

Guide to
**Developing Effective Urban
Tree Regulations on Private Property**

2024



King County

Department of Natural Resources and Parks
Water and Land Resources Division

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Prepared for King County by Facet

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King County

Department of Natural Resources and Parks
Water and Land Resources Division

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Executive Summary

Urban forests are complex regional, and watershed-scale natural systems located across natural areas, parks, public spaces, private residential and commercial properties, and transportation corridors. As development increases across the Puget Sound region, so does the need to protect and maintain our urban and community forests and the valuable ecosystem services they provide. King County is at the forefront of urban growth, with approximately 2.3 million people in 39 jurisdictions and an estimated population of 118,000 residing in unincorporated urban areas (UUAs). Canopy studies indicate the majority of trees that make up the urban forest in King County are located on private property, where trees are regulated on a local level.^{1 2 3 4} As such, tree ordinances vary by municipality. To date, very little guidance or data exists to inform the tree ordinance update process for local governments, nor is there a clear understanding of the effectiveness of tree regulations on private property.

The Guide to Developing Effective Urban Tree Regulations on Private Property (the Guide) was developed to fill a critical need for guidance on developing and implementing private tree regulations. The Guide includes a synthesis of existing regulations in King County jurisdictions that were gathered through code research, an online survey of jurisdictional planning staff, and interviews with four municipalities that recently updated their city's tree ordinance. The project team also looked outside of the region to identify effective and creative regulatory approaches across the country.

Based on survey results, interview responses, and industry best practices – the Guide synthesizes code elements that comprise an effective ordinance as well as recommended strategies for public education and implementation by staff and permit applicants. The resources and data presented here will be utilized by the King County Department of Natural Resources and Parks, Water and Land Resources Division to develop a tree code toolkit for King County and local jurisdictions seeking to update existing regulations or implement new regulations for trees on private property.

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I. Introduction

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1. Introduction

King County, located in the heart of the Pacific Northwest, is home to almost 30 percent of Washington residents and contains the highest population density in the state. The County is comprised of 39 jurisdictions that range in size from larger cities like Seattle with a population of 733,919, to smaller towns like Beaux Arts Village with a population of 311. It also includes urban unincorporated areas (UUAs), such as Skyway, which are geographically defined regions that have been identified as centers of future population growth and urban development outside of incorporated cities. The population of King County increased by 50 percent between 1990 and 2020 and is expected to continue to grow at a rapid rate. Many areas within the county, including UUAs, are heavily developed with existing infrastructure, and redevelopment of properties is frequently occurring. Developed land cover within King County cities increased from 61 percent in 1992 to 67 percent in 2016, while UUAs saw a seven percent increase during that same period.⁶ The amount of tree canopy cover is directly correlated to developed land cover and the distribution of this growth.

What is the difference between a policy, ordinance, code, and regulation?



A **POLICY** articulates long-range objectives, such as the community's vision expressed as policy goals in a Comprehensive Plan. Intended to guide day-to-day actions and decisions, policies may be achieved through ordinances, programs, public education, etc. Although comprehensive plan policies are mandated by the state and enacted by a local legislative process, they cannot be violated or enforced upon.



An **ORDINANCE** is a law that is created by a local legislative body (e.g., county, town, or city council) and is also the mechanism for which it is adopted or passed. An ordinance regulates or prohibits conduct or actions and therefore can be violated and enforced.



CODE refers to a collective group of standards, ordinances, or rules. For example, "Tree code" may refer to different sections within a jurisdiction's municipal code.



REGULATIONS, or rules (when used in a regulatory sense), establish procedures required by ordinances, however the term is commonly used interchangeably with code and ordinance or as a verb to regulate, meaning enforce or as a "regulatory approach."



Photo credit: Tom Wheatley

Urban forest is defined by its proximity to human populations and includes all trees within urban lands including those on public property such as streetscapes, rights-of-way, parks, municipal facilities, and open spaces as well as privately owned and Tribal lands.⁷ The importance of urban forests has been quantified and well documented on a site scale (individual trees) and landscape scale (groves or forests) through research conducted by agencies like the United States Forest Service (USFS) and Washington Department of Natural Resources (WADNR), organizations like American Forests and the Arbor Day Foundation, universities, and others. Some benefits of urban trees include improved quality of life^{8,9}, wildlife habitat, green stormwater infrastructure^{10,11}, increased property values, energy savings, reduction of urban heat island effects^{13,14}, pollutant removal¹⁵, noise buffering¹⁶, and carbon sequestration.¹⁷ There is a lack of research, however, around effective tree ordinances and the adoption and implementation of such, which is an essential strategy for preserving urban forests.

According to the King County 30-Year Forest Plan, canopy cover in King County cities ranges from 16 percent to more than 50 percent, while UUAs range from 45 percent canopy cover near rural areas to 21 percent in areas closer to cities.¹⁸ Given that the vast majority of the urban forest canopy

resides on private property in low-density residential zones,¹⁹ trees within these areas are under substantial development pressures and are seeing an increase in impervious surfaces and subsequently, the highest loss of canopy cover. Further, the UUAs contain some of the remaining patches of contiguous forest stands and are similarly under high development pressures.

1.1: Project Background

In 2021, the King County Department of Natural Resources and Parks (DNRP), Water and Land Resources Division Forestry Program (County), identified the need to maintain and increase urban tree canopy in the *King County 30-Year Forest Plan*.²⁰ This collaborative effort involved input from stakeholders such as county staff, Tribes, nonprofits, municipalities, forestland owners, managers, and community members. Among the plan's seven priorities is a focus on urban forests, with goals and strategies to increase tree canopy and urban forest health. In response to stakeholder input, King County initiated the Urban Forestry Forum in 2022, bringing together cities countywide with a shared interest in urban forestry. Surveys among participants emphasized the significance of tree regulations to support urban canopy retention and growth, identifying King County as a key player in synthesizing information and showcasing best practices.



Photo credit: Xinly

Project Background continued...

To address an identified need for comprehensive and effective tree retention regulations, King County obtained funding through the State of Washington Department of Natural Resources Urban and Community Forestry Program grant and launched an analysis of urban tree protection regulations in King County. This project is structured into two major tasks:

1. Conduct data collection and evaluation of existing tree codes for all King County municipalities and urban unincorporated areas of King County.
2. Develop a guide containing insights, best practices, and recommendations for King County and municipalities to consider when crafting effective tree regulations and facilitating tree ordinance adoption.

Conducting an extensive analysis of regulations for both public and private trees was not feasible due to constraints in budget and timeline. Therefore, acknowledging the unique challenges faced by urban trees on private lands, the County identified tree regulation on private property as the focus of this initial research. Public trees include

those located within public rights-of-way, city or county-owned and managed parks, natural areas, and other public facilities. While public trees play a distinct role in urban forests, trees in these areas are regulated by a variety of plans and legal documents, including franchise agreements for utilities within the right-of-way. In many jurisdictions, maintenance of right-of-way trees is the responsibility of the adjacent property owner. Public tree management is tied to public safety and the responsibilities associated with providing utilities, access, and park amenities to and for the benefit of the public. For ease of reference, public tree code sections are noted in the code spreadsheet (Appendix D) but not included in this evaluation.

This *Guide to Developing Effective Urban Tree Regulations for Private Property* (the Guide) is grounded in the information gathered from the two tasks stated above as well as current best practices for arboriculture science and urban forestry management.²¹ The project team evaluated key components of successful tree protection and retention regulations to develop a model tree ordinance and regulation elements specific to the management of trees on private lands.

1.2: What defines a model tree ordinance framework?

Urban forests are complex regional and watershed-scale natural systems that are governed independently across local municipalities. Tree protection ordinances are established at the local level and are not regulated by the Growth Management Act like critical areas ordinances. Additionally, the structure and location of related local codes (for example, development, construction, landscaping, and land use) varies by municipality. As a result, there are diverse approaches to regulating trees within urban settings. Along with community values and priorities, staffing and financial resources greatly influence the structure, elements, and administration of tree regulations. Therefore, how do you define a “model tree ordinance?”

For purposes of this project, the term model tree ordinance is broadly defined as an ordinance that does the following:

- *Provides clear and effective code language for ease of administration by staff and stakeholders;*
- *Is grounded in best arboriculture science and management practices;*
- *Balances growth and development while providing protections for existing trees; and*
- *Helps meet the jurisdiction stated vision, purpose, and objectives of the code*

and related policies (for example, urban forest management plans and goals, comprehensive plans, climate action strategies, etc.).

Another challenge to defining a model tree ordinance is the lack of metrics or an assessment process for measuring regulatory efficacy, which is necessary to determine whether an ordinance is successful in furthering canopy cover and related urban forestry, climate action, and/or sustainability goals. To date, there has not been a comprehensive study that conclusively links specific regulatory elements to canopy cover outcomes. In the absence of statistically significant data, the Guide presents trends seen in King County jurisdictions with tree regulations in place, as well as case studies from select jurisdictions outside the county. The project team also included a discussion of the advantages and disadvantages of specific regulations as they pertain to implementation and administration. It is important to note that tree regulations are one strategy used to protect and enhance tree canopy cover and will only be successful when combined with other policy and programmatic approaches, such as urban forest management plan goals, ongoing monitoring and assessment, planting programs, public education and engagement, and investments in staffing and program implementation.



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2. Jurisdictional Tree Regulations in King County

2.1: Approach and Methods

The first objective of this project was to evaluate existing tree codes across all King County municipalities and urban unincorporated areas of King County and document the process that select municipalities followed with recent code updates. This was accomplished through code research and conducting surveys and interviews. The combined datasets helped inform the recommendations provided in this Guide and will be referenced throughout. A complete discussion of the methods from this first phase of research is summarized in the Data Synthesis Report found in Appendix B.

Code Evaluation

Tree codes from all 39 King County municipalities as well as urban unincorporated areas were researched and uniformly synthesized into a code matrix (Appendix C) and a code summary spreadsheet (Appendix D). Once synthesized, key code concepts were identified, cross-referenced, and compared. Each jurisdiction's code was then categorized into one of four regulatory levels based on elements in the existing private tree code. The regulatory levels are indicated on the summary spreadsheet in addition to the city population, the date of the last code update, and specific code requirements. Levels of regulation do not imply a rating of code quality or effectiveness but are rather a reflection of many factors, including the community's vision, its purpose and intent of regulating trees, desire for greater code simplicity, or for taking a more comprehensive approach. Decision-makers also carefully consider levels of code regulation in other contexts, such as resources needed for code administration and enforcement, when adopting codes.

The code matrix and summary spreadsheet were designed for use by planners, urban foresters, and decision-makers to reference how trees are commonly regulated throughout King County towns, cities and UUAs. These tools may help jurisdictions identify gaps and consider ways to improve the effectiveness of their tree ordinances.

County-wide Survey

To better understand the policy drivers and nuances of administering tree codes on private property, survey questions were developed to engage directly with individuals involved in the implementation of tree codes. Using Survey Monkey software, the project team developed 18 multiple-choice, rated, and open-ended questions to ask who administers the code, how easy or challenging the code is to apply/enforce, and how cities are tracking code effectiveness. The survey was released to planning staff in all 39 municipalities in the County. Questions included:

- What are the drivers or reasons for adopting your private tree code?
- How are you measuring the effectiveness of the code in meeting those goals?
- On sites where no development activity is proposed, what tree removals are allowed?

In-depth Local Interviews

In 2022 and 2023, eleven King County jurisdictions updated their tree code regulations to some degree. Of those, four cities, Burien, Issaquah, Kirkland, and Seattle, were selected and engaged through in-depth interviews because of the complexity of their recent efforts to evaluate, update, and adopt new tree code ordinances. Staff were interviewed on their experience with the code amendment process, timeline, lessons learned, public engagement efforts, and the rationale for implementing the code amendments.



Photo credit: Seattle DOT

2.2: Results: Tree Regulations in King County

The project team found local tree codes to vary widely in quality, clarity, terminology, consistency with industry standards, and levels of restrictiveness. Survey participation was very good, with 34 out of 39 municipalities submitting partial or full survey responses. Beyond critical area tree removal restrictions, some jurisdictions (9) had little to no tree regulations, while the greatest single number of jurisdictions (15) were found to have comprehensive codes that both regulate tree retention with development and limit tree removal on private property. Through the data collection and analysis of

local jurisdictions' tree codes during the first phase of this effort, the project team found many examples of effective language and processes to consider when crafting effective ordinances. Based on the categorization of the jurisdictions evaluated - including King County - 25 of the 40 have moderate to comprehensive levels of tree regulations (Level III and IV, see page 09). The complete results of this research are described in the Data Synthesis Report (Appendix B) and woven throughout this Guide to demonstrate and highlight specific code elements and provide model language.

Levels of Code Regulation

The private tree regulations of King County and each municipality were categorized into one of four levels, based on the code elements and extent of provisions and restrictions.



LEVEL I

LEVEL I • Limited Regulations

Level I codes have little or no limitations to tree removal on private property aside from tree removal and replacements in critical areas. May require review of trees as part of a landscape plan review for informational purposes.

Algona | Carnation | Clyde Hill | Des Moines | Enumclaw
Normandy Park | Pacific | Skykomish | Snoqualmie

LEVEL II

LEVEL II • Minimal Regulations

Level II codes are primarily limited to required landscaping areas, which do not apply to new single-family residential development. No removal thresholds or replacement standards to meet a minimum density are set, which precludes all other standard requirements of replacement, protection, and mitigation.

King County | Auburn | Black Diamond | Milton | SeaTac | Tukwila

LEVEL III

LEVEL III • Moderate Regulations

Level III codes include tree density requirements for retention and replacement on development with standard protection, maintenance, and mitigation, but may not apply to non-residential development. Most lack removal thresholds or requirements for developed sites and non-development related activity.

Bothell | Federal Way | Kenmore | Kent | Maple Valley
Medina | Mercer Island | Newcastle | North Bend | Woodinville

LEVEL IV

LEVEL IV • Comprehensive

These jurisdictions have comprehensive private tree codes that pertain to both development and non-development related tree removals. They have tree density retention and replacement requirements, and, priority locations, alternative compliance, incentives, protection, maintenance, enforcement with penalties, and where appropriate, a dedicated tree fund account.

Beaux Arts Village | Bellevue | Burien | Covington | Duvall
Hunts Point | Issaquah | Kirkland | Lake Forest Park | Redmond
Renton | Sammamish | Seattle | Shoreline | Yarrow Point



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3. Nationwide Tree Regulation Research

3.1: Approach and Methods

The second phase of research included a search of nationwide tree codes to identify unique approaches to tree protection from a regulatory standpoint. To conduct a nationwide search for model tree ordinances, the project team reviewed case studies from professional conferences and webinar agendas, published research papers, and relevant articles. Sources include the Journal of Environmental Management, the Urban and Community Forestry Society (formerly the Society of Municipal Arborists), Vibrant Cities Lab, Arbor Day Foundation, and the Washington State Department of Natural Resources Urban and Community Forestry. States with growth management policies were considered for the cities' similarities in balancing regulatory levels with environmental protection. From there, jurisdictions comparable in size to those in King County were considered and further narrowed down to cities that face similar development pressures, have existing mature tree canopy, and may have received some recognition for their regulatory approach to tree protection.

In all, seven nationwide jurisdictions were selected by range in population from under 10,000 to about 965,000 residents. Aside from Austin, Texas, the project team selected half the jurisdictions with under 40,000 residents and the remaining half over 40,000, up to about 75,000 residents, noting that the average population size of most King County jurisdictions is approximately 40,000 residents. Each of the selected cities has tree codes that both protect existing trees and allow for development (Appendix E). State urban foresters were asked to recommend jurisdictions within their state that fit these criteria. Other jurisdictions that were recommended included Palo Alto (California), Reno (Nevada), Miami-Dade County (Florida), Atlanta (Georgia), Decatur (Georgia), Amelia Island/Nassau County (Florida), Whitefish (Montana), and the Town of Mt. Pleasant (New York).

Ordinances for these recommended jurisdictions were reviewed for unique components and effectiveness; and compared using elements of tree ordinance topics established during the earlier research phase of the project and discussed in the Data Synthesis Report (See Appendix B). The project team also reviewed Portland and Olympia's tree codes based on suggestions that those codes may fit the same criteria we were seeking nationwide.

