

DRAFT

**URBAN FOREST
MASTER PLAN
TECHNICAL REPORT**

**CITY OF
FORT WORTH, TEXAS**

OCTOBER | 2023



**TEXAS TREES
FOUNDATION**



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DRAFT URBAN FOREST
MASTER PLAN
TECHNICAL REPORT
FORT WORTH®



TEXAS TREES
FOUNDATION

**CITY OF FORT WORTH, TX AND THE
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A SPECIAL THANKS TO THE SUPPORTERS OF THIS PLAN:



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Family Foundation

Nicholas Martin Jr. Family Foundation



BNSF Railway

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Park and Recreation Department - Forestry

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Transportation and Public Works Department
Code Compliance Department
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With support of staff from: Planning & Data Analytics, Library, Municipal Court, Diversity & Inclusion

Fort Worth Development Advisory Committee and the Urban Design Commission

City Council and the community members of Fort Worth

The Project Planning and Engagement Team



All photos are from the City of Fort Worth, TX or Texas Trees Foundation unless otherwise noted.

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- ❖ Hispanic Real Estate Brokers Association
- ❖ Real Estate Council of Fort Worth
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- ❖ Community Design Fort Worth
- ❖ Community Frontline
- ❖ Downtown Fort Worth Inc
- ❖ Fort Worth Audubon Society
- ❖ Fort Worth Neighborhood and Homeowners Associations
- ❖ Friends of Fort Worth Nature Center & Refuge
- ❖ Friends of Tandy Hills Natural Area, Inc.
- ❖ Girl Scouts Texas Oklahoma Plains
- ❖ Greater Fort Worth Sierra Club
- ❖ Keep Fort Worth Beautiful
- ❖ Kids Environmental Education Network
- ❖ League of Women Voters, Tarrant County
- ❖ Near Southside Inc.
- ❖ Riverside Alliance
- ❖ RxPlore / Fort Worth Climate Safe Neighborhood Coalition
- ❖ Scenic Texas / Scenic Fort Worth
- ❖ Texas Blossoms / Eastside Blossoms
- ❖ Trust for Public Land
- ❖ Urban Land Institute
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- ❖ Streams and Valleys
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- ❖ Fort Worth Metropolitan Black Chamber of Commerce
- ❖ Greater Fort Worth Chamber of Commerce
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- ❖ Tarleton University, Fort Worth Campus
- ❖ Tarrant County College
- ❖ Texas Christian University
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- ❖ North Texas Tollway Authority
- ❖ Tarrant Regional Water District (TRWD)
- ❖ Texas A&M AgriLife Extension Service District 4
- ❖ Texas A&M Forest Service
- ❖ Texas Department of Transportation (TxDOT) Fort Worth District
- ❖ Trinity River Vision Authority (TRVA)
- ❖ US Army Corps of Engineers (USACE), Fort Worth District

DRAFT Mission Statement

Fort Worth's Urban Forest Master Plan provides the framework to maintain, protect, and enhance the City's urban forest. Fort Worth is dedicated to achieving the goals set forth in this Plan through shared commitments with its partners and residents. This shared commitment will lead to a city where the benefits of the urban forest are utilized for environmental, economic, and local success for present and future generations.

DRAFT Vision Statement

Fort Worth's urban forest is an integrated and valued part of our city that enhances the livability, economic development, and environmental integrity of the community. We will strive to create and sustain a resilient, inclusive, and diverse urban forest that serves as the cornerstone of a vibrant, cool, healthy, and prosperous city.



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FORT WORTH, TX URBAN FOREST MASTER PLAN

TECHNICAL REPORT

DRAFT OCTOBER 2023



URBAN FOREST MASTER PLAN FRAMEWORK

Figure 1. Overview of the framework to develop Fort Worth's Urban Forest Master Plan



Technical Report and Supporting Studies

To guide the City in implementing the Urban Forest Master Plan (“Plan” or “UFMP”), the research phase of the planning process is summarized in this Technical Report that is based on the framework from A Model of Urban Forest Sustainability (Clark, et al. 1997). This Technical Report provides the research and data analyses, results of extensive internal and external engagement, details for implementing strategies such as canopy goals and best practices, and the supporting studies conducted throughout the planning process.

