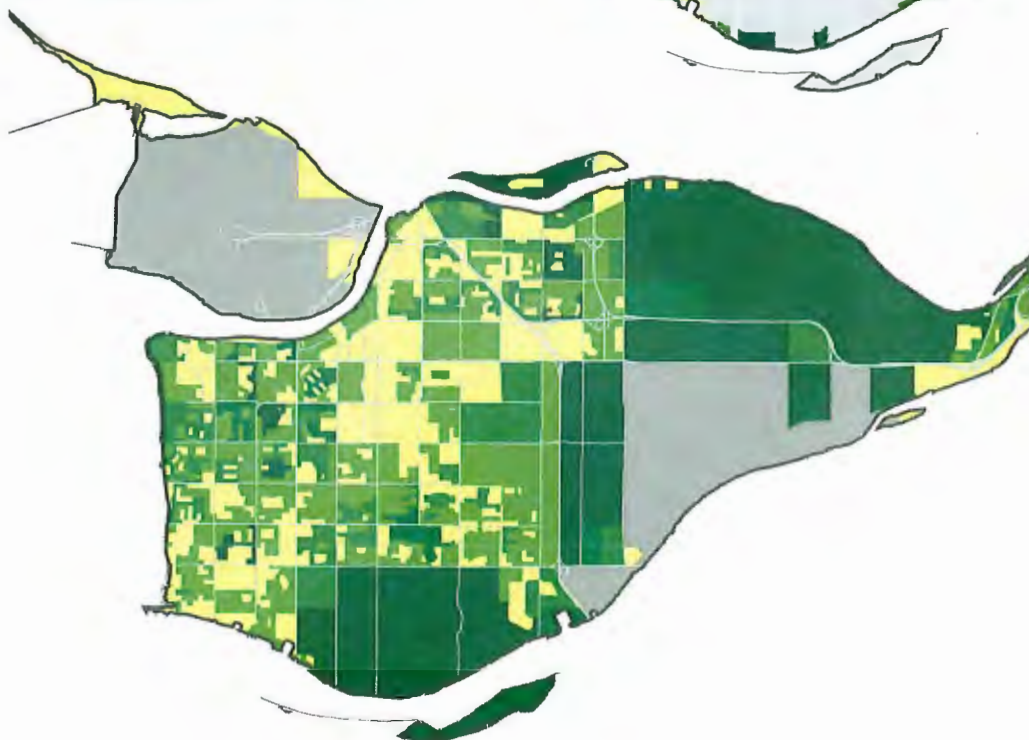
4 The Future of the Public Urban Forest

This section covers the challenges and opportunities that will shape the future of Richmond's public trees, and describes how the City's management practices can be adapted in response.

4.1 Climate Change and Forest Health

Climate change projections for the Metro Vancouver Region predict an average annual temperature increase of 3°C in the 2080s (Metro Vancouver, 2016). As climate changes, the management of Richmond's public trees will have to be altered and adapt to the new reality.

Several conditions important for future tree growth are presented in the table below. The values reported are averages for Metro Vancouver but are similar for Richmond, which has lower average precipitation and warmer average temperatures than other parts of the region.

Climate variable	Past (1971 - 2000)	2080s projected* (2071 - 2100)
Extreme maximum temperature	30°C	37°C
Duration of dry spells	21 days	29 days
Summer precipitation	206 mm	147 mm
Frost days	79 days	17 days
Growing season length	252 days	331 days

* Projected change is based on modelling for Metro Vancouver using the Intergovernmental Panel on Climate Change's Representative Concentration Pathway 8.5 scenario (RCP8.5), which assumes there is no coordinated effort to reduce global greenhouse gas emissions by the end of this century (or "Business as Usual"). In producing its Climate Action Plan, Richmond used RCP2.6, which assumes global greenhouse gas emissions will peak by 2020 and decline thereafter.

What does this mean for Richmond's trees?

Based on work completed to assess the risk and vulnerability of the region's urban forest (Metro Vancouver, 2017), Richmond's urban forest is likely to experience:

<div style="border">

1. Reduced growth and increased mortality due to...

- Reduced water availability and increased length of drought in summer.
- Waterlogging of soils and localized freshwater flooding within City parks in fall, winter and spring.
- Longer wildfire seasons and an increased frequency and duration of wildfires.
- More hot days that exceed species specific growth optimums.
- More frequent and severe pest outbreaks and variety of pests.
- Ongoing windstorms and severe weather events.

2. Increasing diversity of species tolerant of Metro Vancouver's climate due to...

- Longer growing season, milder winters and fewer damaging frosts.

</div>

Most tree species that occur in Richmond today are expected to be able to persist in a changing climate. However, climate change will place more stress on trees.

How can we adapt trees in Richmond's urban areas?

Richmond's urban forest will be less vulnerable to climate change if the following recommendations are implemented:

- Plant species well suited to both site and future climate, and trial new species.
- Provide planting sites that maximize permeability, soil volume and quality.
- Provide adequate water to young trees and, where possible, irrigation of street trees adjacent to new development sites.
- Promote strong branch structure by pruning trees when young and regularly throughout their lives.
- Protect public trees from the impacts of construction activities.
- Mitigate impacts to and from private utilities and civic infrastructure.
- Monitor and adapt management to changes in urban trees, natural forests and peat bogs.

Implementing these adaptation measures will create more resilient urban forest population. A healthy urban forest will complement the City's adaptation efforts by providing cooling refuges, absorbing rainwater and preventing erosion, reducing air pollution, buffering severe wind and sequestering carbon.

Low vulnerability

- Right species and right place
- Adequate, good quality soil volume
- High permeability
- Adequate young tree care and proactive pruning
- Tree protection

High vulnerability

- Wrong species or wrong place
- Above and below ground conflicts
- Low soil volume or compacted soil
- Low permeability
- Inadequate maintenance
- Inadequate tree protection

m^2

m^3

TARGET SOIL VOLUME
0.6 cubic meters of soil for every square meter of crown pr

Tree graphic from Metro Vancouver's Urban Forest Climate Adaptation Framework (Metro Vancouver, 2017)

4.2 Parks and the Ecological Network

Parks and Open Space

Development and management of Richmond's park and open space system is guided by the 2022 Parks and Open Space Strategy (POSS). This Strategy can support POSS outcomes by:

- Managing a high value and resilient urban forest in parks to maximize ecosystem services.

- Connecting the City's green network to create a healthy and resilient city-scape.

- Protecting and enhancing soils, trees and green infrastructure to improve the City's sustainability.

- Diversifying and transforming the management of resources.

In turn, parks and open spaces play an important role for implementing this Strategy by providing space to plant more trees, room to grow large trees, and provide a more stable environment for trees to reach maturity. Parks also provide more opportunities for habitat and biodiversity where shrubby understories, downed wood and snags, and mostly native species can be supported. In natural areas ecosystem processes like nutrient cycling, windthrow and vegetation succession can often be left to occur with limited management intervention.

Ecological Network

Ecologically valuable areas in Richmond have been defined as part of the Ecological Network (EN). This includes larger areas such as Richmond Nature Park, Terra Nova Rural Park, Sturgeon Bank, South Arm Islands, and smaller areas such as parks, school yards, fields and meadows. These areas support habitat for birds, insects and wildlife, including migratory shorebirds and waterfowl, and salmon.

This system of natural areas, as well as developed parks and greenways and green infrastructure, are the basis of the Ecological Network (EN). The connectivity of each area is a key success factor to creating a healthy and viable corridor for habitat health and vitality.

The protection and enhancement of the EN enriches the health and livability of Richmond and provides access to nature within increasingly urban neighbourhoods. The EN also plays an important role in increasing Richmond's resilience to climate change by providing ecosystem services like flood mitigation, carbon storage, supporting biodiversity and enabling natural processes to occur. Along with mature trees, understory plants and soils

The components of the EN are defined below and on the map as:

Hubs: natural areas greater than 10 hectares. Capable of supporting entire and diverse populations of animals and plants associated with ecological functions.