Two cities, Decatur and Olympia had elements of their tree ordinances that stood out as effective or unique and could serve as an example to local jurisdictions. These tree codes were further evaluated by analyzing the ordinances in-depth, reviewing educational materials available on each city's website, and contacting each jurisdiction for brief interviews using the general outline of questions from the local interviews. These case studies are presented in Section IV of this report. Additionally, the Chicago Region Tree Initiative (CRTI) was identified as an innovative organization leading the way for developing tree ordinance frameworks and is also featured as a project spotlight.

3.2 Results: Nationwide Case Studies

It is not uncommon for municipalities outside of King County, and across other regions of the country, to base tree retention regulations on factors such as development type, minimum canopy cover requirements, and tree density standards. These approaches are aimed at preserving and enhancing urban tree canopy cover, promoting environmental sustainability, and maintaining the aesthetic and ecological benefits that trees provide to communities. The following case studies provide approaches from communities outside of King County with unique code elements that are not seen in local ordinances and contribute to the overall effectiveness of the tree regulations.

Case Study: City of Decatur, Georgia

The City of Decatur, a suburb northeast of Atlanta, is home to an estimated 23,000 residents and contains an abundance of mature trees. Decatur is a developed city with an existing tree canopy of 57 percent. It is similar to larger jurisdictions in King County in that much of the City has been previously developed and the majority of impacts to tree canopy comes from the redevelopment of existing residential lots. This is evident through their tree removal permit applications, which the City tracks through a permitting software called Community Core. On average last year, Decatur received 13 tree removal permit applications associated with commercial properties and 120 residential tree removal permit applications.

TREE ORDINANCE UPDATE AND CANOPY ANALYSIS

In 2019, the City initiated the tree ordinance update process, which was previously amended in 2014. Public input was solicited from stakeholders, the City's Environmental Sustainability Board, and the community via several open house events held at a public park and other outreach efforts. As part of the effort, the City commissioned a tree canopy study using i-Tree that revealed the city's total canopy cover remained consistent between 2009 and 2019 at 57 percent, with low-density residential zoning containing more than 70 percent of the city's canopy cover. Notably, redevelopment within this single-family zoning was identified as the primary driver of canopy loss. In 2021, the Decatur Environmental Sustainability Board conducted site visits throughout the city to verify the canopy study's findings. While certain areas of the city experienced tree canopy loss during that timeframe, others experienced tree canopy gain that overall supports the study's finding that the City achieved and maintained its 50 percent canopy cover goal.

After a three-year effort, the revised ordinance was adopted in 2022, known as the Tree Canopy Conservation Ordinance. The result is a clear, well-written ordinance that provides the following:

- Strong protections for existing tree canopy, replacement tree plantings, and still allows for development opportunities.

- The tree canopy and replacement requirements are established by zone, with the highest canopy retention (75 percent) required in single-family residential zoning.
- The intent section ensures that the effectiveness of the ordinance can be evaluated periodically by requiring a tree canopy cover study every five years using a similar methodology to the 2021 canopy assessment.
- Requires the City Arborist to publish a quarterly report summarizing tree removal and replacement activities and requires an annual public information meeting to be held.

Based on the information provided in the canopy study and guidance from the Arbor Day Foundation, the City increased its tree canopy cover goal from 50 percent to 65 percent, which is reflected in their updated ordinance.

UNIQUE ELEMENTS OF THE DECATUR, GA TREE CODE

- Requires **75 percent** of a lot's existing healthy canopy cover to be retained;
- Offers an **Administrative Tree Variance** that allows applicants to apply for a variance to the zoning setback regulations to preserve an existing protected tree;
- Implements a **Canopy Loss Fee** for situations where tree retention requirements are met but an applicant wants to remove other healthy protected trees. Funds are distributed by the City to establish, maintain, improve, and expand the canopy;
- Requires a **Boundary Tree Agreement** for land disturbance that impacts more than 20 percent of a critical root zone of a boundary tree straddling two properties; and
- Requires that trees retained or planted to meet tree canopy requirements be maintained in perpetuity through tree maintenance agreements and bonds.

The City acknowledges that education is a key component to the success of its code. The city's website includes an informative collection of educational materials.²³



Photo credit: Peter Robbins

Case Study: City of Olympia, Washington

Olympia, the state capital of Washington, is located 60 miles southwest of Seattle in Thurston County, with a population of nearly 56,000—slightly larger than the City of Bothell in King County. Encompassing 20 square miles, Olympia was assessed in 2022 to have an overall tree canopy cover of 42 percent, with the greatest canopy cover percentage located in low-density residential areas. According to Olympia's Urban Forest Program Manager, the City plans to provide greater policy support for its tree code by establishing data-driven tree canopy cover goals through Comprehensive Plan updates and Urban Forest Management Plan development.

Olympia's tree code, Municipal Code Chapter 16.60, was initially adopted in 2016 and underwent minor updates in 2021. Separate code sections address required landscaping related to zoning/buffers, clearing and grading, and landmark trees. While not seeing all requirements under one code section may be frustrating to some, the overall length and complexity of Olympia's tree code is minimized with references to the City's Urban Forest Manual (Manual), which outlines permitting standards and procedural requirements.²⁴ Because issues with code length and clarity emerged during the research phase of this project, the team sought examples of strategies that resulted in succinct, understandable code language. While Olympia's tree code was found to be as comprehensive as Kirkland's Level IV of regulations, Olympia's approachable code language and unique code elements were found to be a model for this project.

UNIQUE ELEMENTS OF THE OLYMPIA, WA TREE CODE

- Overall **code language is clear, user-friendly, and aligns with industry standards** without overuse of jargon.
- The **Urban Forest Manual is written for a broad audience** in narrative format; it explains requirements, provides checklists, includes tables and diagrams, and gives examples of code use.
- **Checklists** in the Manual outline what information needs to be submitted with tree removal permit applications and provide instructions for how to measure a tree, calculate tree density, etc.
- Depending on the jurisdiction's code amendment schedules, updates to the industry standards, tree lists, procedural checklists, etc. in the Manual may occur more frequently than would normally be feasible through a legislative process.²⁵
- **Tree retention requirements include soil preservation.** For example, single-family development requires that a Soil and Vegetation Protection Plan show soil remediation and understory vegetation replanting, in addition to meeting a minimum of 30 tree units per acre with existing and/or replacement trees.
- The code includes a tree removal mechanism for larger, heavily wooded undeveloped properties to allow up to 30 percent removal by volume every ten years, much like traditional forest stand management.

Based on the community engagement related to other projects, the Urban Forest Program Manager believes the community is generally accepting of trees being regulated and that trees are of value to Olympians, possibly an outcome of the community's tree code being so approachable.

PROJECT SPOTLIGHT

Chicago Region Trees Initiative

The Chicago Region Trees Initiative, or CRTI, is an Illinois-based partnership dedicated to developing and implementing strategies for a healthy, diverse, and equitable urban forest. CRTI provides resources on grant funding related to urban forestry and environmental initiatives, ordinance development, carbon credits, invasive species, and hiring a qualified arborist. CRTI also maintains interactive maps and data sets of the Chicago region that include layers like tree canopy cover, surface temperatures, flood risk, air quality, and vulnerable populations.²⁶

Notably, CRTI guides jurisdictions seeking to implement tree preservation ordinances through their ordinance builder program. Spearheaded by Lydia Scott, Zach Wirtz, et al., over ten years ago, the program today features examples of tree preservation ordinance templates categorized as bronze, silver, and gold frameworks, for jurisdictions to utilize and model tree ordinances after (See Table 1).²⁷ To incentivize jurisdictions to adopt and maintain a tree preservation ordinance, the program requires a minimum bronze-status tree preservation ordinance to receive funding through the Urban and Community Forest Grant. The bronze and silver ordinance templates only address public trees; however, the gold template includes protections for both public trees and trees on private property.

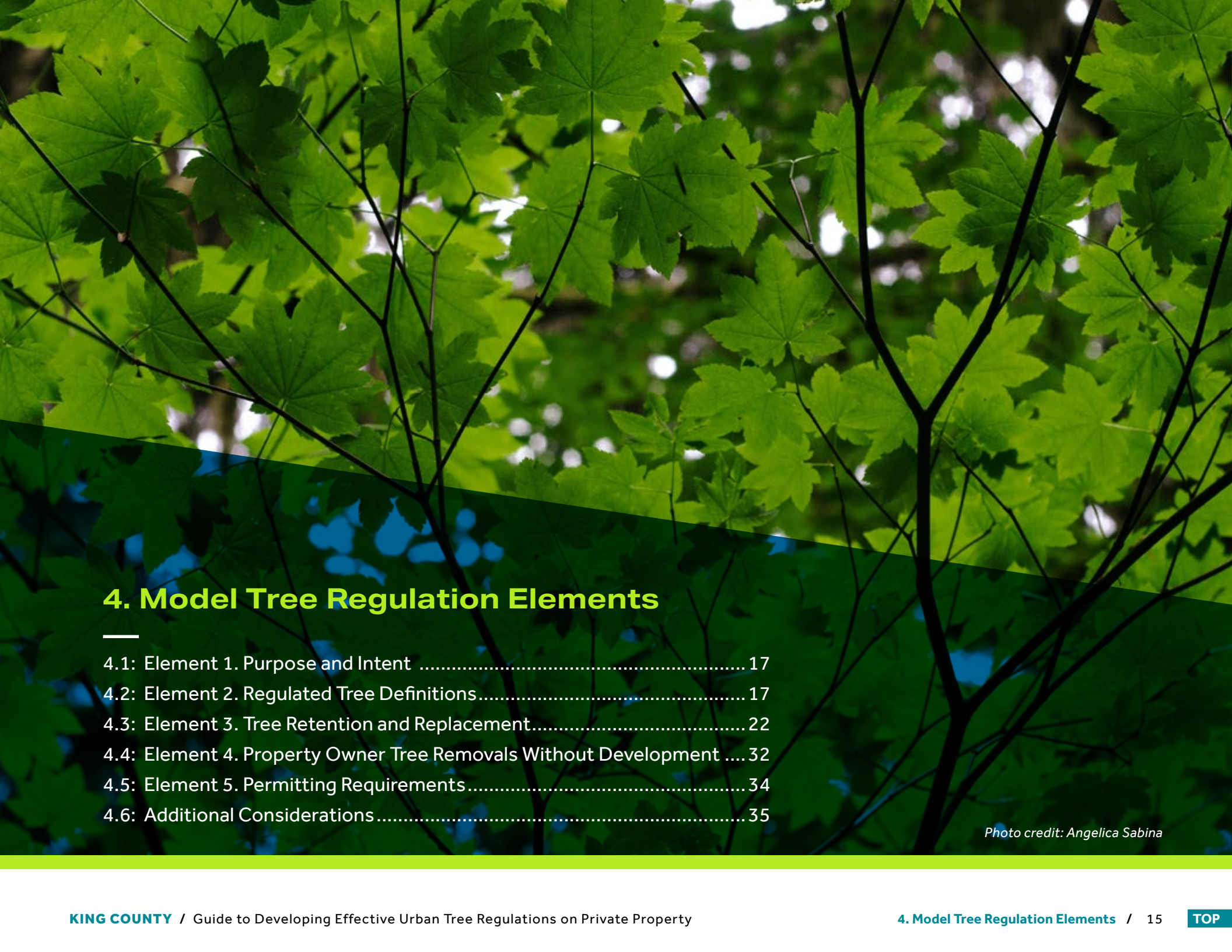


Photo credit: Sawyer Begston

TABLE 1.

Chicago Region Tree Initiative - Tree Code Preservation Framework

Ordinance Level	Code Elements
Bronze	• Regulates public trees. • Statement of purpose • Definitions • Tree care and protection • Legacy tree protections • Tree removal and replacement • Tree preservation and/or removal plan • Permit procedures! • Enforcement and compliance • Nuisance trees • Invasive species control • Sets goals to help move toward a silver-level ordinance
Silver	• Builds upon elements of the bronze-level ordinance • Requires a community forest management plan
Gold	• Builds upon elements of the silver-level ordinance • Preserves and protects trees in the community by regulating both public and private trees



4. Model Tree Regulation Elements

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Photo credit: Angelica Sabina

4. Model Tree Regulation Elements

Across King County, certain code elements became evident within a regulatory framework as the codes were compiled and analyzed. The following section outlines elements of tree ordinances that the project team found to be integral components of a model tree ordinance and that highlight best practices. There are varying levels of complexity found in tree regulations across King County jurisdictions, as well as nationwide. As noted in the previous section, some jurisdictions may want to incorporate fewer tree ordinance elements than listed below, while others may prefer more robust tree regulations that contain some variation of all elements. The appropriate level of regulation is often related to a city's size, environmental policies, departmental makeup, funding, and in-house staff expertise. Further, the distribution of tree regulation elements may be in a variety of code locations, including zoning and development, land use, clearing and grading, or required landscaping codes. In other cases, tree regulation elements can be found under a standalone ordinance. The Municipal Research Services Center (MRSC) provides guidance on ordinance drafting and adoption for Washington cities and counties.²⁸

The description of each tree code element below includes its purpose, jurisdictional trends found during the research phase of the project, and recommended approaches or strategies:

TABLE 2. Tree Regulation Elements

Element	Description
1. Purpose and Intent	• Function of clearly stated purpose.
2. Regulated Tree Definitions	• Significant • Landmark • Heritage
3. Tree Retention and Replacement	• Methods for Quantifying Tree Retention • Tree Retention Priorities • Tree Protection during Development • Replacement Tree Standards
4. Property Owner Removals Without Development	• Removal thresholds • Replacement ratios
5. Permitting Requirements	• Site plans • Arborist report

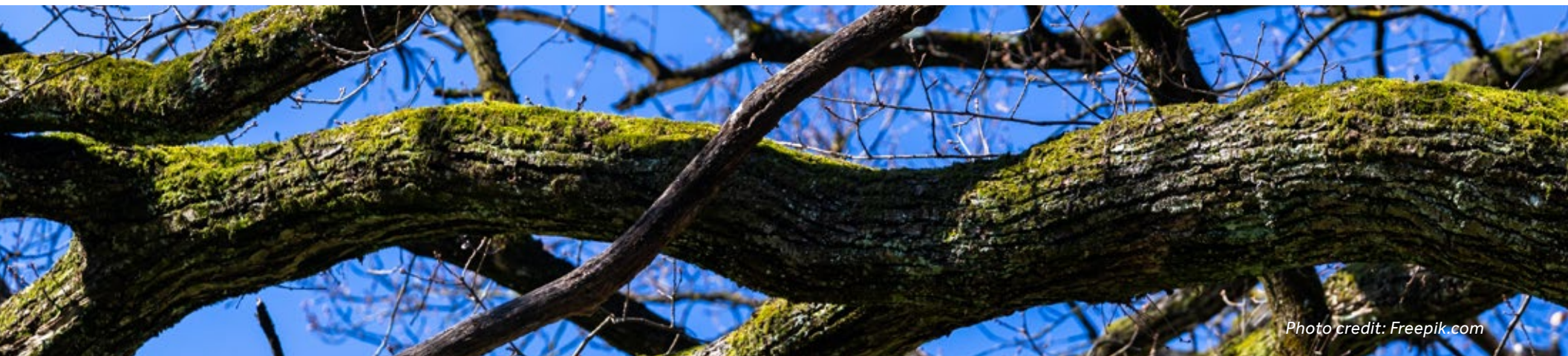


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Photo credit: Freepik.com

4.1: Element 1: Purpose and Intent

Knowing the purpose behind an ordinance gives users the ability to understand and interpret it with more insight and accuracy. For that reason, ordinances should have a clearly stated purpose that justifies the need for the code or regulation and a clear statement of intent that describes what the code or regulation seeks to accomplish. Within the purpose and intent, code language can be included to reinforce jurisdictional values that would be achieved through the implementation of tree regulations. Values are often articulated in long-range policy goals, such as a commitment to maintaining canopy cover, support of climate action and urban forestry, and other goals, like sustainability.

The intent of an ordinance is also an essential element of many judicial decisions, which may be important with appeals or legal challenges. A clearly stated intent and purpose behind the ordinance can also guide evaluating the efficacy of the code and identify needed code interpretation and future code updates.

4.2: Element 2: Regulated Tree Definitions

The use of these definitions and terminology varies across jurisdictions. Surveyed and interviewed municipalities touched on the importance of code clarity; and the nationwide study of tree ordinances showed that clear, concise code language is more unique than common. This section offers guidance for jurisdictions to consider when crafting or revising definitions related to regulated tree criteria.