Following the summary of planning elements in the Technical Report is a recommendations table that was developed as a preliminary exercise to inform the development of the primary goals, strategies, and actions in the Urban Forest Master Plan. The recommendations in the Technical Report should be considered draft recommendations. The Urban Forest Master Plan provides the long-term framework for the urban forest. Following the recommendations in the Technical Report, a series of implementation plans and strategies including public tree maintenance, risk management, emergency preparedness and response, tree pest and disease management, trees for stormwater management, addressing tree conflicts with infrastructure, planting, and ongoing public education and engagement are provided.

In addition to the Technical Report, the Urban Forest Master Plan is supported by an Implementation and Monitoring Plan that details the process for evaluating, monitoring, reporting, and revising strategies and progress.

Primary Urban Forest Master Plan

The final Urban Forest Master Plan is the primary framework document that provides the Executive Summary as well as the high-level overview of the urban forest resource (the trees), the resource management (the programs), and the community frameworks (the people). This background sets the stage for introducing the Plan’s goals for urban forest management, sustainability, and equity. The primary Plan includes the urban forest vision, goals, actions, and targets. These goals and actions are supported by the City, its partners, and the community and provide the roadmap to achieve the shared vision for the future of Fort Worth’s urban forest. Implementation of these actions should be supported by the data, analyses, and findings provided in the Technical Report and supporting studies.

