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VANCOUVER URBAN FORESTRY MANAGEMENT PLAN

DRAFT August 2023

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	l
BACKGROUND	1
Plan Purpose	
Public Participation	
Staff and Stakeholder Participation	3
Plan Framework	4
Vancouver's Urban Forest Vision	
Guiding Principles	4
INTRODUCTION	
INTRODUCTIONDefining the Urban Forest	
Overview of Urban Forest Benefits	
Overview of Orban Forest Denems	
ANALYSIS OF VANCOUVER'S URBAN FOREST	10
Overview	
History of Vancouver's Urban Forest	
Urban Forest Status: Urban Tree Canopy	
Status of Vancouver's Public Trees (Partial Inventory)	
Urban Forest Function, Benefits, and Services The Role of Vancouver's Urban Forest in Ecosystem Conservation	
The Role of Vancouver's Orban Forest in Ecosystem Conservation	
MANAGEMENT OF VANCOUVER'S URBAN FOREST	40
Challenges in Maintaining and Managing Public Trees	41
Addressing the Challenges	46
Summary of Program Highlights	
Program Recommendations	71
THE COMMUNITY FRAMEWORK FOR URBAN FORESTRY	120
Engagement to Inform the Plan	120
Plan Outreach and Engagement Strategy	
THE LONG-TERM FRAMEWORK FOR URBAN FOREST MANA	AGEMENT 135
Goals, Objectives, and Strategies	
Key Strategies	
Action Intervals	140
EVALUATION	146
EVALUATION	146
World High Tull	
IMPLEMENTATION SCHEDULE	149
SUMMARY AND CONCLUSION	
APPENDICES	la
Appendix A. References	
Appendix B. Risk Tree Management	
Appendix C. Urban Forest Audit Results (2023)	6a
Appendix D. Estimated In-house Arborist Costs	17a
Appendix E. Estimated Costs for the 28 Percent Canopy Goal	
Appendix F. Tree and Hardscape Conflicts Solutions Workbook	
Appendix G. Stakeholder Feedback	
Appendix H. Considerations for Apprenticeship and Youth Programs	
Appendix I. Plan Implementation Schedule	

TABLES AND FIGURES

LIST OF TABLES

Table 1. Summary of public tree condition	23
Table 2. Summary of the types of observations and defects recorded for public trees	25
Table 3. Recommended maintenance for the 2,000 trees inventoried in 2021	26
Table 4. Summary of the annual benefits provided by the citywide urban forest	35
Table 5. Summary of the annual benefits provided by Vancouver's public trees*	
Table 6. Summary of the Urban Forestry Program's budget and expenditures over a 5-year time period.	
Table 7. Summary of the policies in the City's Comprehensive Plan that support the Urban Forestry	
Table 8. Summary of the strategies in the City's Climate Action Framework that support the Urban	
Table 9. Summary of the strategies in the City's 2007 Urban Forestry Management Plan that support the	
Table 10. Summary of tree permit counts by type over a 5-year timespan (as of October 2022)	
Table 11. Program highlights recreated from the City's Urban Forestry 2022 Annual Report	
Table 12. Communities benchmarked for the Vancouver, WA Urban Forestry Management Plan	
Table 13. Summary of phase 1 benchmarking research results (Tree City USA dataset)	
Table 14. Summary of phase 2 benchmarking research results (2014 Census, Hauer et al.)	
Table 15. Outcomes of the urban forest auditing process for Vancouver, WA	69
Table 16. Summary of the estimated costs for removing 160 City-maintained public trees	
Table 17. Summary of the estimated costs for programmed pruning of City-maintained public trees	
Table 18. Summary of the estimated costs for removing 177 privately-maintained public trees	
Table 19. Summary of the estimated costs for programmed pruning of privately-maintained public trees	
Table 20. Estimated annual and 7-year costs for proactively pruning public street trees in priority	
Table 21. Summary of the options, costs, and number of trees for a proactive public tree pruning	
Table 22. Summary of baseline conditions, tree canopy goals, and forecasted future benefits and	
Table 23. Summary of the metrics to track the 28% canopy cover by 2047 goal	93
Table 24. General guidance for emerald ash borer preparation, management, and recovery	9/
Table 25. Parcel tax options and provisions for Vancouver's Urban Forestry Program	
Table 26. Overview of the options evaluated for funding Vancouver's urban forestry goals	
Table 27. Summary of financing options for Vancouver's urban forestry goals	. 11/
Table 28. Summary of the participating external stakeholders	. 123
Table 29. Summary of the feedback received during the public meeting table sessions	. 126
Table 30. Action intervals	. 140
Table 31. Vancouver's urban forest benchmark values	. 14/
Table 32. Evaluation, monitoring, and reporting techniques to achieve the urban forestry goals	
Table 33. Example of the plan implementation, evaluation, and revision process	
Table 34. The ISA tree risk assessment matrix to establish a risk rating	
Table 35. Urban Forest Audit results for Vancouver, WA (2022)	0d
Table 37. Estimated costs for planting 124,900 trees to reach 28% canopy cover	
Table 38. Estimated costs for planting and maintaining 60% of the 124,900 trees to reach 28% canopy Table 39. Description of possible alternative solutions for tree and construction conflicts	
Table 40. City staff feedback on the strengths and challenges facing Vancouver's urban forest	
Table 41. External stakeholder open comments from the online survey	
Table 42. Plan implementation schedule	, 37d

LIST OF FIGURES

Figure 1. Overview of the benefits provided by urban forests	8
Figure 2. Illustration of the types of trees and ownership Figure 3. The extent and various landscapes comprising Vancouver's urban forest	11
Figure 4. Vancouver's Tree Canopy Assessment results	
Figure 5. Distribution of tree canopy cover by city neighborhood (2021)	I J 1 2
Figure 3. Distribution of free cattopy cover by City freighborhood (2027)	I J
Figure 6. The amount of tree canopy and available space by land ownership type	14
Figure 7. The amount of tree canopy and available space by zoning type	
Figure 8. Citywide tree canopy cover change from 2011 to 2020	15
Figure 9. Tree canopy cover change from 2011 to 2020 for zoning classes	15
Figure 10. Examples of possible causes for canopy gains and losses by zoning type	16
Figure 11. Count of Census Block Groups by Tree Equity Score ranges	17
Figure 12. Comparison of tree equity scores (100 = the highest possible score)	17
Figure 13. The effects of vegetation and trees on urban heat islands in cities	18
Figure 14. Map of the location and size classes for over 12,000 public trees in the City's online database	20
Figure 15. Comparison of the diameter at breast height (DBH) size distribution of Vancouver's public	20
Figure 14 Most common public tree genera	21
Figure 16. Most common public tree genera	,∠ı
Figure 17. Most continuit public free species	८८
Figure 18. Public tree condition	Z 3
Figure 19. Relative Performance Index of the most common public trees	24
Figure 20. Pruning for clearance (on the left) and types of pruning for established trees (Source: Arbor	26
Figure 21. Best practices for young tree training and pruning (Source: Penn State Extension)	
Figure 22. Diagram showing the impacts maintenance has on tree structure, function, and benefits	
Figure 23. Examples of techniques for routine tree pruning (Source: Arbor Day Foundation)	28
Figure 24. Examples of public street tree planting sites in the tree lawn (images not of Vancouver)	29
Figure 25. Illustration of the benefits and services provided by public trees	30
Figure 26. Overview of the ecosystem benefits and services provided by trees in communities	32
Figure 27. Summary of the ecosystem services and benefits of all public trees	
Figure 28. Summary of the feedback received from the staff in Vancouver	
Figure 29. Summary of the feedback received from external stakeholders in the Vancouver region	48
Figure 30. Structure of Vancouver's Urban Forestry Program	40 19
Figure 31. Summary of the Urban Forestry Program expenditures (2021)	51
Figure 32. Summary of the 2022 Urban Forest Audit for Vancouver's Plan	
Figure 33. a) Relationship between pruning cycle lengthand condition class rating	
Figure 33. A) Relationship between profiting cycle feligintdid condition class failing	/ Z
Figure 34. As the years between street tree pruning increases, tree health and safety decrease and	
Figure 35. The street tree maintenance strategy and action in the City's Climate Action Framework (2022)	2)/4
Figure 36. Map of trees in priority neighborhoods and Census Tracts for consideration in the priority	/ 6
Figure 37. The updated canopy goal for Vancouver, 28 percent by 2047	85
Figure 38. Map displaying areas with a high percentage of possible planting area (>30%)	88
Figure 39. Map displaying areas most suitable for trees to reduce stormwater volume	88
Figure 40. Map displaying areas with a high percentage of public land for City-led plantings	89
Figure 41. Map displaying priority areas based on the Washington Environmental Health Disparities data	a 89
Figure 42. Map displaying areas where trees could address socioeconomic challenges	90
Figure 43. Map displaying the results of prioritizing all themes	
Figure 44. Images for identifying ash trees and the emerald ash borer (Source: WA DNR)	96
Figure 45. Examples of the types of tree pruning	
Figure 46. Types of pruning cuts and proper branch cutting technique	
Figure 47. Key considerations for pruning established trees	
Figure 48. Examples of trees directionally pruned for clearance from power lines	
Figure 49. Example of pruning newly planted trees to promote good structure	. 108
Figure 50. Vancouver's Urban Forestry Management Planwebsite (BeHeardVancouver.org/UFMP)	. 120
Figure 51. Infographic summary of results from the 2023 UFMP public survey	
Figure 52. Map showing the count of survey responses by Vancouver zip code	
Figure 53. Examples of the news media efforts to encourage public participation and awareness	
Figure 54. Example of the types of questions asked of the external stakeholders to inform the Plan	
Figure 55. Presentation to the Vancouver Urban Forestry Commission on January 18, 2023	
Figure 56. Poll questions asked during the noon and evening public meeting on January 25, 2023	. 125
Figure 57. The first public meeting to raise awareness and encourage participation	
Figure 58. Photos from the public meeting table sessions	
Figure 59. Story maps can visualize urban forest stories, maps, and data for the public	130
Figure 60. Proposed decision matrix for tree and construction conflicts	
Figure 61. Example of alternative solutions for tree and construction conflicts	
r 1901 C VI. Example of afferhative solutions for thee and construction collinics	,∠ud

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A VISION FOR THE FUTURE

"Vancouver's urban forest is a healthy, dynamic, diverse, and cohesive ecosystem that is valued and cared for through community stewardship because it balances economic vitality with the conservation of natural resources now and for future generations."

This vision reflects the community's deep-rooted desire to live in a green and vibrant community. It reinforces our responsibility to manage our urban forest in order to preserve and enhance this valuable community resource for the good of the environment, the economy, and the health and well-being of current residents and future generations.

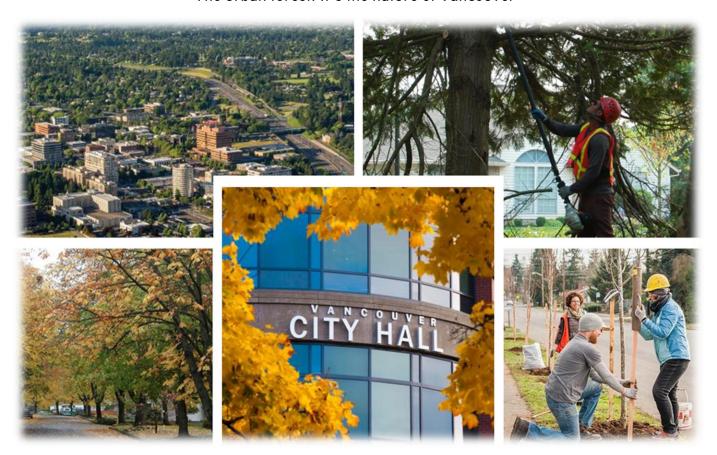
Vancouver is well-positioned to fully realize this vision...

...The city is uniquely situated in a landscape of uncommon beauty – the Columbia River, Vancouver Lake, Burnt Bridge Creek Greenway, Mt. Hood and Mt. St. Helens, and the surrounding National Forests create its landscape context within the coastal temperate rainforest. Mild climate, abundant water and fertile soil all contribute to a lush and verdant environment.

...The Pacific Northwest on the whole is a progressive, cutting-edge place to live, with a high level of environmental awareness. Vancouver residents recognize the value of nature and are becoming more and more focused on sustainability.

This vision will be achieved not just by public agencies, but by homeowners, neighborhoods and businesses, all looking not just near term, but 10, 20, 50 and even 100 years into the future and working together on multiple levels to improve the quality of life by starting, literally, from the ground up – by planting and taking care of their trees.

The urban forest: It's the nature of Vancouver



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EXECUTIVE SUMMARY



OVERVIEW

The City of Vancouver with an approximate population of 190,000 people, is located in Clark County in southwest Washington, directly across the Columbia River from Portland, Oregon. The city comprises approximately 52 square miles and is experiencing significant population growth, mainly due to people moving to the region. Future annexation of the urban unincorporated area of Clark County will result in Vancouver nearly doubling in both land area and population.

The City of Vancouver has a long history of urban forestry efforts that support growth, restoration, enhancement, protection, and stewardship of the city's trees. This Urban Forestry Management Plan (UFMP or Plan) is an update to the 2007 plan and it integrates with past plans, programs, and policies and involved extensive internal and external engagement. The Urban Forestry Management Plan is a critical component to sustainably and equitably managing and growing the city's urban forest canopy cover.

The urban forest consists of trees, lower vegetation, open green spaces, and associated natural resources located throughout the city. They include street trees, city parks, natural areas and open space, trails and greenways, gardens, landscaping, retention areas, green infrastructure, and much more.

Each tree within the urban forest provides valuable ecosystem services and benefits to the community. The overarching goal of urban forestry management plans is to maximize the long-term benefits of trees while addressing tree issues and risks both sustainably and equitably. A sustainable urban forest can be defined as "the naturally occurring and planted trees in cities which are managed to provide the inhabitants with a continuing level of economic, social, environmental and ecological benefits today and into the future" (Clark and Matheny et al. 1997).

Urban forests are increasingly important to urbanized areas and the people who live and work in these built landscapes. Trees offer many benefits, some of which are directly identifiable and quantifiable, and others that are experienced. Vancouver's urban forest addresses many of the challenges facing growing and changing urban areas. The city's trees reduce surface temperatures and energy costs, improve water quality and reduce stormwater volume and the resulting flooding

that can occur, increase property values, improve air quality, mitigate the effects of climate change, provide wildlife habitat and support biodiversity, and improve human health and well-being among a myriad of other benefits and services.

Vancouver's urban forest canopy is living infrastructure that shades nearly 19 percent of the community and provides benefits valued at \$44 million and a structural / replacement value of nearly \$500 million.

The City's legacy of trees continues to grow. Caring for Vancouver's urban forest is an important part of growing a sustainable, healthy, and vibrant city. Urban forests and community health are inextricably linked; the better an urban forest, the greater a community's health. A community that is engaged with its urban forest will responsibly plant, care for, and nurture its trees, while inspiring others to do the same and supporting the City's urban forest management program. A thriving urban forest is only possible through civic commitment and partnerships shared by all.

IMPORTANCE OF THIS PLANNING EFFORT

Vancouver is a community that recognizes its trees as one of its most valuable resources and with this Urban Forestry Management Plan, has dedicated itself to the preservation, proper maintenance, and continued enhancement of the urban forest to support sustainability and equity. The trees throughout Vancouver are an asset that bring value and benefits to the community.

Unfortunately, the trees comprising the urban forest suffer from the rigors of urban life, including pests and diseases, the current and changing climate, air pollution, compacted soils, limited growing spaces, and limited resources. To overcome such rigorous conditions for the city's trees and reap the benefits of these, our most valuable assets, the care of the urban forest must be strategically and efficiently planned and cared for.

This Urban Forestry Management Plan aligns with the City's Comprehensive Plan, the Comprehensive Plan for Parks, Recreation and Cultural Services, and the Climate Action Framework. It builds upon the policies and goals in these plans and seeks to secure adequate tree management levels and garner the enabling support through staffing, funding, the community, and policy. Adequate tree management includes efficient and effective tree care, bolstered tree plantings to maintain age and species diversity in the public tree population, the equitable preservation and enhancement of canopy coverage citywide to enhance the character and aesthetics of neighborhoods, and exemplary stewardship of the forest from all who live and work in Vancouver. The Plan must be regarded as both a long-range policy guide and a living document that will respond to changing conditions over its life. It requires a close partnership between policy makers, staff, and the community. Adoption of this Plan enables the city to accomplish these objectives.

The following provides an overview of the UFMP following the adaptive management framework that examines the baseline conditions, the desires for the urban forest, the roadmap to achieve the vision, and the process for monitoring and updating the Plan. By utilizing this framework, urban forest benefits can be maximized and the challenges that lie ahead can be effectively and efficiently planned for and managed.

WHAT DO WE HAVE?

- ❖ 18.9 percent tree canopy cover citywide (6,066 acres).
- * 12,263 public trees inventoried, 15 percent are Citymaintained.
- An estimated 99,000 trees exist along public streetscapes and in maintained areas of parks and public facilities.
- * The urban forest provides \$44 million in ecosystem benefits and has a structural value estimated at nearly \$500 million. The citywide tree canopy sequesters over 25.3 million pounds of carbon annually.
- * The public tree population provides \$9.9 million in ecosystem benefits. Arbor Day Foundation estimates 48 pounds of carbon are stored per year per mature tree.
- * For every dollar spent on urban forest management, there is a \$4.12 return on investment.
- ❖ The Urban Forestry (UF or Urban Forestry) Program is staffed with 4 full-time employees, has acquired 2 additional positions, utilizes AmeriCorps staff, and has a 7member Urban Forestry Commission.
- Urban Forestry conducts community engagement, longrange planning, tree permitting, maintenance and management services, development plan reviews, among other core services to support the urban forest and community's needs.
- ❖ The budget and expenditures for Urban Forestry in 2022 was \$1.5 million including volunteer hours valued at \$60,000.
- * The city has ordinances for public street trees (Vancouver Municipal Code Chapter 12.04 Street Trees) and private trees (Chapter 20.770 Tree, Vegetation, and Soil Conservation).

WHAT DO WE WANT?

- * A total of 44 City staff representing 4 departments were engaged in the planning effort.
- * 25 external stakeholder groups were surveyed to gather their insights, priorities, and desired outcomes for the Plan.
- Residents of the city were educated and engaged through website content, an online public survey, news media and online videos, social media, public meetings, and other mediums.
- Internal and external engagement efforts uncovered shared priorities and desired goals relating to increasing tree canopy cover and tree equity, improved tree regulations, planting for sustainability and resiliency, proactive public tree maintenance, and more public engagement opportunities and events.
- * A citywide tree canopy goal of 28 percent by 2030 was established and alternative approaches were provided such as 28 percent canopy in 25 years (2047).
- The Urban Forest Audit conducted to develop the Plan scored Vancouver at 75 percent out of 100.

HOW DO WE GET WHAT WE WANT?

Goal 1: Proactively manage public trees, continue to grow and expand a healthy canopy to achieve the 28% citywide canopy goal, maintain public safety, and optimize urban forest benefits.

Objective 1.1) Make data-driven management decisions.

Strategy 1.1A Update and maintain the public tree inventory.

Strategy 1.1B Utilize current and future canopy assessments.

Strategy 1.1C Stay current with industry research, tools, technology, and innovation.

Objective 1.2) Sustainably manage the public tree population.

Strategy 1.2A Align staffing levels with the needs of the urban forest and the community.

Strategy 1.2B Establish and implement a proactive pruning cycle and management program for City-maintained trees.

Strategy 1.2C Ensure newly planted trees receive post-planting care and young tree training.

Objective 1.3) Establish a strategy for increasing tree canopy cover through City and public efforts.

Strategy 1.3A Formally update the Tree Planting Initiative.

Strategy 1.3B Increase citywide tree canopy cover.

Strategy 1.3C Grow a sustainable and resilient urban forest.

Objective 1.4) Effectively manage tree risk.

Strategy 1.4A Develop a Risk Tree Management Plan.

Strategy 1.4B Institute a formal rotation for risk tree inspections.

GOAL 2: Achieve environmental justice through a partnership with the City and its residents to improve well-being, human health, local economies, and urban forest sustainability.

Objective 2.1) Create an urban forestry public outreach program that addresses all communities.

Strategy 2.1A Maintain Tree City USA recognition.

Strategy 2.1B Maintain active communications with diverse audiences.

Strategy 2.1C Provide education and training workshops.

Strategy 2.1D Implement program services through the lens of environmental justice.

Objective 2.2) Increase capacity through trained citizens and community partners.

Strategy 2.2A Expand partnerships and the Neighborhood Tree Stewards program.

Strategy 2.2B Coordinate Plan implementation and community engagement with the Urban Forestry Commission and local partners.

Strategy 2.2C Effectively manage volunteers and events.

GOAL 3: Strengthen policies for preserving the environmental benefits, management, and the character of Vancouver's urban forest.

Objective 3.1) Strengthen policies for protecting the urban forest.

Strategy 3.1A Protect trees during construction projects.

Strategy 3.1B Apply a no-net-loss approach to tree canopy cover.

Strategy 3.1C Use tree canopy assessment data for tree management policies.

Strategy 3.1D Update and strengthen tree-related ordinances, design standards, and protocols.

Objective 3.2) Improve workflows and operations for sustainable urban forest management.

Strategy 3.2A Enforce tree regulations.

View the Long-term Framework section to view the strategic actions and additional details.

How ARE WE Doing?

The following provides the results of the Urban Forest Audit conducted in 2022 to inform the goals and strategies in the Plan. The audit framework should be utilized to evaluate progress and success of implementing the Plan. View additional details in the Monitoring section of the Plan.

#	Category Evaluated	Overall (% Achieved)
, 1	Management Policy, Ordinances	96%
2	Professional Capacity and Training	100%
3	Funding and Accounting	75%
4	Decision, Management Authority	100%
5	Inventories	46%
6	Urban Forest Management Plans	58%
7	Risk Management	78%
8	Disaster Planning	71%
9	Standards and Best Practices	80%
10	Community	100%
11	Green Asset Evaluation	50%
SC	CORE	78%

Based on the urban forestry consultants' experience in performing the audit for similar projects and cities, Vancouver scored higher than the average for 15 cities with 78 percent compared to 67 percent. While Vancouver has a higher overall score, the City scored lower than the average for the Inventories and Green Asset Management categories. Also, categories that scored 90 percent or greater do not indicate that there is no further action required. Maintaining those strengths and adjusting to changing conditions is required in order for the City to sustain these high scores.

Strategies and actions align with the Urban Forest Audit categories to enable the City to revisit and update the rankings to generate a new score that can be incorporated into the Urban Forestry Program's annual report and work plans.

A CALL TO ACTION

The urban forest is an important green infrastructure asset for neighborhoods across Vancouver. However, the capacity of urban forests to support healthy and resilient communities is constrained and challenged by stressors such as climate change impacts, urban development pressures, altered soils, invasive species, pests and diseases such as emerald ash borer, and resource shortages. Now more than ever there is a critical need to sustain large, healthy, genetically appropriate trees on public and private land through long-term planning and budgeting, inclusive decision-making, and strategic policy development that supports adaptive management. Thus, comprehensive urban forest support must extend well beyond tree planting initiatives.

Management of Vancouver's urban forest should be a shared priority among its citizens, community groups, institutions, and City departments. All of these groups have important roles to play. Successful management frameworks must recognize that the urban forest is part of a complex system that includes the built environment and is influenced by human activities and policies and practices that shape Vancouver. Furthermore, decision-making must be made in the context of future uncertainty associated with climate change. With this understanding, along with the input from staff and residents of Vancouver, the Urban Forestry Management Plan was developed with these guiding principles that should be applied to the implementation of the Plan.

- Recognize that the trees of the urban forest are more than aesthetic enhancements.
- Recognize trees as the backbone of the urban ecosystem and an essential part of the community's green infrastructure.
- Promote the health and growth of the urban forest by following scientifically established best management practices for tree selection, planting, watering, and pruning.
- Promote a robust urban forest through policies and practices that reduce its vulnerability to known diseases or pest infestations, and future threats, including the anticipated effects of climate change.
- Engage in a continuous process of long-range planning for the growth and maintenance of the urban forest.
- Promote public appreciation of the urban forest through educational outreach programs.
- Support local businesses, institutions, organizations, and individuals in their efforts to grow and maintain the urban forest through community education.
- Proceed in a manner that is inclusive and transparent.





BACKGROUND

PLAN PURPOSE

An Urban Forest or Urban Forestry Management Plan ("UFMP") is a long-range action plan that coordinates the management and administration of the urban forest. A UFMP is a roadmap that creates a shared vision for the future of the urban forest. It is a detailed plan that coordinates the roles and responsibilities to proactively and effectively manage the urban forest and provide for maximum, long-term equitable benefits to the community. The main tenets of this Plan focus on ensuring public safety, increasing operational efficiencies, facilitating short- and long-term sustainable urban forest planning, validating budgets and programs, ensuring equitable distribution of green resources and services, and standardizing methodology for asset management of the urban forest.

The planning process consisted of two phases; the needs assessment conducted as part of the planning process and the development of goals, objectives, and strategies in the Urban Forestry Management Plan. The first phase establishes a baseline from which short- and long-term strategies can be developed and monitored over time. The needs of the urban forest and the programs that manage it were evaluated through an audit of existing conditions and operations to establish a baseline for measuring progress. This diligent approach to Vancouver's urban forest management gauges the city's readiness and available resources to achieve optimal levels of urban forest management and sustainability. Through this iterative approach, a comprehensive understanding was gathered of the urban forest, the programs that manage it, and the community that benefits from and shapes it to inform strategic goals and actions.

In adhering to best management practice as framed by guiding principles, the urban forest stands a chance of being a sustainable and resilient resource. This will require an integrated ecosystem management approach. That system is based on the recognition that the urban forest is a resource which should be viewed as a tangible asset which confers broad benefits to all residents of the City of Vancouver and complements the biodiversity values of the surrounding natural environment. Urban forests face unprecedented challenges in a warming environment with ever expanding development needs. In order to preserve the urban forest and the myriad benefits conferred, the residents of Vancouver will need to be vigilant and remain committed to sound environmental standards which will ensure that generations to come will enjoy the same. If Vancouver is to be a leader and environmental champion, the stewardship of its green infrastructure and the fundamental role played by trees in that ecology is paramount. This 25-year Urban Forestry Management Plan is an important piece of that larger mission. All community stakeholders should be involved in bringing this to fruition and safeguarding the future of trees in our neighborhoods.

Prior to settlers and colonization to the area currently known as Clark County, this land was cared for by indigenous peoples for thousands of years. At the time that colonization began, this area of Southwest Washington was occupied primarily by the Chinook and Cowlitz tribes. Additionally, countless tribes from across the Pacific Northwest came to this area to trade with one another by using the Columbia River and its adjoining waterways as an intricate network of trade routes. For millennia, their communities thrived while maintaining a balanced, sustainable relationship with the natural world. These values were passed down from generation to generation and are still practiced by indigenous groups today, including the Cowlitz and Chinook. We pay our respects to these peoples, both past and present, by coming together to protect and honor the last legacies of the great natural areas that once dominated this region (Source: City of Vancouver, WA). The creation of the 2023 Urban Forestry Management Plan included engagement with local indigenous groups and any feedback received was incorporated into developing the Plan's vision and goals for sustaining and expanding the tree component of the natural environment.

PLANNING APPROACH

This Urban Forestry Management Plan ("Plan" or "UFMP") is an update to the 2007 Urban Forestry Management Plan. This update will set the stage for future actions and efforts that will ensure the long-term health, management, equitable distribution of benefits, and resilience of the trees that comprise the urban forest. Vancouver's Urban Forestry Management Plan provides the framework for making incremental improvements with the current resources available that will lay the groundwork for the City to accomplish the ambitious goals over the life of this Plan.

The purpose of the 25-year Urban Forestry Management Plan is to answer the fundamental components of adaptive management: what do we have, what do we want, how do we get what we want, and how are we doing. Developing the Plan required input from City staff, stakeholders, residents, data sources, thoughtful analysis, a coordinated vision, and time.

A) What do we have?

The first step of the process is to complete a baseline assessment of the urban forest, the resources that manage it, and the people that influence and benefit from it. The elements completed in the planning process provide the foundation for setting goals and measuring progress.

D) How are we doing?

The City needs to continually monitor progress towards the vision and goals. The Urban Forestry Management Plan includes guidance for implementing actions. The planning approach for this Plan provides the framework for continual monitoring and evaluation of efforts using the U.S. Forest Service's Urban Forest Audit System. Updates to this audit will inform any necessary changes to strategies in an adaptive management approach.

B) What do we want?

The Plan is shaped by knowing what the urban forest needs, the resources required to manage it, and what the community wants. This was informed by public engagement through websites and social media, surveys, online videos, presentations, staff and stakeholder interviews, and development of the urban forest vision and supporting goals.

C) How to get what we want?

goal, strategy, and action framework lay out the roadmap to achieve a shared vision that supports the needs of all members of the community. Recommended actions and the associated targets are strategic, measurable, attainable, realistic, and time-bound (SMART) and have been developed through extensive research, analyses, consultations, engagement, benchmarking research, and gap analyses during the planning process.

PUBLIC PARTICIPATION

Prior to the development of Vancouver's Urban Forestry Management Plan, the City's Urban Forestry Program in the Public Works Department along with supporting staff worked with departments, partners, and the community to identify the needs of the urban forest. Based on the discussions, an internal Community Engagement Strategy was created to guide public outreach and education over the course of the Plan's development.

The public engagement sessions consisted of an online survey, news articles, social media posts, City website content, email listservs, informational online videos, presentations with the Urban Forestry Commission, and a dedicated project website hosted on the Be Heard Vancouver platform. From these sessions, it is estimated that at least 7 percent of the City's population was engaged in the planning effort.

Feedback received through these efforts was used to produce a draft Plan with a shared vision for the urban forest. The team then shared draft goals, strategies, and actions with City staff, key stakeholders, and the residents of Vancouver to ensure initial input was accurately captured. In March 2023, a 30-day comment period which included an in-person open house on March 18th was held for the public to weigh in on the first draft of the Plan.

Within the final draft Plan, action priorities were developed to provide technical guidance for City departments that are relevant, accessible, and tangible to the community.

STAFF AND STAKEHOLDER PARTICIPATION

To inform the Plan, a series of meetings and interviews were conducted with City staff (44 staff representing 4 departments) and traditional and non-conventional stakeholder engagement occurred throughout the planning process. In the process, a total of 44 external stakeholders were engaged representing 25 unique agencies, organizations, or companies in the Vancouver region.

When stakeholder engagement is done effectively, it improves communication channels between parties, creates and maintains support for the Plan, gathers information for the Urban Forestry Program, reduces the potential for conflict or other issues, and enhances the reputation of the program and ultimately, the Plan. Effective communication with stakeholders not only ensures they are aware of the objectives and finer points of a plan, it also serves to help the program understand those who will be affected by the Plan, how they will access and interpret information from the program, allows the program to anticipate how stakeholders will respond, and builds a support system within City departments to collectively implement the plan.

PLAN FRAMEWORK

URBAN FORESTRY MANAGEMENT PLAN FRAMEWORK

PLANNING PROCESS

An examination of the

- Urban Forest Resource
- Resources for Management
- Community Frameworks



MANAGEMENT PROGRAM

An analysis of and guidance for programs managing the urban forest

- Management
- Sustainability
- Levels of Service
- Maintenance
- Engagement



Objectives and Actions

URBAN FOREST VISION

Represents City principles and the values and priorities of a diverse community.



GUIDING PRINCIPLES

Further refines the vision statement based on City and resident values and priorities.



GOALS, IMPLEMENTATION, & MONITORING



The guidance to achieve the urban forest vision with:

- · Goals, Objectives, Actions
- Targets & Implementation Schedule
- Monitoring Approach

The primary framework of this Plan supplements the City's Comprehensive Plan's vision statement— "...We are dedicated to preserving our heritage and natural beauty..." and "...We are the most livable city in the Pacific Northwest..."— and represents the diverse values and priorities unique to each community, resident, and property owner within the city. The Plan's framework begins with the vision statement that reflects the values of these stakeholders and identifies the optimal state of Vancouver's urban forest over the 25-year planning horizon. To achieve the vision of a healthy, sustainable, and equitable urban forest, guiding principles are defined and supported by the Plan's goals, objectives, and recommended actions.

VANCOUVER'S URBAN FOREST VISION

Vancouver's urban forest is a healthy, dynamic, diverse, and cohesive ecosystem that is valued and cared for through community stewardship because it balances economic vitality with the conservation of natural resources now and for future generations.

GUIDING PRINCIPLES

Green Asset Management Trees are vital components of the community to be thoughtfully managed.

Health and Sustainability The urban forest grows sustainably through Best Management Practices and shared commitments.

Program Efficiencies and Fair Policies Long-lasting improvements to the urban forest are achieved with improved levels of service and sound policies, protocols, and standards.

Preservation and Resiliency Continuous process of long-range planning and management enhances and protects the urban forest for future generations.

Community Engagement The growth and management of the urban forest is informed by education and engagement that is equitable, inclusive, diverse, and transparent.

Using the foundation of sound principles that support a vision which captures the values of all stakeholders, the City will conduct urban forest management activities and services that recognize trees as not only aesthetic enhancements to communities but also as essential to human health and well-being. Management of the trees in Vancouver will be in recognition of the urban forest serving as the backbone of the urban ecosystem and an essential part of the city's green infrastructure. Encouraging the health and growth of the urban forest will follow scientifically established best management

practices with long-lasting impacts enabled through robust and fair urban forest policies that reduce its vulnerability to known risks and future threats including the experienced and anticipated effects of climate change. These guiding principles will ensure management is engaged in a continuous process of long-range planning for the growth and maintenance of the urban forest and supported by the community. The support and a shared commitment to urban forest sustainability will be attained through consistent and inclusive community education and engagement.



INTRODUCTION

DEFINING THE URBAN FOREST

"Urban forestry can be defined as the art, science, and technology of managing trees and forest resources in and around community ecosystems for the physiological, sociological, economic, and aesthetic benefits trees provide to society." Helms, 1998

Urban forestry is the study and management of a community's urban forest, which is comprised of the trees, shrubs and other vegetation in parks, along streets, in yards, on unbuilt properties and in urban natural areas. Vancouver's urban forest provides important benefits to all residents of the city. Trees within the city significantly improve the livability and vitality of our community and provide numerous environmental services including reductions in air pollution, greenhouse gases, and stormwater runoff.

The concept of urban and community forest management developed in the 1960s out of the death and devastation of the elm tree population throughout the United States due to Dutch Elm disease. The discipline of urban forestry strongly advocates for species and age diversity in a city's tree population so that the elm tree devastation of the 1960s does not happen again. Unfortunately, native and invasive pests and diseases continue to spread. During the last three decades, urban forestry has evolved as researchers and practitioners learn more about the structure and function of trees and their unique role in providing environmental, economic, and social benefits to urban areas.

With recent media and political attention toward climate change issues and the rapid rise of the sustainability movement as a conservative, smart business model, the recognition of the importance of urban trees is at an all-time high. The numerous and varied benefits and services provided by trees in the urban landscape can be the unifying concepts to which new developments are measured and old patterns examined.

Effective management of the urban forest requires recognition of the diversity of land uses and landowners within the urban area and the interactions of policies, programs, and physical development. Whether connected by the logistics of managing urban infrastructure (for example, coordinating maintenance of urban trees and power lines, sewers, sidewalks, and roads), or by contributing to the overall character of the area, the urban forest links "landscape" with "architecture" and becomes an important component of urban planning. With the many benefits provided by urban trees, the management of the urban forest may be linked to an array of other urban initiatives, including community revitalization, economic development, community empowerment and environmental education, in addition to programs for improving air and water quality, stormwater control, energy conservation and recreational opportunities.

A Model of Sustainability for Vancouver's Urban Forest

Unlike timber forests which are managed primarily to produce wood products, urban forests are managed for the services, such as air and water quality improvement, they provide to city residents. The pressures on the urban forest are a direct result of their location in growing urban areas; without planning and management, much of the urban forest would be eliminated. Therefore, management intervention is necessary to keep city trees and urban forest lands sustainable and healthy in perpetuity. Diversity is the key to a sustainable urban forest. An urban forest diverse both in age and in species is more resilient and ensures that no single event, pest, or disease (such as the Dutch Elm Disease and the emerald ash borer pest examples) wipes out a significant proportion of the city's trees at any one time. As a rule of thumb, no more than 10 percent of the urban tree population should be of the same species, no more than 20 percent of any genus, and no more than 30 percent of any family. Some tree species such as Norway maples, sweetgums, flowering plums, and flowering pears tend to be over planted in Vancouver. The focus

of future plantings should limit these species by favoring other quality species and cultivars and native species, which require less water and are better adapted to our climate.

Vancouver's 2023 Urban Forestry Management Plan ("Plan" or "UFMP") proposes measures for sustainable management. The city has a vibrant urban forest— spanning almost 19 percent of the city's land area equal to nearly the surface area of three Vancouver Lakes— that continues to be created, modified, and removed primarily by people. Sustaining it will require ongoing human intervention. The goal of this intervention is a sustainable urban forest— an urban forest that optimizes the benefits of trees while meeting established safety and economic goals. Achieving this requires robust management, diverse funding, adequate staffing, effective policies, and maintenance actions consistent with best practices. The urban forest offers many benefits, some of which are directly identifiable and quantifiable, and others that are experienced. Recognition of the role urban forests play in improving human health and well-being in addition to being critical climate change mitigators continues to increase.

Urban forestry provides each of these benefits in differing circumstances as infrastructure, as part of design and development, and as efficient and productive providers of economic development. In fact, there are very few areas of urban management and its various departments that aren't affected and benefited by the urban forest.

Residents traditionally have indicated that they consider the trees in the community a priority. In urban environments, street and park trees are sometimes the only day-to-day interaction with nature that many residents may enjoy. As Vancouver continues to grow, the urban forest needs a strong advocate. This will happen with the education and support of the city's constituency, staff, and elected officials via an approved Urban Forestry Management Plan. The urban forest is unique in the array of benefits it provides to the community, and a plan will effectively collect and showcase these values.

While a plan is useful in helping educate and ensure future viability, it also will set up useful parameters for the daily operations and care of the urban forest. A fresh look at all urban forestry-related policies currently in place will bring into focus what is necessary for day-to-day activities to ensure long-term viability and safety of the urban forest.

OVERVIEW OF URBAN FOREST BENEFITS

The following benefits and services were gathered and adapted from the Alliance for Community Trees, "Benefits of Trees and Urban Forests: A Research List" (ACTrees, 2011).

CARBON STORAGE



In one year, an acre of mature trees absorbs the amount of CO2 produced by a car driven 26,000 miles.

STRESS REDUCTION

Workers without views of nature from their desks claimed 23% more sick days than workers with views of nature.



CLEANER AIR

Roadside trees reduce nearby indoor air pollution by more than 50%.



WILDLIFE HABITAT



Planting and protecting trees provides habitat for hundreds of birds and small animals.

STORMWATER MANAGEMENT



Contiguous tree canopy is estimated to intercept 4" of rain over 1 acre in a typical year— about 108,000 gallons.

SHADE AND COOLING

Shaded surfaces may be 20–45°F cooler than unshaded areas.



LOWER ENERGY BILLS



Residents and businesses can save up to 50% on hotday energy bills.

SOIL STABILIZATION



Urban trees remove sediment and chemicals from waterways, stabilize shorelines, and minimize erosion.

Figure 1. Overview of the benefits provided by urban forests

Data sources and links: <u>US Forest Service</u>, the Arbor <u>E</u>

VANCOUVER'S URBAN FOREST



ANALYSIS OF VANCOUVER'S URBAN FOREST

OVERVIEW

The City of Vancouver is approximately 53 square miles in size, of which approximately four square miles are water surfaces. Across the city, trees are critical elements of the region's green infrastructure, contributing to environmental quality, public health, water supply, local economies, and aesthetics.

Methods for Urban Forest Analyses

A comprehensive resource analysis was completed to inform the Plan's vision, guiding principles, and goals. This included citywide inventories and evaluations of public trees, a top-down look at urban tree canopy cover, analyses of urban forest threats and vulnerabilities, and an equity assessment on the extent of canopy cover. The datasets included an inventory of over 12,000 public trees and 2,000 potential tree planting sites in public areas across the city, a high-resolution urban tree canopy (UTC) assessment completed in 2021, historical planting and maintenance records, and tree equity as defined by American Forests' Tree Equity Score Tool (TreeEquityScore.org).

Defining the Urban Forest

The urban forest is comprised of trees across all city landscapes. While the Plan primarily addresses public trees, all trees across

ownership types and the care of these trees contribute to overall urban forest health, sustainability, and associated benefits. To present an analysis of the urban forest, tree populations in these landscapes are characterized by the type of setting and land ownership type (public or private) and the responsibility for maintenance (City, property owner, or other).

Public trees are comprised of trees along streetscapes, in medians, backup lots, alleys, parks, open space, and natural areas on Cityowned land. While the City is primarily responsible for the maintenance of trees in parks, natural areas, and medians, the responsibility to maintain street trees is shared between the City and the adjacent property owner. The City's Urban Forestry Program actively supports neighborhoods to organize neighborhood tree plantings and tree care events to reverse the canopy decline experienced over the last few decades.

Framework of this Section

The following sections provide an assessment of the urban forest beginning with a top-down look at tree canopy cover across public and private boundaries followed by a ground-up assessment of public trees and the opportunities and challenges facing all trees in urban areas of the city.



Figure 2. Illustration of the types of trees and ownership

Figure 3. The extent and various landscapes comprising Vancouver's urban forest

THE URBAN FOREST EXTENT AND LANDSCAPES



HISTORY OF VANCOUVER'S URBAN FOREST

The natural environment consists of the non-human-made surroundings and conditions in which living and non-living things exist. It consists of the water, air, earth, and the wildlife and organisms that inhabit the area. Trees are a vital component of the natural environment. They provide habitat and the air we breathe. Trees stabilize soils, cool streams, capture pollutants, and improve water quality. Trees provide food and nutrients for pollinators, birds, mammals, insects, fungi, and microorganisms. Trees are essential to life and have existed long before humans. Over time, the indigenous people of the area utilized these trees for all of the functions and services described above. As development took place over the last century, the expansive forest transitioned to an urban forest where settlements emerged, and human populations grew.

Prior to the introduction of white settlers to the area currently known as Clark County, this land was cared for by indigenous peoples for thousands of years. At the time that colonization began, this area of Southwest Washington was occupied primarily by the Chinook and Cowlitz tribes. Additionally, countless tribes from across the Pacific Northwest came to this area to trade with one another by using the Columbia River and its adjoining waterways as an intricate network of trade routes. For millennia, their communities thrived while maintaining a balanced, sustainable relationship with the natural world. These values were passed down from generation to generation and are still practiced by indigenous groups today, including the Cowlitz and Chinook. We pay our respects to these peoples, both past and present, by coming together to protect and honor the last legacies of the great natural areas that once dominated this region (Source: City of Vancouver, WA). The creation of the 2023 Urban Forestry Management Plan included engagement with local indigenous groups and any feedback received was incorporated into developing the Plan's vision and goals for sustaining and expanding the tree component of the natural environment.

The health of Vancouver's environment impacts the local economy and quality of life. Vancouver's natural environment is typical of an urban area west of the Cascade mountains. Much of the area has been altered by development, but valuable streams, lakes, shorelines, wetlands, and forested areas remain. Major surface waters include the Columbia River, Vancouver Lake and the adjacent lowlands, and Burnt Bridge Creek. Significant wetlands include the Water Resources Education Center Wetlands along the Columbia River, the restored wetlands in the Burnt Bridge Creek Greenway and Columbia Springs, and those near Vancouver Lake. Water quantity and quality is important for fish and wildlife habitat, and human recreation and health. All Vancouver drinking water comes from local groundwater.

Urban development inevitably involves replacement of some forests, grasslands, or wetlands with impervious surfaces such as buildings, roads, and parking lots which do not allow rainwater to pass directly through to the ground. Increasing impervious surface areas increases flooding and decreases replenishment of groundwater. Much of the pollution comes from activities on surrounding land. Stormwater runoff adds pollutants and contaminants to the water supply. Wastes from pets, wild animals, and failing septic systems contribute bacteria. Soils from erosion and fertilizers (containing phosphorus and nitrogen) both cause excess growth of plants and microscopic organisms.

Trees help beautify Vancouver in addition to improving air and water quality, conserving energy by providing shade, and providing habitat for many species. Vancouver's landscape is a reflection of the effort to preserve existing trees and other vegetation and to add new vegetation. Historic trees in the city help preserve its character. Vancouver was named a "Tree City USA" since 1989 and routinely receives the prestigious Growth Award from the Arbor Day Foundation. Tree canopy currently covers 19 percent of Vancouver's citywide surface area. The goal is 28 percent by 2030, an ambitious but achievable goal for the city to mitigate the effects of development and climate change and to equitably distribute the associated benefits provided by our community's trees.

URBAN FOREST STATUS: URBAN TREE CANOPY

The citywide urban forest is measured with high-resolution urban tree canopy (UTC) assessments using various imagery and geographic information system (GIS) processes. The primary goal of this type of assessment is to identify a baseline and benchmark of the city's tree canopy and analyze the land cover class across a range of geographic boundaries. This analysis identifies areas for tree canopy preservation as well as the opportunities for new urban tree canopy cover.

Vancouver's 2021 Tree Canopy Assessment (TCA) utilized 2019 and 2020 high-resolution imagery to evaluate the extent and opportunities for tree canopy cover. Currently, 18.9 percent of the city's land area is covered by the canopy of trees across public and private properties. Another way to look at the extent of this resource— of the 41,040 total land acres¹ in Vancouver, 6,066

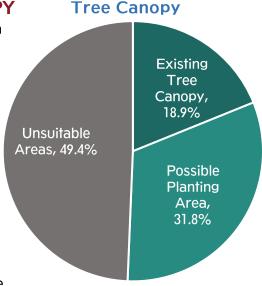
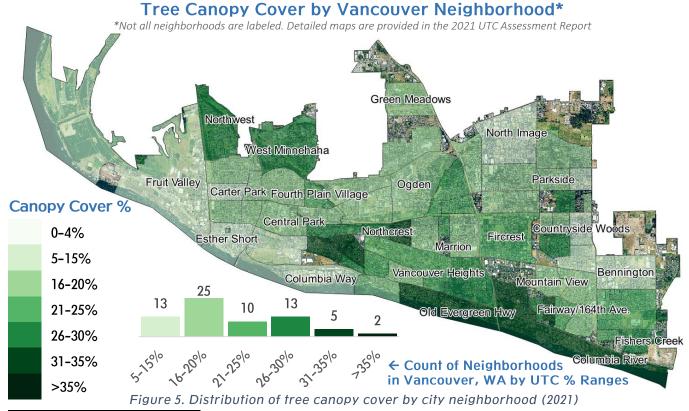


Figure 4. Vancouver's Tree Canopy Assessment results

acres are covered by tree canopy— equivalent to the area of nearly 4,600 NFL-sized football fields. The unsuitable areas covering 49.4 percent of the city refers to vegetated areas where it would be biophysically feasible for tree plantings but undesirable based on their current usage. Examples include recreational sport fields, golf courses, and other open space.

To support local planning efforts, the tree canopy assessment was also summarized by various planning geographies such as city neighborhoods. The map below shows how the 18.9 percent tree canopy is distributed across neighborhoods. Most neighborhoods have between 16 and 20 percent canopy, two neighborhoods have over 35 percent canopy, but 13 neighborhoods have between 5 and 15 percent canopy.



¹ Vancouver has a total of 33,568 acres of which 31,194 acres comprise land area and 2,368 acres comprise water

Urban Forest: A Closer Look at the City's Tree Canopy Tree Canopy Cover by Land Ownership Type (Public or Private)



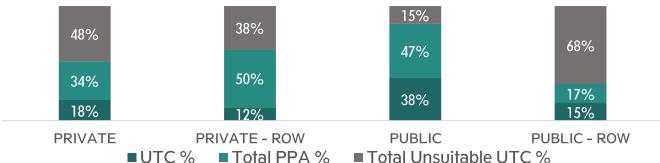


Figure 6. The amount of tree canopy and available space by land ownership type

Understanding the ownership of the city's tree canopy cover is critical for effective management. The 2021 assessment examined urban tree canopy (UTC) cover, possible planting area (PPA), and unsuitable area (e.g., turf within sport fields) across all publicly- and privately-owned land. It was found that a higher proportion of tree canopy cover is located on public land (38 percent) compared to private land (18 percent). Public land also has the highest percentage of possible planting space with 47 percent compared to 34 percent for private land. The public rights-of-way (ROW) have 17 percent available as possible planting space though additional evaluations should be conducted to determine feasible and preferable sites for new trees. The high percentage of public right-of-way land that is unsuitable is likely due to the existing sidewalks and other impermeable surfaces though with added effort and resources, some of these areas may be converted into plantable space. Regarding tree canopy and possible planting space on private land, the City may encourage tree plantings through various programs and enforce plantings and preservation through City regulations.

Tree Canopy Cover by Zoning Types

Tree Canopy and Possible Planting Space by Zoning Type

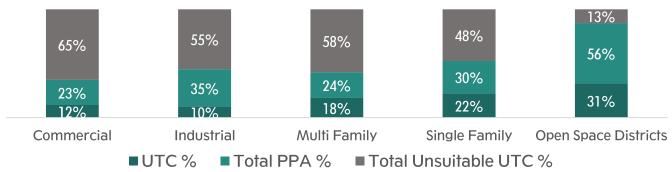


Figure 7. The amount of tree canopy and available space by zoning type

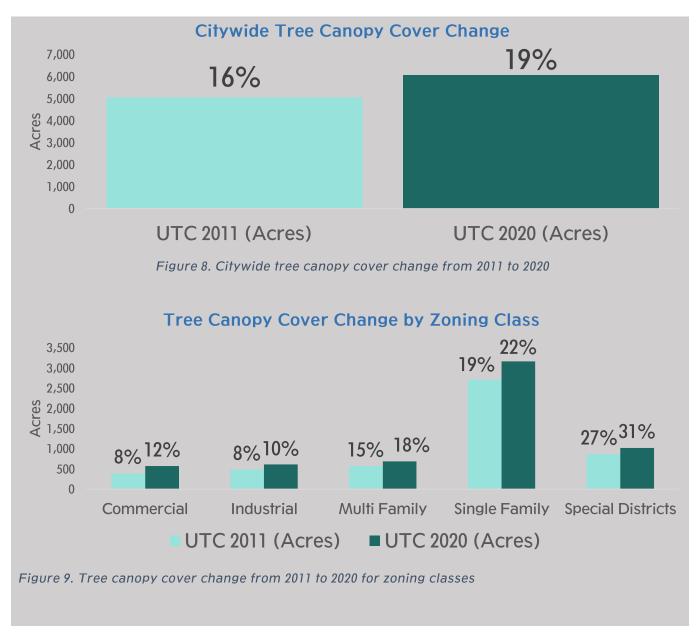
The zoning types in the city have an impact on the tree canopy and opportunities for preservation and expansion. Some areas that have a higher density zoning may have less space for tree plantings. Title 20 of the Vancouver Municipal Code regulates zoning by requiring certain landscape and tree preservation requirements depending on the zoning classification and project. The 2021 canopy assessment identified open space districts with having the highest proportion of existing urban tree canopy (UTC) with 31 percent and industrial zoning with the lowest proportion at 10 percent. Open space also has the highest proportion of possible planting area (PPA) though considerations must be made into the intended use before planting trees. Single family zoning has 22 percent tree cover but has the greatest amount of tree canopy with 3,159 acres. The large amount of tree canopy on private land emphasizes the need for community education, programs, and updates to tree-related regulations as needed to reflect the goals of this Plan.

Urban Forest: Tree Canopy Cover Change

Assessments of canopy cover change over a time period such as 10 years can provide a measure of the performance for various urban forest management activities such as tree preservation, maintenance, planting, and community education. By looking at various geographies and the canopy change within, the possible causes of canopy gains and losses can be explored and possibly addressed through strategies in this Plan or by adjusting regulations and best practices.

For Vancouver, tree canopy cover was assessed based on 2019/2020 and 2011 imagery. Based on the analysis, there was an

increase in Vancouver's tree canopy over the eight to nine-year study period. Throughout the city, the average canopy cover increased from 16 percent in 2011 to 19 percent in 2019/2020. Tree canopy increased approximately 1,027 acres citywide, yielding a 3 percent raw increase (20 percent relative to 2011 acreage) since 2011. Although there was an overall increase in canopy, further analysis revealed that there were also some losses in the city due to development expansion and tree removals. The following provides a summary of canopy cover change though more information is provided in the 2021 Urban Tree Canopy Assessment Report.



Examples of Tree Canopy Cover Change

Tree canopy change can happen for a variety of reasons. Gains in canopy are the result of new tree plantings and existing tree growth, whereas losses can be caused by natural tree mortality, improper or inadequate tree maintenance leading to decline, and tree removals due to development. For this reason, gains in canopy typically happen at a slower rate and can be more difficult to visualize, while losses can seem much larger when whole areas of trees are removed. Even in places where the net canopy percentage remained relatively unchanged, gains and losses are always occurring. To get a clearer understanding of the full picture, examples of gains and losses from every zoning category were compiled.

Tree Canopy Cover Change Examples

Zoning

COMMERCIAL

Commercial areas in Vancouver consist of general, neighborhood, and mixed-use commercial areas, including the City Center.

INDUSTRIAL

Light, heavy, mixeduse, and office commercial industrial zones make up the industrial zoning category.

MULTI-FAMILY

The multifamily zoning class includes medium- and high-density residential areas (18, 22, 30, and 35 du/ac).

SINGLE-FAMILY

The single-family zoning class includes all of Vancouver's low-density residential zones (2, 4, 6, and 9 du/ac).

OPEN SPACE DISTRICTS

Open space districts, including Vancouver's parks, greenway open space, and natural areas.

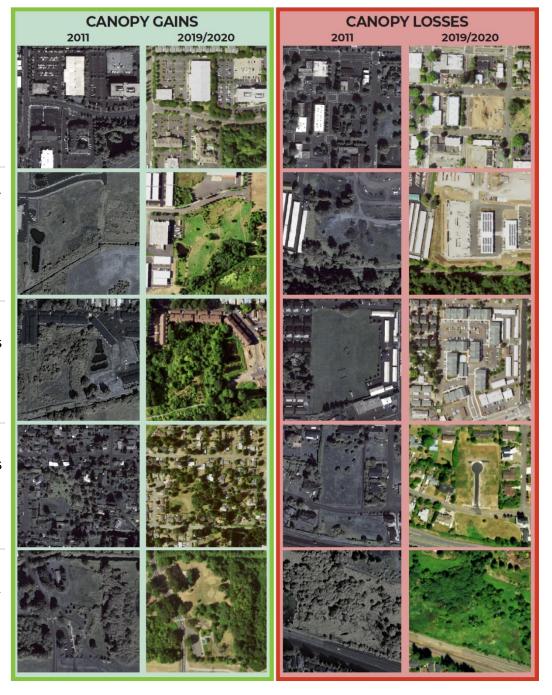


Figure 10. Examples of possible causes for canopy gains and losses by zoning type

Urban Forest: Tree Canopy Equity

Tree canopy cover is often not distributed equitably across city landscapes and ownership types. The American Forests organization created the Tree Equity Score (TES, www.treeequityscore.org) tool to measure tree equity across 150,000 U.S. neighborhoods and 486 municipalities in urban areas. Each community's TES indicates whether there are enough trees for everyone to experience the health, economic, and climate benefits that trees provide. The scores are based on how much tree canopy and surface temperature align with income, employment, race, age, and health factors. A 0- to-100-point system makes it easy to understand how a community is doing. With the knowledge the score provides, Vancouver's community leaders, tree advocates, and residents alike can address climate change and public health through the lens of social equity, attract new resources, factor the scores into technical decisions, guide implementation of the 2023 Urban Forestry Management Plan, and track progress toward achieving tree equity. A score of 100 represents tree equity. Based on a 2023 analysis, Vancouver's tree equity score is 78 out of 100.