Significant Trees

A significant tree refers to a tree's minimum size threshold that is subject to a city's tree regulations. The significant tree threshold is intended to promote a sustainable succession, or diverse range of tree ages within an urban forest, maximizing the many ecosystem-service benefits it provides to the community. Because it can take decades for a tree to reach maturity, and the rate of maturity varies by tree species and growing conditions, municipalities should establish a regulated size threshold that reflects established trees that are just beginning to contribute to the municipality's tree canopy. Size thresholds are typically defined by the trunk diameter measured at breast height (DBH), also sometimes referred to as the diameter at standard height (DSH).

Although King County municipalities have established significant tree diameter thresholds between 4 and 18 inches, the most typical significant tree size is 6 inches DBH. Setting lower-sized thresholds captures a greater number of existing trees in the urban landscape and would potentially capture more recently planted trees resulting from development requirements within the past 5 to 10 years. In turn, this will result in more regulated trees. Many King County jurisdictions include a description or criteria for tree condition in the "significant" tree size definition, achieving greater code simplicity. However, because all regulated trees may not be required to meet condition criteria (trees in critical areas, NGPAs, etc.), defining tree conditions separately from the minimum size threshold may help avoid code interpretation conflicts.



Photo credit: Jamie Taylor



MEASURING TREE DIAMETER

The standard method for measuring trees is by trunk diameter, known by the acronym **DBH (Diameter at Breast Height)** or DSH (Diameter at Standard Height). Trees are measured 4.5 feet above the ground, on the uphill side of the tree. Due to the many tree form variations (for example., multiple trunks, trunks that fork below 4.5 feet, trunk swelling, etc.), see standards outlining proper measuring techniques in the Guide for Plant Appraisal and ANSI A300 for Tree Care, 2023, Planting and Transplanting Standards. **Caliper** also refers to the trunk diameter taken at a standard height, typically used in specifying nursery stock with smaller trunks, measured above grade 4 to 12 inches, depending on the trunk diameter.



TREE HEALTH AND VIABILITY

Not all trees are candidates for successful retention, which is why accurately assessing a tree's health and viability is an important factor in developing tree retention plans. "Viable" for retention may be defined as a tree's current condition while "viability" may refer to long-term prognosis after sustaining impacts from construction. Either way, specifying that a significant tree must be healthy or viable in a clear definition is one way to ensure successful tree retention. Retained trees initially in poor condition, generally do not survive more than a few years following impacts from construction. The City of Kirkland defines a "viable" tree in the present and potential context: it must fit tree condition ratings based on industry standards (KZC 95.30).



Photo credit: Freepik.com

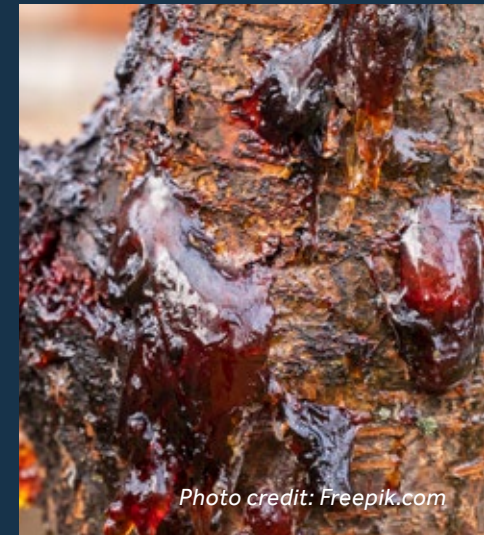


Photo credit: Freepik.com

Element 2: Regulated Tree Definitions continued...

Nuisance Trees

A nuisance tree is a tree that meets certain criteria and cannot be corrected by reasonable practices such as pruning, bracing, or cabling. Criteria for nuisance trees vary by jurisdiction and typically include:

- Is causing obvious physical damage to private or public structures, including sidewalks, curbs, roads, driveways, parking lots, building foundations, or roofs; or
- Has sustained damage from past maintenance practices or naturally occurring events such as wind, ice, or snow-loading.

Hazard Trees

A hazard tree (or tree part) is assessed by a qualified professional and is typically defined by a certain overall risk rating using the ISA Tree Risk Assessment method in its most current form.²⁹ Many jurisdictions determine that “extreme” or “high” is an appropriate risk rating threshold to differentiate hazard trees from those that may be remediated by practices such as pruning or monitoring, versus removal. Hazard trees are often exempt from tree removal permitting requirements; however, many jurisdictions require some form of documentation prepared by a Tree Risk Assessment Qualified (TRAQ) arborist before removal activities. Often, tree removal in critical areas is limited to hazardous trees only. Under a development scenario, hazard trees should be removed and should not count toward the lot’s retention requirements.



Photo credit: Freepik.com



Photo credit: Kim Frappier

Element 2: Regulated Tree Definitions continued...

Landmark or Exceptional Trees

Landmark trees - sometimes used interchangeably with exceptional trees - are larger, healthy mature specimens considered worthy of long-term retention. The removal of landmark trees results in an immediate loss of wildlife habitat and quantifiable benefits such as heat, stormwater, and air quality mitigation. Preservation of landmark trees is important to maintain multi-aged, resilient urban forests. Most of the jurisdictions in King County define Landmark or Exceptional trees using 24-inch DBH size criteria, although as low as 18 inches was found (Tukwila), to as large as 50 inches DBH (Medina).

Options for defining landmark trees include establishing a diameter threshold, providing a table organized by species, or a combination of both. For example, the City of Burien regulates any tree 30 inches or greater as an exceptional tree but also has an Exceptional Tree Table with smaller threshold sizes for common tree species of the Pacific Northwest whose maximum size at maturity is smaller or are slow-growing, such as *Arbutus menziesii* (Pacific madrone) and *Quercus garryana* (Garry oak).³⁰ The Cities of Lake Forest Park³¹ also provides diameter thresholds for landmark/exceptional trees by species.

Jurisdictions can tailor landmark size and species requirements to be specific to local landscape and tree characteristics. Table 3 provides an example list adapted from the City of Burien. When developing a landmark tree list, it is important to consider the following:

- Consider the local native forest composition. In areas that were logged more recently than the turn of the 19th century, there may be no old-growth trees, so establishing a 55-inch landmark tree provision may not be effective in protecting the largest trees in the jurisdiction, if the predominant size of mature trees is under 24-inches DBH.
- Account for the size of a species at maturity to protect high-value trees that do not typically reach 24-inch DBH or greater (for example, *Arbutus menziesii*).

- Exclude tree species on the King County Noxious Weed List or are noted as a weed of concern.³²
- Exclude fast-growing 'early successional' species, such as red alder (*Alnus rubra*), which are short-lived and have weedy characteristics.
- Exclude trees known to have significant infrastructure conflicts and are not suitable for long-term retention on a densely developed urban lot, such as black cottonwood (*Populus balsamifera*).

TABLE 3. Example Landmark/Exceptional tree table with threshold diameters by species*

Common Name	Scientific Name	DBH
Grand fir	<i>Abies grandis</i>	24 inches
Bigleaf maple	<i>Acer macrophyllum</i>	24 inches
Pacific madrone	<i>Arbutus menziesii</i>	8 inches
Port Orford cedar	<i>Chamaecyparis lawsoniana</i>	24 inches
Cascara	<i>Frangula purshiana</i>	8 inches
Sitka spruce	<i>Picea sitchensis</i>	24 inches
Lodgepole or shore pine	<i>Pinus contorta</i>	12 inches
Western white pine	<i>Pinus monticola</i>	24 inches
Douglas-fir	<i>Pseudotsuga menziesii</i>	24 inches
Pacific yew	<i>Taxus brevifolia</i>	8 inches
Garry oak	<i>Quercus garryana</i>	12 inches
Western redcedar	<i>Thuja plicata</i>	24 inches
Western hemlock	<i>Tsuga heterophylla</i>	24 inches
Tree not listed in this table	Not applicable	24 inches or greater

*Adapted from City of Burien Exceptional Tree List.

In some jurisdictions, the removal of landmark trees is only allowed under limited circumstances and generally requires a demonstration of need. This is the case in the cities of Seattle, Kirkland, Issaquah, Renton, and Burien. Higher levels of protection for landmark trees could include establishing landmark trees as a high retention priority prohibiting removal with certain exceptions, and/or offering incentives for retention of landmark trees (See Additional Considerations, page 35). Exceptions that grant the removal of landmark trees could include the following scenarios:

- The tree is determined by a qualified tree professional to meet the criteria of a hazard tree or nuisance tree;
- The tree is unhealthy before development, as determined by a qualified professional;
- Retention of the tree will prohibit reasonable development.

If approved for removal, conifer species such as Douglas fir, western redcedar, and western hemlock should be replaced in-kind and on-site, if feasible. Further, an increased replacement requirement to offset the ecological loss should be required, such as a 3:1 or 2:1 replacement ratio. Currently, there are five King County jurisdictions requiring increased replacement ratios for landmark tree removals.

Heritage Trees

The purpose of heritage tree code provisions is to recognize and protect trees with unique or historical attributes of significance to the community, such as size, relation to a historical event, special site location, and unusual or exemplary species. Heritage trees may include grove trees and can be on public or private property.

Element 2: Regulated Tree Definitions continued...

Most jurisdictions' heritage trees are nominated by a Tree Board, city staff, or, as with Seattle, a non-profit partnering organization. Trees must be nominated with written consent from the property owner. Once approved, heritage trees are typically listed in a Heritage Tree registry. Similar to the nomination process, removal of a heritage tree must also go through an approval hearing, although most codes do not explicitly include removal processes for heritage trees.

Ten King County jurisdictions and King County define heritage tree criteria within their municipal code and most require increased levels of protection compared to other significant trees. Of these, the cities of Covington, Issaquah, and Sammamish establish minimum trunk diameter thresholds for heritage trees within their code. Burien's heritage tree criteria apply broadly to cultural, aesthetic, ethnic, archeological, historic, political, and economic significance. Sammamish offers incentives to permanently preserve heritage trees by awarding greater retention credits with development. Of the select nationwide jurisdictions, two include heritage trees directly within their tree ordinance, and two incorporate landmark tree regulations that are more along the lines of the heritage tree process seen on a local level in King County.

4.3: Element 3: Tree Retention and Replacement

The need to provide retention and replacement regulations for trees on private property is two-fold: 1) The majority of the urban forest is located on private property and 2) Private properties are experiencing the highest rates of development, driven in part by the regional need for additional housing. To preserve existing canopy cover and allow for development, tree codes should include retention thresholds, protections for existing trees, and replacement standards. It is also important that tree retention and replacement be measured and tracked over time. Quantifying on-site trees alone is not enough to ensure trees providing high ecological value are preserved or that retained trees survive long-term after construction is completed. Therefore, the quantification of trees should be paired with retention

priorities and tree protection standards during development.

Important components of Tree Retention and Replacement include:

- Methods for Quantifying Tree Retention
- Tree Retention Priorities
- Tree Protection during Development
- Replacement Tree Standards

Methods for Quantifying Tree Retention

To determine the level of tree retention and replacement requirements, different methodologies are utilized on a local level throughout the County and vary nationwide. Commonly used methods for quantifying tree retention and replacement include:

- Canopy cover
- Count or percent of total trees
- Tree density credit

Within these methodologies, there is variation in application and implementation based on other development and landscaping codes, community priorities, and programmatic and staffing resources. Each method has cost implications to both the jurisdiction and the applicant, which vary based on the level of in-house permit project review and/or urban forestry expertise of the staff. Having qualified professionals involved in tree retention efforts is critical, much like having wetland specialists involved in administering critical areas ordinances is necessary. The following discussion describes the commonly used methods and some of the advantages and disadvantages of each. With all methods, development triggers the need for a site to be brought into compliance with tree retention requirements. The development threshold should be specified by the municipality. If a lot doesn't contain enough existing trees to meet tree retention requirements before development activities, then supplemental tree plantings should be required.



Photo credit: Freepik.com

THE CANOPY COVER

One methodology used to set minimum tree retention and replacement standards is the “canopy-based approach.” Using this approach, tree canopy is determined by measuring the canopy cover provided by existing trees to be retained on the site and the anticipated canopy rating of replacement trees at a 20-year or 30-year mark. Canopy cover goals, or requirements, can be established by lot size and/or by land use zone and development type (for example, single-family, multi-family, commercial, and industrial) and are typically stated as a percent area that ranges anywhere from 28 percent on smaller lots in Lake Forest Park to 68 percent for lots in the Tibbets Creek Valley subarea in Issaquah. Jurisdictions using this approach utilize various tools for calculating a lot’s canopy cover, such as city GIS data or applications like iTree.³³ It is important to note that while canopy cover is calculated using the gross lot area, it does not include canopies from off-site trees, trees in public rights-of-way, or invasive species unless otherwise specified.

Jurisdictional Trends

The canopy-based approach is currently used by a limited number of King County jurisdictions, including Issaquah, Lake Forest Park, and Maple Valley. These cities allow canopy cover requirements to be met through a combination of canopy cover provided by existing trees and the projected canopy cover of replacement trees. The City of Lake Forest Park provides a replacement tree species list that includes the projected canopy area of various tree species at 30 years of maturity.

Nationally, the City of Decatur has been using a canopy-based approach since at least 2014. Under Decatur’s tree ordinance, trees are assigned to a canopy size category—very small, small, medium, and large—based on the square footage and crown diameter of the tree’s canopy upon maturity. Canopy cover requirements can only be met through the retention of existing trees on-site. In the event a site does not contain the minimum required tree canopy prior to development activities, supplemental plantings must be used to meet the lot’s required canopy percentage. New trees receive a partial credit at the time of planting based on the “canopy cover potential” for the species at maturity.

TABLE 4. Advantages and Disadvantages to ‘The Canopy Cover’ Approach

Advantages	Disadvantages
Canopy can be assessed in a desktop exercise using aerial imagery or field assessment	Uncertainty in aerial imagery of projected canopy cover
	Reliance on GIS tools
It can be cost-effective for heavily treed sites	Canopy cover potential for replacement trees is a future projection based on tree size or species that may or may not be the reality based on environmental and site factors
	Subjectivity of canopies from off-site sources (such as trees located near property lines and public rights-of-way) and invasive tree species

Quantifying On-Site Tree Canopy using the Canopy Cover Method

SCENARIO IN LAKE FOREST PARK:

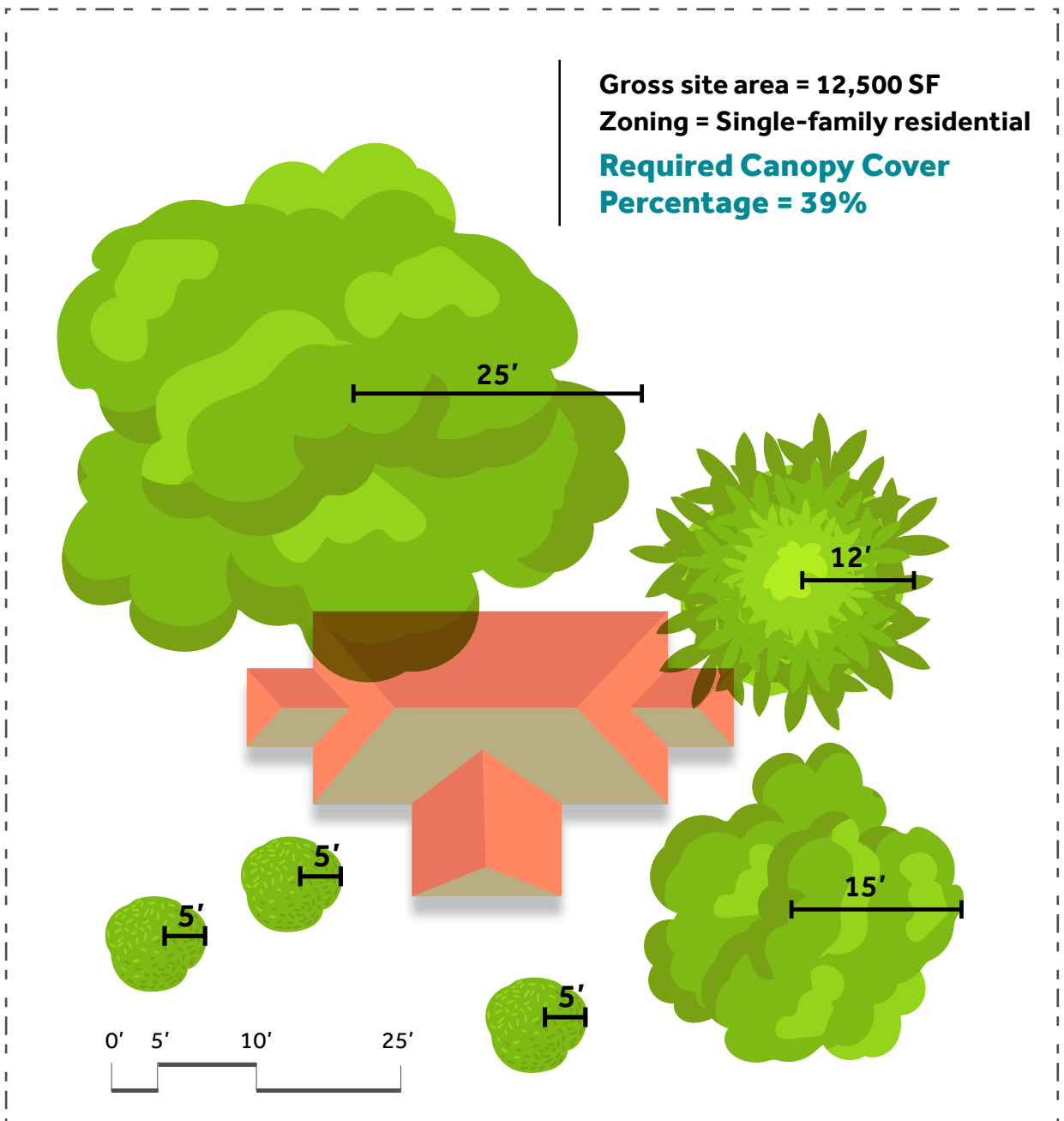
The landowner of a 12,500 square foot (SF) undeveloped lot in a single-family residential zone would like to build a new home. The required canopy cover for a lot undergoing development that is between 10,000 – 15,000 SF in a single-family residential zone is 39%. Therefore, for the 12,500 SF lot, the canopy cover required is 4,875 SF.

