Establishing the Roots of Urban Forestry in Lakewood, WA:

An Implementation Guide

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Positionality Statement

Our team would like to acknowledge the inherit privilege and biases that we hold as graduate students at the University of Washington Evans School of Public Policy and Governance. We are each from areas outside of Washington State, with two authors from the United States, specifically Illinois and Georgia, and two authors from the Dominican Republic and China. These identities and experiences have shaped how we approach this project, and we acknowledge that our assumptions and inherent biases influence the outcomes of any work we produce. We are committed to questioning these assumptions and combating our biases through intentional conversations about race, gender, and equity, as well as through the careful development of research questions and methodologies.

We recognize that our team's identities do not represent the entirety of the City of Lakewood's community. We attempted to center Lakewood's goals and did our best to incorporate a diversity, equity, and inclusion lens throughout our report. We understand that as graduate students living and studying in Seattle, we are outsiders to the community of Lakewood, and we did our best to respect this community.

Lastly, we approached this project as consultants who are not employed by the City of Lakewood. We present this report and our recommendations with the hope that equity will be centered in the use of any of our materials.

Land and Labor Acknowledgements

We would like to acknowledge that the University of Washington is on the traditional land of the first people of Seattle, the Duwamish People past and present. We honor with gratitude the land itself and the Duwamish Tribe. We strive for public service in community and recognition of their ancient heritage with deep gratitude to the original caretakers of this land, many who are still here.

We recognize that this land, which was taken from native peoples, was used to exploit and indenture people of color. We acknowledge that enslaved and indentured peoples were forced into unpaid and underpaid labor in the construction of this country, state, and city. To the people who contributed this immeasurable work and their descendants, we acknowledge their indelible mark on this city.

City of Lakewood's Indigenous People and Lands Acknowledgement

Every community owes its existence and vitality to generations from around the world who contributed their hopes, dreams, and energy to making the history which led to this moment. The City would like to recognize that we are on the lands of the Nisqually People and acknowledge the history of dispossession that allowed for the growth of our community. We offer respect to the Nisqually People and their Elders, past, present, and emerging. We recognize our responsibility to value all people and are committed to equitably serving all people in our diverse community.

Meet the Team

Jamie Ziah

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Zihao Xu

Zihao is a second-year international student earning his Master of Public Administration at the Evans School of Public Policy and Governance. Zihao completed his undergraduate education in Beijing, China where he obtained a bachelor's degree in Finance along with a dual degree in English. His expertise spans across international and cross-cultural communications, consultancy in environmental policy and financial evaluation, as well as investment advisory. As part of his academic journey at the Evans School, he interned as a policy analyst at an education policy-focused consulting firm.

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Marlyn is a second-year masters candidate in Public Administration, and she is the Vice Chair of the Evans School Student Organization. Marlyn is a Fulbright Scholar from the Dominican Republic. She is also a Chevening alumni and holds a Master of Science in International Development from the University of Edinburgh. Marlyn's professional experience and interests involve policy analysis, project management, and evaluation work in the public and nonprofit sectors, especially around development, gender, youth, and education.

Alla Smilnak Cross

Alla is a second-year masters candidate at the Evans School of Public Policy and Governance. She is the Co-Chair of the Evans Student Budget Council and the Vice Chair of the UW Chapter of the International City/County Management Association. Alla served as the UW ICMA Local Government Finance Fellow in the City of Burien. Originally from Southeast Georgia, Alla lived in Nashville, TN for ten years before moving to Seattle. Her professional and policy interests include public financial management, performance management, policy analysis, and anti-violence and gender equity policy.

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Abbreviations and Glossary

Throughout this guide, there are several concepts that share similarities but have distinct differences that are crucial to differentiate and understand:

What is an Urban Forest?

An Urban Forest includes the forest resources available in urban areas, offering various benefits that contribute to the overall quality of life in cities. Urban forests include public and private properties, public community spaces, street trees, and yards (Dwyer et al., 2003; City of Issaquah & Forterra, 2020; City of Seattle, 2020).

And how is that different from Urban Forestry (UF)?

Urban Forestry refers to the planning and management of trees and forest resources in and around urban community ecosystems, including street trees and urban woodlands. Urban Forestry also recognizes the physiological, sociological, economic, and aesthetic benefits associated with trees (Konijnendijk et al., 2006; Konijnendijk et al., 2005).

Local governments can implement Urban Forestry Programs **(UFP)** and Urban Forest Management Plans **(UFMP)** to manage forest resources in cities. UFPs and UFMPs can establish clear goals, activities, financial resources, and outcomes to start, grow, and maintain a sustainable urban forest.

Other key concepts and abbreviations included in this report:

- **BIPOC:** Black, indigenous, and people of color
- **CBO:** Community-based organizations
- **ECCC:** Energy and Climate Change Chapter of the City of Lakewood's Comprehensive Plan
- **GIS:** Geographic Information System
- **M&E:** Monitoring and Evaluation
- **ROW:** Right-of-Way
- **UF:** Urban Forestry
- **UFMP:** Urban Forest Management Plan
- **UFP:** Urban Forestry Program
- **UTC:** Urban Tree Canopy or canopy cover refers to the percentage of the city that's covered by trees from an aerial view.

Executive Summary

Introduction

The City of Lakewood updated the Energy and Climate Change Chapter (ECCC) of its Comprehensive Plan in 2021. The ECCC outlines specific goals and tasks to address climate change impacts, energy use, and greenhouse gas emissions. The city's ECCC update includes two main urban forestry goals: (1) increasing Lakewood's urban tree canopy cover from 26% to 40% by 2050 and (2) developing and promoting an urban forest management plan in the near-term (i.e., beginning between 2021 and 2025). This report provides an urban forestry program (UFP) implementation guide for the City of Lakewood.

Research Question and Methods

To best develop an implementation guide for the City of Lakewood, we aimed to answer the following question:

> How should the City of Lakewood structure a UFP to meet its environmental goals, considering existing city frameworks, climate change implications, and financial constraints?

We used a mixed methods approach for our research, using qualitative and quantitative data from sources in private, public, and nonprofit sectors, as well as academic papers. We primarily used benchmarking case studies conducted on three cities in western Washington state that have established UFPs. In addition to the case studies, we analyzed secondary data on the city's tree canopy and relevant urban forestry expenditures. We also conducted semi-structured interviews with key actors to understand how other cities implemented UFPs in Washington.

Literature Review and Case Studies

Our literature review explores the importance of urban forestry and its impacts on climate, environment, and public health. The benefits of urban forests include heat mitigation, reduction in air pollution, energy savings, carbon sequestration and storage, biodiversity, stormwater management, and public and social support spaces. The literature review also provides an overview of best practices for tree selection, planting, maintenance, and community engagement approaches for the sustainable and equitable development of urban forests.

Roots of Effective Urban Forestry Programs

Through our research, we identified three foundations of sustainable UFPs: comprehensive resource assessments, community engagement, and administrative capacity. We used these foundations as our case study objectives and further delineated them into seven criteria that we used to analyze the existing UFPs and provide recommendations for Lakewood. Table 1 summarizes our key findings across the three objectives and seven criteria.

Table 1: Summary of Roots of Urban Forestry Program Analysis

Objectives	Criteria
Resource Assessment: UFPs typically begin by conducting a comprehensive resource assessment that includes gathering data on the urban forest's general and specific conditions.	**Tree Population Assessment:** Lakewood contracted a high-level analysis of the current tree canopy in 2022. However, many UFPs begin by conducting an additional on-the-ground assessment of current tree health before restoration, maintenance, or planting.
Community Engagement: Community participation is essential to the sustainability of UFPs as they rely on ongoing community support and involvement to thrive.	**Strategies:** The city can utilize many community engagement strategies to implement and manage a UFP, including hosting community meetings and conducting public surveys to gather feedback. Many cities construct volunteer systems, including a Forest Stewardship Program, to train community members to lead volunteer activities.
	Equity Considerations: All three of our case study cities emphasized equity considerations as a critical focus for their UFPs, with a commitment to finding ways to engage diverse populations and address environmental justice. Our report offers various ways the city can implement an equitable UFP.
Administrative Capacity: Creating capacity within the current city organizational structure through advisory boards, staffing, and financial resources is common among UFPs.	**Plan Updates:** Most urban forest management plans are updated every three to five years.
	City Departments: Each of the case study cities houses its urban forestry program within a different department or departments, reflecting variations in organizational structure and priorities. All cities have either an advisory board or a commission, which can be essential to prioritizing UFP activities.
	Staff: Lakewood could consider hiring a full-time administrator, utilizing existing employees, or contracting with AmeriCorps to support the program.
	Budget: UFP expenditures vary depending on the size and scope of the program. Potential funding sources for UFP activities include: • Reallocated revenue from storm and surface water utility fees • City Tree Fund • General fund revenue • Government and nonprofit partnerships

Recommendations

Based on our analysis, we developed four recommended actions for implementing a UFP in the City of Lakewood.

Recommendation 1:

Develop a mission, vision, and goals for urban forestry in the City of Lakewood.

We recommend the city develop mission and vision statements for urban forestry work. We have provided draft statements in Chapter 6 of this report. The city should also prioritize specific program goals and outcomes. We suggest the goals of forest health, tree population expansion, community engagement, equitable access to urban forest benefits, and sustainability.

Recommendation 2:

Complete a comprehensive resource assessment and begin restoration practices in the city.

The city should complete a comprehensive resource assessment before beginning urban forestry fieldwork. A thorough, on-the-ground evaluation will provide the city with essential data on the health of the city's urban tree canopy. An ISA Certified Arborist should complete the assessment. We detail additional fieldwork steps in Chapter 6 of this report.

Recommendation 3:

Develop a comprehensive community engagement strategy.

The city should develop a UFP that aligns with the interests and needs of Lakewood's community, as a successful UFP depends heavily on robust support and active participation from the people of Lakewood. We recommend two main strategies to involve the Lakewood community in developing and implementing an urban forestry program: community outreach and constructing a robust volunteer system.

Recommendation 4:

Create administrative capacity within the existing city organizational structure.

Based on the three case studies, Lakewood's current structure, and our research, we developed three alternative organizational structures the city can consider for carrying out UFP activities:

- Option 1: Develop a standalone Urban Forestry Advisory Board (UFAB) to oversee urban forestry activities in the city.
- Option 2: Lakewood's Parks and Recreation Advisory Board (PRAB) expands its responsibilities to include urban forestry priorities.
- Option 3: Hire a full-time program administrator instead of a standalone board or PRAB expansion.

Based on these organizational structures and the plan outcomes defined in Recommendation 1, we developed priorities and preliminary budgets for years one through five of the UFP.

This executive summary serves as a concise overview of our research, analysis, and recommendations. For a more comprehensive understanding and additional context, we encourage readers to refer to the full report. The full report provides an in-depth exploration of the findings and insights gathered throughout our research process.

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Chapter 1: Introduction

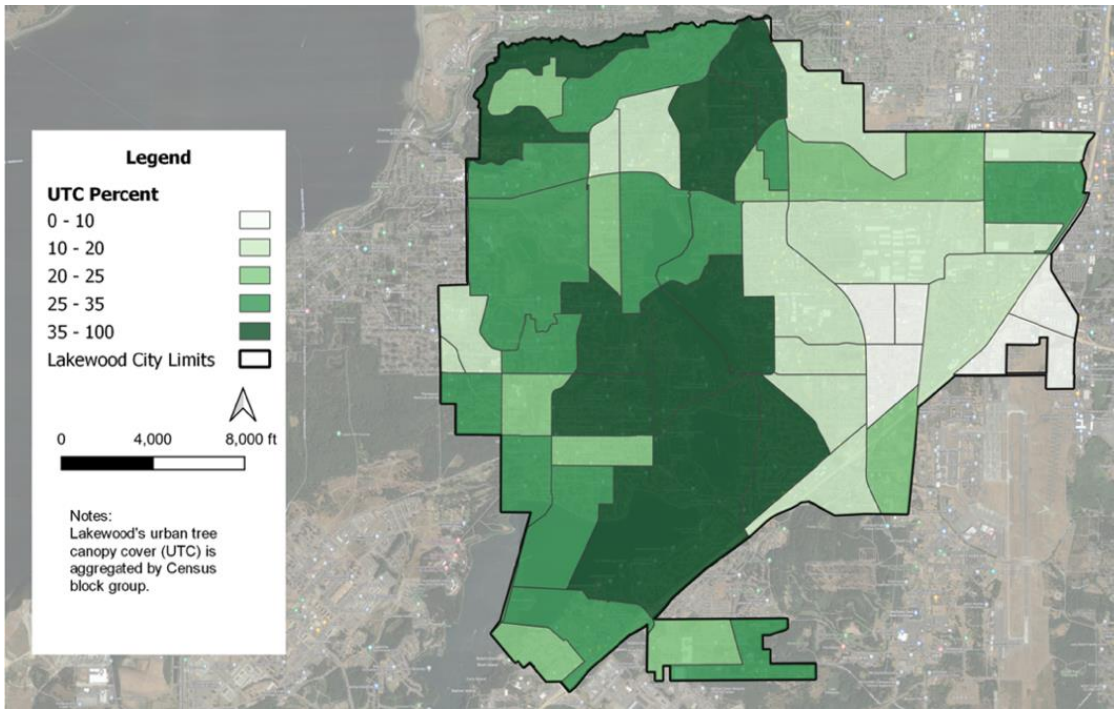
The City of Lakewood updated the Energy and Climate Change Chapter (ECCC) of its Comprehensive Plan in 2021. The ECCC outlines the city's specific goals and tasks to address climate change impacts, energy use, and greenhouse gas emissions. The city's ECCC update includes two main urban forestry goals: (1) increasing Lakewood's urban tree canopy cover from 26% to 40% by 2050 and (2) developing and promoting an urban forest management plan in the near-term (i.e., beginning between 2021 and 2025). In support of these goals, the city contracted the University of Washington Evans School Student Consulting Lab to develop this report, including an urban forestry program (UFP) implementation guide and preliminary budget for the first five years of official urban forestry activities. The following chapters include details on our research methods, findings, and recommendations for implementing a UFP in the City of Lakewood.

1.1 Background

Over the past several years, the City of Lakewood has actively worked towards achieving the goals outlined in its ECCC. In 2021, the city commissioned the Evans School Student Consulting Lab project titled *A Study on Climate Change Perceptions in Lakewood, WA.* The project focused on understanding climate change perceptions in the city and making recommendations for engaging citizens in climate change efforts (Thompson et al., 2022).

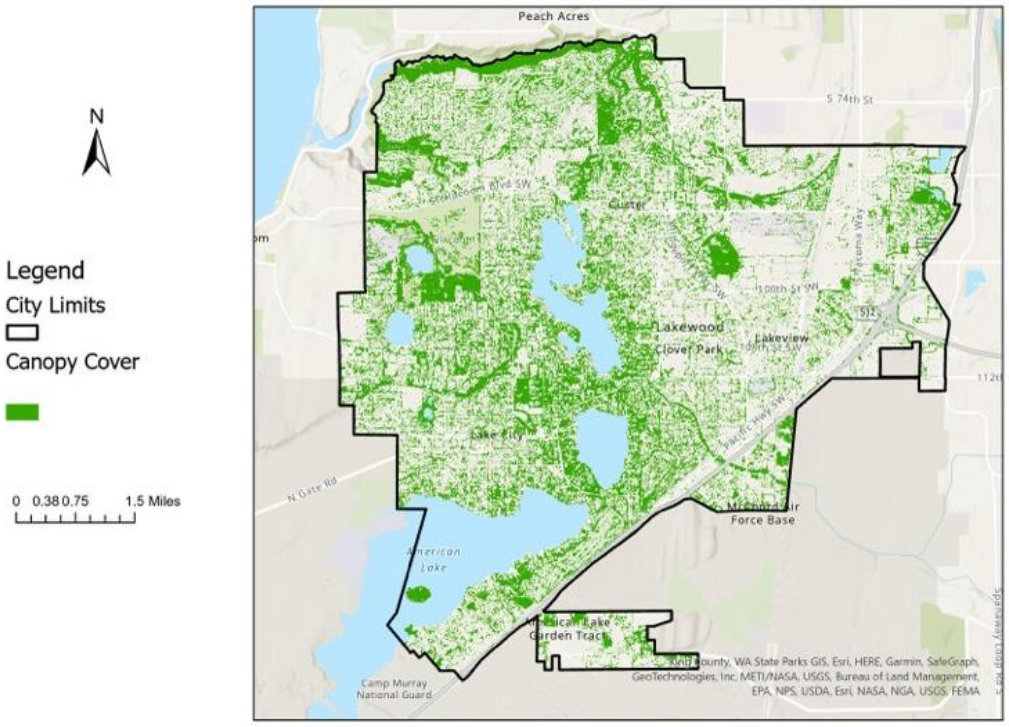
The city recently updated its municipal code related to preserving the city's urban tree canopy (UTC) and protecting significant trees. The Lakewood City Council adopted Ordinance 775 on November 7, 2022, and it went into effect on March 1, 2023. As part of this update, the city contracted PlanIT Geo to analyze the city's current UTC, which was estimated to be at 26.3%. Of the total UTC, 72% is on private land, and 28% is on public land (Peiffer et al., 2022). See Figure 1 for the distribution of UTC in Lakewood grouped by census blocks.

Figure 1: City of Lakewood – Current Tree Canopy Distribution (PlanIT Geo, 2022)



PlanIT Geo's analysis provides an aggregated view of the tree canopy data, using census blocks to simplify the data visualization and analysis (Peiffer et al., 2022). Figure 2 presents Lakewood's UTC using Google (n.d.) Insights Explorer data. Google's data offers a more detailed and granular depiction of the city's tree canopy compared to Figure 1. It provides precise information on the location of individual trees, allowing for a more comprehensive understanding of the distribution and extent of UTC in Lakewood.

Figure 2: City of Lakewood – Google (n.d.) Insights Tree Canopy Data



The city set an ambitious goal to increase UTC from 26% to 40% by 2050, resulting in a 14-percentage point increase and 1,500 acres of new canopy. PlanIT Geo estimates $1.2 million in additional benefits over the next 25 years, including lower energy costs due to lower surface temperatures and decreased stormwater maintenance resulting from trees intercepting and storing runoff, thus reducing the burden on stormwater systems (Peiffer et al., 2022).

The updated tree ordinance includes new regulations on removing and maintaining significant trees throughout Lakewood, particularly the Oregon White Oak (Ordinance No. 775, 2022). The Oregon White Oak is the only oak native to the state of Washington and is considered a priority species for conservation and management by the Washington Department of Fish and Wildlife (WDWF, 1998). The new regulations are crucial for the city to maintain and increase its tree canopy due to the Oregon White Oak's high population in the area. As outlined in the ordinance, other allowable activities include removing diseased trees and trees that present an imminent threat to properties with an approved tree removal permit, trimming guidelines and uses for commercial, industrial, multifamily, institutional, or other developments (Ordinance No. 775, 2022).

The city established a tree fund to collect donations and penalty fees related to regulations outlined in the ordinance. Funds can be used for purchasing, planting, and maintaining trees, as well as other urban forestry-related activities such as education programs and tree canopy monitoring. The city sought community feedback through a public comment process during the ordinance development. The public comment process and the

city's dedication to maintaining and preserving trees throughout the city renewed community interest in a UFP in the city.

The City of Lakewood's initiatives, such as establishing a long-term UTC goal and implementing preservation guidelines, provide valuable insight and inform our urban forestry implementation guide. Through the efforts of elected officials, city staff, and the larger Lakewood community, the city is part of an active and ongoing effort to become a climate-resilient community.

1.2 Research Question

The City of Lakewood aims to establish a sustainable approach to preserve existing trees, increase the current tree canopy, and implement best practices in urban forest management. The city requested an initial five-year implementation guide and budget to achieve this goal. This report examines the city's organizational structure, including its capacity to undertake new initiatives and collaborate across departments, as well as relevant regulations, codes, and ordinances to inform the design of the implementation guide. Based on the City of Lakewood's goals, we developed the following research question to guide our work:

> How should the City of Lakewood structure an urban forestry program to meet its environmental goals, considering existing city frameworks, climate change implications, and financial constraints?

To help answer this research question, we identified the following sub-questions to guide our research and recommendations:

- What is the current status of the City of Lakewood's tree canopy? What are the current challenges and opportunities for improving the city's tree canopy?
- What are the best practices and necessary components for a UFP in the City of Lakewood?
- What are the costs associated with developing and implementing a UFP?

1.3 Client Objectives and Deliverables

The city seeks an in-depth report outlining the necessary components for implementing a UFP in the city. This report aims to provide actionable steps for the City of Lakewood to implement the program and a detailed understanding of the financial commitment required for the UFP's first five years. Based on the city's objectives and our research questions, this report provides the following deliverables:

- analysis of current tree canopy status in the City of Lakewood, produced in collaboration with the City of Lakewood
- recommendations on management, evaluation, equity, and community engagement to develop and maintain a UFP; and
- recommendations for UFP structure in the first five years of implementation, including staffing, function, budget, and revenue recommendations.

1.4 Report Structure

We divided the remainder of this report into five chapters:

Chapter 2: Research Methods provides a detailed explanation of our research approach and the various tools we used to address our research question.

Chapter 3: Literature Review provides an overview of the literature that informed our research and analysis, including the benefits of urban forestry and management best practices.

Chapter 4: Case Studies provides an overview of the case studies we conducted to examine existing UFPs and assess best practices.

Chapter 5: Analyzing the Roots of Effective Urban Forestry Programs and Opportunities for Lakewood provides an analysis of the city's current tree canopy, fieldwork, community engagement, monitoring, and budgetary considerations.

Chapter 6: Urban Forestry Implementation Guide details the proposed implementation details for the UFP, including recommended resource assessment, community engagement strategies, city structures, and financial estimates.

Chapter 2: Research Methods

This chapter provides a detailed description of our research approach and the specific tools we used to answer our research question. We identified and analyzed qualitative and quantitative data from private, public, nonprofit, and academic sources through a mixed methods approach. The results from our research methods inform the analysis of the City of Lakewood's current canopy and context and the UFP implementation guide.

We applied diverse research methods to achieve our specific objectives. Our primary method was a benchmarking case study of Washington UFPs, specifically those in Seattle, Issaquah, and Vancouver. These case studies informed our analysis and recommendations for developing a UFP and estimating expenditures for the City of Lakewood. We also conducted a secondary analysis of tree canopy data and budget estimates produced by the City of Lakewood, nonprofits working in the environmental field, and the private sector. Finally, we conducted semi-structured interviews with key actors to understand other cities' processes for establishing their UFPs in the State of Washington.

2.1 Case Studies Approach

Several cities in Washington have implemented UFPs that are now at different stages of development. While some programs are still in their initial phases, others have progressed to more advanced stages of maturity. To design appropriate recommendations for Lakewood, we learned about how other cities are implementing their UFPs, how they got to where they are today, and the resources cities are investing in to take care of their public open spaces and tree populations. The case study cities were selected in consultation with our client.

We limited our case studies to western Washington State because of the shared environmental characteristics of the region and the framework provided by the Evergreen Communities Act and House Bill 1216. Therefore, all three cities are in the Pacific Northwest Region and share similar habitats and environmental characteristics. Each city is either in or near temperate rainforest ecosystems with common tree species like Douglas fir, Western Red Cedar, and Western Hemlock (Washington Forest Protection Association, n.d.).

We also based our selection on each city's performance in renowned indexes such as the American Forests' Tree Equity Score and the Arbor Day Foundation's Tree City recognition. The Tree Equity Score is a tool that measures "whether there are enough trees in a neighborhood for everyone to experience the health, economic and climate benefits that trees provide. Scores are based on tree canopy, surface temperature, income, employment, race, age, and health factors" (American Forests, 2021a, What do the Scores Mean section). Arbor Day's Tree City recognizes cities based on four core standards: 1) form a tree board or department; 2) establish a tree care ordinance; 3) maintain a community forestry program with an annual budget of at least $2 per capita; and 4) proclaim and observe Arbor Day. All four standards require a strong commitment to tree preservation (Arbor Day Foundation, n.d.-a).

Our three case study cities, Issaquah, Vancouver, and Seattle, have Tree Equity Scores of 88, 78, and 91, respectively (American Forests, 2021b). Additionally, these cities have been recognized as Tree Cities for 29, 33, and 37 years, respectively (Arbor Day Foundation, 2021). Vancouver and Seattle have received Arbor Day's Growth Awards for 22 years. The Arbor Day Growth Award recognizes cities for high levels of work in annual activities in five categories that support sustainable programs and community engagement: building the team, measuring trees, planning, performing the work, and having a community framework (Arbor Day Foundation, n.d.-b). In addition to the cities' performance on the Tree Equity Score and their recognition as a Tree City, we looked at each city's budget and environmental context to ensure each offered appropriate comparisons or context to the City of Lakewood.

Evaluating other UFPs was essential to answering our research question and fulfilling our objectives, especially in developing the program structure and determining recommendations regarding staff, budget, and revenue. The case studies were particularly informative about plan structure, community engagement, budgetary considerations, maintenance guidelines, and evaluation approaches.

The case studies analysis was guided by three overarching objectives: resource assessment, community engagement, and administrative capacity. We defined these three objectives through our interview with the Washington Department of Natural Resources (DNR). DNR expressed that these three objectives were essential to effective and sustainable UFPs. Using Lakewood's priorities, we further delineated these objectives into seven criteria, as seen in Table 2. The following definitions of objectives and criteria are the frame for the case study analysis in Chapter 4.

Table 2: Case Studies Objectives and Criteria

Objectives	Criteria
Resource Assessment	Tree Population Assessment
Community Engagement	Strategies
	Equity Considerations
Administrative Capacity	Plan Updates
	City Departments
	Staff
	Budget

Resource Assessment

This objective refers to identifying the existing tree canopy within city limits and assessing the health conditions of the tree population. The criterion under this objective is *Tree Population Assessment*, which refers to the process of a specialist assessing the conditions of the existing tree population. A comprehensive tree assessment is a foundation for designing management steps for a UFP. The assessment is foundational because it is the tool that allows the city to know where to prioritize restoration and maintenance to keep trees healthy and ensure suitable planting conditions for new trees.

Community Engagement

This objective refers to the public's role in developing and managing a UFP. The first criterion is *Strategies,* which refers to participation methods and spaces cities use to integrate the community into urban forestry efforts. The second criterion is *Equity Considerations*. We decided to include equity as a criterion because one challenge of urban forests is that tree population tends to be more prominent in affluent areas and smaller in low-income and vulnerable neighborhoods (American Forests, 2021b). Therefore, we consider equity an essential piece of community engagement, especially considering our use of the Tree Equity Score to this report.

Administrative Capacity

This objective refers to the indicators, organizational structure, budgets, and human resources that are necessary to implement and sustain a UFP. The first criterion, *Plan Updates*, focuses on the frequency and process of revising urban forest management plans in cities, including the involvement of stakeholders. The second criterion is *City Departments,* which refers to the position of the UFP within the city's organizational

chart, including the department responsible for managing and overseeing the program. It also considers the presence of accountability mechanisms like volunteer advisory boards or city commissions. The third criterion is *Staff*, which refers to the number of Full-Time Employees (FTE) working on the UFPs and their specific responsibilities. The aim of the Staff criterion is to understand the amount of staff work required to implement a UFP and how cities navigate staffing as the program grows. The final criterion is *Budget*, which refers to the program's allocated resources and the distribution of those resources to program activities. This criterion also outlines funding sources cities use to fund their UFPs, including fees, grants, and taxes.

Chapter 4 analyzes each case study through the lens of the objectives and criteria defined in this section and summarizes the results for each case.

2.2 Secondary Analysis of Data

We used data produced by leading organizations working in urban forestry and technological tools to understand Lakewood's current canopy coverage, including where the city needs to prioritize increasing the canopy in the future. The analysis included:

- an assessment of the canopy analysis completed by PlanIT Geo for the City of Lakewood's tree ordinance update, which includes city demographics, current canopy coverage, and recommended planting locations;
- a comparison of Google Insight Explorer canopy data and PlanIT Geo's to ensure the highest accuracy for the canopy analysis;
- a review of American Forests' data, including the Tree Equity Score, to understand Lakewood's challenges in terms of equitable distribution of the benefits of their urban forest; and
- a review of budgetary information from Lakewood's 2023-2024 Biennial Budget to estimate maintenance costs, supplies, and personnel requirements for the UFP.

Chapter 5 in this report focuses on analyzing the outlined quantitative and qualitative data, which informed our recommendations for the city.

2.3 Semi-structured Interviews

We conducted four semi-structured interviews with experienced professionals who work with and in cities to design and implement UFPs. The interviewees were two Washington Department of Natural Resources (DNR) staff members, the City of Vancouver's Urban Forester, the City of Issaquah's Parks and Community Services Director, and Forterra's Managing Director for Restoration and Stewardship. These interviews informed our recommendations for managing and restoring land and existing trees in urban settings. We also identified priorities and important considerations for the early stages of a UFP, such as community engagement approaches and determining where to house the program within the city. These interviews gave us insight into budgeting considerations and cost estimates for UFP activities.

