



URBAN FOREST MANAGEMENT PLAN

WESTMINSTER, CO
DECEMBER 2024



URBAN FOREST MANAGEMENT PLAN

CITY OF WESTMINSTER, CO

December 2024

Acknowledgements

Funding for this effort supported by the City of Westminster

Westminster City Council

Nancy McNally, Mayor

Sarah Nurmela, Mayor Pro Tem

Claire Carmelia, Councillor

David DeMott, Councillor

Obi Ezeadi, Councillor

Amber Hott, Councillor

Kristine Ireland, Councillor

City of Westminster

Jody Andrews, City Manager

Barbara Opie, Deputy City Manager

Larry Dorr, Deputy City Manager; CFO Finance Director

Chris Lindsey, Assistant City Manager; General Services Director

Aric Otzelberger, Acting Parks, Recreation, and Libraries Director

Alex Reaves, Parks, Recreation, and Libraries Operations Manager

Lance Johnson, Parks, Golf, and Open Space Manager

Blake Ramsey, Parks Superintendent

Chris Johnson, Parks and Golf Superintendent

Joe Reale, Open Space Superintendent

Andie Murtha, Parks and Open Space Planner

Bridger Tomlin, Sustainability Administrator

Prepared By: Matthew Urmson, PlanIT Geo, Inc.

All photos unless noted otherwise are from the City of Westminster

A VISION FOR WESTMINSTER'S

URBAN FOREST

Our vision is to cultivate a sustainable, inclusive urban forest that is driven by the community, fostering environmental stewardship, and enhancing the quality of life for all city residents, across present and future generations. Through developing and maintaining a diverse and resilient tree canopy, we are committed to improving the health and well-being of our community, ensuring a harmonious environment for everyone to thrive in.



TABLE OF CONTENTS

| | |
|---|----|
| Executive Summary | 1 |
| Introduction | 1 |
| Purpose | 1 |
| Aligning City Priorities..... | 1 |
| Key Findings..... | 2 |
| Urban Forest Key Findings | 2 |
| Management Key Findings | 2 |
| UFMP Key Recommendations | 3 |
| Introduction | 5 |
| About Westminster | 5 |
| HISTORY OF WESTMINSTER'S NATURAL ENVIRONMENT | 6 |
| THE VALUE AND BENEFITS OF URBAN TREES..... | 7 |
| A Closer Look at Trees Improving the Quality of Life in Westminster | 8 |
| Environmental Benefits of Trees | 9 |
| Challenges Facing Westminster's Urban Forest | 12 |
| External Challenges | 12 |
| Internal Challenges | 12 |
| The Time is Now..... | 13 |
| WHAT DO WE HAVE? | 14 |
| Program Overview | 15 |
| Trees That Make Up Westminster's Urban Forest | 15 |
| Tree Inventory Overview | 16 |
| Structure and Composition of Inventoried Trees | 17 |
| Public Inventoried Tree Population..... | 17 |
| Species Diversity..... | 17 |
| Size and Relative Age Distribution..... | 18 |
| Condition | 19 |
| Relative Performance Index..... | 19 |
| Observations and Defects..... | 20 |
| Maintenance Needs | 21 |
| Privately Managed Rights-of-Way Tree Population..... | 21 |
| Species Diversity..... | 21 |
| Size and Relative Age Distribution | 22 |
| Condition | 22 |
| Relative Performance Index..... | 23 |
| Observation and Defects..... | 23 |
| Maintenance Needs | 23 |
| Summary of Tree Inventory Analysis..... | 24 |
| Current Conditions of the Citywide Urban Forest..... | 24 |
| Tree Canopy Cover..... | 24 |
| Current Tree Management in Westminster | 30 |
| Programs for Managing Westminster's Trees | 30 |
| Budget and Funding..... | 31 |
| Public Tree Maintenance and Planting | 32 |
| Public Engagement | 33 |

| | |
|--|----|
| Tree-related Plans and Regulations in Westminster | 35 |
| Stakeholder Feedback on Current Conditions..... | 39 |
| Internal Stakeholder Feedback | 39 |
| External Stakeholder and Community Feedback..... | 41 |
| Development and Land Use Changes..... | 43 |
| Altered Soils | 43 |
| Competition for Space..... | 43 |
| Threats to the Urban Forest | 44 |
| Climate Change Impacts..... | 44 |
| Urban Tree Pests and Diseases | 44 |
| Invasive Tree Species | 45 |
| Urban Heat..... | 47 |
| Changes in Plant Communities..... | 48 |
| Urban Forest Program Audit..... | 49 |
| Urban Forest Audit Process | 49 |
| Westminster’s Audit Results | 50 |
| Interpreting the Urban Forest Audit Scores..... | 51 |
| WHAT DO WE WANT? | 52 |
| VISION FOR THE FUTURE | 53 |
| Introduction..... | 53 |
| Plan Vision Statement | 53 |
| Goals, Strategies, and Actions | 53 |
| Guiding Principles and Goals Overview | 55 |
| 10-Year Canopy Cover Goal | 55 |
| Westminster’s Tree Canopy Cover Goal..... | 55 |
| Goal Framework..... | 57 |
| HOW DO WE GET THERE? | 58 |
| Implementation | 59 |
| Challenges and Recommendations..... | 60 |
| City Code and Ordinances | 60 |
| Guidance for Adopting and Referencing a Tree Manual..... | 65 |
| TREEPLOTTER..... | 67 |
| Tree Management and Prioritization Workbook..... | 67 |
| Pests and Disease | 70 |
| Staffing and Resources for a Growing Urban Forest and Demand..... | 71 |
| Improved Coordination..... | 72 |
| Strengthening and Establishing Partnerships | 73 |
| Community Engagement..... | 73 |
| HOW ARE WE DOING? | 80 |
| Assessing Progress | 81 |
| Primary Urban Forest Benchmark Values to Measure Plan Progress | 82 |
| Report and Revise..... | 83 |
| Conclusion | 84 |
| APPENDICES AND REFERENCES | 85 |
| References | 86 |

| | |
|--|----|
| Appendix A. Canopy Goals and Planting Targets | 87 |
| Canopy Goal Assumptions..... | 87 |
| Priority Planting Areas to Achieve Canopy Goals and Tree Equity..... | 88 |
| Appendix B. 2024 Urban Forest Audit Results | 89 |
| Management Policy..... | 89 |
| Capacity and Training | 90 |
| Funding and Accounting | 90 |
| Authority | 91 |
| Tree-related Inventories | 91 |
| Tree-related Plans..... | 92 |
| Risk Management | 92 |
| Disaster Planning | 93 |
| Standards and Best Management Practices..... | 93 |
| Standards and Best Management Practices (continued)..... | 94 |
| Community | 94 |
| Green Asset Management | 95 |

List of Figures

| | |
|---|----|
| Figure 1. Summary of Westminster's Urban Forest Audit score..... | 3 |
| Figure 2. Benefits and services of Westminster's trees..... | 7 |
| Figure 3. Human health and social benefits of trees..... | 8 |
| Figure 4. Estimated annual benefits of Westminster's urban forest..... | 11 |
| Figure 5. Illustration of the types of trees in Westminster..... | 15 |
| Figure 6. A Certified Arborist examines the tree buds to accurately identify the species..... | 16 |
| Figure 7. Comparison of Westminster's public tree size classes (left) to the Ideal Distribution (right, Richards, 1993). | 18 |
| Figure 8. Relative Performance Index (RPI) of the most common public trees..... | 19 |
| Figure 9. Comparison of Westminster's privately managed street tree size classes (left) to the Ideal Distribution (right, Richards, 1993). | 22 |
| Figure 10. Relative Performance Index (RPI) of the most common privately managed street trees..... | 23 |
| Figure 11. Citywide tree canopy results (2024). | 25 |
| Figure 12. Examples of the land cover classes analyzed as part of the tree canopy study. | 25 |
| Figure 13. Inputs for Westminster's Tree Equity Score (2023). Source: American Forest's Tree Equity Score Tool. | 26 |
| Figure 14. Map showing the Tree Equity Scores for Census Block Groups in Westminster. Source: American Forest's Tree Equity Score Tool. | 27 |
| Figure 15. Count and percent of Census Block Groups by Tree Equity Score ranges. Source: American Forests' Tree Equity Score Tool. | 28 |
| Figure 16. Comparison of Tree Equity Scores for select Colorado cities based on a 2023 study. Source: American Forests' Tree Equity Score Tool. | 28 |
| Figure 17. Canopy cover (%) and count of Census Block Groups by ranges of people of color. Source: American Forests' Tree Equity Score Tool. | 28 |
| Figure 18. Canopy cover (%) and count of Census Block Groups by ranges of people in poverty. Source: American Forests' Tree Equity Score Tool. | 29 |
| Figure 19. Canopy cover (%) and count of Census Block Groups by temperature ranges in degrees Fahrenheit. Source: American Forests' Tree Equity Score Tool..... | 29 |
| Figure 20. Summary of Westminster's per capita urban forestry budget compared to national and state averages and best-matched cities in Colorado..... | 32 |
| Figure 21. Limb recycling program usage of Westminster residents from 2017-2022 by month..... | 34 |
| Figure 22. Infographic summary of feedback received from internal stakeholders. | 40 |

| | |
|--|----|
| Figure 23. Infographic summary of feedback received from external stakeholders. | 42 |
| Figure 24. Examples of potential streetscape design solutions for preventing or mitigating tree and infrastructure conflicts. | 43 |
| Figure 25. Emerald ash borer (EAB). Source: Colorado State Forest Service. | 44 |
| Figure 26. Ips beetle. Source: Colorado State Forest Service. | 44 |
| Figure 27. Elm leaf beetle. Source: University of Colorado. | 45 |
| Figure 28. Asexual fruiting bodies in bark cracks of thyronectria canker. Source: Colorado State University. | 45 |
| Figure 29. Siberian elm (<i>Ulmus pumila</i>). Source: Colorado Department of Agriculture. | 45 |
| Figure 30. Tree of heaven (<i>Ailanthus altissima</i>). Source: Colorado Department of Agriculture. | 46 |
| Figure 31. Illustration of the temperature difference in urban areas due to the urban heat island effect. | 47 |
| Figure 32. Predicted climate adaptability by hardiness zone for the most common tree species in Westminster's urban forest. | 48 |
| Figure 33. Predicted climate adaptability by hardiness zone for species of interest in Westminster's urban forest. | 49 |
| Figure 34. Summary of the 2024 Urban Forest Audit completed for Westminster's Plan. | 51 |
| Figure 35. Westminster's draft 10-year canopy goal milestones and targets. | 56 |
| Figure 36. Summary of estimated costs and tree counts for the recommended seven-year Public Tree Management Program. | 68 |
| Figure 37. Illustration and description of the young tree pruning methods and considerations (Source: Arbor Day Foundation). | 70 |
| Figure 38. Map of Westminster's Tree Equity by Census Block Group. Areas in orange of less than the average citywide canopy coverage and tend to correspond with areas with a higher percentage of communities of color and/or poverty (Source: American Forests Tree Equity Tool). | 78 |
| Figure 39. Example of the plan implementation, evaluation, and revision process. | 83 |

LIST OF TABLES

| | |
|---|----|
| Table 1. Breakdown of Westminster's urban forest by management and property type based on the 2024 canopy assessment. | 16 |
| Table 2. The status and count of public trees in the inventory database (Note: all subsequent data summaries are based on 12,875 trees unless otherwise specified). | 17 |
| Table 3. The status and count of privately managed inventoried trees in public rights-of-way (Note: all subsequent data summaries are based on 15,569 trees unless otherwise specified). | 21 |
| Table 4. Westminster's Forestry Team pruning and tree maintenance by year. | 33 |
| Table 5. Westminster's tree planting to removal ratio from 2013 to 2023. | 33 |
| Table 6. Summary of Westminster's ordinance benchmarking exercise. | 38 |
| Table 19. Summary of the public tree maintenance and removal prioritization criteria and process. | 67 |
| Table 20. Summary of costs for Westminster's urban forestry team. | 71 |
| Table 21. Estimated costs for additional tree maintenance staffing. | 71 |
| Table 22. Westminster's primary urban forest benchmark values to measure Plan progress. | 82 |



Executive Summary

Introduction

Westminster’s urban forest, distinct from many cities, is not a relic of natural woodlands but a testament to civic growth and human effort. As the city has evolved, so too has this green infrastructure, shaped and sustained by the residents. The urban forest’s future hinges on continued human involvement—planting, care, and policy—to ensure its longevity and efficacy in delivering environmental, social, and economic benefits. The urban forest represents a collective investment in the well-being and sustainability of the urban landscape. The City values its 150-year legacy of urban forestry, recognizing the intrinsic connection between a healthy urban forest and a vibrant community. The Urban Forest Management Plan, developed by a dedicated team and backed by the community, focuses on protecting and enhancing tree-related benefits across the city’s natural and residential areas. This plan is a collective commitment to nurture and grow Westminster’s green spaces for the health and enjoyment of all residents.

Purpose

The City’s Urban Forest Management Plan (“Plan”) aims to provide goals and a roadmap for the City to preserve and expand tree canopy cover and maximize the benefits of Westminster’s urban forest.

Aligning City Priorities

The Urban Forest Management Plan complements existing city and regional planning efforts such as the Westminster Sustainability Plan, 2040 Comprehensive Plan, Strategic Plan, Open Space Stewardship Plan, Downtown Specific Plan, and the Parks, Recreation, & Libraries Vision Plan (in development as of February 2024).

Involvement from stakeholders and residents has been key to the development of the Urban Forestry Management Plan and establishing the Plan’s priorities. A diverse group of city staff, residents, and community stakeholders provided perspectives on the most important issues faced by the urban forest.

Collectively, this group prioritized preserving existing trees and incorporating healthy, climate-tolerant or native trees into the city’s built environment, particularly in underserved areas. The Plan’s goals reflect these values and priorities.

WHAT IS THE URBAN FOREST?

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

THE PLANNING PROCESS

The development of the Westminster Urban Forest Management Plan was based on answering four key questions:

- What Do We Have?
- What Do We Want?
- How Do We Get There?
- How Are We Doing?

This structure, termed “adaptive management,” is commonly used for resource planning and management and provides a useful conceptual framework for managing Westminster’s urban forest resource (Miller, 1988).



Key Findings

Westminster's programs for urban forest management, community engagement, public tree maintenance, and tree ordinances are critical to meeting the City's commitment to climate change mitigation and adaptation, carbon sequestration, stormwater reduction, water conservation, wildlife habitat enhancement, and service to the community. The process to develop Westminster's Plan uncovered key findings about the city's tree canopy, its programs, and the community it serves.

Urban Forest Key Findings

- 11.6% of the city is shaded by urban tree canopy cover and has a Tree Equity Score of 86 out of 100, the national average is 85. Grassland cities like Westminster are recommended to have 20% canopy cover.
- The citywide urban forest provides an annual estimated benefit of \$705,151 by improving air quality and reducing stormwater volumes (this estimate excludes tree contributions to property values, energy savings, and health savings among others).
- An inventory and analysis of 15,569 private Rights-of-Way (ROW) trees and an analysis of 12,875 inventoried public trees was completed in 2023.
- The Top Ten Species comprise 55% of all publicly managed trees and 61% of all inventoried private ROW Trees, indicating a need for greater diversity.
- Westminster has an estimated tree population of 184,702 trees of which 19,386 are under City management.
- The inventoried 12,875 publicly maintained trees have an asset value of \$26,400,000 equating to an annual average of \$230 per tree and \$26 per capita (2021 population).
- Westminster's urban forest is at risk from emerald ash borer, ips beetle, thyronectria canker, and elm leaf beetle.

Management Key Findings

- The urban forest is managed collaboratively, with the Parks, Recreation, & Libraries Department focusing on public trees and the Community Services Department managing private trees. Citizens often seek guidance from the City Forester on both public and private tree matters, reflecting the interconnected roles of these departments.
- **4.00 full-time equivalent (FTE) Forestry Staff** oversee tree plantings and maintenance, recycling programs for tree branches, Christmas trees, leaves, and pumpkins, Arbor Day Celebration, the Tree City USA program, Mulch Madness, ReLeaf Westy, budgets, outreach activities, and advising on maintenance best management practices.
- 72% of inventoried public trees are 12 inches in diameter or less, 84% of trees are in good condition, and the most common maintenance need for public trees is routine pruning of mature trees (52%), young tree pruning (43%), and watering for tree establishment.
- From 2013 to 2023, the City has removed 4,875 trees but planted only 2,523 trees, reflecting an unsustainable ratio for maintaining a healthy urban forest and canopy.
- Forestry staff efficiently handle 1,000 tree service requests annually, swiftly resolving the majority without the need for full crew dispatch, while an average of 205 requests necessitate comprehensive service action. Additionally, staff proactively conduct routine preventative maintenance on 288 trees each year.
- To maintain a healthy and sustainable urban forest, the team needs to proactively prune approximately 948 mature trees per year over seven years, and 1,844 young trees per year



over three years with an estimated cost of \$6,421,800 at the end of seven years if this work were entirely contracted out.

- Challenges and shared priorities among city staff include environmental or ecological concerns, staffing, budget, sustainability, and ordinance and standards with 50% or more of participating staff indicating these as challenges or concerns.
- Community engagement emphasized prioritizing resources for private property incentives, tree equity, cost share tree maintenance, and youth engagement.
- Westminster’s Urban Forest Audit Score based on U.S. Forest Service criteria is 55% out of a total possible 100% (completed in 2024). The Audit evaluates and scores 11 categories of sustainable urban forest management according to industry standards and best practices.

Westminster’s Urban Forest Audit Results as a Percentage of 100% (2024)

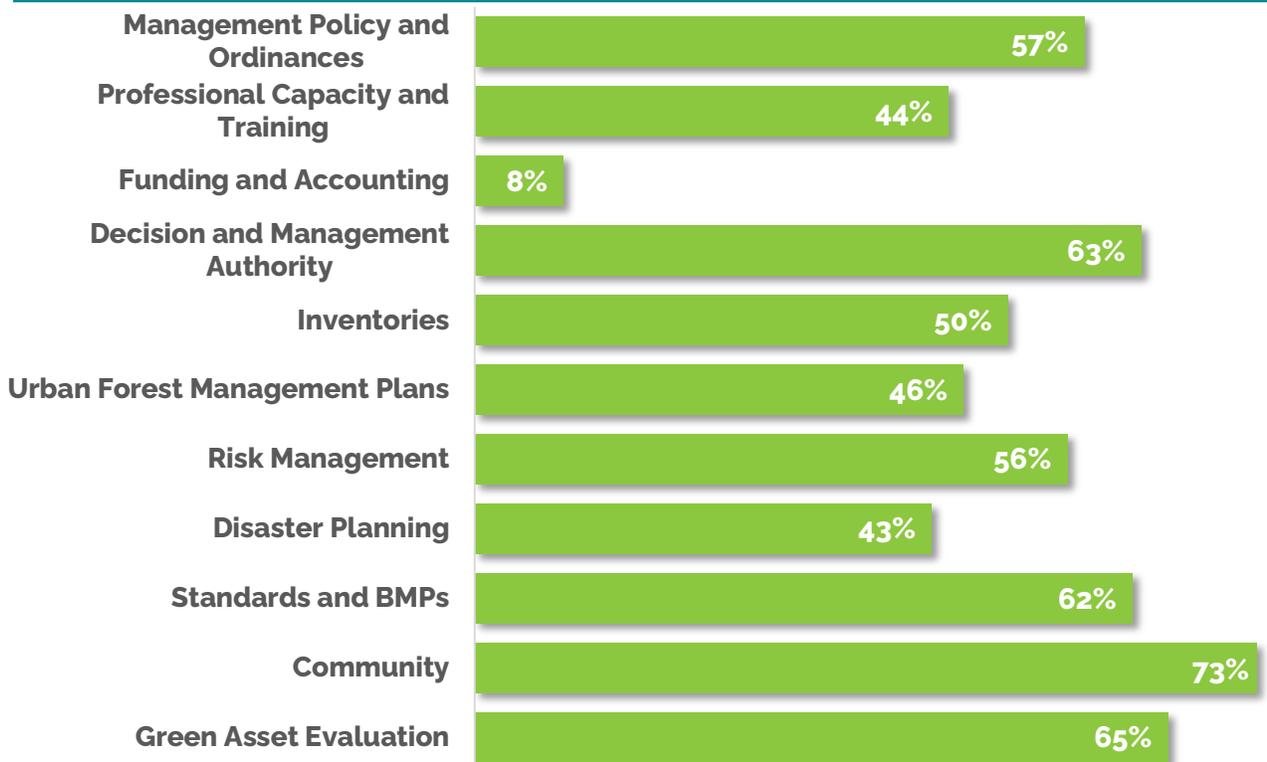


Figure 1. Summary of Westminster's Urban Forest Audit score.

UFMP Key Recommendations

- The City should aim to achieve a canopy coverage of 14% by 2050, with 900 trees planted each year in the first ten years at an estimated cost of \$612,000 per year. Planting smaller nursery stock is recommended to help reduce costs.
- Identify and secure funding sources for ROW tree care assistance and cost share by exploring grants, public-private partnerships, and community sponsorships.
- The City should conduct a comprehensive inventory of trees in open spaces, and regularly update the inventory of all publicly managed and private ROW trees every three years, using industry recommended protocols.

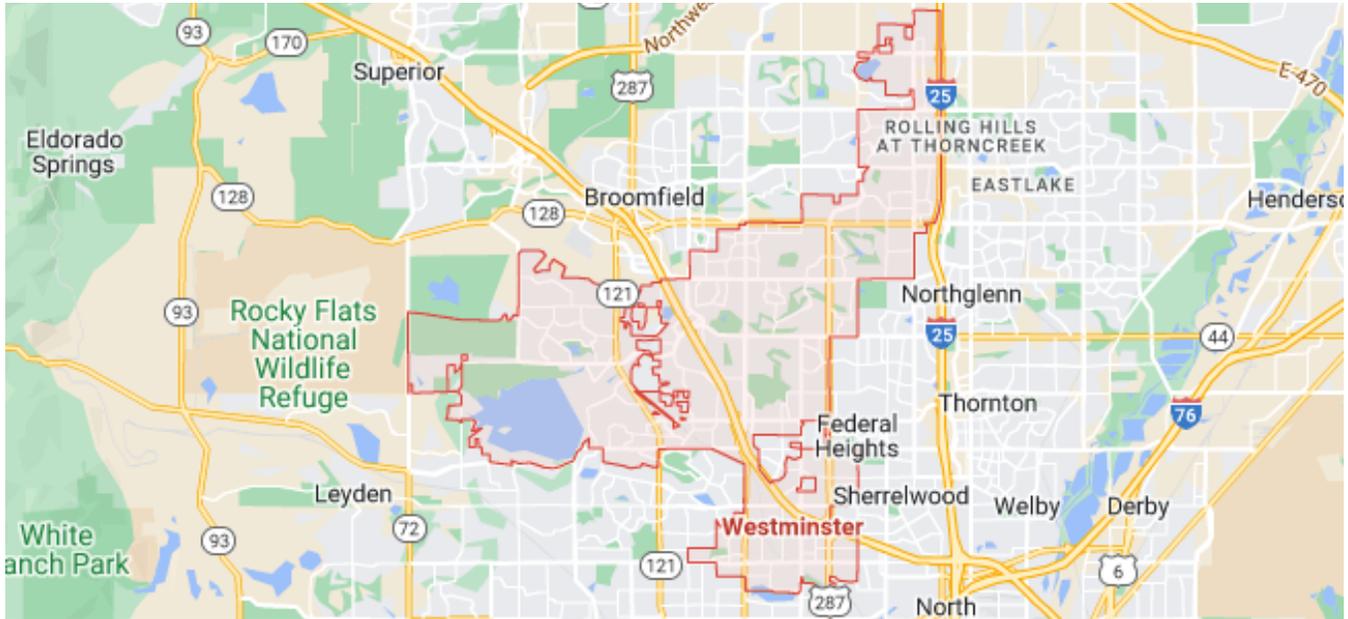


- To address current urban forestry demands and initiate Actions outlined in the UFMP, the City should hire three additional Arborist Technicians and two additional fieldworkers with increased wages for the fieldworker position to improve hiring and employee retention.
- Forestry staff should shift efforts from non-forestry tasks like snow removal and holiday tree lighting, freeing up 2-3 months of labor for forestry work. The Parks, Recreation, and Libraries Department will need to determine the best approach for implementing this change.
- Enhance collaboration with Community Services and planning staff to improve citywide tree diversity and adopt best management practices.
- Update and clarify ordinances related to trees using the recommendations and key considerations provided in the UFMP.
- Strengthen tree protection processes with consistent internal and external policies.
- Implement Goals and Actions outlined in the Tree Pest and Disease Management Plan and Urban Forest Storm Resilience Plan to enhance the resilience and sustainability of the urban forest.
- Update the suitable tree list based on the tree inventory, climate change projections, site suitability (Right Tree Right Place), drought tolerance, ecosystem services, and tree canopy goals.
- Use the Actions and Action Targets outlined in the UFMP, initially focusing on those Actions already in progress or near completion to achieve early success for the plan to build momentum for implementing Actions that require greater effort and collaboration.
- Utilize the provided benchmarking values to regularly measure Plan progress.





Introduction



About Westminister

Located at the base of the majestic Rocky Mountains in Colorado, Westminister is a thriving city that integrates urban living with the splendor of its natural surroundings. The city spans approximately 34 square miles, and of that area 11 percent (3.7 square miles) is covered by the canopy of trees that comprise Westminister’s urban forest. Positioned 12 miles northwest of Denver and 13 miles southeast of Boulder, Westminister is a community that has experienced significant growth as part of the Denver metropolitan area, expanding from 74,000 residents in 1990 to over 116,000 according to the 2020 census. This trend is projected to continue, with an increasingly diverse and aging population. Challenges such as housing affordability and inequitable distribution of urban canopy are important to the City.

The area's development and land use have been shaped by the Front Range's natural landscape, jurisdictional boundaries, and significant infrastructure such as I-25 and US 36, alongside RTD's B-Line service. Westminister is committed to maintaining a network of parks and open spaces, vital for development planning, with 55 parks totaling 2,910 acres, two golf courses, and over 150 miles of trails, which include the 2,321-acre Standley Lake Regional Park and Wildlife Refuge.

The city's proximity to both the metropolitan allure of Denver and the rugged trails of the Rockies positions it as a unique crossroads of outdoor recreation and urban convenience. Residents and visitors can indulge in the serenity of Standley Lake, explore the city's extensive trail system, or engage in the vibrant arts and culture scene. Westminister's dedication to maintaining a balance between development and ecological stewardship is evident in its commitment to preserving green spaces and nurturing its community's connection to nature.

Westminister's UFMP underlines the City's dedication to balancing urban growth with environmental care, ensuring the preservation of green spaces and fostering a connection with nature for its community. This interplay between urbanization and nature is at the heart of Westminister's identity, offering residents the benefits of city life alongside the tranquility and recreational opportunities provided by its rich natural surroundings.



HISTORY OF WESTMINSTER'S NATURAL ENVIRONMENT

The natural environment encompasses all that is not man-made: the air, the soil, the water that carves the land, and the living organisms that inhabit the world. The Colorado Front Range, where Westminster is located, is a testament to this environmental tapestry, shaped by a rich geological story. Here, human history is deeply entwined with the land, as its mountains and plains have provided resources and refuge from extreme weather for millennia. With a population now around 4.5 million, this region is home to Colorado's most populous cities, demonstrating a bridge between nature's past and present human development.

Historically, the Nuche, or Ute people, along with the Arapaho and Cheyenne, were the stewards of the Front Range, their lifestyles adapting with the acquisition of horses and the shifting availability of resources. The discovery of gold in the mid-19th century marked a pivot point, igniting a rush of settlers and the birth of towns that now define the region's urban landscape like Westminster. Agriculture followed the mining boom, transforming the high plains grassland into a patchwork of farms.

Initially, Westminster was a treeless high plains grassland, save for the cottonwoods along waterways. The streets now lined with trees are a testament to the transformation brought by human hands. The city's history with its bountiful orchards during the early 20th century contributed to the Front Range's agricultural identity. Yet, the latter part of the century saw the Denver-Boulder Turnpike pave the way for modern development, shaping the Westminster of today, a city that pays homage to its roots while forging ahead into the future.

Urban development inevitably involves replacement of some forests, grasslands, or wetlands with impervious surfaces such as buildings, roads, and parking lots which do not allow rainwater to pass directly through to the ground. Increasing impervious surface areas increases flooding and decreases replenishment of groundwater.

Trees help beautify Westminster in addition to improving air and water quality, conserving energy by providing shade, and providing habitat for many species.

Westminster's landscape reflects the effort to preserve existing trees and to add new vegetation. Historic trees in the city help preserve its character. Westminster has been named "Tree City USA" since 1986. Tree canopy currently covers 11 percent of Westminster's citywide land area.





THE VALUE AND BENEFITS OF URBAN TREES

Urban forests, often underappreciated, are invaluable to cities, providing a wealth of benefits that enhance the quality of urban life. They serve as critical components of the green infrastructure, offering aesthetic beauty, enhancing real estate values, and contributing to the health and well-being of communities. Beyond their visual appeal, urban trees deliver tangible environmental benefits: they purify the air, mitigate stormwater runoff, provide cooling shade that counters the urban heat island effect, and contribute to biodiversity. Economic advantages are also significant, as well-maintained trees can increase property values and reduce energy costs through their shading and wind-blocking properties. Socially, they offer communal spaces for recreation and relaxation, improve mental health, and encourage active lifestyles. Westminster's UFMP acknowledges these multifaceted values and is dedicated to fostering an urban forest that continues to provide these benefits sustainably and equitably.

CARBON STORAGE



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

STRESS REDUCTION

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



CLEANER AIR

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



WILDLIFE HABITAT



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

STORMWATER MANAGEMENT



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

SHADE AND COOLING

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



LOWER ENERGY BILLS



Residents and businesses can save up to 50% on hot-day energy bills.

SOIL STABILIZATION



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



Figure 2. Benefits and services of Westminster's trees.



A Closer Look at Trees Improving the Quality of Life in Westminster



Trees come in various forms— shade trees, flowering trees, trees with edible fruit and nuts, and trees with vibrant fall color. All types contribute benefits and services to the urban ecosystem— an ecosystem that brings nature into cities through tree canopy, parks, and interconnected green space. Many environmental benefits of trees in urban areas are identifiable and measurable, while other benefits are tangential and experiential, such as the feeling of walking a quiet tree-covered trail. The following provides a summary of the

social and human health benefits of trees and green spaces.

The urban forest brings a myriad of social and health benefits to Westminster’s neighborhoods. Park and boulevard trees create a sense of community, offering opportunities for people to come together and engage in various activities. These shared spaces foster a sense of belonging and connection among residents. Additionally, Westminster’s urban forest provides a respite from the hustle and bustle of city life, offering peaceful retreats where individuals can relax, unwind, and enjoy nature.

Research summarized in the following paragraphs shows the presence of trees and greenery in urban areas reduces stress, improves mental well-being, and encourages physical activity, all of which contribute to healthier and happier communities. Moreover, Westminster’s urban forest creates opportunities for environmental education and volunteering, inspiring residents to learn about nature, participate in tree planting initiatives, and engage in environmental stewardship.

“Urban tree canopies help cool the urban environment while providing an important habitat for a wide range of species. Trees also help to purify air and water systems and absorb carbon dioxide. This strategy focuses on maintaining Westminster’s Tree City USA status by identifying and mitigating threats to Westminster’s urban tree canopy and promoting tree sales and plantings through education and incentives.”
—Westminster Sustainability Plan 2021

Overall, Westminster’s urban forest plays a crucial role in enhancing social interactions, well-being, human health, and community engagement, making Westminster a more livable and enjoyable city.

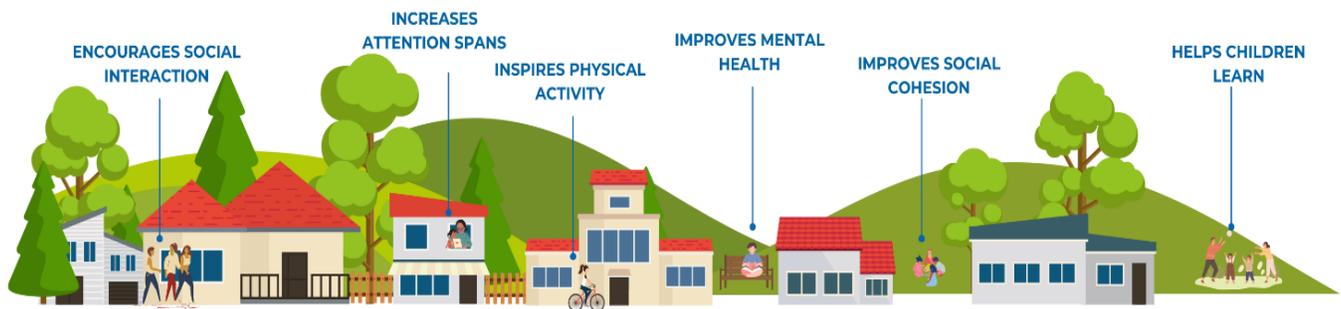


Figure 3. Human health and social benefits of trees.



Studies have found that the amount of trees and vegetation in common spaces such as parks are related to a sense of neighborhood safety and more social activity. In turn, greenery in cities enhances the strength of social ties among neighbors (Kim, et al., 2020).