Sites: smaller, non-linear areas of natural ecosystems providing "stepping stones' as connections between hubs.

Corridors: linkages that facilitate movement of species, water, nutrients and energy between hubs and sites. Urban forest canopies add to the connectivity of corridors.

Additionally, Riparian Management Areas (RMA) are a critical component of Richmond's Ecological Network. These sites are often located in setback areas straddling both public and private land in and around watercourses, where trees form a major portion of the structure of valuable habitats.

The urban forest occurs in and around the Ecological Network, and the Public Tree Management Strategy can integrate the goals and objectives of the Ecological Network on public land by:

- Increasing tree cover along corridors and buffering the edges of hubs, sites and City-owned lands generally to enhance ecological connectivity and habitat.
- Increasing the use of green infrastructure on boulevards in developing and redeveloping neighbourhoods to reduce runoff, improve water quality, and encourage the use of native plants.
- Retaining and enhancing tree cover and vegetation.
- Retaining and enhancing permeability and soils for water filtration and storage.
- Encouraging restoration and enhancement of vegetation and wildlife habitat and features.
- Enabling urban forest stewardship initiatives.

Map of Ecological Network Components

Corridors
Sites
Hubs
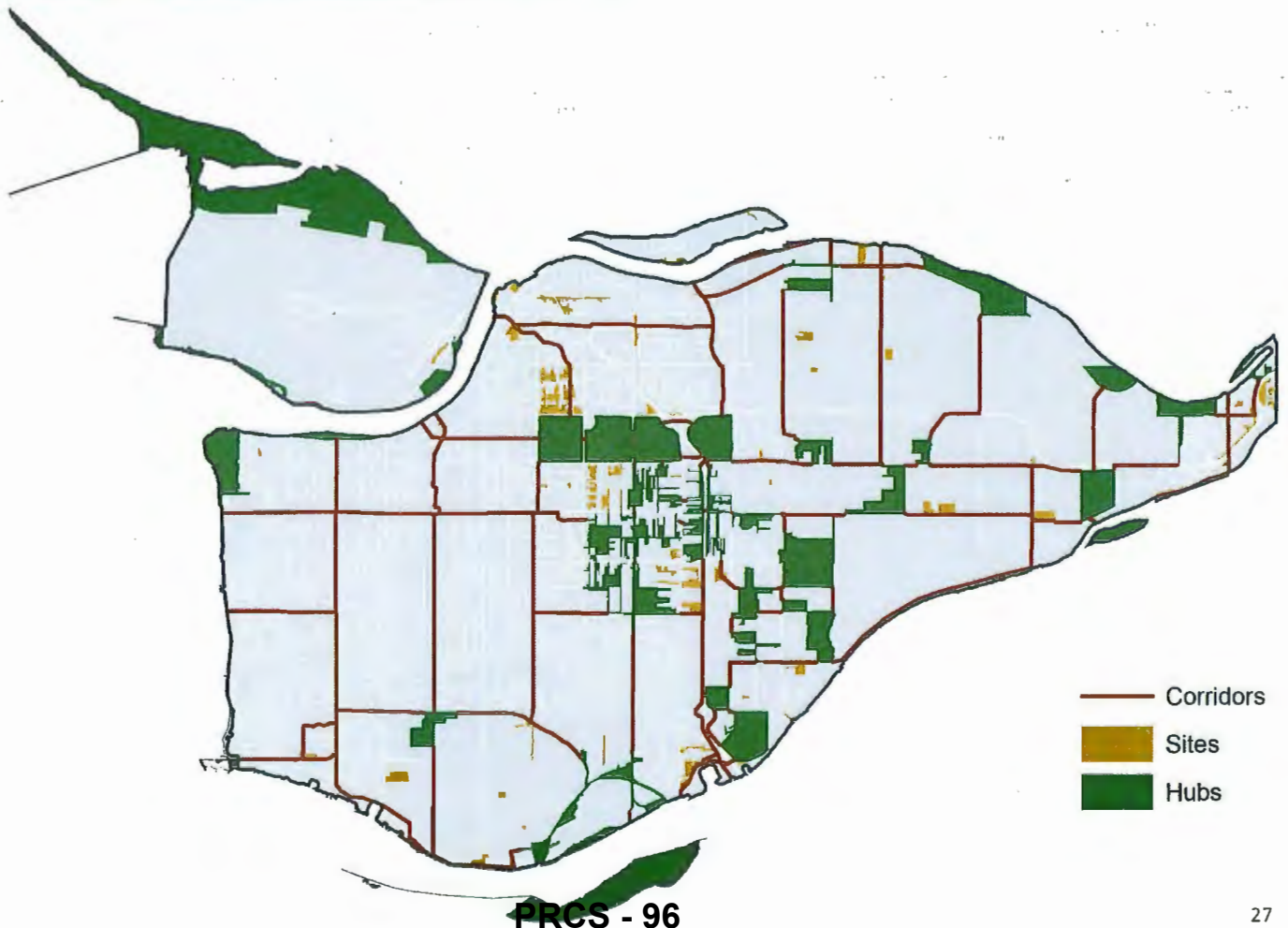
4.3 Integrated Rainwater Management and Flood Protection

Lulu Island, being relatively flat and on average one metre above sea level, relies on dikes to prevent flooding. Runoff is managed by either draining water with gravity or pumping it out during high tides. Richmond's drainage system has been carefully engineered and includes channelized watercourses, sloughs and ditches. The dike system prevents flooding during high water levels and will be upgraded to adapt to projected sea-level rise. Three key documents guide the management of stormwater and flood protection in Richmond:

1. The Flood Protection Management Strategy.

2. Dike Master Plans.

3. The Integrated Rainwater Resource Management Strategy.

Flood Protection Management Strategy

Under the City's Flood Plain Designation and Protection Bylaw, construction grades are raised to protect habitable space from flooding. Grade changes often have adverse impacts on existing tree health as a result of construction impacts and changed groundwater behavior. Planning for public tree planting must also avoid, where possible, locations subject to future grade changes.

Dike Master Plans

Council adopted Dike Master Plan Phases 1, 2, 3 and 5. The City is currently developing Dike Master Plan Phase 4. Trees are not recommended for planting within the dikes structure, as they compromise the structural integrity of the dike and restrict access for maintenance. The Strategy acknowledges that some trees will likely need to be removed for dike upgrades and that trees will not be planted within the dike structure. Any tree removals associated with dike upgrade projects will be replaced elsewhere in the city.

Integrated Rainwater Management

Richmond's Integrated Rainwater Resource Management Strategy (IRRMS) is focused on minimizing the negative impacts of future development on drainage infrastructure and ecological health, reducing potable water use, addressing sedimentation issues, and supporting the City's Ecological Network. The IRRMS goals and strategies are closely aligned with those of the Public Tree Management Strategy in that they address habitat quality, impervious surfaces and enhancement of green infrastructure to increase ecosystem services and rainwater infiltration.

This Strategy can complement implementation of the IRRMS goals and strategies by:

- Encouraging rainwater harvesting and reuse as alternatives to potable water use for irrigation of trees and vegetated landscapes. .

- Selecting trees with drought tolerance traits.

- Prioritizing tree planting and forest restoration within the Ecological Network.

- Encouraging use of green infrastructure for rainwater management on public lands.

4.4 City Trees Operations

City trees need management to maintain a healthy and safe urban forest that benefits the community. Operational costs are higher in the first few years of a tree's life and decrease as trees mature. Costs increase again when trees become stressed or over-mature. As illustrated in the graphic below, maximizing tree health and life expectancy is important for two main reasons:

1. The longer a tree stays healthy in the landscape, the less often the City incurs the high costs of removal and replanting.

2. Ecosystem services benefits grow as trees mature. The longer a tree lives, the longer it produces maximum benefits.

Maximizing both the establishment success of young trees and the healthy life-span of mature trees is the best way to delay removal and replanting.