Tree Equity Scores by Census Block Groups (TreeEquityScore.org)

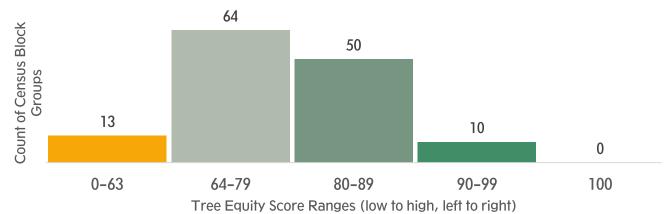


Figure 11. Count of Census Block Groups by Tree Equity Score ranges

Comparison of Tree Equity Scores (TreeEquityScore.org)

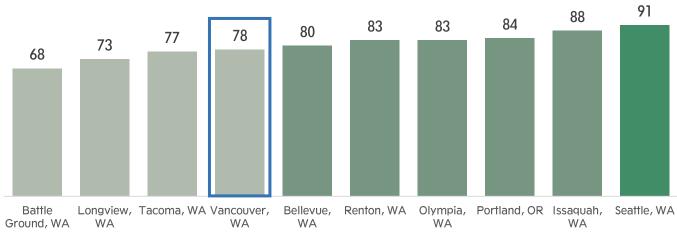


Figure 12. Comparison of tree equity scores (100 = the highest possible score)

As figures 11 and 12 above show, most of the 137 Census Block Groups (CBG) in Vancouver have a Tree Equity Score between 64 and 79 (64 CBGs) or 80 and 89 (50 CBGs), though 13 CBGs have a score between 0 and 63. Compared to other cities in the region with a Tree Equity Score value, Vancouver ranks seventh out of ten with a score of 78 and the average of 81. Seattle has the highest TES with 91 and Battle Ground has the lowest TES score with 68.

Urban Forest: The Effects of Climate Change

Climate change is having a direct effect on the city's urban forest. Increased temperatures and prolonged heat in Vancouver and the Pacific Northwest have a dramatic impact on not only the human population but also the ecology of the area—specifically, trees in urban areas. Urban areas are especially prone to higher temperatures due to the abundance of hard or bare surfaces – such as parking lots, rooftops, and roads – that absorb heat (Figure 13). Limited vegetation and industrial activity can also contribute to what is known as the urban heat island effect. The resulting higher temperatures increase the risk of illness and death from heat stroke and cardiovascular disease and the issues are exacerbated in areas with existing inequities in housing, access to healthcare, and health outcomes.

Urban trees already have an uphill struggle to reach their maximum size and function due to the competition for space, elements of an urban environment, vandalism, pests and diseases, among other factors and stressors. Abnormally high temperatures and prolonged heat can have a negative impact on established trees especially those not acclimated or unable to adjust to these changes. According to the USDA Plant Hardiness Zones, Vancouver is in zone 8b with an average annual extreme minimum temperature of 15 to 20 degrees Fahrenheit. Planting the right trees for the current and changing climate along with the adequate care they require will play a vital role in Vancouver's sustainability and human health.

Changes in local climates are also impacting the wildfire seasons and intensity. Portions of Vancouver's land area are within what is referred to as the wildland urban interface or WUI and as such, vegetation management is essential to wildfire management on both public and private land. Changing climates also influence the abundance and introduction of tree pests and diseases. The urban forest in Vancouver requires constant attention and climate-specific planting and management strategies to ensure the resource is safe, expanding, sustainable, and beneficial to city residents, the environment, and the local economy. Maintaining existing trees and increasing tree canopy coverage are key strategies in the City's adopted Climate Action Framework.

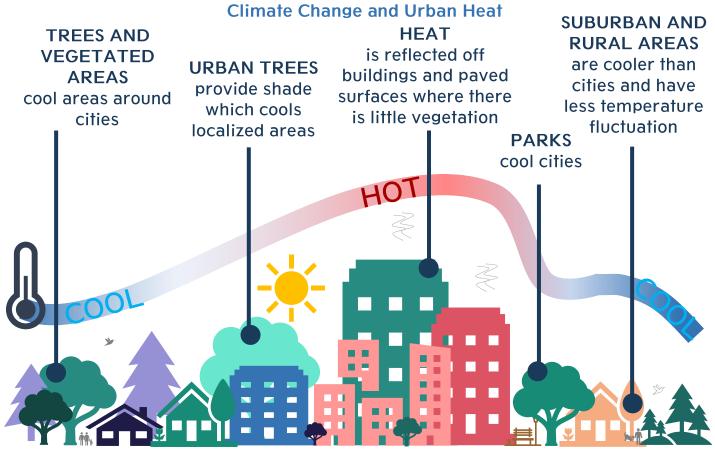


Figure 13. The effects of vegetation and trees on urban heat islands in cities

STATUS OF VANCOUVER'S PUBLIC TREES (PARTIAL INVENTORY)



12,263

PUBLIC TREES INVENTORIED

15% are City maintained

85% are privately maintained

99,000

ESTIMATED TOTAL NUMBER OF PUBLIC TREES

50k Street Trees 30k Park Trees 19k Other Public Trees

Overview

Analyses of public tree populations throughout a city can provide insights into the sustainability, resiliency, and vulnerability of the portion of the urban forest that is typically monitored, regulated, and managed on a routine basis. In the City of Vancouver, it is primarily the adjacent property owner's responsibility to maintain public street trees whereas, the City manages public trees in parks, natural areas, and medians. While the City does not have a comprehensive inventory of all public trees, the Urban Forestry Program and its partners are actively adding and updating an online database as new trees planted or established trees maintained. As of February 2023, the City has inventoried a total of 12,263 public trees of which 15 percent are City-maintained and 85 percent are privately-maintained.

The following summaries are based on the public trees inventoried in the online database. In 2021, urban forestry consultants conducted an inventory of a portion of the public tree population— approximately 2,600 trees on developed park lands. Between the 2016 park tree inventory and the 2021 update, approximately 75 percent of developed parks have a tree inventory. A comprehensive

public tree inventory (i.e., street tree inventory) was outside of the scope of work for the Plan but the sample data can provide insights and talking points for the Urban Forestry Program and its partners to communicate industry standards, best practices, and City regulations surrounding public tree management. In some cases, the inventory sample analysis may be extrapolated to represent the citywide public tree population. Based on benchmarking, regional research, and aerial imagery interpretation, it is estimated Vancouver has 100,000 public trees nearly along streetscapes, in medians, and in maintained areas of public parks (Hauer, et al. 2014).

Note, the data collected and analyzed in the following summaries were derived from analyses conducted in January and February 2023. Public trees are dynamic assets that and change. Tree conditions, grow observations, defects, maintenance needs, and other factors are constantly changing due to the nature of the trees, the growing environment, and the maintenance history. summaries The and associated recommendations are based on the inventory data at the time of analysis.

Public Trees Inventoried in Vancouver (12,263 Trees)

Tree Size Classes (inches)

O-3in

12-18in

18-24in

24-30in

North Image

Revanna Park

Revanna Par

Figure 14. Map of the location and size classes for over 12,000 public trees in the City's online database

Public Trees: Size and Age Distribution

The distribution of tree ages influences the structure of the urban forest as well as the present and future costs. An unevenly aged urban forest offers continued flow of benefits and a more uniform workflow allowing managers to accurately allocate annual maintenance schedules and budgets.

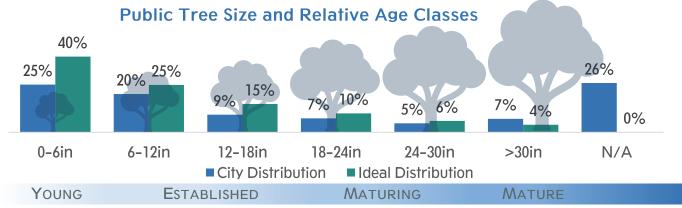
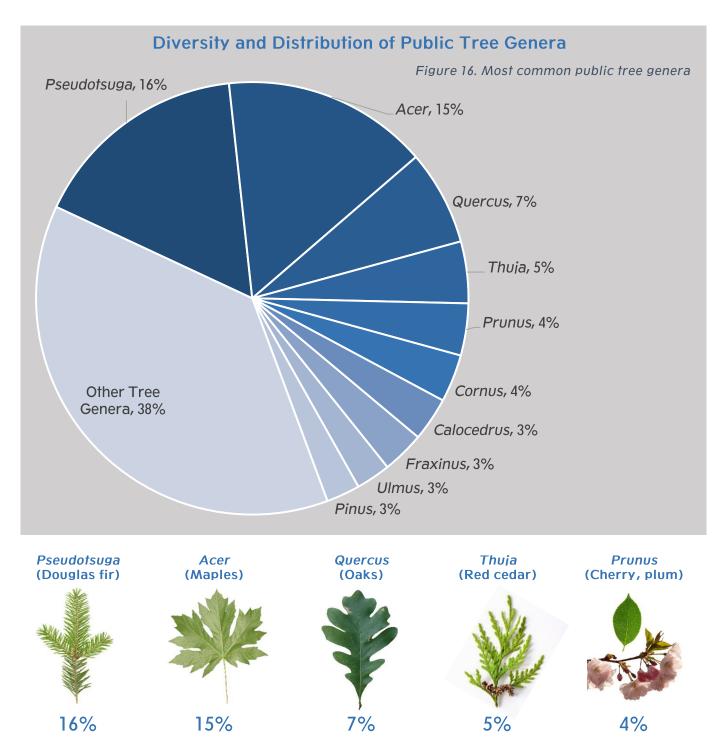


Figure 15. Comparison of the diameter at breast height (DBH) size distribution of Vancouver's public trees to an ideal distribution

Overall, the size and relative age distribution of Vancouver's public tree population are similar to the ideal age distribution. The ideal distribution is based on a street tree study conducted to determine the appropriate proportions of tree sizes for maximizing benefits while keeping maintenance and management costs at a manageable level (Richards, 1983 and 1993). As the figure above shows, 25 percent of the public tree population (3,089 trees) is composed of trees with a DBH (or "diameter at breast height," measured at 4.5 feet above grade) ranging from 0 to 6 inches. This indicates that many trees are young or small-statured. Vancouver should ensure the planting sites allow for larger species where possible. The City's approved street tree and yard tree lists support this future collaboration to plant the appropriate trees for species and age diversity goals.

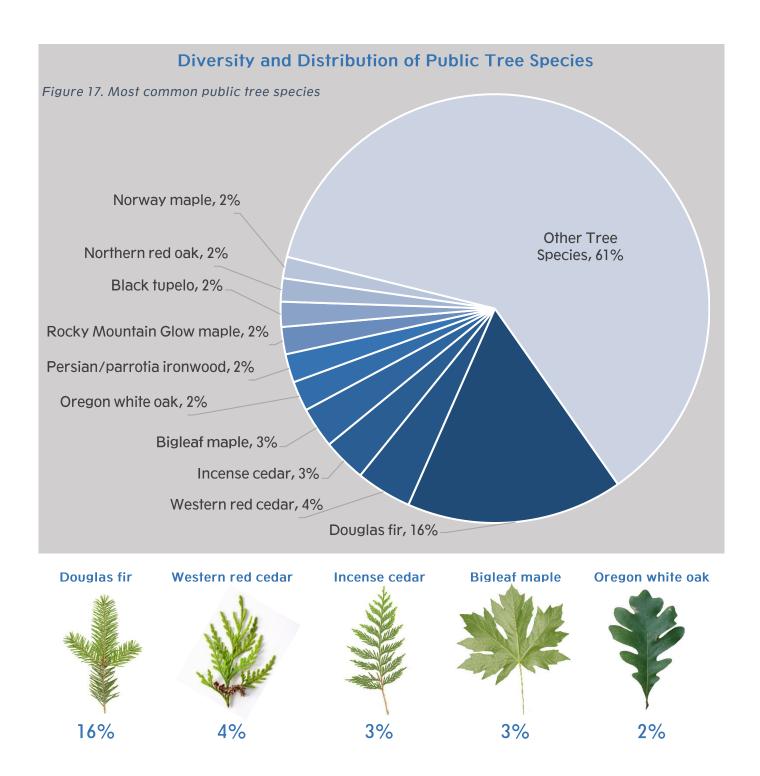
Public Trees: Genus Diversity

Understanding the frequency and distribution of tree genera enables tree managers to get a pulse on the urban forest's resiliency to climate change, pests and diseases, among other challenges facing trees in urban areas. A commonly accepted diversity goal is for no species to account for more than 10 percent of the population, no genus more than 20 percent, and no family more than 30 percent (Santamour, 1990). This rule can be applied at the city, neighborhood, and street level. Based on these principles, no tree genera in the inventoried public tree population is exceeding the thresholds. *Pseudotsuga* (16 percent), *Acer* (15 percent), and *Quercus* (7 percent) are the most common tree genera. The top ten most common genera comprise 62 percent of the public trees.



Public Trees: Species Diversity

Tree species composition data are essential since the types of trees present throughout the city dictate the amount and type of benefits produced, tree maintenance activities required, and budget considerations. The 12,263 public trees inventoried consist of 345 unique species. Douglas fir comprise the highest percentage with 16 percent (2,003 trees), followed by western red cedar at 4 percent (515 trees), and incense cedar with 3 percent (401 trees). The top ten most common tree species comprise 39 percent of the inventoried public tree population.



Public Trees: Condition

Figure 18 summarizes the trees that were assigned a condition rating and shows an example of the canopy health for each respective classification. The data show that nearly half of the trees inventoried are classified as being in "Good" condition, comprising 44 percent or 5,370 trees and 397 trees (3 percent) in "Excellent" condition. A total of 2,557 trees (21 percent) are in "Fair" condition, 3 percent (402 trees) in "Poor" or "Very Poor" condition, and 89 trees (1 percent) are "Dead". A total of 3,448 trees (28 percent) inventoried do not have a condition rating. Note, trees in poor or dead condition may meet the criteria for priority snag habitat as defined by the WA Department of Fish & Wildlife and could avoid removal if such trees do not pose a safety concern or compete with other priorities of the City.

The condition of public trees is influenced by a number of factors such as the tree's age, the location, the history of maintenance and plant health care, and possible stressors that are caused by biotic and abiotic elements. In many cases where a tree's health is rated less than good, defects and observations recorded show mechanical damage (caused by mowers or weed trimmers), trunk decay or cavities, poor structure, dieback, or a combination of these.

Many of these defects causing declining tree health could possibly be prevented or remediated with a proactive pruning program, proper tree and site selection during planting, plant health care (e.g., pest and disease management, watering, mulching), tree protection from construction or mower damage, public education and training, and/or young tree pruning.

The City should continue to educate the public and encourage the use of industry standards and best practices since the majority of public street trees are the responsibility of adjacent property owners to maintain.

Public Tree Condition

Condition	Count	%
Excellent	397	3%
Good	5,370	44%
Fair	2,557	21%
Poor	354	3%
Very Poor	48	0%
Dead	89	1%
N/A	3,448	28%

12,263

Table 1. Summary of public tree condition

TOTAL

Excellent or Good





Poor or Very Poor



Dead



100%

Figure 18. Public tree condition

Public Trees: Relative Performance Index

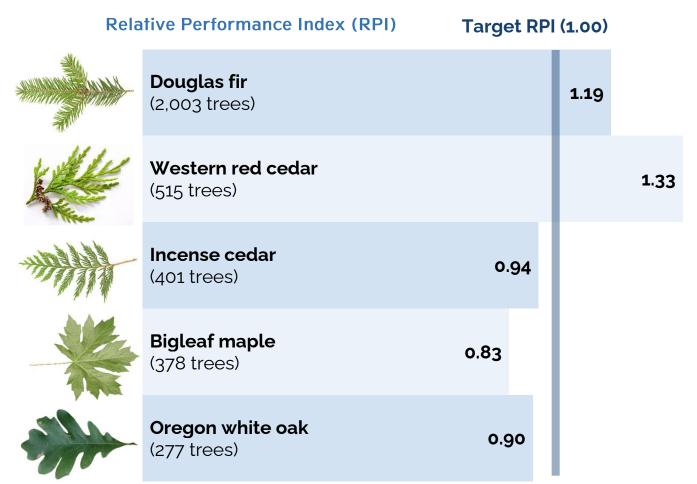


Figure 19. Relative Performance Index of the most common public trees

In addition to understanding the overall condition of the public tree population to inform management strategies, an analysis of performance was also conducted for the five most prevalent tree species using the Relative Performance Index approach. Relative Performance Index (RPI) is a comparison of a species' condition rating of "Good" and the tree population's "Good" rating. Using the percent of Good trees for a given species divided by the tree population percentage of Good trees gives a value of equal to 1, less than 1, or greater than 1. A value equal to 1 means the particular species is as healthy as the overall tree population. A value less than 1 means the species is not as healthy as the overall tree population. A value greater than 1 means the species is healthier than the overall tree population. RPI answers the question of how well a species is performing in terms of health compared to the entire inventoried population.

For Vancouver's inventoried public tree population, Douglas fir and western red cedars are performing better than the overall public tree population. Incense cedar and Oregon white oaks are performing similar to the overall public tree population. Looking at underperformance, bigleaf maples are in the poorest condition of the top five most prevalent tree species. In addition to the top five, the RPI values were calculated for the remaining tree species that comprise the top ten. Persian / parrotia ironwood has an RPI of 0.47, Rocky Mountain Glow maple has a score of 0.74, black tupelo with 0.74, northern red oak with 1.36, and Norway maple with an RPI score of 0.69. These metrics are useful in identifying concentrations of maintenance demand and determining the appropriate tree species to plant in the future.

Public Trees: Observations and Defects

Observations and defects are recorded in the City's database for the public trees inventoried. A total of 3,277 of the 12,263 trees (27 percent) have an observation or defect recorded. Of those trees, there are a total of 7,875 observations or defects recorded. These recordings can assist to further describe or detail the potential causes for a tree's health or condition. A total of 57 unique observation options are available in the City's database.

The table below provides a summary of the observations and defects recorded for Vancouver's public trees. A total of 7,876 observations are recorded in the inventory, with 3,277 trees (27 percent) noted as having at least one observation while 8,986 trees (73 percent) have no observation recorded. Deadwood is the most frequent observation recorded (12 percent or 1,495 trees) followed by poor structure (9 percent or 734 trees), and codominant stems (9 percent or 721 trees).

Of the 7,876 observations made, 53 percent are possibly preventable or mendable meaning the defects or concerns observed

are primarily human-caused. For example, poor structure can be prevented or limited with proper young tree pruning, implementing best practices and standards would prevent or reduce the number of improperly pruned trees, and poor root systems can be prevented by choosing quality tree nursery stock, proper planting, and amending soils. Trees with poor location and/or hardscape damage observations could have been prevented by choosing the appropriate species for the site and ensuring adequate root space. Lastly, adequate mulch rings, growing space, grates, and awareness would reduce the count of mechanical observations. data damage The exemplifies the need for structural pruning of young trees and routine pruning established trees. About 33 percent of the observations recorded could be addressed or prevented with proactive pruning. Since maintaining public street trees is the adjacent property owner's responsibility, education and training relating to industry standards and best practices should be administered to broad audiences.

Public Tree Observations and Defects

Table 2. Summary of the types of observations and defects recorded for public trees

Best Practices	Plant Health Care	Tree Pruning	Tree / Site Selection	Tree Protection	Young Tree Care	Unknown
16%	2%	16%	7%	8%	13%	3%
Improperly Pruned,	Decline,	Deadwood,	Poor Root	Sun Scald,	Poor	Dieback-
Basal Scar, Basal	Canker, Conk,	Dieback,	System,	Trunk Scar,	Structure,	minor,
Decay, Trunk	Fungus,	Hanger,	Lean, Poor	Trunk Wound,	Co-dominant	Crack,
Decay, Root Collar	Pests,	Storm	Location,	Mechanical	Stems,	Crown
Missing, Girdling	Nutrient	Damage	Hardscape	Damage,	Included	Scar
Roots, Branch	Deficiency,		Damage,	Construction	Bark,	
Tear Out,	Insects,		Sidewalk	Damage,	Branch	
Topped, Improperly	Borers		Damage	Lawnmower,	Architecture,	
Installed or				Vandalism,	One-sided	
Mulched				Memorial Tree		



Public Trees: Maintenance Needs

In 2021, urban forestry consultants conducted an inventory of approximately 2,600 public trees. With this inventory, the recommended maintenance was recorded in the database as "Tree Work". A total of 1,384 trees (11 percent of 12,263 trees) were given a recommendation. A total of 20 unique maintenance needs were included as options in the inventory.

Table 4 provides a summary of the maintenance and pruning recommendations for the trees inventoried in 2021. Of the 2,000 trees that were inventoried, 1,384 trees were given a recommended task and a total of 1,725 recommendations were recorded. 89 percent of the trees in the database do not have any maintenance recommendations but the database does have an additional field for maintenance comments that addresses trees outside of the 2021 inventory. All public trees should be routinely monitored to assess for any maintenance needs that may arise in the future.

Crown cleaning, the selective removal of dead, dying, diseased, and broken branches from the tree's crown, was recommended for 40 percent of the trees inventoried and structural pruning accounted for 16 percent of the trees inventoried in 2021.

Properly maintained trees are key to the sustainability of the public tree population and overall urban forest.

Public Tree Maintenance Needs

Maintenance Need	Count	%
Crown Cleaning	781	40%
Prune-Structural	306	16%
Remove Suckers	139	7%
Remove-Girdling Root	128	7%
Remove	79	4%
Monitor	60	3%
Remove Hardware	57	3%
Remove-Hanger	44	2%
Raise	23	1%
Reduce	18	1%
Other Maintenance Needs	90	5%
TOTAL	1,725	100%

Table 3. Recommended maintenance for the 2,000 trees inventoried in 2021

Since the adjacent property owners primarily maintain street trees, it is recommended the City implement an education campaign to address the maintenance needs with owners. Working with property owners to prioritize high risk tree removals and to educate them about the proper maintenance of their trees will ensure a sustainable urban forest for future generations. The City should also consider expanding programs relating to education, training, tree protection, planting, and developing a proactive street tree maintenance program to address inequities in tree canopy by removing the cost of tree care barrier.

Public Tree Maintenance Examples and the Percentage of Public Trees with the Respective Maintenance Recommendation

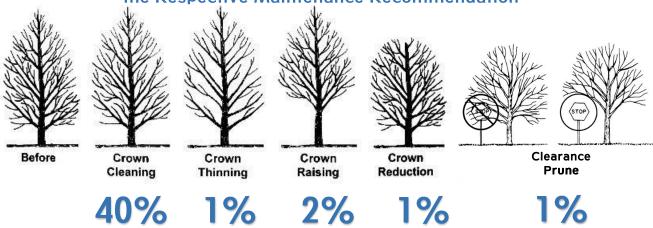


Figure 20. Pruning for clearance (on the left) and types of pruning for established trees (Source: Arbor Day Foundation)

Public Trees: Young Tree Training and Routine Pruning Young Tree Training (Structural) Pruning

Young tree training pruning is performed to improve tree form or structure; the recommended length of young tree pruning cycles is three years since young trees tend to grow at faster rates (on average) than more mature trees. The young tree cycle differs from a routine pruning cycle in that these trees generally can be pruned from the ground with a pole pruner or pruning shear.

The objective is to increase structural integrity by pruning for one dominant leader in most cases for most tree species. Young tree training pruning is species-specific, since many trees may naturally have more than one leader. For such trees, young tree training pruning is performed to develop a strong structural architecture of branches so that future growth will lead to a healthy, structurally sound tree. In addition to training pruning, young trees may also require additional maintenance such as added or amended mulch, watering, added or removed stakes and ties, and/or clearance of debris and litter. These needs can potentially be addressed during young tree training pruning.

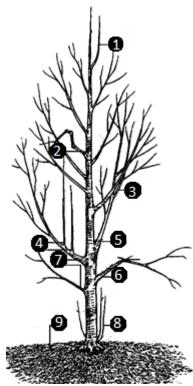
Trees included in the young tree training pruning cycle are generally less than six inches DBH. These younger trees sometimes have branch structures that can lead to potential problems as the tree ages. Potential structural problems include codominant leaders, multiple limbs attaching at the same point on the trunk, crossing/interfering limbs, or dead/diseased/damaged limbs. If these problems are not corrected, they may worsen as the tree grows, increasing risk and creating potential liability.

Within Vancouver's public tree inventory, 3,039 trees (25 percent) are under six inches in diameter, not dead, and are not recommended for removal. These trees may qualify for young tree pruning.

Routine (Proactive) Pruning of Established Trees

Designed to create structurally sound trunk and branch architecture, this "routine pruning" or "proactive pruning" will sustain a tree's benefits to the longest extent possible until the tree naturally reaches a point of senescence— a process of deterioration that occurs as trees age. Proactive or programmed pruning is typically implemented citywide or in prioritized maintenance corridors on a rotation of five to seven years depending on the tree species, density of trees, frequency of pedestrians and vehicles, available budget, and other factors. This means that each tree in the

Young Tree Training



- 1. Prune competing leader
- Prune malformed branches
- 3. Remove crossing branches
- 4. Remove water sprouts
- 5. Remove branches with poor angles
- 6. Prune broken or damaged branches
- 7. Prune temporary branches over time
- 8. Remove suckers
- 9. Apply 2-3" of mulch

Figure 21. Best practices for young tree training and pruning (Source: Penn State Extension)

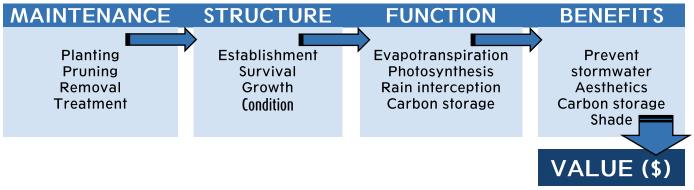
proactive pruning cycle is pruned for clearance, risk, health, and/or structure at least once within the programmed cycle (e.g., five to seven years). The goal with mature trees is to develop and maintain a sound structure to minimize risks such as branch failure. This task is easier provided a good structure was established earlier in the tree's life. When properly executed, a variety of benefits are derived from pruning. Benefits include reduced risk of branch and stem breakage, better clearance for vehicles and pedestrians, improved health and appearance, and enhanced view. 75 percent of Vancouver's inventoried public trees are eligible for the routine pruning program though maintenance responsibility should be evaluated as cost of tree care is a barrier.

Proactive pruning should continue to be a prominently positioned component of Vancouver's Urban Forestry Program for the City-maintained public trees. Proactive pruning plans as well as tree risk mitigation plans (see Appendix B) should complement the City's overall street and park tree management program goals, align with the Urban Forestry Management Plan, and should be fully integrated with the tree planting, plant health care, and emergency response programs to grow an equitable and resilient urban forest.

The level of care or maintenance performed on a planted tree is linked to tree establishment, survival, growth, condition, and longevity. Survival, growth, and condition are closely connected to one another and to the structure of a tree (size, leaf area) and of the urban forest (canopy cover, diversity, age distribution). As a result, tree structure impacts the functions provided by the urban forest and ultimately the level of benefits generated by the tree. Thus, less than optimal maintenance may lead to decreased benefits produced by the urban forest. The benefits lost are the "costs" of not maintaining trees.

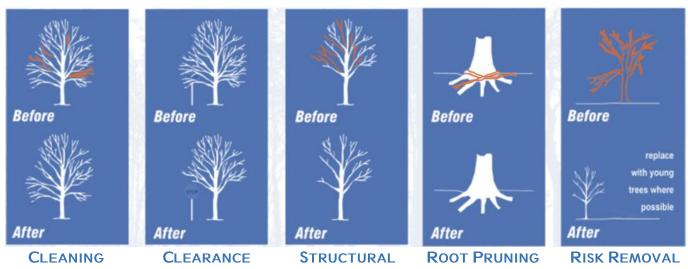
The Impacts of Proactive Pruning

Figure 22. Diagram showing the impacts maintenance has on tree structure, function, and benefits



Examples of Proactive Pruning Techniques for Preventative Maintenance

Figure 23. Examples of techniques for routine tree pruning (Source: Arbor Day Foundation)



Public Trees: Stocking Level

There are numerous opportunities to plant more trees on public property in the City of Vancouver. Historically, the locations of new tree plantings on City-owned rights-of-way in Vancouver have been based on constituent requests, the replacement of dead or dying trees (where feasible), and project-specific plantings (e.g., streetscape improvement projects). As the City updates and adds to its inventory database, locations of possible public tree planting sites should also be collected. Possible planting sites for street trees should consider best practices and City regulations such as tree spacing, distance from intersections and utilities, among other factors. This data can provide information on how the city can grow its urban forest over time. In addition to tree inventory data, the development of a prioritization scheme based on canopy data in the Urban Forestry Management Plan allows the City to begin significant tree planting efforts in high priority areas of the city.

"Stocking" is a traditional forestry term used to measure the density and distribution of trees. For Vancouver's public trees, stocking looks at the total number of available planting sites along the public right-of-way that are identified by an inventory and how many of those sites have a tree present. Note that an inventory of possible public street tree planting sites typically only gathers information on sites that have grass or soil area along the street right-of-way. Additional opportunities may exist among impervious surfaces in public areas that could become planting locations. Moreover, most planting site inventories do not include the potential planting locations in parks or other

civic spaces. Of the total public trees in the inventory, 271 trees were recommended for removal based on the 2021 inventory or are listed as dead. These recommended removals represent a future increase in total number of potential planting sites. An important benchmark in maintaining a sustainable urban forest is to keep it at least 90 percent stocked, such that no more than 10 percent of the existing planting sites remain vacant. The City should make every effort to budget for a comprehensive inventory to ramp up tree planting in the future to keep the public tree population at a 90 percent stocking level and to continue increasing its canopy. Before committing to enhanced tree planting, the responsibility and resources for post-planting care and long-term maintenance need to be identified. It is recommended the City develop a master tree planting plan to guide species selection, timing, location, maintenance needs, and considerations such as additional assessments necessary to identify potential utility conflicts (underground and aboveground). The planting plan should also identify strategies for coordinating tree planting and maintenance with public utility agencies regarding the required clearances from utility installations.

In addition to street trees, planting locations throughout the city were identified and prioritized as part of the urban tree canopy analysis to inform planting priorities beyond public properties. Potential planting locations included all viable areas of the city that were classified as grass/open space, impervious (parking lots), and bare ground in the urban tree canopy analysis.

Examples of Possible Public Street Tree Planting Sites and Respective Widths







SMALL (<5') MED

MEDIUM (5-7') LARGE (>7')

Figure 24. Examples of public street tree planting sites in the tree lawn (images not of Vancouver)

URBAN FOREST FUNCTION, BENEFITS, AND SERVICES

Introduction

While the urban forest is a vital component of a city's infrastructure, it also plays an important role in supporting and improving the quality of life in communities. A tree's shade and beauty contribute to a community's quality of life and soften the often hard appearance of urban landscapes and streetscapes. When properly maintained, trees provide communities with abundant environmental, economic, and social benefits that far exceed the time and money invested in planting, pruning, protection, and removal.

Vancouver's trees provide numerous tangible and intangible benefits such as pollution control, energy reduction, stormwater management, property value increases, wildlife habitat, education opportunities, human health and well-being, and aesthetics. The following sections provide an overview and description of the types of benefits followed by an analysis of benefits for the public tree population and the citywide urban tree canopy cover.

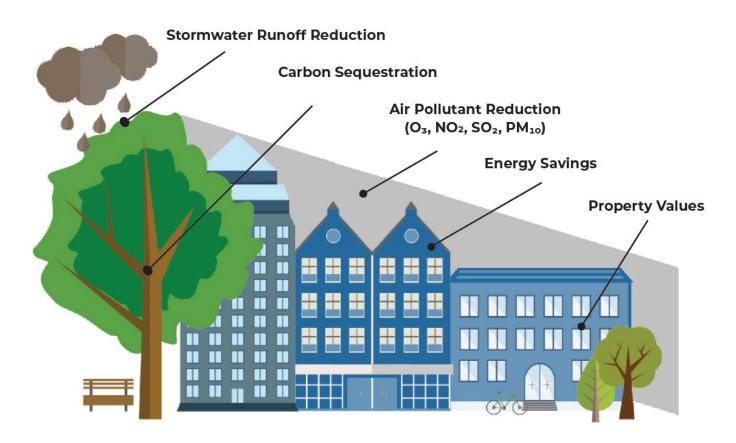


Figure 25. Illustration of the benefits and services provided by public trees

Benefits and Services Defined

The following provides a summary of the common terms and considerations made in regard to urban forest benefits and services (Source: U.S. Forest Service i-Tree tools)

Property Value: Shows the tangible and intangible benefits of trees reflected by increases in property values (in dollars).

Stormwater: Presents reductions in annual stormwater runoff due to rainfall interception by trees measured in gallons.

Air Quality: Quantifies the air pollutants (ozone [O₃], nitrogen dioxide [NO₂], sulfur dioxide [SO₂], particulate matter less than 10 micrometers in diameter [PM10]) deposited on tree surfaces, and reduced emissions from power plants (NO₂, PM₁₀, volatile organic compounds [VOCs], SO2) due to reduced electricity use in pounds. The potential negative effects of trees on air quality due to biogenic volatile organic compounds (BVOC) emissions is also reported. BVOCs are compounds produced by some tree species that can contribute ozone to the local atmosphere. Therefore, the types of trees planted should be considered as some species emit more BVOCs than others.

Energy: Presents the contribution of the urban forest towards conserving energy in terms of reduced natural gas use in the winter (measured in therms [thm]) and reduced electricity use for air conditioning in the summer (measured in Megawatt-hours ([MWh]).

Natural Gas: Monetary increase due to the contribution of the urban forest toward conserving energy in terms of reduced natural gas use in winter by the canopy and branches of trees reducing wind and insulating surfaces.

Therms: Contribution of the urban forest toward conserving energy in terms of reduced natural gas use in winter (measured in therms).

Aesthetic/Other Benefits: Shows the tangible and intangible benefits of trees reflected by increases in property values (in dollars).

Carbon Stored: Tallies all of the carbon dioxide (CO_2) stored in the urban forest over the life of its trees as a result of sequestration. Carbon stored is measured in pounds.

Carbon Sequestered: Presents annual reductions in atmospheric CO_2 due to sequestration by trees and reduced emissions from power plants due to reductions in energy use. This is measured in pounds and has been translated to tons for this study. The model accounts for CO_2 released as trees die and decompose and CO_2 released during the care and maintenance of trees.

Carbon Monetary Benefit: Calculates the dollar value associated with the amount of carbon stored or sequestered by trees based on calculations of the social cost of carbon.

Importance Value (IV): IVs are calculated for species that comprise more than 1 percent of the population. The Streets IV is the mean of three relative values (percentage of total trees, percentage of total leaf area, and percentage of canopy cover) and can range from 0 to 100, with an IV of 100 suggesting total reliance on one species. IVs offer valuable information about a community's reliance on certain species to provide functional benefits. For example, a species might represent 10 percent of a population but have an IV of 25 percent due to its substantial benefits, indicating that the loss of those trees would be more significant than just their population percentage would suggest.

Replacement Value: Replacement values are estimates of the full cost of replacing trees in their current condition, should they be removed for some reason. Replacement values are based on the Council of Tree and Landscape Appraisers (CTLA) Guide for Plant Appraisal, which uses a trunk formula technique.

The Urban Forest System and Associated Benefits

Trees and the urban forest are vital components of a city's public infrastructure. They create quantifiable cost savings for both the City and private property owners alike and create economic benefits for the entire community. The quality of life of the residents in any community also depends on the urban forest, as trees make a vital and affordable contribution to the sense of community, pedestrian-friendly neighborhoods, energy savings, and air quality. Trees are one of the few infrastructure investments that grow in value over time. The following data was derived from Alliance for Community Trees.

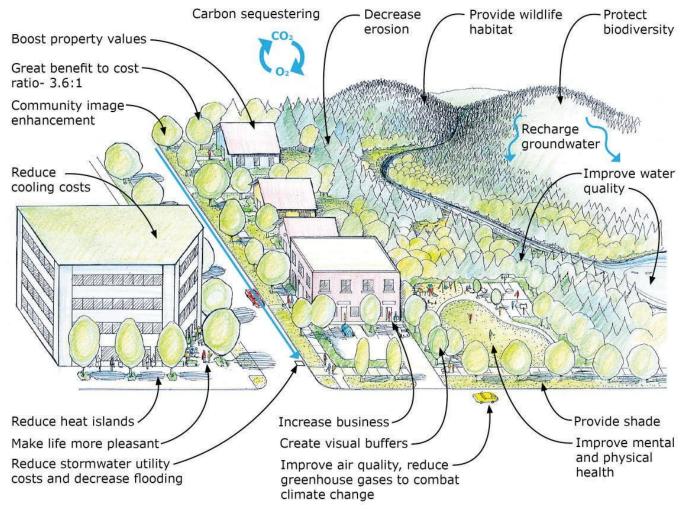


Figure 26. Overview of the ecosystem benefits and services provided by trees in communities

The following benefits and services were gathered and adapted from the Alliance for Community Trees, "Benefits of Trees and Urban Forests: A Research List" (ACTrees, 2011).



Reduce Stress and Improve the Quality of Life

Neighborhoods with generous canopies of trees are good for public health. Greater contact with natural environments correlates with lower levels of stress, improving performance. Students' concentration levels go up when they are able to look out onto a green landscape. Studies show that children with attention deficit disorder function better after activities in green settings. A green environment impacts worker productivity. Workers without views of nature from their desks claimed 23 percent more sick days than workers with views of nature. Residents of areas with the highest levels of greenery were three times as likely to be physically active and 40 percent less likely to be overweight than residents living in the least green settings.



Clean the Air and Breathe Easier

Shade trees reduce pollution and return oxygen to the atmosphere. In addition to carbon dioxide, trees' leaves or needles absorb pollutants, such as ozone, nitrogen dioxide, sulfur dioxide, and some particulate matter. Roadside trees can reduce nearby indoor air pollution by more than 50 percent.



Save Energy and Lower Energy Costs for Buildings

As natural screens, trees can insulate homes and businesses from extreme temperatures, keep properties cool, and reduce air conditioning utility bills. A 20 percent canopy of deciduous trees over a house results in annual cooling savings of 8 to 18 percent and annual heating savings of 2 to 8 percent. By planting shade trees on sunny exposures, residents and businesses can save up to 50 percent on hot-day energy bills.



Positively Influence Climate to Ensure Sustainability

Trees absorb carbon dioxide and store carbon in wood, which helps to reduce greenhouse gases. Carbon emissions from vehicles, industries, and power plants are a primary contributor to increased air temperatures in metropolitan areas. Trees in the United States store 700 million tons of carbon valued at \$14 billion with an annual carbon sequestration rate of 22.8 million tons per year valued at \$460 million annually. In one year, an acre of mature trees can absorb CO2 equivalent to a car driving 26,000 miles.



Reduce the Need for Street Maintenance

Shaded streets last longer and require far less pavement maintenance, reducing long- term costs. Canopies diminish pavement fatigue, cracking, rutting, and other damage. A study from University of California at Davis found that 20 percent shade cover on a street improves its pavement condition by 11 percent, which is a 60 percent savings for resurfacing over 30 years. Also, the selection of appropriate tree species guided by a management plan would reduce maintenance by reducing damage associated with tree roots (on curbs, gutters, driveways, and pavement).



Raise Property Values

Trees are sound investments, for businesses and residents alike, and their value increases as they grow. Sustainable landscapes can increase property values up to 37 percent. The value of trees appreciates over time because the benefits grow as they do. For businesses, trees have added value, including higher revenues. Shoppers seek out leafy promenades that frame storefronts. Research shows that shoppers spend more—between 9 and 12 percent more—on products in tree-lined business districts. A study by Donovan & Butry in 2008 shows trees increase value to the home where they reside but also contribute to increased property values of

adjacent homes and properties. As an additional benefit, increased property values resulting from trees lead to quicker home sales (Wolf 2007).

Conserve Water and Soil



A tree's fibrous roots, extending into the soil, are premier pollution filtration and soil erosion prevention systems. Intensely urbanized areas are covered with a large number of impermeable surfaces. In contrast to an impervious hardscape, a healthy urban forest can reduce annual stormwater runoff up to 7 percent. Highly efficient trees also utilize or absorb toxic substances such as lead, zinc, copper, and biological contaminants. One study estimated that eliminating the need for additional local stormwater filtration systems would result in savings exceeding \$2 billion.

Cooler Pavement Diminishes Urban Heat Islands



Broad canopy trees lower temperatures by shading buildings, asphalt, and concrete. They deflect radiation from the sun and release moisture into the air. The urban heat island effect is the resulting higher temperature of areas dominated by buildings, roads, and sidewalks. Cities are often 5 to 10 degrees (Fahrenheit) hotter than undeveloped areas, because hot pavement and buildings have replaced cool vegetated land. In addition, high temperatures increase the volatility of automobile oil and oil within the asphalt itself, releasing the fumes into the atmosphere. Shade trees can reduce asphalt temperatures by as much as 36 degrees (Fahrenheit), which diminishes the fumes and improves air quality.

Protect Wildlife and Restore Ecosystems



Planting and protecting trees can provide habitat for wildlife. Urbanization and the destruction of valuable ecosystems have led to the decline of many species. Adding trees, particularly native trees, provides valuable habitat for wildlife. The Washington Department of Fish and Wildlife's Priority Habitat and Species (PHS) list identifies these critical habitats. Examples of priority habitats found within the city are riparian areas, biodiversity areas and corridors, Oregon white oaks (individual trees and woodlands), and snags.

Build Safe Communities and Decrease Crime



Police and crime prevention experts agree that trees and landscaping cut the incidence of theft, vandalism, and violence by enhancing neighborhoods. Thriving trees on well-maintained streets indicate pride of ownership. Public housing residents with nearby trees and natural landscapes reported 25 percent fewer acts of domestic aggression and violence. Apartment buildings with high levels of greenery had 52 percent fewer crimes than those without any trees. Buildings with medium amounts of greenery had 42 percent fewer crimes. Many cities have implemented CPTED (Crime Prevention through Environmental Design) strategies and policies.

Calm Traffic and Make Neighborhoods Safer and Quieter



People drive more slowly and carefully through tree-lined streets because trees create the illusion of narrower streets. One study found a 46 percent decrease in crash rates across urban arterial and highway sites after landscape improvements were installed. The presence of trees in a suburban landscape reduced the cruising speed of drivers by an average of three miles per hour. Faster drivers and slower drivers both drove at decreased speeds in the presence of trees. Trees reduce noise pollution, buffering as much as half of urban noise. By absorbing sounds, a belt of trees 100 feet wide and 50 feet tall can reduce highway noise by 6 to 10 decibels. Buffers composed of trees and shrubs can reduce 50 percent of noise.

Benefits of Vancouver's Urban Forest

The services and benefits of trees in the urban and suburban setting were once considered to be unquantifiable. However, by using extensive scientific studies and practical research, these benefits can now be confidently calculated using tree inventory and canopy assessment information. Tree benefit values for the City of Vancouver's trees are summarized in the Plan using the findings from the 2021 Urban Tree Canopy (UTC) Assessment, the 2021 partial inventory of public trees, and other tree datasets in the City's online tree inventory software. The benefits and services of the citywide urban forest and public tree population were calculated and extrapolated using the U.S. Forest Service's i-Tree's Streets and i-Tree Eco applications. The data within Vancouver's tree inventory provide insight into the overall health of the city's public trees and the management activities needed to maintain and increase the benefits of trees into the future.

The 2021 UTC Assessment uses i-Tree Canopy and the total acres of existing tree canopy cover to calculate citywide urban forest benefits and services. The public tree inventory software program has built-in calculations for ecosystem services and benefits using the i-Tree research and the National Tree Benefits Calculator. The following sections summarize the benefits and services of these tree populations.

Citywide Urban Forest Benefits and Services

The citywide urban forest comprised of all trees across the various types of landscapes provides environmental, economic, and social benefits and services. This expansive resource, stretching across public and private boundaries, enhances the quality of life, improves ecosystems, and offers financial savings to the community. The citywide urban forest is measured by assessing the amount of tree canopy cover (i.e., surface area) when viewed from above. Using the 2021 Urban Tree Canopy Assessment, these benefits and services were derived. The urban forest holds millions of dollars of savings in avoided infrastructure costs, pollution reduction, and stored carbon.

Summary of the Citywide Urban Forest Benefits and Services

Table 4. Summary of the annual benefits provided by the citywide urban forest

Benefit or Service	Description	Quantity	Value or Savings
Air Quality	Trees produce oxygen, indirectly reduce pollution by lowering air temperatures, and improve public health by reducing air pollutants which cause death and illness.	149 tons	\$2M
Stormwater and Water Quality	Trees and forests mitigate stormwater runoff which minimizes flood risk, stabilizes soil, reduces sedimentation in streams and riparian land, and absorbs pollutants, thus improving water quality and habitats.	40,000 gallons per canopy acre 243M gallons total	\$2M
Carbon Storage and Sequestration	Trees accumulate carbon in their biomass; with most species in temperate forests, the rate and amount increase with age.	224k tons C stored 7k tons C sequestered	\$38M \$1M
TOTAL BENEFI	TS		\$44M

The citywide urban forest provides over \$44 million total in terms of benefits, value, and/or savings. Annually, Vancouver's green asset contributes over \$6 million (excludes carbon storage values) in value or savings. It should be noted, this study does not account for property value increases, energy savings, increased consumerism, reduced pavement wear, improved human health, structural or replacement value, among many others that would likely increase the value of the urban forest to nearly \$500 million (McPherson, et al. 2017).

Public Tree Benefits and Services

A total of 8,950 public trees out of the 12,263 trees in the inventory database contain values for ecosystem benefits and services. The following table provides a summary of the benefits and services provided for these trees and the values were then extrapolated to represent the total public tree population.

Summary of Public Tree Benefits and Services

Table 5. Summary of the annual benefits provided by Vancouver's public trees*

Benefit or Service of 8,950 trees	Total (\$)	Quantity	\$/Tree	\$/Capita
Stormwater	\$23,904	2.7M gallons of runoff avoided	\$2.67	\$0.12
Carbon Dioxide Sequestered	\$15,764	677,840 pounds CO2 sequestered	\$1.76	\$0.08
Carbon Dioxide Stored	\$795,903	34,221,819 pounds CO2 stored	\$88.93	\$4.14
Air Pollutants Removed	\$20,890	4,560 pounds of pollutants removed	\$2.33	\$0.11
BENEFITS OF 8,950 PUBLIC TREES	\$893,098		\$99.79	\$4.65
BENEFITS OF ESTIMATED 99,000 PUBLIC TREES	\$9,876,962		\$99.79	\$51.41
ANNUAL COST**	\$2,395,800		\$24.20	\$12.47
COST: BENEFIT \$1:\$4.12 → For every \$1 spent on trees, there is a \$4.12 return on investment				

* Distribution of benefits per tree and per capita based on 8,950 trees (of an estimated 99,000 public trees) and a population of 192,169 people (2021 US Census).

The trees in Vancouver provide value in terms of increased property values; air quality improvements; reduction in stormwater volumes and an improvement in water quality; energy savings from the shade of their canopy and protection from cool winds; and their ability to sequester and store carbon. These values for public trees, originating from research conducted by the U.S. Forest Service, and implemented in i-Tree software, equate to nearly:

\$9.9 million total annual value of benefits and services \$100 in annual benefits per tree

\$51 in annual benefits per capita

\$1:\$4.12 annual cost-benefit ratio

Note, the cost-benefit ratio of \$1:\$4.12 does not take into account the added value to city properties, energy savings, health savings, reductions in crime, increased longevity of pavement, or other benefits that have yet to be researched and quantified. It is expected the rate of return would be greater with these considerations (\$5.82 returned for every dollar spent according to research from McPherson, et al. in 2016).

^{**} Research shows the average cost to maintain a public tree was \$19.00 in 2014 or \$24.20 adjusted to 2023's US dollar. This cost includes planting (15 percent), pruning (45 percent), removal (5 percent), and plant health care (35 percent) (Hauer, et al. 2014).

Estimated Benefits and Services of All Public Trees (~99,000 trees)

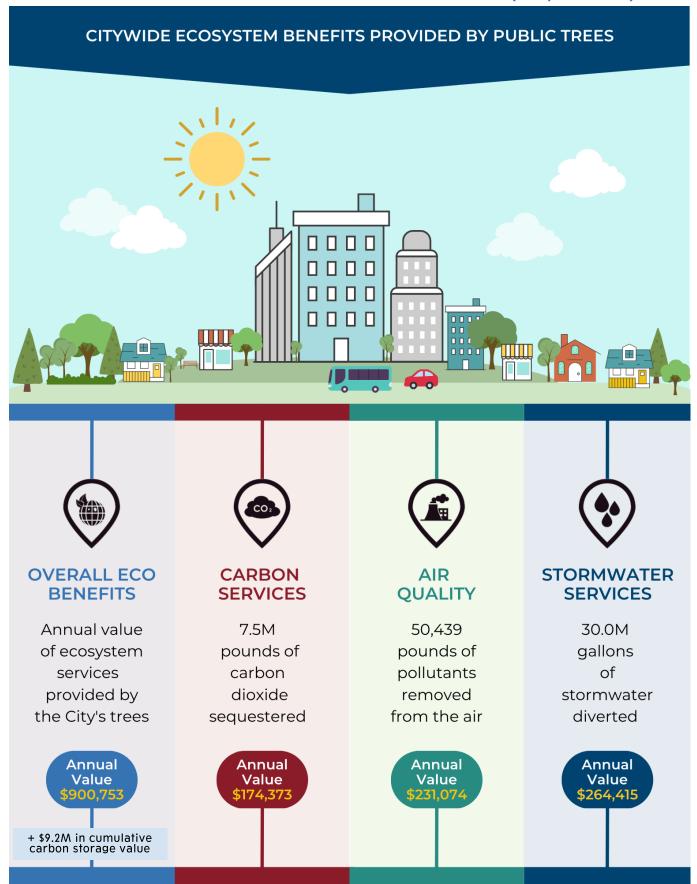


Figure 27. Summary of the ecosystem services and benefits of all public trees

THE URBAN ECOSYSTEM

THE ROLE OF VANCOUVER'S URBAN FOREST IN ECOSYSTEM CONSERVATION

Managing an urban ecosystem involves much more than just focusing on trees. It encompasses a holistic approach that considers the intricate interactions between various living and non-living components within Vancouver's environment. While trees play a vital role in urban ecology, managing other elements is equally crucial for creating a sustainable, healthy, and resilient city.

Regional organizations and agencies involved in urban ecosystem conservation such as the WA Department of Fish & Wildlife (WDFW) have developed resources and best practices for a holistic management approach. WDFW recently established the Priority Habitat and Species framework that can be applied to the City of Vancouver's urban forest management approach.

The following considerations for conservation of other facets of the urban ecosystem are summarized below based on WDFW's Priority Habitat and Species (PHS) framework. The City and its partners may consider developing or updating plans and resources pertaining to these ecosystems:

Riparian Areas: WDFW has recently developed Riparian Management Recommendations that identifies Site Potential Tree Height at 200 years (SPTH200) as the distance that provides all riparian functions for healthy stream environments for fish life and habitat. Review the Riparian Ecosystems, Volume 1: Science Synthesis and Management Implications and Riparian Ecosystems, Volume 2: Management Recommendations for specific guidance.

Biodiversity areas and Corridors: Areas considered to be biologically diverse or areas within an Urban Growth Area (UGA) that contain habitat valuable to fish or wildlife and comprised of native vegetation. Biodiversity areas are vertically and horizontally diverse while corridors are relatively undisturbed unbroken tracts of vegetation that connect fish and wildlife habitat conservation areas, priority habitats, areas that are biologically diverse, or valuable habitats within the Urban Growth Area (UGA).

Oregon white oaks (OWO): Single trees within urbanizing areas are considered priority habitat if they are particularly valuable to wildlife. Additionally, it is important to highlight that natural processes associate with OWO and how they differ from other species, such as dead/dying branches, epicormic branching, and cavities. "Poor health" standards for OWO should differ from other native species because those features may be beneficial to urban wildlife. Review the Management Recommendations for Washington's Priority Habitats - Oregon White Oak Woodlands for additional information. Additionally, WDFW is updating the Best Management Practices for Oregon white oaks woodlands. Information within this document can be referenced for creating new oak woodlands and enhancing existing stands.

Snags: Priority snags in Western Washington have a DBH of 20-inches and are greater than 6.5-feet. Priority logs are greater than 12-inches at the largest end and are 20-feet long. If there is a park or natural area that does not have snags, WDFW encourages creating snags or habitat features (e.g., brush piles) to support urban wildlife. Review the resource Snags - The Wildlife Tree for additional information. Vancouver could consider creating a snag decision-making framework for maintaining priority snags on the landscape and maintaining public safety. The WDFW has recommendations and suggested questions for creating such a framework for Vancouver's trees.

While Vancouver's Urban Forestry Management Plan focuses on trees within the urbanized area of the city, the departments and programs should consider utilizing these resources and collaborating with regional organizations and agencies to sustainably manage trees as part of the greater urban ecosystem.

URBAN FOREST MANAGEMENT



MANAGEMENT OF VANCOUVER'S URBAN FOREST

THE MISSION OF VANCOUVER'S URBAN FORESTRY PROGRAM

"Maximize the aesthetic, environmental and economic benefits that trees provide to city residents and visitors by preserving, managing and enhancing existing trees and other vegetation and promoting the reforestation of the urban area, through an active integrated program with community support and participation."

OVERVIEW

The City of Vancouver has a unique urban form and character. Its size, layout, and development density influence the landscape and has created a charming and livable city. Vancouver's residents show pride in their city, and their neighborhoods are well cared for. The city's climate is ideal for a wide range of plants and street trees and many of the city's streets and landscapes exhibit a unique and rich planting character. Some of the city's historic neighborhoods and its newest developments have a rich urban forest that illustrates Vancouver's potential to be an even greater tree-filled city guided by a strategic plan— a city that can be truly 'ahead of the curve'.

Urban trees can play a significant role in making cities resilient to weather and climate extremes, and in protecting human and ecosystem health and safety. To do so, trees must be consciously selected, planted, and managed as the central component of an urban forest where individual trees are maintained as part of a greater system with the purpose of improving the urban environment and enhancing the benefits of that ecosystem.

The ability of Vancouver's trees to achieve the desired maximum return of benefits is greatly dependent upon proper maintenance and management supported by sufficient funding and staffing. Vancouver's Urban Forestry Program ("Urban Forestry") ensures the urban forest management system is fully developed and integrated among the City's departments, programs, and policies.

The Urban Forestry Program supports the City of Vancouver in meeting federal National Pollutant Discharge Elimination System (NPDES) permit requirements and provides three important services to the community:

planning, education, and management related to maintenance and growth of the urban tree canopy to improve watershed health.

Planning includes reviewing site development applications for conformance to existing tree ordinances, working with various partners on strategies to grow the citywide tree canopy, and assessing, inventorying, and monitoring the health of the city's urban forest resources. Education promotes the benefits of trees, educates the public about trees and how to properly care for them, manages the Tree Stewards program to train community volunteers to become neighborhood tree stewards, administers the Heritage Tree and Witness Tree programs, and collaborates with neighborhood associations and community members to assist in the stewardship of the city's urban forest. Urban Forestry also coordinates with City departments and outside agencies regarding policy and program development, enforces policies and regulations, and provides quality customer service to community members and businesses through its management services.

The citizen Urban Forestry Commission, appointed by City Council, provides an opportunity for community members to take active implementation and advisory roles in all three of these service areas. Together, the Urban Forestry Program and Commission have collaborated to ensure the city continues to be recognized as a "Tree City USA" by the Arbor Day Foundation— a title the City of Vancouver has held since 1989.

The direction of Urban Forestry was set in the Urban Forestry Management Plan adopted in 2007 and this 2023 update to the Urban Forestry Management Plan provides program direction for the next 25 years.

CHALLENGES IN MAINTAINING AND MANAGING PUBLIC TREES

The trees in Vancouver face multiple challenges to surviving and thriving. Trees that die years prematurely will not create the root systems and canopies needed to reach their benefit potential and maximize their return on investment. Planting and maintaining an urban forest that exists in concert with other green infrastructure must include management by trained individuals, the use of tree inventory data, an understanding of baseline conditions and forecasted environmental changes, collaboration among departments to mainstream urban forest management, adherence to industry standards and best practices, a community with a shared commitment to the urban forest vision, and a roadmap for management provided in a plan.

The City's Urban Forestry Program has direct authority over the management of the public tree population through in-house and contracted services, the tree permitting program, Chapter 12.04 Street Trees of Vancouver Municipal Code (VMC), and Chapter 20.770 Tree, Vegetation and Soil Conservation of VMC. There are a total of 12,263 public trees in the City's inventory database and an estimated 99,000 public trees citywide. The trees in public parks, open spaces, medians, and properties are primarily the responsibility of the City to maintain whereas, the public street trees are the responsibility of the adjacent property owner. Maintenance of these street trees is administered through the City's permit program overseen by the Urban Forestry Program. Any person performing major pruning on street trees must obtain a street tree worker license from the Urban Forestry Program, unless the person is properly supervised by the holder of a license. This structure for public street tree maintenance is an effective solution for limiting City expenses. It allows the Urban Forestry Program to dedicate staff and resources to long-range planning, community service, and other core activities, though it presents some unique challenges discussed in the following sections.