Encounters with nature in cities also lead to enhanced positive attitudes, decreased stress levels, improved attention spans, and better performance on cognitive memory assessments (Wolf, et al., 2020).

Tree canopy cover and green spaces in cities motivate and provide opportunities for people to be physically active. The percentage of green space within a two mile radius of a person’s home has been associated with the percentage of residents reporting good health, particularly among the elderly and those with lower socioeconomic status—groups that are typically less likely to get sufficient physical activity. Research shows that community residents are three times as likely to be physically active when living in areas with more green space (Ulmer, et al., 2016).



Source: PlanIT Geo stock photo

Opportunities to experience urban nature—whether it’s a view of a street tree out a window or actually being outside in nature— are key to the mental well-being of city residents. People are happier, experience a greater sense of well-being, and have reduced stress levels when they live in areas with more green space nearby or on a tree canopied neighborhood street (White, et al., 2013).

More tree cover near schools also has a positive effect on student performance. Children with challenges concentrating are more focused following a 20-minute walk in an urban park or tree canopy covered sidewalk than after walks in other urban settings without trees and greenery (Taylor, et al., 2009). Trees in neighborhoods and parks connect children to nature.

The link between time spent in natural settings and health outcomes has been the center of focus for healthcare and insurance industries in recent years. Trees and green spaces have shown to increase longevity, reduce the risk of cancer and heart disease, reduce anxiety and depression, improve immune function, and reduce stress hormones. A study in 2016 of 108,000 people found a 12% lower rate of non-accidental mortality among those with the most greenery in a 820-foot (250 meters) radius around their homes (James, et al., 2016). In addition, hospital patients placed in rooms with views of nature experienced shorter stays in the hospital compared to patients in rooms that faced other buildings (Mihandoust, et al., 2021).

Environmental Benefits of Trees

Research over the past several decades provides valuable quantified data on environmental benefits for urban forest researchers, managers, and practitioners. This data can be used to communicate tree benefits to residents and stakeholders and to incorporate trees into infrastructure design such as stormwater management. It can also be used to develop strategies that redress inequities.

A tree canopy assessment contracted by the City in 2023 estimated that 11% of the city (2,361 acres or 3.7 square miles of canopy cover) was shaded by tree canopy. It is important to note this assessment used available data from 2020. In 2023, a tree inventory was conducted to understand the composition and structure of privately managed street trees, complementing the City’s comprehensive record of publicly managed trees. These datasets were used to calculate the following benefits of the citywide urban forest and public tree population as noted.



Citywide Tree Canopy Benefits

The citywide tree canopy, encompassing both public and private land, delivers significant ecosystem benefits. Each year, it is estimated to contribute approximately \$705,000 in value by enhancing air quality and mitigating stormwater volumes. Note, the 2023 study that examined Westminster's canopy cover and the associated benefits does not include benefit or savings values for property value enhancements, health savings, and energy savings among others. It was found that the 2,361 acres of tree canopy cover in Westminster capture the following amount of pollutants annually:

- 2,042 pounds of carbon monoxide
- 38,657 pounds of nitrogen dioxide
- 92,115 pounds of ozone
- 3,250 pounds of fine particulates (PM2.5)
- 55,383 pounds of coarse particulates (PM10)
- **Total pounds of pollutants captured annually: 196,755 pounds**

According to the USDA Forest Service's i-Tree research (itreetools.org), the 196,000 pounds of pollutants removed annually equates to an approximate value of \$286,000. In addition, it is estimated that all trees across the city uptake approximately 7,400,000 gallons of stormwater annually valued at \$66,000 (itreetools.org). Westminster's trees capture or sequester 4,100,000 pounds of carbon annually at a value of \$353,000 a year. Future updates to the tree canopy assessment, building upon the 2023 efforts, should incorporate detailed ecosystem benefit calculations. These calculations would measure the contributions of the canopy to air and water quality, carbon sequestration, and energy savings, among other ecological services. Additionally, the updates should analyze changes in canopy coverage over time, quantifying how such changes augment or diminish these benefits. This holistic approach will provide a more comprehensive understanding of the urban forest's value and the impact of any shifts in the canopy.

Public Tree Benefits

Based on the publicly managed tree inventory, the annual benefits and services provided were determined. Westminster's inventoried public tree population of 12,875 trees provide annual benefits in the amount of \$44,720. The trees capture over four tons of air pollutants, sequester 149,000 pounds of carbon, and prevent over 650,000 gallons of runoff annually. The inventoried publicly managed trees have a replacement or asset value of \$26,400,000, and a carbon storage value of \$641,000 with 3,700 tons of carbon stored. Using the asset value which incorporates the cumulative benefits for the 12,875 maintained public trees result in an average of \$230 in benefits per tree, and \$26 per capita (2021 population).



In Westminster, the inventoried public tree population of 12,875 trees, represents only a portion of the City’s urban forest assets. This count does not include the estimated 6,511 trees in open spaces, which have historically been omitted from the City’s management figures. When considering these additional trees, the total number under the City’s stewardship is significantly higher. While estimates of the benefits these open space trees provide are included in city wide canopy assessments, an inventory of all open space trees is recommended to provide a more accurate reflection of the City’s stewardship and the true value of its urban forest.

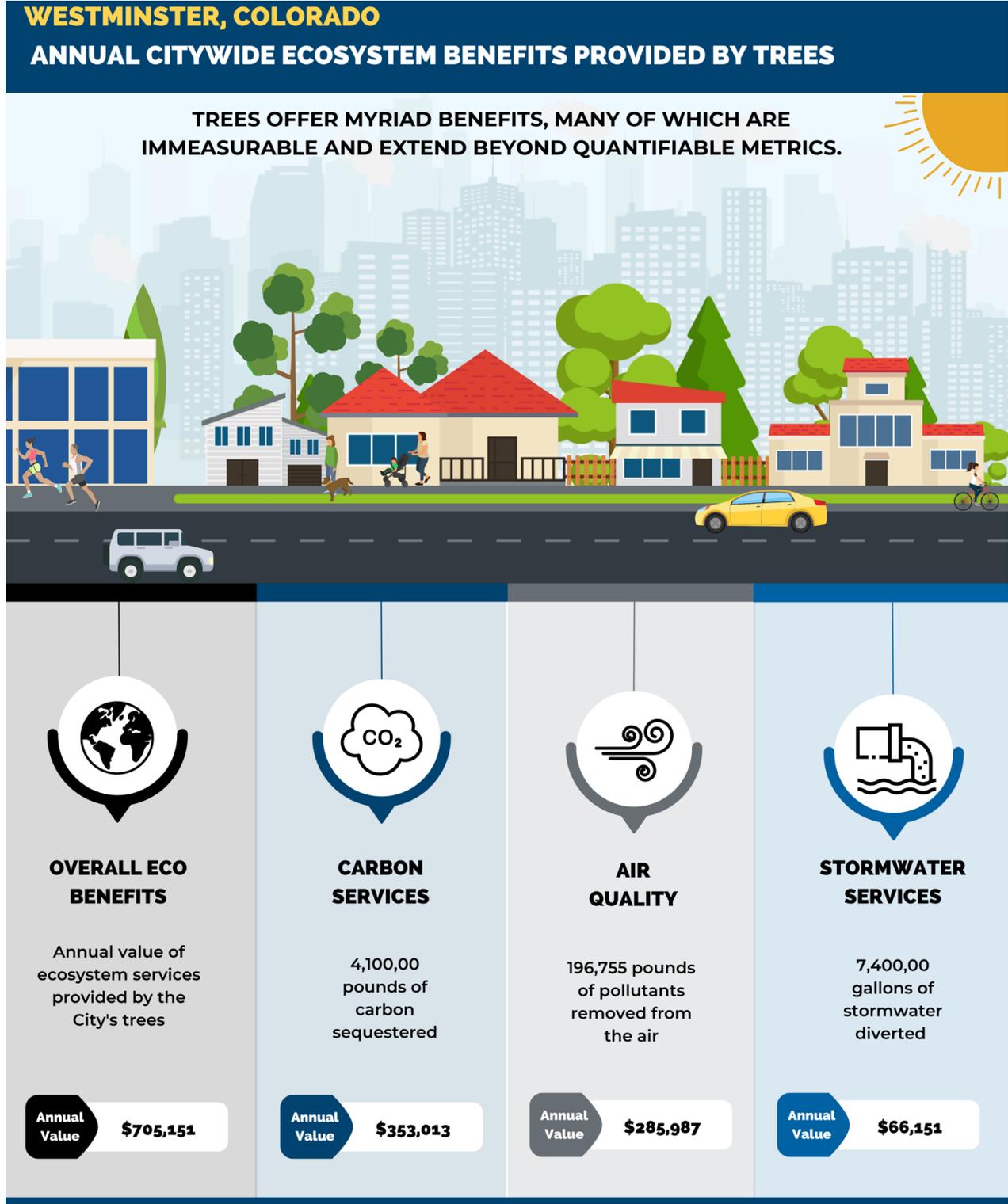


Figure 4. Estimated annual benefits of Westminster's urban forest.



Challenges Facing Westminster's Urban Forest

Urban trees in Westminster face challenges common to their counterparts globally, including harmful pests and diseases, a changing climate, soil and air pollution, compacted soils, limited growing spaces, development pressures, and resource constraints. To overcome these challenges and harness the benefits of these valuable tree assets, strategic and efficient planning and care for the urban forest are imperative.

External Challenges

Westminster's urban forest has been growing and changing as development and redevelopment occurs in the city. In many ways Westminster and the Front Range Corridor are fortunate to be such a highly desirable place to live, work, recreate, and study. Rapid growth in the region is predicted to continue and the effects are being felt. From 2010 to 2020, the Front Range population rose by 16.7%. Specifically, Westminster experienced a 9% growth rate and is now the eight largest city in the state (NWARPC). According to Brookings, the Front Range megapolitan area has a 70% population growth projected by 2040, bringing the region's population to around 6.3 million. This increase in population will result in greater land use and development resulting in the loss of urban canopy if not mitigated properly.

Like many cities, the tree canopy cover in Westminster is not equitably distributed across the city. As a result, some neighborhoods experience higher surface and ambient temperatures, poorer air quality, and more frequent flooding than neighborhoods with greater canopy cover. Additionally, the lack of access to trees and greenspace impacts residents' physical and mental health, sense of community, and overall well-being.

Climate change is an overarching challenge that is compounding the issues facing Westminster's trees. In addition to the known pests, diseases, and weather that the native trees have evolved to withstand, the new changes in temperature and weather extremes bring a new onslaught of pests, diseases, and wet/drought cycles.

Healthy trees can play a significant role in making Westminster more resilient to weather and climate extremes by sustaining the natural ecosystem health. Yet the ability of community trees and forests to achieve their full potential is often significantly limited due to poor tree health stemming from reactive fixes instead of holistic solutions, limited training of tree care professionals, and insufficient municipal budgets.

Internal Challenges

- Proper and timely management of the trees in accordance with current best management practices.
- The need for updated tree-related regulations that preserve, protect, and grow the urban forest aligned with best practices and City priorities.
- Limited financial and operational resources to address the gradual and immediate impacts of climate change.
- Addressing emerald ash borer and other emerging tree pests and diseases.
- Strategic tree planting programs and initiatives needed to sustain and expand tree canopy and the associated benefits.
- Confusion among non-management and planning staff over tree management responsibilities, particularly regarding private and public trees.
- Educating and revitalizing community tree stewardship.



The Time is Now



It is critical for Westminster’s environment, economy, and community well-being that the City act now to sustainably manage the urban forest. The City has a Comprehensive Plan for how Westminster will grow and change with development. Just as important, the City’s 2021 Sustainability Plan lays the foundation and precedent for sustainable management of the city and its assets in the face of climate change. Westminster’s first Urban Forest Management Plan supports and builds on the goals and policies of these plans and supplements those with vital analyses, studies, metrics, and strategies relating to the city’s natural environment and specifically, the urban forest.

Undeveloped areas contain native trees and vegetation, fertile soils, vital water resources, natural prairie, and wetlands. Protection and conservation of these critical areas is up to the citizens and the choices made by the City.

Westminster’s Urban Forest Management Plan provides the roadmap with goals and supporting recommendations to manage, grow, preserve, and strengthen the urban forest through invigorated partnerships that align with City and community priorities. The following section of this Plan, “What do we have?”, is an overview of the current state of Westminster’s urban forest and will serve as a baseline to measure future progress. Following the current state of the urban forest is an overview of Westminster’s priorities for the urban forest, “What do we want?”, which were identified through community and stakeholder input which informed the Plan’s goals, strategies, and priority actions. The “How do we get there?” section details the implementation guidelines, and the “How are we doing?” section and supporting resources in the Appendix provide additional information and studies to support adaptive management and monitoring of the Urban Forest Management Plan.

Let’s begin by exploring Westminster’s urban forest.

WHAT DO WE HAVE?





Program Overview

Trees That Make Up Westminister's Urban Forest

When the term infrastructure is used, oftentimes roads, bridges, power lines, and storm drains are most recognized. In addition to these staples of city infrastructure, trees lining streets and shading parks and backyards are to be included. These trees, collectively known as the urban forest, provide essential benefits that help Westminister function. Services generated by trees in Westminister provide immense value to the city. Like other city infrastructure, urban trees require management and maintenance to succeed. Trees are one of the few infrastructure investments that, if properly maintained, will grow in value over time.

The urban forest is comprised of trees across all city landscapes including streetscapes, parks and open space, trail and waterway corridors, commercial and residential properties, among others. While the Plan primarily addresses public trees, all trees across ownership types and the care of these trees contribute to overall urban forest health, sustainability, and associated benefits.

To present an analysis of the current conditions of Westminister's urban forest, tree populations in these landscapes are characterized by the type of setting and land ownership type (public or private) and the responsibility for maintenance (City or property owner). In the following section, analyses are first summarized for the public tree population, and then the privately managed street tree population. Other private trees are then incorporated into the summary by describing the citywide urban tree canopy cover.

Public trees are comprised of trees along streetscapes, most medians, City owned properties and parking lots, parks, open space, and natural areas on City owned land. The City is primarily responsible for the maintenance of these trees and the Urban Forest Management Plan focuses on the public trees. In Westminister, street trees in the public rights-of-way are the management responsibility of the adjacent property owner, making these public trees privately managed, except in instances when the adjacent property is City owned. View the illustration below for a summary of the tree types in Westminister.



Figure 5. Illustration of the types of trees in Westminister.



Figure 6. A Certified Arborist examines the tree buds to accurately identify the species.

Tree Inventory Overview

Westminster’s urban forest is a diverse ecosystem consisting of young and mature trees of varying species, function, and associated benefits. Cultivating a robust and varied urban forest requires a comprehensive understanding and management of the overall tree population. In 2023, an extensive inventory was undertaken, documenting 15,569 trees located within public rights-of-way but managed by private entities, as mandated by the Westminster City Code. These trees, though situated on public land, fall under the care of adjacent property owners, and are hereafter designated as ‘privately managed’ or ‘private trees.’ This inventory captures only a portion of the private trees that contribute to the urban forest of Westminster, underscoring the significance of both public and private trees to the city’s ecosystem. The species, size, and health of the inventoried trees were analyzed to inform management decisions.

Concurrently, the City of Westminster maintains an inventory encompassing 16,334 data points, representing the publicly managed trees on City property, including parks, facilities, most medians, greenbelts, and select rights-of-way. However, it should be noted that trees in open spaces have historically not been part of this inventory nor included in the management counts. The consulting team conducted a thorough review of this inventory, validated the data, and utilized 12,875 viable data points for further analysis. Similar to the privately managed trees, these were also evaluated based on species, size, and health to pinpoint essential management traits.

Additionally, the consulting team estimated the total urban tree population to be approximately 184,702, with the inventoried trees accounting for 15% of the total population. The uncounted remainder includes trees on private lands and those in open spaces and other natural areas. Estimates suggest some 6,511 trees within city open spaces, which are under City ownership and are subject to passive management unless they are near trails, roads, or private property, at which point they are actively managed, emphasizing the need for a complete inventory of all open space trees.

The tree inventory was intended to gather data that informs the current extent, structure, characteristics, and maintenance needs of the urban forest that can be addressed in the Plan. Note, the public and private tree inventory analysis was conducted in October 2023. Due to ongoing tree maintenance and the dynamic

| Publicly Managed Tree Population | |
|--------------------------------------|----------------|
| City Properties | 12,875 |
| Open Spaces | 6,511 |
| Total City Managed Trees | 19,386 |
| Privately Managed Tree Population | |
| ROW Trees | 15,569 |
| Private Properties | 149,747 |
| Total Privately Managed Trees | 165,316 |

Table 1. Breakdown of Westminster’s urban forest by management and property type based on the 2024 canopy assessment.



characteristics of trees, changes such as condition, tree size, and maintenance needs may have changed since the analysis.

The 2024 Urban Forest Management Plan reveals that Westminster is responsible for a **total of 19,386 trees**, combining 12,875 inventoried publicly managed trees with an estimated 6,511 trees in open spaces. Since the open space trees have not been inventoried, they are excluded from the detailed analysis and recommendations in this Plan. It is imperative, for the sake of a thorough urban forestry program, that the City conducts an inventory of all open space trees as part of the Plan's rollout. This document will focus on the 12,875 inventoried trees that provide quantifiable data for informed decision-making.

Additional summaries and analyses of the public and private tree inventories from 2023 are provided in a separate report. The report culminates with recommendations that address these critical factors, laying out a strategic approach for the stewardship of Westminster's urban forest.

Structure and Composition of Inventoried Trees

Understanding the composition and structure of the urban forest is crucial for effective and sustainable management. This Plan focuses on the City-managed public trees under the City's jurisdiction and provides insights into this natural resource. Summaries of the privately managed street trees are valuable in providing information about the city-wide urban forest and are included to assist the City in engaging residents and property owners to manage this resource more effectively.

The following sections begin with a summary of the publicly managed trees followed by a summary of the privately managed street trees. Each section describes the composition, structure, and maintenance needs which informed the strategies in this Plan, primarily focusing on public trees. The analysis of this data occurred in October 2023.

Public Inventoried Tree Population

| | |
|---------------------------|---------------|
| Number of Alive Trees: | 12,718 |
| Number of Dead Trees: | 68 |
| Number of Unknown: | 89 |
| Total Data Points: | 12,875 |

Table 2. The status and count of public trees in the inventory database (Note: all subsequent data summaries are based on 12,875 trees unless otherwise specified).

Species Diversity

Species composition data are essential since the types of trees present throughout the city dictate the amount and type of benefits produced, tree maintenance activities required, budget considerations, and influences species selection for future plantings.

The 12,875 publicly managed inventoried trees consist of 50 unique genera and approximately 100 different species and cultivar classifications. Of the 50 unique genera, *Pinus* (pine) comprise the highest amount with 2,446 trees (19 percent), *Populus* (cottonwood/aspens/poplar) with 1,496 trees (12 percent), *Fraxinus* (ash) with 1,287 trees (10 percent), and *Quercus* (oak) with 1,139 trees (9 percent). Regarding tree species, of the approximately 100 unique species, cottonwood (*Populus deltoides* and *Populus angustifolia*) comprise the highest amount with 11 percent (1,477 trees) of the total tree population, followed by green ash (*Fraxinus pennsylvanica*) at 8 percent (1,009 trees), honeylocust (*Gleditsia triacanthos*) at 7 percent (923 trees), crabapple (*Malus spp.*) at 6 percent (772 trees), and Austrian pine (*Pinus nigra*) at 5 percent (632 trees). The top ten most prevalent species comprise 55 percent of the



total publicly managed inventoried tree population. The remaining 45 percent is composed of other species that are primarily bur oak, Kentucky coffeetree, littleleaf linden, white ash, catalpa, Ponderosa pine, ornamental pear, swamp white oak, English oak, and silver maple—each with at least 150 trees or more.

The 10-20-30 rule in urban forestry is a guideline for biodiversity in urban tree populations. It suggests that no single tree species should make up more than 10% of the trees in any urban area, no single genus should make up more than 20%, and no single family should make up more than 30%. This rule aims to increase diversity among urban trees, thereby reducing the risks associated with pests and diseases and increasing the resilience of the urban forest. When trees of the same genus are planted together, they are more susceptible to being attacked by a single pest or disease, which can spread rapidly and cause significant damage. Diversifying plantings can significantly reduce the risk of large-scale damage from species-specific threats.

Cottonwoods surpass the recommended species threshold, comprising 11% of the population against a suggested 10%. Given their native status and prevalence in local natural areas, their abundance is in line with regional expectations. The genus *Pinus* at 19% of the population is close to the 20% guideline and indicates the City should consider reducing the number of plantings moving forward. Nonetheless, a closer examination of the privately managed tree inventory will be critical in later sections to assess the diversity of the entire urban forest. To maintain ecological balance, the City should regularly update its tree inventory, keeping a close watch on species variety among public trees.

Size and Relative Age Distribution

The distribution of public tree ages and size classes influences the structure of the citywide urban forest and impacts present and future management costs. An unevenly aged urban forest offers continued flow of ecological benefits and a more uniform workflow allowing managers to more accurately allocate annual maintenance schedules and budgets.

To optimize the value and benefits of Westminster’s trees, the public tree population should have a high percentage of large canopy trees which provide greater ecosystem benefits. On the other hand, there must be a suitable number of younger, smaller trees in the urban forest to account for and eventually replace large and mature trees in decline. Having a healthy percentage of young trees in the urban forest will ensure a sustainable tree population.

To compare Westminster’s urban forest structure to industry-recommended standards, the “ideal distribution” is used (Richards, 1983 and 1993). The diameter at breast height (“DBH” measured at 4.5-feet above grade) is used to measure relative age.

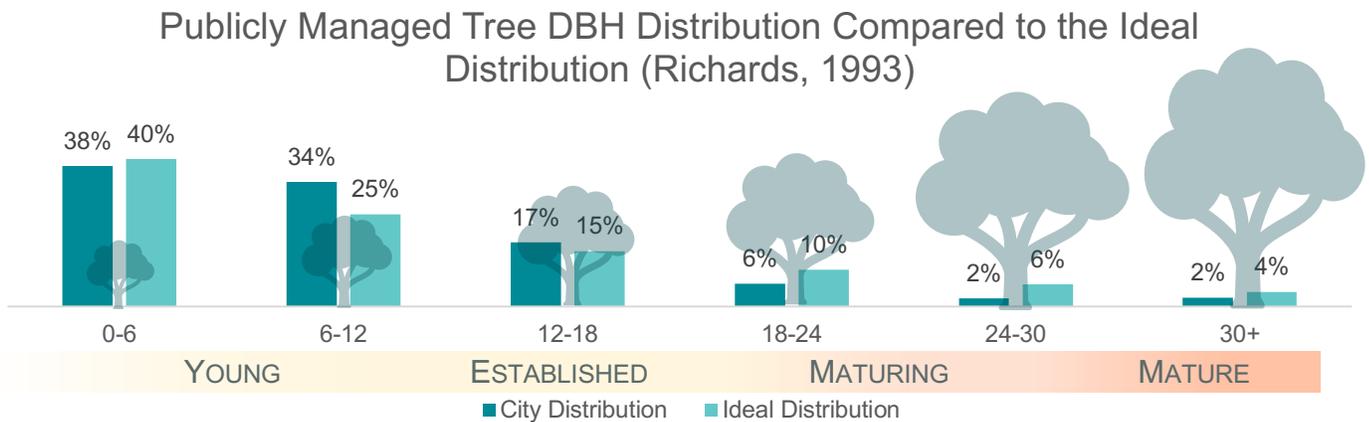


Figure 7. Comparison of Westminister's public tree size classes (left) to the Ideal Distribution (right, Richards, 1993).



The size and relative age distribution of Westminster’s public trees indicates the population is relatively young given the City has more small-diameter trees and fewer trees than the ideal percentage for each of the larger size classes. This distribution may be an indication of an increase recently in planting efforts. The City should expect a growing demand for maintenance as the large number of young / small trees mature.

Condition

Tree characteristics and environmental factors affect the management needs for urban trees. An analysis of the condition can provide an indicator of how well the trees are managed and how they are performing given site-specific conditions. Understanding current and changing conditions plays an important role in planning, budgeting, and resource allocation. Tree maintenance tasks are prioritized based on public safety and the health needs of the trees. By monitoring these needs, managers can more effectively plan and oversee the care of Westminster’s public trees and the broader urban forest.

The inventory of public trees was analyzed to identify potential trends in tree condition and the management recommendations to improve condition or minimize the deterioration of tree condition. Each inventoried tree’s health was evaluated by ISA Certified Arborists based on the condition of the wood and the foliage as well as the structure.

Based on the analysis, it is estimated that five out of six public trees (84%) are in good condition and 12% are in fair condition with only 4% of trees in poor, dead, or unknown condition. The dead trees or trees noted for removal should be addressed and planned for immediately. Trees classified as “Fair” or “Poor” should be examined to determine the necessary mitigation or plant health care, if any, to improve their condition.

Relative Performance Index

In addition to understanding the overall condition of Westminster’s inventoried public trees to inform management strategies, an analysis of performance was also conducted for the ten most prevalent tree species using the Relative Performance Index approach. Relative Performance Index (RPI) is a comparison of a species’ condition rating of “Good” and the tree population’s “Good” rating. Using the percent of Good trees for a given species divided by the tree population percentage of Good trees gives a value of equal to 1, less than 1, or greater than 1. A value equal to 1 means the particular species is as healthy as the overall tree population. A value less than 1 means the species is not as healthy as the overall tree population. A value greater than 1 means the species is healthier than the overall tree population.

Relative Performance Index of Westminster's Publicly Managed Trees

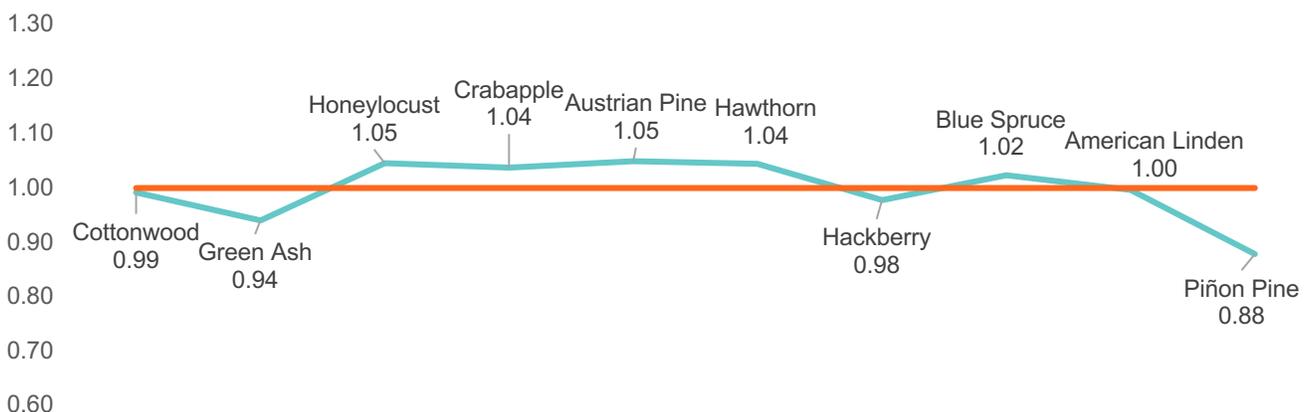


Figure 8. Relative Performance Index (RPI) of the most common public trees.



RPI answers the question of how well a species is performing in terms of health compared to the entire inventoried population. For the inventoried public trees, honeylocust, crabapple, Austrian pine, hawthorn, and blue spruce are performing better than the overall public tree population while American linden is performing similar to the overall population. Cottonwood, green ash, hackberry, and piñon pine are underperforming. These results are in line with the research and evidence of tree species condition and performance for the region. Green ash are currently experiencing decline nationwide due to emerald ash borer (EAB) and their low performance rating is expected. Cottonwoods and piñon pine are native to the region but are experiencing decline due to changing climate. It is well known that the condition of cottonwoods tend to worsen as they grow larger in size, they are prone to decay as they age, and shed branches regularly due to brittle wood.

Interestingly, hackberry is a popular urban tree due to its wide soil adaptability and tolerance of heat, drought, salt spray, wind, ice, and even flooding, but it is underperforming in Westminster. The City would benefit from analyzing the hackberry population to see how performance could be improved.

Observations and Defects

Tree observations (or defects) were recorded for both the publicly and privately managed inventoried trees to further describe a tree's health, structure, or location when more detail was needed. Due to differences in inventory methodologies tree observations were recorded differently between publicly and privately managed tree populations. A total of 19 unique observation options were included in the privately managed inventory for the arborists to note during inventory. An analysis of tree observations in the publicly managed tree inventory was completed by the consulting team and the observations were categorized using the 19 unique observation options used in the privately managed tree inventory.

The public tree inventory contained 1,089 trees (8 percent of the total inventory) with one or more observations related to defects, and a total of 1,140 observations were recorded. Codominant stems was the most frequent observation recorded, based on the inventory 3% of the citywide public tree population has codominant stems. Mechanical damage due to lawnmowers, weed trimmers, construction, vehicles, or vandalism comprise 2% of the public tree population followed by pests with 1%. Although the comments on the inventoried public trees don't provide a complete overview or track the updates made by the City's Forestry Staff, they still deliver important insights into the urban forest's conditions. An updated and comprehensive inventory of all public trees would be invaluable, offering necessary details to guide the forestry team's maintenance practices in alignment with this Plan.

Of the recordings, 87% of the observations or defects may be preventable or mendable meaning the defects or concerns observed are primarily human-caused. For example, poor structure can be prevented or limited with proper young tree pruning, implementing best practices and standards would prevent or reduce the number of improperly pruned trees, and poor root systems can be prevented by choosing quality tree nursery stock, proper planting, and amending soils. Trees with poor location and/or hardscape damage observations could have been prevented by choosing the appropriate species for the site and ensuring adequate root space.

Lastly, adequate mulch rings, growing space, grates, and awareness would reduce the count of mechanical damage observations. Creating mulch rings is a task with substantial benefits for tree health and is particularly impactful for the vitality of smaller trees. While the City's Forestry Team lacks the personnel to take on this work, the Parks staff has available time during the winter when regular activities such as mowing are on hold. Winter mulching can not only safeguard these important green assets but also significantly cut down on labor-intensive trimming come spring and summer. Leveraging Parks staff during these quieter months can enhance interdepartmental collaboration and increase their engagement with urban forestry initiatives. The data also shows the impacts of deferred maintenance. About 45% of the observations recorded could be addressed or prevented with proactive pruning and/or plant health care.



Maintenance Needs

Most tree work recommendations made for the publicly managed trees relate to tree removal or site amendment, both at 4 percent of the inventoried population. All other tree work tasks represent less than 5 percent of the total inventoried population. Otherwise, 88% of the public trees only require routine rotational pruning. The low percentage of maintenance needs may be an indicator of the City’s current practices of conducting routine proactive pruning of public trees across the city.

The tree work tasks, apart from insects, can all likely be addressed with a programmed pruning cycle. This proactive approach aims to address all public trees within a 3- to 7-year cycle as recommended by industry standards and best practices. Studies show this is the optimal range for program efficiency, tree health, and public safety. Pruning less frequently begins to impact the tree health, public safety, and program efficiency due to the compounded effects of deferred maintenance. Newly planted trees should be structurally pruned (training pruned) within three years of planting.

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

The objective is to increase structural integrity by pruning for one dominant leader in most tree species. Young tree pruning is species-specific, since many trees may naturally have more than one leader. Pruning young trees is conducted to cultivate a robust branch structure, ensuring that as they grow, they develop into healthy, structurally stable trees. In addition to training pruning, young trees may also require additional maintenance such as added or amended mulch, watering, added or removed stakes and ties, and/or clearance of debris and litter. These needs can potentially be addressed during young tree pruning.

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

Privately Managed Rights-of-Way Tree Population

| | |
|------------------------|--------|
| Number of Alive Trees: | 15,447 |
| Number of Dead Trees: | 122 |
| Total Data Points: | 15,569 |

Table 3. The status and count of privately managed inventoried trees in public rights-of-way (Note: all subsequent data summaries are based on 15,569 trees unless otherwise specified).

Species Diversity

The 15,569 privately managed inventoried rights-of-way (ROW) trees consist of 42 unique genera and approximately 113 different species and cultivar classifications. Of the 42 genera, *Fraxinus* (ash) comprise the highest amount with 2,870 trees (18 percent), *Acer* (maple) with 2,240 trees (14 percent), *Malus* (apple and crabapple) with 1,423 trees (9 percent), and *Gleditsia* (honeylocust) with 1,447 trees (9 percent). Regarding tree species, of the approximately 113 unique species, green ash (*Fraxinus pennsylvanica*) comprises the highest amount with 18 percent (2,726 trees) of the total tree population, followed by crabapple (*Malus spp.*) at 9 percent (1,409 trees), Austrian pine (*Pinus nigra*) at 7 percent (1,028 trees), blue spruce (*Picea pungens*) at 5 percent (840 trees), and honeylocust (*Gleditsia*



tricanthos) with 5 percent (824 trees). The top ten most prevalent species comprise 61 percent of the total privately managed inventoried tree population. The remaining 39 percent is made up of other species that are primarily Norway maple, swamp white oak, red oak, cottonwood, red maple, bur oak, quaking aspen, Siberian elm, juniper, and common hackberry— each with at least 150 trees or more.