Steps to calculate required tree retention and replacement:

1. To calculate existing canopy, measure canopy radius (r) for each tree to be retained and calculate existing canopy area using πr^2 .
2. Divide the sum of the tree canopy areas by the gross site area to get the percent of existing canopy coverage: $(1963+707+452+79+79+79) / 12,500 \text{ SF}) = .27$ or 27%.

RESULTS:

- The site currently has 27% canopy cover or 3,375 square feet of existing tree canopy cover.
- Therefore, the site needs an additional 12 percent of canopy cover to meet the required minimum.



Quantifying On-Site Tree Canopy using the Canopy Cover Method continued...

Using Projected Tree Canopy to Meet Canopy Cover Requirements

SCENARIO IN LAKE FOREST PARK:

- The Lake Forest Park site needs an additional 12% or 1,500 square feet of canopy to meet the required canopy cover of 39% for lots between 10,000 and 15,000 square feet.
- Using the Tree List provided by the City, the applicant must select tree species that together will provide 1,500 SF of canopy area.

Species	Quantity	Canopy area (at 30 years maturity)
Black hawthorn (<i>Crataegus douglasii</i>)	1	314 SF
Flowering crabapple (<i>Malus spp.</i>)	3	177 SF
Incense cedar (<i>Calocedrus decurrens</i>)	1	707 SF

As an example, this could be achieved by planting one (1) black hawthorn, three (3) flowering crabapples, and one (1) Incense cedar, for a total of 1,552 SF of additional canopy cover. The required canopy cover is achieved through both tree retention and replacement totaling **4,927 SF or 39% canopy cover**.

Photo credit: Tomoko Uji

COUNT OR PERCENT OF TOTAL TREES

Some jurisdictions set retention requirements using a count or percentage of total significant trees on a site. These methods alone are generally less effective at retaining existing tree canopies because they do not account for individual tree sizes, such as diameter or canopy radius unless other retention requirements are specified elsewhere in the code. For example, a six-inch maple is given the same weight and “value” as a 24-inch Douglas fir tree.

Jurisdictional Trends

The municipalities of Black Diamond, Carnation, Redmond, Sammamish, Mercer Island, Renton, and Shoreline are examples in which retention is calculated by the total number or percentage of individual significant trees in the developable area of a site. Tree retention in King County UUAs is regulated using the percentage of total trees or number of trees per acre and further divided by separate interior and perimeter requirements.

TABLE 5. Advantages and Disadvantages to ‘Count or Percent of Total Trees’ Approach

Advantages	Disadvantages
Simplicity of calculation	Does not account for individual trees of different sizes.
	Does not provide greater protections or value to larger-diameter trees

TREE DENSITY CREDIT METHOD

A commonly used approach is the “tree density credit” method, which regulates tree retention based on the diameter of individual trees and assigns more credit when larger trees are retained. Tree density consists of existing trees, replacement trees, or a combination of both. Tree Density Credit models are similar to a timber stocking level that quantifies density based on the trunk diameter (DBH) of existing trees. This is considered a general indicator of tree size and canopy cover over time. Parcels within the city or specific land use zones will then have specific minimum tree density credits that must be met. During the permit review, the existing tree credits are calculated based on trees proposed for retention versus those proposed for removal.

Tree density credit methods are commonly used due to the ease of data collection regardless of expertise. In addition, tree diameter by species can be used as a correlation for canopy, age, and ultimate size when assessing retention values for specific species. A challenge of using a tree credit system is that without clear instructions or a “user guide,” code language can be difficult to interpret and understand for the layperson, whether that individual is a member of city staff or an applicant. Instructions for implementing this method and how it applies to permit review should be provided to planning staff and published on the city website.

Jurisdictional Trends

Nine King County jurisdictions use some variation of this method, including Burien, Kirkland, Kenmore, Kent, Medina, North Bend, Renton, Woodinville, and Yarrow Point. Of the jurisdictions researched outside of King County, Amelia Island, and Olympia utilize a tree credit method. A less frequently used method for quantifying tree retention is the percent of total diameter inches. This method allows the permit applicant to measure the diameter of each tree and then retain a percentage of the sum of all diameter inches. The City of Bothell regulates tree retention using a percent of the total diameter inches on a site.

Tree Density Credit Method continued...

Burien (BMC 19.26) requires a minimum tree density credit to be maintained on each lot regardless of development status. The construction of new structures or additions greater than 500 square feet triggers the requirement for the lot to be brought into compliance with the required minimum tree credits. For single-family and multi-family developments, one tree credit per 1,000 square feet of developable area is required, while 0.15 tree credits per 1,000 square feet are required for commercial, industrial, or non-residential lots. The code also includes a provision that requires tree credits to first be met through the retention of existing trees and secondly using replacement trees.

TABLE 6. Advantages and Disadvantages of the 'Density Credit' Approach

Advantages	Disadvantages
Does not require access to up-to-date aerial imagery	Code language can be difficult to interpret for staff and applicants
Trunk size is easily quantifiable	
DBH measurement is correlated to canopy, age, and size	Requires additional guidance and educational materials
Many jurisdictions have tree credit systems in place	

Quantifying On-Site Trees using the Tree Density Credit Method

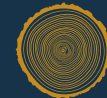
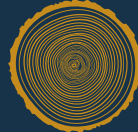
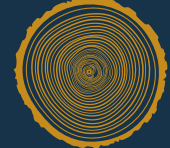
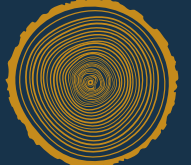
SCENARIO IN BURIEN:

The landowner of a 6,600 square foot (SF) lot is proposing to construct a new single-family residence. The required minimum tree credits for single-family development is one (1) credit per 1,000 square feet of developable area.

Steps to calculate required tree retention and replacement:

1. Calculate developable (or buildable) area, as defined by the jurisdiction. In Burien, this means taking the gross lot size and subtracting the square footage of on-site critical areas and associated buffers, public streets and trails, shared driveways, and private PUD streets. The developable area of the sample lot is 6,600 SF.
2. Calculate minimum tree credits. This is done by taking the developable area and dividing it by 1,000: (6,600 SF / 1,000 SF = 6.6 credits, rounded up to 7).
3. Calculate existing tree credits using the tree credit table (BMC 19.26, Table 19.26.050-2 Tree Credits).

EXISTING TREE CREDITS

Tree DBH							
	6-10"	Larger than 10" and up to 14"	Larger than 14" and up to 18"	Larger than 18" and up to 22"	Larger than 22" and up to 26"	Larger than 26" and up to 30"	Larger than 30" or greater and all exceptional trees
Credit Per Tree	1	2	3	4	5	7	9



Quantifying On-Site Trees using the Tree Density Credit Method

RESULTS:

- The site has six (6) existing tree credits from the three trees on-site and is required to retain these trees to meet the minimum credits.
- Therefore, one (1) supplemental tree is required to meet the minimum seven (7) tree credits.
- The applicant can plant one 2" caliper deciduous tree worth one (1) tree credit or one 6-foot-tall evergreen tree worth two (2) tree credits, which would exceed the minimum required credits.

Tree Retention Priorities

In addition to quantitative and qualitative tree retention requirements, priorities should also be established to ensure that mature, ecologically significant trees are retained, and the loss of mature canopy is prevented whenever possible. Although it is important to retain significant trees wherever feasible on-site for long-term health and viability, codes that include specific retention priorities provide an opportunity to protect those tree(s) that contribute a diverse canopy assemblage and ecosystem service benefits. Both larger-diameter trees and grove trees provide more ecological benefits to the urban forest than a single, smaller-sized tree. Eighteen King County jurisdictions set retention priorities for existing significant trees. Of the jurisdictions reviewed nationwide, retention priorities are included less frequently but are outlined in Olympia's tree code.

High retention priorities often include the following:

- Grove trees
- Large diameter or special designation trees (for example, Landmark, Exceptional, and Heritage)
- Native conifer species
- Location (for example, yard setbacks or perimeters landscaping, and critical areas)

Establishing retention priorities requires providing clear definitions for landmark trees, grove trees, and native conifer species within the tree protection ordinance.

Tree Protection During Development

Retained trees must be adequately protected from construction impacts to ensure long-term survival. Impacts can include root loss, damage to branches, roots, and trunks, soil contamination, or compaction, which reduces oxygen and water availability. Evidence of any injury is often not visible for several years; affected trees may gradually decline and eventually fail as a result of impacts.³⁴

Because root growth is often asymmetric and varies by site conditions, code requirements for prescriptive root protection may be insufficient in providing adequate tree protection on restricted space development sites. Traditionally, the methods for determining the extent of tree protection included the critical root zone (CRZ) formula, dripline, on-site root excavations, etc., determined by a qualified professional³⁵. Recently, the standards and best practices for establishing tree protection boundaries have been revised, rendering the familiar CRZ and limits of disturbance (LOD) terms obsolete, although many cities have codified these terms and methods. Ultimately, the jurisdiction will need to ensure the proposed tree protection zone (TPZ) is adequate during permit review.

Ideally, best management practices would follow American National Standards (ANSI) for the management of trees and shrubs during development.³⁶ This could include the requirement for alternative construction methods to be employed, such as cantilevering over TPZs, air spading to detect the presence of large structural roots, and tunneling below structural roots, to prevent damage to significant trees being retained. Tree protection measures should include tree protection fencing and signage around the TPZ, as well as the prohibition of certain activities within the CRZ of the tree, such as materials storage, clearing and grading, and construction access.

Replacement Tree Quantities and Standards

In the interest of establishing future tree canopy and mitigating the loss of removed trees, tree replacement should be required. Almost all jurisdictions within King County that have tree regulations in place require some sort of tree replacement standards. This is also the case for nationwide cities. The approach to tree replacement standards is driven by tree retention requirements and is generally triggered when a site under development does not meet the minimum required tree credits, percent canopy cover, or other tree retention standards. Some jurisdictions require a standard 1:1 ratio, meaning one supplemental tree is required to be planted on-site

for every tree removed. Two nationwide cities, Rocklin (California) and Decatur (Georgia) collect mitigation and canopy loss fees for healthy significant trees removed beyond the minimum retention requirements. This practice discourages applicants from simply meeting minimum requirements and removing other healthy trees that provide valuable canopy cover.

Ideally, tree retention and replacement standards would be structured based on the size (DBH) and species of the trees removed rather than simply a 1:1 ratio. As mentioned previously, the removal of a landmark tree should be required to have additional replacement ratios and species requirements. For example, a 24-inch diameter western redcedar that is removed would ideally not be replaced on a one-to-one ratio with a deciduous dwarf ornamental cherry. At maturity, the cherry would not replace the ecological values provided by the conifer. Jurisdictions such as Issaquah and Kirkland require a 2:1 or 3:1 replacement ratio for landmark tree removal.

To ensure that the trees being removed, and long-term canopy benefits are adequately replaced, several important factors should be incorporated into tree replacement standards, including size, species, and location. These factors are discussed in detail below.

REPLACEMENT TREE SPECIES

Growing healthy full-sized canopy trees in the built environment requires careful consideration of optimal growing conditions by species, proper planting practices, and protection of infrastructure (for example, buildings, utilities, driveways, sidewalks, and fences). Whenever feasible, the retention of native conifer species, such as Douglas fir, western redcedar, and western hemlock should be prioritized, and their removal should ideally be replaced in-kind. Although deciduous trees, small ornamental trees, and fruit trees do provide some valuable canopy cover, they do not offer the same level of year-round ecosystem service benefits that conifers provide in Western Washington.

Additionally, species selection and recommendations should be informed by current trends in the region's changing climate. The University of Washington Climate Impacts Group predicts that Western Washington will likely see increasingly drier conditions and higher temperatures during the summer months, with potential increases in precipitation during the winter months.³⁷ This increases stressors on urban trees such as drought, insect, and tree disease outbreaks.

APPROVED TREES

The more guidance a jurisdiction can provide to applicants, the easier the implementation and review process will be. A thorough tree protection ordinance will refer to approved and prohibited tree lists and have supplemental materials available online. Several King County jurisdictions have approved tree lists. Examples of these are included in Appendix G. Providing a list of replacement tree species can help alleviate confusion and ensure trees are planted utilizing the 'right tree, right place' approach.

For those jurisdictions with a Landmark tree element in their regulations, a separate landmark tree mitigation list is ideal to ensure the loss of mature native conifer tree canopy is adequately compensated. See Appendix G to see an example of this from the City of Kirkland.

PROHIBITED TREES

Additionally, providing a prohibited tree list that includes trees known to be weedy or invasive such as the tree of heaven (*Ailanthus altissima*) and English holly (*Ilex aquifolium*), or trees that may be undesirable in urban settings, such as red alder and black cottonwood, would provide further guidance. While useful, tree lists are subject to change and will need to be routinely reviewed and updated to ensure they are using the best available science, climate adaptation recommendations, and updated noxious weed classifications.

Replacement standards should further include provisions prohibiting trees planted to form a hedge and Thuja/Arborvitae species (or other slow-growing conifers) from counting toward replacement or tree density standards. Not explicitly prohibiting hedges from counting toward these standards has led to an excess of Thuja/Arborvitae hedges being planted as replacement trees in several jurisdictions. These species do not provide habitat functions or significant ecosystem benefits equivalent to mature native trees.

REPLACEMENT TREE SIZE

Most jurisdictions include minimum size standards for replacement trees, including Kirkland, Issaquah, Sammamish, Enumclaw, Redmond, and Burien. Nationwide, most jurisdictions reviewed also included minimum size requirements for replacement trees. The common minimum replacement size for deciduous trees is a 1 to 2-inch caliper and 6 to 8 feet in height for conifer trees. Replacement size specifications are typically based on the latest standards outlined in the American Standard for Nursery Stock (ANSI Z60. 1-2014).³⁸ A tree protection ordinance should specify minimum size requirements to be met to count as a replacement tree and/or toward tree credits or canopy requirements.

LOCATION

Ideally, replacement trees are planted on-site to maintain tree canopy within that land use area. To ensure that the intent of replacement trees is met, best practices would include establishing a priority list of on-site replanting locations. Priorities for on-site tree planting typically include:

- Perimeter areas, setbacks, or transition zones;
- Areas adjacent to existing tree groves; and
- Areas adjacent to or within critical area buffers.

In the event on-site planting is not feasible, some jurisdictions include an option for off-site planting locations. However, replacement standards include little to no information about applicability and site selection rationale and there are many hurdles when it comes to implementation of this practice. These include but are not limited to 1) the time and cost associated with tracking replacement tree plantings in off-site locations and 2) the challenges of maintenance and monitoring of the new plantings.