We contacted UFP professionals in Issaquah and Vancouver, as listed on their websites and online program materials. In consultation with our client, we prioritized those two cities based on their potential to inform the program's initial stages and budgeting. Specific questions around program expenditures were central to our decision to conduct the interviews and to prioritize Issaquah and Vancouver. The City of Seattle's budget is significantly larger than what Lakewood might consider at this stage. Given time limitations, the scope of this report, and client preferences, this project does not include any outreach to Lakewood's community. However, community outreach and spaces for public participation are central to our recommendations, as discussed in Chapters 5 and 6.

2.4 Limitations

Given the fixed timeline of five months for this project, certain methods that could have been beneficial in the development of Lakewood's UFP, like semi-structured interviews with community members, were not included. Getting input from the community is a critical element for developing, implementing, and sustaining a UFP. In lieu of including this method in our research design, we supported our analysis with relevant survey data obtained from Lakewood's community on climate change perceptions (Thompson et al., 2022). Additionally, we recommend in Chapter 6 that the City of Lakewood collect additional input from the community.

Another significant limitation was the lack of a comprehensive tree assessment containing specific information on the condition of the existing tree population, including invasive species presence and forest health. Conducting a tree assessment is a crucial first step in implementing an effective UFP. Therefore, our recommendations in this report will be subject to the findings of a future tree assessment that can provide accurate information on maintenance needs in Lakewood. Without the assessment, we estimated budgetary expenses and developed maintenance goals and indicators based on the case studies, Lakewood's context, and resources available to Lakewood. Finally, we relied on data produced by PlanIT Geo, American Forests, and Google's Environmental Insights Explorer to estimate management units and tree conditions.

Chapter 3: Literature Review

We began our research by conducting an in-depth literature review to provide a comprehensive understanding of urban forestry in the context of sustainable urban development. This chapter is comprised of three main parts:

1. a broad introduction to urban forestry, including its definition and fundamental concepts;
2. an exploration of the benefits of urban forestry from three critical perspectives: climate impacts, environmental impacts, and public health impacts, as well as how equity should be considered through all these lenses; and
3. a synopsis of best practices in urban forestry, including:
    - basic principles
    - a comparison between adaptive management and traditional ecosystem management
    - effective community engagement strategies

This literature review aims to provide a comprehensive understanding of these interrelated themes to establish a solid foundation for implementing a successful and sustainable UFP for the City of Lakewood.

We used keywords like “urban forestry,” “urban forestry management,” and “ecosystem management” to find scholarly articles in the University of Washington online library holdings and Google Scholar to inform our research, as well as consulted references from other cities’ UFPs. In Chapter 4, we outline further analysis of UFP best practices by reviewing the three case studies in detail.

3.1 What is an Urban Forest?

There are various definitions for the concepts of Urban Forests and Urban Forestry. The Green Issaquah Partnership indicates: “An urban forest encompasses all the trees in a defined urban area, such as a city” (City of Issaquah & Forterra, 2020, p. 6). We can broadly define urban forests as encompassing a wide range of tree populations, including those situated within municipal parks, along metropolitan roadways, and in residential zones, both in private yards and communal living spaces. Urban forests also extend to trees present in public community areas, such as libraries and public gardens, as well as in greenways, wetlands, river corridors, nature preserves, and natural areas. Tree shelter belts and working trees at industrial brownfield sites also contribute to the overall concept of urban forests (City of Issaquah & Forterra, 2020). Seattle’s Urban Forest Management Plan states that Seattle’s urban forest consists of the trees and associated understory plants in the city, as well as the ecosystem services that they provide. The urban forest extends across public and private properties and rights-of-way, including trees in yards, parks, natural areas, and along streets (City of Seattle, 2020). In general, we define a “Urban Forest” as the collection of trees, vegetation, and green spaces within a city or urban environment that contribute to the development of the overall ecosystem, providing critical environmental, social, and economic benefits to communities.

3.2 The Importance of Urban Forestry

Urban Forestry is the planning, managing, and maintaining of urban forests to optimize their benefits for the community and the environment. The City of Vancouver (2007) has defined urban forestry in its Urban Forestry Management Plan as the study and management of the city’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. The presence of an urban forest provides significant benefits to every city inhabitant. Incorporating trees into a city substantially enhances communities’ overall quality of life and vitality. Urban trees can also provide various

environmental benefits, such as mitigating air pollution, reducing greenhouse gas emissions, and mitigating stormwater runoff (City of Vancouver, 2007).

Nitoslawski et al. (2019) state that the benefits of urban forests include, but are not limited to, heat mitigation, reduction in air pollution, energy savings, carbon sequestration and storage, biodiversity, stormwater management, and public and social support spaces. Urban forests also offer a sense of place and belonging, which is vital for the general well-being of people living in cities (Nitoslawski et al., 2019). Urban forestry aims to promote the health and resilience of urban ecosystems while enhancing the quality of life for residents and addressing issues related to climate change, air and water quality, and public health. The following sections analyze the impacts of urban forestry, specifically through the lenses of climate, environment, and public health.

Climate Impacts

Climate change is already affecting the Pacific Northwest and, as a result, the City of Lakewood. Climate change has significant implications for UFP implementation in Lakewood, particularly considering the increased intensity and frequency of heat waves and other extreme weather events, such as flooding (Snover, 2013). Scientists expect the average temperature in the Puget Sound Region to increase by 5.0°F to 8.6°F by the end of the 21st century, resulting in an estimated average between 57.4°F and 61.0°F. The increase is in relation to the historic average temperature of 52.4°F from 1971 to 2000 (Rutledge & Brandt, 2022). Littell et al. (2009) report that Washington State will have increasingly hot summers with decreased rainfall, potentially leading to a significant increase in the area burned in forest fires, from 425,000 acres annually on average from 1916 to 2006 to an increase of an average of 1.1 million by 2040. The increase in temperature will result in more air pollution from fires, along with other heat-caused air pollution. Increased air pollution and extreme heat are predicted to cause over 100 deaths per year in Seattle alone in 2025 (Littell et al., 2009). Air pollution unfairly impacts the most disadvantaged communities; if left unchecked, these climate impacts will threaten Lakewood's poorest and most vulnerable population (WA DOH, n.d.).

Urban forests play a critical role in adapting to and mitigating the impacts of climate change for future generations. As humans continue to emit more greenhouse gases (GHGs), GHG concentrations in the atmosphere are rising, and the atmosphere is trapping more heat. Urban forests sequester carbon dioxide, removing it from the atmosphere, which is essential to fighting climate change. Trees act as natural carbon sinks by absorbing carbon dioxide from the atmosphere and storing it in their biomass (USDA, 2018). Nowak & Crane (2002) argue that increasing the number of trees could lead to a slower accumulation of atmospheric carbon, which would lessen the warming effect of climate change. Urban forests have an average carbon storage density of 25.1 tC/Hr (a ton of carbon per hectare) throughout the United States. UFPs in the Pacific Northwest are known to sequester even more carbon than the national average, making the area uniquely equipped to combat climate change (Nowak & Crane, 2002).

One of the most essential benefits of urban forests is their climate change adaptation capabilities. As previously mentioned, two of the leading climate change threats facing the Pacific Northwest are increased temperatures and an increased number of severe weather events. Increased temperatures leave urban communities especially vulnerable to the heat island effect, where impervious, dark surfaces (i.e., streets and buildings) trap heat, creating higher temperatures in the surrounding area. Trees provide shade over urban areas and create a natural cooling effect through evapotranspiration that can reduce temperatures by 1°C (Kurn et al., 1994). This drop in temperature can decrease energy usage, reduce strain on the power grid during heat waves, and extend the life of street pavement (Safford et al., 2013). Lower-income neighborhoods often have less tree coverage and are more susceptible to heat islands and their adverse effects (Subramanian, 2016). Utilizing urban forestry

to alleviate heat stress can particularly benefit marginalized communities that bear the disproportionate impact of urban heat islands.

Adverse weather effects from climate change will increase flooding in the Puget Sound area (Littell et al., 2009). Lakewood is currently engaged in evaluating strategies the city could use in the event of a 100-year flood in the area. Urban forests can reduce the intensity of these floods in multiple ways. Tree canopies create a barrier that rain must pass through before hitting the pavement of a road and going into the city's drainage system (Kurn et al., 1994). This delay helps relieve the sewers and the soil from having to absorb more water quickly. The same effect happens with fallen branches and leaves that trees leave behind: rain is further delayed from running into the soil, which reduces flooding. Trees also reduce storm runoff by absorbing water into their leaves, bark, and roots (Fazio, 2010). An urban forest can even reduce the erosion and effects of high winds during storms (Safford et al., 2013). These benefits will reduce the costs associated with more frequent severe weather events due to property damage, which poorer communities would struggle to pay.

Environmental Impacts

Not only do urban forests provide communities with climate change protection, but they also create habitat for local wildlife and promote biodiversity. Habitat degradation is a significant cause of biodiversity loss across the globe (Roeland et al., 2019). St. Clair & Howe (2009) argue that urban forests are an opportunity to connect the old-growth forests of the Pacific Northwest with different, more urban regions. Creating habitat through an UFP provides space for biodiversity to thrive. Biodiversity is nature's primary tool against disasters and other environmental shocks. Maintaining high biodiversity leads to a more resilient ecosystem, thus leading to a healthier environment overall (St. Clair & Howe, 2009). As climate change continues to stress local environments at higher rates, preserving the Pacific Northwest's biodiversity is more important than ever.

Fragmentation is one of the main challenges that wildlife and plant life face when creating a healthy ecosystem. Fragmentation occurs when the habitat is segmented into small plots of land that can be very far away from each other. The smaller the land fragment or the farther away from another habitat fragment, the more likely it is that biodiversity loss will occur in that land fragment (Fahrig, 2003). When land is fragmented, species often struggle to find mates or suitable lands for their offspring to survive. Most species thrive if they can travel over land; this includes plants spreading seeds and animals finding food and partners. Therefore, an urban forest can decrease the spaces between habitat fragments and increase the habitat size (Dwyer et al., 1992).

Implementing a UFP allows the City of Lakewood to adopt an adaptive management strategy for improving the local ecosystem's health. Ecosystems in urban areas typically require more resources to carry out their natural processes. For instance, very few trees grow naturally in urban areas without first being planted. Therefore, old-growth forests will require adaptive (or active) management techniques to be replenished, enabling those forests to continue to provide ecosystem services to the urban areas and the wildlife in the greater Pacific Northwest. Urban areas are subject to invasive species choking out native plants and preventing them from growing new natives. Adaptive management techniques involve removing harmful invasives as well as planting and maintaining native trees like Douglas-firs and Gary Oaks.

Public Health Impacts

Urban forests have many public health benefits including mental health benefits, air pollution filtration, and even increased public safety. Trees can naturally filter the air around them by absorbing multiple hazardous air pollutants. Such hazardous air pollutants include ground-level ozone, nitrogen oxides, sulfur dioxide, and particulate matter (Zupancic et al., 2015). These pollutants are classified as criteria air pollutants under the Clean Air Act, which the Environmental Protection Agency regulates. These pollutants can cause many adverse

health effects, such as respiratory illness, asthma, heart disease, and even death (Axelrad et al., 2013). Urban areas are exposed to a higher concentration of these air pollutants than other more rural areas (Zupancic et al., 2015). Lower-income neighborhoods in the City of Lakewood face a higher risk of exposure to air pollutants. The Washington Department of Health's Health Disparities Map categorizes most of Lakewood under the highest risk category for health disparities, including air pollution (WA DOH, 2023). Urban forests create a natural filtration system that helps reduce the risk of exposure. One tree in an urban area can filtrate out 50 pounds of air particulates in a single year (Dwyer et al., 1992).

There is overwhelming evidence that green spaces and urban forests positively affect mental health (USDA, 2018). Exposure to nature has been shown to leave people feeling less stressed and less depressed overall. Living near natural areas also encourages more outside physical activity, leading to a healthier life and improving mental health. Natural spaces have also been shown to help prevent children from developing learning disorders, such as attention deficit hyperactivity disorder. Exposure to nature helps reduce stress, leading to higher memory retention and an increased attention span. Urban forests can help people manage stress, anxiety, and mood disorders while providing a recreation space for increased physical fitness (USDA, 2018). It is important to recognize that due to the unequal distribution of current green spaces, lower-income communities reap fewer benefits than high-income areas (Subramanian, 2016).

Urban forestry can also increase public safety by increasing an area's sense of community. Natural spaces tend to increase property values and the desirability of living in specific neighborhoods. This allows for more resources for the community and for the green space to be well maintained. As mentioned before, urban forests also provide recreational areas for people to experience nature. All this feeds into a sense of community which leads to more public safety (Brunson, 1999).

3.3 Best Practices

This section expands on best practices for urban forestry management from the perspective of academic literature, highlighting general strategies and approaches that ensure sustainable and equitable development of urban forests. We have organized the discussion into four main parts. We begin by providing an overview of basic best practices that encompass tree selection, planting, and maintenance. The second section presents a comparison between adaptive management and traditional ecosystem management, detailing their respective advantages and limitations in the context of urban forestry. We then outline a summary of community engagement best practices, emphasizing the importance of inclusive and participatory approaches to urban forest management. Finally, we provide an overview of Lakewood's existing research regarding community engagement. This section aims to provide a general yet comprehensive understanding of some of the most effective methods for managing urban forests and fostering their long-term health and resilience by examining these key elements.

The specifics of urban forestry management or how to implement a UFP are addressed in our case study analysis in Chapter 4 instead of this section.

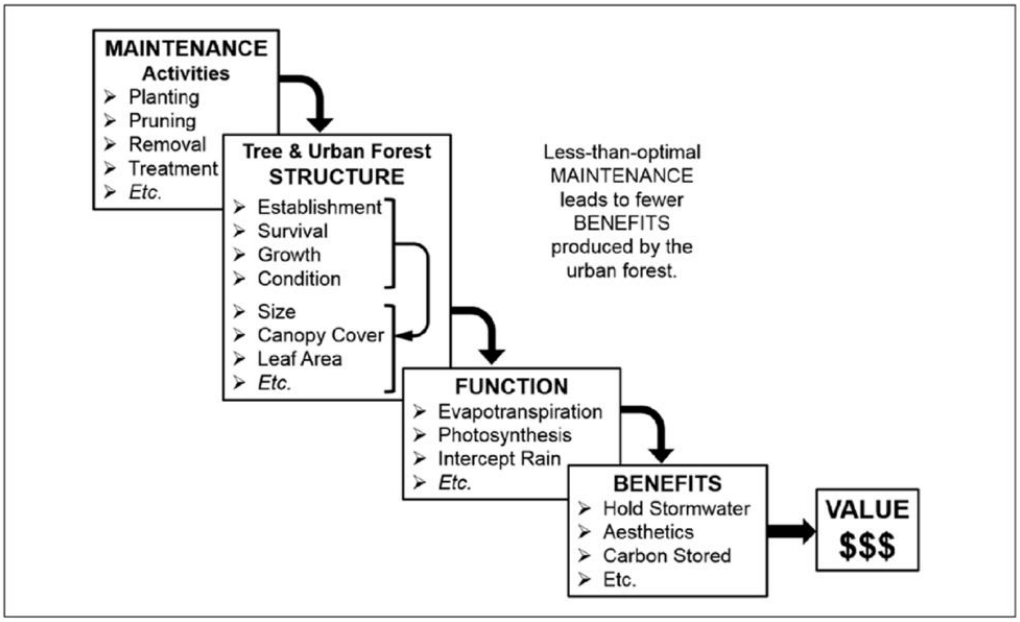
General Best Practices

Tree selection is a fundamental component of urban forestry management. The effectiveness of urban forestry hinges on the trees' ability to perform as designed, even in stressful environments (Sæbø et al., 2003). Consequently, the selection and utilization of appropriate tree species is an essential element in an approach focused on enhancing the quality of and reducing expenses associated with establishing and managing urban green spaces. Sæbø et al. (2003) identified several criteria for the selection of trees for urban forestry. Among those, the basic properties of the trees are (1) climate adaptation; (2) resistance to diseases; and (3) large

phenotypic plasticity in the plant materials. Specific properties related to trees in urban settings are (1) aesthetic characteristics; (2) social factors; (3) root quality; (4) growth potential and form; (5) wind resistance; (6) drought resistance; (7) resistance to breakage of limbs and (8) tolerance of air pollution (Sæbø et al., 2003). Equally crucial in urban forestry management is the implementation of proper tree-planting techniques.

Finally, having solid tree maintenance strategies directly impacts the tree structure, which in turn impacts the functions and benefits provided by the urban forest. Implementing a regular maintenance program that includes watering, pruning, mulching, and monitoring for pests and invasive species can prolong the life of trees and maximize their benefits to the urban environment. Vogt et al. (2015) produced Figure 3 to demonstrate how maintenance is linked to the benefits and costs of trees, which concludes that less-than-optimal maintenance may lead to decreased benefits produced by the urban forest.

Figure 3: The Logic of Tree Maintenance (Vogt et al., 2015, p. 295)



Vogt et al. (2015) also concluded that in the initial stages of a tree's existence, specifically during the establishment and immature phases, it is crucial to provide sufficient maintenance to ensure its early survival and integration within the urban environment. As the tree matures, the focus of maintenance shifts towards prolonging its life span and averting potential collapse, which can effectively postpone the costs associated with tree removal (Vogt et al., 2015).

Adaptive Management vs. Traditional Ecosystem Management

When discussing best practices in urban forestry, an important distinction is the difference between adaptive and traditional ecosystem management. Historically, formal management approaches to valuing the natural world were based solely on commodities like timber and fish until the late 1800s. At that time, analysts began to include the intrinsic value of nature as a consideration (Robbins et al., 2014). To correct the depletion of natural resources, the United States government adopted what is now called a "traditional" approach to protect the natural world. This traditional approach led to preservation efforts, such as establishing the first national parks. The new management practice was focused on the preservation of the natural world and conserving resources for future generations. Conservation marked the beginning of government consideration regarding sustainability. Historical conservationist Gifford Pinchot described conservation as "the greatest good for the greatest number" (Robbins et al., 2014, p. 70).

A significant aspect of conservation and preservation involves leaving nature in its untouched state, free from human intervention. The issue is that humans, as a highly impactful species, have already made substantial impacts on most of the land, altering it from its natural state (Robbins et al. 2014). The concept of adaptive management stems from the idea that effective ecosystem management involves more than just extracting necessary resources or simply leaving land unaltered. It emphasizes the importance of monitoring, planning, and implementing measures to restore and maintain the health of the land even after humans have altered it (Haney & Power, 1996).

In urban areas, the need to actively maintain the land becomes even more crucial due to the extensive alterations that occur to the natural environment. Native ecosystems in urban settings often face challenges that they may not be able to overcome without intervention and assistance. Therefore, it is essential to implement measures to support and enhance urban ecosystems, ensuring their sustainability and resilience in the face of urbanization and human activities. Adaptive management is described as "learning by doing". It is the process of learning from the ecological, socioeconomic, institutional, and cultural issues of an area and developing a plan to address those issues (Haney & Power, 1996). The plan to address these issues is put in place, evaluated, changed, and re-implemented. Evaluation and adaptation are at the heart of this process and are directly related to successful practices in urban forestry. Adaptive management provides cities with a framework to evaluate the existing health of their ecosystems and tree canopy, enabling them to develop strategies for maintaining and enhancing a healthy urban environment.

Community Engagement Best Practices

Community engagement is essential in developing and implementing a UFP. The City of Issaquah and Forterra (2020) state in the Green Issaquah Partnership that the program's success greatly depends on the engagement and endorsement of the public. They argue that creating a program that resonates with and caters to the needs and interests of the community it serves is essential. They also estimate that if every Issaquah resident contributed just 2.5 hours over the course of the 20-year program, the city would achieve its community engagement and restoration goals, illustrating the importance of community engagement. The City of Vancouver (2007) also mentions in its UFMP that the successful implementation of their plan requires broad support and participation from diverse segments of the community. Vancouver specifically states that property owners, business owners, and neighborhoods can all contribute to the realization of the goals of the plan. Property owners can strategically plant new trees and properly maintain trees to maximize benefits. Business owners can sponsor local tree-planting projects and encourage their employees to participate in volunteer activities. Neighborhoods can help educate people about the benefits of trees and proper maintenance practices while coordinating neighborhood tree-planting projects. Throughout the various stages of development, the input and feedback from residents, forestry experts, and business stakeholders played a significant role in shaping the goals and strategies for Vancouver's UFP (Vancouver, 2007).

Scholars agree with the importance of community engagement in UFPs. Campbell-Arvai and Lindquist (2021) support the significance of community engagement in the development and long-term support of urban green spaces and green stormwater infrastructure. Similarly, Morgan and Ries (2022) highlight the role of community involvement in promoting tree survival and sustained stewardship, ultimately leading to the long-term benefits of increased canopy coverage. Furthermore, Nitoslawski et al. (2019) emphasize the importance of smart city trends and technologies in enhancing urban forest management and involving various stakeholders, including governmental authorities, non-governmental organizations, businesses, citizens, and local associations.

Cities must find proper motivating factors to encourage UFP involvement from community members. Morgan & Ries (2022) found that people love trees for various reasons, including the aesthetic appeal, environmental

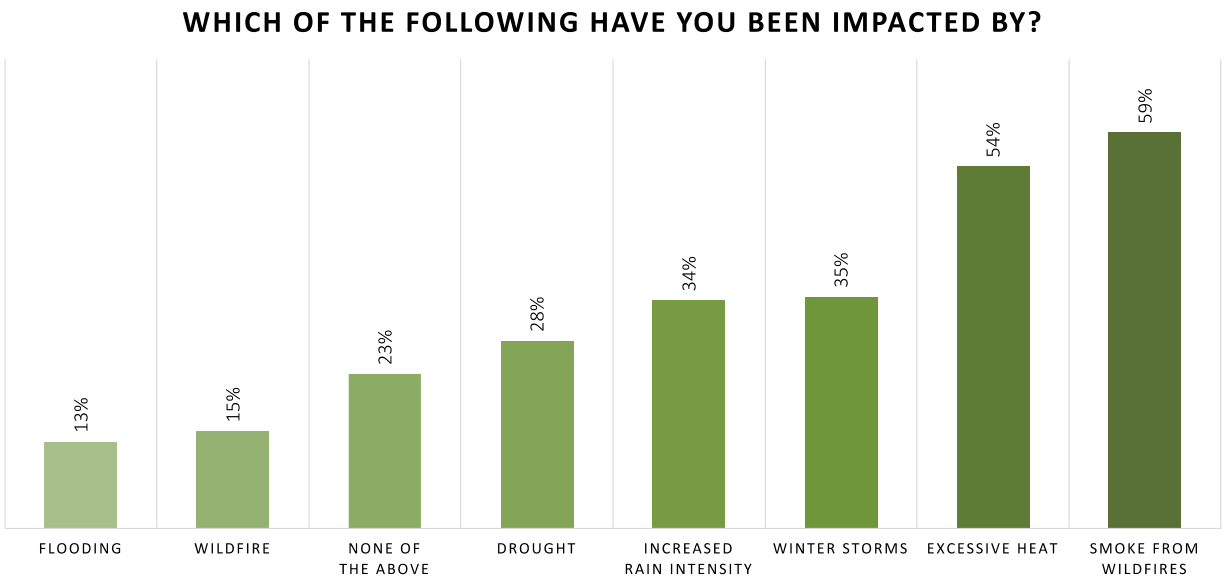
contributions, and health benefits of trees. Therefore, emphasizing these motivating factors in marketing and outreach efforts is crucial to engage community members in tree-related initiatives.

Lakewood's Community Engagement Research

In 2022, the Evans School Student Consulting Lab produced a report titled *A Study on Climate Change Perceptions in Lakewood, WA*. This report aimed to help the city improve its communication and outreach efforts regarding climate change by exploring how the community members engage the issue and understanding their primary concerns and expectations regarding the city's actions. We reviewed this report to gain insight into the recommendations for improving communication with Lakewood's residents regarding climate change. We aim to incorporate these suggestions into our community engagement recommendations for implementing a UFP.

The report indicates that among the weather events that may have the most impact on the lives of residents, "smoke from wildfires" (59%) and "excessive heat" (54%) are two extreme weather events that residents in Lakewood are concerned about the most, as shown in Figure 4 (Thompson et al., 2022). These results suggest that explaining the benefits of urban forestry to reduce those weather events may help attract the community's support.

Figure 4: Lakewood Climate Survey Response (Thompson et al., 2022).



The report also provided several recommendations for governmental communication and outreach. Firstly, governmental discourse on climate change should emphasize the benefits of potential climate initiatives and educate the public about feasible lifestyle changes, giving special attention to the simplest and most accessible ones for everyday citizens. Secondly, the government should establish communication strategies that recognize people's concerns and associate them with specific actions at the local level. Thirdly, employing clear language that firmly anchors the city's climate-related communications in scientific resources may enhance residents' faith in the city's reliance on credible sources for climate-related decision-making. Lastly, future climate change public perception studies should not only inquire about respondents' sources of climate information but also seek to identify their most trusted sources (Thompson et al., 2022).

For outreach and equity consideration, the report highlighted several recommendations for the city to consider during community engagement, including but not limited to the following:

1. Use a more personal approach (such as canvassing) and offer incentives for engagement (such as gift cards);
2. Continue to provide the primary non-English languages spoken in Lakewood with translations in addition to Spanish and Korean;
3. Consider capitalizing on all existing relationships the city maintains with individuals or organizations representing or serving these populations;
4. Have one-on-one conversations with community members;
5. In the engagement process, the City of Lakewood should acknowledge the historical relationship between the government and these communities;
6. Provide compensation to community members who give their time, effort, and knowledge in the City's outreach process; and
7. Contract community-based organizations (CBOs) that 1) are in neighborhoods of interest, 2) serve Lakewood's low-income and BIPOC residents, or 3) represent the needs of residents with marginalized identities. (Thompson et al., 2022, p. 59).

3.4 Literature Review Summary

This chapter presents an in-depth literature review using the University of Washington online library and various cities' UFPs. Our goal was to establish a general understanding of urban forests, emphasize the significance of urban forestry, and outline best practices for urban forestry management.

First, based on the definition provided by other cities' UFPs, we defined "urban forest" as the collection of trees, vegetation, and green spaces that exist within a city or urban environment that contribute to the development of the overall ecosystem, providing critical environmental, social, and economic benefits to local communities.

We also utilized scholarly articles from the University of Washington online library and Google Scholar to carry out an in-depth exploration of the benefits provided by Urban Forestry. Specifically, we discovered that urban forests play an important part in climate change adaptation capabilities and create habitat for local wildlife, thereby fostering biodiversity. Urban forests also absorb multiple hazardous air pollutants to generate positive effects on people's both physiological and psychological health, while also nurturing a strengthened sense of community cohesion.

Finally, we summarized several overarching practices that could improve urban forestry management. These include the selection and deployment of appropriate tree species, the implementation of effective tree maintenance strategies, the benefits of employing adaptive management in an urban forestry context compared with traditional ecosystem management, the importance of community engagement, and some general practices. We also summarized previous studies on the design of Lakewood's community engagement strategies.

The next chapter presents a detailed analysis of existing UFPs in Issaquah, Vancouver, and Seattle.

Chapter 4: Case Studies

We reviewed best practices and strategies in urban forestry from three other Washington cities to develop a UFP implementation guide for the City of Lakewood that maximizes benefits for its citizens and creates the healthiest urban forest possible. In this chapter, we summarize UFP practices in each city to determine the most essential implementation considerations for Lakewood.

The three cities we selected for our research were Issaquah, Vancouver, and Seattle, Washington. Each city's UFP is at a different stage, meaning each is more or less advanced in reaching its ultimate objectives. The differences in size and scope, as well as the variation in local government organizational characteristics and budget size, were instrumental in understanding the possibilities, costs, and benefits of implementing a UFP, as well as the main priorities during implementation.

We analyzed each city against three objectives and seven criteria as explained in Chapter 2:

- Resource Assessment: Tree Population Assessments
- Community Engagement: Strategies and Equity Considerations
- Administrative Capacity: Plan Updates, City Departments Involved, Staffing, and Budget

This chapter, along with the benefits of UFPs outlined in the literature review, is central to the recommendations provided in Chapter 6.

Forterra

The Green Cities Partnership is a key factor in understanding the organization and implementation of the UFPs in Issaquah and Seattle. Forterra (n.d.-b) established the "Green City Partnerships" program in 2004 to address the need for more proactive efforts to maintain urban parks and natural areas. During our interview with Forterra's Interim Managing Director, we learned that the connection between the Green Cities Partnerships and Forterra's mission is that "Forterra was thinking about broader sustainability issues – how people were living in cities and towns […] Forterra realized cities didn't have resources to do broad assessments of city tree canopy (inside and outside of parks)". This program created a network of cities dedicated to protecting forested parks, natural areas, and communities in Washington State. Today, the network contains a total of 14 Green Cities, logging over 115,000 volunteer hours at more than 1000 events each year. The goal of this network is to improve quality of life and enhance forest benefits in cities by restoring forested parks and natural areas, galvanizing an informed and active community, and ensuring long-term sustainable funding and community support. Forterra currently works closely with the 14 Green City municipalities to develop achievable goals, shared visions, long-term plans, and community-based stewardship programs to care for the valuable forests and natural areas in urban environments. Forterra also supports this network by hosting annual summits and quarterly meetings to exchange ideas and offer solutions.

