TREE MASTER PLAN

NORWALK, CONNECTICUT

APRIL | 2025



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PlanIT Geo™
developers of TreePlotter

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The back cover image is courtesy of the Norwalk Tree Alliance. All images are from the City of Norwalk, CT unless otherwise noted



EXECUTIVE SUMMARY

This impactful long-range Plan unites the community in protecting and expanding Norwalk's urban forest. It combines strategic tree management practices with an ambitious tree planting program, with the goal of increasing canopy cover citywide from 43% as of 2021 to 53% tree canopy cover within the next three decades. Developing this Plan fostered a shared commitment among the City, community partners, and private landowners and developers.

THE SCOPE OF THIS PLAN

Norwalk's Tree Master Plan is more than just a vision; it's a comprehensive strategy designed for everyone who calls this vibrant city home, as well as those who work, play, and visit here. This actionable plan is geared towards elevating our urban landscape by enhancing our citywide canopy cover from 43% to an impressive 53% over the next three decades. Achieving this goal requires planting approximately 64,000 trees, with an initial focus on bolstering tree canopy in overburdened and underserved communities. However, the benefits of this initiative will extend far beyond specific neighborhoods, encompassing parks, streets, residences, businesses, and institutions alike. By prioritizing sustainability and equity, this Plan seeks to maximize the long-term advantages— environmental, health, social, and economic— for all residents. Furthermore, it addresses pressing challenges such as climate change and the aging public tree population head-on. To turn this ambitious vision into reality, we're committed to implementing a proactive public tree maintenance program alongside an extensive tree planting initiative, ensuring Norwalk thrives for generations to come.

The quality of life for Norwalk's community members is strongly influenced by the urban forest, as trees make a vital and affordable contribution to the sense of community and are an essential component to the City's infrastructure. Norwalk's trees (collectively known as the urban forest) provide much-needed shade and are one the most effective mechanisms to cool urban areas, reduce stormwater runoff, and make the City more livable. Protecting, maintaining, and expanding Norwalk's urban forest is essential to preserving and improving quality of life for all residents. To plan and manage Norwalk's urban forest toward this brighter future, a baseline assessment of tree canopy cover was conducted in 2022.



A PLAN SHAPED BY DATA AND THE COMMUNITY

Norwalk's tree canopy directly impacts everyone in the City, providing significant environmental and aesthetic benefits. Recognizing and prioritizing the financial needs and benefits of maintaining and expanding the tree canopy is crucial, especially as climate change effects intensify. Proactive tree management maximizes benefits, reduces costs, mitigates risks, and minimizes emergency callouts and post-storm cleanup.

The need for a master plan arose from funding challenges for city tree plantings and maintenance. To address these and other challenges, stakeholder engagement was conducted in two phases. The first phase involved surveys and interviews with stakeholders, including key City departments like Recreation & Parks, Public Works, Economic and Community Development, and the Tree Advisory Committee. This input was vital for informing the planning process and key considerations that go into developing a widely supported and actionable Tree Master Plan.

Following the initial engagement, a draft Plan was created, incorporating tree data, supporting plans, stakeholder feedback, and previous studies. After internal reviews, a robust strategy for the second phase of engagement was launched, including two well-attended workshops in March 2025— one for internal stakeholders and one for the public. These workshops featured a mock tree planting exercise with a fixed budget and planting guidelines, sparking discussions on barriers and innovative planting strategies.

Key feedback from the workshops included the need for more tree planting strategies (36%), increased funding for planting and maintenance (25%), and better coordination among City departments and stakeholders (18%). Top concerns related to limited resources, staffing, and training for proactive tree maintenance; the need to establish or strengthen partnerships; and funding gaps. Other priorities included bolstering public education (19%), aligning staffing with needs (14%), and more public-private partnerships (11%).

Engaging stakeholders is essential for the Plan's success. Involving diverse voices early and often aligns the Plan with community priorities, builds trust, fosters collaboration, and ensures long-term support. Continuous engagement transforms ideas into actionable strategies that resonate with stakeholders and lead to meaningful outcomes.

The Plan's vision is a result of this engagement. The goals align with stakeholder priorities and build on other City policies and plans, such as the Citywide Plan 2019-2029, which aims for Norwalk to be a national example of a thriving small city with beautiful open spaces. Additionally, the Mayor envisions Norwalk as becoming the greenest city in the state. With this process, a shared commitment among the City and stakeholders was established in support of this Plan. Implementing the Plan will sustain and expand Norwalk's tree canopy, enhancing social, economic, and environmental benefits like improved health, biodiversity, air and water quality, local economies, and climate resilience.

State of Norwalk's Urban Forest

Urban forests nationwide confront common stressors such as urban heat, air pollution, weather variations, invasive species, and development pressure, exacerbated by resource constraints and conflicting priorities. For Norwalk, tree canopy cover has been evolving and changing amidst rapid growth, climate change, and fluctuations in programs, resources, and regulations.

Despite Norwalk's appeal of being a respite from dense cities while being in proximity to these major employment centers, inequitable tree distribution across Norwalk results in disparate environmental conditions and impacts residents' well-being, underscoring the urgent need for holistic tree care approaches and enhanced municipal support to bolster community resilience.

To redress inequities in canopy cover and to ensure investments made today are sustained for the future, a baseline assessment of canopy cover was conducted in 2022 using high-resolution imagery from 2021. This study found that 43% of Norwalk's 14,423 total land acres are covered by the canopy of trees when viewed from above. This proportion equates to over 6,200 acres— or approximately 10 square miles— of canopy cover. For comparison, a 2018 study (WestCOG, 2018) found that Norwalk had the lowest canopy cover of 19 cities in western Connecticut and the average for the region was 61% canopy.

URBAN FOREST CHALLENGES



URBAN FOREST CANOPY DISTRIBUTION



43% Canopy Cover

21% Possible Planting Area

36% Unsuitable Areas

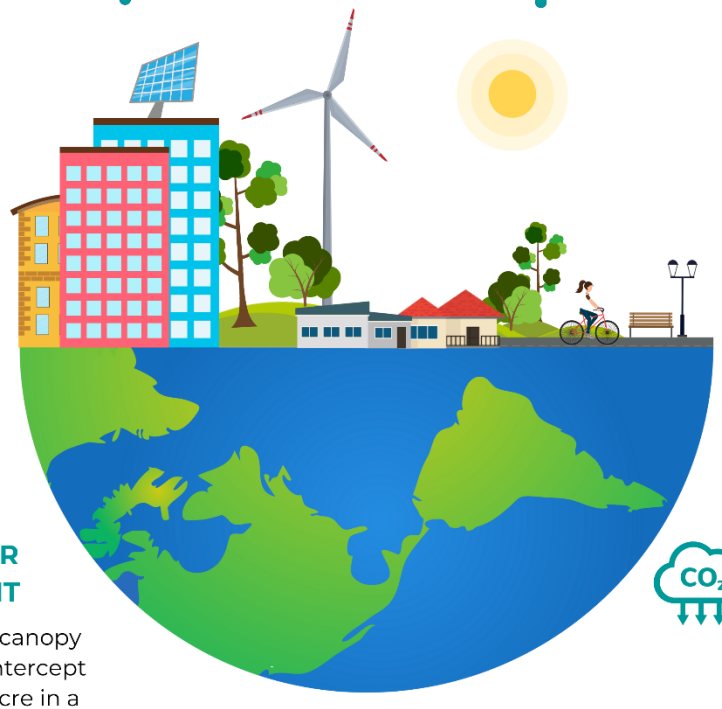
Benefits of Trees

MENTAL HEALTH

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

WILDLIFE HABITAT

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



CLEANER AIR

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

ENERGY SAVINGS

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

STORMWATER MANAGEMENT

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

CARBON SERVICES

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

Data sources and links: US Forest Service, the Arbor Day Foundation, and the EPA.

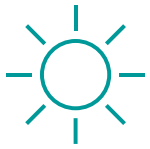
TREES WORKING FOR YOU AND OUR ENVIRONMENT

A healthy and diverse population of trees across Norwalk culminates into an urban forest that works to the benefit of the community, the environment, and the economy. The following is a summary of some of the key benefits and services of trees, nature, and greenspaces in urban areas.



IMPROVE THE QUALITY OF LIFE

Trees make cities more livable by decreasing summer temperatures and improving well-being. Greater contact with natural environments correlates with lower levels of stress, improved performance, and fewer sick days. Residents in areas with more greenery are three times more likely to be physically active and less likely to be overweight than residents living in areas with little greenery.



REDUCE AIR AND SURFACE TEMPERATURES

Tree canopy lowers temperatures by shading buildings, asphalt, and concrete. Trees deflect radiation from the sun and release moisture into the air, reducing surface temperatures which in turn supports reductions in fumes from heated asphalt and mitigates the urban heat island effect.



IMPROVE AIR QUALITY

Trees produce oxygen and clean the air by removing pollutants that would otherwise contribute to human health problems, such as asthma and other respiratory diseases.

VALUE OF TREES

Annual values are based on the 2022 Tree Canopy Assessment

Air Quality: 376,500 pounds of pollutants removed | $1.2 million annual value

Stormwater Management: 69.1 million gallons of runoff prevented | $626,500 annual value

Carbon Sequestration: 51.5 million pounds of carbon captured | $1.1 million annual value

TOTAL ANNUAL VALUE: $3.0 MILLION



PROTECT WILDLIFE AND ECOSYSTEMS

Preserving and planting trees provides valuable habitat for wildlife, supports pollinator species, and provides favorable conditions for beneficial soil microorganisms.



SAVE ENERGY AND LOWER ENERGY COSTS FOR BUILDINGS

As natural screens, trees insulate homes and businesses from extreme weather, keeping buildings cooler and reducing air conditioning bills. In the winter, evergreen trees provide a protective barrier against cold winds.



CONSERVE WATER AND SOIL

A tree's root system draws water into the soil, and its canopy slows rainfall, reducing runoff and erosion while removing contaminants. In contrast, impervious surfaces like roads and parking lots allow water to run off unfiltered and at high volumes, increasing the likelihood of flooding and impaired water quality.

Continuing reading to learn about other tangible, quantified, and experienced benefits and services provided by our trees.

ECONOMIC IMPACTS OF URBAN FORESTS

Urban forests in Connecticut play a crucial economic role, contributing $1.2 billion annually and employing 11,994 people across 142 communities. These forests also provide significant ecosystem services, saving an estimated $109.6 million through air pollution removal, stormwater runoff prevention, and carbon sequestration. This highlights the importance of urban tree management and maintenance, especially for private companies in the state. In addition, private sector urban forestry represents about 97% of direct jobs and industry output in urban forestry in Connecticut.

~ Paraphrased from "Connecticut Urban Forestry Economic Analysis, Northeast-Midwest State Foresters Alliance, 2021"

Trees as Green Infrastructure

Trees serve as vital green infrastructure in Norwalk, offering multifaceted benefits that address pressing environmental challenges.

NATURE'S COOLING SYSTEM

One significant role trees play is mitigating the urban heat island effect by providing shade and reducing surface temperatures. As Norwalk and other cities continue to grapple with rising temperatures due to climate change and urbanization, incorporating trees into capital projects, planting programs, and development plans become essential to creating a cooler, more livable environment.

CLEAN WATER GENERATORS

Trees play a crucial role in managing stormwater and improving water quality. Their extensive root systems help absorb and store rainwater, reducing the risk of flooding and soil erosion. Moreover, trees act as natural filters, trapping pollutants and sediments, thus enhancing water quality in urban streams and waterways. Incorporating trees into city projects not only mitigates the impacts of stormwater runoff but also contributes to overall environmental sustainability.

INTEGRATING CITY ASSETS

The successful integration of trees into city infrastructure requires careful planning and innovative techniques. Ensuring there is enough space and soil volume for trees to thrive is essential for their long-term health and effectiveness. Utilizing techniques such as tree pits, structural soils, and permeable pavement can maximize soil volume and provide adequate root space in constrained urban environments. Additionally, post-planting care, including watering, pruning, and maintenance, is crucial for tree survival and growth.

NORWALK'S 2009 TREE MANAGEMENT PLAN

Tree protection should be considered early in the development and review of construction plans – not after the fact. It's far less expensive and problematic to plan for tree protection than to compensate for lost capital invested in their establishment and maintenance, or recovery of the environmental benefits reduced or eliminated as a result of their damage. Essential to protecting trees is protecting the growing sites upon which they depend.

To achieve sustainable urban development, green infrastructure, including trees, must be seamlessly integrated at the design, planning, installation, and maintenance stages. Norwalk is making strides in this direction but establishing the Complete Streets Policy and Ordinance along with the supporting Design Guide. This integration should extend beyond tree planting to encompass other infrastructure components, such as sidewalks. By carefully considering trees for sidewalk installation and repairs, we can reduce conflicts and associated costs, enhance walkability, reduce heat stress, and improve the overall experience in Norwalk. Embracing trees as integral components of infrastructure not only enhances environmental resilience but also fosters a healthier, more vibrant city.

Tree Canopy Goals

Setting a canopy cover goal for Norwalk not only ignites momentum and interest but also serves as a catalyst for addressing a myriad of urban challenges. By aiming to increase canopy cover, Norwalk can effectively combat urban heat, mitigate the impacts of climate change, promote sustainability, and enhance overall livability. Embracing a canopy cover goal also underscores Norwalk's commitment to environmental justice, ensuring that all communities, regardless of their socioeconomic status, have access to the myriad benefits of urban greenery. Additionally, striving towards this goal fosters community engagement and collaboration, empowering residents to actively participate in shaping the future of their city and creating a more vibrant, sustainable urban forest.

Achieving Norwalk's canopy cover goal necessitates a shared commitment and collaborative effort from the City, its partners, and the community at large. The journey towards a greener, more resilient urban forest requires proactive planning, strategic investments, and ongoing care and maintenance. A canopy goal and reassessments of canopy cover over time will be a foundational metric to measure progress and inform changes to strategies and programs. The City must lead by example, implementing policies and initiatives that support tree planting and preservation while also fostering partnerships with local organizations, businesses, and residents. Community involvement is paramount, as residents play a vital role in advocating for green spaces, volunteering for tree planting and maintenance efforts, and fostering a culture of environmental stewardship. Through collective action and shared responsibility, Norwalk can realize its vision of a thriving urban forest that enriches the lives of its residents, enhances ecological health, and strengthens community bonds for generations to come.



Current Cover	43% (2021)
Canopy Goal	53% (2053)
10-year Target	46% canopy cover
20-year Target	50% canopy cover
Planting Target	2,200 trees/year average
Phase 1 Target	1,604 trees/year for years 1-10
City-led Plantings	70% of plantings
Community-led Plantings	20% of plantings
Development Plantings	10% of plantings
Total Plantings in 30 Years	64,000 trees

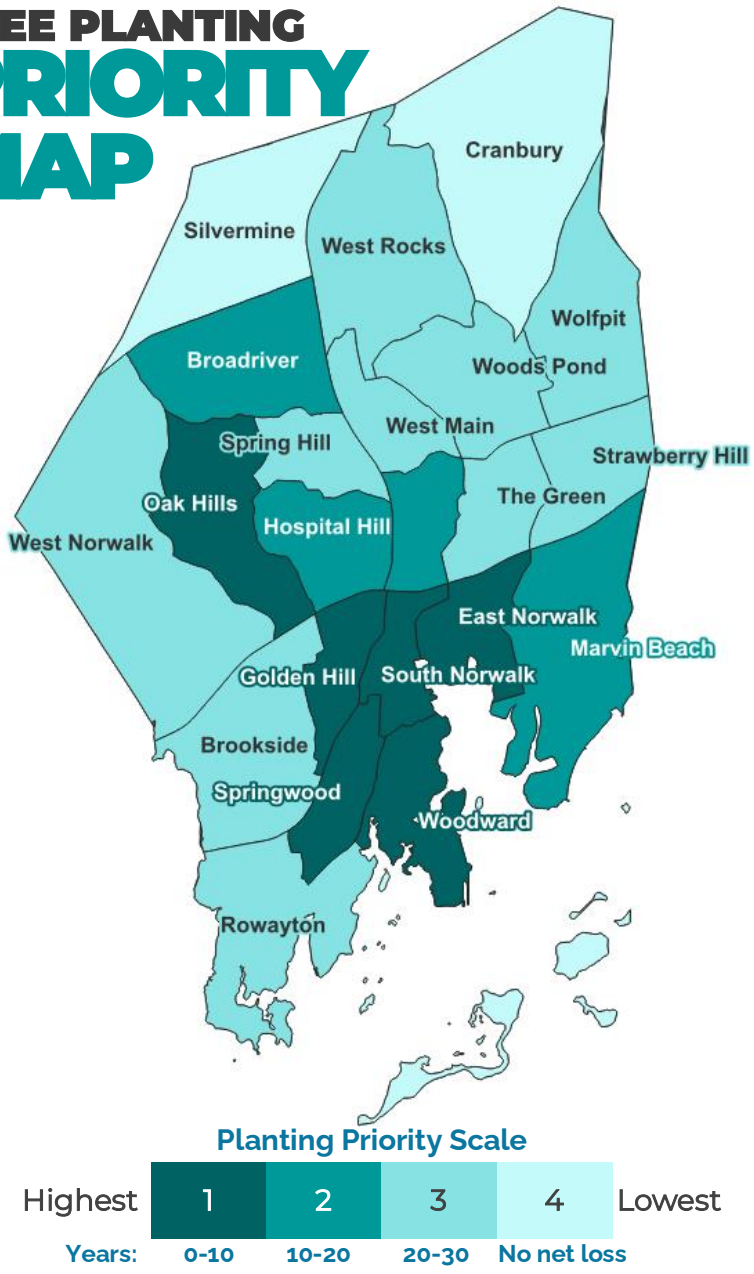
Note: The 30-year canopy goal timeframe is based on a starting year of 2024 when the canopy goal was finalized during the planning process to develop the Tree Master Plan. The City continues to track plantings toward the canopy goal, noting the number of trees required per year is an average.

Planting Strategy

Imagine a Norwalk transformed— a city with a thriving 53% tree canopy, its streets shaded and cool, its neighborhoods vibrant and healthy. This Plan's strategies provide the roadmap to make that vision a reality in 30 years. These strategies address planting and caring for trees on public lands, while also implementing policies and programs to empower residents, business owners, and developers to join the movement. Reaching the ambitious goal requires the planting of 64,000 trees, but it's not just about numbers. We'll nurture and protect the health of our existing canopy, ensuring every tree thrives. This comprehensive plan, guided by criteria detailed in separate reports, sets us on a path to a cooler, healthier Norwalk, one flourishing tree at a time.

To guide the planting strategy, a neighborhood priority map was developed based on the 2022 tree canopy assessment, overburdened areas according to the Council on Environmental Quality's Climate and Economic Justice Screening Tool (Justice40 Initiative), Tree Equity Scores (TES) based on the American Forests' tool, and stakeholder input.

In coordination with these inputs and the urban forestry consultants, a priority ranking system was established. Priority 1 denotes those neighborhoods comprised of Justice40 overburdened / underserved U.S. Census Tracts; Priority 2 areas focus on neighborhoods with U.S. Census Block Groups (CBGs) that have a TES that is less than 80 out of 100; Priority 3 is made up of neighborhoods with CBGs having a TES between 80 and 99; and Priority 4 is made up of the remaining neighborhoods that have a TES of 100.



Addressing the Priorities

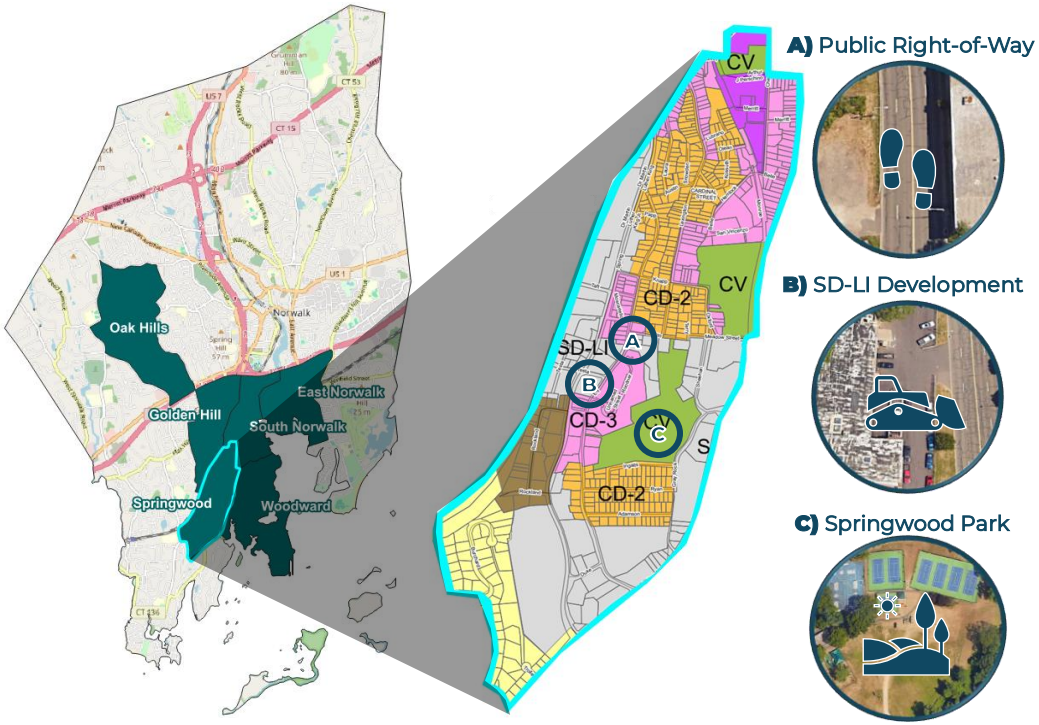
Norwalk's urban forest extends across both public and private property, encompassing all trees within the City limits. To effectively implement Norwalk's ambitious planting strategy, seamless coordination is imperative among the City, its partners, and the community.

Each of the 23 neighborhoods in Norwalk are characterized by their unique conditions, resources, and population dynamics. Norwalk's planting strategy to achieve 53% will be achieved from the ground up— with canopy goals and tree planting targets established for each neighborhood (see below). The Justice40 neighborhoods provide the first step in targeting resources, but careful onsite examinations must be made to identify suitable tree species, responsible caretakers, project timing, and other factors crucial for fostering canopy growth and sustainability.

Priority	Neighborhood	Existing Canopy %	Canopy Goal %	Trees per Year (10-year intervals)	10-year Totals
Priority 1: Years 1-10	South Norwalk	6%	14%	102	1,604 trees/year 16,035 total trees
	East Norwalk	14%	27%	232	
	Woodward	25%	46%	420	
	Golden Hill	27%	40%	210	
	Springwood	27%	38%	175	
	Oak Hills	50%	63%	465	
Priority 2: Years 11-20	Norwalk Center	13%	17%	55	1,112 trees/year 11,115 total trees
	Hospital Hill	25%	32%	177	
	Marvin Beach	28%	41%	630	
	Broadriver	53%	59%	249	
Priority 3: Years 21-30	West Main	20%	26%	105	2,810 trees/year 28,102 total trees
	The Green	27%	34%	138	
	Strawberry Hill	31%	38%	178	
	Spring Hill	32%	41%	145	
	Rowayton	43%	50%	303	
	Wolfpit	45%	52%	265	
	Woods Pond	46%	52%	217	
	West Rocks	47%	52%	285	
	Brookside	48%	54%	301	
	West Norwalk	54%	64%	874	
Priority 4: No net loss	Norwalk Islands	29%	42%	133	1,069 trees/year 10,690 total trees
	Silvermine	61%	66%	265	
	Cranbury	67%	75%	671	
TOTALS: 23 neighborhoods		6% to 67%	53% Citywide by 2053	287 trees/year average by neighborhood for 10 years	65,942 trees over 30 year period

*The difference between 65,942 total trees listed here compared to 64,000 total trees shown on a previous page is a result of different land area totals and it considers mortality of existing trees and newly planted trees.

The following provides an example of the strategy for the priority neighborhoods to focus planting efforts for the first implementation schedule (i.e., years 1-10). For example, the Springwood neighborhood includes overburdened areas identified by the Justice40 Initiative and currently has 27% canopy cover. Springwood's canopy goal is 38% in the first 10 years, which requires 1,750 trees or 175 per year. Planting trees as required by Zoning Regulations, public-private partnerships, and dedicated resources in Springwood will support the citywide goal of 53% cover. Each neighborhood will have its own planting strategy that scales up to the citywide goal.



EXAMPLE NEIGHBORHOOD STRATEGY:

SPRINGWOOD

The Springwood neighborhood contains overburdened areas according to the Justice40 Initiative and is one of six priority #1 areas for planting in years 1-10 of this Plan. The canopy goal for Springwood is 38% in 10 years— up from 27% currently. To achieve this a total of 1,750 trees are needed in Springwood— 70% on public property (1,225 trees); 20% on institutional property (schools and churches), businesses, and residential property (350 trees); and 10% through private development (175 trees).

Implementing the strategies for each neighborhood will enable Norwalk to reach ***53% canopy cover by 2053.***

Springwood's Planting Strategy			
	Priority	#1	Years 1-10
	Trees Per Year	175	50% large trees at maturity 30% medium trees 20% small trees
	Total in 10 Years	1,750	
	No Net Loss Strategy	TBD	1-1 public tree replacement; private development mitigation
	Public Rights-of-Way (ROW)	263 total trees	15% (26 trees per year) (# should be based on an inventory of planting sites)
	Public Parks	700 total trees	40% of plantings (70 trees per year)
	Other Public Properties	263 total trees	15% of plantings (26 trees per year)
	Institutions, Businesses, Residents	350 total trees	20% of plantings (35 trees per year)
	Private Development	175 total trees	10% of plantings (18 trees per year)

Zoning and Considerations
CD-1M (Sub-Urban Medium Lot): Regulations do not require trees for this class
CD-2 (Sub-Urban Single- and Two-Family): Regulations do not require trees for this class
CD-3 (General Urban): Front yards ≥ 15 feet = 1 tree per 50 feet of frontage
CV (Civic District): Regulations do not require trees for this class
SD-HI (Heavy Industrial Special District): Front yards ≥ 15 feet = 1 tree per 50 feet of frontage
SD-LI (Light Industrial Special District): Front yards ≥ 15 feet = 1 tree per 50 feet of frontage

Education and Outreach

A shared commitment from the City and the community is needed to achieve Norwalk's 30-year canopy cover goal and other goals in this Plan. Planting strategies in each neighborhood will require 70% of plantings to take place in public spaces such as the rights-of-way, parks, and other public properties. 10% of plantings will be completed by private development projects through City Planning & Zoning requirements, developer incentives, and other strategies. Another 20% will need to be voluntary plantings on private land such as residential property, schools and campuses, and businesses. This means that of the 64,000 trees needed to achieve 53% canopy cover, a total of 12,800 trees will need to be planted on this private land over 30 years. Therefore, the City of Norwalk's programs can assist the private landowners in this effort through trainings, public-private partnerships, enabling of community organizations, and other incentives such as free tree giveaways.

The education and outreach strategies to implement this Plan should consider:

- Establishing a coordinated marketing and messaging campaign.
- Developing and strengthening community programs and volunteer initiatives.
- Bolstering existing relationships/partnerships with local organizations.
- Evaluating and adapting strategies based on outcomes and public input.

> "Urban trees and forests are considered integral to the sustainability of cities as a whole. Yet, sustainable urban forests are not born, they are made. They do not arise at random, but result from a community-wide commitment to their creation and management."
>
> ~Clark et al.: Urban Forest Sustainability, Journal of Arboriculture, 1997



Description 1. Image courtesy of Norwalk Tree Alliance (2023)

Implementation Plan

Tree Planting Considerations



Norwalk recognizes the urgent need to increase its tree canopy cover to 53%. There are numerous opportunities to enhance this urban forest. Effective urban tree programs must consider site constraints, tree selection, and maintenance requirements to preserve, protect, and expand Norwalk's tree canopy. Key factors to consider include:

- Fall/Winter Planting – Planting trees during the fall and winter months promotes root growth before the onset of hot and dry weather, significantly enhancing tree survival rates.
- Optimal Locations Relative to Infrastructure – Selecting the best sites in relation to existing infrastructure is crucial for long-term success.
- Site Climate and Exposure – Evaluating the specific climate, sun exposure, and exposure to salts/chemicals at each site ensures the best conditions for tree growth.
- Right Tree for the Right Place – Tree selection should be guided by growth rate, mature size, canopy shape, shade potential, ornamental traits, wildlife value, resistance to disease and pests, and species diversity. While costs are typically based on a 2.5" caliper tree, smaller sizes can be considered under the right conditions.
- Maintenance Needs – Proper watering, mulching, and pruning are essential to support the health and growth of urban trees.

The period immediately following planting is critical for a tree's long-term health. Regular inspections and diligent maintenance during this establishment phase will ensure the consistent growth and success of Norwalk's urban trees.

Priority Actions

Timeframe	Priority Action Category
Immediate (2025 & 2026)	Tree Planting Strategy
	Public Tree Inventory
	Urban Forest Management Strategy
	Climate Vulnerability Assessment
	Organizational Structure Improvement
	Community Outreach and Engagement
	Updates to City Plans
	Green Infrastructure Integration
	Ordinance and Regulation Review
	Storm Preparedness and Response
	Urban Wood Waste Utilization
	Invasive Species Management
Short Term (Years 2-5)	Expand Tree Planting
	Monitor and Report
	Public Education Programs
	Enhance Green Infrastructure
	Funding and Budget
Mid Term (Years 6-10)	Sustain Tree Planting Efforts
	Evaluate and Adjust Strategies
	Expand Community Engagement
	Advanced Green Infrastructure Projects
	Comprehensive Plan Review
Long Term (Years 10+)	Achieve Canopy Cover Goal
	Sustainable Urban Forest Management
	Long-Term Funding Strategies
	Periodic Plan Updates

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INTRODUCTION

The quality of life for Norwalk's community members is strongly influenced by the urban forest, as trees across the City make a vital and affordable contribution to the sense of community, enhance and create pedestrian-friendly neighborhoods, provide energy savings, reduce stormwater runoff, and improve air quality. Future climate predictions indicate that heat waves will become more frequent, and the average yearly temperatures are expected to continue to rise. In addition, it is anticipated that the region will experience more frequent extreme weather events and temperature changes, prolonged periods of drought, and shortened or disrupted natural seasons. Norwalk's trees (collectively known as the urban forest) provide much-needed shade and are one the most effective mechanisms to cool urban areas, reduce stormwater runoff, and make the City more livable. Protecting, maintaining, and expanding Norwalk's urban forest is essential to preserving and improving quality of life for all residents while bolstering property and cultural values. To plan and manage Norwalk's urban forest, a baseline assessment of tree canopy cover was conducted in 2022. Norwalk's new Tree Master Plan provides the roadmap to preserve and expand this benefit-producing tree canopy.

Purpose

Norwalk's Tree Master Plan ("Plan" or "TMP") aims to provide goals and supporting guidance for the City to preserve and expand tree canopy cover and maximize the benefits of Norwalk's urban forest. An overarching canopy cover goal of 53% by the year 2053 with strategic actions sets in motion the necessary development of a robust urban forestry program for Norwalk that meets the needs of the urban forest and the community.

The development and implementation of this Plan supports other efforts including Norwalk's Citywide Plan of Conservation and Development (2019-2029), the 2018 canopy distribution study conducted by the WestCOG for western Connecticut communities, and the City's updated Zoning Regulations that went into effect in February 2024, among other plans to ensure continuity, sustainability, reduced conflicts, and long-lasting beneficial outcomes.

Planning Approach

Norwalk's Tree Master Plan was developed with a culmination of research and collaborative efforts. The planning process began with a deep dive into existing City plans and environmental initiatives. To understand existing conditions and to establish a baseline to measure progress, tree data including a citywide urban tree canopy assessment and a sample inventory of public trees in South Norwalk was collected and analyzed. Stakeholder engagement was paramount; City staff, residents, businesses, and environmental groups all had a voice in shaping the Plan. Studies were conducted and reports drafted, exploring critical factors impacting Norwalk's urban forest. Existing ordinances and regulations were evaluated, ensuring alignment with city goals. Finally, a comprehensive audit was undertaken, meticulously examining the health and quality of Norwalk's urban forest and existing tree programs. This iterative approach, grounded in industry best practices and real data, ensures the Tree Master Plan is a roadmap to a greener, more sustainable Norwalk.

This data-driven, collaborative approach lays the groundwork for success. By leveraging industry standards and best practices, a clear vision for the future of Norwalk's urban forest was established. From targeted planting strategies to robust maintenance procedures along with the teams and resources required, the Tree Master Plan equips the City and the community with the tools necessary to cultivate a thriving urban ecosystem for generations to come.





THE PLANNING PROCESS

The development of the Norwalk Tree Master 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 Norwalk’s urban forest resource (Miller, 1988).

Trees Working for People and the Environment

Protecting trees and expanding canopy cover can have the power to transform a city. With a healthy urban forest, shaded streets provide cooler summer temperatures, the air feels crisp and cleaner, and the vibrant tree canopy hums with life. This is the future that Norwalk can create with a thriving urban forest. Studies by the USDA Forest Service (USFS) demonstrate that trees act as nature's air filters, removing pollutants and enhancing air quality. Research by the University of Washington (Wolf, 2020) further highlights the connection between trees and human health, with exposure to nature reducing stress and promoting overall well-being. And beyond human benefit, trees provide essential habitat for countless species, fostering a rich biodiversity that enriches our environment. A healthy urban forest isn't just about aesthetics; it's about creating a city that works for both people and the planet.

Norwalk's Canopy Goal: A Cascading Effect

The urban forest plays a critical role in every area of Norwalk's sustainability, as well as in its health, resilience, equity, and quality of life. Like many cities however, Norwalk's canopy coverage is not equitably distributed across neighborhoods. Low-income neighborhoods have lower tree canopy coverage, and some of the highest asthma rates in the state. The Tree Master Plan provides the roadmap to achieve a shared community vision for Norwalk's urban forest. One facet of that vision includes the goal to increase canopy cover from 43% to 53% in 30 years. This vision and the supporting goals outlined in this Plan require a strong commitment to stewardship, consistent and strategic planting of new trees, the retention of the existing tree canopy, a community and constituency that values and engages with the urban forest and trees, and a network of public and private stakeholders who share a vision for a vibrant urban tree canopy.

The City and its stakeholders acknowledged this canopy deficit well before this Plan took shape. Community groups like the Norwalk Tree Alliance with support from City departments and the Tree Advisory Committee have been conducting spring and fall tree plantings, focusing efforts in underserved areas, and engaging the community. This Tree Master Plan leverages the successes from these programs and partnerships to formulate a coordinated long-term strategy for Norwalk's urban forest.

Achieving the ambitious 53% canopy cover goal brings a cascade of benefits. Healthy trees not only provide a wealth of services but also offer a cost-effective solution to many of Norwalk's current and future challenges. A coordinated planting strategy will align City priorities while addressing local needs, such as creating shaded walking paths and

bus stops. From improved air and water quality to increased biodiversity, trees offer a powerful tool— and one of the most cost-effective approaches— to combat climate change, habitat loss, and even student focus and hospital recovery times. The goal of protecting and expanding tree canopy cover should extend beyond the City's urban forestry program and be incorporated into all other pertinent aspects of City planning, design, and maintenance projects. Investing in the urban forest fosters a healthier, more vibrant city, promoting physical activity and a stronger sense of community— all critical elements for a thriving Norwalk.

Upcoming Sections

The Introduction of Norwalk's Tree Master Plan outlines its purpose and strategic approach, emphasizing the importance of a well-managed urban forest for environmental health, aesthetics, and quality of life. It serves as a roadmap, guiding readers through sections on the current state of the urban forest, management importance, city priorities, tree planting strategy, urban forest management, and a 10-year roadmap with actionable steps. The summary highlights upcoming sections to inform readers about resonant content.

- SECTION 1: STATE OF NORWALK'S URBAN FOREST: Learn about the urban forest, public trees that comprise the urban forest, stakeholders engaged with trees, regulations and plans impacting trees, and how Norwalk's urban forest compares to industry standards.
- SECTION 2: MANAGEMENT IMPORTANCE: Gain insights and new perspectives on how Norwalk's urban forest provides benefits and services to the community, the environment, and the economy if challenges are adequately addressed and incorporated into the City's green infrastructure and urban planning.
- SECTION 3: UNDERSTANDING NORWALK'S PRIORITIES: Learn about the community's priorities relating to trees in Norwalk and how this feedback helped guide the development of the Plan's goals and strategies.
- SECTION 4: TREE PLANTING STRATEGY: Understand the strategy to achieve 53% canopy cover and other related goals of the Plan, recognizing that success requires a shared commitment from both the City and the community to the Plan's vision, industry standards, and best practices.
- SECTION 5: URBAN FOREST MANAGEMENT STRATEGY: Learn about the standards and best practices for managing public trees, tree risk, storms, pests and diseases, and wood waste along with the structures, programs, and resources necessary to meet the levels of service required.
- 10-YEAR ROADMAP AND NEXT STEPS: Learn about the 10-year roadmap to achieve the strategies set forth in this Plan and learn how all members of the community can take part in the next steps.



SECTION 1: STATE OF NORWALK'S URBAN FOREST

Learn about the urban forest, public trees that comprise the urban forest, stakeholders engaged with trees, regulations and plans impacting trees, and how Norwalk's urban forest compares to industry standards.

Defining the Urban Forest and Tree Populations

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 Norwalk function. Services generated by trees in Norwalk provide immense value to the City. Like other city infrastructure, urban trees require management and maintenance to succeed.

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 contributes to overall urban forest health, sustainability, and associated benefits.

To present an analysis of the current conditions of Norwalk'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, property owner, or other). In the following section, analyses are first summarized for the citywide urban tree canopy that encompasses public and private trees, followed by a discussion about the public street and park tree population.

Public trees are comprised of trees along streetscapes, in medians, backup lots, alleys, parks, open space, and natural areas on City-owned land. The Tree Master Plan focuses on the public street trees. The City is primarily responsible for the maintenance of these trees along city streets whereas trees along Route 15 fall under the State of Connecticut's purview. View the illustration below for a summary of the tree types in Norwalk.

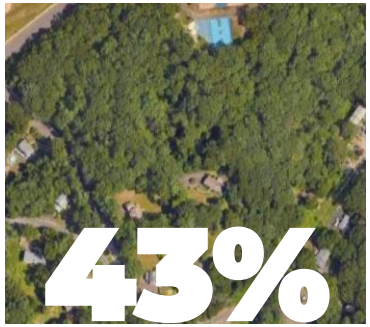


Figure 1. Illustration of the common tree ownership types in Norwalk

Norwalk's Urban Forest: A Top-down Approach

An assessment of tree canopy cover across Norwalk provides essential data for developing strategies related to tree planting, preservation, equity, and risk management. These urban tree canopy (UTC) assessments, also often referred to as tree canopy assessments (TCA), offer vital information for long-term planning and tracking progress. They support various city planning efforts, including sustainability, equity, health, climate resiliency, stormwater management, water quality, wildlife preservation, air quality improvements, and development guidelines. UTC assessments establish a baseline of current canopy cover and identify potential planting areas. This assessment is crucial for understanding Norwalk's urban forest conditions and should be used to measure progress from implementing this Plan.