Based on the 10-20-30 rule, green ash are exceeding the 10% guideline at 18% of the population. With the threat posed by EAB this has dire implications for Westminster’s urban forest. As stated earlier, planting similar species of trees in one area, also known as a monoculture, can have negative impacts on the environment and ecosystem and puts the tree population at risk to harmful pests and diseases. A lack of diversity can also lead to a reduction in biodiversity. A diverse ecosystem typically supports a wider variety of wildlife, but monocultures may not provide the necessary habitat diversity for many species, leading to a decline in wildlife populations.

Size and Relative Age Distribution

Privately Managed ROW Tree DBH Distribution Compared to the Ideal DBH Distribution (Richards, 1993)

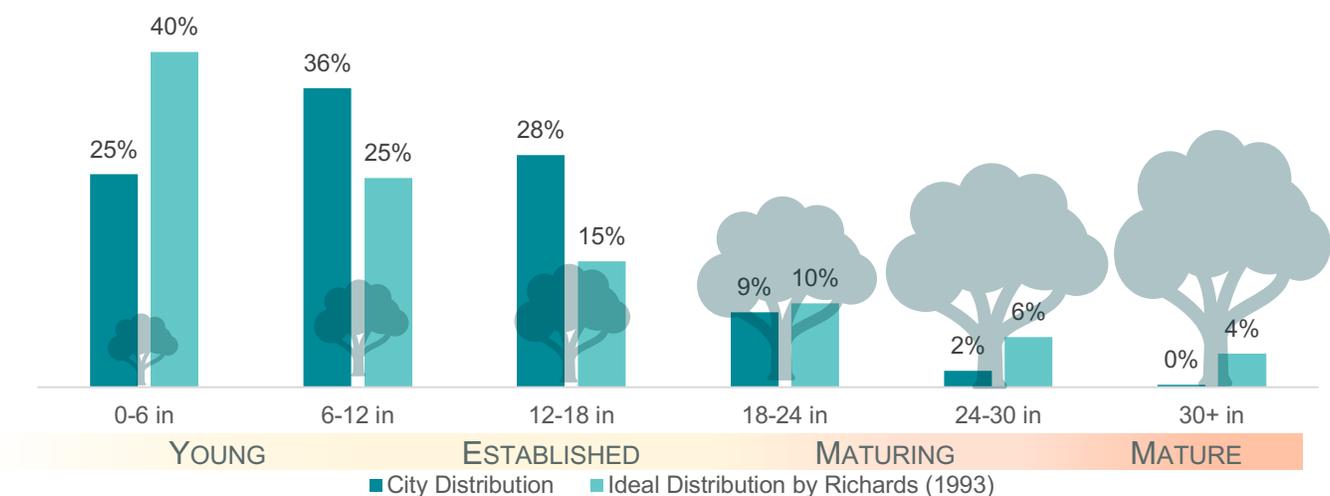


Figure 9. Comparison of Westminster’s privately managed street tree size classes (left) to the Ideal Distribution (right, Richards, 1993).

Privately managed ROW trees, show an imbalance with an overrepresentation of mid-sized trees and a shortage of both young and very large trees. Very large trees (30+ inches) are exceedingly rare, below one percent, a shortfall that could affect biodiversity and carbon storage. Mid-sized trees (6-18 inches) are overrepresented at 64%, compared to an ideal 40%, hinting at historical planting surges or a gap in the cultivation and retention of young and very mature trees.

Condition

Overall, privately managed ROW trees are in excellent, good, and fair condition, representing 93% of the 15,569 trees in the inventory. “Excellent” condition comprises less than 1% or 10 trees, followed by those in “Good” condition comprising 69% or 10,780 trees, and finally those in “Fair” condition comprising 24% or 3,713 trees. Nine hundred and forty-four (6%) trees are noted as being in “Poor” condition and 122 trees (1%) are dead. The dead trees or trees noted for removal should be addressed and planned for removal immediately. Trees classified as “Poor” may have a chance at recovery depending on the factor(s) affecting the rating. These trees should be examined to determine the mitigation necessary, if any. As responsibility of management for the two inventoried tree populations is different, the approach to dead and poor trees will differ. It will be necessary to send letters to the adjacent property owner of privately managed trees alerting them of the necessary actions required for their trees.



Relative Performance Index

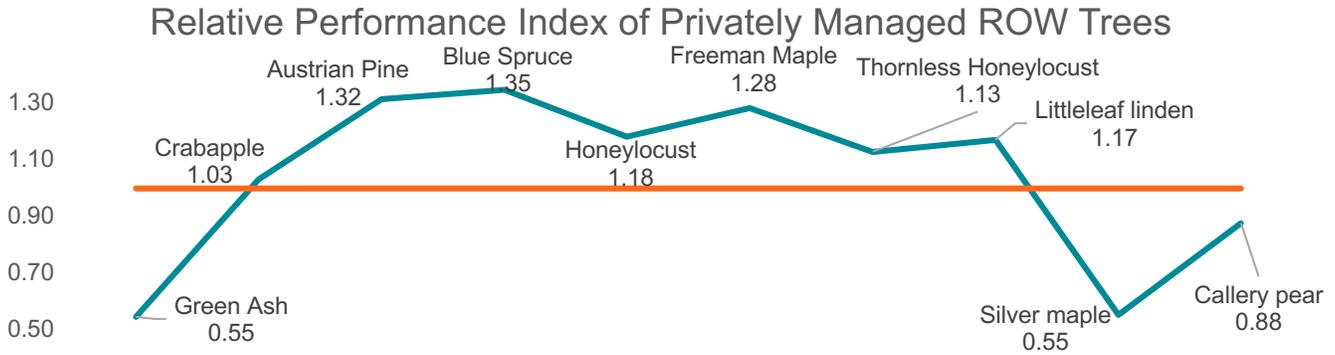


Figure 10. Relative Performance Index (RPI) of the most common privately managed street trees.

For the inventoried private trees, crabapple, Austrian pine, blue spruce, honeylocust, Freeman maple, thornless honeylocust, and littleleaf linden are performing better than the overall private tree population while green ash, silver maple and callery pear are all underperforming. These results are in line with the research and evidence of tree species condition and performance for the region. Of note, it is well-known that the condition of silver maples and callery pears tends to worsen as they grow larger in size. These tree species are also known to periodically shed branches and suffer catastrophic failure as the wood is brittle.

Interestingly, privately managed ROW green ash have a lower RPI (0.55) than their publicly managed counterparts (0.94). This is likely due to privately managed trees receiving less maintenance and care while facing pressure from EAB. As green ash makes up 18% of the private tree population, it is crucial that steps be taken to improve the performance of ash trees. At this time the City of Westminster has implemented the Save Your Ash program to assist residents and property owners with green ash maintenance and EAB treatment. The Save Your Ash program only provided one-time assistance for the first round of EAB preventative treatments, securing funding to provide further assistance to preserve or remove privately managed ROW ash trees will be discussed in later sections of the Plan.

Observation and Defects

In the private ROW tree inventory, 2,917 trees (19 percent of the total inventory) had one or more defects, and a total of 5,406 observations were recorded. Of the 5,406 observations recorded, codominant stems was the most frequent defect recorded (10 percent or 1,483 trees). Eight percent or 1,297 trees were noted as having crown dieback, and 7 percent or 1,063 trees were observed to have poor structure.

Of the total observations made, 91 percent, are preventable or mendable meaning the defects or concerns observed are primarily human-caused. The data also shows the impacts of deferred maintenance. About 76 percent of the observations recorded could be addressed or prevented with proactive pruning (codominant stems, crown dieback, poor structure, improperly pruned, girdling roots, included bark, and vines).

Maintenance Needs

Most of the tree work recommendations made for the privately managed ROW trees relate to priority tree pruning (19 percent) to address immediate concerns such as clearance, structural, and crown clearing. All other tree work tasks represent less than 2 percent of the total inventoried population. It is recommended that the remaining 79 percent of trees receive regular routine pruning on a rotational cycle.



Summary of Tree Inventory Analysis

As both inventoried populations are parts of a whole, it is important to analyze the inventoried tree populations in terms of the citywide urban forest. The combined inventories total 28,444 trees, as previously mentioned accounting for 25% of the estimated citywide urban forest.

The urban tree inventories of Westminster reveal distinctive characteristics between publicly and privately managed trees. The public tree population boasts a wider variety of genera, totaling 50 unique types, alongside approximately 100 species and cultivars. In contrast, the private tree population exhibits a greater species diversity, with about 113 species and cultivars across 42 unique genera. Certain genera like *Fraxinus* (ash) and *Gleditsia* (honeylocust) feature prominently in both inventories, indicative of their adaptability or preference within the urban landscape of Westminster. Overall, the comparison of the two datasets underscores the need for continued diversification in both public and private urban forestry efforts. The data illustrates the dynamic and evolving nature of urban forestry management and the importance of adaptability in maintaining a resilient urban canopy.

This comparative analysis indicates that while both inventories show a majority of trees in good or fair condition, publicly managed trees have a higher percentage in the good category, while privately managed trees have a slightly higher incidence of poor health and mortality. The observed differences in tree health between publicly and privately managed trees may be attributable to several factors. Publicly managed trees often benefit from systematic maintenance programs and consistent care by City-employed arborists or contracted tree care professionals. These programs are likely to follow established urban forestry guidelines, which can lead to a greater proportion of trees in good health. Privately managed trees, on the other hand, may not receive the same level of attention due to variability in homeowners' knowledge, interest, or financial resources dedicated to tree care. The higher incidence of poor health and mortality in these trees might reflect inconsistent care practices, less frequent pruning, watering, or disease management, which are crucial for tree health. Additionally, public trees might be selected based on their suitability to the local environment and their known resilience to urban stressors, whereas private tree selection may be driven by aesthetic preferences without equal consideration for longevity or disease resistance. The public sector's capacity to implement large-scale interventions, like pest control programs, also contributes to the better condition of publicly managed trees. In summary, the variance in tree health between public and private sectors likely results from differences in the level and quality of tree care, expertise in tree selection, and the scale at which tree maintenance practices are implemented.

Comparing the two datasets, suggest Westminster has a young urban forest, but is lacking in very young trees as most fall in the 6-18 inch DBH range. To align more closely with ideal distribution, urban foresters may need to prioritize the planting of new trees, especially focusing on the protection and maintenance of mature specimens, and ensuring a diverse age distribution to maintain the forest's sustainability and ecological benefits into the future. Management strategies discussed in this plan will help the City and its partners to maintain and protect the existing urban forest, allowing the young trees to grow and reach maturity while planting new trees every year. By following these suggested strategies, the urban forest will reach the ideal distribution over the next couple decades.

Current Conditions of the Citywide Urban Forest

Tree Canopy Cover

An assessment of tree canopy cover citywide provides the data and information to develop goals and strategies relating to tree planting, preservation, tree equity, and risk management along with the data to support community outreach and education. These urban tree canopy assessments, referred to as "UTC Assessments" or "Tree Canopy Assessments" and "TCA's" provide the information for long-term planning and serve as a measurement of change and progress over time.



This information can be utilized with other City planning efforts for sustainability, equity, human health, climate resiliency, stormwater management, water quality, wildlife preservation and enhancement, air quality improvements, and development guidelines among many others.

UTC assessments provide a baseline understanding of existing canopy cover across the entire city. In addition, these assessments provide an analysis of possible planting areas citywide and by various planning boundaries. This assessment for Westminster represents an important step in better understanding current conditions of the urban forest, its tree canopy distribution and value, and the importance of urban forestry during planning processes. This baseline assessment should be utilized in measuring progress resulting from implementing this Plan.

Urban Tree Canopy (UTC) Findings

This Urban Tree Canopy (UTC) Assessment of Westminster, Colorado was conducted by PlanIT Geo, Inc. for the City of Westminster. Using high-resolution aerial imagery from the USDA's National Agriculture Imagery Program (NAIP), PlanIT Geo used remote sensing and GIS techniques to map and measure land cover types across several geographic scales. This assessment identifies existing UTC and Possible Planting Areas (PPA) to assist in developing an urban forest management planning.

Westminster, CO Land Cover

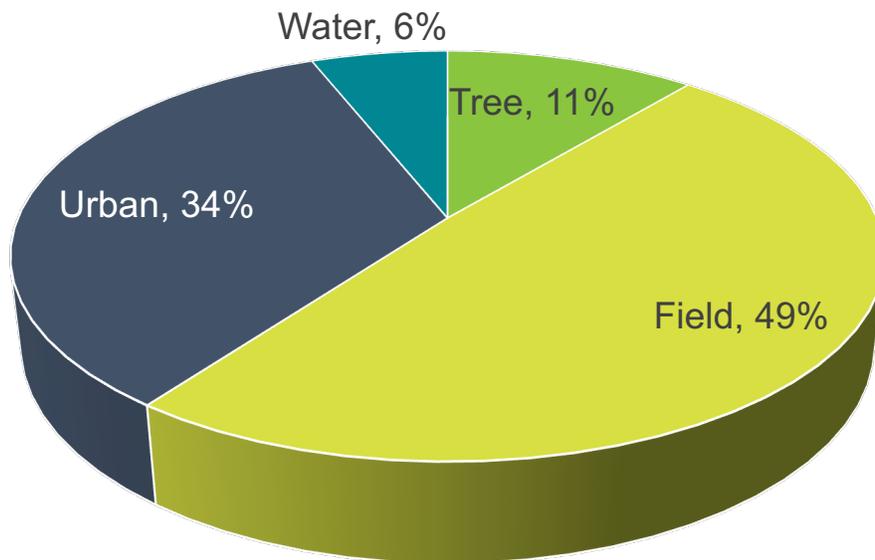


Figure 11. Citywide tree canopy results (2024).



Urban Tree Canopy
"Tree"



Non-Canopy Vegetation
"Field"



Impervious
"Urban"



Waterbodies
"Water"

Figure 12. Examples of the land cover classes analyzed as part of the tree canopy study.



The 2024 UTC assessment classified land cover by various types. The acreage and percentage of tree canopy, field, urban, and water were calculated based on the total city land area of 21,757 acres. Of the total city land area, 11% is tree canopy, 49% is field, 34% is urban, and 6% is water.

The citywide tree canopy cover of 11% means there are 2,361 acres of tree canopy when viewed from above. This amount of canopy translates to 3.7 square miles of canopy across the city. For reference, the city’s total land area is 34 square miles.

Of the 21,757 total acres of Westminster, 49% is classified as “field” meaning it is land cover that is either grass, turf, low-lying shrubs, short grass prairie, or bare soil. These areas may be potential future opportunities for tree plantings, however short grass prairie constitutes the majority of the city’s open space and is unirrigated making planting difficult though not impossible.

34% of the area that is classified as “urban” means these areas are either buildings, road surfaces, parking lots, sidewalks, or other paved and impervious surfaces. Certain impervious areas such as parking lots and sidewalks could potentially be new opportunities for tree planting. While it may be more difficult and costly to plant trees in these areas, the benefits of the trees once established may be far greater due to the reduction of impervious surfaces that contribute to stormwater runoff, urban heat islands, and reduced air quality.

Communities frequently use this data to establish tree canopy goals and achieve a shared vision for the urban forest. When canopy data is available, goals are set based on a comparison of existing and potential tree canopy coverage with a focus on equitable distribution. According to a national analysis by U.S. Forest Service researchers, a 40-60% urban tree canopy is achievable in forested communities. Realistic baseline targets are lower in grassland cities (20%) and desert cities (15%). However, higher percentages are attainable through greater investment and prioritization (Leahy, 2017). It is important to note that urban tree canopy percentage is just one of many criteria to consider. Age and species diversity, condition of trees, and equitable distribution are equally important (Leahy, 2017).

Tree Canopy Equity

Tree canopy is often not distributed equitably across city landscapes and ownership types. The American Forests organization created the Tree Equity Score (TES, www.treeequityscore.org) tool to measure tree equity across 150,000 U.S. neighborhoods and 486 municipalities in urban areas. Each community’s TES indicates whether there are enough trees for everyone to experience the health, economic, and climate benefits that trees provide.

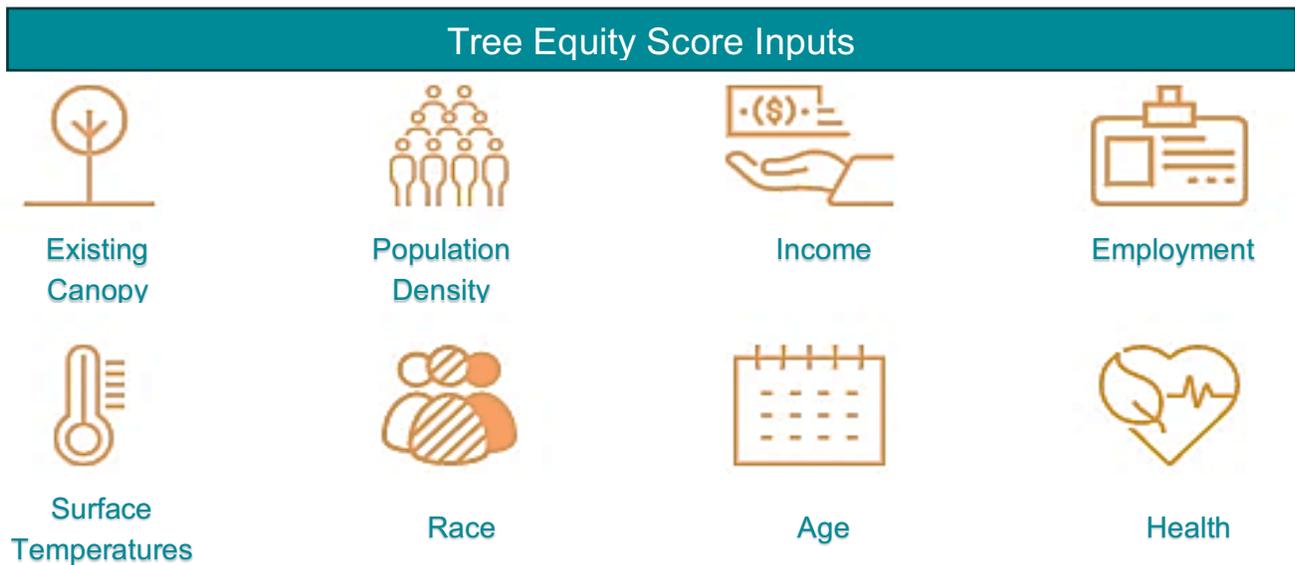


Figure 13. Inputs for Westminster's Tree Equity Score (2023). Source: American Forest's Tree Equity Score Tool.



The scores are based on how much tree canopy and surface temperature align with income, employment, race, age, and health factors. A 0- to-100-point system makes it easy to understand how a community is doing.

With the knowledge the score provides, Westminster’s community leaders, tree advocates, and residents alike can address climate change and public health through the lens of social equity, attract new resources, factor the scores into technical decisions, guide implementation of the 2024 Urban Forest Management Plan, and track progress toward achieving tree equity.

A score of 100 represents tree equity. Based on a 2023 analysis, Westminster’s overall tree equity score is 86 out of 100. Based on the nationwide dataset for 197,505 U.S. Census-defined urban areas, the average score is 85 (as of 2023).

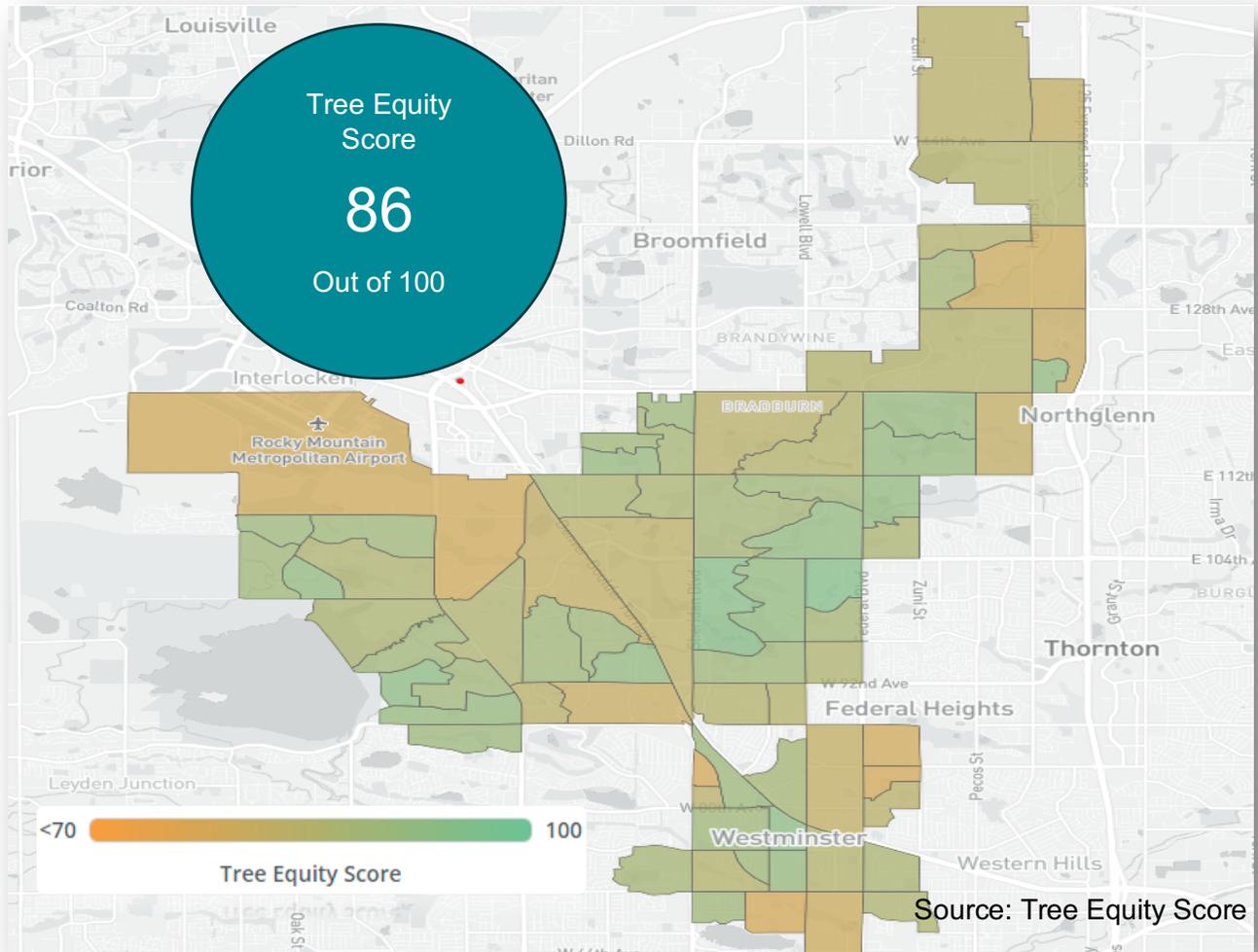


Figure 14. Map showing the Tree Equity Scores for Census Block Groups in Westminster. Source: American Forest’s Tree Equity Score Tool.

The map illustrates Tree Equity Scores for each of the 72 Census Block Groups (CBGs) within Westminster, derived from the preceding figure’s data inputs. None of the CBGs have achieved a perfect tree equity score of 100, and none fall below the threshold score of 75. The majority, 48 CBGs, fall within the 80-89 score range. The five CBGs within the 70-79 range present a chance for the City to foster equitable tree canopy expansion, especially since they rank among the lowest. It should be noted that the tree equity score map, generated by American Forests, mistakenly includes one CBG that belongs to Broomfield, CO. This external analysis remains unalterable by the City or consulting team; however, removing this CBG would likely improve Westminster’s aggregate tree equity score.

Tree Equity Score Distribution by Census Block Group (CBGs)

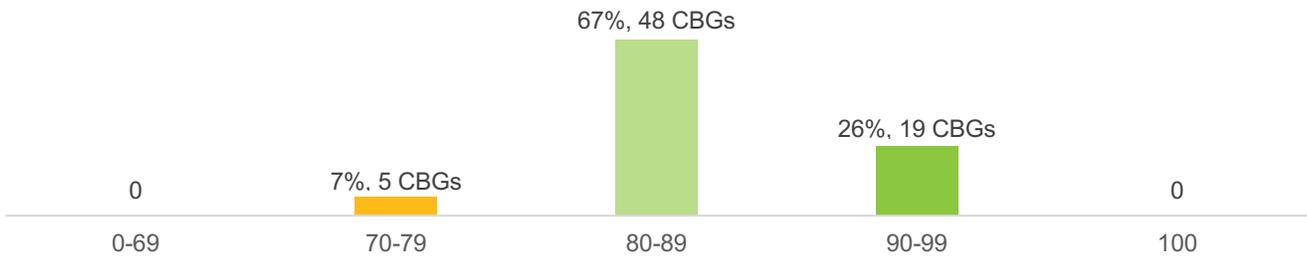


Figure 15. Count and percent of Census Block Groups by Tree Equity Score ranges. Source: American Forests' Tree Equity Score Tool.

Compared to other cities in the state, Westminster's Tree Equity Score of 86 is above the average of 84 for 11 Colorado cities assessed as part of the study (see figure below) and is slightly above the national average of 85 as of 2023.

Comparison of Tree Equity Scores in Colorado

Average Score: 84

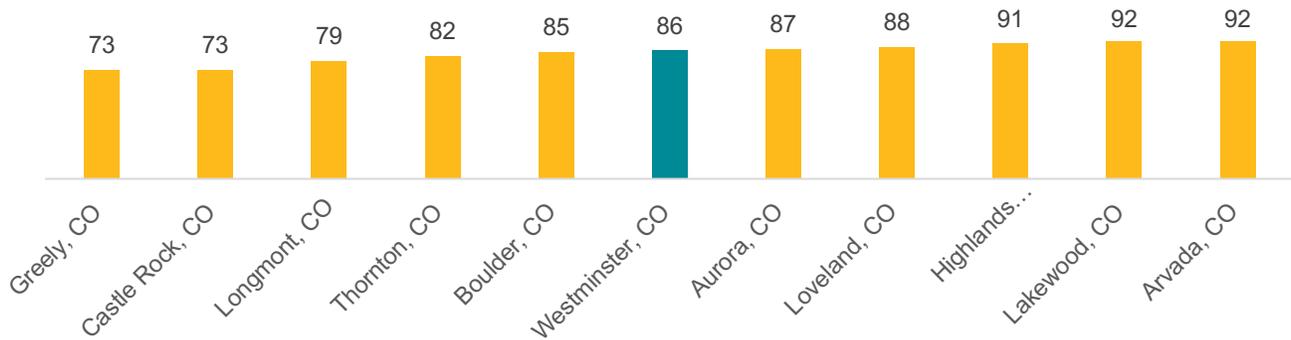


Figure 16. Comparison of Tree Equity Scores for select Colorado cities based on a 2023 study. Source: American Forests' Tree Equity Score Tool.

The Tree Equity Score tool utilized data from EarthDefine and found the canopy cover percentage to be 12% though this plan uses the 11% determined by the City provided data from 2020.

Canopy Cover by Percentage of People of Color

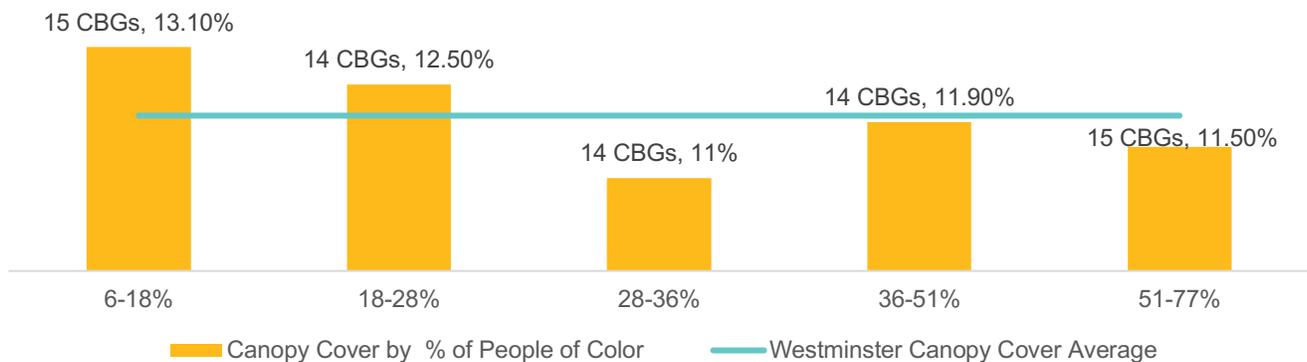


Figure 17. Canopy cover (%) and count of Census Block Groups by ranges of people of color. Source: American Forests' Tree Equity Score Tool.

Canopy Cover by Percentage of People in Poverty

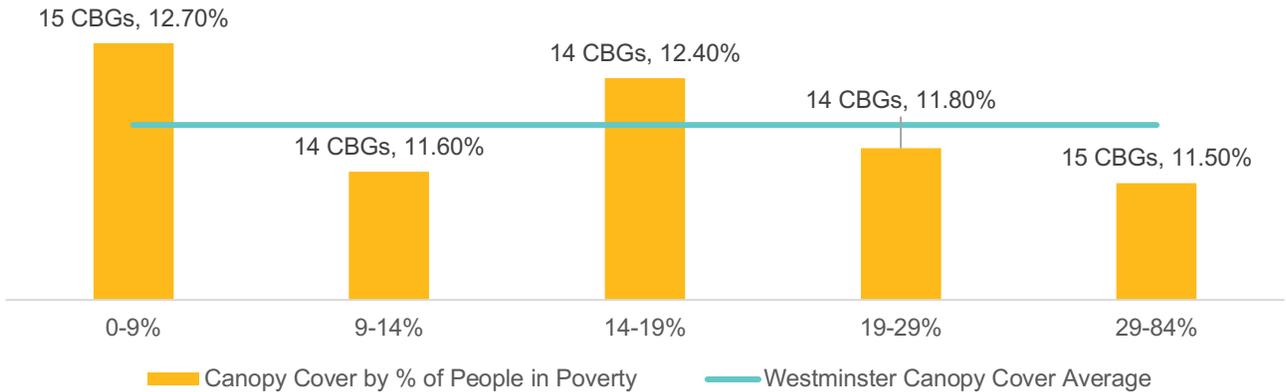


Figure 18. Canopy cover (%) and count of Census Block Groups by ranges of people in poverty. Source: American Forests' Tree Equity Score Tool.

Canopy Cover by Temperature Ranges

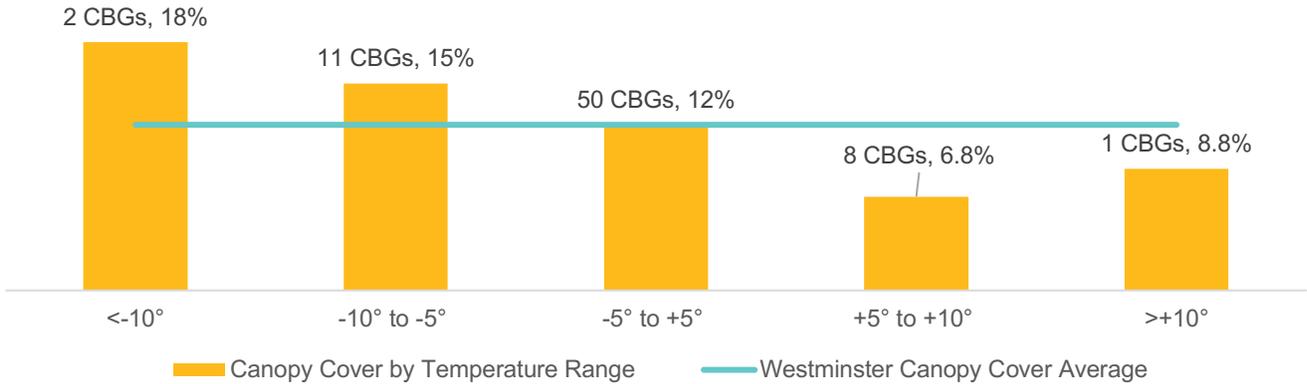


Figure 19. Canopy cover (%) and count of Census Block Groups by temperature ranges in degrees Fahrenheit. Source: American Forests' Tree Equity Score Tool.

The summaries on the following page provide insights into the distribution of canopy cover across 72 CBGs and sociodemographic data including the proportion of people of color, people in poverty, and change in temperature by CBG. Canopy cover tends to decrease as the percentage of people of color in the population increases. Block groups with 0-28% people of color have a higher-than-average canopy cover, while those with over 28% people of color have significantly less canopy cover than the average. A similar trend is observed with economic status; areas with a lower percentage of people in poverty have higher canopy coverage. The lowest canopy cover is seen in block groups where the poverty rate exceeds 20%. CBGs with less than the average canopy coverage experience greater temperature variations and an increase in the urban heat island effect. This data should be utilized in prioritizing public and private tree plantings to redress inequities and low canopy cover. These charts underscore the importance of equitable distribution of urban forestry efforts, as there appears to be a correlation between lower canopy coverage and higher percentages of marginalized populations, as well as warmer temperature ranges. These patterns suggest a need for targeted interventions to enhance canopy cover, particularly in heat-vulnerable and underserved communities.



Current Tree Management in Westminster

The City of Westminster has a range of existing policies, regulations, and programs that are used to manage the city’s urban forest. City departments engaged in Westminster’s urban forest planning effort each bring important expertise, perspective, and resources to this commitment.

Westminster has been recognized as a Tree City USA for 39 years, ranking alongside other cities like Englewood, Glenwood Springs, and Evans, together making up the eight longest running designations in Colorado. Westminster has a long-standing commitment to urban forestry, showcasing its dedication to maintaining and improving its urban canopy.