Study Area

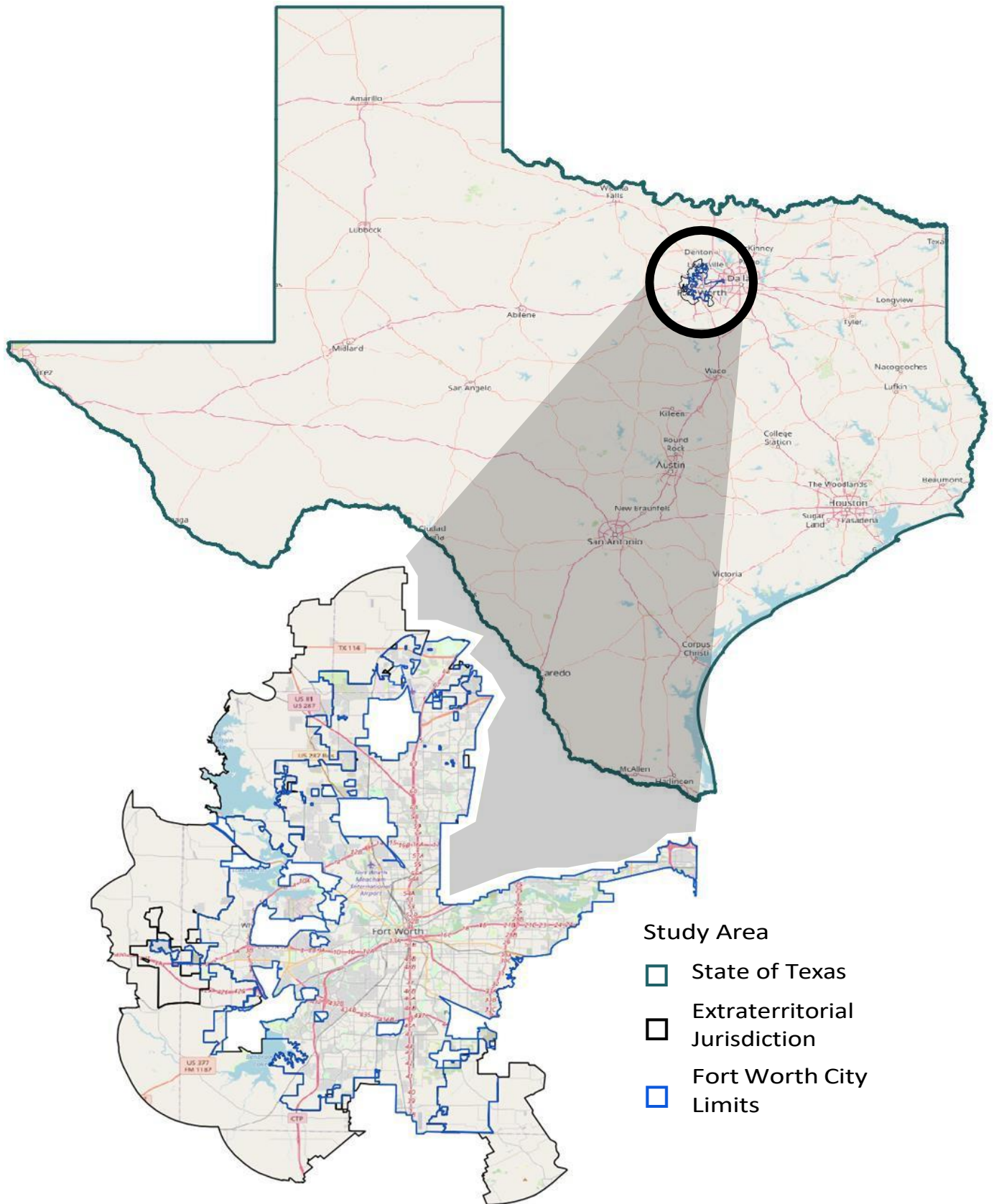


Figure 2. Map displaying the study area of Fort Worth, TX and its Extraterritorial Jurisdiction

Plan Overview

Trees along streets, in parks, open spaces, backyards, and across the city provide many essential benefits and constitute an "urban forest". Fort Worth's urban forest is a valuable asset that, if planned and cared for, will continue to add to the health and well-being of a community for generations to come. All city residents, business owners, and visitors can benefit from the proper care and enhancement of Fort Worth's trees.

A successful urban forestry program for a community contributes to vibrant and healthy neighborhoods, while promoting the safety of residents and visitors. The City of Fort Worth's Urban Forest Master Plan ("Plan" or "UFMP") effectively directs City resources towards this mission, supporting healthy neighborhoods and a thriving North Central Texas region, growing a better Fort Worth for all.

A Project Team (PT) and Steering Committee (SC) were assembled to develop a plan specific to Fort Worth's urban forest and community needs. In addition to these members, the consultant planning team was led by the Texas Trees Foundation. With support from these members, the planning team conducted extensive research and auditing to establish baseline conditions of Fort Worth's urban forest as part of the Technical Report to the Urban Forest Master Plan.

The outcomes of this Technical Report support the Plan's main tenets of ensuring public safety, increasing operational efficiencies, facilitating short- and long-term sustainable urban forest planning, validating budgets and programs, ensuring equitable distribution of green resources and services, standardizing methodology for asset management of the urban forest, and garnering support and spurring behavioral change for community-wide tree stewardship.



DEFINING URBAN FORESTRY, FORESTRY, AND TREE TYPES

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

Public trees consist of trees within public parkways, parkland, rights-of-way, or other public spaces and are under the purview of the City’s Park and Recreation Department’s (PAR) Forestry Section. Referred to as “Forestry” or “PAR Forestry”, this section conducts hazard abatement for City-owned trees as needed, administers the Neighborhood Tree Planting Program, and reviews permits for trees in the parkway, rights-of-way, parkland, or other public space. Other public trees such as those in open space, natural areas, and floodplains are overseen by the City’s Open Space Conservation Program with support from Forestry.

Trees on private property such as those in residential backyards, parking lots, and planted or preserved as part of development projects are overseen by the City’s Development Services Department’s (DSD) Urban Forestry Management Section (“DSD Urban Forestry”). Authority to regulate the planting, protection, and removal of trees on private property is determined by the City’s Urban Forestry Ordinance (within Fort Worth’s Code of Ordinances Appendix A, Zoning Regulations, Chapter 6 Development Standards) and the permitting process.

For this project and resulting reports, the term “Urban Forestry” is used to describe the Development Services teams, operations, programs, and authority. The term “Forestry” is used to describe the Park and Recreation’s Forestry Section. The general use of “urban forest” is intended to represent trees across all ownership types (public and private) in the city. View the illustration below for a summary of the tree types and the responsible City department.