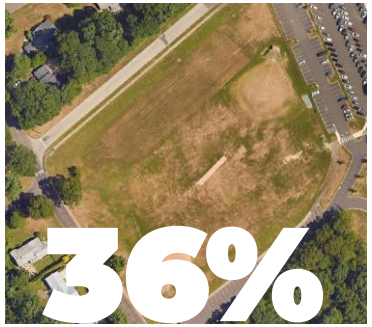
Norwalk's tree canopy assessment completed in 2022 utilized 2021 high-resolution imagery from the National Agriculture Imagery Program (NAIP) to evaluate the extent and opportunities for tree canopy cover. The study also looked at canopy cover change between 2021 and historical imagery of 2012. The results of the analysis of 2021 imagery are provided below:



Urban Tree Canopy (UTC)



Possible Planting Area (PPA)



Unsuitable Area

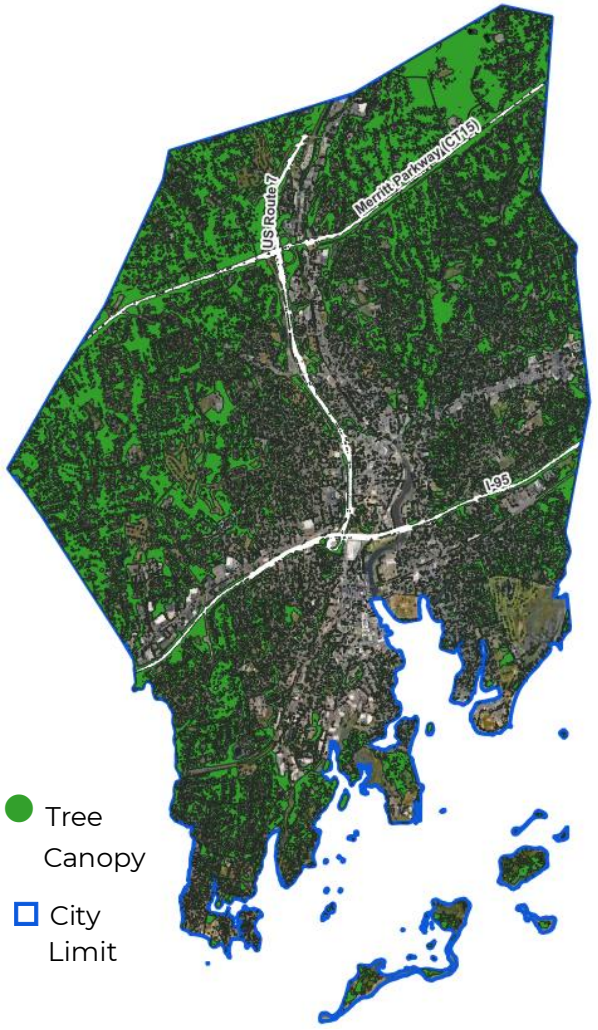


Figure 2. Depiction of the canopy cover assessed in 2022 using 2021 imagery

What Is an Urban Forest?

An urban forest encompasses all the trees in a defined urban area, such as a city. Urban forests broadly include the trees in urban parks; on city streets; in residential areas, including private yards and shared residential spaces; trees in community spaces (such as libraries and public gardens) and in greenways, river corridors, wetlands, nature preserves, and natural areas; shelter belts of trees; and working trees at industrial brownfield sites, among others.

What Is Canopy Cover?

Imagine you are a bird flying over a city (or a human in an airplane) in the summer months. As you look down on your city, what percentage of the ground is covered (obscured from view) by trees? That amount is called the canopy cover of an area. In 2021, the City of Norwalk had a canopy cover of 43%.

Currently, 43% of the City's land area is covered by the canopy of trees across public and private boundaries when viewed from above— down from 49% in 2012. Another way to look at the extent of this resource; of the 14,423 total land acres in Norwalk in 2021, a total of 6,218 acres are covered by tree canopy. That equates to nearly 10 square miles of canopy cover equal to the area of over 4,700 professional-sized football fields. The 2022 assessment of 2021 imagery also identified areas for potential new tree canopy—tree planting—and in 2021 a total of 2,964 acres in Norwalk were either grass, low-lying shrubs, or impervious surfaces (paved areas like parking lots[1]). This amounts to 21% of the City theoretically containing "possible planting space" although additional analyses and onsite inspections would need to be conducted to determine whether the possible space is "feasible" and "preferable". The remaining 36% of the City is classified as "unsuitable" meaning tree canopy cover cannot exist in these spaces. Examples may include baseball fields, tennis courts, golf fairways, and unsuitable impervious areas such as building rooftops and roadways. This amounts to 5,241 acres across Norwalk.

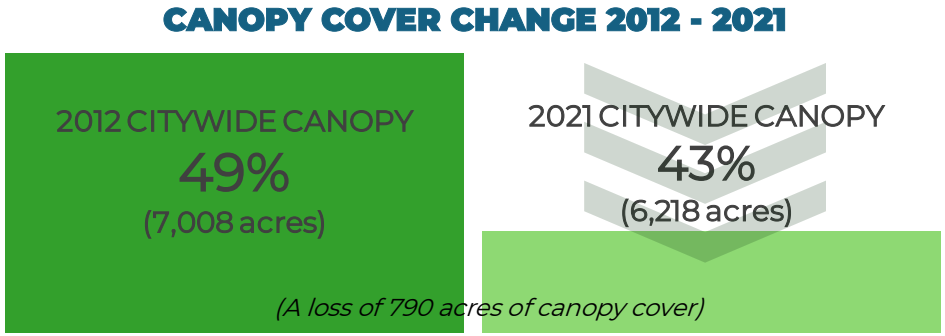


Figure 3. Citywide canopy cover change between 2012 and 2021 (Source: 2022 UTC Assessment)

[1] Impervious surfaces such as parking lots are included as "possible planting areas" since, while more costly, it is possible to remove pavement and replace with soil for tree planting. Impervious areas that are not possible such as building rooftops and roadways are included in the "unsuitable" category rather than the "possible planting area" category.

NEIGHBORHOOD TREE CANOPY

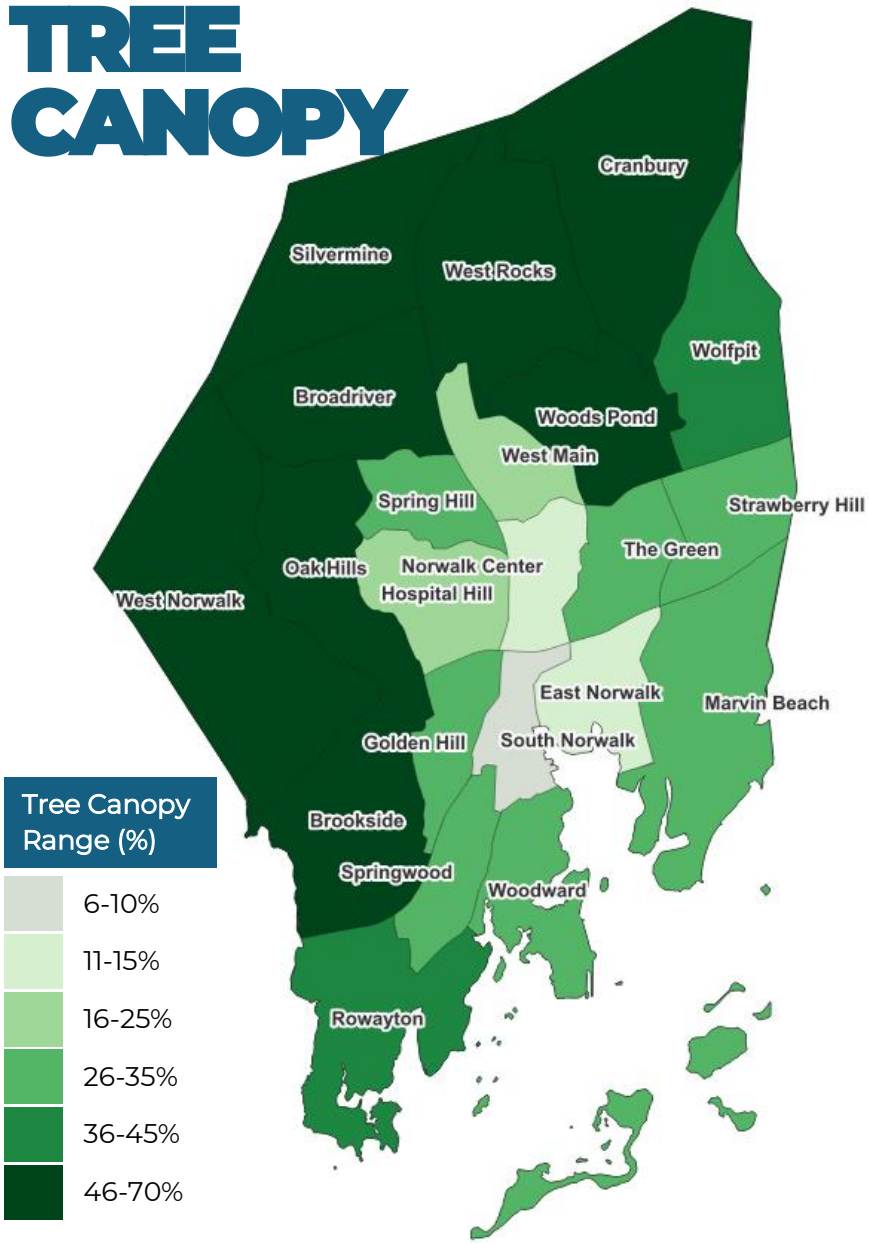


Figure 5. Tree canopy cover by City of Norwalk neighborhood (Source: 2022 UTC Assessment)

The 2022 assessment was analyzed further by City neighborhood to provide more specific insights into the canopy cover, available planting space, and potential causes for gains and losses of canopy from 2012 to 2021. As the map shows below, the 790 acres of canopy loss between the 9-year period occurred in the central portion of the City with South Norwalk at the highest rate of relative canopy loss (46% or 12% canopy cover in 2012 and 6% canopy cover in 2021).

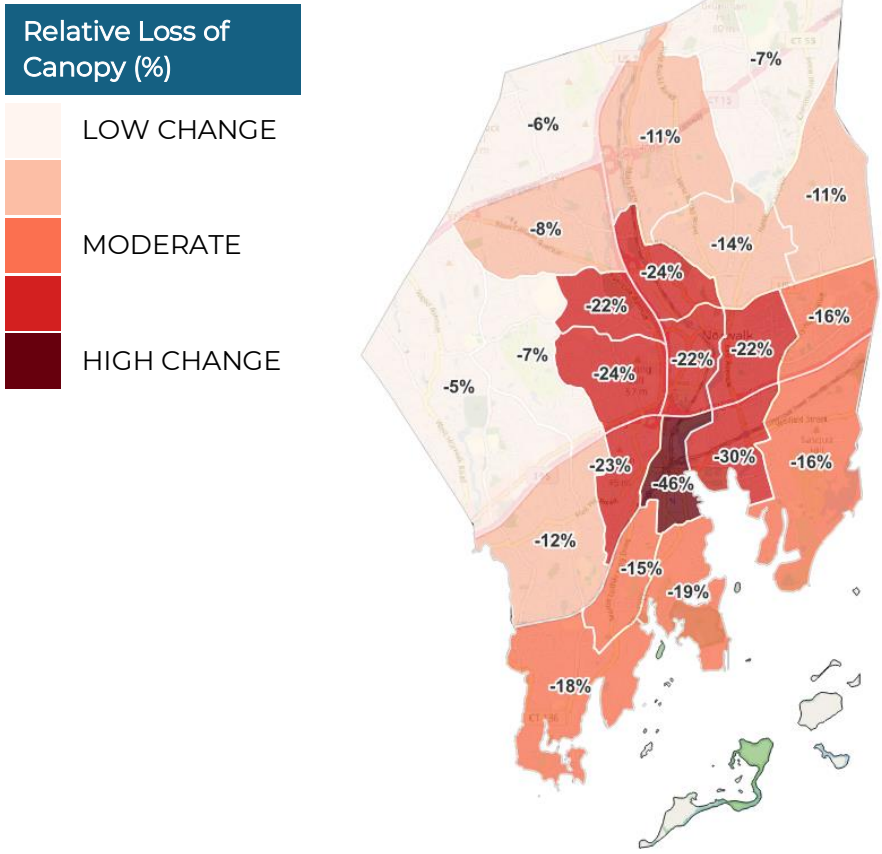


Figure 4. Relative canopy cover change by City of Norwalk neighborhood from 2012 to 2021 (Source: 2022 UTC Assessment)

Tree Canopy in the Region

In 2018, Norwalk completed a "Tree Canopy Improvement Strategy" (WestCOG, 2018) which aimed to enhance the City's tree canopy by integrating extensive data and existing plans for a comprehensive view of current conditions. This study set in motion subsequent planning efforts including an updated canopy cover assessment, a sample inventory of public trees, additional program resources, and this Tree Master Plan. From the 2018 study, a comparison of Norwalk's canopy cover to the other jurisdictions within WestCOG was conducted. While the canopy assessment utilized different imagery and methodology, it does provide insights into how the City of Norwalk's canopy cover compares to other communities in the region and what may be a realistic amount of cover in the future.

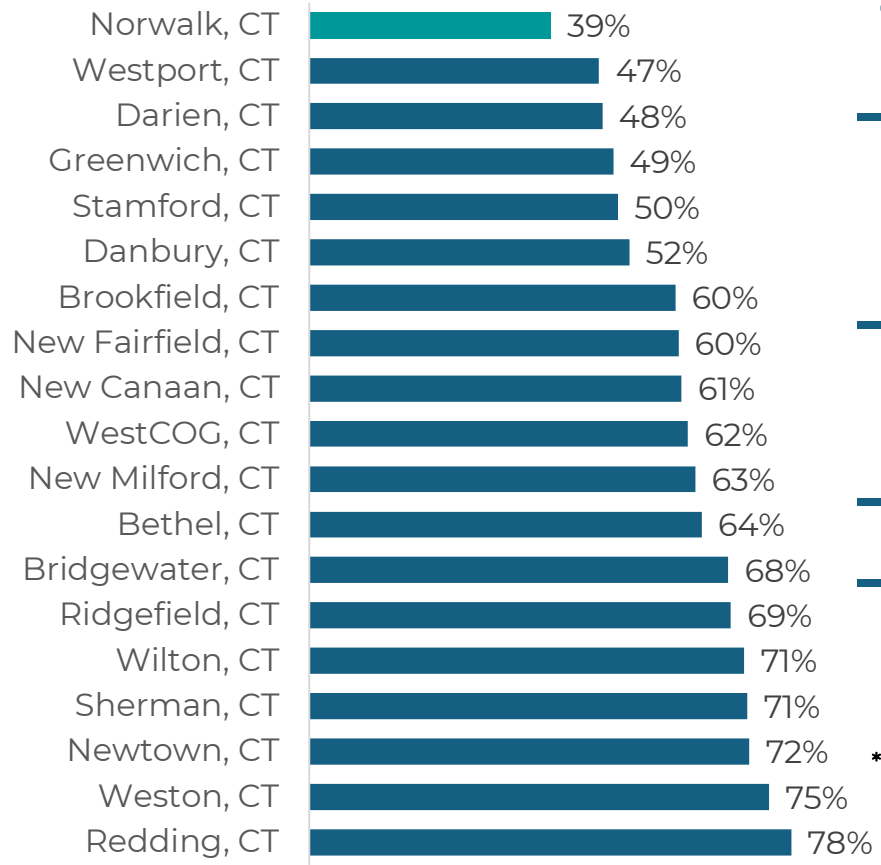


Figure 6. Summary of tree canopy cover according to a 2018 study for jurisdictions within the Western Connecticut Council of Governments (Source: WestCOG, 2018)

CANOPY ASSESSMENT RESULTS ACROSS STUDIES

2021*	**43.11%**	**PlanIT Geo**
2023	36%	Average for U.S. Census Block Groups in Norwalk according to the American Forests' Tree Equity Score Tool via Google Environmental Insights Explorer
2023	47%	(Citywide) According to the American Forests' Tree Equity Score Tool via Google Environmental Insights Explorer
2015	39.20%	WestCOG, 2018 (Table 1, page 10)
2015	44.19%	WestCOG, 2018 (page 10, notes that the 44.19% is the refined analysis of the region to be specific to Norwalk

***Bold font indicates the primary data used in the Tree Master Plan**

Table 1. Summary results of recent canopy assessments completed for Norwalk, CT

Tree Canopy Equity

> "American Forests defines tree equity as having enough trees in an area so that everyone can experience the health, climate and economic benefits."
>
> American Forests' Tree Equity Score tool (treeequityscore.org)

For most communities in the U.S., the surface temperatures during a heat wave can vary dramatically by neighborhood and even by street. A big reason for the difference is shade and the canopy of trees that line some sidewalks but not others. Typically, wealthier areas of a city that are zoned for single-family homes attract more city services, like wide sidewalks and trees. As time progresses, that disparity becomes more than a matter of aesthetics. Research shows shade and water evaporation from trees can lower surrounding air temperatures by six degrees or more. While it is well known that shade from a tree can help keep the ground temperatures cooler, as climate change continues to affect the region, the stakes are likely to get higher. In certain cases that shade could be the difference between life and death, especially for the sick, elderly, and disabled people. Studies show that just an extra degree during a heat wave increases mortality 2-3% (Coleman, 2024).

Some areas in Norwalk lack adequate tree canopy cover, such as the South Norwalk neighborhood. The tree canopy and associated benefits of the urban forest are not equally shared and experienced by all communities in Norwalk. Whatever the cause for canopy disparity, the purpose of this tree equity study is to state the baseline conditions, identify priorities, and establish goals for increasing tree canopy cover equitably while supporting other priorities and goals relating to urban planning and development, climate action, risk management, public safety, environmental justice, and sustainability, among others.

Focused on addressing canopy cover inequity, the American Forests organization created the Tree Equity Score (TES, TreeEquityScore.org) tool that measures 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. Tree Equity Score measures how well the benefits of trees are reaching communities living on low-incomes, communities of color, and others disproportionately impacted by extreme heat and other environmental hazards. A 0- to-100-point system makes it easy to understand how a community is doing. Based on this system and its methodology, a score of 100 represents tree equity.

With the knowledge the score provides, Norwalk's community leaders, tree managers, 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 2025 Tree Master Plan, and track progress toward achieving tree equity.

Norwalk's Tree Equity Score is slightly higher than the national average. A 2023 analysis scored Norwalk at 86 out of 100, compared to the U.S. average of 85 across 197,505 U.S. Census-defined urban areas (as of 2023).

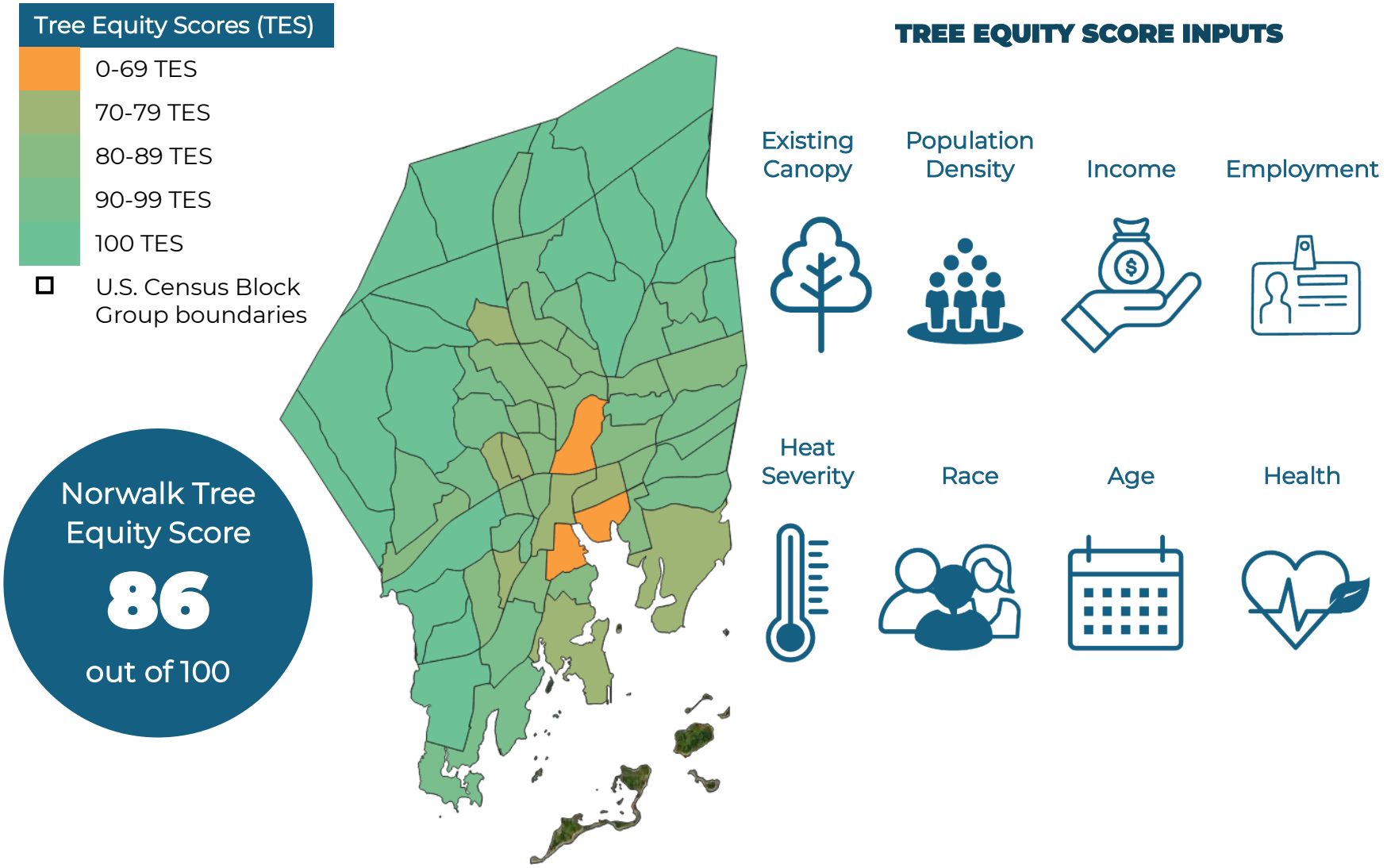


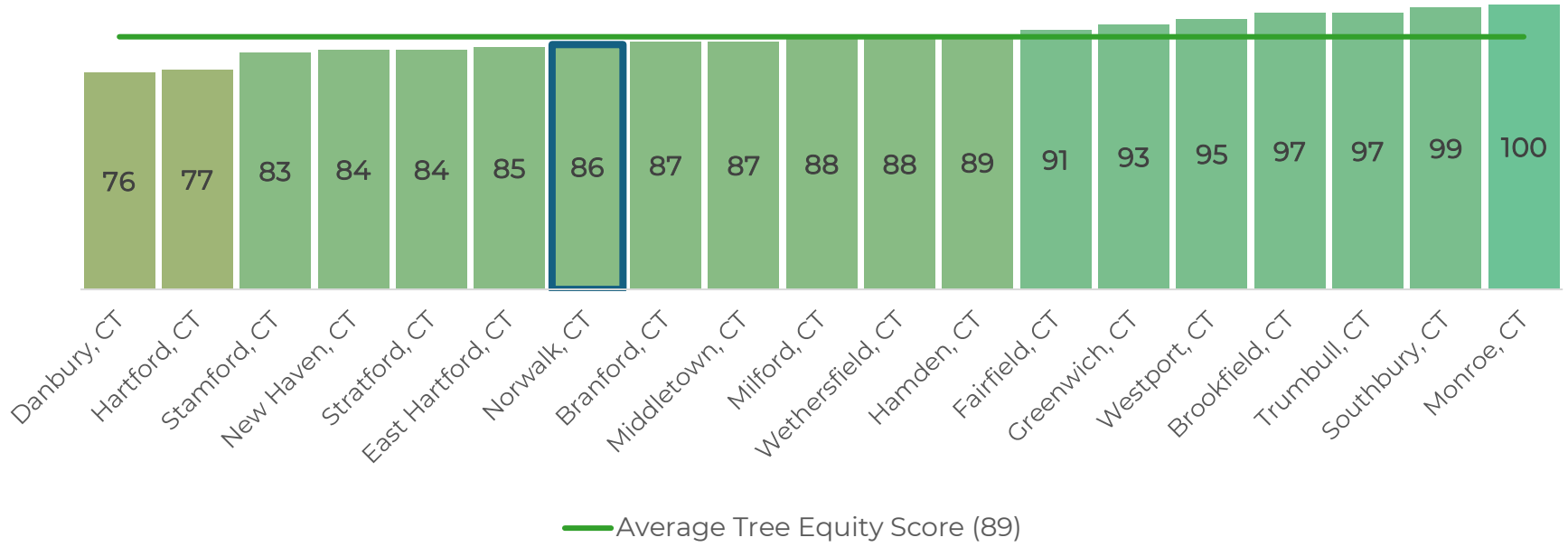
Figure 7. Map showing the Tree Equity Scores for U.S. Census Block Groups in Norwalk (Source: American Forests' Tree Equity Score Tool, 2023)

The previous map displays the Tree Equity Scores for each U.S. Census Block Group (CBG) within the City of Norwalk based on the data inputs listed in the figure above. Compared to other cities in the state, Norwalk's Tree Equity Score of 86 is the seventh lowest score out of a total of 19 Connecticut cities[2] that were awarded as a Tree City USA city in 2021 by the Arbor Day Foundation (see figure below). This score for Norwalk is based on a combination of metrics listed in the figure above for 68 Census Block Groups comprising the City and averaged for a combined total score.

COMPARISON OF TREE EQUITY SCORES IN FOR 2022 TREE CITY USA CITIES IN CONNECTICUT

Figure 8. Comparison of Tree Equity Scores for select CT communities accredited by the Arbor Day Foundation as a Tree City USA city in 2022 (Source: American Forests' Tree Equity Score Tool, 2023)

Average Tree Equity Score: 89 | Norwalk, CT: 86
Average Tree Canopy Cover: 50% | Norwalk, CT: 47%*



*47% average canopy cover for Norwalk, CT is based on the Tree Equity Score tool data and not based on the high-resolution Urban Tree Canopy (UTC) assessment completed in 2022 using 2021 imagery that found the City has 43% canopy cover. Also, the Tree Equity Score percentages are based on the boundaries of the census areas within the City of Norwalk city limits and are not based on the extent of city limits.

[2] The 19 communities selected for the benchmarking research and comparison study were based on their proximity to Norwalk, population size, and status as a Tree City USA (TC USA) community in 2021 according to the Arbor Day Foundation. The year 2021 was used as this is the most recent complete database provided to the consultants. Note, a separate report compares Norwalk to other select TC USA communities outside of Connecticut and all TC USA communities nationwide as of 2021 (3,597 communities).

Based on the criteria evaluated for each of the 68 Census Block Groups in Norwalk, the Citywide Tree Equity Score is currently at a score of 86 out of 100. This score is based on a combination of metrics for 68 Census Block Groups (CBGs) comprising the City (refer to figure below). Strategies in the Plan support the City in growing a more equitable urban tree canopy. For Norwalk, 19 of the CBGs (28%) are attaining tree equity with a score of 100, 19 (28%) have a score between 90-99, and 19 (28%) have a score of 80-89. Uniquely for these types of studies, there are only 11 (16%) CBGs with a TES score that is less than 80.

TREE EQUITY SCORE (TES) DISTRIBUTION BY CENSUS BLOCK GROUPS (CBGS)

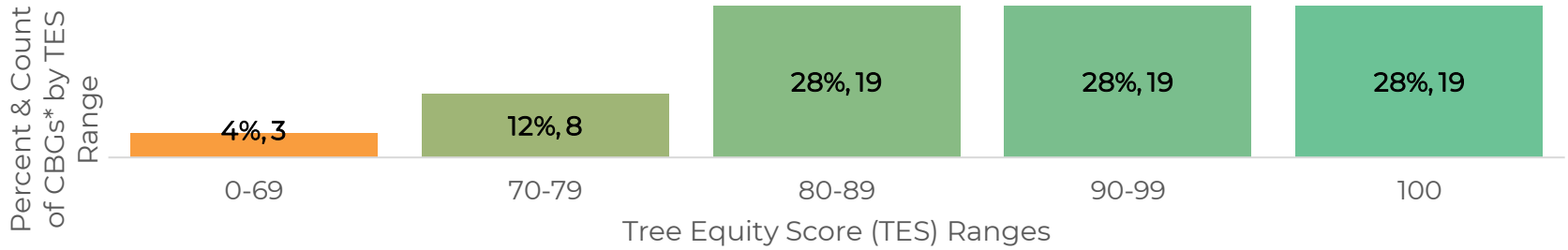


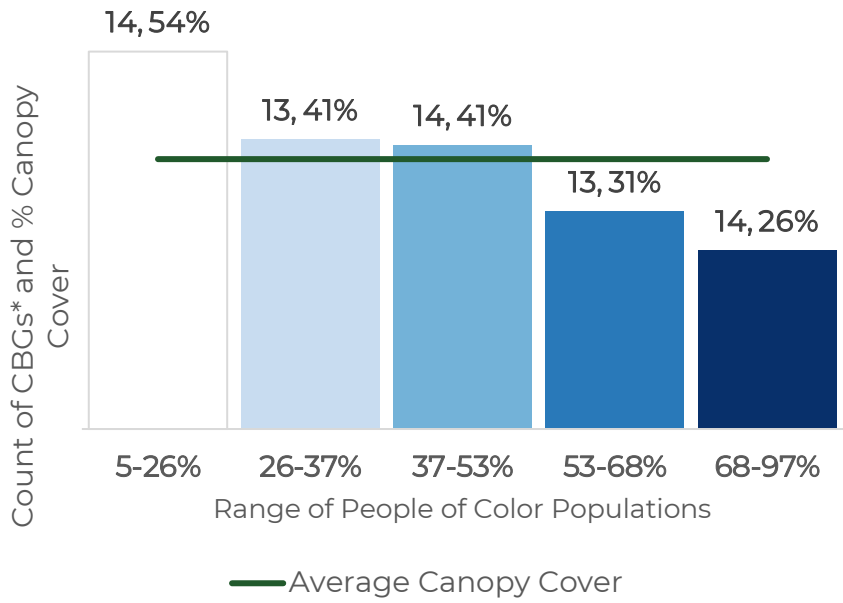
Figure 9. Count and percent of Census Block Groups (*) for each Tree Equity Score range (Source: American Forests' Tree Equity Score Tool, 2023)

The following charts and maps provide a closer look at how tree canopy cover is distributed by various sociodemographic metrics including: tree canopy cover by Census Block Group compared to percentages of people of color, tree canopy by CBG compared to percentages of people in poverty, and tree canopy cover by CBG compared to summer surface temperature averages by CBG. Additional details are provided in a separate "Urban Forest Distribution" report as well as on the Tree Equity Score's website (treeequityscore.org).

Regarding canopy cover and percentages of people of color, in CBGs with 68-97% people of color, tree canopy cover is 13% less than the average for all CBGs. When comparing canopy cover to the percentage of people in poverty by CBG, it was found that in CBGs with 34-60% of its population in poverty, canopy cover is 11% lower than the overall average. Lastly, the study shows that areas like South Norwalk have hotter than average CBGs and the least amount of canopy cover. CBGs with 16% less canopy cover than the average are more than 10 degrees (Fahrenheit) hotter than CBGs with an average canopy cover of 39%. These results may indicate correlations between tree canopy cover, underserved communities, and increased temperatures. Thus, the Tree Master Plan incorporates these considerations into its strategies and these maps could be utilized by the City and its partners in outreach and engagement efforts going forward.

CANOPY COVER BY PERCENTAGE OF PEOPLE OF COLOR

Figure 10. Canopy cover (%) and count of Census Block Groups(*) by ranges of people of color (Source: American Forests' Tree Equity Score Tool, 2023)



% People of Color by Census Block Group (CBG) (Source: American Forests' Tree Equity Score Tool, 2023)

- 5-26%
- 26-37%
- 37-53%
- 53-68%
- 68-97%
- U.S. Census Block Groups
- City area with no data available *Note, U.S. CBGs extend beyond community boundaries*

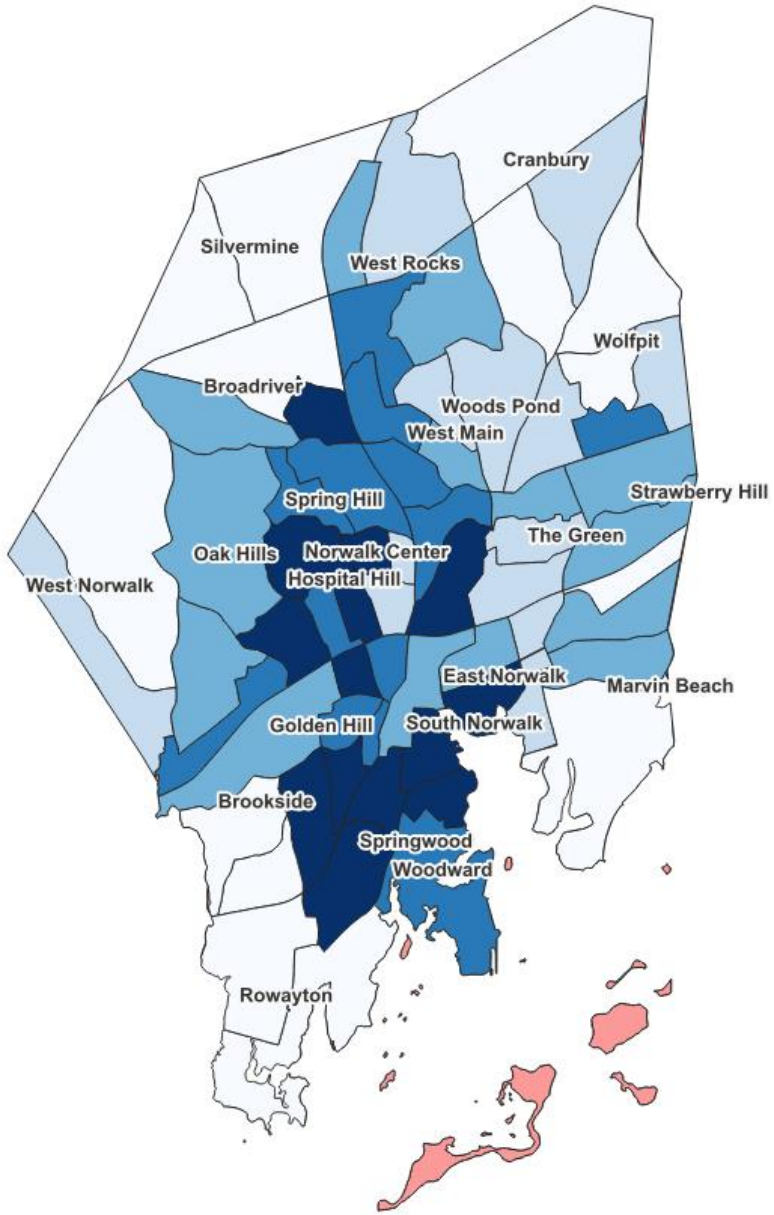
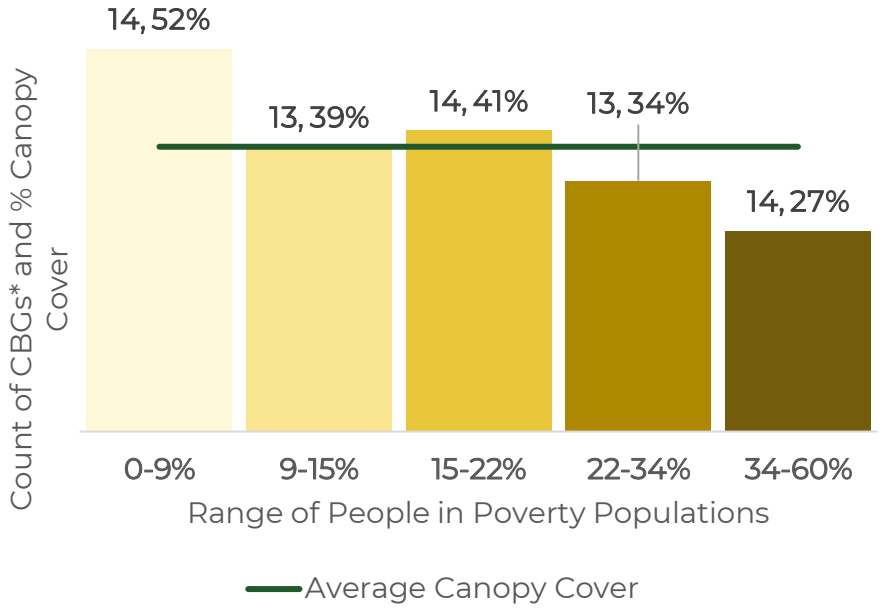


Figure 11. Map displaying the percentage of people of color by Census Block Group (Source: American Forests' Tree Equity Score Tool, 2023)

CANOPY COVER BY PERCENTAGE OF PEOPLE IN POVERTY

Figure 12. Canopy cover (%) and count of Census Block Groups(*) by ranges of people in poverty (Source: American Forests' Tree Equity Score Tool, 2023)



% People in Poverty by Census Block Group (CBG)
(Source: American Forests' Tree Equity Score Tool, 2023)

- 0-9%
- 9-15%
- 15-22%
- 22-34%
- 34-60%
- U.S. Census Block Groups
- City area with no data available *Note, U.S. CBGs extend beyond community boundaries*

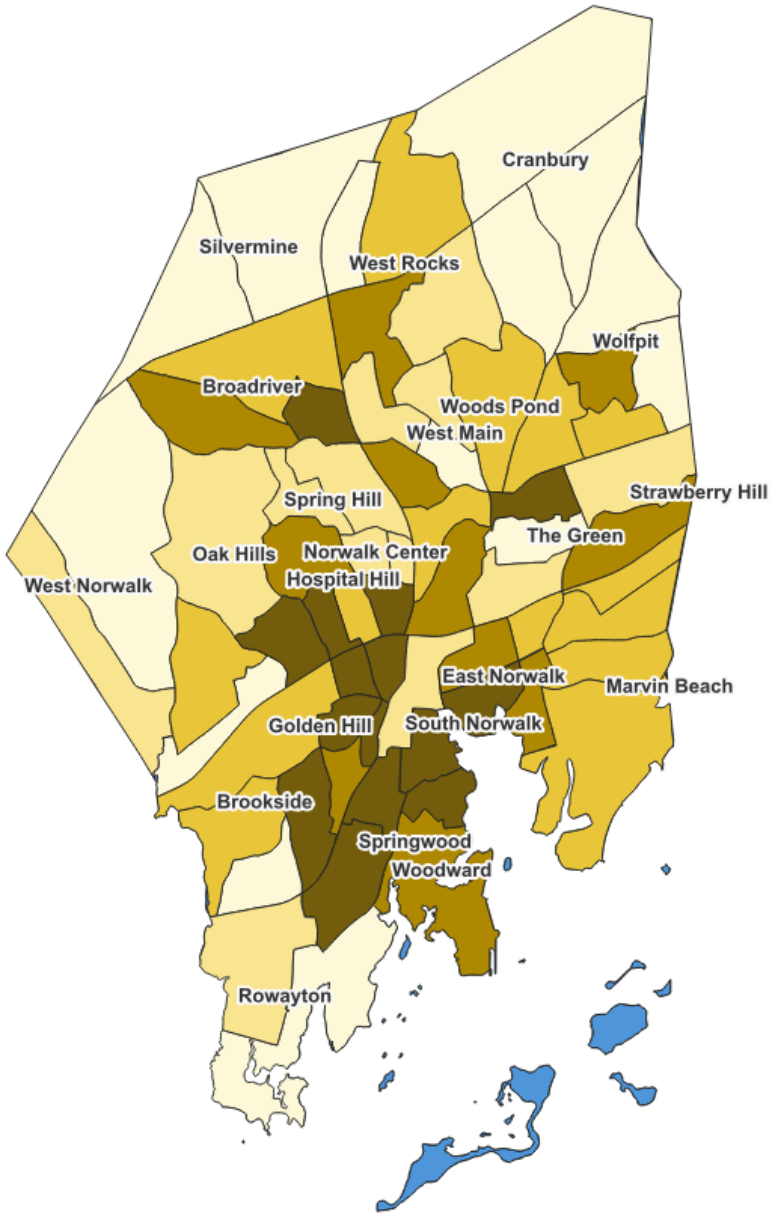
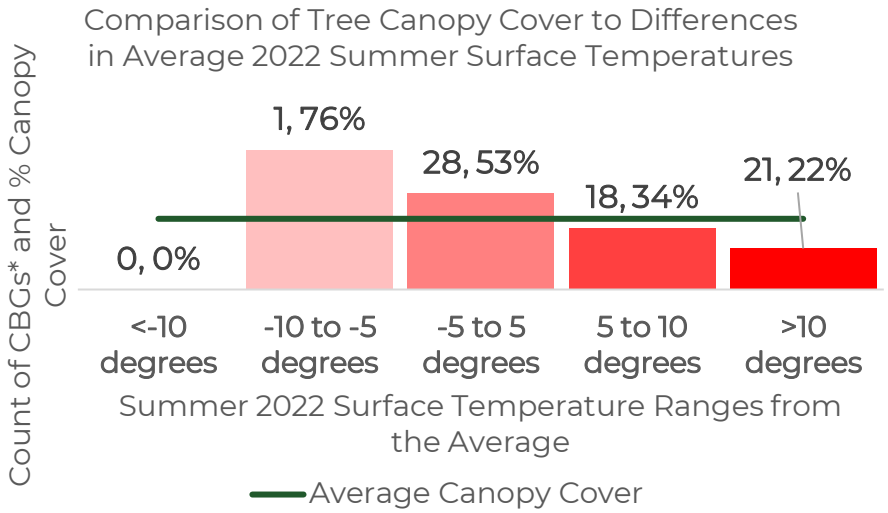


Figure 13. Map displaying the percentage of people in poverty by Census Block Group (Source: American Forests' Tree Equity Score Tool, 2023)

CANOPY COVER BY TEMPERATURE RANGES**

Figure 14. Canopy cover (%) and count of Census Block Groups(*) by temperature ranges in degrees Fahrenheit (Source: American Forests' Tree Equity Score Tool, 2023)



Heat Disparity** by Census Block Group (CBG) (Source: American Forests' Tree Equity Score Tool, 2023)

- <-10 degrees Fahrenheit (F)
- -10 to -5 degrees F
- -5 to 5 degrees F
- 5 to 10 degrees F
- >10 degrees F
- U.S. Census Block Groups
- City area with no data available *Note, U.S. CBGs extend beyond community boundaries*

**Positive values indicate hotter than average block groups, and negative values indicate cooler than average block groups. Block groups set to the urban area average due to lack of data result in a heat disparity value of zero.