Richmond has developed a City Tree Policy and Public Tree Operations Manual (PTOM) to establish the standards, practices and processes the City uses to manage public trees under Community Services - Parks jurisdiction.

The policy and PTOM address:

- Planning and design for tree planting.
- Planting including soil volume and technical standards for planting.
- Maintenance and plant health care.
- Inventory and risk management.
- Succession planning and removal management.

This Strategy, the policy and PTOM provide the guidance to shift the City's tree management from the current program of demand driven management towards a planned, preventative approach that will improve the life expectancy of and benefits from City trees.

Magnitude of Life Cycle Costs per Tree for Maintenance Activities

Maximize time in this phase for best return on investment

Costs

Benefits

| Tree Life Stage | 1-3 Newly Planted | 4 - 15 Young | ~ 15 - 40 Semi-Mature | 40 - life expectancy Mature | Over-mature or Stressed | Declining | Dead |

a   b   c   d   d   e
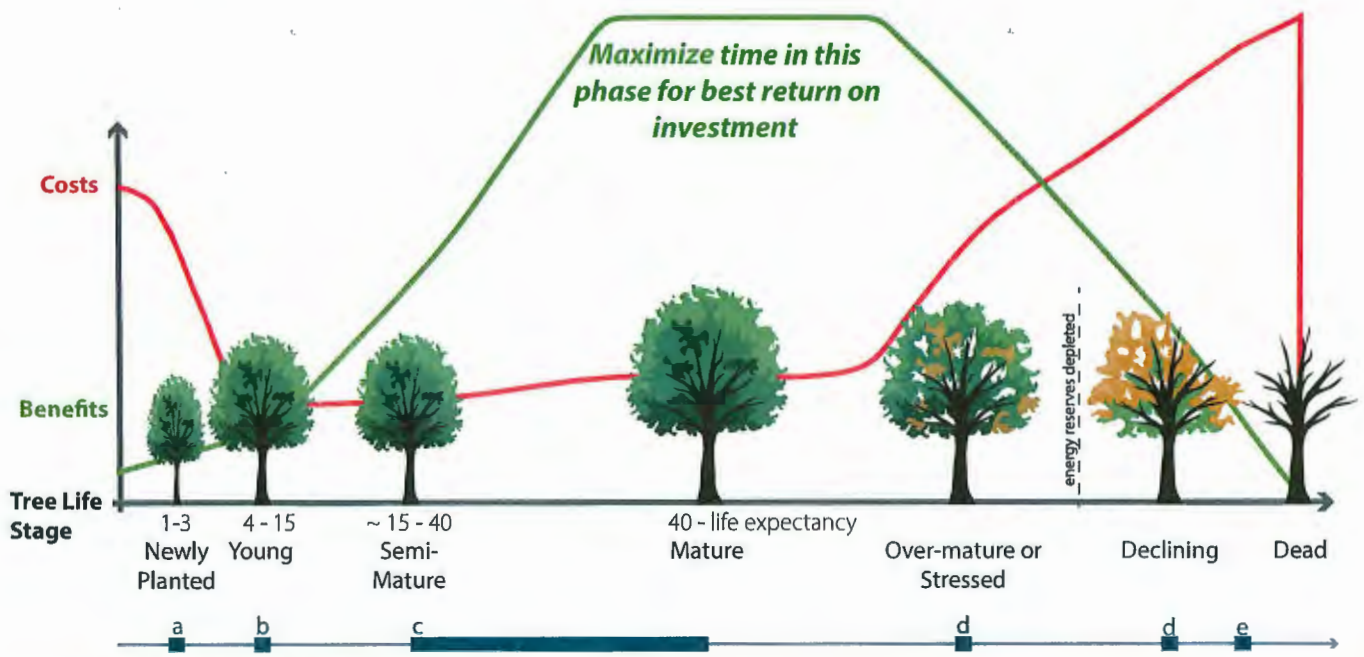
Tree Management Best Practices

a. Planting and young tree watering

b. Young tree pruning

c. Proactive inspection and pruning cycle

d. Tree health and risk management treatments

e. Removal & stump grinding

29

Planting the Future Urban Forest

The City has been planting an average of 850 public shade trees per year in addition to hundreds of smaller trees planted in parks for forest restoration. These trees are a combination of new and replacement street and park trees planted by City crews and through development activities or stewardship volunteers. Funding sources for tree planting include City capital budgets, Tree Compensation Fund, and grants. Presently, the rate of planting exceeds the rate of removals.

An analysis of potential planting areas on public land has identified approximately 30,000 individual sites for shade tree planting. Further analysis is needed to filter out locations with constraints such as utilities and land use plans and it is likely the total sites will be fewer.

New planting sites are also created with developments when parks or streetscapes are upgraded, new parks are built, or when areas are retrofitted with green infrastructure to manage rainwater.

By setting a target to plant **850 new trees per year**, in addition to replacement trees and restoration plantings in parks, public canopy cover should increase from 20% to 30% by 2045. Based on present tree removal numbers, the planting program (City and developer planted trees) would require a net increase of approximately 300 trees per year above current levels; this figure may vary with removal rates. The canopy forecast assumes that Richmond's canopy area will grow by 1.5% (7 hectares) each year on public land to reach the target by 2045. This canopy increase is forecasted from both the growth of existing trees as well as from planned new plantings and the replacement of every tree lost.

Planting out all available sites is one of the main ways Richmond can maximize ecosystem services from the urban forest. To ensure that new tree plantings are successful, the City will:

- Plant the right tree in the right place.

- Plant from a diversity of species using high quality planting stock.

- Consider the suitability of species and stock to future climate in all planting decisions. This may include altering the balance of native tree species composition or sourcing seed from warmer, drier climates.

- Provide good soil, growing conditions and water for young trees.

- Partner with and educate residents and community groups to plant and care for young trees.

City Tree Planting Prioritization

Richmond's data on canopy cover, street tree density and population density was used to prioritize blocks where public tree planting is a priority. Areas in and around 'Ecological Network' are a priority for planting to meet the objectives of the Ecological Network Strategy regardless of low, moderate or high priority ratings defined below. In these areas, the focus will be on native plant species and connecting green spaces to enhance habitat.

Areas that rated as 'Low' priority are census blocks with any one of:

- Fewer than 10 people per hectare.
- More than 6 street trees per 100 metres.
- Canopy cover greater than 30%.

Areas that rated as 'Moderate' priority are census blocks with:

- Fewer than 100 people per hectare.
- Fewer than 6 street trees per 100 metres.
- Canopy cover less than or equal to 30%.

Areas that rated as 'High' priority are census blocks with:

- More than 100 people per hectare.
- Fewer than 6 street trees per 100 metres.
- Canopy cover less than or equal to 30%.