TREE AND OWNERSHIP TYPES



Figure 3. Illustration of the types and ownership of trees comprising the urban forest

Figure 4. The extent and various landscapes comprising Fort Worth's urban forest

THE URBAN FOREST EXTENT AND LANDSCAPES



TREE MANAGEMENT IN FORT WORTH



Urban forestry is the management of tree populations in urban settings for the purpose of improving the environment and providing aesthetic benefits. With this in mind, the care, planting, and maintenance of Fort Worth’s public trees is a cooperative arrangement between Park and Recreation’s Forestry Section, private property owners, and contracted professional services.

The citywide urban forest is influenced by a number of City departments and programs including Transportation and Public Works, Code Compliance, Diversity and Inclusion, Neighborhood Services, and Planning and Data Analytics but there are two main departments with tree care and management responsibilities— Park and Recreation and the Development Services Departments. Each of these departments provide important urban forestry services for Fort Worth’s trees and the community.

Fort Worth is the oldest and longest running Tree City USA in Texas, a designation the city first received in 1978. The Forestry Section operates the Hazard Abatement program, caring for more than 150,000 trees in street rights-of-way and an unknown number of trees in parks and other municipal property. Special events across the city such as the Arbor Day celebration, a tree giveaway booth at Mayfest, tree planting projects, and a variety of outreach events are hosted by the Forestry Section annually.

Additionally, the Forestry Section operates the 71-acre municipal tree farm, where trees are grown from seeds and acorns harvested from the best trees in the city. Crews offer Citizen Forestry training, volunteer opportunities and grants to provide trees to Fort Worth communities. The trees grown at the tree farm are transplanted to parks and public spaces throughout the city and are maintained by the Forestry Section.

The Urban Forestry Section administers the plan review and permitting process for any planting, pruning, or removal of trees during development projects and enforces the city’s Urban Forestry Ordinance, which protects trees and works to achieve the city’s goal of 30% canopy cover.



TECHNICAL REPORT FRAMEWORK

Table 1. Summary of the planning elements implemented to develop the Technical Report

ELEMENT	PURPOSE	PROCESS
 <p>1) Existing Plans and Policies</p>	<p><i>To gauge the City's commitment and readiness for improved levels of urban forest management and sustainability</i></p>	<p>Research, document index, plan alignment, City staff consultations</p>
 <p>2) Internal Engagement</p>	<p><i>To understand existing internal infrastructure and processes around tree management, and to identify shared strengths, challenges, and desired outcomes</i></p>	<p>Survey, staff meetings, review of best practices, protocols, gap analysis</p>
 <p>3) External Engagement</p>	<p><i>To understand the interests, priorities, and viewpoints of the community, inform ongoing engagement, and build support for the urban forest</i></p>	<p>Community meetings, surveys, focus groups, pop-up events, project website, messaging, continuous feedback loop</p>
 <p>4) Data Analyses</p>	<p><i>To examine the extent, structure, opportunities, and vulnerabilities, of the city's urban forest</i></p>	<p>Analyses of tree canopy data, local and regional tree inventories, correlations, and other relevant data</p>
 <p>5) Urban Forest Benchmarks</p>	<p><i>To understand the level of effort and capacity necessary to satisfy the City's adopted goals, and to ensure urban forest sustainability</i></p>	<p>Research, analysis of ordinances, comparison of City programs to analogous communities and industry standards</p>
 <p>6) Urban Forest Audit</p>	<p><i>To identify strengths and challenges relating to sustainable urban forest management and development a framework for Plan monitoring</i></p>	<p>Analysis of 11 categories of urban forest sustainability and management</p>
 <p>Draft Recommendations to Support the Needs of the Urban Forest, the Programs, and the Community</p>		