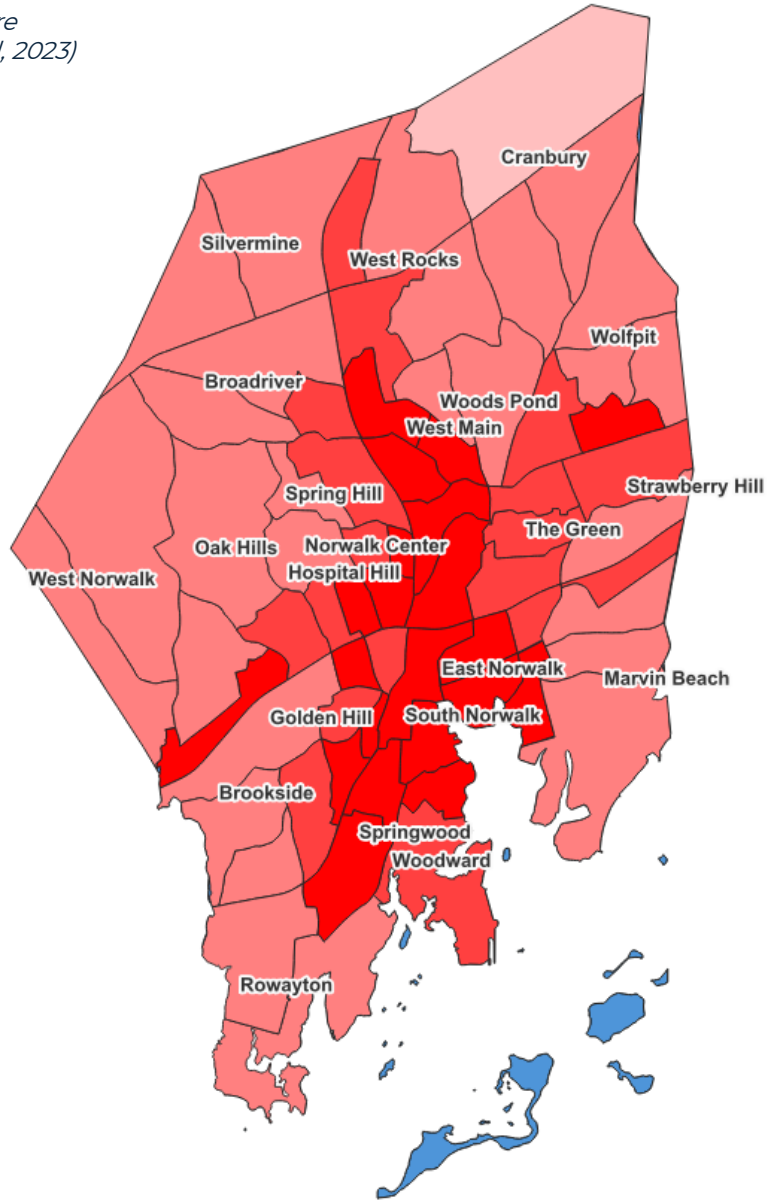


Figure 15. Map displaying the heat disparity across U.S. Census Block Groups in Norwalk (Source: American Forests' Tree Equity Score Tool, 2023)

The Bottom-up Approach: Norwalk's Public Trees

Urban tree canopy assessments are crucial for managing Norwalk's urban forest, but a comprehensive understanding requires a bottom-up analysis through a full or sample inventory of public trees. Although Norwalk lacks a complete public tree inventory, a 2023 sample inventory of 4,190 trees in South Norwalk and other areas south of Interstate 95 offers insights. With an estimated 25,000 public trees along streets and in parks, this sample data, combined with regional resources and the planning team's expertise, reveals the urban forest's composition, tree conditions, maintenance needs, and supports the Tree Master Plan's long-term vision. To effectively manage and plan for the growing tree population amid ongoing challenges, the City needs an accurate, maintained inventory.



Figure 16. Examples of the types of landscapes containing trees that comprise the citywide urban forest

As discussed earlier and illustrated above, the urban forest is comprised of trees across a variety of landscapes and ownership types. To provide an initial bottom-up assessment of Norwalk's urban forest, this section will focus on trees in public areas of the City. It summarizes public tree information gathered in 2023 and extrapolated to represent citywide characteristics.

2023 PUBLIC TREE SAMPLE INVENTORY

The summaries below are derived from a 2023 inventory of 4,190 public trees in Norwalk, which has been extrapolated to estimate a total of 25,000 public trees along streets and in maintained park areas.

BY THE NUMBERS

Sample Inventory 4,190 trees

Total (estimated) ~25,000 trees

Status (alive or dead) 98% living trees

GROWING SPACE TYPE

Front Yard 58%
(in front of private property adjacent to public planting strips)

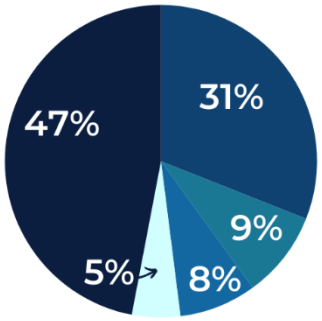
Maintained Open Area 24%
(areas of parks or the grass area between sidewalk and park property)

Planting Strip 11%
(space between sidewalk and road)

Other Types 8%
(cutouts, medians, unmaintained areas)

COMPOSITION

Common Genera



47% Other common genera
9% *Quercus* (oaks)
5% *Prunus* (cherries, plums)
31% *Acer* (maples)
8% *Thuja* (arborvitaes)

Common Species

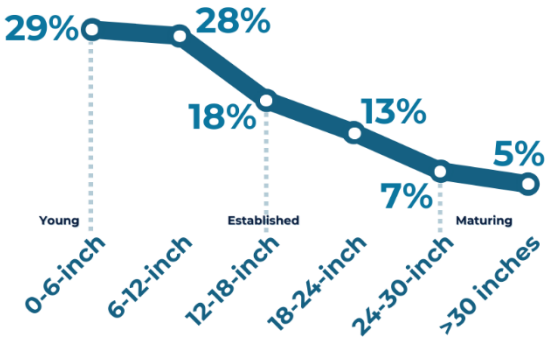
Norway maple	12%
Red maple	8%
Arborvitae	8%
Sugar maple	5%
Northern red oak	4%
All others	63%

****131 unique tree species****

****64 unique tree genera****

TREE SIZE CLASSES

(measured at diameter at standard height or "DSH" measured 4.5-feet above natural grade)



TREE CONDITION



Figure 17. Summary of the 2023 sample inventory of public trees extrapolated to represent a population of 25,000 trees (estimated)

Public Tree Insights

Using the estimate of 25,000 public trees in maintained or landscaped areas, the data reveals that the most common tree genera are *Acer* (maples) at 31%, *Quercus* (oaks) at 9%, and *Thuja* (arborvitae) at 8%. The most common species are Norway maple (12%) and red maple (8%). The trees lining streets and growing in maintained park areas are primarily in the 0–6-inch diameter size class (29%) or the 6–12-inch class (28%). Most trees are adjacent to single-family residential land use, accounting for 65% of the total, followed by parks and vacant land at 23%. The primary growing space type is the street frontage and rights-of-way that are under the City's purview, which make up 58% of the total. Additionally, 84% of trees are growing in planting sites with a width of over 11 feet, although many trees in fair condition (33%) are showing signs of stress likely due to limited growing space and other factors.

From a management perspective, the data highlights several key areas for attention. The public tree population consists of 64 unique tree genera and 131 unique species, which is typical for the region. Given that most trees are young or small-statured (over half, or 57%, are less than 12 inches in diameter), the public tree population aligns with the recommended structure where younger trees dominate to sustain canopy cover and associated benefits. The high percentage of trees in good condition (61%) suggests that current maintenance practices are effective. However, the presence of deadwood in 40% of the trees and crown dieback in 19% indicates a need for ongoing monitoring and intervention. Priority maintenance tasks include routine pruning for 79% of the trees and addressing wire conflicts present in 15% of the trees. The overall ecosystem benefits provided by these trees, valued at $19,894 annually, underscore the importance of maintaining and enhancing the urban forest. This data suggests that while the current state of the urban forest is generally healthy, proactive management is essential to address emerging issues and ensure long-term sustainability.



The 2023 sample inventory of 4,190 public trees estimates there are 25,000 public trees in Norwalk. This sample revealed an overabundance of maple trees, particularly Norway maples, which could endanger the urban forest and canopy cover if a pest or disease that targets maples emerge or exists and proliferates in Norwalk.

According to the sample, the size and relative age of Norwalk's tree canopy is young— an indicator of recent planting efforts— but those trees need to survive and thrive in order to eventually replace the mature large trees that contribute a significant amount of canopy cover and benefits.

Vulnerabilities of Norwalk's Trees

Trees in Norwalk face numerous challenges threatening their health and longevity. Climate change leads to extreme temperatures and unpredictable precipitation, stressing trees and making them more vulnerable. Pests and diseases like the emerald ash borer and oak wilt are increasingly prevalent, devastating local tree populations. Limited space in urban areas of the City exacerbates these issues, as trees struggle in confined environments with poor soil and limited water. The following section highlights these challenges, supported by a comprehensive report.

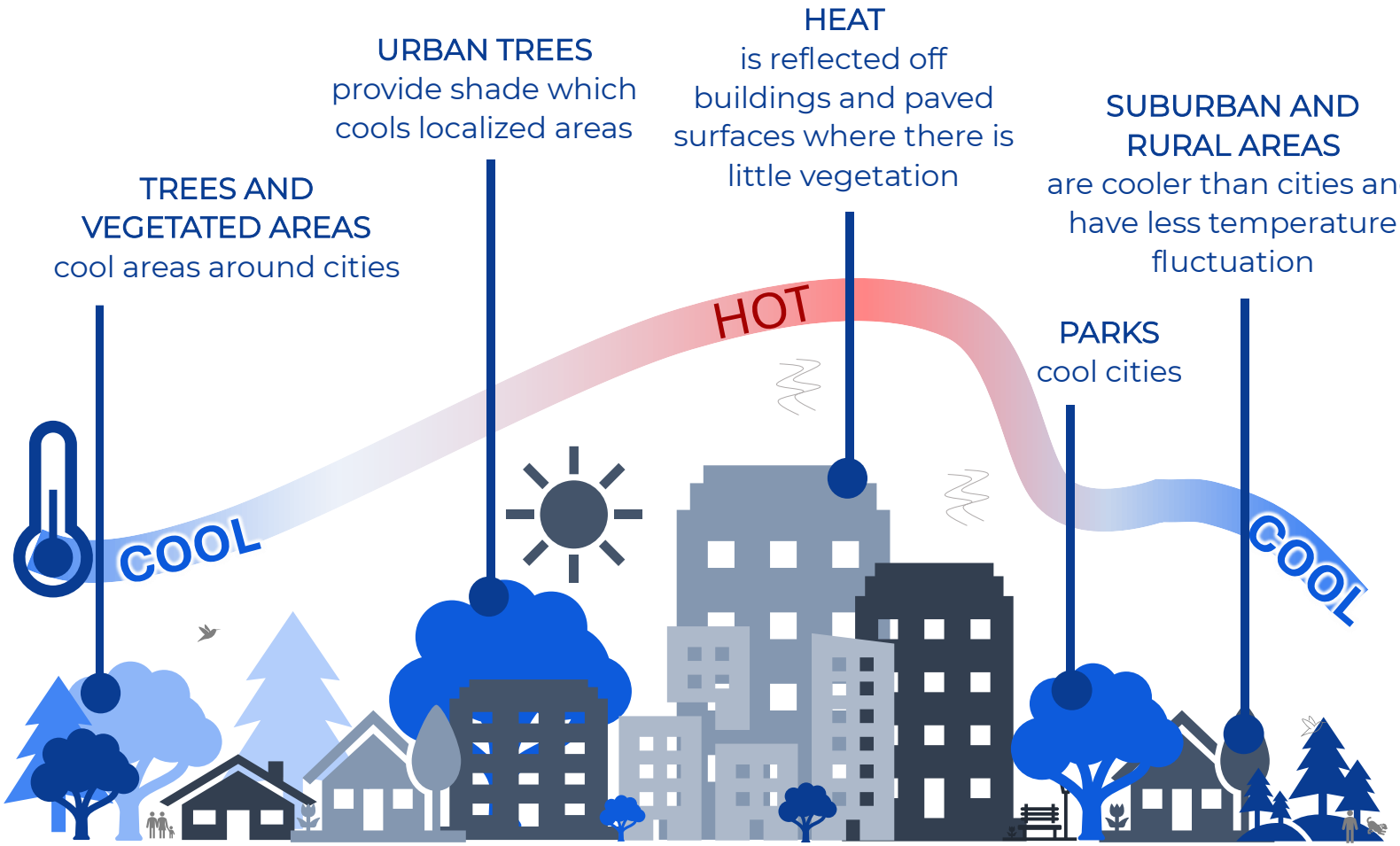


Figure 18. The effects of vegetation and trees on urban heat islands in cities

Climate Change

Climate change is creating more urban heat islands by increasing the frequency and intensity of heatwaves, which exacerbates the heat retention in urban areas already affected by extensive concrete and asphalt surfaces and declining tree canopy cover. The urban heat island (UHI) effect occurs when urban areas become significantly warmer than their rural surroundings due to human activities.

This temperature difference is primarily caused by the extensive use of concrete and asphalt, which absorbs and retain heat, and the reduced presence of vegetation, which would otherwise provide cooling through shade and evapotranspiration.

According to the 2023 USDA Plant Hardiness Zone Map, Norwalk is in zone 7a, with average annual extreme minimum temperatures ranging from 5 to 10 degrees Fahrenheit. Norwalk's conditions are expected to change with prolonged high temperatures, droughts, rapid temperature changes, and more frequent and intense storms. The U.S. Forest Service Climate Change Tree Atlas was used to examine current and potential future tree habitat distributions in western Connecticut in order to assess the vulnerability of tree species in Norwalk and to inform resilient planting strategies going forward.

Table 2. Tree species in Norwalk most vulnerable to climate change (Source: USFS Climate Tree Atlas)*

Tree Common Name	% of Public Trees (est.)	(continued) Tree Common Name	(continued) % of Public Trees (est.)
Red maple	8.1%	Paper birch	0.1%
Sugar maple	4.6%	Slippery elm	0.0%
Northern red oak	4.2%	Serviceberry	0.0%
Flowering dogwood	2.9%	Pin cherry	0.0%
Northern pin oak	1.4%	Striped maple	0.0%
Swamp white oak	0.6%	Bigtooth aspen	0.0%
White ash	0.5%	Quaking aspen	0.0%
Shagbark hickory	0.5%	Red spruce	0.0%
Sweet birch	0.3%	Black willow	0.0%
Gray birch	0.1%	Tamarack (native)	0.0%
Total Vulnerable Trees in Norwalk			23.4% (5,800+ public trees)

**A separate report details the methodology and findings, including tree species that may thrive with climate change.*

Norwalk's trees face significant challenges due to the urban heat island effect, where urban areas are warmer than rural ones. Climate change has increased the number of extremely hot days, storms, hurricanes, and flooding in Connecticut, posing health risks. Norwalk's humid subtropical climate sees average highs from the mid-30s in winter to mid-80s in summer, with about 48 inches of annual precipitation. The City experienced a severe heatwave in July 2021, with temperatures exceeding 90 degrees for several days, leading to heat advisories. Periodic droughts and below-average precipitation have also impacted water availability and ecosystems. Norwalk is vulnerable to extreme weather events exacerbated by climate change, including heatwaves, droughts, and intense storms.

SUMMARY OF TREE SPECIES VULNERABILITY TO CLIMATE CHANGE

The table on the previous page shows that 23% of Norwalk's public street trees are expected to lose their habitats due to climate change, affecting around 4,600 trees. Vulnerable species include red maple (8%), sugar maple (5%), northern red oak (4%), and flowering dogwood (3%). Notably, 13% of those vulnerable trees are maples. Fortunately, 12% of trees, like black cherry and eastern white pine, may thrive under changing conditions. However, only 58% of the public tree population is represented in this study and the vulnerability of the remaining 42% public trees remain unknown, highlighting the need for ongoing monitoring. For future tree selection, the City should focus on species that can adapt to climate change, expand their habitats, or migrate into the area within 100 years, avoiding exotic species to protect biodiversity.

In addition to climate change making conditions less favorable for common trees in Norwalk, other climate-related factors may impact tree health and survival. For example:

- Extreme heat: Rising temperatures increase heat stress on trees, causing leaf scorch, wilting, and even death. Urban trees are particularly vulnerable due to heat-absorbing surfaces like asphalt and concrete.
- Drought: Higher temperatures increase water demand, stressing trees further. Urban trees also compete for water with lawns and gardens, making it harder for them to survive.
- Stronger storms: More intense storms can damage or uproot trees, creating hazards and leading to costly cleanup and replanting efforts.
- Pests and diseases: Climate change creates favorable conditions for pests like the emerald ash borer and diseases like Dutch elm disease. Oak wilt, detected in New York, can also proliferate with changing conditions.

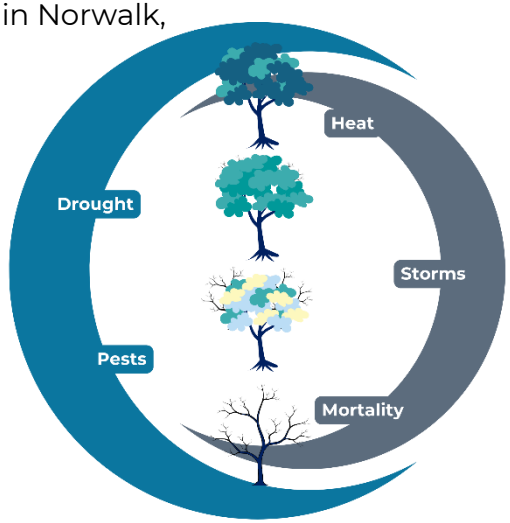


Figure 19. Example of the tree mortality spiral due to climate change

ADDRESSING CLIMATE CHANGE VULNERABILITY

Mitigation plans and adaptation techniques are essential to address the risks facing Norwalk's urban forest. Diversifying tree species, planting them in suitable locations, and investing in their maintenance, irrigation, and protection are key strategies. Norwalk's Tree Master Plan addresses many of these concerns.

Norwalk's urban forest supports healthy communities and is more effective at mitigating climate change challenges than other strategies. Trees offer solutions to urban issues by capturing and storing carbon dioxide, reducing urban heat, and adapting environments.

Pests and Diseases

Both native and non-native insect pests and diseases affect trees and forests, especially in developed areas. Trees and the urban forest are already under stress due to the harsh urban environments which usually include poor soil quality, inadequate volume, and the urban heat island. Stressed trees are more vulnerable to insects and diseases. In Norwalk, the primary insect pest threats include nematodes vectoring beach leaf disease, spongy moth, eastern tent caterpillars, emerald ash borers, and hemlock woolly adelgid, and Asian longhorned beetles. The following images are in order of the descriptions provided in the bullet list (Source of images: UCONN Extension Forestry).

COMMON TREE INSECT PESTS OF CONCERN



Spotted lanternfly (*Lycorma delicatula*): Abbreviated as SLF, this large insect has a diverse host range feeding on about 60 genera of trees and plants found in North America. In Connecticut, many hardwoods are susceptible although there is greater threat in the agricultural industry.

Spongy moth, formerly known as the gypsy moth (*Lymantria dispar*): The caterpillars of spongy moth defoliate tree leaves and are commonly found on oak (*Quercus* spp.) trees.

Eastern tent caterpillar (*Malacosoma americanum*): These caterpillars leave silky tents nests of eggs in tree branches and once they hatch, the caterpillars defoliate leaves. Most trees can recover from eastern tent caterpillars since the feeding of leaves occurs after the tree's growing season and toward fall season when photosynthesis processes begin to slow down, hence, the tree has already acquired the food reserves it needs for overwintering and spring growing season.

Emerald ash borer (*Agrilus planipennis*): The emerald ash borer insect was first confirmed in Connecticut in July 2012 and was detected in Norwalk in 2018 (CT DEEP, 2022). This insect causes catastrophic loss to all true ash (*Fraxinus*) species.

Hemlock woolly adelgid (*Adelges tsugae*): In Connecticut, hemlock woolly adelgid or HWA was first reported to the Connecticut Agricultural Experiment Station in New Haven in 1985 and by 1997, was found throughout the state (CAES, Hemlock Woolly Adelgid).

Asian longhorned beetles (*Anoplophora glabripennis*): Also referred to as ALB, this invasive insect feeds on a wide variety of trees in the United States, eventually killing them. Adult beetles are large, distinctive-looking insects measuring 1 to 1.5 inches in length with long antennae. ALB's preferred host species include maples, ash, elms, birch, poplars, sycamores, horsechestnut and buckeyes, katsuratrees, and willows (USDA APHIS).

Figure 20. Examples of the tree insect pests of concern (Source: UCONN Extension Forestry)

COMMON TREE DISEASES OF CONCERN



Oak wilt (*Ceratocystis fagacearum*): Oak wilt is a primary fungal pathogen that invades the vascular system of oak trees. While all oak trees are susceptible, red oak species are the most commonly affected trees. Both red and white oak groups are found throughout the City.



Dutch elm disease (*Ophiostoma ulmi*): Dutch elm disease (DED) is caused by a fungus that infects the vascular system of elm (*Ulmus*) trees. DED was found in Connecticut in 1933 in Glenville. The disease propagates on a number of different elm species, but the majority of cases have been found on American elms. Elm bark beetles are a primary vector.



Beech leaf disease (the *Litylenchus crenatae mccannii* nematode): This microscopic roundworm can be found within the leaves of beech (*Fagus americana*) trees. It was recently found in Connecticut and the first sign that a tree may be affected by beech leaf disease is a yellow banding on the leaves. Leaves later turn brown and shrivel, resulting in leaf drop.



Sudden oak death (*Phytophthora ramorum*): Sudden oak death (SOD) is caused by the fungus-like organism and was detected in CT in 2004 on nursery stock shipped from out of state. While the disease primarily threatens certain oak species on the west coast, it can infect other plants which raise concerns for Connecticut's native flora.



Thousand cankers disease (*Geosmithia morbida*): The disease is caused by a fungus and spread by walnut twig beetles and has not yet been officially identified in Connecticut. Though some experts believe it might eventually arrive, the eastern black walnut trees may have some resistance compared to their western counterparts.



Bacterial leaf scorch (*Xylella fastidiosa*): The bacterium is primarily a concern for oaks and maples in Connecticut. The disease clogs water transport vessels, leading to leaves browning and scorching from the edges inward. While not always fatal, it can weaken trees over time, making them more susceptible to other problems.

Figure 21. Examples of the tree diseases of concern (Source: CT Tree Protective Association, UCONN Extension Forestry, and CAES)

Note: The above descriptions are not intended to be a definitive guide or management strategy for tree pests and diseases, nor does it encompass all existing or potentially harmful agents.

VULNERABILITY OF NORWALK'S PUBLIC TREES

Table 3. Susceptibility of Norwalk's public trees to harmful tree pests and diseases (Source: 2023 sample inventory extrapolated to represent 25,000 public trees)

Tree Insects of Concern	Host Tree Count in Public Areas	% of 25,000 Public Trees	Host Tree Species Counted
Asian longhorned beetle	8,264	33%	Maples, ash, elms, birch, sycamores, katsura, willows
Spongy moth	2,357	9%	Oaks
Eastern tent caterpillar	1,909	8%	Cherry, crabapple, plums, apples
Hemlock woolly adelgid	537	2%	Hemlocks
Spotted lanternfly	257	1%	Tree of heaven
Emerald ash borer	233	1%	Ash

Tree Diseases of Concern	Host Tree Count in Public Areas	% of 25,000 Public Trees	Host Tree Species Counted
Bacterial leaf scorch	9,976	40%	Oaks, maples
Oak wilt	2,357	9%	Oaks
Sudden oak death*	656	3%	Sycamore maples, European beech, mountain laurel, yew, viburnum
Dutch elm disease	179	1%	Elms
Thousand cankers disease	72	0%	Walnuts
Beech leaf disease	24	0%	Beech

*The oak species susceptible to sudden oak death (SOD) are not in Norwalk's inventory or, since SOD is not found in the state yet, susceptibility of oak species found in Norwalk is unknown.

Note: The prevalence of host tree species for any given tree pest or disease does not infer eradication of any given tree species in response to or to prevent a threat

Stakeholders for Norwalk's Trees

Norwalk's tree canopy brings together the people of Norwalk. Whether you are a resident enjoying the cool, clean air from tree-lined streets, or a business professional unwinding during a lunch hour stroll among the trees in Cranbury Park, we all rely on the trees of Norwalk. And the trees of Norwalk rely on us. Every person and every business within Norwalk's boundaries impact the tree canopy and can help protect and expand it. Below is a summary of the key members shaping the future of Norwalk's Tree Canopy.

Table 4. Examples of tree-related stakeholders in Norwalk

Name	Roles Relating to Trees	Example Programs
City of Norwalk	Oversees urban forestry initiatives, tree planting, maintenance, and policy.	Tree Planting Program, Norwalk Heat Vulnerability Study, Urban Forest Equity Grant.
Department of Public Works	Manages tree planting and maintenance on City property and public rights-of-way.	Neighborhood Treescapes, Adopt A Tree Program.
Recreation and Parks Department	Enhances parklands and open spaces through tree planting and maintenance.	Tree Planting Program in parks and public spaces.
Planning and Zoning Department	Integrates urban forestry considerations into City planning and development.	Tree Management Plan, tree preservation ordinances.



PUBLIC WORKS SIDEWALK REPAIRS



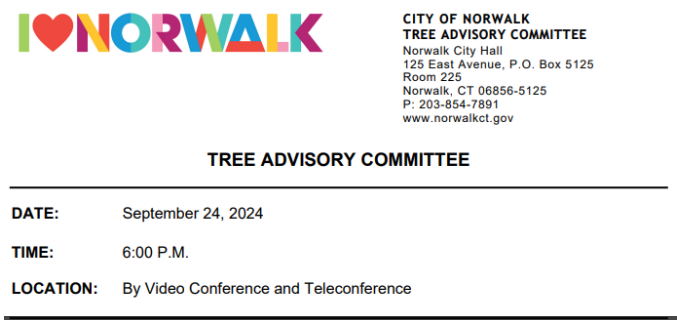
RECREATION & PARKS PUBLIC SPACES



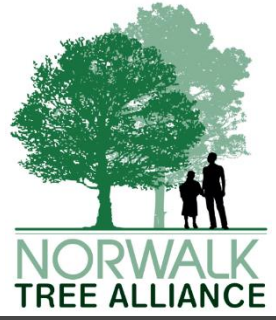
PLANNING & ZONING'S ZONING REGULATIONS

The City of Norwalk funds tree management through various departments. The Department of Public Works (DPW) manages about 25,000 trees in the city's right-of-way, overseeing tree removal, trimming, and yard debris operations. The Department of Recreation and Parks handles trees in public parks, schools, and buildings, collaborating with DPW on tree removal and planting. The 2024-25 budget includes funding for expanding the tree canopy and implementing the Tree Master Plan. Expanding and preserving canopy cover is supported by the following groups:

Name	Roles Relating to Trees	Example Programs
Norwalk Tree Advisory Committee	Advises on tree and shrub-related policies, promotes awareness of tree care and urban forest benefits.	Advise planting requests, tree planting, planting native trees, planting and watering contracts as administered by the City Arborist / Horticulturist
Norwalk Tree Alliance (NTA)	Primary advocate for tree canopy health in Norwalk.	Tree planting events, environmental education, urban forest protection.
Norwalk River Watershed Association	"NRWA" partners with local organizations to enhance urban forestry and environmental health.	Micro-forest project at Meadow Street Park, aimed at expanding tree canopy and mitigating climate impacts; Norwalk River Watershed Plan.
Norwalk Land Trust	Collaborates on projects to protect and expand green spaces and urban forests.	Partner in the micro-forest project at Meadow Street Park.
CT Department of Energy & Environmental Protection (DEEP)	Provides grants and support for urban forestry projects.	Urban Forest Equity Grant for the micro-forest project.



NORWALK TREE ADVISORY COMMITTEE



NORWALK TREE ALLIANCE



NORWALK LAND TRUST

Summary of Tree Ownership and Responsibility Types

Public Trees	Private Trees
Transportation, Mobility and Parking Department Recreation and Parks Department	Planning and Zoning Department

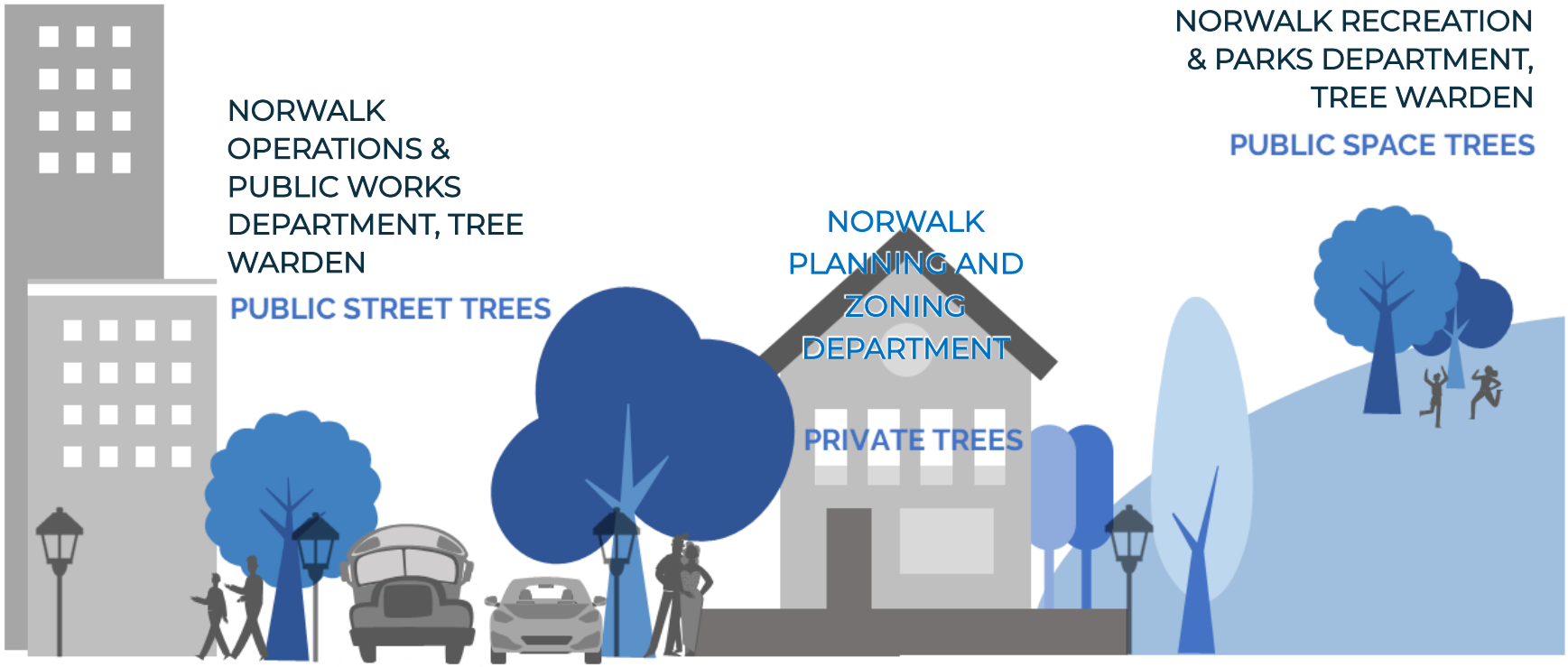
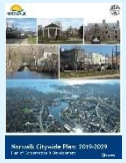
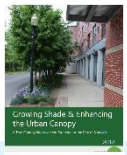
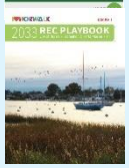


Figure 22. Illustration of the ownership and authority types for trees in Norwalk

Tree-related Plans and Regulations

Table 5. Summary of select City plans in regard to the alignment with Norwalk's Tree Master Plan

City Document	Purpose	Urban Forestry Alignment	Key Policies or Goals	Potential Conflicts
 Norwalk Plan of Conservation and Development	Guide growth and development, protect resources	Emphasizes open space and recreation systems	Promote balanced growth, protect natural resources, enhance urban green spaces	Balancing development with conservation
 Growing Shade & Enhancing the Urban Canopy (WestCOG)	Improve tree canopy, environmental health	Directly focused on urban forestry	Increase tree canopy cover, improve air quality, reduce urban heat island effect	Potential costs and maintenance
 2023 Rec Playbook: City of Norwalk Recreation & Parks Master Plan (DRAFT)	Develop sustainable parks and recreation facilities	Includes tree planting and maintenance	Provide high-quality parks, enhance environmental sustainability, promote physical and mental health	Funding and resource allocation
 Norwalk Transportation Master Plan	Improve transportation infrastructure	Incorporates green infrastructure	Enhance connectivity and mobility, promote sustainable transportation, integrate green infrastructure	Space allocation for trees vs. transportation needs
 City of Norwalk, CT Zoning Regulations	Regulate land use and development	Supports green spaces and tree preservation	Protect property values, ensure compatible land use, preserve green spaces	Development pressures vs. green space preservation
 Norwalk Complete Streets Project	Create safe, accessible streets for all users	Includes street tree planting	Ensure safety and accessibility for all users, promote sustainable transportation, integrate green infrastructure	Balancing street space for trees and traffic
 Norwalk Industrial Waterfront Land Use Plan	Plan for waterfront development	Considers environmental impacts and green buffers	Prioritize water-dependent uses, enhance public access, improve environmental resilience	Industrial use vs. environmental preservation

Norwalk Plan of Conservation and Development Summary Overview

D. Continue to maintain and increase the shade tree canopy in Norwalk.

Actions	When	Who	Resources
i. **Continue the annual tree planting program and consult the WestCOG strategic tree canopy improvement plan developed for Norwalk by WestCOG.**	2020 and ongoing	Parks and Recreation Department; Norwalk Tree Advisory Committee; Planning and Zoning	Staff time; capital funding

Table 6. Example of an action in the Plan of Conservation and Development that supports the Tree Master Plan

The Norwalk Plan of Conservation and Development (POCD) is a comprehensive guide for the City's growth and development. It aims to balance economic growth with environmental sustainability, enhance the quality of life for residents, and preserve natural resources. Key Goals: Promote balanced economic growth. Protect and enhance the natural environment. Improve infrastructure and public services. Foster community and cultural facilities. Enhance transportation systems. Ensure sustainable urban design and zoning practices.