Programs for Managing Westminster’s Trees

Summary of Programs and Services



The **Parks, Recreation, and Libraries Department (PRL)** of Westminster, encompassing several divisions, manages the city’s urban forest through its Parks, Golf, and Open Space Division (PGOS). The Forestry team, dedicated to managing trees on public lands—including parks, open spaces, medians, select rights-of-way, city facilities, and, more recently, golf courses—comprises four full-time employees: a City Forester, an Assistant City Forester, and two Arborist Technicians. Additionally, up to three non-benefited field workers are employed for 30 hours weekly throughout the year. However, the Forestry Team has historically faced challenges with staffing, particularly with field workers, due to high turnover rates and difficulties in hiring and retention. Maintenance of trees on golf courses remains a topic of discussion, as these operations are financed through enterprise funds, which differ from the regular budgeting for public spaces. While golf maintenance is predominantly managed by dedicated staff specializing in turf and irrigation, the only parks personnel the golf operations rely on for maintenance are from the forestry team.

The Parks and Standley Lake operations are supported by 40 full-time employees (FTEs) whose positions are financed by the General Fund. This includes two roles designated for landscape design, held by either Landscape Designers or Senior Landscape Architects. An additional 48 FTEs, funded by alternative sources which encompass forestry operations, contribute to the department's objectives. This

contingent includes one position for a Landscape Designer or Senior Landscape Architect. These



allocations ensure that both the aesthetic and functional aspects of Westminster's public spaces are thoughtfully designed and maintained for community use and enjoyment.

In Westminster's [Community Services](#) department, planners oversee the selection of trees for development projects, with roles clearly defined to ensure compliance with landscape regulations and city standards. The Landscape Planner reviews all private development plan landscape sheets within an Overall Development Plan (ODP) application, assessing elements such as planting ratios, mitigation efforts, species diversity, and planting specifications. The Planner negotiates during the Planned Unit Development (PUD) zoning process with developers, the ODP Inspector, and the Landscape Planner to modify standards for achieving desired outcomes. The ODP Inspector handles the financial aspects, including collecting surety at 115% of the project estimate, which is reduced to 15% one year after construction acceptance, pending a final inspection.

Currently, there isn't an established protocol for the Forestry Team to participate in the review of tree selection or placement in private property developments. Due to limited staffing capacity, Forestry has not been involved in these processes. However, there is a strong interest in engaging more actively to aid in diversifying the urban forest and better managing the city's tree population by tracking these trees. The Forestry Team aims to collaborate with Community Services to enhance tree management across both public and private properties.

Staffing Levels for Urban Forest Management

Many cities struggle to maintain adequate staffing and resource allocation. Available resources may cover short-term needs while neglecting important initiatives necessary to sustain long-term urban forest management. Determining and maintaining optimal staffing levels is critical to a program's efficiency. Optimal staffing depends on several factors including the number of public trees, how authority and responsibility is defined in the municipal code, internal and external expectations, customer service including requested assistance and inquiries from the public, operations, and existing programs. Understaffed programs typically contend with excess overtime, morale issues, absenteeism, employee burnout, and difficulty with relief coverage and training requirements.

The City of Westminster's commitments to public health and safety, combating climate change, and addressing inequities translates into a growing demand for both long-term initiatives, and the staff to operate them. The growing urban forest will require increased staffing levels to achieve and maintain urban forest goals. To assess growth and demand, the Urban Forestry Program should develop annual work plans and reports (as applicable) based on key performance indicators provided with this Plan.

Some capacity and efficiencies for existing workloads can be improved through clarifications of roles, responsibilities, and workflows among City departments and divisions. Periodically examining program structures, staffing needs, and levels of service may identify ways to improve efficiencies, communications, and workflows within and among departments. Cities often consider consolidating their tree programs into one division or section to achieve these outcomes. Redirecting forestry staff away from non-forestry tasks like snow removal and holiday decorating is crucial for maintaining their focus and effectiveness in forestry operations. Establishing a strong organizational structure with clear operating procedures is foundational in reducing future costs and addressing increased service demands.

Budget and Funding

In 2023, Westminster's forestry budget, which is notably intricate despite its modest size, was categorized into two main funding streams: the restricted Tree Mitigation Account and the unrestricted Tree Mitigation Program.

For the first time, forestry received a dedicated line item in the City budget, with an amount consistent with 2023's allocation projected over the next five years. Capital Improvement Project (CIP) funds are expected to stay at \$170,000 for the upcoming year and potentially beyond. Previously, forestry funding



was limited to staffing and equipment, with any additional funds for contracted work—usually under \$20,000—being sporadically available at year-end.

The City Forester oversees the budget but not the salary accounts, which are managed by a higher-level supervisor. The unrestricted tree mitigation account, newly established in 2023, addresses City tree maintenance, hazard tree removal, and Emerald Ash Borer prevention. Funds from the restricted tree mitigation account are derived from development project fees and a formula mandating the replacement of removed trees at twice their diameter, or a cash-in-lieu option. These funds, solely used for tree planting and related aftercare, significantly fluctuate year to year, creating challenges in planning. No general fund is allocated for tree planting purposes.

Benchmarking of Westminster’s urban forestry budget and various programs was conducted by comparing the City to national and state averages, as well as to best-matched cities in Colorado, to inform the development of the plan.

Westminster Per Capita Urban Forestry Budget

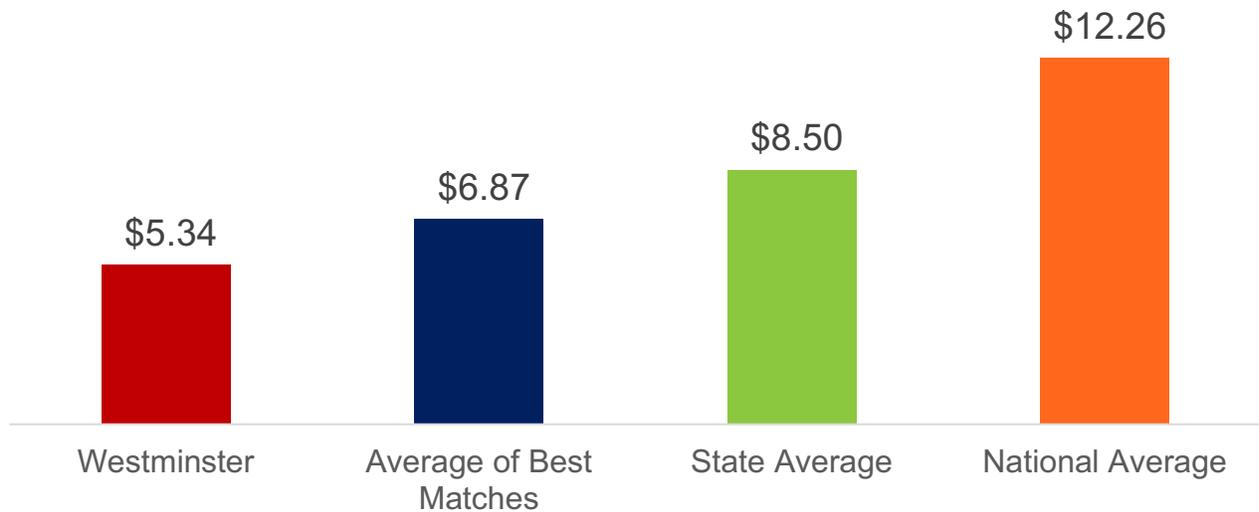


Figure 20. Summary of Westminster's per capita urban forestry budget compared to national and state averages and best-matched cities in Colorado.

Figure 20 illustrates benchmarking of Westminster’s per capita urban forestry budget. Westminster’s budget stands at \$5.34 per capita, which is lower than the average of best-matched cities at \$6.87, the state average of \$8.50, and significantly less than the national average of \$12.26. This benchmarking exercise offers a perspective on how Westminster’s urban forestry funding compares to broader averages, indicating room for potential growth in its budget allocation to align more closely with state and national levels.

Public Tree Maintenance and Planting

The Forestry Team in Westminster adheres to a proactive rotational tree maintenance schedule, targeting at least one large- and one small-designated area each quarter, with the bulk of the work typically carried out in the winter. However, snow removal and holiday light installation take precedence during these months. Rotational work areas are demarcated by parks, facilities, or other natural demarcations and vary greatly in the number of trees.

From April to May, requests for work from residents, Access Westminster, and City staff begin to increase, only lessening at the end of fall. These requests span a wide spectrum, from individual damaged



branches to extensive pruning across multiple trees. Tasks are classified into three priority levels: Priority 1 tasks necessitate immediate attention, ideally within two weeks, and include urgent situations such as storm damage, access issues, or hazardous conditions. Priority 2 encompasses less urgent maintenance or pre-scheduled work, while Priority 3 includes non-critical tasks to be completed within six months to a year, serving as supplemental activities for staff during slower periods, though such lulls are rare. Since 2020, the Forestry Team has responded to an average of 205 actionable service requests, referred to as one-offs, while the City Forester receives close to 1,000 service requests per year. It is important to note, the majority of these requests come from City staff or the forestry team indicating that issues are typically addressed before becoming apparent to the public. However, this high number of internal requests also highlights the proactive tree management limitations due to inadequate staffing and resources. Required tree maintenance and rotational pruning based on inventory data to achieve a healthy and sustainable urban forest will be discussed in greater detail in the Implementation Section of this Plan.

| Year | In House Number of Trees Pruned* | Number of Trees Pruned by Contractors | Actionable Service Requests (one-offs) |
|------|----------------------------------|---------------------------------------|--|
| 2020 | 54 | 70 | 169 |
| 2021 | 132 | 386 | 208 |
| 2022 | 503 | 341 | 257 |
| 2023 | 463 | N/A | 187 |

Table 4. Westminster's Forestry Team pruning and tree maintenance by year.

The City of Westminster actively plants and removes trees as necessary throughout the city on public lands. At this time, the removal to planting ratio is not sustainable for the urban forest with removals exceeding annual plantings. To improve tree mitigation and increase planting rates to exceed annual removals, the consulting team has outlined goals and strategies in the [Implementation Section](#) of this plan to aid the City in creating a sustainable urban forest and increase canopy cover. Currently, the City has identified 905 planting locations ready to plant, with 752 more planting locations requiring irrigation work to be ready. With the number of available planting locations, Westminster is well poised to improve their planting to removal ratio and increase canopy coverage. Within Westminster's public lands, there are numerous potential tree planting sites that either have not been identified or for which the data has been lost over time. Additionally, as trees are removed for maintenance, this will create new opportunities for planting, expanding the available locations for future tree growth.

| Year | Trees Removed | Trees Planted |
|------|---------------|---------------|
| 2013 | 363 | 287 |
| 2014 | 368 | 154 |
| 2015 | 617 | 125 |
| 2016 | 574 | 119 |
| 2017 | 368 | 102 |
| 2018 | 262 | 145 |
| 2019 | 150 | 211 |
| 2020 | 723 | 340 |
| 2021 | 384 | 171 |
| 2022 | 407 | 566 |
| 2023 | 659 | 303 |

Table 5. Westminster's tree planting to removal ratio from 2013 to 2023.

Public Engagement

Beyond their essential duties, City

Forestry oversees a suite of community services such as tree branch recycling, complimentary mulch distribution, and the recycling of leaves and pumpkins. They also conduct the ReLeaf Westy Tree Sale and offer training opportunities through partnerships with Front Range Community College and The Park People's arborist apprenticeship programs.

The City of Westminster's urban forestry program, while lacking tree-specific volunteer groups, has initiated efforts to establish the Westminster Tree Stewards program. However, due to constraints on time and staffing, this initiative has not progressed beyond its initial conceptual stage. Historically, Westminster Open Space volunteers have actively participated in forestry projects, including tree planting



and the removal of invasive Russian olive trees. The Forestry Team hosts four volunteer events annually, two of which involve tree wrapping and unwrapping to protect trees from winter damage.

In 2019, an informational flyer regarding the Emerald Ash Borer (EAB) was created in both English and Spanish. By the fall of 2022, the Forestry Team, in collaboration with the Marketing team, began developing a comprehensive EAB Awareness Campaign for a spring 2023 launch. This campaign includes regular updates on social media, articles, a creative "Save Your Ash" slogan, and associated graphics, which are prominently displayed throughout the community and on City equipment.

Moreover, the team promotes a tree wrapping tutorial video in autumn and hosts an Arbor Day booth where forestry staff provide guidance and engage with residents. The limb recycling program, running monthly from March to November, allows residents to dispose of woody debris. The collected limbs are processed into mulch, with a portion made available to residents and the rest utilized by City maintenance.

The Mulch Madness program, aimed at recycling wood waste and keeping it within city limits, has seen great success and popularity, offering free mulch to residents, and supporting City landscaping needs. All the mulch produced by the City's limb recycling program is repurposed, successfully diverting it from landfills and significantly contributing to the City's sustainability objectives. Additionally, a leaf and pumpkin recycling initiative coincides with the November limb drop, processed by a third-party contractor.

Limb Recycling Usage

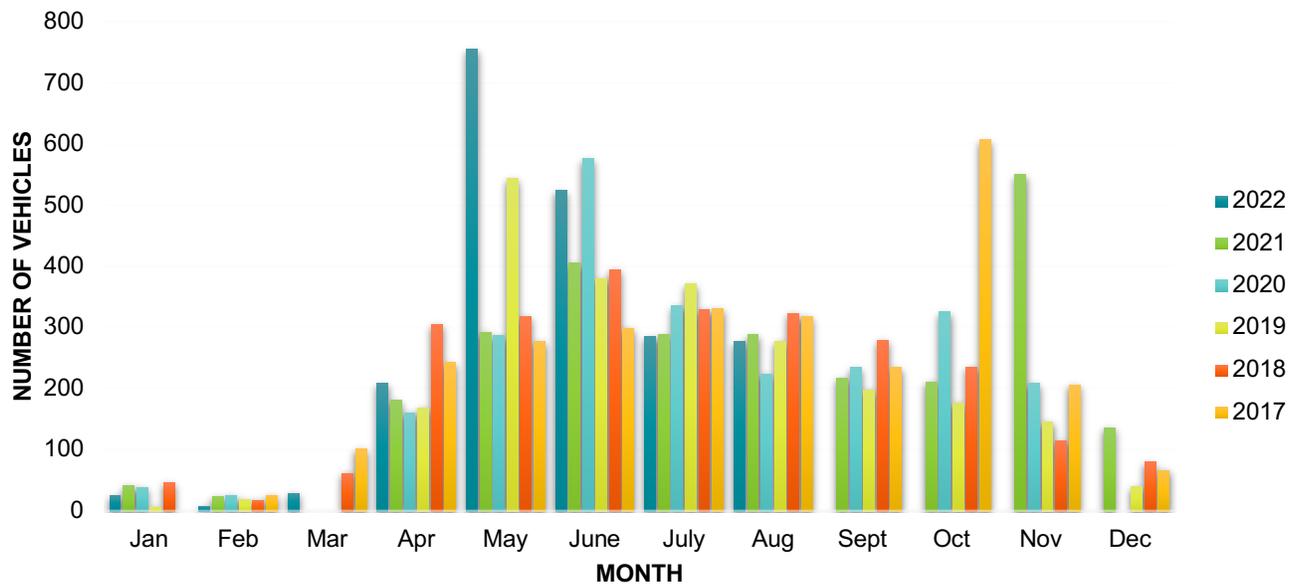


Figure 21. Limb recycling program usage of Westminster residents from 2017-2022 by month.

The Living Legacy Memorial Tree program has been suspended due to logistical challenges in tracking memorial bricks and replacing deceased trees. Current efforts are directed towards managing existing memorials and communicating with stakeholders.

The ReLeaf Westminster tree sale, in collaboration with state forestry organizations, provides discounted diverse tree species to residents, bolstering the urban canopy. As of 2023, the Releaf Westy Program has sold 100 trees on average to citizens since 2017, and has grown in popularity, selling out within four days in 2023.



Westminster's commitment to a vibrant and sustainable urban forest is evident through partnerships with educational institutions and community groups. These collaborations are aimed at fostering training and pre-apprenticeship programs that equip individuals with vital skills. Notably, the City collaborates with the Park People's Tree Force program, providing career training opportunities for those who were previously incarcerated. Additionally, an established MOU with Front Range Community College allows the college to conduct arborist apprenticeship training on city trees across Westminster's public lands. Despite these initiatives, the City has not yet received authorization to directly employ apprentices, although it plays a significant role in their training within the state of Colorado.

Tree-related Plans and Regulations in Westminster

Evaluating the alignment of existing policies and plans in Westminster with urban forest management elements ensures a strong connection among the programs that manage the urban forest and the projects and initiatives that support them. Proper alignment of urban forestry program recommendations reduces the risk of wasting resources and enables success of key projects that support urban forestry goals. Plans cannot live in isolation, therefore, cross-examining various plans and documents brings to light any projects or initiatives that are a misplacement of resources and time. Tree regulations in the City provide the foundation from which tree canopy cover can be preserved, protected, and expanded while aligning with industry standards and best practices. Regulations for trees on private property are the primary tools for urban foresters to guide private landowners and developers in sustainable practices.

Several documents and resources were reviewed and indexed as part of the information discovery process to develop the Urban Forest Management Plan. These documents included:

Relevant Plans and Studies



City of Westminster 2040 Comprehensive Plan (2023): The 2040 Comprehensive Plan outlines the community's vision for the future through a framework of goals and policies that support a thriving and healthy community comprised of great neighborhoods.

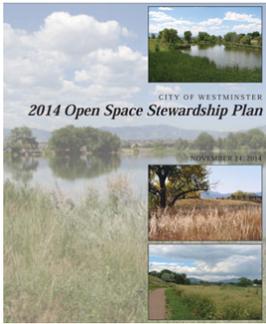


Westminster Sustainability Plan (2021): In 2018, the City of Westminster began the development of its first Sustainability Plan to provide a guiding framework for city staff, residents, businesses and other community partners. The Westminster Sustainability Plan focuses on actions that can be implemented within the next 5-10 years to move the City towards its vision of becoming one of the most sustainable cities in the U.S. This Sustainability Plan is an essential component of the City's Strategic Plan vision and seeks to provide a platform to align, coordinate and unify sustainability efforts across City departments and the community. The plan will address the community's desire for an economically strong, socially vibrant and environmentally healthy Westminster.

Strategic Priorities

- Strategic Priority: Preparedness and Resilience**
Build a system of operational support for residents, businesses and the environment that mitigates risks and proactively seeks out ways to ensure the community and environment are resilient.
- Strategic Priority: Proactive Public Safety**
Enhance public safety to improve both prevention and enforcement, engage the community through education and outreach and provide the resources necessary to ensure safety and well-being throughout the community.
- Strategic Priority: Shared Sense of Community**
Foster equitable opportunities that help residents feel at home and connected in their community and empowered to lead their best lives.
- Strategic Priority: Quality of Life**
Ensure the Westminster office offers a wide range of amenities and activities for residents, businesses and visitors that honor the city's history and support the arts, parks, recreation, open spaces, and tourism.
- Strategic Priority: Robust Infrastructure**
Provide safe and reliable access to our services and amenities by safeguarding, maintaining and improving the city's water, wastewater, stormwater, mobility and roadway systems.

City of Westminster Revised Strategic Plan (2023): The Westminster City Council uses a strategic planning process to help achieve its long-range vision of a city that is rich in complexity and a community that is desirable as a place of residence or business. Approximately once per year City Council reviews its vision for the future through a Strategic Plan. The plan defines the City's vision, mission, and principal goals. Each goal is further defined, and specific initiatives are identified as priorities for the City Council that help achieve the associated goal.



Open Space Stewardship Plan (2014): The 2014 Open Space Stewardship Plan contains tools that will allow City staff to make decisions concerning land management needs, acquisitions, trail usage, and future capital improvements. Focusing heavily on land stewardship, this plan will identify open space land management responsibilities, associated costs, needed resources, and future projected capital improvements. The goal of this plan is to provide a foundation that can be used to assemble an open space management program at a level that is complete and comprehensive. An update to this plan is in progress.

Parks, Recreation, & Libraries Vision Plan (in progress): The City of Westminster is initiating a system-wide Vision Plan for the Parks, Recreation & Libraries (PRL) Department. The Vision Plan will be used to guide PRL's future direction, identify the culture and values of the community, analyze current strengths and weaknesses, guide PRL development, set priorities, and aid in fiscal planning. The scope includes facilities, services, and programming to meet the community's future needs and provide a framework for future investments.

The relevant plans and studies are summarized above to demonstrate the parallels among urban forestry and other planning efforts in the city. The Urban Forest Management Plan's long-term framework aims to complement goals and policies within these City plans and studies that pertain to trees in Westminster. This evaluation of existing resources serves to reduce conflicting priorities in the city.

Tree Ordinances in Westminster

The Code of Ordinances includes tree protection standards throughout multiple sections and chapters.

- *Chapter 3. - Trees and Shrubbery of Title XIII. - Parks, Recreation, and Libraries* of the City Code are related to parks and public property. Additional regulations for public trees are found in an external document, *Standards and Specifications for the Design and Construction of Public Improvements*.
- *Chapters 5 and 7 of Title XI. - Land Development and Growth Procedures* contain most of the requirements for trees and landscaping on private property, with extensive references to the external *Landscape Regulations* document.
- *Landscape Regulations, 2004*-These regulations were adopted in 2004 by the City for regulating trees and landscaping on private property. The document offers considerations in landscape design, which “must be considered and incorporated into the landscape and irrigation design.” These are considered the primary design requirements for landscape plans. Xeriscaping and irrigation standards are included to encourage waterwise practices. Trees are specifically addressed in the section on “General Landscape Provisions for Plant Material, Design and Installation.” This section provides important standards for species diversity and planting standards. For some specifications, the *Landscape Regulations* refer to the *City’s Standards and Specifications for the Design and Construction of Public Improvements*. Requirements are outlined for residential areas, rights-of-way, parking lots, and non-residential properties. Maintenance and irrigation standards are included, with special attention given to plant selection by hydrozones.
- *Standards and Specifications for the Design and Construction of Public Improvements, 2020*-The “*Standards and Specifications*” document is directly related to the processes and permitting for design and construction on public property and rights-of-way, however this document is referenced by the *Landscape Regulations* document which regulates private property. There is no mention of “urban forestry” or “arborist” in this document. This document is relevant for its references to the following topics:



- **Landscape and Private Improvements Agreement:** approved written contract between the OWNER and the CITY for construction of private improvements including all onsite and off-site landscaping required to be installed pursuant to the official development plan for the project, whether on private or public property, as well as all on-site amenities to be privately owned and maintained in areas of private or common ownership, including, but not limited to, sewer systems, water and sewer service lines to buildings, grading, drainage structures, retaining walls, parking lots, private streets and walks, fire lanes, driveways, fencing, screening, trash enclosures, trails, swimming pools, tennis courts, and community recreation facilities.
- **Land Disturbance Permit requirements:** 1.27.01 and 1.29.02 and 2.10.00. Any grading, stripping, excavating, filling or otherwise disturbing of land within the CITY limits shall comply with the CITY CODE, an IMPROVEMENTS AGREEMENT, an approved Land Disturbance Permit and the CDPHE Water Quality Control Division's Construction Stormwater Discharge Permit Regulations.
- **Revegetation permit requirements:** 2.20.00 refers to ground covers only, with reference to the Landscaping Requirements document for additional formal landscaping requirements.
- **4.16.00 Easements:** "Trees and permanent structures (i.e., fences, mailboxes, sheds, buildings, etc.) are prohibited within utility easements."
- **6.40.00 Construction Specifications:**
 - 6.43.02 Clearing and Grubbing: "Branches on trees or shrubs shall be removed as directed. Branches of trees extending over the road bed shall be trimmed to give a clear height of twenty feet (20') above the road bed surface. All trimming shall be done by skilled workmen and in accordance with good tree surgery practices."
 - 6.43.06 Excavation and Embankment: "Before any embankment is placed, clearing, tree removal, sod and topsoil removal over the entire area shall be performed in accordance with these STANDARDS AND SPECIFICATIONS."





Benchmarking Exercise

A review of existing tree-related ordinances in Westminster was conducted based on industry tools and resources, comparisons of findings from benchmarking research of five cities in the region, input gathered from internal stakeholders, and a cross-examination of regulations compared to industry standards and best practices. This integrated approach aims to balance goals for tree canopy cover, development, and other priorities in the future.

| Ordinance Topic* | Westminster CO | Arvada, CO | Boulder, CO | Lakewood, CO | Longmont, CO | Thornton, CO |
|--|----------------|------------|-------------|--------------|--------------|--------------|
| Authority + Credential | | | | | | |
| ISA Certified Arborist required for tree work, tree survey, etc. | N | Y | Y | N | Y | N |
| Staff Authority over trees (urban forester, director, landscape architect, etc.) | Y | Y | Y | Y | Y | Y |
| Tree Preservation | | | | | | |
| Protected Tree (DBH) | Y | Y | Y | N | Y | N |
| Heritage Tree (DBH) | N | N | N | N | N | N |
| Canopy-based preservation | N | Y | N | N | N | N |
| Exemptions | Y | Y | Y | N | N | N |
| Incentives | N | Y | N | N | N | Y |
| Tree removal permit process established | Y | Y | Y | N | Y | N |
| Tree Protection During Construction | | | | | | |
| Dripline or root area definition | Y | N | Y | N | Y | N |
| Signage and fencing | Y | Y | Y | N | Y | N |
| Tree Planting Standards | | | | | | |
| Tree species list (preferred, required, prohibited, etc.) | Y | Y | Y | Y | Y | Y |
| Tree size (caliper, height, projected canopy, etc.) | Y | Y | Y | N | Y | Y |
| Minimum tree well or soil area | N | N | Y | N | N | N |
| Minimum spacing | Y | Y | Y | N | Y | N |
| New private development | Y | Y | Y | N | Y | Y |
| Distance from utilities | Y | Y | Y | N | Y | N |
| Tree Maintenance/Management | | | | | | |
| Authority over street trees | Y | Y | Y | N | Y | N |
| References to BMPs and industry standards | Y | Y | N | Y | Y | Y |
| Pest/disease strategy | Y | N | Y | Y | Y | Y |
| Mitigation | | | | | | |
| Public trees | Y | Y | Y | Y | Y | Y |
| Private trees | Y | Y | Y | Y | Y | Y |
| On site | Y | Y | Y | N | N | N |
| Off site | N | Y | N | N | N | N |
| In lieu of fees | N | Y | N | N | N | N |
| Enforcement | | | | | | |
| Inspections | Y | Y | Y | Y | Y | Y |
| Fines and fees | Y | Y | Y | Y | Y | Y |
| Other penalties for noncompliance | N | Y | N | Y | N | N |

Table 6. Summary of Westminster's ordinance benchmarking exercise.

*The presence of specific language within ordinance topics does not indicate it is enforced or implemented effectively.



Stakeholder Feedback on Current Conditions

Internal and external engagement is critical to the success of an urban forest management plan. By engaging with Westminster’s staff, residents, businesses, and other stakeholders, urban forestry staff are given a better understanding of the needs and concerns of the community. Engagement was conducted throughout the development of Westminster’s Urban Forest Management Plan. The feedback and input gathered was used to shape a plan that is representative of the needs of all stakeholders in the city. The engagement conducted throughout the development of the Plan also helps to build support for Westminster’s urban forest and to ensure the Plan is implemented effectively.

Internal Stakeholder Feedback



Source: PlanIT Geo stakeholder engagement stock photo.

In July and August of 2023, a collaborative effort to craft the Urban Forest Management Plan commenced. An online survey was distributed across various City departments to gather insights into existing workflows, success metrics, challenges, and objectives related to urban forestry. This survey prompted responses from City staff that helped to pinpoint collective aspirations and concerns surrounding the city’s trees. It was followed by a series of two meetings, offering a platform for direct engagement and discussion among staff members. In total, the survey garnered 58 unique responses from the 71 invited staff members, with 11 out of 14 meeting attendees also contributing to the survey, culminating in 61 City staff members participating in the formation of the Urban Forest Management Plan.

A total of 58 of 71 invited staff participated in engagement. These participants represented the departments of Parks, Recreation, &

Libraries; Community Services; Public Works & Utilities; and Administration & City Manager’s Office. In addition, numerous divisions from these four departments were represented in both the survey and engagement meetings, providing diverse and unique perspectives on the City of Westminster’s urban forest.

The figure on the following page provides a graphic summary of responses. The survey revealed key concerns within the urban forestry domain: environmental/ecological issues (14%), staffing (13%), budget constraints (12%), and the need for supportive ordinances (9%). When asked about their roles with trees, the largest group of participants (16%) reported being involved in advocacy for public tree and park improvement. This was closely followed by vegetation management and landscape maintenance (14%), and minor park improvements (11%).

Top priorities and goals highlighted by City staff included planting more trees and allocating the necessary plans and resources to ensure their maintenance. Public education programs, enhancing processes and regulations for tree protection, increasing funding for tree canopy expansion, and maximizing the benefits of the urban forest were also underscored. Respondents noted the importance of addressing the urban forest’s vulnerability to pests, diseases, and climate change effects.



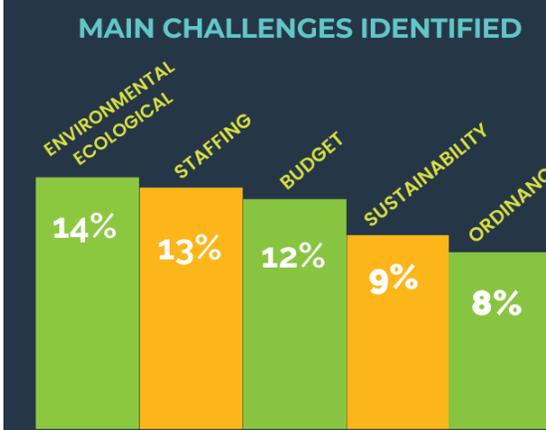
71  **STAFF MEMBERS INVITED**
58 PARTICIPATED
82% RESPONSE RATE

SURVEY HELD July & August 2023

- Participants**
- Parks, Recreation, & Libraries
 - Community Development
 - Public Works & Utilities
 - Administration & City Manager's Office



- Most Important Benefits of Trees to the Community**
- 1 Address the effects of climate change
 - 2 Beautify the City
 - 3 Improve mental and physical health
 - 4 Improve air quality
 - 5 Sequester carbon



- OTHER CHALLENGES**
- COLLABORATION, PARTNERSHIPS (8%)
 - INFRASTRUCTURE CONFLICTS (8%)
 - INTER-DEPARTMENTAL PROTOCOLS (8%)
 - PREPAREDNESS PLANNING (7%)
 - REGULATORY REQUIREMENTS (5%)
 - DELINEATION OF DEPARTMENT RESPONSIBILITIES (4%)

Participants Role(s) with Trees in Westminster



- Top Priorities & Goals**
- More Trees in the city with a plan and resources for maintaining
 - Public education programs and strategies
 - Improved processes and regulations for tree protection
 - Increase funding to increase tree canopy
 - Increase efforts to maximize urban forest benefits
 - Reduce the urban forests vulnerability to pests, diseases, and climate change
- 

Figure 22. Infographic summary of feedback received from internal stakeholders.



Source: PlanIT Geo stakeholder engagement stock photo.

External Stakeholder and Community Feedback

From November 2023 through mid-January 2024, a 14-question online survey was launched on the City's website and social media to learn how trees impact the lives of Westminster's community members, to gather feedback on canopy goals and priority planting areas, to identify where the City should prioritize resources and investments, and to recognize the benefits and services provided by trees that the community values most. The survey was prepared using SurveyMonkey and made available in English, Spanish, and Hmong.

A total of 106 responses were received. The following provides an overview of the engagement gathered from the effort followed by a summary infographic. The success of this engagement effort is largely attributed to the City's commitment to share the survey and conduct outreach.

Homeowners constituted the majority of the 106 respondents, with the largest age groups being between 35 to 44 years. The primary race/ethnicity identified was white, with a notable representation preferring not to answer. Residents have a deep connection with Westminster's trees, appreciating the shade and cooler temperatures they provide and expressing concern over the apparent decline in tree health and quality, with only a few perceiving improvements. There's a strong desire for tree planting in areas with historically less canopy, particularly resilient species that can withstand droughts, pests, diseases, and climate challenges.

The survey findings indicate a robust support for achieving tree canopy goals to combat heat and enhance ecosystems, with a significant emphasis on expanding canopy in underserved areas and integrating trees into new developments. The majority of respondents prioritize shade provision to mitigate heat and support a proactive approach to public tree maintenance. The community suggests that future resources should focus on strengthening private development ordinances, acquiring conservation lands, and fostering public-private partnerships for tree planting. Parks and greenways are seen as priority areas for tree planting, alongside streets, and commercial and industrial properties. There is also a substantial advocacy for watering street trees during drought periods.