Urban Forest Diversity, Extent, and Health

Urban forest diversity in terms of species composition and relative age structure is crucial for maintaining a healthy and resilient ecosystem. A diverse urban forest can better withstand tree pest and disease outbreaks, mitigate the effects of climate change by providing a range of tree species that can adapt to changing conditions, and supports city goals relating to sustainability, design, and heritage.

Tree canopy cover and the associated benefits are not distributed equitably across the city. 19 percent of the city is shaded by the canopy of trees, but its neighborhoods vary in amounts. Research has shown that a city's wealthier areas zoned for single-family homes typically attract more city services like wide sidewalks and trees. As time progresses, that disparity becomes more than a matter of aesthetics. These areas that are lacking adequate canopy cover are typically the result of policies championed by local authorities, codification through federal actions, and decisions to disinvest in neighborhoods where people of color resided as regions grew rapidly in population and infrastructure. A pattern was created that is replete in the urban studies literature (Wolch et al. 2005). Other possible factors may include the competition for limited physical space, and the increasing dominance of private real estate in driving development processes and occupying areas with pavement that might otherwise contain green space. Tree canopy cover equity and equitable levels of service are challenges that are addressed in this Plan.

Urban forest health is critical for maintaining the long-term viability of the ecosystem. This means ensuring that trees are planted in appropriate locations and that they receive adequate care, such as regular watering, pruning, and pest management. It also means prioritizing the use of native species that are adapted to local conditions and have co-evolved with local wildlife. By maintaining a healthy urban forest, the City can ensure it continues to provide important ecosystem services and support the well-being of urban residents for generations to come.

Urban forest diversity, equity, and health are all important considerations for creating and maintaining a healthy and resilient city. By prioritizing the planting and maintenance of diverse urban forests, especially in low-income and marginalized communities, disparities in health outcomes can be reduced and the quality of life for all urban residents can be improved. It is critical that the City continue to recognize the value of urban forests and invest in the preservation and enhancement as an essential component of sustainable urban development.

Sustainable Management

Public tree management in Vancouver is a shared responsibility among City departments. The Public Works Urban Forestry Program oversees permits from adjacent property owners to maintain public street trees. The Public Works Grounds Maintenance Division provides landscaping services including tree pruning, shrub maintenance, and leaf removal for City-owned facilities, parks, open spaces, trails, street medians, and transportation rights-of-way in addition to three City-owned cemeteries. Additional grounds maintenance services include mowing, irrigation, weed control, turf repair, litter control, and supporting city events.

Proactive Public Tree Maintenance

Routine maintenance, often referred to as grid pruning, proactive pruning, or programmed pruning, is the most cost effective near- and long-term pruning management strategy for city tree maintenance since every tree within a given grid, priority area, or zone is pruned each pruning cycle. When each tree is inspected and pruned on a regular cycle, both short- and long-term maintenance costs are reduced due to efficiencies in mobilization, scheduling, and service tracking; both preventative and reactive maintenance are performed in one operation and the need for future priority pruning is minimized. Conversely, street trees that are not pruned on a regular cycle, or their maintenance is deferred, results in the opposite effect— as the interval between pruning increases the tree health declines and the maintenance costs increase. For cities where street tree maintenance is primarily the adjacent property owner's responsibility, public education along with cost-share programs can support accomplishing the pruning cycle collectively.

One measure of sustainable management is the number of years it takes to prune all public trees, referred to above as proactive pruning. Currently, the City actively manages the trees on public properties whereas the adjacent property owners are responsible for street trees. In Vancouver, while it is not known how many street trees managed by property owners are pruned annually, the City can use the annual average count of tree pruning permit records to estimate the annual quantity of trees pruned. This would only be an estimate as the City is unable to fully monitor all street tree maintenance activities performed by adjacent property owners and not all owners adhere to the permit requirements. The City does have the ability to require property owners to maintain trees adjacent to their property, however, monitoring and enforcement needs to continue in the city.

Cities where public street trees are maintained by the adjacent property owners have the opportunity to dedicate resources toward sustainable long-range urban forest management instead of resource demanding services such as street tree maintenance. In the short term, this is an effective structure though industry standards and best practices recommend cities to explore the framework and resource needs for acquiring additional responsibility to maintain street trees. With a citywide program devoted to public street tree maintenance, tree health and safety can be more effectively managed, issues can be mitigated, costs can be reduced, and the city can stem the impacts of deferred maintenance and can address inequities by removing the barrier of costs for tree care. When economies of scale are at play, government often intervenes to deliver a service. Economies of scale occur when cost declines and efficiency increases with a larger, contiguous service area (garbage collection, water/sewer/stormwater, street sweeping, and street tree management).

To support a sustainable urban forest, the City relies on property owners to care for trees on their private property as well as the trees in the right-of-way adjoining their property. Fully two-thirds of Vancouver's existing tree cover is on private property. However, property owners have very limited knowledge of tree regulations or tree management. Evidence of mismanaged trees is visible all over the city. It is estimated that at least 30 percent of Vancouver's street trees have been topped; many trees have been unnecessarily removed and have not been replanted; trees are planted in inappropriate locations; and many trees do not receive adequate watering, pruning and other care (Source: City of Vancouver's Neighborhood Tree Stewards Program webpage). This Plan explores the potential framework and resource needs for enhanced community education, stewardship, and street tree maintenance responsibility and support. Exploring changes to maintenance responsibility should include additional considerations such as the needs for other public trees, existing and expanding programs, and community support.

Risk Tree Management

An important aspect of urban forest management is the management of tree risk. Trees are living organisms and by their very nature will decay, die, and may present potential danger to person and property. This important natural resource comes with a duty-of-care to prevent issues that could foreseeably harm others, and to respond appropriately to tree risks. To do so, cities should employ Qualified Tree Risk Assessors. The Tree Risk Assessment Qualification (TRAQ) training and methodology, developed and administered by the International Society of Arboriculture is the best available methodology for tree risk assessment at this time. It is not possible to mitigate all risks of trees, nor would that be a reasonable or desirable goal. The risk to human life from trees is low relative to other risks posed to humans. A study: "Human fatalities from wind-related tree failures in the United States, 1995–2007" discovered in that period 407 deaths were caused by trees. To give a sense of perspective, in the same period 416,268 fatalities were recorded on US roads by the National Highway Traffic Safety Administration. Community managers need to minimize the risk of trees, while maximizing the community benefits of trees.

Tree Planting

In cities where a comprehensive long-term management plan is not in place, sporadic tree plantings may take place either through development projects, inconsistent availability of funding

or grants, volunteer programs, or through a combination of these mechanisms. Having an Urban Forestry Management Plan unifies efforts by different departments and divisions of the City, development projects, volunteer efforts, and community partners to ensure success at multiple levels of implementation, from creating policies and overarching goals to the correct planting of diverse species and the coordinated on-going maintenance of each individual tree.

Vancouver's Urban Forestry Program has funding for regular tree planting projects, has an approved list of trees for street tree plantings, coordinates plantings with departments and community partners, enforces ordinances to preserve and plant trees, and actively pursues urban forestry-related grants. The City is known for these vital programs, services, and activities but it recognized the need for an updated strategic plan that is supported by data to make informed, effective, and equitable decisions on growing its urban forest.

Tree planting is one of the few tangible actions the City can directly take to address non-source specific pollution in Vancouver. Planting trees in Vancouver should be strategically planned to address environmental justice, equity, access, and levels of service for all neighborhoods. Tree plantings can address canopy cover inequities, intensive tree management can reduce risks and prolong the associated benefits of trees, and diverse outreach approaches and unique programs can enhance urban forest stewardship in the community.

Planting and maintaining an urban forest that exists in concert with other green infrastructure must include: management by trained individuals, the use of tree inventory data, an understanding of baseline conditions and forecasted environmental changes, collaboration among departments to mainstream urban forest management, and a community with a shared vision for the urban forest. To address these challenges, the Urban Forestry Management Plan provides the guidance on how the city can achieve the 28 percent canopy goal. These tree canopy goals and priority planting areas can be addressed and accomplished through the implementation of this Plan.

Program Challenges

Tree Regulations

Several City codes, regulations, and plans address trees. To maintain a healthy urban forest and quality of life in Vancouver, the City of Vancouver enforces Street Tree (VMC 12.04) and Tree Conservation (VMC 20.770) Municipal Codes to prevent the unnecessary removal and destruction of trees. The City's Street Tree Manual supplements VMC 12.04 to support awareness and application of tree regulations and best practices.

Trees associated with Priority Habitat and Species (PHS) (as defined by the WA Department of Fish & Wildlife. Examples include biodiversity areas and corridors, riparian areas, snags, and Oregon white oaks) are regulated under the Critical Areas Ordinance (CAO) of VMC Chapter 20.740.

Regulations to guide tree planting and maintenance are limited and do not sufficiently address the concerns of many City staff and the public. Though significant improvements have been made, there still exists room for improvement in the policies and regulations for Vancouver's trees. Examples include ensuring enough space is set aside for trees in development and providing adequate soil volume for trees to mature. Also, new construction should be required to identify and eradicate invasive plant species prior to an approval of a permit. Other considerations include incentives for developers to preserve and plant trees, updates to mitigation requirements to support the Plan's goals, among others including enforcement of regulations and internal coordination. The City may explore regulations for tree care in the future by gathering input from City staff, stakeholders, and the general public and bringing proposed amendments to Council for consideration. In doing so, the City would be equipped with clear goals for the overall urban forest maintenance and care, its programs, and the community, as well as the goals for development.

Best Management Practices (BMPs) for protecting trees and their critical root zones (CRZ) on construction sites should be consistently applied, monitored, and enforced when necessary. The

City should continue to explore alternative solutions when it comes to conflicts between trees and sidewalks or other hardscapes. Flexible design would allow for more sidewalks to meander around trees, parcels to be developed around existing healthy trees, and additional right-of-way easements/frontages could be considered for the sake of tree preservation. Through the planning effort to develop this Plan, recommendations for alternative solutions to tree and hardscape conflicts were provided.

Internal Coordination and Efficiencies

City departments and programs collaborate on Capital Improvement Projects, ordinance enforcement, development plan reviews, tree maintenance, and community engagement. One challenge that was uncovered in the planning process was the need for improved communications, workflows, and methods for defining priorities. A clearly communicated and adopted policy that integrates urban forestry with transportation, development, housing needs, climate adaptation, and community health in a way that allows staff to move forward in a coordinated, balanced, and cohesive way is needed and addressed in this Plan. The City should also explore opportunities for cross-training and education with other City staff— such as those involved in operations maintenance and building inspections— on best management practices for the urban forest, e.g., invasive plant species identification and management.

Community Challenges

The management and preservation of the urban forest to meet the goals of this Plan require active involvement and collaboration of diverse stakeholders, including government agencies, local communities, and businesses.

Diverse and equitable community engagement and education are crucial for the success of urban forest management programs as they provide opportunities for all stakeholders to share their perspectives, knowledge, and experiences. By engaging people from diverse backgrounds, the management programs can benefit from a range of ideas, experiences, and values that can enrich decision-making and enhance the relevance and effectiveness of the programs.

Involving communities and educating them about the importance of urban forests can help build a sense of ownership and stewardship, leading to increased participation in planting, maintenance, and protection efforts. It also allows community members to understand how urban forests benefit them, providing them with a greater appreciation and respect for these natural resources.

Equity in community engagement and education is also vital, ensuring that all community members have access to information and opportunities to participate, regardless of their race, ethnicity, income, or other demographic factors. This approach can help reduce disparities in access to urban forests and their benefits, and ensure that all community members have a say in decisions that affect them.

Furthermore, education and engagement efforts can help raise awareness about the potential negative impacts of urbanization on the urban forest, such as pollution, soil compaction, and tree loss. By educating community members about these threats and ways to mitigate them, they can become advocates for the urban forest and support efforts to protect and enhance it. The Plan provides guidance for ongoing inclusive community education and engagement.

ADDRESSING THE CHALLENGES

Overview

These issues and challenges recognized in Vancouver are exacerbated in disadvantaged areas of communities with limited resources. The City needs this comprehensive plan to preserve and expand the urban forest which results in an equitable distribution of tree canopy, associated benefits, and urban forestry opportunities. The City, its partners, and the community support a plan for the urban forest that sustains the resource and provides benefits to all who live, work, and recreate in the City.

To address these challenges, the Urban Forestry Management Plan update offers Vancouver an opportunity to study, evaluate, and plan for improving urban forest management toward the goal of supporting human and ecosystem health and well-being. The urgency of protecting the urban forest has risen sharply as drought, pests, diseases, and climate impacts lead to rapidly rising tree mortality. To address and reverse tree die-off and the loss of ecosystem benefits, Vancouver needs a robust system of professional management of public trees and improved support of resident engagement in the care and expansion of the urban forest, both public and private.

When making improvements to the urban forest, efforts should be prioritized to improve environmental justice, equity, access, and levels of service for underserved and vulnerable areas. These considerations may include additional tree plantings for more equitable distribution of urban forest cover and benefits, intensive tree management, diverse outreach approaches, and unique stewardship programs.

Vancouver's Urban Forestry Management Plan is a crucial planning effort to build a more sustainable resource and a healthy community, among other core urban forest management elements. This strategic plan for Vancouver's urban forest aims to help guide how the City might think about strengthening City Code, policies, ordinances, standards, practices, and procedures; analyzes staffing structures and authority; identifies opportunities for sustained and diversified funding; provides guidance for routine and systematic inventories and assessments; identifies tree maintenance efficiencies and planting/canopy goals and priorities; addresses storm, disaster, and risk management needs; and strengthens community outreach, education, and engagement.

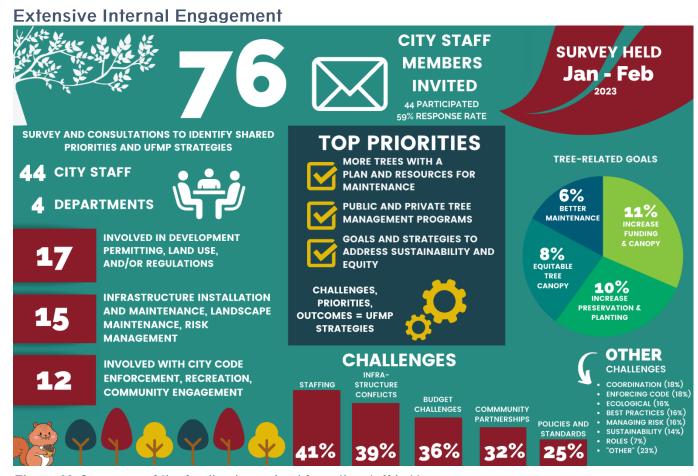
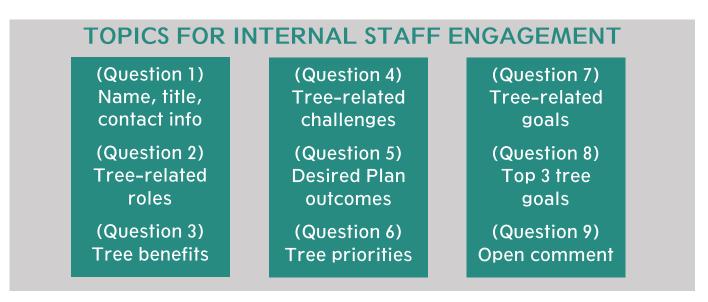


Figure 28. Summary of the feedback received from the staff in Vancouver

To gather a greater understanding of the structure, workflows, challenges, and priorities relating to trees in Vancouver, consultations with City staff were conducted through online surveys, meetings, and interviews. Through this process, staff responsibilities, strengths, and shared challenges were uncovered. As a result, the Plan's strategies and supporting studies align with shared priorities across City departments. The strengths were examined to determine how they can be leveraged to address the challenges or where additional resources would be needed. The following provides a summary of the topics discussed and the feedback relating to strengths and challenges which are then thoroughly addressed in the upcoming sections of the Plan. For additional information regarding staff consultations, see Appendix G.



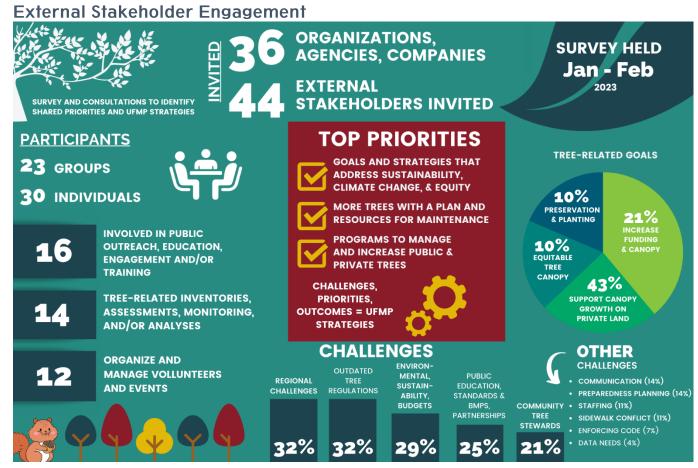


Figure 29. Summary of the feedback received from external stakeholders in the Vancouver region

A survey similar to the City staff survey was conducted with external stakeholders in the Vancouver region to gather insights and perspectives. The external stakeholder engagement included an invitation to 36 unique organizations, agencies, companies, or individuals and a total of 30 survey responses were received representing a total of 23 unique groups. The invited and participating groups are listed below:

INVITED AND PARTICIPATING EXTERNAL STAKEHOLDERS

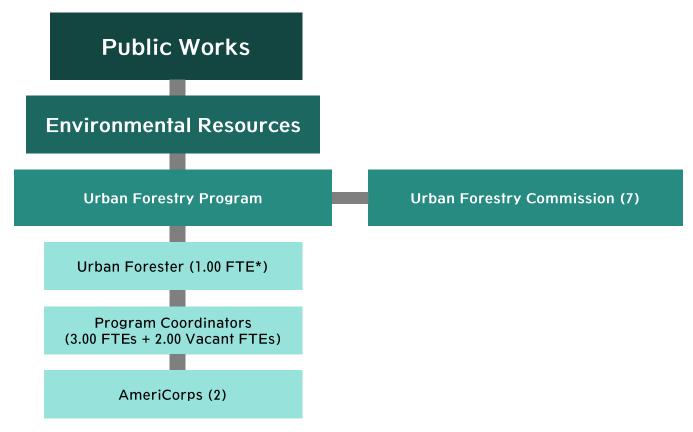
Groups colored green participated in the survey						
AKS Engineering & Forestry	East Vancouver Business Association	Parks Foundation of Clark County	Urban Abundance			
American Building Community	Fourth Plain Forward	Planning Solutions	Vancouver Bee Project			
Arborscape Tree Care	Friends of Trees Vancouver	Rosevillage Neighborhood Association	Vancouver Dawn Lions Club			
Bartlett Tree Experts	Grande Ronde Tribe	Sauk-Suiattle Tribe	Downtown Association			
Chinook Indian Nation	J. Frank Schmidt & Son C	SW WA LULAC Council 47013	VSD Horticulture			
Clark County Parks Foundation	Lower Columbia Nature Network	Teragan & Associates, Inc.	WA Urban & Community Forestry			
Clark County Historical Museum	Mackay Sposito	The Confluence Project	Warm Springs Tribe			
Clark County Public Health	NAACP Vancouver Branch	Todd Prager & Associates	WSU Extension Master Gardeners			
Clark Public Utilities	National Parks Service	TreeWise Tree Care	Watersheds Alliance			
Columbia Springs Env. Ed. Center	Neighborhood Traffic Safety Alliance	Umatilla Tribe	WSDOT			
Cowlitz Tribe	Nez Perce Tribe	Uptown Village Association	Yakama Tribe			

As shown in the graphics above (Figure 28 and Figure 29), urban forest challenges, priorities, and goals were gathered from City staff and external stakeholders. The challenges differ between the two groups though their view on goals is similar. These include increasing funding to increase canopy cover and increasing tree preservation and planting efforts that are aligned with goals for tree canopy equity.

Additional information regarding external stakeholder engagement is provided in the Community Framework section and Appendix G.

Program Organization

The Urban Forestry Program within the Public Works Department is supported by the Urban Forestry Commission, a seven-member volunteer commission appointed by the Vancouver City Council. The Commission helps the City to develop good management practices to conserve the community's trees and forests, educate citizens on the importance of urban trees, and organize tree plantings. In 2023, the Urban Forestry Program employs four full-time staff and has received two new positions in the 2023-24 budget but they are currently vacant (as of May 2023). With a program of four staff currently, this equates to about one full-time employee per 48,000 residents, and is supported by two AmeriCorps staff and the Friends of Trees liaison.



*FTE = Full-time Equivalent

Figure 30. Structure of Vancouver's Urban Forestry Program

Urban Forestry Program

Vancouver's Urban Forestry Program preserves and enhances the community's urban forest through:

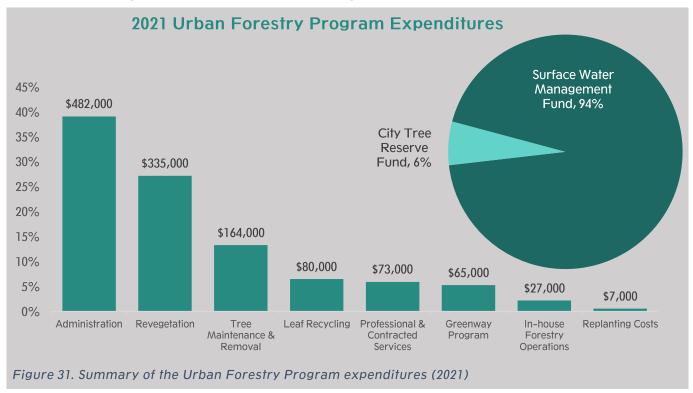
- Assisting all City departments, citizens and interest groups with tree issues.
- Developing and coordinating effective maintenance and stewardship programs to preserve existing trees and protect safety.
- Planning and managing the urban forest by coordinating related roles, responsibilities, policies, and projects of City departments, other agencies, and public and private partners.
- Documenting, inventorying, and assessing the health and condition of the urban forest.
- Identifying areas where additional trees and vegetation, especially native and large canopy trees, can be added to improve and enhance the urban forest.
- Administering ordinances that manage street trees, private property hazardous trees, and tree conservation in development projects.
- Permitting all trees within the street right-of-way and assisting the City's Community and Economic Development Department with permitting for private trees and

- hazardous trees. This includes oversight of planting, major pruning, tree removal, alleviating hazardous conditions, and mitigating damage to trees by development.
- Assisting in enforcement of effective regulations and in applying planting and design standards that ensure the health, quality, and long-term benefits of trees.
- Increasing awareness and understanding of the value and benefits of the urban forest through outreach and education.
- Promoting proper care for the urban forest by instilling environmental stewardship among citizens and providing them with the tools and knowledge necessary to make sound tree care decisions.
- Participating in partnerships, team building and networking within the community.
- Educating the Urban Forestry staff and Commission about the history of environmental justice and racism in communities and integrate equity and inclusion into all aspects of the program.

Interdepartmental Management of Trees

There are a wide range of management activities necessary to maintain an urban forest and many of these overlap between city departments and divisions. The overlap is often based on the location of a tree on publicly managed land or on private property. In the City of Vancouver, public trees on streets, in parks, and in natural areas are the responsibility of the Urban Forestry Program. Trees on private property fall under the purview of the Community Development Department's (CED) Development Planning Division. This division oversees private property development, ordinance enforcement, and zoning, and the review of development plans and the adherence to tree-related regulations. While organizing tree management in this manner is a natural fit for the responsibilities of each department or division, it does not necessarily coincide with the expertise and skills of each department, nor does it orchestrate a holistic management of the urban forest. As such, it is important to review the current structure management for its benefits and tree management limitations, and to explore if alternative management structures may improve City efficiency and ultimately, lead toward a safer and sustainable urban forest.

Urban Forestry Program Budget and Expenditures



The public trees are managed by the Urban Forestry Program with \$1,233,708 in overall expenditures in 2021 (2021 utilized for benchmarking). Core funding is provided through the City's Surface Water Management Fund (94 percent of total funding) and the City's Tree Reserve Fund (6 percent of total funding). In addition to dedicated municipal funding, the Urban Forestry Program utilizes and engages with volunteers— a total of 1,458 volunteer hours in 2021, valued at nearly \$42,000.

Of the total municipal investment, approximately 39 percent is attributed to administration (\$482,000), 27 percent to urban forestry revegetation projects (\$335,000), and 13 percent to tree maintenance and removal (\$164,000). The remaining 21 percent is distributed among leaf recycling (6 percent or \$80,000), professional and contracted services (\$73,000 or 6 percent funded through the City's Tree Reserve Fund), the Greenway Program (\$65,000 or 5 percent), in-house forestry operations (\$27,000 or 2 percent), and costs associated with replanting such as transportation (\$7,000 or 1 percent).

5-Year Urban Forestry Program Budget & Tree-related Expenditures

Budget Line Items	2018	2019	2020	2021	2022	Average
Administration	\$394,270	\$433,004	\$429,373	\$481,668	\$493,495	\$446,362
City Tree Reserve Fund	\$72,743	\$79,840	\$103,556	\$73,409	\$204,631	\$106,836
Revegetation	\$233,531	\$245,281	\$328,658	\$334,938	\$309,016	\$290,285
Tree Maintenance & Removal	\$207,591	\$196,508	\$163,306	\$164,402	\$297,903	\$205,942
Leaf Recycling	\$103,010	\$85,836	\$79,949	\$79,930	\$74,328	\$84,611
Greenway Program	\$227,832	\$213,026	\$58,522	\$64,906	N/A	\$141,072
In-house Forestry Operations	\$46,155	\$148,169	\$33,270	\$27,455	\$76,393	\$66,288
Replanting Costs (Transportation)	\$4,985	\$3,500	\$949	\$7,000	\$2,625	\$3,812
Other Project Costs	\$101,510	\$15,400	N/A	N/A	N/A	\$58,455
Volunteers*	\$132,758	\$116,520	\$14,362	\$41,611	\$60,077	\$73,066
TOTAL	\$1,524,385	\$1,537,084	\$1,211,945	\$1,275,319	\$1,518,468	\$1,413,440

^{*} Volunteer expenditures are based on the number of hours and the standard equivalent rates (\$/hour)

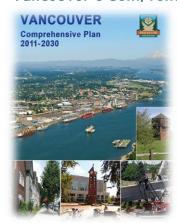
Table 6. Summary of the Urban Forestry Program's budget and expenditures over a 5-year time period

Including Urban Forestry in the City's Surface Water (stormwater) Management Fund represents a comprehensive watershed approach to improving water quality. These dedicated funding sources are vital to the success of Urban Forestry. The sound public investment will pay dividends for many years to come by effectively improving water quality, decreasing runoff and flooding, improving fish and wildlife habitat, and assisting the municipality in meeting state and federal regulations. In addition to these dedicated funding sources, Urban Forestry receives thousands of hours of volunteer time and in-kind contributions from many partners. These factors enable the program to be much more accomplished through an active, integrated program that has grown with support and participation at all levels within the community. The in-kind dollars do not include contributions from other City programs based on their impacts related to the urban forest. Without such strong support, the City's Urban Forestry Program would not be able to accomplish its mission. In 2021, these in-kind contributions, along with grants and donations (including those for Witness Trees), totaled \$77,728.

Alignment with City Plans

This section describes the relationship of the Urban Forestry Management Plan to other City documents that provide goals and policies relating to the urban forest or influence / impact trees in the City. The main documents that influence citywide environmental policy and programs are the City's Comprehensive Plan, the Climate Action Framework (CAF), the 2007 Urban Forestry Management Plan, and the Parks, Recreation & Cultural Services Comprehensive (Park) Plan.

Vancouver's Comprehensive Plan



Washington law requires that every city and county prepare and adopt a long-range comprehensive plan to guide future development and to identify the community's environmental, social, and economic goals. In 1990 the Washington State Legislature declared that "uncoordinated and unplanned growth, together with a lack of common goals...pose a threat to the environment, sustainable economic development, and the health, safety, and high quality of life enjoyed by residents of this state" and that "it is in the public interest that citizens, communities, local governments, and the private sector cooperate and coordinate with one another in comprehensive land use planning." This is the foundation for the Growth Management Act (GMA) in Washington. The GMA specifies that all cities (and counties) in Washington must, at a minimum:

- Designate and protect five types of critical areas, such as wetlands and frequently flooded areas;
- Counties must designate farm lands, forest lands, and other natural resource areas; and
- * Both cities and counties must ensure that new residential subdivisions have appropriate provisions for public services and facilities, and obtain proof of potable water prior to issuance of a building permit.

In addition, the GMA requires growth plans for 29 counties and the cities therein to address 14 goals including sprawl reduction, affordable housing, open space and recreation, environmental protection, natural resource industries, permit processing, early and continuous public participation, concentrated urban growth, economic development, regional transportation, property rights, historic lands and buildings, public facilities and services, and shoreline management.

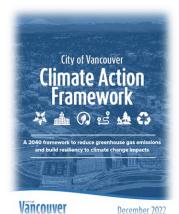
Vancouver's Comprehensive Plan, adopted in 2011, is a long-range vision which establishes priorities and goals for the future as it relates to the state-mandated and Vancouver-specific elements. Vancouver's first comprehensive plan under the Washington Growth Management Act was adopted in 1994. It established a vision of a livable urban area with growth tied to the ability to provide services, and a range of residential options, including more intensive development in urban centers. The Vancouver Comprehensive Plan was completely rewritten in 2004, following an extensive public process involving Clark County, local cities, stakeholders, and the community at large. A more modest update was completed in 2011. The next major update is anticipated to begin in 2023.

The intent of the comprehensive plan is to present a clear vision for Vancouver's future over the next 20 years—a vision that can be easily understood, evaluated, and implemented. The plan contains policy direction relating to growth and development, environmentally sensitive areas, historic places, public services, and other issues. Plan policies are implemented through subarea plans and provisions of the Vancouver Municipal Code and other local standards.

The jurisdiction of the Vancouver Comprehensive Plan is the land within Vancouver's city limits. Unincorporated areas in the Vancouver Urban Growth Area (UGA) are governed by Clark County. Vancouver UGA lands are anticipated to be annexed to the City over the 20-year planning period, and will become subject to the Vancouver comprehensive plan if and when this occurs. The

Vancouver comprehensive plan is intended to coordinate development and to smooth the transition of services between the incorporated and unincorporated urban areas as annexation is considered.

Climate Action Framework



The City's 2022 Climate Action Framework (CAF) provides strategies and specific actions to cut carbon emissions and build community resilience across six focus areas: Building Energy, Transportation and Land Use, Equity and the Green Economy, Solid Waste and Wastewater, Governance, and Natural Systems.

The Framework is intended to serve as a living document that is updated regularly to include new policies, ideas, and technologies as needed to continue making progress toward our goals. Every four years, City staff will work with the community to assess the greenhouse gas reductions that have been achieved and refine the strategies and actions as needed.

The CAF provides the framework for the City to reach carbon neutrality by the year 2040. Policies and actions within the CAF that relate to

sustainability and greenhouse gas (GHG) emission reductions align with the 28 percent tree canopy cover goal and the goals within the Urban Forestry Management Plan.

2007 Urban Forestry Management Plan



CITY OF VANCOUVER
URBAN FORESTRY MANAGEMENT PLAN
DICEMBER 2007

The purpose of the 2007 Vancouver Urban Forestry Management Plan is to recommend direction and actions for Vancouver to optimize the benefits of trees by envisioning and enabling an integrated and sustainable approach to preserving and enhancing the city's urban forest resources in the next ten to twenty years. This 2023 update to the Plan provides the framework to achieve the long-term vision that builds upon the progress of the 2007 plan.

The Urban Forestry Management Plan provides details on how existing City plans and documents align with the goals in the Plan. The following tables summarizes the policies and goals in Vancouver's Comprehensive Plan (Table 7), the Climate Action Framework (Table 8), and the 2007 Plan (Table 9) that support the Urban Forestry

Management Plan's goals and strategies or how the Urban Forestry Management Plan's goals and strategies support these existing plans.

2022-2031 Vancouver Parks, Recreation & Cultural Services Comprehensive Plan



The Comprehensive Plan for parks is the primary framework for developing and managing park facilities and programs in the city. It provides a 10-year work plan and helps guide decision-making about park, facility, and program development, as well as land acquisition. The plan is a reflection of the community's long-term goals and priorities for their city park system and recreation programs. The theme of Essential Spaces was selected for the plan update to reflect the important role of parks systems. Review the following section for additional details.

Alignment of Urban Forestry Goals with the Comprehensive Plan

Community Development Pol	iries
CD-4 Urban centers and	Design with consideration for efficiency, identity, mixed uses,
corridors	flexible standards, enhanced livability
COTTIGOTS	
CD-6 Neighborhood livability	A stable mix of housing, jobs, open spaces, and safe pedestrian
	environments Standards for visual interests, no destrice connections
CD-8 Design	Standards for visual interests, pedestrian connections,
CD 1011	neighborhood identity, and public spaces
CD-12 Integrated area	Cohesive, integrated planning
planning	· · · · ·
CD-14 Connected and	Complete neighborhoods with parks and amenities
integrated communities	
CD-15 Public health and the	Improved public health through walking and bike paths, community
built environment	gardens, and coordination
CD-16 Sustainability	Sustainable land use development that supports reduced
eb 10 0031amasmi,	greenhouse gas emissions and reduced energy usage
Economic Development Polic	ies
EC-7 Regional focus	Work with partners in the Portland-Vancouver region
Housing Policies	
H-4 Innovative zoning	Encourage policies that maintain neighborhood character
Environment Policies	
EN-1 Environmental	Dustock systems and provide for bookley and diverse assessment
protection	Protect, sustain, and provide for healthy and diverse ecosystems
EN-2 Stewardship	Demonstrate and promote stewardship and education
EN-3 Energy conservation	Promote and facilitate energy conservation
EN-4 Restoration and	
enhancement	Promote and facilitate ecosystem restoration and enhancement
EN-5 Environmental	
coordination	Coordinate environmental policies and programs
EN-6 Habitat	Protect the city's vital habitats
EN-7 Endangered species	Protect the city's endangered habitats and plant and animal species
EN-8 Water quality and	Enhance and protect surface water, stormwater, and groundwater
quantity	quality
EN-9 Trees and other	Conserve and restore tree cover, particularly native species, and
vegetation	work towards the tree canopy goal
EN-10 Air quality	Protect and enhance air quality
	Manage development in areas such as floodplains to protect public
EN-11 Hazard areas	health and safety
Dublic Codiling 10	
Public Facility and Services P	Officies
PFS-4 Transportation	Develop and maintain an interconnected transportation system
system	
PFS-10 Livable streets	Design streets and sidewalks for livability
PFS-13 Neighborhood traffic	Protect and enhance neighborhoods focusing on safety, safe routes
	to school, and traffic calming
PFS-18 Street design	Design city streets to achieve safety and accessibility for all modes
PFS-25 Stormwater	Maintain and improve water quality of receiving streams
management	
PFS-30 Open spaces and	Provide and maintain parks and open spaces and support
parks	environmental resource protection
PFS-31 Trails	Provide a system of trails in balance with habitat protection
PFS-34 Parks education	Provide education on the uses and benefits of parks, open spaces,
o o arko caocarion	and habitat protection
PFS-35 Asset management	Facility assets shall be systematically managed using best
o oo / tooci illullugelilelil	management practices and data

Table 7. Summary of the policies in the City's Comprehensive Plan that support the Urban Forestry Management Plan

Alignment of Urban Forestry Goals with the Climate Action Framework

Equity & Green Economy	
EQ-1 Enhance resilience of overburdened communities	Climate risk assessments, hazard mitigation plan, extreme weather events, outreach and education
EQ-2 Build a more community- driven, circular economy	Community gardens
EQ-3 Support growth of the green technology workforce	Green workforce development
Buildings & Energy	
BE-1 Increase use and storage of renewable energy while reducing consumption	Community energy efficiency incentives, resilient energy grid, green building policies, energy savings
Transportation & Land Use	
TLU-1 Create neighborhoods that support clean modes of transportation	Transit-oriented and sustainable development
TLU-2 Shift driving trips to clean, active modes of transportation	Improved pedestrian and bicycle infrastructure, retrofits for vulnerable infrastructure, curb management
Natural Systems & Water Resou	rces
NS-1 Increase carbon storage in trees, vegetation, and soil	Native and climate-resilient plantings, street tree maintenance, carbon sequestration
NS-2 Improve ecosystem resilience	Critical areas code enforcement, habitat restoration, tree canopy recommendations
NS-3 Conserve water resources	Conservation, rainwater capture incentives, drought tolerant landscaping
Solid Waste & Wastewater	
SW-1 Require recycling and organic material management	Citywide composting
City Governance	
GOV-1 Mainstream sustainability at the City, including staff capacity	Staff capacity, climate priority declaration, GHG inventory, City Green Teams, policy alignment

Table 8. Summary of the strategies in the City's Climate Action Framework that support the Urban Forestry Management Plan

Alignment of Urban Forestry Goals with the 2007 Urban Forestry Plan

1) Tree Resource Protection

Protection of larger tracts of private forest land, Heritage Tree and Witness Tree programs, tree-friendly development, stewardship of native plant communities, proper tree care, prevent unnecessary tree removal on single-family residential lots

2) Tree Resource Expansion

28% canopy goal, increased tree plantings, promote street tree plantings, planting and preservation on private property, development project reviews, expanding canopy cover in unincorporated areas, memorial tree plantings

3) Management, Maintenance & Care

Tree inventory and GIS canopy analyses, long-term tree management programs, storm and hazard tree response protocols, manage City-owned natural areas, update the UFMP on a 5-year cycle or as needed

4) Education & Outreach

Urban forestry information sharing, events, coordination with partners

5) Citywide & Agency Coordination and Support

Increase communications, ensure consistency of best practices across City departments

6) Volunteer, Commission & Staff Development

Promote professional development opportunities

Table 9. Summary of the strategies in the City's 2007 Urban Forestry Management Plan that support the 2023 update

Alignment of the Parks, Recreation & Cultural Services Comprehensive Plan's Goals and Objectives with Urban Forestry

Expanding on the City's Parks, Recreation & Cultural Services Comprehensive Plan, the city park and natural area system plays a significant role in the city's tree canopy program. Although the park system land area cannot serve to compensate for the risk of tree loss as the urban density increases, City policy to prioritize and fund the expansion of the park system could notably improve not only the quantity, but also quality and distribution of trees, natural areas, and generally non-impervious areas throughout the city. If Vancouver truly aims to achieve an increase in canopy cover citywide, an integrated approach to tree planting and preservation is needed. Opportunities to align efforts are noted in the city's Comprehensive Plan for parks as summarized below:

- Goal 1) Provide safe and equitable access to parks, natural areas and public arts and cultural spaces for all residents.
 - Objective 1.7 -- Collaborate with Urban Forestry and Community and Economic Development to address socioeconomic and health inequities caused by low green space and tree canopy areas.
 - Objective 1.8 -- Support Vancouver's climate readiness plan by enhancing tree canopy through species selection, design and maintenance practices, particularly in high density and underserved areas.
 - Collaboration Consideration: Continue to coordinate among City departments and programs to address shared challenges and priorities both efficiently and effectively.
- Goal 2) Provide an interconnected system of park properties and public spaces that support alternative modes of transportation, public health, recreational opportunity and environmental stewardship.
 - Objective 2.2 -- Purchase land to connect and/or extend existing regional and connector trails through partnerships, grants and creative funding strategies.
 - Collaboration Consideration: Land acquisition provides a unique opportunity for conservation and expansion of tree canopy cover.
- Goal 3) Preserve Vancouver's historic and cultural heritage.
 - Objective 3.1 -- Expand and enhance public access, viewpoints and recreation amenities along to the Columbia River and other major waterways...
 - Collaboration Consideration: Expanding and enhancing public areas should consider tree canopy cover in the design, construction, and maintenance phases.
- Goal 4) Expand Level of Service and Equity Gap Analysis to inform and guide project and funding opportunities and priorities.
 - Objective 4.2 -- Perform citywide demographic and equity analysis to identify vulnerable and underserved communities and neighborhoods.
 - Collaboration Consideration: Utilize the tree canopy assessments, priority planting areas, and results of future equity analyses to integrate and collaborate within the identified communities and neighborhoods.

- Goal 5) Update Improvement Level definitions to include innovative approaches that meet the needs of a growing and diversifying community.
 - Objective 5.3 -- Incorporate native plant species in park and natural area designs and enhancements to support pollinator species within 25 percent of the planned landscaped area in response to the state legislation.
 - Collaboration Consideration: Develop local and specific-area planting plans such as those for parks and natural areas that support this objective and state legislation.
- Goal 6) Maintain and enhance parks, trails, natural areas, culture and heritage spaces, recreation facilities and community assets to meet identified standards.
 - Objective 6.1 -- Design and maintain all outdoor facilities and spaces to minimize maintenance requirements and support and enhance the natural landscape for a healthy tree canopy, habitat, and sustainability.
 - Collaboration Consideration: Support the design and maintenance of public facilities by providing recommendations for tree species and maintenance best practices.
- Goal 7) Establish and meet goals outlined in the departmental program areas.
 - Recreation Program Area Objective 7.2 -- Advance community health, safety and well-being by effectively maintaining and developing community centers that provide a wide range of recreational amenities.
 - Collaboration Consideration: Align canopy cover goals and efforts with goals for community health, safety, and well-being.
 - <u>Cultural Services Program Area Objective 7.8</u> -- Build capacity of the cultural sector through increased organizational capacity in resource development, training and operations.
 - Collaboration Consideration: Provide training on urban forestry best management practices as applicable.
 - Special Events Program Area Objective 7.13 -- Provide seasonal work opportunities and year-round internships to local youth that instill leadership skills and provide real world career preparation.
 - Collaboration Consideration: Provide training to water newly planted trees.
 - Program Areas for Urban Youth and Volunteer Programs Objective 7.23 Develop and establish restorative native planting spaces...
 - Collaboration Consideration: Tree planting programs should include native plantings and involve community volunteers, especially youth volunteers.
- Goal 8) Reflect the community we serve through creative public engagement, collaborative planning and culturally responsive communication.
 - Objective 8.1 -- Develop and implement a public relations plan that keeps residents informed about programs, parks, natural areas, facilities and cultural assets.
 - Collaboration Consideration: 3Align the public outreach plan in the UFMP with the public relations plan developed as part of the Comprehensive Plan for parks.

Urban Forest Regulations

To maintain a healthy urban forest and quality of life in Vancouver, the City of Vancouver enforces Street Tree (VMC 12.04) and Tree Conservation (VMC 20.770) Municipal Codes to prevent the unnecessary removal and destruction of trees. The following provides an overview of the procedures and permitting processes for trees on public and private land. Detailed information can be found in the City's ordinances and Street Tree Manual.

Tree Permits

- If the tree is a Heritage Tree, permission from the Urban Forestry Commission is required for removal and major pruning. View the Heritage Tree Registry online at www.cityofvancouver.us/urbanforestry.
- If the tree is in the public right-of-way, a street tree work permit is required for planting, major pruning, and removal.
- If the tree is on private property, there are various situations when a tree removal permit is required.
 - On developed, single-family residential properties: either a Level I permit (for site disturbance or building), or a Level III permit (for nuisance or hazard trees) may be required, depending on when the lot was platted or developed, the size of the lot, and the underlying zoning.
 - On undeveloped properties: a Level III, VI, or VII tree removal permit is required depending on proposed activity.
 - On developing properties: a Level I, IV, or V permit is required for all proposed developments.
 - On properties zoned commercial, industrial, or multiple-family: a tree removal permit is required, even for nuisance and hazard trees. A level II permit is required for building additions or site disturbance; a Level III permit is required for nuisance and hazard trees (non-development related removals).
 - On properties containing or adjacent to sensitive areas: a Critical Areas permit is required for any proposed tree removal which occurs in or near a designated sensitive area, such as a wetland, stream corridor, priority habitat, steep slope, or any associated sensitive area buffers.
- Note: Some tree removal permit applications require a tree plan prepared by a qualified professional.

Tree Permit Records Over a 5-Year Timespan (as of October 2022)

Year	Street Tree Permits	Private Permits (non development)	Development Review
2018	230	186	285
2019	250	202	280
2020	295	146	281
2021	255	146	237
2022	180	92	215
Avg	242	154	260

Table 10. Summary of tree permit counts by type over a 5-year timespan (as of October 2022)

Over the past five years, the City has received on average 242 street tree permits, 154 private tree permits, and 260 development reviews annually. Information on the permitting activities provides insights into the changing dynamics of the urban forest extent and structure.

Tree Preservation and Planting Requirements for Development

- All trees on private property may not be removed unless permitted through Title 20.770 or through an approved permit.
- All trees and native vegetation located in a critical area or shoreline district are to be protected and preserved as outlined in Critical Areas Ordinance Chapter 20.740.
- Existing street trees and Heritage Trees (VMC 20.770.120) are to be protected and preserved. An approved permit from the Urban Forestry is required to remove, destroy, cut, break, or injure any street tree.
- Title 20.770 requires a minimum tree density of 30 tree units per acre to be planted on private property. This tree density is to be achieved through preservation of existing quality trees and replanting new trees. New trees shall be spaced appropriately to provide for the eventual mature size of the trees. Required new trees are to be actual trees to meet the purpose and goals of 20.770, not large shrubs, hedge plants, fruit trees, weeping trees, or dwarf trees. The City has a list of Approved Trees that count towards tree units.
- Urban Forestry shall be contacted before planting trees that are not on the list. Projects could still plant these trees but would not receive credit for these as tree units. Per VMC 20.770.080.D trees shall optimize tree diversity; include native species and at least 60 percent conifers; utilize insect and disease resistant trees.
- Title 20.925.060 requires street trees to be planted in new development projects fronting or on a public street or private street.
- Title 20.925 requires buffer trees to be planted at a minimum 1 tree every 30 feet along all property lines.
- Street trees may be required in an existing planting strip that is a least 2.5 feet in width, in tree wells, or in some cases, behind the sidewalk. Vancouver Public Works Transportation Division regulates sidewalk and tree well requirements. Locate new utility lines away from existing and required trees.
- Deciduous trees required for projects are to be at least two (2) inches in caliper size and conifers are to be at least six (6) feet tall or based on Table 20.770.080-2.

Tree location guidelines

- All trees must be shown on the site or landscape plans at the time a permit is applied for during site plan review or plat approval. All required landscaping and trees must be planted prior to occupancy being granted. City staff utilize an inspection sheet to verify required trees are planted in appropriate locations prior to issuing occupancy.
- * Maximize the benefits of trees within the right-of-way by utilizing large, long-lived, site appropriate trees. The City's approved street tree list shall be used.
- Trees with heights of more than 25 feet at maturity shall not be planted under power lines. Lower tree branches on street trees should be shortened or removed to provide physical and visual clearance.
- Trees shall not be planted closer than:
 - 25 feet from the curb line of an intersection
 - Five (5) feet from alley margins and driveways
 - Five (5) feet from fire hydrants and other utilities
 - 10 feet from directional traffic signs
 - Two (2) feet from property lines
 - 20 feet from stop or yield signs
 - 20 feet from street lights, if a columnar tree variety is selected the distance can be reduced but species selection is determined by the Urban Forester
 - 25 feet from adjacent trees depending on species
 - o Three (3) feet behind curb or sidewalk if no planter strip exists
 - Recommend 10 feet from building foundations depending on setback

Community Programs

Heritage Tree Program



Vancouver's Heritage Tree program aims to preserve and recognize the significant trees in the community. By preserving natural resources, a vital link to the city's past is preserved. The program provides a way for people to save significant trees on private property where a tree removal permit is not applicable.

Heritage trees are protected from unnecessary removal and aggressive maintenance actions with review and appropriate approval of all activity by the Urban Forestry Commission. Heritage Trees receive plaques with their designation on or adjacent to the tree. The Urban Forestry Commission and City of Vancouver strive to create partnerships with local tree care companies or sponsors for the care and maintenance of Heritage Trees. All Heritage Trees are inventoried with all relevant information and photographs for interested parties to research. To date, over 40 Heritage Trees are listed in the fourth edition of the City's Heritage Tree booklet.

Heritage Tree status is granted if the tree meets any or all of the requirements including size (at least 36 inches in diameter), location of interest, relation to a historical event, unusual species for the area or exemplary form, and/or a grove of trees that are mature and distinctive,

associated with a historical event, or a relationship with a natural resource. Heritage Trees are recognized and regulated through City Code chapter 20.77.120 – Heritage Trees.

Witness Tree Program



Residents wishing to plant a tree in honor or memory of a special person or event may participate in the Witness Tree program, which is both a memorial program and an adopta-tree program that provides a way to commemorate special occasions while also enhancing Vancouver's urban forest. To date, over 100 Witness Trees are listed on the City's webpage.

Neighborhood Tree Stewards Program



The need for more urban forestry education is documented in the City of Vancouver's Urban Forestry Work Plan. The plan identifies individual citizens as major players in the implementation of the work plan because the city depends on property owners to care for trees on their private property as well as the trees in the right-of-way adjoining their property.

Neighborhood Tree Stewards receive free education from local arboriculture experts on tree identification, tree biology, proper tree care, Vancouver tree regulations, tree planting, natural area restoration, nursery tree production, and the benefits of trees. After the training, the Tree Stewards will be equipped to take on the task of spreading accurate information about trees to their own neighborhoods. Tree Stewards volunteer to conduct a tree planting or tree-related education project in exchange for the training and education they receive. The Urban Forestry staff offer guidance and assistance throughout the project.

Yard Tree Giveaway Program



Vancouver Urban Forestry distributes free yard trees through the Yard Tree Giveaway Program in the fall. Yard trees are trees planted on private, residential property in the City of Vancouver. Recipients are eligible for one tree per household and they must commit to watering, mulching, and caring for their tree. Renters may get approval from the property owner. These trees may not be planted in containers, as street trees, or to fulfill planting requirements.

Letters to Trees Program



Welcome to the world, dear tree, spring blooms, summer shade. I will watch you grow.



Melissa

Letters to Trees aims to connect people throughout the community with Vancouver's trees. This tree appreciation program is for all ages, and seeks to be inclusive and fun for everyone. Interested community members can visit the City's Heritage Tree map to find a local Heritage Tree and to learn more about the specimen. Community members can then send the tree anything from a little note about their day to their favorite quote. Some Letters to Trees have included a list of the writer's favorite things about trees, a thank you note to the tree, and even short stories or poems to the tree. The Letters to Trees program seeks to bring recognition of trees, as well as awareness about Heritage trees, to real or virtual classrooms through a mode other than science. This project can be used as part of lessons to fulfill language arts or general arts requirements.

Tree Canopy Achievement Program (TreeCAP)



Every tree in the City of Vancouver increases neighborhood livability, adds to the value of homes, decreases stormwater runoff, and reduces energy costs. The Tree Canopy Achievement Program (TreeCAP) rewards community members who do their part to grow and maintain a healthy urban forest. Acknowledging the achievements of those who reach and exceed their specific land use zoning tree canopy goal inspires others and helps the entire city realize the environmental, social, and economic benefits of a healthy tree canopy.

The Vancouver Urban Forestry Commission invites groups, businesses, and individuals to participate in TreeCAP, which seeks to recognize those who strive to help the City of Vancouver attain a goal of 28 percent urban tree canopy by 2030.

TreeCAP supports the protection of mature trees, proper tree maintenance, and planting new trees and individuals that participate are recognized as a Bronze Leaf, Silver Leaf, or Gold Leaf property depending on whether they meet, reach, or exceed the canopy cover goals for their respective zoning class / level. Single-family residential lots (medium density) have a goal of 33 percent canopy; commercial lots have a goal 15 percent; and industrial lots have a goal of 9 percent.

Neighborhoods, individual properties, and development projects can participate in the program. As of February 2023, five entities have been recognized including two Bronze Leaf and four Gold Leaf recipients. The types of recipients range from neighborhoods to private consultants and businesses, to residential properties.

Tree Refund Program



The Treefund program encourages the planting of quality trees that will benefit Vancouver long into the future. Treefund is made possible by the city Tree Account where donations, penalties, and mitigation funds are deposited so that trees can be planted throughout the city. No General Fund monies are allocated to the program. Applicants are eligible for a 50 percent refund, up to \$50, for up to 5 trees per lot. Existing or new Vancouver Utility eBilling customers receive up to \$100 back on their first tree, up to the cost of the tree.

SUMMARY OF PROGRAM HIGHLIGHTS

The following was recreated from the Urban Forestry 2022 Annual Report by the City of Vancouver.

•	•	•	
	Actual	Goal	Actual
	2021	2022	2022
utcome The Public is Involved in Environmental Stewardship			
Calls for assistance & information	2,142	Work Load	2,302
Site inspections	948	Work Load	1,067
Average response time (site inspections)	12 days*	10 days	15 days*
Customer satisfaction as rated by program participants (new)	98%	75%	100%
Presentations and educational events	17*	25	29
Urban Forestry Administers a Viable Volunteer Progr	RAM		
Volunteers trained (unique)	10	10	12
Volunteers participating (adults)	462	300	780
Volunteers participating (youth)	100*	200	216
tome The Public Trees Management Program is Effective			
Acres of total tree canopy based on latest GIS report (2011)	6,066	5,579	6,066
Technical reviews of projects completed on time	816	200	837
Young Tree Survival is Improving			
Trees monitored (all projects in 5-year cycle)	6,810	3,750	6,921
Survival rate of new trees	96%	≥95%	96%
Trees pruned to improve health	609	≥500	621
Estimated acres of added canopy from monitored trees at maturity	110	60	112
NEW TREES ARE ADDED TO THE EXISTING CANOPY			
Restoration projects (contractor, volunteer, youth)	40	10	40
Trees planted	1,311	750	1,323
Tree seedlings and shrubs planted	0	500	100
Other plants distributed or planted	0	500	551
Native species composition of new plants	>50%	50%	>50%
Estimated increase in tree canopy this year, in square feet	16,388	9,375	16,538
utcome Urban Forestry is a Good Investment			
Value of grants, donations, sponsorships, and reductions	\$79,411	\$35,000	\$98,971
Benefits of newly planted trees over 40-year period** (millions)	2.6M	1.6M	2.7M
Value of program per tree cost (planted and maintained for 5 yrs)	\$784	\$700	\$667
		_	

^{*}Impacted by the COVID-19 pandemic. **Based on data Western Washington and Oregon Community Trees Guide: Benefits, Costs and Strategic Planting

Table 11. Program highlights recreated from the City's Urban Forestry 2022 Annual Report

Urban Forest Benchmark Comparisons

Urban forest benchmarking research provides an understanding of the level of effort and capacity necessary to satisfy the City's adopted goals, identifies industry trends and best practices, enables the creation of realistic goals, and provides the metrics for measuring change.

Benchmarking Data Sources

Several data sources were reviewed and compiled to paint a picture of how Vancouver measures up against industry standards and communities of a similar size or geographic location and how its own operations have changed over time.

Phase 1 of the benchmarking process uses the Arbor Day Foundation's Tree City USA 2021 dataset and compares statistics provided by the City of Vancouver to other regional cities that also

participate in the Tree City USA program. Using this dataset helps better understand how Vancouver's urban forestry budget and activities compare to relevant cities. Relevant cities are determined by 1) proximity (nationwide), 2) proximity (statewide), 3) population size (nationwide), 4) population size (statewide), and finally 5) within 200 miles and most similar population size (best match). The Tree City USA dataset is largely focused on: urban forestry budgets, per capita funding information, and volunteer hours. The data further describes the number of trees planted, removed, and pruned by City staff. This data is useful in determining



adequacy of urban forestry program funding as well as understanding workloads of those City employees involved in urban forestry operations.

Phase 2 of benchmarking involves comparing Vancouver's urban forestry operations to findings from an in-depth study conducted by researchers Richard Hauer and Ward Peterson (2014). In this study, researchers interviewed urban forestry programs in various regions across the U.S. and

among varying population classes. Specific study focus areas include: community and staff profiles, funding, tree management policy and planning, volunteers and partnerships, contracting tree care activities, community tree populations, tree operations and management, and assistance programs. Data from this study was compared to data obtained from the City of Vancouver for the purposes of determining program health as compared to accurate data across a range of scales and locations.



View the 2014 study by Hauer et al. at https://www.uwsp.edu/cnr/Pages/Forestry---MTCUS.aspx.