POCD Category	Alignment with Urban Forest Management
Natural Environment	- Preservation of waterways (coastal and inland) - Improvement of air quality - Promotion of sustainable practices in waste management, energy use, and building designs
Urban Forest	- Support for tree planting programs - Development of green corridors - Mitigation of urban heat island effect through urban forestry
Human Health	- Expansion and improvement of parks, trails, and recreational facilities - Enhancement of air and water quality - Increased access to natural spaces
Other Environmental Factors	- Implementation of climate resilience strategies - Conservation of biodiversity - Encouragement of energy-efficient buildings and infrastructure
Urban Forest Management	- Integration with POCD through tree planting and maintenance - Allocation of funding and resources for urban forestry programs - Community involvement in urban forestry initiatives
Support for POCD	- Improvement of air quality, reduction of stormwater runoff, and enhancement of biodiversity - Enhancement of City's aesthetic appeal and provision of recreational opportunities - Mitigation of climate change impacts

2023 Recreation and Parks Master Plan Playbook Summary Overview

10	Development standards for urban solutions in growth areas	
	Goals & Objectives	Timeframe
10.3	Transfer responsibilities and resources for the management and maintenance of tree canopy within parks to R&P Department to help ensure implementation of City's tree canopy goals and tree program. Identify additional funding to proactively manage and maintain general landscapes, shrubs, and other plantings within parks. Develop a landscape renewal program and identify funding for lifecycle replacement capital costs for landscapes within existing parks.	Short-Term

Table 7. Example of an objective in the Recreation & Parks Master Plan Playbook that supports the Tree Master Plan

The City of Norwalk's 2023 Recreation & Parks Master Plan (draft), or Rec Playbook, updates the 1996 plan to address evolving community needs. It identifies current and future needs through demographic analysis, park evaluations, and public engagement, outlining a long-term vision with strategies for the next five years. The plan highlights the benefits of parks, such as promoting health, enhancing sustainability, providing economic benefits, fostering social cohesion, preserving cultural heritage, increasing property values, and promoting tourism. It also discusses trends like neighborhood parks, recreation centers as community hubs, adventure recreation, and the use of technology in parks.

Goal / Strategy	Alignment with Urban Forest Management
Enhancing Environmental Sustainability	- Parks serve as natural buffers against climate change, absorb CO2, and reduce urban heat island effects.
Stormwater Management	- Parks act as sponges during large storm events, helping to manage stormwater and reduce flooding.
Promoting Biodiversity	- Parks provide habitats for wildlife and promote biodiversity, which is crucial for a healthy urban forest.
Climate Change Mitigation	- The plan includes strategies to use parks for climate change mitigation, such as planting more trees.
Community Engagement	- Engaging the community in the planning and maintenance of urban forests to ensure their sustainability.

Norwalk's Zoning Regulations



Figure 23. Example site standard for General Urban - Corridor Community District in Norwalk's Zoning Regulations

The updated zoning regulations, effective February 19, 2024, include provisions for tree plantings on private property and emphasize environmental sustainability and urban forest management. The following provides a high-level summary of key sections pertaining to Norwalk's trees, canopy, and/or the urban forest. For details, view the City's Zoning Regulations or Appendix A of this Plan.

4.3.12.C.18 Parking Lot Regulations
C. Design:

- Landscape Islands: Parking areas with ten or more spaces must include at least one landscape island for every ten spaces, distributed throughout the lot. Each island must contain at least one shade tree unless covered by a solar panel.
- Tree Placement: For every 2,000 square feet of parking area, at least one tree must be installed or preserved. No parking space should be more than 72 feet from a tree.
- Bioswales and Rain Gardens: Landscape islands can be designed as bioswales or rain gardens to enhance stormwater management.
- Buffer Zones: Rows of parking fronting drive aisles must have a minimum five-foot landscaped buffer.
- Tree Counting: Trees within 20 feet of the parking area, including those in street rights-of-way and civic spaces, can count towards tree requirements.

4.3.16 Private Landscape Standards and
6.2 Grading, Tree Removal, and Drainage:

- The City of Norwalk's Zoning Regulations emphasize the importance of maintaining landscaping, including trees and vegetative cover, to support the urban forest.
- Property owners must keep plantings healthy through regular maintenance such as watering, mulching, and pruning.
- Dead or diseased plants must be replaced, and natural water courses within buffers maintained. Approval is required to remove significant trees or walls, and plant materials must meet specific standards, including being native to Connecticut.
- Trees and shrubs must be strategically placed to avoid conflicts with infrastructure and ensure safety.
- These regulations aim to enhance canopy cover, control erosion, and promote a sustainable urban environment.

Norwalk's Tree Ordinance



Figure 24. Example activities relating to Norwalk's Tree Ordinance (Left: measuring Specimen Trees, image courtesy of Norwalk Hour. Right: tree removal notice by Eversource, image courtesy of Nancy on Norwalk)

The 2021 Tree Ordinance expands the Tree Warden's role, establishes a legacy tree program, requires developers to protect tree root zones, fines unauthorized tree removal, and creates a Norwalk Tree Account for funding tree planting. The following provides a high-level summary of Chapter 112 Trees. For details, see the City's Code or Appendix B of this Plan.

112-3. Tree Warden:

- The Chief of Operations and Public Works designates a Tree Warden and Deputy Tree Wardens to enforce tree regulations.
- The Tree Warden prepares permits, maintains records, and provides annual reports. They are advised by the Tree Advisory Committee.
- The Tree Warden assesses and manages hazardous trees and shrubs, determines their value, and conducts tree canopy assessments, updated every 10 years.
- The Tree Warden can issue citations, authorize tree removals, and recommend a budget for the Norwalk Tree Account.

112-4. Tree Advisory Committee:

- Composed of five members appointed by the Mayor and approved by the Common Council, advises on tree-related issues, develops a Master Tree Plan, and creates an annual State of the Forest report to guide urban forestry.

112-5. Legacy Tree Program:

- The Tree Advisory Committee catalogs legacy trees with public input, and the Tree Warden maintains records and makes the list available to the public.

Planting, Altering, Damaging, Removing Trees (112.6 – 112-8):

- The public is encouraged to support planting trees or shrubs in public areas, with permit applications reviewed by the Tree Advisory Committee. Permits are required for altering, damaging, or removing city trees. Unauthorized actions can result in fines up to $250 per tree or shrub. The Tree Warden can issue citations and stop-work orders.

Tree Protection and Replacement (112-9 – 112.10):

- Replacement of city trees or shrubs must follow specific guidelines, and construction projects near city trees must adhere to ANSI standards. The Norwalk Tree Account funds urban forestry activities, supported by fines, fees, and other contributions.

Enforcement, Exemptions, and Appeals (112.13 – 112.15):

- Violations of tree regulations are enforced by the Tree Warden through notifications, stop-work orders, fines, and civil actions, with exemptions for emergency or permitted actions, and decisions can be appealed.

Norwalk's Complete Streets Policy



Figure 25. Example of a Complete Street on Calf Pasture Beach Road in Norwalk (Source: Complete Streets Public Workshop, September 28, 2023

The Complete Streets Policy and Design Manual, currently under development, will incorporate tree installations and stormwater management techniques, promoting a sustainable and accessible streetscape. The following provides a high-level summary of Norwalk's Complete Streets Policy. For details, visit the City's website.

Integrating the Complete Streets Ordinance and Policy with Urban Forestry Best Practices:

- Purpose: Norwalk aims for a livable, sustainable city. Complete Streets supports preserving existing trees and integrating new plantings for environmental benefits and aesthetics.
- Definitions: Complete Streets prioritizes safety, convenience, and equitable access for all users. These streets will integrate green infrastructure like street trees and permeable surfaces for stormwater management and urban greening.
- Policy and Design Guide: The Mobility System design will guide all City projects, incorporating urban forestry best practices for tree preservation and integrating tree planting and stormwater management within project areas. The Design Guide is reviewed every 24 months to include innovative techniques.
- Responsibilities: The Complete Streets Coordinator ensures Transportation Projects comply with the Design Guide, advocating for tree preservation and green infrastructure. They review and approve plans to ensure these elements are considered.
- Implementation and Exemptions: The Design Guide applies to all capital projects. Exemptions are granted only if meeting standards presents a legal requirement or minimal impact, with justification.
- Exceptions and Reporting: If a project cannot fully meet standards, the exception process must consider the impact on tree preservation and stormwater management. Annual reports should detail how projects addressed these aspects, including challenges and successes in integrating green infrastructure.

Complete Streets Design Guide:

Described in the City of Norwalk's Ordinance Committee's meeting notes as, "The practical, working manual that provides standards and guidance on the planning, design, and building of all current and future streets in the City to meet the objectives of this Chapter. The Design Guide is applied by the City and its relevant departments tasked with the implementation of Complete Streets."

Indicators of a Sustainable Urban Forest

To assess Norwalk's urban forest, the Indicators of a Sustainable Urban Forest, a comprehensive assessment tool, was used during the Plan development process (Clark, et al., 1997; Kenney, et al., 2011). The Indicators, in three broad categories – The Trees, The Management, and The People, use urban forestry industry standards and best management practices to evaluate and rate Norwalk's trees, how they are managed, and the level of community engagement / awareness there is around trees and urban forestry.

After initial research, data reviews, internal staff meetings, and benchmarking, the Forest Service's Urban Forest Sustainability and Management Audit System (Abbott, et al., 2015) was used to rank 130 urban forestry elements. This ranking provided context for scoring each indicator in the Sustainable Urban Forest framework. Norwalk's performance for each indicator was rated as low, medium, or high based on gathered data and feedback from the project team and staff. The assessment identified improvement areas for Norwalk's urban forest and informed the Plan's goals and strategies. Understanding the current state of the urban forest is the first step toward prioritizing trees and creating a sustainable, resilient urban forest. This baseline assessment may be used by Norwalk's Urban Forestry team in future planning efforts and updates to the 2025 Tree Master Plan.

The following provides a final summary of the audit based on the input and feedback gathered on previous drafts from City staff and interested parties. Norwalk was assessed on 30 sustainable urban forest indicators. The performance levels for each indicator were determined based on data, information, and input from the community and City staff with guidance from urban forestry planners at PlanIT Geo. The following summarizes Norwalk's overall performance level for each category:

The Trees: LOW (6 out of 7 indicators = Low)
Determined based on analysis of existing data and information.

The Management: LOW-MODERATE (6 out of 12 indicators = Low)
Determined based on the surveys, meetings, program operations review, policy review, benchmarking research, and analysis of existing data.

The People: MODERATE (9 out of 11 indicators = Moderate)
Determined by evaluations of existing community frameworks and information shared during surveys, meetings, and events.

Summary Evaluation Table

Table 8. Norwalk's urban forest evaluation (2023-24) using the Indicators of a Sustainable Urban Forest (Source: Clark, et al., 1997 and Kenney, et al. 2011)

EVALUATION OF URBAN FOREST INDICATORS FOR NORWALK, CT		Low	Moderate	Good
The Trees	Tree Canopy Cover	•		
	Location of Canopy (Equitable Distribution)		•	
	Age of Trees (Size and Age Distribution)	•		
	Condition of Publicly-Owned Trees	•		
	Trees on Private Property	•		
	Diversity / Pest Vulnerability	•		
	Tree and Site Suitability	•		
The Management	Tree Inventory	•		
	Canopy Assessment			•
	Plans and Programs: Management Plan		•	
	Plans and Programs: Risk Management	•		
	Plans and Programs: Planting		•	
	Plans and Programs: Disaster Management	•		
	Maintenance of Publicly-Owned Trees	•		
	City Staffing and Equipment	•		
	Funding		•	
	Tree Protection Policy		•	
	Standards and Best Practices	•		
	Communication		•	
The People	Neighborhood Action		•	
	Large Landholder Involvement	•		
	Green Industry Involvement	•		
	City Department/Agency Coordination		•	
	Funder Engagement		•	
	Utility Engagement		•	
	Developer Engagement		•	
	Public Awareness		•	
	Regional Collaboration		•	
	State Agency Engagement		•	
	City Boards and Commissions		•	
	Totals	14	15	1
		47%	50%	3%

INTERPRETATION OF RESULTS

Table 9. Example of how the evaluation of urban forest indicators is used for developing Plan strategies and recommendations

Category	Indicator	Score	Example Strategy for Consideration
The Trees	Tree Canopy Cover	Low	Plant new trees annually in under-canopied areas.
	Location of Canopy (Equitable Distribution)	Moderate	Survey neighborhoods with low canopy and prioritize planting.
	Age of Trees (Size and Age Distribution)	Low	Develop a planting schedule that diversifies ages.
	Condition of Publicly-Owned Trees	Low	Implement bi-annual health assessments and secure funding.
	Trees on Private Property	Low	Launch a campaign to encourage private tree planting with incentives.
	Diversity / Pest Vulnerability	Moderate	Ensure no single species exceeds 10% of the urban forest.
	Tree and Site Suitability	Low	Conduct soil and site assessments before planting.
The Management	Tree Inventory	Low	Complete a comprehensive tree inventory within two years.
	Canopy Assessment	Good	Maintain annual canopy assessments.
	Plans and Programs: Management Plan	Moderate	Update the management plan every five years.
	Plans and Programs: Risk Management	Low	Develop and implement a risk management plan.
	Plans and Programs: Planting	Moderate	Establish a yearly planting program with specific targets.
	Plans and Programs: Disaster Management	Low	Create a disaster response plan for urban forestry.
	Maintenance of Publicly-Owned Trees	Low	Increase the budget for tree maintenance.
	City Staffing and Equipment	Low	Hire additional arborists and purchase modern equipment.
	Funding	Moderate	Secure additional funding through grants and partnerships.
	Tree Protection Policy	Moderate	Develop and enforce a tree protection ordinance.
	Standards and Best Practices	Low	Adopt and implement industry standards and best practices.
	Communication	Moderate	Enhance public communication on urban forestry projects.
The People	Neighborhood Action	Moderate	Establish neighborhood tree committees.
	Large Landholder Involvement	Low	Partner with large landholders for tree planting.
	Green Industry Involvement	Low	Collaborate with local nurseries and landscaping companies.
	City Department/Agency Coordination	Moderate	Improve coordination between City departments.
	Funder Engagement	Low	Engage with potential funders for financial support.
	Utility Engagement	Low	Work with utility companies to manage trees near infrastructure.
	Developer Engagement	Low	Require developers to include tree planting in project plans.
	Public Awareness	Moderate	Launch educational campaigns on urban forestry benefits.
	Regional Collaboration	Moderate	Collaborate with neighboring municipalities.
	State Agency Engagement	Moderate	Partner with state agencies for aligned efforts.
	City Boards and Commissions	Moderate	Involve City boards and commissions in planning.

EXAMPLES

These example strategies show how the evaluation results can inform the Plan.

Current State of the Urban Forest Summary

Section 1 provides an in-depth analysis of Norwalk's urban forest using available data. It categorizes tree ownership by public and private sectors and examines the landscapes where these trees thrive. The section highlights the citywide tree canopy cover, detailing its distribution across neighborhoods and the region, and compares it with other communities. Tree Equity Scores show the correlation between canopy cover, sociodemographic data, and urban heat.

The 2023 sample inventory in South Norwalk offers insights into the composition of public trees, examining their types, sizes, conditions, and maintenance needs. It projects an estimated 25,000 trees in maintained public spaces and assesses their vulnerability to climate change, pests, diseases, and other stressors.

The section reviews current frameworks, programs, and regulations for managing Norwalk's urban forest, summarizing stakeholders and cross-examining City plans for urban forestry implications. It also reviews Norwalk's Zoning Regulations, Tree Ordinance, and Complete Streets Policy.



Figure 26. Healthy trees coexisting with other infrastructure illustrating the connection between Section 1 and 2 of this Plan (Source: WestCOG, 2018)

The Indicators of a Sustainable Urban Forest consolidate planning results into an evaluation framework that examines urban forestry elements related to trees, management programs, and people. This framework serves as a foundation for developing the Plan's strategies and monitoring implementation progress.

The insights emphasize the need for a comprehensive public tree inventory, ongoing canopy cover assessments, and monitoring of threats to the urban forest. Enforcing tree protection and preservation requirements will ensure continuous environmental, social, and economic benefits. Data-driven decisions will be more cost-effective and resourceful. The section also highlights the need to adequately staff the Urban Forestry Program.

Section 2 builds on this by exploring the benefits of trees, the challenges they face, and the potential for integrating trees into broader City planning efforts. It emphasizes how urban forestry can be incorporated into programs and projects to address current and future challenges and supports the City's goals for increasing canopy cover, enhancing sustainability, and resilience.





SECTION 2: MANAGEMENT IMPORTANCE

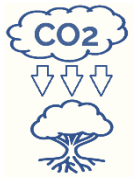
Gain insights and new perspectives on how Norwalk's urban forest provides benefits and services to the community, the environment, and the economy if challenges are adequately addressed and incorporated into the City's green infrastructure and urban planning.

A Closer Look at the Benefits of Trees

A diverse and healthy urban forest works to the benefit of the community, the environment, and the economy. The following is a summary of key benefits and services of trees, nature, and greenspaces in urban areas that was compiled from research to develop Norwalk's Tree Master Plan. A separate study and report accompany this section.

Reduce Stress and Improve the Quality of Life

Trees make cities more livable by cooling summer temperatures and enhancing well-being. Natural environments reduce stress, improve performance, and decrease sick days. Residents in greener areas are three times more likely to be active and less likely to be overweight.



Mitigate Climate Change Impacts

Trees absorb carbon dioxide and store carbon in wood, which helps to reduce greenhouse gases. Carbon emissions from vehicles, industries, and power plants are a primary contributor to increased air temperatures in cities. In one year, an acre of mature trees can absorb CO2 equivalent to a car driving 26,000 miles.

Clean the Air and Breathe Easier

Trees produce oxygen and clean the air by removing pollutants that would otherwise contribute to human health problems such as asthma and other respiratory diseases.

Protect Wildlife and Ecosystems

Preserving and planting trees provides valuable habitat for wildlife, supports pollinator species, and provides favorable conditions for beneficial soil microorganisms. Conversely, wildlife can support trees. For example, wildlife may serve as pollinators or act in seed dispersal.

Save Energy and Lower Energy Costs for Buildings

Trees act as natural screens, insulating homes and businesses from extreme weather. Shade trees can reduce summer cooling costs by up to 50%, while evergreen trees block cold winter winds.

Conserve Water and Soil

Trees' roots absorb water and their canopy slows rainfall, reducing runoff, erosion, and contaminants. In contrast, impervious surfaces like roads and parking lots increase runoff, flooding, and water quality issues.

Cooler Pavement Diminishes Urban Heat Islands

Tree canopies cool temperatures by shading buildings, asphalt, and concrete. They deflect sunlight and release moisture, reducing surface temperatures by up to 36 degrees. This lowers fumes from heated asphalt and mitigates the urban heat island effect.

Other benefits include bolstering property values, reduced pavement wear, traffic calming, public safety, among others. Continue reading for details about social and environmental benefits of trees.

Social and Human Health Benefits of Trees



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 greenspace. 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 greenspaces.

The urban forest brings a myriad of social and health benefits to Norwalk's communities. Park and street 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, Norwalk'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.

> "We need to focus on the potential positive impact Norwalk can have on climate change. Grow and maintain trees and parks where people can find peace and solitude in the woods."
>
> *Open Public Comment for the Norwalk Recreation & Parks Master Plan Public Survey, September 2023*

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, Norwalk'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.

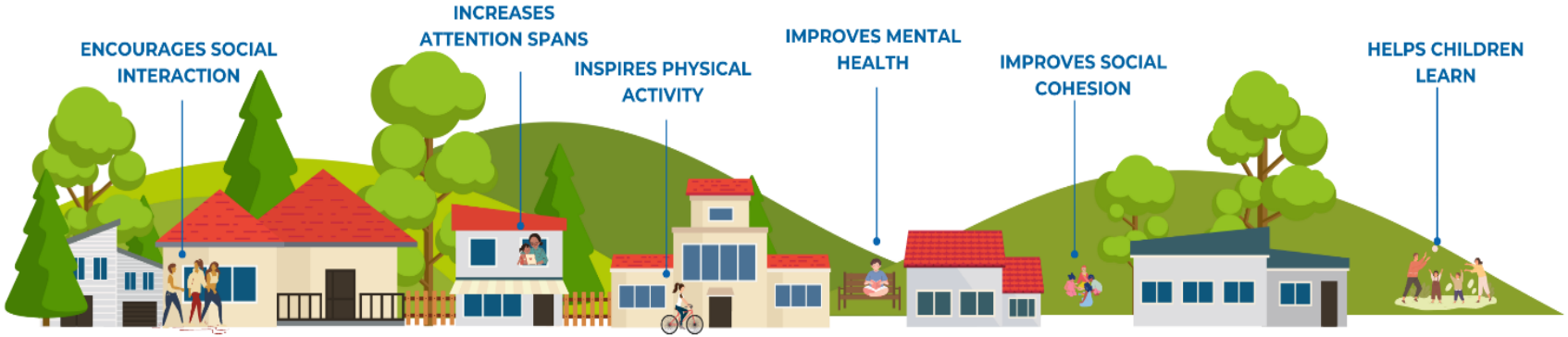


Figure 27. Illustrative summary of the human health and social benefits of trees

Norwalk's urban forest enhances social interactions, well-being, health, and community engagement, making the City more livable. Studies show that trees and vegetation in parks relate to neighborhood safety and social activity, strengthening social ties (Kim et al., 2020). Encounters with nature improve attitudes, reduce stress, and enhance cognitive performance (Wolf et al., 2020).



Figure 28. A trail connecting Norwalk to Danbury (Source: NewsTimes, 2023)

Tree canopy cover and greenspaces encourage physical activity. Greenspace within two miles of a home correlates with better health, especially among the elderly and lower socioeconomic groups. Residents in greener areas are three times more likely to be active (Ulmer et al., 2016). Urban nature views or experiences boost mental well-being, happiness, and stress reduction (White et al., 2013).

More tree cover near schools improves student performance. Children with concentration challenges focus better after a 20-minute walk in a park or tree-lined area (Taylor et al., 2009). Trees connect children to nature.

Healthcare and insurance industries focus on the link between natural settings and health. Trees and greenspaces increase longevity, reduce cancer and heart disease risks, alleviate anxiety and depression, improve immune function, and lower stress hormones. A 2016 study of 108,000 people found a 12% lower mortality rate among those with the most greenery within 820 feet of their homes (James et al., 2016). Hospital patients with nature views have shorter stays (Mihandoust et al., 2021).

Quantifying Tree Benefits and Services

The benefits of trees in the urban setting were once considered to be unquantifiable. However, by using extensive scientific studies and practical research, these benefits can now be confidently calculated using tree inventory and canopy assessment information. Tree benefit values for the City of Norwalk's trees are summarized below using the findings from the 2022 Urban Tree Canopy (UTC) Assessment.

Since the City does not have a comprehensive inventory of public trees, research is used to provide estimates, although the sample did determine that $19,894 in annual ecosystem benefits or services are generated from the 4,190 trees sampled. The benefits for the citywide urban forest are based on the acres of canopy determined from the 2022 canopy assessment and calculated using the U.S. Forest Service's i-Tree Canopy tool. The following summarizes the benefits of Norwalk's 43% tree canopy.



Figure 29. Summary of the annual benefits and services provided by Norwalk's urban forest (6,218 acres of tree canopy according to the 2022 urban tree canopy assessment study. Values are based on i-Tree Eco, www.itreetools.org)

"...Trees and shrubs provide important benefits to the City and its residents, including the beautification of City streets and neighborhoods, the reduction of urban heat islands, an improvement in air and water quality, and the enhancement of property values. Trees and shrubs provide oxygen, impede soil erosion, aid water absorption and the mitigation of stormwater, ameliorate against potential flooding, and absorb CO2, other pollutants, and breathable particulate matter. Furthermore, trees and shrubs provide shade, screening, privacy, and aesthetic appeal, absorb and lessen impacts from winds, act as natural noise barriers, and support habitat for wildlife."

§112-1 of Chapter 112 "Trees" in Norwalk's City Code

Addressing Challenges to Maximize Investments

The table below highlights the diverse challenges confronting Norwalk's urban forest, such as climate change, poor soil conditions, pests, development pressures, conflicting priorities, and limited resources. Each challenge underscores the significance of urban forest management, as guided by the Tree Master Plan. By tackling these issues through strategic planning, community involvement, and consistent funding, Norwalk can ensure its urban forest flourishes, delivering essential ecosystem services and improving the quality of life for all residents. Effective urban forest management can also maximize the long-term benefits provided by trees, ensuring these benefits are distributed sustainably and equitably across the community.

Table 10. Summary of current and potential challenges facing Norwalk's urban forest and the importance of proper management

Challenge	Description	Importance of Urban Forest Management
Climate Change	Increasing temperatures and changing precipitation patterns stress trees and reduce their lifespan. More frequent severe storms.	Implementing adaptive management strategies to select climate-resilient tree species and ensure long-term sustainability.
Poor Soil or Lack of Soil Volume	Urban environments often have compacted, nutrient-poor soils that limit tree growth.	Enhancing soil quality through amendments and ensuring adequate soil volume for root growth to support healthy trees.
Pests and Diseases	Invasive species and diseases can decimate tree populations.	Monitoring and managing pest and disease outbreaks to protect tree health and biodiversity.
Competition for Space with Hardscape	Trees compete with sidewalks, roads, and buildings for space, leading to limited growth and health issues.	Planning and designing urban spaces to accommodate trees, using techniques like permeable pavements and structural soils.
Development Pressure	Urban development often leads to tree removal and reduced canopy cover.	Enforcing tree protection ordinances and integrating tree planting into development projects to maintain and enhance canopy cover.



Figure 30. Examples of challenges facing Norwalk's trees— Left: Hurricane Sandy (Nancy on Norwalk); Middle: Hurricane Ida (The Hour); Right: tree management to prevent or mitigate issues (Norwalk Tree Alliance)

Challenge	Description	Importance of Urban Forest Management
Stormwater Management	Urban areas often face challenges with stormwater runoff, which can erode soil and damage tree roots.	Utilizing trees to manage stormwater through natural absorption and filtration, reducing runoff and improving water quality.
Air Quality	Pollution from vehicles and industry can harm trees and reduce air quality.	Planting trees to filter pollutants, improve air quality, and provide health benefits to residents.
Community Engagement	Lack of community involvement can lead to neglect and vandalism of urban trees.	Engaging the community through education and volunteer programs to foster a sense of ownership and stewardship for the urban forest.
Managing the Entire Urban Ecosystem	Integrating trees with other urban elements like green spaces, water bodies, and wildlife habitats.	Coordinating efforts across different sectors to create a cohesive and sustainable urban ecosystem that benefits all living organisms.
Stable Funding	Ensuring consistent and adequate funding to support tree planting, maintenance, and urban forest programs.	Securing long-term funding through grants, public-private partnerships, and municipal budgets to match the needs of the urban forest and its management programs.

Benefits of Trees as Critical Infrastructure



The Tree Master Plan equips Norwalk with a strategic framework to manage its urban forest as essential infrastructure, enhancing climate resilience, public health, and the overall quality of life for its residents. The following provides examples of how trees can be more integrated into city infrastructure planning, design, and management:

Climate Mitigation: Trees absorb carbon dioxide and other pollutants, helping to reduce greenhouse gas emissions. By sequestering carbon, they play a vital role in mitigating climate change and improving air quality.

Temperature Regulation: Urban trees provide shade and release moisture through transpiration, which helps to cool the air. This reduces the urban heat island effect, making cities more comfortable during hot weather and decreasing the need for air conditioning.

Stormwater Management: Trees intercept rainfall and facilitate water infiltration into the soil, reducing runoff and the risk of flooding. Their root systems also help to stabilize soil and prevent erosion, contributing to better stormwater management.

Public Health: Trees improve air quality by filtering pollutants and providing oxygen. They also offer spaces for recreation and relaxation, which can reduce stress and promote physical activity, contributing to overall public health.

Biodiversity and Habitat: Urban trees provide habitats for various species of birds, insects, and other wildlife. This enhances urban biodiversity and creates more resilient ecosystems within city environments. Research such as “The Nature of Oaks: The Rich Ecology of Our Most Essential Native Trees “ (Tallamy, D. W., 2021) shows the important role native trees, especially oaks, have in sustaining biodiversity.

Social and Economic Benefits: Trees enhance the aesthetic appeal of urban areas, which can increase property values and attract businesses. They also foster community engagement by providing green spaces for social interaction and cultural activities.

Norwalk is making significant strides in integrating trees with urban infrastructure, highlighting their critical role in enhancing city life. The Norwalk Tree Alliance advocates for tree canopy health, native tree planting, and environmental education. Projects like the Calf Pasture Beach Parking Lot and Green Infrastructure Project demonstrate the City's commitment to sustainability by managing stormwater runoff and planting native vegetation. Collaboration with UConn's CIRCA on the Heat Vulnerability Study uses tree data to inform climate resilience strategies. The Tree Master Plan supports these efforts and aligns with the Complete Streets Policy (Complete Streets Ordinance adopted in November 2024), promoting safer, more accessible streetscapes, improved stormwater management, and enhanced public health, making trees a vital part of Norwalk's infrastructure. The Tree Master Plan aims to reduce conflicts and clarify City priorities. While trees can aid stormwater management, they shouldn't impede other systems. Planting strategies consider potential leaf litter blocking storm drains and ensure trees don't crowd drains, allowing access for repairs.



Figure 31. Parking and green infrastructure design and construction at Calf Pasture Beach (Source: Nancy on Norwalk, 2023)

The Vital Role of Urban Forest Management in Strengthening Norwalk's Community



Source: Norwalk Tree Alliance

Norwalk's tree and urban forestry programs are designed to foster community engagement, education, and inclusivity. The Norwalk Tree Alliance, for instance, plays a pivotal role in educating residents about the environmental benefits of trees and involving them in tree planting activities.

Programs like the Free Tree initiative enable homeowners to beautify their neighborhoods without financial burden, ensuring that even those from underserved communities can participate. Additionally, the City's tree planting program— managed in coordination with the Department of Public Works and the Department of Recreation & Parks with help from the Tree Advisory Committee— focuses on enhancing parklands and streetscapes, which not only improves the urban environment but also provides educational opportunities for residents to learn about tree care and the importance of urban forestry.

The Tree Master Plan strengthens these efforts while addressing missed opportunities and removing barriers to participation by emphasizing equity and inclusivity. It includes provisions for planting trees in areas that have historically lacked green spaces, ensuring that all neighborhoods benefit from the environmental and social advantages of a robust urban forest. The Plan also involves community members in the decision-making process, allowing them to have a say in the types of trees planted and their locations. By doing so, it fosters a sense of ownership and responsibility among residents, making it easier for them to integrate tree care into their daily lives despite other challenges. This comprehensive approach ensures that the benefits of Norwalk's urban forestry programs are accessible to all, promoting a healthier, more sustainable community for everyone.

The Role of Soil for Effective Management

Research consistently highlights the critical role of healthy soil in growing healthy trees and supporting the community. For instance, the Natural Resources Conservation Service emphasizes that soil health is essential for sustaining plant and animal life, filtering pollutants, cycling nutrients, and providing physical stability. Healthy soil supports tree growth, which in turn stabilizes soil, increases aeration and water infiltration, and adds nutrients to the soil. This symbiotic relationship enhances ecological balance and sustainability, benefiting the entire community.

Large trees offer numerous benefits, but ensuring they have a planting area that allows them to grow to their full size requires careful planning. Studies have shown that a tree's ability to establish, grow to its full potential, and remain healthy is largely dependent on soil volume. In Norwalk, if too little soil is available, trees will not reach their full size. Trees without adequate soil volume tend to be short-lived and do not function long-term as useful components of the City's infrastructure. The following techniques should be used to enhance the effectiveness and longevity of urban trees in Norwalk:

- Tree Pits/Trenches: Areas cut out in sidewalks to provide more capacity to intercept stormwater and return moisture into the soil.
- Structural Soil: Continuous soil under pavements to provide for root growth.
- Structural Cells: Modular, pre-engineered cell systems that create large soil-filled spaces under the pavement.
- Permeable Pavement: Allows water to infiltrate through void space; used in conjunction with the above techniques.

"...Research consistently highlights the critical role of healthy soil in growing healthy trees and supporting the community. For instance, the Natural Resources Conservation Service emphasizes that soil health is essential for sustaining plant and animal life, filtering pollutants, cycling nutrients, and providing physical stability. Healthy soil supports tree growth, which in turn stabilizes soil, increases aeration and water infiltration, and adds nutrients to the soil. This symbiotic relationship enhances ecological balance and sustainability, benefiting the entire community."

USDA Natural Resources Conservation Service on Soil Health

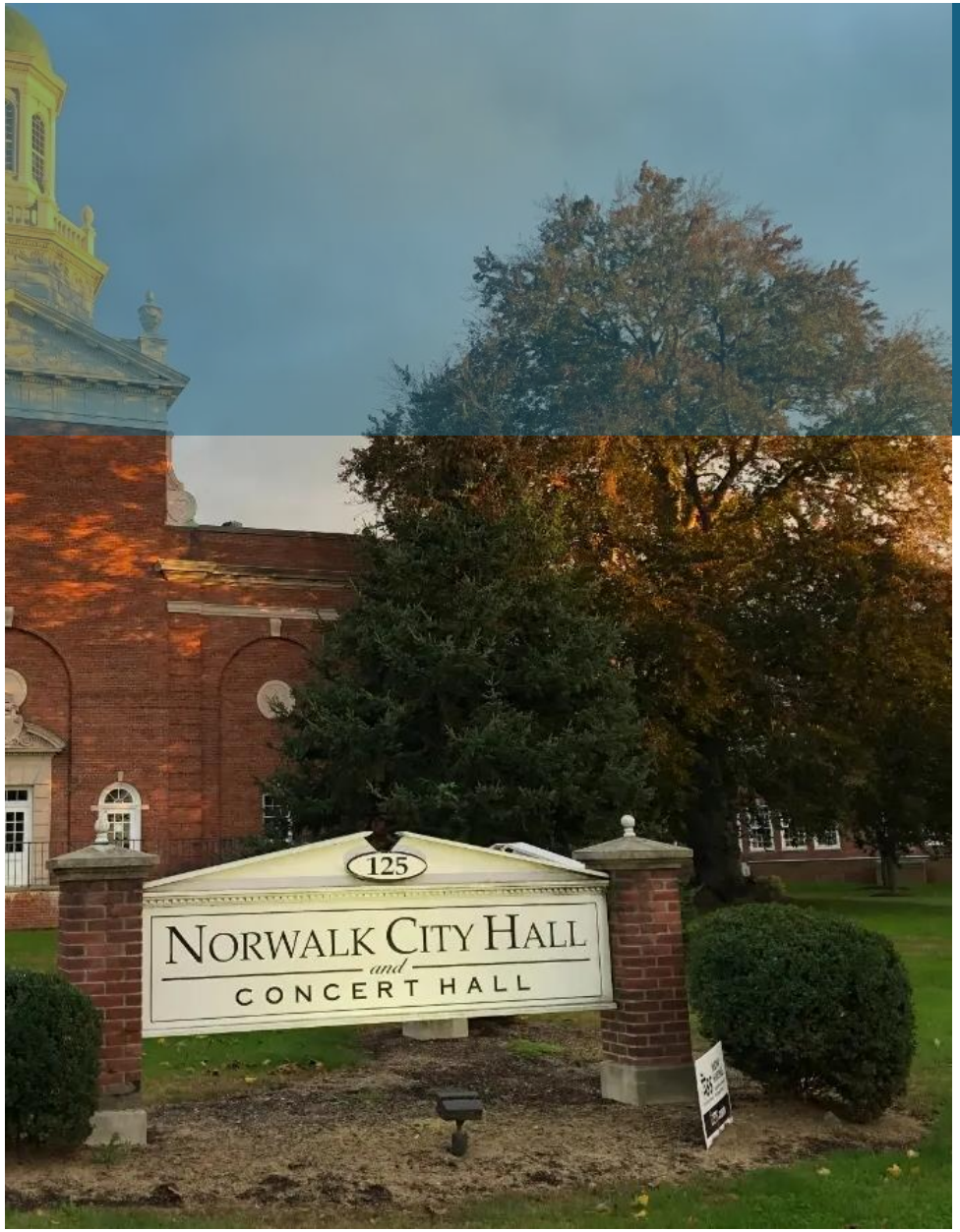


Structural Soil Silva Cell

Figure 32. Examples of newer technology available for creating adequate soil volume (Source: DeepRoot)



Figure 33. Illustration of how cities are incorporating green infrastructure to help with storm surges (Source: Norwalk Tomorrow)



SECTION 3: UNDERSTANDING NORWALK'S PRIORITIES

Learn about the community's priorities relating to trees in Norwalk and how this feedback helped guide the development of the Plan's goals and strategies.

Community Insights on Urban Forest Priorities

Internal and external engagement is critical to the success of a plan for community trees. By engaging with Norwalk's staff, residents, businesses, community partners, and other interested parties, urban forestry staff are given a better understanding of the needs and concerns of the community. Engagement was conducted throughout the development of Norwalk's Plan and the feedback and input gathered helped shape a plan that represents the needs of all community members in Norwalk. The engagement conducted throughout the development of the Plan also helps to build ongoing support for the urban forest and ensures the Plan is implemented effectively and collaboratively.

City Staff Contribute to the Planning Process

Staff Survey Summary

An internal stakeholder survey was launched from January to February 2024 via Google Forms. The survey aimed to gather insights from internal staff and stakeholders whose work directly or indirectly involves Norwalk's trees. A total of 23 responses were received representing five groups: Core Team, Oversight Group, City Planning, Common Council, and other key staff. Participating departments, boards, and committees included Public Works, Recreation and Parks, Planning and Zoning, Common Council, the Tree Advisory Committee, and others.

Participants were asked to identify strengths, challenges, needs, and opportunities related to tree management. The greatest challenge was climate-related impacts to the environment (74%), followed by sustainability concerns (61%), and budget issues (57%). To address these challenges, the strategies, programs, or resources participants would like to see include FAQs about the urban forest for the public (78%), integration of trees into Capital Improvement Projects (61%), and more resources for improved tree maintenance, species selection, and planting site selection (61%).

When asked about priorities and desired outcomes, participants would like to have a comprehensive inventory (65%); a tree maintenance plan (52%); public education programs (43%); adequate staffing levels for tree management (43%); and resources for implementing best practices and standards (39%). Participants were also asked to select the top three urban forest benefits that the Tree Master Plan should support. The results included addressing the effects of climate change by reducing air and surface temperatures (61%), controlling stormwater runoff and erosion while improving water quality (52%), and beautifying the City (48%).