Map of Priority Planting Areas

Metro Vancouver regional park

Federal lands

Mitchell Island is primarily industrial

Agricultural lands with few streets and low population

Federal lands and industrial

Priority

Low

Moderate

High

Ecological Network

PRCS - 100
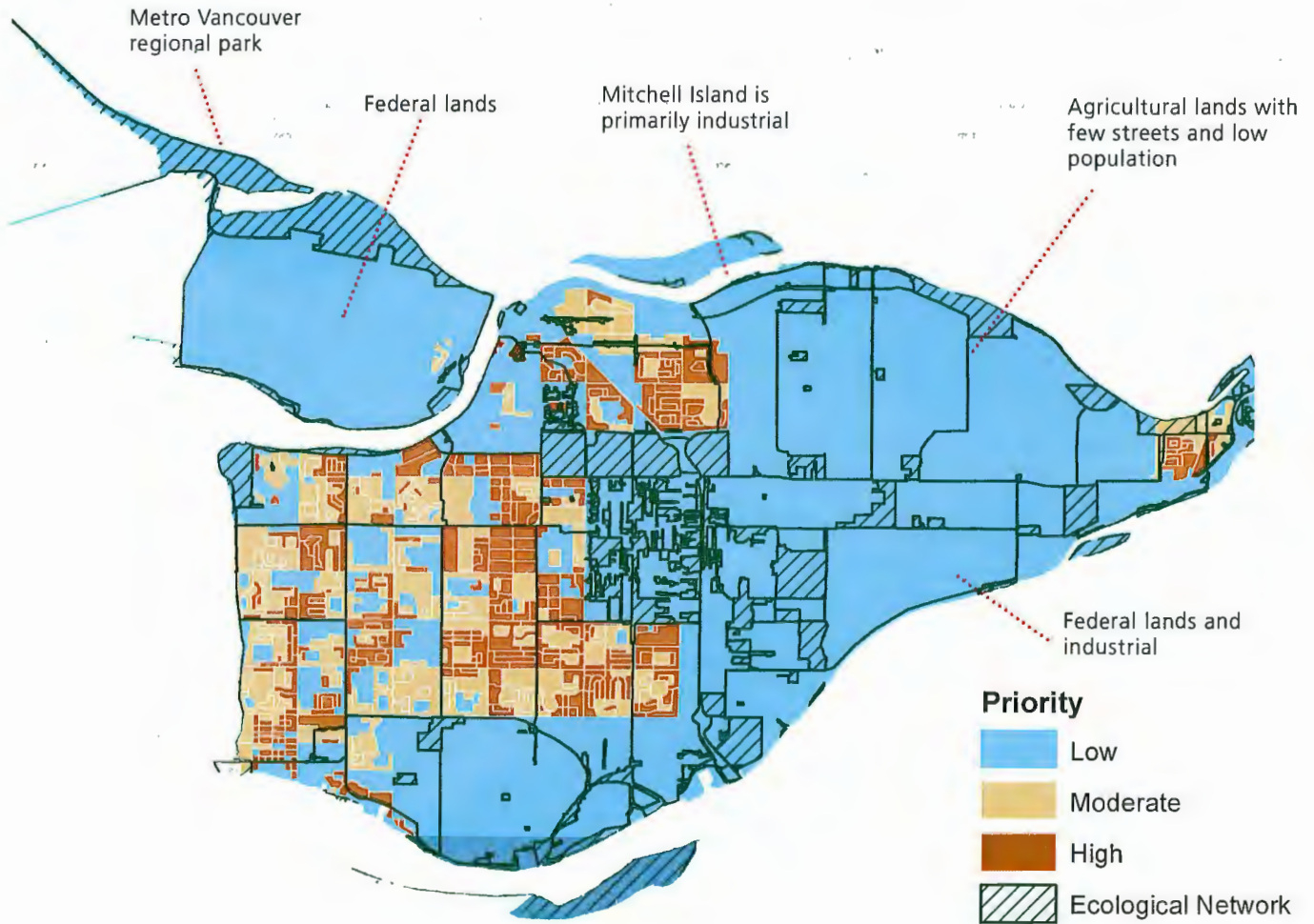
In total, approximately 30,000 potential public planting opportunities have been identified:

Vacant spaces in...

→ Some high priority blocks have no planting opportunities
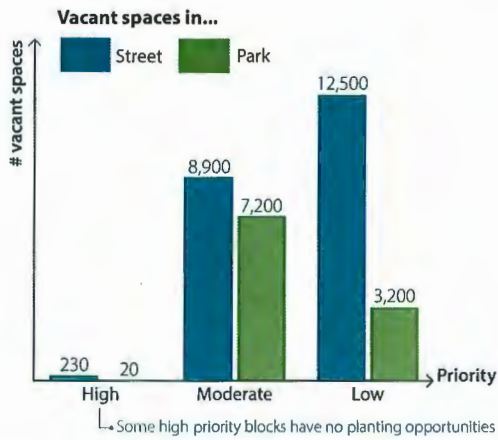
Creating New Planting Opportunities

The graphic at right illustrates "typical", "ideal", and "engineered" planting scenarios. Many high priority areas have high impermeability because of extensively paved sidewalks and roadways. Increasing canopy cover in these locations will require the creation of "engineered" planting sites using innovative approaches such as structural soil or soil cells. As planting technologies and best practices evolve, the City will look to test and implement new methods to grow more trees successfully in these challenging urban environments.

In Metro Vancouver's climate, it is recommended that between 0.3 and 0.6 cubic metres of soil be provided for every 1 square metre of tree canopy, though this can be reduced when multiple trees share the same volume or when sites are irrigated.

Supporting New Tree Plantings under Servicing Agreements

When trees are planted on public property as part of development Servicing Agreements, they are maintained by the Agreement holder for the first year. The City ensures trees are planted per applicable landscape best management practices, with approved soil volumes, and with irrigation systems connected to private water connections. Upon completion of the maintenance period, City staff again inspect the trees and any dead or deficient trees are replaced prior to final acceptance by the City. Once accepted as a new city asset, the trees are inventoried into the City's geographic information system and then maintained by the

City. Irrigation systems remain the maintenance responsibility of the landowner.

"TYPICAL" | INADEQUATE SOIL VOLUME
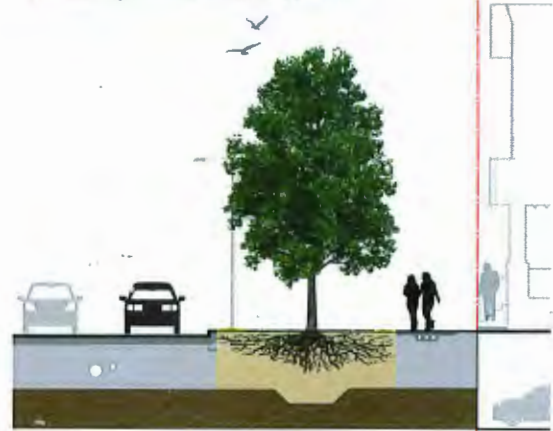
"IDEAL" | ADEQUATE OPEN SOIL VOLUME

"ENGINEERED" | OPEN VOLUME + STRUCTURAL / CONSTRUCTED SOIL VOLUME

Streetscape soil volume illustration from Metro Vancouver's Urban Forest Climate Adaptation Framework (Metro Vancouver, 2017)

PRCS - 101

Maintenance

Maintenance needs differ for trees throughout their life-cycle (see page 30 for a graphic summary):

- Young trees need water to establish their root systems and structural pruning to set up good branch structure.
- Once trees reach 15 years of age, they can move onto a preventative pruning cycle that involves periodic inspection and pruning when required. Trees stay on this pruning cycle as long as they are healthy and safe.
- As they near the end of their lives, or become stressed for other reasons, trees need more intensive care until they return to health or the decision is made to remove them.

Demand versus Preventative Model

Richmond's urban forest currently is managed primarily on a demand basis. This means trees are maintained as they come to the attention of staff through service requests initiated primarily by residents or staff that identify issues.

Recognizing that preventative maintenance would be a more sustainable and financially responsible approach, the City is beginning to transition its operations to a scheduled pruning cycle. Each year, City crews will work through a section of Richmond inspecting trees and pruning (when needed). Each full cycle will take five years to complete for streets and about ten years in parks. That means every inventoried public tree will be visited by City crews in that period. As well, some high-use areas will be inspected more frequently.

A demand system will still operate alongside so that crews can respond to emergency pruning or tree health issues as they arise (for example, storm damage or tree failure).

The transition to preventative maintenance will initially increase the cost of the City's urban forest operations. However, once the first cycle is complete, the frequency of demand pruning requests is expected to drop.

With climate change, tasks related to drought and pest management are expected to become a larger operational cost. Presently, City trees are in good health and few trees require watering once established except during extreme drought. Several pests, such as Asian Longhorn Beetle, Japanese Beetle (currently quarantined in Vancouver), Gypsy Moth and Emerald Ash Borer are potential threats to Richmond's forest; however, none of these pests have yet been detected in the City.

Priorities for maintaining a healthy and resilient tree resource are to:

- Transition to preventative maintenance including a block pruning cycle and young tree pruning to promote good structure at maturity.
- Water young trees until they are established (at least the first three years after planting).
- Monitor plant pest threats.