Phase 3 of benchmarking is comprised of presenting the above information to the City and making clarifications in order to ensure the highest quality analysis. This phase also includes internal quality controls to ensure data comparisons are as accurate as possible. In this phase, data discrepancies and caveats are identified to ensure relevant and compatible comparisons are made. Information gathered during this process informed the development of realistic and attainable goals and strategies in the City's Urban Forestry Management Plan.

Understanding the urban forest policies, management approaches, budgets, and programs of comparable communities and nationwide averages provides comparative data to benchmark the City's performance, present and future. While existing tree data describe the current conditions, benchmarks offer guidance to bring Vancouver's urban forestry policies and practices into alignment with similar-sized cities in Washington and nationwide, enhancing urban forest management. A summary of research into policies and actions of these cities follows.

Data Descriptions, Discrepancies, and Limitations

The benchmarking research is based on data reported by communities to the agencies summarizing the metrics. For the Tree City USA and 2014 Urban and Community Forestry Census records, the method for reporting budgets and activities may vary among communities since each community forestry program is unique. The reporting methodology for budgets, staffing, and activities may differ resulting in less accurate comparisons. Some communities may only report staffing numbers based on the primary program while others may include supporting departments, contractors, and technical service providers. These differences in reporting would also affect the budget comparisons. In addition, the methods for reporting activities for each community may vary. Some communities may only report on the in-house activities conducted by the lead department whereas other communities may report on activities conducted by supporting departments, utility companies, and other sources. The values used in the comparison study are based on 2021 Tree City USA records and 2021-2022 budgets. Due to the number of discrepancies and the limitations of this analysis, the benchmarking research is meant to serve as an initial starting point in developing the Urban Forestry Management Plan. The metrics are not meant to imply overall management effectiveness. Interpretations for each metric were provided and used to guide goals and strategies within the Urban Forestry Management Plan. It is recommended the City verify and finalize benchmarking values in order to measure Plan implementation progress and inform reporting.

Urban Forest Benchmarking Research

	Orbair r ores	or benchmarki	ng Research		
Comparison Criteria	Community	County	Pop.*	Difference	Distance**
STUDY AREA	Vancouver	Washington	189,700	0	0.0
City Interest (>50k pop)	Seattle	King	755,935	566,235	165
City Interest (>50k pop)	Spokane	Spokane	227,579	37,879	355
City Interest (>50k pop)	Tacoma	Pierce	220,603	30,903	135
City Interest (>50k pop)	Bellevue	King	145,300	-44,400	168
City Interest (>50k pop)	Kent	King	131,118	-58,582	150
City Interest (>50k pop)	Everett	Snohomish	110,629	-79,071	193
City Interest (>50k pop)	Renton	King	102,153	-87,547	159
City Interest (>50k pop)	Yakima	Yakima	97,340	-92,360	189
City Interest (>50k pop)	Kirkland	King	93,010	-96,690	173
City Interest (>50k pop)	Bellingham	Whatcom	90,620	-99,080	253
City Interest (>50k pop)	Kennewick	Benton	84,620	-105,080	218
City Interest (>50k pop)	Auburn	King	81,720	-107,980	146
City Interest (>50k pop)	Redmond	King	80,915	-108,785	175
City Interest (>50k pop)	Pasco	Franklin	72,899	-116,801	220
City Interest (>50k pop)	Richland	Benton	59,609	-130,091	223
City Interest (>50k pop)	Shoreline	King	58,422	-131,278	176
City Interest (>50k pop)	Lacey	Thurston	56,576	-133,124	110
City Interest (>50k pop)	Olympia	Thurston	53,630	-136,070	106
City Interest (>50k pop)	Burien	King	51,038	-138,662	158
AVERAGE			138,171	-54,241	183
Comparison Criteria			Pon *	Difference	

Comparison Criteria	Pop.* Difference
State Average	41,054 -148,646
Nationwide Average	42,702 -146,998

^{*} Population as of 2021 TC USA reporting

Table 12. Communities benchmarked for the Vancouver, WA Urban Forestry Management Plan

^{**} Driving distance from the study area in miles

Table 13. Summary of phase 1 benchmarking research results (Tree City USA dataset)

	EE CITY USA - VANCOUVER	ANCOUVER 2021 TREE CITY USA - REGIONAL			
\$1.2M	(Urban) Forestry budget	\$1.5M	Average forestry budget		
\$6.50	Per capita forestry budget	\$9.35	Average per capita budget		
\$342k	Tree planting, initial care, maintenance, and removal budget	\$213k	Average tree planting, initial care, maintenance, and removal budget		
\$139k	Tree maintenance budget	\$731k	Average tree maintenance budget		
\$25k	Tree removal budget	\$155k	Average tree removal budget		
\$647k	Program management budget	\$262k	Average program management budget		
609	Trees pruned	1,025	Average trees pruned		
~50	Trees removed	130	Average trees removed		
1,311	Trees planted	1,695	Average trees planted		
1,458	Volunteer hours	6,695	Average volunteer hours		

Table 14. Summary of phase 2 benchmarking research results (2014 Census, Hauer et al.)

CENSUS – VANCOUVER (2021)		CENSUS – POPULATION GROUP (100-250K)		
\$1.2M	(Urban) Forestry program budget (2021)	\$1.4M	Average forestry budget	
0.19%	Of total budget for forestry	0.48%	Of total budget for forestry	
99k	Estimated public trees	74k	Average count of public trees	
\$12.88	Budget per tree	\$44.85	Average budget per tree	
0.52	Public trees per capita	0.51	Average public trees per capita	
20k	Public trees per staff	14k	Average public trees per staff	
1,600	Acres of parks and open space	1,284	Average acres of parks and open space	
\$115M	Value of public trees	\$98M	Average value of public trees	

^{*}The values from the 2014 urban and community forestry census were adjusted for inflation

Urban Forest Audit

To develop this Plan, 62 documents, plans, and resources were gathered and reviewed by applying the U.S. Forest Service's Urban Forest Sustainability and Management Audit's Discovery Matrix. This matrix includes a total of 11 urban forest categories, each containing a multitude of supporting elements. All resources were reviewed to identify references regarding each of the categories and supporting elements. There are a total 726 instances where the 62 resources reference the 11 categories and supporting elements. The number of resources referencing elements of urban forest sustainability and management demonstrate Vancouver's readiness for changes driven by this Plan. Recommendations in this Plan align with components of these supporting resources. For a complete list of categories, elements, rankings, and supporting resources, see Appendix C.

Based on the analysis of findings from the project planning and research, **Vancouver scored a 78 percent** in terms of urban forest sustainability and management as defined by the U.S. Forest Service, partners, and planning consultants. The City of Vancouver scored relatively high when compared to other urban forestry audits completed by the consultants for other communities of similar size (average of 67 percent for 15 comparable cities). Overall, the City scored highest in the Professional Capacity and Training, Decision and Management Authority, Community, and Management Policy and Ordinances categories — all of which are above 90 percent. The Urban Forestry Management Plan provides the guidance to maintain these strengths and to address shortcomings as opportunities.

Based on the audit of 129 subcategories (11 primary categories), Vancouver is achieving "Adopted Common Practice" for 77 (60 percent) of these. 46 subcategories (36 percent) are "In Development". Applying the multipliers of 2 for Adopted Practice and 1 for In Development results in a total score of 200 out of 256 possible points, or 78 percent (detailed in the following table).

Urban Forest Audit and Gap Analysis

Table 15. Outcomes of the urban forest auditing process for Vancouver, WA

#	Description	SOC* (% Achieved)	Base** (% Achieved)	Overall Rating	Overall (% Achieved)
1	Management Policy, Ordinances	75%	100%	27	96%
2	Professional Capacity and Training	100%	NA	18	100%
3	Funding and Accounting	100%	NA	9	75%
4	Decision, Management Authority	100%	100%	8	100%
5	Inventories	NA	38%	12	46%
6	Urban Forest Management Plans	NA	42%	14	58%
7	Risk Management	83%	50%	14	78%
8	Disaster Planning	NA	67%	10	71%
9	Standards and Best Management Practices	75%	88%	48	80%
10	Community	100%	NA	30	100%
11	Green Asset Evaluation	NA	NA	10	50%
TC	TAL	90%	69%	200	78%

^{*}Standard of Care (SOC) elements represent the minimum group of urban forestry management "best practices" that a municipality should consider for implementation. SOC refers to the degree of prudence and caution required of an individual who is under a duty of care (i.e., legal obligation of the controlling authority, owner, or manager) to minimize risk. Neither state, regional, nor national minimum management components have been established for SOC but these are interim recommendations for consideration. (NA = not applicable)

^{**}Base Practices (BP) elements represent additional urban forest management activities or components that may effectively expand a program beyond the SOC group (see footnote above). These elements are typically precursors to other "non-core" elements in the category. (NA = not applicable)

Discussion

The main purpose of the urban forest audit is to apply the research and findings gathered throughout the planning effort to inform the Plan's goals, objectives, and strategies. This audit or "gap analysis" enables the Urban Forestry Program to control different aspects of its program with data. This gap analysis identified the shortcomings that the Urban Forestry Program should overcome and by quantifying them, the program can make improvements. It also enables effective monitoring of Plan strategies in that the audit categories and elements can be revisited at key intervals in the Plan implementation process to measure progress and adapt strategies accordingly.

The information provided in the table above describes the current conditions of Vancouver's urban forest, the programs that manage it, and the community framework. As recommended in the Plan's monitoring methods, the City should use this framework to evaluate implementation progress, report successes, and inform changes to Plan actions. Many of the urban forest audit elements were given a rating of "In Development" as they previously did not exist but are addressed in this Urban Forestry Management Plan. This means that the City is already well underway in advancing its program and its Urban Forest Audit score.

Urban Forest Audit Summary 96% 1) Policy and Ordinances 100% 2) Capacity and Training 75% 3) Funding and Accounting 100% 4) Decision and Management Authority 46% 5) Inventories 6) Urban Forest Plans 58% 7) Risk Management 8) Disaster Planning 80% 9) Standards and Best Practices 100% 10) Community 50% 11) Green Asset Evaluation

Figure 32. Summary of the 2022 Urban Forest Audit for Vancouver's Plan

PROGRAM RECOMMENDATIONS

Public Tree Maintenance

Urban forest and public tree management priorities should in part be determined by the current maintenance practices and how well they support program goals and the Plan's goals. Some maintenance practices are specific to local climate conditions and number of trees to manage. Others, such as maintaining an optimal pruning cycle are relatively consistent for all tree management programs. As such, the City's pruning cycle can be used to identify funding and staffing needs.

Revisiting the public tree condition and maintenance needs summarized in the Urban Forest Status section, an inventory and routine monitoring can inform priorities and management strategies. It is estimated that there are approximately 99,000 public trees along streetscapes, in maintained areas of parks, and on public properties. The City's tree inventory database currently contains 12,263 public trees (as of February 2023), or approximately 12 percent of the total public tree population (excluding natural areas and open space). Based on the 12 percent sample, 44 percent of the trees are in good condition, 21 percent are in fair condition, and 1 percent are either very poor in condition or they are dead trees.

In most cases, the very poor or dead trees cannot be improved with maintenance or plant health care and will eventually need to be removed if they do not meet the requirements of a priority snag (per WA Department of Fish & Wildlife guidelines). If they do meet priority snag requirements, the City will promote active maintenance to mitigate risk to public safety and avoid the tree from becoming a hazard tree. The trees that are in fair to excellent condition (68 percent) may be eligible for a routine pruning program often referred to as programmed pruning or proactive pruning.

As stated in earlier sections, public street tree maintenance is primarily the responsibility of the adjacent property owner whereas, public park, median, and property trees are the responsibility of the City to maintain. Therefore, a citywide public tree proactive pruning program cannot be fully implemented at this time. Rather, the Urban Forestry Program can focus on a recommended pruning rotation of the trees for which they are responsible and encourage property owners to proactively maintain the street trees. The following sections summarize the recommended pruning programs for the City-maintained public trees and the property owner-maintained street trees. These sections also include recommendations for the City to explore priority maintenance corridors for street trees in disadvantaged areas of the city.

Removal and Maintenance Recommendations for City-maintained Public Trees

Removals for City-maintained Public Trees

Tree & Stump Removal Cost by DBH Range	Per Tree Cost	Removals	Costs
0-3"	\$70	160	\$11,200
3-6"	\$125	160	\$20,000
6-12"	\$307	160	\$49,120
12–18"	\$1,095	160	\$175,200
18-24"	\$1,095	160	\$175,200
24-30"	\$1,938	160	\$310,080
>30"	\$3,023	160	\$483,680
TOTAL	\$1,093 Average	160	\$11k - \$480k

Table 16. Summary of the estimated costs for removing 160 City-maintained public trees

As shown in the table above, 160 City-maintained public trees are dead and recommended for removal based on the inventory database (February 2023). The diameters of these trees are unknown; therefore, the table above summarizes the possible range of costs based on regional averages for tree and stump removal by diameter class ("DBH Range" or diameter at breast height measured at 4.5 feet above grade). Costs per diameter class range from \$70 per tree (0-3-inch class) to \$3,023 per tree (30 inches or greater) and with 160 trees, the overall costs range from \$11,200 to \$483,680. Note, these cost ranges assume all 160 trees are in one diameter class to provide a high and low range of costs that the City can further explore. In 2021, the City removed a total of 50 trees.

Identifying Optimal Pruning Cycles

A study (Miller et al. 2015) was conducted for Milwaukee, Wisconsin to determine the optimum pruning cycle by comparing the marginal cost of pruning to its marginal return. For example, a portion of Milwaukee was inventoried to record tree condition and calculate tree value. Since condition class influences tree value, the date of last pruning and average condition class for each work unit inventoried was subjected to regression analysis. This analysis determines the relationship between pruning and condition class (see Figure 33 below). Marginal costs were calculated based on the loss of tree value, using condition classes, for each one-year extension of the pruning cycle. Marginal returns are the savings in pruning costs for each one-year extension of the pruning cycle. For Milwaukee, the relationship between marginal cost and return indicates that the optimum pruning cycle for the city is five years, assuming the management goal is to provide the highest-value tree population for dollars expended.

Optimal Pruning Cycles and Costs of Deferred Maintenance

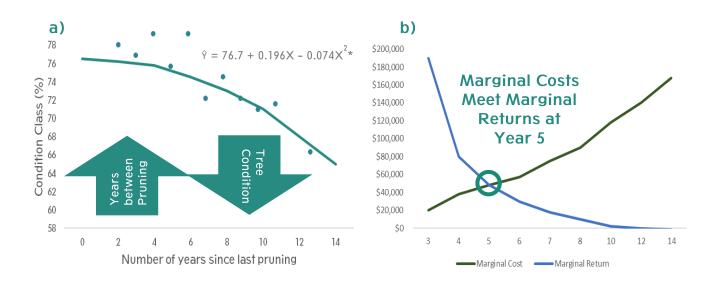


Figure 33. a) Relationship between pruning cycle length (number of years since last pruning) and condition class rating. Asterisk (*) indicates regression is significant at the 0.05 level. b) Marginal cost (loss of tree value) and marginal return (savings in pruning costs) for pruning cycle lengths. For this study, the optimal pruning cycle is where marginal costs and marginal returns intersect—at 5 years. Figure recreated from Miller and Sylvester (1981). - The Costs of Maintaining and Not Maintaining the Urban Forest: A Review of the Urban Forestry and Arboriculture Literature (Jess Vogt, Richard J. Hauer, and Burnell C. Fischer, 2015)

An Optimal Pruning Cycle for Vancouver's Public Trees

As illustrated in the 2015 study for Milwaukee (Figure 33), a 5- to 7-year pruning cycle is the optimal intersection of efficiency and safety. If each public tree were to be maintained within a 5- to 7-year window, research shows the trees would be in a safer condition while limiting city expenses. Based on the analysis (Figure 33), a pruning cycle on a shorter timeframe has a higher cost to a city but does not correlate to a proportional increase in safety. Conversely, a longer timeframe lowers costs to a city, but also decreases tree safety.



Figure 34. As the years between street tree pruning increases, tree health and safety decrease and costs increase

For Vancouver specifically, the pruning rotation for public trees that the City is responsible for is unknown and the case is similar for the street trees maintained by adjacent property owners. Numerous studies have shown the detrimental effects a delayed pruning cycle can have on a community's tree population as well as the increased risks to public safety. Not pruning street trees or pruning on such a long rotation is referred to as deferred maintenance. The costs for deferred maintenance have been closely examined researchers. Prolonged deferred maintenance has a triple negative effect on costs— it reduces the health and sustainability of the urban forest, it costs the residents and adjacent property owners as the associated benefits

of trees are diminished as tree health declines, and costs the City in terms of increased callouts and liability management.

Maintenance can be linked to tree success both at the beginning and end of its lifespan. Early in a tree's life, during the establishment and immature (i.e., juvenile) phases, maintenance must be adequate to ensure early survival and establishment in the urban landscape. Presumably, any post-planting maintenance performed on a tree that improves its chances of survival to maturity or lengthens the time that tree spends in its mature phase (where benefits are produced in the greatest amount) increases the monetary value of that tree. The cost of not maintaining trees early in life may translate to greater maintenance costs down the road; this is deferring maintenance (and its costs) to the future in order to save on maintenance costs today. Later in a tree's life, maintenance may aim to extend the tree's lifespan or prevent tree failure. In this way, late-stage maintenance can defer removal costs. If maintenance does prolong a tree's useful life (i.e., delays the onset of senescence and a tree's removal), it increases the amount of benefits it produces over its lifespan. Alternatively, removing the low-hanging limbs on an aging tree can prevent these limbs from failing and damaging people or property, and thereby avoid subsequent repair- or liability-related costs. Tree pruning to remove high-risk limbs and removal of the entire tree can be considered a type of maintenance that potentially saves money due to avoided litigation costs. With a complete inventory of the public tree population, the City should determine the costs and optimal schedule for pruning all public trees, specifically street trees, on a rotation.

The following analysis is based on determining what funding may be needed to maintain the trees for which the City is responsible. The costs are based on a market comparison of programmed pruning costs. The section also explores the costs for pruning the entire public tree population on a 7-year pruning cycle, to create a baseline for the City to measure its progression towards sustainable urban forest management.

Programmed Pruning for City-maintained Public Trees

Activity	DBH Class	Cost / Tree	Annual Tree #'s	Annual Costs	7-Year Cost	Total Trees
	0-3"	\$55	17	\$950	\$6,650	120
	3-6"	\$111	24	\$2,612	\$18,287	165
Proactive	6-12"	\$222	32	\$7,061	\$49,430	223
Pruning of City- maintained	12-18"	\$277	13	\$3,562	\$24,937	90
Trees (1,728	18-24"	\$332	12	\$3,942	\$27,597	83
Total Trees)	24-30"	\$388	8	\$3,103	\$21,723	56
	30"+	\$443	19	\$8,233	\$57,632	130
	Unknown*	\$261	123	\$32,133	\$224,929	861
Activity Total(s)			247	\$61,598	\$431,184	1,728

^{*} An average cost is used for the trees with an "Unknown" diameter (DBH)

Table 17. Summary of the estimated costs for programmed pruning of City-maintained public trees

Of the 12,263 trees in the City's tree inventory database, a total of 1,888 are City-maintained public trees. Within this subset of trees there are 160 trees recommended for removal and 1,728 trees that are eligible for a proactive (programmed) pruning program. As stated in the implementation Action #3 for the Natural Systems strategy #NS-1 of the City's Climate Action Framework, a 7-year street tree pruning cycle is recommended. The table above provides the estimated costs for a pruning program that addresses the City-maintained trees over a 7-year time period. The costs are based on the total number of trees by size class (DBH Class) and regional cost estimates for contracted proactive pruning. Using these figures, it is estimated that a total of 247 City-maintained public trees need to be pruned annually and the costs would be approximately \$61,598 per year or 1,728 trees and \$431,184 over a 7-year period.

The market research on costs for street tree maintenance found that the estimates are based on existing grid pruning programs that have been implemented for a number of years. The City of Vancouver largely has not been maintaining street trees on a recommended rotation. Therefore, the per tree cost for grid pruning in Vancouver may be greater in the first rotation due to deferred maintenance causing increased maintenance needs and associated time.

These estimates are based on the inventoried public tree dataset and does not include the costs to maintain all public street trees since the condition, size, and locations are unknown. Currently, the City prunes approximately 600 trees per year based on the reporting to Arbor Day Foundation (2021). The City can utilize these calculations to estimate the costs for citywide proactive pruning. Note, the maintenance of newly planted trees differs from established trees and these differences are discussed in the Urban Forest Status section. It should also be noted that the costs associated with programmed pruning do not include the costs for tree removals among other management activities.

Action #3: Street tree maintenance



Working through the City's Urban Forestry Program, preserve existing street trees through proper care and maintenance. This includes:

- Optimize maintenance to increase carbon sequestration and resilience to extreme weather events.
- Where replacement trees are needed, replace with climate-resilient trees.
- Prioritize service in overburdened communities and areas with a tree canopy deficit to promote equitable distribution of benefits, risk reduction, and resilience to climate-related extreme weather events.
- Support overburdened communities consistent with anti-displacement best practices.

Method(s)

Existing plans; City budget appropriation; task force to develop street tree maintenance program

Metrics

Develop and implement a 7-year street trees pruning cycle; completed street tree inventory; reduced storm damage; more participation in street tree planting in overburdened communities

Lead & Key Partners Public Works— Urban Forestry

KEY PARTNERS

- Transportation
- Public Works Operations
- Property owners
- Friends of Trees
- Tree care providers/arborists

Timeframe						
Near Term	Mid Term	Long Term	Ongoing			
			Х			

Figure 35. The street tree maintenance strategy and action in the City's Climate Action Framework (2022)

Maintenance Recommendations for All Public Street Trees

The following analysis and summary is provided to support the Urban Forestry Program in exploring and discussing the acquisition of additional tree maintenance responsibility for street trees. It is not intended to serve as a formal recommendation in the Plan but rather to serve as a starting point for incrementally improving the proactive maintenance of street trees.

A total of 10,380 public trees (85 percent of 12,263 trees) in the database are privately-maintained and of those trees, a total of 177 (2 percent) are either dead, in very poor condition, or recommended for removal. The remaining 10,203 trees (98 percent) are eligible for a proactive pruning program. The following tables provide a summary of the estimated costs for tree removals and proactive pruning though actual costs may vary depending on a number of variables.

Removals for Privately-maintained Public Trees

Tree & Stump Removal Cost by DBH Range	Per Tree Cost	Removals	Costs
0-3"	\$70	24	\$1,680
3-6"	\$125	32	\$4,000
6-12"	\$307	39	\$11,973
12-18"	\$1,095	30	\$32,850
18-24"	\$1,095	13	\$14,235
24-30"	\$1,938	3	\$5,814
>30"	\$3,023	3	\$9,069
N/A	\$1,093	33	\$36,078
TOTAL	\$1,093 Average	177	\$115,699

Table 18. Summary of the estimated costs for removing 177 privately-maintained public trees

Based on the inventory, a total of 177 trees are recommended for removal and the table above provides the estimated costs based on the diameter class (DBH Range). Costs generally increase with the size of the tree though other factors influence actual costs. The table above shows that the costs range from \$1,680 for 24 trees in the 0-3-inch class and \$32,850 for 30 trees in the 12-18-inch class. A total of 33 trees do not have a diameter recorded, therefore, the average per tree cost was used for a total of \$36,078. Overall, the 177 trees are estimated to cost \$115,699.

Programmed Pruning for Privately-maintained Public Street Trees

Activity	DBH Class	Cost / Tree	Annual Tree #'s	Annual Costs	7-Year Cost	Total Trees
Proactive Pruning of Privately- maintained Trees (10,203 Total Trees)	0-3"	\$55	169	\$9,357	\$65,501	1,182
	3-6"	\$111	223	\$24,683	\$172,784	1,559
	6-12"	\$222	316	\$70,076	\$490,534	2,213
	12-18"	\$277	146	\$40,413	\$282,894	1,021
	18-24"	\$332	116	\$38,426	\$268,984	809
	24-30"	\$388	75	\$28,982	\$202,874	523
	30"+	\$443	105	\$46,739	\$327,170	738
	Unknown	\$261	308	\$80,537	\$563,761	2,158
Activity Total(s)			1,458	\$339,214	\$2,374,501	10,203

^{*} An average cost is used for the trees with an "Unknown" diameter (DBH)

Table 19. Summary of the estimated costs for programmed pruning of privately-maintained public trees

Using the same market research as the analysis in Table 18, estimated costs for proactively pruning privately-maintained public street trees is provided in the table above (Table 19). Annual costs amount to \$339,214 with a 7-year total cost of \$2,374,501 to prune the 10,203 trees on a 7-year recommended rotation.

Priority Maintenance Corridors

A complete overhaul of the public tree maintenance budget and the necessary staff to support a 7-year pruning rotation is not feasible or desirable in the short-term. Therefore, the studies in the previous section provide cost estimates for the City to continue to explore programmed pruning. As an additional or alternative approach, the City could explore phasing the proactive pruning program over time by first addressing public street trees in priority areas.

It is recommended the City explore priority roadways and neighborhoods for public street tree maintenance based on density of trees in the rights-of-way, condition and maintenance history of trees, density of socioeconomically disadvantaged populations (e.g., lower than median income, housing value, and other factors), planned roadway construction, density of tree species requiring frequent maintenance, among other factors.

The following map provides an example of the potential priority street corridors for the City to consider to incrementally implement the 7-year pruning rotation. These corridors can also be the starting point for establishing the framework to increase in-house resources. The priority streets were identified using the public tree inventory dataset, Tree Equity Scores, Census Tract data, and the tree canopy cover within each city neighborhood. The second phase of identifying priority areas was to look at the Washington Environmental Health Disparities data. In addition, the "Socioeconomic Factors" layer in the City's TreePlotter CANOPY software was examined to identify priorities. This layer shows socioeconomic ranking as reported in the Washington Environmental Health Disparities Map. Includes ACS:Limited English, No High School Diploma, People of Color, Population Living in Poverty (<=185% of Federal Poverty Level), Transportation Expense, Unaffordable Housing, and Unemployed.

Priority Areas and Privately-maintained Street Trees for Maintenance

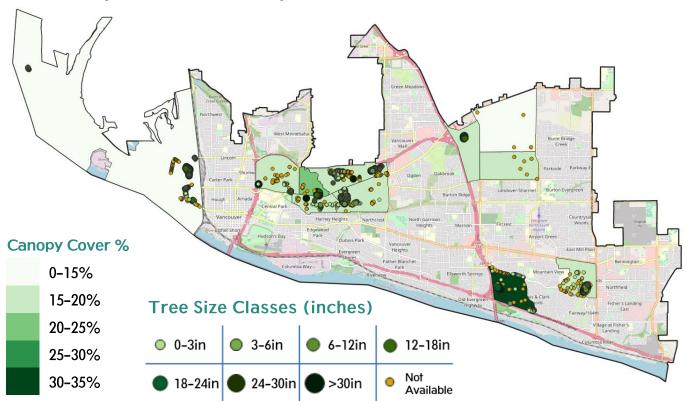


Figure 36. Map of trees in priority neighborhoods and Census Tracts for consideration in the priority maintenance corridor pruning program

Based on the Washington Environmental Health Disparities Map, tree canopy data, and the inventory of public street trees that are privately-maintained, the map above displays the location and diameter of trees within these priority areas. A total of 1,885 trees are in these priority neighborhoods and the estimated costs for proactive pruning are provided in the following table.

Programmed Pruning of Public Street Trees in Priority Areas

Activity	DBH Class	Cost / Tree	Annual Tree #'s	Annual Costs	7-Year Cost	Total Trees
	0-3"	\$55	35	\$1,924	\$13,466	243
Priority Maintenance Corridors for Underserved Neighborhoods (1,885 Trees)	3-6"	\$111	24	\$2,692	\$18,841	170
	6-12"	\$222	52	\$11,558	\$80,906	365
	12-18"	\$277	30	\$8,273	\$57,909	209
	18-24"	\$332	20	\$6,602	\$46,216	139
	24-30"	\$388	10	\$4,045	\$28,317	73
	30"+	\$443	23	\$10,070	\$70,488	159
	Unknown*	\$261	75	\$19,668	\$137,675	527
Activity Total			269	\$64,831	\$453,817	1,885

^{*} An average cost is used for the trees with an "Unknown" diameter (DBH)

Table 20. Estimated annual and 7-year costs for proactively pruning public street trees in priority neighborhoods

The majority of the 1,885 trees in priority neighborhoods are in the 6-12-inch diameter class (365 trees) though 527 trees do not have a diameter recorded. Using the regional costs, the estimated annual cost for pruning trees in these areas amounts to \$64,831. This would enable the proactive pruning of 269 trees annually for a total 7-year cost of \$453,817. The City can utilize this data to discuss the estimated costs with adjacent property owners or explore addressing the priority maintenance in underserved neighborhoods to work towards sustainable urban forest management.

Summary of Public Tree Maintenance Recommendations

The Urban Forestry Program should continue to maintain its inventory of public trees to prioritize tree maintenance and removals for City-maintained trees and to inform adjacent property owners of priorities for street trees. A maintained inventory can also inform future tree plantings. 21 percent of the inventoried public trees are in fair condition and 44 percent are in good condition. Advancing towards a proactive pruning cycle of five to seven years would likely improve the condition of the trees, reduce clearance issues, and improve public safety. A 7-year pruning cycle is the optimal rotation. A shorter timeframe has a higher cost to a city but does not correlate to a proportional increase in safety. Conversely, a longer timeframe lowers costs to a city, but also decreases tree health, public safety, and depletes urban forest ecosystem benefits.

Based on the inventory of 12,263 public trees, a 7-year pruning cycle for City-maintained public trees would require the pruning of 247 trees per year. The City currently prunes approximately 600 trees per year so the costs for the 247 trees can be extrapolated to represent total annual costs. A 7-year cycle for privately-maintained street trees would require 1,458 trees to be pruned annually and the same cycle for priority maintenance neighborhoods would require 269 trees per year. Between the City-maintained public trees and the trees in priority neighborhoods, the City would prune approximately 500 trees annually. Note, these numbers do not reflect the total estimated public tree population of 99,000 trees but is meant for the City to explore a gradual transition into a more proactive pruning program.

Summary of Proactive Pruning Options

Tree Population	Total Number of Trees	Annual Number of Trees to Prune	Annual Costs	7-Year Costs
City-maintained	1,728	247	\$61,598	\$431,184
Privately-maintained	10,203	1,458	\$339,214	\$2,374,501
Priority Neighborhoods	1,885	269	\$64,831	\$453,817
TOTAL	13,816	1,974	\$465,643	\$3,259,502

Table 21. Summary of the options, costs, and number of trees for a proactive public tree pruning program

Staffing to Support Sustainable Management

When it comes to program staffing, many cities struggle with the issue of being understaffed. The programs may be fulfilling their duties within the confines of current staffing and resources but they are not performing services that fully capture sustainable urban forest management. Determining and maintaining optimal staffing levels is critical to a program's efficiency. Optimal staffing depends on several factors including number of public trees, authority and responsibility defined in municipal code, internal and external expectations, customer service (i.e., the public), operations, and existing programs. The concept of being understaffed also plays a critical role in employees' behaviors, attitudes, and directly affects individual productivity. If a program is understaffed, it typically encounters excess overtime, morale issues, absenteeism, employee burnout, and has difficulty with relief coverage and training requirements.

One of the most effective techniques for a city to utilize in determining the optimal staffing level is to complete an area workload assessment by looking at the number of public trees managed divided by the total number of staff and using the ratio as a comparison to industry standards and averages for communities of similar size. The following section provides this analysis and a recommendation for optimal staffing.

City Staffing Recommendations: In-house Arborist Crews

The number of staff available to perform annual tree maintenance, inspections, and ordinance / policy enforcement is a critical element of a sustainable forest. To measure whether staffing is at a level where sustainable management can occur, the ratio of staff to the number of public trees is often used. Based on research and industry standards, the optimal ratio for public tree maintenance is 1 staff for every 2,000 trees (McPherson, et al. 2016). A less aggressive ratio of 1 staff for every 10,000 trees is also found in the research. But, according to the 2014 Urban and Community Forestry Census of Tree Activities (Hauer et al. 2014), communities with a population between 100,000 to 249,000 people have an average of 11.8 full-time employees for urban forest management (tree maintenance and all other services).

For Vancouver, the Urban Forestry Program is staffed with four full-time employees or equivalents (FTEs), two "Program Coordinator" vacancies (as of May 2023), plus AmeriCorps staff (1.50 FTEs). Assuming 99,000 public trees and exploring what the structure would look like for the City to maintain all public trees in-house (including street trees), the Urban Forestry Program should have 10 FTEs. It is assumed the City would still need to contract very large tree removals.

Alternatively, the City may contract tree maintenance and removals but supplement the program with one additional arborist crew on a less rigorous tree pruning cycle. With the contracted tree maintenance budget and one arborist crew, the public tree population (street and park trees) could be pruned on a 7-year rotation. It is recommended a crew supervisor and a seasonal staff member be considered in the future to support additional arborist crews. The estimated costs for salaries, fleet/equipment, operation and maintenance, and gear are provided in Appendix D.

City Staffing Recommendations: Urban Forest Management

The City is committed to public health and safety, combatting climate change, and environmental justice. Urban forest programs are growing in demand and there is a better understanding and recognition of the important role trees play in addressing many of the challenges facing urban areas. The City is managing this demand with current full-time, part-time, permanent, and temporary staff. However, program demand is and will continue to grow comparable to the growth of the urban forest. That growth must be monitored to adjust staffing levels necessary to maintain the city's goals for the urban forest, climate action, and public service needs. To monitor the growth and demand, the Urban Forestry Program should continue to develop Annual Work Plans and Annual Reports based on key performance indicators provided by or derived from the Urban Forestry Management Plan. These indicators require:

- Properly maintaining the inventory of public park and street trees.
- Evaluating the costs for maintenance compared to tree benefits and services.
- Analyzing the public tree database to understand species and age diversity, relative performance of species, improper pruning incidents, frequency of tree and hardscape conflicts, presence of known tree pests and diseases and/or vulnerability of public trees, structural issues caused by deferred maintenance or lack of young tree training pruning, resilience to climate change, distribution of tree benefits and services, among others.
- Monitoring development impacts on tree canopy.
- Evaluating the effectiveness of programs and resources for tree hazard abatement and risk management.
- Measuring the response time for citizen service requests.
- Understanding the requirements and resources needed to plant and maintain an urban forest that grows into 28 percent canopy cover.
- Measuring the progress towards achieving the citywide tree canopy cover goal.
- Analyzing the effectiveness of community trainings, events, and volunteer management.
- Understanding the resources required to effectively remove barriers for inclusive and equitable community outreach, education, and engagement.
- Evaluating the ability for disadvantaged areas in the city to maintain public street trees.

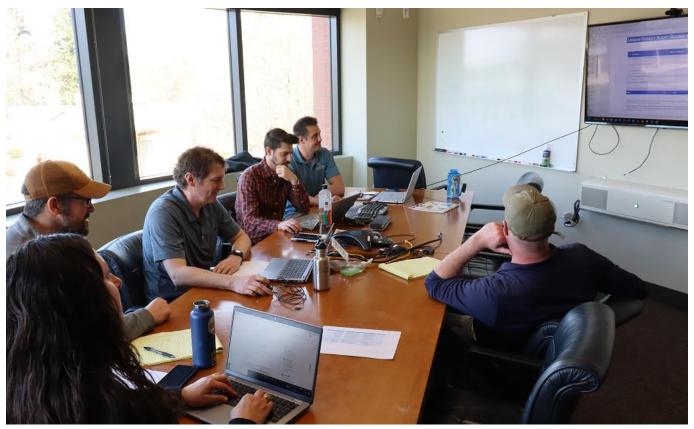


A growing urban forest requires adequate and dedicated staffing resources

By tracking these performance indicators or benchmarks on an annual basis, the City will have an understanding of its levels of service and the potential shortcomings that are emerging or on the horizon. As the urban forest grows and the public's awareness and support for related programs rises, it is recommended the City consider increasing the staffing for Program Coordinators, volunteer coordination specifically for urban forestry, balancing development projects with permitting and inspection requirements, coordination among community partners including Friends of Trees, in-house tree maintenance, and others as determined through evaluations of the performance indicators listed above. The initial framework for performance indicators and benchmarks is provided in Plan's Evaluation section.

Maintaining a strong organizational structure is foundational in reducing future costs to address increasing service demands. In addition, limiting the number of position vacancies can occur with competitive salaries and benefits, widespread recognition of the City's robust tree programs, and proper succession planning. Currently, the Urban Forestry Program is maintaining its service demand, however this demand is increasing as the urban forest matures, parks grow, and combatting climate change becomes an immediate need. Implementing the actionable items of the Urban Forestry Management Plan will require additional dedicated resources. It requires a manager and supporting staff to balance regular pruning cycles, address planned removals, administer and review tree permits, conduct development proposal reviews and inspections, perform inclusive and consistent community engagement, and maintain new plantings in addition to responding to emergency situations and customer service.

With proper planning and resources, Vancouver's Urban Forestry Program can increase efficiency, improve the quality of work, maintain a higher return on investment by ensuring the survival of trees through maturity, decrease liability by reducing tree risk and proactively addressing issues to avoid emergencies in the long run, and achieve the goals set forth in this Plan. The result is a sustainable urban forest that provides benefits to the community and is valued as a public asset.



The Urban Forestry Program staff and urban forestry planners discuss the urban forest audit for monitoring the Plan's performance indicators

Workflows and Standard Operating Procedures

Consistent protocols are needed for impervious surface conflicts, sidewalks specifically, along with budgetary considerations. Poor historic tree species selection, the growth of the trees, and the size of some planting sites has resulted in multiple locations around the city where the infrastructure conflict is a result of the trees outgrowing their space causing surface upheaval and basal flare. Currently, neither Urban Forestry nor Public Works Streets/Pavement teams have the means in terms of staffing or resources to deal with replacing all the trees and sidewalks on their own, but the mandate by the Americans with Disabilities Act (ADA) to eliminate all sidewalk hazards remains. Similar to public street trees, sidewalk maintenance is the responsibility of the abutting property owners. No matter the maintenance responsibility, the issues between trees and hardscape such as sidewalks exist throughout the city. Updated protocols between the Sidewalk Management team and the Urban Forestry Program are needed where the conflict(s) can be evaluated using a joint approach. Updated protocols would likely require a dedicated fund, especially if a cost-share program for sidewalks and tree maintenance were to be explored (perhaps in disadvantaged areas of the city).

There are older neighborhoods in the city with damaged or deteriorated infrastructure or lacking curb ramps up to current ADA standards. Impacts of other infrastructure upgrades, such as widening lanes for buses, which impact street trees should be more thoughtfully planned and designed. It is not a sustainable practice to simply remove mature trees and replant on a one for one basis.

The management practice to actively address hazards within the public right-of-way by repairing sidewalks and removing and replacing trees as needed is important to provide mobility throughout the city and maintain canopy cover. Often, root pruning is the main approach to preserve a tree and fix a sidewalk, but this practice comes with the potential to impact tree health and tree longevity. If a tree cannot be safely preserved after root pruning, it requires removal. However, alternative materials and methods are becoming more common to repair sidewalk issues in lieu of tree removal. New sidewalk materials and technologies can be used that reinforce the structural integrity of concrete to allow tree roots to grow underneath sidewalks and increase useful longevity like suspended pavement systems and structural soils. In some cases, tree planting areas can be expanded to allow more growing space like meandering sidewalks, bulb-outs, or increased tree well sizes. All of these methods should be within the solutions "toolbox" before tree removal is considered, but they are not all currently codified as available City options and agreed upon by City staff as acceptable standards. Therefore, Appendix F, provides the draft framework for tree and sidewalk conflicts and alternative solutions for the City to consider.

Recommendations for Tree and Sidewalk Conflicts

The City should consider adopting the decision checklist and protocols provided in Appendix F and include alternative solutions in design guidelines, standards, and recommendations to abutting property owners. Alternative solutions may offer cost savings in some instances to the property owner though the City should explore opportunities to develop a cost-share program for tree and sidewalk maintenance. In Washington where the city is responsible for sidewalk repair and replacement, funding typically comes from the General Fund or through a ballot-approved Sales and Use Tax. Sales tax rates for funding sidewalk programs average 0.2 percent. In Seattle, the responsibility is placed on the adjacent property owner— similar to Vancouver— but the "Levy to Move Seattle" was approved by voters in 2015 to help fund sidewalk maintenance and improvement projects. In addition to local funds, Seattle also seeks state or federal grants. Grant funding may be available for a sidewalk repair / replacement cost-share program, but is not a consistent long-term option. One local example of a grant to fund the program is in Sumner where Sound Transit is funding sidewalk replacements as part of their station access improvement grant, costing approximately \$1.4 million.

Other funding options or mechanisms include special citywide assessments, bonds, improvement districts, gas tax, or tax incremental financing. In Cheney, a voter-approved tax on electrical and

natural gas services funds maintenance of residential streets and sidewalks. The 4 percent electric and natural gas tax generates roughly \$380,000 annually. Whenever new development triggers frontage improvements there are opportunities for improved street tree planting and would be an appropriate time to levy enhanced use fees.

The City should explore these options such as the Sales and Use Tax option if General Funding is not available to support a sidewalk and tree cost-share program. An example is in Seattle where it is the property owner's responsibility unless the sidewalk damage is caused by City infrastructure such as a City-owned tree or sewer line. In this scenario, the City takes the responsibility for making the repairs.

Tree Canopy Cover Goals and Priority Planting Areas

To guide efforts towards the urban forest vision, communities with tree canopy assessment data often set tree canopy cover goals based on the existing tree canopy cover amount and the aim to provide an equitable distribution of canopy cover and associated benefits. For Vancouver, a canopy goal of 28 percent by 2030 was established and documented in various planning resources such as the Comprehensive Plan and the Climate Action Framework.

Note, canopy goals and canopy cover targets that are updated through this planning effort should align with the City's Tree Canopy Achievement Program's (TreeCAP) canopy goals for zoning—industrial properties have a goal of 9 percent canopy cover, 15 percent for commercial properties, and 33 percent for residential properties.

The planning consultants analyzed the 2021 tree canopy cover data (based on 2019/2020 imagery) and Tree Equity Scores (TreeEquityScore.org) to localized canopy goals and priority planting areas that enable the city and partners to scale up tree plantings over time to achieve the citywide canopy goal. Achieving the canopy goals would increase canopy cover and address tree equity to align with the Washington Environmental Health Disparities Map and other priorities in the city, such as stormwater management. This section provides the guidance to examine the localized goals, establish incremental targets, and implement a goal that is shared by the City, its partners, and all property owners within Vancouver. Progress towards these canopy goals should be tracked, measured, and shared to guide urban forest management and maintain community interest and support.



Background on Canopy Goal Setting

Across the U.S., cities are setting goals— some based on careful study of current canopy, community needs, and availability of planting space, other base their goals on the principle that more trees are better than fewer, set ambitious campaign goals, then work to mobilize efforts to meet it. Generally, the U.S. Forest Service recommends canopy cover of 40-60 percent in northwestern communities and in 1997, the American Forests organization established a benchmark of 40 percent after analyzing the tree canopy in dozens of cities from 1992 to 1997 and working closely with the research community. While incredibly valuable and groundbreaking at the time, technology and research have significantly evolved over the past 25 years, leading to a consensus that more nuanced approaches to canopy goal setting are necessary. Supporting this statement, U.S. Forest Service Research Forester Greg McPherson of the Pacific Southwest Research Station adds "Tree canopy cover targets are difficult to specify broadly because the opportunities to create canopy are highly variable among cities, even within a climatic region or land use class."

Tree canopy targets are best developed for specific cities and should consider constraints to creating canopy such as:

- Development densities (i.e., dense development patterns with more impervious surfaces have less opportunity for cover);
- Land use patterns (i.e., residential areas may have more opportunity for canopy than commercial areas, but canopy cover tends to be less in residential areas of disadvantaged communities versus wealthy ones);
- Ordinances (i.e., parking lot shade ordinances promote cover over some impervious areas);
- Climate (i.e., canopy cover in desert cities is often less than tropical cities).

Within those parameters, quantifiable data can be used so a tree canopy goal achieves specific objectives, such as reaching the canopy percentage necessary to reduce urban heat island temperatures to a specific range, or to reduce stormwater runoff by a projected amount. According to a national analysis by U.S. Forest Service researchers, a 40-60 percent urban tree canopy is attainable under ideal conditions in forested states. 20 percent in grassland cities and 15 percent in desert cities are realistic baseline targets, with higher percentages possible through greater investment and prioritization.

It is important to note, however, that urban tree canopy percentage is just one of many criteria to consider. A robust tree canopy comprised of largely invasive species, for example, is not a healthy urban forest. Age and species diversity, condition of trees and equitable distribution across income levels, to name a few, should also be considered (Leahy, American Forests, 2017).

Citywide and Neighborhood-level Canopy Goals

The following presents the proposed localized canopy goals to achieve the citywide goal of 28 percent though the City and partners should evaluate and refine these for approval by staff and City Council.

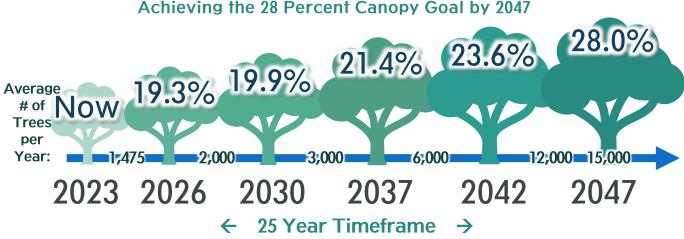
For the City of Vancouver, the development of neighborhood-level canopy goals was driven by tree canopy cover data, benchmarking research, Tree Equity Scores, the Washington Environmental Health Disparities data, analysis of existing and potential resources, City input, and community feedback.

Achieving 28 Percent Canopy by 2030

As part of the Urban Forestry Management Plan project, the City's original canopy goal of 28 percent by 2030 was closely evaluated to determine the feasibility of achieving it. Based on the evaluation and analyses, it was determined that a total of 124,800 trees need to be planted in an eight-year timeframe, equating to an average of 15,600 trees planted per year. This is an incredible number of trees and resources required to achieve 28 percent by 2030, therefore, an alternative scenario was presented to the City's Urban Forestry Program and Urban Forestry Commission. The final approved canopy goal is provided in the following section.

Vancouver's Tree Canopy Goal: 28 Percent by 2047

As stated in the previous section, planting 15,600 trees per year over the next eight years is an endeavor that would require substantial resource shifts and dedicated funding. While the 28 percent canopy goal is an ambitious and lofty goal, it was likely set after the 2011 Tree Canopy Assessment and incorporated into the Comprehensive Plan update without further analysis into the requirements. The City intends to adopt this Urban Forestry Management Plan and incorporate goals into updates to the Comprehensive Plan and Climate Action Framework. Therefore, this Plan should inform updates to those plans relating to urban forestry. With this in mind, an alternative canopy goal approach is provided for consideration.



Average number of trees per year are community-wide tree plantings, not just City-led



Vancouver's Tree Canopy Achievement Program's (TreeCAP) canopy goals for zoning:

Industrial properties 9% ❖ Commercial Properties = 15% ❖ Residential Properties = 33%

Figure 37. The updated canopy goal for Vancouver, 28 percent by 2047

In the scenario presented above, the 124,900 trees required to meet the 28 percent canopy goal are distributed across a 25-year timeframe to align with the planning horizon of this Plan. As a result, the number of trees to plant annually scales up over time beginning with 1,300 trees per year and ending with 15,000 trees per year (average of 5,000 trees over 25 years).

The City of Vancouver's ambitious goal of 28 percent by 2047 has intermediate goals of 19.9 percent by 2030 (year 8), 21.4 percent by year 15 (2037), and 23.6 percent by year 20 (2042). To achieve these goals, the City must preserve the existing canopy and increase its coverage by 9.1 percent by planting an average of 5,000 trees per year over a 25-year period. As a result, 124,900 trees will be planted, and these new trees will collectively grow the canopy throughout the city to an area equivalent to over 2,500 football fields and provide annual ecosystem benefits amounting to \$2.3 million once mature.

These calculations and estimates are based on industry research and practices though there are some assumptions including:

- A no-net-loss strategy, meaning the number of public trees removed along with removals on private property or through development are replaced with tree species that support goals for urban forest diversity.
- Trees that mature into large canopy-bearing trees are planted wherever feasible. Ornamental trees offer aesthetic and design benefits though they are limited in providing ecosystem benefits and services. In addition, in cases where public street trees are the responsibility of the adjacent property owner to maintain, there can be a trend towards downsizing replacement trees due to the costs incurred for maintenance and removal of the previous large-canopied tree. Small-statured trees at maturity may also be preferable due to the misconception that they are lower in cost for care and maintenance. While this may be correct in some cases, the benefits of trees will decrease over time as fewer and fewer large-canopied trees replace trees removed or when small trees are planted at new sites.
- Calculations use an average tree canopy diameter of 40 feet equating to a surface area of 1,257 square feet for large trees and a 20-foot diameter for small trees (314 square feet). Given the ability for trees to grow large in the region, the number of trees to plant assumes 25 percent will be small-statured at maturity and 75 percent will be large-statured.
- The planting of invasive plant species is prohibited for public projects and development projects.
- Includes City-led, partner, volunteer, and private tree plantings. Based on the 28 percent by 2047 canopy goal, it is recommended the City plant 60 percent of the necessary trees or approximately 75,000 total trees, equivalent to 3,000 trees per year through the end of 2047.
- It is likely the city only has a limited number of available public street planting sites so new planting sites will need to be created by converting impervious surfaces to planting sites and/or planting in parks and natural areas.
- Assumes a potential for young tree mortality post-planting.

To accomplish these goals, the Urban Forestry Management Plan provides priority planting areas in the following section for the City and its partners to consider.

Priority Planting Areas to Achieve Canopy Goals and Tree Equity

Once the City finalizes the canopy goal implementation timetable, it is recommended to establish priority areas based on a variety of themes and community needs. Themes may include ownership type (public and private), areas of low existing tree canopy, Tree Equity Scores (TreeEquityScore.org) and Washington Environmental Health Disparities data, areas that support biodiversity (see WDFW's Priority Habitats and Species), and greatest amount of available planting space while other themes may address air quality, stormwater reduction, and water quality. Others may evaluate opportunities to address disadvantaged areas, densely populated regions, and human health factors such as asthma cases, median age, and mental health. In any planting prioritization scenario, the scale may include U.S. Census Bureau Census Block Groups, Census Tracts, Zoning Type, Neighborhoods, and Citywide. A series of priority maps were provided in a separate report to this Plan.

Using the 2021 Tree Canopy Assessment, the City's TreePlotter CANOPY software application (pg-cloud.com/VancouverWA), and analyses in a Geographic Information System (GIS), a series of recommended prioritization techniques is provided. The description of the prioritization techniques and scenarios is provided below followed by a series of corresponding priority maps.

- Census Block Groups (CBGs) with the greatest possible planting area. CBGs with the highest percent of total area available for possible planting. Includes vegetative and impervious possible planting areas.
- * CBGs with low amounts of tree canopy cover. CBGs with the lowest percentage of existing tree canopy cover.
- Tree planting in Census Blocks to reduce stormwater runoff. Trees can be integrated to help manage stormwater, specifically when targeting impervious surfaces. This indicator uses available planting area on impervious surfaces and available planting areas within 100 feet of all surface water bodies.
- Tree planting in neighborhoods with high populations of minorities. Tree canopy is negatively correlated with the percentage of minority residents. Planting trees in communities with higher percentages of minority residents can support environmental equity.
- Tree planting in neighborhoods with underserved populations. Tree canopy is positively correlated with higher median income. Planting trees in lower income communities can support environmental equity. CBG suitability is based on the percentage of residents living below the poverty level.

View the maps on the following pages for examples of the listed planting priority techniques.

Addressing Areas with the Most Available Space for Tree Plantings*

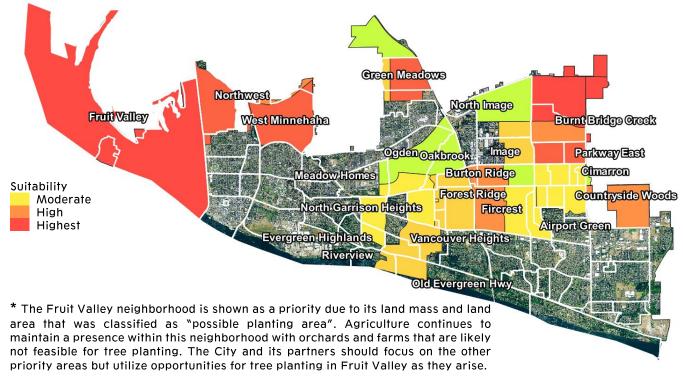


Figure 38. Map displaying areas with a high percentage of possible planting area (>30%)

Addressing Stormwater and Water Quality

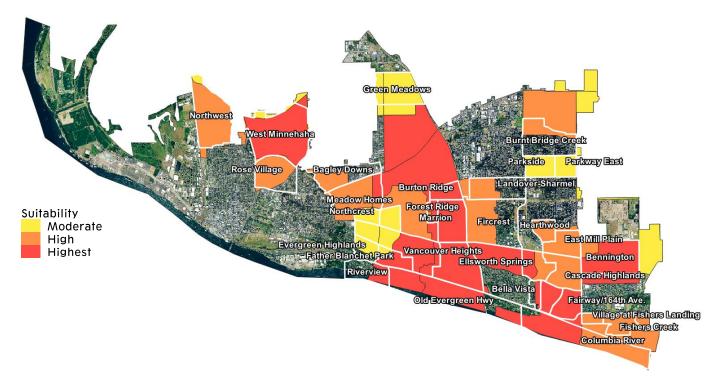


Figure 39. Map displaying areas most suitable for trees to reduce stormwater volume

Addressing Tree Canopy in Areas with the Most Public Land* **Green Meadows** Northwest Fruft Valley West Minnehaha Ogden Suitability **Central Park** Moderate High Vancouver Heights Highest Ellsworth Springs Columbia Way Wildwood * The Fruit Valley neighborhood is shown as a priority due to its land mass and land area that was classified as "possible planting area". Agriculture continues to maintain a presence within this neighborhood with orchards and farms that are likely

Figure 40. Map displaying areas with a high percentage of public land for City-led plantings

not feasible for tree planting. The City and its partners should focus on the other priority areas but utilize opportunities for tree planting in Fruit Valley as they arise.

Addressing WA Environmental Health Disparities Priorities*

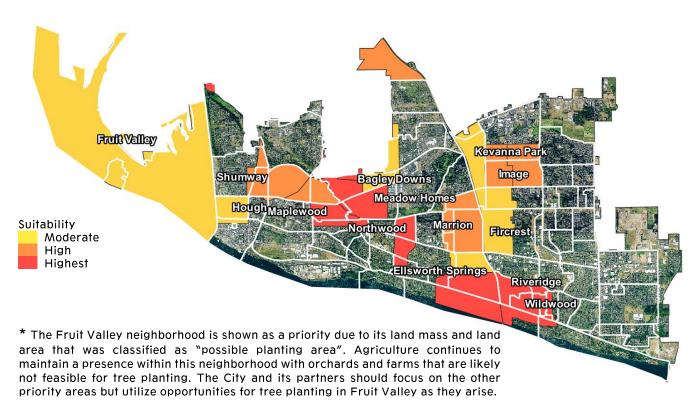


Figure 41. Map displaying priority areas based on the Washington Environmental Health Disparities data

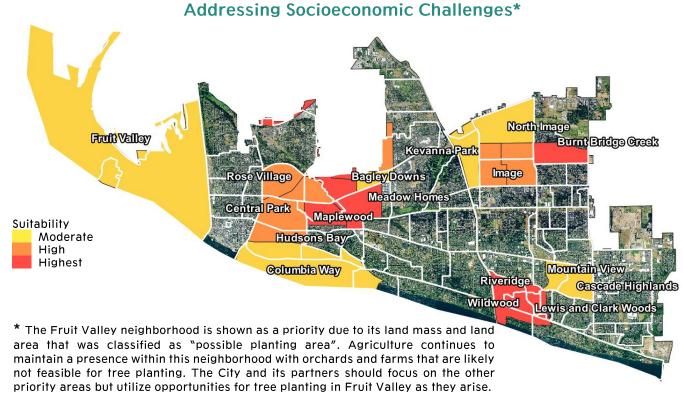


Figure 42. Map displaying areas where trees could address socioeconomic challenges

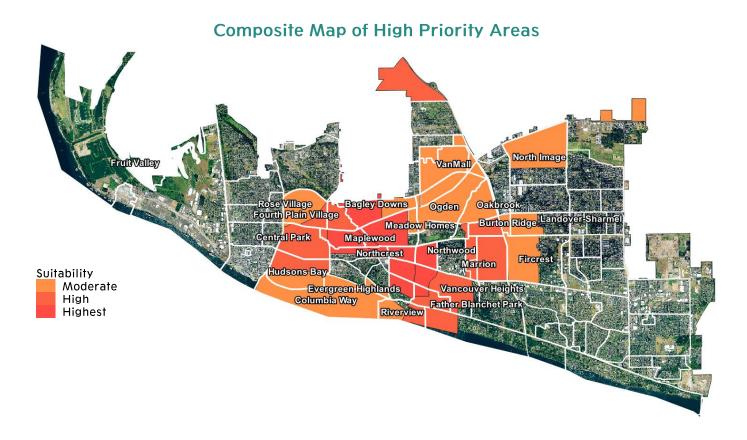


Figure 43. Map displaying the results of prioritizing all themes

Recommendations for Tree Canopy Cover Goals

Cities around the world are using tree canopy goals, usually in the form of percent tree canopy cover, to guide urban forest management and meaningfully improve the livability of their communities. Urban tree canopy is ideal for goal setting because it can represent the complex distribution and benefits of an urban forest within a single metric. Urban tree canopy goals must walk a careful line of ambition, inspiration, and practicality.