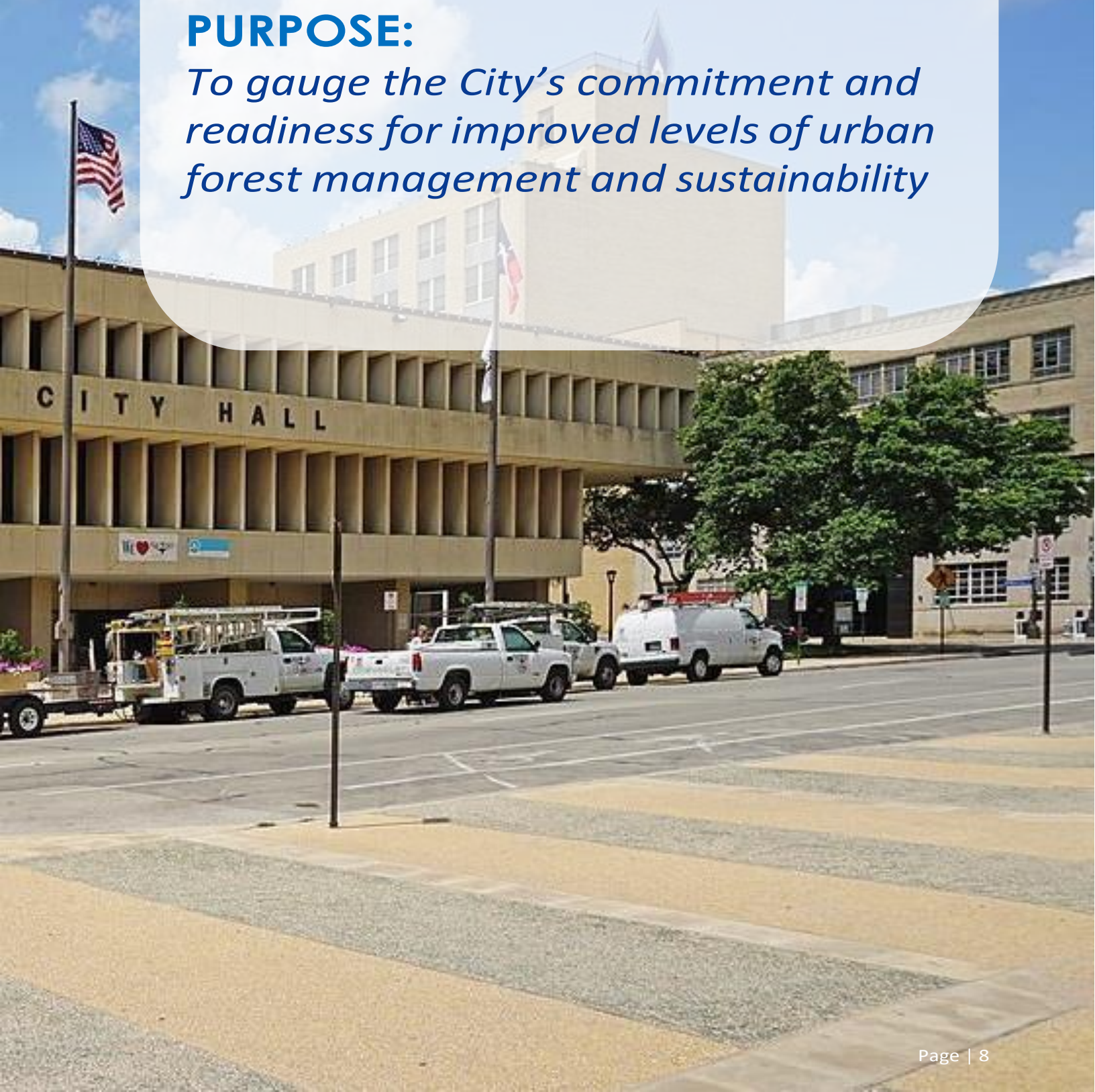
PLANNING ELEMENT:



EXISTING PLANS AND POLICIES

PURPOSE:

To gauge the City's commitment and readiness for improved levels of urban forest management and sustainability



ELEMENT 1: EXISTING PLANS AND POLICIES

Purpose

The purpose of this element is to gauge the City’s commitment and readiness for improved levels of urban forest management towards goals of sustainability, equity, and resiliency. Measuring alignment of existing plans and policies ensures a strong connection between Forestry and Urban Forestry’s high-level strategic goals, and the projects and initiatives that support these goals. A strategic plan without proper alignment runs the risk of wasting resources and time while jeopardizing the success of key projects that support the Urban Forest Master Plan. Plans cannot live in isolation, therefore, cross-examining various plans brings to light any projects or initiatives that are a misplacement of resources and time.