Tree Protection and Removal

Trees are civic assets, just like roads, sidewalks and sewers. As such the City conserves and protects its trees to the greatest extent possible. City tree protection and removal are regulated by Tree Protection Bylaw No. 8057, the Public Parks and School Grounds Regulation Bylaw No. 8771 and are further guided by the City Tree Policy. Staff, as authorized and guided by these policies and bylaws, must make a decision to protect or remove a City tree whenever development or City works are planned in their vicinity. Tree removal should be viewed as a last resort.

Priorities for improving tree protection and providing staff with the tools to make transparent decisions about removals are to:

- Implement the Council adopted City Tree Policy to guide protection and removal decisions and processes.

- Quantify and share the value of trees according to their appraised amenity value, role in carbon sequestration, stormwater capture and water quality improvement and providing building energy savings.

- Improve referral procedures, information sharing systems and tree protection standards internally so that City trees and potential conflicts are consistently identified and managed.

Inventory

Currently, the City inventories the trees it maintains to record the species, size, location, condition and work history of City trees. It is an essential tool for all aspects of urban forest operations but particularly for enabling preventative maintenance and monitoring health and risks. The inventory will be continuously updated and improved over the course of the pruning cycle by City crews using geospatial-enabled mobile technology. Inventory methods will be updated as technology evolves. To further inform urban forest operations, the inventory will be used to:

- Monitor mortality and failure rates to identify problem planting sites, health issues or species to avoid.

- Monitor tree condition to inform succession planning for tree replacement.

- Track progress towards meeting Strategy targets.

- Communicate tree locations, benefits and health information internally and externally.

Inspection and Risk Management

Inspections are used to identify and assess the health and condition of City trees. Inspection programs are one way to mitigate risk by ensuring the trees are providing maximum enjoyment and safety to the City and residents. Inspections are also a way for the City to identify appropriate pruning requirements, tree health and where, a risk is suspected or identified, the additional actions to investigate, monitor and/or mitigate risk. Tree removal is considered only as a 'last resort' to risk management; arboricultural best practices will be implemented first before outright removal is considered.

City trees will now be inspected in coordination with the pruning cycle. Inspections will be done by staff qualified to conduct Tree Risk Assessments. The appropriate allocation of resources for staffing and training will be required to support this enhanced risk management approach.

Typical risks from City trees include limb or tree failures and root damage. Damage to private property or individuals could result in increased costs to the City. A preventative maintenance program is expected to reduce the City's exposure to claims. Priorities to reduce risk exposure are to:

- Inspect trees periodically in coordination with the pruning cycle.
- Inspect and assess a tree when a service request is received.
- Document inspection procedures to support the City Tree Policy.
- Document actions to investigate, monitor and/or mitigate risk.

4.5 Community Stewardship

Community stewardship supports urban forest management in Richmond's parks and enables residents to learn about the urban forest and its value. Occasionally, public trees are intentionally or accidentally harmed by people. Stewardship programs help to educate the public about the important role trees play and how to properly care for them. Richmond runs urban forestry volunteer stewardship, community outreach and public education through Parks Programs.

Volunteer stewardship is focused on engaging individuals and groups in specific activities such as tree planting and invasive plant removal, as well as forming partnerships for managing specific areas. For example, Paulik Park is maintained in partnership with the Richmond Garden Club.

Community outreach programs include Adopt-a-Tree, which allows groups to take ownership of a planting program to beautify a public space. The City identifies the locations, develops the planting plan and provides the plant materials, equipment, tools and Parks staff support to plant the trees and assist in their care.

Public education involves sharing information about the urban forest, its benefits and how to care for it in a manner which engages and empowers volunteers with little to no training in tree care.

These programs extend the work of urban forest operations to provide both environmental and social benefits to the community. Priorities for community stewardship are to:

- Share information and data about the urban forest's critical role in community health and wellness.
- Educate the public to avoid activities that harm trees.
- Educate the public about how to properly care for trees and partner in stewardship activities.
- Support people to connect with nature through urban forest stewardship.

Stewardship programs also serve to communicate the importance of preserving trees on private properties, particularly mature trees and trees located in Environmentally Sensitive Areas.

5 Strategy Objectives and Action Plan

In Chapter 1, the four strategic framework goals were defined as:

1	**Conserve and Protect**
2	**Manage and Maintain**
3	**Enhance and Expand**
4	**Educate and Engage**

The following section details the targets and actions under each of these goals and outlines a phased 5-Year Implementation Plan (see page 44).

The Action Plan defines the actions for growing an urban forest that is beautiful, resilient and sustainable and is supported by the community for the benefits it provides. The 5-Year Implementation Plan outlines how implementation will move forward.

Parks Services will align its annual work plans with the 5-Year Implementation Plan. The Action Plan and Implementation Plan will be regularly reviewed and revised as required to respond to performance reporting and the resources available in the Capital and Operating budgets.

5.1 Conserve and Protect

TARGET: 30% of City trees have a trunk diameter greater than 40 cm by 2045.

Objective A. The urban forest is valued as an integral part of the City's civic asset infrastructure	Time-frame
Action A.1: Implement a Council adopted City Tree Policy to guide City tree protection, removal, replacement and maintenance decisions.	**2019**
Action A.2: Prepare an analysis of the impact of the shift of public tree management practices on the Operating and Capital Budgets.	**2020**
Action A.3: Quantify and track the value of the services provided by the public urban forest as it grows including appraised amenity value, carbon sequestration, stormwater capture and water quality improvement and building energy savings.	**2022**
Action A.4: Review the processes and resources required for tree preservation and protection.	**Ongoing**
Action A.5: Share the City Tree Inventory on the City's internal mapping system and publicly on the Richmond Interactive Map.	**2021**

Objective B. City tree conservation and protection is prioritized and implemented on all City and urban development projects	Time-frame
Action B.1: Regularly update the Public Tree Operations Manual to define the process and standards that apply when City trees are affected by City capital and development related activities.	**Ongoing**
Action B.2: Annually review compensation and replacement rates for public trees impacted by development.	**Ongoing**
Action B.3: Review the administration of the tree protection process to improve customer service.	**2021**
Action B.4: Explore options to increase enforcement or inspection capacity for protection of City trees.	**2021**
Action B.5: Coordinate the review of the Tree Protection Bylaw in relation to public tree protection with other City departments.	**2020**
Action B.6: Explore the potential to apply conservation covenants in cases where a high value City tree or stand is being protected at the rezoning or subdivision stage so that ongoing protection is tied to the property title.	**2021**
Action B.7: Continually review the City Supplementary Specifications and Detail Drawings to reflect best practices for tree planting and tree protection, including critical root zones.	**Ongoing**
Action B.8: Manage trees in the Ecological Network as a key element of the forest ecosystem.	**Ongoing**
Action B.9: Consider the creation of a Heritage Tree Program in collaboration with the Province.	**Ongoing**

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5.2 Manage and Maintain

TARGET: Tree mortality is maintained below 3.5% for City trees less than 10 cm diameter and maintenance practices maximize the healthy life-span of mature trees.