Measuring, tracking, and improving urban tree canopies is an essential component of sustainable urban living. As the world's population continues to urbanize the value of healthy UTC is only going up. Unfortunately, the global urban canopy trend is moving in the opposite direction. A worldwide analysis showed urban forest cover on average is slightly, but significantly decreasing. The United States is also losing urban tree canopy, to the tune of 175,000 acres or 36 million trees a year. That represents a loss of \$96 million in tree benefits a year, and those benefits, like heat reduction and public health improvements, are growing in necessity.

Urban tree canopies are in perpetual motion as growth and regeneration push against destructive forces, both natural and anthropogenic. These include development expansion, old age, disease, climate change, pests, and fire. Reversing this course starts with knowing the extent of the urban tree canopy and then establishing a goal for growth. "By knowing the amount of and direction in which urban tree cover is moving, urban forest management plans can be developed to provide desired levels of urban tree cover and forest benefits for current and future generations." (Nowak, et al. 2018)

In Vancouver, 74 percent of possible planting area (PPA) is found in areas designated as private land. The City should focus on community outreach and education programs to better inform citizens and private landholders of the environmental, health, social, and financial benefits that trees provide and consider other strategies to help preserve existing trees and grow the tree canopy in the 7,500+ acres of plantable space on private properties. Purchasing or partnering with environmental groups to further protect at-risk land should be considered by the City. The City should also explore options to develop grant programs for tree maintenance or removal of hazard or invasive trees within the city to remove barriers for overburdened communities which lack tree canopy. Tree giveaways, tree planting programs, and tree maintenance events can help to promote new tree plantings. To promote new plantings, expand the partnership with the local non-profit Friends of Trees, to plant more trees on private property, focusing on low-canopy and underserved neighborhoods. The City should also continue to develop partnerships with community-based organizations and individual champions throughout neighborhoods to build stewardship at the community level. In addition, the City should continue to conduct volunteer tree planting and tree maintenance events to increase awareness levels in the community.

For Vancouver, the tree canopy goal was established and documented in City plans. This Urban Forestry Management Plan provides alternative considerations and priority areas for tree planting to expand canopy cover. Guidance on how the City can achieve the 28 percent by 2047 canopy goal was provided in terms of the recommended number of trees to plant per year and priority areas. The City and its partners should review and formally approve of the approach in reaching canopy goals and develop a master tree planting plan or canopy action plan. These supporting plans would address priority areas, the number of trees to plant, partners involved and related roles, species recommendations, timing, costs, among other considerations for growing a sustainable urban forest.

Note, canopy goals and targets should align with the City's Tree Canopy Achievement Program's (TreeCAP) canopy goals for zoning—industrial properties have a goal of 9 percent canopy cover, 15 percent for commercial properties, and 33 percent for residential properties.

Based on the assessment data, City input, community feedback, and research the recommended tree canopy goals and planting targets for the City of Vancouver are provided in the following table:

Summary of Tree Canopy Goals, Requirements, and Milestones

Existing Urban Tree Canopy Cover	18.9% or 6,066 acres
Tree Canopy Compared to 25 WA Cities	25 th out of 25 (average canopy cover is 35%)
Total Possible Planting Area	32% or 10,220 acres out of 32,155 total land acres
Tree Equity Score	78 out of 100
Tree Equity Score Compared to WA Cities	7 th out of 10 (average score is 81)
Citywide Tree Canopy Goal by 2047	28% by 2047
Canopy Milestones	19.9% by 2030 (Year 8) 21.4% by 2037 (Year 15) 23.6% by 2042 (Year 20)
Total Number of Trees Required Total Number of Native Trees Planted Trees planted in Priority Habitats (WDFW)	124,900 trees (or 2,928 new acres of canopy) Track individual trees or canopy cover Count and location of associated trees
Timeframe	25 years (2023 – 2047)
Number of Trees to Plant per Year (avg)	5,000 (ranges from 1,300 – 15,000 trees per year)
Recommended Commitment by the City and by the Community	60% City-led (75,000 total trees) 40% public-led (50,000 total trees)
Canopy Goal Strategies and Planting Priorities	Low Tree Canopy Areas Addressing Stormwater Priority Land Use Types Public and Private Ownership Environmental Health Disparities Areas
	Addressing Socioeconomic Challenges Areas with Low Tree Equity
Tree Canopy Goal Milestones for 28% by 2047 (City and Public-led)	
for 28% by 2047	Areas with Low Tree Equity 2023 – 2026: 5,900 total new trees (19.3% canopy) 2027 – 2030: 8,000 total new trees (19.9% canopy) 2031 – 2037: 21,000 total new trees (21.4% canopy) 2038 – 2042: 30,000 total new trees (23.6% canopy)
for 28% by 2047 (City and Public-led)	Areas with Low Tree Equity 2023 – 2026: 5,900 total new trees (19.3% canopy) 2027 – 2030: 8,000 total new trees (19.9% canopy) 2031 – 2037: 21,000 total new trees (21.4% canopy) 2038 – 2042: 30,000 total new trees (23.6% canopy) 2043 – 2047: 60,000 total new trees (28.0% canopy)
for 28% by 2047 (City and Public-led) Total Added Ecosystem Benefits	Areas with Low Tree Equity 2023 – 2026: 5,900 total new trees (19.3% canopy) 2027 – 2030: 8,000 total new trees (19.9% canopy) 2031 – 2037: 21,000 total new trees (21.4% canopy) 2038 – 2042: 30,000 total new trees (23.6% canopy) 2043 – 2047: 60,000 total new trees (28.0% canopy) \$2,318,016 annually once trees are mature 25.3 million pounds of carbon (\$591k annual

Table 22. Summary of baseline conditions, tree canopy goals, and forecasted future benefits and services

Tracking the 28 Percent by 2047 Canopy Goal

	Metric	2023 – 2026	2027 – 2030	2031 – 2037	2038 – 2042	2042 – 2047	TOTAL
	Canopy % Target	19.3% (0.3% increase)	19.9% (0.6% increase)	21.4% (1.5% increase)	23.6% (2.2% increase)	28.0% (6.6% increase)	28.0% canopy cover
Reach	City-led	3,540 trees	4,800 trees	12,600 trees	18,000 trees	36,000 trees	74,940 City-led trees
Total Trees to Goal	Public- led	2,360 trees	3,200 trees	8,400 trees	12,000 trees	24,000 trees	49,960 public- led trees
Total	Total Trees	5,900 trees	8,000 trees	21,000 trees	30,000 trees	60,000 trees	124,900 total trees
r Year to (avg)	City-led (avg)	885 trees	1,200 trees	1,800 trees	3,600 trees	7,200 trees	14,685 trees per year
ees per	Public- led (avg)	590 trees	800 trees	1,200 trees	2,400 trees	4,800 trees	9,790 trees per year
Total Trees per Year to Reach Goal (avg)	Total Trees per Year (avg)	1,475 trees	2,000 trees	3,000 trees	6,000 trees	12,000 trees	24,475 total trees per year
	Future Added Benefits	\$109,498	\$148,472	\$389,738	\$556,769	\$1,113,539	\$2,318,016 added benefits

Table 23. Summary of the metrics to track the 28% canopy cover by 2047 goal

Tree Regulations to Support Canopy Goals and Sustainable Management

The Urban Forestry Program has conducted several reviews and exercises relating to the City's tree ordinances. In addition, the 2023 Urban Forestry Management Plan examined the previous recommendations, conducted benchmarking research, and reviewed industry standards and best practices to provide the following general recommendations for Vancouver Municipal Code (VMC) Chapter 20.770 Tree, Vegetation, and Soil Conservation and VMC Chapter 12.04 Street Trees.

In general, the following recommendations relate to necessary code amendments that increase the quality and quantity of tree retention over replacement whenever possible, including incentives; higher consequences for violations resulting in tree damage on site or adjoining sites; changes to urban street and urban development design requiring broader root zones; requiring broader canopy trees; and other considerations aligned with industry standards and best practices.

VMC Chapter 20.770 Tree, Vegetation, and Soil Conservation

- Update definitions as needed and include a reference to the UFMP and canopy goals.
- Increase the percent minimum landscaping requirement to provide more space for tree retention and planting based on the zoning type / type of development project.
- Set a hard surfaces limit so that landscape areas remain pervious and available for landscaping.
- Review and revise tree canopy percentages and minimum tree densities.
- ❖ Increase front and rear yard setbacks in residential zones.
- ❖ Increase setbacks by five feet in commercial, mixed use, and industrial zones.
- Increase parking lot tree planting minimums.
- Set soil volume standards for parking lot trees.
- **Establish developer incentives and policies for tree preservation and planting. For example:**
 - Prior to tree removal, mitigation costs are required to be paid to the City Tree Account based on tree units of existing trees permitted to be removed. Mitigation costs are not required for hazardous, nuisance, dead/declining, invasive or damaged trees.
 - Example: If removing a 34-inch Douglas fir in good condition which is worth 12 tree units, mitigation costs would be 12 times the going rate for tree units (\$850.00) and the amount would equal \$10,200.
 - Explore requiring a landscape bond or escrow for new tree planting as part of development or inspecting all new development prior to occupancy and 3 years later. This will ensure new trees survived the establishment period. Require replanting as needed.
 - Encourage or require tree species selection that optimizes the ability to sequester carbon and store it over the course of the tree's lifetime.
 - Protect the area within a tree's dripline in perpetuity for unauthorized removal during construction projects.

- Protect significant mature native trees throughout the urban area that are not protected through Heritage Tree regulations and are at risk from the densification of the urban area. Consider variances such as density or building height adjustments to protect and retain tree groves or isolated trees that can add quality to the urban landscape.
- Align citywide canopy cover goals with the City's Tree Canopy Achievement Program's (TreeCAP) canopy goals for zoning— industrial properties have a goal of 9 percent canopy cover, 15 percent for commercial properties, and 33 percent for residential properties.
- Consider changes to facilitate emerald ash borer detection, treatment, management, and replanting on public and private land.

VMC Chapter 12.04 Street Trees

- Evaluate the fee schedules for public tree permitting to align with the administrative costs and the needs of the urban forest.
- Update the City's Street Tree Manual with changes to tree regulations and include diagrams, graphics, and illustrations to communicate requirements and procedures.

VMC Chapter 20.740 Critical Areas Protection Ordinance

It is recommended that the Urban Forestry Program be involved when the City updates the Critical Areas Protection Ordinance (VMC 20.740). There is an overlap in trees associated with priority habitats (e.g., riparian areas, biodiversity areas and corridors, Oregon white oaks, and snags) through the protection, creation, and enhancement in urban forests. As of June 2023, the WA Department of Fish & Wildlife stated that regional technicians are available to provide recommendations in future updates to the Critical Areas Protection Ordinance (CAO) and encourages the Urban Forestry Program to be involved in the process due to the overlap and potential opportunities for coordination.



The waterfront in Vancouver is a critical area and the revitalized Waterfront Park is an example of successful coordination of City regulations, design, and installation. The Urban Forestry Program could be more involved in the selection of tree species in future projects and updates to ordinances such as the Critical Areas Protection ordinance (VMC 20.740) to support more projects such as Waterfront Park

Emerald Ash Borer Management

Emerald ash borer (EAB) is an extremely destructive insect of ash trees (*Fraxinus* species). The emerald ash borer (*Agrilus* plannipennis) is a wood boring beetle of Asian origin that has become established in many parts of the United States and Canada where native and urban ash are found. Ash tree species such as green and white ash are very common in Washington landscape settings.

The devastating invasive insect was identified in Michigan in 2002 and has since spread throughout the Midwest and along the Atlantic coastline killing hundreds of millions of ash trees resulting in losses of over \$4 billion worth of resources. As it continues its path of destruction, EAB is now in Forest Grove, Oregon as of June 2022. Its arrival to Washington will likely threaten both native and non-native ash trees in the region's forests and urban areas. Experts agree that EAB has a strong potential to ultimately kill every unprotected susceptible ash tree

presently growing in North America. Furthermore, if preventative treatments are not implemented within a community, it has the capacity to kill every ash tree within a given community inside ten years.

EAB has the potential to be far more damaging to urban trees than any other insect that has previously been found in the state. Vancouver's Urban Forestry Management Plan provides guidance for monitoring the urban forest and planting trees that are resilient.

Based on the City's partial inventory of 12,263 public trees, 5 percent are *Fraxinus*. If the proportion of ash trees are extrapolated to represent the entire public tree population (estimated at 99,000 trees), then there is a potential for nearly 5,000 ash trees to be impacted by EAB. In addition, an unknown number of ash trees exist on private land in Vancouver.

EAB and Ash Tree Identification

Early EAB detection protocols are critical to management strategies and budgetary planning. Urban Forestry should explore options for early detection.



Figure 44. Images for identifying ash trees and the emerald ash borer (Source: WA DNR)

Ash trees have opposite buds, diamond-shaped ridged bark, five to nine leaflets on each stalk, and paddle-shaped seeds. Adult beetles are approximately one-half inch long and have an emerald-green head and back, a coppery reddish purple abdomen, create D-shaped exit holes, and S-shaped galleries when entering the tree in the larval stage.

Signs of EAB infestation include:

- Sparse leaves or branches in the upper part of the tree
- D-shaped exit holes approximately one-eighth-inch wide
- New sprouts on the lower trunk or lower branches
- Vertical splits in the bark
- Winding, S-shaped tunnels under the bark
- Increased woodpecker activity

Emerald ash borer has a life cycle that normally takes one year to complete. During winter, the life stage present is a full grown larva that lives within a chamber cut into the outer sapwood of a host tree. In the spring it will transform to a pre-pupal phase and then continue into the pupal stage. It will transition from a pupa into the adult beetle form which will then emerge from the ash. During low population levels, this life cycle may take two years to complete. Adults emerge from the tree by cutting through the bark, producing a D-shaped exit hole. If EAB were to emerge in Washington, the borer will likely begin to emerge in early to mid-May, with peak emergence in June. However, some beetle emergence could extend into midsummers. After emergence, adults move to the crown of an ash tree (flight season) where they feed on leaves. After about a week of feeding, the now mature adults will begin to mate. A few days after mating the females will begin to lay eggs on the surface of the bark. Females typically live for about a month and during this time will lay several dozen eggs. Eggs hatch in about a week and the tiny, newly hatched larvae burrow through the bark to feed on the tissues underneath which includes the phloem, cambium, and outer sapwood. This is the primary cause of death to ash trees.

The following provides an overview of the EAB monitoring and management strategy though the City should implement the WA Urban Forest Pest Readiness Playbook Assessment and complete a comprehensive management plan for EAB.

Table 24. General guidance for emerald ash borer preparation, management, and recovery

EAB Monitoring and Detection

Create and maintain an inventory of public trees with active monitoring.

Coordinate with partners to provide public information and trainings regarding EAB detection.

Estimate the EAB management costs and prepare budget requests.

Keep current with local and regional research, resources, and quarantines.

Identify ash trees for preventative treatments such as high value trees in good condition.

Identify trap trees for EAB.

Identify and remove dead or dying ash trees as needed and feasible.

Develop incentives and programs to support private ash tree management.

Consider updating City Code to allow flexibility in ash removals for development projects, removal of diseased trees, emergency removals, and City authority for ash tree treatments and removals.

Determine the approach for treatments (methods, in-house vs. contracted).

Establish a wood utilization program and/or identify local woodworkers for wood reuse.

EAB Emergence

Identify hazard trees in detection / infested areas.

Remove dead or dying ash trees and public areas promptly.

Detect spread of infestation into new neighborhoods as early as possible and suppress the pest pressure.

Maintain the inventory of public trees based on the planned and completed management.

Continue to educate and support EAB management on private land.

EAB Recovery

Replant using non-host tree species at locations where ash trees were removed.

Plant two trees for each ash removed and replant within one year of removal.

Consider incentives and programs for private landowners to replant.

Align plantings with tree canopy cover goals and priority planting areas.

Tree Planting Initiatives

Tree planting is critical to the health and longevity of Vancouver's urban forest. However, tree planting should be methodically planned with a specific purpose in mind. One of the best ways to do this is to define and adopt an official planting initiative guided by a planting strategy. The first step in developing a planting strategy is to define the goals. Often times, this goal aligns with a citywide tree canopy cover goal and the timeframe to achieve it.

An effective tree planting initiative and program address three main questions: where to plant, what to plant, and how to plant? It is important to develop an overall planting strategy where the initial planting efforts are concentrated on streets and areas with the greatest need for improvement. Tree species and planting location designations are significant components of a municipal tree care program because of the long-term impact of these decisions. Success of a tree planting program will be judged by the health of the trees after planting and the amount of money spent on planting and maintaining the new trees. With a small amount of planning, healthy trees with greater life expectancy can be established with minimal up-front investment and relatively minor maintenance costs.

This Tree Planting Initiative provides guidelines for the implementation of an organized and comprehensive tree planting strategy that results in the prioritization of tree planting locations and the expansion of Vancouver's urban tree canopy within the confines of available resources. The City should continue to partner with Friends of Trees and other neighborhood organizations for the planting and care of trees throughout Vancouver. Information on suitable planting locations in the city is provided in the previous section and general recommendations on choosing suitable trees for each site follow.

Where to Plant

There are numerous opportunities to plant more trees on public property in the City of Vancouver. Historically, the locations of new tree plantings on City-owned rights-of-way in Vancouver have been based on constituent requests, the replacement of dead or dying trees (where feasible), and project-specific plantings (e.g., streetscape improvement projects and Friends of Trees events). With an updated and maintained tree inventory, City managers can identify the exact location of additional planting sites that are available throughout the city. Moreover, the development of a prioritization scheme based on canopy data allows the City to begin significant tree planting efforts in high priority areas of the city (see the 'Priority Planting Areas to Achieve Canopy Goals' section).

With an updated inventory of public trees and possible planting sites, the Urban Forestry Program can determine the city's current stocking level. Stocking levels are based on a total number of suitable planting sites, including sites with existing trees, vacant locations, and locations with stumps. "Stocking" is a traditional forestry term used to measure the density and distribution of trees. In this case it means that, of the total number of available planting sites identified in a tree inventory along the public right-of-way, a certain number currently have a tree present. Note that this value typically only considers the currently available planting areas along the street right-ofway, and not impervious surfaces that could become planting locations. Moreover, this value typically does not incorporate potential planting locations in parks or other civic spaces. Based on the 12,263 trees in the City's inventory database, 337 trees were recommended for removal (177 privately-maintained and 160 City-maintained public trees). These recommended removals represent a future increase in total number of potential planting sites. An important benchmark in maintaining a sustainable urban forest is to keep it at least 90 percent stocked, such that no more than 10 percent of the existing planting sites remain vacant. The City should make every effort to budget for tree planting in the future to maintain the urban forest at least 90 percent stocked and to continue increasing its canopy.

Planting locations throughout the city were identified and prioritized as part of the urban tree canopy analysis (Priority Planting Areas to Achieve Canopy Goals section). Potential planting

locations included all viable areas of the city that were classified as grass/open space, impervious (parking lots), and bare ground in the urban tree canopy analysis.

Tree Planting Parameters

Trees are an important part of the city, but they must coexist with various other aspects of the built environment. To provide ample space for a growing tree while also maintaining public safety and protecting other city infrastructure, the City should use the following minimum guidelines when choosing new planting locations:

- New tree wells in existing sidewalks provide a minimum of 18 square feet of open soil (ex. a 3' x 6' tree well).
- New tree wells in new sidewalks should provide a minimum of 36 square feet of open soil (ex. a 6' x 6' tree well), and at least 1,000 gross cubic feet of soil value space for each tree, providing any soil volume under paved surfaces through suspended pavements or structural cells.
- To reduce infrastructure conflicts and maintain visibility and access to important public safety features, trees should be planted a minimum of:
 - 20 feet away from any intersection, crosswalk, or stop sign;
 - 5 feet away from any fire hydrant or utility pole;
 - 10 feet from any streetlight;
 - 3 feet from any driveway or walkway; and
 - 1 foot away from any underground utilities (ex. gas and water).
 - The width of the sidewalk must also be taken into account, as per American with Disabilities Act (ADA) regulations a 3 foot sidewalk width must remain.
 - Trees must be spaced out in such a way that they have room to grow. Trees are spaced at least 20 feet on center (i.e., measured trunk to trunk).

What to Plant

The City must determine which tree species will be planted in each specific site. The phrase "right" tree, right place" is the most important concept in planting. Many factors must be considered in choosing a species for a site that maximizes the health and survivability of the tree, and the benefits provided by that tree. Trees in urban environments must withstand particularly challenging conditions, such as high temperatures, drought, flooding, air pollution, soil salt, and limited growing space both above and below ground. Trees have different characteristics suitable for different landscapes, sites, and microclimates. It is recommended that all characteristics be recognized, including, but not limited to, the desired function (e.g., seasonal flowering, shade canopy, wind resistance), mature size and shape for the intended location, soil conditions, root structure, maintenance requirements, potential pest problems, and survivability in the face of climate change. Equally important to selecting the right tree is choosing the right spot to plant it. Blocking an unsightly view or creating shade may be a priority, but it is important to also consider how a tree may impact existing structures and utilities as it grows taller, wider, and deeper. For example, if the tree's canopy, at maturity, will reach overhead utility lines, it is best to choose another tree. Taking the time to consider location before planting can prevent power disturbances and improper utility pruning practices.

Historically, there has been some mismatch of tree species selection with available planting sites in Vancouver. There are some large growing trees under power lines, and there are some small growing trees planted in sites suitable for larger trees. Large trees in small spaces can damage sidewalks and curbs, require severe pruning for overhead utility lines and street clearance, and often have a much shorter service life due to the restricted growing area. Small trees in large spaces limit the use of mature shade trees on public streets. It is well known that larger growing trees provide the most environmental and economic benefits, and appropriate areas to plant them rarely exist in older, well developed communities. Proactive planning should be made to plant the

"right tree in the right place" in the vacant sites, considering available growing space, presence of utilities, and traffic and pedestrian clearance issues, while obtaining the desired aesthetic effects and function of the street tree. Planting the proper type of tree for each planting area will result in a more effective, healthy, and attractive urban forest.

Tree Species Diversity

At the scale of the entire urban forest, species diversity in new plantings should be of major importance. Planting a variety of species can decrease the impact of species-specific pests and diseases by limiting the number of susceptible trees in a population. Moreover, planting a wide variety of tree species can help limit the impacts from physical events, as different tree species react differently to stress. Species diversity helps withstand urban forest impacts from drought, ice, flooding, strong storms, and wind. As stated in the Status of Vancouver's Trees section, at the genus level, Douglas firs (Pseudotsuga) account for 16 percent of the total public tree population which is below the genus diversity threshold of 20 percent but the Douglas firs exceed the 10 percent threshold for species diversity with 16 percent. An abundance of Douglas fir trees is understandable considering they are the most dominant native conifer in the region. The dangers of planting monocultures have proven to be devastating. One of Vancouver's goals should be to increase species diversity throughout the city, such that no species represents more than 10 percent and that no one genus comprises more than 20 percent of the population. Consideration should be given to large trees that provide shade, are aesthetically pleasing, and provide food or habitat for native insects and wildlife. Although the City should consider focusing efforts on planting species that are native to the region, particularly in the face of climate change, the wider effort should focus on urban-tolerant and/or wind-resistant species, regardless of origin.

Tree Species Selection

Matching a species to its favored climatic and soil conditions is the most important task when planning for a maintainable and survivable landscape. Plants that are well matched to their environmental conditions are much more likely to resist pathogens, insect pests, and severe storm damage and will therefore require less maintenance overall and be more likely to survive. In addition to considering site characteristics (such as climate, precipitation, native vegetation, availability of space) and soil characteristics (such as soil texture, structure, drainage, pH, water availability, and road salt), specific physical tree features must also be scrutinized to ensure public safety. Some considerations for street trees are the amount of litter dropped by mature trees, the maintenance required, and public acceptance.

In the face of climate change, plummeting insect populations, and mass extinctions, the City should focus efforts on planting species indigenous to the region. Planting species that are native to the region whenever possible will provide additional benefits to the ecosystem at large. Above all, given the tough growing conditions in an urban environment, tree species should be selected for their durability and low maintenance requirements. These attributes are highly dependent on site characteristics as well as species characteristics.

How to Plant

The steps taken to properly plant trees must continue to be clearly outlined for City crews, partners, volunteers, and/or contractors performing the work. Planting oversight and/or post planting inspections must continue to be performed to ensure that the work meets the guidelines set forth by the City. The tree planting methodology outlined in this section is supported by industry standards and best practices, including the American National Standards Institute (ANSI) Z60.1-2014 American Standard for Nursery Stock, and the American National Standards Institute (ANSI): Standard A300. Standard Practices for Tree, Shrub and other Woody Plant Maintenance.

These standards and best practices detail the methods and protocols for selecting healthy planting stock, handling trees during transport and planting, preparing the planting site, planting the tree, mulching, and young tree pruning.

Key Considerations for a Tree Planting Plan

A planting strategy is crucial to urban forest sustainability and should be based on data, available resources, partnerships, and community input. Some of the more common goals that define a planting strategy include:

- * Equitable Distribution. With this goal, planting priorities are assigned to areas determined to be the most in need based on the goal of an even distribution of benefits provided by trees. Beyond equal distribution, an area defined to be "in-need" is determined locally and can be a combination of priorities or focused on one specific priority. It is recommended the City utilize the guidance provided in the section that discusses tree canopy cover goals to identify areas of low tree equity that are most suitable for planting.
- Areas of Predicted Future Canopy Loss. Older neighborhoods with a more established tree canopy can anticipate significant losses in future years. One method to planning future planting efforts is to target these replanting areas now to aid in a less drastic succession of trees over time.
- Benefits-Based Plantings. Areas that have a specific issue like poor air or water quality, or a large percentage of older residents sensitive to heat stress, may work to plant trees based on the anticipated benefits in years to come.
- * Regular, Methodical Planting in Concert with Cyclical Tree Care Efforts. Planting may be most effective if it follows the City's inventory, in that trees are planted where they are removed. Regular methodical planting can also be considered a worthy goal.
- Species Diversity. Planting strategies should not only identify where to plant but also what is being planted. Species diversity in Vancouver can quickly become an issue if data is not used to make decisions on the types of trees to plant. Neighborhood-level and citywide planting plans should detail how biodiversity will be maintained with short- and long-term strategies.
- Inventory-Driven Plantings. In addition to tree canopy assessment data or data pertaining to the spatial location of existing tree canopy and possible planting space, a city may also utilize or conduct inventories of available public planting spaces. Often times, these types of inventories identify planting spaces based on criteria such as minimum width, distance from existing tree, distance from intersection, among others. Most planting space inventories catalogue the relative size of the growing space (small, medium, large).
- * Partners in Planting. Vancouver's planting strategy should also include who is doing the planting. This work can be done by City partners, neighborhood groups, community tree stewards, developers, and other interested parties, thus allowing the City to focus on specialized care (pruning, removals, assessments).

Future tree plantings should focus on maintaining or increasing species diversity and reducing reliance on any particular species.

Vancouver's public tree population is primarily in fair or better condition with over 345 distinct species. The City should continue to focus resources on preserving existing and mature trees to promote health, strong structure, and tree longevity. Structural and training pruning for young trees will maximize the value of this resource, reduce long-term maintenance costs, reduce risk, reduce storm damage, and ensure that as trees mature, they provide the greatest possible benefits over time.

Tree Planting Recommendations

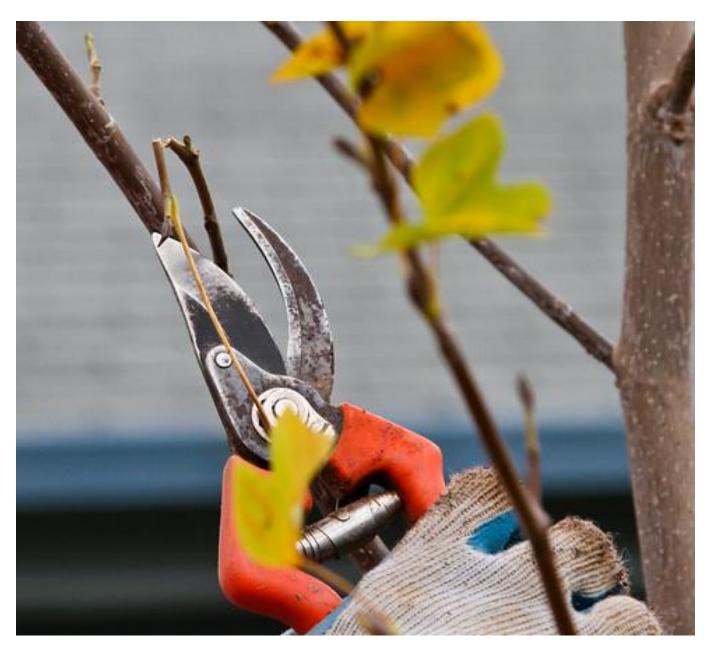
- Increase genus and species diversity in new and replacement tree plantings to reduce reliance on abundant groups. At a minimum, strive for no species representing more than 10 percent of the overall population and no genus representing more than 20 percent of the overall population.
- Use available planting sites to improve diversity, increase benefits, and further distribute the age distribution of street and park trees.
- Prioritize planting replacement trees for those trees that have previously been removed.
- Identify additional planting sites for trees and use the largest stature tree possible where space allows.
- Prioritize successional planting of important species, as determined by relative performance index (RPI) and the relative age distribution.
- Species that are adequately represented by established age distributions but lack recent plantings should receive priority care.
- Prioritize structural pruning for young trees and ensure maintenance plans and associated budgets are prepared as trees become established.
- Regularly inspect trees to identify and mitigate structural and correctable defects to reduce the likelihood of tree and branch failure.
- Consider opportunities to further support wildlife habitat and pollinators when making decisions on the species of tree(s) to plant.
- Update the recommended master tree list for projects and to provide as a recommendation to the public for private property plantings. Include attributes such as tree size at maturity, primary feature, soil requirements, space requirements, recommended location(s), native/nonnative classification, description, and any concerns.
- Consider preparedness planning for invasive pests and deleterious effects of climate change including wildfire, stormwater, and extreme weather events.

Post-Planting Care and Young Tree Maintenance

The urban forest within Vancouver plays a significant role in maintaining the health and vitality of urban life. It provides a wealth of benefits to neighborhoods and residents through the reduction of energy consumption, the removal of pollutants from the air and water, reduction in stormwater flows, increased valuation of private property, increased worker productivity, reduction in stress and violent crime, as well as providing recreational opportunities and aesthetic diversity. At the same time stresses from the urban environment including air pollution, damage by vehicles, increased impervious surface, soil compaction, and maintenance neglect reduce the diversity and magnitude of these benefits and may lead to tree-related problems.

The inherently close interaction between people and trees in the city requires active and diligent management of the urban and community tree and forest resources to ensure public safety. To enhance tree canopy and associated benefits, trees need to be properly planted and maintained.

The City of Vancouver can use the following information to make any updates to tree policies.



Urban Forestry Best Practices

Urban forest management priorities should in part be determined by the current maintenance practices and how well they support program goals and the Plan's goals. Some maintenance practices are specific to local climate conditions and number of trees to manage. Others, such as maintaining an optimal pruning cycle are relatively consistent for all tree management programs. As such, the City's current pruning cycle can be used to identify the funding and staffing needs.

Standards and best practices are implemented in Vancouver through references to these in ordinances and design guidelines, through City tree operations and services, and by administering an approved tree contractor list for public tree care. In addition, resources relating to standards and best practices are available on the City's website and occasional trainings are offered to the public.

Tree Inventory Best Practices



The City of Vancouver is actively adding and maintain its inventory of public trees. To support efficient management, growing a sustainable and resilient urban forest, communicating the benefits of trees, and adapting Plan strategies, the public tree inventory should be maintained and updated as changes occur such as maintenance, removals, and plantings. It will be necessary for the City to reassess each public tree to update the condition, size, observations, and maintenance needs that will support and inform urban forest management in the future. In

conducting future inventories of public trees, the City should adhere to the International Society of Arboriculture's Best Management Practices – Tree Inventories, Second Edition (2013) resource that details the standards, practices, and protocols.

Tree Maintenance Best Practices

The following provides an overview of tree maintenance best practices. It is not intended to be an extensive or comprehensive summary of best practices. All tree maintenance practices should follow the American National Standards Institute's (ANSI) A300 Standards (Parts 1-10).

REASONS FOR TREE PRUNING

1. Pruning for Safety

Involves removing branches that could fall and cause injury or property damage, trimming branches that interfere with lines of sight on streets or driveways, and removing branches that grow into utility lines. Safety pruning can be largely avoided by carefully choosing species that will not grow beyond the space available to them and have strength and form characteristics that are suited to the site.

2. Pruning for Health

Involves removing diseased or insect-infested wood, thinning the crown to increase airflow and reduce some pest problems, and removing crossing and rubbing branches. Pruning can best be used to encourage trees to develop a strong structure and reduce the likelihood of damage during severe weather. Removing broken or damaged limbs encourages wound closure.

3. Pruning for Form

Improves the structure of trees and removes branches that are more likely to fail. Branches that are poorly attached may be broken off by wind and weather. Branches removed by such natural forces often result in large, ragged wounds that rarely seal.

4. Pruning for Aesthetics

Involves enhancing the natural form and character of trees or stimulating flower production. To reduce the need for pruning it is best to consider a tree's natural form. It is very difficult to impose an unnatural form on a tree without a commitment to constant care.

COMMON TYPES OF TREE PRUNING

1. Crown Cleaning

Consists of the selective removal of dead, dying, diseased, and weak branches from a tree's crown. No more than 25 percent of the live crown should be removed in any one year, even for young trees.

2. Crown Thinning

Primarily for hardwoods, thinning is the selective removal of branches to increase light penetration and air movement throughout the crown of a tree. The intent is to maintain or develop a tree's structure and form. To avoid unnecessary stress and prevent excessive production of epicormic sprouts, no more than one-quarter of the living crown should be removed at a time. If it is necessary to remove more, it should be done over successive years. Branches with strong U-shaped angles of attachment should be retained. Branches with narrow, V-shaped angles of attachment often form included bark and should be removed.

3. Crown Raising

The practice of removing branches from the bottom of the crown of a tree to provide clearance for pedestrians, vehicles, buildings, lines of site, or to develop a clear stem for timber production. After pruning, the ratio of the living crown to total tree height should be at least two-thirds. On young trees temporary branches may be retained along the stem to encourage taper and protect trees from vandalism and sunscald.

4. Crown Reduction

Most often used when a tree has grown too large for its permitted space. This method, sometimes called drop crotch pruning, is preferred to topping because it results in a more natural appearance, increases the time before pruning is needed again, and minimizes stress. Crown reduction pruning, a method of last resort, often results in large pruning wounds.

Before Crown Crown Raising Reduction

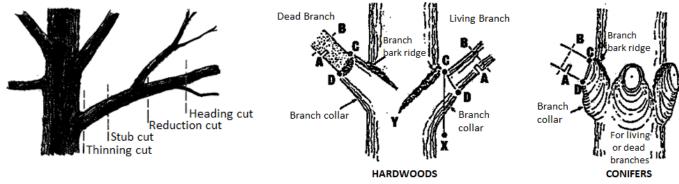
Figure 45. Examples of the types of tree pruning

Image source: Arbor Day Foundation

TREE PRUNING CUTS

Pruning cuts should be made so that only branch tissue is removed, and stem tissue is not damaged. To find the proper place to cut a branch, look for the branch collar that grows from the stem tissue at the underside of the base of the branch. On the upper surface, there is usually a branch bark ridge that runs parallel to the branch angle, along the stem of the tree. A proper pruning cut does not damage either the branch bark ridge or the branch collar. A proper cut begins just outside the branch bark ridge and angles down away from the stem of the tree, avoiding injury to the branch collar.

Figure 46. Types of pruning cuts and proper branch cutting technique



Natural target pruning properly removes a branch while protecting the branch collar, which is essential for wounds to heal. First cut A, second cut B, and third cut C-D.

Image source: Pennsylvania State University Urban Forestry Extension



Figure 47. Key considerations for pruning established trees

Utility Tree Maintenance Best Practices

UTILITY TREE PRUNING OVERVIEW

The City should work with Clark Public Utilities to ensure proper pruning practices are followed and that open communication between the company, the City, and the public are maintained. The International Society of Arboriculture provides guidelines for maintaining trees near power lines (Best Management Practices – Utility Pruning of Trees, G. Kempter, 2004).

Maintaining power lines free of tree growth is based on a consistent, planned trimming cycle of the utility vegetation management company. This approach improves electric service to all the customers who get their power from that line. A sensible approach to trimming trees means having a thorough maintenance plan that improves the safety and reliability of electric service to residents. Residents and the City staff should not attempt to trim any vegetation growing near or on any overhead power lines.

UTILITY TREE MAINTENANCE TECHNIQUES

1. Directional Pruning

Removes entire branches and limbs to the main trunk of the tree and future growth is directed away from the power lines. Reduction cuts are used for removing these branches and limbs and should be pruned properly back to a lateral branch that is at least one-third the diameter of the branch being removed. This allows for good wound closure and protects apical dominance and reduces sprouts. Avoid topping or rounding over trees. This removes more foliage than directional pruning, increases the number of tree wounds, stresses the tree, causes unstable decay, and increases water sprouts.

2. Right Tree Right Place

Selecting the right tree for the site can reduce potential safety hazards and improve the reliability of the electric service. Smaller trees near power lines do not need to be excessively pruned and do not lose their natural form.

3. Recommended Trees

Trees potentially suitable for planting adjacent to power lines should be shorter and slow growing to prevent clearance issues.

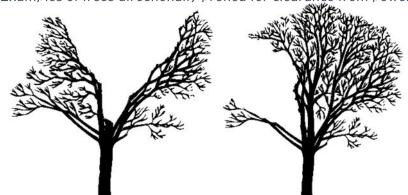


Figure 48. Examples of trees directionally pruned for clearance from power lines

Photo source: Pennsylvania State University Urban Forestry Extension

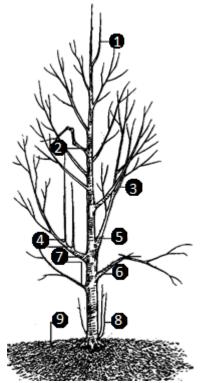
Young Tree Maintenance Best Practices

Proper pruning is essential in developing a tree with a strong structure and desirable form. Trees that receive the appropriate pruning measures while they are young will require less corrective pruning as they mature.

YOUNG TREE MAINTENANCE TECHNIQUES

- 1. Consider the Natural Form and Desired Growth
 Accentuate the natural branching habit of a tree and correct any structural problems over
 time, if needed, to not stress the tree.
- 2. Pruning in 1-2 Years after Planting Prune as little as possible after planting to ensure there are enough temporary branches to produce food for new growth of roots, trunk, and branches. Prune only dead, broken, malformed, or diseased branches. Remove codominant leaders to maintain one dominant trunk. Prune for clearance if absolutely necessary. Keep size of branch removed to less than one inch in diameter.
- 3. Pruning 2-3 Years after Planting
 Prune any dead, broken, malformed, or diseased branches. Remove any suckers from the base of the tree. Next, determine the permanent branch structure. Apply the following:
 - Remove, thin, or cut back any competing leaders.
 - Remove crossing or rubbing branches, keep the branch that maintains the natural form.
 - ❖ Thin excessively crowded branches but do not lions-tail.
 - Remove branches with narrow angles between the branch and trunk (consider species).
 - * Remove branches to maintain well-spaced branches along the trunk. Ideal mature trees will have lateral branches that are 18-24 inches apart (depending on species).
 - * Avoid pruning near time of bud break.
 - Prune flowering trees after flowering.

Figure 49. Example of pruning newly planted trees to promote good structure



- 10. Prune competing leader
- 11. Prune malformed branches
- 12. Remove crossing branches
- 13. Remove water sprouts
- 14. Remove branches with poor angles
- 15. Prune broken or damaged branches
- 16. Prune temporary branches over time
- 17. Remove suckers
- 18. Apply 2-3" of mulch

Photo source: Pennsylvania State University Urban Forestry Extension

Tree Planting Best Practices

The following provides an overview of best practices that should be considered and followed before, during and after planting trees.

- Trees to be planted should be selected from an approved tree planting list developed to maintain and enhance species diversity that are suitable for the Vancouver, WA Plant Hardiness Zone (Zone 8b) and changing climates.
- Planting material must conform to the latest version of the American Standard for Nursery Stock (American National Standards Institute [ANSI] Z60.1). Trees to be planted should be of standard quality or better, and should be true to name and type of their species variety.
- ❖ Trees should not be planted in lawns less than 2 feet in width or in planting pits less than 5 feet long by 5 feet wide.
- Trees should not be planted within 50 feet of any major intersection, or within 20 feet of a fire hydrant, a driveway, or a pole supporting a light.
- The burlap and twine from balled-and-burlap trees should be removed from the tree and the tree pit. Wire tree baskets may remain on the root ball, but the top one-third should be clipped and removed from the planting hole.
- Mulch should be placed around trees in a minimum 3-foot circle and 3-inch depth to protect trees from lawnmower damage and competition from turf; mulch must be kept away from tree trunks.
- Newly planted trees should be irrigated weekly during droughts in the growing season for three years.

Tree Irrigation Considerations and Best Practices

- Current limiting factor is budget for watering newly planted trees.
- ❖ A marketing campaign to remind and educate homeowners on how to water trees in times of drought, even if water to other landscaping such as turf or grass is cut off, would support a healthy urban forest.
- With dry and increasingly hot summers this is a critical requirement for new tree establishment.
- Establishing new trees requires 4-5 years of supplemental irrigation during the summer months.
- Vancouver should continue to require trees to be watered as necessary to ensure establishment, survival, and growth, during the first two growing seasons after planting (Vancouver Municipal Code Chapter 20.770).

Public Education Regarding Ordinance, Permitting, Programs, and Best Practices

Frequent communications and messaging relating to urban forest management best practices and industry standards keeps the public informed and reminded of the importance of proper tree care. The details regarding private property tree ordinances, regulations, permitting processes, and programs can be shared on the City's website, included as call-out box reminders in the permitting process, added to utility mailings, among other mediums and platforms. It is important to consider the barriers that inhibit public access to information and materials. Strategies to remove barriers include language translations, accommodating vision and hearing impairments, among others. It is recommended the City pursue or strengthen these outreach approaches by utilizing data from this Plan. If updates are made to tree ordinances, the City should implement a messaging campaign to share the changes.

Additional Best Practices for Urban Forest Management

PEST AND DISEASE MANAGEMENT

A principle to controlling insect pests, invasive plant species, and tree diseases is an innovative strategy known as Integrated Pest Management (IPM), which integrates cultural (growing) practices, monitoring, threshold and life cycle analysis, and chemical application strategies to effectively manage urban forest pest populations in an ecologically-sound manner. Vancouver's urban forest faces numerous existing and potential exotic tree pests and diseases.

ENCOURAGE NATURALLY OCCURRING BIOLOGICAL CONTROL

Biological control uses living natural enemies, antagonists, or competitors (biological control agents) to control other living organisms. Examples of naturally occurring biological controls include lady beetles, lacewings, parasitic wasps, predatory mites, spiders, earwigs, insectivorous birds, and bats. By using plants that attract the living organism above, chemical use for preventing and treating tree pests and diseases is minimized.

USE ALTERNATE PLANT SPECIES

With tree inventory data that describes the composition of tree species in the urban forest, concentrations of susceptible trees and problematic trees can be thoroughly identified and understood. The information can be utilized to update the palette of trees that are planted by the City to reduce the likelihood of tree pest and disease issues. Some well-known alternate tree species that are resistant to tree pests and diseases include the 'Frontier' elm or Asian elm species that are resistant to Dutch Elm Disease and powdery mildew resistant cultivars of crapemyrtle. A diverse urban forest is a more resilient urban forest to diseases and pests.

USE CULTURAL PRACTICES

Cultural practices discourage pest invasion. Some of these practices include good tool sanitation, removing debris and infested plant material from the site, proper watering and fertilizing, growing competitive plants, or using pest resistant tree species. Expanding on the examples, the City should avoid sprinkler irrigation around trees that are susceptible to anthracnose such as elms and sycamores and avoid irrigation around the trunks of native oaks in the dry season. Thinning out tree canopies can reduce foliar disease problems and pruning trees at certain times of the year can reduce pest problems. For example, to avoid bark beetle infestations, it is recommended to prune pines and elms in the winter. If a disease or insect is spotted in a tree, it can be removed and properly disposed of to potentially reduce the spread. Another example of a pest and disease best practice is to only fertilize trees when absolutely needed. The use of fertilizers can be reduced or eliminated if the appropriate trees for a given site are planted. Lastly, the habitat can be altered to make a site less suitable or compatible for pest development. Examples include planting trees at or above grade to reduce crown rot problems and frequent monitoring and management of trees near known tree pest and disease issues and outbreaks.

URBAN WOOD UTILIZATION

Trees in the urban environment are part of a continuous cycle. A tree is planted, it grows for a period of time, and then inevitably it declines and must be removed. Historically, tree removal has been considered a negative side of urban forestry. The cost of removing a tree and then disposing of the resulting debris is seen as a burden to homeowners and municipalities alike and creates a gap in the urban tree cycle. Urban wood utilization is a term and practice describing the reuse of wood with the goal of diverting organic waste from landfills where materials decompose and release methane, a greenhouse gas contributing to climate change. Wood biomass from the urban forest is often disposed of rather than put to use in some new manner. To complete the cycle of urban trees there is a need and opportunity to make use of the resulting biomass to keep the carbon in the wood rather than released into the atmosphere. Good logs can be milled into lumber for furniture, flooring, or kitchenware and lower quality materials can be used as a biofuel to displace fossil fuel use or composted into quality soil amendments like mulch.

Currently, Vancouver does not implement an urban wood utilization program and could explore the financial costs and return on investment to implement a program. In addition to the environmental benefits of carbon storage, urban wood utilization programs could contribute to the green economy of Vancouver and can provide employment opportunities throughout the entire process to remove, store, treat, and prepare urban wood for its second life.

To develop an urban wood utilization or urban wood use program, it is recommended the City start simple and allow the program to evolve. One of the first steps is to inventory the volume of biomass generated annually and identify other local partners that can add to the volume. From the

inventory, the City can assess its operational, equipment, personnel, and administrative needs and begin to identify local and regional markets and partners that have a demand or need for the biomass. With this understanding, the program can then establish goals and begin implementation. Additional information and resources are available online and one local example to potentially model is the University of Washington's Seattle Campus "Salvage Wood Program". This program is a commendable example of urban wood utilization. Their campus-sourced wood end products have included recognition plaques, campus benches, conference tables, and wood for utilization by students. Another resource includes the Urban Wood Network (www.urbanwoodnetwork.org) which is a network of municipalities, arborists, sawmills, suppliers, manufacturers and makers, professionals, and stakeholders.

Implementing or updating such a program enables the City to effectively manage the complete life cycle of trees to support goals relating to sustainable urban forest management.

Funding Mechanisms

Urban forests are an essential component of a municipality's infrastructure. Well-managed urban forests boost community livability and build resilience through a myriad of ecosystem services. However, the budgets afforded to urban forestry programs do not always represent this "essential" status and forestry managers often need to work with budgets that are below their needs. Urban forestry budgets are also prone to large swings in need, as is currently being observed with the emerald ash borer causing spikes in tree removal demand. It can also be difficult to finance singular, capital intensive projects, like a public tree inventory, that provide critical data for forest planning and management.

The general fund has long been the core of urban forestry program funding across the county and it remains a stable and popular option today (making up 72 percent of urban forestry funding in 2014).

The general fund is also beholden to many other community needs and it is often stretched thin to meet all these demands. The best strategy for overcoming these budgetary challenges is to leverage a variety of sources, both public and private, to supplement allocations from the general fund. A diverse portfolio of funding streams allows urban forestry programs to weather resource restrictions and provide higher levels of service, like advancing from reactive to proactive maintenance cycles and implementing the Urban Forestry Management Plan.

City Tree Account

According to Chapter 20.770.040 "City Tree Account" in Vancouver Municipal Code, in lieu of planting replacement trees, the permittee for a tree removal request may contribute to the City's tree fund based on Vancouver's fee schedule. In addition, penalties, fees, and fines relating to the tree ordinances can be allocated to the City's Tree Account. Other sources of funds include the sale of trees or wood from City property, donations and grants to the fund, and the sale of seedlings by the City. In 2021, the Tree Account or "Tree Reserve Fund" amounted to \$121,342 and in 2022 the amount was \$71,669. These funds can be used for acquiring and maintaining wooded areas within the city, planting and maintaining trees, identifying and maintaining Heritage Trees, propagating seedlings, urban forestry education, or other purposes as determined by City Council.

Stormwater Utility

Stormwater management has been a growing financial burden for many communities across the country, even before the effects of climate change had begun to take hold. To pay for the increasing costs, cities have been implementing user fees for stormwater management services. These charges are called stormwater fees or stormwater utility fees because they are modeled after the way municipalities have historically billed residents for other utility services like water and sewer. Stormwater fees provide local governments with a stable source of revenue to pay for their growing stormwater management costs, Urban forests are a well-documented complement to grey

infrastructure for treating and mitigating stormwater. Therefore, many communities include urban forestry in stormwater fee payouts.

In Vancouver, all real property located in the city contributes drainage runoff and/or benefits from the City's surface water (i.e., stormwater/drainage) system. Property owners are required to pay monthly charges to cover operations and maintenance of stormwater facilities and capital expenditures for surface water improvements. The Urban Forestry Program in Vancouver is primarily funded through the Surface Water Management Fund and contributed \$776,346 to the Program's budget in 2022.

Requirements for a Comprehensive Street Tree Program

The Urban Forestry Program should utilize the recommendations in the Urban Forestry Management Plan to sustain and expand funding from the Surface Water Management Fund. Funding should more closely align with the goals of the Plan. Data such as the benefits of trees in reducing stormwater runoff volumes, the number of trees to be planted to reach the 28 percent canopy goal, the tree maintenance needs, and necessary staffing levels could all be utilized in budget planning and requests.

Special Assessment Districts

Many properties in Vancouver are included in unique special financing districts of different types, especially in newer or redeveloping areas of the city. These districts are ordinarily initiated by the developer of a property, but are approved by City Council. The purposes of these districts may include financing of public improvements, ongoing maintenance and operations, or a combination. In general, these districts either serve to reimburse the developer for public improvements they are required to provide or to augment public facilities and services which might not otherwise be available to most city residents. Most districts obtain their revenue via a property tax, although some may also charge fees or collect assessments. Residential districts have an eventual time limit for debt service, but in some cases they may operate more or less in perpetuity to provide maintenance and/or services.

In Vancouver, several special assessment districts may be considered, including Business Improvement Districts (BIDs), General Improvement Districts (GIDs), Special Improvement Maintenance Districts (SIMDs), and Local Improvement Districts (LIDs). Others include water districts, fire protection districts, sanitation districts, and parks and recreation districts.

Focusing on areas with higher concentrations of street trees or maintenance needs, such as business districts or the recommended priority maintenance corridors discussed in this Plan, may capture property owners who are more willing to pay for tree care. This approach may be more politically palatable and could potentially lead to a citywide special assessment district where existing districts could be consolidated and organized into separate benefit zones, each with its own budget.

Requirements for a Comprehensive Street Tree Program

Special assessments are usually calculated per linear foot, based on the idea that benefits to property owners are directly related to street frontage. In some cases, special assessments include additional metrics such as building and/or lot square footage to account for the added benefit associated with larger buildings that have more occupants.

Parcel Tax

A parcel tax is a special tax levied for the provision of special benefits. Revenues from special taxes must be used for the specific purpose for which they are intended, so a parcel tax would create a dedicated funding stream for street trees. Similar to a special assessment, a parcel tax cannot be based on the value of property; however, the amount levied on each parcel does not need to be directly related to the benefits provided. Cities have the flexibility to levy parcel taxes as they see fit, but they are typically based on lot square footage or levied as a flat tax, with the same amount per parcel.

Parcel taxes are designed to encompass entire cities and therefore, are good candidates for a citywide street tree program, as opposed to the district-level approach that often occurs under special assessments. Parcel taxes typically fund more than just street trees. For example, a tree maintenance tax per parcel may include provisions for the maintenance of parks and open space and improvements to recreation facilities.

A parcel tax requires strong public support, as it must be approved by voters, rather than just the majority of property owners, as with a special assessment. Because a parcel tax must be voted on in a general election, rather than via mail-in ballot, it is likely to receive heightened political attention. However, general elections capture the votes of renters, who may be more apt to approve a tax borne by property owners.

Requirements for a Comprehensive Street Tree Program

A parcel tax for urban forestry operations and maintenance (O&M) may be levied as a flat tax, or it may be based on lot size (square footage). This study evaluated the parcel tax amount required to finance a City-operated street tree program according to both approaches.

The number of parcels within Vancouver was not easily found and is outside of the scope of this Plan but this section offers a hypothetical scenario for the City to review and consider.

In this hypothetical scenario, Vancouver has 60,000 parcels citywide and with the city's total land area of 52 square miles, there are 1,462,222,080 square feet of parcels and the average parcel size is 25,000 square feet. In the case of a flat parcel tax, the City would need to levy approximately \$1.11 per parcel per year to cover the full costs of the Priority Maintenance Corridors Program that follows a 7-year pruning cycle. To fund the Proactive Pruning Program for public trees, a flat parcel tax of approximately \$7.96 per parcel per year is required.

With the estimated 1.5 billion square feet of parcels, the Priority Maintenance Corridors Program could be funded through a parcel tax levied according to lot size. This would translate to an annual tax of \$0.000044 per square foot and \$0.000318 to fund the Proactive Pruning Program annually. For a typical 2,500-square foot lot (25 feet wide and 100 feet deep), a parcel tax based on lot size would amount to \$0.11 to fund the Priority Maintenance Corridors Program annually or \$0.80 to annually fund the Proactive Pruning Program for public trees.

Another approach to consider is the average parcel lot area of 25,000 square feet (hypothetical). This would amount to \$1.11 or \$7.96 per parcel for the Priority Maintenance Corridors Program and the Proactive Pruning Program, respectively. The City may also explore classifications of parcels by counts within area (square feet) ranges.

Considerations and adjustments to these numbers must be made for properties with multiple rightof-way trees, HOA-managed trees, and maintenance responsibility stated in plat plans.

able 25. Parcel fax options and provisions for Vancouver's Urban Forestry Program					
	Priority Maintenance	Public Tree Proactive			
Metric	Corridors	Pruning Program			
# of Parcels	60,000	60,000			
Recommended Annual Budget	\$64,831	\$465,643			
Flat Tax (budget by parcel)	\$1.08	\$7.76			
Parcel Square Feet (sq. ft.)	1,462,222,080	1,462,222,080			
Tax by Lot Size	\$0.000044	\$0.000318			
Typical Parcel (2,500 sq. ft.) Annual Tax	\$0.11	\$0.80			
Average Parcel Size (sq. ft.)	25,000	25,000			
Average Parcel Size Annual Tax	\$1.11	\$7.96			

General Obligation Bonds

Local governments commonly use General Obligation (GO) bonds to fund the construction and improvement of projects involving real property (e.g., buildings, infrastructure and parks). GO bonds typically carry low interest rates, making them attractive for capital projects, which may include tree planting. However, funding is available for discrete projects, often over a limited time rather than an extended period. In addition, ongoing maintenance is ineligible for GO bond funding pursuant to federal tax law. Washington cities may pay debt service from GO bonds through property taxes (in proportion to the estimated value of the goods or transaction concerned), where assessments are based on property value. As a result, the issuance of GO bonds requires majority voter approval.