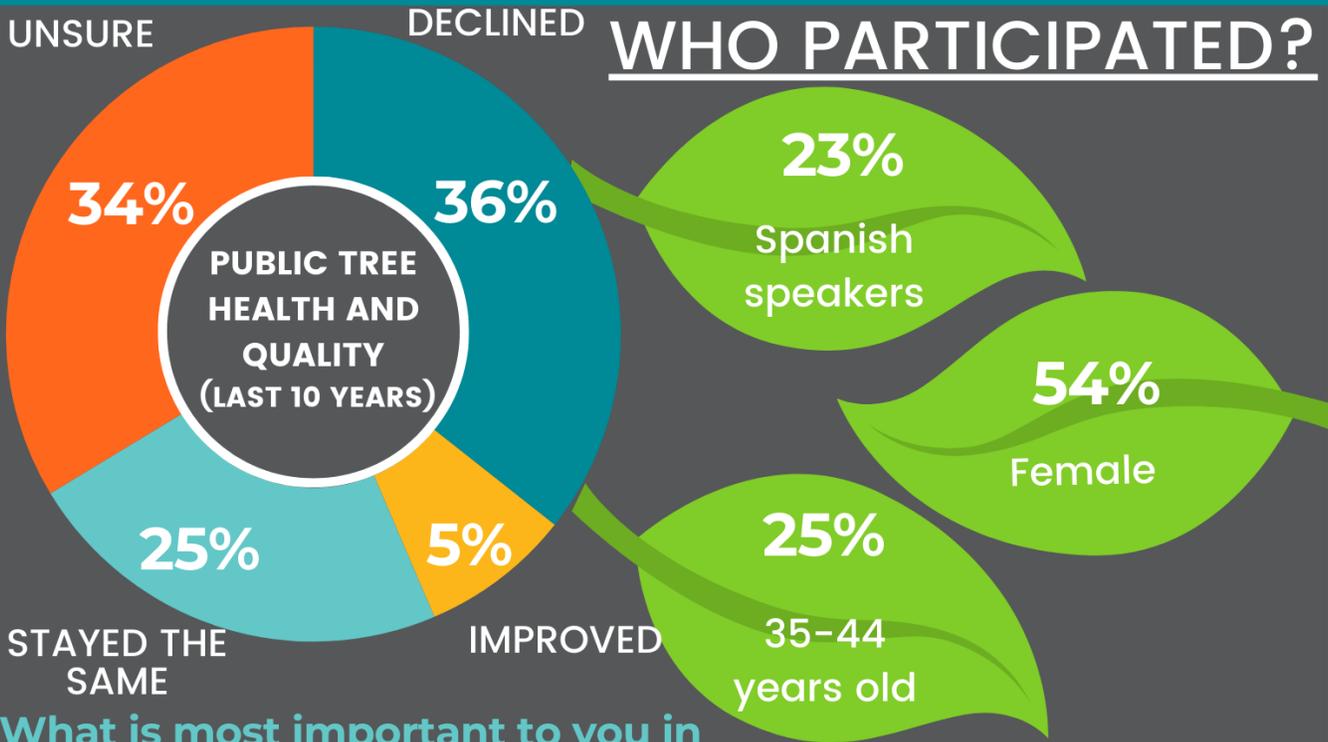
The feedback outlines a clear path for the Urban Forest Management Plan in Westminster: to increase tree diversity, bolster maintenance efforts, and strategically enhance the urban canopy for ecological and community benefits.



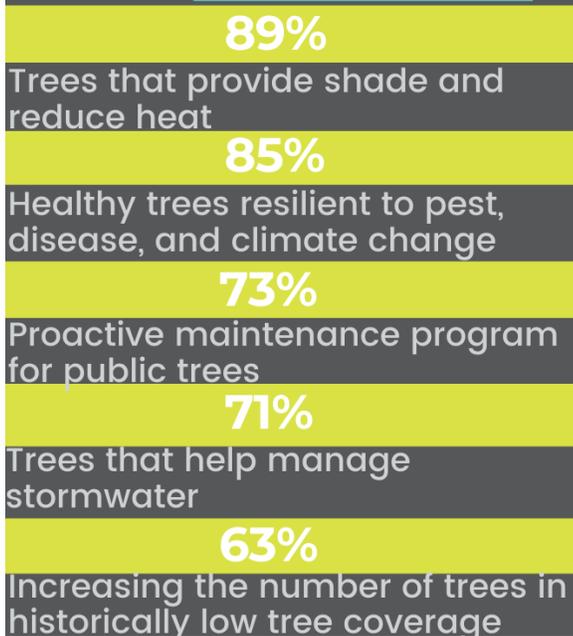
Westminster's Urban Forest Management Plan Community Survey

Shared on the City's website
and social media accounts

November 2023-January 2024



What is most important to you in an Urban Forest



Where to prioritize resources?



Private Property Incentives



Tree Equity



Cost-share tree maintenance



Youth Engagement

Figure 23. Infographic summary of feedback received from external stakeholders.



Development and Land Use Changes

As noted in the introduction, Westminster’s trees face multiple challenges from various sources. The urban forest is vulnerable to changing conditions due urbanization, extreme weather, and pests and diseases.

Westminster's approach to growth and sustainability, as outlined in its Sustainability and 2040 Comprehensive Plans, recognizes the dynamic nature of the Front Range. This region is no stranger to change, having experienced significant population increases, demographic shifts, economic fluctuations, and the impacts of natural disasters. Drawing on data from the Colorado Department of Local Affairs, Westminster has seen a 51% increase in its population from 1990 to 2018, rising from 74,000 to 113,000 residents. Although growth has decelerated recently, continued expansion is projected for the coming two decades.

Forecasts for the Denver metropolitan area, including Westminster, anticipate a substantial population surge, with over 380,000 new residents expected between 2020 and 2030, and Adams and Jefferson Counties accounting for almost 150,000 of that increase. While Westminster's growth rate may not match the broader metro area's, an upward trend remains evident.

Addressing this growth sustainably calls for meticulous regional and local planning. This planning must ensure a balance between the escalating demands for resources—natural, transportation, housing, and public services—and the ability to provide them without compromising the area's ecological integrity or quality of life for its residents.

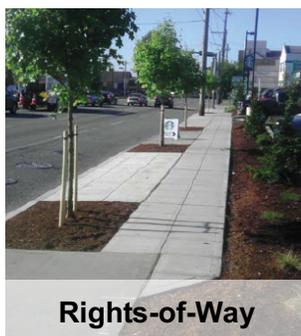
Altered Soils

Urban trees must often survive in compacted soils that have been altered for the built environment. A good growing medium for trees contains approximately 50% pore space (which allows the root system access to the air and water it needs to survive) and a layer of organic matter. In contrast, construction soils typically have less than 25% pore space and organic matter combined.

Competition for Space

Conflicts with hardscapes and utilities often occur when trees are not provided adequate space for root and canopy growth. In rights-of-way, trees may compete for space with signs and streetlights, underground utilities, and overhead electric and telephone lines. As trees outgrow available space, their roots can raise sidewalks as they search for water, air, and growing space. The resulting sidewalk repairs may require removal of the tree or application of alternative sidewalk solutions. The City has regulations and best management practices (BMPs) for addressing these situations.

The prevention of future conflicts requires streetscape design that considers the mature size of trees being planted as well as available technologies that allow trees to thrive in this environment. Examples of these unique designs are provided in the graphic below:



Rights-of-Way



ROOT BARRIERS



SUSPENDED PAVING



STRUCTURAL SOILS

Figure 24. Examples of potential streetscape design solutions for preventing or mitigating tree and infrastructure conflicts.



Threats to the Urban Forest

Climate Change Impacts

As the effects of climate change take hold, already stressed trees will decline more rapidly, and healthy trees will have to endure multiple stressors to survive and thrive. The extreme heat and drought will reduce water availability, the plant hardiness zone will shift and introduce invasive plant species, stronger storms will occur resulting in more downed trees and limbs due to the canopy declining, and existing and introduced tree pests and diseases will flourish as trees continue to weaken.

If the City does not commit to a long-term proactive approach and disciplined investment to improve the health and reliability of the public trees, Westminster will fight a costly, reactive and escalating battle against failing trees— which will have a detrimental impact to public safety, budgets, tree crews, road closures, and utility reliability. The negative environmental, public well-being and scenic impacts will also be significant.

While the majority of Westminster’s publicly managed trees are in good condition, over a quarter of the privately managed ROW trees are in fair or worse condition, and with climate change altering the types of species that thrive, the city’s tree canopy is at considerable risk.

Urban Tree Pests and Diseases

Pests and diseases add to the existing stresses faced by trees in an urban environment. Stressed trees are more vulnerable to insects and diseases, although some pests and diseases pose an equal threat to healthy trees. Climate change can create conditions that are favorable for the spread of pests and diseases. Also, prolonged drought stresses trees causing them to be more susceptible to pests and diseases.



Figure 25. Emerald ash borer (EAB).
Source: Colorado State Forest Service.

Emerald Ash Borer (EAB) poses a significant threat to North American ash trees, with the potential to eradicate every unprotected ash if preventative measures are not adopted. In communities where such interventions are lacking, EAB could eliminate all ash trees within a decade. EAB indiscriminately attacks both healthy and compromised ash trees, leading to widespread devastation across ash species and turning affected trees into potential safety risks due to compromised structural integrity. Since its 2013 detection in Boulder, EAB has spread across Colorado, affecting numerous cities. Westminster's

proactive measures include a ban on new ash tree plantings and the 'Save Your Ash' initiative to mitigate the impact of EAB. Despite these efforts, EAB remains a significant and ongoing challenge for communities across Colorado.



Figure 26. Ips beetle. Source: Colorado State Forest Service.

The **Ips beetle**, known as the “engraver beetle,” has become a critical issue in many Colorado municipalities, particularly affecting spruce and pine trees, including varieties like lodgepole pine, ponderosa pines, and Austrian pines. These beetles burrow into the bark and disrupt the tree's vital systems, often killing stressed trees. Unusually high beetle populations and infestations in healthy trees can occur due to factors like drought and the accumulation of cut wood from fire mitigation efforts. The piñon ips beetle (*Ips confusus*), is of particular concern due to its increased ability to adapt to environmental changes, switch from its preferred host tree to other pines, and spreads rapidly. Within municipalities, outbreaks typically begin in the wildland urban



interface or open space and then move into the municipality targeting any stressed pine or spruce. Austrian and piñon pines often endure the majority of Ips beetle outbreaks, yet all pine and spruce are susceptible under the right conditions.



Figure 27. Elm leaf beetle. Source: University of Colorado.

The **Elm Leaf Beetle**, a European pest in North America for over 150 years, targets elm trees for defoliation, which can weaken and ultimately kill these trees. Additionally, homeowners often find the beetles sheltering indoors during the winter. To address this, biological control efforts, specifically the introduction of the parasitic wasp *Oomyzus gallerucae*, have been implemented. These wasps have been effective in reducing beetle populations since their introduction in the early 20th century and re-introduction in the 1970s. While these biological controls have generally been successful, periodic surges in beetle populations still occur, necessitating continuous management. The overall

health of elm species, especially susceptible Siberian and English elms, remain a priority for forestry management in Colorado.



Figure 28. Asexual fruiting bodies in bark cracks of thyronectria canker. Source: Colorado State University.

Thyronectria canker, predominantly affecting honeylocust trees is caused by the fungus *Pleonectria austroamericana*, and poses a significant threat to urban forests, especially wherever honeylocust trees are prevalent. This canker disease is a fairly common fungal disease on stressed honeylocust and can be easily overlooked. Due to honeylocusts high adaptability and ability to thrive in harsh urban environments, it is the preferred street tree for many municipalities. Thyronectria has a wide distribution throughout the United States and was first identified in Massachusetts in the early 1930s. Thyronectria poses little threat to healthy trees, however recent extended drought conditions and variable wintertime temperatures along the front range communities of Colorado has resulted in stressed trees,

creating optimal conditions for thyronectria to thrive and cause considerable damage.

Invasive Tree Species

Invasive plant species are often characterized by their vigor, ability to adapt, reproductive capacity, and general lack of natural enemies. These abilities enable them to displace native plants and make them a threat to natural areas. Of Westminster’s inventoried public trees, three species (Russian olive, Siberian elm, and Tree of heaven) were identified as invasive on the state invasive species list (Colorado Weed

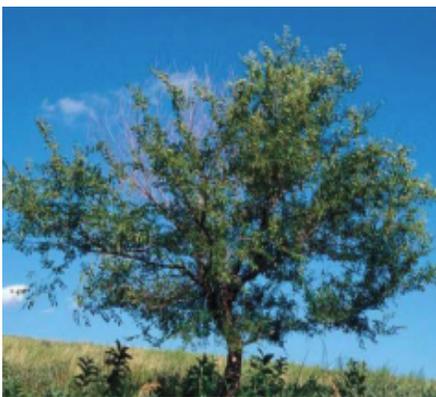


Figure 29. Siberian elm (*Ulmus pumila*). Source: Colorado Department of Agriculture.

Management Association 2012). Though these species have minimal representation in the inventory, it is likely they have larger representation in Westminster’s urban forest resulting in significant impacts on the ecosystem.

The **Siberian elm** (*Ulmus pumila*), a resilient tree native to Asia, is widely recognized for its rapid growth and ability to thrive in disturbed environments like stream banks, pastures, and along roadsides. Capable of reaching 70 feet with a crown of upward-growing branches, this deciduous tree produces heart-shaped leaves, flexible brittle branches that easily break off, and wind-pollinated flowers, which give way to samaras, or wing-like fruits. The Siberian elm’s high germination rate and sunlight requirement allow it to quickly colonize new areas but also limit its spread to mature forests.



In Colorado, efforts to manage this invasive species are guided by the Colorado Noxious Weed Act. Land managers are encouraged to maintain healthy native plant communities, promptly address disturbed areas, and remove young Siberian elms before they reach maturity. Mechanical removal is effective for young seedlings, particularly when soil is moist, but mature trees may require herbicide treatments post-cutting to prevent sprouting. The key to managing Siberian elm lies in prevention, monitoring, and a combination of cultural, mechanical, and chemical control methods to ensure the health of local ecosystems.



Figure 30. Tree of heaven (*Ailanthus altissima*). Source: Colorado Department of Agriculture.

The **Tree of heaven** (*Ailanthus altissima*), originating from China, is a fast-growing deciduous tree, reaching heights of 70 feet and crown widths of 80 feet. This species prospers in harsh conditions, such as poor, compacted soils, and withstands heat, drought, and pollution, posing problems in both urban and natural landscapes. It reproduces through wind-dispersed seeds and asexually via root sprouts, with female trees producing numerous seeds. The leaves are dark green with a unique lanceolate shape and teeth at the base; the bark is light brown to pale gray and fissured.

Tree of heaven, which aggressively invades roadsides, railways, and woodland edges, can damage infrastructure with its roots, has brittle wood, and competes with native species. It also facilitates the spread of the spotted lanternfly. In Colorado, where it is classified as a "List C" species in the Noxious Weed Act, effective control includes preventing establishment, promoting healthy native vegetation, and removing seedlings. While no biocontrol agent is yet

approved, methods like hand-pulling seedlings, cutting older trees followed by herbicide treatment, and cultural management strategies are recommended for its control.



Russian olive (*Elaeagnus angustifolia*) is a perennial tree native to Europe and Asia that can reproduce by seed or root suckers. It was once thought to be a beneficial windbreak tree but has since been deemed detrimental to the environment. Russian olive outcompetes native plants, interferes with natural plant succession and nutrient cycling, and taxes water reserves. Though they provide a plentiful source of fruits for birds, bird species richness is higher in areas dominated by native vegetation.

The City of Westminster actively manages and removes Russian olive in natural areas and open spaces. In 2019, Westminster initiated a comprehensive inventory of invasive species in open spaces, aiming for a 20% coverage each year. By the summer of 2023, this extensive

survey was completed, and it's now planned to reassess 20% of open spaces annually to ensure the data remains current. Prior to 2019, Russian olive counts were potentially inaccurate due to estimations and inadequate tracking. However, the figures from 2022 and 2023 are considered highly reliable. Previously, Russian olive removal was largely managed through volunteer efforts and special collaborations between forestry and open space teams. This approach has been phased out in favor of employing the Mile High Youth Corps, who have taken on the primary role of eradicating Russian olives during 4 to 8-week stints in the summer or fall. The inventory indicates there are 8,184 Russian olives



present in Westminster's open spaces. This inventory includes all visible Russian olives such as seedlings and root suckers, which would not be accounted for in canopy assessments and the corresponding tree count estimates. Removal data varies, with a noticeable increase to 562 in 2023 from 41 in 2013, and some inconsistencies noted in 2020 and 2018 due to possible reporting issues. This proactive approach reflects a growing capacity and commitment to managing invasive species within the city's natural areas.

Urban Heat

Like many urban areas, Westminster is experiencing the detrimental effects of excessive summer heat. Urban heat is a phenomenon that describes the higher air and surface temperatures in urban areas compared to surrounding rural areas. The temperature difference is largely due to the prevalence of buildings, roads, and other elements of the built environment that absorb and retain heat. Increased emissions of greenhouse gases and reduced tree canopy serve to magnify these impacts. Without strategic intervention, urban heat threatens the well-being and health of the community, particularly vulnerable populations lacking the cooling shade of trees.

With urban heat rising, the concern of tree decline is at the forefront of planning in urban areas. To understand Westminster's urban forest vulnerability to urban heat, analyses were conducted to measure and project potential impacts on its trees. These impacts include:

- **Increased stress on trees:** Urban heat adds to stress trees are already facing from factors such as air pollution, drought, and pests, making it more difficult for trees to survive and thrive.
- **Reduced tree growth:** Urban heat can slow down tree growth, which can lead to a decline in the overall health of the urban forest.
- **Increased tree mortality:** Urban heat increases the risk of tree loss, which can lead to gaps in the urban forest.
- **Reduced air quality:** Urban heat tends to hold pollutants in the atmosphere, worsening air quality. This places an additional burden on trees' air purifying capabilities while also having a negative impact on human health and the environment.
- **Changes in plant communities:** Urban heat can lead to changes in the composition of plant communities, as some species are more tolerant of heat than others. This can lead to a loss of biodiversity in the urban forest.

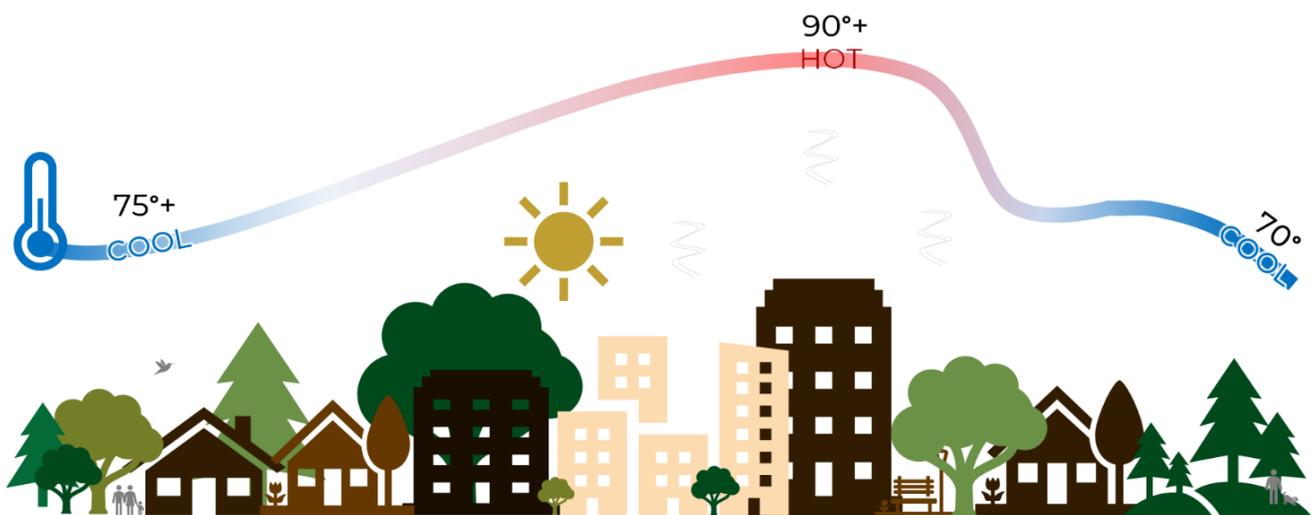


Figure 31. Illustration of the temperature difference in urban areas due to the urban heat island effect.



Changes in Plant Communities

Westminster, located within the greater Southwest region of the United States, is set to undergo substantial environmental shifts, including rising temperatures, more frequent droughts, and increased occurrences of severe precipitation events due to climate change. These changes will inevitably have repercussions on Westminster’s urban forest, having a dramatic impact on the tree species that can survive and thrive, necessitating proactive and strategic planning.

As climate projections indicate a shift from USDA hardiness zone 5 to zone 7 for Westminster by 2040, it’s imperative to guide future urban and agricultural planning with this in mind. Such foresight encourages collaboration with cities already experiencing the climatic conditions Westminster is expected to face by the century’s end. This partnership can inform urban forest management planning, ensuring that the trees planted today will be appropriate for future conditions and contribute positively to the urban forest of the coming decades.

Urban foresters and planners are advised to select tree species that will adapt to the anticipated climate conditions 30 to 50 years hence. This may include species indigenous to lower elevations or those native to regions several hundred miles south. Proactive consideration of these shifts allows for a strategic transition in the urban forest, gradually phasing out species unsuited to the evolving climate.

However, while plant hardiness zones are a valuable tool for urban forestry, they do not encompass all necessary considerations. Local soil conditions, water requirements, and susceptibility to pests must also be factored into the selection process. For instance, while maples might thrive in zone 7 conditions, Colorado’s soils can induce chlorosis due to iron deficiencies in these trees. Similarly, although green ash might be climatically suited, its vulnerability to pests like EAB necessitates cautious deliberation. These complexities highlight the importance of a holistic approach to urban forestry planning that accounts for the multifaceted nature of ecosystem management.

The tables below list tree species found growing in Westminster and their predicted vulnerability to habitat loss due to changing conditions. The species represented in Figure 30, compose 41% of the inventoried tree populations in Westminster’s urban forest.

| <u>Common Name</u> | <u>Scientific Name</u> | <u>Adaptability to</u> | <u>Hardiness Zones</u> |
|-----------------------|---------------------------------|------------------------|------------------------|
| Green ash | <i>Fraxinus pennsylvanica</i> | Good | Zones 3 to 9 |
| Cottonwood | <i>Populus deltoides</i> , | Good | Zones 3 to 9 |
| Thornless honeylocust | <i>Gleditsia triacanthos f.</i> | Good | Zones 3 to 9 |
| Silver maple | <i>Acer saccharinum</i> | Good | Zones 3 to 9 |
| Hackberry | <i>Celtis occidentalis</i> | Good | Zones 3 to 9 |
| American linden | <i>Tilia americana</i> | Good | Zones 3 to 8 |
| Freeman maple | <i>Acer x freemanii</i> | Good | Zones 3 to 8 |
| Honeylocust | <i>Gleditsia triacanthos</i> | Good | Zones 3 to 8 |
| Littleleaf linden | <i>Tilia cordata</i> | Good | Zones 4 to 8 |
| Hawthorn | <i>Crataegus spp.</i> | Good | Zones 4 to 8 |
| Callery pear | <i>Pyrus calleryana</i> | Good | Zones 5 to 8 |
| Piñon pine | <i>Pinus edulis</i> | Good | Zones 5 to 8 |
| Blue spruce | <i>Picea pungens</i> | Fair | Zones 2 to 7 |
| Austrian pine | <i>Pinus nigra</i> | Fair | Zones 3 to 7 |
| Crabapple | <i>Malus floribunda</i> | Fair | Zones 4 to 7 |

Figure 32. Predicted climate adaptability by hardiness zone for the most common tree species in Westminster’s urban forest.



| Common Name | Scientific Name | Adaptability to Changing | Hardiness Zone |
|----------------------|--------------------------------|--------------------------|----------------|
| Kentucky coffeetree | <i>Gymnocladus dioica</i> | Good | Zones 3 to 9 |
| Scotch pine | <i>Pinus sylvestris</i> | Good | Zones 4 to 9 |
| Goldenrain tree | <i>Koelreuteria paniculate</i> | Good | Zones 5 to 9 |
| Bur oak | <i>Quercus macrocarpa</i> | Good | Zones 3 to 8 |
| Swamp white oak | <i>Quercus bicolor</i> | Good | Zones 3 to 8 |
| Red oak | <i>Quercus rubra</i> | Good | Zones 3 to 8 |
| White pine | <i>Pinus strobus</i> | Good | Zones 3 to 8 |
| Western catalpa | <i>Catalpa speciosa</i> | Good | Zones 4 to 8 |
| Japanese pagoda tree | <i>Styphonolobium</i> | Good | Zones 4 to 8 |
| Ponderosa pine | <i>Pinus ponderosa</i> | Fair | Zones 3 to 7 |
| Norway maple | <i>Acer platanoides</i> | Fair | Zones 3 to 7 |
| Douglas-fir | <i>Pseudotsuga menziesii</i> | Poor | Zones 4 to 6 |
| Amur maple | <i>Acer ginnala</i> | Poor | Zones 3 to 6 |
| White spruce | <i>Picea glauca</i> | Poor | Zones 2 to 6 |

Figure 33. Predicted climate adaptability by hardiness zone for species of interest in Westminster's urban forest.

Urban Forest Program Audit

To develop a UFMP that reflects the community of Westminster, 31 local documents, plans, and resources were gathered and reviewed by applying the U.S. Forest Service's Urban Forest Sustainability and Management Audit's Discovery Matrix. This matrix includes a total of 11 urban forest categories, each containing a multitude of supporting elements. All of Westminster's resources were reviewed and assessed for each of the categories and supporting elements.

Examples of the elements supporting the Management Policy and Ordinances category include (but not limited to) natural resources, tree protection, risk management, canopy goals, infrastructure conflicts, and public health. The primary objectives of the audit are defined by the Urban Forest Audit System authors and adapted by the project team to engage the full spectrum of the organization, provide program direction to increase efficiency, conduct a gap analysis of management practices and the health of urban forests, provide strategic direction to improve the health of the urban forest, and optimize management for environmental justice and equitable distribution of resources.

Urban Forest Audit Process

The process of analyzing the urban forest involved extensive information and document gathering and research to identify policies, practices, programs, and standards pertaining to categories of urban forest sustainability and management as defined by Clark et al. (1997), Kenney et al. (2011), and the Forest Service.

Each element was ranked or scored based on the consultants' evaluations in 2023 for the Urban Forest Management Plan. All available documents and plans were reviewed and tallied in the audit worksheet as part of the information discovery phase. Based on the evaluation of the documents and outcomes of all planning processes (i.e., research, City staff interviews, urban forest benchmarks, data analyses, and community engagement) each subcategory within the 11 categories was "ranked" using the following system:

| Ranking | Description | Points |
|-------------------------|---|--------|
| Not Practiced | Doesn't exist or is not practiced | 0 |
| In Development | In development as part of or aside from this Plan | 1 |
| Adopted Practice | Routinely practiced | 2 |



The points were then totaled for an overall rating to provide a summary of the City’s level of achieving each category of urban forest management and sustainability.

This audit or “gap analysis” provides a data-driven approach to growing and shaping different aspects of the City of Westminster’s urban forestry program. It also enables effective monitoring of Plan’s strategies in that the audit categories and elements can be revisited at key intervals in the Plan implementation process to measure progress and adapt strategies accordingly. The Implementation section includes guidance and strategies for completing updates to the audit as progress is made in the City’s urban forestry program. It is recommended the City’s Urban Forestry Task Force complete a bi-annual audit to inform any alterations to actions and strategies.

Westminster’s Audit Results

According to the analysis of findings from the needs assessment, **Westminster scored a 55% in terms of urban forest sustainability and management** as defined by the U.S. Forest Service, partners, and planning consultants. Based on similar audits completed by the urban forestry consultants, of the 16 audits, the average score is 64%. The City of Westminster scored low when compared to other urban forestry audits completed by the consultants for other communities of similar size. However, this ranking is to be expected of a city in the process of elevating their urban forestry program from a base level to a more advanced and sustainable level. While all areas of urban forestry require improvement under the guidance of an urban forestry program manager, significant improvements could be made in the Professional Capacity and Training, Funding and Accounting, Inventories, Urban Forest Management Plans, and Disaster Planning categories — all of which are below the City’s overall audit score of 55%.

An evaluation of Westminster's practices across 129 subcategories, organized under 11 main categories, shows that the City meets established common practice in 90 of these areas, which is about 35%. Another 20% of the subcategories, totaling 52, are currently in the process of being developed. Using a scoring system where established practices are valued twice as much as those in development (2 points for "Adopted Common Practice" and 1 point for "In Development"), Westminster scores 142 out of a potential 256 points. This equates to a performance score of 55%, with the specifics depicted in subsequent figures.

| Overall Audit Totals | | | | | | |
|----------------------|--|-----------------------|----------------------|-------------------|-------------------------|--------------------------|
| Category | Description | SOC * (% Achieved) | Base (% Achieved) | Overall Rating | Overall (% Achieved) | Total Possible Points |
| 1 | Management Policy and Ordinances | 50% | 33% | 16 | 57% | 28 |
| 2 | Professional Capacity and Training | 67% | NA | 8 | 44% | 18 |
| 3 | Funding and Accounting | 25% | NA | 1 | 8% | 12 |
| 4 | Decision and Management Authority | 100% | 0% | 5 | 63% | 8 |
| 5 | Inventories | NA ** | 44% | 13 | 50% | 26 |
| 6 | Urban Forest Management Plans | NA | 33% | 11 | 46% | 24 |
| 7 | Risk Management | 58% | 50% | 10 | 56% | 18 |
| 8 | Disaster Planning | NA | 50% | 6 | 43% | 14 |
| 9 | Standards and BMPs | 75% | 50% | 37 | 62% | 60 |
| 10 | Community | 50% | NA | 22 | 73% | 30 |
| 11 | Green Asset Evaluation (Observed Outcomes) | NA | NA | 13 | 65% | 20 |
| | Totals | 61% | 37% | 142 | 55% | 258 |

*SOC=Standard of Care

**NA indicates an audit category has no “SOC” or “Base” element



Westminster's Urban Forest Audit Results as a Percentage of 100% (2024)

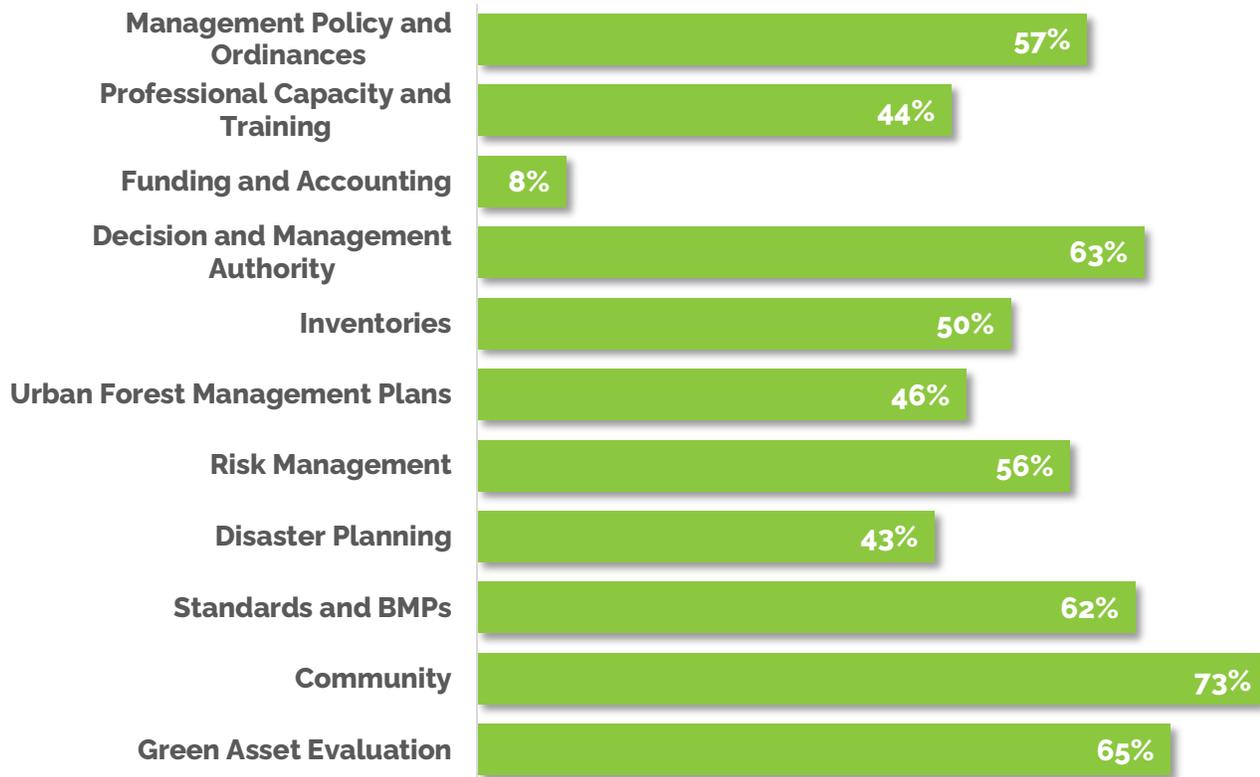


Figure 34. Summary of the 2024 Urban Forest Audit completed for Westminster's Plan.

Interpreting the Urban Forest Audit Scores

The Urban Forest Audit System should serve as a baseline assessment from which progress can be measured and strategies can be adjusted using an adaptive management approach. Overall, Westminster scored a 55 out of 100 based on the consultants' evaluation. The scores resulting from the evaluation are informative but should not be considered a definitive assessment or a reason for excessive action due to a currently low score or inaction due to a high score. The following provides an interpretation of the scores for the City to consider when implementing the Plan's corresponding actions.



WHAT DO WE WANT?