Forterra's Green Cities Department has historically supported all Green City Partnerships and worked to keep all partnerships connected through the Green Cities Network (Forterra, n.d.-b). However, within the last few years, Forterra has started to shift its organizational priorities. During our interview with Forterra, we learned that the organization is currently assessing whether to pursue expansion of the Green Cities initiative or to prioritize existing Green Cities and ensuring the long-term effectiveness of their urban forestry efforts. We discuss the implications of this development in our Partnership Guide in Appendix A.

4.1 City of Issaquah, WA

Introduction

The City of Issaquah, through a collaboration with Forterra, began an evaluation of the general condition of Issaquah's forested parks and natural areas in 2019. At that time, they established the Green Issaquah Partnership: a program to protect, enhance, and sustain Issaquah's forested parks, natural areas, and scenic resources (City of Issaquah & Forterra, 2020). The intent of the Green Issaquah Partnership 20-Year Implementation Guide is to describe the challenges facing urban forests today, as well as the benefits of restoring and enhancing those forests. This guide also shares important results of the health assessment of Issaquah's forested parks and natural areas, sets goals to restore Issaquah's forested parks and natural areas, and recommends actions and benchmarks to reach those goals to benefit Issaquah's people and ecosystem (City of Issaquah & Forterra, 2020).

Issaquah and Forterra

Issaquah joined the Green City Partnerships network in 2019. Since then, Forterra has worked collaboratively with the city on urban forestry activities, including conducting outreach activities to solicit input specifically for the Green Issaquah Partnership, providing training guides applicable to both city staff and Forest Stewards in forest restoration projects, assisting Issaquah in estimating program costs, and coordinating initial volunteering programs using the networks' existing model (City of Issaquah & Forterra, 2020). As of 2023, Forterra is no longer working directly with Issaquah on Green Issaquah Partnership activities. This change is due to Forterra's recent organizational shifts.

In an interview with Issaquah's Parks and Recreation Director we learned that the city is now partnering more closely with city communities to recruit, train and support volunteer stewards to lead forest restoration projects in priority parks.

Resource Assessment

The City of Issaquah used the Forest Landscape Assessment Tool (FLAT) to conduct its resource assessment. There are three main steps Issaquah took to utilize FLAT: forest-type mapping, on-the-ground forest assessment, and management strategies prioritization (City of Issaquah & Forterra, 2020).

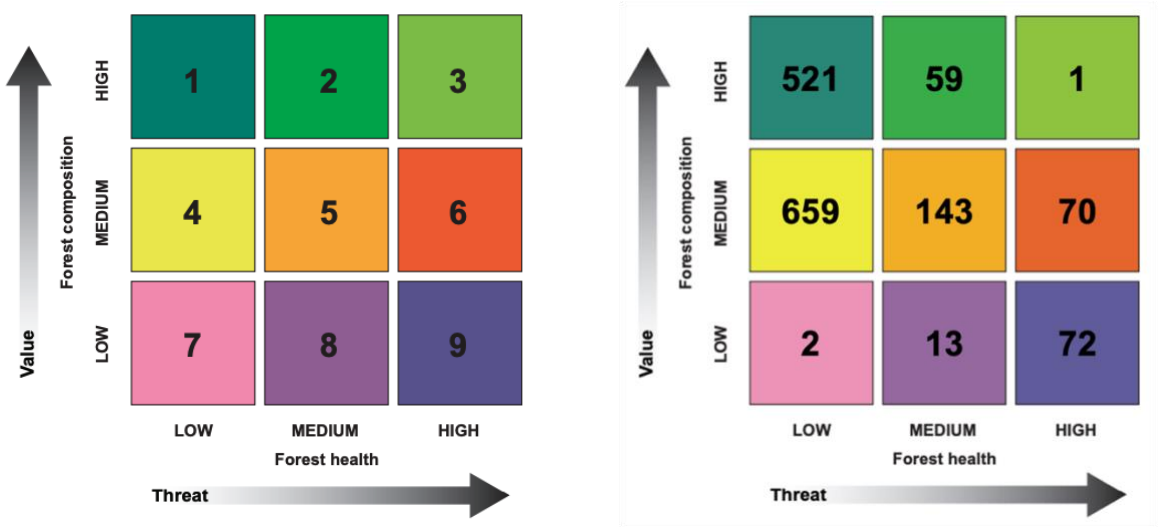
First, using GIS analysis, the city classified natural areas within the partnership project area through digital orthophoto interpretation and divided each stand into one of five categories: forested, natural, open water, hardscaped, or landscaped (City of Issaquah & Forterra, 2020). The final delineated stands are called Management Units (MU), and all MUs were assigned to unique letter combinations for future restoration planning and data tracking.

Next, the Green Issaquah Partnership used FLAT, a prioritization tool that uses habitat composition and invasive plant cover as the two parameters, to prioritize restoration to conduct a forest health assessment (Ciecko et al. 2016). This assessment includes characterizing conditions across Issaquah's forested parks and natural areas, documenting the presence of regenerating trees (i.e., canopy species less than 5 inches in diameter at breast height) and stocking class (i.e., estimated number of trees per acre and spacing between trees). Using this assessment, the city was able to produce a general picture of the overall condition at any given site and on a landscape or city scale, which serves as a high-level baseline from which finer-scale, site-specific restoration planning can be conducted (City of Issaquah & Forterra, 2020). In the field, the city surveyed each MU to identify its specific habitat type (e.g., conifer forest, deciduous forest, riparian, shrubland) and to capture information on the dominant overstory species and tree canopy cover (City of Issaquah & Forterra, 2020). The city then

assigned a value (i.e., high, medium, or low) to each MU based on habitat composition. Details on how values are assigned can be found in Chapter 6 of this report.

After assigning values to all MUs, the city hired a professional urban forester who used the tree-iage matrix system to assign a tree-iage category or priority rating to the MUs. Categories range from 1 to 9, with 1 representing high-quality habitat and low invasive species threat, and 9 representing low-quality habitat and high invasive species threat (City of Issaquah & Forterra, 2020). By summing the acres in each row and column, the city was able to have a clear understanding of the total distribution of the project acres, as shown in Figure 5. The tree-iage matrix was then used to develop future management strategies and prioritize MUs.

Figure 5: FLAT assessment Tree-iage Matrix (left) and Distribution of Issaquah Project Acres by Tree-iage Category (right) (Ciecko et. al., 2016; City of Issaquah & Forterra, 2020)



Community Engagement

The main community engagement strategies that the City of Issaquah used were conducting community surveys to gather information on residents' priorities and outreach to gain support from its existing partners for its UFP. The city then incorporated the needs of partners, residents, and volunteers into several goals and objectives for the partnership. For instance, one of the most common themes that emerged from surveying Issaquah residents was the hope that the city would work with the school district to engage students in restoration projects, both as in-school outdoor-classroom activities and for service hours outside of school hours (City of Issaquah & Forterra, 2020). As a response to this theme, the seventh community objective for the partnership is to seek opportunities to engage youth and provide education. Specifically, the Green Issaquah Partnership will work with Issaquah Public Schools to engage youth in outdoor experiences and environmental stewardship. The city hopes that opportunities like this will serve as pilot projects and guides for other potential collaborations with schools.

The Green Issaquah Partnership also includes the structure for a centralized volunteer system, making it easier for the community to get involved (City of Issaquah & Forterra, 2020). Additionally, individuals can become a Forest Steward for any city park. As Forest Stewards, volunteers will receive training, tools, and resources supported by the Green Issaquah Partnership to operate their restoration project and lead other volunteers at events. We discuss the Forest Steward Program in-depth in Chapter 5. The Green Issaquah Partnership also provides educational resources and training to private property owners and residents to encourage them to be good stewards of the forest and their property. The accomplishment of Issaquah's UFP activities will tracked, reported, and celebrated by the city each year.

Equity Considerations

One of the community objectives of the Green Issaquah Partnership is to "develop and implement community outreach and engagement strategies to equitably serve Issaquah's residential population" (City of Issaquah & Forterra, 2020). The partnership hopes to provide various ways to equitably engage every resident by building relationships with community groups and local organizations. Community members are encouraged to participate in caring for the shared public urban forests and natural areas regardless of age, income, ethnicity, or language spoken at home. The partnership also highlights that volunteer restoration projects are opportunities for neighbors, families, friends, and newcomers to unite in revitalizing their parks, fostering community bonds through shared experiences, and deepening ties to the natural world and each other (City of Issaquah & Forterra, 2020). In addition to seeking opportunities to work with existing successful community organizations and programs, the Green Issaquah Partnership emphasizes employing new and creative strategies over the life of the program as one of the goals to equitably engage the city's diverse population.

Implementation Logistics

Plan Updates

The first five years of the Green Issaquah Partnership focus on building and supporting a volunteer base, spreading program awareness, and demonstrating restoration and planting results on the ground. After those five years have passed, staff time will be reallocated to fieldwork like volunteer management and coordination of field crews. The Partnership also requested that the city establish a Community Advisory Committee to help involve community members in the partnership (City of Issaquah & Forterra, 2020).

The Green Issaquah Partnership relies on both hired staff and volunteer partners that include public, nonprofit, and public organizations. Issaquah uses a four-phase approach to restoration fieldwork that was developed in the Green Seattle Partnership (City of Issaquah & Forterra, 2020). The four phases are:

- Restoration Phase 1: Invasive plant removal
- Restoration Phase 2: Secondary invasive removal and planting
- Restoration Phase 3: Plant establishment and follow-up maintenance
- Restoration Phase 4: Long-term stewardship and monitoring

Each phase is planned to take several years and is tracked through work logs to track the progress of the plan and the canopy. More details about the four-phase restoration approach can be found in Chapter 6.

Staffing

The Issaquah program places significant reliance on volunteers to support various aspects of their urban forestry activities, including on-the-ground fieldwork and coordination of other volunteers. The Issaquah program aims to recruit approximately 100,000 volunteer hours throughout the 20-year program duration (City of Issaquah & Forterra, 2020). The original staffing recommendations outlined in the guide suggest Forterra could provide volunteer hours instead of hiring paid staff.

The Green Issaquah Partnership outlines the need for a dedicated city staff member that can allocate at least half of their time to managing and coordinating volunteer efforts. This staff member would spend a portion of their time coordinating the Forest Steward Program, which involves training stewards, working with them to develop site plans, providing support and encouragement, and coordinating their efforts with other staff members. The staff member would also dedicate time to education and outreach, with the possibility of receiving support from Forterra or the city's Communications Department.

Their program requires at least a part-time position in the first few years to coordinate field restoration, which will need to be a full-time position by 2025. There could be a need for a part-time or full-time staff member dedicated to fund development and management whose main job is finding and applying for grants and funding opportunities. The high-end estimate of staffing suggestions for the Issaquah plan for the first 5 years is 4-5 paid full-time staff members within the Parks and Community Services Department (PCSD) whose main responsibilities are the Green Issaquah Partnership.

Per the City of Issaquah's 2023-2024 Proposed Biennial budget, the city is planning to hire one FTE Urban Forest Supervisor and one FTE 0.5 Volunteer Coordinator to manage the Forest Steward Program starting in 2023(City of Issaquah, 2022).

City Departments

Issaquah's PCSD has housed the UFP since its implementation. However, the program consists of coordinated efforts amongst multiple city departments, including Community Planning & Development and Public Works. In 2023, the city will establish a Natural Resource Team within PCSD. The Natural Resource Team will work to coordinate efforts across departments. The Urban Forest Supervisor and Volunteer Coordinated will be held in the Natural Resource Team.

The City of Issaquah does not currently have an advisory board or commission.

Budget

The city's urban forestry expenditures are relatively low compared to the other two case study cities due to the relative age and size of the program. According to our interview with a city staff member, the city initially invested approximately $100,000 into a comprehensive resource assessment in 2018 that was used to inform the Green Issaquah Partnership Implementation Guide. In the city's 2023 proposed budget, the city budgeted approximately $360,000 for urban forestry activities, which includes hiring a full-time Urban Forest Supervisor, a part-time Volunteer Coordinator, and development of an Urban Forestry Management Plan.

In 2019 and 2020, the city received funding from Forterra to be used for implementing the UFP. The city received $100,000 in 2019 and $50,000 in 2020 (City of Issaquah, 2019). Based on our interview, we know the remaining expenditures were funded through city resources. Urban forestry activities primarily take place within PCSD so we can assume that most of the funding came from the city's General Fund as PCSD is 86% funded with General Fund revenue (City of Issaquah, 2022). The new Urban Forest Supervisor position will be fully funded through the city's Stormwater Fund (City of Issaquah, 2022). We discuss the use of Storm and Surface Water Utility Fees as a revenue source more in-depth in Chapter 5.

The exact breakdown of the city's UFP expenditures can be seen in Table 3. Please note that these expenditures do not include regular, ongoing tree maintenance and planting in the city (e.g., tree pruning related to repaving streets). The expenditures outlined are specifically defined within the city's budget as relating to urban forestry.

Table 3: City of Issaquah, WA - 2023 Urban Forestry Expenditures

Department	Expenditure Detail	2023 Adopted
Parks and Community Services	New Position - Full-Time Urban Forest Supervisor	185,686
Parks and Community Services	New Position - Part-Time Volunteer Coordinator	77,547
Parks and Community Services	Development of Urban Forestry Management Plan	100,000
	Total	**363,233**

4.2 City of Vancouver, WA

Introduction

The City of Vancouver's UFP is part of the city's Department of Public Works and works closely across all departments. The city first developed its Urban Forestry Management Plan in 2007, which provided a foundation and guideline for its future program and activities. In 2021, the city produced an annual report, a tree canopy assessment, as well as its Urban Forestry Work Plan. As stated by the City of Vancouver (2022a), the current UFP "seeks to improve the quality of life in the city by enhancing tree canopy to provide clean air and water for current residents, visitors, and future generations" (p. 4). The City of Vancouver is currently engaged in initiatives to expand tree canopy throughout the city. However, at the program's inception in 2007, the city was primarily focused on the restoration and maintenance of the existing tree canopy and green spaces. Over the past 15 years, since the program's inception, the city has continued its restoration practices while gradually expanding its public and private UTC expansion efforts.

The program 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 management methods to preserve the trees and forests, educate residents on the importance of urban trees, and organize tree plantings (City of Vancouver, 2022a).

Resource Assessment

There are three parts to the tree canopy assessment for Vancouver. The first is to quantify the city's existing tree canopy cover. Using high-resolution multispectral imagery from the U.S. Department of Agriculture's National Agriculture Imagery Program (NAIP) collected in 2019 and 2020, the city was able to derive the land cover dataset and classify all types of land cover (City of Vancouver & PlanIT Geo, 2021). The city also used tree canopy and land cover data from the EarthDefine US Tree Map to classify a five-class land cover, including urban tree canopy, soil and dry vegetation, other vegetation, impenetrable surfaces, and surface water. These data were then used to extract generalized tree species composition using a Normalized Difference Vegetation Index (NDVI), supervised training, and an iterative machine learning approach (City of Vancouver & PlanIT Geo, 2021). Google StreetView also provided street-level images for the city to obtain training and verification samples of deciduous and evergreen trees.

The second is to identify areas where the tree canopy could be expanded. All land areas in Vancouver that did not have existing tree canopy coverage were classified as either possible planting area (PPA) or unsuitable for planting (City of Vancouver & PlanIT Geo, 2021). PPAs were estimated from the non-canopy vegetation layer. Unsuitable areas and areas that are not viable to plant trees due to biophysical or land use restraints were manually delineated and overlaid with the existing land cover data set. The City of Vancouver and PlanIT Geo (2021) reported the results as "PPA Vegetation, Unsuitable Vegetation, Unsuitable Impervious, Unsuitable Soil, and Total Unsuitable" (p. 4). This process is conducted on both private land and public land. Some of the results show that 66% of all UTC in Vancouver is found on private land, with public land and rights-of-way (ROW) occupying the remaining 34% evenly. Similarly, private land contains 74% of all PPA, while 14% is found in the ROW and just 12% on public lands. (City of Vancouver & PlanIT Geo, 2021).

Finally, tree canopy change between 2011 and 2019/2020 was analyzed across the same geographic assessment. Both tree canopy data sets were created from the EarthDefine US Tree Map. Using machine learning techniques to produce highly comparable datasets, the city was able to find the canopy changes in percentages during the period. And in 2021, Vancouver hired PlanIT Geo to perform a full tree canopy assessment and a partial park tree inventory.

Community Engagement

The first step in community engagement has been outlined in the 2007 Urban Forestry Management Plan, which delineated four primary outreach methods:

1. review of two citizen-based planning efforts conducted between 2004 and 2006
2. public opinion survey completed in November 2006
3. stakeholder interviews
4. community meetings were conducted during October 2006 and February 2007 (City of Vancouver, 2007)

An electronic version of the draft plan was posted on the city's website requesting residents' comments via email.

In the latest 2021 report, the city marked promoting an urban forest stewardship ethic in the community as one of the four goals in its urban forestry work plan. Apart from the existing partnerships with neighborhood associations, faith-based organizations, nonprofit organizations, public agencies, and private businesses, the city planned to strengthen and expand community partnerships with underserved organizations and communities, local businesses, regional partners, etc. For instance, the city decided to foster civic involvement through the Neighborhood Tree Stewards program, a comprehensive training and education program that empowers neighborhood volunteers to become leaders in urban forest management. Also, by offering Tree Talk workshops on various tree-related topics monthly throughout the year, the city planned to expose participants to knowledge on a variety of trees to plant in landscapes that offer a myriad of benefits (City of Vancouver, 2021).

Equity Considerations

In the first draft of its 2023 Urban Forestry Management Plan, Vancouver highlights the importance of fostering equity and environmental justice by addressing the uneven distribution of canopy resources and benefits. The plan acknowledges that existing tree canopy coverage tends to be larger and more established in wealthier neighborhoods since canopy expansion and maintenance largely depend on tax dollars. The plan points out that communications that build trust with disadvantaged communities should begin months before tree planting starts. The plan argues that by engaging with respected community leaders to introduce the concept of tree canopy expansion, organizing community outreach events at an earlier stage, and soliciting local input on tree species selection, a strong partnership with the community's residents can be established. The plan asserts that identifying areas in most need of tree canopy covers, tree plantings, and urban forestry services (e.g., a program assisting low-income property owners with the management of hazardous or invasive trees) will address community equity and environmental justice (City of Vancouver & PlanIT Geo, 2023).

Implementation Logistics

Plan Specifics

The City of Vancouver's UFP has been actively working in the city since 2007. As of its 2021 plan update, the Urban Forestry Division's main goals are categorized into three overarching responsibilities: planning, education, and management (City of Vancouver, 2007). Planning refers to reviewing site development applications, partnering with agencies and professionals to grow the tree canopy, and assessing and monitoring the health of the forest resources. Community outreach and education are outlined more above but entail the promotion of learning about trees, coordinating their NeighborWoods Program, and hosting community events and training. The management responsibility involves coordinating with city departments, enforcing policies, identifying funding, and customer service.

In order to understand current and future opportunities and challenges, the City of Vancouver implemented a Strengths, Weaknesses, Opportunities, and Threats (S.W.O.T.) assessment in 2007 (City of Vancouver, 2007). This assessment was a way to organize and synthesize comments from the public, agency and local organization staff, and the Urban Forestry Commission. Based on this feedback and the needs of the community the Urban Forestry Division established four main goals to guide the direction of the program:

- Preserve existing trees and institutionalize planning, maintenance, and operating principles that improve canopy health.
- Restore canopy-deficient areas through tree planting to provide equitable distribution of urban forest benefits to all Vancouver residents.
- Promote an urban forest stewardship ethic within the community.
- Adhere to City of Vancouver's Operating Principles and establish Vancouver Urban Forestry as a leader in Pacific Northwest municipal forest management.

The city developed a priority-level system to gauge the timeline of specific action steps under each of its four main goals (City of Vancouver, 2007). They developed a matrix of all the planned steps they determined would let them achieve their goals. The priority levels correspond to an approximate timeline as follows:

Priority	**Timeline (approx.)**
High	immediately to 3 years
Medium	within next 3 to 10 years
Low	as budget, staffing and other resources allow

Staffing

The City of Vancouver's Urban Forestry Program currently consists of four full-time staff members, including one Urban Forester, two Urban Forest Specialists, and one Urban Forest Outreach Coordinator. This staffing equates to about one full-time employee per 46,548 residents. The city also contracts with AmeriCorps and currently has two AmeriCorps members supporting UFP activities.

City Departments

The Vancouver City Council has appointed a seven-member volunteer commission called the Urban Forestry Commission to advise their City Council on urban forestry efforts. The commission helps the city to develop good management practices to preserve community trees, educate citizens, and organize tree plantings. Commission members are appointed for four-year terms.

In Vancouver, the commission was created as a result of community interest in an urban forestry program but limitations regarding organizational capacity. In an interview with the program's Urban Forester, we learned that at the time the city's parks department did not consider urban areas outside of parks as integral to their mission Therefore, urban forestry activities were not prioritized within the parks budget, and instead the department allocated more resources to their core activities. As a result, the community pushed for a voluntary board that could prioritize the UFP and advocate for appropriate budgetary allocation while supporting program implementation.

Similar to the Green Issaquah Partnership, the Vancouver Urban Forestry Program has relied on multiple partnerships with nonprofits, public agencies, and neighborhood associations to help implement coordination of planting efforts and develop the plan itself. UFP activities are centrally managed by the Urban Forestry Division,

which is housed in the city's Public Works department. The division works closely with the Vancouver-Clark Parks & Recreation, Transportation, and Development Review departments.

Budget

Vancouver is the only city of our three case studies that had a standalone urban forestry department at the time of this report. As a result, we were able to easily identify 2023 expenditures related to urban forestry activities within the city's 2023-24 Biennium Budget. Total projected expenditures for UFP activities were estimated at approximately $1.9 million (City of Vancouver, 2022b). This was a 97% increase from previous years' total expenditures of approximately $900,000. This increase was due, at least in part, to a comprehensive update to the city's Urban Forestry Management Plan for the first time since 2007, which required significant investment in contract labor and plan development (City of Vancouver, 2022b; Ellenbecker, 2023).

According to the city's budget, an estimated 95% of program expenditures in 2023 will be funded through the city's Surface Water Management Fund (City of Vancouver, 2022b). The primary revenue source for this fund is city storm and surface water utility fees. UFP expenditures account for approximately 7.5% of the total estimated fund revenue in 2023 (budget p. 99). The remaining 5% of UFP expenditures will be funded through the City Tree Reserve Fund. The fund is primarily funded through penalties and fees related to the city's tree ordinance and donations (municipal code 20.770.040 City Tree Account).

The city's 2023 UFP expenditures are outlined by revenue source in Table 4. Since all UFP activities are held in a single department within the city, expenditures are instead delineated based on revenue source. Please note that these expenditures do not include regular, ongoing tree maintenance and planting in the city (e.g., tree pruning related to repaving streets). The expenditures outlined are specifically defined within the city's budget as relating to urban forestry.

Table 4: City of Vancouver, WA - 2023 Urban Forestry Expenditures by Revenue Source

Revenue Source	Expenditure Detail	2023 Adopted
SWM Fund	Salaries and Benefits	693,250
SWM Fund	Supplies and Services	770,620
SWM Fund	Interfund	353,052
	Total	**1,816,922**

Revenue Source	Expenditure Detail	2023 Adopted
City Tree Reserve Fund	Supplies and Services	80,155
City Tree Reserve Fund	Other Intergovernmental	3,000
City Tree Reserve Fund	Interfund	3,264
	Total	**86,419**

4.3 City of Seattle, WA

Introduction

The City of Seattle originally developed its UFMP in 2007 and more recently produced an update in 2020. The update provided a framework for policies and actions that guide the city's decision-making to help preserve, maintain, restore, and enhance its urban forest. The core of the plan is a set of outcomes, strategies, actions, and indicators that support a healthy and sustainable urban forest across Seattle's publicly and privately owned land. The UFMP was produced by the joint effort of the City of Seattle Urban Forestry Core Team, which is a group representing city departments with tree management and regulatory responsibilities, and the Urban Forestry Commission (City of Seattle, 2020).

Resource Assessment

The city undertook a comprehensive canopy cover assessment in 2016 using light detection and ranging (LiDAR) data, which is a surveying method that uses lasers to create a 3D model (City of Seattle, 2020).

The plan first defined nine management units that cover all the land in the city, which allowed for easy coordination of GIS mapping layers and related planning initiatives. The units include eight distinct areas selected based on physical characteristics:

1. Single-Family Residential
2. Multi-Family Residential
3. Commercial/Mixed-Use
4. Industrial
5. Institutional
6. Downtown
7. Developed Parks
8. Parks' Natural Areas

A ninth unit, the Right-of-Way, goes through each of the other eight units. With the criteria of these management units, the city was able to construct an overview of canopy cover, as shown in Table 5.

Table 5: Seattle Canopy Coverage by Management Unit in 2016 (Seattle UFMP, p.13)

Management Unit	Land area (acres)	% of city land area	2037 UFMP Goal (set in 200)	2016 Canopy Cover
Single-Family Residential	29,918	56%	33%	32%
Multi-Family Residential	5,646	11%	20%	23%
Commercial / Mixed Use	4,522	8%	15%	14%
Downtown	815	1%	12%	10%
Industrial	6,191	11%	10%	6%
Institutional	1,101	2%	20%	25%
Developed Parks	2,578	4%	25%	37%
Parks' Natural Areas	2,356	7%	80%	89%
Citywide	54,379	100%	30%	28%
Right-of-Way	14,682	27%	24%	23%

In addition to measuring citywide canopy cover, the city initiated an ongoing process of developing inventories of certain public and street trees. The Seattle Department of Transportation (SDOT) aims to complete a 100 percent inventory of all street trees in Seattle by the end of 2024, which will enable SDOT and other

departments that manage urban forestry activities to better prepare for street tree-related emergencies and enhance the future of street trees across Seattle communities.

In a parallel effort, the Green Cities Research Alliance assessed Seattle's urban forest to quantify the regional impact of trees on pollution reduction, carbon storage, and energy conservation. Researchers randomly selected a total of 223 plots of trees throughout Seattle on both private and public land to assess. Researchers were able to capture the size and condition of Seattle's urban forest, which they used to quantify the public benefits and economic value of the ecosystem. This comprehensive assessment was vital for understanding the current and future management needs of the city's urban forest to infer the development of solid management policies (City of Seattle, 2020; Ciecko et al., 2012).

Community Engagement

Public engagement around the city's UFMP was shaped by the Equity and Environment Initiative and the city's Race and Social Justice Initiative (City of Seattle, 2020). Several key commitments were identified, including intentional engagement with historically underrepresented communities before plan update drafting, reviewing, and valuing all feedback from historically underrepresented communities, transparency, and engaging the public in developing the plan.

According to the City of Seattle (2020), before the UFMP was developed, the city worked with various governmental agencies to "engage native peoples, as well as the African American, East African, Chinese, and Latinx communities living in and around the Greater Seattle region" (p. 6). Throughout the drafting process, the city kept close contact with members of nine environmental-justice priority communities (African American, Chinese, disabled, East-African, Latino, Native American, seniors, Southeast Asian Cham refugees, and unhoused populations), presenting ideas and collecting feedback so that the goals and strategies could reflect on racial and social equity.

Equity Considerations

During the plan update process, the city's Equity and Environment Initiative recognized the disproportionate impact of past policies and practices on communities of color, which were referred to as "environmental justice priority communities" in their UFMP. Therefore, the city stated the determination to provide clean, healthy, resilient, and safe environments for communities of color, native peoples, immigrants, refugees, people with low incomes, youth, and individuals with limited English proficiency.

The Race and Social Justice Initiative (RSJI) is the city's current initiative that ensures the Seattle government realizes its vision of racial equity. According to the City of Seattle (2020), RSJI is "a citywide effort to end institutional racism in city government, and to achieve racial equity across the community" (p. 22).

The city also launched the Equity and Environment Initiative and produced the Equity and Environment Agenda, which is a blueprint to progress racial equity in Seattle's environmental work. The agenda lays out four key goals and recommended strategies in areas like healthy environments for all, jobs, local economies, youth pathways, equity in city environmental programs, and environmental narrative and community leadership (City of Seattle, 2020).

Implementation Logistics

Plan Specifics

Seattle's Urban Forest Management Plan is a 30-year plan that is divided by Management Units that are based on different types of land (i.e., residential, downtown, mixed-use, etc.). Their plan started off by utilizing the

Model of Urban Forest Sustainability to guide the design of their management plan (City of Seattle Urban Forestry Coalition, 2007). This model outlined four principles that Seattle followed for their management plan:

- Sustainability is a broad, general goal that results in the maintenance of environmental, economic, and social functions and benefits over time;
- Urban forests primarily provide services rather than goods;
- Sustainable urban forests require human intervention; and
- Trees growing on private lands compose the biggest part of urban forests.