Survey results revealed common themes across departments, and these insights informed subsequent staff interviews. The results of the internal stakeholder survey and the interviews were utilized in drafting the Tree Master Plan's goals and strategies along with providing context to existing conditions and operations relating to Norwalk's trees. A summary infographic provides highlights from the survey and is accompanied by a separate summary report.

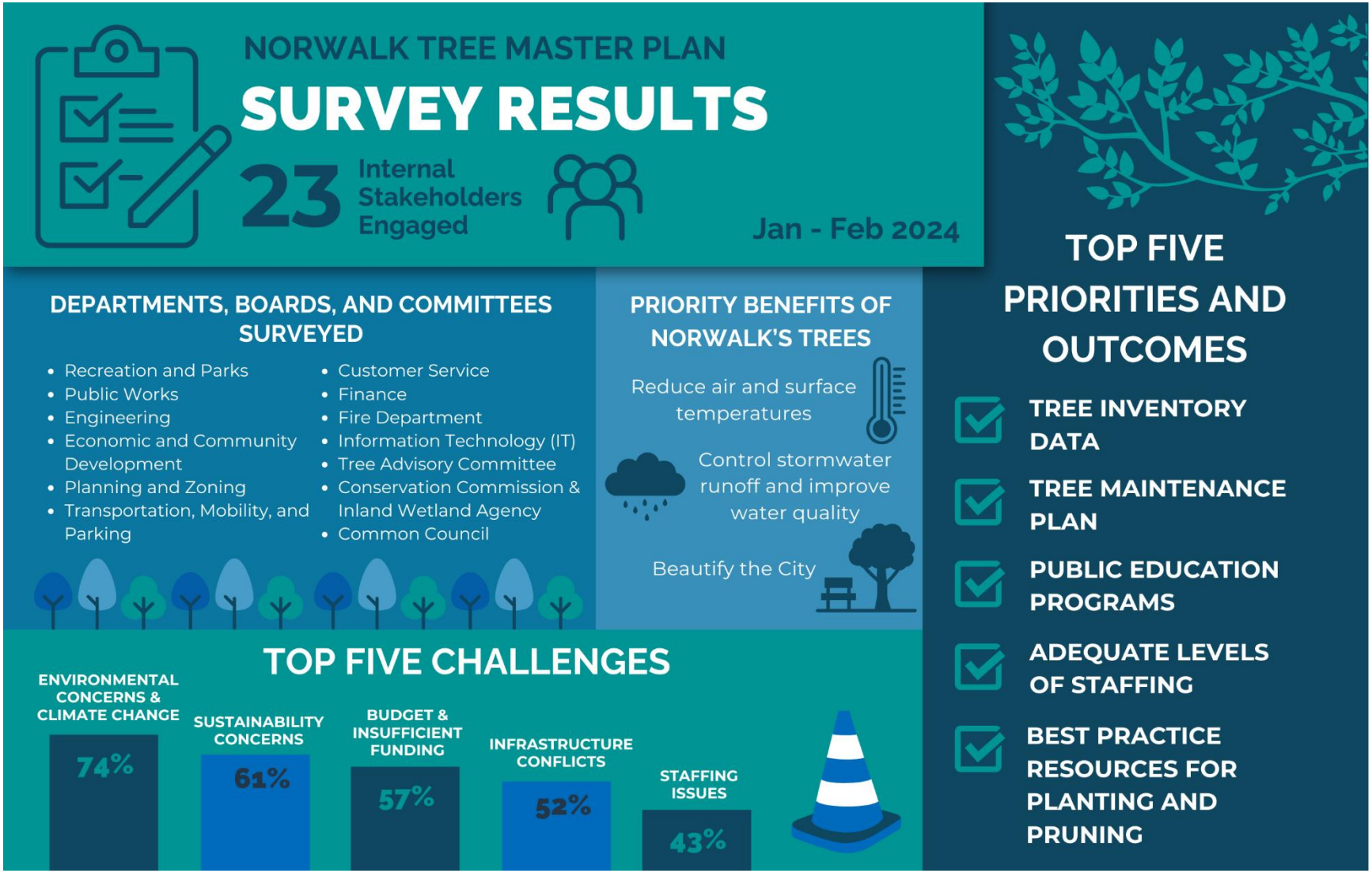


Figure 34. Summary of the process and results of the internal stakeholder survey held in 2024 to gather feedback for Norwalk's Tree Master Plan

Staff Interviews

In January and February 2024, remote meetings were conducted with various City departments and groups to gain a comprehensive understanding of Norwalk's existing structures, workflows, and responsibilities related to public and private trees. These meetings aimed to identify shared strengths, concerns, and priorities, as well as establish success metrics and desired outcomes for Norwalk's Tree Master Plan (TMP). As a result, the City of Norwalk will have a plan that supports goals, policies, and programs across departments to streamline urban forest management, strengthen communications, and support sustainable and resourceful practices.

The meetings started with an overview presentation and then addressed four key questions about departmental responsibilities, strengths, challenges, and desired outcomes for tree management. Themes like management, policy, maintenance, staffing, and planting guided the discussions. A total of 24 City staff, Common Council members, and board/committee members participated.

In addition to the internal stakeholder meetings, an online survey of internal stakeholders received 23 responses. 13 of the 24 meeting participants also completed the survey. As a result, a total of 34 unique City staff, Common Council, and board/committee members were engaged in the effort to develop the Tree Master Plan. Accompanied by graphics summarizing the interview process and discussion topics (detailed in a separate report), this comprehensive engagement process resulted in a Plan aligned with City goals, policies, and programs.

Table 11. Summary of groups interviewed to inform the development of the Tree Master Plan

Groups Interviewed			
Public Works	Recreation and Parks	Planning & Zoning	Business Development & Tourism
GIS Services	Common Council	Tree Advisory Committee	Transportation, Mobility & Parking

Table 12. Summary of the feedback received from the internal stakeholder interviews

Strengths	Challenges, Needs, Issues	Desired Outcomes
• Regulations, Ordinances, and Policy Support • Community Partners and Grant Funding • Tree Preservation and Maintenance • Staff Experience and Training • Tree Planting • Tree Advisory Committee • Inventory and Mapping Tools	• Interdepartment Coordination • Liability and Risk Management • Funding and Budget Needs • Staffing and Equipment Needs • Public Education and Engagement • Data and Inventory Management • Policy and Regulatory Framework • Storm Response and Recovery • Invasive Species and Pest Management • New Tree Maintenance and Monitoring • Environmental and Equity Considerations • Trees Management, Private Property, and Utilities	• Utilize TreePlotter Inventory Software • Evaluate Urban Forestry Program • Preventative Maintenance Program • Improved Policy Alignment, Language, and Incentives • Rights-of-Way and Complete Streets Opportunities • Dedicated Tree Division • Canopy Cover Growth • Tree Benefit Quantification • Liability and Risk Management • Coordination among Tree Groups

Community Participation in the Planning Effort



Figure 35. Example of the engagement with the community for Norwalk's urban forest (Source: City of Norwalk Instagram, April 2024)

The Norwalk community was engaged during the planning process to raise awareness and provide channels for education while gathering an understanding of their values and knowledge about trees and the City's urban forest. These efforts are aimed at identifying priorities and issues important to them. Input gathered from the community and special interest groups during development of the Tree Master Plan provided important context for understanding community priorities, where Norwalk is today, and urban forest challenges and opportunities.

Purpose of Education and Engagement to Develop the Plan

The public outreach, education, and engagement in Norwalk ensured the Plan was developed with input from the community and reflected its needs and priorities. As stated by James Clark in A Model of Urban Forest Sustainability (Clark, et al., 1997),

> "Urban trees and forests are considered integral to the sustainability of cities as a whole. Yet, sustainable urban forests are not born, they are made. They do not arise at random, but result from a community-wide commitment to their creation and management."
>
> ~James Clark, A Model of Urban Forest Sustainability

The community engagement process aimed to reach diverse residents and inform them about the project and benefits of urban trees while collecting feedback for Plan development. This framework will help the City engage with the community to preserve, manage, and grow Norwalk's urban forest. Ongoing engagement is crucial, especially since much of the tree canopy is on private land, requiring property owners' active stewardship. The City and its partners support this through various community programs and activities. The graphic on the following page highlights some of the most relevant examples relating to Norwalk's urban forest that are supported by this Plan:

EXISTING AND POTENTIAL COMMUNITY PROGRAMS AND EVENTS

RELEVANT EXAMPLES OF COMMUNITY PROGRAMS AND PARTNERS



Environmental and Conservation Partnerships

- Norwalk Land Trust
- Norwalk River Watershed Association
- The Maritime Aquarium
- Save the Sound
- CT Land Conservation Council
- CT DEEP

Community Engagement and Education

- Norwalk Tree Alliance
- Keep Norwalk Beautiful
- State and Federal Grant Programs
- CT State, Norwalk Campus
- Norwalk Garden Club
- Neighborhood Associations

Urban Forestry and Sustainability

- Norwalk Tree Advisory Committee
- City Tree Planting Program
- Ad-hoc Sustainability Committee

Celebrations and Festivals

- Annual Arbor Day Celebration with Norwalk Public Schools
- Annual Arbor Day Cleanup led by the Tree Advisory Committee
- Norwalk Earth Day Festival

Recreation and Stewardship Initiatives

- Friends of Norwalk Parks Groups
- Nature Walks
- Outdoor Programs

Shaping the Plan's Strategies

In crafting Norwalk's Tree Master Plan, the City launched a robust engagement strategy to weave the priorities of the diverse community into a shared vision for a greener future. Through dynamic workshops and targeted outreach, both internal stakeholders—City staff and committee members—and external stakeholders— including the public—were engaged to refine the Plan and align it with the Mayor's goal of making Norwalk Connecticut's greenest city.

The Engagement Process

After drafting the Tree Master Plan, the City and consultants rolled out a multi-faceted engagement effort. Presentations to the Mayor's Office, department heads, and the Recreation, Parks and Cultural Affairs Committee in February 2025 laid the groundwork. In March 2025, two workshops brought the Plan to life: one on March 19 for internal stakeholders and another on March 20 for the public. Each session kicked off with a welcome from City officials, followed by a summary of the planning process and strategies. A hands-on activity then challenged participants to map tree plantings on real Norwalk streetscapes, using guidelines, a hypothetical budget, and species options. This exercise revealed practical constraints—like driveways and utilities—while inspiring creative solutions. Discussions underscored the vital role of maintenance and community involvement, and a QR survey captured feedback to shape the Plan's final strategies.

Key Insights and Priorities

The engagement process illuminated shared priorities across stakeholders:

- **Space-Smart Planting:** With space, not budget, as the main hurdle, participants proposed innovative ideas like staggering tree sizes and shifting utilities to unlock planting areas.
- **Ongoing Care:** Both groups rallied around the mantra "growing trees, not just planting them," emphasizing post-planting care and maintenance as critical to success. Participants also voiced support to assist in the care of newly planted trees.
- **Community Power:** Suggestions like tree adoption programs and neighbor-driven planting highlighted a desire for grassroots involvement.
- **Collaboration:** Better coordination between City departments and stronger public-private partnerships emerged as key to execution.
- **Education and Resources:** Calls for public education on tree care and biodiversity, alongside staff training, underscored a need to build knowledge and capacity.



Surveys reinforced these themes: 36% prioritized more planting strategies, 25% sought increased funding, and 18% focused on improved coordination. Maintenance, pruning, and care topped the list of Urban Forestry Program priorities, with public education (19%) and staffing (14%) leading improvement ideas.

Looking Ahead

This engagement didn't just shape the Tree Master Plan—it built a collective commitment to Norwalk's urban forest. As we approach adoption near Arbor Day and Earth Day 2025, we're ready to turn these insights into action, creating a resilient, thriving canopy together.



Figure 36. Summary and results from the workshops held to gather input on the draft Tree Master Plan (March 2025)

Norwalk's Tree Canopy Cover Goal



To achieve the vision for Norwalk's trees, scenarios to achieve a citywide canopy cover goal were prepared and finalized in this Plan. The canopy goal serves as the cornerstone metric for tracking progress in implementing the Tree Master Plan and its planting strategy. 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, if the City's urban forest is effectively managed using best practices, achieving the canopy cover goal supports other goals and priorities in the City such as wildlife and biodiversity, stream health and habitat recovery, environmental stewardship, workforce development, climate change resilience, public health, air quality enhancement, sustainability, smart development, and temperature moderation, among others. By using canopy cover as an overarching measure, Norwalk ensures a comprehensive approach that not only improves the urban ecosystem but also fosters a sense of pride, unity, and responsibility among City programs, partners, residents, and interested parties.

Norwalk's 30-Year Canopy Cover Goal: 53% by 2053

The 2025 Tree Master Plan outlines a 10-year roadmap for urban forestry, supporting a 30-year canopy goal*. This extended timeframe aligns with tree planting grant opportunities and allows newly planted trees to grow their canopy to the projected levels, aiming for a significant milestone in canopy cover over 30 years. The Plan's central objective is to achieve 53% total tree canopy cover by 2053. Canopy cover across Norwalk was first examined in the 2018 canopy study by WestCOG and this study included future canopy cover scenarios for consideration. Supporting this 2018 study was the 2023 urban tree canopy assessment summarized in Section 1 of this Plan. Additional details are provided in a supporting report.

The Tree Master Plan's canopy goal builds on Norwalk's 2009 Tree Management Plan: "Goal A: Establish and maintain optimum tree cover in the City."

To meet this goal:

- The 2024–2053* canopy target requires a 10% increase from the 2023 study based on 2021 imagery.
- This translates to an average of 2,130 trees planted annually across the City.
- By milestone year 10 (2033), 21,300 trees planted over the 10-year period will collectively increase the City's canopy cover to 46%. The same number of trees will be needed by year 20 (2043) to reach a 50% canopy cover. By year 30 (2053), a total of 63,900 trees will collectively grow the canopy cover to 53%.

Recommendations:

- The City should lead 70% of tree plantings toward the 30-year goal. This amounts to ~1,500 trees per year or a total of 45,000 of the 63,900 total trees needed.
- The remaining 30% of tree plantings needed (~18,900 total trees) can come from community partners, private property owners, homeowners' associations, and as part of private development projects.
- Key factors include protecting existing canopy, strategic tree placement, post-planting care, and prioritizing resilient native species.
- Additional details are available in Section 4, Planting Strategy, Appendix D, and Appendix E.

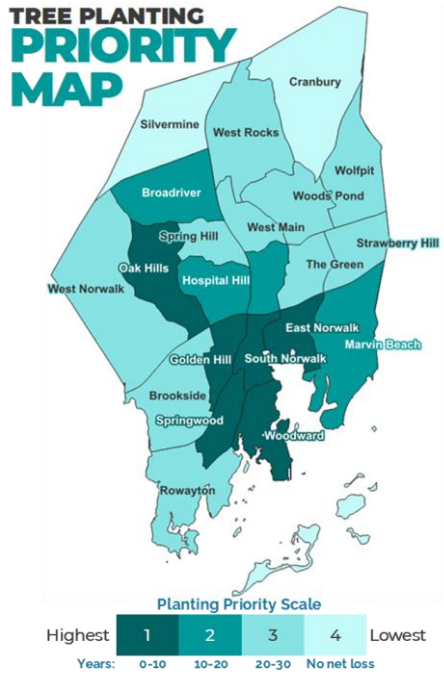
The City can adopt these goals, consider alternatives, and implement the tree planting strategy provided in this Plan. Regular measurement and community engagement will guide successful urban forest management. For detailed calculations, consult Appendix E. As stated earlier, the City should reassess the Plan every 10 years and update goals and targets accordingly.

**The 30-year canopy goal timeframe is based on a starting year of 2024 when the canopy goal was finalized during the planning process to develop the Tree Master Plan. The City continues to track plantings toward the canopy goal, noting the number of trees required per year is an average.*

Aligning Priorities

Figure 37. Summary of how the canopy cover goal supports other priorities in the City





View the Planting Strategy for details

Implementing and Achieving the Canopy Cover Goal Supports:

THE PEOPLE
Underserved and vulnerable populations; tree canopy cover equity

THE ENVIRONMENT
Wildlife, habitats, pollinators, and biodiversity

CURRENT AND FUTURE CHALLENGES
Climate adaptation, modification, and resiliency; stormwater management; air quality improvements; reduced surface temperatures

PROGRAM NEEDS
City staff feedback and priorities

COMMUNITY NEEDS
Community priorities





SECTION 4: TREE PLANTING STRATEGY

Understand the strategy to achieve 53% canopy cover and other related goals of the Plan, recognizing that success requires a shared commitment from both the City and the community to the Plan's vision, industry standards, and best practices.

Tree Planting Strategy Overview

Implementing a long-term planting strategy is crucial for enhancing Norwalk's urban forest, requiring commitment from the City, partners, and community. Baseline data from 2018 and 2023 show the canopy could increase from 43% to 53%. To achieve this, priorities must address existing canopy inequalities. This Plan outlines strategies, administrative needs, planning tools, public outreach, and associated costs. Optimizing the canopy will enable the Urban Forestry Program to fully benefit the community.

Priority Areas and Themes (public and private)

The Tree Planting Strategy prioritizes neighborhoods based on canopy cover, planting space, sociodemographic data, and other criteria. This gives the City of Norwalk and its partners a map and priority index to guide efforts over 30 years. Priorities 1-4 are based on the following criteria:

Priority 1	Neighborhoods with Justice40 overburdened / underserved U.S. Census Tracts	Years 1-10
Priority 2	Neighborhoods with U.S. Census Block Groups (CBGs) having a Tree Equity Score <80 (out of 100)	Years 11-20
Priority 3	Neighborhoods comprised of CBGs with a Tree Equity Score between 80 and 99	Years 20-30
Priority 4	Neighborhoods comprised of CBGs with a Tree Equity Score of 100	No net loss

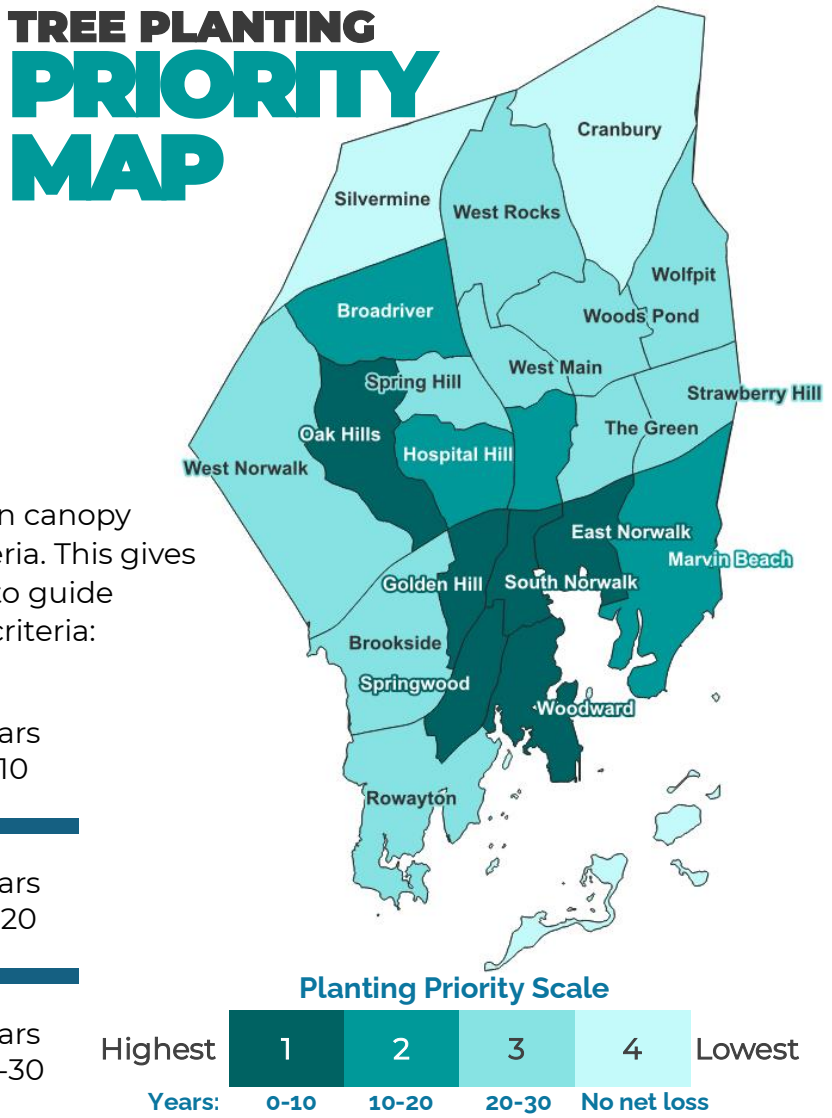


Figure 38. Map displaying the priorities for planting toward the 53% canopy cover goal

Table 13. Norwalk's 30-year planting strategy to achieve 53% canopy (top) and the planting targets for the Priority 1 Neighborhoods in years 1-10 (bottom)

Priority	Neighborhood	Existing Canopy %	Canopy Goal %	Trees per Year (10-year intervals)	10-year Totals
Priority 1: Years 1-10	South Norwalk	6%	14%	102	1,604 trees/year 16,035 total trees
	East Norwalk	14%	27%	232	
	Woodward	25%	46%	420	
	Golden Hill	27%	40%	210	
	Springwood	27%	38%	175	
	Oak Hills	50%	63%	465	
Priority 2: Years 11-20	Norwalk Center	13%	17%	55	1,112 trees/year 11,115 total trees
	Hospital Hill	25%	32%	177	
	Marvin Beach	28%	41%	630	
	Broadriver	53%	59%	249	
Priority 3: Years 21-30	West Main	20%	26%	105	2,810 trees/year 28,102 total trees
	The Green	27%	34%	138	
	Strawberry Hill	31%	38%	178	
	Spring Hill	32%	41%	145	
	Rowayton	43%	50%	303	
	Wolfpit	45%	52%	265	
	Woods Pond	46%	52%	217	
	West Rocks	47%	52%	285	
	Brookside	48%	54%	301	
	West Norwalk	54%	64%	874	
Priority 4: No net loss	Norwalk Islands	29%	42%	133	1,069 trees/year 10,690 total trees
	Silvermine	61%	66%	265	
	Cranbury	67%	75%	671	
TOTALS: 23 neighborhoods		6% to 67%	53% Citywide by 2053	287 trees/year average by neighborhood for 10 years	65,942 trees over 30 year period

Priority 1 Neighborhoods	Timeframe	Canopy Goal	No Net Loss Strategy	Public Plantings Total (ROW, Parks, Properties) (70% of Trees)	Institutions, Businesses, Residents Total (20% of Trees)	Private Development Total (10% of Trees)	Total Trees & (Trees per Year)
South Norwalk	Years 1-10	14% (up from 6%)	1-1 public tree replacement; private development mitigation	711	203	102	1,015 (102/year)
East Norwalk	Years 1-10	27% (up from 14%)		1,625	464	232	2,322 (232/year)
Woodward	Years 1-10	46% (up from 25%)		2,941	840	420	4,201 (420/year)
Golden Hill	Years 1-10	40% (up from 27%)		1,470	420	210	2,100 (210/year)
Springwood	Years 1-10	38% (up from 27%)		1,225	350	175	1,750 (175/year)
Oak Hills	Years 1-10	63% (up from 50%)		3,253	929	465	4,647 (465/year)
TOTALS	10 Years	14% to 63%		11,225	3,207	1,604	16,035 (1,604/year)

SUMMARY OF THE 30-YEAR TREE PLANTING STRATEGY

To achieve the citywide canopy cover goal of 53% by 2053, the Tree Planting Strategy divides prioritized neighborhoods into four intervals: Years 1-10, Years 11-20, Years 21-30, and post-30 years. This strategy also applies a "no net loss" policy for public trees, meaning a new tree is planted for every public tree removed. Canopy goals for each neighborhood were determined based on existing canopy cover, available planting space, land distribution, zoning classifications, and the contribution needed to reach the 53% goal.

As shown in the previous table, the current canopy cover for the 23 neighborhoods ranges from 6% in South Norwalk to 67% in Cranbury. The canopy goals for all neighborhoods range from 14% in South Norwalk to 75% in Cranbury. The increase in canopy cover varies, with a 4% increase in Norwalk Center and a 21% increase in Woodward, averaging a 9% increase across all 23 neighborhoods.

PRIORITY 1 NEIGHBORHOODS (YEARS 1-10)

The top table on the previous page summarizes this strategy and the table at the bottom of the page details the trees required for the Priority 1 neighborhoods. To achieve the canopy cover goals in Priority 1 neighborhoods over the next 10 years, the Tree Planting Strategy focuses on increasing tree coverage in six key areas.

- South Norwalk aims to increase its canopy from 6% to 14% by planting 102 trees per year, totaling 1,015 trees.
- East Norwalk plans to raise its canopy from 14% to 27% with 232 trees planted annually, reaching 2,322 trees.
- Woodward targets a canopy increase from 25% to 46% by planting 420 trees per year, totaling 4,201 trees.
- Golden Hill aims to grow its canopy from 27% to 40% with 210 trees planted annually, totaling 2,100 trees.
- Springwood plans to increase its canopy from 27% to 38% by planting 175 trees per year, totaling 1,750 trees.
- Oak Hills aims to raise its canopy from 50% to 63% with 465 trees planted annually, totaling 4,647 trees.

Overall, the strategy will plant 1,604 trees per year across these neighborhoods, achieving a total of 16,035 trees over 10 years. Public plantings will account for 70% of the trees, institutions, businesses, and residents will contribute 20%, and private development will add 10%. For years 11-30, a similar approach is recommended. The City should evaluate the Tree Planting Strategy's success and update the Tree Master Plan after year 10. If the City foregoes the 10-year intervals, it will need to plant an average of 2,133 trees per year over 30 years to achieve 53% canopy cover. Key considerations include selecting native or highly adaptable species, following best practices for planting and care, clearly defining maintenance responsibilities and required resources, integrating the trees into an online GIS inventory database, and ensuring that the planted trees grow to their full potential under practical guidelines.

CONSIDERATIONS FOR PLANTINGS ON PUBLIC PROPERTY

For this Plan, public property refers to land owned by the City of Norwalk and designated for public use. The City is tasked with planting, maintaining, and removing trees on these properties. Tree planting opportunities on public property include:

- Public rights-of-way (ROW)
- Public parks and cemeteries
- City-owned open space / natural areas
- Public schools
- Public facilities
- Norwalk Housing Foundation properties
- Fire and Police Departments
- City-owned open / vacant lots / land acquisition

Note: Norwalk's 2024 Zoning Regulations include zoning classifications to assist in identifying public land. Examples of public land opportunities are provided in the Priority 1 Neighborhood Maps in Appendix D.

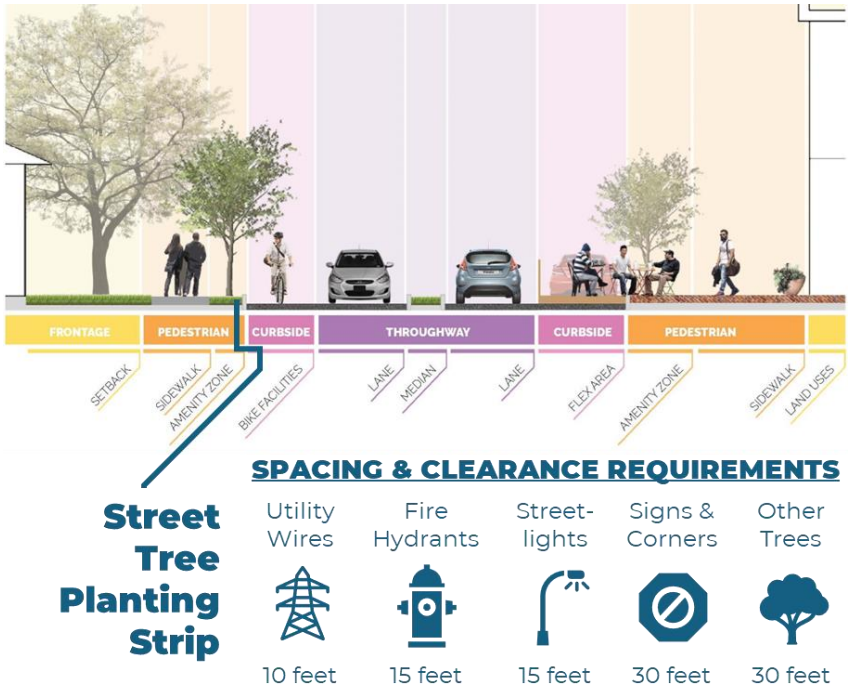


Figure 39. Example of how Norwalk's Complete Streets Policy supports the Tree Planting Strategy and the requirements for tree spacing

Public parks offer significant space for new tree plantings. Many of Norwalk's largest trees are in these parks, so the City should prioritize sustaining and expanding the canopy through succession planting, ensuring new trees replace aging ones.

Commonly, the right-of-way between roadways and sidewalks has limited or no space for street tree plantings. Overhead wires and underground utilities often further restrict planting opportunities. In many of Norwalk's neighborhoods, additional planting opportunities exist beyond the right-of-way on private property (setback plantings) which can be utilized with the property owner's approval and a signed agreement. Cities like New Haven and New Britain support this approach. When Norwalk updates or renovates street surfaces and sidewalks, it should create space and soil volume for street trees, while addressing other needs like stormwater management and multi-modal transportation in alignment with the Complete Streets Policy. Creating space for trees in these areas can reduce their exposure to salt and snow removal damage, resulting in healthier, larger trees that provide public benefits.

ABOUT NORWALK'S URBAN FOREST IMPROVEMENT PROGRAM

(summarized from the City's Tree Planting Program webpage, www.norwalkct.gov)

Goals & Objectives of the Urban Forest Improvement Program

- Enhance parklands and open spaces
- Expand environmental benefits of trees in urban areas
- Improve streetscape aesthetics
- Restore tree canopy along city streets
- Each tree planted is added to the City's tree inventory and GIS system.

How the Program Works

- Trees are typically planted on City property or in the right-of-way (ROW).
- If City property or the ROW is inadequate, trees can be planted on private property with the owner's agreement to care for them.
- The program is not intended to provide free landscaping for residents or businesses.

Forms and Requests

- Online Tree Planting Request e-Form
- Free Tree Request Form (Paper Copy) (PDF)
- Adopt A Tree Form (For Trees On Private Property) and Guidelines

Neighborhood Treescapes

- Trees are planted along contiguous streets or on a neighborhood basis.
- Planting plans are developed by neighborhood associations and approved by tree wardens and the Tree Advisory Committee.
- Neighborhood associations and property owners select tree species.
- The Department of Public Works orders and plants the trees through a contract.

Benefits of the Neighborhood Approach

- Fosters a sense of accomplishment and ownership within the neighborhood.
- Provides group oversight for tree health and development.
- Reduces vandalism and theft.

Tree Liaisons

- Receive training, a staking kit, and a volunteer guidebook with information on available tree and shrub species.

CONSIDERATIONS FOR TREE PLANTING ON PRIVATE PROPERTY

The Role of Private Property in Achieving a Sustainable Urban Forest

Private property in Norwalk plays a pivotal role in achieving a healthy and sustainable urban forest, aligning with the City's ambitious goal to increase canopy cover to 53%. The diverse array of private property owners, including residents, businesses, educational institutions, multi-family housing, healthcare facilities, religious organizations, new developments, homeowner associations, and private golf courses, collectively contribute to this vision. By encouraging these stakeholders to support 20% of the plantings and private developments to contribute an additional 10%, the City can leverage the vast potential of private lands to enhance urban greenery. This collaborative effort not only enriches the urban forest but also fosters a sense of community stewardship and environmental responsibility.



Figure 40. The urban forest is comprised of trees across all ownership types (Source: Discover Norwalk)

Supporting Private Property Owners

To ensure private property owners' investments reach their full potential, the City should provide robust support mechanisms. This includes offering technical assistance, funding opportunities, and planting support through partnerships with community organizations. These partners can help with the selection of appropriate tree species, planting techniques, and ongoing maintenance to ensure the health and longevity of the trees. Additionally, the City should consider implementing cost-share programs to alleviate financial burdens and remove barriers to participation, ensuring equitable access to tree planting resources across all 23 neighborhoods.

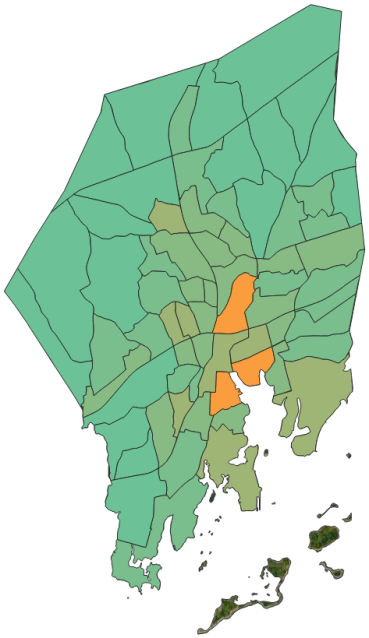


Figure 41. Map for illustration purposes showing the Tree Equity Scores by Census Block Group (Source: American Forests' Tree Equity Score Tool, treeequityscore.org)

Tracking and Monitoring Plantings

Tracking the progress of these plantings is crucial for measuring success and making data-driven decisions. The City should utilize inventory management software like TreePlotter to monitor tree plantings on private properties. This software can track the number, location, and health of trees, ensuring that private development plantings are maintained and thrive. Regular monitoring will help prevent pest and disease outbreaks, promote species diversity, and enhance climate resilience. By tracking and monitoring plantings, the City and stakeholders can use this data to create a cohesive and effective urban forestry strategy.

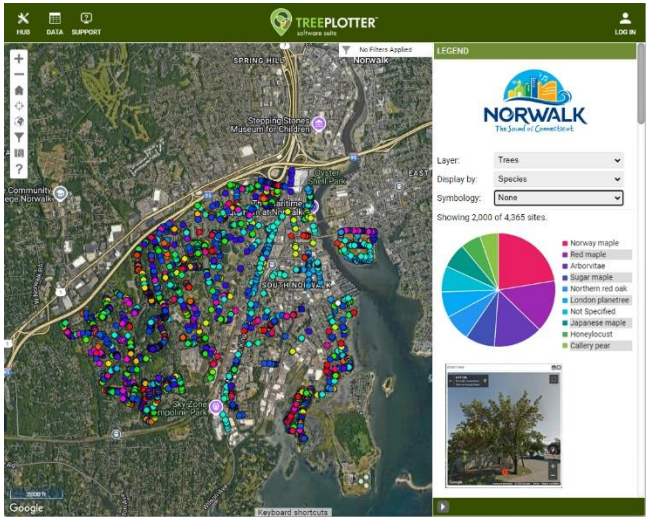


Figure 42. Screenshot of Norwalk's TreePlotter software for inventorying and managing trees (Source: www.pg-cloud.com/NorwalkCT)

Achieving the Canopy Goal

Ultimately, achieving the 53% canopy goal requires a concerted effort from all stakeholders. By fostering collaboration, providing necessary support, and ensuring rigorous tracking and maintenance, Norwalk can create a vibrant, sustainable urban forest that benefits all its residents.







Tree Planting Costs: Phase 1 Neighborhood Priorities Years 1-10

The 10-year costs for planting trees in priority neighborhoods to achieve the 30-year canopy cover goal are summarized below for phase 1 of the Tree Planting Strategy in Priority 1 neighborhoods (South Norwalk, East Norwalk, Woodward, Golden Hill, Springwood, and Oak Hills). Plantings will be led by the City, private property owners, and developers. A total of 1,604 trees per year are required over the next 10 years. The table below highlights the key metrics for this phase (see Appendix E for details):

Table 14. Tree planting estimates and tracking metrics

Tracking Metric or Criteria	City-led Plantings (70% of total plantings)	Private Property Owner Plantings (20% of total plantings)	Development-led Plantings (10% of total plantings)	TOTAL
Average Trees per Year	1,122	321	160	1,604
Total Trees Added	11,225	3,207	1,604	16,035
Total Forecasted Asset Value & 10-year Ecosystem Benefits	$5,915,985	$1,690,281	$845,141	$8,451,407
Total Annual Planting Cost (assumes 30% of private property owner plantings are seedling giveaways)	$926,021	$265,540	$132,289	$1,323,850
Average Annual Maintenance Cost per Tree in Maintained Areas	$29.64	$29.64	$29.64	N/A
Total Annual Maintenance Costs for Seedlings, Whips	$0	$0	$0	N/A
Total Annual Maintenance Costs for New Plantings in Maintained Areas	$33,269	$6,654	$4,753	$44,676
Total Annual Costs of Plantings (Initial Planting + Annual Maintenance Cost (Tree Master Plan))	$959,291	$272,193	$137,042	$1,368,526
Total Costs of Plantings (Initial Planting + Annual Maintenance Cost x 10 Years (Tree Master Plan))	$9,592,907	$2,721,935	$1,370,415	$13,685,257

* N/A = Not Applicable. See Appendix E for more details.

Summary of Phase 1 Assumptions and Costs

PLANTING REQUIREMENTS

To achieve a 53% canopy cover, phase 1 focuses on the first 10 years for the highest priority neighborhoods. In this phase, a total of 1,604 trees need to be planted annually in the neighborhoods of South Norwalk, East Norwalk, Woodward, Golden Hill, Springwood, and Oak Hills (see the previous table for additional details). This considers a recommended approach of 70% of plantings be led by the City (1,122 trees per year), 20% by private property owners (321 trees per year), and 10% led by developers for private development (60 trees per year).

TOTAL TREES ADDED OVER 10 YEARS

Over the 10-year period, the City will add 11,225 trees, private property owners will add 3,207 trees, and developers will add 1,604 trees, totaling 16,035 trees. Note, the required amounts for developers is not to deter additional trees being planted as long as their survival is ensured or trees are replanted and Norwalk's Zoning Regulations take precedence over this recommendation.

ADDED ANNUAL ECOSYSTEM BENEFITS

The annual ecosystem benefits from these plantings are estimated at $270,126, with the City's plantings contributing $189,088, private property owner plantings contributing $54,025, and $27,013 contributed by developer-led plantings. Note, the benefits are estimated based on trees reaching maturity and that 50% of trees will be large-statured at maturity, 30% medium-statured, and 20% small-statured at maturity. Benefits include stormwater management, air quality improvement, and carbon sequestration and storage (excludes energy savings and other environmental benefits and services). A comprehensive inventory of trees planted should be conducted and maintained to more accurately quantify the associated ecosystem benefits.

TOTAL CARBON SEQUESTERED

The total carbon sequestered once all trees planted in the 10 years reach maturity is estimated at 1,998,923 pounds, with the City plantings amounting to 1,399,246 pounds, private property owner plantings amounting to 399,785 pounds, and developer-led plantings at 199,892 pounds.