Process

Overview of the Research and Review of Existing Plans and Policies:

- ❖ Identified all relevant plans and resources. This included plans for land use, transportation, parks and recreation, and environmental protection.
- ❖ Each plan or resource was carefully reviewed to identify its goals, objectives, and resources. Instances where documents support or potentially conflict with the urban forest were documented.
- ❖ Met with City staff and stakeholders to discuss the plans and potential outcomes of the Urban Forest Master Plan.
- ❖ The information gathered was used to develop a plan that is consistent with existing plans and has the support of key stakeholders.

Extensive document gathering, research, interviews, consultations, and information discovery was conducted. This process used the information discovery framework outlined in the U.S. Forest Service’s Urban Forest Sustainability and Management Audit system (see [Appendix E](#) for more information). Additional information was gathered from City staff interviews and project consultation meetings to provide additional context to these documents.

In addition, extensive analyses with recommendations were prepared for the City’s tree-related ordinances. The methodology, findings, and recommendations for tree regulations are provided in this section as an overview to support the detailed report provided to the City.

An index of the documents and findings was prepared and a total of two rounds of research were conducted. The relevant information was catalogued and summarized in the Urban Forest Sustainability and Management Audit’s (“Urban Forest Audit” or “Audit”) Information Discovery worksheet and the Document Index. Once the documents were indexed, each of the 109 resources were reviewed and cross-examined with the Audit’s Discovery Matrix categories (11) and elements (130). Any reference to the element within a document was given a “1” to enable a count of the total references to urban forestry per document, per element (see example below).

Table 2. Example of the Discovery Matrix utilized to conduct the research

DOCUMENTS:		Fort Worth 2022 Comprehensive Plan	Environmental Master Plan 2019	CHAPTER 33 Trees, Shrubs, Etc.	Chapter6 ARTICLE 3 Landscaping, Buffers, & Urban Forestry	Fort Worth Urban Forestry Ordinance-18615-05-2009	Confluence - Trinity River Strategic Master Plan	TOTAL COUNT
1) Management Policy and Ordinances								
1.01	Urban Heat (Sustainability)	1	1				1	6
1.02	No Net Loss				1	1	1	3
1.03	Risk Management							3
1.04	Tree Canopy Goals	1	1		1	1	1	9
1.05	Tree Protection	1	1	1	1	1	1	24
1.06	Utility							1
1.07	Human Health – Physical & Psychological	1	1					7
1.08	Wildlife Diversity / Habitat / Protection	1	1					10
1.09	Performance Monitoring							8
1.10	Ordinance (Private)	1	1		1	1		28
1.11	Ordinance (Public)			1				12
1.12	Development Standards	1	1		1	1		19
1.13	High-Conservation Value Forests	1	1					3
1.14	Urban Interface (WUI)							2
Count Subtotal		8	8	2	5	5	4	509

Once the resources were indexed in the Discovery Matrix, a total count of documents by Audit category was prepared. Key information for the Urban Forest Master Plan, potential implications, and opportunities for alignment with existing plans were summarized and provided in this Technical Report. This summary provides the foundation for the Urban Forest Master Plan’s context, strategies, and actions.

Results

Document Gathering and Reviews

A total of 109 unique documents and resources were compiled for the research and indexed in a summary worksheet. These resources relate to urban forestry or have potential implications or impacts to trees in the city. Each of the resources were categorized for summary as shown in the table below.