GO bonds may be a tool for financing the planting of street trees in Vancouver as part of a larger package of capital improvements, as bonds are typically issued for large amounts. For example, voters may approve a Road Repair and Street Safety Bond, with funds designated for streetscape and street safety improvements that included street tree planting. GO bonds may include tree planting among streetscape improvements through street enhancement programs such as "complete streets" programs. However, these bonds may allocate funding for street tree planting to the streets program, rather than the City's Urban Forestry Program. A bond specifically focused on a major street tree planting effort may be appropriate in the future.

Requirements for a Comprehensive Street Tree Program

Because GO bonds only fund capital costs, they could only be used to finance tree planting and establishment activities under a comprehensive city-operated street tree program.

Additional Financing Options

Parking Benefit District

Parking Benefit Districts (PBDs) generate revenue within a special district for improvements and services related to streets, streetscapes, and landscapes. Because revenue derives from parking meters, visitors to PBDs fund the majority of improvements. As a result, local governments may create PBDs via ordinance without requiring a vote of property owners, setting them apart from other special assessment districts. Although only commercial areas with parking meters provide revenue, improvements may be implemented beyond PBD boundaries. The ordinance that creates the PBD determines the share of revenue that must be applied to improvements within the district, known as the "local return" portion. A committee of residents, property owners, and business owners advises the local agency administering the PBD on how to expend revenue. Adjustments to City policy regarding the agency receiving excess meter revenue may be required to enable the use of this financing option for a street tree program.

While activities may include street tree planting and maintenance, a PBD is likely to cover other improvements related to neighborhood beautification. It is possible to create a dedicated funding stream for improvements, including street tree planting, sidewalk maintenance, and the installation of street furniture and light fixtures. This may present an opportunity to finance a portion of Vancouver's public tree maintenance costs; however, this strategy requires additional analysis to determine the likely amount of revenue to be generated for street trees, along with the potential for adding parking meters in new areas of the City.

General Fund

Vancouver's Urban Forestry Program is primarily funded through the Surface Water Management Fund unlike many other cities in the region where the General Fund provides most of the funding for street tree planting, establishment, and maintenance activities through the Capital Improvement Plan (CIP). For the General Fund, appropriations typically do not keep pace with the needs of urban forest management to keep it sustainable. Because the General Fund is not a dedicated funding stream with a consistent budget amount, and is subject to changing economic conditions and political support, the General Fund is a volatile funding source. Nonessential services are the first target for cuts when expenditures exceed revenues, and there is no guarantee

that one year's appropriations will equal the next. Reliance on the General Fund is not ideal for long-term planning of a program that will require a substantial commitment of resources (e.g., new staff, funding for partners).

A mixed General Fund and Special Assessment model is often considered an appropriate compromise but can lead to decreases in General Fund budget allocations over time, as the assessment bears a large share of the burden of maintenance. Vancouver's Urban Forestry Program has a unique advantage of being primarily funded through the Surface Water Management Fund.

Partnerships

A number of opportunities for partnerships exist to help implement a public tree program in Vancouver and cover a portion of the costs. Continued collaboration with the Friends of Trees organization, WA Department of Natural Resources, community groups, and corporations would advance the City's planting agenda, particularly if Urban Forestry does not have the resources to conduct all the work.

Many communities across the country partner with local non-profit organizations (NPOs) that conduct tree planting. The Plan provides recommendations and action steps to strengthen partnerships with local community organizations.

Public agencies, such as the U.S. Forest Service and regional air quality management districts, may also provide grant funding, although these are typically one-time contributions rather than a sustainable funding source. As an alternative or addition to NPOs and public agencies, corporate partnerships may present an opportunity for financing a share of Vancouver's street tree planting and maintenance activities. Communities often establish adopt-a-tree programs and a corresponding fund that accepts donations for street tree activities, but a formal corporate partnership program could be a component of corporate social responsibility programs, particularly for Vancouver-based businesses. In particular, large goals like increasing the city's tree canopy may attract corporate partners interested in environmental stewardship and a positive public image. Emphasizing the benefits of street trees, such as clean air and water, may expand the pool of funders to areas like public health. For example, large health or fitness corporations may contribute substantial funds for projects and programs that promote increased access to trails for fitness purposes. Development of a corporate partnership program would likely require significant fundraising and outreach efforts on Urban Forestry's part and may place the City in competition with NPOs with highly organized fundraising programs based in Vancouver such as conservancies and park foundations. Some funders may prefer to contribute to NPOs, and therefore, it may benefit the City to partner closely with the NPO or support the establishment of an NPO. Ideally, corporate contributions would be consistent so that the City could rely on a sustainable funding stream.

Urban Forest Mitigation Cost

The City could explore changes or additions to tree code as it relates to mitigation and incentives for tree preservation and planting. In development projects, if existing trees are approved for removal, the developer would pay a mitigation cost for the removal of those trees. Costs are typically based on the type of project or property, type of tree (e.g., Heritage and/or native trees) fixed fee schedules, appraisal values of trees, and the diameter of the tree(s) removed. This would incentivize developers to reduce impacts to trees as part of development and preserve the city's existing tree canopy cover.

Recommendations for Funding Mechanisms

The Urban Forestry Program should continue utilizing the Surface Water Management Fund and Tree Reserve Fund as the primary sources of funding. Data and recommendations in the Urban Forestry Management Plan can be used to support budget requests to address goals such as the proactive pruning programs, number of tree plantings to reach canopy goals, citywide public tree inventory collection, updated canopy assessments, staffing levels, and community programs. Urban Forestry should also continue partnering with neighborhood partners and applying for traditional urban forestry grants from the WA Department of Natural Resources. In addition, the Urban Forestry Program can utilize the tree canopy data and other information in the Plan to explore non-conventional grant opportunities that address themes such as air quality, energy conservation, water quality, climate change mitigation, biodiversity, human health and wellbeing, among others.

Vancouver should explore options for implementing an Urban Forestry Mitigation Cost to prioritize tree preservation as part of development. The following provides an overview and evaluation of the potential funding mechanisms for Vancouver.

Table 26. Overview of the options evaluated for funding Vancouver's urban forestry goals

Local Sources	Grants & Taxes & Fees Special Distri		Special Districts	Additional Sources
General Fund	Federal Grants	Tax Increment Financing	Special Benefit Districts	Memorial Programs
Capital Improvement Funds	State & Local Grants	Stormwater Utility Fees	Conservation District	Adopt-a-Tree Programs
General Obligation Bonds	Non-profit Grants	Frontage Tax	Business Improvement District	Mitigation & Escrow Funds
Urban Forestry Mitigation Costs	Corporate & Private Donations	Gas Tax, Permits, Pest Control Fees	Parking Benefit District	Wood Utilization & Carbon Trading

The table on the following page summarizes the funding mechanisms and the considerations for utilizing them to support the implementation of the Plan. Additional resources such as the "How to Fund Your Urban Forestry Program" eBook are available at www.planitgeo.com/library/urban-forestry-grant-resources and www.planitgeo.com/urban-forestry-resource-library.

Table 27. Summary of financing options for Vancouver's urban forestry goals								
Financing Options	Attributes	Process	Opportunities	Challenges				
Feasible Optio	ns							
Tree Fund	Building permit fees received, tree mitigation fees, and stormwater fees could all contribute to a general tree maintenance operating fund.	Enforcement of the Code generates monies from restitution. Building permit and stormwater fees would need evaluated and adjusted to accommodate supporting the Tree Fund.	Monitoring Code violations would generate additional revenue for the Tree Fund. Use of funds for tree maintenance. The City is growing and revenue from fees could benefit the Tree Fund.	Staffing levels are need to align with the ability to monitor Code violations. Fees would need evaluated, adjusted, and approved. Funds used for tree maintenance do not directly affect all contributors to the fee programs.				
Special Assessment Districts	Special assessment for landscaping, open space improvements, acquisition, and maintenance.	City agency / property owners initiate via petition, City agency administers; based on benefits calculated in engineer's report; >50% of property owners in proposed district must approve via (mail) ballot.	Citywide district possible for all street trees; individual districts more feasible in areas with many trees, high maintenance needs, and/or political support.	Typically funds more than just street trees.				
Parcel Tax	Assessment levied independent of property value, can be equal amount per parcel or dependent on lot size.	2/3 of voters (not just property owners) must approve via election ballot.	Tax can be directly related to program costs; maintenance taxes deductible for property owners.	2/3 voter approval; potential competition from other services (e.g., schools); flat tax distributes cost inequitably.				
General Obligation (GO) Bond	Low-interest loan for capital projects; repaid by levying tax revenue.	2/3 voter approval required.	Frequently used tool in municipal government.	Funding provided for set period; maintenance ineligible for funding.				
Urban Forestry Mitigation Costs	Typically based on landscape and tree plans as part of development projects with approval required.	Regulation would include tree mitigation based on criteria such as tree size, Heritage Trees, number of trees, or type of project.	Provides incentives for developers to preserve existing trees to prevent additional project costs.	Requires updates to ordinances and defining the mitigation requirements. Requires enforcement and a fair and balanced approach.				

Financing Options Additional Op	Attributes	Process	Opportunities	Challenges
Parking Benefit District (PBD)	Revenue from parking meters for range of right-of-way improvements.	Enacted via local ordinance specifying boundaries, rates, use of funds; City administers with committee input.	No ballot approval required; visitors bear burden over residents.	Typically funds more than trees.
General Fund	City's primary funding pool for wide range of municipal services.	Annual budget via City's legislative process.	History of funding for tree planting and establishment.	Not a guaranteed source of funding; no guaranteed funding amount; funds at risk if budget shortfalls.
Partnerships	Non-profits, corporate partners, grant funding; for tree planting and establishment.	Various, depends on City's processes.	Decrease costs, increase capacity, develop a tree steward organization and program.	Union resistance, sustainable funding stream required.
Carbon Offsets	The WA Climate Commitment Act (May 2021) creates a "cap and invest" program with a statewide cap on greenhouse gas emissions and auctions or allocates emissions allowances which supports climate resiliency programs.	The WA Department of Ecology is I developing the program and regulations. House Bill 1216 (HB1216) promotes urban forestry programs that will be facilitated through the WA Department of Natural Resources.	WA is only the second state to pass an economy-wide carbon cap program, after CA. In CA, projects must plant at least 1,000 trees as offset projects to enable the sale of carbon credits. WA may adopt similar requirements. Also, HB1216 presents opportunities.	Many trees (5,000+) must be planted to cover costs of an offset program. Creates two types of street trees, offset program trees require higher oversight. Does not support tree maintenance.
Pest Control Fee	A fee for forestry related services such as pest control and replanting.	A forestry fee specific to pest control added to the public service utility billing as a levy.	Opportunity to offset costs of managing and recovering from tree pests and diseases.	Increased fee may require voter approval. The City must analyze pest control costs to establish the appropriate fee amount.

THE COMMUNITY FRAMEWORK

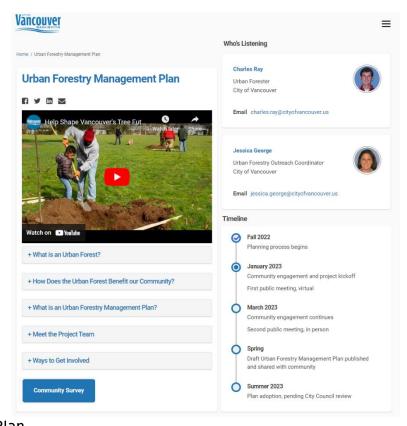


THE COMMUNITY FRAMEWORK FOR URBAN FORESTRY

The urban forest is a resource that benefits and belongs to the city's residents. In order to care for it, the passion that is so frequently used to talk about trees can be harnessed to build stewardship around Vancouver's trees. Approximately 68 percent of Vancouver's tree canopy is located on private property (see the Urban Tree Canopy Cover section). Thus, success in improving or maintaining tree canopy must include not only the municipal government, but also a populace that understands the value of trees and tree canopy to the community and the environment and how to plant and care for trees.

ENGAGEMENT TO INFORM THE PLAN

Throughout the development of the Urban Forestry Management Plan, engagement opportunities and activities were held to gather feedback and input that would inform the vision, goals, and strategies. The engagement sessions launched with an internal Community Engagement Strategy that detailed the sessions, objectives, partners, timing, and other considerations to engage, educate, and capture feedback from a diverse community. The Strategy was developed in coordination with City staff and the engagement began with the launch of the project website on the Be Heard Vancouver website (beheardvancouver.org/ufmp). website served as a portal for sharing information about the project, the urban opportunities forest, and participation in the development of the Plan.



Shortly after the launch of the website, an educational online video was created to provide a brief overview of the urban forest and the planning project.

Figure 50. Vancouver's Urban Forestry Management Plan project website (BeHeardVancouver.org/UFMP)

In addition to the website and online video, an online survey was hosted and shared on the project website throughout January and February 2023. The survey gathered 155 responses and focused on identifying viewpoints and perceptions relating to the urban forest cover, health, benefits, programs, and priorities. Questions also sought to gather input on developing the Plan's goals, strategies, and future programs.

Public Survey

There were 155 responses to the Google Form survey that was available online in January and February of 2023. Survey respondents are primarily in the 98661 zip code (17 percent), 98660 zip code (12 percent), or the 98683 zip code (12 percent). View the map on the following page to see the distribution. They were predominantly female (61 percent), are 65 years old or older (25 percent) or 55 to 64 years old (23 percent), are white (78 percent) homeowners (82 percent), and 35 percent fluently speak Spanish and 4 percent speak Portuguese.

Most respondents have interacted with trees on their walk, ride, or commute (97 percent), sat or parked under the shade of a tree (94 percent), and/or cared for their own trees (89 percent).

Regarding the health of Vancouver's trees, most responses indicated a decline in the last 10 years (50 percent) followed by being unsure of the health and quality (34 percent). 8 percent feel the health and quality of trees has improved and 8 percent feel it has remained the same in the last 10 years.

When asked about their priorities, most respondents selected trees that provide shade and lower temperatures (90 percent), a city program that proactively maintains public trees (88 percent), healthy trees that are resilient (86 percent), increasing the number of trees where there is historically less tree canopy cover (83 percent), and supporting trees in their role to manage stormwater and reduce erosion (80 percent).

To improve tree health, respondents feel the City should use resources to incorporate more tree plantings and preservation development projects (89 percent), set and achieve canopy goals (85 percent), planting to withstand droughts and temperatures (82 percent), proactively maintaining trees for structure, health and safety (78 percent), and planting trees that can coexist with sidewalks and utilities (77 percent).

Respondents feel the City should prioritize future tree plantings in parks, greenways, and other public spaces (88 percent); street tree planting sites (85 percent); in commercial and industrial areas (78 percent); and/or on school campuses (77 percent).

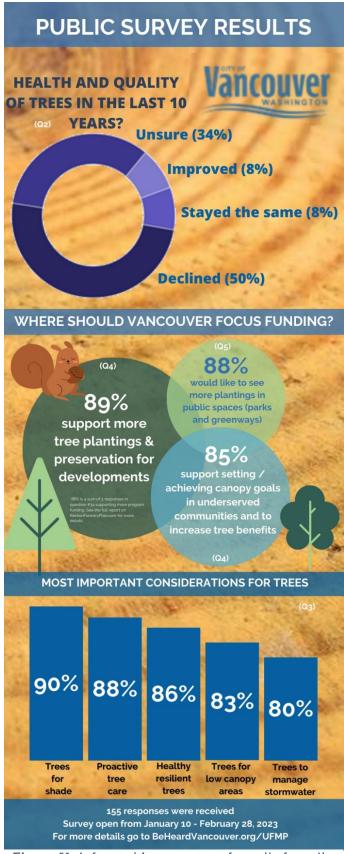
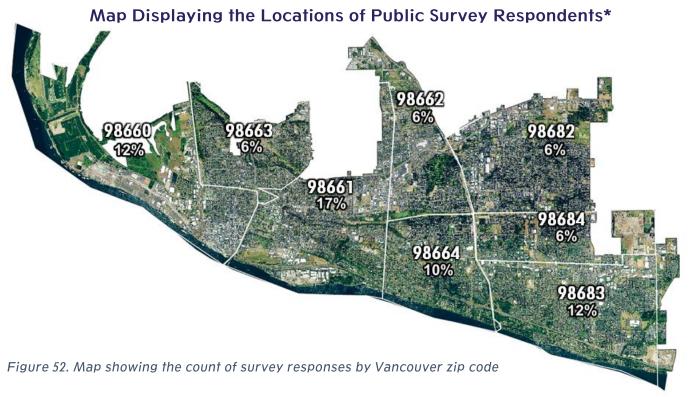


Figure 51. Infographic summary of results from the 2023 UFMP public survey



^{*} Note: Zip code boundaries were recreated and formatted to Vancouver for summarizing public survey responses. The map is not intended for any additional use.

News Media

Throughout the development of the Plan, the City's Urban Forestry Program coordinated with other city staff, partners, and media outlets to spread the word about the project and to encourage participation from all members of the community. In addition to the online video, Urban Forestry Program staff were interviewed by news media and one such example is highlighted below. On January 25, 2023 a news segment on FOX12 was held entitled, "City of Vancouver seeks community input on plan to enhance its urban forest" and on January 27, 2023 The Columbian published an article, "Vancouver to revise urban forestry plan as it aims for equity, climate goals".

City of Vancouver seeks community input on plan to enhance its urban forest



The Columbian

Vancouver to revise urban forestry plan as it aims for equity, climate goals

By <u>Lauren Ellenbecker</u>, Columbian staff writer Publishe January 27, 2023, 6:05am Updated: January 28, 2023, 12:18pm



Figure 53. Examples of the news media efforts to encourage public participation and awareness

External Stakeholder Engagement

In addition to consultations with City staff, public engagement, and other efforts to gather a wide range of feedback from the community, external stakeholders were identified and invited to participate in an online survey (SurveyMonkey). This survey was separate from the public survey and looked to gather viewpoints, priorities, and ideas relating to the urban forest of Vancouver and the greater region.

A total of 36 agencies, organizations, companies, or individuals were invited to participate in the survey. The table below provides a summary of the invited stakeholders. The survey was available from January 20 through February 10, 2023. The 36 entities included a total of 44 individuals that were invited and of those invitations, a total of 30 stakeholders participated representing 23 unique groups.

The majority of stakeholders are involved in public outreach, education, engagement, and/or training (53) percent); tree-related inventories, assessments, monitoring, and/or analysis (47 percent); and organizing and managing volunteers and events (40 percent). Of all the benefits and services that trees provide, most stakeholders feel the greatest benefit relates to trees addressing climate change by reducing air and surface temperatures (80 percent). Regarding concerns and challenges for Vancouver's urban forest, most stakeholders identified a regional approach to urban forest management being needed (32 percent); outdated or inconsistent ordinances, standards, and/or policies needing to be addressed (32 percent); or budget challenges (29 percent). To summarize

Vancouver, WA Urban Forestry Management Plan

Survey for Urban Forestry Stakeholders in the Region



4. Which of the following concerns, if any, do you have about Vancouver's urban forest? (Choos all that apply)

Concerns relating to the sustainability of the urban forest, programs, or other Environmental/ecological concerns or challenges	Improvements needed in preparedness planning (wildfire, drought, invasive insects & pests, storms disease)
Collaboration and/or partnerships that need to be established or strengthened	Ordinances, standards, and/or policies that are outdated, inconsistent, or other
Community education about the benefits of the urban forest needs improvement	City staff, partners, and/or community tree stewards lack the necessary trainings and certifications
Community tree stewardship could be improved Communications between the City and contractors, organizations, or other need	☐ Tree planting and maintenance standards, best practices, and/or overall approach needs improvement
improvement Cities are not applying data, tools, and research to	Staffing-related issues, concerns, challenges, or other
urban forest management planning Regulatory requirements that are not met.	☐ Budget-related issues, concerns, challenges, or other
enforced, reflective of the needs, or other	A more regional approach to urban forest management is needed
Alternative solutions to tree and hardscape conflicts are not implemented or properly prevented	Request to meet to further discuss
Other (please specify)	

Figure 54. Example of the types of questions asked of the external stakeholders to inform the Plan

stakeholder viewpoints and priorities relating to Vancouver's urban forest, most stakeholders view developing goals and strategies that address sustainability, climate change, and equity as a priority (43 percent) followed by increasing the number of trees and developing a plan with resources for maintaining them (40 percent).

Participating Stakeholders	Continued		
AKS Engineering & Forestry	Planning Solutions, Inc.		
Arborscape Ltd Inc Tree Care	Rosevillage Neighborhood Association		
Bartlett Tree Experts	Teragan & Associates, Inc.		
Clark County Historical Museum	The Confluence Project		
Clark County Public Health	Todd Prager & Associates		
Clark Public Utilities	TreeWise		
Columbia Springs Environmental Education Center	Vancouver Bee Project		
Friends of Trees	Vancouver Dawn Lions Club		
Landscape Architect	Vancouver School District Horticulture		
Lower Columbia Nature Network	Vancouver's Downtown Association		
MacKay Sposito, Inc.	Watershed Alliance of SW WA		
Parks Foundation of Clark County	WSU Extension, County Master Gardeners		

Table 28. Summary of the participating external stakeholders

Urban Forestry Commission Meetings

Vancouver's Urban Forestry Commission was established to advise the Mayor and City Council on local and regional tree related issues. The Commission assists the city to develop good management practices to conserve the city's trees and forests, educate citizens on the importance of urban trees, and organize tree plantings.

The Urban Forestry Commission was created by City ordinance 12.02 in 1987 for the purpose of "managing, and increasing the city's urban forest, thereby protecting a vital environmental, social and economic resource that benefits all residents and visitors, and for the purpose of assisting property owners and public agencies in improving and maintaining the urban forest in a manner consistent with adopted city policies..".

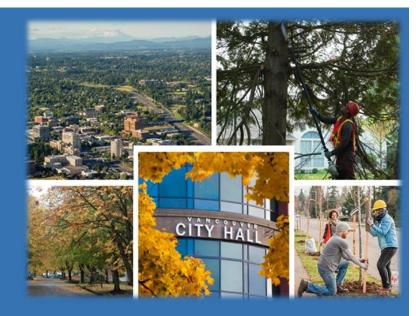
The seven-member citizen Commission is appointed by and reports to the City Council, and it is staffed by the Urban Forester. The Commission has been directed by Council to focus on the following activities:

- Considering changes to urban forestry policy and regulation as presented by City staff.
- Administering the Heritage Tree Program (as defined in VMC 20.77).
- Updating the Urban Forestry Work Plan.
- Coordinating community outreach activities for urban forestry:
 - o Traditional events Arbor Day and Old Apple Tree Festival
 - Assist Vancouver neighborhoods through the Neighborhood Liaison program to identify urban forestry needs, especially in Neighborhood Action Plans and funding opportunities.
 - Promotion of public awareness through Neighborhood Tree Stewards program, Urban Forestry brochures, recognition ceremonies (Tree City USA, Silva Bolds Whitfield Award, Mac Award), and planting programs for the entire community.

On January 18, 2023 the urban forestry consultants and the Urban Forestry Program presented on the Urban Forestry Management Plan project, its status, initial findings, engagement opportunities, and other key information to provide awareness and gather input.

Vancouver, WA Urban Forestry Management Plan

Urban Forestry Commission Meeting January 18, 2023



Presented By:

Charles Ray, City of Vancouver Urban Forester Chris Peiffer, PlanIT Geo, Project Manager





Public Meeting #1

Once the awareness grew from the initial outreach that began in November 2022, two virtual public meeting sessions were held on January 25, 2023 at noon and in the evening. The public meeting was titled, "Let's Talk Trees, Vancouver!" with a tagline of "An online open house to plant the seeds for the future of Vancouver's urban forest".

For the noon session, a total of 17 members from the community attended in addition to 9 City staff. The evening session had a total of 21 community members participated along with six City staff.

Participating community members listened in via Zoom Meeting to hear about the purpose of the project, the importance of urban forest management planning, the project scope and timeline, initial findings, and opportunities for continued engagement. During the presentation, participants were asked via Zoom Poll

"What would you like to learn or discuss today?"

day?"

☐ The UFMP project

☐ The Citywide urban forest

☐ The City's Urban Forestry Program

☐ Tree preservation related

☐ Tree plantings and events☐ A specific tree question

Just here to listen

□ Other

Poll #2
"Where would
you like to see
more trees
planted in the
City?"

☐ In public parks

□ Along our streetscapes

☐ In development projects

☐ Commercial areas and parking lots

☐ Along creeks and waterbodies

☐ On school grounds

□ As part of stormwater projects

☐ Areas to address urban heat & climate change

 $\hfill \square$ Areas with low tree canopy cover

☐ An area not listed here

☐ Not applicable, no more trees

Figure 56. Poll questions asked during the noon and evening public meeting on January 25, 2023

about the topics or information they wanted to learn about as well as where they view tree plantings should be a priority. The second half of the meeting was available for open discussion where questions were asked about the urban forest, the Urban Forestry Program, or the planning project. Input and feedback received from the two sessions held on January 25 were documented, summarized, and reviewed to determine if and how the subject matter would be incorporated into the Plan.

Closing Remarks

Learn and Provide Input!

Website

www.beheardvancouver.org/UFMP

Survey

https://forms.gle/8nJvzdLSqyB9MnzRA

Informational Video

https://youtu.be/sFF8H7yFi4s

Public Meeting #2

March 18, 10-noon @ MLK Elementary (4801 Idaho St, Vancouver, WA 98661)

Questions/Comments

Charles Ray, Urban Forester

Charles.Ray@cityofvancouver.us

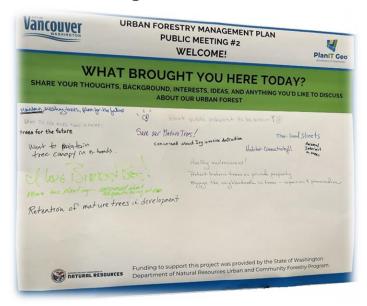




Figure 57. The first public meeting to raise awareness and encourage participation

19

Public Meeting #2



The second public meeting was held in-person on Saturday, March 18, 2023 at the Martin Luther King Elementary School. The "Let's Talk Trees, Vancouver!" event was held from 10 AM to 12 PM and the meeting began with updates on the progress of the Plan, key findings and highlights, and the Plan's draft goals and strategies. Interactive exercises were held as the primary means to gather input about the key challenges facing the urban forest and the Plan's goals and strategies that can these challenges.

A total of 15 community members, Urban Forestry Program staff, Urban Forestry Commissioners, and the urban forestry planning consultants attended the event. The project team assisted the public in

participating in seven unique and interactive table sessions. The sessions and a summary of the feedback received are provided below:

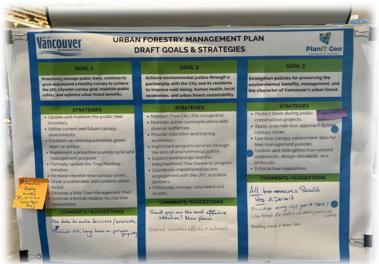
Table 29. Summary of the feedback received during the public meeting table sessions

	<u>I able 29. Sumn</u>	nary of the teed	back received (during the publ	ic meeting table	esessions	
	A) Welcome Board: "What Brought You Here Today?"	B) Most Important Tree Benefits	C) Issues Caused by Public Trees	D) Challenges Facing the Urban Forest	E) Priorities for Tree Preservation & Planting	F) Revitalizing the Vision for the Urban Forest	G) Input on the Draft Goals & Strategies
	Maintain trees	#1 Supports wildlife	#1 Lack of maintenance	#1 Canopy inequity	#1 Development	A cool city	Data-driven decisions
	Plan for the future	#2 Mitigates climate change	#2 Sidewalk / utility conflicts	#1 Development impacts	#2 Trail & transportation corridors	Dense, lush, green	Protect old trees
	Support more tree plantings	#3 Improves water quality	#2 Aphid honeydew	#2 Pests, diseases, invasives	#2 Public parks & open space	A core city value	Alternative funding sources
	Support wildlife	#4 Improves air quality	#2 Costs for tree care	#2 Limited resources	#3 Private residential	Adequate funding	Small group education
	Protect old trees	#4 Improves human health	#3 Conflicts with design (e.g., solar)	#3 Climate change impacts	#3 Campuses & institutions	Laws saving trees	More volunteer events
	Manage invasives	#5 Provides shade, save energy	Other: English ivy, emerald ash	#4 Poor pruning practices	#3 Commercial & industrial	Venerable older growth protected	More tree permits
	Show support	#5 Improves walking routes	borer, limited space, sourcing trees,	#5 Lack of species diversity	#4 Public streets	Equal access, improved well-being	Post-planting care (water, mulch, prune)
	Identify engagement opportunities	#5 Enhances beauty in the city	succession planting	#6 Storms and extreme weather	<u>Other</u> : Parking lots	Educate youth	Prioritize saving old growth trees

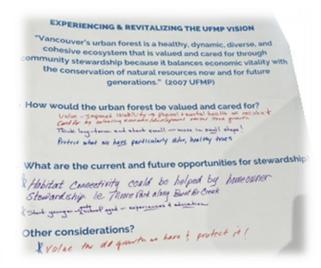
Figure 58. Photos from the public meeting table sessions













These engagement sessions provided the community with an opportunity to learn about the urban forest and to provide input and feedback on the development of the Urban Forestry Management Plan to support a shared vision.

PLAN OUTREACH AND ENGAGEMENT STRATEGY

The City of Vancouver and its Urban Forestry Program actively engage with the community through website content, social media messaging, press releases and news articles, and by extending outreach through community partners' networks. The following strategy is provided for the Urban Forestry Program to review and adapt community engagement efforts to support the implementation of the Urban Forestry Management Plan.

There are multiple ways to engage the public to improve the care of and expanse of local tree canopy. First, topics or messages must be defined, prioritized, and limited in number. More effective communication occurs through choosing a few strong messages and repeating them over and over. After messages are chosen, avenues of targeted communication to deliver those messages can be determined and implemented. Important topics and messages that should be considered for Vancouver are as follows:

- Current Canopy Extent and Value of Vancouver's Trees. The message should present the current canopy level and benefits the canopy provides. This is typically the first message to send out to the public, as all other messages should connect back to this one. This can also be a way to "roll out" the Urban Forestry Management Plan to the public. Include information such as why Vancouver needs tree canopy, what the current canopy level is, and the plans to improve the management of the trees that comprise the canopy. Educating local business owners on the impact that a shady commercial district can have on sales and educating property owners about the impact that trees have on property values are other useful methods for boosting the desire for increased canopy along main thoroughfares and neighborhood streets while also engaging the public. The important value of mature trees could be also highlighted, as people often do not realize that the large tree they have is a value to their property, the community, wildlife, and the environment.
- * How You Can Get Involved. What are the next steps you want people to take? The City should decide the answer and insert this "ask" in every outreach piece or effort. The City should continue organizing tree giveaways (usually saplings) at Arbor Day and related events for people to plant on private property. The City should also continue to support the Urban Forestry Program's Witness Tree and the adopt-a-tree program whereby residents sign up to receive and plant a tree in memoriam or to commemorate special occasions. Another opportunity for getting the community involved is to increase awareness of the City's Heritage Tree program where residents are encouraged to find and nominate the largest or otherwise significant trees in the city. Lastly, citizens can donate funds or volunteer at a tree planting event.
- Tree Threats. Public and private trees can die, decline, or become safety risks as a result of insect and disease infestation as well as inadequate maintenance. With education, the residents of Vancouver can become aware of the common threats to the tree canopy and what they can do to help. The City should provide education on existing tree pest and disease concerns and what the City is doing about these threats on public land, and options for management on their own land. Since the majority of the trees that comprise the city's urban tree canopy are on private property, it is vital for the City to educate the public on how to detect insect and disease threats, provide information about management and treatment options, and relay the importance of reforestation in the event trees are removed. Informing residents about tree removals and other significant tree work is essential for maintaining the City's relationship with the community. When an established public tree has to be removed, the City should continue its current practice of notifying abutting or adjacent property owners of the necessary removal.
- General Tree Care Education for Property Owners. There are several actions people take that are detrimental to trees at all stages of life, including improper mulching and pruning. Easy tips and tidbits of information to share with residents for trees on their own properties can help improve tree maintenance and increase tree health and survival rates. Some examples include:

- Demonstrate how to properly mulch a tree. Too often mulch is placed around tree trunks in a "mulch volcano", which is extremely detrimental to the tree. A simple message of how to mulch properly can improve tree health and longevity.
- Provide guidance on how and when to prune trees. Incorrect pruning can lead to poor tree structure or wounds that may never seal.
- Explain proper tree planting and tree care techniques. This could be especially helpful for homeowners who are considering planting a tree in their yard but are unsure where to start.
- Encourage recycling or composting leaves on-site.

Use Multiple Avenues of Communication

There are numerous avenues to convey urban forestry messages and accomplishments of the program to the residents, such as:

- Social Media. Social media sites such as Facebook, Instagram, and Twitter can create buzz and promote involvement in the current urban forestry activities occurring locally. To reach even more people, the City should consider coordinating with allied community gardens, non-profits, educational institutions, and business to get messages posted on their social media sites as well.
- ❖ Website. The City of Vancouver's Urban Forestry webpage contains important information about the urban forestry program, including details about tree planting, programs and upcoming events, urban forestry best practices, tree regulations, among other things. The website should be maintained regularly to make sure information is up to date. The project website for the Urban Forestry Management Plan (BeHeardVancouver.org/UFMP) can also be maintained going forward to continue outreach and education.
- * Presentations to City leadership and local business and neighborhood groups. Identify key audiences, partners, and potential champions for the urban forestry program. Making short presentations at regular or special meetings where they are relieves individuals from having to go to yet another meeting in the evenings. Initial outreach could be based on letting the audience know about Vancouver's urban forest and the work called for in this Plan. Be sure to have an "ask" at the end of the presentation. What do you want them to do next? This work often unearths new partners and funding sources that can otherwise go untapped.
- ❖ Do a survey. Once a year, create a short online survey to identify what urban forestry issues people in Vancouver are concerned or care about. The survey can also be used to gauge people's reactions to new urban forest management procedures and regulations, and their willingness to participate in volunteer work or to donate funds or other resources. Questions about public trees and tree canopy can be part of the annual public survey.
- Cultivate partnerships for communication. Partnerships can be initiated with organizations that can help promote, enhance, and preserve Vancouver's urban forest. Organizations can include local businesses, local utilities, regional non-profits, homeowner associations, neighborhood associations, and schools and other educational institutions. Other audiences to engage can include youth groups, landscape architect firms, faith-based groups, and nurseries and landscape contractors. Actions that can be taken by each partner should be defined before approaching them for support.
- Encourage Clark College to continue achieving Tree Campus USA status. This distinction and legacy supports Vancouver's urban forest. One standard the College needs to achieve annually is for students to participate in one or more Service Learning Projects. These projects are intended to provide an opportunity to engage the student population with trees. College students could help the City's Urban Forestry Program perform many tasks, such as tree planting, tree care, and public outreach.
- Continue to create and publish the Annual Urban Forestry Report and Work Plan. This annual report or state of the urban forest should continue to provide highlights from the

previous year and the Work Plan should continue to provide goals and actions for the upcoming year. These actions should reflect the goals and strategies in the Urban Forestry Management Plan and the monitoring plan section can be utilized to support the reporting and work plans. The reports should include updated tree inventory data, tree planting statistics, key performance indicators and metrics, status of achieving canopy goals and actions in the Plan, and other program information. It should provide information on the number and condition of public trees, as well as maintenance, planting, and management accomplishments. It should also present a summary of the current year's annual work plan and identify emerging issues and budget or resource needs.

- Add signage to the landscape. Signs placed in high traffic areas can spark interest in trees and the urban forest. Something as simple as species name or a notable fact about a tree can encourage people to learn more and to get more involved.
- Create Story Maps. The story about Vancouver's urban forest, the programs that manage it, and the community that shapes and benefits from it can be told through maps that illuminate and contextualize the story. Maps are the visual representation of where events happen. As such, maps and stories complement each other, and story maps serve as an integrated presentation. Story maps use geography as a means of organizing and presenting information. They tell the story of a place, event, issue, trend, or pattern in a geographic context. They combine interactive maps with other rich content—text, photos, illustrations, video, and audio—within intuitive user experiences. Content may include the Urban Tree Canopy Assessment, the tree inventory, programs and events, and content from the Urban Forestry Management Plan such as tree canopy goals, ecosystem benefits, and the urban forest vision, goals, objectives, and strategies.

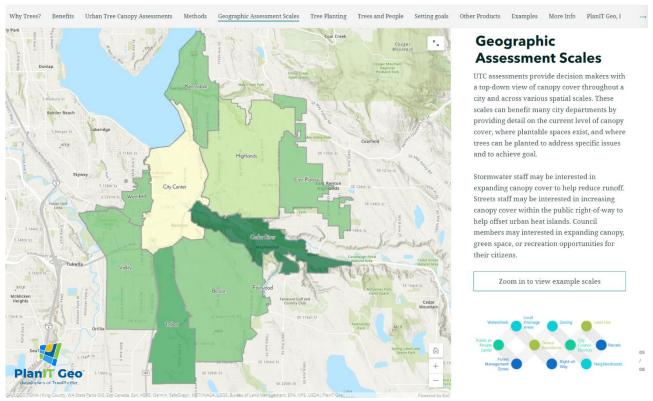


Figure 59. Story maps can visualize urban forest stories, maps, and data for the public

Neighborhood Tree Stewards

The City should continue to support the Neighborhood Tree Stewards program which provides free education from local arboriculture experts on tree identification, tree biology, proper tree care, Vancouver tree regulations, tree planting, natural area restoration, nursery tree production, and the benefits of trees. After the training, the Tree Stewards are equipped to take on the task of spreading accurate information about trees to their own neighborhoods. Tree Stewards volunteer to conduct a tree planting or tree-related education project in exchange for the training and education they receive. The Urban Forestry staff offer guidance and assistance throughout a project. Neighborhood Tree Stewards is coordinated by the Urban Forestry Program and supported by Friends of Trees, AKS Engineering, Watershed Alliance of Southwest Washington, and the City of Vancouver.

The program should continue serving as a volunteer opportunity for community residents to assist with new tree planting and new tree care such as watering, mulching, and pruning. The young tree care volunteers are specially trained to care for young trees and to serve as advocates and educators within their networks. As such, this type of program involves initial and continuing training, frequent mentoring, and overall coordination of the process and volunteers. It also provides yet another engagement opportunity and encourages partnership opportunities with a variety of groups, such as neighborhood associations, master gardeners, scout troops, church affiliated groups, youth groups, high school community service programs, and others to accomplish new and young tree care tasks.

The City should explore ways in which the program can expand to provide the essential care that newly planted trees need. Trees to include in a "Young Tree Care" program are generally less than six inches in diameter. These younger trees sometimes have branch structures that can lead to potential problems as the tree ages, such as codominant leaders, multiple limbs attaching at the same point on the trunk or crossing/interfering limbs. If these problems are not corrected, they may worsen as the tree grows, which increases risk and creates potential liability. With direction from City staff, young tree care volunteers could be trained to carry out the young tree training program. Beyond pruning, young trees need watering and mulching to become established, and may require fertilization and other Plant Health Care (PHC) treatments until they reach maturity. This program in Vancouver is already leading the region in community tree stewardship though the Urban Forestry Program and Friends of Trees should regularly evaluate and meet with other community stewardship programs like the Tacoma Tree Foundation.

The tree stewards could also be used to support the urban forest management program in other ways. Volunteers could develop and/or staff Arbor Day and Earth Day events, post and manage tree messages on social media, help update the inventory, and/or locate planting sites in neighborhoods.

Explore Partnerships

Establish partnerships to fund and accomplish the young tree training program and some mature tree care activities. For instance, the utility companies may support tree growth regulator applications for trees under their lines; businesses or developers may pay into a fund to "adopt" or maintain trees in parks, commercial areas, and newly built streets; residents may help water mature street trees during times of drought.

The City should continue to maintain and strengthen partnerships with agencies and organizations that provide technical service and grant opportunities. For example, the WA Department of Natural Resources Urban and Community Forestry Program provides Community Forestry Assistance Grants, Clark County has the Urban Tree Canopy Restoration Project, and Washington State University Extension Forestry offers technical support. These partners among many other local, regional, and national partners can support Vancouver in implementing the Urban Forestry Management Plan.

Public Education



Public education is one of the true keys to reaching the goals of an urban forestry program. Only by educating the public, City officials, developers, and contractors working within city limits will the City be able to achieve urban forest protection and planting goals. Ordinances and guidelines alone will not guarantee success since builders, contractors, and others often have their own priorities and agendas, and trees and ordinances are sometimes viewed as a nuisance with no incentives for tree planting, protection, and preservation.

Cooperation from all concerned parties can be improved by requesting various community stakeholders, such as City Council members and neighborhood groups, to attend educational sessions to learn about the current state of Vancouver's urban forest, plans for urban forest management and planting, and the importance to the future of the community.

To gain support for Vancouver's Urban Forestry Program, various public outreach campaigns aimed at educating the residents of Vancouver should be established. Where there is understanding and acceptance of the Urban Forestry Program as a whole, there will be increased support for the planting portion of the program. Based on examples of public relations efforts by urban foresters in other communities, the following types of activities are suggested for the City to undertake, adopt, or adapt current efforts:

- Hold a seminar or public meeting to discuss the tree inventory project, its results, and its importance for the city.
- Develop monthly evening or weekend seminars related to tree care and landscaping; bring in guest experts from various disciplines in the green industry.
- Write a monthly "Tree Talk" article for local newspapers or social media.
- Develop a Tree Care door hanger brochure to go to each residence where new trees are planted; educating residents about proper tree care could help eliminate trunk damage and improper mulching and pruning of new trees.
- The City should continue giving away tree seedlings to interested community members. This is a great offer and a way to spread the word about trees. Vancouver could capitalize on the idea and attach the same Tree Care door hanger brochure or a different informational brochure to each of these trees.
- Co-host tree planting programs with the local garden club, local non-profits, or groups.
- * Map the locations of fruit-bearing trees in the city and coordinate with groups that harvest the fruit for homeless and food insecure organizations.
- ❖ Embrace story telling within the urban treescape. Connect the trees to the history of the area through complementary art, placards, or signage. Consider establishing tree walks that highlight some of Vancouver's greatest tree specimens and provides tree identification training. Regularly update the Witness Tree and Heritage Tree records, maps, and information.
- Encourage citizen science activities that involve the urban forest. For example, the Nature

- Conservancy's "Healthy Trees Healthy Cities" app can be used to monitor tree health and check trees for pests. Local professors and non-profit groups that work with citizen science may be able to help plan projects and recruit citizen scientists.
- * Expand the annual Arbor Day celebration to help it become an even greater community tradition. The Arbor Day celebration could be further developed as an all-day Saturday event, preferably held in a popular park/public space setting in the city. Expanding on programs about planting and pruning trees and including children's programs about trees can help increase public interest in the City's tree programs. Additionally, the City could invite contractors to conduct demonstrations on tree planting, trimming, landscaping, and species selection. Organizers could also set up booths with tree information. Refer to the National Arbor Day Foundation (ArborDay.org) for publications that provide great Arbor Day ideas to assist in planning of this event.

Supporting the Urban Forestry Commission

In addition to its regular duties, the Urban Forestry Program can support the Vancouver Urban Forestry Commission by providing updates on the progress of implementing the Urban Forestry Management Plan. Key findings and information from the Plan can be shared with the Commission to support their coordination of community outreach activities. In addition, the Plan's monitoring section provides key strategies and metrics that can be incorporated into the Urban Forestry Annual Report and the Urban Forestry Work Plans.

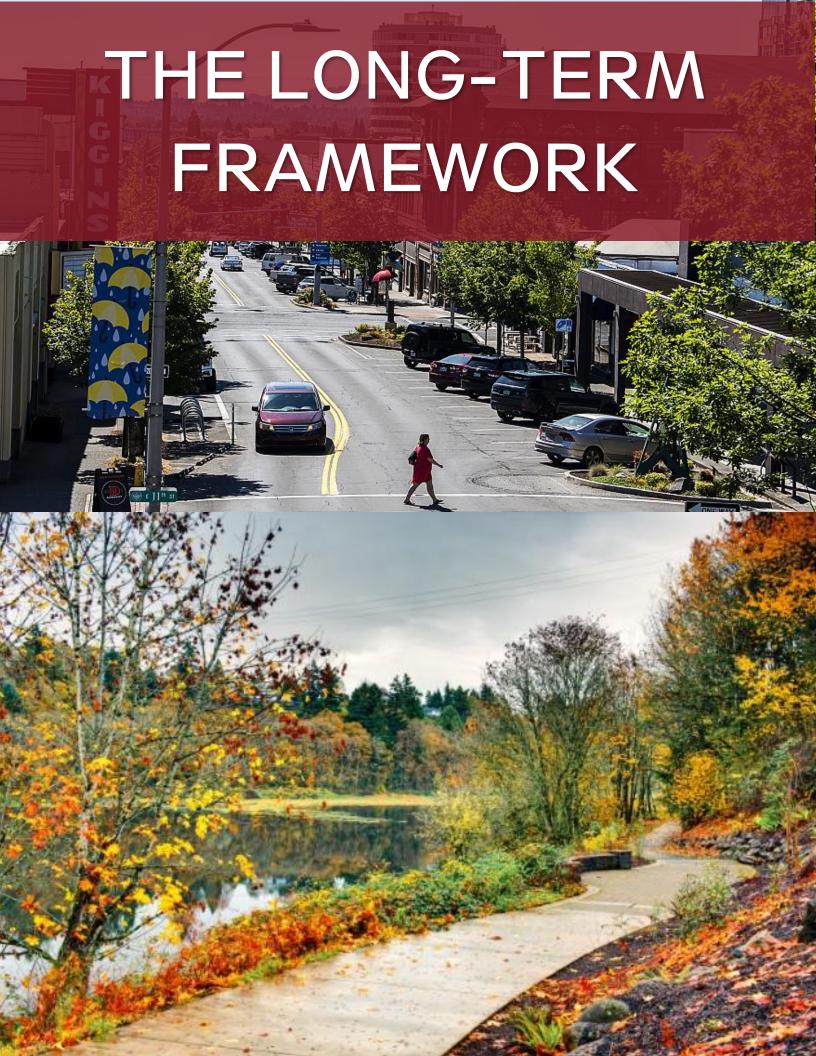
Environmental Justice

The equitable distribution of resources is a key driver of environmental justice. This Urban Forestry Management Plan aims to grow the urban forest and address the fact that existing canopy resources and associated benefits are unequally distributed. Urban tree canopy expansion and maintenance requires a financial investment on the part of the City, primarily from tax dollars. As a result, tree canopy coverage tends to be larger and more established in wealthier neighborhoods, and tree canopies are often less than ideal in communities that are economically disadvantaged. Along with funding, community support for the urban forest and this Plan are necessary to succeed. Communication should begin months before a tree planting starts and should build trust between the entity spearheading the tree plantings and the community the tree planting is taking place in. Connecting with trusted community leaders to introduce the idea of an expanded tree canopy, holding outreach events at an earlier stage in the plan, and taking local opinion into account when it comes to tree species selection can develop a partnership, rooted in trust, with the area's residents. But a big part of keeping that trust is staying consistent through action. Following up with these communities to hear and address any concerns while consistently maintaining the new plantings will help ensure a fully developed urban forest. The framework of the Urban Forestry Management Plan guarantees the presence of environmental justice principles in Vancouver's Urban Forestry Program.

The Tree Planting Initiative and citywide tree canopy cover goals will address community equity and environmental justice by identifying areas in most need of tree canopy cover, tree plantings, and urban forestry services such as a program to assist low income property owners with management of hazardous or invasive trees. And, as the City expands its network of partners, all populations within a neighborhood will be better represented.

Community Engagement Recommendations

Community outreach and engagement about the Plan begins with clear messaging and information gathered from the Urban Forestry Management Plan. To make a greater impact and to fully recognize all communities in Vancouver, it is recommended the City continue partnering with local non-profit community organizations with a mission that supports the urban forest. In addition to community partners, the Urban Forestry Commission adds capacity and creates more advocates for the Urban Forestry Program. Lastly, an expanding community of tree stewards that are trained in tree planting and post-planting care will increase Urban Forestry Program capacity and build support for long-lasting impacts.



THE LONG-TERM FRAMEWORK FOR URBAN FOREST MANAGEMENT



Trees are an integral part of the community and the ecological systems in which they exist. They provide significant economic, social, and ecological benefits, such as carbon sequestration, reduction of urban heat energy savings, islands, reduction of stormwater runoff, improvement of water quality, enhancement of human health and wellness, and increase the value of properties. Planting and maintaining trees help Vancouver become more sustainable and reduce the negative impacts on the ecosystem from urban development. Trees are as necessary as water, infrastructure, and energy to sustaining healthy communities. The health of the urban forest is directly linked to the health of the community.

Through research, staff interviews, data analyses, benchmarking research,

community engagement, and urban forest auditing, the City identified three specific goals with each having several objectives to accomplish each goal. The objectives were further divided into strategies. The Analysis of Vancouver's Urban Forest and the Management of Vancouver's Urban Forest sections provide the context, discussions, and recommendations that led to the development of the long-term framework— the goals, objectives, and strategies.

The Implementation Schedule in Appendix I breaks down the strategies into actions and tasks which are proposed to occur over a 25-year period with an emphasis on the first 10 years. Through this process, the Urban Forestry Management Plan can be followed each year to culminate into the vision for Vancouver's urban forest.

GOALS, OBJECTIVES, AND STRATEGIES



GOAL 1: Proactively manage public trees, continue to grow and expand a healthy canopy to achieve the 28% citywide canopy goal, maintain public safety, and optimize urban forest benefits.

Objective

1.1 Make data-driven management decisions.

Strategies

- 1.1A Update and maintain the public tree inventory.
- 1.1B Utilize current and future canopy assessments.
- 1.1C Stay current with industry research, tools, technology, and innovation.

Objective

1.2 Sustainably manage the public tree population.

Strategies

- 1.2A Align staffing levels with the needs of the urban forest and the community.
- 1.2B Establish and implement a proactive pruning cycle and management program for City-maintained trees.
- 1.2C Ensure newly planted trees receive postplanting care and young tree training maintenance.

Objective

1.3 Establish a strategy for increasing tree canopy cover through City and public efforts.

Strategies

- 1.3A Formally update the Tree Planting Initiative.
- 1.3B Increase citywide tree canopy cover.
- 1.3C Grow a sustainable and resilient urban forest.

Objective

1.4 Effectively manage tree risk.

Strategies

- 1.4A Develop a Risk Tree Management Plan.
- 1.4B Institute a formal rotation for risk tree inspections.

GOAL 2: Achieve environmental justice through a partnership with the City and its residents to improve well-being, human health, local economies, and urban forest sustainability.

Objective

2.1 Create an urban forestry public outreach program that addresses all communities.

Strategies

- 2.1A Maintain Tree City USA recognition.
- 2.1B Maintain active communications with diverse audiences.
- 2.1C Provide education and training workshops.
- 2.1D Implement program services through the lens of environmental justice.

Objective

2.2 Increase capacity through trained citizens and community partners.

Strategies

- 2.2A Expand partnerships and the Neighborhood Tree Stewards program.
- 2.2B Coordinate Plan implementation and community engagement with the Urban Forestry Commission and local partners.
- 2.2C Effectively manage volunteers and events.





GOAL 3: Strengthen policies for preserving the environmental benefits, management, and the character of Vancouver's urban forest.

Objective

3.1 Strengthen policies for protecting the urban forest.

Strategies

- 3.1A Protect trees during construction projects.
- 3.1B Apply a no-net-loss approach to tree canopy cover.
- 3.1C Use tree canopy assessment data for tree management policies.
- 3.1D Update and strengthen tree-related ordinances, design standards, and protocols.

Objective

3.2 Improve workflows and operations for sustainable urban forest management.

Strategies

3.2A Enforce tree regulations.

KEY STRATEGIES

The planning process identified 23 strategies following development of the program goals and objectives. This rich number of strategies will position Vancouver as a leader in urban forestry across the state and perhaps the nation and will guide the City towards a sustainable urban forest. There were five significant strategies identified as being of higher priority than others. These were predicated upon resolving public safety issues, inefficiencies, community engagement, policy gaps, and urban forest sustainability.

Key Strategies

Proactive maintenance program
The Tree Planting Initiative
Tree Stewards Program
No-net-loss, 28% canopy
Enforce tree regulations

Proactive Public Tree Maintenance Program

One of the more critical strategies identified was the need for an improved public tree pruning program on a routine cycle. The strategies focus on the public trees for which the City is responsible to maintain though it also includes recommendations to explore additional responsibility for maintaining public street trees in the long-term. Additional public tree maintenance requires an increase in funding and

more staff and resources. Feedback from the community and City staff expressed support for the structure of this strategy.

Tree Planting Initiative

To grow an urban forest that is sustainable and resilient to climate change, pests and diseases, and urban development pressures, a strategic planting initiative guided by short- and long-term canopy goals and planting targets is needed. The Plan contains the guidance for finalizing citywide and localized canopy goals, identifying priority planting areas, planting targets (i.e., tree numbers), and developing the tree planting initiative.

Tree Stewards Program

A shared commitment to the urban forest and vision is essential to the long-term success and impact of the Plan. A community of tree stewards will increase Urban Forestry Program capacity and support the Tree Planting Initiative along with other programs and services. The Plan provides the guidance to strengthen and expand community partnerships and tree stewards.

No-Net-Loss

Perhaps more important than tree canopy cover goals and planting initiatives is the foundation of sound policies to preserve the existing urban forest. With this key strategy, tree replacement, retention, removal, mitigation, and enforcement protocols are solidified along with incentives for developers to protect, preserve, and plant trees. In addition, alternative solutions to tree and sidewalk conflicts are explored and guidance for formally adopting a decision checklist and solutions toolkit is provided.

Enforce Tree Regulations

Throughout the planning effort, concerns were expressed and identified relating to the protection of trees from construction damage, illegal removals, and maintenance malpractice. The actions supporting this strategy expand the enforcement efforts by increasing capacity as well as community education to prevent instances from occurring in the first place.

ACTION INTERVALS

Table 30. Action intervals

Short-term (0-5 years)

Action 1.1A.1 Utilize an asset management program to collect and manage public tree inventory data and regularly update the inventory. Begin by completing the parks inventory and start a street tree inventory.

Action 1.1B.1 Update policies and design guidelines to preserve existing tree canopy cover (see Goal 3).

Action 1.2A.1 Identify and finalize members for an interdepartmental green team or similar and establish meeting intervals and team objectives.

Action 1.2B.3 Continue the 7-year pruning cycle for Park sites and include all public facilities such as cemeteries, stormwater facilities, community centers, and police and fire stations to address equity and climate resilience.

Action 1.2b.4 Build off successes of the City's Park Pruning cycle to develop a proactive street tree maintenance program on a 7-10 -year cycle like other communities to address equity and climate resilience by working with adjacent property owners.

Action 1.2C.1 Establish maintenance plans for new plantings.

Action 1.2C.4 Acquire commitments from the local community and property owners to water new trees.

Action 1.2C.6 Develop a summer green workforce tree care program to include watering, mulching, and pruning new trees through the establishment period to sustain a high survival rate for trees planted. See Appendix H of the Technical Report for considerations.

Action 1.3A.1 Finalize tree canopy goals (short- and long-term) and priority planting areas and themes such as areas that score 8 or above on the WA Health Disparities Map and/or areas experiencing severe urban heat island effects.

Action 1.3A.2 Establish a citywide tree planting plan with strategies.

Action 1.3C.7 Plan for and manage Emerald Ash Borer which was identified in Oregon in June 2022.

Action 1.3C.8 Strengthen storm and disaster preparations, communications, mitigation, and recovery strategies, protocols, and mechanisms.

Action 1.3C.9 Complete the WA Urban Forest Pest Readiness Playbook Assessment to identify current and future management strategies.

Action 1.3C.10 Develop and implement a tree assistance program to address hazardous and invasive trees on public and private property.

Action 1.3C.11 Develop a working group to address English ivy on public and private property, develop a plan, and begin implementation.

Action 1.4A.1 Develop a scope and secure funding to complete a Risk Tree Management Plan for public trees.

Action 2.1B.1 Finalize a robust Community Outreach Strategy and a communications plan to garner support, spur behavior change, and increase participation from the community. Increase outreach and marketing for improving and expanding tree canopy for the public good by utilizing a designed marketing campaign by professional firms to seek public behavior change.