ASSET VALUE

The asset value of the trees is estimated at $5,750,151, with the City's trees valued at $4,025,106, private property owners' trees at $1,150,030, and developers' trees at $575,015.

TOTAL VALUE AND BENEFITS

The combined total value and benefits of the plantings over a 10-year period amount to $8,451,407, with the City's plantings contributing $5,915,985, private property owner plantings amounting to $1,690,281, and developer-led plantings amounting to $845,141.

PLANTING COSTS

The average subcontract planting cost per tree is $825 (based on the City's 2022 planting contracts), and the average cost per seedling or whip is $10. Over 10 years, the cost for caliper-sized trees is $12,435,143, with the City spending $9,260,213, private property owners $1,852,043, and developers $1,322,888. The cost for seedlings and whips is $9,621, all borne by private property owners to lessen the burden of planting caliper-sized trees. The calculations only work if trees that are planted survive to maturity and those that prematurely die or are removed get replaced.

ANNUAL PLANTING COSTS

The total annual planting cost is $1,323,850, with the City spending $926,021, private property owners $265,540, and developers $132,289.

MAINTENANCE COSTS

The average annual maintenance cost per tree in maintained areas is $29.64. The total annual maintenance costs for new plantings are $44,676, with the City spending $33,269, private property owners $6,654, and developers $4,753.

TOTAL ANNUAL COSTS OF PLANTINGS

The total annual costs of plantings, including initial planting and management, are $1,368,526, with the City spending $959,291, private property owners $272,193, and developers $137,042.

TOTAL COSTS OVER 10 YEARS

The total costs over 10 years amount to $13,685,257, with the City spending $9,592,907, private property owners $2,721,935, and developers $1,370,415.

NOTES ON ESTIMATES

The estimates are based on a distribution of 50% large, 30% medium, and 20% small statured trees at maturity. Costs are adjusted from 2016 USD to 2024 USD, and planting costs are derived from regional estimates and past projects performed by the planning consultants. Maintenance costs are based on historical data adjusted for inflation.

Tree Planting Considerations and Implementation

Successful tree planting is influenced by many factors. Conducting site evaluations can enhance the longevity and health of trees by ensuring proper site selection. It's crucial to avoid underground and above-ground utilities and to place the tree where the maximum soil volume is available. Environmental factors such as pollution, drought, and exposure to radiant heat from streets also impact tree health. Therefore, understanding all site limitations is essential when choosing the tree best suited for the growing conditions.



Tree Planting Budget Considerations

Budgets are greatly affected by warranty, watering and tree sizes.

- Watering / irrigation costs over the first 10 years are included in the calculations for maintenance costs in the previous section. An additional cost of approximately $100 per tree per year should be considered if a watering regimen is needed for those trees after the initial 10-year period.
- Tree selection and size are both important. The City of Norwalk's Zoning Regulations require a minimum tree size of 2.5 inches (measured as a caliper at 3 feet from the base of the trunk) for building and lot site standards (Article 4). Ball and burlapped (B&B) trees are recommended for private development projects and City-led street tree plantings. For plantings led by private property owners or when the City is using volunteers, it is recommended that bareroot trees be planted given they are less weight, easier to plant, and require less materials for handling. Using smaller caliper trees of 1.75 inches in a #20 container may be considered in areas such as parks and private yards. The City and partners may also offer tree seedlings, whips, or saplings as giveaways and these trees contribute to the Tree Planting Strategy but like all plantings, these must survive and remain healthy to maturity. However, each tree planting site is unique, and smaller tree sizes should be considered outside the recommended sizes when appropriate.
- An additional cost for each additional year of warranty should be factored into the cost estimates as needed.
- Coordination between departments regarding sidewalk repairs and the installation of structural soil when planting trees in the grass strip between the curb and sidewalk can affect tree growth, longevity, and cost.

TREE WATERING BUDGET

Allocating a budget for water can significantly affect costs. To ensure the survival of tree plantings, the City must address water needs. Best management practices suggest providing supplemental watering for the first two years, with weekly watering from May to October. This can be achieved through various methods, as outlined below.

Resident Watering

Many of Norwalk's public trees will be planted in residential neighborhoods. In years 1-10 of the Tree Planting Strategy, the neighborhoods of South Norwalk, East Norwalk, Woodward, Golden Hill, Springwood, and Oak Hills are the first priority although that should not deter the City and its partners from planting in other neighborhoods in the first 10 years as opportunities arise. Tree planting campaigns in cities such as New Haven and Stamford require residents to accept the tree and watering responsibilities before the tree is planted. Continuous outreach and education are essential for community acceptance, and to encourage and remind residents of their watering responsibilities. This offers a no-cost option for the City and promotes a collaborative effort among the entire community. Resident watering, combined with a neighborhood stewardship program, can further educate and motivate residents to participate in city tree watering and maintenance campaigns.

Contractor Watering

The calculations for the first 10 years of the Tree Planting Strategy account for a two-year watering requirement at approximately $200 per tree.

City Watering

If the City is responsible for watering trees planted on public property (and beyond the right-of-way) for two years, additional staff will be required. It is estimated that one City employee can water approximately 72 trees per day on an average workday.

Assumptions: Five minutes to refill a gator bag; two hours for driving, truck refilling, and lunch. Based on the Tree Planting Strategy in this Plan, annual watering should be provided from May to October. Watering costs do not include the cost of watering trucks. Although City



watering is more cost-effective, contractors may void their warranty if they are not granted a watering contract for the trees they installed.

Tree Watering Technology

New tree watering technologies show promising results in improving tree health and survivability compared to the traditional Tree Gator watering bag. The Tree Diaper absorbs and stores water, then gradually releases it into the soil over time. This product may be particularly beneficial for trees planted in park settings, where watering trucks cannot easily access. The cost of a Tree Gator bag ranges from $27 to $34, while a Tree Diaper costs $50. Additionally, a new water polymer called APSA-80 has been demonstrated to significantly increase water infiltration rates. Applying this polymer during the first watering will promote deep water infiltration into the soil.

Tree Mortality and Planting

Tree mortality rates decrease with fall and winter planting. Planting in the fall allows trees to establish roots before the hot and dry months, making it the most cost-effective and best management practice for promoting tree survival. Planning for fall planting involves tagging trees in the spring and purchasing them in the fall. The City will need to plan for planting funds according to the City's budget planning cycle to ensure funds are available for each planting season to meet the Tree Planting Strategy's requirements.

Tree Selection

The Arbor Day Foundation's recommendation for tree planting is to plant 'The Right Tree in the Right Place.' This principle emphasizes that tree selection should take into account both the species of the tree and the site conditions. Biologically, a tree must be able to endure the conditions where it is planted. Factors such as sun exposure, soil type, drainage, salt exposure, and available growing space above and below ground must all be considered. Additionally, promoting biodiversity by selecting a variety of tree species is encouraged. A diverse forest is less vulnerable to being completely wiped out by diseases and pest infestations.

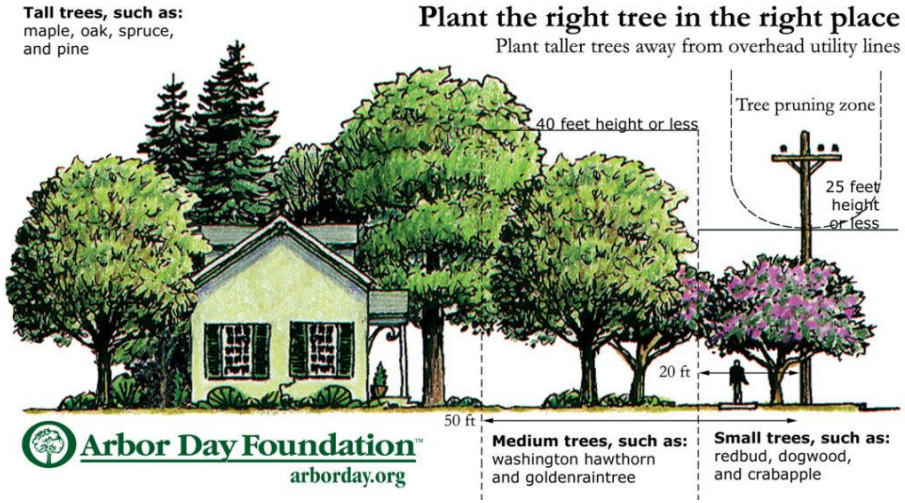
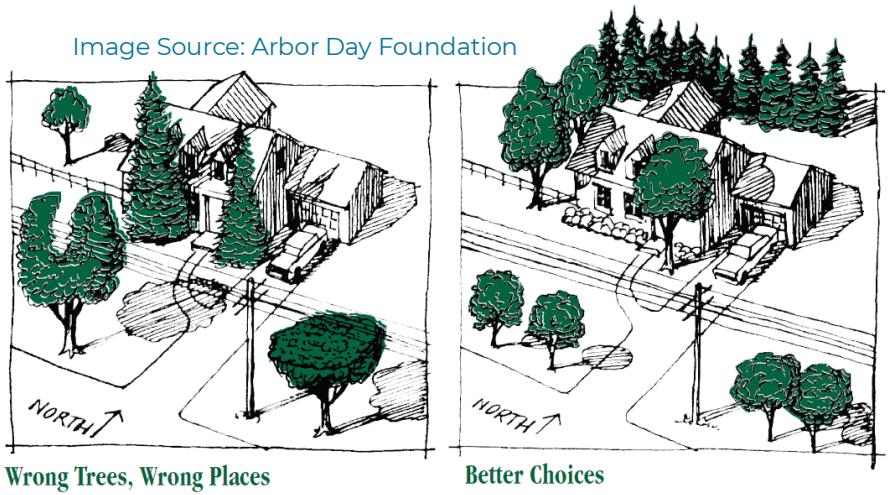


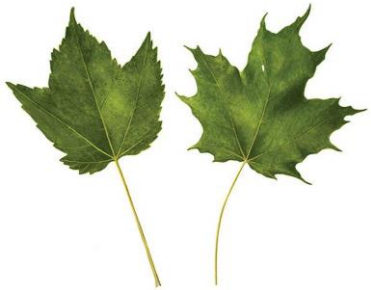
Image Source: Arbor Day Foundation

The Tree Master Plan acknowledges the biodiversity of Norwalk's right-of-way (ROW) and parks in sample inventory analysis of tree species composition. This Plan notes the abundance of maples and oaks and recommends that their quantities should be limited in future plantings. The City Arborist and The Tree Advisory Committee developed planting lists to encourage biodiversity and selection of the right tree for the right place. These lists along with the vulnerability studies for various tree species should be utilized in making planting decisions. Tree selection to promote wildlife should also be taken into consideration.

Image Source: Arbor Day Foundation



The 10-20-30 Rule is a best management practice guideline that suggests an urban tree population should include no more than 10% of any tree species (e.g., red maple), 20% of any one genus (e.g., maples), or 30% of any family (e.g., *Sapindaceae* formerly *Aceraceae*).



This philosophy helps reduce the risk of tree canopy decimation due to infestations of pests or diseases. According to the sample public tree inventory analysis, Norwalk's existing public tree canopy includes more than the recommended 30% of maples. Therefore, to promote diversity, the City should prioritize planting other tree species.

Growing Space

Soil volume is directly related to tree size and life expectancy. When selecting a location for a tree, it is important to consider the growing space both above and below ground. Priority should be given to areas that offer the most soil volume. Trees planted in restricted soil volumes may survive but will not reach their mature size. It is important to note that street trees planted in urban environments with limited soil volumes have an average lifespan of 7-10 years.

BUDGETING FOR SOIL VOLUME

When planning to plant a tree in the grass median between a curb and sidewalk, it is important to consider soil volume. Adequate soil volume is crucial for tree growth and survival. If the planting strip is less than three feet wide, the use of structural soil, structural cells, or suspended sidewalks should be considered. While this will increase the planting costs, larger trees provide greater environmental benefits over time and reduce replacement costs. Similar locations in the BROW should be evaluated for alternative tree locations, as these areas generally offer more soil volume.

PLANTING RECOMMENDATIONS

The Connecticut Tree Owner's Manual is a reference guide that addresses tree selection, tree installation and tree maintenance. Below are the minimum planting requirements:

Time of Planting (dependent upon temperatures)

- Deciduous Trees: (Spring) March 15 to May 15 or (Fall-Preferred) September 15 to December 15
- Evergreen Trees: (Spring) March 15 to May 15 or (Fall-Preferred) September 1 to November 15

Site Selection

Assumed on public land, first obtain a tree planting permit from the City Arborist, then confirm no underground utilities.

Planting Area Size Requirements

- Tree Well Size: 5' width x 10' length x 3' depth minimum (150 cubic feet of soil).
- Follow Recommend Soil Volumes and Permeable Area recommendations according to best practices. Below is a modified chart with adjusted soil depth to the recommended three-foot depth.
    - Use structural cells (recommended), structural soil, suspended walks in combination with permeable paving to achieve required soil volumes and permeable area.

Table 15. Soil and site requirements for trees of various sizes at maturity

Tree Size	Soil Volume	Soil Surface Area with 3' Soil Depth	Permeable Surface Area Requirement
Very Small	217 cubic feet	72 square feet (approx. 8.5' x 8.5')	25 square feet (5' x 5')
Small	867 cubic feet	294 square feet (approx. 17' x 17')	100 square feet (10' x 10')
Medium	3,468 cubic feet	1,141 square feet (approx. 34' x 34')	225 square feet (15' x 15')
Large	7,500 cubic feet	2,681 square feet (approx. 50' x 50')	400 square feet (20' x 20')

Species Selection

- Analyze sun, salt, and wind exposure, available growing space, aboveground utilities, and hardiness zone.
- Select a tree from the City's approved tree list.
- If planting in a TreePlotter identified location, refer to noted TreePlotter sizes (small, medium, large) as this refers to the suggested tree size.

Tree Size

2.5" minimum caliper; 5' minimum, 6' preferred branching height for trees in a sidewalk or adjacent.

Tree Selection

Purchase a well-shaped, fully branched, healthy, vigorous tree that's free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

Tree Planting

Refer to the Connecticut Tree Owner's Manual for full recommendations.

Minimum Required Planting Recommendations

- Remove all tags, twine, or wrapping from the tree.
- Dig the hole to be three times the width of the root ball.
- Dig the hole to match the depth of the root ball.
- Locate the trunk flare and remove soil if necessary.
- For balled and burlapped trees: Cut the twine and unfold the burlap.
- For containerized trees: Remove the entire container, expose the trunk flare, and loosen the roots if they are matted from the container.
- Set the tree upright and centered in the planting pit or trench, with the root flare two inches above the adjacent finished grade.
- After placing some backfill around the root ball to stabilize the tree, carefully cut and remove the burlap, rope, and wire baskets from the tops and sides of the root ball, but do not remove them from under the root ball. Do not use planting stock if the root ball is cracked or broken before or during the planting process.
- Backfill around the root ball in layers, tamping to settle the soil and eliminate voids and air pockets. When the planting pit is approximately half-filled, water thoroughly before placing the remainder of the backfill. Repeat watering until no more water is absorbed. Continue the backfilling process. Water again after placing and tamping the final layer of soil.

TYPICAL TREE PLANTING IN LAWN

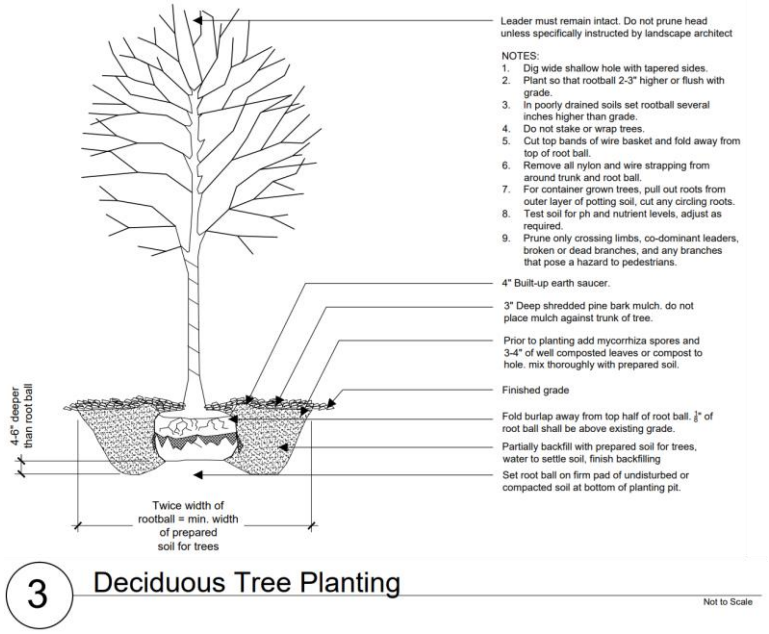


Figure 43. City of Norwalk's specifications for deciduous tree planting

TREE PLANTING WITH STRUCTURAL SOIL

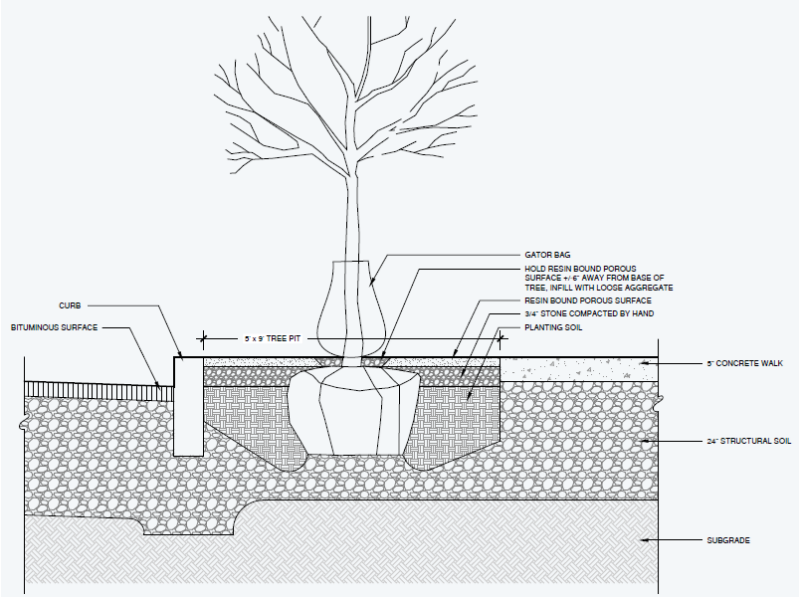


Figure 44. Recommended specifications for planting with structural soil

TREE PLANTING WITH ADJACENT STRUCTURAL CELLS UNDER WALK

KEY PLAN

- (A) STRUCTURAL CELL SYSTEM (DECK, BASE, AND POSTS)
- (B) SUBGRADE, COMPACTED
- (C) GEOTEXTILE FABRIC, PLACED ABOVE SUBGRADE
- (D) 4" MIN AGGREGATE SUB BASE, COMPACTED TO 95% PROCTOR
- (E) STRUCTURAL CELL BASE SLOPE, 10% MAX
- (F) 1" TO 6" SPACING BETWEEN STRUCUTRAL CELLS AT BASE
- (G) ANCHORING SPIKES, CONTACT DEEPROOT FOR ALTERNATIVE
- (H) GEOGRID, WRAPPED AROUND PERIMETER OF SYSTEM, WITH 6" TOE (OUTWARD FROM BASE) AND 12" EXCESS (OVER TOP OF DECK)
- (I) CABLE TIE, ATTACHING GEOGRID TO SILVA CELL AT BASE OF UPPER LEG FLARE, AS NEEDED
- (J) PLANTING SOIL, PER PROJECT SPECIFICATIONS, PLACED IN LIFTS AND WALK-IN COMPACTED TO 75-85% PROCTOR
- (K) COMPACTED BACKFILL, PER PROJECT SPECIFICATIONS
- (L) GEOTEXTILE FABRIC TO EDGE OF EXCAVATION
- (M) RIBBON CURB AT TREE OPENING (TO BE USED WITH PAVERS OR ASPHALT)
- (N) THICKENED EDGE AT TREE OPENING (TO BE USED WITH CONCRETE)
- (O) PAVEMENT AND AGGREGATE BASE PER PROJECT *
- (P) DEEPROOT ROOT BARRIER, 12" OR 18", DEPTH DETERMINED BY THICKNESS OF PAVEMENT SECTION, INSTALL DIRECTLY ADJACENT TO CONCRETE EDGE RESTRAINT
- (Q) PLANTING SOIL BELOW ROOT BALL, COMPACTED WELL TO PREVENT SETTLING
- (R) ROOT BALL
- (S) TREE OPENING TREATMENT, PER PROJECT SPECIFICATIONS
- (T) GATOR BAG

*MINIMUM PAVEMENT PROFILE OPTIONS TO MEET H-20 LOADING

PAVEMENT	+ AGGREGATE BASE COURSE
4" CONCRETE	+ 4" AGGREGATE
3" PAVER	+ 12" AGGREGATE
4" ASPHALT	+ 12" AGGREGATE
2.6" PAVER	+ 5" CONCRETE

NOTES

1. **SEVERAL STRUCUTRAL CELL PRODUCTS ARE AVAILABLE: SILVA CELLS AND STRATACELLS ARE TO NAME TWO.**
2. EXCAVATION SHALL BE DONE IN ACCORDANCE WITH ALL APPLICABLE HEALTH AND SAFETY REGULATIONS
3. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS
4. PROVIDE SUPPLEMENTAL IRRIGATION
5. DO NOT SCALE DRAWINGS

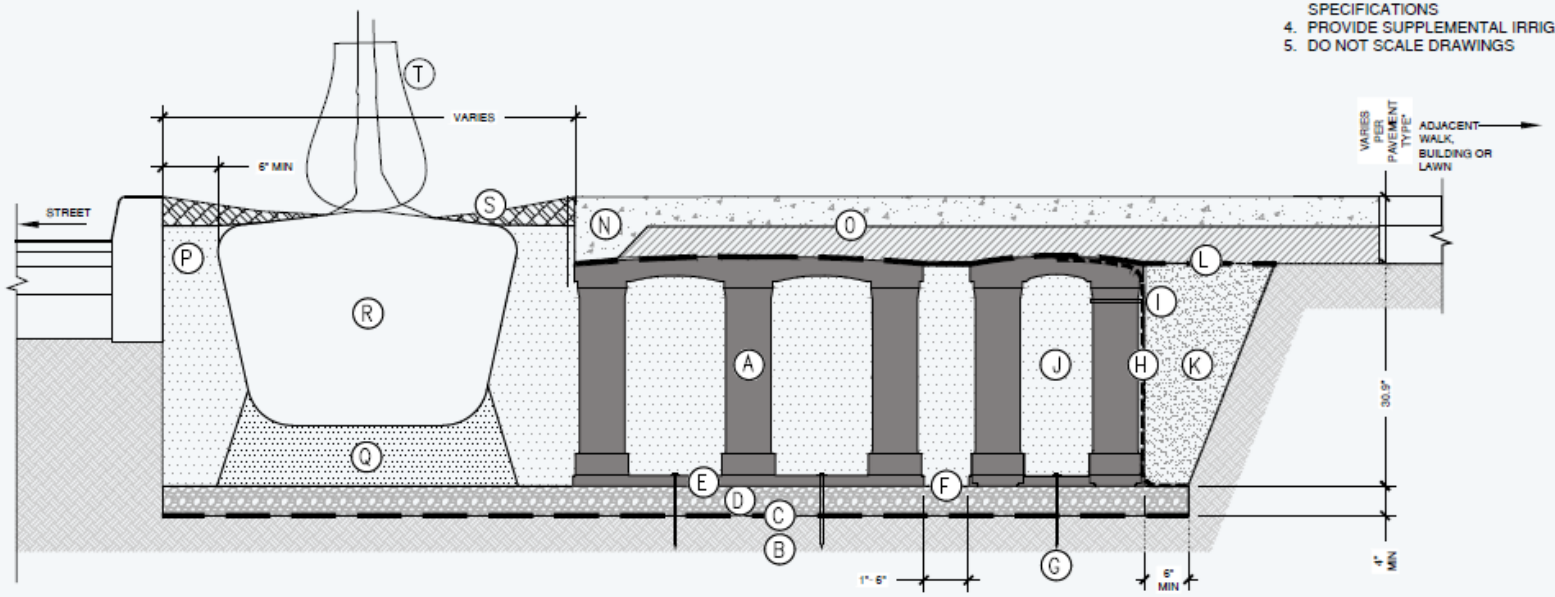


Figure 45. Recommended specifications for planting with adjacent structural cells under walkways





SECTION 5: URBAN FOREST MANAGEMENT STRATEGY

Learn about the standards and best practices for managing public trees, tree risk, storms, pests and diseases, and wood waste along with the structures, programs, and resources necessary to meet the levels of service required.

Overview of the Management Strategy

The City of Norwalk has already made significant strides in sustainable urban forest management. For example, the City's Tree Planting Program has successfully increased canopy cover in underserved neighborhoods, enhancing both environmental and social benefits. Additionally, the City's participation in the Tree City USA program underscores its commitment to maintaining a healthy and vibrant urban forest. Through these efforts, the City of Norwalk is not only preserving its natural heritage but also creating a greener, healthier future for all its residents.

Norwalk is committed to fostering a sustainable and resilient urban forest that enhances the quality of life for its residents. The Urban Forest Management Strategy section within the Tree Master Plan provides the City with the guidance needed to ensure the health and longevity of its public trees and it supports citywide urban forest management. This strategy will prioritize the maintenance of public trees to mitigate risks and ensure public safety, including regular inspections and assessments to identify and address potential hazards. With this strategy, routine maintenance activities, such as pruning and watering, will be systematically addressed to ensure that all public trees receive the care they need. To promote strong structure and longevity, young trees will undergo formative pruning, helping shape them during their early years, reducing future maintenance needs, and enhancing their resilience.

The strategy also guides the City in actively monitoring and managing tree pests and diseases, employing integrated pest management strategies to minimize the impact of harmful organisms. Additionally, the strategy includes guidance for storm preparedness and response, encompassing pre-storm tree assessments and post-storm recovery efforts to quickly address any damage. Committed to sustainable practices, the City will utilize wood waste by repurposing fallen trees and branches for mulch, compost, and other beneficial uses, reducing waste and supporting the local ecosystem.

This strategy will rely on accurate and up-to-date data, and the City will utilize advanced data management systems to track tree health, maintenance activities, and other critical information. By adhering to industry standards and best practices in all aspects of urban forest management, the strategy will ensure that the highest level of care is provided to the urban forest. The success of the Urban Forest Management Strategy will depend on a well-structured program and adequate resources, with the City allocating the necessary funding and personnel to support these initiatives.

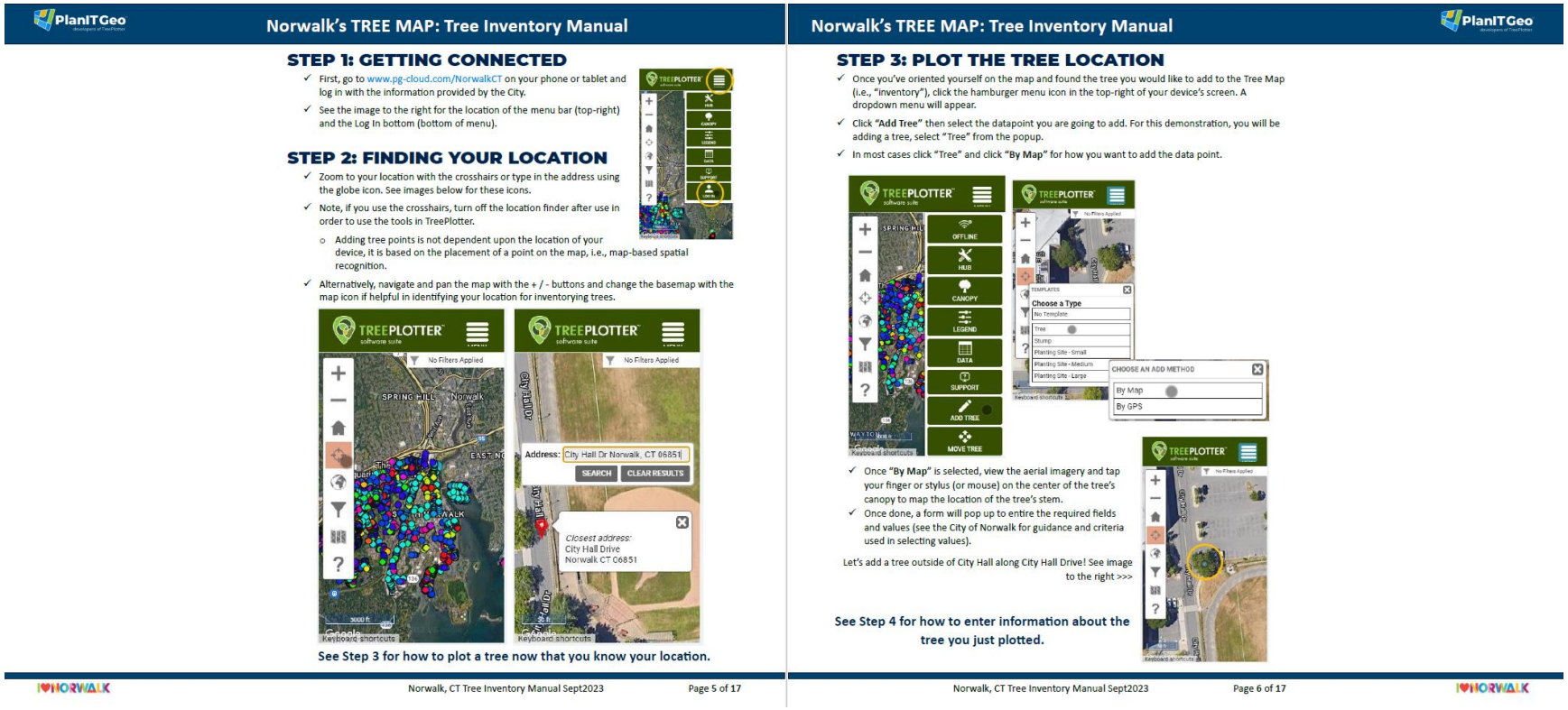
Public Tree Inventory and Data Management

The foundation of a sustainable municipal urban forest program is a comprehensive understanding of the public trees under its purview. Cities across the country conduct inventories of public trees to understand the location, composition, structure, and other information to inform data-driven strategies, programs, and budgets.

A comprehensive tree inventory in public areas will provide essential data on their condition, maintenance needs, and risks. This information will help prioritize tree care, optimize urban forestry services, and develop policies to maximize benefits and minimize hazards. It will also identify resources needed for a sustainable, safe, and resilient urban forest.

The City of Norwalk's street maintenance crews provide services to mitigate hazards observed or reported to them. However, the program is primarily reactive due to limited resources and a lack of current tree inventory data. The most recent data currently available is from a sample street tree inventory conducted in 2023 of 4,190 public trees. As of March 2025, the City is actively evaluating options for updating and expanding the inventory.

Figure 46. Example of the City's TreePlotter software application and the Tree Inventory Manual provided as part of the Tree Master Plan project



Proactive Public Tree Maintenance

One measure of sustainable management is the number of years it takes to prune all public trees, also referred to as the pruning cycle. Routine maintenance is the most cost-effective short- and long-term pruning management strategy for street tree maintenance. Efficiencies in mobilization, scheduling, and service tracking allow preventive and reactive maintenance to be performed in one operation, reducing the need for future priority pruning. Conversely, street trees that are not pruned on a regular cycle are frequently more costly to maintain when the need arises. A programmed pruning cycle of 5 to 7 years is typically recommended for public street trees. Studies show a decline in tree health and increase in maintenance costs associated with longer pruning cycles (Miller, et al., 2015).

According to § 112-7 "Altering or damaging City trees, City shrubs or required trees" in Norwalk's City Code,

> "Any person wishing to prune a City tree, City shrub or required tree shall apply in writing for a permit to the Tree Warden prior to taking such action. Each application to prune a City tree, City shrub or required tree shall be subject to a fee established in accordance with § 90-4, Approval of rates and fees."

Public street tree maintenance is a shared responsibility between the City and adjacent property owners. Best practices suggest the City should handle routine maintenance, but Norwalk needs more resources to implement a proactive 5- to 7-year maintenance program. To manage the 25,000 public trees effectively, the City should identify funding, staffing, and equipment needs, and consider contracted services for immediate maintenance, especially in underserved areas. This approach assumes all 25,000 trees include both street trees and those in public parks.

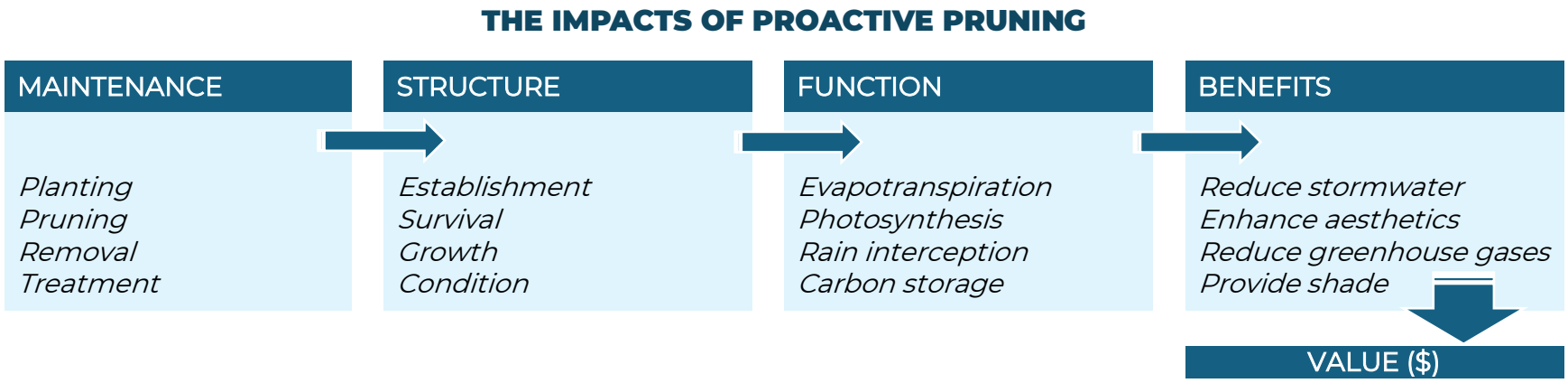


Figure 47. Diagram showing the impacts that proactive tree maintenance has on tree structure, function, and benefits

IDENTIFYING RESOURCES

- Funding: Explore municipal budgets, grants, and local partnerships. A dedicated urban forestry budget ensures consistent support for tree maintenance and planting.
- Staffing: Hire certified arborists and urban forestry professionals. Assess current staffing and train existing staff in tree care and risk management.
- Equipment: Invest in essential tools, trucks, and data management software. Evaluate current equipment and address any gaps.
- Contracted Services: Use contracted services for immediate and large-scale maintenance, especially in underserved areas, to ensure urgent tasks are promptly addressed.

PRUNING PROGRAM

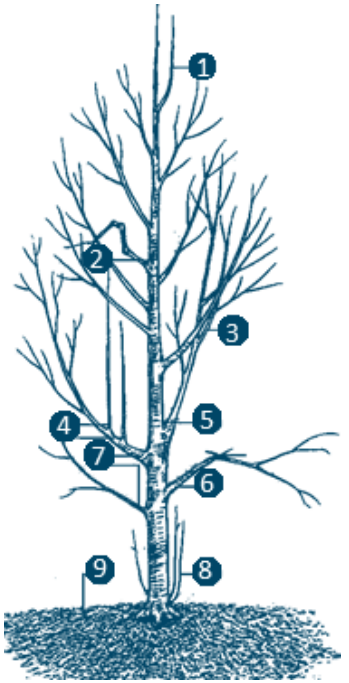
To maintain a 7-year pruning cycle for 25,000 trees, the City would need to prune approximately 3,571 trees per year (or 5,000 per year for a 5-year cycle). This 7-year cycle helps ensure that each tree receives attention regularly, promoting health and reducing risks.

ESTIMATED TIME AND COSTS

- Time: Assuming each tree takes 1 hour to prune, the City would need about 3,571 hours annually. A 3-person crew (one supervisor and two arborists) is recommended, using equipment like a bucket truck, chipper, chip truck, pickup truck, skid steer, chainsaws, cleanup tools (rakes, shovels, blowers), and personal protective equipment (PPE: hardhats, glasses, earplugs, gloves, boots, and chainsaw chaps).
- Costs: If the average cost per tree is $100, the annual cost would be about $357,100 (can vary based on local labor rates and specific tree needs). With a full tree inventory, the City can determine the number of young trees eligible for a 3-year formative pruning program. This program would address post-planting care and structural pruning to minimize future costs and support tree health and longevity.

Note, this section does not include approaches for public tree removals and stump grinding. In general, trees over a certain height (e.g., >75 feet), diameter (e.g., larger than 24 inches), and complexity (e.g., proximity to wires or a crane is required) would require contracted services.

YOUNG TREE FORMATIVE 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 48. Illustration and description of formative tree pruning for young trees (Source: Arbor Day Foundation)

INVENTORY AND DATA MANAGEMENT

Maintaining an up-to-date tree inventory is essential for implementing an effective pruning program. The inventory should include details such as tree species, size, health (i.e., condition) status, location (spatially located), and maintenance needs/history. This data supports planning and prioritizing maintenance activities, ensuring resources are allocated efficiently.

As maintenance occurs and new trees are planted, the inventory must be updated to reflect these changes. This ongoing data management helps track progress, identify trends, and adjust strategies as needed. For considering tree inventory management software, a supporting report was developed as part of Norwalk's Tree Master Plan ("Norwalk Tree Inventory & TreePlotter Manual Sept2023").



Figure 49. Tree inventory software is accessible on smartphones and tablets to actively manage maintenance needs and record observations

MONITORING FOR PESTS, DISEASES, AND RISK MITIGATION

During maintenance activities, certified staff should monitor trees for abiotic and biotic stressors and signs of pests, diseases, and potential risks. Early detection and intervention can prevent widespread issues and maintain the overall health of the urban forest. Regular monitoring also supports public safety by identifying and mitigating tree-related hazards.



Abiotic Factors

Abiotic stresses are caused by changes in the environment, such as precipitation, heat, and soil around the tree that alter or interfere with the tree's natural processes. These can be harder to diagnose because they can take several years to manifest in visible ways.

Biotic Factors

A biotic stress is caused by a living organism, such as insects, fungi, or bacteria predating or parasitizing on parts of or the whole tree. Most biotic pests have coevolved in conjunction with a species of tree and have become specific to those trees.