Objective C. All inventoried City trees are managed within a preventative maintenance program	Time-frame
Action C.1: Develop a best practices tree pruning and preventative maintenance program on a 5 year pruning cycle.	**2020**
Action C.2: Develop a 5-year staffing, equipment and budget plan to enable the transition from demand to preventative maintenance.	**2020**
Action C.3: Develop parameters and a rating system for evaluating and prioritizing demand maintenance and removal requests.	**2020**
Action C.4: Quantify data on past tree failures and risk claims and develop a tree maintenance response plan for problem species or locations.	**2020**

Objective D. City tree care and maintenance operations are based on ISA Best Management Practices, ANSI Standards to ensure continuous improvement	Time-frame
Action D.1: Maintain regular Parks Urban Forestry staff training, participation in industry workshops and conferences, and industry standard certifications.	**Ongoing**
Action D.2: Regularly update the Public Tree Operations Manual and implement the practices identified.	**Ongoing**
Action D.3: Continuously review and update urban forestry procedures, practices and standards to ensure they meet current industry standards.	**Ongoing**
Action D.4: Maintain the City's tree inventory simultaneously with the pruning cycle.	**Ongoing**

Objective E. City tree care and maintenance operations are continuously adapted to climate change	Time-frame
Action E.1: Review the City's young tree watering program in response to the impacts of climate change.	**2020**
Action E.2: Monitor mortality and failure rates to identify problem planting sites, insufficient watering or species prone to failure.	**Ongoing**
Action E.3: Monitor forested natural areas for vegetation decline and loss of ecosystem functions.	**Ongoing**
Action E.4: Continuously adjust storm response practices and monitor species prone to breakage and failure	**Ongoing**
Action E.5: Continuously update integrated pest management practices and monitor pest activity.	**Ongoing**
Action E.6: Maintain contact with the Canadian Food Inspection Agency's Plant Pest Surveillance Unit to obtain or exchange current information on plant pest threats.	**Ongoing**

Objective F. City tree risk is managed to maintain public safety	Time-frame
Action F.1: Map and rank locations and risk management factors throughout the City and establish a risk inspection frequency.	**Ongoing**
Action F.2: Continue to follow ISA Tree Risk Assessment criteria for evaluating and prioritizing tree risk assessment and response.	**Ongoing**
Action F.3: Work together with Engineering and Public Works to define tree planting standards and develop a standard approach for managing trees growing adjacent to the dike system, in Riparian Management Areas, Environmentally Sensitive Areas, and drainage watercourses.	**Ongoing**

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5.3 Enhance and Expand

TARGET: Increase canopy cover over the public realm from 20% to 30% by 2045.

Objective G. Public urban forest canopy cover increases to enhance community & ecological health benefits	Time-frame
Action G.1: Develop more comprehensive public streetscape/urban realm tree planting standards incorporating municipal best practices and targets for soil volume, tree spacing, permeability and utility conflicts and update these in the City Supplementary Specifications detail drawings.	**2021**
Action G.2: Develop a Public Realm Planting Master Plan to guide species selection, set local diversity targets, planting character and planting schedules.	**2021**
Action G.3: Strive to plant 850 new trees per year (in addition to replacement trees and restoration plantings) in parks and streets, focusing on moderate and high priority areas. Target no single genus exceeding 10% of the city-wide population (excluding native trees).	**Ongoing**
Action G.4: Develop design strategies to allow for and to expand groves of trees and expanding plantable sites in the urban realm through planning and urban design.	**2021**
Action G.5: Explore options to improve the quality and survival of developer-planted trees through a review of tree planting and maintenance practices.	**Ongoing**
Action G.6: Review inspection and enforcement process for developer planted trees.	**2020**
Action G.7: Quantify the public urban forest's stormwater storage capacity to help implement the Integrated Rainwater Resource Management Strategy.	**Ongoing**
Action G.8: Collect aerial thermal and LiDAR imagery every 5 years to monitor ongoing change of the urban forest canopy.	**2023**

Objective H. Standards for City tree planting infrastructure and species selection are continuously adapted to climate change and urban development.	Time-frame
Action H.1: Continuously update species lists and selection criteria for future climate resilience and site suitability.	**Ongoing**
Action H.2: Continuously update practices and standards for tree planting infrastructure (e.g., tree pits, soil trenches, soil cells, structural soil etc.) and soil volumes.	**Ongoing**
Action H.3: Explore opportunities to work with the nursery industry to source tree species that are expected to be resilient to future climate.	**2022**
Action H.4: Undertake a review of Gilbert Road nursery operations and optimize its potential as a source for City tree planting projects.	**2022**

5.4 Educate and Engage

TARGET: Engage 1,000 people per year on the role and value of the Richmond's public urban forest.

Objective I. The City regularly updates the public about the urban forest's critical role in community health and wellness	Time-frame
Action I.1: Produce and distribute information illustrating tree benefits and explaining the urban forest's role in improving community health and wellness.	**2020**
Action I.2: Create an interactive City tree map linked to the City's tree inventory that reports individual tree data and ecosystem services.	**2021**
Action I.3: Promote greater awareness of the Public Urban Forest Policy and the Tree Protection Bylaw.	**Ongoing**

Objective J. Activities that are detrimental to City trees are minimized	Time-frame
Action J.1: Produce and distribute information:	**2021**

- Defining activities that harm trees.
- Explaining alternative practices where relevant to avoid harming trees.
- On how to report vandalism or damage to trees.

Action J.2: Encourage behavioural change among individuals or groups that have caused harm to City trees through targeted education or participation in damage restoration.	**Ongoing**

Objective K. Stewardship opportunities are provided to connect people with the urban forest	Time-frame
Action K.1: Provide stewardship opportunities such as tree or understory planting, invasive species removal and citizen science projects for the public.	**Ongoing**
Action K.2: Create new opportunities to partner with residents to water newly planted trees in City boulevards.	**2021**
Action K.3: Produce and distribute information on:	**2020**

- tree watering instructions in times of drought.
- how to properly care for private trees.
- how to identify and report City trees in need of care.

Objective L. Increase awareness of best management practices for tree protection and retention across all City departments	Time-frame
Action L.1: Provide City Engineering and Public Works Operations staff on the best management practices for working around trees.	**2020**
Action L.2: Create a quick reference guide for the requirements and standards for arborist reports, tree protection and construction practices when working near City trees.	**2020**
Action L.3: Engage with other municipalities and senior levels of government to share effective urban forestry best management practices and tree preservation efforts.	**Ongoing**

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5.5 Measuring Success

Regular monitoring and evaluation will be conducted to ensure that the Public Tree Management Strategy is meeting these goals, objectives and targets. Monitoring will inform updates to the Public Tree Management Strategy and Action Plan.

Beginning in 2020, the Parks Division will collect the appropriate data for performance reporting to:

- Measure progress towards targets.
- Track changes in budgets and resource allocation.
- Evaluate the effectiveness of programs.
- Monitor progress on priority actions.

Performance reporting will be conducted every five years. The benefits of continually measuring results are improved performance, enhanced accountability, greater cost effectiveness and increased innovation.

5.6 Next Steps

Trees managed by the City's Parks Department are located on public land but are part of the larger, city-wide urban forest. A significant portion of the City's forest is located on private land. Management of trees on private land is the responsibility of individual land owners and is regulated through the administration of bylaws and policies.

There are numerous opportunities and challenges to ensuring trees located on private property are preserved. Parks is committed to working in concert with relevant City departments to support a systematic implementation of policy and regulatory updates to encourage the overall health of the City's urban forest.

The City will look at broad, City-wide tree management policies and procedures to consider how to better serve the public with more efficient services regarding trees on both the public realm and private property. This would include the following suggested reviews and new initiatives, including:

- Development of a City-wide Urban Forest Management Strategy (to consider trees in the public and private realms).
- Considering updates to the relevant sections of the Official Community Plan (e.g., Development Permit Guidelines and tree canopy targets for public open space).
- Developing city-wide urban forest canopy coverage targets.
- Considering the creation of a customer service focused "one-stop shop" approach to tree related issues.
- Increase community engagement opportunities to instill a stewardship ethic in Richmond residents to protect and expand the public urban forest.