FEE-IN-LIEU

An alternative to on-site and off-site planting is fee-in-lieu, usually exercised when the first two options have been exhausted. Fee-in-lieu would ideally only be offered in scenarios where replacement trees cannot be planted on-site due to inadequate spacing, existing conditions, or other extenuating circumstances. The option should be prefaced with a statement that specifies the priority for on-site replacement trees to prevent applicants from excessively and unnecessarily “buying” tree credits rather than replanting. Typically, funds collected go toward a city tree account generated for planting trees at designated sites within the city or toward other urban forestry-related expenses.

Jurisdictional Trends

Nineteen King County jurisdictions offer a fee-in-lieu option for replacement trees, including Black Diamond, Burien, Covington, Redmond, Renton, Des Moines, Kirkland, Seattle, Tukwila, and Woodinville to name a few. Most of the jurisdictions researched nationally offer a fee-in-lieu option. Fixed fee prices factor in the cost per tree (using a tree appraisal system), market rate installation costs, maintenance, and fund administration. Ultimately, the jurisdiction will need to set a price per tree credit and allocate what the collected funds will go toward.



Photo credit: Freepik.com

4.4: Element 4: Property Owner Tree Removals Without Development

Regulating tree removal activity where no development activity is proposed presents several distinct issues. One challenge is balancing the rights of individual property owners with the community benefits that trees provide. Banning tree removal outright would constitute taking or denying the right to reasonable use of one's property. The ability of a jurisdiction to administer and enforce limitations to property owner tree removal will largely depend on the funding and staff resources of that jurisdiction and the community's commitment to protecting tree canopy cover on private property. Public education on code and permitting requirements is crucial to ensure that residents understand their responsibilities and rights when it comes to tree removal on private property.

Jurisdictional Trends

Of the jurisdictions that regulate trees on private property, the requirement for a tree removal permit varies, both locally and nationwide. Non-development scenarios that are typically exempt from permit requirements include annual removal allowances, standalone tree removal, emergency/hazard tree removal, and nuisance tree removal. Few jurisdictions have definitions and processes established in their code for nuisance tree removals. Clear definitions of what constitutes a hazard tree and a nuisance tree should be established, as well as appropriate levels of documentation. Most jurisdictions allow for some significant tree removal when the proposed removal is not associated with development activity.

Sixteen jurisdictions have tree removal allowances in their codes, where a predetermined number of trees can be removed without a permit in a given timeframe. For example, the City of Burien allows one tree to be removed per calendar year, while the City of Covington allows up to three trees to be removed on lots less than 7,200 square feet, up to a maximum of six trees for larger lot sizes within 36 months. Note that exempt tree removal allowances vary greatly and may depend on several factors, such as the number of trees allowed to be removed per lot size and frequency of removal requests. The majority of King County municipalities surveyed reported that they process approximately 25 non-development tree removal requests annually, however, each removal incident could equate to multiple trees, depending on the allowance rate. Regardless of the permit or notification process, the advantages of establishing tree removal limitations are:

- Municipalities can track tree removal activity, where otherwise periodic tree canopy analysis would be the only manner to monitor canopy gains or loss.
- Even if property owners can eventually remove every tree on the lot under an allowance process, limited tree removals effectively slow the loss of canopy cover over time.
- Replacement requirements ensure removals are mitigated, especially if removal thresholds are exceeded.
- Promote forest conservation practices on larger, significantly wooded lots with forest stewardship plan options for forest thinning and replanting, like traditional stand management.

Common Permit Requirements



1. Permit Application



2. Arborist Report



3. Site Plan

- » Location of all proposed improvements and existing improvements within the project area.
- » Location of proposed utilities.
- » Surveyed location of existing regulated trees on-site, with labels corresponding to the inventory provided in the Arborist Report.
- » Approximate trunk location of off-site trees with CRZs extending onto the subject property.
- » CRZ of existing trees on-site.



4. Tree Retention or Tree Protection Plan

- » Inventory of existing regulated trees on-site and any regulated trees on adjacent properties with CRZs extending onto the subject property.
- » DBH of existing trees.
- » CRZ drawn to scale for all existing regulated trees.
- » TPZ (location of tree protection fencing).
- » Proposed tree removals.
- » Location, size, and species of replacement tree plantings.
- » Mitigation measures or alternative methods proposed to protect existing trees.



Photo credit: Freepik.com

4.5: Element 5: Permitting Requirements

Tree removals associated with development are generally reviewed by municipalities as part of the development permit application itself; however, some jurisdictions like Medina require a separate tree removal permit application in addition to a development permit. Permit requirements vary greatly across local jurisdictions. Explicitly identifying components to be included with each submittal will ensure consistency and assist with ease of review for staff.

Site Plans

Seventy-one percent of King County jurisdictions require site plans or tree protection and replacement plans with tree removal permit applications. With any plan submitted for review, significant trees should be identified according to surveyed locations, with canopies drawn to scale. Trees to be retained and removed should be marked, and any landmark or grove trees on-site should be identified consistent with definitions. Plans should also include the CRZ of all significant trees, which can be estimated by using the dripline but often extends beyond that. In addition to the CRZ, the LOD and TPZ should be shown and clearly distinguished from the CRZ given that they are often not the same. Tree protection measures such as fencing and signage locations, application of mulch or wood chips, a requirement for project arborist monitoring during construction, and/or other alternative methods should also be incorporated into site plans and tree retention plans.

Arborist Report

Requiring an arborist report prepared by a qualified professional to accompany permit applications is a trend seen in jurisdictions with recently updated tree regulations. The report should include components such as a tree inventory, tree protection plan, and tree replacement plan, a timeline for implementing protection and/or replacement, and discuss any impacts to significant trees. Several

jurisdictions have added more detailed requirements for the arborists conducting tree inventories, evaluating tree health and risk, and developing tree protection plans. Example requirements can be found in the City of Mercer Island City Code **MICC 19.16.010** or the City of Burien **BMC 19.10.432**.

QUALIFIED PROFESSIONAL

One example from Burien's recent tree preservation code update (BMC 19.10.432) reads as follows:

"Qualified Tree Professional": A qualified tree professional is: An individual with relevant education and training in arboriculture or urban forestry, having the International Society of Arboriculture (ISA) Tree Risk Assessment Qualification (TRAQ) and one of the following credentials:

- I. ISA Certified Arborist;*
- II. ISA Certified Arborist Municipal Specialist;*
- III. ISA Board Certified Master Arborist;*
- IV. American Society of Consulting Arborists (ASCA) Registered Consulting Arborist (RCA);*
- V. Society of American Foresters (SAF) Certified Forester for forest management plans.*

A qualified arborist must also be able to prescribe appropriate measures for the preservation of trees during land development. Any provision in this title referring to using an arborist or qualified arborist or tree professional or qualified professional shall be interpreted to require using a qualified tree professional.

4.6: Additional Considerations

Staffing and Resource Considerations

A jurisdiction's staff capacity and resources to administer the tree regulations will impact code effectiveness and ultimately, whether the code achieves its intent and purpose. Depending on the code complexity and permitting requirements, review for development permits may include tree retention and protection plans, civil plans, landscape plans, and arborist reports.

How municipal urban forestry programs are organized and how they staff their programs varies greatly.³⁹ Ideally, the staff that is evaluating urban forestry-related permit applications should have some background in arboriculture or horticulture, understand the impacts of construction activities (excavation, trenching, etc.) on tree roots and tree health, and determine if tree protection and replacement trees are suitable to the proposed location. The ability to understand and interpret site plans is critical, especially as they pertain to the construction impacts on retained trees.

However, not all municipalities have the funding for such a position and rely on land use planners to evaluate tree requirements. It is even more important for those without in-house arboriculture expertise to require a sound Arborist Report prepared by a qualified professional that provides accurate information and an overall assessment of the trees. This in turn will reduce the burden placed on Planning staff during reviews.

Maintenance requirements

Twenty-five local jurisdictions include maintenance requirements for trees planted as part of the permit process. Of the jurisdictions reviewed in the nationwide research, most jurisdictions explicitly require maintenance of replacement tree plantings in the code ranging from one year to the lifetime of the project, while three cities

require a performance bond or recorded covenant as a condition of permit issuance. Eleven King County jurisdictions require a security assurance or performance bond. While maintenance requirements can pose an enforcement and monitoring challenge, it is an important aspect that is often overlooked. Requiring replacement trees to be maintained for the lifetime of the project is ideal to encourage applicants to care for the trees and ensure that canopy cover and ecological value are being adequately replaced.

Incentives

Offering incentives to retain significant trees can encourage applicants to consider trees at the early stages of the design process and to retain large, mature trees or groves of trees. Incentives can include deviations from zoning requirements, such as parking regulations, setbacks, or height allowances, and could also include reduced or waived permit fees and expedited review times. Of the King County municipalities with tree regulations, 51 percent offer incentives or some form of 'alternative design option' to encourage the retention of significant trees. Five out of the seven national jurisdictions reviewed offered incentives.

Incentives will be specific to the jurisdiction and will likely depend on requirements outlined in other code sections, as well as community input. For example, the City of Burien underwent a major code update in 2022, which included incentives to preserve exceptional trees. Examples include:

- An increased building coverage by 20 percent;
- Up to a 10-foot reduction of the front setback;
- Additional 10 feet in height for uses other than single-family residential; and
- Parking reductions.



Photo credit: David Wirzba

4.6: Additional Considerations continued...

However, the City noted during their interview that the incentives are not used by applicants. A further investigation across municipalities with incentives would help determine if incentives are an effective component of tree regulations and mature canopy preservation.

An alternative to offering departures from development code provisions include:

- Assigning additional credit to larger trees that are retained;
- Reducing permitting fees; and
- Expediting permit reviews.

The City of Amelia Island (Florida) assigns tree preservation credits for trees to be retained based on diameter at breast height. For example, trees with a DBH between 24.1 and 38 inches receive a 125 percent preservation credit, which in turn is used to reduce overall tree replacement requirements. The City of Rocklin (California) offers expedited review times and deferred mitigation and capital facility fees for up to 12 months for projects saving a percentage of native oak trees.

Enforcement

Enforcement generally covers penalties for unpermitted tree removal activities and violations of tree regulations, as well as ensuring compliance with approved plans. Penalties often include civil fines and required mitigation planting. Sixty-seven percent of King County jurisdictions require some form of mitigation, while 49 percent have civil penalties for tree removal violations. While equity must play a factor in enforcement measures, the penalties for removing significant trees without a permit should be high enough to discourage the practice of knowingly removing trees and paying fines. Enforcement should be tracked and repeat offenders should have increased penalties.

Maintenance and Monitoring

To ensure applicants are retaining and replanting trees according to approved site or landscape plans, pre- and post-construction monitoring is recommended. Tree maintenance and post-construction monitoring is an area that is often lacking in tree regulations and ultimately makes it difficult to measure the effectiveness of an ordinance. Costs to fund these activities are often a limiting factor. Some jurisdictions require pre-construction inspections to ensure tree protection measures are in place for retained trees and that trees have been removed and/or retained according to approved plans. Permit issuance can be contingent upon passing such an inspection. The City of Kirkland is an example of a jurisdiction that implements this practice.



Photo credit: Tomoko Uji

4.6: Additional Considerations continued...

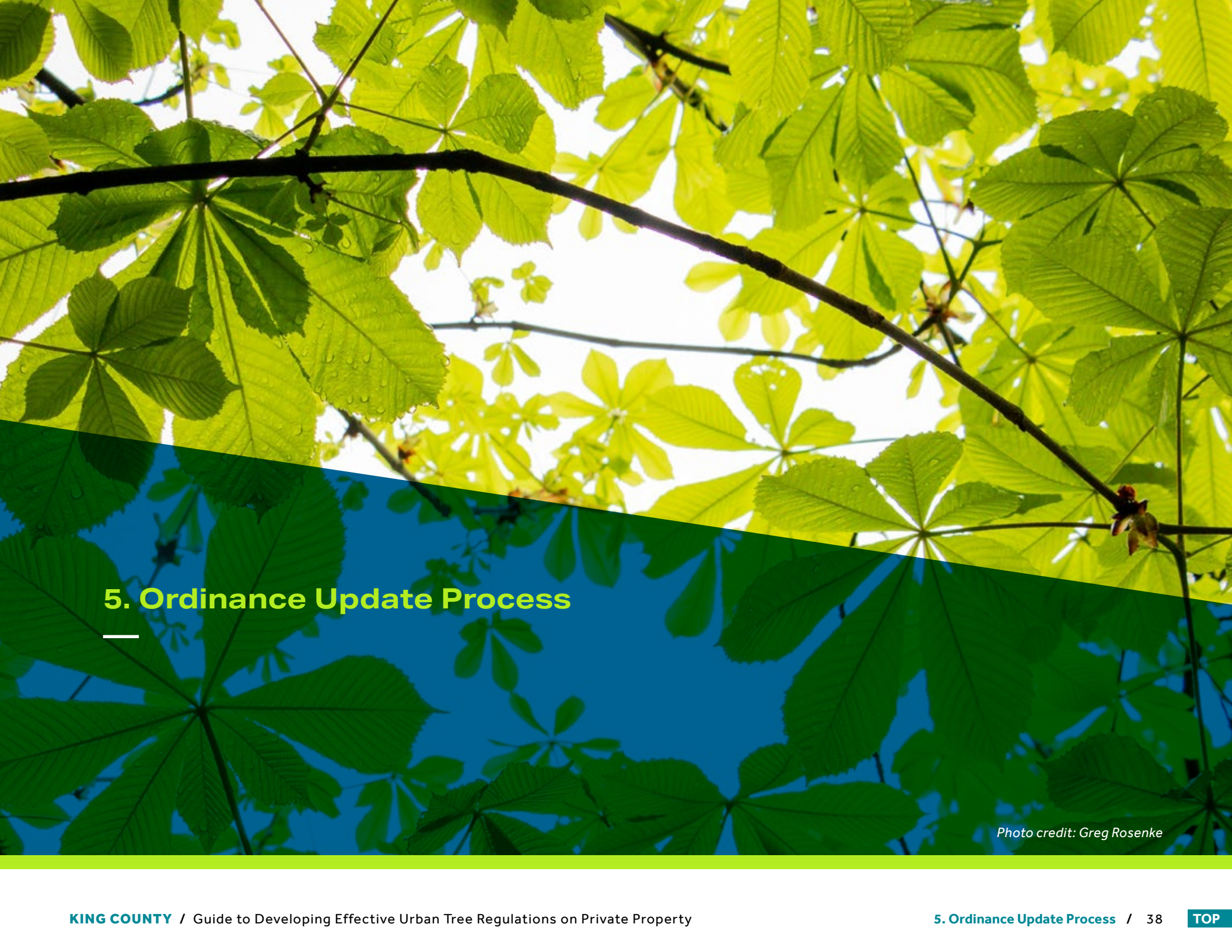
Equity and Economic Burden

Addressing equity concerns related to tree removal regulations is essential to ensure that all residents have equal access to the benefits and opportunities provided by urban and community forests. For example, it is important to consider that the cost of assessing and removing a hazardous tree disproportionately burdens residents with fixed or low incomes. While assessing equity in urban forest policies and regulations was not included in the scope of this project King County and the Urban Forestry Forum are exploring avenues to provide incentives and financial and technical assistance to help address this issue. To promote equity, municipalities may consider implementing the following strategies, recognizing that certain approaches may be more feasible for those with heavier resources.

- **Fee Waivers or Assistance Programs.** Establish fee waivers or financial assistance programs to help lower-income residents cover the costs associated with hiring qualified professionals for tree assessments and removals. These programs can help alleviate the financial burden and support equitable access to tree management services.

- **Subsidized Services.** Partner with local arborist companies or non-profit organizations to offer subsidized tree assessment, maintenance, hazard tree removal, and replacement services for residents in need. Subsidies can help reduce the overall cost of tree maintenance and make it more affordable for disadvantaged households.
- **Equity Assessments.** Conduct equity assessments of tree removal regulations and associated policies to identify any disproportionate impacts on vulnerable or marginalized communities. Use the findings to inform policy adjustments and ensure that regulatory frameworks are fair and inclusive.
- **Community Engagement and Input.** Engage directly with impacted communities to understand their unique needs and concerns related to tree management. Solicit feedback and input from residents when developing or revising tree removal regulations to ensure that policies reflect community priorities and values.

By implementing these strategies, jurisdictions can work towards reducing the economic burden of tree regulations on lower-income households and promoting equity in urban forestry management.