Abiotic and biotic factors can affect tree health and accelerate decline

Figure 50. Illustration and definition of the types of tree stressors

ENGAGING THE COMMUNITY IN PROACTIVE TREE MAINTENANCE

The City's Urban Forestry Program and tree maintenance crews should utilize inventory data and monitor the trees that are structurally pruned to support future budgetary and staffing requests. The City should also continue its efforts in raising awareness and educating the public about:

- The City's and the community's role in care and maintenance of street trees.
- The City's public tree ordinance (Chapter 112 "Trees") in City Code.
- The importance of utilizing Certified Arborists to perform tree care.
- Responsibilities of adjacent property owners, including watering existing trees and obtaining a permit before planting, pruning, or removing a street tree.
- Proactive pruning reduces per-tree costs compared to reactive pruning done in response to storm damage.
- Proactive pruning eliminates clearance issues and immediate risks.
- Early identification and correction of insect and disease problems can reduce tree mortality.
- Properly pruned trees develop correct form and structure and are less susceptible to storm damage.
- Trees pruned on a regular cycle, especially when young, require less work in the future, lowering costs.
- Pruning before trees become hazardous reduces the number of tree-related service requests, decreasing response time.
- Proactive tree pruning helps to create a healthy, sustainable, and resilient urban forest.

The City should inform property owners about best management practices and the costs of tree maintenance. Studies estimate an average annual maintenance cost of $19 per medium-size public street tree over a 40-year lifespan, covering planting (15%), pruning (45%), plant health care (35%), and removal (5%) (McPherson et al., 2016). Early intensive care, including adequate watering and pruning in the first 5 years, is crucial for tree survival and can reduce long-term costs.

Property owners can help by monitoring trees for pests, diseases, and hazards, and contacting the City for maintenance. Planting and caring for trees on private property also enhances the urban forest. Follow "right tree, right place" guidelines: www.arborday.org/trees/righttreeandplace/.

Public Tree Risk Management

Risk management is a well-established concept in the management of public spaces. Acceptable levels of risk have been recognized or defined for most basic infrastructure elements, such as sidewalks, streets, playgrounds, and utilities. In many communities, these elements are assessed and managed according to acceptable levels of risk that are specified within written policies or enacted through management practices. A successful risk management program provides a systematic approach to implement corrective actions within a reasonable timeframe.

Tree risk is managed in much the same way. Trees are evaluated for their potential to injure people or damage property. For Norwalk, tree hazard abatement work could be prioritized in the following manner →→→

Emergency: An immediate threat to person, property, or commerce. Example: Tree uprooting and leaning toward a busy playground or a tree fallen and blocking all lanes of traffic on an arterial street.

Urgent: A threat to life, property, or commerce that can be barricaded and made safe until the risk can be mitigated. Example: Large broken branch over the sidewalk in front of an elementary school.

Priority 1: Significant and obvious danger. Example: dead tree in poor condition, serious traffic hazard, broken limbs, fallen trees.

Priority 2: Hindrance or nuisance but not an immediate danger. Example: Dead trees which are still solid, trimming of dead wood and low limbs over sidewalks, minor traffic hazards.

Priority 3: Routine maintenance that presents either a low or no safety risk. Examples: Minor trimming, limbs safely down on the ground/trunk removal in low use areas.

Norwalk should include both in-house and contracted crews under annual agreements for its hazard abatement program. These crews should handle tree care for trees on or affecting City-owned property. The program should aim to receive over 3,000 service requests annually and address thousands of trees, maintaining positive feedback.

Risk assessors should maintain the International Society of Arboriculture's Tree Risk Assessment Qualification (TRAQ), and the City should continue applying the American National Standards Institute's (ANSI) A300 Standards. Additional details should be provided in the Recommendations Section of the Technical Report to the Urban Forest Master Plan, under Tree Risk Management.

Urban Forest Storm Preparedness and Response

The purpose of preparing an emergency storm preparedness plan is to mitigate, respond, and recover from an emergency or natural disaster in a timely manner. For Norwalk, having a comprehensive tree inventory is crucial to this effort, as it provides essential data on tree conditions, maintenance needs, and potential risks. Proactive maintenance, informed by this inventory, ensures that trees are healthy and less likely to cause damage during storms. Effective coordination among City departments, local partners, and regional agencies is also vital to streamline efforts and resources, ensuring a swift and efficient response to emergencies. By integrating these elements, Norwalk can enhance its resilience and protect both its urban forest and community.

According to the FEMA National Risk Index (www.hazards.fema.gov/nri/map), Fairfield County is in the 95.45 percentile nationally, and in the 100.00 percentile in Connecticut. Nationally rated risk percentiles include strong winds (99.1), ice storms (97.6), hurricanes (97.0), coastal flooding (96.0), earthquakes (88.0) and heat waves (84.8). These high ratings for the County emphasize the need for Norwalk to establish or update protocols, strategies, and resources for storm preparedness, response, and recovery.

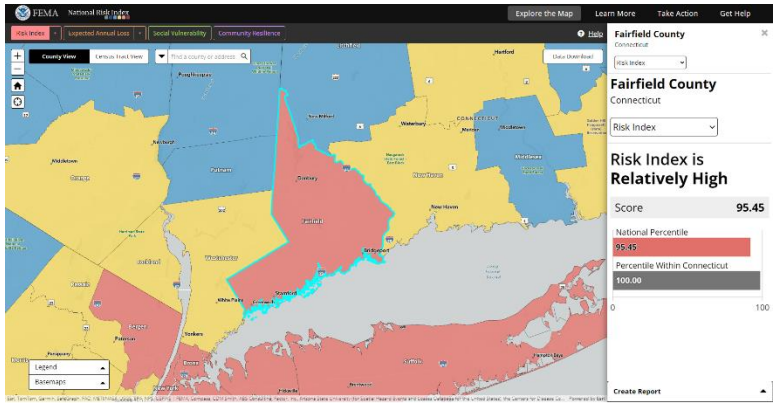


Figure 51. FEMA's National Risk Index for Fairfield County, CT

Objectives of a storm response and disaster preparedness plan:

- Reduce the amount and severity of the damage and losses to people, property, the economy, and the environment that results from tree failures during storm events.
- Reduce tree canopy cover losses resulting from storm events.

Purpose of the plan:

- Provide information and set policies.
- Describe actions to be taken related to trees and the urban forest.
- Effectively prepare for, respond to, and recover from a storm event.
- Support the expansion of funding resources for tree maintenance, debris management, and post-storm tree replacement.

Key components of the plan:

- Prep: Assessments, planning, communication, and agreements.
- Response: Mobilization, debris management, damage assessment, and record-keeping.
- Recovery: Analysis, tree replacement, and mitigation.

Access a plan template at: www.gicinc.org

Urban Wood Waste Utilization

Norwalk may consider shifting from a contractor-focused tree maintenance program to one managed by City crews. This change could lead to a sustainable and cost-efficient wood waste utilization program, reducing expenses and supporting community initiatives. Wood waste in Norwalk comes from tree removals, pruning, curb-side pick-up, and resident drop-off.

The City has a yard waste site for tree and yard debris from permitted community members. Residents are encouraged to compost at home and mulch grass clippings into their lawns. Yard waste, including leaves, brush, and grass clippings, is processed into mulch for community gardens, park trails, and erosion control. The Department of Public Works manages yard waste collection and disposal, producing wood chips for various projects. The Norwalk Transfer Station & Recycling Center also processes clean wood waste for recycling and reuse. Larger wood debris, like tree logs, could be repurposed by local woodworkers if a market exists.

Urban wood waste utilization promotes a circular economy, conserving natural resources and reducing greenhouse gas emissions. Reusing or recycling wood waste enhances resource efficiency and minimizes waste. Programs for repurposing urban wood support environmental sustainability, economic growth, and community development through local job creation and green initiatives.

Urban wood is often underused, seen mostly as an expense. However, there are cost-effective alternatives with environmental and economic benefits. Many communities made an opportunity out of the devastation caused by emerald ash borers to their ash tree population. Economically, urban wood utilization can recover tree removal costs, reduce disposal fees, and generate community income. Environmentally, it conserves forest resources, reduces landfill waste, stores carbon, and minimizes transportation emissions. Socially, it educates the public about tree value and urban forest management, connects people to nature, and supports local economies. Uses for urban wood include high-value products, mulch, and energy sources.



Figure 52. Examples of urban wood waste utilization from left to right: Portable sawmill processing a high-value cherry log; a mulch yard in Southington; a wood chip burning firebox at Hotchkiss School where the wood ash is then used as a soil amendment (Source: CT DEEP Division of Forestry, June 2014)

RECOMMENDED URBAN WOOD WASTE UTILIZATION STRATEGY

The following will enable Norwalk to identify opportunities to expand the program and strengthen its efforts toward sustainable management of the urban forest.

1) Assess Wood Waste Generation
   - ❖ Complete a comprehensive public tree inventory and determine the amount of wood waste generated from public tree management operations, its sources, and current distribution methods.
2) Document Procedures and Protocols
   - ❖ Develop and document procedures for alternatives to mulching and landfilling woody debris from public tree maintenance. Most debris from hazard abatement and storm cleanup could be mulched and made available for free pickup by residents if it is not used for City-led planting projects or other uses of mulch. Continue these efforts while expanding the reuse of logs for wood products such as furniture.
   - ❖ Establish clear protocols with information on mulch drop-off/pick-up sites and woodworkers accepting wood waste to streamline the program. Include tracking and reporting of wood volume generated and establish a City Tree Debris Standard Operating Procedure.
3) Quantify Carbon and Waste Diversion Impacts
   - ❖ Use wood volume tracking data to quantify the amount of carbon sequestered and repurposed through wood utilization. Assess the reduced costs associated with the program and the increased public awareness and engagement.
   - ❖ Expand the wood utilization program and network of woodworking facilities using the collected data and protocols. Consulting firms like Cambium Carbon can assist with stakeholder engagement, biomass inventories, strategy development, impact studies, community education plans, business models, and revenue opportunities.
4) Engage Private Tree Care Companies
   - ❖ Increase awareness and provide opportunities for private tree care companies to support sustainable practices such as urban wood utilization. Offer guidance and best practices for participating in wood waste reuse programs and activities.

Short-Term Target

Measure the current amount of wood volume repurposed annually and estimate the potential volume generated by expanding the program. From the engagement workshops in March 2025, it was identified that the stakeholders and general public would like to see the City's Firewood Program revitalized. Revamping this program may be a starting point for a robust urban wood waste utilization strategy.

PROGRAM STRUCTURE AND RESOURCES

During the development of Norwalk's Tree Master Plan, it was identified that the tree programs in the City collectively referred to as the Urban Forestry Program are under the purview of a combination of City departments and divisions with support from the Tree Advisory Committee and community partners.

Staff feedback during the planning process indicated a need to clarify the program structure (see Figure 54) and possibly the need to create an Urban Forestry Division in the future to support the growing need as the current program outgrows its capacity. Other feedback included clarifying roles and responsibilities to improve the levels of service, coordination and collaboration, and efficiencies. The following provides a summary of the effects of consolidated tree-related programs and services into one City department or program along with a recommended approach to implement changes. Further analyses and studies should be conducted before adopting and implementing any changes.

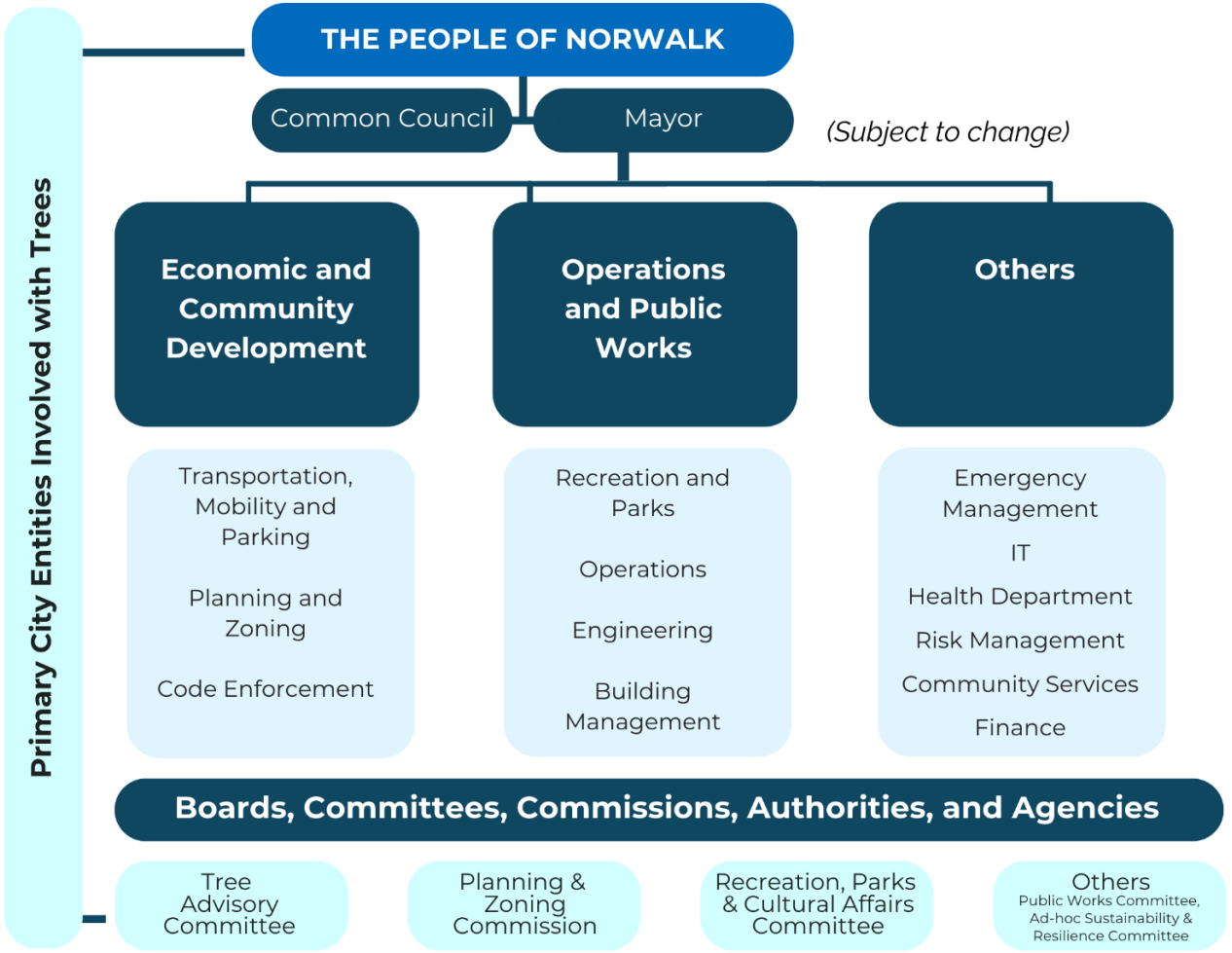


Figure 53. The City's organizational structure recreated to highlight tree-related departments, divisions, boards, and committees

Consolidating tree programs and services into a single department or division may be considered for several reasons:

- **Improved Coordination and Efficiency**
  - Streamlined Processes: By housing all tree-related activities under one roof, the City can streamline processes, reducing duplication of efforts and ensuring that all tree management activities are aligned.
  - Clear Communication: A single department can facilitate better communication and coordination among staff, leading to more efficient decision-making and implementation of tree-related projects.
- **Consistent Policies and Standards**
  - Unified Approach: Consolidation allows for the development and enforcement of consistent policies and standards for tree care and management across the City.
  - Standardized Procedures: With one department overseeing all tree-related activities, procedures can be standardized, ensuring that all trees are managed according to the same high standards.
- **Enhanced Resource Allocation**
  - Focused Budgeting: A single department can manage a unified budget for all tree-related activities, allowing for more strategic allocation of resources.
  - Specialized Staffing: Consolidation enables the City to hire and train specialized staff who are dedicated to urban forestry, leading to higher quality care and management of trees.
- **Better Data Management**
  - Centralized Information: A consolidated department can maintain a centralized database of all tree-related information, making it easier to track tree health, maintenance needs, and other important data.
  - Improved Planning: With comprehensive data at their fingertips, City planners can make more informed decisions about tree planting, maintenance, and removal.

❖ Enhanced Public Engagement and Education

- Single Point of Contact: Residents will have a single point of contact for all tree-related inquiries and concerns, improving customer service and public satisfaction.
- Focused Outreach: A dedicated department can develop targeted outreach and education programs to engage the community in urban forestry initiatives.

❖ Environmental and Community Benefits

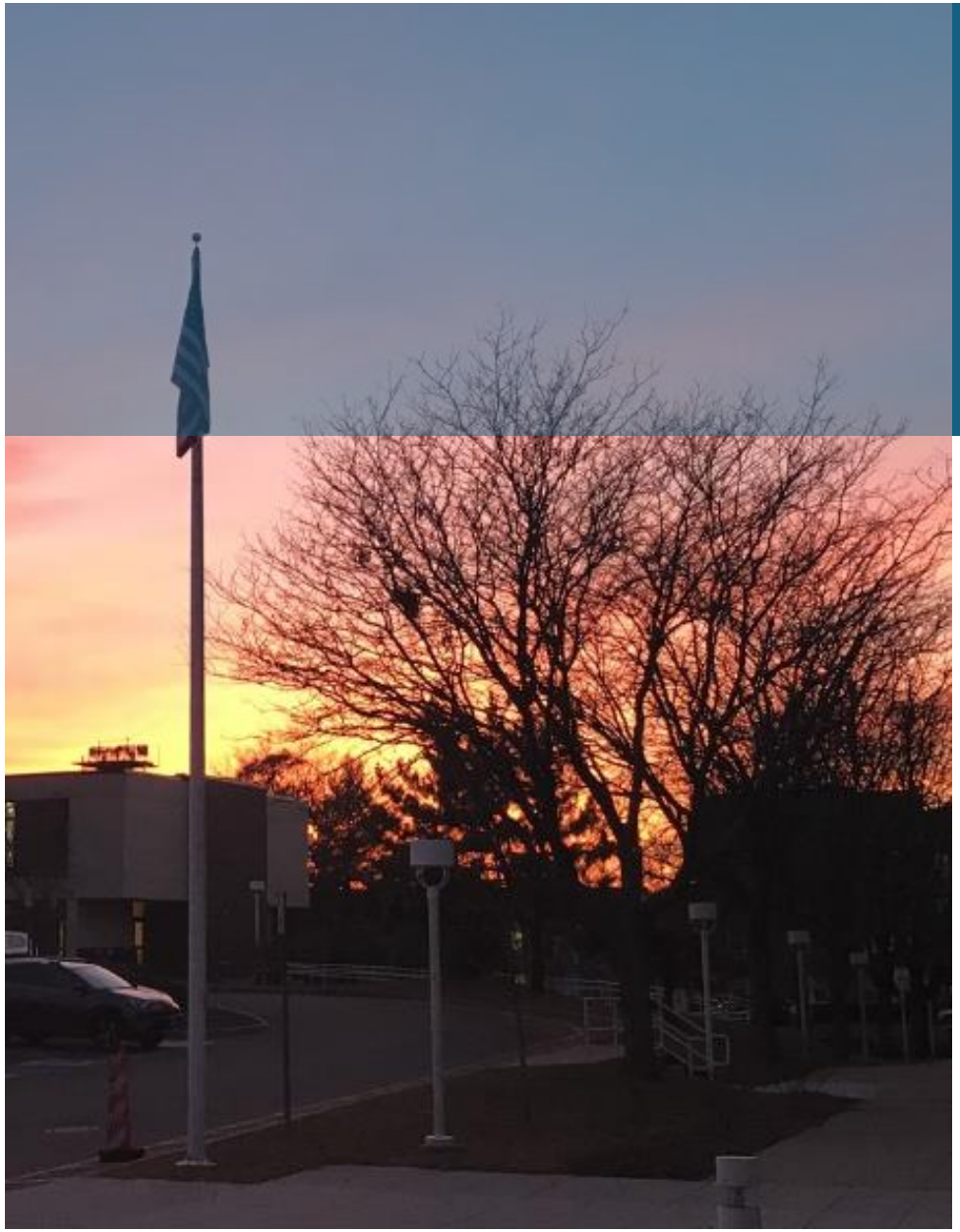
- Healthier Urban Forest: Consolidation can lead to better care and management of the City's trees, resulting in a healthier urban forest that provides numerous environmental benefits, such as improved air quality, reduced urban heat island effect, and enhanced biodiversity.
- Community Well-being: Well-managed urban forests contribute to the overall well-being of the community by providing aesthetic beauty, recreational opportunities, and mental health benefits.

❖ Long-term Sustainability

- Strategic Planning: A single department can develop and implement long-term strategic plans for urban forestry, ensuring the sustainability of the City's tree canopy for future generations.
- Resilience: Consolidation can enhance the City's ability to respond to challenges such as pests, diseases, and climate change, making the urban forest more resilient.

The City of Norwalk's departments responsible for public street trees, park trees, and trees in private developments can significantly enhance their protocols, coordination, and collaboration by adopting a more integrated approach. Whether or not tree staff are consolidated into a single department, establishing clear communication channels and shared goals across departments is essential. By leveraging tree inventory data, departments can prioritize maintenance and planting efforts, ensuring that tree care is proactive and efficient. Collaborative planning with local partners and regional agencies can further align tree-related projects with broader urban development goals. Integrating trees into multiple projects and programs, such as stormwater management, public health initiatives, and community beautification efforts, will maximize the benefits of Norwalk's urban forest, creating a more resilient and vibrant cityscape.





10-YEAR ROADMAP AND NEXT STEPS

Learn about the 10-year roadmap to achieve the strategies set forth in this Plan and learn how all members of the community can take part in the next steps.

Next Steps

The following table outlines the high-level 10-year priority actions for Norwalk's Tree Master Plan, emphasizing the need for a coordinated and strategic approach to achieve the City's tree canopy cover goal of 53% by 2053. To effectively implement and monitor the Tree Master Plan, the City of Norwalk should identify both internal and external stakeholders, formalize internal communications, coordination, and protocols, and begin public messaging immediately to foster a shared commitment to a sustainable urban forest. While the priority actions require additional investments, the Tree Master Plan provides the necessary context to build support for these initiatives, including the Tree Planting Strategy, the Urban Forest Management Strategy, the Storm Preparedness and Response Strategy, the Pest and Disease Management Strategy, the Urban Wood Waste Utilization Strategy, among others. Solidifying the roles and responsibilities of all stakeholders is crucial for the successful implementation of the priority actions presented in the table, ensuring that the City can achieve its long-term urban forestry goals.

By 2053, Norwalk will achieve a 53% tree canopy cover, creating a resilient, sustainable, and vibrant urban forest that enhances the quality of life for all residents. Through strategic initiatives outlined in the Plan, the City will foster environmental stewardship, economic growth, and community engagement. This comprehensive approach will ensure that Norwalk's urban forest thrives, contributing to a healthier, greener, and more connected community for generations to come.

10-YEAR ROADMAP

Table 16. 10-year roadmap by implementation interval

Immediate (Years 2025 & 2026)				
Priority Action Category	Priority Action Description	Lead*	Supporting Role*	Partners*
Tree Planting Strategy	Begin planting 1,604 trees annually, focusing on underserved neighborhoods. City to lead 70% of plantings (1,122 trees per year). Apply the "Right Tree Right Place" principle by planting trees appropriate for the site including above ground and below ground considerations.	DPW & DRP	TMP, ENG, P&Z	Norwalk Tree Alliance, Community Groups
Public Tree Inventory	Complete a comprehensive public tree inventory to inform species and location decisions. Maintain a GIS-based inventory management solution for tracking plantings, maintenance, and removals among other key data for management decisions. Utilize the inventory to report on the ecosystem benefits and services provided by trees and the asset value they contribute.	DRP & DPW	IT	Tree Advisory Committee, Consultants
Urban Forest Management Strategy	Develop proactive public tree maintenance and risk management strategies. Identify priority maintenance corridors beginning in underserved neighborhoods and establish a formal maintenance strategy for trees planted toward the canopy goal.	DPW & DRP	Risk Manager	Tree Advisory Committee
Climate Vulnerability Assessment	Conduct assessments to address climate vulnerabilities and harmful pests/diseases.	DPW, DRP, Con-Com	Sustainability & Resilience	Environmental Agencies, Universities
Organizational Structure Improvement	Review and improve the City's organizational structure for tree programs to align with the needs of this Plan, Norwalk's programs, and the community. Plan for increased service demands given an increase in tree canopy cover, increased community awareness, and the challenges of climate change.	DRP & DPW	City Administration	Tree Advisory Committee
Community Outreach and Engagement	Launch campaigns to build a network of tree stewards utilizing community partners and existing programs.	DRP	City Communications	Norwalk Tree Alliance, Schools, NGOs

Updates to City Plans	Integrate Tree Master Plan information into City plans and policies like the Complete Streets Policy.	P&Z, TMP, ENG	DRP	Tree Advisory Committee
Green Infrastructure Integration	Create more space and soil volume for trees by integrating with green infrastructure and stormwater management.	DPW	ENG, TMP, P&Z, Sustainability & Resilience, DRP	Environmental Agencies
Ordinance and Regulation Review	Review and update Chapter 112 Trees and 2024 Zoning Regulations as needed to align with the Plan's strategies. Continue to support the Legacy Tree Program per Chapter 112.	DPW & DRP	City Legal	Tree Advisory Committee, Common Council
Storm Preparedness and Response	Develop and implement storm preparedness and response strategies as recommended in the Plan. Utilize a comprehensive public tree inventory.	DPW	Emergency Management, DRP	Utility Companies
Urban Wood Waste Utilization	Implement urban wood waste utilization strategies as recommended in the Plan.	DPW & DRP	Sustainability & Resilience	Local Woodworkers, Recycling Centers
Invasive Species Management	Develop and implement invasive species management plans for public open space, parks, natural areas, and properties. Begin by assessing the extent of invasive plant species of concern with a sample inventory or by other means.	DRP	DPW, ConCom	Environmental Agencies, Community Partners & Organizations

* DRP = Department of Recreation & Parks; DPW = Department of Public Works; TMP = Transportation, Mobility & Parking Department; P&Z = Planning & Zoning Department; ENG = Engineering Division; IT = Information Technology Department; ConCom = Conservation Commission; NGOs = Non-governmental Organizations

Short Term (Years 2-5)				
Priority Action Category	Priority Action Description	Lead*	Supporting Role*	Partners*
Expand Tree Planting	Continue planting 1,604 trees annually, focusing on underserved neighborhoods with the City leading 70% of plantings (1,122 trees per year). Address invasive plant species prior to planting in public parks and open spaces.	DPW & DRP	ENG, TMP, P&Z	Norwalk Tree Alliance, Community Groups
Monitor and Report	Regularly monitor and report on tree inventory and health.	DRP & DPW		Tree Advisory Committee
Public Education Programs	Expand public education on tree care and urban forest benefits.	DRP	City Communications	Schools, NGOs
Enhance Green Infrastructure	Further integrate trees with green infrastructure projects.	ENG, TMP, P&Z	DRP	Environmental Agencies
Funding and Budget	Align budgets and secure funding for ongoing and new initiatives.	DRP	City Finance	Agencies, Other
Mid Term (Years 6-10)				
Priority Action Category	Priority Action Description	Lead*	Supporting Role*	Partners*
Sustain Tree Planting Efforts	Maintain the annual planting of 1,604 trees by utilizing the Tree Planting Strategy in the Plan with the City leading 70% of plantings (1,122 trees per year).	DPW & DRP	ENG, TMP, P&Z	Norwalk Tree Alliance, Community Groups
Evaluate and Adjust Strategies	Evaluate the effectiveness of current strategies and adjust as needed. Utilize the Indicators of a Sustainable Urban Forest framework for evaluating and updating strategies.	DRP & DPW		Tree Advisory Committee
Expand Community Engagement	Strengthen community engagement and stewardship programs as a coordinated Citywide effort with strategies to remove barriers to participation by all members of the community.	DRP	City Communications	Norwalk Tree Alliance, Schools, NGOs
Advanced Green Infrastructure Projects	Implement advanced green infrastructure projects integrating trees.	DPW	DRP, ENG, TMP, P&Z	Environmental Agencies
Comprehensive Plan Review	Conduct a comprehensive review of the Plan and policies.	DRP & DPW		Tree Advisory Committee

LONGER TERM CONSIDERATIONS

Long Term (Years 10+)				
Priority Action Category	Priority Action Description	Lead*	Supporting Role*	Partners*
Achieve Canopy Cover Goal	Ensure progress towards the 53% tree canopy cover by 2053 by establishing a Tree Planting Strategy for years 11-20 and 21-30 by priority neighborhood described in the Plan.	DRP & DPW		Tree Advisory Committee, Norwalk Tree Alliance, Community Groups
Sustainable Urban Forest Management	Maintain sustainable urban forest management practices.	DRP & DPW		Tree Advisory Committee
Long-Term Funding Strategies	Develop long-term funding strategies for urban forestry initiatives and the resources (staffing and equipment) to address a growing urban forest with increased service demands and climate change challenges.	DRP	City Finance, Grant Coordinator	Grant Agencies, Private Sector
Periodic Plan Updates	Regularly update the Tree Master Plan and related policies on a 10-year cycle aligned with reassessments of canopy cover and updates to the public tree inventory.	DRP & DPW		Tree Advisory Committee

* DRP = Department of Recreation & Parks; DPW = Department of Public Works; TMP = Transportation, Mobility & Parking Department; P&Z = Planning & Zoning Department; ENG = Engineering Division; IT = Information Technology Department; ConCom = Conservation Commission; NGOs = Non-governmental Organizations

PLAN MONITORING AND ADAPTIVE MANAGEMENT

Revisit Indicators of a Sustainable Urban Forest: Conduct regular reviews of the Indicators of a Sustainable Urban Forest detailed in Section 1, State of Norwalk's Urban Forest to monitor progress and inform updates to strategies and priority actions. Following this framework will enable the City's implementation team to monitor and report progress and adapt strategies as unexpected changes emerge.

It is recommended that the City monitor and report on progress every two years and to gather stakeholder feedback on the progress every five years. At minimum, it is recommended that the City update the Tree Master Plan as needed after year 10, although minor revisions and updates may be needed at year 5. In addition, the City should reevaluate its canopy cover using similar methodology or advanced technology to track changes and inform updates to strategies. Technology now enables communities to reassess canopy cover with high accuracy every two years at a fraction of the cost of 5-10 years ago.

Table 17. Recommended Plan monitoring, reporting, and revising schedule

Task	Description	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Public Tree Inventory	Collect data on the public trees in rights-of-way, maintained areas of parks, and properties. Update regularly.	✔				✔					✔
Progress Reporting	Monitor and report on progress.		✔		✔		✔		✔		✔
Stakeholder Feedback	Gather feedback from stakeholders on the progress.					✔					✔
Canopy Cover Reassessment	Reassess canopy cover using similar or advanced methodology to track changes and inform updates to strategies.		✔		✔		✔		✔		✔
Tree Master Plan Update	Update the Tree Master Plan based on monitoring, canopy assessments, inventories, best practices, and stakeholder feedback.					✔					✔

The Tree Master Plan implementation team may develop their own Plan tracking and reporting system but the following table may be used in tandem with the Indicators of a Sustainable Urban Forest following the schedule in the previous table:

Table 18. Recommended metrics for tracking and reporting Plan implementation progress

Tree Management	Community Engagement	Tree Management Policy
Consider tracking and reporting on the following as feasible:	*Consider tracking and reporting on the following as feasible:*	*Consider tracking and reporting on the following as feasible:*
❖ Ecosystem benefits of the inventoried tree population. ❖ Number of public trees pruned, removed, and planted. ❖ Number of trees managed for pests and diseases. ❖ Number of trees planted in stormwater management projects. ❖ Progress towards canopy goals and tree planting targets. ❖ Volume of woody biomass utilized. ❖ Condition, structure, and diversity of the public trees. ❖ Changes to relevant Indicator scores, actions achieved, ongoing, and not started.	❖ Existing and potential outreach platforms and initiatives. ❖ Existing and potential partners. ❖ Number of planting events and trees planted. ❖ History/count of Tree City USA and supporting awards. ❖ Number of volunteers, events, and volunteer hours. ❖ Number of private tree plantings as feasible. ❖ Number of trainings, workshops, and attendees. ❖ Results of public surveys. ❖ Exemplary urban forest stewards. ❖ Changes to relevant Indicator scores, actions achieved, ongoing, and not started.	❖ List existing and potential partners. ❖ City and partner-led planning efforts. ❖ Related planning efforts. ❖ Canopy goals integrated into policy and planning. ❖ Tree planting targets (number of trees) by neighborhood and / or priority area. ❖ Recommended changes to City Code, policies, and manuals. ❖ Changes to relevant Indicator scores, actions achieved, ongoing, and not started.

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



In order to accomplish the goals, the City should consider the following commitments:

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

Successful implementation of the actions in this Plan will bring Norwalk 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— ultimately achieving the Plan vision: By 2053, Norwalk will achieve a 53% tree canopy cover, creating a resilient, sustainable, and vibrant urban forest that enhances the quality of life for all residents. Through strategic initiatives outlined in the Plan, the City will foster environmental stewardship, economic growth, and community engagement. This comprehensive approach will ensure that Norwalk's urban forest thrives, contributing to a healthier, greener, and more connected community for generations to come.

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APPENDIX A. TREE-RELATED REQUIREMENTS IN NORWALK'S ZONING REGULATIONS

Article 4: Building & Lot/Building Site Standards

4.3.16 Private Landscape Standards

B. Maintenance of Landscaping.

- Landscaping must be properly maintained by the property owner and successors.
- Plantings must be kept attractive and healthy, including watering, mulching, fertilizing, pest management, mowing, weeding, litter removal, and pruning.
- Dead or diseased plantings must be removed and replaced.
- Natural water courses within buffers must be maintained naturally.
- A water source must be within 100 feet of any planting requiring watering; non-native or non-drought tolerant plants need an irrigation system.
- Landscape structural features must be maintained safely and attractively.
- Pedestrian, bike, or other trails within buffers must be maintained for safe use.
- Maintenance standards are enforceable by the Planning and Zoning Director, with costs recoverable.
- A one-year maintenance bond is required for city-owned plantings.

C. Removal of Walls or Trees.

- Approval is required from the Decision-Making Authority to remove any existing walls or trees.
- Trees within 30 feet of any street or internal drive line, or within 50 feet of a Special District or CD-1L, CD-1M, CD-1S, or CD-2 District boundary, with a diameter of 8 inches or more (measured 3 feet from the base), cannot be removed without approval.
- Walls or trees shown on a Site Plan or Sketch Plan submitted with a Zoning Permit application for Exempt Development or Construction cannot be removed without approval.

D. Plant Material Standards and Sizes.

- All required plant materials must meet American Standards for Nursery Stock.
- Plants should be native to Connecticut, except for screening purposes.
- When planting more than 20 trees, a mix of genera is required to ensure diversity.

- Shrubs must reach a minimum height of 24 inches within 12 months and be spaced 40 inches apart when used as a hedge.
- Canopy trees need a planting area at least 10 feet wide; accent and substitution trees need at least 8 feet wide.
- Plants must be mulched at least 3 inches deep, keeping mulch away from tree trunks.
- Foundation plantings must be within 5 feet of the building perimeter or in planter boxes if not feasible.
- Screening plant materials must be evergreen with at least 90% opacity.
- Trees must be a minimum of 2.5 inches caliper at installation.
- Shrubs must be in a 3-gallon container and at least 30 inches tall at installation.
- Plantings must not conflict with other required elements or plantings.
- Hazardous ground vegetation or shrubs are prohibited in the first 2 feet of the front yard.

E. Placement of Trees and Shrubs.

- Trees and shrubs must be placed at least 18 inches from sidewalks or pavement edges.
- Trees are not allowed in wet retention ponds or drainage maintenance easements.
- Trees and shrubs must be installed at least 5 feet from the flow line of a drainage facility unless designed as water quality measures.
- Existing trees may remain in dry retention ponds if the natural slope is undisturbed, they are adapted to seasonal flooding, and the pond is maintained.
- Accent trees and shrubs are allowed in access easements if a 20-foot wide travelway is maintained clear of vegetation and sight triangle requirements are met.
- Trees may be planted in utility easements with city and utility provider approval, provided the root structure does not extend more than 3 feet below ground. Shrubs may be planted within the outer 3 feet of the easement.
- Property owners are responsible for replacing required vegetation if maintenance or utility requirements necessitate removal.

Article 6: City-wide Standards

Section 6.2 Grading, Tree Removal, and Drainage

6.2.1 General

B. Removal of Trees or Vegetative Ground Cover

- Trees and vegetative ground cover control erosion by protecting the soil surface, holding soil particles in place, and enhancing soil water absorption.
- They slow runoff velocity, remove subsurface water through evapotranspiration, and improve infiltration rates.
- Clearcutting or removal of trees and vegetative ground cover is considered an erosion factor equivalent to grading and soil disturbance.
- References to soil disturbance and grading include clearcutting or removal of trees and vegetative ground cover.

Article 9: Definitions

Specimen Tree: a tree that is particularly impressive or unusual example of a species due to its size, shape, age, or any other trait that epitomizes the Character of the species.

APPENDIX B. SUMMARY OF NORWALK'S TREE ORDINANCE

Tree Warden

- The Chief of Operations and Public Works designates a Tree Warden and Deputy Tree Wardens to enforce tree regulations.
- The Tree Warden prepares permits, maintains records, and provides annual reports. They are advised by the Tree Advisory Committee.
- The Tree Warden assesses and manages hazardous trees and shrubs, determines their value, and conducts tree canopy assessments, updated every 10 years.
- The Tree Warden can issue citations, authorize tree removals, and recommend a budget for the Norwalk Tree Account.

Tree Advisory Committee

- Composed of five members appointed by the Mayor and approved by the Common Council, advises on tree-related issues, develops a Master Tree Plan, and creates an annual State of the Forest report to guide urban forestry.

Legacy Tree Program

- The Tree Advisory Committee will catalog legacy trees, with public input encouraged.
- The Tree Warden keeps records of legacy trees and their locations.
- A list of legacy trees is available to the public at the Tree Warden's office.

Planting Trees or Shrubs in Public Places

- Public encouraged to support planting trees or shrubs in public areas.
- Written permit application required, including a planting and maintenance plan.
- Tree Advisory Committee reviews applications and notifies applicants within 30 days.
- Planted trees or shrubs become city property after the maintenance period.
- Tree Advisory Committee reports approved applications quarterly to the Tree Warden.
- Unauthorized plantings must be removed by the responsible party or the Tree Warden.

Altering or Damaging City Trees

- No alteration or damage to city trees without a permit.
- Written permit application required for pruning city trees, subject to a fee.
- Tree Warden reviews applications and notifies applicants within 30 days.

Violations and Fines

- Violations of tree regulations can result in fines up to $250 per tree or shrub.
- The Tree Warden can issue citations for violations.
- Severe damage to trees requiring replacement must follow specific guidelines.