Action 2.1B.2 Aligned with the Community Outreach Strategy, develop direct outreach and education programs informing the community on the value of trees, and roles and responsibilities, to under-represented communities; property renters, non-English speaking, and others.

Action 2.1C.1 Use the Outreach Strategy (Action 2.1B.1) to finalize topics, audiences, approach.

Action 2.1C.2 Identify existing resources and tools for workshops.

Action 2.1C.3 Establish and maintain partnerships with community-based organizations that are inclusive of the diverse demographics of the city.

Action 2.1D.1 Use the Outreach Strategy (Action 2.1B.1) to identify local community groups and partners that represent all neighborhoods.

Action 2.1D.2 Identify low canopy neighborhoods for targeted engagement.

Action 2.2B.1 Identify actions in the Plan where the Urban Forestry Commission can lead or support implementation.

Action 2.2C.1 Identify needs and interests from multiple departments.

Action 2.2C.2 Work with community partners and City volunteer coordinators to strengthen the Outreach Strategy (Action 2.1B.1).

Action 2.2C.3 Identify roles for past Urban Forestry Commissioners and Neighborhood Tree Stewards to keep them engaged.

Action 3.1B.1 Explore a fee-in-lieu of payment for the value of any trees removed from the development site and not planted back into the landscape. Consider fee schedules based on the type of project, the number of trees, the size of trees, Heritage Trees, among other considerations.

Action 3.1C.2 Update policies, regulations, standards, and plans to include the long-term and intermediate citywide and local canopy goals.

Action 3.1D.1 Evaluate city codes in an effort to increase tree preservation and create space for existing trees during the development process as well as space for new larger stature trees to be planted both on private property and within the public right-of-way.

Action 3.1D.2 Establish requirements for minimum soil volumes for new tree planting that align with industry standards and best practices.

Action 3.1D.3 Explore opportunities to update City standards such as the Transportation Standards to increase growing space that supports large-canopied trees.

Action 3.1D.6 Codify TreeCAP Program as part of new development instead of a voluntary program to ensure all new development is fulfilling their role in urban forest management.

Action 3.1D.7 Require Silver Leaf achievement in the City's TreeCAP program, which sets a goal of 15% tree canopy cover for commercial development and 33% tree canopy cover for single-family residential development.

Action 3.1D.11 Identify public areas and plant climate resilient trees where they can be integrated into stormwater management systems.

Action 3.2A.2 Explore requiring a landscape bond or escrow for new tree planting as part of development or inspecting all new development prior to occupancy and 3 years later to ensure new trees survived the establishment period and require replanting as needed.

Action 3.2A.8 Update the process for development and final acceptance of new development projects to require Urban Forestry to complete a final inspection to ensure all projects are implemented as designed regarding tree requirements and quality tree species.

Mid-term (6-10 years)

Action 1.1A.2 Complete the comprehensive street tree inventory and actively manage the data as changes occur.

Action 1.1B.2 Secure funding, prepare a scope of work, and complete an updated tree canopy assessment.

Action 1.1B.3 Refine canopy goals and planting priorities as necessary.

Action 1.2A.4 Evaluate staffing needs and submit budget requests for additional staff when service demands and the needs of the urban forest exceed capacity.

Action 1.2B.1 Optimize management of the city's street (right-of-way) trees to increase carbon sequestration, resilience to extreme events, support overburdened communities and consistent with anti-displacement best practices and ensuring equitable distribution of benefits, risk and resilience.

Action 1.2B.2 Optimize management of the city's natural lands to increase carbon sequestration and support resilience to extreme events, consistent with anti-displacement best practices and ensuring equitable distribution of risk and resilience.

Action 1.2B.5 Evaluate proactive maintenance programs for public facilities and street trees.

Action 1.2B.6 Evaluate the effectiveness of contract crews and explore the feasibility of developing an inhouse tree crew rather than relying heavily on contract crews. Consider the insurance implications and identify the threshold when it would be more economical to have an in-house tree crew.

Action 1.3A.3 Identify additional local community partners for planting, maintenance, and funding support.

Action 1.3B.4 Identify additional opportunities beyond services city is currently providing for preserving and expanding tree canopy on private and city property to ensure equitable distribution of urban forest benefits to all Vancouver residents.

Action 1.3C.1 Monitor and analyze the inventory to inform tree species selection for new plantings and update the Approved Tree List as needed.

Action 1.3C.12 Continue implementing English ivy management with community support on public and private property.

Action 1.4B.1 Update public tree inventory and monitoring protocols based on the Risk Tree Management Plan.

Action 2.1A.2 Retain the consecutive recognition as a Tree City USA city and strive for continual receival of the Growth Award and Sterling Tree City USA from the Arbor Day Foundation.

Action 2.1A.3 Seek additional accreditation beyond Tree City USA such as Evergreen Community and American Public Works accreditation.

Action 2.2A.1 Expand the partnership with the local non-profit organization, Friends of Trees, to plant more trees on private property especially once barriers for overburdened communities have been removed such as a program for removing hazard and or invasive trees.

Action 3.1C.1 Evaluate causes for canopy loss and gain from the 2021 assessment and future assessments to inform updates to policies and regulations.

Action 3.1D.4 Revisit Open Space District design standards to reduce and or limit high maintenance turf area to increase possible planting area within the Open Space District and to maximize ecosystem services while still providing active play areas.

Action 3.1D.5 Identify street corridors where roadway widths can be reduced and remove pavement and plant trees and landscape that reduce reflected heat, remove impervious area, reduce future repaving needs, and provide traffic calming elements.

Action 3.1D.8 Explore the feasibility of incentivizing Gold Leaf achievement in the City's TreeCAP program, which sets a goal of at least 17% tree canopy cover for commercial development and at least 35% tree canopy cover for single-family residential development.

Action 3.1D.9 In support of the City's goal to reach 28% canopy cover by 2047, incentivize long-lived, large form, drought-tolerant, climate-resilient native plantings and retention of the mature canopy in existing and new developments.

Action 3.1.D.12 Encourage the use of vegetated and treed rooftop and vertical spaces to reduce the urban heat island as part of new development especially in the downtown core.

Action 3.2A.4 Increase costs for street tree permits to align with the costs for administration and the needs of the urban forest.

Action 3.2A.6 Update the Street Tree Manual based on changes to City tree regulations, standards, and protocols.

Long-term (11-25 years)

Action 1.1A.5 Develop incremental goals for street tree stocking levels after completing the street tree inventory.

Action 1.2A.5 Explore the development of an Urban Wood Reuse Program.

Action 1.2B.7 Focus on streamlining proactive tree maintenance and strive for a 7-year cycle for public facilities and street trees. Explore the feasibility of updating codes to transition from the adjacent property owner being responsible for street tree maintenance.

Action 1.2B.8 Develop in-house tree crews and rely on contractors for special projects and to supplement staff if or when the City identifies a practical need.

Action 1.3C.4 The City should retain remnant parcels as carbon sinks by planting with native conifers or climate adaptive conifers.

Action 1.3C.5 Purchase parcels citywide to increase carbon sequestration and support resilience to extreme events, consistent with anti-displacement best practices and ensuring equitable distribution of risk and resilience.

Action 1.3C.6 The City should acquire more parcels as part of the Open Space District for public use and to be used as carbon sinks to address climate, health, and equity.

Action 1.3C.13 Continue to work towards eradication of English ivy from tree canopies and from the landscape on both public and private property.

Action 1.3C.14 Collaborate with local tree nurseries to explore opportunities for expanding tree species options.

Action 3.1D.10 Strengthen and enforce code to protect critical areas such as contiguous forest areas, fish and wildlife habitats, frequently flooded areas, geologically hazardous areas, and special ecosystems.

Ongoing

Action 1.1A.3 Analyze the public tree inventory data regularly to report on ecosystem services and benefits and to identify inequitable areas.

Action 1.1A.4 Monitor and assess the public tree population for risk and tree pests/diseases.

Action 1.1C.1 Attend training events, maintain understanding of industry research and innovation, and effectively implement data management solutions to their full potential.

Action 1.2A.2 The interdepartmental green team should meet regularly to address workflows, communications, and information sharing.

Action 1.2A.3 Tree managing staff should engage in City department planning such as updates to the Comprehensive Plan and Climate Action Framework.

Action 1.2C.2 Plant trees using the right tree, right place approach.

Action 1.2C.3 Educate the public and gather local community input on public tree plantings.

Action 1.2C.5 Utilize local partners and existing programs for the care of young public trees.

Action 1.3A.4 Continue to partner with Parks and Schools to replant trees and reduce unnecessary turf areas.

Action 1.3B.1 Plant trees to support an equitable expansion of the canopy with a focus on areas with low urban tree canopy, high susceptibility to urban heat island effects, areas of poor air quality, and areas with higher percentages of low-income people and communities of color.

Action 1.3B.2 Replant climate-resilient trees where public trees were removed as appropriate.

Action 1.3B.3 Retain and preserve existing tree canopy through education, outreach, design review, and inspections to ensure low-income populations and overburdened communities understand and receive the benefits trees provide.

Action 1.3C.2 In support of the City's goal to reach 28% canopy cover by 2047, require long-lived, large form, drought-tolerant, climate-resilient native plantings (as feasible) in parks and other public properties to maximize carbon sequestration.

Action 1.3C.3 Mimic natural design or sustainable landscape design in new public development projects.

Action 1.3C.15 Continue to support and budget for professional training and certifications.

Action 1.4B.2 Apply industry standards and best practices and implement the Risk Tree Management Plan.

Action 2.1A.1 Maintain accurate records and conduct Arbor Day Celebrations to continue to receive the Tree City USA status from the Arbor Day Foundation.

Action 2.1B.3 Aligned with the Community Outreach Strategy, update the City's website with information in the Plan and share information regularly with the public through other mediums.

Action 2.1B.4 Aligned with the Community Outreach Strategy, gather public input and feedback regularly to inform future messaging, programs, and events.

Action 2.1C.4 Support youth education of environmental topics, engage schools with Arbor Day events.

Action 2.1C.5 Lead or support at least one training or education material annually.

Action 2.1D.3 Develop strategies to remove barriers to participation for all community members. Examples of barriers include ADA communications compliance, internet access, childcare, languages, and transportation needs.

Action 2.2B.2 Continue to coordinate with the Urban Forestry Commission on the development of annual reports and work plans aligned with the Plan's long-term framework and monitoring protocols.

Action 2.2C.4 Continue to support and expand programs such as the Heritage Tree and Witness Tree programs to sustain the urban forest and recognize exemplary urban forest stewards and volunteers.

Action 3.1A.1 Continue to review tree and hardscape conflicts and integrate alternative solutions that preserve trees where feasible.

Action 3.1A.3 Continue to perform construction project inspections to ensure proper tree protection requirements are implemented and maintained.

Action 3.2A.1 Inspect final landscape installation to ensure development projects are implemented as designed to meet code and contribute to environment.

Action 3.2A.3 Capture trees that are not planted as part of the VMC 20.925 and VMC 12.04 due to site constraints.

Action 3.2A.5 Continue to require the use of industry standards and best practices for the maintenance of public trees and encourage / educate the public to conduct similar practices on private trees.

Action 3.2A.7 Continue to administer and review tree permits.

EVALUATION

MONITORING PLAN

This Urban Forestry Management Plan will be updated and revised periodically to reflect changes in the urban forest resource structure and function, to incorporate changes in industry standards, to consider community response, and to measure the progress of the urban forest partners in implementing the recommendations and reaching the established goals. This process should be implemented by the Urban Forestry Program, supported by the Urban Forestry Commission, and possibly a subcommittee such as an Urban Forestry Working Group. The implementation and monitoring strategies follow the Evaluate, Monitor, Report, and Revise methodology.

Knowing how the City of Vancouver and its partners are doing will require a continual process of evaluation. This section presents examples of how to monitor, analyze, and revise the Plan, which will keep stakeholders informed of the status of the Urban Forest Program. To monitor progress toward implementing the Plan recommendations, an evaluation similar to the U.S. Forest Service's Urban Forest Audit conducted to develop the initial Plan should be completed. This evaluation will identify progress and shortfalls compared to the baseline audit.

In addition, the annual report should continue to be developed and it is recommended the report adopt the Urban Forest Audit framework and this monitoring plan's protocols. This will measure the progress toward implementing the Plan's strategies and actions. The following example provides a suggested reporting structure to measure success toward accomplishing each goal. Other indicators to measure progress may need to be developed to ensure a thorough and accurate evaluation.

Evaluate

The U.S. Forest Service's Urban Forest Audit System provides a framework for routine evaluations of the urban forest, the programs that manage it, and the community that shapes and benefits from it. The deliverables to this Urban Forestry Management Plan project include guidance for completing the audit. It is recommended the Plan implementation team (Urban Forestry, Commission, and possible subcommittee) complete a bi-annual audit to inform any alterations to actions and strategies.

This audit system consists of 11 categories of urban forest management, sustainability, and community. Within the 11 categories are approximately 130 elements. Each element was ranked or scored based on the consultants' evaluations in 2022 for the Urban Forestry Management Plan. The City Collaborative Team (or similar) should complete an update to this ranking bi-annually to inform Plan reporting, monitoring, and revision as described in the following sections.

Monitor

Measuring accomplishment of the actions will require ongoing analysis. The outcomes of the Urban Forest Audit System in the "Evaluate" section can be used to monitor change over time. These benchmark values should be tracked, and a state of the urban forest report should be prepared and distributed to the public every 2 to 5 years. Analysis may include an updated public tree inventory, i-Tree benefits analyses, or urban tree canopy assessments. The state of the urban forest report should include the benchmark values as reported in past reports as well as the benchmarks provided in the Plan and the Urban Forest Audit System as of 2022. This enables the City to measure and compare changes to the urban forest. The report should reflect changes to the audit system that are measured.

Vancouver's Urban Forest Benchmark Values

Table 31. Vancouver's urban forest benchmark values

Table 31. Vancouver's urban forest benchmark values	
URBAN TREE CANOPY (UTC) COVER (20)	19/2020)
Urban Tree Canopy (UTC)	18.9%
Recommended Canopy Goal (short-term)	19.9% by 2030
Recommended Canopy Goal (long-term)	28% by 2047
Total Number of Trees to Plant (short-term)	13,900 for 19.9% canopy by 2030
Total Number of Trees to Plant (long-term)	124,900 trees by 2047
City-led Plantings to Reach Canopy Goals (avg)	1,040 trees/year for 19.9% by 2030
(60% of total plantings)	3,000 trees/year for 28% by 2047
Public Tree Counts (2023)	
Total Public Trees Managed	99,000 (estimated): 50k street trees, 30k
	trees in maintained areas of parks, 19k
Other was a large at B. His Town Large at a deal	in other public spaces
City-maintained Public Trees Inventoried	1,888
Privately-maintained Public Street Trees Inventoried	
Tree Species Diversity (species excee	
Public Trees Partial Inventory (2022)	Douglas fir (16%)
Tree Benefits	
Citywide (UTC Assessment)	2021: \$44 million
Inventoried Public Trees (8,950 of 12,263 Trees)	2023: \$893,098 (annual)
Estimated Benefits of the Public Tree Population	2023: \$9,876,962 (99,000 trees)
Carbon Storage and Sequestration (2021 UTC)	2020: 25.3 million pounds sequestered
Tree and Budget Distribution (2022)	
Public Trees per Capita	0.52
Budget per Capita, Budget per Tree	\$6.50, \$12.88
Urban Forestry Program FTEs	4.00
Total Public Trees per Staff	20,000
MANAGEMENT ACTIVITIES (2021)	
Public Trees Pruned	609
Public Trees Removed	~50
Public Trees Removed Public Trees Planted	~50 1,311
Public Trees Removed	~50 1,311 255 street tree, 146 private, 237
Public Trees Removed Public Trees Planted Tree Permits	~50 1,311 255 street tree, 146 private, 237 development reviews
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL S	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78%
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL S Management Policy and Ordinances	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96%
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL S Management Policy and Ordinances Professional Capacity and Training	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100%
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL Someons Professional Capacity and Training Funding and Accounting	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100% 75%
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL Sometimes) Management Policy and Ordinances Professional Capacity and Training Funding and Accounting Decision and Management Authority	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100% 75% 100%
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL Sometimes) Management Policy and Ordinances Professional Capacity and Training Funding and Accounting Decision and Management Authority Inventories	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100% 75% 100% 46%
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL S Management Policy and Ordinances Professional Capacity and Training Funding and Accounting Decision and Management Authority Inventories Urban Forest Management Plans	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100% 75% 100% 46% 58%
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL Sometimes) Management Policy and Ordinances Professional Capacity and Training Funding and Accounting Decision and Management Authority Inventories	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100% 75% 100% 46%
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL Sometimes) Management Policy and Ordinances Professional Capacity and Training Funding and Accounting Decision and Management Authority Inventories Urban Forest Management Plans Risk Management	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100% 75% 100% 46% 58% 78%
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL Sometimes) Management Policy and Ordinances Professional Capacity and Training Funding and Accounting Decision and Management Authority Inventories Urban Forest Management Plans Risk Management Disaster Planning	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100% 75% 100% 46% 58% 78% 71%
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL Sometimes) Management Policy and Ordinances Professional Capacity and Training Funding and Accounting Decision and Management Authority Inventories Urban Forest Management Plans Risk Management Disaster Planning Standards and Best Management Practices	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100% 75% 100% 46% 58% 78% 71% 80%
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL Sometimes) Management Policy and Ordinances Professional Capacity and Training Funding and Accounting Decision and Management Authority Inventories Urban Forest Management Plans Risk Management Disaster Planning Standards and Best Management Practices Community	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100% 75% 100% 46% 58% 78% 71% 80% 100%
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL STANDING STAND	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100% 75% 100% 46% 58% 78% 71% 80% 100%
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL SOME Management Policy and Ordinances Professional Capacity and Training Funding and Accounting Decision and Management Authority Inventories Urban Forest Management Plans Risk Management Disaster Planning Standards and Best Management Practices Community Green Asset Evaluation PUBLIC PERCEPTION (2023)	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100% 75% 100% 46% 58% 78% 71% 80% 100% 50% feel the health has declined
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL SOME Management Policy and Ordinances Professional Capacity and Training Funding and Accounting Decision and Management Authority Inventories Urban Forest Management Plans Risk Management Disaster Planning Standards and Best Management Practices Community Green Asset Evaluation PUBLIC PERCEPTION (2023)	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100% 75% 100% 46% 58% 78% 71% 80% 100% 50%
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL SOME Management Policy and Ordinances Professional Capacity and Training Funding and Accounting Decision and Management Authority Inventories Urban Forest Management Plans Risk Management Disaster Planning Standards and Best Management Practices Community Green Asset Evaluation PUBLIC PERCEPTION (2023) Health of the urban forest in the past 10 years	750 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100% 75% 100% 46% 58% 78% 71% 80% 100% 50% 50% feel the health has declined 89% support more tree planting and preservation in development projects
Public Trees Removed Public Trees Planted Tree Permits Number of Volunteers and/or Hours URBAN FOREST AUDIT SYSTEM (TOTAL SOME Management Policy and Ordinances Professional Capacity and Training Funding and Accounting Decision and Management Authority Inventories Urban Forest Management Plans Risk Management Disaster Planning Standards and Best Management Practices Community Green Asset Evaluation PUBLIC PERCEPTION (2023) Health of the urban forest in the past 10 years	~50 1,311 255 street tree, 146 private, 237 development reviews 1,458 hours CORE OF 2022): 78% 96% 100% 75% 100% 46% 58% 78% 71% 80% 100% 50% 50% feel the health has declined 89% support more tree planting and

Report

Based on the evaluation of Plan implementation progress, the City's implementation team should track, record, and report on the metrics described below that are measures or indicators of success for each goal and supporting actions. Note, the series of urban forestry goals to address the resource, the programs, and the people and are not listed in any particular priority or order. These reporting elements can be incorporated into the Urban Forestry Program's annual report.

Table 32. Evaluation, monitoring, and reporting techniques to achieve the urban forestry goals

GREEN ASSET MANAGEMENT:

Proactively manage public trees, continue to grow and expand a healthy canopy to achieve the 28% citywide canopy goal, maintain public safety, and optimize urban forest benefits.

- * Report the ecosystem benefits of the inventoried tree population.
- * Report the number of public trees pruned, removed, and planted.
- * Report the number of trees managed for pests and diseases.
- * Report the number of trees planted in stormwater management projects.
- * Report progress towards canopy goals and tree planting targets.
- * Report the volume of woody biomass utilized.
- * Report the condition, structure, and diversity of the public trees.
- ❖ List audit score and actions/targets achieved, ongoing, and not started.

COMMUNITY ENGAGEMENT:

Achieve environmental justice through a partnership with the City and its residents to improve well-being, human health, local economies, and urban forest sustainability.

- List the existing and potential outreach platforms and initiatives.
- List existing and potential partners.
- * Report the number of planting events and trees planted.
- * Report the history/count of Tree City USA and supporting awards.
- Report the number of volunteers, events, and volunteer hours.
- Report the number of private tree plantings as feasible.
- Report the number of trainings, workshops, and attendees.
- Report the results of public surveys.
- * Recognize exemplary urban forest stewards.
- List audit score and actions/targets achieved, ongoing, and not started.

TREE MANAGEMENT POLICY:

Strengthen policies for preserving the environmental benefits, management, and the character of Vancouver's urban forest.

- List existing and potential partners.
- List all City and partner-led planning efforts.
- Describe related planning efforts.
- Establish a Citywide canopy goal and local planting targets.
- List recommended changes to City Code, policies, and manuals.
- List audit score and actions/targets achieved, ongoing, and not started.

G₂

G3

Revise

Completion of this Plan is a critical step towards meeting the vision for Vancouver's urban forest. Continual monitoring, analysis, and reporting will help to keep urban forest partners involved and focused on accomplishing the actions. Plans are typically revised every 10 to 15 years; hence, the Plan will need formal revision to respond and adapt to changes as they develop. Formal revision of the Plan should coincide with the update of the City's Comprehensive Plan and other relevant planning efforts. Recommendations and goals of each should be compared. Revisions to the Plan should occur with major events, such as newly discovered pests or diseases, changes in program budget and resources, or significant changes to industry standards or legal codes.

ACT AND REPORT	EVALUATE AND REVISE	ACT AND REPORT	EVALUATE AND REVISE
Years 1-5	Year 5	Years 6-10	Year 10
Annual Action Plans and Reports	Urban Forest Audit and Plan Amendments	Annual Action Plans and Reports	Urban Forest Audit and Plan Update
Monthly Activities and Annual Report	Updated Benchmarks and Plan Actions	Monthly Activities and Annual Report	Updated Benchmarks and Plan Actions

Table 33. Example of the plan implementation, evaluation, and revision process

IMPLEMENTATION SCHEDULE

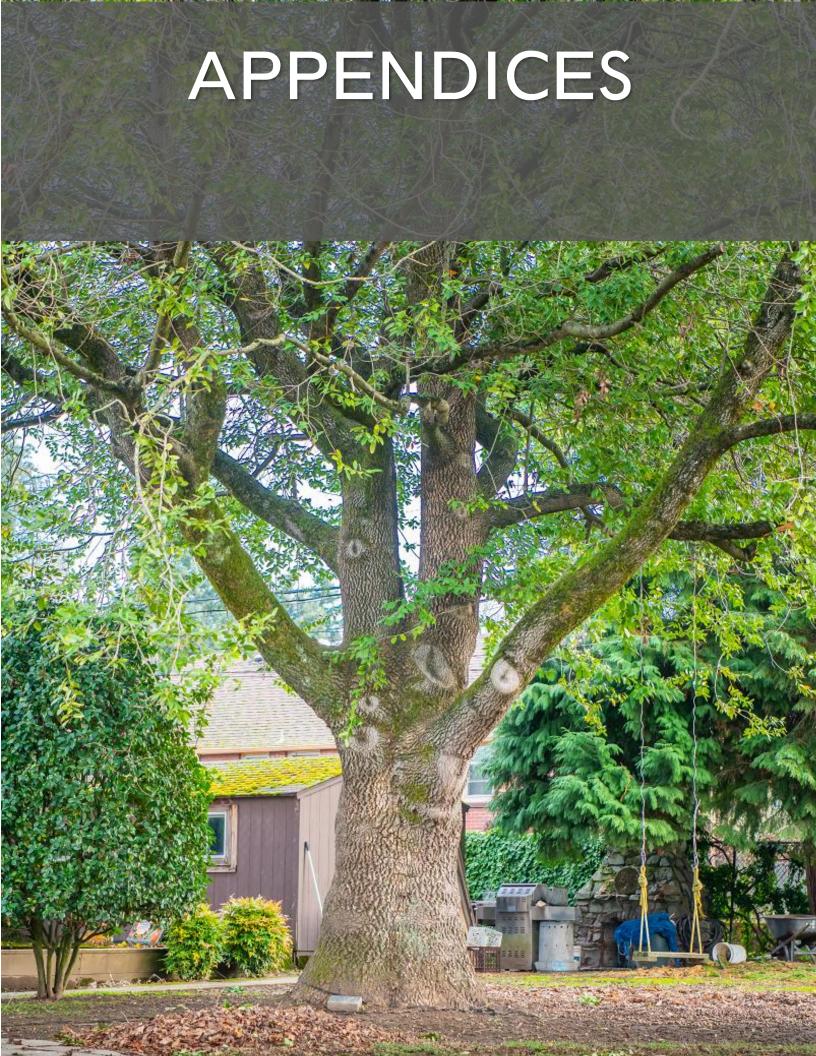
Appendix I contains the Implementation Schedule which is the yearly program for the next ten years and includes long-term strategies for a 25-year planning horizon. It takes the strategies, shown under the goals and objectives, and subdivides each strategy into actions and tasks. In addition, the Implementation Schedule shows a budget estimate with a total by year. The Schedule is the main piece of the Plan that can be easily adapted to changing conditions, providing more or less activity in any given year. The Implementation Schedule will be used by City staff to guide activities occurring in the current year and to plan for succeeding budget years. It provides the reader with information on how each program strategy is to be accomplished.

SUMMARY AND CONCLUSION

Vancouver has a rich forestry history that strongly influenced the city's early development. Today, with most of the original vegetation gone, the urban forest plays an important role in making life richer for Vancouver citizens and visitors, and attracting new businesses. This Urban Forestry Management Plan is timely to resolve many of the issues that urbanized areas and the natural environment experience today. With dedication, Vancouver's urban forest will once again provide the value of the historic landscape. The Urban Forestry Management Plan is a roadmap for a strategic approach to manage Vancouver's urban forest. The Plan contains goals and supporting actions that are critical to the long-term vitality of the forest. However, in order for the Plan to actually have an impact on the forest resource, it requires stewardship and financial resources to begin implementation. Further, it needs to be institutionalized as a document requiring implementation with a sense of urgency to get things started. Completion of the Urban Forestry Management Plan clearly demonstrates that City leadership understands that a healthy urban forest is critical to guaranteeing the long-term health and vitality of the community, and that it is not a luxury but an absolute necessity. In order to accomplish the goals, the approach to overall implementation should adhere to the guiding principles of the Plan:

- Recognize that the trees of the urban forest are more than aesthetic enhancements.
- Recognize trees as the backbone of the urban ecosystem and an essential part of the community's green infrastructure.
- Promote the health and growth of the urban forest by following scientifically established best management practices for tree selection, planting, watering, and pruning.
- Promote a robust urban forest through policies and practices that reduce its vulnerability to known diseases or pest infestations, and future threats, including the anticipated effects of climate change.
- Engage in a continuous process of long-range planning for the growth and maintenance of the urban forest.
- Promote public appreciation of the urban forest through educational outreach programs.
- Support local businesses, institutions, organizations, and individuals in their efforts to grow and maintain the urban forest through community education.
- Proceed in a manner that is inclusive and transparent.





APPENDICES

Appendix A. References	2a
Appendix B. Risk Tree Management	3a
APPENDIX C. URBAN FOREST AUDIT RESULTS (2023)	6a
Appendix D. Estimated In-house Arborist Costs	17a
APPENDIX E. ESTIMATED COSTS FOR THE 28 PERCENT CANOPY GOAL	18a
Appendix F. Tree and Hardscape Conflicts Solutions Workbook	19a
APPENDIX G. STAKEHOLDER FEEDBACK	30a
APPENDIX H. CONSIDERATIONS FOR APPRENTICESHIP AND YOUTH PROGRAMS	36a
APPENDIX I. PLAN IMPLEMENTATION SCHEDULE	39a

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APPENDIX B. RISK TREE MANAGEMENT

Overview

Risk management is a well-established concept in the management of public spaces. Acceptable levels of risk have been recognized or defined for most basic infrastructure elements such as sidewalks, curbs, streets, playgrounds, and utilities. In many communities, these elements are assessed and managed according to acceptable levels of risk that are specified within written policies or enacted through management practices. Although not all pot-holes can be immediately filled in, not all heaving sidewalks immediately repaired, not all burned-out street light bulbs immediately replaced, a successful risk management program provides a community with a systematic approach to implement corrective actions within a reasonable timeframe.

An urban community consists of both the gray infrastructure (buildings, streets, utilities) and the green infrastructure— the urban forest. Although gray infrastructure has long been assessed and monitored for acceptable levels of risks, green infrastructure has for the most part not received the same subjective evaluations. The urban forest is an integral part of a community's infrastructure, and trees often dominate the landscape or at least are the most visible part of it. Urban trees contribute to increased quality of life for many communities and their residents. Most people prefer to live, recreate, and work in communities of healthy and well-maintained urban forests. Considerable research documents that people not only prefer to recreate in well-maintained parks with trees, but are willing to pay extra for the privilege. Safety, or at least the perception of safety, is critical if urban forests are to be managed and enjoyed.

Management of Tree Risk

Community managers have the responsibility to create and maintain a safe and useful urban forest for their constituents. Urban foresters need the training, expertise, and data to recognize varying levels of risk, and to manage the forest at an acceptable level of risk. Tree risk management involves the process of inspecting and assessing trees for their potential to injure people or damage property. Traditionally the term "hazard" (or hazardous) had been used in the context of evaluating trees for their failure potential. To many people, "hazard" suggests trees are at immediate risk for failure. In this report, the term "risk" trees is used to define trees with structural defects that may cause the tree or tree part to fail, where such a failure may cause property damage or personal injury. Trees will vary, ranging from low to high risk for failure and may require attention immediately or in the near future. The threshold of risk acceptable to liable parties is dependent upon their policies and objectives. To make objective, science-based decisions on the safety of trees and the urban forest, individual trees and site conditions need to be evaluated for the level of risk that they do or do not present.

Liability and Risk

Community leaders and decision-makers must consider the perceived public liability for tree damage and injury claims. In the extreme, trees are excluded from public rights-of-way to minimize public exposure. In the risk management field this is called risk avoidance. In these cases, the public benefits that trees provide, which usually outweigh the perceived costs, are not delivered to the community. Attempts to attain zero risk often become costly over time, due to premature tree removals, more frequent tree replacements, and loss of benefits that mature trees provide. Instead, a city should actively monitor, prioritize, and mitigate risk as funding permits.

Street Tree Management in Vancouver

The responsibility to maintain public street trees in Vancouver is primarily the responsibility of the adjacent property owner. In most cases, a tree permit is required to prune or remove a street tree.

The City of Vancouver's staff will remove hazardous limbs, trees, or debris in the public right-of-way as they are encountered and as resources allow. This section aims to provide the City with the guidance to effectively assess and mitigate priority risks within the confines of available resources and funding, communicate to property owners, and to monitor contractors for best practices.

Purpose of Tree Risk Management

The purpose of a tree risk assessment is to inspect and assess in detail the structure and quality of the tree, tree parts, surrounding targets, and environmental conditions. An assessment provides the persons or entity responsible for tree care with options for mitigating or reducing risk associated with each tree assessed. By evaluating and ranking the risk potential, tree managers can prioritize mitigation efforts within the limits of available funding and resources.

Trees may appear to be permanent fixtures of our environment though at some point, trees will eventually decline in health, deteriorate in structure, collapse, and decompose. Trees may decline and eventually die from myriad causes including disease, insect attack, drought, uprooting, and catastrophic stem failure in high winds, or from combinations of factors working together. Others may die from old age and go through a natural cycle of senescence before failure. Some trees die and later collapse as their stems and branches decay, and some begin to break up while they are still green. While any large tree poses a risk of failure in high winds, in situations where people and trees must live together in close proximity it is important to identify where a tree has become an unacceptable risk.

Many different kinds of professionals are interested in managing tree risk in communities. For the City of Vancouver, the Urban Forestry Program implements long-term planning and management of the street tree population comprising the citywide urban forest. These tree managers need reliable information concerning the identification and management of hazard or "risk" trees. In addition, public trees need to be routinely pruned to minimize risk, maintain public safety, improve tree health, strengthen the structure of trees, and provide a continual flow of ecosystem benefits and services.

Procedures for Tree Risk Management

The City should use tree inventory data, inventory software, service requests, and staff observations to continue to prioritize trees for risk assessment and potential mitigation. Risk assessors should use the ISA Level 2 Basic Risk Assessment protocols along with the American National Standards Institute's (ANSI) A300 Standards.

Both empirical data and subjective data should be gathered for each tree. The industry protocols require the assessor to evaluate the tree for conditions and factors that may qualify as a potential risk. The evaluation considers the tree's crown and branches, trunk(s), and roots. If a potential risk is identified in either or all of the tree's components, the site information is collected, and the risk assessment commences. Potential targets such as people or vehicles are noted along with site factors and tree health issues. The tree component causing the potential risk is then examined and documented. For the crown or branches, issues such as deadwood are recorded along with the deadwood size and the level of load bearing on the branch or branches. The likelihood of failure and impact are recorded, and the likelihood of failure and impact is autopopulated based on the ISA tree risk assessment matrix (see tables below). In addition, the level of consequence is autopopulated as is the risk rating for the specific tree component (e.g., crown and branches). If other tree components such as the trunk or roots pose a potential risk, a similar process is completed. Once all components are assessed, an overall risk rating is autopopulated indicating the risk level as extreme, high, moderate, or low risk.

Table 34. The ISA tree risk assessment matrix to establish a risk rating

Likelihood of	Likelihood of Impact			
Failure	Very Low	Low	Medium	High
Imminent	Unlikely	Somewhat Likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat Likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat Likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Likelihood of	Consequences of Failure			
Failure	Negligible	Minor	Significant	Severe
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat Likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Definitions

Risk Tree: Formerly referred to as a hazard tree, a risk tree has structural defects in the roots, stem, or branches that may cause the tree or tree part to fail, where such failure may cause property damage or personal injury.

Tree Defects: Tree defects are often organized into two categories— 1) injury or disease that seriously weakens the stems, roots, or branches of trees, predisposing them to fail or, 2) structural problems arising from poor tree architecture, including poorly attached stems and branches that lead to weak unions, shallow rooting habits, inherently brittle wood, and other physiological conditions.

Low Risk: The low risk category applies when consequences are "negligible" and likelihood is "unlikely"; or when consequences are "minor" and likelihood is "somewhat likely" (refer to Table 34 for terminology). Some trees with this level of risk may benefit from mitigation or maintenance measures, but immediate action is not usually required. Tree risk assessors may recommend retaining and monitoring these trees, as well as mitigation that does not include removal of the tree.

Moderate Risk: Moderate risk situations are those for which consequences are "minor" and likelihood is "very likely" or "likely"; or when likelihood is "somewhat likely" and consequences are "significant" or "severe" (refer to the ISA tree risk assessment matrix table in the overview above). The tree risk assessor may recommend mitigation and/or retaining and monitoring. The decision for mitigation and timing of treatment depends upon the risk tolerance of the tree owner or manager.

High Risk: High risk situations are those for which consequences are "significant" and likelihood is "very likely" or "likely," or when consequences are "severe" and likelihood is "likely". This combination of likelihood and consequences indicates that the tree risk assessor should recommend mitigation measures be taken as soon as is practical. The decision for mitigation and timing of treatment depends upon the risk tolerance of the tree owner or risk manager. In populations of trees, the priority of high risk trees is second only to extreme risk trees.

Extreme Risk: The extreme risk category applies in situations in which failure is "imminent" and there is a high likelihood of impacting the target, and the consequences of the failure are "severe" (refer to Table 34). The tree risk assessor should recommend that mitigation measures be taken as soon as possible. In some cases, this may mean immediate restriction of access to the target zone area to avoid injury to people.

APPENDIX C. URBAN FOREST AUDIT RESULTS (2023)

Urban Forest Audit Scoring Key

Table 35. Urban Forest Audit results for Vancouver, WA (2022)

Not Practiced (0)	In Development (1)	Adopted Practice (2)

Management Policy

Category	Component Evaluated	Description or Criteria for Evaluation
1.00	Approved Policy Statements	Written policy statements approved by a governing body.
1.01	Climate Change (Sustainability)	Also referred to as Sustainability. With reference to urban trees. Addresses the long-term health and productivity of the natural resource.
1.02	No Net Loss	Can refer to trees, basal area, or canopy.
1.03	Risk Management	Should reference: ANSI A300 Part 9, ISA BMP, and prioritization funding mechanisms.
1.04	Tree Canopy Goals	Overall community/campus goal, or by designated "zone".
1.05	Tree Protection	Construction and/or landscape maintenance.
1.06	Utility	Utility pruning, planting, and installation policy (e.g. boring vs. trenching).
1.07	Psychological	Recognizes and addresses the human health benefits of the natural resource (e.g., exercise, air quality, stress management, shade). Could also include Urban Heat Island (UHI) policies.
1.08	Wildlife Diversity/Habitat/Protection	Mammals, birds, or reptiles.
1.09	Performance Monitoring	Recognizes the annual or biennial calculation of metrics (e.g. some component of ecosystem services) for the purpose of tracking management performance.
1.10	Ordinance (Private)	Tree protection and management for trees on private property.
1.11	Ordinance (Public)	Tree protection and management for public trees.
1.12	Development Standards	US Green Building Council's LEED® rating systems (or similar internationally) LEED v4 BD+C (Sustainable Sites) LEED 4 ND (Neighborhood Pattern & Design, Green Infrastructure) ASLA's SITES® Rating System
1.13	High-Conservation Value Forests	Programs or policies for identification, acquisition, and/or protection of groups of trees or forests that provide unique public benefits.
1.14	Urban Interface (WUI)	Programs or policies that improve management of the urban interface for fire and/or invasive species.

Capacity and Training

Capaci	ly and Training	
Category	Component Evaluated	Description or Criteria for Evaluation
2.00	Professional Management	Provision for professional consultation.
2.01	Certified Arborist - Staff	International Society of Arboriculture
2.02	Certified Arborist - Contracted	International Society of Arboriculture
2.03	Certified Arborist - Other Resource	International Society of Arboriculture
2.04	Other Professional - Advising/directing UF management	This could be a professional in an allied field like Landscape Architecture.
2.05	Municipal Forestry Institute	Graduate of Society of Municipal Arborist's MFI program or similar
2.06	USFS Urban Forestry Institute or similar regional training	Attendance at USFS UFI or similar
2.07	Campus/city arborist - ISA CA instructor for CEUs	Arborist routinely provides ISA CEU presentations/workshops.
2.08	Tree Board University or similar	On-line training modules from Oregon U&CF for Tree Board/Advisory Council or similar
2.09	Organizational Communications	Process, procedures, and protocol for cross-professional communications within the organization (all departments "touching" trees).

Funding and Accounting

Category	Component Evaluated	Description or Criteria for Evaluation
3.00	Urban Forestry Budget	
3.01	Budgeted Annually	Budget authorized/required for tree board, tree maintenance, and/or tree planting.
3.02	Contingency Budget Process	A protocol is in place to prioritize urban forestry management activities during budget shortfalls; e.g. during times of limited funding for: 1) risk management, 2) young tree care, 3) mulching.
3.03	Funding Calculated from Community Attribute	Budget in terms of per capita, per tree, or for performance (e.g. per tree weighted by size class or age.
3.04	Funding Based on Performance Monitoring	Budget connected with/based on ecosystem service (ES) monitoring and performance.
3.05	Urban Forestry Line Item	Is the budget specific to urban forest management?
3.06	Green Asset Accounting	Maintain green infrastructure data in the "unaudited supplementary disclosure of an entity's comprehensive annual financial report (CAFR)". GASB 34 implementation for municipalities.

Authority

Category	Component Evaluated	Description or Criteria for Evaluation
4.00	Authority	
4.01	Urban Forest Manager	Professional urban forest manager with authority over the program and day-to-day activity. Including designated budget line item.
4.02	Staff Authority	Designated staff with authority over the program and day-to-day activity. Including designated line item.
4.03	Communication Protocol	Established protocol and mechanism(s) for communication among all members of the urban forest management "community" in your municipality or organization (e.g. manager, department under control, advisory board, finance, field operations, public, NGOs, business community, developers).
4.04	Tree Board, Commission, or Advisory Council	Establishes a board for public participation (advisory or with authority).

Inventories

Category	Component Evaluated	Description or Criteria for Evaluation
5.00	Inventories and Assessments	
5.01	Canopy Inventory (UTC)	Periodic (≤5 year) canopy inventory and assessment. Public & private.
5.02	Ecosystem Services	Recent (≤5 year) ecosystem services (ES) inventory & assessment? Public: 100% or street trees; Public & Private: Sample; or Campus. Or, are ES calculated annually or biennially based on partial reinventory and projected growth as a monitoring tool.
5.03	Public Trees Ψ	Ψ Evaluate below Ψ
5.04	Street Trees	Is there a recent (5 year) inventory?
5.05	Parks/Riparian Areas	Is there a recent (5 year) inventory?
5.06	Other Public Trees	Public facility landscaped areas, Industrial parks, green space.
5.07	Continuous inventory on a cycle (≤5 years; i.e. panel)	Partial re-inventory to support continuous forest inventory, growth projections, and the calculation of ecosystem services for the purpose of long-term monitoring of urban forest management performance (e.g. carbon or leaf surface).
5.08	Private Trees ↓	Ψ Evaluate below Ψ
5.09	Campus (Educational)	Is there a recent (5 year) inventory?
5.10	Corporate	Is there a recent (5 year) inventory?
5.11	Other Private Property	Is there a recent (5 year) inventory?
5.12	Continuous inventory on a cycle (≤5 years; i.e. panel), inventory software	Partial re-inventory to support continuous forest inventory, growth projections, and the calculation of ecosystem services for the purpose of long-term monitoring of urban forest management performance (e.g. carbon or leaf surface).
5.13	Green Stormwater Infrastructure (GSI)	BMP stormwater mitigation practices and locations (e.g. Washington DC)
5.14	Spatial	Inventory data includes Lat/Long (i.e. GIS). Should address the spatial relationship between the natural resource and people (i.e. residents, visitors, activities) that would help manage the resource for benefits associated with proximity (air quality, recreation, stress mitigation, improved educational opportunity).
5.15	Maintenance and Planting Records Maintained	Planting details (nursery, species, size, cost, contractor, etc.) maintained with inventory or as separate database or recordkeeping system. Also pruning and removal histories.

Plans

Category	Component Evaluated	Description or Criteria for Evaluation
6.00	Management Planning Activities	
6.01	Annual Maintenance Calendar	An annual calendar that defines typical activity by season. To support scheduling.
6.02	Public Trees Ψ	♥ Evaluate below ♥
6.03	Street Tree Management	Is there a recent (5 year) plan for street trees?
6.04	Parks/Riparian Area Management	Is there a recent (5 year) plan ?
6.05	Other Public Trees	Public facility landscaped areas, Industrial parks, green space.
6.06	Private Trees ↓	↓ Evaluate below ↓
6.07	Campus (Educational)	Is there a recent (5 year) plan for Campus trees?
6.08	Corporate	Is there a recent (5 year) plan?
6.09	Other Private Property	Is there a recent (5 year) plan?
6.10	Green Infrastructure	Is there a plan for green infrastructure (i.e. nodes & linkages)? Large-scale projects.
6.11	Other Written Plans	Other natural resource plans (e.g. tree canopy). May be a component of another plan.
6.12	Tree Planting	Is there a recent (3 year) tree planting plan?). May be a component of another plan.
6.13	UF as Part of a Comprehensive Plan	Is any UF management plan referenced in the comprehensive plan (i.e. county or municipality) or master plan (i.e. Campus)?
6.14	Urban Forest Planning and Management Criteria and Performance Indicators	Criteria and indicators based on <i>A Model of Urban Forest</i> Sustainability (Clark, J.R., Matheny, N.P., Cross, G., and Wake, V. 1997 Journal of Arboriculture.) or on work of W.A. Kenney, P.J.E. van Wassenaer, and A.L. Satel in Criteria and indicators for strategic urban forest planning and management. (2011)

Risk Management

	Component Evaluated	Description or Criteria for Evaluation
7.00	Risk Management Activities	
7.01	TRAQ Attained	At least one staff or consultant is TRAQ.
7.02	Annual Level 1 (ANSI A300 Part 9 & ISA BMP)	All trees in high occupancy areas visited annually.
7.03	Mitigation Prioritization	A protocol for prioritizing mitigation following Level 1 and Level 2 assessments. Reflects the controlling agency's threshold for risk.
7.04	(ACCUPANCY ARGAE MARINGO	Has TRAQ staff/consultant discussed/mapped occupancy levels with controlling authority?
7.05		A process has been put in place to maintain records on requests, inspections, evaluations, and mitigation of risk; and on the communications among the managers related to those risk assessments.
7.06		Controlling authority has adopted a Standard of Care (SOC) or risk management policy.
7.07	Tree Risk Specification	Is there a written specification that meets requirements of ANSI A300 (Part 9)? And, has it been discussed with the controlling authority with relevance to the controlling authority's threshold for acceptable risk?
7.08		The community has prepared and follows a comprehensive program for urban tree risk management.
7.09	Invasive Management	Plan to address and manage invasive: plants, insects, and disease.

Disaster Planning

	Component Evaluated	Description or Criteria for Evaluation
8.00	Disaster Planning Activities	
8.01	Response/Recovery Mechanism	Staff knowledge of the municipality's protocol for requesting disaster resources through the county or state with access to mutual aid and EMAC.
8.02	County Disaster Plan	The UF plan (8.3) is incorporated into the county/municipal disaster plan; specifically in reference to debris management and risk mitigation.
8.03	Urban Forestry Disaster Plan	A separate/specific plan within the urban forestry management program (i.e. who to call, priorities).
8.04	Pre-disaster Contracts	Contracts are in place for critical needs.
8.05	Mitigation Plan	A mitigation plan has been developed for pre-disaster, recovery, and post-disaster.
8.06	EMAC Mission Ready Packages (MRP)	Municipality has published disaster resources with state EM and participates in inter-state Mutual Aid to support Urban Forest Strike Teams (UFST).
8.07	Urban Forest Strike Team	Participation in the UFST project.

Standards and Best Management Practices

6 1		
Category	Component Evaluated	Description or Criteria for Evaluation
9.00	ANSI Standard & BMP Activities	
9.01	ANSI Standards	Reference and adherence to ANSI Standards for arboricultural practices (A300), safety (Z133), or Nursery Stock (ANSI Z60.1) (any or all).
9.02	Ages/Diameter Distribution	Specific management for the development of an age-diverse tree population
9.03	Arborist Standards	Standards of practice for arborists (i.e. Certification).
9.04	Best Management Practices (BMPs)	Establishes or references tree maintenance BMPs (i.e. written comprehensive standards & standards).
9.05	Fertilization and Mulching	Fertilization or mulching standards required for conserved & planted trees.
9.06	Lightning Protection Systems	BMP written to the ANSI A300 Standard.
9.07	Planting	Planting and transplanting standards required/specified.
9.08	Pruning	Pruning standards required for conserved & planted trees.
9.09	Removal	Infrastructure damage, stump grinding, etc.
9.10	Support Systems (Guying and Bracing)	BMP written to the ANSI A300 Standard.
9.11	Tree Risk	Tree risk assessment procedures; ISA BMP or equivalent.
9.12	Construction Management Standards	Written standards for: tree protection, trenching/boring in CRZs, pre-construction mulching, root or limb pruning, watering (any or all).
9.13	Design Standards	Standards for design that specifically require trees; standards for tree placement (i.e. location), soil treatment, and/or drainage.
9.14	Genus/Species Diversity	Suggests or requires diversity of plant material.
9.15	Green Stormwater Infrastructure (GSI)	BMPs for site level GI practices like rain gardens and swales. Small-scale projects.
9.16	Inventory Data Collection	Community has adopted or developed applicable standards for local urban tree inventory data collection to support QA/QC.
9.17	Minimum Planting Volume	Minimum required root zone volume.

Standards and Best Management Practices (continued)

Category	Component Evaluated	Description or Criteria for Evaluation
9.00	ANSI Standard & BMP Activities	Continued
9.18	Minimum Tree Size	Minimum caliper for tree replacements, and/or minimum size of existing trees to receive tree density or canopy credit.
9.19	Root Protection Zone (CRZ)	Defines adequate root protection zone; Critical Root Zone (CRZ).
9.20	Safety	Safety logs, trainings, reference to ANSI Z133 Safety Standard
9.21	Topping	Prohibits topping or other internodal cuts (public & private).
9.22	Tree Species List	Identifies and publishes a list of the most desirable, recommended, and/or preferred species (may include native and non-native species); alternatively, a list of species prohibited.
9.23	Tree Quality Standards	Written standards for tree selection at nursery in addition to Z60.1.
9.24	Utility Right-of-Way (ROW) Management	Requirements for planting, pruning, and/or removal of trees within a utility ROW.
9.25	Urban Agriculture	Enabled urban food forestry practices.
9.26	Wood Utilization	Larger diameter material is processed for wood products.
9.27	Third-party forest products certification compliance	Examples: American Tree Farm System (ATFS), Forest Stewardship Council™ (FSC®)
9.28	Energy generation	Local or regional use of chips or other woody debris for cogeneration facilities.
9.29		Leaves and small woody debris are captured and used on-site or processed by someone by composting for reuse.
9.30	Watering Standards	

Community

	Component Evaluated	Description or Criteria for Evaluation
10.00	Activities that Build	
10.01	Social Media Website or Similar	Does your community/campus use social media platforms or similar to document and publicize your urban forestry program, activity, or events?
10.02	Education	The urban forest is used as an educational laboratory for class activity; Kids in the Woods, PLT, high school, or college level.
10.03	Private Property Tree Program	Does your community sponsor this program locally?
10.04	Tree Inventory and Management Software	Public access to the community tree resource via an on-line mapping program (i.e. any Web Map Service; WMS).
10.05	Public Perception	Is public management consistent with private property requirements for tree protections and care? Does the Campus/public tree management reflect neighborhood norms?
10.06	Recognition Programs	Programs that raise awareness of trees or that use trees to connect the community to significant events or activities.
10.07	Arbor Day Celebration	Whether or not associated with Tree City USA.
10.08	Arboretum designation	Internal or third party arboretum designation.
10.09	Significant trees	For example: size, history.
10.10	Memorial/Honorarium	Tree planting or tree care programs than honor/memorialize individuals, organizations, or events.
10.11	Social Media	Does your community/campus make use of Twitter, Facebook, Blogs for internal or external outreach?
10.12	Active Communications	Press releases, regular news articles (print), "State of the Urban Forest" reports, periodic analysis of threats and opportunities.
10.13	Tree Care	Are volunteers trained and used for basic tree care (e.g. mulching, pruning, planting).
10.14	Tree Campus USA®, Tree City USA®, Tree Line USA®	Community/campus meets current qualifications for any of these programs.
10.15	Volunteer Opportunities	Ad hoc or scheduled. Any/all age groups. Tree Campus USA student activities.

Green Asset Evaluation

riodic or ad-hoc deadwood removal (i.e. lack trees or on the ground). of population; make specific observations for s, Ulmus and other local species of concern. ed in the landscape, and are of acceptable anagement. e.e. spatial extent, depth, and material) roots e classes.
e trees or on the ground). of population; make specific observations for s, Ulmus and other local species of concern. ed in the landscape, and are of acceptable anagement. e.e. spatial extent, depth, and material) roots
ed in the landscape, and are of acceptable anagement. e.e. spatial extent, depth, and material) roots
e. spatial extent, depth, and material) roots
ched for optimization of above ground right spot concept.
ched for optimization for below ground ee in the right spot concept.
ceed 10% of population; make specific Quercus, Fraxinus, Ulmus and other local evaluate the role of regionally local native
I compaction by users or staff during desire" lines and construction activity at time
alth in all size (age) classes; look for crown density & color.
riodic (e.g. every 3 years to year 9) structural tion cuts, dominant central leader, co- nat 20').

APPENDIX D. ESTIMATED IN-HOUSE ARBORIST COSTS

Estimated Costs for a Proactive Pruning Program

Recommended Staff	Hours per Staff	Cost per Hr per FTE	# of New Staff	Total Cost	Estimated Cost per Staff
A) Crew Supervisor	2,088	\$45.98	2	\$192,012	\$96,006
B) Arborist	2,088	\$40.23	4	\$336,001	\$84,000
C) Seasonal	1,044	\$24.71	0.5	\$25,797	\$25,797
Subtotal			6.5	\$553,811	\$205,804
Equipment	Hours	Cost / Unit	# of Units	Total Cost	Annual Cost
F450 Pickup	1	\$57,000	2	\$114,000	
1 F450 Pickup hours	1,000	\$16.94	1,000		\$33,880
Chipper	1	\$25,000	2	\$25,000	
Chipper hours	1,000	\$16.94	1,000		\$33,880
Bucket/Chip Truck	1	\$200,000	2	\$200,000	
Bucket/Chip Truck hours	1,000	\$16.94	1,000		\$33,880
Subtotal				\$339,000	\$101,640
Gear	Hours	Cost/Unit	# of Units	Total Cost	Annual Cost
PPE		\$200	7	\$1,400	\$150
Uniforms		\$250	7	\$1,750	\$188
Chainsaw		\$800	4	\$3,200	\$400
Rake		\$25	4	\$100	\$13
Shovel		\$25	4	\$100	\$13
Brush Bucket		\$40	4	\$160	\$20
Cart		\$50	2	\$100	\$25
Other (e.g. blower)		\$500	2	\$1,000	\$250
Subtotal			19	<i>\$7,8</i> 10	\$1,058
TOTAL COST				\$900,621	
ANNUAL COST					\$656,508
Summary of Costs					Cost
Annual Staff Cost \$553,811					
Vehicle and Equipment Purchase \$339,000					

Summary of Costs	Cost
Annual Staff Cost	\$553,811
Vehicle and Equipment Purchase	\$339,000
Annual Operating Costs (supplies, clothing, equipment, rental, etc.)	\$102,698
Annual Training, Certifications, and Membership Costs	\$4,000

Table 36. Estimated staff and associated costs to maintain public trees on a 7-year rotation

Based on regional estimates and local costs, the addition of four arborists and two crew supervisors with the option for a seasonal part-time employee would cost a total of \$553,811 including fringe benefits. To equip the new staff with resources for the proactive pruning program, the initial costs for equipment amounts to \$339,000 plus \$7,810 for gear with an average annual cost of \$102,698 after initial purchase. Costs do not include professional training and certifications though a budget of \$4,000 annually is recommended

APPENDIX E. ESTIMATED COSTS FOR THE 28 PERCENT CANOPY GOAL

Table 37. Estimated costs for planting 124,900 trees to reach 28% canopy cover

					rios (Assume ngs for Compa		
Milestone	Years	Total # of Trees	New Canopy %	A: In-house Planting Costs*	B: Contracted Planting Costs*	C: Private Planting Costs*	D: Added Maintenance Cost**
Year 1 - Year 4	2023 - 2026	5,900	19.3%	\$1,180,000	\$2,655,000	\$2,065,000	\$85,668
Year 5 - Year 8	2027 - 2030	8,000	19.9%	\$1,600,000	\$3,600,000	\$2,800,000	\$116,160
Year 9 - Year 10	2031 - 2032	6,000	20.3%	\$1,200,000	\$2,700,000	\$2,100,000	\$87,120
Year 11 - Year 15	2033 - 2037	15,000	21.4%	\$3,000,000	\$6,750,000	\$5,250,000	\$217,800
Year 16 - Year 20	2038 - 2042	30,000	23.6%	\$6,000,000	\$13,500,000	\$10,500,000	\$435,600
Year 21 - Year 25	2043 - 2047	60,000	28.0%	\$12,000,000	\$27,000,000	\$21,000,000	\$871,200
TOTALS	25 Years	124.900	28.0%	\$24,980,000	\$56,205,000	\$43,715,000	\$1.813.5 <i>4</i> 8

^{*}Costs are based on industry and regional estimates. Includes cost for hole preparation, transportation, unloading, planting time, and backfilling (McElhinney, et al. 2018). \$200 for in-house, \$450 contracted, \$350 private planting. Costs are not adjusted for future inflation.