5.7 Five-Year Implementation Plan

Goal	2019/2020	2021	2022	2023	2024
CONSERVE AND PROTECT					
Objective A. The urban forest is valued as an integral part of the City's civic asset infrastructure	A.1 A.2	A.5	A.3 A.4		
Objective B. City tree conservation and protection is prioritized and implemented on all City and urban development projects	B.5	B.3 B.4 B.6	B.1 B.2 B.7 B.8 B.9		
MANAGE AND MAINTAIN					
Objective C. All inventoried City trees are managed within a preventative maintenance program	C.1* C.2 C.3 C.4				
Objective D. City tree care and maintenance operations are based on ISA Best Management Practices, ANSI Standards to ensure continuous improvement			D.1 D.2 D.3 D.4		
Objective E. City tree care and maintenance operations are continuously adapted to climate change	E.1*		E.2 E.3 E.4 E.5 E.6		
Objective F. City tree risk is managed to maintain public safety			F.1 F.2 F.3		
ENHANCE AND EXPAND					
Objective G. Public urban forest canopy cover increases to enhance community & ecological health benefits	G.6	G.1 G.2* G.4	G.3* G.5 G.7	G.8*	
Objective H. Standards for City tree planting infrastructure and species selection are continuously adapted to climate change and urban development.			H.1 H.2 H.3 H.4*		
EDUCATE AND ENGAGE					
Objective I. The City regularly updates the public about the urban forest's critical role in community health and wellness	I.1*	I.2*	I.3		
Objective J. Activities that are detrimental to City trees are minimized		J.1* J.2			
Objective K. Stewardship opportunities are provided to connect people with the urban forest	K.3*	K.2	K.1*		
Objective L. Increase awareness of best management practices for tree protection and retention across all City departments	L.1 L.2		L.3		

* Recommendation with budget implication. Resourcing implications are not reflected in this table but staffing increases for planting and maintenance are anticipated.

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Appendix A: Public Survey

City of Richmond
Urban Forest Management Strategy
Survey
Parks Department
6911 No. 3 Road, Richmond, BC V6Y 2C1

The City of Richmond is developing an Urban Forest Management Strategy (UFMS). Trees and forests provide important benefits for our community's health and well-being. The Strategy will give us the vision for what our urban forest will be and will set out principles and targets to make our vision a reality.

Please complete and return this survey to the City of Richmond by **Sunday, November 12, 2017.**

What is an Urban Forest Management Strategy?

An Urban Forest Management Strategy guides how we protect and manage trees on public and private land in urban areas. The Strategy will provide the vision for what our future urban forest will be and a framework for how to get there.

Why do we need an Urban Forest Management Strategy?

The strategy will provide City of Richmond public, City Council and staff with a better understanding of the urban forest and what needs to be done to ensure a healthy urban forest legacy for future generations. Recommendations in the strategy will guide staff in decisions on budgeting and prioritization of urban forest work including tree protection, maintenance and inventory programs, street, park and native tree planting and stewardship.

We want to hear from you

This survey will take about 15 minutes to complete. It will be available in paper form and online at LetsTalkRichmond.ca until Sunday, November 12 at 11:59 p.m. The survey results will be used to help guide the vision, objectives and targets for the future management of trees and natural systems that make up the City's urban forest.

DEFINITIONS

Urban Forest: The urban forest includes all of the trees, vegetation, soil and associated natural processes found across our city's landscape - on both public and private lands including parks, schools, streets, parking lots, back yards, and apartment complex grounds.

Canopy Cover: One way to understand the extent of the urban forest is to measure the urban tree canopy; envision the layer of leaves, branches and tree stems when viewed looking down from above.

Urban Forest Management: The art, science and technology of managing trees and natural systems in and around urban areas for the health and well-being of communities.

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URBAN FORESTRY SURVEY

1.   I am a Richmond resident:

☐ Yes

☐ No – thank you for your interest.

2.   I think it is most important for the urban forest to:
Tick only one box in each row.

		Least Important				Most Important
		1	2	3	4	5
A	Support habitat for native (local) plants and animals	☐	☐	☐	☐	☐
B	Regulate storm water run-off and improve flood protection	☐	☐	☐	☐	☐
C	Reduce air pollution	☐	☐	☐	☐	☐
D	Buffer wind	☐	☐	☐	☐	☐
E	Sequester and store carbon	☐	☐	☐	☐	☐
F	Reduce noise	☐	☐	☐	☐	☐
G	Regulate temperature by shading and cooling streets and buildings	☐	☐	☐	☐	☐
H	Provide a place for heritage trees	☐	☐	☐	☐	☐
I	Beautify Richmond	☐	☐	☐	☐	☐
J	Provide pleasant spaces for people to interact and socialize	☐	☐	☐	☐	☐
K	Attract tourists to improve the local economy	☐	☐	☐	☐	☐
L	Provide spaces that reflect Richmond's cultural diversity	☐	☐	☐	☐	☐
M	Provide spaces of spiritual or exceptional personal meaning	☐	☐	☐	☐	☐
N	Increase property prices	☐	☐	☐	☐	☐
O	Provide spaces for people to play sports or do other recreational activities	☐	☐	☐	☐	☐
P	Contribute to Richmond's identity	☐	☐	☐	☐	☐
Q	Produce food	☐	☐	☐	☐	☐

3.   I am satisfied with the number, condition and size of:
Tick only one box in each row.

		Very dissatisfied				Very satisfied
		1	2	3	4	5
A	Trees in my street	☐	☐	☐	☐	☐
B	Trees in my local park	☐	☐	☐	☐	☐

Please explain why you selected the ratings above.

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For questions 4 and 5, please consider the following photos:

A. Few or no trees

B. Regularly spaced small trees

C. Unevenly spaced, variously sized trees

D. Regularly spaced, medium trees

E. Regularly spaced, large trees

4.   Looking at the photos above, my street is most similar to: _____

5.   Looking at the photos above, I would like my street to look like: _____

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6. **In the last year, I have:**
Please check all that apply:

A	Watered trees	☐
B	Planted a tree on private property	☐
C	Pruned a tree on private property	
D	Assisted a family member or neighbour with their tree needs	☐
E	Applied pesticides to a tree or garden	☐
F	Participated in a not-for-profit's tree planting activity	☐
G	Obtained a permit to protect or remove trees on a development site	☐
H	None of the above	☐

7. **On my own property, I plan to do the following in the next year:**
Please indicate how likely you are to undertake the following actions. Tick only one box in each row:

		Very unlikely		Neither likely or unlikely		Very likely
		1	2	3	4	5
A	Plant one or more <u>large</u> tree (e.g. > 15 m tall at maturity)	☐	☐	☐	☐	☐
B	Plant one or more <u>medium</u> tree (e.g. 10 – 15 m tall at maturity)	☐	☐	☐	☐	☐
C	Plant one or more <u>small</u> tree (e.g. < 10 m tall at maturity)	☐	☐	☐	☐	☐

8. **I feel the following:**
Tick only one box in each row.

		Strongly disagree		Neither agree or disagree		Strongly agree
		1	2	3	4	5
A	Public street trees are well cared for by the City	☐	☐	☐	☐	☐
B	Trees in parks are well cared for by the City	☐	☐	☐	☐	☐
C	Natural areas are well cared for by the City	☐	☐	☐	☐	☐

9. **I think it is most important for the City to:**
Tick only one box in each row.

		Least Important				Most Important
		1	2	3	4	5
A	Plant more trees in streets	☐	☐	☐	☐	☐
B	Plant more trees in parks	☐	☐	☐	☐	☐
C	Plant more trees in natural areas	☐	☐	☐	☐	☐
D	Protect trees on private land	☐	☐	☐	☐	☐

10. **I feel the following about each of these statements. The City should:**
Please indicate how much you agree with each of the following statements. Tick only one box in each row.

		Strongly disagree		Neither agree or disagree		Strongly agree
		1	2	3	4	5
A	Plant more trees and increase urban forest canopy cover	☐	☐	☐	☐	☐
B	Strengthen the tree bylaw so that more trees are retained during development	☐	☐	☐	☐	☐
C	Require replacement trees that are medium or large at maturity, rather than small at maturity if there is enough space	☐	☐	☐	☐	☐
D	Require replacement trees for every tree removed	☐	☐	☐	☐	☐
E	Require replacement trees for every tree removed unless the tree was hazardous	☐	☐	☐	☐	☐
F	Increase the tree permit fee ($50) to fund more enforcement of the City's tree bylaw	☐	☐	☐	☐	☐
G	Set a minimum requirement for permeable surface on private land in new developments	☐	☐	☐	☐	☐
H	Encourage people to plant trees on private property by selling trees at a low cost	☐	☐	☐	☐	☐
I	Encourage people to plant trees on private property by educating them about how to select, plant and care for trees	☐	☐	☐	☐	☐

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11. **I would like to learn:**
    Select up to three choices.