Using the sustainability model, the City of Seattle also incorporated three main management elements for their plan. The plan began by assessing these three elements:

1. **Tree Resource**: the trees themselves, as individuals or in forest stands
2. **Management Framework**: the policy, planning and resources— including staff, funding, and tools — brought to bear on the tree resource; and
3. **Community Framework**: the way residents are engaged in planning and caring for trees. Because most trees in the urban forest are on private property, a successful program requires that the community plant and maintain trees on their property.

Seattle's plan then goes through the different conditions, issues/opportunities, and goals/actions for each of the nine "Management Units" that they identified. This way they could have different strategic approaches for the different types of land use in the city.

Staffing

The city established the Urban Forest Coalition in 1994, which was a cooperative effort of nine city departments that shared different tree management responsibilities before the UFMP was ultimately developed. The coalition was responsible for implementing other tree-related policies, programs, and budget initiatives. In 2007, the coalition was tasked with the implementation of the UFMP. Today, this coalition has been replaced by the city's Urban Forestry Core Team which manages the bulk of cross-departmental coordination on UFP activities (City of Seattle Urban Forestry Core Team, 2020). It is unclear how many staff members are fully dedicated to implementing Seattle's UFMP. According to the City of Seattle (2022), the city will establish a City Urban Forester position in 2023. This new position will be housed in the Office of Sustainability and Environment, and they will work with staff across city departments to coordinate urban forestry efforts throughout the city.

City Departments

The city also has an urban forestry commission. The Seattle Urban Forestry Commission (UFC) is a voluntary space with 13 members appointed by a majority vote of the City Council (6), the mayor (5), by a majority vote by the UFC members (1) or by a special process (1). Members serve three-years terms and positions are a mixture of specialists such as Wildlife Biologist, Urban Ecologist, Natural Resource Agency or University Representative or community representatives.

Due to the size and resources available to Seattle, there are many departments that are responsible for implementing different aspects of the UFMP, and representatives from each department make up the Core Team. The departments involved in Seattle's UFMP are as follows: Finance and Administrative Services, Office of Planning and Community Development, Office of Sustainability and Environment, Seattle Center, Seattle City Light, Seattle Department of Construction and Inspections, Seattle Department of Transportation, Seattle Parks and Recreation, Seattle Public Utilities, and Trees for Seattle (City of Seattle Urban Forestry Coalition, 2007).

Budget

The City of Seattle's decentralized approach to urban forestry is also reflected in its budgeting practices. Each individual department manages a separate budget that includes that department's urban forestry expenditures. This budget structure does not allow us to provide a single urban forestry budget for a given year as many expenditures may be recorded under broad, high-level activities that are not explicitly labeled as urban forestry. However, the City of Seattle's 2023-2024 Adopted Budget did provide insight into the city's current spending for activities that are explicitly earmarked for urban forestry.

As outlined in the city's 2023-2024 Adopted Budget Summary, Mayor Bruce Harrell is launching a One Seattle Tree Strategy that "will provide a framework needed to maintain the city's commitment to a 30% tree canopy cover goal" (City of Seattle, 2022). This strategy includes close to $800,000 over the next two years for improving the city's tree canopy. The first and second components of this strategy are under the jurisdiction of the Seattle Department of Sustainability and Environment. The first initiative supports greening and tree planting on private properties for industrial and industrial-adjacent areas of the city. This initiative has a proposed budget of $300,000 in 2023 and an additional $300,000 in 2024 (City of Seattle, 2022). The One Seattle Tree Strategy also includes $150,000 for the development of a Tree Canopy Equity and Resilience Plan. This plan will identify locations for increasing tree canopy on private and public land, with a specific focus on low-canopy neighborhoods in environmental justice priority areas (p. 41). The third component of the program provides $320,000 to Seattle Parks and Recreation to increase capacity for tree planting, specifically in Seattle Parks.

Most expenditures outlined above, including all activities in the One Seattle Tree Program, will be funded through the JumpStart Payroll Expense Tax, which is a funding Green New Deal programs throughout the city (City of Seattle, 2022). Other urban forestry activities are funded through the city's general fund or through revenues specific to each department.

The city's 2023 UFP expenditures are outlined in Table 6. Please note that these expenditures do not include regular, ongoing tree maintenance and planting in the city (e.g., tree pruning related to repaving streets). The expenditures outlined are specifically defined within the city's budget as relating to urban forestry.

Table 6: City of Seattle, WA - 2023 Urban Forestry Expenditures

Department	Expenditure Detail	2023 Adopted
Office of Sustainability and Environment	New Position - Full-Time City Urban Forester	147,000
Office of Sustainability and Environment	Development of Tree Canopy Equity and Resilience Plan	150,000
Department of Transportation	Tree Planting in Right-of-Way Initiative	250,000
Department of Construction and Inspections	Additional Capacity for Tree Protection	54,961
Office of Sustainability and Environment	Greening of Industrial Properties in Equity Focus Areas	300,000
Parks and Recreation	Increased Tree Planting and Maintenance in Parks	637,000
	Total	**1,538,961**

4.5 Case Studies Summary

We analyzed each city according to our seven criteria (Table 1): tree population assessments, strategies, equity considerations, plan updates, commission, city departments involved, staffing, budget, and funding sources. At the end of this section, Table 7 synthesizes the content of each case study and summarizes key information for each city based on our criteria.

Resource Assessment

All three cities conducted a tree assessment early in the design process of their forestry program. In Issaquah's case, the approach was a FLAT assessment that focused on identifying trees' conditions to create management units. Meanwhile, Vancouver did an assessment that focused on creating additional imagery data of the canopy and land covers, and a tree inventory which is more detailed than a flat assessment. Finally, Seattle completed a canopy assessment and is in the process of doing a tree inventory of street trees. In each case, the resource assessment looks different, and each approach carries specific benefits and costs. Issaquah's case centers more on the management units throughout the city; thus, the assessment supports the management efforts for the plan. However, for Vancouver and Seattle, the assessment goes further as it also includes a tree inventory which adds additional information on the types of trees in the city. Tree inventory is costly, as it requires more work on the ground to identify trees.

Community Engagement

Strategies and Equity Considerations

All three cases implement steward programs to integrate volunteers, which are integral to successful implementation and long-term program sustainability. Aside from steward programs, cities also carry out periodic surveys, meetings, or other spaces to gather feedback from the public to inform the plan. In Issaquah and Vancouver, volunteers have been central to gathering community insight and integrating community perspectives throughout the program, allowing volunteers to develop ownership of the urban forest and ensure the program's sustainability. All three cities emphasize the significance of considering feedback from minority communities and plan to integrate this into their community outreach efforts.

Administrative Capacity

Plan Updates

Cities release updates to their programs every three to five years to integrate resident feedback, make budgetary adjustments, as well as any other technical adjustments related to tree maintenance or public versus private land. There is no clear rationale for why they update the plans at three or five-year increments, but there is an implicit agreement that frequent revision is important to stay on track with the cities' long-term plans for their urban forest.

City Departments

The City of Issaquah manages its UFP within its Parks, Recreation and Community Services Department. The City of Vancouver houses its program within Public Works. However, both cities work closely across city departments to prioritize urban forestry activities and coordinate city efforts. The benefit of this approach is that program goals and activities are prioritized because it has staff and funding dedicated solely to the program.

It is worth mentioning that Vancouver is able to maintain a department with four full-time employees and considerable annual expenditures because of the stable stormwater fee revenue stream Vancouver uses to fund its program. However, Vancouver's approach involves coordination among multiple departments, recognizing the need to work collaboratively with different teams that may have varying priorities and perspectives,

particularly when addressing challenges related to street trees. Finally, Seattle's program is managed through a collaborative approach involving staff from various city agencies. These staff members come together to collectively determine the program's initiatives.

As we mentioned in the case of Vancouver, there can be challenges in aligning interests among city departments. However, one significant advantage of involving multiple departments is that the program becomes a citywide effort that benefits from diverse perspectives and has the potential for a greater impact when all participating departments contribute their resources to the plan.

Vancouver and Seattle have volunteer advisory boards or commissions that oversee the implementation and management of their UFPs. As explained in each section, the establishment of boards or committees dedicated to the UFP ensures that it remains a priority in the city, particularly for departments that have specific responsibilities within the program. These boards help maintain focus, coordination, and accountability for the successful implementation of the UFP, even when different departments are responsible for specific tasks. Seattle's approach to the UFP differs from that of Vancouver and Issaquah, where the program responsibility is centralized within a single department. This centralized approach allows for focused management and coordination within a single department, ensuring that the UFP receives dedicated attention and resources.

Staffing

The cases studied show variations in staff size, ranging from 1 full-time employee in Issaquah to 9 employees in Seattle. The size of the staff is closely linked to the financial resources allocated to the program. The program strategy plays a crucial role in determining the necessary number of employees to initiate and sustain the program over time. The specific needs, goals, and scale of the program will influence the staffing requirements, whether it's centralized or distributed across the city.

Budget

The budgets of the three case study cities differ significantly. Issaquah, being the newest UFP, has the lowest budget with approximately $360,000 in total expenditures for 2023. Vancouver, with its four dedicated staff members, has the highest total annual expenditure, amounting to nearly $2 million in 2023. For a detailed comparison of the budgets of the three case study cities, please refer to Appendix B.

The City of Issaquah's similar governmental structure and size to Lakewood made it a valuable case study in developing the UFP for Lakewood. Vancouver's Urban Forestry Management Plan, established in 2007, provided insights into the early stages of UFMP development and showcased a comprehensive forestry plan. Seattle, with its ample financial resources, highest tree equity score, and larger governmental structure, served as an example of a more ambitious forestry plan. The combination of these case studies contributed to a well-rounded understanding of UFP implementation in different contexts.

Table 7: Case Study Criteria and Summary Findings

Objectives	Criteria	Issaquah	Vancouver	Seattle
Resource Assessment	Tree Population Assessment	Use the Forest Landscape Assessment Tool (FLAT) to produce baseline plans; Utilize GIS and the Tree-iage Matrix to classify acres as Management Units (MU).	Use high-resolution multispectral imagery from NAIP and data from the EarthDefine US Tree Map to classify all types of land covers and acquire canopy changes; identify areas where the tree canopy can be expanded; hire PlanIT Geo to perform a full tree canopy assessment and a partial park tree inventory.	Comprehensive canopy cover assessment in 2016 using light detection and ranging (LiDAR) data; defined 9 management units covering entire city for easy coordination of GIS mapping layers and related planning initiatives; SDOT will complete a 100% inventory of street trees by EOY 2023.
Community Engagement	Strategies	Use community surveys to gather the public's priorities; Construct a centralized volunteer system with Forest Stewards as leaders.	Use existing citizen-based planning efforts, stakeholder interviews, public opinion surveys, and two community meetings to engage with the public; promote urban forest stewardship by working with nonprofits to foster civic involvement; Offer monthly Tree Talk workshops on various tree-related topics.	RSJI outlined key commitments, including intentional engagement with historically underrepresented communities before plan update drafting, reviewing, and valuing all feedback from those communities, transparency, and engaging the public in developing the plan.
	Equity Considerations	List developing new and creative strategies to equitably engage the city's diverse population as one of the Guide's goals.	Plan to incorporate demographics on race, language, and income from the 2020 Census and American Community Survey in future canopy mapping projects to analyze and address tree canopy distribution and environmental justice.	RSJI aims to end institutional racism in city government and achieves racial equity across the community; With the help of RSJI and the Equity and Environment Initiative, the city stated the determination to provide clean, healthy, resilient, and safe environments for all communities.
Administrative Capacity	Plan Updates	Every 3 years.	Every 5 years.	Every 5 years.
	City Departments	Parks and Recreation.	Public Works.	Numerous.
	Staff	1 FTE and 1.5 FTE.	5 FTE and AmeriCorps members.	Core Team composed of 9 FTE across departments.
	Budget	2023 Adopted: $363,000	2023 Adopted: $1,900,000	2023 Adopted: $1,500,000

Chapter 5: Analyzing the Roots of Effective Urban Forestry Programs and Opportunities for Lakewood

The three main objectives that emerged in our case studies comprise the pillars or "roots" of effective urban forestry programs (UFP). This chapter analyzes how these roots apply to the City of Lakewood and provides implementation considerations based on the results from our literature review and case studies.

The discussion in this chapter informs our recommendations and the proposed implementation guide in Chapter 6, in the following structure:

1. We analyze Lakewood's currently available resources to start the program and the additional needs to fulfill the city's urban forestry objectives.
2. We discuss community engagement strategies from other cases and how they relate to Lakewood's context.
3. We evaluate implementation logistics for the program, especially around partnership opportunities and staffing, analyzing them with Lakewood's aspirations and available financial resources.

5.1 Resource Assessment

Throughout our case studies, interviews, and research we observed an important constant throughout all urban forestry examples and resources, which is that the first step for a successful UFP should always be a resource assessment of current tree canopy coverage and forest health. Issaquah, Vancouver, and Seattle all started their plans with a virtual Geographic Information System (GIS) canopy assessment that classified the land coverage types (i.e., grassland, forest, open water, etc.) and identified different management units of land. Each city used a different visualization data set, but every case utilized similar methods of identification and classification of land-use types (City of Issaquah & Forterra, 2020; City of Vancouver, 2007). As mentioned in Chapter 1 of this report, the City of Lakewood conducted a similar canopy analysis to update its Tree Code. This section summarizes the findings of this canopy analysis along with our own GIS analysis to inform our recommendations.

Our research also provided a clear next step after a GIS tree canopy analysis is performed, which is implementing an on-the-ground assessment of the land management units identified in the previous step. Due to the different city sizes in our case study, the ground assessments of each urban forestry plan were quite different. In this chapter, we analyzed these options to decide which path would be most beneficial for the City of Lakewood's program and examined different urban forestry tools to help with the assessment.

Assessment of Lakewood's Current Tree Canopy

For the City of Lakewood to develop a UFP that fulfills its goals, any plan needs to be grounded in the most effective scientific management tools. Below we will outline the current assessment of Lakewood's tree canopy, which is the basis of our recommended actions outlined in Chapter 6.

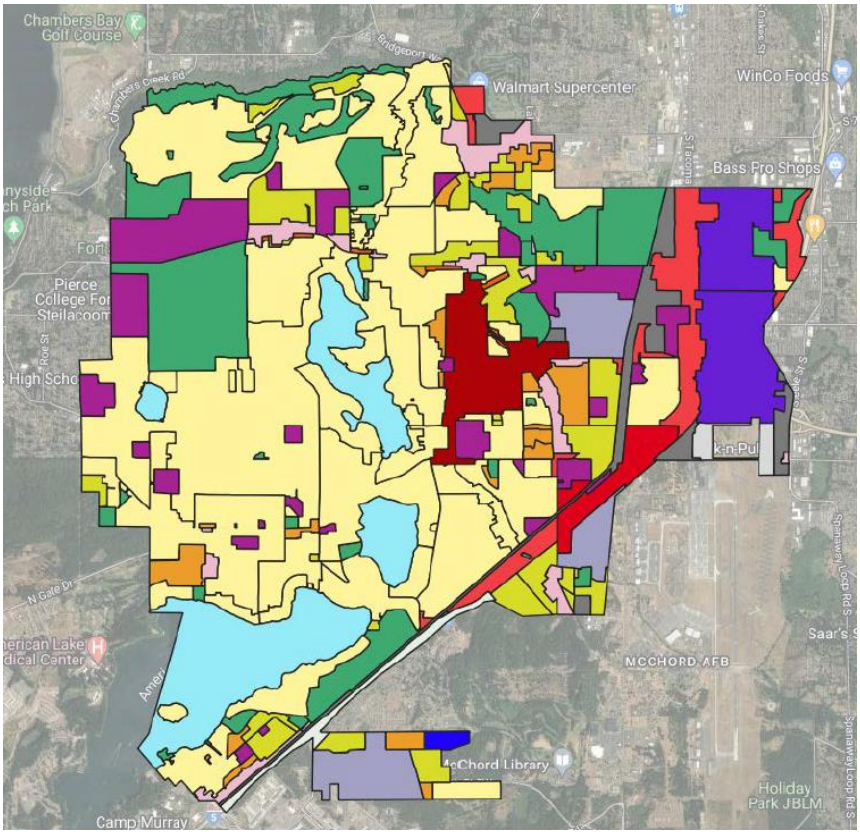
Canopy Assessment

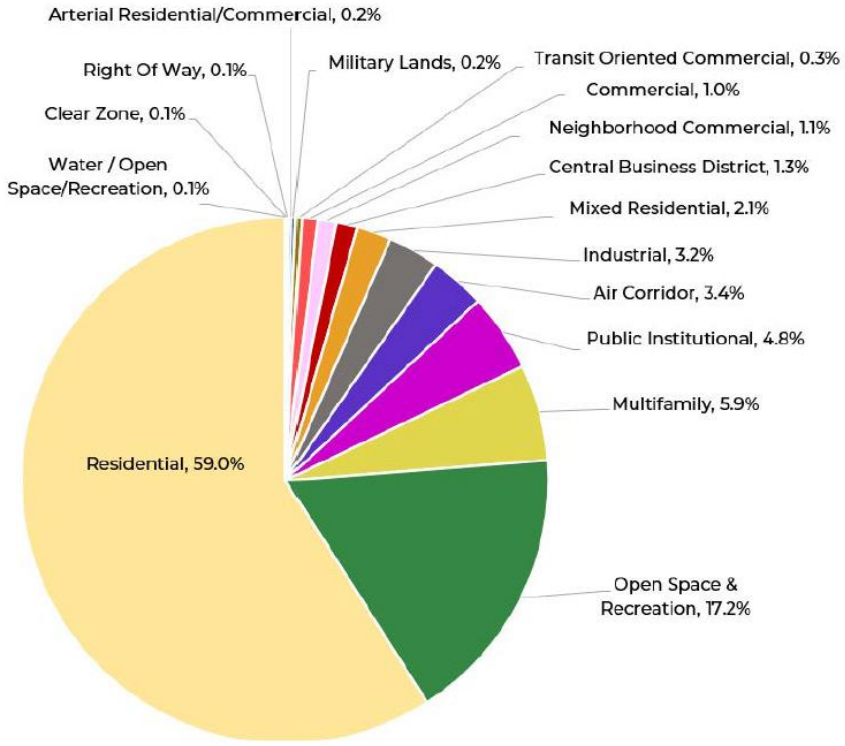
Lakewood contracted PlanIT Geo to assess the city's current tree canopy during the city's tree code update in 2022. The assessment utilized GIS to review Lakewood's land and determined potential planting sites where the city could prioritize planting trees. The assessment involved analyzing the current urban tree canopy (UTC),

types of land cover, zoning categories, equity considerations, and local plant species. Tree Equity Score, unemployment, demographic, zoning, and surface temperature data was used to help inform the equity considerations of each census block (PlanIT Geo, 2022). We contacted the foresters that performed the canopy analysis for Lakewood for more details about their analysis. They said they used Earth Define AI-driven data to perform the analysis which has a 60cm resolution. The data classifies the land into seven classes: tree canopy over impervious, shrub, other vegetation, impervious, bare soil, and water. No one variable was weighted more than the others during the assessment to determine which areas to prioritize planting. To see the details of each variable PlanIT Geo considered, the maps of this data are shown in Appendix C.

PlanIT Geo determined that the City of Lakewood's current citywide UTC is 26.3%. Of this total, 72% is on private land, and 28% is on public land. Approximately 28% of all private land has UTC cover, and approximately 22% of all public land has UTC cover. Figure 6 shows the specific breakdown of UTC by Zoning Category. PlanIT Geo's analysis outlines that there is a lot of work to be done on both public and private lands to develop a larger and healthier urban forest. This data serves as the foundation for conducting land health assessments, identifying areas in need of improvement or restoration, and developing cost-effective strategies. By understanding the existing canopy distribution, the UFP can prioritize resources and interventions to maximize the impact on the community's overall tree cover and associated benefits.

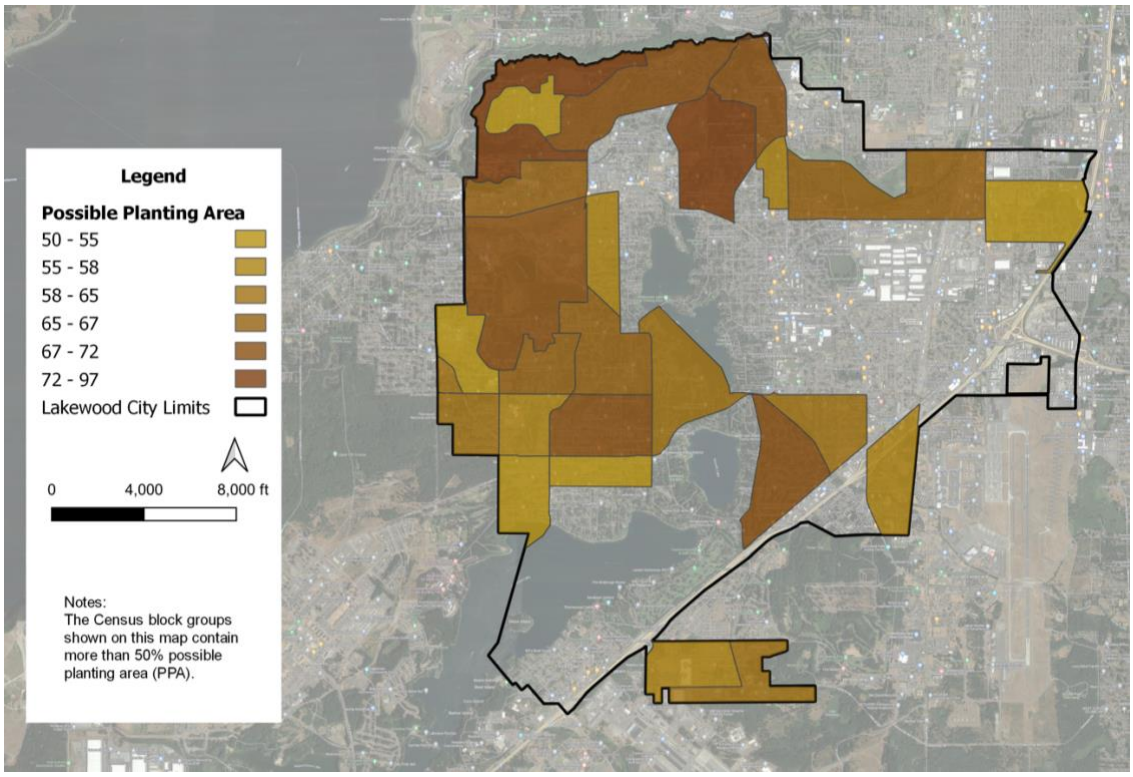
Figure 6: Visual Breakdown of Lakewood Urban Tree Canopy by Zoning Category (Peiffer et al., 2022)





PlanIT Geo also produced the map shown in Figure 7 which highlights census block groups with more than 50% possible planting area. This map identifies areas where trees can be feasibly planted, taking into consideration factors such as available space, location in parks, and other feasibility considerations. The darker shaded census blocks indicate areas with higher potential for increasing the tree canopy.

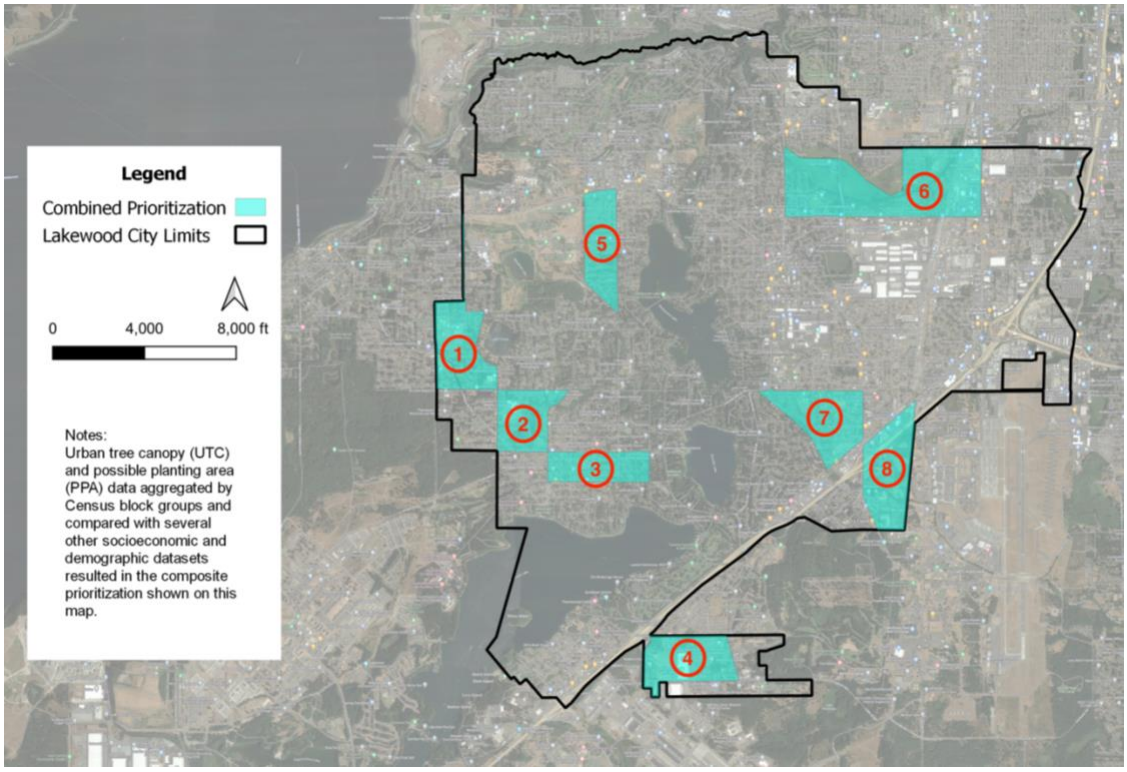
Figure 7: Possible Planting Areas of Census Block Groups (PlanIT Geo, 2022)



Using the available information on possible planting locations and the equity variables, PlanIT Geo created a map that identifies and prioritizes census block groups that would derive the most benefit from tree planting initiatives. Figure 8 presents the identified priority areas for tree planting and management in Lakewood. These areas, referred to as Management Units (MUs), are categorized into eight distinct zones for ease of identification and implementation.

To provide the City of Lakewood with a more specific recommendation on where to start a forest health assessment and thus urban forestry activities, we analyzed the eight MUs displayed in Figure 8 more closely. We wanted to consider the zoning of each MU to understand what areas were publicly owned land that the city would be able to manage directly. The zoning of each MU is shown in the maps in Appendix C. The MUs have various land uses, and most are mainly residential areas. We wanted to identify the MU that has the most open space, publicly owned land, and had the lowest Tree Equity Score according to National Explorer. Identifying where there is a lot of open space and publicly owned land will allow the city to start planting more quickly. While the city has a lot of potential areas to expand its tree canopy, we wanted to provide guidance on where the easiest, most cost-effective, and most equitable place might be to start the field assessment.

Figure 8: Planting Prioritization of Census Block Groups (PlanIT Geo, 2022)



Tools and Strategies

The Green Issaquah Partnership guide benefited from utilizing the forestry management procedures outlined in the Forest Landscape Assessment Tool (FLAT). Not only is this tool publicly available, but it is also relatively simple to implement with easy-to-understand results. The guide was developed by the City of Seattle and is implemented by all "Green Cities" in Forterra's Green City program. Seattle and Vancouver, on the other hand, are both doing more expensive assessments on top of or in place of FLAT. These assessments are conducted either by professionals like PlanIT Geo or by each city's hired staff. Because of FLAT's low cost and ease of use, Lakewood would easily be able to use this assessment tool without the added expenses associated with performing a full tree audit like the larger cities of our case studies. However, full tree audits could provide Lakewood with the most data on forest health, the number of trees, and possible planting areas. A thorough tree audit is also very time-consuming which goes against the city's goal of increasing the canopy quickly.

Table 8 shows the three phases of utilizing FLAT to obtain data on the city's forested land. Obtaining this data informs future management strategies (i.e., invasive species control, planting, and maintenance) by assessing the health of the forest and other ecological conditions (Ciecko et. al., 2016). Following the FLAT phases will allow for more informed ecological management decisions and lead to a stronger and longer-lasting UFP overall. Planting trees before assessing the health of an area could lead to trees not surviving due to invasive species overcrowding, poor soil health, or any number of other ecological issues. The FLAT tool guide provides simple yet thorough guidelines to follow when assessing the health of an urban forest that will be imperative to Lakewood's UFMP.

Table 8: Description of FLAT Phases (Ciecko et al., 2016)

FLAT Phase 1: Forest Cover Type Mapping	**FLAT Phase 2:** Field Assessment	**FLAT Phase 3:** Management Prioritization
Aerial imagery and boundary data are used in a lab or office to divide a project area into management units (MUs), the unit of observation and measurement for the assessment. Data attributes are also developed during Phase 1 based on local conditions and assessment purposes (e.g., species composition, size and age classes, invasive species, tree-canopy vigor, etc.).	A trained field team visits the project area to collect estimates of each attribute for each MU. Such teams may include professionals, technicians, and volunteers.	The data, which provide a snapshot of ecological conditions in the project area (within and across all MUs), can be used to classify or rank each MU. The assigned values can be viewed spatially to provide a mapped, visual representation of landscape conditions. These results can then be used to prioritize where on-the-ground management actions would most improve ecological function and health, contributing to long-term sustainability of a forest area.