VISION FOR THE FUTURE

Introduction

This section provides guidance and recommendations for the City of Westminster to continue to provide high levels of service now and into the future over the next 10 years. The Urban Forest Management Plan’s recommendations include those that may only take a few months and others that will require a coordinated effort that may need to continue beyond the 10-year timeframe.

Plan Vision Statement

“Our vision is to cultivate a sustainable, inclusive urban forest that is driven by the community, fostering environmental stewardship, and enhancing the quality of life for all city residents, across present and future generations. Through developing and maintaining a diverse and resilient green canopy, we are committed to improving the health and well-being of our community, ensuring a harmonious environment for everyone to thrive in.”

Goals, Strategies, and Actions

A series of guiding principles supported by goals, strategies, and actions are provided to serve as a 10-year roadmap toward the urban forest vision.





Vision

What does the urban forest and its programs look like 10 years from now?

The vision guides direction on where Westminster is headed and helps guide recommendations for the future.

Guiding Principles

What are we aspiring to achieve?

These are the aspirations for the City over the next 10 years. They are key themes for organizing the Plan and include a citywide canopy cover goal.

Goals

How do we achieve our principles and vision?

The goals are specific opportunities for the City to move toward the 10-year vision.

Strategies

What is the approach to take?

Strategies provide the general direction or method to take to achieve the goals.

Priority Actions

What is the next step?

This is the prioritized list of steps to take.





Guiding Principles and Goals Overview

Westminster’s Urban Forest Management Plan was designed to guide the City in managing, protecting, and growing its urban forest. The goals, strategies, and priority actions were developed based on research and analysis of available data, extensive internal and external engagement, and an evaluation of urban forest sustainability criteria. The resulting goals and recommendations address the current conditions, existing and potential challenges, and shared priorities described in previous sections of the Plan. The Plan’s long-term framework supports the shared vision for Westminster’s urban forest.

To achieve the vision for the urban forest, a citywide canopy cover goal was established as the cornerstone metric for tracking progress in implementing the Urban Forest Management Plan. The canopy goal embodies the City’s commitment to sustainability and community well-being. This metric can be used by the City for tracking and monitoring the urban forest and it resonates with residents, creating a tangible and shared vision of a lush and vibrant urban environment. Moreover, the canopy cover goal aligns with other goals and priorities in the City such as environmental stewardship, climate change resilience, public health, air quality enhancement, and temperature moderation. By using canopy cover as an overarching measure, Westminster ensures a comprehensive approach that not only improves the urban ecosystem but also fosters a sense of pride, unity, and responsibility among its residents.

10-Year Canopy Cover Goal

Westminster’s Tree Canopy Cover Goal

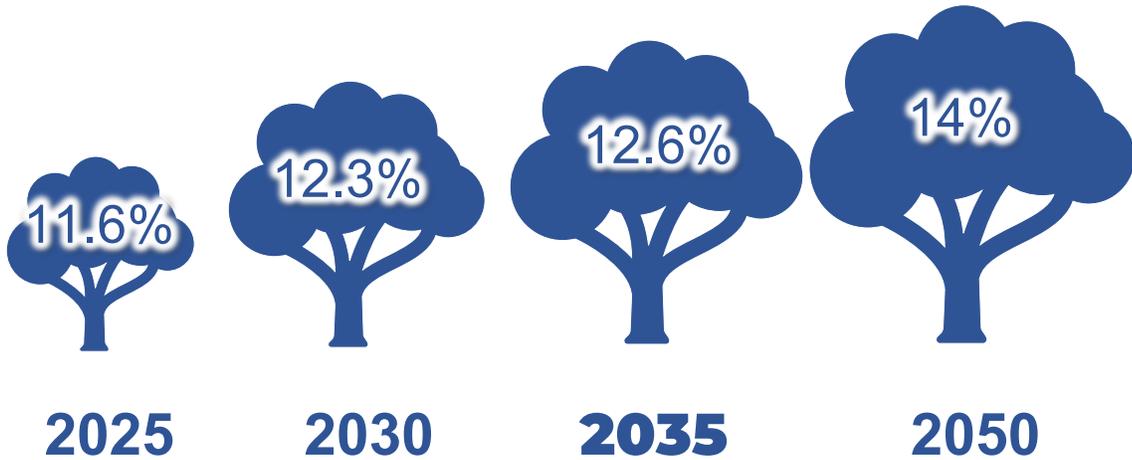
The 2024 Urban Forest Management Plan outlines a 10-year strategy guiding the progression of urban forestry from 2025 to 2035, aiming for a 25-year target of 14% canopy coverage. This goal reflects a realistic increase of 3% from the baseline established by 2020 imagery. A critical factor in determining this goal is the need to counterbalance the canopy loss due to EAB while acknowledging the developing stages of Westminster’s sustainable urban forestry initiative.

In the first 10 years an average of 747 trees need to be planted per year, amounting to 7,464 trees planted by the end of 2035 and a 1% increase in canopy cover. The required planting numbers to reach this goal is citywide, both public and private. The City is recommended to undertake the planting of at least 50% of the necessary trees, securing these through collaborations with local nurseries, and further incentivizing private tree planting through the ReLeaf Westy sale. Achieving this target could be more realistic by offering ReLeaf Westy trees at half price, or through significant discounts and giveaways for smaller tree stock. Additionally, establishing contracts with nurseries for future tree growth could ensure a continuous and cost-effective supply for these initiatives. Since 2017, the City has sold on average 100 trees a year to citizens through the ReLeaf Westy program. The program has gained popularity in recent years, selling out in four days in 2023, therefore the goal is ambitious but achievable although the trees must survive.



The following provides a summary of Westminster’s canopy goal over the next 10 years. The City may adopt these goals, approve action steps and targets, and implement a tree planting initiative that is supported by City staff, community partners, and Westminster residents. Progress should be measured, tracked, and shared to guide urban forest management and maintain community interest and support.

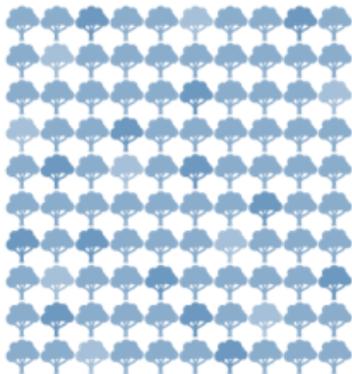
YEAR 1 YEAR 5 YEAR 10 YEAR 30



Years 1-10: 747 trees per year | Years 11-25: 3,030 trees per year

7,464 total trees
planted

49,880 total trees
planted



100 trees planted across the city that have large canopy cover at maturity equals 3 acres of new canopy cover. Approximately 2,491 acres of new canopy cover is needed to reach 12.6% by 2035. 747 trees per year for 10 years is recommended. See the [Urban Tree Canopy \(UTC\) Findings](#) section for more details.

Figure 35. Westminster’s draft 10-year canopy goal milestones and targets.

The figure above suggests that to meet the ten-year tree planting goal of 7,464 trees, the City must plant a minimum of 747 trees annually from 2025 at an annual estimated cost of \$500,049. To achieve the twenty-five-year goal of 49,880 trees by 2050, it is necessary to plant 3,030 trees each year for the following fourteen years. However, if Westminster begins planting 900 trees annually from 2025, it will not only surpass the ten-year target with 9,000 trees, achieving roughly 13% canopy coverage but also reduce the annual planting requirement for 2035 to 2050 to 2,856 trees per year.

It was determined that the annual cost to plant and care for 900 trees to reach the canopy coverage goals will be \$612,000 per year, this figure does not account for tree care after initial planting or mitigation planting to ensure ‘no net loss’. Estimated costs include tree purchase of 2-inch caliper trees, planting, mulching, and watering. Costs for each activity were based on regional averages and should be updated to reflect actual costs in Westminster.



By incorporating the outlined goals and strategies in this Plan, the City will be equipped by 2035 with the adequate capacity and resources required to handle the increased tree planting efforts essential to meet the 25-year goal, covering a citywide initiative that spans public and private properties, with the City accountable for a minimum of 50% of the total plantings. Through identifying priority planting areas to achieve the canopy goal, tree planting and maintenance can be strategically targeted where trees will have the most beneficial impact.

Goal Framework

During the analysis of data, collection of information, and gathering of internal and external stakeholder input, a series of overarching guiding principles emerged that helped to set the Plan’s direction and solidify its foundation. The following principles summarize the community’s priorities and are reinforced by the feedback received from internal stakeholder engagement sessions. These priorities along with the Urban Forest Audit and the Indicators of Sustainable Urban Forestry (detailed in previous sections) established the foundation of the Plan.



**MP=Tree Management Policy Goal. CT=Capacity, Training, & Authority Goal. BF=Budget & Funding Goal. AP=Assessments & Plans Goal. CE=Community Engagement Goal. GA=Green Asset Management Goal*

Tree Management Policy Goal

Enhance and uphold urban forest policies and ordinances to solidify tree conservation, advance management practices, and support the expansion of the citywide tree canopy, targeting a canopy coverage increase to 14% by 2050 with a focus on equitable distribution.

Capacity, Training, & Authority Goal

Empower the City of Westminster with expanded capacity and expertise to deliver superior urban forest management services, emphasizing sustainable practices, pest and disease control, and the cultivation of a resilient urban forest.

Budget & Funding Goal

Adequate levels of funding and resources enable comprehensive and sustainable urban forest management for the preservation and enhancement of tree benefits.

Assessments & Plans Goal

Elevate the City of Westminster's urban forestry understanding with data-driven strategies, ensuring robust sustainability in planning efforts and an enhancement of ecosystem services, while addressing the specific challenges of climate change and environmental equity.

Community Engagement Goal

Foster a collaborative urban forestry initiative within the City of Westminster by engaging residents and stakeholders in educational programs, facilitating the planting of shade trees, and integrating urban forest management into the wider community for heightened health benefits and local economic growth.

Green Asset Management Goal

Advance the proactive management of Westminster's green assets, incorporating trees and green infrastructure into city developments, managing the risks from environmental factors, and optimizing tree health and canopy growth through strategic resource allocation and maintenance planning.

HOW DO WE GET THERE?





Implementation

The Urban Forest Management Plan is the first of its kind in Westminster and lays the foundation for the long-term health, sustainable management, and resilience of the city's urban forest. To successfully implement this plan after its approval, a dedicated team—likely comprising members from both the City and the community—is essential. This team would be responsible for organizing, managing, monitoring, reporting, and adapting strategies and actions through an adaptive management approach. This approach involves a structured, iterative process of making informed decisions amid uncertainty and adjusting as programs and resources change. The primary goal is to reduce uncertainty over time through systematic monitoring, ensuring that the plan remains relevant and effective. As the plan advances, additional resources will become available to support long-term actions.

It is recommended that the City leverage the expertise of the Urban Forestry Team by establishing a dedicated urban forestry working group or Tree Board. This group would oversee the plan's implementation and monitoring and coordinate action with relevant partners or collaborators.

For Westminster's 2024 Urban Forest Management Plan, the goals outlined in the "What do we want?" section are based on data from the tree canopy and public tree inventory, stakeholder input, reviews of existing plans and policies, and alignment with industry standards and best practices highlighted in the "What do we have?" section. The City will determine the best approach to achieve the goals in this plan based on available resources and circumstances. To support effective implementation, the following challenges and recommendations need to be addressed and considered.





Challenges and Recommendations

City Code and Ordinances

A detailed analysis of Westminster’s existing city codes and ordinances was conducted to guide the development of the Plan and make recommendations to incorporate the goals and strategies outlined. Based on the benchmarking exercise, the following results and key considerations are included to highlight potential focus areas for code recommendations.

Authority + Credential

Westminster’s ordinances currently do not give authority to or make mention of “ISA Certified Arborist” or “Urban Forester” or arborists generally. Authority to make decisions is given to the Planning staff in Community Services with minimal guidance from the City’s Forestry Team. Throughout the code, authority is given to the following entities:

- The Director of Parks, Recreation and Libraries shall have the power to promulgate rules, regulations, and specifications for the trimming, spraying, removal, planting, pruning, and protection of trees, shrubs, vines, and other plants upon the public right-of-way of any street, alley, sidewalk, or any other public place in the city.
- The Planning Manager oversees all aspects of development implementation, including landscaping, and administers the Comprehensive Plan and its execution; and
- A Landscape Architect/Designer shall complete the Landscape Plans; and
- The Department of Public Works and Utilities shall share public information; and
- The Planning Commission and/or City Council make final determinations; and
- A Certified Irrigation Designer, Contractor or Auditor shall create irrigation plans; and
- The City Engineer is authority in the Construction of Public Improvements (including public trees).

Key Considerations:

- *Define ISA Certified Arborist in the following sections:*
 - *11-2-1. - Definitions.*
 - *13-1-2. - Definitions.*
- *Require a report written by an Arborist certified by the International Society of Arboriculture and/or a Consulting Arborist registered with the American Society of Consulting Arborists, for situations which need professional guidance.*
- *Clarify roles, responsibilities, and timelines for maintenance of street trees after planting.*
- *Consider giving authority to the City’s Forestry group during plan review, specifically for tree related considerations on public and private property.*
- *City of Arvada sample language (omit landscape architects):*
 - *The tree survey shall be prepared by a professional forester, arborist, or a registered landscape architect, and shall include an analysis of existing trees with two-inch or greater calipers, including...*
- *City of Thornton sample language:*
 - *The parks, buildings and recreation director shall appoint the city forester. The city forester shall have such duties and responsibilities as assigned by the parks, buildings and recreation director. The city forester shall also have the authority to order the removal of any trees or plants upon public or private property when the city forester determines such action is necessary to prevent the spread of disease or insects, and to protect the public health and safety based upon standards established by the International Society of Arboriculture. It is declared to be a public nuisance for an owner to maintain a tree or plant in a condition that presents a threat to the public health and safety.*



Tree Preservation

In Westminster, trees are defined as woody plants usually having one or more perennial stems, a more or less definitely formed crown of foliage, and a height of at least 12 feet at maturity. The *Landscape Regulations* state that “All existing healthy trees of desirable species 4 inch caliper or more must be shown on the landscape plan, and must be preserved or transplanted on the site unless approved otherwise by the City.”

While there is no tree removal permit process for private property developments, except for an Official Development Plan (ODP) excluding single-unit dwellings, a land clearing or grubbing permit is required for development on public property. Overall, tree preservation standards in Westminster are limited to trees on public property. While the city has tree lists for heritage trees, recommended plantings, and prohibited trees, it does not identify 'Protected Tree Species.' The Westminster code does not make use of canopy-based preservation or preservation incentives, though preserved trees are allowed to count toward total tree requirements.

Key Considerations:

- *Strengthen the tree removal permit process.*
- *Create a DBH thresholds and definitions for tree preservation.*
 - *ISA definition: “Woody perennial usually having one dominant trunk and a mature height greater than 5 meters (16 feet).”*
 - *Longmont definition: Mature tree means a tree typically planted in the state with a diameter at breast height (dbh) of eight inches or more.*
 - *Lakewood definition: Tree means a single or multi-stemmed woody plant that attains a minimum mature height of 16 feet with a minimum mature trunk diameter of one inch measured at six inches above the ground.*
 - *Boulder definition: Tree means a self-supporting deciduous or evergreen plant normally fifteen feet or more in height at maturity as grown in Boulder County.*
- *Improve preservation of specific species of concern.*
 - *Longmont sample language: Significant trees and native vegetation means those trees and native vegetation identified as desirable by the city tree preservation code, or are given federal, state, county or local special status listing, including, but not limited to, threatened or endangered species, species of special concern, sensitive species, state natural heritage program global, national, or state rankings of critically imperiled, imperiled, vulnerable, or apparently secure, or provide erosion control, shading of streams or creeks, or filter stormwater, or provide important habitat as defined in this Code, or as otherwise determined by the city to be significant.*
- *Preservation incentives can be added to Westminster code Title XI, Chapter 7. - Site Development Standards. Incentives should be provided as a handout to developers to promote their use and implementation.*
 - *Arvada sample language: [4-6-4-2. - Tree preservation credits.](#)*
- *Create a protected tree list and/or a prohibited species list to include as a referenced document using dynamic expertise by City staff.*

Tree Protection During Construction

A “critical root zone” or “tree protection zone” is not defined in the Westminster code. The *Landscape Regulations Section V. Considerations in Landscape Design* states that: “Grading shall not be permitted within the drip line of trees to be preserved or until after relocation is complete. Tree wells or retaining walls may be used beyond the limits of the drip line of the trees in order to protect the trees if grading does not otherwise accommodate preserving the existing grade.” In the *Standards and Specifications*, it is stated that the developer and contractor will use “every reasonable precaution to prevent the damage or destruction of... trees” on public or private property.



Key Considerations:

- Define “drip line.”
 - Boulder definition: “Drip line means a vertical line extending downward from the tips of the outermost branches of a tree or shrub to the ground.”
- Define “tree protection zone.”
 - Longmont definition: “Tree protection zone means an area surrounding the base of tree, generally circular in shape corresponding to the dripline (outer most branches) of a tree, within which neither construction activity nor physical development is permitted.”
- Define “critical root zone.”
 - ISA definition: “Area of soil around a tree where the minimum amount of roots considered critical to the structural stability or health of the tree are located. CRZ determination is sometimes based on the drip line or a multiple of dbh, but because root growth is often asymmetric due to site conditions, on-site investigation is preferred.”
- In a Westminster Tree Manual, include construction tolerance information for specific species. (This guide may be a starting point: <https://extension.psu.edu/a-guide-to-preserving-trees-in-development-projects>)
- Require fencing and signage explaining tree protection measures to increase their effectiveness.
- Require inspection of tree protection fencing and signage prior to issuance of land grading permit.

Tree Planting Standards

The *Landscape Regulations* document identifies planting standards for trees on private property, and the standards in this document are referenced by the Westminster code directly and by the *Standards and Specifications* document as well. Specifically, section VI. *General Landscape Provisions for Plant Materials, and Their Design and Installation* of the *Landscape Regulations* provides detail about species selection, species diversity, general watering standards, mulching requirements, and minimum tree grate size. Additional details are provided for various land uses.

Key Considerations:

- Preferred species list should be identified, with reference to supporting regional or state-wide lists.
- Include references to a Westminster Tree Manual for tree maintenance and planting information for property owners.
- Add minimum surface area and soil volume to our requirements.
 - Boulder sample language: 10.03 Planting (C)(4)(b) The diameter of all tree pits shall be at least two times the diameter of the ball or spread of the roots. Tree pits shall be excavated so that the top of the ball will be 3 inches above finished grade when irrigated and 2 inches when not irrigated.
 - ANSI A300 Part 6, Digging the hole: 64.4.4 The planting-hole width should be a minimum of 1.5 times the diameter of the rootball, or soil surrounding the upper 1/3 of the planting hole should be loosened to a width of 1.5 times the rootball diameter.
- Identify prohibited species.
 - Thornton sample language: Sec. 18-554. - Prohibitions. (a) The following are prohibited on all properties in the city, developed or undeveloped: (3) The planting of elm trees (*Ulmus* genus) at any location within the city, unless these trees are certified



by a horticulturist to be resistant to Dutch elm disease.(4)All trees of the Salix and Populus genera within 25 feet of any street or public right-of-way.

- Reference industry standards for tree quality and size.
 - Arvada sample language: 4-6-4-3. - Size and quality of landscape plants. C. Specification of Landscape Materials.1. All new plant material shall meet specifications of the American Standard for Nursery Stock (ANSI Z60.1) and 8 CCR § 1203-5, Rules Pertaining to the Administration and Enforcement of the Colorado Nursery Act.
- Consider transferring planting approvals from community planning to the City Forester’s team. Consider periodic updates at City Forester’s discretion, without the need for council approval.

Tree Maintenance and Management Standards

In Westminster, while property owners are responsible for maintaining trees in their abutting public rights-of-way, the City also has authority to maintain those trees. However, no budget is dedicated from the City to support street tree maintenance.

Westminster code section 13-3-1 identifies the Director of Parks, Recreation and Libraries’ authority over the trimming, spraying, removal, planting, pruning, and protection of trees, shrubs, vines, and other plants upon the public right-of-way of any street, alley, sidewalk, or any other public place in the city. Code section 13-3-4. - Removal or Treatment of Infected or Infested Trees outlines some requirements for pest management on public property, which specific mention of Dutch Elm and Emerald Ash Borer disease. The code states that certain tree species are prohibited due to excessive insect infestation or invasive growth habits (Siberian or Chinese Elm (*Ulmus pumila*) and Russian Olive (*Elaeagnus angustifolia*)). While the code requires for landscaping and to be continually maintained with irrigation, weeding, pruning and replacement, this reference is not very specific and could be strengthened with industry standards and Best Management Practices.

In the *Standards and Specifications*, ANSI is defined and referenced for other disciplines, but no urban forestry ANSI standards are included. The *Standards and Specifications* section 6.43.02 states that tree branches extending over the roadbed shall be trimmed to 20’ of clearance, and that the trimming “shall be done by skilled workmen and in accordance with good tree surgery practices.”

The *Landscape Regulations* section VIII. *Right Of Way Area Landscape Standards* establishes that “The ownership and maintenance of landscape improvements in the right-of-way is that of the developer until turned over to the adjacent property owner or homeowner/business association.” Section XIV. *Landscape Maintenance Requirements* establishes that “All tree-pruning activities shall be in accordance with the American National Standard for tree care operations (ANSI A300).”

Key Considerations:

- Include references to industry standards and Best Management Practices to support proper watering and maintenance of trees.
- Include references to a Westminster Tree Manual for tree maintenance and planting information for property owners.
 - Boulder language: Design and Construction Standards
 - 3.01(D) City Approval Required: All work associated with the planting, maintenance, and removal of trees and landscaping materials located, standing, or growing within or upon any City of Boulder public right-of-way is subject to City of Boulder approval or permit issuance as set forth in Chapter 8-5, “Work in the Public Right-of-Way and Public Easements,” and Chapter 6-6, “Protection of Tree and Plants,” B.R.C. 1981.
 - 3.06(A)(3) Responsibility for Damages: The applicant shall be responsible for any damage to trees, plants, fences, buildings, roadways, sidewalks, and public and private property resulting from the applicant’s activities. The City



may require an applicant to provide, at no cost to the City, devices to prevent damage to fragile plant materials or structures.

- City of Longmont language: Sec. 13.24.020. - Responsibility for trees and plants. The care and maintenance of trees and other plant material is the responsibility of the owner of the property on which those plants are located.
 - A. Public trees and plants. The City is responsible for the care, maintenance, and removal of trees and plants located on city property.
 - B. Private trees and plants. Owners of private property are responsible for trees and plants located on their properties.
 - C. Alley tree and plants. The adjacent property owner is responsible for the care, maintenance, and removal of trees and plants up to the center of the alley.
 - D. Written agreement. A written agreement, such as a landscaping plan or other document approved by the City, may establish responsibility for trees and plants located in public rights-of-way as the responsibility of the adjacent property owner, such as a homeowners' association, business or private individual.
- Arvada sample language: Sec. 94-68. - Maintenance responsibility. It shall be the responsibility of present and future owner of property adjacent to all streets to provide for the maintenance of all facilities and landscape area from the property line out to the main traveled portion of the roadway. This shall include, but is not limited to, the curb, gutter, sidewalks and landscaping, except where the rear lot line of a residential property is adjacent to the street. This section shall be applicable to all property within the city.
- Update Westminster code with water-wise requirements
 - Arvada sample language: [4-6-7-1. - Water-wise requirements.](#)
- Strengthen clarity around maintenance responsibilities of street trees.
 - Arvada sample language: 4-6-6-1. - Street trees. Maintenance. Maintenance of street trees shall be the responsibility of the adjacent property owner, unless the Applicant has provided for an alternative perpetual maintenance arrangement that is acceptable to the Director (e.g., via a property owners' association or special district).

Mitigation

Currently, there is an informal in-lieu-of planting payment option of \$150/diameter inch removed. This process must be formalized for internal and external projects. No mitigation requirements were found in the Westminster Code for trees removed from public property. It is common for municipalities to exempt government entities from mitigation requirements, fees, and/or fines, however it is vital that the City has an effective and transparent process for administering funds gathered from tree removals to dedicate to City properties and ROW. The following tree mitigation regulations are outlined for private property in the City's *Landscape Regulations*:

- Preserved trees can be credited toward the total number of trees required for the development.
- Any tree removed shall be replaced on a 2:1 caliper-inch ratio. Special circumstances may be considered in the total number of trees required for replacement.
- Off-site planting may be considered in some instances.
- Improper pruning of trees can result in the owner being required to “replace the affected plant with an equal plant within 6 months of notification by the City. This requirement also applies to plant material affected by storm damage.”

Key Considerations:

- Identify a tree mitigation plan process.
 - Thornton sample language: Sec. 18-537. - Existing plant material. (b)Prior to approval of any subdivision plat or development permit, the applicant shall inventory and graphically depict, by species, all existing deciduous trees over two inches in caliper, all existing evergreen trees six feet in height or taller, and all shrub masses over 100



square feet ("inventoried plant material"). Plant materials on the property may be removed only after a mitigation plan has been approved by the City.

- Boulder sample language: 6-6-7. - Mitigation of Trees or Plants Removed or Destroyed. No person shall remove, damage or destroy any tree or plant in the public right-of-way without first having a plan approved by the city manager for the mitigation of the loss of such tree or plant.
- Consider the following tree valuation for cash-in-lieu: The Basic Value of a tree shall be calculated at \$50.00 per square inch of cross-sectional area at Diameter at Breast Height (DBH), using the formula: $Basic\ Value = \$50.00 \times 3.14 \times (D/2)^2$. This method allows for adjustments over time, factoring in inflation, price changes, and the significance of the tree.
 - For trees under 15 inches DBH, a flat rate of \$150 per inch is applied
 - For trees 15 inches DBH and larger, the basic value formula is applied
- Determine which government entities will be exempted from fees and fines, if any, and why.
 - Longmont sample language: Sec. 13.04.060. - Permit, plan review and inspection charges; payment before permit issuance. The applicant shall pay to the City the reasonable costs and expenses of any engineering review and inspection, in addition to the permit fee. No permit shall be issued, and no work shall be performed, under any permit for which required fees and charges have not been paid. The City shall waive these fees and charges for governmental entities, except the City's telecommunications utility.

Enforcement

According to Westminster Code section 11-1-6. - Land Use and Development Review Fee Schedule, land disturbance permits cost a fee of \$250.00. Section 11-1-5. - Penalties and Remedies establishes that a violation of the Title 11, Chapter 5 regulations can result in a misdemeanor crime.

Westminster Code section 13-3-5. - Compliance Required; Unlawful Acts establishes that it is unlawful to fail or refuse to comply with Title 13, Chapter 3 – Trees and Shrubbery regulations, and it is unlawful to plant trees in the right-of-way or any other public property.

It is currently unlawful for a property owner to plant trees in their adjacent public rights-of-way, but it is important to note that in rights-of-way which are privately maintained in accordance with HOA or other organization's regulations etc., tree planting may or may not be allowed.

In terms of practical implementation, Planning has the authority, but code enforcement has the expertise and ability to carry out the enforcement process. A gap in enforcement services exists between code enforcement, planning, and the forestry team.

Key Considerations:

- Establish a process for inspections of tree plantings.
- Strengthen City authority over control of pest and disease with additional inspections and enforcement measures.
 - Lakewood sample language: 8.06.100 - Correction notice; noncompliance. C. Should the owner refuse or fail to comply with the terms of the correction notices, the City of Lakewood is hereby authorized to solicit a contractor to enter the premises and remove, treat or dispose of, or otherwise care for, vegetation in order to make the required corrections. The costs therefor, including all administrative fees, may be assessed against the owner in the form of a property lien.

Guidance for Adopting and Referencing a Tree Manual

The City of Westminster is interested in publishing a Tree Manual containing Right-of-Way tree care responsibility, standards, and best management practices (BMP) in an easy to understand, multilingual format. A primary goal of the Tree Manual is to provide flexibility to update and edit without council approval, specifically for components such as recommended tree list or BMP's.

Because laws vary from state to state and year to year, a preliminary review of Colorado Revised Statutes was conducted to provide guidance based on current regulations. It was discovered that as of



the 2023 Regular Session, Colorado requires that ordinances, resolutions, and orders for the appropriation of money shall require adoption and publication (unless otherwise exempted, or) unless the ordinance codes are “adopted by reference” (C.R.S. §§ [31-16-201](#) – 31-16-208).

The City of Westminster establishes the “adoption by reference” process in Municipal Code section [1-1-4. - Adoption by Reference](#), with two relevant procedural requirements to consider as the Tree Manual is developed:

(B) *Availability of Codes Prior to Enactment:* At least one copy of the material being considered for adoption shall be on file with the City Clerk and open for public inspection five days prior to first reading of the ordinance proposing adoption of the material by reference.

(C) *Filing of Public Record; Sale of Copies:* At least one copy of material adopted by reference shall be filed with the City Clerk and shall be kept on file for public inspection while the ordinance is in force. Following the adoption of material by reference, the City may maintain copies available for purchase by the public or, in the alternative, shall provide information on where such material may be obtained.

In initial research of the application and usage of “adoption by reference” throughout Colorado, many municipalities use this statute to directly reference international, federal, and state standards. The City of Westminster adopts certain State Department of Transportation regulations in [Municipal Code Title X. - Traffic, Chapter 1. - Traffic Code](#), which could provide a useful format for crafting code language.

The following are three examples of tree and landscape standards adopted by reference in other Colorado cities. In each example, links are provided to the code sections establishing the adoption by reference, as well as the externally referenced documents:

- **City of Aurora:** The [Aurora Unified Development Ordinance section 4.7.3. General Landscaping Standards](#) references the “[Landscape Reference Manual](#)” as the guide for preparing a preliminary landscape plan. This manual was last revised in 2016.
- **City of Boulder:** The City of Boulder uses the Design and Construction Standards Chapter 3 to address Streetscape Design and Tree Protection. This document is explicitly adopted by reference in Municipal Code section [9-9-4. Public Improvements \(a\)](#), and the document is effective as of February 6, 2020.
- **City of Colorado Springs:** The City of Colorado Springs establishes in [Unified Development Code section 7.4.903: Landscape Policy Manual](#) that “the Planning Department is authorized to adopt, and as necessary make revisions to, a Landscape Policy Manual containing provisions that implement and supplement the provisions of this Part 7.4.9, Section 7.5.524 (Administrative Adjustment), Section 7.5.803 (Nonconforming Site Features), and Chapter 7 of this Code, and other City regulations and standards as they relate to landscaping, irrigation, buffering, screening, fences, grading, and walls.” [The Landscape Code and Policy Manual](#) is effective as of June 2023.





TREEPLOTTER

In 2023, the City of Westminster subscribed to the tree inventory management software, TREEPLOTTER. This software program will enable the City to maintain up-to-date inventory, planting, and management records. Using this mapping tool, the City can focus on varying neighborhoods and areas for maintenance by utilizing the filters to showcase the most critical tree removal and pruning needs.

Tree Management and Prioritization Workbook

The table below summarizes the tree maintenance and removal prioritization criteria and process as determined by the analysis of the publicly managed tree inventory:

| Westminster’s Public Tree Management Prioritization Parameters | | |
|---|---|---|
| Priority Ranking | Filters Applied | Justification |
| Priority 1 High Risk Removal | Status = Dead, or Condition = Dead Hazard = Yes Management = Contractor remove | These trees are the most critical to address first in maintenance to reduce risk and create new planting spaces. 182 trees are eligible (as of September 2023) |
| Priority 2 Critical Removal or Prune | Status = Alive Condition = Poor Tree Work = Remove Risk Assessment = Medium Management = Prune now, contractor prune | Trees that have the potential to be a high risk and need to be maintained. 526 trees are eligible (as of September 2023) |
| Priority 3 Large Tree Routine Maintenance (7-year cycle) | Diameter at Standard Height (DSH) >6” Status = Alive Condition ≠ Dead or poor Tree Work ≠ Remove Risk Assessment = Low | These trees require routine maintenance to maintain their health over time. 6,634 trees are eligible (as of September 2023) |
| Priority 4 Young Tree Routine Pruning (3-year cycle) | DBH <6” Status = Alive Condition ≠ Dead or poor Tree Work ≠ Remove | These are young trees and are being maintained to reduce structure and pruning issues in the future. 5,532 trees are eligible (as of September 2023) |

Table 7. Summary of the public tree maintenance and removal prioritization criteria and process.