Removal of City Trees or Shrubs

- A permit from the Tree Warden is required to remove any city tree or shrub, except as allowed by Connecticut General Statutes.
- The Tree Warden must determine the necessity of removal based on health, safety, or mitigation of negative impacts on the urban canopy.
- Written permit applications must include proof of notification to nearby property owners and relevant authorities.
- Permits for removing trees with a DBH of six inches or more must be posted on the tree at least 10 days prior to removal.
- Unauthorized removal requires replacement of the tree or shrub according to specific guidelines.

Protection During Construction

- Construction projects within the dripline of city trees must follow ANSI standards for tree care.
- Violations can result in fines of $250 per day, per tree.
- Severe violations may require a five-year bond equal to the tree's assessed value.

Tree or Shrub Replacement

- Replacement of city trees or shrubs must follow specific guidelines.
- Acceptable methods for replacing city shrubs include planting a comparable shrub or paying the shrub's assessed value to the Norwalk Tree Account.
- City trees can be replaced with a tree of equal or greater DBH, inch-for-inch replacement, or a payment to the Norwalk Tree Account.
- Legacy trees require replacement with trees totaling four times the original DBH or a payment of four times the assessed value.
- Replacement trees must be maintained for at least five years, with any dead trees replaced and maintained for another five years.

Norwalk Tree Account

- Established to fund activities promoting urban forestry, including tree canopy assessments and master tree plans.
- Funded by fines, fees, gifts, grants, designated funds, and investment income.
- Expenditures require Mayor's recommendation and Common Council approval, primarily for purchasing and planting trees or shrubs.
- Budget for tree planting must not be reduced due to account funds; expenditures add to existing budgets.

Public Utilities

- Tree Warden monitors public utility work to protect trees and shrubs.
- Utilities must submit an annual work plan, including maps, tree removal lists, and contact information for licensed arborists and supervisors.
- Work plans must be submitted 30 days prior to starting activities, with Tree Warden approval required.

Enforcement

- Notification of Violation: The Tree Warden will notify violators by certified mail or hand delivery, explaining the violation and giving a reasonable time for compliance.
- Stop-Work Orders: Work must stop immediately upon verbal or written notice of a violation. A formal stop-work order will follow within seven days, detailing conditions to resume work. Continuing work after a stop-work order results in daily fines.
- Willful Violations: Willful violations incur a civil penalty up to three times the tree or shrub's assessed value.
- Civil Actions: The City can seek court injunctions to stop or correct violations.
- Legal Fees: Violators are responsible for the City's legal fees incurred in enforcement.
- Separate Violations: Each failure to comply (e.g., replacing a tree, making payments) is a separate violation, with daily fines.
- Enforcement Authority: The Chief of Operations and Public Works, the Tree Warden, and Public Works employees enforce these provisions.

Exemptions

- Emergency Actions: The chapter does not apply to emergency alterations or damage ordered by the Tree Warden or City officials for hazardous trees or shrubs.
- Permitted Actions: Actions properly permitted under state law are also exempt.

Appeals of Tree Warden Decisions

- Appeal Process: Decisions by the Tree Warden can be appealed in writing. A public hearing will be scheduled, and a decision will be made within three business days of the hearing.
- Further Appeals: Aggrieved parties can appeal the Tree Warden's decision to the Superior Court within 10 days.

APPENDIX C. URBAN FORESTRY PROGRAM STRUCTURE CONSIDERATIONS

The following provides a general description of the process for considering a consolidation of tree programs and services:

Table 19. Considerations for evaluating and addressing staffing and resource needs

Phase	Steps	Staffing Additions	Other Considerations
Phase 1: Assessment and Planning (Year 1-2)	Conduct a comprehensive assessment of current tree-related programs and services across all departments. Identify overlaps, gaps, and opportunities for consolidation. Develop a strategic plan for consolidation.	Hire a consultant or project manager to oversee the assessment and planning process.	Engage stakeholders (community members, staff, and experts) for input. Ensure alignment with City goals and policies.
Phase 2: Initial Consolidation (Year 3-4)	Establish a new Urban Forestry Division within an existing department (it is recommended to add this division to the Department Public Works although the Transportation, Mobility and Parking; Recreation and Parks; or Planning and Zoning Departments may be considered). Transfer urban forestry responsibilities to the new division. Begin integrating tree-related responsibilities from the other departments and programs.	Appoint a Division Manager. Transfer existing staff. Hire additional arborists and urban forestry specialists as needed.	Develop clear roles and responsibilities. Create a unified budget for tree-related activities.
Phase 3: Full Integration (Year 5-7)	Complete the transfer of all tree-related responsibilities to the Public Works Urban Forestry Division. Standardize procedures and protocols across all tree-related activities. Implement a centralized tree management system.	Hire additional support staff (e.g., administrative assistants, GIS specialists). Provide training for all staff on new procedures and systems.	Monitor and evaluate the effectiveness of the consolidation. Adjust staffing and resources as needed.
Phase 4: Optimization and Evaluation (Year 8-10)	Conduct a thorough evaluation of the consolidated Urban Forestry Division. Identify areas for improvement and optimization. Implement changes based on evaluation findings.	Consider hiring external evaluators for an objective assessment. Adjust staffing levels based on workload and efficiency.	Continue stakeholder engagement to ensure community needs are met. Update strategic plan based on evaluation results.

Table 20. Estimated costs for the City of Norwalk to staff and equip a 3-person in-house arborist crew for public tree maintenance

Recommended Staff	Hours per Staff	Cost per Hr per FTE*	# of New Staff	Salary Per Staff	Salary Totals	Benefits Package (40% of Salary)	Totals
A) Lead Certified Arborist / Supervisor	2,088	$65.07	1	$135,860	$135,860	$190,205	$190,205
B) Certified Arborist	2,088	$55.29	1	$115,438	$115,438	$161,613	$161,613
C) Arborist	2,088	$49.62	1	$103,608	$103,608	$145,051	$145,051
Subtotal	--	--	*3*		*$354,906*	*$496,868*	*$496,868*
Equipment†	**Hours**	**Cost/Unit**	**# of Units**		**Total Cost**		**Annual Cost**
F450 Pickup (or similar)	1	$95,000	1		$95,000		--
1 F450 Pickup hours	1,000	$16.94	1,000		--		$16,940
Chipper	1	$40,000	1		$40,000		--
Chipper hours	1,000	$16.94	1,000		--		$16,940
Bucket/Chip Truck	1	$300,000	1		$300,000		--
Bucket/Chip Truck hours	1,000	$16.94	1,000		--		$16,940
Subtotal	--	--	--		*$435,000*		*$50,820*
Gear†	**Hours**	**Cost/Unit**	**# of Units**		**Total Cost**		**Annual Cost****
PPE (personal protective equipment)	--	$350	6		$2,100		$630
Uniforms	--	$250	15		$3,750		$1,125
Arborist Saw	--	$800	2		$1,600		$480
Ground Saw (Large)	--	$800	2		$1,600		$160
Ground Saw (Medium)	--	$500	2		$1,000		$100
Power Pole Saw	--	$800	2		$1,600		$160
Pole Pruner	--	$300	2		$600		$60
Rake	--	$25	3		$75		$23
Shovel	--	$25	3		$75		$23
Brush Bucket	--	$40	2		$80		$24
Cart	--	$50	2		$100		$25
Other (e.g. blower)	--	$500	2		$1,000		$250
Subtotal	--	--	*43*		*$13,580*		*$3,059*
TOTAL UPFRONT COST (est.)					**$803,486**		
ANNUAL COST (est.)							**$550,747**

*Wage rates are estimated based on industry averages

**Accounts for equipment depreciation and replacement

†Equipment costs are based on 2021 estimates gathered from dealerships by PlanIT Geo at municipal rates / discounts. Gear based on 2024 estimates and municipal discounts

Table 21. Estimated training costs for the new in-house arborist crew staff

Recommended Staff	# of New Staff	Training Costs per Staff	Total Training Costs
A) Lead Certified Arborist / Supervisor	1	$2,000	$2,000
B) Certified Arborist	1	$2,000	$2,000
C) Arborist	1	$2,000	$2,000
Subtotal	*3*	*$6,000*	*$6,000*

Table 22. Summary of estimated costs for a 3-person in-house arborist crew

Cost Item	Amount
Annual Staff Cost	$496,868
Vehicle, Equipment, and Gear Purchase	$448,580
Total Upfront Cost	**$945,448**
Annual Operating Costs (supplies, clothing, equipment, rental, etc.)	$53,879
Annual Training, Certifications, and Membership Costs	$6,000
Total Annual Cost	**$556,747**

Note, the above costs are estimates and provided solely for the City's consideration in the future in the event that the demand increases and/or the opportunity arises in terms of resources. Incremental changes may also be considered such as seasonal / part-time staffing and focusing public tree maintenance in underserved neighborhoods. Approving of the Tree Master Plan does not infer approval of the budget for this hypothetical 3-person in-house arborist crew.

IN-HOUSE OR CONTRACTED SERVICES?

Most Public Works agencies have the option of performing urban forestry tasks using in-house staffing and equipment or using contractors who specialize in various arboricultural and horticultural disciplines and services. Often, a combination of using both in-house personnel and contractors is chosen to ensure that the urban forest management services provided are performed at the lowest possible cost, as efficiently as possible, and with the greatest level of expertise. Additionally, for special projects, or tasks that are not daily responsibilities, Public Works agencies will often use consultants on an as-needed basis. There are potential advantages and disadvantages to using in-house staff and contractors for urban forest management. Both the leadership of the program (the tree warden, urban forest manager, city forester, city arborist) and the workers in the program (tree planting, maintenance, stump removal, insect and disease control), can be inhouse or contracted. The advantages and disadvantages for both levels are generally summarized as these:

In-House Management - Forester/Arborist

Advantages

- Deep ties within the community.
- Has or will build “institutional knowledge.”
- Is available at a moment’s notice to perform a wider variety of tasks.
- Is directly accountable to the citizens and the Public Works director.

Disadvantages

- May only be experienced in limited aspects of arboriculture and urban forest management.
- Investment must be made in equipment for this position, such as a vehicle, computer, and diagnostic tools.
- May need to invest time and funding for obtaining and maintaining certifications, licenses, and other training.
- Not easily removed from the position if performance is substandard.

Contracted Management - Urban Forestry Consultant

Advantages

- Usually is very experienced and knowledgeable on a wide array of topics.
- Can provide a high level of knowledge in a specific area, such as hazard tree identification, tree valuation, ordinances and technical specifications, tree preservation.
- Can be released from service more easily.
- Usually is fully and pre-equipped with a vehicle and computer.

- All certifications, licensing, and continuing education are already in place and separately provided.

Disadvantages

- Contract agreement may limit flexibility in job assignments.
- If used regularly, and for an extended period of time, can be more expensive in the long term.
- Administrative time must be provided for contract writing, monitoring, and invoice processing.

In-house Crews and Work Production

Advantages

- More flexible for other work assignments.
- Quality can be perfected to meet community standards through training and over time.
- Can respond more quickly to emergencies.
- Workforce is more stable.
- Staff can be more knowledgeable about the community, and can be motivated by pride and residency.
- More control over training and specializations.
- No administrative time is needed to write and oversee contracts.

Disadvantages

- Large investment in equipment and maintenance, for example, a lift truck and chipper can cost $140,000 per crew.
- Workers are paid regardless of work production quantity, efficiency, and quality.
- Difficult to release from employment.
- Public Works Department is responsible for damage caused by crew actions.
- Public Works Department is responsible for on-the-job injuries and workman's compensation.

Contractual Crews and Work Production

Advantages

- Funds are paid only for work performed and when completed to specifications and the satisfaction of the Public Works department.
- Labor is available for peak demands and special projects; there is cancellation and no cost when work is not needed or when the weather is poor.

- Contractor provides all required equipment, tools, and supplies; repair, maintenance, and downtime of equipment are not the responsibility of the Public Works department.
- All insurance and workman's compensation is the responsibility of the contractor.
- Contractor provides employee supervision, training, and certifications.
- Liability for damage to public and private property is the responsibility of the contractor.

Disadvantages

- Contractors are bound by the specifications of the contract; their work assignments are not as flexible.
- May not be as quick to respond to emergencies as in-house crews.

Administrative time is required for contract writing, monitoring, and invoice processing.



APPENDIX D. TREE PLANTING AND MAINTENANCE ESTIMATED COSTS

Table 23. Summary of the Tree Planting Strategy's phase 1 plantings for Priority 1 neighborhoods

Tracking Metric or Criteria	City-led Plantings (70% of total plantings)	Private Property Owner Plantings (20% of total plantings)	Development-led Plantings (10% of total plantings)	TOTAL
Average Trees per Year	1,122	321	160	1,604
Total Trees Added	11,225	3,207	1,604	16,035
Added Annual Ecosystem Benefits of Matured Trees	$189,088	$54,025	$27,013	$270,126
10-year Total Added Annual Ecosystem Benefits of Matured Trees	$1,890,879	$540,251	$270,126	$2,701,256
Total Carbon Sequestered (lbs)	1,399,246	399,785	199,892	1,998,923
Asset Value ($358.60/tree)**	$4,025,106	$1,150,030	$575,015	$5,750,151
Total Value & 10-year Benefits	$5,915,985	$1,690,281	$845,141	$8,451,407
Average Subcontract Planting Cost Per Tree	$825	$825	$825	
Average Cost per Seedling, Whips, etc.	$10	$10	$10	
% of Total Plantings to be Caliper-sized (e.g., not seedlings)	100%	70%	100%	
% of Total Plantings to be Seedlings / Whips	0%	30%	0%	
Total # of Caliper-sized Trees	11,225	2,245	1,604	15,073
Total # of Seedling, Whips, etc.	0	962	0	962
Caliper-sized Plantings Cost	$9,260,213	$1,852,043	$1,322,888	$12,435,143
Annual Caliper-sized Plantings Cost	$926,021	$264,578	$132,289	$1,322,888
Seedlings, Whips, etc. Plantings Cost	$0	$9,621	$0	$9,621
Annual Seedlings, Whips, etc. Plantings Cost	$0	$962	$0	$962
Total Annual Planting Cost	$926,021	$265,540	$132,289	$1,323,850
Average Annual Maintenance Cost per Tree in Maintained Areas	$29.64	$29.64	$29.64	
Total Annual Maintenance Costs for Seedlings, Whips, etc.	$0	$0	$0	
Total Annual Maintenance Costs for New Plantings in Maintained Areas	$33,269	$6,654	$4,753	$44,676
Total Annual Costs of Plantings (planting + maintenance)	$959,291	$272,193	$137,042	$1,368,526
Total Costs of Plantings (Initial Planting + Annual Maintenance Cost x 10 Years (Tree Master Plan))	$9,592,907	$2,721,935	$1,370,415	$13,685,257
Total Cost-Benefit (does not include energy savings)	$0.62	$0.62	$0.62	$0.62

Cost and Calculation Notes
1,122 / yr = City-led plantings | 321 = private | 160 = development-led = 1,604 / year to reach 53% UTC
City = 70% of 16,035 or 11,225 | Private = 20% or 3,207 of 16,035 | Developers = 10% or 1,604 of 16,035
Based on 50% large; 30% medium; 20% small statured trees at maturity (i-Tree, USFS)
Annual ecosystem benefits (“ecobenefits”) x 10 years
Based on 50% large; 30% medium; 20% small statured trees at maturity (i-Tree, USFS)
2016 USD adjusted to 2024 USD. Based on McPherson, et al., 2016 (view References)
Sum of ecobenefits & asset value | Sum of ecobenefits & asset value
Cost estimates provided by the City Arborist in April 2025 ranged from $750 to $900, used the average of $825
$10/seedling for admin and handling (PlanIT Geo or “PG” estimate)
PG recommendation | PG recommendations | PG recommendation
PG recommendation | PG recommendations (30% = seedlings to make it easier for residents & businesses) | PG recommendation
100% of 11,225 trees | 70% of 3,207 trees | 100% of 1,604 trees
0% of 11,225 trees | 30% of 3,207 trees | 0% of 1,604 trees
Cost per tree ($825) x 11,225 caliper-sized trees | $825 x 2,245 caliper trees | $825 x 1,604 caliper trees
Total caliper-sized tree cost / 10 years | Total caliper-sized tree cost / 10 years | Total caliper tree cost / 10 years
0 seedlings x $10/seedling | 962 seedlings x $10/seedling | 0 seedlings x $10/seedling
Divided by 10 years
Annual caliper-sized trees & seedlings cost summed
2006 USD of $19 adjusted to 2024 USD. Based on McPherson, et al. 2016 and $19 is from Thompson, et al., 2006
Assumes no maintenance although it's understood minor maintenance may occur
1,122 trees/year x 100% = caliper trees x $29.64 maintenance cost/tree | 321 trees/year x 70% caliper trees x $29.64 maintenance/tree | 160 trees/year x 100% caliper trees x $29.64 maintenance/tree
Initial planting cost + maintenance costs ($926,021 + $0 +$33,269) | $264,578 + $962 + $6,654 | $132,289 + $0 + $4,753)
Annual x 10 years
10-yr ecobenefits + asset value / total costs

APPENDIX E. PRIORITY NEIGHBORHOOD MAPS

Zoning Map Legend

Table 24. Zoning class codes and descriptions

Color and Code		Description (from 2024 Zoning)
	CD1L	Sub-Urban - Large Lot
	CD1M	Sub-Urban - Medium Lot
	CD1S	Sub-Urban - Single-Family
	CD2	Sub-Urban - Single- and Two-Family
	CD3	General Urban
	CD3C	General Urban - Corridor
	CD3W	General Urban - Water
	CD4	Urban Center
	CD4W	Urban Center - Water
	CV	Civic District
	SDH	Special District - Hospital
	SDIC	Special District - Island Conservation
	SDMC	Special District - Marine Commercial
	SDLI	Special District - Light Industrial
	SDHI	Special District - Heavy Industrial
	Water	Water
	Public Tree	From 2023 Sample Inventory

Priority Neighborhoods

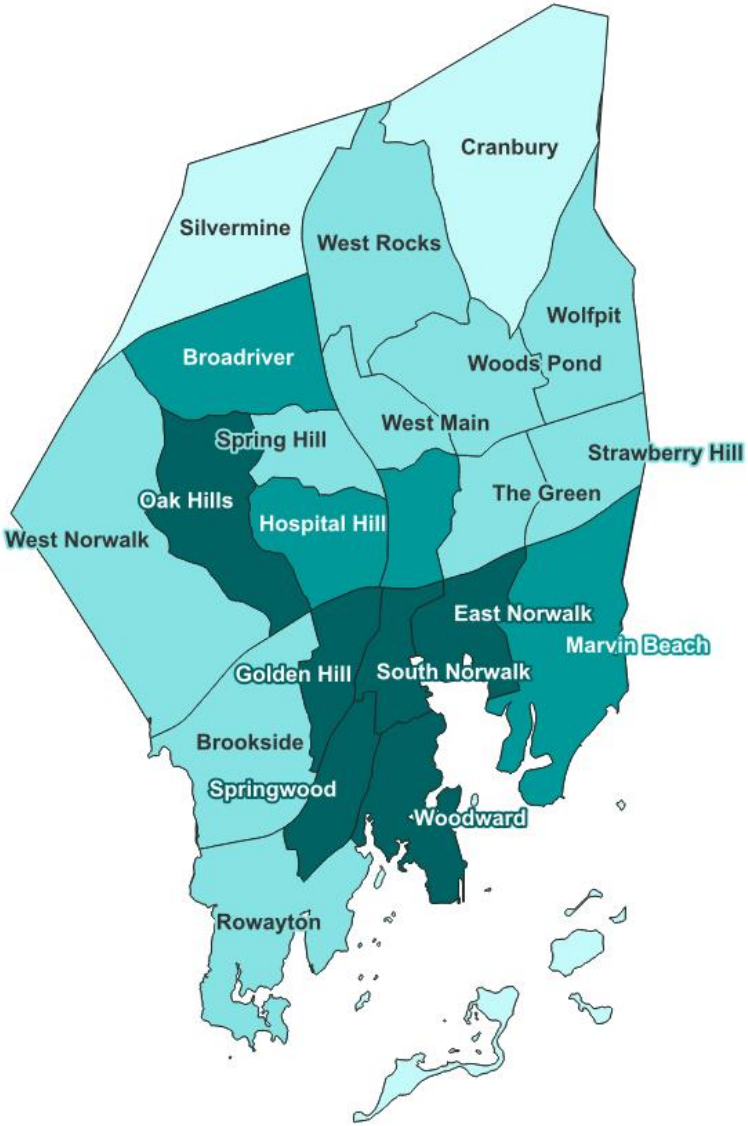


Figure 54. Tree planting priority map

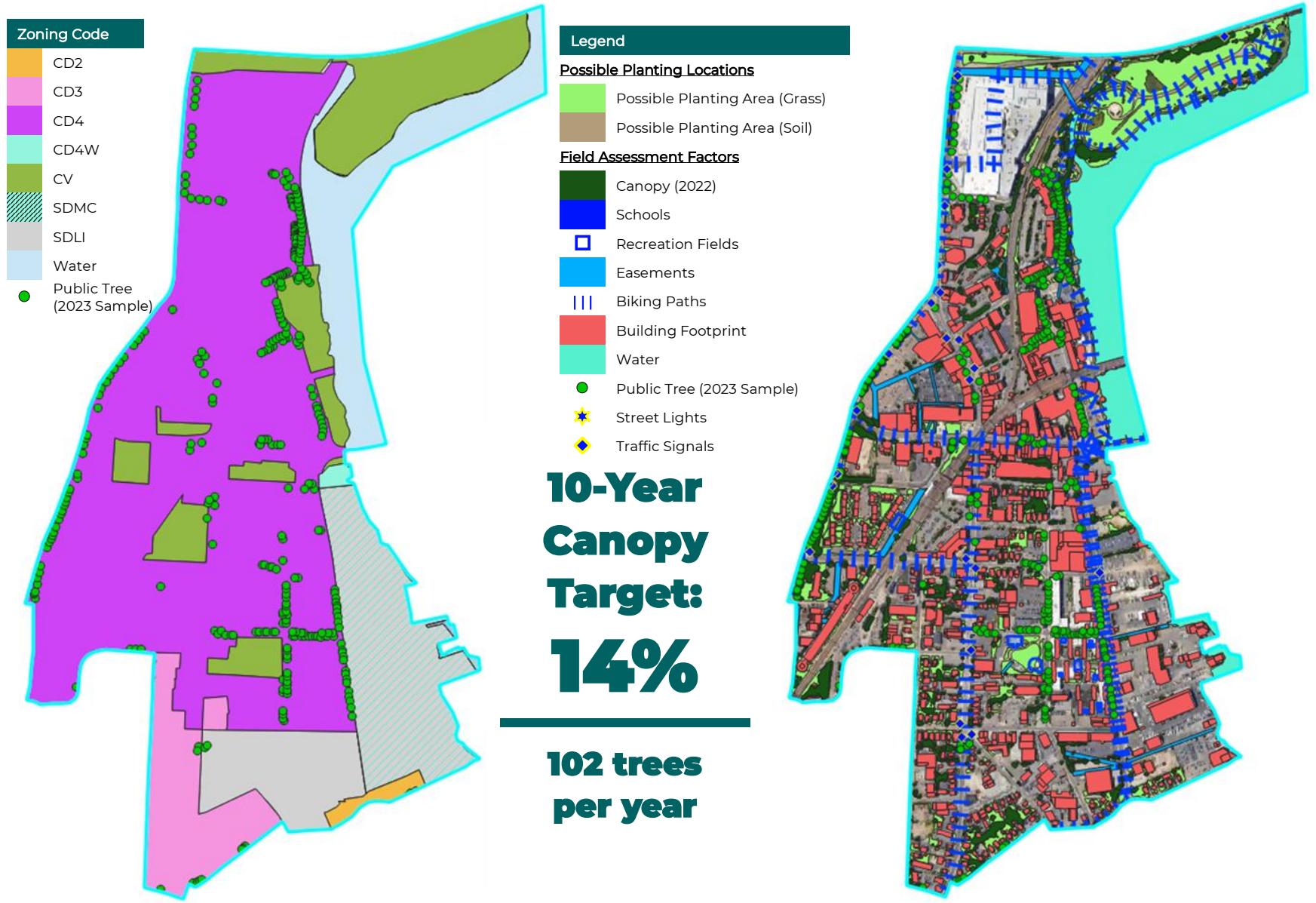
TREE PLANTING PRIORITY MAP

Planting Priority Scale

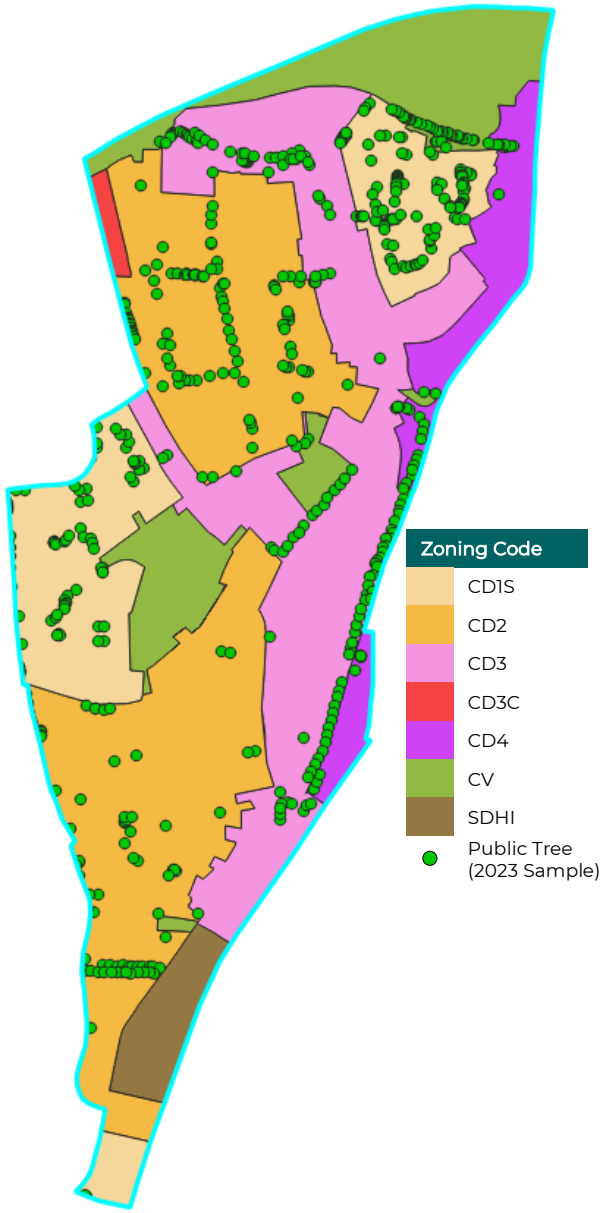
Highest	1	2	3	4	Lowest
Years:	0-10	10-20	20-30	No net loss	

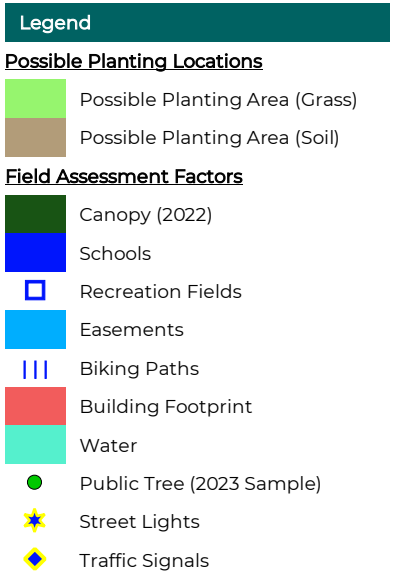
Priority 1	Neighborhoods with Justice40 overburdened / underserved U.S. Census Tracts	Years 1-10
Priority 2	Neighborhoods with U.S. Census Block Groups (CBGs) having a Tree Equity Score <80 (out of 100)	Years 11-20
Priority 3	Neighborhoods comprised of CBGs with a Tree Equity Score between 80 and 99	Years 20-30
Priority 4	Neighborhoods comprised of CBGs with a Tree Equity Score of 100	No net loss

Figure 55. Maps supporting the planting strategy for priority 1 neighborhoods



Golden Hill – Priority 1 Area





10-Year Canopy Target:

40%

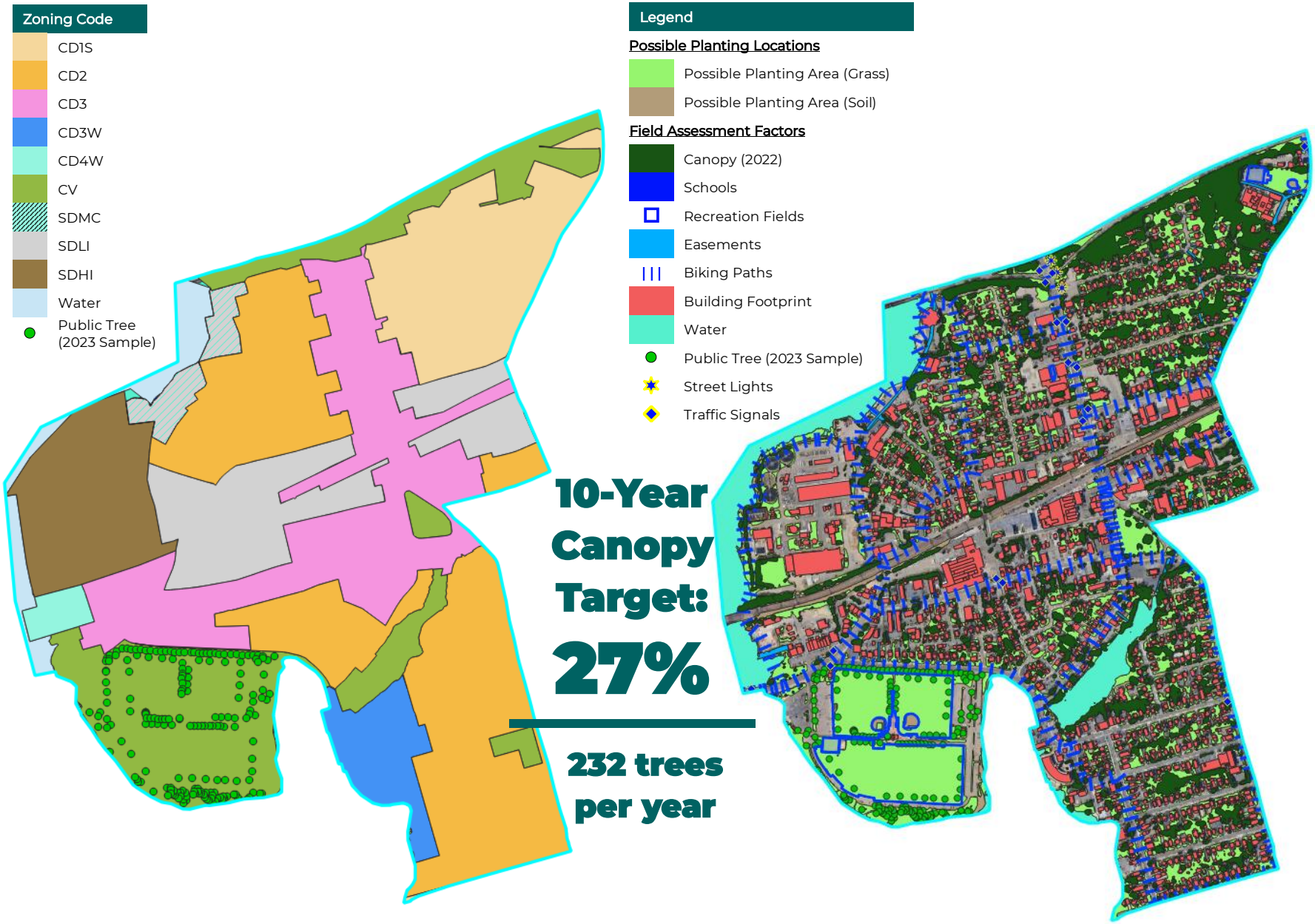
210 trees per year



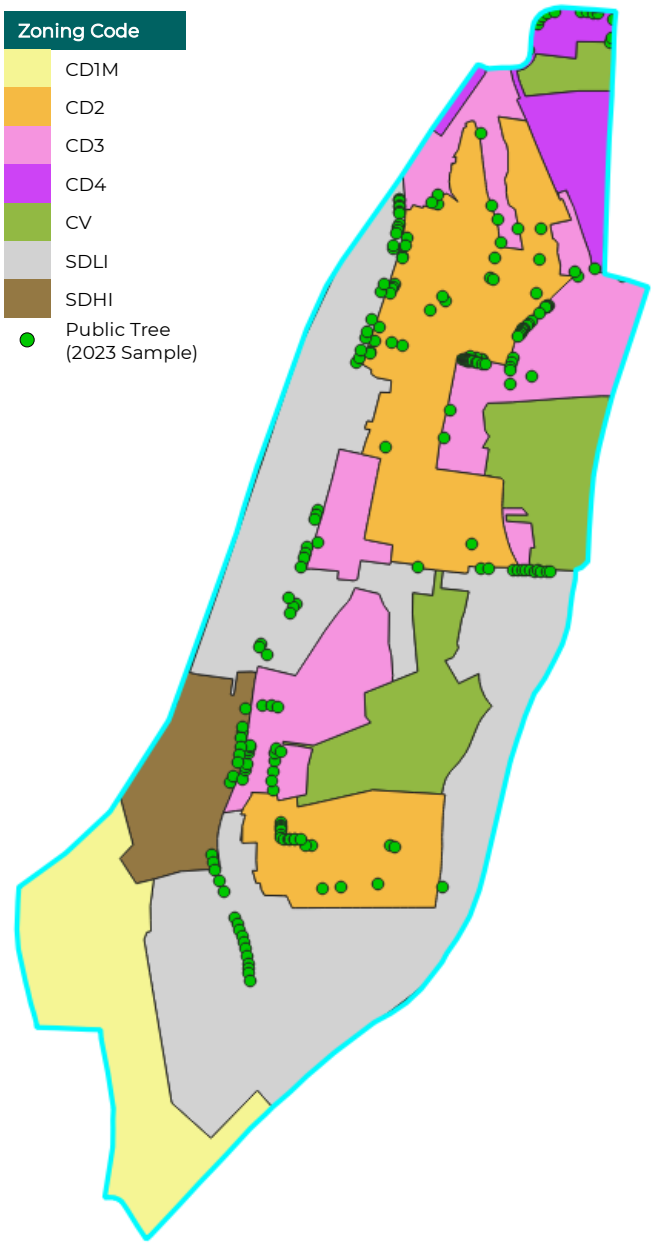
Woodward – Priority 1 Area



East Norwalk – Priority 1 Area



Springwood – Priority 1 Area



Legend

Possible Planting Locations

- Possible Planting Area (Grass)
- Possible Planting Area (Soil)

Field Assessment Factors

- Canopy (2022)
- Schools
- Recreation Fields
- Easements
- Biking Paths
- Building Footprint
- Water
- Public Tree (2023 Sample)
- Street Lights
- Traffic Signals

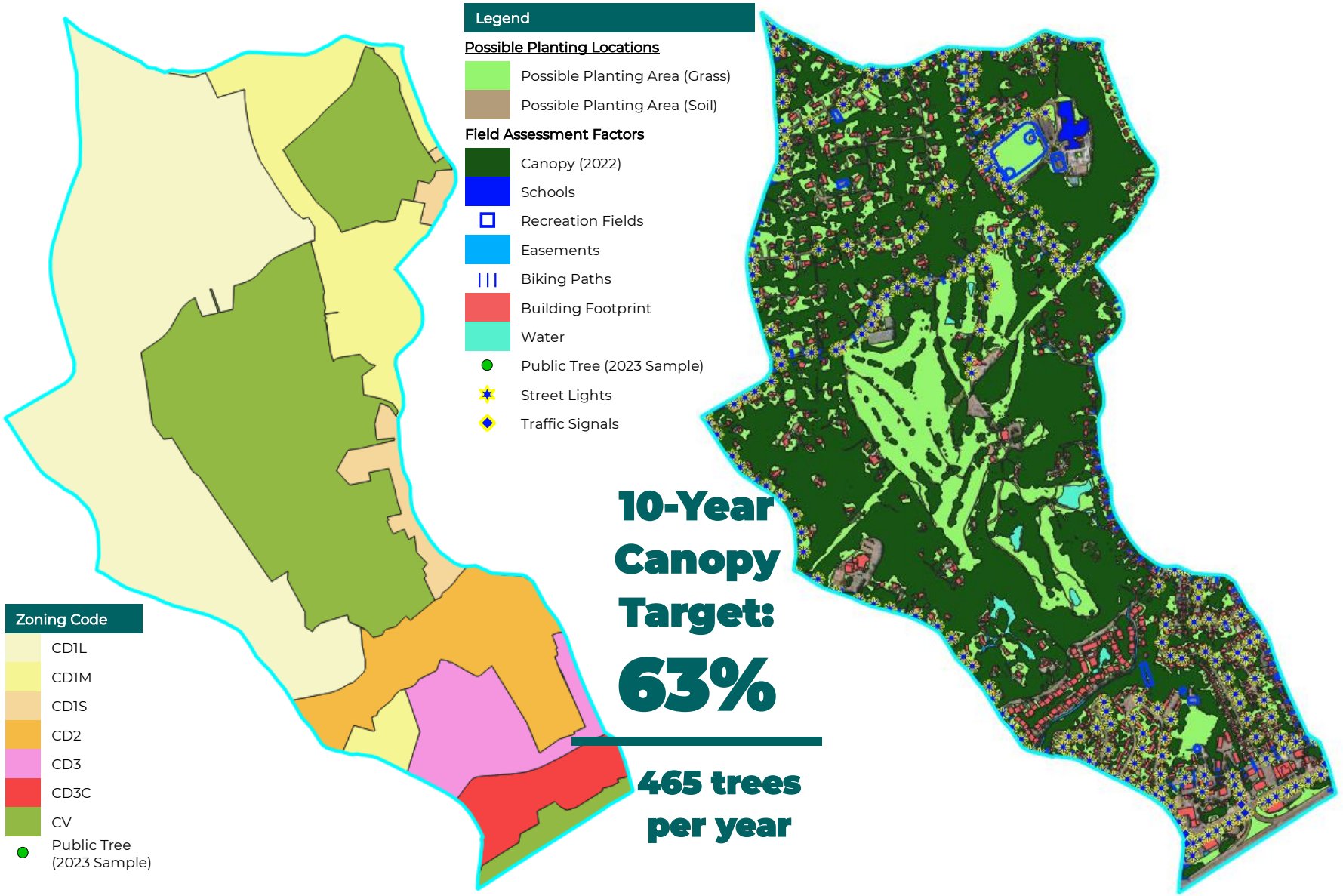
10-Year Canopy Target:

38%

175 trees per year



Oak Hills – Priority 1 Area





TREE MASTER PLAN

NORWALK, CONNECTICUT

APRIL | 2025

I ♥ NORWALK

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developers of TreePlotter