5. Ordinance Update Process

Photo credit: Greg Rosenke

5. Ordinance Update Process

Washington State gives jurisdictions the statutory authority to address complex urban problems of local concern through its municipal codes.⁴⁰ All tree codes in King County jurisdictions are

found within a municipal code structure, which may be segregated further into critical areas, zoning/land use, landscaping, building/development, and clearing/grading sections. While it is not always feasible to have a consolidated tree ordinance, it is more convenient to follow (and comply with) for code users than cross-referencing multiple code sections. If possible, we recommend having dedicated tree protection regulations within the same chapter or section of the municipal code for ease of application and understanding. The code adoption or amendment process is typically defined within local municipal codes as a “Decision Type” or “Process” that may be shown under land use. Some jurisdictions, including Kirkland, have codified a streamlined roster process for minor code amendments (no substantive changes to the code), enabling the opportunity to

regularly assess how the code functions, update the best available science and industry standards and achieve greater consistency with other policies and codes.

Based on the information provided by survey and interview participants, the project team learned that the primary drivers behind code updates include public demand, direction from decision-makers, and challenges with administering the current code. In determining how best to adopt, amend, or write a tree ordinance, planning staff or consultants typically lead efforts in determining the scope and objectives of the code updates and facilitating public engagement. Because regulating trees on private property is a complex and often controversial topic, interviewed cities concur that developing a robust public engagement plan is essential. More and more jurisdictions have developed frameworks for equitable and inclusive public engagement that include some of the following strategies:





Photo credit: Yusheng Deng

Another primary reason for recent code updates was the need to clarify overly complex code language. Code clarity enhances its understanding, enables ease of its administration, and lowers the risk of due process challenges. The Municipal Research Services Center (MRSC) publication *Local Ordinances for Washington Cities and Counties* is an especially helpful resource for writing clear ordinance language.⁴¹

When writing code language, staff should internally test the proposed code for ease of use. Planning staff (or other review staff) should complete a review of application materials and ensure requirements

are straightforward to verify. When establishing tree density and tree retention requirements, it can be helpful to run scenarios using sample projects from different land use zones, lot sizes, and development types to compare results. For example, when implementing the tree credit method, staff should select a variety of lot sizes from different land use zones and apply the proposed number of credits per acre (or per thousand square feet) to each. Each scenario should be assessed, and retention/canopy outcomes should be analyzed on both a neighborhood and landscape scale. Ultimately, a methodology that is easy to implement and achieves the jurisdiction's tree retention and canopy goals is a successful one.

TABLE 7. Internal and External Stakeholders by Interest

Interest	Potential Stakeholders
Residents	• Homeowners • Renters
Residential property owners	• Homeowner associations • Residential landlords (single and multi-family) • Residential property management companies • Non-resident homeowners (for example, 2nd/vacation homes) • Owners of short-term rentals (for example, Airbnb, VRBO)
Commercial, industrial, and institutional property owners	• Business owners and operators and their employees • Commercial landlords (warehouse, office, service, and industrial) • Commercial property management companies • Ports
Residential, commercial, industrial, and institutional developers	• Individual construction and development companies • Construction and developer advocates and trade organizations
Professional consultants, such as landscape architects, foresters, and arborists	• Companies located in the jurisdiction • Companies that serve the jurisdiction • Individual consulting companies • Industry advocates and trade organizations
Tree-cutting/landscape maintenance companies	• Companies located in the jurisdiction. • Companies that serve the jurisdiction • Individual tree-cutting and landscape maintenance companies • Industry advocates and trade organizations
Tribes	• Tribal representatives • Tribal employees • County tribal liaison

TABLE 7. Internal and External Stakeholders by Interest *(cont.)*

Interest	Potential Stakeholders
Environmental groups	• Tree and arboricultural advocacy organizations • Wildlife groups • Land conservancies • Climate change advocacy groups • Hunting and fishing groups • Outdoor recreational advocacy groups
Utility providers	• Public natural gas/electric, other energy providers • Private utility providers • Water, sewer, and stormwater services
Economic development groups	• Jurisdiction Chamber of Commerce • Master Builders
City leadership	• Mayor • City Council • Planning Commission • Tree and Parks Boards
City development review staff	• Development services staff (planning, environmental) • Building department staff • Transportation/engineering staff
City maintenance staff	• Parks and Recreation Department staff • Transportation and operations department staff • Utility department staff
City code enforcement staff	• Police department staff • Community development department staff • Building department staff • Water resources department staff • Utility department staff



6. Measuring Success

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6. Measuring Success

To assess the effectiveness of tree regulations, metrics of some kind must be in place. This is an area often overlooked and likely accounts for the lack of data encountered when attempting to define an effective tree ordinance. Based on discussions during interviews with local city staff, implementing performance measures and tracking protocols is often challenging due to resources and funding. Yet establishing metrics to measure the effectiveness of tree regulations is critical to ensuring tree canopy goals, climate change objectives, and other policy drivers are achieving the city's desired goals and outcomes. For example, the City of Decatur (Georgia) includes several metrics and timelines within the Intent section of their code that include periodic tree canopy studies and a quarterly report written by the City Arborist at the end of each calendar quarter summarizing tree removals, tree replacement, and additional tree plantings. The results of the subsequent actions can be used to both inform strategies for mitigation and tree planting efforts as well as needed tree regulation updates.

Tracking tree retention, removal, and replacement activity with permit database systems is an efficient way to regularly analyze code outcomes. Alternatively, tracking tree code violations and other unauthorized activities such as topping may indicate trends in community cooperation or general acceptance of the code. However, without boots-on-the-ground data, it is a challenge to gauge the effectiveness of tree regulations by tree canopy cover analyses alone. This is due to the gradual tree removal and incremental growth of new plantings which cannot be detected for several years. Breaking down city-wide canopy cover goals into neighborhood or land use/zoning area scales may help in gauging code effectiveness and inform tree retention and replacement requirements on a lot-by-lot basis.

TABLE 8. Strategies for Measuring Success of Tree Regulations

Strategy	Considerations
Establish clear benchmarks and timelines for assessment	This will vary by the jurisdiction's resources and staffing capacity as well as the type of assessment conducted. Benchmarks can be based on goals outlined in the urban forestry management plan or related policies.
Evaluate development and/or tree removal permits	Accounting of tree removals and replacement.
Code enforcement audits	Assessment of tree-related code violations tracking the number of incidents, outcomes, and mitigation efforts.
Community surveys	Online and in-person surveys to assess public interest and understanding of tree regulations and urban forestry efforts.
Programmatic and staff capacity	This could include an analysis of the budget and costs associated with administering the tree code as well as gathering input from planners and municipal arborists on administrative challenges to implementing the code.
Periodic canopy studies	Conduct a study every 5 to 10 years based on city resources to track city-scale trends in urban tree canopy.



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Photo credit: Joel Jasmin

7. Implementation

The adoption of new tree regulations can present significant challenges for jurisdictions administering the regulations effectively, as well as for its stakeholders in terms of understanding and applying the regulations. Here we discuss some of the key hurdles and potential strategies for overcoming them:

7.1: Staff Training and Administration

The key to any successful regulation starts at the top with administration. It can be challenging for staff to thoroughly understand new regulations, particularly those without arboriculture expertise such as planners, code enforcement, or other departmental staff conducting development reviews. Training sessions for staff and educational materials that address frequently asked questions and common scenarios may be required. New regulations may also require an update to existing processes and procedures for permitting, site plan review, and enforcement. This could involve revising application forms, checklists, and documentation requirements to align with the new regulations.

7.2: Providing Technical Assistance and Resources

Property owners, developers, and arboriculture/landscape professionals may require technical assistance to comply with the new regulations. Jurisdictions can offer guidance, resources, and support to help stakeholders understand their obligations and navigate the regulatory process effectively. Ideally, educational materials would be publicly available online and provided in several languages so that all residents can have access to them. Internal staff should also be able to articulate the regulations during in-person discussions or phone calls. Jurisdictions must ensure consistency and fairness in the administration of tree regulations to avoid confusion and potential conflicts. During code development and implementation, it will be essential to establish clear guidelines, criteria, and decision-making processes to promote transparency and equity.

7.3: Public Outreach and Education

Public outreach and education are essential to raising awareness about the new tree regulations and their importance for achieving urban forestry goals. Jurisdictions can use various outreach channels, such as websites, social media, workshops, and community meetings, to engage with residents and stakeholders. For communities with diverse ethnicities, the translation of documents and interpreters should be readily available to ensure equality. The jurisdictions interviewed indicated the importance of early collaboration with stakeholder groups, such as non-profit organizations and developers, to solicit feedback and input on proposed tree regulations. Collaborative efforts can lead to a smoother adoption process and potentially avoid conflicts.



Photo credit: Freepik.com



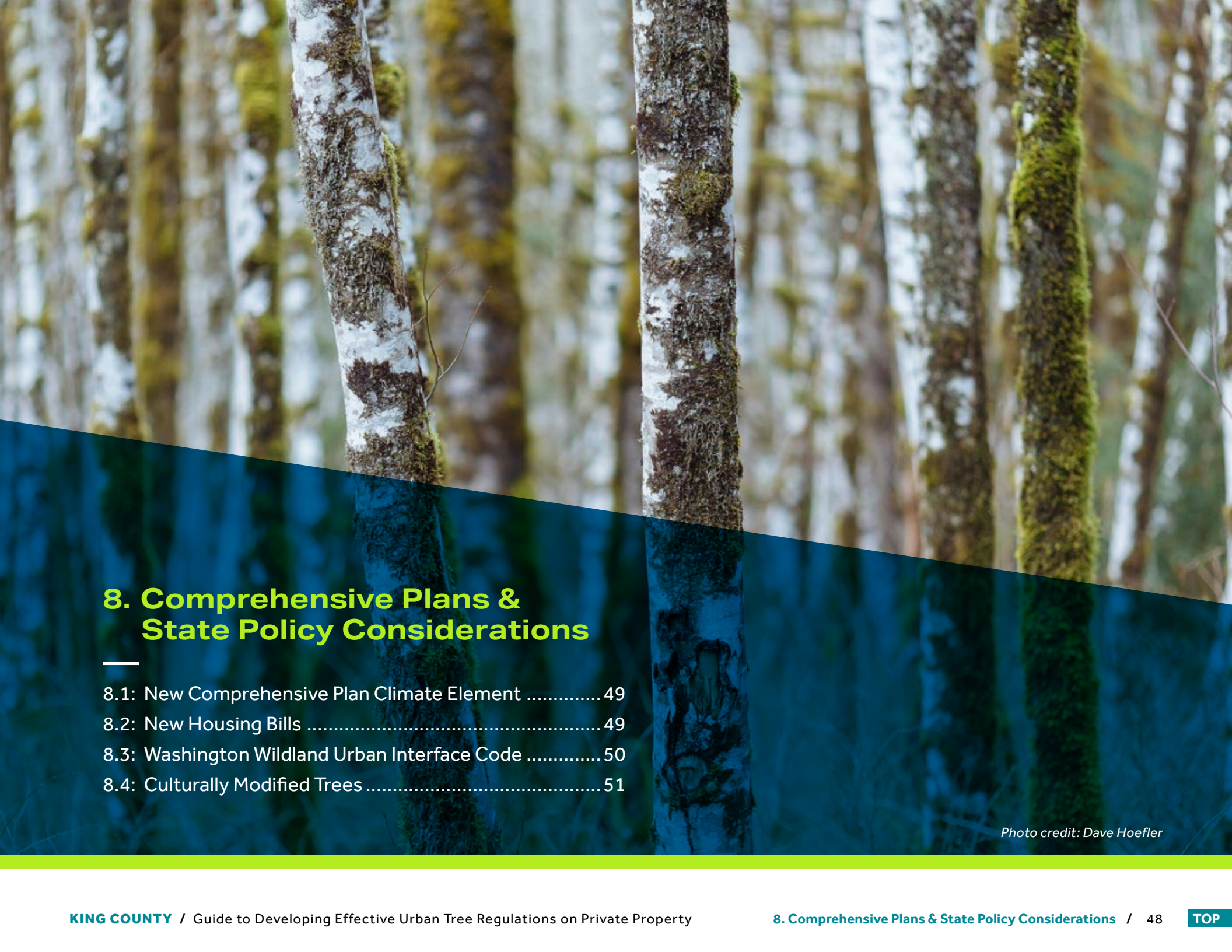
7.4: Evaluation and Adaptation:

Periodic evaluation of the effectiveness of the regulations is crucial to identify any shortcomings or areas for improvement. Metrics to measure the effectiveness of the regulations and a timeline for review should be established in the ordinance and code language. The City of Decatur's Intent section of its code is a primary example of an ordinance that does this well. While there are currently no King County jurisdictions that provide this language, incorporating such statements would ensure data is captured and would also hold the jurisdiction accountable to the timeline. Jurisdictions should be prepared to adapt the regulations based on feedback, emerging issues, and changing circumstances over time. By addressing these challenges proactively and collaboratively, jurisdictions can successfully implement new tree regulations and achieve their

objectives of protecting trees on private land and preserving city-wide canopy cover, while also balancing the competing demands of sustainable development.

Through both the survey and interviews conducted for this project, jurisdictions shared their challenges, lessons learned, and educational strategies and resources developed to support both city staff and stakeholders in implementing their new tree code. These resources are found in the following appendices:

- Public engagement plans.
- Outreach and educational materials during code development.
- Post-adoption handouts and tools for applicants.



8. Comprehensive Plans & State Policy Considerations

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Photo credit: Dave Hoefler

8. Comprehensive Plans & State Policy Considerations

Washington State requires that cities and counties of a certain size accommodate future growth through the development of comprehensive plans. Under the Growth Management Act (GMA) statute, municipalities must address housing, transportation, and other growth issues and citizen participation through comprehensive plan policy goals that are supported by municipal codes, other policy documents, management plans, and programs.

Many cities establish canopy cover goals, typically expressed as a percentage, within urban forest management plans, or sometimes in other guidance documents or management plans such as climate action and sustainability plans. As a reflection of community values and vision for future growth, a tree canopy cover policy goal provides greater support for municipal tree ordinances and other tree preservation efforts when located within the framework of a comprehensive plan. A canopy cover goal may be placed under any “element” or required section, such as land use, environment, or in newly mandated elements.

8.1: New Comprehensive Plan Climate Element

In 2023, House Bill 1181 was enacted, requiring that Washington jurisdictions add a new comprehensive plan element addressing climate change and community resiliency. A climate element can take the form of a single comprehensive plan chapter or be integrated into several chapters/elements such as housing, transportation, and land use. Climate elements must maximize economic, environmental, and social co-benefits and prioritize environmental justice to avoid worsening environmental health disparities. Because comprehensive plan policies are adopted by local decision-making bodies, they can spur the community to revise tree codes, establish tree canopy cover

goals, and require alignment with existing urban forest management plans and programs. The Washington Department of Commerce provides planning guidance, grants, and other resources for developing a comprehensive plan climate element.⁴²

8.2: New Housing Bills

Also enacted into law in 2023, several housing and land use bills address housing availability and affordability issues, affecting how local governments regulate low-density residential housing. House Bill 1110 requires that many cities revise their codes to allow duplex/triplex, townhome, cottage, etc. housing, the “missing middle” between single-family and multifamily residential housing types. Additionally, House Bill 1337 requires that cities allow Accessory Dwelling Units (ADUs), a small self-contained living unit, on existing single-family lots. In both cases, local municipalities must update their zoning/development regulations within six months following their comprehensive plan updates to include these changes.

Generally, accommodating a larger (or second, albeit smaller) building footprint on single-family lots will reduce the number of existing trees that can be successfully retained, and limit space for tree replanting, which in turn, could impact climate action, urban forest management, and tree canopy cover goals. However, note that some jurisdictions such as the City of Kirkland have allowed missing middle/ADU housing types while fully regulating tree protection years ahead of the 2023 state mandates, evidence that meeting housing needs and protecting trees can be synonymous. The Washington Department of Commerce provides resources and technical assistance to local governments on housing topics.⁴³



Photo credit: Joe Ciciarelli

8.3: Washington Wildland Urban Interface Code

In 2021, the State Building Code Council (SBCC) adopted amendments to the Washington Wildland Urban Interface Code (WWUIC) amendments that had originally been scheduled for implementation in 2023. The implementation timeline was delayed to March 2024 while the State Building Code Council considered several amendments during rule-making and held public hearings in November 2023 and February 2024.⁴⁴ In March 2024, the SBCC announced that they would no longer be adopting the Wildland Urban Interface Code amendments as part of the current code update cycle. This was due to the passage of ESB 6120 (Engrossed Senate Bill) by the state legislature.