The Public Tree Management Prioritization Workbook provides an in-depth 7-year guide for tree work according to the tree inventory data results and the prioritization analysis. The entire workbook is based on Westminster’s current on-call tree work contract costs. It is categorized by maintenance priority and DBH class for a detailed understanding of where program resources are or should be allocated.



| Management Activity Costs | Duration | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Activity Totals |
|-------------------------------------|----------------|--------------------|--------------------|--------------------|------------------|------------------|------------------|------------------|--------------------|
| Priority 1 High Risk Removal | Years 1-3 | \$80,010 | \$75,030 | \$79,920 | \$0 | \$0 | \$0 | \$0 | \$234,960 |
| Priority 2 Critical Removal | Years 1-3 | \$117,930 | \$109,980 | \$115,440 | \$0 | \$0 | \$0 | \$0 | \$343,350 |
| Priority 2 Critical Prune | Years 1-3 | \$27,660 | \$26,964 | \$28,746 | \$0 | \$0 | \$0 | \$0 | \$83,370 |
| Priority 3 Large Tree Routine Prune | Years 1-7 | \$622,188 | \$625,188 | \$621,366 | \$616,236 | \$619,752 | \$624,492 | \$626,622 | \$4,356,114 |
| Priority 4 Small Tree Routine Prune | Years 1-3 | \$468,582 | \$468,234 | \$467,190 | \$0 | \$0 | \$0 | \$0 | \$1,404,006 |
| Annual Totals | 7 Years | \$1,316,370 | \$1,305,396 | \$1,312,932 | \$616,236 | \$619,752 | \$624,492 | \$626,622 | \$6,421,800 |

| Management Activity Counts | Duration | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Activity Totals |
|-------------------------------------|----------------|--------------|--------------|--------------|------------|------------|------------|------------|-----------------|
| Priority 1 High Risk Removal | Years 1-3 | 62 | 59 | 61 | 0 | 0 | 0 | 0 | 182 |
| Priority 2 Critical Removal | Years 1-3 | 143 | 139 | 140 | 0 | 0 | 0 | 0 | 422 |
| Priority 2 Critical Prune | Years 1-3 | 35 | 34 | 35 | 0 | 0 | 0 | 0 | 104 |
| Priority 3 Large Tree Routine Prune | Years 1-7 | 948 | 951 | 948 | 941 | 945 | 950 | 951 | 6,634 |
| Priority 4 Small Tree Routine Prune | Years 1-3 | 1,846 | 1,845 | 1,842 | 0 | 0 | 0 | 0 | 5,533 |
| Annual Totals | 7 Years | 3,034 | 3,028 | 3,026 | 941 | 945 | 950 | 951 | 12,875 |

Figure 36. Summary of estimated costs and tree counts for the recommended seven-year Public Tree Management Program.

As shown in the figure above, the Public Tree Management Prioritization Workbook identified four priority levels beginning with immediate and necessary tree removals and pruning, routine pruning for established, and routine pruning for newly planted trees. The counts are based on the City’s public tree inventory as of September 2023. The workbook includes a section for inputs to update the tree counts which in turn updates the prioritization counts. By implementing this recommended seven-year Public Tree Management Program, within three years the 182 immediate removals will be addressed, 422 other removals will occur simultaneously, an average of 948 established trees are pruned per year, and an average of 1,844 young trees are pruned for structure and health annually. As new trees are planted, they will need to be added to the young tree routine pruning schedule resulting in increased costs.

As the figure above shows, implementing the recommended seven-year Public Tree Management Program has an average annual cost of \$879,755 or a total seven-year cost of \$6,421,800. The following sections provide additional guidance for tree management.

The tree counts currently reported in the Public Tree Management Program exclude the 6,511 open space trees that await inventory. After these trees are fully inventoried, the program's figures should be revised to encompass the open space trees, which will result in an increase in both maintenance requirements and associated costs.

Routine (Proactive) Pruning of Established Public Trees

Designed to create structurally sound trunk and branch architecture, maximize the lifespan of a healthy tree, and manage potential tree risks, this “routine pruning” or “proactive / programmed pruning” will sustain a tree’s benefits to the longest extent possible until the tree ideally reaches a natural point of



senescence— a process of deterioration that occurs as trees age. Proactive or programmed pruning is typically implemented citywide or in prioritized maintenance corridors on a rotation of five to seven years depending on the tree species, density of trees, frequency of pedestrians and vehicles, available budget, and other factors. This means that each tree in the proactive pruning cycle is pruned for clearance, risk, health, and/or structure at least once within the programmed cycle (e.g., five to seven years). The goal with mature trees is to develop and maintain a sound structure to minimize risks such as branch failure. This task is easier provided a good structure was established earlier in the tree’s life. When properly executed, a variety of benefits are derived from pruning. Benefits include reduced risk of branch and stem breakage, better clearance for vehicles and pedestrians, improved health and appearance, enhanced view, and increased storm resilience.

Proactive pruning should continue to be a prominently positioned component of Westminster’s Public Tree Management Program for the City maintained public trees. Proactive pruning plans as well as tree risk mitigation should complement the City’s overall tree management program goals, align with the Urban Forest Management Plan, and should be fully integrated with the tree planting, plant health care, and emergency response programs to grow an equitable and resilient urban forest.

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

In recent years, the City prunes approximately 288 public trees annually. With 12,875 trees in the inventory database, the number of pruned trees will need to increase to approximately 1,000 annually to fit in a seven-year cycle. According to the City’s public tree inventory database of 12,875 trees, a total of 6,634 public trees (52%) are eligible for a routine pruning program. This means that if the City were to prune 1,000 trees per year on average, the Public Tree Management Program will maintain a routine pruning cycle with less than seven-year intervals. Going forward, the City should evaluate this metric, public tree needs, and demands for services to adjust its staffing and associated resources to maintain a five- to seven-year pruning cycle for public trees.

Young Tree (Structural) Pruning

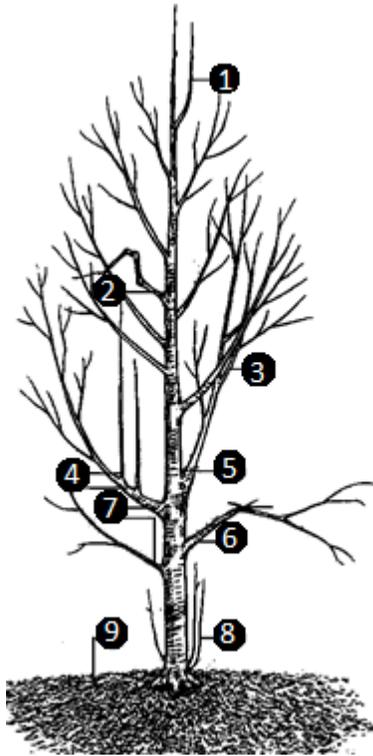
Young tree pruning is performed to improve tree form or structure; the recommended length of young tree pruning cycles is three years since young trees tend to grow at faster rates (on average) than more mature trees. The young tree cycle differs from a routine pruning cycle in that these trees generally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

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

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



Young Tree Pruning



Within Westminster’s public tree inventory, there are 5,533 trees (43%) that require young tree pruning under the Public Tree Management Program. These trees are under six inches in diameter, not dead, and are not recommended for removal. View Figure 35 for the recommended pruning cycle and associated costs for young tree pruning.

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

Figure 37. Illustration and description of the young tree pruning methods and considerations (Source: Arbor Day Foundation).

Pests and Disease

Westminster’s Urban Forest Management Plan places a strong emphasis on tree pest and disease management to maximize the benefits of trees for the long-term by keeping them healthy and growing. For Westminster, there are many native and invasive forest and urban forest pests and diseases that can either directly cause mortality or weaken a tree to the point at which it is susceptible to other physical or biological stressors. These pests and diseases often attack trees already weakened by poor soils, drought, or storm damage.

An integral part of Westminster’s UFMP project, was the creation of a Tree Pest and Disease Management Plan for the City. Structured around the principles of Integrated Pest Management (IPM), this Tree Pest and Disease Management Plan for Westminster outlines specific strategies for the identified pests and emphasizes a sustainable and comprehensive approach to pest control, prioritizing long-term health of the urban canopy while minimizing pesticide use. The IPM framework is predicated on the understanding of pest life cycles, their ecological interactions, and the judicious application of control methods to address pest damage economically and with minimal risk to public health, property, and the environment. IPM in urban forestry integrates a spectrum of techniques, including biological control, habitat manipulation, cultural practice alterations, and the introduction of resistant flora. Chemical treatments are employed conservatively, guided by rigorous monitoring and strict adherence to established environmental guidelines, ensuring interventions are precise and target specific. This dynamic method of pest management necessitates continual surveillance and the flexibility to adapt to shifting pest dynamics and environmental conditions, thus fostering biodiversity, reducing dependency on chemical interventions, and promoting the resilience of the urban forest ecosystem.



Staffing and Resources for a Growing Urban Forest and Demand

Adequate staffing and resources for public tree management and broader urban forest impacts within the Forestry Team is essential to sustainability and quality levels of service to the community. Proactive management of the public trees requires trained, qualified, and dedicated staff to balance regular pruning cycles, address planned removals, and maintain new plantings in addition to responding to emergency situations and customer service.

The City is committed to public health and safety, combatting climate change, and environmental justice. Currently, the Forestry Team is maintaining its service demand, however this demand is increasing as the urban forest matures, parks grow, and combating climate change becomes an immediate need. Urban forest programs are also growing in demand. The City is managing this demand with current full-time and temporary staff. However, program demand is and will continue to grow comparable to the growth of the urban forest and that growth must be addressed now to maintain the city’s urban forest and public service needs. If the City aims to achieve tree canopy goals, then this will require additional planting, watering, maintenance, engagement, and administrative resources, particularly for those trees within public spaces.

In Westminster, the Forestry Team currently comprises four full-time employees: a City Forester, an Assistant City Forester, and two Arborist Technicians. Additionally, up to three field workers are employed for 30 hours weekly throughout the year. According to the City, the 2021 annual average wages of the Forestry Team are displayed in the following table.

| Position | Salary |
|--------------------------------|-----------|
| City Forester | \$95,388 |
| Assistant City Forester | \$76,648 |
| Arborist Technician 1 | \$63,253 |
| Arborist Technician 2 | \$58,739 |
| Fieldworker 1 | \$33,399 |
| Fieldworker 2 | \$31,839 |
| Fieldworker 3 | \$31,839 |
| Total | \$327,852 |

Table 8. Summary of costs for Westminster's urban forestry team.

These figures do not include additional costs such as trainings, professional development, overtime pay, severance pay, employer cost for benefits, and tuition reimbursements. Also, urban forestry professionals are often required to maintain certifications for safety standards, industry standards, and best management practices.

Going forward, the Forestry Team should closely monitor expected changes to demands and services to effectively request budget and staffing adjustments. The following section provides estimated costs for the City to consider increasing its maintenance capacity to account for a growing public tree population and greater challenges that lie ahead due to climate change.

| Recommended Staff | Cost per Hour per Staff* | # of Existing Staff | # of New Staff | Salary Totals |
|------------------------------|--------------------------|---------------------|----------------|---------------|
| City Forester | \$45.86 | 1 | 0 | \$95,388 |
| Assistant City | \$38.14 | 1 | 0 | \$76,648 |
| Arborist Technician 1 | \$31.47 | 1 | 0 | \$63,252 |
| Arborist Technician 2 | \$29.95 | 1 | 3 | \$233,517 |
| Fieldworker | \$22.50 | 3 | 3 | \$192,594 |
| Subtotal | -- | 7 | 5 | \$661,399 |

Table 9. Estimated costs for additional tree maintenance staffing.

* Wage rates were provided by the City of Westminster.



The table above shows the recommended staffing increase to meet current demands and begin implementation of the goals and strategies outlined in the UFMP. The recommendations include hiring three additional Arborist Technicians and three additional Fieldworkers with a salary increase for the Fieldworker position to \$35,100 or \$22.50 an hour. The salary increase for the Fieldworker position is recommended to make the position more competitive, overcoming historic difficulties in hiring. According to the estimates, the new Forestry Team, including existing staff, would cost \$661,399, not including benefits for eligible positions.

As the City's forestry team expands to meet the increased demands of managing the historically unaccounted-for open space trees and to initiate the goals and strategies of the UFMP, it is advisable to streamline their workload by limiting their tasks to core forestry duties. Since the forestry team is engaged in year-round tree maintenance, with a focus on preventative and rotational work during the winter, reallocating their time away from non-forestry activities such as snow removal and holiday decorating could significantly enhance productivity. By doing so, the existing staff could redirect 2-3 months' worth of labor hours back to core forestry functions.

Improved Coordination

Implementing effective communication and workflow management in urban forest management requires a structured and collaborative approach. The process begins with establishing regular internal meetings. These meetings, set at a frequency that balances continuous communication with productivity, serve as a platform to review ongoing activities, address challenges, and strategize future actions. Within this framework, it is crucial to clearly define the roles and responsibilities of each team member. This clarity not only streamlines communication but also ensures comprehensive coverage of all urban forest management aspects, avoiding overlaps and gaps in responsibilities.

A critical step in this process is the documentation of current workflows. These workflows encompass all processes related to tree planting, maintenance, data collection, stakeholder engagement, and emergency responses. Utilizing visual tools like flowcharts or process maps can greatly enhance the understanding and analysis of these processes. It is also beneficial to develop a centralized information system, possibly a digital platform like a cloud-based system, where all relevant information is stored. This system should be easily accessible to all team members and include essential data like tree inventories, maintenance schedules, and feedback from stakeholders.

Implementing a project management tool can significantly improve task tracking and coordination. Such a tool provides a clear view of tasks, deadlines, and progress, ensuring everyone is aligned and informed. Moreover, fostering an environment of open communication is pivotal. Encouraging team members to freely share ideas, concerns, and feedback leads to early identification of potential issues and collaborative problem-solving.

Annually assessing these workflows is an integral part of the process. This assessment involves analyzing the effectiveness of current processes, considering advancements in urban forestry practices, technological developments, and team feedback. Based on this assessment, workflows should be updated and adapted to reflect best practices and incorporate new technologies or methodologies. It's important that all team members are adequately trained on any new processes or tools.

Additionally, maintaining a record of best practices and lessons learned from various projects can serve as an invaluable resource for training and refining processes. This documentation aids in capturing experiential knowledge and ensures that successful strategies are replicated, and pitfalls are avoided in future projects.

Finally, integrating stakeholder feedback into the internal review process is essential. Regularly considering input from external stakeholders ensures that the workflow remains relevant and effective, aligning with the needs and concerns of the community and other stakeholders. By following these steps,



urban forest management can be conducted more efficiently, transparently, and adaptively, leading to a more sustainable and community-aligned approach.

Strengthening and Establishing Partnerships

Managing an urban forest effectively requires a dedicated, full-time staff member whose primary responsibility is to strengthen and foster both new and existing collaborative partnerships. This role involves actively engaging the local community in urban forest management through volunteer initiatives, educational programs, and regular feedback sessions, thereby fostering a sense of ownership and stewardship among residents. Additionally, the staff member would be responsible for establishing and maintaining partnerships with local businesses, encouraging them to sponsor tree planting events or adopt green spaces, which are crucial for the expansion and maintenance of urban forests.

Collaboration with nonprofits, environmental groups, and government agencies is also a key aspect of this role. These entities can offer expertise, resources, volunteers, and funding opportunities. The staff member(s) would also liaise with educational institutions to facilitate research, educational programs, and student projects, promoting a culture of learning and innovation in urban forestry management. During stakeholder engagement with the community of Westminster, the Butterfly Pavilion was identified as a potential partnership for the Forestry Team to work with moving forward.



A significant part of this job involves leveraging technology and social media to coordinate events, disseminate information, and gather community input, making the role highly dynamic and interconnected. Organizing regular meetings and workshops with all stakeholders to discuss progress, challenges, and future plans ensures continuous communication and collaboration. Recognizing the contributions of partners and volunteers through awards and public acknowledgment is also a critical function, as it motivates continued participation and support.

Given the diverse responsibilities and the need for a flexible, inclusive approach, this role requires full-time commitment. Regular monitoring and reporting on the health and growth of the urban forest are essential, as it builds trust among stakeholders and demonstrates the tangible impact of these collaborative efforts. Thus, this position is not just a job, but a mission to enhance and protect urban green spaces through sustained community involvement and partnership.

Community Engagement

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

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



- **Current Canopy Extent and Value of Westminster’s Trees.** The message should present the current canopy level and benefits the canopy (and public trees) provides. This is typically the first message to send out to the public, as all other messages should connect back to this one. This can also be a way to “roll out” the Urban Forest Management Plan to the public. Include information such as why Westminster needs tree canopy, what the current canopy level is, and the plans to improve the management of the trees that comprise the canopy. Educating local business owners on the impact that a shady commercial district can have on sales and educating property owners about the impact that trees have on property values are other useful methods for boosting the desire for increased canopy along main thoroughfares and neighborhood streets while also engaging the public. The important value of mature trees could also be highlighted, as people often do not realize that the large tree they have is a value to their property, the community, wildlife, and the environment.
- **How You Can Get Involved.** What are the next steps you want people to take? The City should decide the answer and insert this “ask” in every outreach piece or effort. The City should continue offering the ReLeaf Westy program and consider offering tree giveaways (such as seedlings, saplings, or small nursery stock) at Arbor Day and related events for people to plant on private property. Another opportunity for getting the community involved is to increase awareness of the City’s Heritage and Champion Trees. Lastly, citizens can donate funds or volunteer at a tree planting event.
- **Tree Threats.** Public and private trees can die, decline, or become safety risks because of insect and disease infestation as well as inadequate maintenance. With education, the residents of Westminster can become aware of the common threats to the tree canopy and what they can do to help. The City should provide education on existing tree pest and disease concerns and what the City is doing about these threats on public land, and options for management on their own land. Since the majority of the trees that comprise the city’s urban tree canopy are on private property, it is vital for the City to educate the public on how to detect insect and disease threats, provide information about management and treatment options, and relay the importance of reforestation in the event trees are removed. Informing residents about tree removals and other significant tree work is essential for maintaining the City’s relationship with the community. When an established public tree must be removed, the City should begin notifying abutting or adjacent property owners of necessary removals. Consistent and transparent messaging around the cause(s) and reason(s) for removing a public tree— and that the removal is part of a larger, long-term planting strategy in support of the City’s canopy cover goal— will build trust and support while reducing staff time in addressing concerns.
- **General Tree Care Education for Property Owners.** There are several actions people take that are detrimental to trees at all stages of life, including improper mulching and pruning. Providing residents with information on tree care can significantly enhance maintenance practices, leading to better tree health and higher survival rates. Some examples include:
 - Demonstrate how to properly mulch a tree. Too often mulch is placed around tree trunks in a “mulch volcano”, which is extremely detrimental to the tree. A simple message of how to mulch properly can improve tree health and longevity.
 - Provide guidance on how and when to prune trees. Incorrect pruning can lead to poor tree structure or wounds that may never seal.
 - Explain proper tree planting and tree care techniques. This could be especially helpful for homeowners who are considering planting a tree in their yard but are unsure where to start.



- Encourage recycling or composting leaves on-site.

Use Multiple Avenues of Communication

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

- **Social Media.** Social media sites such as Facebook, Instagram, and X (formerly Twitter) can create buzz and promote involvement in the current urban forestry activities occurring locally. To reach even more people, the City should consider coordinating with allied community gardens, non-profits, educational institutions, and business to get messages posted on their social media sites as well.
- **Website.** The City of Westminster's Forestry webpage contains important information about the program, including details about tree planting, watering, emerald ash borer management, programs, upcoming events, urban forestry best practices, and tree regulations, among other things. The website should be maintained regularly to make sure information is up to date.
- **Presentations to City leadership and local business and neighborhood groups.** Identify key audiences, partners, and potential champions for the urban forestry program. Making short presentations at regular or special meetings where they are relieves individuals from having to go to yet another meeting in the evenings. Initial outreach could be based on letting the audience know about Westminster's urban forest and the work called for in this Plan. Be sure to have an "ask" at the end of the presentation. What do you want them to do next? This work often unearths new partners and funding sources that can otherwise go untapped.
- **Do a survey.** Once every other year, create a short online survey to identify what urban forestry issues people in Westminster are concerned about or care about. The survey can also be used to gauge people's reactions to new urban forest management procedures and regulations, and their willingness to participate in volunteer work or to donate funds or other resources. Questions about public trees, maintenance responsibility, and tree canopy can be part of the public survey.
- **Cultivate partnerships for communication.** Partnerships can be initiated with organizations that can help promote, enhance, and preserve Westminster's urban forest. Organizations can include local businesses, local utilities, regional non-profits, homeowner associations, neighborhood associations, and schools and other educational institutions. Other audiences to engage can include youth groups, landscape architect firms, faith-based groups, and nurseries and landscape contractors. Actions that can be taken by each partner should be defined before approaching them for support.
- **Create and publish the Annual Urban Forestry Report and Work Plan.** This annual report or state of the urban forest should provide highlights from the previous year and the Work Plan should provide goals and actions for the upcoming year. These actions should reflect the goals and strategies in the Urban Forest Management Plan and the "How Are We Doing?" section can be utilized to support the reporting and work plans. The reports should include updated tree inventory data, tree planting statistics, key performance indicators and metrics, status of achieving canopy goals and actions in the Plan, and other program information. It should provide information on the number and condition of public trees, as well as maintenance, planting, and management accomplishments. It should also present a summary of the current year's annual work plan and identify emerging issues and budget or resource needs.
- **Add signage to the landscape.** Signs placed in high traffic areas can spark interest in trees and the urban forest. Something as simple as species name or a notable fact about a tree can encourage people to learn more and to get more involved. Adding signs identifying various tree



species can help the City achieve Arboretum status resulting in greater recognition, funding, and support.

Public Education

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

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

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

- Hold a seminar or public meeting to discuss the tree inventory project, its results, and its importance for the city.
- Develop monthly evening or weekend seminars related to tree care and landscaping; bring in guest experts from various disciplines in the green industry.
- Write a monthly "Tree Talk" article for local newspapers or social media.
- Develop a Tree Care door hanger brochure to go to each residence where new trees are planted; educating residents about proper tree care could help eliminate trunk damage and improper mulching and pruning of new trees.
- The City should consider giving away tree seedlings or small nursery stock to interested community members. This is a great offer and a way to spread the word about trees, especially around Arbor Day. Westminster could capitalize on the idea and attach the same Tree Care door hanger brochure or a different informational brochure to each of these trees.
- Co-host tree planting programs with the local garden club, local non-profits, or groups.
- Embrace story telling within the urban treescape. Connect the trees to the history of the area through complementary art, placards, or signage. Consider establishing tree walks that highlight some of Westminster's greatest tree specimens and provide tree identification training. Regularly update the memorial tree records, maps, and information.
- Encourage citizen science activities that involve the urban forest. For example, the Nature Conservancy's "Healthy Trees Healthy Cities" app can be used to monitor tree health and check trees for pests. Local professors and non-profit groups that work with citizen science may be able to help plan projects and recruit citizen scientists.
- Expand the annual Arbor Day celebration to help it become an even greater community tradition. Expanding programs about planting and pruning trees and including children's programs about trees can help increase public interest in the City's tree programs. Additionally, the City could invite contractors to conduct demonstrations on tree planting, trimming, landscaping, and species selection. Organizers could also set up booths with tree information. Refer to the National Arbor Day Foundation (ArborDay.org) for publications that provide great Arbor Day ideas to assist in planning of this event.



Establish a Tree Board

The establishment of a dedicated Tree Board is recommended to enhance the governance and implementation of the Urban Forest Management Plan. This board would serve as a vital liaison between the Forestry Program and the community, ensuring that updates on the Plan's progress are consistently communicated. The Tree Board could facilitate the integration of the Plan's findings and strategies into community outreach, annual reports, and work plans, fostering a more informed and proactive approach to urban forestry management.

Furthermore, revisiting and potentially expanding the roles and responsibilities of the board members to align with the Urban Forest Management Plan will ensure that the board's efforts are cohesive with long-term urban forestry goals. To support board members, the Forestry Program can provide access to Tree Board University (treeboardu.org) and other educational resources to bolster their expertise and engagement in urban forestry management, underscoring the importance of informed leadership in sustaining and growing the urban canopy.

Westminster Tree Stewards Program

The City should revitalize and formally establish the Westminster Tree Stewards program that provides free education from local arboriculture experts on tree identification, tree biology, proper tree care, city tree regulations, tree planting, natural area restoration, nursery tree production, and the benefits of trees. After the training, the "Tree Stewards" would be equipped to take on the task of spreading accurate information about trees to their own neighborhoods. Tree Stewards could volunteer to conduct a tree planting or tree-related education project in exchange for the training and education they receive. The City's Forestry Staff could offer guidance and assistance throughout a project. A Tree Stewards program should establish local partnerships such as community-based organizations, green industry experts, youth programs, among others.

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

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

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

Environmental Justice

The equitable distribution of resources is a key driver of environmental justice. This Urban Forest Management Plan aims to grow the urban forest with a focus on public spaces. The Plan addresses the



fact that existing canopy resources and associated benefits are unequally distributed. Urban tree canopy expansion and maintenance requires a financial investment on the part of the City, primarily from tax dollars. As a result, tree canopy coverage tends to be larger and more established in wealthier neighborhoods, and tree canopies are often less than ideal in communities that are economically disadvantaged. Along with funding, community support for the urban forest and this Plan are necessary to succeed. Communication should begin months before a tree planting starts, should be translated into the appropriate languages such as Spanish and Hmong, and should build trust between the entity leading the tree plantings and the community the tree planting is taking place in. Connecting with trusted community leaders to introduce the idea of an expanded tree canopy, holding outreach events at an earlier stage in the plan, and taking local opinion into account when it comes to tree species selection can develop a partnership, rooted in trust, with the area's residents. But a big part of keeping that trust is staying consistent through action. Following up with these

communities to hear and address any concerns while consistently maintaining the new plantings will help ensure a fully developed urban forest. The framework of the Urban Forest Management Plan aims to ensure the presence of environmental justice principles in Westminster's Forestry Program.

The citywide tree canopy cover goals will support Westminster's efforts in addressing community equity and environmental justice. These planting and canopy efforts could identify areas in most need of tree canopy cover, tree plantings, and urban forestry services such as a program to assist low-income property owners with post planting care, mature tree maintenance, and management of hazardous or invasive trees. And, as the City expands its network of partners, all populations within a neighborhood will be better represented.

Community Engagement Recommendations Summary

Community outreach and engagement about the Plan begins with clear messaging and information gathered from the Urban Forest Management Plan. To make a greater impact and to fully recognize all communities in Westminster, it is recommended the City translate their materials into Spanish and Hmong and partner with local non-profit community organizations with a mission that supports the urban

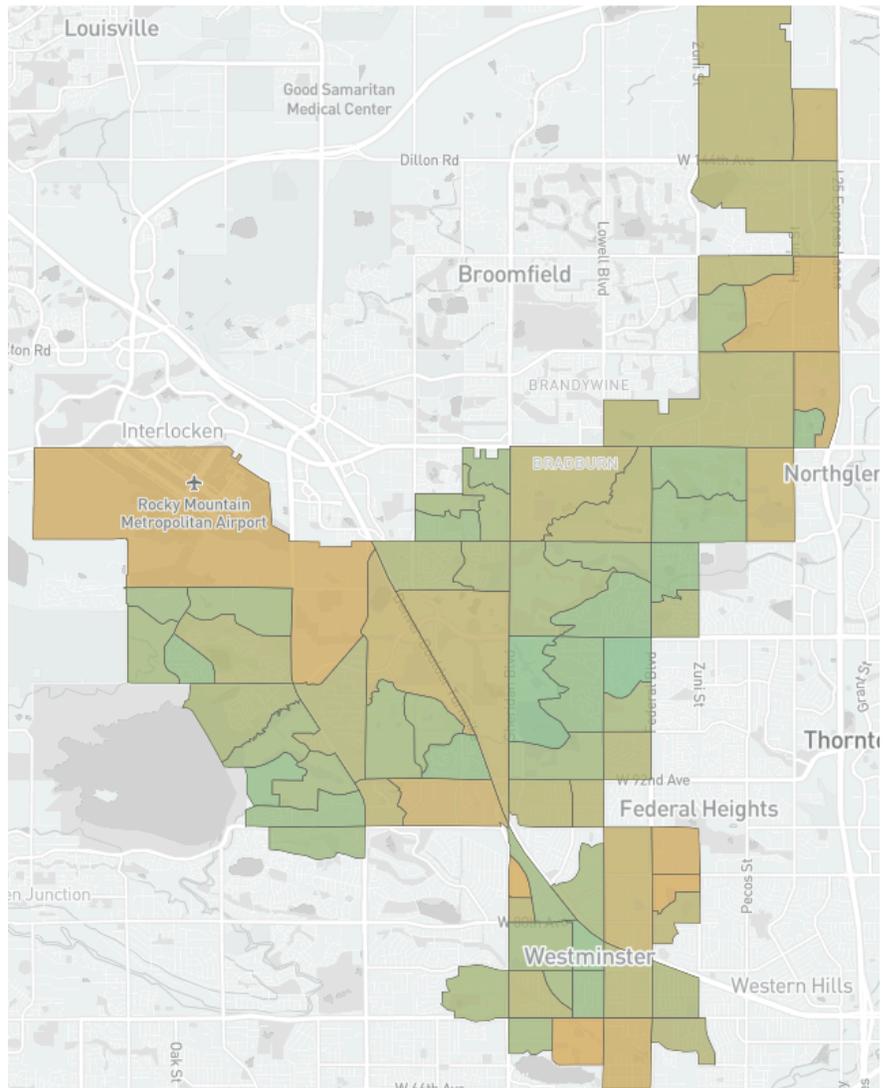


Figure 38. Map of Westminster's Tree Equity by Census Block Group. Areas in orange of less than the average citywide canopy coverage and tend to correspond with areas with a higher percentage of communities of color and/or poverty (Source: American Forests Tree Equity Tool).



forest. In addition to community partners, establishing a Tree Board could add capacity and create more advocates for the Forestry Program. Lastly, an expanding community of tree stewards that are trained in tree planting and post-planting care will increase the Forestry Program's capacity, support the citywide canopy cover goals, and build support for long-lasting impacts.

However, it's important to underscore that while these enhancements are aspirational, the current focus must be on meeting essential operational goals, such as routine tree maintenance. Any expansion of the program, including these outreach initiatives, is contingent upon a solid foundation, which is presently constrained by staffing limitations. Addressing the staffing needs is critical to laying the groundwork for these additional programs and their potential success.



HOW ARE WE DOING?





Assessing Progress

The Urban Forest Management Plan equips the City of Westminster with a comprehensive framework to measure progress, adapt to changes in the environment, and respond to shifting resources. Each goal in the plan aligns with industry standards, best practices, and stakeholder priorities. The objectives within the plan are designed to improve public tree management and ensure the sustainability of the citywide urban forest. As goals are pursued, various metrics should be used to evaluate success, monitor progress, and make necessary adjustments.

It is recommended that the City leverage the expertise of its Forestry Team and form an urban forestry working group or Tree Board to manage the monitoring of the Plan. This group should work in collaboration with relevant partners to ensure effective execution.

While the UFMP outlines a strategic vision for the city's urban forest, the specific actions and strategies for implementation will be determined by the City upon adoption. This will ensure a focused approach to action steps while providing flexibility as the City addresses challenges and opportunities over time. As progress is made, additional resources will become available to support longer-term initiatives, ensuring that the City continues to meet its urban forest goals efficiently and effectively.





Primary Urban Forest Benchmark Values to Measure Plan Progress

| 2020 Urban Tree Canopy (UTC) Cover (Assessed in 2024) | |
|--|---|
| Tree Equity Score (2023) | 86 out of 100 |
| UTC | 11.6% |
| Short-term Canopy Goals | 12.6% by 2035 (747 trees/year) |
| Long-term Canopy Goals | 14% by 2050 (1,918 trees/year) |
| Total Trees Planted to Reach 10-year Goal | 7,464 trees by 2035 (747 trees per year avg.) |
| Total Trees Planted to Reach 25-year Goal | 49,880 trees by 2050 (1,918 trees per year avg.) |
| Public Tree Counts (Inventory as of 2023) | |
| Total Public Trees (alive or dead) | 12,875 |
| Total Public Open Space Trees | 6,511 (estimated) |
| Total Private Street Trees | 15,569 |
| Total Inventoried Public Tree Planting Sites | 1,657 |
| Tree Benefits (2023 Estimates) | |
| Citywide (UTC Assessment) | 2024: \$14,700,00 (total) |
| Ecosystem benefits of Public Trees | 2023: \$686,000 (annual benefits and total carbon storage) |
| Asset Value of Public Trees | \$26,400,000 (\$230 per tree average) |
| Tree And Budget Distribution (2022) | |
| Public Trees per Capita | 0.31 |
| Budget per Capita | \$5.34 |
| Budget per Public Tree (inventoried) | \$62.64 |
| Urban Forestry Staff (FTE) | 4.00 (2023) |
| Total Public Trees per Staff | 4,847 trees for every 1.0 FTE |
| Management Activities (2024) | |
| Public Trees Pruned | To be recorded at the end of the year |
| Public Trees Removed | To be recorded at the end of the year |
| Public Trees Planted | To be recorded at the end of the year |
| Number of Volunteers and/or Hours | To be recorded at the end of the year |
| Urban Forest Audit System (Total Score of 2024): 55% | |
| Management Policy and Ordinances | 57% |
| Professional Capacity and Training | 54% |
| Funding and Accounting | 8% |
| Decision and Management Authority | 63% |
| Tree-related Inventories | 50% |
| Tree-related Plans | 46% |
| Risk Management | 56% |
| Disaster Planning | 43% |
| Standards and Best Management Practices | 62% |
| Community | 73% |
| Green Asset Management | 65% |
| Public Perception (2023) | |
| Tree-related priorities | 89% want trees for shade |
| Preference for improving public tree health | 75% for setting canopy goals, 71% for proactively maintain trees for health and safety and to manage harmful tree pests and diseases. |
| Where to prioritize future investments | 84% for planting more trees in parks, greenways, and other public spaces |

Table 10. Westminster's primary urban forest benchmark values to measure Plan progress.