A	How and when to water trees	☐
B	How and when to prune tree branches	☐
C	How to choose the right tree for my yard	☐
D	How to keep trees healthy during construction	☐
E	How to manage tree pests and diseases	☐
F	How to protect mature trees during development	☐
G	I am not interested in learning about trees	☐

Other:

12. **The things I MOST VALUE about Richmond's urban forest are:**

    A. _____

    B. _____

    C. _____

13. **The things I LEAST VALUE about Richmond's urban forest are:**

    A. _____

    B. _____

    C. _____

14. **It is the year 2050, 33 years from now. My ideal image of Richmond's urban forest is:**
    Optional question, please complete if your time allows.

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15. I would like to be contacted about...
Check all that apply

☐ Future consultation for Richmond's Urban Forest Management Strategy

☐ Urban forest events and volunteer opportunities

Please provide email: _____

16. I heard about this public engagement through:
Check all that apply

☐ Newspaper ad (Richmond News)

☐ News story written by reported in local newspaper

☐ LetsTalkRichmond.ca email sent to me

☐ LetsTalkRichmond.ca website (not an email from this site)

☐ City of Richmond website (Richmond.ca)

☐ Twitter

☐ Facebook

☐ Poster in a City facility

☐ Poster in a retail store in my community

☐ Word of mouth

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Some information about me:

It's important that we hear from a diverse group of people and perspectives. The following questions help us determine how the feedback we received represents the community.

17. **My home postal code is:** _____

18. **I fall into the following age group:**

☐ Less than 18

☐ 18-34

☐ 35-54

☐ 55+

☐ Prefer not to answer

19. **I have lived in Richmond**
Choose one option

☐ My whole life

☐ A long time (6 or more years)

☐ I have moved here in the past 5 years

☐ Prefer not to answer

20. **I was born in Canada**
Choose one option

☐ Yes

☐ No

☐ Prefer not to answer

21. **My first language is**
Choose one option

☐ English

☐ French

☐ Cantonese

☐ German

☐ Japanese

☐ Mandarin

☐ Persian (Farsi)

☐ Punjabi

☐ Russian

☐ Spanish

☐ Tagalog

☐ Prefer not to answer

☐ Other (please specify): _____

Thank you for your time and feedback

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City of Richmond

Page **1** of **2**	**The Public Urban Forest**	**Policy <policy no.>**
	Adopted by Council: <date>	

1. POLICY <POLICY NO.> :

It is Council policy that:

1.1 The purpose of this policy is to serve as a statement of values that will guide the City of Richmond's actions in managing the public urban forest.

1.2 The public urban forest, which includes all the trees growing on City owned land in parks, medians and boulevards in streets, road rights of way, civic properties and natural areas is a civic asset which increases in value and in the benefits it provides over time.

1.3 The City of Richmond will manage, sustain and expand the City's urban forest on public land in order to deliver multiple health and wellness benefits to the community including resilience to climate change and mitigating the urban heat island effect.

1.4 Parks Services will manage the public urban forest with the view it is a shared resource and a legacy for future generations of Richmond residents.

1.5 This policy supports the Public Tree Management Strategy's goals to:

(a) Conserve and protect the public urban forest;

(b) Manage and maintain a healthy and safe public urban forest;

(c) Enhance and expand the extent and health of the public urban forest; and,

(d) Educate and engage with the community on the benefits of the public urban forest and provide opportunities for community stewardship.

1.6 Protecting the public urban forest is the primary objective of the City. Without compromising public safety, tree removal will be considered as a last resort and only after all other options are first considered.

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1.7 The City will enhance and expand the public urban forest according to the best management practices of the International Society of Arboriculture by:

(a) Planting and watering new trees;

(b) Performing scheduled preventative maintenance and responding to Service Requests which may include pruning and removal;

(c) Maintaining an up-to-date inventory of the public urban forest; and,

(d) Performing regular inspections and implementing risk management mitigation measures.

1.8 Parks Services staff or their designate will implement best management practices including planning, inventory, risk management, planting, watering, pruning, tree removal and integrated pest management (as required).

1.9 The City encourages the residents of Richmond to enjoy this shared asset and help to nurture and grow our trees through volunteer stewardship and planting opportunities.

1.10 This policy is applicable to all trees located on City owned land and according to agreements with other public entities including BC Hydro, Telus and other third party providers.

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![City of Richmond crest] **City of Richmond**

Report to Committee

To:	Parks, Recreation and Cultural Services Committee	**Date:**	October 31, 2019
From:	Todd Gross Director, Parks Services	**File:**	06-2345-20-GCIT1/Vol 01
Re:	Garden City Lands Update and Site Activation Plan		

Staff Recommendation

That the staff report titled "Garden City Lands Update and Site Activation Plan," dated October 31, 2019, from the Director, Parks Services, be received for information.

Todd Gross
Director, Park Services
(604-247-4942)

Att. 2

REPORT CONCURRENCE	
CONCURRENCE OF GENERAL MANAGER	
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	**INITIALS:** CT
APPROVED BY CAO	

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Staff Report

Origin

At the Council meeting held on May 14, 2018, staff received the following referral:

> *That staff work with Kwantlen Polytechnic University and others to explore alternate farming methods and paludiculture and windrows for future farming on the Garden City Lands.*

The purpose of this report is to respond to the referral and update Council on staff's efforts to explore viable options which would facilitate farming in the approximately 8 ha (20 acres) agricultural fields in the southwest corner of the Garden City Lands (the "Lands"), and identify the recommended directions to provide public access throughout the site.

Background

In 2010, the City purchased the 55 ha (136 acres) Garden City Lands from the Federal Government, and the planning for the future of the Lands began in 2012. As a result of a robust public consultation process, the Legacy Landscape Plan was developed and subsequently endorsed by Council in June 2014. The Legacy Landscape Plan provides a framework for the future development of the Lands based on the site's ecology, history, civic context and agricultural status as part of the Agricultural Land Reserve (ALR).

A Park Development Plan (the "Plan") (Attachment 1) was created based on the direction provided by the Legacy Landscape Plan. The Plan guides staff's implementation of the park program and vision of the Legacy Landscape Plan, including approximately 16 ha (40 acres) of agricultural fields on the western half of the site. Portions of the Plan implemented to date include the development of the 8 ha (20 acres) farm leased to Kwantlen Polytechnic University (KPU), the perimeter recreational trail, extensive plantings and the construction of a pond. In the southwest corner of the Lands, an 8 ha (20 acres) field is envisioned to become incubator farm plots, demonstration gardens and community gardens. The entire agricultural zone on the Lands will be managed according to organic farming best practices.

In 2017, the Agricultural Land Commission (ALC) approved the placement of soil on the farm area leased to KPU. The placement of soil was a condition of the Licence to Use Agreement between the City and KPU. The ALC's approval was based on low level contamination being present in the existing soils and that the placement of imported soils over the predominantly peat-based soil would minimize the release of sequestered carbon.

In summer of 2017, the City imported soil suitable for agricultural purposes onto the Lands to establish the first phase of the KPU research and teaching farm measuring approximately 2.6 ha (6 acres). Initially there were challenges with the quality of the soil that was imported (e.g., low fertility and electrical conductivity) but they have been addressed with the addition of soil amendments and the implementation of a quality control procedure. Since that time, KPU has begun actively farming the site and implementing site infrastructure improvements, including a greenhouse, hoop houses and processing area. When a viable source of soil is identified, the remaining 5.4 ha (13 acres) of KPU's leased lands will receive soil for the purposes of farming.

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