What does ESB 6120 require?

- Washington Department of Natural Resources (DNR) is required to develop a statewide wildfire hazard map and a base-level wildfire risk map for each county based on criteria established in coordination with the State Fire Marshal's Office.
- Once the maps have been completed, local jurisdictions will have an additional six months once the maps have been completed to adopt the code as adopted by the SBCC at the local level and will have the

option to modify the maps based on their own assessments as long as they follow the same or similar criteria as the statewide map.

- Counties and municipalities that issue residential and commercial building permits for parcels in areas identified as high hazard and very high hazard will be subject to the WUI code provisions.⁴⁵

The WWUI is based on the 2021 International Wildland-Urban Interface Code (IWUIC). The IWUIC establishes minimum requirements for land use and the built environment in designated wildland-urban interface areas to reduce the loss of life and property due to wildfires. These requirements include specific fire-resistant materials for structures and limiting the amount and type of trees and vegetation in “defensible space” within 30 to 100 feet of structures. The WWUIC could limit the type, number, and density of trees and vegetation in the wildland-urban interface in the required “defensible space” and have an impact on a jurisdiction’s ability to regulate trees in critical areas, retain trees with development, and to support tree canopy cover goals. Although the SBC is no longer adopting the Washington Wildland Urban Interface code amendments as originally adopted during this code update session, jurisdictions still have the local authority to adopt and administer the 2018 International Wildland Urban Interface Code adopted in the state statute.



Photo credit: Kim Miller

8.4: Culturally Modified Trees

Culturally Modified Trees (CMTs) are trees that were modified in some way by past or current Indigenous People. CMTs are cultural resources and non-renewable. In the Puget Sound region, these trees are often cedar and feature sections where bark was stripped for clothing, tools, baskets, and other purposes, or have bent boughs which help indicate important harvesting and hunting areas or waterways. These trees are physical evidence of the connection between native peoples and their lands, and many have survived where Tribal villages or longhouses were burned down by settlers to the region.

As mature and majestic native trees in the urban landscape, CMTs contribute not only to a community's canopy and ecosystem services but often are a part of critical native forest remnants and wildlife habitat. The cultural and ecological significance of CMTs makes it vital for them to be recognized in local jurisdictions' comprehensive planning and climate action strategies.

Currently, once identified, a CMT may be protected under state law RCW 27.53.060 which regulates the removal or alteration of any historic or prehistoric archaeological resource or site. However, most jurisdictions do not have a regulatory mechanism protecting CMTs in local tree ordinances. Some have quasi-protection for historic or culturally significant trees, which may be used to help protect CMTs within the jurisdiction. While most of these voluntary designations have not been actively pursued, there is renewed interest to revive efforts and coordinate with local Tribes to include CMTs. With that revival, it will be important to raise awareness of the fact that state protections apply to identified CMTs regardless of landowner consent to any city-sanctioned program.

The Snoqualmie Tribe recently received a USDA Forest Service grant to develop a Culturally Modified Tree protection program, the first of its kind in the Pacific Northwest. The Tribe is exploring how to work with local municipalities (including the County) to include CMTs in their tree code as high-value trees, like landmark or exceptional trees, which require special consideration for retention efforts, particularly during development. Further collaboration will be needed for jurisdictions to also ensure their policies and ordinances support and comply with standing State CMT protection laws. Along with coordination among local tribes, public education, and arborist training to properly maintain these trees, the Tribe hopes to attain better preservation of CMTs throughout the Puget Sound region.



9. Conclusion

Photo credit: Freepik.com



9. Conclusion

Photo credit: Getty Images

As development pressures and the effects of climate change continue to impact the Pacific Northwest, and more specifically, King County, the preservation of the urban forest and associated benefits has become of the utmost importance. A lack of state legislation on tree regulations has led to local municipalities being solely responsible for developing, implementing, and enforcing tree regulations. The project team found both local and national tree codes vary widely in clarity, terminology, consistency with industry standards, and levels of restrictiveness. Beyond critical area tree removal restrictions, nine local jurisdictions have little to no tree regulations, while fifteen were found to have comprehensive codes that both regulate tree retention with development and limit tree removal on private property without development. Of the King County survey participants, more than one-third indicated they are considering or are planning to update their tree regulations in the near future. The primary drivers for regulating trees on private property include public demand or direction from decision-makers, comprehensive plan policy goals, sustainability or climate action goals, and city-wide tree canopy targets.

Developing tree regulations at the local level is not a one-size-fits-all process and is informed by community and stakeholder values,

development code structure, municipal resources, staffing, and the characteristics of the land uses in the jurisdiction. Therefore, defining effective language and determining best practices for a singular model tree ordinance is not feasible. However, several fundamental foundation elements are pivotal in developing effective tree regulations. A successful tree ordinance will balance growth and development while providing protection for trees that comprise the urban tree canopy and meet city management goals. Further, an effective ordinance will also be easily understood and implemented by stakeholders and staff. Lastly, to measure the effectiveness of an ordinance and ensure canopy goals are being achieved, metrics to measure the effectiveness of the ordinance must be incorporated.

Future research considerations that could supplement this body of work include an analysis of tree quantification methods and how they influence canopy cover, the effectiveness of incentives, and measuring the effectiveness of tree regulations on private property. The next step in this project is the development of the King County Tree Code Toolkit. This toolkit is intended to be a one-stop shop for municipalities seeking guidance on developing and implementing tree regulations, including ordinance frameworks, tree species lists, educational materials, and more.



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Photo credit: Sara Dao

Appendix A. List of Terms

*Terms listed here are consistent with ANSI A300-2023 Tree Care Standards, Managing Trees During Site Development & Construction, 3rd edition; ISA Best Management Practices, Managing Trees During Site Development; Council of Tree and Landscape Appraisers (CTLA), Guide for Plant Appraisal and the online International Society of Arboriculture Dictionary.*⁴⁶

American National Standards Institute (ANSI)

A non-profit organization that oversees standards for products, services, processes, systems, and personnel activities in the United States. The current version of the American National Standards Institute A300 (2023) tree care standards are developed by the Tree Care Industry Association (TCIA) to manage trees, shrubs, and other woody vegetation.

Arbor Day Foundation

A non-profit membership organization dedicated to planting trees and providing resources for tree planting, maintenance, pruning, identification, climate change, reforestation, and urban forestry. The Arbor Day Foundation established the Tree City USA program in 1976.⁴⁷

Arborist report

Written findings of a tree inventory that includes recommendations prepared by a qualified professional defined by code, typically an ISA Certified Arborist and/or other certifications and allied professionals.

Buildable area

The portion of land wherein a structure, parking, and other improvements may be located and where construction may take place. The definition of buildable area varies by jurisdiction but does not generally include environmentally critical areas, shorelines, or public rights-of-way. Also termed the “building envelope.”

Calculated Tree Protection Zone (CTPZ)

Defined by species tolerance to construction activities, tree size (DBH), and relative age/health. The calculated TPZ radius should be 6-18 times the trunk diameter (DBH).

Caliper

The industry standard for trunk measurement of nursery stock is measured in inches, taken at four to twelve inches above the ground, depending on the trunk diameter, applicable to replacement tree standards.

Canopy Cover

The percentage of a fixed area covered by the crown of a tree is measured by the horizontal projection of its outermost perimeter.

Critical Root Zone (CRZ)

The area of soil around a tree where the minimum volume of roots considered critical to the structural stability or health of the tree is located. Currently, there are no universally accepted methods to calculate the CRZ. Historically known and still defined in tree codes as a formulaic area expressed as the radius from the face of a tree trunk equal to one foot for every inch of trunk diameter (DBH). (Duvall, Kenmore, North Bend, etc.).

Culturally modified tree

A tree that has been modified by Indigenous people as part of their traditions. This may include peeling, ax cuts, delimbing, wood removal, or other modifications.

Crown

The branches and foliage of a tree.

Development

Any activity that requires a project permit or jurisdictional approval. This varies by jurisdiction and is often differentiated between major and minor thresholds or by development type relating to additional square feet or cost of improvements.

Diameter at Breast Height (DBH) or Diameter at Standard Height (DSH)

The diameter of a tree trunk measured 4.5 feet above average grade. Diameter at standard height is used in determining the diameter of existing trees.

1. Where a tree has a branch or branches or swelling that interferes with the measurement at four and one-half feet above average grade or where a tree tapers below this point, the diameter is measured at the narrowest point below four and one-half feet.
2. For trees located on a slope, the four and-one-half feet height is measured from the average of the highest and lowest ground points or, on very steep slopes where this is not possible, the lowest practical point on the uphill side.
3. Where a tree splits into several trunks close to ground level, the diameter at standard height for the tree is the square root of the sum of the diameter at standard height for each individual stem squared.

Dripline

The distance from the tree trunk is equal to the furthest extent of the tree's crown. For trees with asymmetrical crowns, the dripline is measured in all four cardinal directions. Dripline may be a measure for determining the extent of a tree's roots to designate the TPZ (e.g., As seen in Issaquah and Newcastle).

Fee in-lieu

A payment made in place of planting replacement trees.

Grove trees

A group of a specified number, typically three or more, viable regulated trees with overlapping or touching crowns.

Growth Management Act (GMA)

A series of state statutes that require fast-growing cities and counties

to develop a comprehensive plan that outlines their vision for growth, land use, and development within their communities to manage population growth. State GMAs designate urban growth areas, require identification and protection of critical areas, and influence development regulations.

Hazard tree

A tree or tree part that has a high likelihood of failure that would cause damage or injury due to its proximity to a target, which cannot be mitigated. In practice, a hazard tree is assessed by a qualified professional arborist typically using the ISA Tree Risk Assessment methodology.

Heritage tree

A tree designated by code criteria, often nominated by the City, Tree Board, or other organization on public or private property as historically significant, specimen, rare, as a significant grove, or other criteria.

Inner Critical Root Zone

Not currently defined as an ANSI A300 (2023) Tree Care standard or recognized as ISA Best Management Practices. Historically known and still defined in tree codes as an area half the distance of the CRZ that, when impacted, may compromise the structural integrity of the tree and is not to be disturbed during construction activities. Example: A 26-inch DBH tree has a 13-foot radius inner critical root zone measured from the face of the trunk.

International Society of Arboriculture (ISA)

An organization that promotes the professional practice of arboriculture and fosters a greater awareness of tree benefits.

Landmark tree

A healthy mature significant tree with a minimum DBH that varies by jurisdiction but is typically between 24 inches and 30 inches. Some jurisdictions define landmark trees by both species and size.



Photo credit: Freepik.com

Limits of Disturbance

Not currently defined as an ANSI A300 (2023) Tree Care standard or recognized as ISA Best Management Practices. Historically known and still defined in tree codes as the boundary between allowable site disturbance from development activity and the protected area surrounding a tree. (Kent, Lake Forest Park). Due to similarities to Temporary Erosion-Sediment Control (TESC) Limits of Disturbance fencing and the resulting confusion on site plans, Tree Protection Zone (TPZ) has become more common as a codified industry standard replacing tree “limits of disturbance.”

Municipal code

A collection of laws passed by a governing body. The municipal code contains the ordinances adopted by a jurisdiction.

Nuisance trees

A tree that meets certain criteria and cannot be corrected by reasonable practices such as pruning, bracing, or cabling. May also be defined as causing significant physical damage to structures.

Ordinance

A local law or regulation enacted by a municipal authority.

Public tree

A tree located in parks, maintained or unmaintained public rights-of-way, stormwater facilities, or on other property owned by the jurisdiction.

Private tree

A tree located on private (fee-simple) property not owned or maintained by a jurisdiction.

Qualified Professional

This definition varies by jurisdiction but generally means an individual with relevant education and training in arboriculture or urban forestry who can demonstrate performing appropriate assessments to produce the required documentation for a request or application. Some jurisdictions require qualified professionals completing arborist evaluations to have one or more of the following credentials:

- International Society of Arboriculture (ISA) Certified Arborist;
- Tree Risk Assessor Qualification (TRAQ) as established by ISA or equivalent;
- American Society of Consulting Arborists (ASCA) Registered Consulting Arborist;
- Society of American Foresters (SAF) Certified Forester for Forest Management Plans;
- Board Certified Master Arborist as established by the ISA.

Significant tree

A regulated tree that meets a minimum DBH threshold.

Tree City USA

A program founded by the Arbor Day Foundation that provides assistance and recognition to incorporated communities and military bases that maintain a continuously active tree management program.

Tree inventory

A record of the location and characteristics of trees that provides basic information on attributes like species, condition, and size. Many jurisdictions require a tree inventory to be completed by a qualified professional arborist as part of development or tree removal permit requirements.

Tree protection fencing

Chain link or orange plastic construction fence or similar material that must meet height and installation standards, be erected around the tree protection zone.

Tree Risk Assessment Qualification (TRAQ)

Means a qualified tree professional who has specialized knowledge and training and is certified by the ISA in basic tree risk assessment as defined by the ISA Best Management Practices: Tree Risk Assessment.

Tree Protection Zone (TPZ)

Currently defined as an ANSI A300 (2023) Tree Care standard and recognized as an ISA Best Management Practices term. A defined area within and including an outer boundary, as determined by a qualified professional arborist, in which certain activities are prohibited or restricted to prevent or minimize potential impacts from construction or development, and applies to individual trees, groups of trees, roots, and soil. TPZ is measured in feet from the face of the trunk and may be determined using critical root zone, dripline, exploratory root excavations, or other methodologies. The established TPZ is the location of tree protection fencing. (Burien, Kirkland). See Calculated TPZ.

Urban Growth Area (UGA)

A regional boundary is set by a jurisdiction to encourage urban growth and development to limit urban sprawl, enhance open space, protect rural areas, and more efficiently use human services. The UGA is required under the Growth Management Act as part of a jurisdiction's comprehensive plan. UGA is often referenced by cities, while UUA (below) is most often referenced by counties. Both are often used interchangeably; for the purposes of this Guide, UGA will be referenced throughout.

Urban Unincorporated Area (UUA)

An area that is unincorporated as a municipality that typically does not have elected officials at the town level. Since unincorporated communities are not officially considered to be municipal areas of their own accord they often act as a part of a larger municipality, such as a county. Skyway is an example of an urban unincorporated area.

Viable tree

A term that typically describes a tree that meets a combination of tree health and structure criteria for tree retention purposes. Although defined in the Council of Tree and Landscape Appraisers (CTLA) Guide for Plant Appraisal, 'viable tree' means trees assessed by a qualified professional to be in fair or better condition, with low risk of failure due to structural defects. Some jurisdictions define trees worthy of retention succinctly with 'viable' criteria, while others may define qualitative tree retention criteria in greater detail with tree condition tables.

Wildland Urban Interface Code (WWUI)

A code designed to mitigate the risks from wildfire to life and property in wildland-urban interface areas.

Appendix B. Data Synthesis Report

<https://your.kingcounty.gov/dnrp/library/2024/kcr3648/kcr3648AppB.pdf>

Appendix C. King County Jurisdictional Tree Code Matrix

<https://your.kingcounty.gov/dnrp/library/2024/kcr3648/kcr3648AppC.pdf>

Appendix D. King County Jurisdictional Tree Code Summary Spreadsheet

<https://your.kingcounty.gov/dnrp/library/2024/kcr3648/kcr3648AppD.pdf>

Appendix E. National Tree Code Research Spreadsheet

<https://your.kingcounty.gov/dnrp/library/2024/kcr3648/kcr3648AppE.pdf>

Appendix F. Sample Documents and Online Resources

The following resources are provided by the four cities that participated in the in-depth interviews to discuss their recent tree code updates. Cities included Kirkland, Burien, Issaquah, and Seattle. For more information on the interviews see the Data Synthesis Report in Appendix B.