Based on industry research and averages, the table above provides a cost summary by milestone and by responsible entity. The estimates in columns A-C assume 100 percent of the responsibility for the respective entity to provide a baseline for comparisons. In scenario A where the City would plant 100 percent of the required trees each milestone would amount to \$24,980,000 over the 25-year period. Costs do not account for future inflation and an average of \$200 per tree is used. For scenario B, if 100 percent of the 124,900 trees are planted through City contracts, the costs would amount to \$56,205,000 for the 25-year period. If the private landowners were to plant all 124,900 trees (scenario C), the costs are estimated to amount to \$43,715,000 over the 25-year period.

In scenario D with the table above, an assumption was made that 60 percent of the 124,900 trees will be planted by the City. Using an average maintenance and plant health care cost of \$42 per tree, the future added cost amounts to \$3,147,480 after all trees are installed.

Table 38. Estimated costs for planting and maintaining 60% of the 124,900 trees to reach 28% canopy cover

Entity	Total # of Trees Planted	Total Planting Costs	Per Year Planting Costs (25 Years)	Future Total Maintenance Costs of City-led Plantings - 60- year lifespan (\$24.20/tree/year average*)	Future Annual Maintenance Costs of City-led Plantings (\$24.20/tree/year average*)
60% City-led (in- house) Plantings	74,940	\$14,988,000	\$599,520	\$108,812,880	\$1,813,548
40% Partners, Private-led Plantings	49,960	\$17,486,000	\$699,440	City-led 10-year pruning Annual pruning	
TOTAL	124,900	\$32,474,000	\$1,298,960	*\$24.20 based on Hauer, et al.	2014, adjusted for inflation

The table above summarizes the estimated planting and maintenance costs if the City were to lead 60 percent of the 124,900 required plantings over the 25-year period. With nearly 75,000 trees required to be planted by the City, the planting costs amount to \$14,988,000 or an average of \$599,520 per year. The accumulated future maintenance costs for these 75,000 trees amount to \$108,812,880 assuming a 60-year lifespan and an average cost of \$24.20 per tree (Hauer, et al. 2014, adjusted for inflation). The average annual cost would amount to \$1,813,548 if each tree were to be maintained annually. Given the goal of a 7- to 10-year proactive maintenance program, 7,494 trees per year amounts to \$181,355 annually.

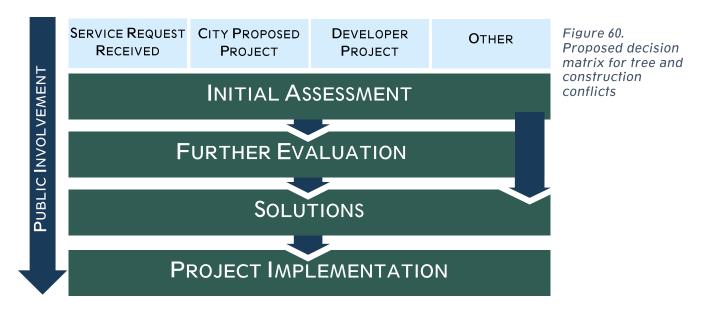
^{**}Scenario considers only in-house maintenance of 60% of total plantings, \$24.20 per tree per year average (Hauer, et al. 2014, adjusted for inflation).

APPENDIX F. TREE AND HARDSCAPE CONFLICTS SOLUTIONS WORKBOOK

Decision Matrix

The development of Vancouver's Urban Forestry Management Plan identified the need to clarify the decision process to address tree and sidewalk or construction conflicts. A clear decision matrix can help to reduce inter- and inner-department uncertainty and establish or adhere to consistency and fairness. The City's departments have standard operating procedures and checklists for evaluating conflicts at a project site, but these traditionally have not been available to the public. To make the decision process around the retention or removal of trees more transparent and consistent, a clarified process, decision matrix, and solution toolkit should be developed to highlight the key decision points.

Proposed Decision Matrix for Tree and Construction/Sidewalk Conflicts



Initial Assessment

The following applies to tree removal requests and proposed projects.

The initial assessment of trees, sidewalks (or other infrastructure), and site at the service request location or project location provides consistency and predictability by collecting the appropriate information. It is recommended to have the Urban Forestry Program involved in the initial assessment process and/or a City staff member with an International Society of Arboriculture Certified Arborist accreditation.

- <u>Tree Preservation Potential.</u> What is the tree quality or health, and is it worth preserving? Is the tree designated as a significant tree or Heritage Tree?
- <u>Tree Mitigation Exploration.</u> If the request to remove the tree is a result of infrastructure damage and the tree exhibits poor health or vigor, can the tree's health or vigor be mitigated by any means other than removal?
- <u>Public Safety Risk.</u> Is the tree a potential hazard that cannot be mitigated by any means other than removal? This includes any tree or tree part that poses a high risk of damage to persons or property located in public places. Use the International Society of Arboriculture's tree risk evaluation standards.
- <u>Initial Assessment Timing.</u> It is recommended that the initial assessment be conducted within 3-4 weeks of receiving a service request for removal. If the assessment is required

- due to a proposed project, the assessment should occur no later than 30% design or equivalent of design effort (e.g., during an environmental assessment period).
- <u>Tracking.</u> Consider tracking the decisions made for the public tree(s) in question in the City's asset software or similar program.
- For an example Initial Assessment Checklist, see the Example Initial Assessment Checklist further below.

Initial Tree Decision

If the tree removal request was made due to the condition of the tree or other reason not relating to the damage or impediment of infrastructure such as sidewalk, the Urban Forester or representative may conduct the initial tree decision. If infrastructure is part of the assessment and/or the tree removal request was initiated for a proposed project, the City Engineer or appropriate staff should also be part of the initial tree decision. The appropriate staff will visit the tree and/or proposed project location and assess the tree (and sidewalk, if applicable) conditions. The following actions will result from the assessment:

- Remove Tree. The tree removal request was made not as a result of the tree impacting or damaging infrastructure and the tree is identified as unhealthy or unsafe with no remediation possible.
 - Remove the tree and consider the "no net loss" policy of replacing the tree. Some cities implement a 2:1 replacement to removal ratio. The replacement policy should be based on City Code. Replacement of trees can occur on site, same street, or City-approved location. A fee in-lieu should also be considered as an option as described in City Code.
 - Removal of the tree should be prioritized based on other work orders, the risk assessment of the tree, and other factors.
 - The service request, decision, work order, tree information, and tree removal information should be tracked in the City's asset software or similar program.
- <u>Retain Tree.</u> Based on the assessment, the tree is not in decline or the issues can be remediated. Alternatively, if the tree in question is designated as a Heritage Tree or significant tree, the tree may be preserved depending on the tree condition and presence of hazards or risks as described in the City policies and manuals.
 - Document the decision, inform the property owner or project developer.
 - Recommend the remediation activity to the tree if needed.
 - Prioritize and track this information in the asset software or similar program.
 - Conduct follow-ups with the property owner and monitor the tree if necessary.
- Remove Tree and Replace Sidewalk. The service request or proposed project identifies a
 tree that is causing sidewalk conflicts and the tree has been deemed unhealthy and no
 remediation is possible. The City should reference City Code as to what is defined as
 unhealthy or hazardous.
 - Remove the tree and consider the "no net loss" policy of replacing the tree. Some cities implement a 2:1 replacement to removal ratio. The requirement to replace the tree will be the City and Urban Forester's discretion. The replacement policy should be based on City Code. Replacement of trees can occur on site, same street, or City-approved location. A fee in-lieu should also be considered as an option as described in City Code.
 - Removal of the tree should be prioritized based on other work orders, the risk assessment of the tree, and other factors.
 - The service request, decision, work order, tree information, and tree removal information should be tracked in the City's tree inventory software or similar program.
 - Replace the sidewalk using appropriate design standards and materials and consider designing according to standards that will protect any replacement trees and provide ample soil volume and root space for the new or existing trees.
- Retain Tree and Maintain Sidewalk. A tree in question is in conflict with infrastructure and the assessment determined that the tree is to be retained and the infrastructure (i.e.,

sidewalk) is to be corrected. The sidewalk will be of standard width and a tree pit of standard width (at minimum) can be installed or retained.

- Be sure to recommend alternative sidewalk amendments such as width reduction, alternative materials, among other solutions where appropriate.
- If any root pruning is needed to amend the sidewalk, the Urban Forester and/or a Certified Arborist hired by the City or property owner should evaluate to determine the appropriate root pruning, branch pruning, soil amendments, and other maintenance required.
- Documentation in City's asset software as stated before is recommended.
- Evaluate Tree and/or Sidewalk Further. During the initial tree decision, it is not appropriate for extensive explorations of pavement, soils, or tree root systems. There are limitations to the initial assessment and decision. The purpose of the initial assessment is to identify where these future actions are required so that the appropriate schedule and funding can be determined.
 - Documentation in City's asset software as stated before is recommended.

Further Evaluation

The team conducting further evaluation may include an arborist, landscape architect, engineer, or other professionals with expertise relevant to the project details and situation. In addition to collecting information about the trees and infrastructure (i.e., sidewalk) the following additional items may be considered:

Level of impact, future risks, cost/benefit, anticipated sidewalk maintenance if the tree is kept, public/environmental benefit, community values, policy guidance, neighborhood context, historic districts, planned construction, funding forecasts.

Solutions

The following best practices and approaches are provided as examples. The City should review and update these as new or improved practices and materials emerge.

- If Tree Removed, Obtain Valuation. If the tree must be removed, the City should provide guidelines to replace the removed tree. Guidelines should be based on City Code. Ideally, the tree would be replaced at the same location if the site is suitable for trees in the first place. If not possible, the City should have a procedure in place for the relocation of replacement trees.
- If Tree is Retained, Determine Management Approach. Since the initial assessment offered the opportunity to closely examine the tree and the site, future management approaches and decisions should be discussed and documented. These include future tree replacement species for when the tree does over mature and decline or conduct corrective actions to provide clearance for pedestrians, vehicles, utilities, and signs.
- Identify Potential Sidewalk Solutions. The Alternative Solutions Toolkit Overview section
 provides information and resources regarding sidewalk solution options. Information
 gathered during the initial assessment and subsequent site visits will support the selection
 of options that should be presented to City staff and the property owner to ensure goals of
 sidewalk repair and tree preservation are kept.
- Identify Opportunities to Improve Conditions for New Trees. When trees are planted by the City, the appropriate tree species for the location should be determined and the City should adhere to best practices in site and tree pit preparation to provide enough soil volume to support tree root growth and minimize future pavement damage by roots. If a tree is being planted at or near where the tree removal request was made, an evaluation of why the request was made should be considered. This may include such things as inadequate soil volume, insufficient growing space, tree leaf litter, messy fruit, poor structure, allergies, screening of shade-intolerant garden or landscape vegetation, or a combination of factors.

Project Implementation

Whether the sidewalk repair is occurring at a location where the tree is retained or removed, the sidewalk must adhere to the Americans with Disabilities Act (ADA) requirements and City standards. Tree repaying projects, curb and gutter repairs, and other Capital Projects should also adhere to this evaluation process. All matters relating to the removal or remediation of the tree will be conducted by the adjacent property unless the conflict is within a Capital Improvement Project or the responsibility of public street tree maintenance changes. Regarding tree maintenance, mitigation, or removal, the City should involve the public by:

- Providing a public notice prior to the initial tree assessment.
- Share the results of the initial assessment.
- Share the solution decision.

EXAMPLE INITIAL ASSESSMENT CHECKLIST

[CITY LOGO]

[City of ####] Trees and Sidev Initial Street Tree and Sidewa	•
DATE Prepared By:	
The purpose of this documen within the dripline of an exist	t is to outline <u>INITIAL ASSESSMENT</u> for locations where sidewalk work is located ing street tree.
Project Location/Address	
Tree Species/Diameter	
Street Classification/Type	
Tree Asset Inventory ID	
Sidewalk Segment #	
Is this assessment along a corridor project?	
 Is a hazardous tree; Poses a public safety I Is in such a condition Cannot be successfully Initial Assessment Is the tree healthy an Yes No Describe: 	of poor health or poor vigor that removal is justified; or retained, due to public or private construction or development conflicts. d worthy of preservation?
means other than ren Yes No Describe:	ree in a condition of poor health or poor vigor that cannot be mitigated by any noval? ined in [CITY CODE CITATION] any tree or tree part that poses a high risk of
damage to persons us	ing, or property located in the public place, as determined by the [AUTHORITY] hazard evaluation standards established by the International Society of

4. Minimu strip?	m Standards—Is there enough space for	r a [6 foot wide sidewalk and a 5 foot wide] planting
	Yes	
□ •	No	
Des	cribe:	
	other than removal? Does the tree location obstruct the visib intersection?	public safety hazard that cannot be mitigated by any pility for pedestrians, cyclists, and/or cars at an hat it no longer meets City of [CITY] ADA requirements? property?
	Use this space to draw a sketch on nearby infrastructure.	f the location. Identify existing clearances from
Recommendati	on for this tree:	
☐ –Remo	ve Tree / Replace Sidewalk	
		althy or if it is hazardous as identified in the Street Tree
Ordinar	ice.	
=	Tree and Maintain Sidewalk	
	vill be kept and the sidewalk will be mair d width (at a minimum) can be installed	ntained if a sidewalk of standard width and a tree pit of or retained around a healthy tree.
[DEPAR intends [DEPAR width r	to keep healthy trees and have accessib TMENT] will take the time and resources	portant public infrastructure assets. [DEPARTMENT] le sidewalks. If standard widths cannot be met then to evaluate if alternative approaches (such as sidewalk adjustments to the tree pit and/or tree root pruning) essible sidewalk at problem locations.
NEXT STEPS	, , , , , , , , , , , , , , , , , , ,	
	VED –Replace the removed tree with the	e minimum 2:1 replacement ratio. Identify if the
=		or on the same street as the removed tree. If not,
		as geographically feasible. Identify the estimated cost
to remove the t	ree(s), repair the sidewalk, and plant rep	placement trees.
If Tree is KEPT	-Estimate the cost of the sidewalk repai	r that would achieve the desired lifecycle for the repair
Estimate sidew	alk and tree maintenance needs/costs an	d any maintenance to the tree that is being retained
(e.g., root prun	ing, branch pruning, soil amendments).	
If EVALUATE Fu	rther – Use Tree and Sidewalk Evaluation	n Form (IN DEVELOPMENT) and/or the tree risk
	uld follow ISA TRAQ guidelines: http://v	
arbor.com/edu	cation/onlineresources/basictreeriskasse	essmentform.aspx
Arborist		Engineer
Title		Tile
Date		Date

Alternative Solutions Toolkit Overview



Paving and Other Surface Materials

These materials can be used to create a walkable surface or to delineate space for people and/or the tree.



Infrastructure-Based Design Solutions

These design considerations can be employed to support a tree and/or sidewalk.



Rootzone-Based Materials

These tools can support tree health and guide tree growth below ground.



Tree-Based Solutions

These solutions are focused on tree selection and tree maintenance.

Table 39. Description of possible alternative solutions for tree and construction conflicts

1 abie 39. L	Description of possible alternative solutions	s tor i	rree a	ina construction con	THCTS			
TOOL TYPE	TOOLS	PROACTIVE	RESPONSIVE	COST*	EXPECTED USEFUL LIFE Month Year Decade Centur			
	PAVING AND OTHER SURFACE MATERIALS							
MATERIAL	Asphalt	Р	R	\$-\$\$\$	Μ	Υ	D	С
	Expansion Joints	Р	R	\$	Μ	Υ	D	С
	Pavers	Р	R	\$\$-\$\$\$	Μ	Υ	D	С
	Pervious Concrete	Р	R	\$\$\$-\$\$\$\$	Μ	Υ	D	С
	Reinforced or Thicker Slab	Р	R	\$\$-\$\$\$	M	Υ	D	С
	Rockery / Wall	Р	R	\$\$-\$\$\$\$	M	Υ	D	С
	Beveling	P	R	\$-\$\$	Μ	Υ	D	С
	Porous Asphalt	Р	R	\$-\$\$\$	Μ	Υ	D	С
	Shims	P	R	\$	Μ	Υ	D	С
	Tree Guards and Tree Rails	Р	R	\$\$-\$\$\$	Μ	Υ	D	С
	Decomposed Granite	Р	R	\$-\$\$	Μ	Υ	D	С
	Mudjacking (Concrete Leveling)		R	\$\$-\$\$\$\$	Μ	Υ	D	С
	INFRASTRUCTURE-BASED DESIGN SOLUTIONS							
DESIGN	Monolithic Sidewalk	Р	R	\$\$\$	Μ	Υ	D	С
	Pavement Thickness	P	R	\$\$\$	Μ	Υ	D	С
	Tree Pit Sizing	Р	R	\$	Μ	Υ	D	С
	Bridging	Р	R	\$\$\$\$	Μ	Υ	D	С
	Curb Bulbs	Р	R	\$\$\$-\$\$\$\$	Μ	Υ	D	С
	Curb Realignment	Р	R	\$\$\$-\$\$\$\$	Μ	Υ	D	С
	Curving or Offset Sidewalk	Р	R	\$\$-\$\$\$	Μ	Υ	D	С
	Easement	Р	R	\$-\$\$\$	Μ	Υ	D	С
	Suspended Pavement Systems	Р	R	\$\$\$-\$\$\$\$	M	Υ	D	С
	Lowered Sites	Р	R	\$\$\$-\$\$\$\$	Μ	Υ	D	С
	Soil Volume	Р	R	\$-\$\$\$	Μ	Υ	D	С

TOOL TYPE	TOOLS	PROACTIVE	RESPONSIVE	COST* \$ \$\$ \$\$\$ \$\$\$\$			ED USE LIFE Decade	
	ROOTZONE-BASED MATERIALS							
ROOT	Mulch	Р	R	\$	Μ	Υ	D	С
	Root Barriers	Р	R	\$	Μ	Υ	D	С
	Continuous Trenches	Р	R	\$\$\$	Μ	Υ	D	С
	Foam Underlay	Р	R	\$-\$\$	Μ	Υ	D	С
	Modified Gravel Layer	Р	R	\$	Μ	Υ	D	С
	Root Paths	Р	R	\$-\$\$	Μ	Υ	D	С
	Soil Modification	Р	R	\$-\$\$	Μ	Υ	D	С
	Steel Plates	Р	R	\$\$-\$\$\$	Μ	Υ	D	С
	Structural Soils	Р	R	\$\$-\$\$\$	Μ	Υ	D	С
	Subsurface Aeration / Irrigation	Р	R	\$\$	Μ	Υ	D	С
	TREE-BASED SOLUTIONS					_		
TREE	City Forestry Street Tree List	Р	R	\$	M	Υ	D	С
	Corrective Pruning	Р	R	\$-\$\$	M	Υ	D	С
	Root Pruning		R	\$-\$\$	M	Υ	D	С

*General cost notes:

- Sidewalk material costs, when given in linear feet, assume 6-foot sidewalk width
- Costs are planning-level costs and will vary for actual construction
- Costs do not include design, permitting, or other "soft" costs
- Costs not included in tool costs but which would be necessary with use of some solutions include:
 - o Drainage structure and connection
 - Curb ramps

Figure 61. Example of alternative solutions for tree and construction conflicts



CURB REALIGNMENT



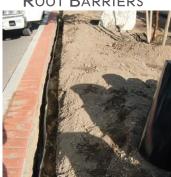
EASEMENT



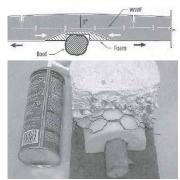
SUSPENDED PAVEMENT



ROOT BARRIERS



FOAM UNDERLAY



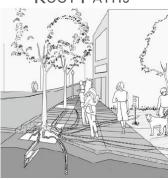
MOD. GRAVEL LAYER



STRUCTURAL SOILS



ROOT PATHS



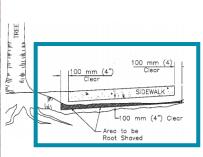
CORRECTIVE PRUNING



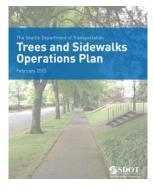
ROOT PRUNING



ROOT SHAVING



Source of Material Examples & Images:



APPENDIX G. STAKEHOLDER FEEDBACK

Table 40. City staff feedback on the strengths and challenges facing Vancouver's urban forest

Table 40. City staff feedback on the strengths and ch	
Strength/Success (paraphrased)	Challenge/Need (paraphrased)
Make sure City Climate Action Policies do not over depend on park properties to meet goals. Open space needs a variety of uses (Q4)	Insufficient code enforcement, incentives, and fines to discourage violations (Q4)
UFP has limited resources but staff have an excellent response rate and level of service (Q4)	City zoning and comp plan policies do not align with native tree preservation (Q4)
UF staff communicate well with staff and residents (Q4)	Need flexible design to build around trees (Q4)
UF staff are very responsive to resident concerns (Q4)	Stormwater properties do not support multiple use and public access (Q4)
Mainstream and integrate urban forestry with other goals and policies in a coordinated manner (Q4)	Improve internal system reviews to reduce planning's time involved (Q4)
Maintenance will need to scale as the city increases canopy cover (Q4)	Streamline development application process (Q4)
The Plan could support more park land acquisitions (Q5)	BMP training for Park Maintenance staff (Q4)
Great collaboration among departments (Q5)	Do not plant trees in rain gardens as they compromise the function (Q4)
City parks should not take all of the burden of achieving the canopy goal. Parks need swaths of grass as well (Q5)	Climate Action may conflict with critical infrastructure and outside regulatory agencies governing facilities (Q4)
Solid waste programs can deploy the chipper program where tree pruning is most warranted (Q5)	Public tree debris cleanup or maintenance may not align with community expectations (Q4)
The solid waste program can utilized the canopy data to identify high canopy areas that could most benefit from the chipper program (Q5)	Need to identify funding opportunities that match infrastructure project (Q4)
Do not compromise quality natural spaces for development (Q6)	Lack of resources for long-term costs of maintaining sites (Q4)
UFP provides exceptional service with limited resources (Q6)	The City cannot address every tree-related burden on private tree owners (Q4)
UFP is responsive and easy to work with on capital projects (Q6)	Improve processes to connect the community with UFP resources (Q4)
Utilized increased awareness of the urban forest to gain more resources that enable alignment of capital projects with UFMP goals (Q6)	Need new policies for shading parking lots (Q5)
Quality of trees, not quantity (Q7)	More resources for proactive maintenance (Q5)
Create logical goals for tree maintenance and planting (Q7)	Need to plant more conifers where possible (Q5)

Strength/Success (paraphrased)	Challenge/Need (paraphrased)
As the city looks to increase canopy, make sure we do not create conflicts (e.g., tree roots) (Q7)	Need to properly maintain trees for sightlines (Q5)
Community passion for trees (Q9)	Need larger planting islands for larger trees (Q5)
Increased communication to the public to support the UFP (Q9)	More resources for tree replacement (Q5)
Utilize tree plantings as part of key neighborhood nodes (relating to the Comp Plan) (Q9)	Develop an integrated policy that aligns tree canopy with transportation, development, and other priorities (Q6)
UFP staff are responsive and reasonable (Q9)	Trees are stated as a priority by elected officials but development sometimes seems to be a higher priority (Q6)
Staff support for integration of UF policies with other city priorities (Q9)	More space for trees means less space for transportation and development (Q6)
	Need tree maintenance support from the city after planting trees (Q7)
	Need to address the public street tree maintenance responsibility (Q9)
	Need a street tree maintenance strategy along priority corridors (Q9)
	Need more resources to improve tree equity (Q9)
	Need improved communication among departments (Q9)
	Need to integrate the UFMP strategies with the Comprehensive Plan (Q9)
	Need a proactive street tree pruning program (Q9)
	Need to strengthen code for tree preservation and protection around development (Q9)
	Need to identify priority planting areas (Q9)
	Need a community engagement section of the UFMP with information on how to incorporate UFP into other City programs (Q9)
	Need to emphasize the role urban forests play in human health (Q9)

Table 41. External stakeholder open comments from the online survey

1) Please provide your name, title, and organization (if applicable) so we can better understand how you interact with Vancouver's urban forest.

Teragan & Associates, Inc.

AKS Engineering & Forestry

Clark County Public Health

AKS Engineering & Forestry

TreeWise

AKS Engineering & Forestry

Landscape Architect

MacKay Sposito, Inc.

Vancouver Dawn Lions

Fort Vancouver High School, Natural Resource Conservation

Arborscape Ltd Inc Tree Care

Confluence

Planning Solutions, Inc.

Lower Columbia & Network

Friends of Trees

Friends of Trees

Clark PUD

Clark Public Utilities

Bartlett Tree Experts

Watershed Alliance of SW WA

WSU Extension, Clark County Master Gardeners

Rosevillage Neighborhood Association (RVNA)

Vancouver Bee Project

Columbia Springs

Todd Prager & Associates

Vancouver's Downtown Association

Columbia River High School, Horticulture

Friends of Trees

Parks Foundation of Clark County

Clark County Historical Museum

2) What is the nature of your work, role, or experience as it relates to trees in the City or region?

I complete tree risk assessments for residents and commercial properties.

I am working with Urban Forestry in my staff role at CCPH to improve the tree canopy in the Fourth Plain neighborhoods where CCPH and other partners are working to address health disparities.

Development consultant for projects constructed in the City

Landscape architect for private development projects. Prepare tree and landscape plans.

Permit plans for development projects.

Working with schools, local businesses and residential property owners to identify locations for more trees and native landscaping

Oversee transmission and distribution right-of-ways in Clark County

We have worked with you folks, and furthermore helped neighbors eradicate known invasive trees.

VBP advocates for the city to plant more native plants in public spaces and parks. Our work focuses on advancement and creation of pollinator habitat and an overall decrease/cessation of pesticide and herbicide use. We provide pollinator-focused advocacy opportunities for citizens to participate in.

Work in partnership with Urban Forestry staff to ensure that the downtown canopy remains sustained and to work with downtown stakeholders regarding concerns in the public right-of-way

Only to help provide grants for parks, trails and recreational programs

3) What do you feel are the most important benefits of trees to the community?

Generally make nice outdoor spaces when located and installed appropriately.

While all of these are very important, my focus is on the need for more trees for the health and well-being of our community (for humans and wildlife). I especially follow the research about wellness on school campuses (i.e. views of nature from windows improve test scores, access to trees at recess improve health, provide shade on campuses, etc.

Caring for trees, planting them, pruning them -- all opportunities for civic engagement. Urban Forestry volunteers become stakeholders in their city, and are more engaged with the city, community, and their neighbors.

4) Which of the following concerns, if any, do you have about Vancouver's urban forest? (Choose all that apply)

I am not deeply involved with many of the areas that these questions address so I don't know the level of need. However, I question the ability of any organization to be able to set goals without looking at the base inventory of trees that are already present, the percentages of land available to plant trees without have conflicts with other urban necessities such as residential, commercial, retail land, recreational fields and other uses. Ie. how much of a percentage of the land in the city is available for trees which would dictate the maximum urban forest canopy percentage.

Preservation of existing trees need to strongly consider the potential hazards to the public.

Maybe this is happening, but a concerted effort to invest in trees for neighborhoods who are more lacking than others in terms of their tree canopy—kind of like an equitable strategy/approach to get neighborhoods who need trees most prioritized for planting.

more collaboration with the development community

The Cities current tree code and enforcement by the urban forester forces planting of too many trees in a small area of a development, as well as planting trees that are not always appropriate for the situation.

While all of these may play a role in the future of the program, ensuring that the staff and budget for the program is a MUST! This program has a proven track record of success and there is opportunity to build to capitalize on expanding partnerships. Wouldn't it be great if there was a staff person dedicated to working with the area school districts to expand tree plantings, education and hands-on stewardship opportunities at/with schools. These programs are really impactful to students and the campuses.

we love to support the Old Apple tree festival

If we recognize that trees provide a public benefit, then tree stewards need more public support. As new pests arrive and climate disasters occur more frequently (heat waves, ice storms), we need more funding/resources to support property owners with the burden of tree stewardship. (Tree care, replacement, planting.)

5) We'd love to know more about how you have helped support Vancouver's urban forest. Which of the following activities have you taken part in? (Choose all that apply)

As a consulting arborist, I work with private developers to implement planning to meet the code aspects on the land development.

Design of sites and preservation of existing trees where suitable.

we did a tree canopy walk with Urban Forestry leading, and it was great!

We have done presentations for the tree stewards program.

Have had UF in my classroom many times to share info with students and have attended field trips to plant trees with my students.

my involvement has really been more with shrubs, mulching, smaller plants and a few smaller trees in a public space

Personally, I have worked at a few volunteer work days over the years. I also try to connect partnerships with the Urban Forestry program, such as school focused plantings.

Columbia Springs is a partner of City of Vancouver Parks, and helps steward approximately 100 acres of urban forest

Worked with Vancouver UF in the past. Currently work for contractor (Friends of Trees) organizing tree planting and tree care events.

Only to help provide flowers in Esther Short Park

6) Which of the following statements best summarize your priorities and views, when it comes to Vancouver's urban forest? (Choose all that apply)

As a private arboricultural consultant that does not live in the City, I am not completely aware of the tree canopy coverage in Vancouver but have always thought that Urban Forestry could be a more important aspect for the City. However, I have been very impressed with the progress that they are making!

Improvements can be made to existing requirements to allow more flexability in preservation of existing trees while integrating them into proposed development. Conflicting needs to meet GMA goals and tree conservation while providing affordable housing.

Safety, liability and considerations for balancing the city's development/growth needs (residential, commercial, industrial) vs. tree preservation and planting goals.

There is great value to an urban forest, however, if code forces planting of trees that are innapropriate or too densely planted, in the long run, they will be removed and the goals of an urban forest will not be met.

Development should only be required to plant trees/species where it makes sense. Planting douglas firs in a 10' residential setback is not smart, nor should one person at the City have the power to require it. 30 tree units is a great goal for a City wide program, but does not work on every site and to force developers to plant trees in areas that do not make sense will ultimatly result either in damage or the removal of the tree later.

expand the use of non-native evergreens that may address development code requirements

I live in Battle Ground, so not overly familiar with the work in Vancouver

7) In your opinion, what are the most important tree-related goals that the City should consider? (Choose up to three responses)

Not Applicable

8) Do you have any examples of cities or programs that have developed innovative approaches to sustainable urban forest management? For example, a community that has innovative incentives for developers to preserve trees during development projects?

I do believe that the City's approach to trees within development projects is very realistic with the end goal of having the development have, eventually, a canopy coverage that will help the City meet its canopy goal in the future. So many communities tend to lean toward preserving mature trees instead of planning to replace trees on a ongoing basis. Mature trees are important to retain if they are healthy and can be retained successfully without jeopardizing their future stability and health.

From the developer's standpoint, this is a great question. There should be more incentives and code flexibility to encourage tree preservation. Density transfer provisions focused on tree retention rather than just critical areas is an idea. Tree bank similar to how wetland or Oregon White Oak banks work is another idea.

Density bonuses or density transfer for saving trees could potentially give developers more incentive to save trees. Additionally, adjusting the requirements to require a appropriate number of trees and appropriate species of trees to be planted would provide a better long term benefit.

Metro in Portland has a Nature in the City grant program to support local partners to add more nature to their sites. This would be very beneficial here!

Puget Sound Urban Tree Canopy

Rose Village NA; ABC, Inc.

I do not know of any programming that has been successful but I would think that financial incentives would be the best route.

Reed College

Lake Oswego

Vancouver, WA is a leader

Vancouver Urban Forestry has developed a responsible, sustainable urban forestry program that both proactively supports and responds to the needs of the community.

I saw on the news not too long ago information about a company that was working with mostly homeonwers (I think) to plant trees and earn income for the carbon offset from larger companies that needed to mitigate their carbon usage. I don't know if it would apply to cities for planting trees for the city and to use the income recieved for the business use.

9) Is there anything else you would like to share with the Urban Forestry team?

If I can help review a proposed Urban Forestry Plan, I will be happy to do so.

Thank you! You have been great to work with.

We look forward to continuing a great working relationship with the City's urban forestry team.

Jessica is such an amazing asset to your team. I can't speak highly enough of how she goes over and above to connect with my classroom and students and to provide opportunities for them to experience UF and the value of Trees. She has been working with me in this capacity for over 10 yrs!

Thank you for your good communication with our company and we feel heard if we have a suggestion

Thanks

I'd like to see the development code (such as setbacks) be more in inline with tree requirements. For example 5' buffers requiring trees is not sufficient space for tree planting. Either reduce the tree requirement or increase the buffer width.

I am personally and professionally very grateful for the UF team and the amazing work they do in our community. Imagine what we could do if there was an increase in funding and staffing to meet ambitious climate oriented goals? Thanks to Charles, Nick, Jessica and Jessie! Dedicated professionals:)

Thanks for all you do. It is wonderful to be in Partnership with y'all.

i would like to see more utility friendly trees planted under overhead utility lines in newly developed areas

love the Old Apple tree festival

Develop a map of invasive tree "hot spots". Give to NA's.

I really appreciate the UF team and the work that you do. I do think that there could be a larger focus on native trees and evergreen shrubs. The Climate Framework indicates that natives are to be prioritized and while exotic trees are nice, they provide little in the way of habitat and food sources for birds and insects. 60% of native birds nest in evergreen shrubs many of which grow to be 12–15 feet tall anyway and could very easily replace some trees in some situations and still provide many of the benefits of a tree. Happy to talk on this more with folks!

Columbia Springs would like to elevate the City's plan and messaging through our own platform, which reaches 6000-8000 students annually.

APPENDIX H. CONSIDERATIONS FOR APPRENTICESHIP AND YOUTH PROGRAMS

Urban forestry plays a vital role in maintaining the health and sustainability of urban environments. To promote awareness, engagement, and skill development in the field of urban forestry that aligns with the goals to increase canopy cover in Vancouver, the following recommendations for an Urban Forestry Apprenticeship Program and Youth Program are provided for the City's consideration. This appendix aims to provide an overview of these programs, their objectives, activities, and the benefits they offer to participants and the community at large.

Urban Forestry Apprenticeship Program

The Urban Forestry Apprenticeship Program is designed to provide hands-on training and mentorship to individuals interested in pursuing a career in urban forestry. The program focuses on developing technical skills, enhancing knowledge of tree care and management, and fostering an understanding of the importance of urban forests in mitigating environmental challenges.

Objectives of the Urban Forestry Apprenticeship Program

The key objectives of the Urban Forestry Apprenticeship Program include:

- a) Equipping participants with practical skills in tree planting, pruning, maintenance, and removal techniques.
- b) Enhancing knowledge of urban forestry principles, including tree species identification, ecosystem services, and urban tree management.
- c) Providing apprentices with opportunities to work alongside experienced arborists, urban foresters, and other professionals in the field.
- d) Promoting environmental stewardship and raising awareness about the importance of urban forests for climate resilience, air quality improvement, and biodiversity conservation.

Program Activities

The program encompasses a range of activities to achieve its objectives:

- a) Classroom and field-based training: Apprentices participate in both classroom sessions and field-based activities to gain theoretical knowledge and practical skills. These sessions cover topics such as tree biology, planting techniques, pruning methods, and tree risk assessment.
- b) Hands-on experience: Apprentices work alongside skilled professionals in urban forestry, engaging in tree maintenance, inventorying, and tree health assessments.
- c) Workshops and seminars: Experts from the field conduct workshops and seminars to provide additional insights into specific areas of urban forestry, such as urban tree inventory management systems or green infrastructure planning.
- d) Community engagement: Apprentices engage with local communities by organizing tree planting events, educational outreach programs, and workshops to promote the value of urban forests.

Youth Program

The Youth Program aims to engage and inspire young individuals to develop an interest in urban forestry, foster a connection with nature, and encourage environmental responsibility. By targeting youth, the program aims to create a generation of environmentally conscious citizens who actively contribute to the sustainable development of their communities.

Objectives of the Youth Program

The primary objectives of the Youth Program are as follows:

a) Instilling environmental awareness: The program educates young participants about the importance of urban forests, climate change, and the role trees play in mitigating environmental challenges.

- b) Developing skills and knowledge: Through hands-on activities, workshops, and field trips, the program enhances the participants' understanding of urban forestry concepts and techniques.
- c) Encouraging civic engagement: The program encourages youth to actively participate in tree planting initiatives, community cleanup campaigns, and other environmentally focused projects.
- d) Fostering leadership and teamwork: By engaging in group activities and collaborative projects, participants develop leadership skills, teamwork abilities, and a sense of community responsibility.

Program Activities

The Youth Program can employ various activities to achieve its objectives:

- a) Environmental education sessions: Through interactive workshops and presentations, participants learn about topics such as tree biology, urban ecology, and the importance of green spaces.
- b) Tree planting and maintenance: Youth engage in tree planting activities to actively contribute to the greening of their communities. They also learn about tree care and maintenance practices.
- c) Field trips and nature excursions: Participants visit local parks, nature reserves, and urban forestry projects to gain firsthand experience of the benefits of urban

The apprenticeship and youth programs can play a significant role in supporting a city's efforts in summer watering of trees. Watering is a critical aspect of maintaining the health and vitality of urban trees, especially during hot summer months when water stress is more prevalent. Engaging youth in tree watering initiatives not only ensures the well-being of the urban forest but also offers numerous benefits to the participants and the community at large.

1. Increased Community Involvement

Youth programs provide an avenue for young individuals to actively engage with their community and contribute to its well-being. Involving youth in summer tree watering initiatives fosters a sense of ownership and responsibility towards the urban environment. They develop a connection with the trees and understand the importance of their role in maintaining a healthy ecosystem. This increased community involvement creates a positive impact and promotes environmental stewardship among the youth.

2. Environmental Education

Youth programs can incorporate environmental education components. Participants can learn about the importance of urban trees, their role in mitigating climate change, and the benefits they provide to the community, such as improving air quality, reducing the urban heat island effect, and supporting biodiversity. Understanding the ecological significance of trees and the challenges they face during hot summer months enhances participants' knowledge and fosters a deeper appreciation for the urban forest.

3. Skill Development

Engaging youth in these programs allows them to practical skills related to proper watering techniques and tree care. They learn how to assess soil moisture, determine watering needs, and apply water efficiently. By working alongside arborists or experienced professionals, participants gain hands-on experience and develop a valuable skill set that can be applied in future environmental endeavors. These skills empower youth to actively contribute to urban forestry initiatives and become advocates for sustainable practices.

4. Collaboration and Teamwork

Tree watering programs offer opportunities for youth to collaborate and work in teams. They learn the importance of coordination, communication, and collective effort in achieving common goals. By working together to water trees, youth develop teamwork skills, build relationships, and

strengthen their sense of community. This collaborative experience encourages them to engage in other community-based initiatives and promotes a culture of collective responsibility.

5. Long-Term Impact

Involving youth in summer tree maintenance has long-term benefits for the city's urban forest. By empowering them with the knowledge and skills to care for trees, the program creates a generation of environmentally conscious citizens who can continue to contribute to tree care and preservation in the future. As these youth grow and take on leadership roles in their communities, they can advocate for sustainable urban forestry practices, support tree planting initiatives, and inspire others to act.

6. Public Awareness and Support

Involvement in summer tree watering programs can raise public awareness about the importance of tree care and the challenges faced by urban trees during hot seasons. Through their participation, youth become ambassadors for the urban forest, educating their families, friends, and neighbors about the significance of proper tree watering and the need for community involvement. This increased awareness can garner public support for urban forestry programs, leading to increased funding, volunteer participation, and overall community engagement.

In conclusion, youth and apprenticeship programs focused on tree care not only contribute to the health and vitality of urban trees but also provide valuable educational and developmental opportunities for the participants. By engaging youth in these initiatives, Vancouver can cultivate a sense of environmental responsibility, foster skill development, and promote long-term sustainability. The active involvement of youth in tree care activities creates a positive impact on the community and helps build a greener and more resilient urban environment.

APPENDIX I. PLAN IMPLEMENTATION SCHEDULE

Goal #1	Goal #2	Goal #3
Objectives	Objectives	Objectives
Strategies	Strategies	Strategies
Actions	Actions	Actions

Table 42. Plan implementation schedule

Table 42. Plan implementation schedule				
Goal 1: Proactively manage public trees, continue to grow and expand a healthy canopy to achieve the 28% citywide canopy goal, maintain public safety, and optimize urban forest benefits.	Short- term (0-5 years)	Mid- term (6-10 years)	Long- term (11-25 years)	Ongoing
1.1) Make data-driven management decisions.				
1.1A Update and maintain the public tree inventory.				
Action 1.1A.1 Utilize an asset management program to collect and manage public tree inventory data and regularly update the inventory. Begin by completing the parks inventory and start a street tree inventory.				
Action 1.1A.2 Complete the comprehensive street tree inventory and actively manage the data as changes occur.				
Action 1.1A.3 Analyze the public tree inventory data regularly to report on ecosystem services and benefits and to identify inequitable areas.				
Action 1.1A.4 Monitor and assess the public tree population for risk and tree pests/diseases.				
Action 1.1A.5 Develop incremental goals for street tree stocking levels after completing the street tree inventory.				
1.1B Utilize current and future canopy assessments.				
Action 1.1B.1 Update policies and design guidelines to preserve existing tree canopy cover (see Goal 3).				
Action 1.1B.2 Secure funding, prepare a scope of work, and complete an updated tree canopy assessment.				
Action 1.1B.3 Refine canopy goals and planting priorities as necessary.				
1.1C Stay current with industry research, tools, technology, and innovation.				
Action 1.1C.1 Attend training events, maintain understanding of industry research and innovation, and effectively implement data management solutions to their full potential.				
1.2) Sustainably manage the public tree population.				
1.2A Align staffing levels with the needs of the urban forest and the communit	у.			
Action 1.2A.1 Identify and finalize members for an interdepartmental green team or similar and establish meeting intervals and team objectives.				
Action 1.2A.2 The interdepartmental green team should meet regularly to address workflows, communications, and information sharing.				
Action 1.2A.3 Tree managing staff should engage in City department planning such as updates to the Comprehensive Plan and Climate Action Framework.				
Action 1.2A.4 Evaluate staffing needs and submit budget requests for additional staff when service demands and the needs of the urban forest exceed capacity.				
Action 1.2A.5 Explore the development of an Urban Wood Reuse Program.				

Goal 1: Proactively manage public trees, continue to grow and expand a healthy canopy to achieve the 28% citywide canopy goal, maintain public safety, and optimize urban forest benefits.	Short- term (0-5 years)	Mid- term (6-10 years)	Long- term (11-25 years)	Ongoing
1.2B Establish and implement a proactive pruning cycle and management pro	gram for		ained tree	es.
Action 1.2B.1 Optimize management of the city's street (right-of-way) trees to increase carbon sequestration, resilience to extreme events, support overburdened communities and consistent with anti-displacement best practices and ensuring equitable distribution of benefits, risk and resilience.				
Action 1.2B.2 Optimize management of the city's natural lands to increase carbon sequestration and support resilience to extreme events, consistent with anti-displacement best practices and ensuring equitable distribution of risk and resilience.				
Action 1.2B.3 Continue the 7-year pruning cycle for Park sites and include all public facilities such as cemeteries, stormwater facilities, community centers, and police and fire stations to address equity and climate resilience.				
Action 1.2B.4 Build off successes of the City's Park Pruning cycle to develop a proactive street tree maintenance program on a 7-10 -year cycle like other communities to address equity and climate resilience by working with adjacent property owners.				
Action 1.2B.5 Evaluate proactive maintenance programs for public facilities and street trees.				
Action 1.2B.6 Evaluate the effectiveness of contract crews and explore the feasibility of developing an in-house tree crew rather than relying heavily on contract crews. Consider the insurance implications and identify the threshold when it would be more economical to have an in-house tree crew.				
Action 1.2B.7 Focus on streamlining proactive tree maintenance and strive for a 7-year cycle for public facilities and street trees. Explore the feasibility of updating codes to transition from the adjacent property owner being responsible for street tree maintenance.				
Action 1.2B.8 Develop in-house tree crews and rely on contractors for special projects and to supplement staff if or when the City identifies a practical need.				

Goal 1: Proactively manage public trees, continue to grow and expand a healthy canopy to achieve the 28% citywide canopy goal, maintain public safety, and optimize urban forest benefits.	Short- term (0-5 years)	Mid- term (6-10 years)	Long- term (11-25 years)	Ongoing
1.2C Ensure newly planted trees receive post-planting care and young tree tra	aining.			
Action 1.2C.1 Establish maintenance plans for new plantings.				
Action 1.2C.2 Plant trees using the right tree, right place approach.				
Action 1.2C.3 Educate the public and gather local community input on public tree plantings.				
Action 1.2C.4 Acquire commitments from the local community and property owners to water new trees.				
Action 1.2C.5 Utilize local partners and existing programs for the care of young public trees.				
Action 1.2C.6 Develop a summer green workforce tree care program to include watering, mulching, and pruning new trees through the establishment period to sustain a high survival rate for trees planted. See Appendix H of the Technical Report for considerations.				
1.3) Establish a strategy for increasing tree canopy cover through City and 1.3A Formally update the Tree Planting Initiative .	public eff	orts.		
Action 1.3A.1 Finalize tree canopy goals (short- and long-term) and priority planting areas and themes such as areas that score 8 or above on the WA Health Disparities Map and/or areas experiencing severe urban heat island effects.				
Action 1.3A.2 Establish a citywide tree planting plan with strategies.				
Action 1.3A.3 Identify additional local community partners for planting, maintenance, and funding support.				
Action 1.3A.4 Continue to partner with Parks and Schools to replant trees and reduce unnecessary turf areas.				
1.3B Increase citywide tree canopy cover.				
Action 1.3B.1 Plant trees to support an equitable expansion of the canopy with a focus on areas with low urban tree canopy, high susceptibility to urban heat island effects, areas of poor air quality, and areas with higher percentages of low-income people and communities of color.				
Action 1.3B.2 Replant climate-resilient trees where public trees were removed as appropriate.				
Action 1.3B.3 Retain and preserve existing tree canopy through education, outreach, design review, and inspections to ensure low-income populations and overburdened communities understand and receive the benefits trees provide.				
Action 1.3B.4 Identify additional opportunities beyond services city is currently providing for preserving and expanding tree canopy on private and city property to ensure equitable distribution of urban forest benefits to all Vancouver residents.				

Goal 1: Proactively manage public trees, continue to grow and expand a healthy canopy to achieve the 28% citywide canopy goal, maintain public safety, and optimize urban forest benefits.	Short- term (0-5 years)	Mid- term (6-10 years)	Long- term (11-25 years)	Ongoing
1.3C Grow a sustainable and resilient urban forest.				
Action 1.3C.1 Monitor and analyze the inventory to inform tree species selection for new plantings and update the Approved Tree List as needed.				
Action 1.3C.2 In support of the City's goal to reach 28% canopy cover by 2047, require long-lived, large form, drought-tolerant, climate-resilient native plantings (as feasible) in parks and other public properties to maximize carbon sequestration.				
Action 1.3C.3 Mimic natural design or sustainable landscape design in new public development projects.				
Action 1.3C.4 The City should retain remnant parcels as carbon sinks by planting with native conifers or climate adaptive conifers.				
Action 1.3C.5 Purchase parcels citywide to increase carbon sequestration and support resilience to extreme events, consistent with anti-displacement best practices and ensuring equitable distribution of risk and resilience.				
Action 1.3C.6 The City should acquire more parcels as part of the Open Space District for public use and to be used as carbon sinks to address climate, health, and equity.				
Action 1.3C.7 Plan for and manage Emerald Ash Borer which was identified in Oregon in June 2022.				
Action 1.3C.8 Strengthen storm and disaster preparations, communications, mitigation, and recovery strategies, protocols, and mechanisms.				
Action 1.3C.9 Complete the WA Urban Forest Pest Readiness Playbook Assessment to identify current and future management strategies.				
Action 1.3C.10 Develop and implement a tree assistance program to address hazardous and invasive trees on public and private property.				
Action 1.3C.11 Develop a working group to address English ivy on public and private property, develop a plan, and begin implementation.				
Action 1.3C.12 Continue implementing English ivy management with community support on public and private property.				
Action 1.3C.13 Continue to work towards eradication of English ivy from tree canopies and from the landscape on both public and private property.				
Action 1.3C.14 Collaborate with local tree nurseries to explore opportunities for expanding tree species options.				
Action 1.3C.15 Continue to support and budget for professional training and certifications.				

Goal 1: Proactively manage public trees, continue to grow and expand a healthy canopy to achieve the 28% citywide canopy goal, maintain public safety, and optimize urban forest benefits.	Short- term (0-5 years)	Mid- term (6-10 years)	Long- term (11-25 years)	Ongoing
1.4) Effectively manage tree risk.				
1.4A Develop a Risk Tree Management Plan.				
Action 1.4A.1 Develop a scope and secure funding to complete a Risk Tree Management Plan for public trees.				
1.4B Institute a formal rotation for risk tree inspections.				
Action 1.4B.1 Update public tree inventory and monitoring protocols based on the Risk Tree Management Plan.				
Action 1.4B.2 Apply industry standards and best practices and implement the Risk Tree Management Plan.				

GOAL 2: Achieve environmental justice through a partnership with the City and its residents to improve well-being, human health, local economies, and urban forest sustainability.	Short- term (0-5 years)	Mid- term (6-10 years)	Long- term (11-25 years)	Ongoing
2.1) Create an urban forestry public outreach program that addresses all co	ommunitie	es.		
2.1A Maintain Tree City USA recognition.				
Action 2.1A.1 Maintain accurate records and conduct Arbor Day Celebrations to continue to receive the Tree City USA status from the Arbor Day Foundation.				
Action 2.1A.2 Retain the consecutive recognition as a Tree City USA city and strive for continual receival of the Growth Award and Sterling Tree City USA from the Arbor Day Foundation.				
Action 2.1A.3 Seek additional accreditation beyond Tree City USA such as Evergreen Community and American Public Works accreditation.				
2.1B Maintain active communications with diverse audiences.				
Action 2.1B.1 Finalize a robust Community Outreach Strategy and a communications plan to garner support, spur behavior change, and increase participation from the community. Increase outreach and marketing for improving and expanding tree canopy for the public good by utilizing a designed marketing campaign by professional firms to seek public behavior change.				
Action 2.1B.2 Aligned with the Community Outreach Strategy, develop direct outreach and education programs informing the community on the value of trees, and roles and responsibilities, to under-represented communities; property renters, non-English speaking, and others.				
Action 2.1B.3 Aligned with the Community Outreach Strategy, update the City's website with information in the Plan and share information regularly with the public through other mediums.				
Action 2.1B.4 Aligned with the Community Outreach Strategy, gather public input and feedback regularly to inform future messaging, programs, and events.				
2.1C Provide education and training workshops.				
Action 2.1C.1 Use the Outreach Strategy (Action 2.1B.1) to finalize topics, audiences, approach.				
Action 2.1C.2 Identify existing resources and tools for workshops.				
Action 2.1C.3 Establish and maintain partnerships with community-based organizations that are inclusive of the diverse demographics of the city.				
Action 2.1C.4 Support youth education of environmental topics, engage schools with Arbor Day events.				
Action 2.1C.5 Lead or support at least one training or education material annually.				
2.1D Implement program services through the lens of environmental justice.				
Action 2.1D.1 Use the Outreach Strategy (Action 2.1B.1) to identify local community groups and partners that represent all neighborhoods.				
Action 2.1D.2 Identify low canopy neighborhoods for targeted engagement.				
Action 2.1D.3 Develop strategies to remove barriers to participation for all community members. Examples of barriers include ADA communications compliance, internet access, childcare, languages, and transportation needs.				

Short- term (0-5 years)	Mid- term (6-10 years)	Long- term (11-25 years)	Ongoing
rban Fore	stry Comn	nission and	d local
	term (0-5 years)	term term (0-5 (6-10 years) years)	term term term (0-5 (6-10 (11-25

GOAL 3: Strengthen policies for preserving the environmental benefits, management, and the character of Vancouver's urban forest.	Short- term (0-5 years)	Mid- term (6-10 years)	Long- term (11-25 years)	Ongoing
3.1) Strengthen policies for protecting the urban forest.				
3.1A Protect trees during construction projects.				
Action 3.1A.1 Continue to review tree and hardscape conflicts and integrate alternative solutions that preserve trees where feasible.				
Action 3.1A.3 Continue to perform construction project inspections to ensure proper tree protection requirements are implemented and maintained.				
3.1B Apply a no-net-loss approach to tree canopy cover.				
Action 3.1B.1 Explore a fee-in-lieu of payment for the value of any trees removed from the development site and not planted back into the landscape. Consider fee schedules based on the type of project, the number of trees, the size of trees, Heritage Trees, among other considerations.				
3.1C Use tree canopy assessment data for tree management policies.				
Action 3.1C.1 Evaluate causes for canopy loss and gain from the 2021 assessment and future assessments to inform updates to policies and regulations.				
Action 3.1C.2 Update policies, regulations, standards, and plans to include the long-term and intermediate citywide and local canopy goals.				
$3.1\mathrm{D}$ Update and strengthen tree-related ordinances, design standards, and p	rotocols.			
Action 3.1D.1 Evaluate city codes in an effort to increase tree preservation and create space for existing trees during the development process as well as space for new larger stature trees to be planted both on private property and within the public right-of-way.				
Action 3.1D.2 Establish requirements for minimum soil volumes for new tree planting that align with industry standards and best practices.				
Action 3.1D.3 Explore opportunities to update City standards such as the Transportation Standards to increase growing space that supports large-canopied trees.				
Action 3.1D.4 Revisit Open Space District design standards to reduce and or limit high maintenance turf area to increase possible planting area within the Open Space District and to maximize ecosystem services while still providing active play areas.				
Action 3.1D.5 Identify street corridors where roadway widths can be reduced and remove pavement and plant trees and landscape that reduce reflected heat, remove impervious area, reduce future repaving needs, and provide traffic calming elements.				
Action 3.1D.6 Codify TreeCAP Program as part of new development instead of a voluntary program to ensure all new development is fulfilling their role in urban forest management.				
Action 3.1D.7 Require Silver Leaf achievement in the City's TreeCAP program, which sets a goal of 15% tree canopy cover for commercial development and 33% tree canopy cover for single-family residential development.				

GOAL 3: Strengthen policies for preserving the environmental benefits, management, and the character of Vancouver's urban forest.	Short- term (0-5 years)	Mid- term (6-10 years)	Long- term (11-25 years)	Ongoing		
3.1D Update and strengthen tree-related ordinances, design standards, and protocols.						
Action 3.1D.8 Explore the feasibility of incentivizing Gold Leaf achievement in the City's TreeCAP program, which sets a goal of at least 17% tree canopy cover for commercial development and at least 35% tree canopy cover for single-family residential development.						
Action 3.1D.9 In support of the City's goal to reach 28% canopy cover by 2047, incentivize long-lived, large form, drought-tolerant, climate-resilient native plantings and retention of the mature canopy in existing and new developments.						
Action 3.1D.10 Strengthen and enforce code to protect critical areas such as contiguous forest areas, fish and wildlife habitats, frequently flooded areas, geologically hazardous areas, and special ecosystems.						
Action 3.1D.11 Identify public areas and plant climate resilient trees where they can be integrated into stormwater management systems.						
Action 3.1.D.12 Encourage the use of vegetated and treed rooftop and vertical spaces to reduce the urban heat island as part of new development especially in the downtown core.						
3.2) Improve workflows and operations for sustainable urban forest management.						
3.2A Enforce tree regulations.						
Action 3.2A.1 Inspect final landscape installation to ensure development projects are implemented as designed to meet code and contribute to environment.						
Action 3.2A.2 Explore requiring a landscape bond or escrow for new tree planting as part of development or inspecting all new development prior to occupancy and 3 years later to ensure new trees survived the establishment period and require replanting as needed.						
Action 3.2A.3 Capture trees that are not planted as part of the VMC 20.925 and VMC 12.04 due to site constraints.						
Action 3.2A.4 Increase costs for street tree permits to align with the costs for administration and the needs of the urban forest.						
Action 3.2A.5 Continue to require the use of industry standards and best practices for the maintenance of public trees and encourage / educate the public to conduct similar practices on private trees.						
Action 3.2A.6 Update the Street Tree Manual based on changes to City tree regulations, standards, and protocols.						
Action 3.2A.7 Continue to administer and review tree permits.						
Action 3.2A.8 Update the process for development and final acceptance of new development projects to require Urban Forestry to complete a final inspection to ensure all projects are implemented as designed regarding tree requirements and quality tree species.						

URBAN FORESTRY MANAGEMENT PLAN DRAFT – TECHNICAL REPORT

City of Vancouver, WA
August 2023