5.2 Community Engagement

The following section presents a comprehensive analysis of the community engagement strategies from the case studies in Chapter 4. Aiming to provide Lakewood with a community engagement framework tailored to its unique context, the proposed strategies encompass a diverse array of approaches and activities, including hosting community meetings, launching public surveys, constructing a volunteer system, building a forest stewardship program, hosting workshops for private property owners, and collaborating with other organizations. Detailed implementation strategies are elaborated in Chapter 6.

Community Meetings

From the case studies we learned that hosting community meetings is one of the most common ways for cities to conduct outreach and engage with the community during the initial phases of their UFPs. The suggestions gathered during these meetings help cities adjust their UFP to better serve constituents. Issaquah, Vancouver, and Seattle all used similar strategies to raise awareness, gather public opinions, and garner political support when formulating their UFPs. The City of Vancouver used community meetings during the initial phases of developing its UFP in 2006 and 2007, while Issaquah marked the meetings as the main strategy to acquire goals and objectives for its Green Issaquah Partnership. Seattle, with its larger capacity, hosted community meetings in collaboration with the Department of Neighborhoods through the Community Liaisons program to engage with diverse communities. Therefore, it could be beneficial for the City of Lakewood to host community meetings as one of the first steps toward building a UFP that aims for achievable goals and public support.

Launch Public Surveys

Public surveys are another activity that cities commonly use to acquire comments and suggestions from the public for their UFPs, as cities sometimes are constrained by budgets to host in-person community meetings regularly. Public surveys are commonly conducted in the form of online surveys, which offer several advantages in terms of cost-effectiveness and convenience. By using online surveys, the city can provide an accessible platform for the public to submit their comments and feedback conveniently from their own devices. This

eliminates the need for physical paper surveys and allows for a larger reach and participation from a wider range of individuals. Additionally, online surveys streamline the data collection process, making it easier for the city to compile and analyze the public's comments efficiently. However, online surveys do have the disadvantage of potentially reaching a limited audience. Typically, online surveys attract individuals who are already interested or engaged in the related topics or issues. This self-selection bias may result in a sample that is not fully representative of the entire population or community. Therefore, public surveys have the potential to exclude the viewpoints of individuals who are not actively engaged or interested in UFPs, despite their potential to provide valuable insights and contributions. For the City of Lakewood, public surveys can serve as valuable complementary tools to community meetings, allowing for a broader reach and gathering input from a diverse range of community members. Since the City Council has already recognized regular community-wide surveys as one of the 2021-2024 goals during its July 2022 study session, the city has the potential to incorporate questions regarding the UFP activities and priorities into existing regular surveys to save resources (City of Lakewood City Council, 2022). By combining these two strategies, the city can enhance the outreach process and gather more detailed and useful responses from a wider range of stakeholders.

Construct a Volunteer System

Experiences from other cities show that volunteers are essential for successful UFPs, as they provide an additional workforce apart from government staff, and can help plant trees, remove invasive species, and perform other activities to help meet UFP goals. In interviews with representatives from Issaquah, Vancouver, and Forterra, we learned that each city has devoted resources to constructing a central system to manage the volunteers. The implemented system enables the city to effectively track past volunteer efforts and strategically plan future work, providing a comprehensive overview of progress for each MU. This streamlined approach facilitates efficient UFP operation, allowing for improved coordination and monitoring of volunteer activities. Implementing a volunteer tracking system that captures individual volunteer contributions enables the city to recognize and reward exceptional volunteers. By acknowledging their efforts, providing rewards, and expressing appreciation, the program can inspire and motivate volunteers, fostering a culture of value and appreciation for their voluntary work. This approach encourages continued engagement and dedication among volunteers, contributing to the long-term success of the program. Given the benefits and advantages mentioned, it would be valuable for the City of Lakewood to allocate resources towards the development and implementation of a volunteering system that effectively manages and tracks the progress of volunteers' work

Build a Forest Stewardship Program

Issaquah established its Forest Stewardship Programs with the purpose of engaging individuals who are passionate about urban forests and interested in expanding their knowledge. These programs aim to identify and empower individuals who are willing to take on leadership roles, guiding and inspiring other volunteers to make positive changes and enhance the environment within their community. In addition to recruiting volunteers, Issaquah's Forest Stewardship Program also aimed to engage individuals who wanted to expand their knowledge of urban forests and develop their leadership abilities. Through a structured training process, these individuals became "Forest Stewards" who worked either independently or in small teams to organize and implement restoration projects in specific parks. They played a crucial role in leading volunteer events and closely collaborated with city staff (City of Issaquah & Forterra, 2020). Implementing a similar stewardship system in the City of Lakewood could be highly beneficial. It would not only provide more opportunities for community members to actively participate in tree planting and care initiatives but also allow the city to achieve the goals of its UFP in a cost-effective manner. By having Forest Stewards capable of leading volunteers and organizing events aligned with the UFP's objectives, the volunteer efforts would become valuable contributions to the city's UFP.

Host Workshops for Private Owners

Both Issaquah and Vancouver host activities like Tree Talk Workshops as one of their private landowner engagement strategies. These talks serve to involve private owners and educate them on how to better maintain private trees. The City of Lakewood could consider hosting similar activities, if feasible, to enhance its engagement with private landowners. Since the government does not have direct control over privately-owned trees, educating tree owners about the importance of specific tree species that contribute to the overall environmental well-being is key. By promoting the maintenance of trees that align with the city's goals outlined in the UFP, private landowners can play an integral role in supporting the city's broader goals and objectives.

Collaborate with Other Organizations

All of our case study cities have established partnerships with various organizations to help fulfill their UFP goals. Issaquah and Seattle partnered closely with Forterra, a nonprofit organization that works with cities to help evaluate the health and condition of their forests and develop a program to protect, enhance, and sustain those resources. Vancouver also partnered with various neighborhood organizations, both private and nonprofit, to help achieve its UFP goals. Partnerships with relevant organizations offer funding opportunities and access to field experts, which can enhance the implementation of Lakewood's UFP. Partnerships with potential organizations are a valuable option for the City of Lakewood to consider as a way of increasing its capacity to implement its UFP, especially since the initial resources for developing and implementing its UFP are limited. Appendix A presents a partnership guide that could support the exploration of potential partnerships to support the City of Lakewood’s urban forest.

Equity Considerations

The cities highlighted in Chapter 4 emphasized that equity considerations are key focal points for developing their future UFP goals. Specifically, all three cities committed to finding creative ways to incorporate demographics on race, language, and other neighborhood characteristics in order to equitably engage the city’s diverse populations and address environmental justice issues. The City of Seattle introduced the Race and Social Justice Initiative (RSJI) and the Equity and Environment Initiative to address and rectify environmental disparities and promote social justice within the city. All three cities also highlighted the importance of considering minorities during planning phases and community meetings to make sure low-income earners, people of color, immigrant communities, and senior citizens all have fair treatment and meaningful involvement in the development, implementation, and enforcement of environmental laws, regulations, and policies (City of Issaquah & Forterra, 2020; City of Seattle, 2020; City of Vancouver, 2021).

The City of Lakewood (2022) has already demonstrated a strong commitment to equity and inclusion by recently hiring a professional Diversity, Equity, and Inclusion (DEI) manager. This consultant will launch a training initiative for city personnel, aiming to enhance the related values across the departments. This training initiative will be a multi-year process that includes examining city processes and implementing DEI lenses consistently throughout projects, which provides opportunities to incorporate important values into the new UFP in a meaningful and impactful manner and result in a more harmonious and socially responsible urban forestry program that benefits the entire Lakewood community.

5.3 Administrative Capacity

City Departments

As outlined in Chapter 4, there are various organizational and administrative structures supporting each city's UFP, including differences in the city departments that are involved in administering the UFP. Vancouver and Seattle have advisory boards with members from the community to ensure oversight and prioritization of the city's urban forestry goals. Seattle's Urban Forestry Commission supports the city departments that carry out specific forest management tasks. The City of Seattle does not have a single agency identified as the sole authority for urban forestry throughout the city. Instead, there is an Urban Forestry Core Team, which is composed of City of Seattle employees across multiple departments. Establishing a commission or advisory board provides accountability and assists city departments with multiple responsibilities to allocate sufficient time for UFP implementation.

The Vancouver houses their urban forestry management within a single department, which is located within Public Works. Even so, the City of Vancouver prioritizes cross-department collaboration on the health and maintenance of trees throughout the city. Vancouver also has an Urban Forestry Commission that supports coordination in the city and ensures UFP prioritization. The city manages collaboration through frequent communication among departments, along with well-documented guidelines and requirements for tree maintenance. The Urban Forester is an ISA Certified Arborist and is able to provide guidance on trees throughout the city to all departments. In addition to the voluntary commission, Vancouver has a small team dedicated to the UFP that coordinates with city departments continuously, supporting logistics and holding volunteering events.

Finally, the City of Issaquah, whose UFP is a relatively new initiative, has a more insular management structure, with the majority of the UFP work taking place within its Parks Community Services Department.

During our interviews, many experts suggested that a single department should house the UFP, in contrast to the City of Seattle's cross-departmental Core Team. Housing the program under a single agency with a dedicated staff member, either a current city employee or a new hire, can ensure that the initiative takes priority in the city. Based on the current organizational structure of Lakewood, the city could consider housing a UFP under Parks, Recreation, and Community Services (PRCS) or Public Works Engineering because of the maintenance work that will be central to the UFP. The advantages of this approach are that those departments already do similar work to the one the UFP will require, so they will have the expertise and knowledgeable staff to implement the program at a lesser cost. The downside of this first option is that the PRCS and PWE departments have many other responsibilities within the city and have limited capacity to manage the UFP. The city could also consider a Core Team comprised of representatives from Community and Economic Development, PRCS, and Public Works. The advantage of that approach is that having more stakeholders within the city facilitates work distribution, ensuring neither department is overburdened by the program and the UFP is more sustainable. The downside of the approach is that with very diffuse responsibilities, the program would not be a priority for the departments that already have many priorities. This downside could be addressed by having a standalone advisory board and/or creating a position whose sole responsibility would be to coordinate program activities throughout the city and whose main priority will be ensuring each party is meeting its goals, as approved in the program plan. That position must be given authority to follow up with other departments to ensure the work is sustainable and no department is burdened with the coordination and logistics between departments. In light of the above, creating a new urban forestry advisory board to oversee the program at the city level, following Vancouver's and Seattle's examples, might be the best option for Lakewood, considering the city structure and capacity to take on a new UFP.

Staffing

Each of the three case study cities has a different staffing structure. The City of Seattle, which has the oldest and most established program, does not have UFP-specific staff. Instead, representatives from related departments comprise a Core Team that leads urban forestry initiatives in the city. In an interview with Vancouver's Urban Forester, we learned that the city has four full-time urban forestry staff members, including the urban forester. Vancouver also hosts AmeriCorps members who provide additional assistance on UFP activities. Issaquah's Parks and Community Services Director informed in an interview that over the last four years, an existing Parks and Community Services employee has coordinated UFP activities in Issaquah. Additionally, Issaquah will hire two dedicated staff members in 2023 – a full-time Urban Forest Supervisor and a part-time Volunteer Coordinator.

Lakewood could also consider hiring a full-time administrator in the first year who manages UFP activities and volunteer efforts, particularly if there is no capacity for a current staff member to take on this responsibility. Alternatively, Lakewood could consider a similar model to Issaquah's where existing employees, within the relevant city departments, administer the urban forestry program in the initial implementation period. The city could apply to become a host for AmeriCorps members, which could also support the program at a lower cost to the city. However, there is a rigorous application process, and this strategy would require a dedicated supervisor for any AmeriCorps members.

Budget

The projected 2023 expenditures for UFP activities in each city vary greatly across each city. In the initial years of a UFP, the largest expenditures to consider are staffing, resource assessments, and volunteer supplies. There are many funding sources that the case study cities used to fund UFP activities. We have outlined the four main sources below:

Reallocate Storm and Surface Water Utility Fee Revenue

Through our interviews, we learned that cities could allocate a portion of storm and surface water fees to urban forestry activities. There are equity implications associated with using city fees, which are regressive in nature, to fund urban forestry. Allocating a portion of fee revenue to urban forestry activities also means that the revenue will not be available for other stormwater management purposes. Nonetheless, it is crucial to recognize the long-term benefits that trees provide by reducing stormwater and surface water management costs. According to the U.S. Department of Agriculture Forest Service (2020), trees benefit city stormwater systems through rainfall "intensity reduction, stormwater infiltration and uptake, and nutrient load reduction" (p. 1). Therefore, urban forest activities can be a useful tool for managing storm and surface water systems and reducing management costs in the long term. Lakewood's updated tree ordinance currently references the benefits urban trees provide to storm and surface water management systems.

The City of Vancouver utilizes this fee to fund urban forestry staffing and activities. In 2023, 95% of the departmental budget, including four staff members, is estimated to be funded through this fee (City of Vancouver, 2022b). The City of Issaquah is using a portion of this fee to fund a full-time Urban Forest Supervisor starting in 2023 (City of Issaquah, 2022).

Surface and stormwater utility fees can be a consistent and stable revenue source for UFPs. The city would need to document how revenues were used and how those activities promote better storm and surface water systems.

City Tree Fund

Many cities, including Lakewood, have established Tree Funds that are funded through penalties and fees related to tree maintenance throughout the city. These funds can also be funded through donations. The City of Lakewood's tree ordinance outlines that the Tree Fund can be used for the following activities:

- acquiring, maintaining, and preserving wooded areas
- planting and maintaining trees
- establishment of a public nursery
- urban forestry education
- implementation of tree canopy monitoring program

Each of the activities outlined below are within the scope of a UFP and can be used to fund the implementation of a UFP.

General Fund Revenue

All three of our case study cities utilize a portion of General Fund Revenue for UFP activities. Lakewood could consider allocating a percentage of General Fund revenues to UFP activities, similar to the 1% that the city currently allocates to Human Services.

Government and Nonprofit Partnerships

There are many government and nonprofit grants and partnerships available to financially support urban forestry work within the City of Lakewood. We have provided a full list of public and nonprofit agencies for potential partnerships the city can consider in Appendix A.

The analysis discussed in this chapter is the foundation for the Urban Forestry Implementation Guide prepared for Lakewood. Chapter 6 is comprised of recommendations for the first five years of plan development and implementation.

Chapter 6: Urban Forestry Implementation Guide

Lakewood established a goal to increase its urban tree canopy from 26% in 2022 to 40% in 2050, which is an increase of 14 percentage points. This goal is driven by the city's conviction that trees offer numerous benefits to the community, including air pollution filtration, stormwater management, wildlife habitat, carbon sequestration, and overall improvement in community members' quality of life. This chapter provides a detailed Urban Forestry Implementation Guide to support the city's efforts to increase its canopy coverage and maintain its existing urban trees. The following pages cover vision, mission, goals, equity commitments, an analysis of the City of Lakewood's current canopy coverage, fieldwork steps, best practices, community engagement, monitoring and evaluation, and as well as available resources for initiating and sustaining the program.

The guide provides strategic recommendations and priorities for the first five years of the urban forestry program (UFP), utilizing the analysis of existing information on Lakewood's urban trees and public spaces. The four main recommendations are as follows:

- Recommendation 1: Develop a mission, vision, and goals for urban forestry in the City of Lakewood.
- Recommendation 2: Complete a comprehensive resource assessment and begin restoration practices in the city.
- Recommendation 3: Develop a comprehensive community engagement strategy.
- Recommendation 4: Create administrative capacity within the existing city organizational structure.

To ensure the successful implementation of these recommendations, it is essential to engage in detailed discussions with the Lakewood community. Additionally, it is advisable to involve an ISA Certified Arborist who can provide expert technical assistance and evaluate canopy recommendations.

RECOMMENDATION 1:

Develop a mission, vision, and goals for urban forestry in the City of Lakewood.

Mission and Vision Statements

Mission and vision statements guide program action and are important tools for an effective management strategy. We drafted mission and vision statements to support the City Council and all relevant departments in establishing the program. However, we recommend that these draft statements be revised and agreed on by the parties that will implement the program after consultation with the community.

Mission Statement:

> The City of Lakewood Urban Forestry Program is a multi-agency effort in which volunteers, residents, businesses, local organizations, and the City of Lakewood design and work together to transform, protect, and grow natural resources in the city.

Vision Statement:

> City of Lakewood creates a sustainable and healthy urban forest with adequate tree species for its local ecosystem that is protected by the city and its community enjoys the benefits of urban trees and recognizes their environmental and economic value.

Plan Goals and Outcomes

In addition to establishing mission and vision statements, setting specific goals and outcomes is crucial to guide the implementation of this guide effectively, particularly in the initial stages. The following goals are derived from the analysis of Lakewood's unique context, available resources, and best practices observed in other cities across Washington state. We have identified associated outcomes for each goal. To ensure the plan's success, Recommendation 4 provides detailed monitoring and evaluation actions aligned with these goals and outcomes. Furthermore, specific indicators have been developed to measure progress under each goal.

- **Forest health:** Improved urban forest health, appropriate tree planting, and invasive species control throughout the City of Lakewood's parks and urban areas:
    - Implement restoration practices in the prioritized Management Units (MU) in Lakewood through the end of year 5.
    - Identify and remove invasive plants from Lakewood's parks and forested urban areas.
    - Establish clear responsibilities in tree maintenance within the city structure and standardize maintenance practices, to ensure regular maintenance operations and canopy health.
- **Tree population expansion:** Increased canopy coverage within the city limits, including the City of Lakewood's parks and forested urban areas:
    - Grow the urban tree canopy (UTC) in the City of Lakewood by 40% by 2050.
    - Plant native trees and plants that are appropriate for the City of Lakewood's ecosystem.
    - Define priority management areas based on land, environmental, and equity considerations including, but not limited to land cover, zoning categories, local plant species, the Tree Equity Score, unemployment, demographics, and surface temperature data.
- **Community engagement:** Lakewood residents are regularly consulted to design and update the plan, and the community is actively engaged in the management and restoration of the city's urban forested areas:
    - Create a voluntary Urban Forestry Advisory Board as a space for community stewardship of the program. This outcome only applies if the city follows Options A or B in Recommendation 4.
    - Strengthen relationships with businesses, nonprofit organizations, schools, and other local allies to collaborate in efforts related to the urban forest.
    - Recruit volunteers and build community capacity for long-term engagement.
    - Survey the community regularly to maintain an updated understanding of their interests and needs, as well as the community's understanding of the city's plan and how to support it.
    - Engage community members in restoration and monitoring projects; and
    - Create comprehensive guidelines and communications to engage the community in the protection, restoration, and maintenance of trees on the right-of-way and private property.
- **Equitable access to urban forest benefits:** Community members across the city enjoy the benefits of a healthy and growing urban forest, independently of their area of residence, race, or socioeconomic conditions:
    - Prioritize tree planting in canopy-deficient areas to ensure equitable distribution of benefits to all residents.
    - Allocate financial and human resources recognizing economic and social equity.
    - Communicate and promote the benefits associated with urban forests on quality of life, including psychological, social, and economic benefits.
    - Develop communication strategies and tools to ensure accessibility for all, such as including subtitles for recorded meetings and translating relevant documents to languages other than English.

- **Sustainability:** Sustainable financial resources and operational capacity support the evolution of urban forestry in the City of Lakewood; tree canopy growth; forest health and an engaged community that enjoys the benefits of forested urban areas:
    - Dedicate financial resources to support the mission of urban forestry in the city.
    - Strengthen partnerships with nonprofits and business leaders in urban forestry development to collaborate in further developing this Urban Forestry Program and support plan revisions in the future.
    - Position the City of Lakewood as a model for urban forestry programs in Washington State.

RECOMMENDATION 2:

Complete a comprehensive resource assessment and begin restoration practices in the city.

This section outlines seven steps for how the city can begin implementing and prioritizing urban forestry activities throughout the city. The city should begin by conducting a tree assessment, using the results to control for invasive species and to establish maintenance priorities. It is important the city take steps to ensure the health of the current tree population prior to planting new trees, especially in the first five years of the program.

Field Step 1: Select Management Units and data attributes for a comprehensive Tree Assessment.

Before the city can begin planting trees and controlling invasives, it needs to complete FLAT Phase 1 of the FLAT assessment outlined in Chapter 5. While the UFP should ultimately conduct on-the-ground field assessments of the entirety of its urban forest, we recommend the city begin with assessments of the eight MUs identified in Chapter 5 (Figure 8).

Of the eight MUs identified, we conducted further analysis to determine which MU the city could begin assessing. The goal of our analysis was to identify which MU had substantial amounts of open space and publicly owned land, which also having a relatively low Tree Equity Score according to National Explorer. Prioritizing an MU with more publicly owned land will help the city focus efforts to public tree canopy and to reduce costs low by utilizing resources that are already available, such as parks maintenance staff. An MU with large amounts of open space will also reduce the costs associated with invasive species control due to the prior and ongoing maintenance on that land. We chose to include the Tree Equity Score in our analysis due to our recommended plan outcome of equitable access to urban forest benefits.

We identified MU 6 as having the most public land and MU 4 as the area with the lowest Tree Equity Score (American Forests, 2023). MU 4 has a Tree Equity Score of 45 out of 100, while MU 6 has a score of 78 (American Forests, 2021b). While MU 6 has a much higher Tree Equity Score than MU four, the census block just south of it has the same score as MU 6 at 45 (American Forests, 2023). Due to its proximity to a low equity score census block and its abundance of public land, MU 6 would give the city the most opportunity of canopy growth while also addressing equity issues. MU 6 is also the largest census block, which provides Lakewood with options on where to start the tree health assessment.

The city should select relevant data attributes before beginning the assessment. These data attributes are the different ecological and local assessment qualities that the city can prioritize. The attributes can be species composition, size and age of species, invasive species, etc. Table 9 shows examples of data attributes that are relevant to the city's goals and that are commonly used in assessments of this nature. We recommend that the city work in tandem with a professional urban forester to develop a comprehensive list of data attributes. The

city should develop a site identification system that the city can easily track and can be understood by city staff and volunteers. For a full list of potential data attributes, please see the FLAT guide (Ciecko et. al., 2016).

Table 9: Examples of Data Attributes for FLAT Assessment

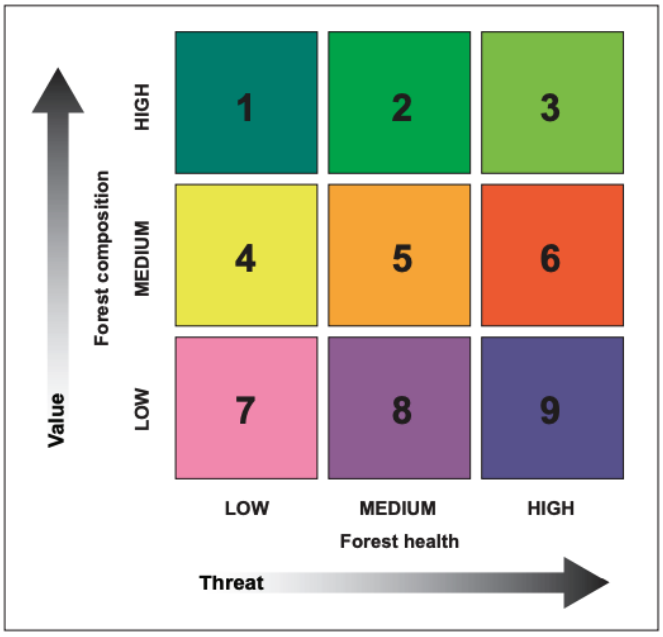
Data Attribute	Detail
Site Identification	Name or management number, some way to identify the site and its data
Date	When progress assessments are made it will be important to have a baseline
Land Cover Type	Identification based on the classifications determined from the tree code review: Grass/Open Space, Bare Soil, Impervious, Tree Canopy, Shrubs
Tree Species Composition	Document what trees are where to know what natives are common and how to promote biodiversity
Age Class	Lakewood is having issues with Gary Oaks aging so documenting the relative age of trees would be relevant for each MU's assessment
Stocking	Crown closure estimate as viewed directly above
Shrub Species Composition	Grassland and shrubland are a large percentage of Lakewood's open spaces
Invasive Density/Composition	Understanding the breadth and depth of invasive invasion of MUs will be very relevant for management strategies
Soil Health	This could include root rot, bare soil, dryness, or other relevant details

Field Step 2: Tree-iage Assessment.

Both Seattle and Issaquah used the Tree-age Assessment model in developing their implementation plans. While Seattle is currently conducting a full tree audit, the FLAT assessment was originally developed in partnership with the City of Seattle. Since the tool was designed in the Pacific Northwest, it provides relevant resources for communities with similar ecosystems, which makes it a good tool for the City of Lakewood. After the relevant data attributes are selected in Field Step 1, the next step for the city is to continue the tree assessment by implementing FLAT Phase 2. This involves a field assessment of MUs by trained staff or volunteers to get an overview of the ecological health of the MU. The field assessment will involve assessing each MU based on each data attribute.

The ecological health rating will then be assessed on the Tree-iage Matrix and each MU will be assigned a tree-iage category or a priority rating from the matrix. The Tree-iage Matrix can be seen in Figure 9.

Figure 9: Tree-iage Matrix (Ciecko et. al., 2016)



As shown in Figure 9, tree-iage categories range from 1 to 9. The Green Issaquah Partnership implementation guide describes the rating system as follows,

> A rating of 1 represents high-quality habitat and low invasive-species threat, and 9 represents low-quality habitat and high invasive-species threat. An MU that appears in tree-iage category 3 scored high for habitat value and high for invasive cover threat. MUs scoring low for habitat value and medium for invasive cover threat were assigned to category 8 based on the tree-iage model. (City of Issaquah and Forterra, 2020, p. 32).

Since there are limited values to represent forest health and composition, the ratings can be subjective based on who is performing the assessment. Because of this subjectivity and because of how vital forest health is to this program, we recommend the City of Lakewood hire a professional urban forester to perform this audit. This will ensure consistency and accuracy throughout the assessment.

After this broad overview assessment of each MU is recorded, then the city, in consultation with an urban forester, will determine what maintenance and restoration each MU requires. Some areas will have higher invasive threats that will require more work initial. However, some MUs will likely have lower invasive threats and can instead be early planting areas. To easily understand where Lakewood's MUs fall within each health category, the assessment should be organized by individual acre. The city can also use this organization to estimate total maintenance needed across all UTC acres.

We recommend that the City of Lakewood begin with MU 6 from Figure 8 in Chapter 5. Since this management unit is primarily publicly owned land, there will be less of a barrier for the city to start its assessment and implement FLAT. This MU is also near a census block with a low Tree Equity score, so starting the assessment there will help reduce the negative effects of a small tree canopy. MU six is also the largest MU at about 465 acres, which we recommend be broken up into smaller sub-management units.

The tree-iage method is explained in greater detail in the FLAT guide (Ciecko et. al., 2016).

Field Step 3: Identify and prioritize work in MUs.

Once the city has completed the field assessment of the MUs, the next step is FLAT Phase 3, which is management prioritization. The city should identify areas of priority based on the tree-iage method outlined in Field Step 2. Based on the identified MUs, the city should design annual and multi-year restoration plans for the high priority MUs. Comprehensive restoration and maintenance schedules ensure that sites do not revert to pre-work condition, which can cost additional resources and cause the public to lose faith in the project.

As new sites are identified for restoration, the tree-iage model can help establish the level of priority and work necessary. For example, MUs falling into tree-iage category 1, which signifies a "high-quality" habitat with little to no invasive plants, will immediately be eligible for restoration and routine monitoring and maintenance. Other high-value habitats, falling into tree-iage categories 2 and 3, will be considered high-priorities for protection and restoration. As the city prioritizes work, it should consider additional factors (i.e., public access and safety or proximity to wetlands, streams, and shorelines). If there are existing agreements with other entities to manage specific areas, such as utility corridors, the entities will still maintain responsibility for providing maintenance as previously agreed upon.

Field Step 4: Continue maintenance in parks and natural areas.

The City of Lakewood currently invests significant time and resources in the maintenance of local parks and natural areas. This ongoing maintenance should continue as the city determines other areas of prioritization. The city should prioritize specific areas within parks and natural areas to focus additional maintenance based on the comprehensive assessment recommended in Field Step 2, areas of importance as defined by the Lakewood community members, and available resources.

Field Step 5: Identify areas appropriate for professional crew intervention.

In this guide, we emphasize the need for volunteers for UFP maintenance and planting. However, not all projects are suitable for volunteers. The city should determine which sites are not suitable for volunteers and should utilize city staff and contract services to carry out maintenance and restoration in those sites.

Field Step 6: Implement restoration best practices on all project sites.

The *Four-Phase Approach* to restoration field work is an important best management practice (BMP) that was developed by Seattle Parks and first outlined in the Green Seattle Partnership (City of Seattle, 2007). As outlined in our literature review and Chapter 5, restoration and adaptive management are essential to the long-term health of existing and newly planted trees. Figure 10 illustrates the potential progression of forested parklands and urban forests over 100 years with and without regular restoration and maintenance.