Report and Revise

Completion of this Plan is a critical step towards meeting the vision for Westminster’s urban forest. Continual monitoring, analysis, and reporting will help to keep urban forest partners involved and focused on accomplishing the actions. Plans are typically revised every 10 to 15 years; hence, the Plan will need formal revision to respond and adapt to changes as they develop. Formal revision of the Plan should coincide with the update of the City’s Comprehensive Plan, Parks Recreation and Libraries Master Plan, Sustainability Plan, Landscape Regulations, and other relevant planning efforts. Recommendations and goals of each should be compared. Revisions to the Plan should occur with major events, such as newly discovered pests or diseases, changes in program budget and resources, or significant changes to industry standards or legal codes.

The findings from monitoring and evaluating Plan progress as demonstrated in the previous section should be incorporated into an internal and external report(s).

Many cities with an urban forest management plan are shifting towards online reporting, making the results of plan implementation and monitoring protocols accessible through interactive platforms on their websites. In addition, the board or committee overseeing the Plan’s implementation in coordination with the urban forestry program often prepare an annual report and work plan that is communicated to other City boards, committees, and City council. In addition, other departments are made aware of the report and work plan and are informed of how the work plan aligns with other City priorities and projects.

Monitoring, evaluating, and reporting on Plan progress will inform any necessary changes to the Plan’s strategies or actions and should be addressed in a timely manner where appropriate. Completion of this 10-year Plan with a seven-year Public Tree Management Program is a critical step towards meeting the vision for Westminster’s urban forest.

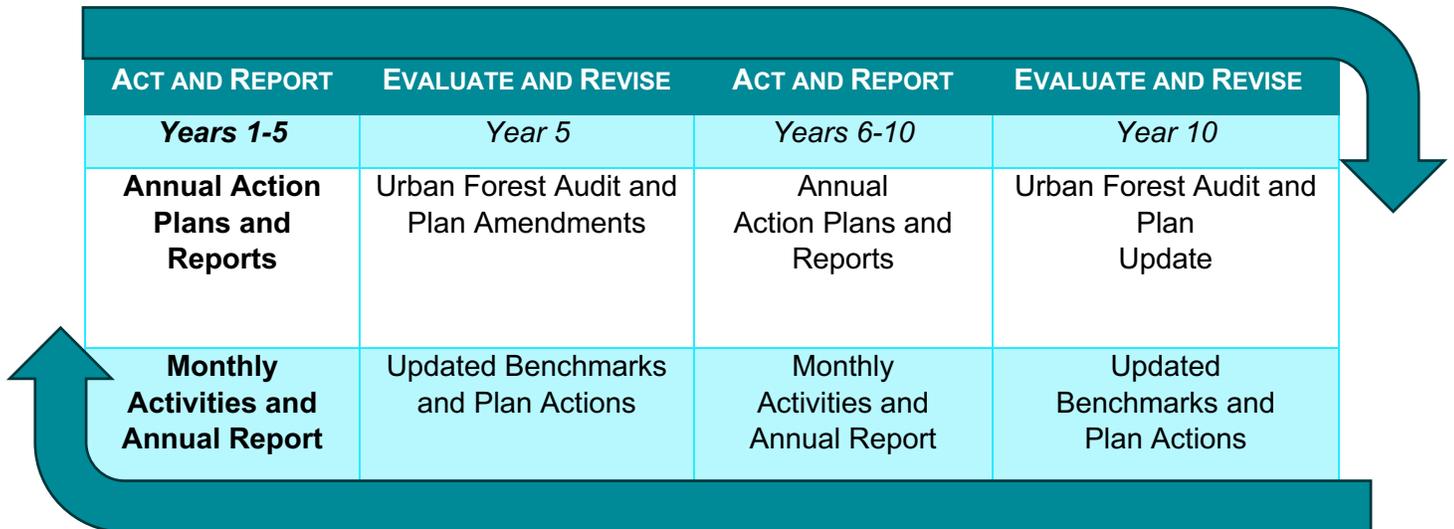


Figure 39. Example of the plan implementation, evaluation, and revision process.



Conclusion

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

The Urban Forest Management Plan is a roadmap for a strategic approach to manage Westminster's urban forest with an emphasis on public trees. The Plan contains goals, strategies, and supporting actions that are critical to the long-term vitality of the urban forest. However, for the Plan to actually have an impact on the forest resource, it requires stewardship and financial resources to begin implementation. Further, it needs to be institutionalized as a document requiring implementation with a sense of urgency to get things started. Completion of the Urban Forest Management Plan clearly demonstrates that City leadership understands that a healthy urban forest is critical to guaranteeing the long-term health and vitality of the community, and that it is not a luxury but an absolute necessity.

To accomplish the goals, the City should consider the following commitments:

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

Successful implementation of actions in this Plan will bring Westminster to a higher level of service that is more equitably distributed across the city resulting in a sustainable and thriving urban forest that benefits all residents and future generations.



APPENDICES AND REFERENCES





References

- Abbot, J., Hartel, D., Kidd, S., Macie, E., Mitchell, C., "Urban Forest Sustainability and Management Review" spreadsheet developed by Urban Forestry South (USDA Forest Service, Region 8, SRS-4952, Athens, GA. Original checklist developed in cooperation with Agnes Scott College Office of Sustainability, the ASC Arboretum Advisory Council, and the City of Austin, TX, 2015.
- Alliance for Community Trees. 2011. Benefits of trees and urban forests: A research list. www.actrees.org.
- Brook, R. D., Rajagopalan, S., Pope, C. A., Brook, J. R., Bhatnagar, A., et al., Particulate matter air pollution and cardiovascular disease: An update to the scientific statement from the American Heart Association, National Library of Medicine, June 2010.
- Clark, J. R., Matheny, N. P., "A Model of Urban Forest Sustainability: Application to Cities in the United States." *Journal of Arboriculture* 24(2): pp. 17-30, March 1997.
- Drescher, M. "Urban heating and canopy cover need to be considered as matters of environmental justice." National Library of Medicine, Proceedings of the National Academy of Sciences (PNAS), December 2019; 116(52): 26153-26154.
- Environmental Protection Agency, What Climate Change Means for Arkansas, EPA 430-F-16-006, August 2016.
- Fahrig, L. (2003). Effects of habitat fragmentation on biodiversity. *Annual Review of Ecology Evolution and Systematics*, 34, 487-515.
- Fowler, A. (Ed) 2015. Arkansas Wildlife Action Plan. Arkansas Game and Fish Commission, Little Rock, Arkansas. 1678 pp.
- Hauer, R., Petersen, W., "Municipal Tree Care and Management in the United States: A 2014 Urban & Community Forestry Census of Tree Activities." 2016.
- Iverson, L.R., Peters, M.P., Prasad, A.M., and Matthews, S.N. (2019). Analysis of Climate Change Impacts on Tree Species of the Eastern US: Results of DISTRIB-II Modeling. *Forests*. 10(4): 302. <https://doi.org/10.3390/f10040302>.
- Keet, C. A., Matsui, E. C., McCormack, M. C., Peng, R. D., Urban residence, neighborhood poverty, race/ethnicity, and asthma morbidity among children on Medicaid, *Journal of Allergy and Clinical Immunology*, Volume 140, Issue 3, 2017, Pages 822-827, ISSN 0091-6749.
- Kellert, S.R., Wilson, E.O. 1993. *The Biophilia Hypothesis*. Island Press, Washington, DC. 484 pp.
- Kim Y. J., Kim, E. J. Neighborhood Greenery as a Predictor of Outdoor Crimes between Low and High-Income Neighborhoods. *Int J Environ Res Public Health*. 2020 Feb 25;17(5):1470.
- Konijnendijk, C., "Promoting health and wellbeing through urban forests – Introducing the 3-30-300 rule, LinkedIn, February 2021.
- Leahy, I. (2017). Why We No Longer Recommend a 40 Percent Urban Tree Canopy Goal. *American Forests*, americanforests.org. Accessed January 2023.
- McPherson, G.E., 2016. Structure, function and value of street trees in California, USA. *Urban Forestry & Urban Greening* 17 (2016) 104-115.
- Mihandoust, S., Joseph, A., Kennedy, S., MacNaughton, P., Woo, M. Exploring the Relationship between Window View Quantity, Quality, and Ratings of Care in the Hospital. *Int J Environ Res Public Health*. 2021 Oct 12;18(20).
- Miller, R. W. (1988). *Urban Forestry: Planning and Managing Urban Greenspaces*. New Jersey: Prentice Hall.



- Miller, R. W., Hauer, R. J., & Werner, L. P. (2015). *Urban Forestry: Planning and Managing Urban Greenspaces*, Third Edition.
- Northwest Arkansas Regional Planning Commission (NWARPC). *Regional and Community Planning*. Accessed February 2023, nwarpc.org.
- Pontius, R. and M. Millones. 2011. Death to Kappa: birth of quantity disagreement and allocation disagreement for accuracy assessment. *International Journal of Remote Sensing*. 32, 15: 4407-4429.
- Richards, N. A. 1983. "Diversity and Stability in a Street Tree Population." *Urban Ecology* 7(2):159–171.
- Richards, N.A. 1993. Reasonable guidelines for street tree diversity. *Journal of Arboriculture* 19:344–349.
- Saunders, D. A., Hobbs, R. J., Margules, C. R., *Conservation Biology*, Volume 5, No. 1, pp. 18-32. "Biological Consequences of Ecosystem Fragmentation: A Review." March 1991.
- Taylor, A. F., Kuo, F. E., "Children With Attention Deficits Concentrate Better After Walk in the Park," *Journal of Attention Disorders* 12.5 (2009): 402-409.
- Ulmer, J.M.; Wolf, K.L.; Backman, D.R.; Tretheway, R.L.; Blain, C.J.; O'Neil-Dunne, J.P.; Frank, L.D. Multiple health benefits of urban tree canopy: The mounting evidence for a green prescription. *Health Place* 2016, 42, 54–62.
- Wolf, K. L., Lam, S. T., McKeen, J. K., Richardson, G. R. A., van den Bosch, M., Bardekjian, A. C., "Urban Trees and Human Health: A Scoping Review." *International Journal of Environmental Research and Public Health*, June 2020.
- Woods & Poole Economics, Inc., Washington, D.C. *Metropolitan Statistical Area Data Pamphlet*, Washington County, Arkansas. Accessed February 2023, woodsandpoole.com.

Appendix A. Canopy Goals and Planting Targets

Canopy Goal Assumptions

Data from Westminster's tree canopy cover assessments and the American Forests Tree Equity Score (TES) tool was analyzed to identify a feasible canopy goal and to develop strategies to achieve it. The draft canopy goal was then refined through examinations of available land area, available resources, other ongoing city priorities, future land use, land ownership types, opportunities to mitigate urban heat, preservation of native prairie land, among other considerations.

Using this integrated approach, the City of Westminster's achievable goal is **14% tree canopy in 25 years**— up from 11.6% based on 2020 imagery. To achieve this, **the City and partners must preserve the existing canopy to the extent possible and increase its coverage by planting a total of 49,880 trees**. These new trees would collectively grow the canopy throughout the City and would provide additional ecosystem benefits once established.

To achieve the long-range canopy goal of 14%, this Urban Forestry Management Plan provides guidance to increase canopy cover to 12.6% in 10 years which will require at minimum an average of 679 trees to be planted per year. The canopy goals and targets should be reevaluated as this Plan is updated. These goals were based on the following criteria and considerations:

- Existing tree canopy cover is based on imagery from 2020 with 2024 as the starting year.
- A no-net-loss strategy is sought, meaning the number of public trees removed along with removals on private property or through development are replaced.
- Trees that grow into large canopy trees are planted wherever feasible. In the 30-year timeframe though, it is assumed that overall, 60% of plantings will be large canopy trees at maturity, 30% of trees planted will be medium trees, and 10% will consist of small-statured trees at maturity.



But, in the first 10 years, 20% of annual tree plantings could be two-inch caliper trees and the remaining 80% could be smaller plantings if a plan is in place for post-planting care to ensure survival.

- The number of trees per year includes City-led, partner, volunteer, and private tree plantings. It is recommended the **City plant at minimum 50% of the necessary trees or approximately 340 trees per year** for 10 years.
- The City will need to plant public street planting sites and consider converting impervious surfaces to planting sites and/or planting in parks and natural areas.
- Assumes a potential for young tree mortality post-planting (the standard is 1%).
- Emphasis should be placed on planting native and highly adaptable trees that support strategies for climate resiliency and tree species diversity.

Priority Planting Areas to Achieve Canopy Goals and Tree Equity

Once the City finalizes local and citywide tree canopy goals, it is recommended to establish priority areas based on a variety of themes and community needs. Themes may include ownership type (public and private), areas of low existing tree canopy, Tree Equity Scores (TreeEquityScore.org), and greatest amount of available planting space while other themes may address air quality, stormwater reduction, water quality, and preserving native land cover (e.g., native prairie land). Others may evaluate opportunities to address disadvantaged areas, densely populated regions, loss due to development, and human health factors such as asthma cases, median age, and mental health. In any planting prioritization scenario, the scale may include U.S. Census Bureau Census Block Groups, Future Land Use Classes, neighborhoods, ownership (public, private, campus and institutional), and citywide.

Using the results from the Urban Tree Canopy Assessment a series of recommended prioritization techniques is provided. The description of the prioritization techniques and scenarios is provided below.

- **Low Tree Canopy:** It is important to understand the existing distribution of existing tree canopy across the City. This scenario shows Census Block Groups (CBGs) that are low in canopy cover (less than 12% canopy cover).
- **Low Income and Tree Canopy:** This scenario shows the CBGs with a high proportion of low-income populations and low amounts of tree canopy cover (less than 12%).
- **Vulnerable and Exclusion Areas:** Certain areas of the City may not be preferable to plant trees such as in native prairie land. And other areas such as easements have tree canopy that is vulnerable to change such as the removal of trees for a utility easement.
- **Development and Future Land Use:** With robust tree regulations in place, tree plantings in future land use areas can be considered to support a citywide canopy goal.
- **Tree Equity:** The American Forests' Tree Equity Score tool evaluates the correlation between tree canopy cover, surface temperatures, and socioeconomic data. Priority areas may include CBGs that have less than the citywide score of 86 out of 100.
- **Percent People of Color:** Redressing tree canopy cover inequities requires multiple facets of urban forest management though identifying canopy cover and the proportion of people of color within CBGs can assist in determining priority areas for plantings.



- **Average Surface Temperature:** Trees and green spaces have been proven to lower surface temperatures and mitigate urban heat island effects. Data from USGS Landsat 8 imagery, thermal bands.
- **Health Risk Index:** Research shows trees can improve human health through air quality improvements and encouraging physical activity. Priority areas are based on self-reported poor mental health, poor physical health, asthma, and coronary heart disease from the Centers for Disease Control.

Appendix B. 2024 Urban Forest Audit Results

Urban Forest Audit Scoring Key

| | | |
|-------------------|--------------------|----------------------|
| Not Practiced (0) | In Development (1) | Adopted Practice (2) |
|-------------------|--------------------|----------------------|

Management Policy

| Category | Component Evaluated | Description or Criteria for Evaluation |
|-------------|---|---|
| 1.00 | Approved Policy Statements | Written policy statements approved by a governing body. |
| 1.01 | Climate Change (Sustainability) | Also referred to as Sustainability. With reference to urban trees. Addresses the long-term health and productivity of the natural resource. |
| 1.02 | No Net Loss | Can refer to trees, basal area, or canopy. |
| 1.03 | Risk Management | Should reference: ANSI A300 Part 9, ISA BMP, and prioritization funding mechanisms. |
| 1.04 | Tree Canopy Goals | Overall community/campus goal, or by designated “zone”. |
| 1.05 | Tree Protection | Construction and/or landscape maintenance. |
| 1.06 | Utility | Utility pruning, planting, and installation policy (e.g. boring vs. trenching). |
| 1.07 | Human Health – Physical & Psychological | Recognizes and addresses the human health benefits of the natural resource (e.g., exercise, air quality, stress management, shade). Could also include Urban Heat Island (UHI) policies. |
| 1.08 | Wildlife Diversity/Habitat/Protection | Mammals, birds, or reptiles. |
| 1.09 | Performance Monitoring | Recognizes the annual or biennial calculation of metrics (e.g. some component of ecosystem services) for the purpose of tracking management performance. |
| 1.10 | Ordinance (Private) | Tree protection and management for trees on private property. |
| 1.11 | Ordinance (Public) | Tree protection and management for public trees. |
| 1.12 | Development Standards | US Green Building Council’s LEED® rating systems (or similar internationally) LEED v4 BD+C (Sustainable Sites) LEED 4 ND (Neighborhood Pattern & Design, Green Infrastructure) ASLA’s SITES® Rating System |
| 1.13 | High-Conservation Value Forests | Programs or policies for identification, acquisition, and/or protection of groups of trees or forests that provide unique public benefits. |
| 1.14 | Urban Interface (WUI) | Programs or policies that improve management of the urban interface for fire and/or invasive species. |



Capacity and Training

| Category | Component Evaluated | Description or Criteria for Evaluation |
|-------------|---|---|
| 2.00 | Professional Management | Provision for professional consultation. |
| 2.01 | Certified Arborist - Staff | International Society of Arboriculture |
| 2.02 | Certified Arborist - Contracted | International Society of Arboriculture |
| 2.03 | Certified Arborist - Other Resource | International Society of Arboriculture |
| 2.04 | Other Professional - Advising/directing UF management | This could be a professional in an allied field like Landscape Architecture. |
| 2.05 | Municipal Forestry Institute | Graduate of Society of Municipal Arborist's MFI program or similar |
| 2.06 | USFS Urban Forestry Institute or similar | Attendance at USFS UFI or similar |
| 2.07 | Campus/city arborist – ISA CA instructor for CEUs | Arborist routinely provides ISA CEU presentations/workshops. |
| 2.08 | Tree Board University or similar | On-line training modules from Oregon U&CF for Tree Board/Advisory Council or similar |
| 2.09 | Organizational Communications | Process, procedures, and protocol for cross-professional communications within the organization (all departments “touching” trees). |

Funding and Accounting

| Category | Component Evaluated | Description or Criteria for Evaluation |
|-------------|---|---|
| 3.00 | Urban Forestry Budget | |
| 3.01 | Budgeted Annually | Budget authorized/required for tree board, tree maintenance, and/or tree planting. |
| 3.02 | Contingency Budget Process | A protocol is in place to prioritize urban forestry management activities during budget shortfalls; e.g. during times of limited funding for: ¹⁾ risk management, ²⁾ young tree care, ³⁾ mulching. |
| 3.03 | Funding Calculated from Community Attribute | Budget in terms of per capita, per tree, or for performance (e.g. per tree weighted by size class or age). |
| 3.04 | Funding Based on Performance Monitoring | Budget connected with/based on ecosystem service (ES) monitoring and performance. |
| 3.05 | Urban Forestry Line Item | Is the budget specific to urban forest management? |
| 3.06 | Green Asset Accounting | Maintain green infrastructure data in the “unaudited supplementary disclosure of an entity’s comprehensive annual financial report (CAFR)”. GASB 34 implementation for municipalities. |



Authority

| Category | Component Evaluated | Description or Criteria for Evaluation |
|-------------|---|--|
| 4.00 | Authority | |
| 4.01 | Urban Forest Manager | Professional urban forest manager with authority over the program and day-to-day activity. Including designated budget line item. |
| 4.02 | Staff Authority | Designated staff with authority over the program and day-to-day activity. Including designated line item. |
| 4.03 | Communication Protocol | Established protocol and mechanism(s) for communication among all members of the urban forest management “community” in your municipality or organization (e.g. manager, department under control, advisory board, finance, field operations, public, NGOs, business community, developers). |
| 4.04 | Tree Board, Commission, or Advisory Council | Establishes a board for public participation (advisory or with authority). |

Tree-related Inventories

| Category | Component Evaluated | Description or Criteria for Evaluation |
|-------------|---|--|
| 5.00 | Inventories and Assessments | |
| 5.01 | Canopy Inventory (UTC) | Periodic (≤ 5 year) canopy inventory and assessment. Public & private. |
| 5.02 | Ecosystem Services | Recent (≤ 5 year) ecosystem services (ES) inventory & assessment? Public: 100% or street trees; Public & Private: Sample; or Campus. Or, are ES calculated annually or biennially based on partial re-inventory and projected growth as a monitoring tool. |
| 5.03 | Public Trees ↓ | ↓ Evaluate below ↓ |
| 5.04 | Street Trees | Is there a recent (5 year) inventory? |
| 5.05 | Parks/Riparian Areas | Is there a recent (5 year) inventory? |
| 5.06 | Other Public Trees | Public facility landscaped areas, Industrial parks, green space. |
| 5.07 | Continuous inventory on a cycle (≤ 5 years; i.e. panel) | Partial re-inventory to support continuous forest inventory, growth projections, and the calculation of ecosystem services for the purpose of long-term monitoring of urban forest management performance (e.g. carbon or leaf surface). |
| 5.08 | Private Trees ↓ | ↓ Evaluate below ↓ |
| 5.09 | Campus (Educational) | Is there a recent (5 year) inventory? |
| 5.10 | Corporate | Is there a recent (5 year) inventory? |
| 5.11 | Other Private Property | Is there a recent (5 year) inventory? |
| 5.12 | Continuous inventory on a cycle (≤ 5 years; i.e. panel), inventory software | Partial re-inventory to support continuous forest inventory, growth projections, and the calculation of ecosystem services for the purpose of long-term monitoring of urban forest management performance (e.g. carbon or leaf surface). |
| 5.13 | Green Stormwater Infrastructure (GSI) | BMP stormwater mitigation practices and locations (e.g. Washington DC) |
| 5.14 | Spatial | Inventory data includes Lat/Long (i.e. GIS). Should address the spatial relationship between the natural resource and people (i.e. residents, visitors, activities) that would help manage the resource for benefits associated with proximity (air quality, recreation, stress mitigation, improved educational opportunity). |
| 5.15 | Maintenance and Planting Records Maintained | Planting details (nursery, species, size, cost, contractor, etc.) maintained with inventory or as separate database or recordkeeping system. Also pruning and removal histories. |



Tree-related Plans

| Category | Component Evaluated | Description or Criteria for Evaluation |
|-------------|--|---|
| 6.00 | Management Planning Activities | |
| 6.01 | Annual Maintenance Calendar | An annual calendar that defines typical activity by season. To support scheduling. |
| 6.02 | Public Trees ↓ | ↓ Evaluate below ↓ |
| 6.03 | Street Tree Management | Is there a recent (5 year) plan for street trees? |
| 6.04 | Parks/Riparian Area Management | Is there a recent (5 year) plan ? |
| 6.05 | Other Public Trees | Public facility landscaped areas, Industrial parks, green space. |
| 6.06 | Private Trees ↓ | ↓ Evaluate below ↓ |
| 6.07 | Campus (Educational) | Is there a recent (5 year) plan for Campus trees? |
| 6.08 | Corporate | Is there a recent (5 year) plan? |
| 6.09 | Other Private Property | Is there a recent (5 year) plan? |
| 6.10 | Green Infrastructure | Is there a plan for green infrastructure (i.e. nodes & linkages)? Large-scale projects. |
| 6.11 | Other Written Plans | Other natural resource plans (e.g. tree canopy). May be a component of another plan. |
| 6.12 | Tree Planting | Is there a recent (3 year) tree planting plan?). May be a component of another plan. |
| 6.13 | UF as Part of a Comprehensive Plan | Is any UF management plan referenced in the comprehensive plan (i.e. county or municipality) or master plan (i.e. Campus)? |
| 6.14 | Urban Forest Planning and Management Criteria and Performance Indicators | Criteria and indicators based on <i>A Model of Urban Forest Sustainability</i> (Clark, J.R., Matheny, N.P., Cross, G., and Wake, V. 1997 Journal of Arboriculture.) or on work of W.A. Kenney, P.J.E. van Wassenae, and A.L. Satel in <i>Criteria and indicators for strategic urban forest planning and management.</i> (2011) |

Risk Management

| Category | Component Evaluated | Description or Criteria for Evaluation |
|-------------|--|--|
| 7.00 | Risk Management Activities | |
| 7.01 | TRAQ Attained | At least one staff or consultant is TRAQ. |
| 7.02 | Annual Level 1 (ANSI A300 Part 9 & ISA BMP) | All trees in high occupancy areas visited annually. |
| 7.03 | Mitigation Prioritization | A protocol for prioritizing mitigation following Level 1 and Level 2 assessments. Reflects the controlling agency's threshold for risk. |
| 7.04 | Occupancy Areas Mapped | Has TRAQ staff/consultant discussed/mapped occupancy levels with controlling authority? |
| 7.05 | Recordkeeping, Reporting, and Communications | A process has been put in place to maintain records on requests, inspections, evaluations, and mitigation of risk; and on the communications among the managers related to those risk assessments. |
| 7.06 | Standard of Care Adopted | Controlling authority has adopted a Standard of Care (SOC) or risk management policy. |
| 7.07 | Tree Risk Specification | Is there a written specification that meets requirements of ANSI A300 (Part 9)? And, has it been discussed with the controlling authority with relevance to the controlling authority's threshold for acceptable risk? |
| 7.08 | Urban Tree Risk Management | The community has prepared and follows a comprehensive program for urban tree risk management. |
| 7.09 | Invasive Management | Plan to address and manage invasive: plants, insects, and disease. |



Disaster Planning

| Category | Component Evaluated | Description or Criteria for Evaluation |
|-------------|--|---|
| 8.00 | Disaster Planning Activities | |
| 8.01 | Response/Recovery Mechanism | Staff knowledge of the municipality’s protocol for requesting disaster resources through the county or state with access to mutual aid and EMAC. |
| 8.02 | Urban Forestry as part of the County Disaster Plan | The UF plan (8.3) is incorporated into the county/municipal disaster plan; specifically in reference to debris management and risk mitigation. |
| 8.03 | Urban Forestry Disaster Plan | A separate/specific plan within the urban forestry management program (i.e. who to call, priorities). |
| 8.04 | Pre-disaster Contracts | Contracts are in place for critical needs. |
| 8.05 | Mitigation Plan | A mitigation plan has been developed for pre-disaster, recovery, and post-disaster. |
| 8.06 | EMAC Mission Ready Packages (MRP) | Municipality has published disaster resources with state EM and participates in inter-state Mutual Aid to support Urban Forest Strike Teams (UFST). |
| 8.07 | Urban Forest Strike Team | Participation in the UFST project. |

Standards and Best Management Practices

| Category | Component Evaluated | Description or Criteria for Evaluation |
|-------------|---|---|
| 9.00 | ANSI Standard & BMP Activities | |
| 9.01 | ANSI Standards | Reference and adherence to ANSI Standards for arboricultural practices (A300), safety (Z133), or Nursery Stock (ANSI Z60.1) (any or all). |
| 9.02 | Ages/Diameter Distribution | Specific management for the development of an age-diverse tree population |
| 9.03 | Arborist Standards | Standards of practice for arborists (i.e. Certification). |
| 9.04 | Best Management Practices (BMPs) | Establishes or references tree maintenance BMPs (i.e. written comprehensive standards & standards). |
| 9.05 | Fertilization and Mulching | Fertilization or mulching standards required for conserved & planted trees. |
| 9.06 | Lightning Protection Systems | BMP written to the ANSI A300 Standard. |
| 9.07 | Planting | Planting and transplanting standards required/specified. |
| 9.08 | Pruning | Pruning standards required for conserved & planted trees. |
| 9.09 | Removal | Infrastructure damage, stump grinding, etc. |
| 9.10 | Support Systems (Guying and Bracing) | BMP written to the ANSI A300 Standard. |
| 9.11 | Tree Risk | Tree risk assessment procedures; ISA BMP or equivalent. |
| 9.12 | Construction Management Standards | Written standards for: tree protection, trenching/boring in CRZs, pre-construction mulching, root or limb pruning, watering (any or all). |
| 9.13 | Design Standards | Standards for design that specifically require trees; standards for tree placement (i.e. location), soil treatment, and/or drainage. |
| 9.14 | Genus/Species Diversity | Suggests or requires diversity of plant material. |
| 9.15 | Green Stormwater Infrastructure (GSI) | BMPs for site level GI practices like rain gardens and swales. Small-scale projects. |
| 9.16 | Inventory Data Collection | Community has adopted or developed applicable standards for local urban tree inventory data collection to support QA/QC. |
| 9.17 | Minimum Planting Volume | Minimum required root zone volume. |



Standards and Best Management Practices (continued)

| Category | Component Evaluated | Description or Criteria for Evaluation |
|-------------|--|--|
| 9.00 | ANSI Standard & BMP Activities | |
| 9.18 | Minimum Tree Size | Minimum caliper for tree replacements, and/or minimum size of existing trees to receive tree density or canopy credit. |
| 9.19 | Root Protection Zone (CRZ) | Defines adequate root protection zone; Critical Root Zone (CRZ). |
| 9.20 | Safety | Safety logs, trainings, reference to ANSI Z133 Safety Standard |
| 9.21 | Topping | Prohibits topping or other internodal cuts (public & private). |
| 9.22 | Tree Species List | Identifies and publishes a list of the most desirable, recommended, and/or preferred species (may include native and non-native species); alternatively, a list of species prohibited. |
| 9.23 | Tree Quality Standards | Written standards for tree selection at nursery in addition to Z60.1. |
| 9.24 | Utility Right-of-Way (ROW) Management | Requirements for planting, pruning, and/or removal of trees within a utility ROW. |
| 9.25 | Urban Agriculture | Enabled urban food forestry practices. |
| 9.26 | Wood Utilization | Larger diameter material is processed for wood products. |
| 9.27 | Third-party forest products certification compliance | Examples: American Tree Farm System (ATFS), Forest Stewardship Council™ (FSC®). |
| 9.28 | Energy generation | Local or regional use of chips or other woody debris for co-generation facilities (an efficient process that uses one fuel to generate two types of energy— electrical and thermal). |
| 9.29 | Composting of Leaf and/or Other Woody Debris | Leaves and small woody debris are captured and used on-site or processed by someone by composting for reuse. |
| 9.30 | Watering Standards | |

Community

| Category | Component Evaluated | Description or Criteria for Evaluation |
|--------------|--|--|
| 10.00 | Activities that Build Community | |
| 10.01 | Social Media Website or Similar | Does your community/campus use social media platforms or similar to document and publicize your urban forestry program, activity, or events? |
| 10.02 | Education | The urban forest is used as an educational laboratory for class activity; Kids in the Woods, PLT, high school, or college level. |
| 10.03 | Private Property Tree Program | Does your community sponsor this program locally? |
| 10.04 | Public-facing Tree Inventory and Management Software | Public access to the community tree resource via an on-line mapping program (i.e. any Web Map Service; WMS). |
| 10.05 | Public Perception | Is public management consistent with private property requirements for tree protections and care? Does the Campus/public tree management reflect neighborhood norms? |
| 10.06 | Recognition Programs | Programs that raise awareness of trees or that use trees to connect the community to significant events or activities. |
| 10.07 | Arbor Day Celebration | Whether or not associated with Tree City USA. |
| 10.08 | Arboretum designation | Internal or third party arboretum designation. |
| 10.09 | Significant trees | For example: size, history. |
| 10.10 | Memorial/Honorarium | Tree planting or tree care programs than honor/memorialize individuals, organizations, or events. |



| | | |
|-------|--|---|
| 10.11 | Social Media | Does your community/campus make use of Twitter, Facebook, Blogs for internal or external outreach? |
| 10.12 | Active Communications | Press releases, regular news articles (print), “State of the Urban Forest” reports, periodic analysis of threats and opportunities. |
| 10.13 | Tree Care | Are volunteers trained and used for basic tree care (e.g. mulching, pruning, planting). |
| 10.14 | Tree Campus USA®, Tree City USA®, Tree Line USA® | Community/campus meets current qualifications for any of these programs. |
| 10.15 | Volunteer Opportunities | Ad hoc or scheduled. Any/all age groups. Tree Campus USA student activities. |

Green Asset Management

| Category | Component Evaluated | Description or Criteria for Evaluation |
|----------|---|---|
| 11.00 | Observed Outcomes (Activity, Health) | |
| 11.01 | Deadwood | Look for evidence of periodic or ad-hoc deadwood removal (i.e. lack of dead limbs ≥ 2 " in the trees or on the ground). |
| 11.02 | Genus Diversity | No genera exceed 20% of population; make specific observations for <i>Acer</i> , <i>Quercus</i> , <i>Fraxinus</i> , <i>Ulmus</i> and other local species of concern. |
| 11.03 | Mature Tree Care | Mature trees are retained in the landscape, and are of acceptable risk; i.e. veteran tree management. |
| 11.04 | Mulching | Evidence of adequate (i.e. spatial extent, depth, and material) roots zone mulching for all age classes. |
| 11.05 | Planting Site Volume Optimization | Are species & sites matched for optimization of above ground canopy; right tree in the right spot concept. |
| 11.06 | Rooting Volume Optimization | Are species & sites matched for optimization for below ground rooting volume; right tree in the right spot concept. |
| 11.07 | Species Diversity | No species/cultivars exceed 10% of population; make specific observations for <i>Acer</i> , <i>Quercus</i> , <i>Fraxinus</i> , <i>Ulmus</i> and other local genera of concern. Also evaluate the role of regionally local native species. |
| 11.08 | Soil Compaction | Observe evidence of soil compaction by users or staff during maintenance. Include “desire” lines and construction activity at time of evaluation. |
| 11.09 | Tree Health | Rate the overall tree health in all size (age) classes; look for crown dieback, decay, foliage density & color. |
| 11.10 | Young Tree Pruning | Look for evidence of periodic (e.g. every 3 years to year 9) structural pruning (e.g. subordination cuts, dominant central leader, co-dominant stems lower than 20'). |