SAMPLE DOCUMENTS

Kirkland

Discussion of issues and staff recommendations (staff report pages 1-13), Public Engagement Plan (2018) pages 87-97 <https://www.kirklandwa.gov/files/sharedassets/public/v/1/planning-amp-building/code-amendments-to-kzc-95-packet-cam18-00408.pdf>

Issaquah

Title 18 Update – Goals, Issues, Desired Outcome Chart

Used for tracking public meeting outcomes. <https://www.issaquahwa.gov/DocumentCenter/View/8646/Attachment-B-Goals-and-Outcomes-Documents-PPC-additions>

ONLINE RESOURCES

Kirkland

- Public Educational Videos <https://www.youtube.com/watch?v=3S5fm8-LA-8>
- [Trees Webpage](#). Includes guides to example site plans, tree retention plans, pre-submittal checklists, arborist report guides, etc.
- Online [High Retention Value Tree Checklist](#)
- Currently developing an [interactive permitting guide](#)

Seattle

- SDCl's Tree and Code webpage - [https://www.seattle.gov/sdci/codes/codes-we-enforce-\(a-z\)/trees-and-codes](https://www.seattle.gov/sdci/codes/codes-we-enforce-(a-z)/trees-and-codes)
- "Stay Connected" webpage: <https://www.seattle.gov/sdci/about-us/stay-connected>

Issaquah

- Webpage dedicated to the 2023 Land Use Code Update, Including Tree Code <https://issaquahwa.gov/3141/2023-Land-Use-Code-Update>
- Tree Permits webpage on Community Planning and Development site – has canopy cover worksheet and FAQs: <https://issaquahwa.gov/1072/Tree-Permits>

Burien

- Webpage dedicated to Trees and Urban Forest Management https://www.burienwa.gov/business/community_development/trees_and_urban_forest_management
- Tree regulations and permit webpage that includes videos on "when do you need a tree removal permit" and "how to measure a tree"; translated to Spanish and Vietnamese (factsheets): https://www.burienwa.gov/business/community_development/trees_and_urban_forest_management/tree_regulations_and_permit_requirements

PRINT RESOURCES

Kirkland

- Tree Code FAQ: <https://www.kirklandwa.gov/files/sharedassets/public/v/1/planning-amp-building/trees/tree-code-faq.pdf>
- Tree Retention Plan Checklist: https://www.kirklandwa.gov/files/sharedassets/public/v/2/development-services/pdfs/planning-pdfs-mbp/pre-submittal-tree-retention-plan-checklist_2023.pdf

Seattle

- 242 Tips (A-D) on tree code information
<https://web.seattle.gov/dpd/cams/CamList.aspx>
- 242A – Tree Requirements Associated with Development
<https://www.seattle.gov/DPD/Publications/CAM/Tip242A.pdf>

Sample Ordinance

City of Duvall, Washington. Ordinance No. 1234 amending City of Duvall Municipal Code, Chapter 14.40: <https://duvallwa.gov/DocumentCenter/View/5746/ORD-1234-Tree-Protection?bidId=>

Appendix G. Tree Lists

Issaquah

Preferred Tree List (2022) <https://issaquahwa.gov/DocumentCenter/View/863/Preferred-Tree-List-2022>

Kenmore

Street Tree List, 2021 Road Standards, Appendix C, pages 100-101 <https://www.kenmorewa.gov/home/showpublisheddocument/2735/638233924155364765>

Kirkland Public Works

Surface Water Division: Staff Recommendations

https://www.kirklandwa.gov/files/sharedassets/public/v/1/public-works/surface-water/tree_list_final_web_1.pdf

Kirkland Planning and Building Department

Approved Landmark Tree Mitigation List (2023)

<https://www.kirklandwa.gov/files/sharedassets/public/v/3/planning-and-building/trees/landmark-tree-mitigation-species-list.pdf>

Lake Forest Park

General Tree List (2011)

<https://www.cityofflp.gov/DocumentCenter/View/224/Tree-List?bidId=>

North Bend

Street Tree List (2018) <https://www.northbendwa.gov/DocumentCenter/View/6798/City-of-North-Bend-Approved-Street-Tree-List-August-2018>

Redmond

Native Tree Species for Tree Replacement (No Date)

https://www.redmond.gov/DocumentCenter/View/29813/Native_Plant_List_for_Tree_Replacement_PDF?bidId=

Seattle

Green Factor Plant List (Bioretention Trees) (2010)

<https://www.seattle.gov/documents/Departments/SDOT/PublicSpaceManagement/SeattleGreenFactorPlantList.pdf>

Tukwila

Approved Tree List (2017)

https://www.tukwilawa.gov/wp-content/uploads/Approved-_Tree_List_2017.pdf



Endnotes

Photo credit: Tomoko Uji

Endnotes

¹ Aken, J. et al. 2019. Redmond's Tree Canopy Strategic Plan. City of Redmond. Accessed on 3/28/2024 from <https://www.redmond.gov/DocumentCenter/View/9576/Tree-Canopy-Strategic-Plan?bidId=#:-:text=The%20proposed%20goal%20for%20the%20plan%20is%20to,time%20to%20realize%20the%20benefits%2C%20costs%2C%20and%20resources>.

² Dyson, K. and M.S. Patterson. 2018. City of Sammamish Land and Canopy Cover Analysis. University of Washington-Urban Design and Planning. Accessed on 3/28/2024 from <https://www.sammamish.us/media/aapjcx/f/urban-forest-management-plan-survey-results.pdf>

³ O'Neil-Dunne, J. 2016. Seattle Tree Canopy Assessment. University of Vermont- Spatial Analysis Laboratory. Accessed online on 3/28/2024 from <https://www.seattle.gov/Documents/Departments/Trees/Mangement/Canopy/Seattle2016CCAFinalReportFINAL.pdf>

⁴ City of Kirkland. 2018. Urban Tree Canopy Assessment. Plan-It Geo. Accessed on 3/28/2024 from <https://www.kirklandwa.gov/files/sharedassets/public/v/1/planning-amp-building/2018-tree-canopy-assessment.pdf>

⁵ United States Census Bureau. 2020. U.S. Department of Commerce.

⁶ King County 30-Year Forest Plan. 2021. Department of Natural Resources and Parks, Water and Land Resources Division. Accessed online on 2/26/2024 from <https://your.kingcounty.gov/dnrp/library/water-and-land/forestry/30-year-forest-plan/30-year-forest-plan.pdf>.

⁷ Nowak, D. 2016. "Chapter 4: Urban Forests." Assessing the Sustainability of Agricultural and Urban Forests in the United States. PP 37-52. Edited by Robertson, Guy; Mason, Andy, 2016. Assessing the Sustainability of Agricultural and Urban Forests in the United States. USDA Forest Service, Washington, DC, FS-1067. 75 pages.

⁸ Wolf, K. L., Lam, S. T., McKeen, J. K., Richardson, G. R. A., Van den Bosch, M., and Bardekjian, A. C. 2020. Urban Trees and Human Health: A Scoping Review. International Journal of Environmental Research and Public Health, 17(12), 4371. <https://doi.org/10.3390/ijerph17124371>

⁹ Wolf, K.L. 2010. Crime and Fear - A Literature Review. Green Cities: Good Health. College of the Environment, University of Washington. Accessed on 2/1/2024 from https://depts.washington.edu/hhwb/Thm_Crime.html.

¹⁰ Nowak, D. J. and J.F. Dwyer. 2000. Understanding the Benefits and Costs of Urban Forest Ecosystems. In Handbook of Urban and Community Forestry in the Northeast (pp. 11-25). Springer US. https://doi.org/10.1007/978-1-4615-4191-2_2.

¹¹ Kuehler, E.; J. Hathaway and A. Tirpak. Quantifying the benefits of urban forest systems as a component of the green infrastructure stormwater treatment network. Ecohydrology. 2017;10e. <https://doi.org/10.1002/eco.1813>.

¹² Wolf, K.L. 2007. City Trees and Property Values. Arborist News 16, 4:34-36.

¹³ Makido Y.; D. Hellman and V. Shandas. 2019. Nature-Based Designs to Mitigate Urban Heat: The Efficacy of Green Infrastructure Treatments in Portland, Oregon. Atmosphere. 10(5):282. <https://doi.org/10.3390/atmos10050282>

¹⁴ Ettinger A.K.; G. Bratman, M.Carey, R. Hebert, O. Hill, H. Kett, P. Levin, M. Murphy-Williams, and L. Wyse. 2024. Street trees provide an opportunity to mitigate urban heat and reduce risk of high heat exposure. Scientific Reports 14, Article number 3266. Accessed on 2/26/2024 from <https://doi.org/10.1038/s41598-024-51921-y>.

¹⁵ Nowak, D.J.; D. Crane, and J.C. Stevens. 2006. Air pollution removal by urban trees and shrubs in the United States. Urban Forestry and Urban Greening Vol 4, Issues 3-4 (pp. 115-123). <https://doi.org/10.1016/j.ufug.2006.01.007>.

¹⁶ Naizhuo, Z.; J.F. Prieur, Y. Liu, D Kneeshaw, E.M. Lapoint, A. Paquette, K. Zinszer, J. Dupras, P.J. Villeneuve, D.G. Rainham, E. Lavigne, H.Chen, M. vanden Bosch, T.Oiamo, A.Smargiassi. 2021. Tree characteristics and environmental noise in complex urban settings – A case study from Montreal, Canada, Environmental Research, Volume 202, ISSN 0013-9351.

¹⁷ Nowak, D.J., Hoehn, R. E. III, Crane, D. E., Stevens, J. C., & Walton, J. T. 2006. Assessing urban forest effects and values, Washington, D.C.'s urban forest. Accessed on 2/1/2024 from <https://www.fs.usda.gov/treesearch/pubs/18406>.

¹⁸ Exact tree canopy percentages vary based on the data source. Timing and methodologies of studies is not consistent.

¹⁹ Puget Sound Regional Council, Regional Housing Strategy, February 2022, page 9.

²⁰ King County 30-Year Forest Plan, page 37-38.

²¹ Best practices for arboriculture include but are not limited to the American National Standards Institute (ANSI) A300 for Tree Care, 2023 which are industry consensus standards developed by the Tree Care Industry Association written by the Accredited Standards Committee. ANSI standards cover everything from specific tree care specifications such as pruning and planting to worker safety.

²² iTree is a free peer-reviewed suite of software applications developed and supported by the USDA Forest Service that quantifies urban forest characteristics as well as their ecosystem and economic benefits. iTree has two applications - iTree Canopy and iTree Landscape - that can be used to calculate tree canopy at the site or landscape scale. For additional information, go to <https://www.itreetools.org>.

²³ City of Decatur, Georgia Tree Canopy Ordinance education webpage. For additional information, go to <https://www.decaturga.com/dec/page/tree-canopy-conservation-ordinance>

²⁴ City of Olympia, Urban Forestry Manual. Accessed on 3/11/2024 from https://cms7files.revize.com/olympia/Document_center/Services/Urban%20Forestry/Urban-Forestry-Manual.pdf

²⁵ The Facet Project Team learned, during the In-depth Interview process, that tree code amendment timelines were protracted due to the controversial and complex nature of tree code updates.

²⁶ Chicago Region Trees Initiative developed an interactive web map that combines canopy cover, surface temperature, air quality, flood risk, health, and social vulnerability data. Accessed on 2/1/2024 from <https://chicagorti.org/maps>.

²⁷ Chicago Region Trees Initiative: Tree Preservation Ordinance Templates. Accessed on 2/1/2024 from <https://chicagorti.org/program/tree-ordinance-templates/>.

²⁸ Municipal Research Services Center. Accessed on 3/29/2024 from: [MRSC - Taking Action Using Ordinances, Resolutions, Motions, and Proclamations](#).

²⁹ Dunster, J. 2017. Tree Risk Assessment Manual, Second Edition. Champaign, IL: International Society of Arboriculture.

³⁰ City of Burien Municipal Code (BMC) 19.2.040 Exceptional trees. Accessed on 2/15/2024 from <https://burienwa.civicweb.net/filepro/documents/?preview=75469>.

³¹ City of Lake Forest Park Municipal Code (LMC) Title 16 Environmental Protection, Chapter 16.14 Tree Canopy Preservation and Enhancement. Accessed on 2/15/2024 from <https://www.codepublishing.com/WA/LakeForestPark/#!/LakeForestPark16/LakeForestPark1614.html#16.14.030>.

³² The King County Noxious Weed board adopts an annual noxious weed list in accordance with RCW 17.10 and WAC 16.750. The Noxious weed List categorizes plants into Class A, B, and C -and specifies which are regulated or recommended for control. For more information go to: <https://kingcounty.gov/en/legacy/services/environment/animals-and-plants/noxious-weeds.aspx>

³³ iTree is a free peer-reviewed suite of software applications developed and supported by the USDA Forest Service that quantifies urban forest characteristics as well as their ecosystem and economic benefits. iTree has two applications - iTree Canopy and iTree

Landscape - that can be used to calculate tree canopy at the site or landscape scale. For additional information, go to <https://www.itreetools.org>.

³⁴ Matheny, Nelda, and James R Clark. Trees and Development: A Technical Guide to Preservation of Trees During Land Development. International Society of Arboriculture, 1998.

³⁵ American National Standard (ANSI) A300 (Part 5). 2019. Tree, Shrub, and Other Woody Plant Management Standard Practices (Management of Trees and Shrubs During Site Planning, Site Development, and Construction). Londonderry, NH: Tree Care Industry Association.

³⁶ American National Standard (ANSI) A300 (Part 5). 2019. Tree, Shrub, and Other Woody Plant Management Standard Practices (Management of Trees and Shrubs During Site Planning, Site Development, and Construction). Londonderry, NH: Tree Care Industry Association.

³⁷ Mauger, G.S., J.H. Casola, H.A. Morgan, R.L. Strauch, B. Jones, B. Curry, T.M. Busch Isaksen, L. Whitely Binder, M.B. Krosby, and A.K. Snover. 2015. State of Knowledge: Climate Change in Puget Sound Report prepared for the Puget Sound Partnership and the National Oceanic and Atmospheric Administration. Climate Impacts Group, University of Washington.

³⁸ American Standard for Nursery Stock (ANSI Z-60.1). 2014. Accessed online on 2/26/2024 from https://cdn.ymaws.com/americanhort.site-ym.com/resource/collection/38ED7535-9C88-45E5-AF44-01C26838AD0C/ANSI_Nursery_Stock_Standards_AmericanHort_2014.pdf

³⁹ City of Kirkland, Urban Forestry Strategic Management Plan. 2013. Davey Resource Group and Forterra. Accessed online on 3/28/2024 from: [UFMPJuly2013_FINAL_DRAFT_08212013](https://www.kirklandwa.gov/UFMPJuly2013_FINAL_DRAFT_08212013) (kirklandwa.gov), pages 35-40.

⁴⁰ Revised Code of Washington (RCW) 35A Municipal Code: RCW 35A.01.010 (Purpose and policy - interpretation), RCW 35A.11.020 (Powers vested in legislative bodies of noncharter and charter code cities), RCW 35A.11.050 (Statement of purpose and policy), RCW 35A.21.160 (General application of laws to code cities. Accessed online on 2/26/2024 from <https://app.leg.wa.gov/RCW/default.aspx?cite=35A>.

⁴¹ Local Ordinances for Washington Cities and Counties. 2016. Municipal Research and Service Center. Accessed online on 2/26/2024 from <https://mrsc.org/getmedia/44e20d0f-a536-473f-baac-bd7504323330/Local-Ordinances-For-Washington-Cities-And-Counties.pdf?ext=.pdf>.

⁴² Washington State Department of Commerce webpage on planning guidance, grants and other resources for developing a comprehensive plan climate element. Accessed online on 3/7/2024 from: <https://www.commerce.wa.gov/serving-communities/growth-management/growth-management-topics/climate-change-2/>.

⁴³ Washington State Department of Commerce webpage, Planning for Housing. Accessed online on 3/7/2024 from: <https://www.commerce.wa.gov/serving-communities/growth-management/growth-management-topics/planning-for-housing/>.

⁴⁴ For more information on the State Building Council's Washington Wildland Urban Interface Resources webpage, go to <https://www.sbccc.wa.gov/state-codes-regulations-guidelines/state-building-code/wildland-urban-interface-code-resources>. Accessed online on 3/27/2024.

⁴⁵ State of Washington, 68th Legislature, 2024 Regular Session, Engrossed Senate Bill 6120. Accessed on 3/27/2024 from <https://lawfilesextra.leg.wa.gov/biennium/2023-24/Pdf/Bills/Senate%20Passed%20Legislature/6120.PL.pdf?q=20240327191743>

⁴⁶ International Society of Arboriculture Dictionary online resource. Accessed online on 3/7/2024 from: <https://www.isa-arbor.com/education/onlineresources/dictionary>

⁴⁷ Arbor Day Foundation. Accessed online on 3/7/2024 from: <https://www.arborday.org/programs/treecityusa/>