Restoration activities fall into four main phases:

Restoration Phase 1: Invasive Plant Removal

Restoration Phase 2: Secondary Invasive Removal and Planting

Restoration Phase 3: Plant Establishment and Follow-Up Maintenance

Restoration Phase 4: Long-Term Stewardship and Monitoring

Figure 10: Illustration of Urban Forest Progression with and without Restoration Practices (Provided by Green City Partnerships, Forterra (2023))

PRESENT
Forested parklands are dominated by deciduous trees, mainly big-leaf maples and alders, nearing the end of their life. After decades of neglect, non-native invasive plants, such as English ivy and wild clematis, cover the ground and grow up into the tree canopy.

IN 20 YEARS
Invasive plants outcompete and grow over existing native vegetation, blocking the sunlight plants and trees need to thrive. English ivy now dominates the tree canopy, making the trees weak, top heavy and susceptible to windfall. Eventually, trees die or fall over.

IN 50 YEARS
The trees are gone. Only a few native shrubs struggle to survive the stress of competition with invasive plants.

IN 100 YEARS
The forest is destroyed. Native trees can no longer establish on their own. We are left with a dense "ivy desert." Very few plant species can live, and forest biodiversity is gone. Such conditions provide homes for rats and scarce habitat for more desirable urban wildlife.

PRESENT
Forested natural areas are dominated by deciduous trees, such as big-leaf maples and alders, nearing the end of their life. After decades of neglect, non-native invasive plants such as English ivy are smothering native vegetation and weakening native trees.

IN 20 YEARS
Through restoration efforts and long-term maintenance, the non-native plants are removed. Native groundcovers, shrubs and evergreen trees such as Douglas firs and Western red cedars and hemlocks are planted.

IN 50 YEARS
As the evergreen trees grow, they shade out sun-loving invasive plants such as blackberry. Native understory plants thrive.

IN 100 YEARS
With continued stewardship, the maturing forest requires less care and provides greater benefits to the city.

The Four-Phase Approach to fieldwork has been adapted from the Green Seattle Partnership and the Green Issaquah Partnership for the City of Lakewood. Moving through each of these phases may take several years. These restoration phases should be used on MUs that have been identified through a comprehensive resource assessment. All work should be thoroughly documented to track, measure, and report progress.

MUs that have been determined to fall under tree-iage category 9, which indicates high invasive cover and low-value canopy, may spend long periods in the first three phases outlined below before moving into Restoration Phase 4. Comparatively, MUs that fall into tree-iage category 1, indicating high-value canopy and low invasive cover, may require very little time in the first three phases and may move rapidly into Restoration Phase 4. The city should complete an assessment of each site before work begins in the appropriate phase.

Restoration Phase 1: Invasive Plant Removal

The goal of the first aim is to clear the site of invasive plants. According to the Pacific Northwest Invasive Plant Council (n.d.), invasive plants negatively impact native plants, wildlife, and entire ecosystems. The impacts of invasive plants are widespread and far-reaching. When invasive plants are present, they degrade soil, which can lead to erosion and can ultimately negatively impact water quality. Invasive plants can also put endangered plant species at further risk, which leads to lower biodiversity (Pacific Northwest Invasive Plant Council, n.d.).

The city should focus on specific tree-iage areas within each MU. This helps ensure that invasive plants are thoroughly cleared, which can minimize potential regrowth. Removal techniques vary based on habitat and species. Please see Appendix E for a list of invasives common in the areas, including removal techniques, and see Appendix G for a list of native plants as a reference when identifying native vs. invasive. Initial removal may take more than one year to complete.

MUs with 50% or greater invasive cover are classified as “high threat from invasive species” and fall into tree-iage categories 3, 6, and 9. These sites will require major invasive-plant reduction, which will likely require skilled crews and special equipment. They may also require a significant investment of both funding and volunteers. Due to the high investment necessary to clear sites of invasive plants, the city should prioritize ongoing monitoring and maintenance to ensure significant removal is not necessary again in the future.

MUs with invasive cover between 5% and 50% are classified as “medium threat from invasive species” and fall into tree-iage categories 2, 5, and 8. These sites will also require invasive removal. However, growth in these areas is likely to be sporadic and less severe, which makes it more appropriate for volunteers.

MUs with 5% invasive cover or less are classified as “low threat from invasive species” and fall into tree-iage categories 1, 4, and 7. These sites need little to no invasive plant removal. Restoration Phase 1 work in these sites could involve walking around the site to visually check that invasives are caught before the problem can escalate.

Restoration Phase 2: Secondary Invasive Removal and Planting

After Restoration Phase 1 is complete and a planting site is identified, an additional round of invasive plant removal should take place. This additional round of removal targets any potential invasive plant regrowth, and it prepares the site for young native plants.

Planting should primarily take place in the fall, although certain planting could continue through March (Llewellyn, 2022). The city should work with a certified arborist to develop appropriate plant palettes and work plans for each planting site. Please see Appendix F for a list of trees that can be used as a guide in work plan development, including ideal habitat, soil, and shade conditions. The city can also refer to a recent publication on climate resilience in the area, which provides information on selecting trees specifically based on current and future climate impacts (Raymond et al., 2022).

Restoration Phase 3: Plant Establishment and Follow-Up Maintenance

This phase repeats invasive plant removal and requires continued maintenance and care for newly established plants. While native plants have adapted to the Puget Sound's drier summer climate, newly installed plants may experience transplant shock. This can impact root and shoot health. As a result, many plants require up to five years of care centered around establishment to ensure survival. Depending on site conditions, MUs may stay in Restoration Phase 3 for many years.

Restoration Phase 4: Long-Term Stewardship and Monitoring

The final phase in this approach is long-term site stewardship, which includes monitoring sites to provide information for ongoing maintenance. Many monitoring activities, such as walking parks trails and other MUs to find invasive species, can be completed by volunteers. Properly trained volunteers may also complete regular documentation of sites by measuring growth and noting site characteristics and plant survival rates.

Maintenance activities will vary based on site location and habitat. However, it will typically involve spot removal of invasive plant regrowth and periodic planting where needed. Many maintenance activities can be completed by individual volunteers or volunteer groups. It is essential that maintenance is properly planned and executed to ensure that any problems do not escalate, which could cause the site to return to Restoration Phase 1, costing significant financial and time investments.

The goal of this four-phased approach is that, in time, all MUs will be enrolled in the restoration process and graduate to Restoration Phase 4. To support the whole health of the city's urban forest, it is important that a comprehensive assessment and thorough preliminary field work take place before extensive planting begins.

Field Step 7: Develop a private land strategy to increase community involvement and support.

As previously mentioned, 72% of Lakewood's UTC is on privately held land, meaning that the majority of the city's tree canopy is outside the jurisdiction of the city. As such, large portions of the priority MUs outlined in Chapter 5 are privately held. Based on this, the city should develop a private land strategy to increase and restore UTC on private land. The community engagement process outlined later in this chapter will provide a foundation for engaging the community. However, the city can implement the following initiatives to actively engage the public in restoration and planting efforts on their own land.

Yard Tree Giveaways

Many surrounding cities, including the City of Tacoma and the City of Seattle, hold tree giveaways one or two times each year. Some cities also provide a bag of mulch and comprehensive care instructions for each tree. Lakewood community organizations, such as the Lakewood Chamber of Commerce, hosted tree giveaways in the past. Lakewood should hold regular tree giveaways for residents. The city should either hold a separate giveaway or partner with the Chamber of Commerce to increase participation and impact. This initiative removes the barrier of choosing and purchasing a tree for residents, which can be particularly important for low-income residents. Lakewood should consider providing transport and planting trees for residents with limited mobility. The City of Lakewood Tree Fund, which is funded through tree preservation efforts, could be a revenue source for this service.

Create Mechanisms to Reduce Tree Purchasing Costs

Similar to tree giveaways, offering a tree rebate to community who purchase trees for private property encourages tree planting in the city. The City of Vancouver, WA offers residents a 50% rebate, up to $50, for up to five trees through their "Treefund" program. Offering reimbursements of this nature can significantly decrease the cost of planting a tree for residents, encouraging residents to plant more trees.

Provide Tree Maintenance for New Private Trees

The city should focus on private land in low-income neighborhoods, which are often disproportionately impacted by high surface temperatures. One way to increase privately planted trees in these communities is for the city to offer to plant trees in these neighborhoods and to provide ongoing maintenance every five years. This initiative would be a considerable undertaking for the city and should only be implemented once a UFP is established and public trees are being regularly maintained.

Develop and Communicate Comprehensive Right-of-Way or "Street Tree" Guidelines

Currently, communication to the Lakewood public surrounding Right-of Way (ROW) planting, maintenance, and removal is imprecise and difficult for the public to find. The city provides guidelines around protected trees, but there is no clear general guidance on street trees. This lack of communication around street trees poses many issues for the city and its residents. For example, if a street tree is planted too close to a street or a stop sign, it may ultimately need to be removed due to visibility issues. If a tree that is too tall at maturity is planted in the ROW, it may impact electricity lines or their maintenance, which could ultimately lead to the tree's removal. To mitigate these issues, the city should develop a webpage that includes comprehensive education and guidance on street trees. This webpage should include recommendations on the types and sizes of trees that can be planted, tree care, planting and spacing, and maintenance. The city should also provide visual guides to residents on ROW planting. An example guide, created and used by the City of Tacoma, can be found in Appendix D.

As part of developing and communicating these guidelines, the city should consider implementing a permit system for the planting of ROW trees to ensure that all requirements are met. Many cities in the surrounding area, including the City of Tacoma, require permits for planting ROW trees to help mitigate issues related to improper planting.

To see examples of comprehensive ROW and Street Tree webpages, including permitting information, Lakewood can refer to the City of Tacoma, WA urban forestry and planting in the ROW websites (City of Tacoma, n.d.). The City of Vancouver, WA also provides comprehensive resources on its tree permitting website that Lakewood should consider providing to its residents (City of Vancouver, n.d.).

Community Education

The city should provide or source educational opportunities where residents can learn about the benefits of increasing city tree canopy on private land. While the city may not have the capacity to house these sessions in the initial phases of this program, there are many government and nonprofit resources available. For a list of potential partnerships, please see Appendix A.

RECOMMENDATION 3:

Develop a comprehensive community engagement strategy.

It is essential to develop a UFP that aligns with the interests and needs of the Lakewood community, as a successful UFP depends heavily on robust support and active participation from community members. It is also necessary to consider accessibility and representation for the diverse community in the City of Lakewood when designing and implementing a UFP to ensure equity and inclusivity. Therefore, in this section, we outline two main community engagement strategies, including several activities for effectively gathering and applying community perspectives in UFP implementation. The two main strategies we outline are conducting community outreach and constructing a volunteer system.

We used previous studies on Lakewood's community engagement, as mentioned in Chapter 3, as well as existing engagement and outreach strategies mentioned in Chapter 4 to inform our recommendations.

The community engagement strategies included in this recommendation are independent of the city's administrative approach to managing the UFP. Having a standalone advisory board, as discussed in Recommendation 4, does not take away the need or relevance of the community engagement strategies included in this section.

Community Outreach

We outlined the importance of community outreach in UFP development and implementation in Chapter 5. The activities we recommend the city consider include hosting community outreach meetings, launching public surveys, hosting workshops for property owners, and reaching out to existing and prospective organizations.

Host Community Outreach Meetings

First, we recommend that the City of Lakewood hold community meetings. These meetings serve as a direct line of communication where the city can both communicate the purpose and benefits of the UFP while also receiving community feedback on necessary changes and considerations for the UFP (City of Issaquah & Forterra, 2020; City of Vancouver, 2007). Based on the approach that Issaquah and Vancouver used, we recommend a specific sequence for the city to conduct its outreach meetings to make these meetings effective.

The city should first identify and meet with community leaders, including those who represent minority and historically underrepresented groups, such as Black, Indigenous, and People of Color (BIPOC) communities that are often disproportionately affected by environmental and urban planning decisions. Communicating with these community leaders early in the process can help to ensure that BIPOC voices are represented and heard in the formulation of the UFP. The outline of the meeting should include the following topics:

- the danger of climate change and how it might affect residents in Lakewood individually
- the importance of urban forestry
- plans to incorporate residents in the urban forestry program
- strategies to communicate UFP information to the public

We recommend the city conduct this meeting as soon as possible to prepare for the subsequent community outreach steps. The city's Diversity, Equity, and Inclusion (DEI) manager mentioned in Chapter 5 can host this meeting to publicly acknowledge the importance of considering minority communities in the UFP development and maintaining communication with leaders of these communities.

Next, we recommend that the city host several town hall community meetings, conveying the importance of urban forests, sharing the goals and progress of the UFP, as well as announcing volunteer opportunities. The City

of Vancouver conducted two similar community meetings to gather suggestions in October 2006 and February 2007, prior to the release of its 2007 UFP. Through these meetings, the City of Vancouver was able to explain the program and answer any questions from the public.

In addition to in-person town hall meetings, we recommend that the city also offer a virtual attendance option, allowing individuals with limited mobility or those who face transportation challenges to actively participate in the decision-making process and contribute to a more equitable UFP. The city currently offers virtual attendance for other public meetings, such as City Council and Commissions and Advisory Board meetings. Offering an online option can also allow the city to record these meetings, making them available for later viewing to guarantee that the information is accessible to those who are unable to attend in real time. Furthermore, we recommend the city equip the recording with subtitles to address the needs of English as a Second Language (ESL) speakers, eliminate language barriers, promote an inclusive environment, and foster a sense of belonging among diverse community members.

To ensure that ESL and BIPOC communities have adequate opportunities to provide suggestions on the UFP, the city should host some of its outreach meetings in relevant city districts (e.g., the International District, Springbrook, etc.), as well as in community centers for BIPOC populations. The city could also explore collaboration opportunities with local cultural community-based organizations (CBOs) and faith-based organizations, further demonstrating the city's commitment to creating an equitable UFP and that incorporates community voices.

The city can also increase diverse participation from the community by utilizing local media and official urban forestry websites to promote community meetings. The City of Vancouver has utilized its website and local news media to spread the word about its UFP and to encourage community participation (City of Vancouver & PlanIT Geo, 2023).

The city should hold community meetings biannually. Spacing meetings out in this way will allow the city to parse through and incorporate relevant community feedback between meetings while also keeping the city informed periodically. The City of Vancouver hosted two public meetings with an interval of approximately 6 months during its UFP's initial development phase (City of Vancouver, 2007). We expect the first meeting to be more time-consuming, as it will likely take considerable time to communicate the initial information for the UFP. As the public's familiarity with the topic increases, future meetings will only include briefing UFP progress for the past six months, goals for the next six months, and answering any questions. The time the city chooses for these meetings should be widely accessible, such as evenings or weekends. This will allow individuals who work during the day or those with other daytime commitments to still engage in the meetings.

Community meetings will not only support transparency but also ensure that no interested parties are excluded from the conversation, maximizing the possibility of acquiring constructive feedback.

Launch Public Surveys

Coinciding with community meetings, we recommend the city launch public surveys to gather community feedback on UFP priorities and activities. This activity is implemented by the case study cities and is outlined in Chapter 4. The city should also use surveys to gather community insight on ROW trees. Currently, many ROW trees are unclaimed and therefore not receiving ongoing maintenance. Through surveys, the city can learn about property owners' opinions on the ROW trees and develop relevant policy and communication.

Host Workshops to Educate Property Owners on Tree-Related Topics

We recommend the city host workshops for property owners on maintaining and preserving private trees. This activity should be implemented once the city has established a UFP and has capacity to perform additional

community outreach activities. Since private land UTC goals can only be satisfied by private property owners, it is essential to educate community members on tree preservation and maintenance. These workshops also offer opportunities to update and remind community members on the regulations outlined in the city's tree ordinance, including permit requirements and relevant fines. The frequency of these activities depends on the city's capacity and private landowner availability, which can be determined using previous community meetings or online surveys.

Conduct Outreach to Potential Community Partners

Building and maintaining community partnerships can support the implementation and success of the UFP (City of Vancouver, 2007). Therefore, we recommend the City of Lakewood prioritize outreach to organizations that can help promote or execute UFP activities. The city can begin outreach by determining opportunities to support UFP activities within existing city partnerships with area nonprofits, private businesses, and schools. The city can then use a snowball method to expand its connections to other organizations. Ideally, a good partnership base represents a collaborative effort across all three sectors: public, nonprofit, and private. The public sector includes the city's administrative staff, volunteers, and schools, while the private sector can include contractors, consultants, local business partners, and property owners.

Construct a Volunteer System

As mentioned in Chapter 5, volunteers are crucial in helping Lakewood accomplish its goals in UFP. Volunteers also need to be carefully guided to conduct UFP activities. Therefore, we recommend the City of Lakewood establish a volunteering system to effectively recruit and manage volunteers. This system includes a stewardship system, volunteers, and a volunteer coordinator.

Build a Forest Stewardship Program

As mentioned in Chapter 5, we recommend that the City of Lakewood construct a Forest Stewardship Program, similar to that of the City of Issaquah, to guide volunteer activities.

The city should begin by recruiting Forest Stewards as part of the town hall meetings described in the previous section. The city should call for community members who are interested in learning more about tree protection, tree health, invasive species, etc., and who want to become leaders in this field. The city should then interview interested community members to determine if they would be a good fit for the program and as leaders of other volunteers. Selected community members will become Forest Stewards once they have completed training from city staff. The training should cover tree maintenance, invasive removal, and planting guidelines.

Similar to the City of Issaquah, we recommend Lakewood begin by recruiting 10 Forest Stewards to determine if this system is appropriate for the community. Once Forest Stewards demonstrate proficiency in restoration practices and volunteer management, the city should allocate one to two acres of MUs for each steward to manage. Initial allocation for each steward should not exceed three acres total to ensure stewards are able to manage their allocation. The city should begin recruiting 5 additional stewards annually starting in Year 3 to expand program acre coverage.

Recruit Passionate Volunteers

It is essential for the city to develop a volunteer base that is passionate about preserving the city's environment and who believe in the numerous benefits of urban forests. We recommend the city recruit 10 volunteers per Forest Steward starting in Year 2. However, this criterion can be modified depending on Forest Steward capacity and the total number of volunteers available. These volunteer teams, led by Forest Stewards, can restore and enhance the city's urban forest. This system also allows the city to leverage the program's financial resources and allows more areas in Lakewood to be actively maintained and restored (City of Issaquah & Forterra, 2020).

Volunteer recruitment should be included as part of the city's UFP community outreach meetings. The city could also use an urban forestry webpage and the city's social media to promote volunteer opportunities.

The city can also collaborate with local organizations to maximize volunteer recruitment efforts. The City of Lakewood has many respected community organizations, such as the Rotary Club and the Kiwanis Club, that are already actively engaged in facilitating community events and activities, such as hosting community gardens. We recommend the city research potential collaborations with these organizations to identify and recruit prospective volunteers. Community members that participate in community events or leadership are already demonstrating a commitment to improve and support the City of Lakewood. Therefore, the city has an opportunity to engage these dedicated community members in UFP activities.

Volunteers will be assigned to work under Forest Stewards, based on the Forest Steward acre allocation and the volunteers' work location preferences. Forest Stewards and their volunteer teams will begin with invasive controls in their designated areas. This maintenance work will keep the existing tree canopy healthy and ensure Lakewood's canopy coverage does not decline. To motivate Forest Stewards and volunteers, city staff should hold regular meetings, praising volunteer work, progress, and contributions to a healthier environment for the people of Lakewood.

Appoint a Volunteer Coordinator

We recommend the city appoint a volunteer coordinator to manage the communication between city staff and volunteers. The duties of this volunteer coordinator include ongoing volunteer recruitment, organizing and tracking volunteer progress, recognizing volunteer efforts through awards, and making necessary changes to the Forest Steward goals as they relate to the UFP. The coordinator should also be responsible for implementing a volunteer management software to track volunteer events and activities. The position of volunteer coordinator can be filled by the existing Neighborhood Coordinator position, which is outlined in Budget 1, or by the Full-Time Program Administrator, which is outlined in Budget 2.

RECOMMENDATION 4:

Create administrative capacity within the existing city organizational structure.

Organizational Structure

As has been discussed in Chapters 4 and 5, creating a sustainable administrative structure for the UFP is essential to its success. We identified three organizational structures Lakewood could implement to manage the UFP.

Option A: Establish a standalone advisory board to oversee the UFP

The city should create a new Urban Forestry Advisory Board (UFAB) that will follow the city's current bylaws regarding volunteer boards. For this option, we recommend that UFP activities are distributed among the city's the Parks, Recreation and Community Services Department (PRCS), the Community and Economic Development Department (CED), and the Public Works Engineering Department (PWE). Existing staff within those departments will dedicate time to carrying out UFP activities. Urban forestry priorities and activities would be supported by the advisory board. To see cost estimates for this structure, please see Budget 1 details in the following section.

Option B: Expand the responsibilities of the Parks and Recreation Advisory Board

For this option, Lakewood should update the mandate for the existing Parks and Recreation Advisory Board (PRAB) to include UFP goals and support coordination with city departments responsible for implementation.

Lakewood should hire a position to coordinate UFP implementation across city departments. With many departments sharing responsibility, accountability and administrative support are key to ensuring program efficiency and progress, as existing departments already have many priorities. If the city decides to update PRAB's mandate, a program coordinator will still be necessary to support the UFP as PRAB already has several priorities. To see cost estimates for this structure, please see Budget 2 details in the following section.

Option C: Hire a full-time program coordinator

The third approach is having a full-time program coordinator manage the program without the support of an advisory board. PRCS, CED, and PWE will share responsibilities to implement the UFP, per the departments' agreement during the design process for this implementation guide. Additionally, a full-time coordinator will coordinate UFP tasks with those departments. The program coordinator could be located within the City Manager's office.

Collaboration between different departments is essential to UFP success, regardless of the organizational structure the city chooses. The city should manage this program with an integrated approach to trees considering activities that concern more than one agency, such as:

- storm and surface water management
- transportation
- electric utility

To see cost estimates for this structure, please see Budget 2 details in the following section.

Budget

Based on our prior recommendations and the three organizational structure options above, we have developed priorities for years one through five. Table 10 shows program priorities for the first five years. Each priority is designated to specific city departments based on the activity. These priorities and designations were developed in partnership with our client.

Table 10: Urban Forestry Priorities Years 1 through 5

Ownership	Priorities	Y1	Y2	Y3	Y4	Y5
CED and Parks	Standardize Citywide Tree Maintenance Practices	✓				
PWE	Evaluate and Update Surface Water Fee Usage	✓	✓			
CED	Coordinate Contract Arborist Work	✓	✓	✓	✓	✓
CED and Parks	Community Outreach and Engagement	✓	✓	✓	✓	✓
CED and Parks	Volunteer Recruitment and Appreciation	✓	✓	✓	✓	✓
CED and Parks	Explore External Partnerships and Funding	✓	✓	✓	✓	✓
CED, Parks, and PWE	Coordinate UFP priorities planting and maintenance	✓	✓	✓	✓	✓

Based on these priorities, we developed two preliminary budgets for the five-year implementation period. The priorities remain the same across organizational structures and budgets.

Budget 1

This budget provides cost estimates assuming the city chooses organizational structure Option A and develops a standalone advisory board. This budget utilizes city staff to carry out day-to-day UFP activities and does not include cost estimates for a new hire. Based on conversation with our client, this budget does not show the costs associated with developing an advisory board. The expenditure costs are relatively low but require additional staff time and city resources to develop the board.

Budget 2

This Budget provides cost estimates assuming the city chooses either organizational structure Option B or C. This budget provides estimates for a new hire to oversee day-to-day UFP activities and to coordinate cross-departmental coordination throughout the city.

Table 11 shows budget highlights for the first two years of implementation. Staffing expenditures, including salaries and benefits, are the only expenditures that vary across budgets. Budget 1 includes cost estimates with four current city staff spending a small percentage of their time on UFP activities. Combined, their UFP work is equivalent to one FTE. Budget 2 staffing costs include one new hire that would potentially be in the City Manager's office.

Professional services and supplies expenditures remain the same for the two budget options. These estimates are based on current city estimates as outlined in the city's 2023-2024 Biennial Budget, estimates provided during our interviews, and industry norms.

Table 11: Year 1 Budget Highlights

Expenditure Category	**Budget 1**: Standalone Board	**Budget 2:** No Standalone Board
Salaries and Benefits	$ 112,108	$ 122,162
Professional Services	135,000	135,000
Supplies and Indirect Costs	1,035	1,035
Total	**$ 248,143**	**$ 258,197**
Annual Increase	*10% decrease from Y1 to Y2 23% average increase Y2-Y5*	*9% decrease from Y1 to Y2 22% average increase Y2-Y5*

To see the full implementation budgets for years one through five, please see Appendix H. For more detail on the underlying budget assumptions, please see Appendix I.

Funding Sources

In Chapter 5, we outline funding sources utilized by the case study cities. We recommend the City of Lakewood consider the following funding sources:

- establish a connection between urban forestry activities and stormwater management and utilize a portion of the city's current Storm and Surface Water Utility Fee to fund activities;
- utilize current funds available through the City of Lakewood's Tree Fund;

- consider reallocating or increasing the percentage of General Fund Revenue that is dedicated to urban forestry activities;
- pursue federal, state, and local government grants, along with nonprofit partnerships, as outlined in Appendix A; and
- public, market-based funding sources, such as carbon credits, as outlined in Appendix A.

Estimating Future Program Costs

This section outlines financial, staff, volunteer, and external resources the city should consider as it moves past the initial 5-year period and into a long-term UFP.

Once the city has completed a FLAT assessment and identified priority MUs, the determined tree-iage categories can provide insight on restoration costs across all MUs. The City of Issaquah and Forterra, estimated a cost estimate per acre per tree-iage category. This estimate is shown in Figure 11. The City of Lakewood should consider a similar model to estimate restoration costs once an assessment is complete.

Figure 11: City of Issaquah - 20-Year Cost Estimate Per Acre by Tree-iage Category

Tree-iage Category	Acreage	Average Restoration Cost/Acre	Total Cost per Tree-iage Category
1	521	$5,000	$2,605,000
2	59	$13,900	$820,100
3	1	$20,600	$20,600
4	659	$10,800	$7,117,200
5	143	$16,100	$2,302,300
6	70	$26,900	$1,883,000
7	2	$14,500	$29,000
8	13	$24,200	$314,600
9	72	$35,400	$2,548,800
TOTAL	**1,540**		**$17,640,600**

Budget Categories

Once the city has developed and implemented a UFP, the expenses below are the areas of the budget that should be prioritized:

- **Field Expenses:** this includes materials and crew hours necessary to complete restoration projects, including the removal of invasive species, regular planting, and ongoing maintenance;
- **Staff Time:** this includes city staff, UFP partners, and contracted workers that are necessary for program coordination, planning, monitoring, as well as volunteer outreach, marketing, and management;
- **Supplies and Materials:** this includes any items needed for volunteer recruiting, training, and regular appreciation; and
- **Overhead:** this includes any overhead costs for field and office work.

Monitoring and Evaluation

This section describes how the city can monitor progress, develop program updates, and report on program milestones. Monitoring and evaluation (M&E) can also inform the program's systematic evolution and improvement and can identify needs to redefine goals.

The conclusions from M&E efforts should clearly state how well the plan is achieving its outcomes and inform any necessary adaptations. Adaptations and updates are often important and critical to continue moving in the right direction and getting closer to the vision that guides the plan, which ultimately is the overall goal. Table 12, shown on the following page, outlines the key actions for the first five years which are associated with the five goals described under Recommendation 1 earlier in this chapter.

Program Evaluation

Every two years, the UFAB or the program coordinator should present a report including a summary of actions undertaken, as well as clear connections between those actions and their impact on outcomes. The biannual evaluation report should be a tool to understand how the program is doing and how close the city is getting to each outcome. The report should also include recommendations on required updates and highlight any urgent matters that require attention from the city departments involved. The Board should present this report to Lakewood's City Council, as well as to all city departments sharing operational, managerial, or financial responsibilities within the plan. As the City of Lakewood and the Advisory Board establish new partnerships, those partners should also receive the evaluation reports.

The advisory board or the program coordinator should consider a deeper evaluation that culminates in a program update every five years, from the start of the program.

Table 12: Key Actions

YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Forest Health				
- Complete FLAT Phases 2 and 3, which includes comprehensive tree assessment - Standardize tree maintenance practices	- Begin four-phase restoration on priority MUs.	- Continue four-phase restoration on priority MUs, incorporating new MUs as possible.	- Begin four-phase restoration on remaining MUs. - Hire an urban forester to lead restoration and maintenance efforts.	- Continue four-phase restoration on all MUs, including monitoring and ongoing invasives control.
Tree Population Expansion				
- Maintain 28% public UTC.	- Maintain 28% public UTC. - Begin planting new trees on publicly owned land guided by four-phase restoration.	- Maintain 28% public UTC. - Continue planting trees on publicly owned land guided by four-phase restoration.	- Maintain 28% public UTC. - Continue planting trees on publicly owned land guided by four-phase restoration.	- Maintain 28% public UTC. - Continue planting trees on publicly owned land guided by four-phase restoration. - Begin outreach to increase trees planted on privately owned land.

Community Engagement				
- Open nomination process for UFAB (only applies to Options A and B in Rec. 4). - Survey community to gather input on urban forestry in city. - Communicate city's efforts on UFP openly and on various platforms. - Recruit and train 10 Forest Stewards (FS).	- UFAB is a working body with authority given by the City Council (only applies to Options A and B in Rec. 4). - Recruit 10 volunteers per FS. - Establish relationships with local nonprofits and businesses.	- Recruit and train 5 additional FS. - Recruit 10 volunteers per FS.	- Recruit and train 5 additional FS. - Recruit 10 volunteers per Forest Steward.	- Recruit and train 5 additional FS. - Recruit 10 volunteers per FS. - Survey community to gather input on urban forestry in city. - Communicate the results of the five-year program evaluation.
Equitable Access				
- Implement community engagement strategies to ensure participation from all population groups within Lakewood in volunteer and information activities. - Include specific questions in community surveys to identify opinions and challenges per racial group, associated with the UFP. - Translate public-facing UFP documents to languages other than English, as relevant for Lakewood's community to ensure access for ESL speakers.	- Implement community engagement strategies to ensure participation from all population groups within Lakewood in volunteer and information activities. - Include specific questions in community surveys to identify opinions and challenges per racial group, associated with the UFP. - Translate public-facing UFP documents to languages other than English, as relevant for Lakewood's community to ensure access for ESL speakers. - Monitor progress on Tree Equity Score.	- Implement community engagement strategies to ensure participation from all population groups within Lakewood in volunteer and information activities. - Translate public-facing UFP documents to languages other than English, as relevant for Lakewood's community to ensure access for ESL speakers. - Monitor progress on Tree Equity Score.	- Implement community engagement strategies to ensure participation from all population groups within Lakewood in volunteer and information activities. - Translate public-facing UFP documents to languages other than English, as relevant for Lakewood's community to ensure access for ESL speakers. - Include specific questions in community surveys to identify opinions and challenges per racial group, associated with the UFP. - Monitor progress on Tree Equity Score.	- Implement community engagement strategies to ensure participation from all population groups within Lakewood in volunteer and information activities. - Translate public-facing UFP documents to languages other than English, as relevant for Lakewood's community to ensure access for ESL speakers. - Monitor progress on Tree Equity Score.
Sustainability				
- Approve funding to formally start the UFP Explore external partnerships and funding sources	- Explore external partnerships and funding sources.	- Expand capacity for increased community events.	- Expand capacity for increased community events.	- Expand capacity to provide more financial resources for private trees.

Conclusion

Urban forests offer a range of benefits to cities and their community members, including addressing climate change, improving the environment, and enhancing public health. The City of Lakewood is committed to taking proactive measures to maximize these benefits and ensure they are accessible to all community members. By implementing an urban forestry program (UFP), Lakewood can systematically plan and execute initiatives to achieve its goal of reaching 40% urban tree canopy cover by 2050. This report outlines the initial steps that Lakewood should undertake in establishing a UFP, considering existing city frameworks, the implications of climate change, and financial constraints.

This report provides a practical implementation guide based on four recommendations focusing on strategic planning, resource assessment and management, community engagement, and organizational capacity. These recommendations aim to support Lakewood in making informed decisions related to program administration, implementation costs, potential partnerships, and management of trees, among other critical components. The Lakewood City Council should, in collaboration with city departments and the community, carefully evaluate the alternatives presented in this guide and determine the most suitable course of action for Lakewood before proceeding with implementation.

It is important to acknowledge that each city is unique, and this report is limited by the information from our case studies, interviews, and research. The research and interviews were conducted within time constraints, resulting in limited input from professionals in the field. The City of Lakewood should continue to foster partnerships with individuals contacted during the research phase and other urban forestry organizations and experts.

There are also limitations in our recommendations regarding in which MUs the city should begin the forest health assessment. Our analysis was dependent on data and analysis completed by PlanIT Geo. The suggested planting areas primarily focused on privately owned land, and due to limited capacity, we could not extensively identify publicly owned land, such as rights-of-way or other street tree areas, for potential plantings. Furthermore, the proposed budgets outlined in this report are subject to change based on external factors, such as economic fluctuations or unforeseen environmental events that may necessitate increased funding for urban forest maintenance.

We recommend the City of Lakewood integrate this guide into its decision-making process as it examines existing city structures and determines efforts to enhance the environmental well-being of the community through urban forestry. By incorporating the recommendations outlined in this implementation guide, Lakewood can develop a UFP that is environmentally sustainable, socially equitable, and economically viable. Urban forestry in the City of Lakewood will contribute to a greener, healthier, and more vibrant community.

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Appendices Guide

- **Appendix A: Partnership Guide**
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Appendix A: Partnership Guide

Partnerships are categorized by the types of assistance or partnership offered by each organization.

Partnership and Assistance Key

- Community engagement or volunteer resources
- Financial assistance or grant funding
- Educational resources for city employees or volunteer training
- Technical assistance for program development or urban forest management

Government Partnerships

Organization	Assistance	Details
Washington Department of Natural Resources (WA DNR)		WA DNR offers Community Forestry Assistance Grants ranging from $5,000 to $40,000. Grants require a 100% match. WA DNR also offers extensive education and technical assistance for urban forestry programs.
Washington State Recreation and Conservation District (WA RCD)		WA RCD offers various grants for conservation and restoration of urban forests. Two potential grants the city could consider: - Community Forests Program – Award limit is $3 million and requires a 15% match - Habitat Conservation Projects – Award varies from $25,000 with no upward limit. Requires a 50% match.
Pierce Conservation District (PCD)		A few partnership opportunities with PCD: - PCD has historically offered a Green Partnership Grant to support projects in the PCD project area. Grants were suspended for 2023 but could be awarded in future years. - PCD also sponsors a native plant sale that Lakewood can promote to residents. - PCD is extremely knowledgeable about the area's unique environmental settings and can utilized for both technical and educational assistance.
South Sound Military and Communities Partnership (SSMCP)		Lakewood should consider partnering with SSMCP be as the city begins community engagement efforts related to UFP activities.
Nisqually Indian Tribe		Lakewood should consider partnering with the Nisqually Indian Tribe as the city begins community engagement efforts related to UFP activities.

Washington State Department of Commerce (WA DOC)		WA DOC has a Defense Community Compatibility Account to support infrastructure projects related to land use and infrastructure near military installations. Lakewood's unique position near Joint Base Lewis-McChord makes them eligible for these grants, as evidenced by its winning this award in recent years. The city could consider pursing this grant again, specifically for UFP purposes.
Washington Department of Fish and Wildlife (WDFW)		WDFW offers technical and educational assistance, as well as opportunities to increase community engagement in UFP activities. WDFW also offers a Watchable Wildlife Grant Program that the city could apply for. The purpose of grant awards is to support wildlife viewing and to foster appreciation of wildlife.

Nonprofit Partnerships

Organization	Assistance	Details
Forterra		While Forterra is currently restructuring their Green City Partnership program, the organization is still a valuable potential partnership for the city. Forterra could be a source of educational and technical assistance, as well as future financial assistance. Forterra also created the Forest Steward program and offers a comprehensive Field Guide for volunteers.
Lakewood Multicultural Coalition		Lakewood should consider partnering with the Lakewood Multicultural Coalition as the city begins community engagement efforts related to UFP activities.
The Garry Oak Coalition (GOC)		The Garry Oak Coalition is a nonprofit located in Lakewood and dedicated to the preservation of area Garry Oaks. Lakewood should consider partnering with the GOC as the city begins community engagement efforts related to UFP activities.
Tacoma Tree Foundation		The Tacoma Tree Foundation is a community-based nonprofit that is committed to growing the urban forest in Tacoma. Due to the close proximity, the city should consider partnering with the foundation for community engagement and educational opportunities.
Washington State University Extension Forestry		The Puget Sound Region Extension Forestry offers online courses and public resources for people who own wooded property. The available resources could be extremely useful as Lakewood develops its volunteer based. This includes a course on Forest Stewardship that is intended for private landowners but is also applicable to public land.
City Forest Credits		City Forest Credits is a nonprofit carbon registry that partners with private organizations, allowing them to purchase carbon credits for urban forest projects. Those carbon credits can be used for urban forestry planting activities. The city can apply to partner with this organization to fund tree planting and restoration activities.
American Forests		American Forests is a national organization that is dedicated to forest conservation in the United States. American Forests has completed comprehensive resource assessments, including FLAT assessments, for other cities in the area.

Appendix B: Comparison of Case Study UFP Expenditures

City of Issaquah, WA – Implementation began in 2019

Department	Expenditure Detail	2023 Adopted
Parks and Community Services	New Position - Full-Time Urban Forest Supervisor	185,686
Parks and Community Services	New Position - Part-Time Volunteer Coordinator	77,547
Parks and Community Services	Development of Urban Forestry Management Plan	100,000
	Total	**363,233**

City of Vancouver, WA – Implementation began in 2007

Revenue Source	Expenditure Detail	2023 Adopted
SWM Fund	Salaries and Benefits	693,250
SWM Fund	Supplies and Services	770,620
SWM Fund	Interfund	353,052
	Total	**1,816,922**

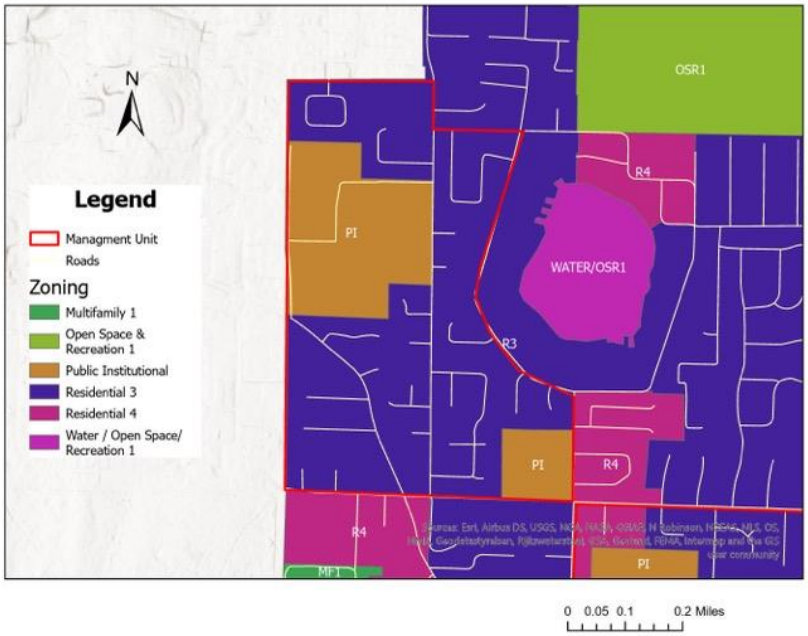
Revenue Source	Expenditure Detail	2023 Adopted
City Tree Reserve Fund	Supplies and Services	80,155
City Tree Reserve Fund	Other Intergovernmental	3,000
City Tree Reserve Fund	Interfund	3,264
	Total	**86,419**

City of Seattle, WA – Implementation began in 2007

Department	Expenditure Detail	2023 Adopted
Office of Sustainability and Environment	New Position - Full-Time City Urban Forester	147,000
Office of Sustainability and Environment	Development of Tree Canopy Equity and Resilience Plan	150,000
Department of Transportation	Tree Planting in Right-of-Way Initiative	250,000
Department of Construction and Inspections	Additional Capacity for Tree Protection	54,961
Office of Sustainability and Environment	Greening of Industrial Properties in Equity Focus Areas	300,000
Parks and Recreation	Increased Tree Planting and Maintenance in Parks	637,000
	Total	**1,538,961**

Appendix C: Management Units with Zoning Classifications

Management Unit 1 Zoning Classifications



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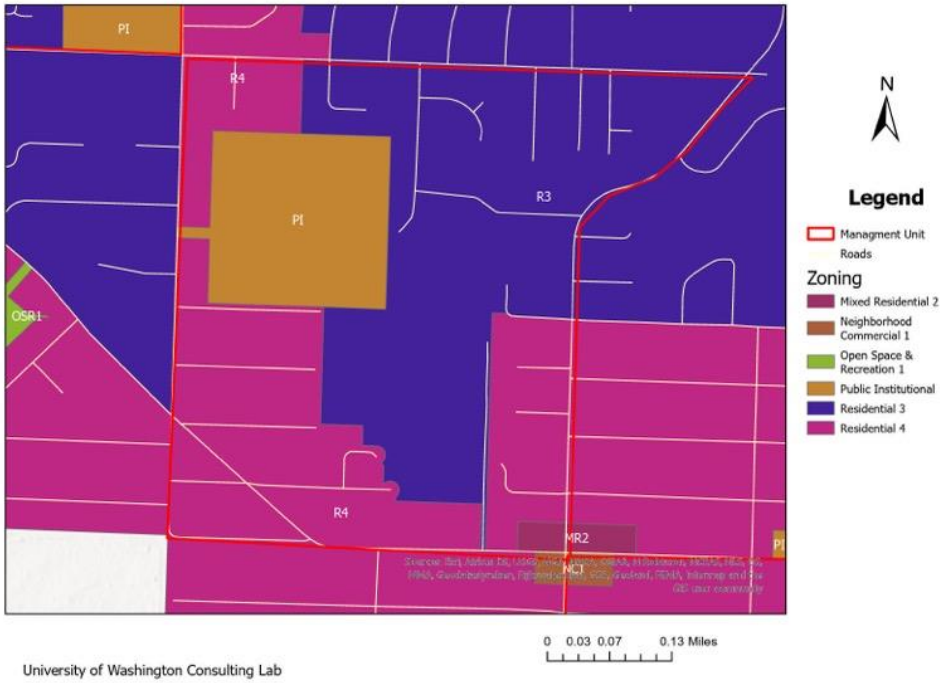
Management Unit 2 Zoning Classifications



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Management Unit 3 Zoning Classifications

Legend

N

Managment Unit
Roads

Zoning
Mixed Residential 2
Multifamily 1
Neighborhood Commercial 1
Open Space & Recreation 2
Public Institutional
Residential 1
Residential 2
Residential 3
Residential 4

0 0.05 0.1 0.2 Miles

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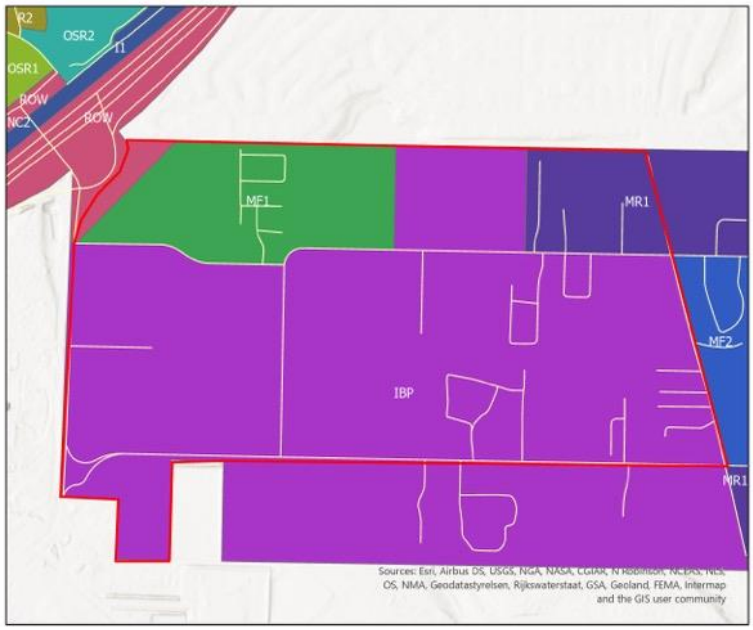
Management Unit 4 Zoning Classifications



N

Legend

Managment Unit
Roads

Zoning
Industrial 1
Industrial Business Park
Mixed Residential 1
Multifamily 1
Multifamily 2
Neighborhood Commercial 2
Open Space & Recreation 1
Open Space & Recreation 2
Residential 2
Right Of Way

0 0.05 0.1 0.2 Miles

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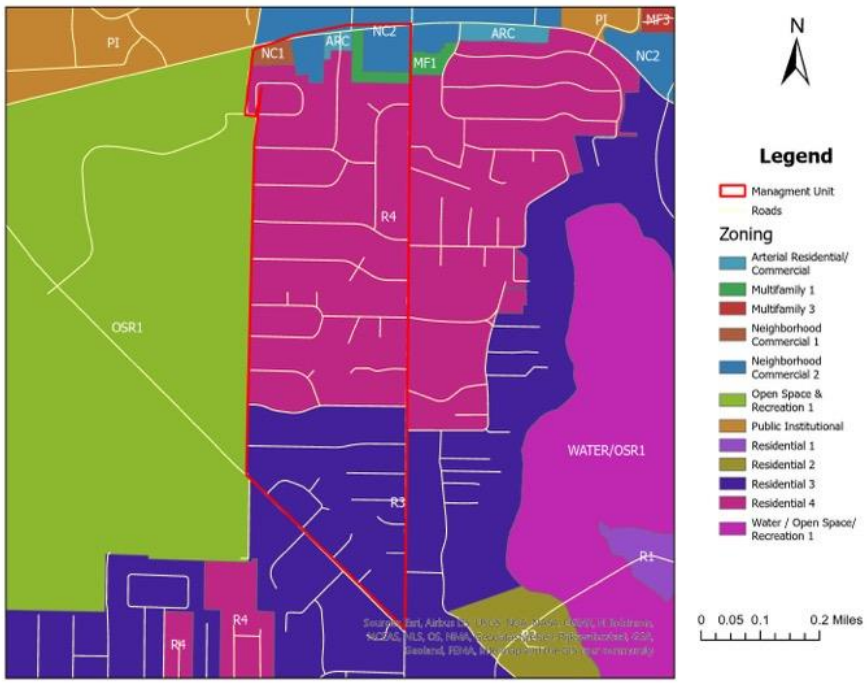
Management Unit 5 Zoning Classifications



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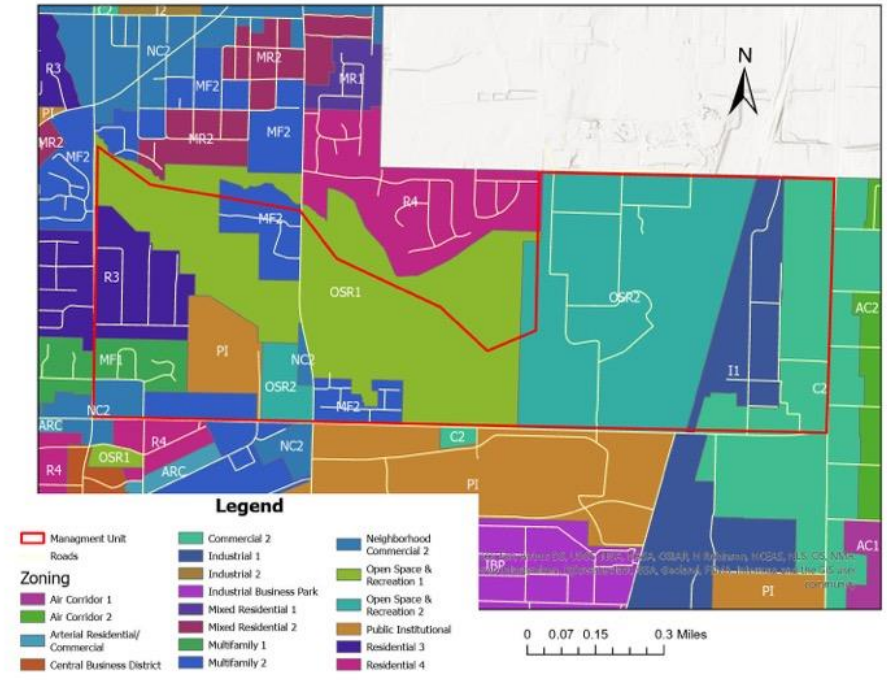
Management Unit 6 Zoning Classifications



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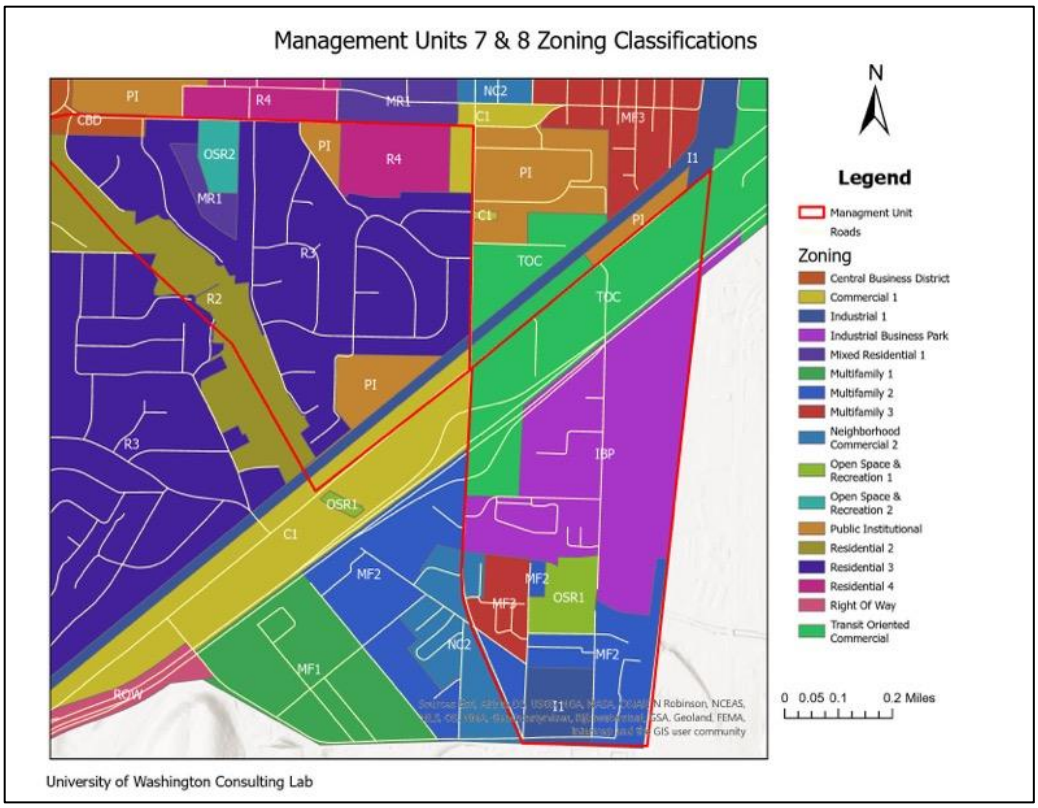

Table 13: Area of Management Units in Acres

Management Unit Identification Number	Total Acreage
1	181.22
2	143.82
3	132.25
4	181.98
5	149.16
6	465.99
7	210.76
8	206.09

Appendix D: City of Tacoma Tree Planting Guide

Appendix E: Invasive Species

Tree / Plant	Name	Plant Type	Size at maturity	Habitat	Flower Description	Leaf Description	Stem Description	Fruit Seed Description
Clematis vitalba	Clematis	vine	up to 65.6 feet	forest lands, forest edges and openings, riparian areas, waste areas, roadsides and coastal and lowland areas.	Flower clusters grow from leaf axils (area where leaf connects to stem) and also at stem tips. 3 to 22 flowers per cluster. Flowers do not have petals. Sepals, petal-like, white to cream, 4 to 6, about 2 times as long as wide with hairs on both sides.	Leaves are arranged opposite each other on the stems and are pinnately compound, divided into 5 leaflets. Leaflet margins are smooth to somewhat toothed. Leaflets have some small hairs on the leaf veins below and no hairs above.	Stems are climbing, become woody and may have curling to winding leaf stems (petioles).	Seeds with feathery hairs, each having a stem-like projection, 1.4 inches (3.5 cm) long. Clusters of seeds can be seen on plants all winter.
Convolvulus arvensis	Field bindweed	vine		ravines, greenbelts, forested parks and farmlands as well as residential settings such as driveways, flower gardens and ornamental borders.	Flowers are bell or funnel-shaped, white to pinkish and approximately 1 inch in diameter. They have 2 small bracts located 1 inch below the flower.	Leaves are alternate, more or less arrowhead-shaped and have pointed or blunt lobes at the base.	Stems are perennial and deciduous, growing along the ground and twining around and through other plants, to around 6.5 feet in length.	Seed in a small capsule, about 0.25 inch in size.
Cytisus scoparius	Scotch broom	evergreen shrub	3 to 10 feet	roadsides, pastures, grasslands, open areas and areas of recent soil disturbance.	Flowers are typical of those in the pea family. They are bright yellow, about 3/4 inches long and have 5 petals.	There are few leaves. The upper are simple and the lower are 3 parted. They are deciduous and pointed at both ends. Leaves may fall early in the year, leaving bare green stems.	Stems are woody and dark green. Young branches have 5 green ridges with hairs. When mature, stems become glabrous and ridges disappear. Young stems remain green throughout the year.	Seed pods are brown-black, legume-like, flattened and have hairy margins with several seeds per pod.

Tree / Plant	Name	Plant Type	Size at maturity	Habitat	Flower Description	Leaf Description	Stem Description	Fruit Seed Description
Hedera helix	English ivy	evergreen vine	up to 99 feet	woodlands, forest edges, riparian areas, fields, hedgerows, coastal areas, and disturbed habitats.	English ivy matures to produce adult stems and flowers when it begins to grow vertically. The small (0.2 to 0.3 inch), bisexual, greenish-white flowers occur in umbrella-like clusters in the fall. The juvenile stage, time before it flowers, may be for 10 years or longer.	Leaves are alternate each other on the stems and leathery, with long petioles and have two forms: adult and juvenile leaves. Juvenile leaves are deeply 3 to 5 lobed and 1.6 to 4 inches long and wide. Adult leaves occur on flowering stems and are primarily un-lobed leaves and egg-shaped to diamond shaped. Only young leaves are hairy.	Stems are climbing vines, shrub-like or groundcovers. Young stems have hairs while older stems are hairless. Stems growing along the ground can develop (adventitious) roots and climbing stems produce root-like structures that can secure it to buildings, trees or anything it is climbing up.	The dark colored fruits (dark blue to black, berry-like drupes) mature in the spring. Each fruit is around 0.16 to 0.31 inch (4 to 8 mm) wide and contains 4 to 5 seeds.
Heracleum mantegazzianum	Giant hogweed	Class A noxious weed	15 to 20 feet	roadsides, other rights-of-way, vacant lots, streams and rivers.	Giant hogweed has broad, flat-topped flower clusters (umbels) of many small white flowers. Each flower cluster may grow to a diameter of 2.5 feet.	The compound leaves of giant hogweed may grow as large as five feet wide. Each leaflet is deeply cut/lobed with leaf edges being sharply toothed (incised).	The stem and stalks are hollow and vary 2 to 4 inches in diameter. Stems have distinctive purplish-red, bumpy blotches with stiff hairs.	The flowers produce large elliptic dry seeds marked with brown swollen resin canals.

Tree / Plant	Name	Plant Type	Size at maturity	Habitat	Flower Description	Leaf Description	Stem Description	Fruit Seed Description
Ilex aquifolium	English holly	evergreen shrub	as tall as 30 feet	anywhere that is shady, in a variety of soil types.	Female plants have small, white to light green flowers that have 4 round petals. Male plants non-descript light green to white round shapes with 4 anthers coming from the center. All the flowers grow individually and directly from the branches, on very short stems.	Holly's leaves are lobed, ending in sharp points. They are deep green and covered in a waxy coating.	Thick, woody stems that start off olive green and can age to brown green.	Bright, red berries, which are popular with birds.
Polygnoum cispidatum	Japanese knotweed	perennial invasive plant	4 to 8 feet	waste places, gardens, roadsides and stream and riverbanks.	The whitish to whitish-green flowers are in drooping panicles (clusters) from leaf axils. Male and female flowers are on separate plants.	Alternately arranged with petioles (stalks) and are 4 to 6 inches long, ovate and have a truncated base and an abrupt tip.	Stems are upright, branching and deciduous.	The fruits are approximately 1/8 inch long, shiny brown and triangular.
Prunus laurocerasus	English laurel	evergreen plant	2 to 5 inches	landscape plantings	Flowers in upright racemes, 2-5 inches long. Flowers white, with 5 petals and about 0.4 inches (1 cm) wide.	Alternately arranged, leathery with serrated to almost smooth margins and two glands at the base of the blade near point of attachment with petiole. Blades ~2-8 inches long, oval to elliptic-oblong in shape, and dark to medium green above, paler green below.	Stems have smooth reddish brown to dark brown bark. New stems are green.	Fruit is a black to purple-black drupe, 0.5" long.

Tree / Plant	Name	Plant Type	Size at maturity	Habitat	Flower Description	Leaf Description	Stem Description	Fruit Seed Description
Rubus armeniacus	Himalayan blackberry	non-native plant	up to 13.1 feet	mixed and deciduous forests and a variety of disturbed sites such as roadsides, railroad tracks, logged lands, field margins and riparian areas.	Flower clusters (panicles) are flat-topped and have 5 to 20 flowers. Each flower has 5 petals that are white to rose colored and about 1 inch in diameter.	Leaves are alternately arranged on stems. Each leaf is palmately compound and made up of 3 to 5 (typically 5) leaflets with toothed margins.	Stems can reach up to 20 to 40 feet and can root at their tips when they touch the ground. Canes have hooked, sharp prickles, also called thorns, with thick bases. Stems green to reddish to purplish-red, strongly angled, and woody. They made dense thickets that are impassable and sprawl over the surrounding vegetation.	Flowers form blackberries—a grouping of small, shiny, black druplets that each contain one seed. Blackberries are about 1/2 inch to 7/8 inch in size.
Senecio jacobaea	Tansy ragwort	perennial herbaceous plant		roadsides, in pastures, fields and cleared forested areas. It is not particular to soil type.	Flowerheads are in somewhat flat-topped clusters. Flowerheads yellow with many disk flowers and 13 ray flowers (which look like petals), overall having a daisy-like appearance. Flowerheads have around 13 bracts at their base with dark tips.	Leaves are twice divided, with petioles (leaf stems) on leaves near the base and without petioles toward stem tips. First year leaves in a basal clump (rosette). Second year leaves are alternate along the stem, 1.6 to 7.9 inches long by 0.8 to 2.4 inches wide.	Stems reach up to 4 feet tall, numbering one to many from roots. They branch near their tips.	Seeds are sparsely hairy to glabrous (hairless and smooth).

Appendix F: Tree Guide

Tree	Name	Plant type	Size at maturity	Width	Land/ Restoration Use	Habitat	Sun/Shade tolerance	Soil Preferences	Cultivation Preferences
Abies grandis	grand fir	Evergreen perennial	50 ft	30-40 ft	erosion control screen windbreak	Riparian, Rocky/Gravelly, Forest	Sun, part shade, shade	Well drained soils	Well-drained
Acer macrophyllum	bigleaf maple, oregon maple	Deciduous perennial	49-50 ft	45-80 ft	erosion control windbreak	Forest	sun, part shade, shade	Gravelly soils, Deep soils	tolerates wet season well-drained
Alnus rubra	red alder	Deciduous perennial	39-50 ft	30-50 ft	Fire resistant erosion control hedgerow windbreak	Wetland, Riparian, Rocky/Gravelly, Forest, Meadows/Fields, Disturbed	Sun, part shade, shade	clay soils, nutrient poor soils	tolerates constant flooding
Arbutus menziesii	arbutus, madrone, madrona	Evergreen perennial	19-50 ft	20-40 ft	erosion control hedgerow windbreak	Rocky/Gravelly, Forest, Disturbed	sun, part shade	Gravelly soils, Shallow soils	tolerates seasonal wet well-drained
Cornus nuttallii	Pacific dogwood	Deciduous perennial	29-50 ft	20-25 ft	erosion control hedgerow windbreak	riparian, forest	part shade, shade	well drained soils	Well-drained
Crataegus douglasii	Black Hawthorn, Douglas's Hawthorn	Deciduous perennial	13-27 ft	12-20 ft	erosion control hedgerow thicket-forming windbreak	Wetland, Riparian, Saline/Estuarine, Rocky/Gravelly, Forest, Meadows/Fields, Steppe, Disturbed	Sun, part shade, shade	Well drained soils	Well-drained
Fraxinus latifolia	Oregon ash	Deciduous perennial	32-50 ft	15-40 ft	erosion control hedgerow windbreak	riparian	Sun, part shade, shade	organic soils	tolerates wet season

Tree	Name	Plant type	Size at maturity	Width	Land/ Restoration Use	Habitat	Sun/Shade tolerance	Soil Preferences	Cultivation Preferences
Malus fusca	Pacific crabapple	Deciduous perennial	13-40 ft	15-25 ft	erosion control hedgerow windbreak	Wetland, Riparian	Sun, part shade, shade	Well drained soils	tolerates seasonal wet
Picea sitchensis	Sitka spruce	Evergreen perennial	39-50 ft	20-40 ft	erosion windbreak	riparian, saline/estuarine, rocky/gravelly, forest	sun, part shade	well drained soils	Well-drained
Pinus contorta	shore pine, lodgepole pine	Evergreen perennial	9-50 ft high	20-45 ft	erosion control hedgerow screen windbreak	Wetland, Riparian, Saline/Estuarine, Forest, Disturbed	sun	gravelly soils, peaty soils, nutrient poor soils	tolerates wet season
Populus Trichocarpa	Black Cottonwood	Deciduous perennial	50 ft	20-30 ft	erosion control windbreak	Wetland, Riparian, Forest, Disturbed	sun	Well drained soils	tolerates wet season
Pseudotsuga menziesii ssp. menziesii	Douglas fir	Evergreen perennial	50 ft	20-30 ft	Fire resistant erosion control windbreak	rocky/gravelly, forest, disturbed	sun, part shade	Gravelly soils, well drained soils	well-drained
Quercus garryana	Garry oak, Oregon white oak	Deciduous perennial	40-90 ft	30-70 ft	Erosion control hedgerow windbreak	rocky/gravelly, forest, meadows/fields	sun	Sandy soils, Gravelly soils, Well drained soils, Deep soils	well-drained
Rhamnus purshiana	cascara	Deciduous perennial	14-40 ft	15-20 ft	erosion control hedgerow windbreak	Wetland, Riparian, Forest, Disturbed	Sun, part shade, shade	muddy soils, well drained soils	drought tolerant well-drained
Salix hookeriana	Hooker's willow	Deciduous perennial	6-27 ft	15-20 ft	erosion control hedgerow thicket-forming	Wetland, Riparian, Saline/Estuarine, Rocky/Gravelly	sun, part shade	Sandy soils	tolerates constant flooding

Tree	Name	Plant type	Size at maturity	Width	Land/ Restoration Use	Habitat	Sun/Shade tolerance	Soil Preferences	Cultivation Preferences
Salix scouleriana	Scouler's willow	Deciduous perennial	3-50 ft	30-40 ft	erosion control hedgerow	Riparian	Sun, part shade, shade	Gravelly soils, well drained soils	drought tolerant tolerates constant flooding
Taxus brevifolia	Western yew, pacific yew	Evergreen perennial	39-50 ft	10-30 ft	erosion control hedgerow windbreak	forest	sun, part shade, shade	Gravelly soils, Deep soils	Well-drained
Thuja plicata	Western redcedar	Evergreen perennial	49-50 ft	25-50 ft	erosion control hedgerow screen windbreak	aquatic, wetland, riparian, forest	part shade, shade	clay soils, muddy soils, nutrient rich soils	tolerates wet season
Tsuga heterophylla	Western Hemlock	Evergreen perennial	50 ft	25-40 ft	erosion control hedgerow screen	forest	part shade, shade	Well drained soils, mineral soils	well-drained

Appendix G: Native Plant Guide

Species Code	Botanic Name	Common Name	Growth Form	Life History	Flowering Period	Average Soil Moisture Regime	Shade Tolerance
ACCI	Acer circinatum	vine maple	shrub	perennial	Mar–Jun	dry–moist	part shade-shade
ACMI	Achillea millefolium var. occidentalis	yarrow	forb	perennial	July–Sep	dry–moist	sun–part shade
ACTI	Achlys triphylla	vanillaleaf	forb	perennial	Apr–July	dry–moist	part shade–shade
ADAL	Adiantum aleuticum	Western maidenhair fern	fern	perennial	moist–wet	part shade–shade	
ADBI	Adenocaulon bicolor	pathfinder	forb	perennial	Jun–Oct	moist	moist shaded
ALCE	Allium cernuum var. obtusum	nodding onion	forb	perennial	July–Aug	dry–moist	sun
AMAL	Amelanchier alnifolia	serviceberry, saskatoon	shrub	perennial	Apr–Jun	dry–moist	shade-tolerant/intolerant
ARDI	Aruncus dioicus var. acuminatus	goatsbeard	forb	perennial	May–July	moist	sun–part shade
ASCA	Asarum caudatum	wild ginger	forb	perennial	Apr-July	moist	part shade–shade
ASSU	Aster subspicatus	Douglas aster	forb	perennial	July-Oct	dry	Wet-moist
ATFI	Athyrium filix-femina	lady-fern	fern	perennial	moist–wet	sun–shade	
BEAQ	Berberis aquifolium	tall Oregongrape	shrub	perennial	Mar–Jun	dry–moist	shade-tolerant/intolerant
BENE	Berberis nervosa	dull/Cascade Oregon-grape	shrub	perennial	Apr–Jun	dry–moist	shade-tolerant/intolerant
BLSP	Blechnum spicant	deerfern	fern	perennial	dry–wet	part shade–shade	
CADE	Carex densa	dense sedge	grass	perennial	moist–wet		
CADE	Carex deweyana var. deweyana	Dewey's sedge	grass	perennial	dry–wet	sun–shade	
CAME	Carex mertensii	Merten's sedge	grass	perennial	moist–wet		
CAOB	Carex obnupta	slough sedge	grass	perennial	moist–wet	sun–part shade	
CAPA	Carex pachystachys	thick-headed sedge	grass	perennial	moist–wet		
CAQU	Camassia quamash	common camas	forb	perennial	Apr–Jun	dry–moist	shade-intolerant
CASC	Campanula scouleri	Scouler's bellflower	forb	perennial	dry–moist	sun–part shade	
CIAL	Circaea alpina ssp pacifica	enchanter's nightshade	forb	perennial	May–Jun	dry–moist	sun–part shade
COCO	Corylus cornuta var. californica	beaked hazelnut	shrub	perennial	Feb–Mar	dry–moist	sun–shade
COSE	Cornus sericea	Red-osier dogwood	shrub	perennial	Jun–Aug	moist–wet	sun–shade
COUN	Cornus unalaschkensis	western bunchberry	forb	perennial	May–Jun	moist–wet	part shade–shade
DECE	Deschampsia cespitosa	tufted hairgrass	grass	perennial	Jun	dry–wet	sun–part shade
DIFO	Dicentra formosa ssp. formosa	Pacific bleedingheart	forb	perennial	Apr–May	dry–moist	part shade–shade

Species Code	Botanic Name	Common Name	Growth Form	Life History	Flowering Period	Average Soil Moisture Regime	Shade Tolerance
DREX	Dryopteris expansa	spreading woodfern	fern	perennial	NA	moist	sun–shade
EROR	Erythronium oreganum var. oreganum	Oregon fawnlily	forb	perennial	Apr–May	dry	shade–part shade
ERSP	Erigeron speciosus	showy fleabane	forb	perennial	dry–moist	sun–part shade	
FEOC	Festuca occidentalis	western fescue	grass	perennial	Jun	dry–moist	part shade
FERO	Festuca roemeri	Roemer's fescue	grass	perennial	May–July	dry–moist	shade-tolerant/intolerant
FRVE	Fragaria vesca spp. bracteata	wood's strawberry	forb	perennial	Apr–Jun	dry–moist	shade-tolerant/intolerant
GASH	Gaultheria shallon	salal	shrub	perennial	Apr–May	dry–moist	part shade–shade
GEMA	Geum macrophyllum	large-leaved avens	forb	perennial	May–Jun	moist–wet	sun–part shade
GLEL	Glyeria elata	tall managrass	grass	perennial	May–July	moist–wet	sun–full sun
GRIN	Grindelia integrifolia	entire-leaved gumweed	forb	perennial	Jun	moist	sun–full sun
HODI	Holodiscus discolor	oceanspray	shrub	perennial	May–Jun	dry–moist	sun–shade
HYTE	Hydrophyllum tenuipes	slender-stem waterleaf	forb	perennial	Apr-May	moist–wet	part shade–shade
IRTE	Iris tenax	Oregon iris	forb	perennial	May–Jun	moist–wet	sun–part shade
LOCI	Lonicera ciliosa	orange honeysuckle	vine	perennial	May–Jun	moist	part shade–shade
LOHI	Lonicera hispidula	hairy honeysuckle	vine	perennial	May–July	dry–moist	sun–part shade
LOIN	Lonicera involucrata var. involucrata	black twinberry	shrub	perennial	Apr–July	moist–wet	sun–shade
LYAM	Lysichiton americanus	skunkcabbage	forb	perennial	Mar–May	wet	part shade–shade
MADI	Maianthemum dilatatum	false lily-of-the-valley	forb	perennial	Apr–Jun	moist	sun–shade
MARA	Maianthemum racemosum ssp. amplexicaule	large false Solomon's seal	forb	perennial	May-Jun	moist	Part sun–Shade
MYCA	Myrica californica	Pacific wax myrtle	shrub	perennial	May–Jun	dry–moist	sun–part shade
MYGA	Myrica gale	Sweet gale	shrub	perennial	NA	moist–wet	sun–part shade
OECE	Oemleria cerasiformis	Indian plum	shrub	perennial	Feb–Apr	dry–moist	part shade–shade
OXOR	Oxalis oregona	redwood sorrel	forb	perennial	Apr–Sep	dry–moist	part shade–shade
PEFR	Petasites frigdus	coltsfoot	Forb	perennial	Feb–Mar	moist–wet	sun–shade
PEOV	Penstemon ovatus	broad-leaved penstemon	forb	perennial	Jun–Aug	dry–moist	sun–part shade
PHCA	Physocarpus capitatus	Pacific ninebark	shrub	perennial	May–Jun	moist–wet	sun–shade
PHLE	Philadelphus lewisii	mockorange	shrub	perennial	May–July	dry–moist	sun–part shade
POGL	Polypodium glycyrrhiza	licorice fern	fern	perennial	moist–wet		

Species Code	Botanic Name	Common Name	Growth Form	Life History	Flowering Period	Average Soil Moisture Regime	Shade Tolerance
POMU	Polystichum munitum	western sword fern	fern	perennial	NA	dry–moist	part shade–shade
PTAQ	Pteridium aquilinum var pubescens	bracken fern	fern	perennial	dry–moist		
RHMA	Rhododendron macrophyllum	Pacific rhododendron	shrub	perennial	May–July	dry–moist	part shade–shade
RILA	Ribes lacustre	swamp currant	shrub	perennial	Apr–May	moist–wet	sun–shade
RISA	Ribes sanguineum var. sanguineum	red-flowering currant	shrub	perennial	Feb–Apr	dry–moist	sun–part shade
ROGY	Rosa gymnocarpa	baldhip rose	shrub	perennial	May–Jun	dry–wet	sun–shade
RONU	Rosa nutkana	nootka rose	shrub	perennial	May–Jun	moist–wet	sun–part shade
ROPI	Rosa pisocarpa	clustered wild rose	shrub	perennial	May–July	moist–wet	sun–shade
RUPA	Rubus parviflorus	thimbleberry	shrub	perennial	May–July	dry–moist	sun–shade
RUSP	Rubus spectabilis	salmonberry	shrub	perennial	Mar–Jun	moist–wet	sun–shade
RUUR	Rubus ursinus	trailing blackberry	shrub	perennial	Apr–Aug	dry–moist	sun–shade
SALU	Salix lucida	Pacific willow	shrub	perennial	Apr–May	moist–wet	sun–part shade
SARA	Sambucus racemosa var racemosa	red elderberry	shrub	perennial	May–July	dry–moist	sun–shade
SCAC	Scripus acutus	hardstem bulrush	grass	perennial	Apr–May	wet	sun
SCMI	Scripus microcarpus	panicled bulrush	grass	perennial	May–Jun	wet	sun–part shade
SIKE	Sidalcea kendrsonii	checker mallow	forb	perennial	Jun–Aug	moist–wet	sun
SOCA	Solidago canadensis	Canada goldenrod	forb	perennial	Jun–Sep	dry–moist	sun–part shade
SPDO	Spirea douglasii	hardhack	shrub	perennial	May–July	moist–wet	sun–part shade
SYAL	Symphoricarpos albus var. laevigatus	common snowberry	shrub	perennial	May–Aug	dry–moist	sun–shade
TEGR	Tellima grandiflora	fringecup	forb	perennial	Apr–July	moist	part shade–shade
TITR	Tiarella trifoliata var trifoliata	threeleaf foamflower	forb	perennial	May–Aug	moist	part shade–shade
TOME	Tolmiea menziesii	youth-on-age	forb	perennial	May–Aug	dry–moist	part shade–shade
TROV	Trillium ovatum ssp. ovatum	western trillium	forb	perennial	Mar–May	dry–moist	part shade–shade
VAOV	Vaccinium ovatum	evergreen huckleberry	shrub	perennial	Apr–July	dry–moist	part shade–shade
VAPA	Vaccinium parvifolium	red huckleberry	shrub	perennial	Mar–May	dry–moist	part shade–shade

Source: Own creation with information from Forterra (n.d.-d); Forterra (n.d.-a); King County (n.d.); Washington Native Plant Society (n.d.).

Appendix H: Budget Options

Budget 1: The city establishes a standalone urban forestry advisory board.

Department	Expenditures	Year 1	Year 2	Year 3	Year 4	Year 5
CED	0.50 FTE - Associate Planner	57,500	59,442	61,450	63,526	65,672
CED	0.15 FTE - Neighborhood Coordinator	16,800	17,367	17,954	18,561	19,188
Parks	0.25 FTE - Recreation Coordinator	26,014	26,892	27,801	28,740	29,711
PWE	0.10 FTE - Administrative Assistant	11,794	12,192	12,604	13,030	13,470
	Subtotal Salaries and Benefits	**112,108**	**115,894**	**119,809**	**123,856**	**128,040**
CED	Comprehensive Tree Assessment	100,000	0	0	0	0
CED	Contract Arborist	35,000	35,000	40,000	50,000	50,000
Parks and PWE	Contract Tree Maintenance and Planting	0	40,000	80,000	120,000	160,000
	Subtotal Professional Services	**135,000**	**75,000**	**120,000**	**170,000**	**210,000**
Parks and PWE	Purchase Trees	0	25,000	50,000	75,000	100,000
All	Volunteer Maintenance and Planting Supplies	0	5,258	5,258	2,629	876
All	General Office and Operating Supplies	1,035	1,035	1,035	1,035	1,035
	Subtotal Supplies and Indirect Costs	**1,035**	**31,293**	**56,293**	**78,664**	**101,911**
	Total Expenditures	**248,143**	**222,187**	**296,102**	**372,520**	**439,951**
	Difference from Budget B	*(10,055)*	*(12,290)*	*(10,746)*	*(11,109)*	*(11,484)*

Ownership	Priorities	Year 1	Year 2	Year 3	Year 4	Year 5
CED and Parks	Standardize Citywide Tree Maintenance Practices	x				
PWE	Evaluate and Update Surface Water Fee Usage	x	x			
CED	Coordinate Contract Arborist Work	x	x	x	x	x
CED and Parks	Community Outreach and Engagement	x	x	x	x	x
CED and Parks	Volunteer Recruitment and Appreciation	x	x	x	x	x
CED and Parks	Explore External Partnerships and Funding	x	x	x	x	x
CED, Parks, and PWE	Coordinate UFP priorities	x	x	x	x	x
CED, Parks, and PWE	Trees planted @ $250 per tree	0	100	200	300	400
	Change in trees planted annually	*0%*	*100%*	*100%*	*50%*	*33%*
	Percentage volunteer-led tree planting	*0%*	*50%*	*50%*	*50%*	*50%*

Budget 2: The city does not establish a standalone urban forestry advisory board. This includes the Parks and Recreation Advisory Board establishing urban forestry as one of their priorities.

Department	Expenditures	Year 1	Year 2	Year 3	Year 4	Year 5
CM Office	Full-Time Program Administrator	122,162	128,185	130,555	134,965	139,524
	Subtotal Salaries and Benefits	**122,162**	**128,185**	**130,555**	**134,965**	**139,524**
CM - Program Admin	Comprehensive Tree Assessment	100,000	0	0	0	0
CM - Program Admin	Contract Arborist	35,000	35,000	40,000	50,000	50,000
CM - Program Admin	Contract Tree Maintenance and Planting	0	40,000	80,000	120,000	160,000
	Subtotal Professional Services	**135,000**	**75,000**	**120,000**	**170,000**	**210,000**
CM - Program Admin	Purchase Trees	0	25,000	50,000	75,000	100,000
CM - Program Admin	Volunteer Maintenance and Planting Supplies	0	5,258	5,258	2,629	876
CM - Program Admin	General Office and Operating Supplies	1,035	1,035	1,035	1,035	1,035
	Subtotal Supplies and Indirect Costs	**1,035**	**31,293**	**56,293**	**78,664**	**101,911**
	Total Expenditures	**258,197**	**234,478**	**306,848**	**383,629**	**451,435**
	Difference from Budget A	*10,055*	*12,290*	*10,746*	*11,109*	*11,484*

Coordinated with	Priorities	Year 1	Year 2	Year 3	Year 4	Year 5
CED and Parks	Standardize Citywide Tree Maintenance Practices	x				
PWE	Evaluate and Update Surface Water Fee Usage	x	x			
CED	Coordinate Contract Arborist Work	x	x	x	x	x
CED and Parks	Community Outreach and Engagement	x	x	x	x	x
CED and Parks	Volunteer Recruitment and Appreciation	x	x	x	x	x
CED and Parks	Explore External Partnerships and Funding	x	x	x	x	x
CED, Parks, and PWE	Coordinate UFP priorities	x	x	x	x	x
CED, Parks, and PWE	Trees planted @ $250 per tree	0	100	200	300	400
	Change in trees planted annually	*0%*	*100%*	*100%*	*50%*	*33%*
	Percentage volunteer-led tree planting	*0%*	*50%*	*50%*	*50%*	*50%*

Appendix I: Budget Assumptions

The underlying assumptions for each budget are detailed below. The assumptions are delineated based on budget:

- Budget A: Expenditures that only apply to Budget A
- Budget B: Expenditures that only apply to Budget B
- Budgets A & B: Expenditures that apply to both Budget A and Budget B

BUDGET A: Standalone Urban Forestry Advisory Board

Staffing

Program Administrator – 1 FTE – City Manager's Office

This position is equivalent to the current Assistant to the City Manager / Policy Analyst position. This equivalent is based on conversations with our client indicating that the City Manager's office could be suitable for this position for the initial years of the UFP and that this position equivalent would be appropriate.

To account for potential differences in qualifications and benefit selections, we used three different sources of reported salary and benefits for this position. We began by pulling the city's budgeted salary and benefits for this position in 2023. The second source we used is the salary range listed on the original job posting, which ranges from $81,096 to $102,876.

The projected benefit costs in 2023 and 2024 are 38.97% and 38.89% of salaries for the respective year. To calculate unknown benefit costs for the low and high salary ranges, we used an average percentage of 38.93%.

To calculate annual compensation increases over the five-year period, we examined the average increase from 2023 to 2024 for all departments relevant to UFP activities, specifically the City Manager's Office, Community and Economic Development (CED), Parks, Recreation, and Community Services (PCSD), and Public Works Engineering (PWE). To provide the most conservative estimate, we used the CED average increase of 3.38% annually, as it is the highest across departments. Table 14 below shows the five-year compensation projections.

Table 14: Program Coordinator - Compensation Estimates

Source	Year 1	Year 2	Year 3	Year 4	Year 5
2023-2024 Proposed Budget	110,898	114,644	118,517	122,520	126,659
Online Job Description - Low Range	112,665	116,471	120,405	124,473	128,677
Online Job Description - High Range	142,924	147,752	152,743	157,902	163,236
Average Salary and Benefits	**122,162**	**128,185**	**130,555**	**134,965**	**139,524**

Budget B: No Standalone Urban Forestry Board

Staffing

Associate Planner – 0.5 FTE – Community Economic Development

This estimate is based on guidance provided by the city using expenditures that were approved in the 2023-2024 Biennial Budget. The city has approved funding for one limited-term Associate Planner in CED for 2023 and 2024. We project the expenditure to be extended for an additional three years. We estimate that this position would spend 50% of their time on urban forestry activities. We used the 2023 to 2024 compensation increase for CED of 3.38% to estimate salary and benefits over five years. This expenditure is intended to be offset by Tree Preservation Revenue.

Neighborhood Coordinator – .15 FTE – Community Economic Development

This estimate is based on guidance provided by the city using expenditures that were approved in the 2023-2024 Biennial Budget. The city has approved funding for one limited-term Neighborhood Coordinator in CED for 2023 and 2024. We projected the expenditure to be extended for an additional three years. We estimate this position will spend 15% of the time on urban forestry activities. We used the 2023 to 2024 compensation increase for CED of 3.38% to estimate salary and benefits over five years.

Recreation Coordinator – 0.25 FTE – Parks, Recreation, and Community Services

This estimate is based on the 2023 salary and benefits for a Recreation Coordinator in PRCS. We choose a coordinator-level position to align with the Neighborhood Coordinator in CED. We estimate that this position will spend 25% of the time on urban forestry activities. We used the 2023 to 2024 compensation increase for CED of 3.38% to estimate salary and benefits over five years.

Administrative Assistant – 0.1 FTE – Public Works Engineering

This estimate is based on the 2023 salary and benefits for the PWE Administrative Assistant (City of Lakewood Career Pages, n.d.). This position currently splits time across three PWE divisions, so this position would not ultimately carry out urban forestry activities. Therefore, this position is used solely for compensation estimation purposes. We estimate that this position will spend 10% of the time on urban forestry activities. We used the 2023 to 2024 compensation increase for CED of 3.38% to estimate salary and benefits over five years.

Table 15 summarizes the annual compensation estimates for each position.

Table 15: Existing FTE Compensation Estimates

FTE % and Position	Year 1	Year 2	Year 3	Year 4	Year 5
1 FTE - Associate Planner	115,000	118,885	122,900	127,052	131,344
0.5 FTE - Associate Planner	**57,500**	**59,442**	**61,450**	**63,526**	**65,672**
1 FTE - Neighborhood Coordinator	112,000	115,783	119,694	123,738	127,917
0.15 FTE - Neighborhood Coordinator	**16,800**	**17,367**	**17,954**	**18,561**	**19,188**
1 FTE - Recreation Coordinator	104,054	107,569	111,202	114,959	118,842
0.25 FTE - Recreation Coordinator	**26,014**	**26,892**	**27,801**	**28,740**	**29,711**
1 FTE - Neighborhood Coordinator	112,000	115,783	119,694	123,738	127,917
0.1 FTE - Neighborhood Coordinator	**11,200**	**11,578**	**11,969**	**12,374**	**12,792**

Budgets A and B: Applicable to both budgets

Professional Services

Comprehensive Tree Assessment

This estimate is based on our interview with Issaquah's and Vancouver's UFP program directors. The final expenditure would change depending on the total size of the land assessed and other conditions such as the timeline and extent or details of the assessment.

Contract Arborist

This estimate is based on guidance provided by the city using expenditures that were approved in the 2023-2024 Biennial Budget. The contract arborist labor is estimated at $35,000 in 2023 and 2024 and coordinated by CED. Tree Preservation Revenue is expected to offset this expenditure for 2023 and 2024.

We have projected the expenditure to be extended for an additional three years and to increase in Years 4 and 5 to align with the city's increased urban forestry activities.

Contract Operations and Maintenance

We used existing city contract tree labor estimates in this assumption. On page 258 of the city's 2023-2024 biennial budget, the city approved $32,000 in contract tree planting and maintenance for 40 trees. We used a simple calculation to estimate the cost of contract labor at $800 per tree planted.

The total expenditure each year is based on the projected number of trees planted and the amount of volunteer engagement each year. The assumption for the number of trees planted each year is outlined under "Purchase Trees" below. We estimate that volunteers will plant 50% of all trees planted each year for the first five years. As the program grows and as volunteer-led planting increases, the percentage of trees planted by contract labor will decrease.

Supplies and Indirect Costs

Purchase Trees

This estimate is based on current inventory and prices provided by Puget Sound Plants. Based on interviews with case study UFPs, the city should consider planting more mature trees to promote successful planting. Based on current availability at their Olympia nursery, the average price for a larger tree (i.e., trees sold in at least a #7 container) is $244. Based on this average, we used a cost of $250 per tree in our estimate. However, this cost could vary greatly depending on the sizes of trees purchased and the vendor.

The number of trees planted each year is based on the city beginning with a low number of plantings in Year 2 and increasing the number of trees planted by 100 each year as program capacity and volunteer efforts grow.

Volunteer Maintenance and Planting Supplies

This estimate is based on maintenance costs and small tools and minor equipment costs in other city departments. We used departments with activities and supply costs comparable to volunteer planting and maintenance activities, such as gloves, parks maintenance, herbicides, and others. The estimate included in both budgets is the average for the comparable costs in Lakewood's biennial budget.

General Office and Operating Supplies

This estimate is also based on comparable approved costs for other departments in Lakewood's biennial budget. Some examples include City Manager/Communications, Administrative Services, CED, PRCS, and Legal departments. The number included in the budget options is the average of all comparable identified costs in the approved biennial budget.

Indirect Costs

If the city uses user-charges, such as stormwater fees, to fund the UFP, it should include indirect costs in the program's budget to account for overhead costs. The U.S. Government has different best practices to estimate indirect costs, which are usually expressed as a percentage of total direct costs (TDC) or the modified total direct costs (MTDC) and can go from 10% to 40% depending on the project (University of Idaho, n.d.; USAID, 2017). If user-charges are used in the future, Lakewood can add the base 10% for indirect costs, given that the new program will not represent significant overhead costs of no more than 3 FTE in the first five years. Ten percent of total direct costs represent at least $25,000 in both budget options presented in this report, the minimum monetary value recommended (University of Idaho, n.d.; USAID, 2017).