Table 3. Summary count of the documents categorized for research

Category	Count	Category (cont.)	Count
Transportation	14	Policy & Land Use	2
About Forestry	11	Tree Program	2
Budget	8	Water Quality	2
Neighborhood Empowerment Zone	7	Air Quality	1
Capital Improvement	6	Blue Zones Project	1
Emergency & Hazard Plans	5	Complete Streets	1
Code of Ordinances	4	Environmental (Area Plan)	1
Downtown Design	4	History	1
Permit	4	Keep Fort Worth Beautiful	1
Area Plan	3	Pest & Disease (EAB)	1
City Parks	3	Solid Waste	1
Fire Prevention	3	Specifications	1
Population & Demographics	3	Stormwater (Area Plan)	1
Bonds	2	Tree Species List	1
Development	2	Urban Tree Canopy	1
Education	2	Urban Villages	1
Forestry Policy	2	Wastewater	1
Historic Preservation	2	Water Conservation	1
Open Space & Natural Areas	2	Yard Waste	1
		TOTAL	109

Transportation was the largest category with 14 unique documents. Information about the urban forest (“About Forestry”) was second largest with 11 documents. This includes the information posted on the Urban Forestry webpage regarding the geography and trees species found in various regions of the City.

Table 4. Summary of the count of references to the Audit categories

Audit Category	Count
1) Management Policy and Ordinances	135
2) Professional Capacity and Training	7
3) Funding and Accounting	26
4) Decision and Management Authority	62
5) Inventories	35
6) Urban Forest Management Plans	10
7) Risk Management	23
8) Disaster Planning	10
9) Standards and Best Management Practices	135
10) Community	66
TOTAL	509

Based on 10 categories within the Urban Forest Audit, there are a total of 509 instances where urban forestry-related elements are mentioned in the 109 documents. The Standards and Best Management Practices category and the Management Policy and Ordinance category contain the most urban forestry-references with 135 counts each. The Community category is the third highest with 66 counts.

Alignment of City Plans and Policies with Urban Forestry

The following provides a summary of the primary City plans that complement, support, or impact the city's urban forest. Additional information about the alignment of other City plans, documents, and resources is provided in the Document Index provided as part of the Urban Forest Master Plan project.

Table 5. Summary of existing policies in City plans that support or impact the urban forest

2022 Comprehensive Plan	
Category	Policies (paraphrased)
Chapter 4: Land Use	<p>Accommodate higher density residential and mixed uses in transit-oriented developments, urban villages, and designated mixed-use growth centers.</p> <p>Adopt a sustainable development policy that promotes...balance among accessibility, affordability, mobility, community cohesion, and environmental quality.</p> <p>Coordinate future land uses and development types and intensity with Complete Streets policy, Master Thoroughfare Plan, Active Transportation Plan, and Transit-Oriented Development Plans.</p> <p>Encourage clustering of development sites within new subdivisions to avoid steep slopes (greater than 15%) and to conserve 100-year floodplains, existing tree cover, wildlife habitat, storm water detention areas, riparian buffers along natural waterways, and archeologically significant sites.</p> <p>To protect water quality and provide for connected green spaces, encourage parks, bike trails, and open space within floodplains and along adjacent water bodies.</p> <p>Encourage the provision of open space within new developments, with the goal of linking open spaces within adjoining subdivisions.</p> <p>Locate public neighborhood parks within easy access of residents (less than one-half mile).</p> <p>Encourage urban agriculture with the purpose of increasing access to fresh food, providing income for people who want to grow and sell produce, and contributing to urban food security and nutrition, especially for residents within food deserts.</p> <p>Preserve the character of rural and suburban residential neighborhoods.</p>
Chapter 5: Housing	<p>Support neighborhood initiatives to regulate the design of industrialized and site-built housing so as to preserve neighborhood character.</p> <p>Promote the revitalization of low and moderate-income neighborhoods, particularly Racially and Ethnically Concentrated Areas of Poverty.</p> <p>Promote neighborhood stability through a comprehensive and coordinated strategy that includes housing, neighborhood economic development, infrastructure, parks, safety, and human services.</p> <p>Promote targeted investments in infrastructure or services in areas previously subject to disinvestment, such as neighborhood park improvements, sidewalks, lighting, and other public facilities that directly impact quality of life for residents.</p>

Chapter 6: Parks, Recreation, & Open Space	<p>Work with local, state, and federal organizations to provide coordinated community services and a City park system that is effectively managed and conserves and protects City resources.</p> <p>Develop attractive and secure park, recreation, open space, and community service facilities that are accessible to all citizens, regardless of race, ethnicity, gender, age, income, sexual orientation, or physical ability.</p> <p>Actively promote citizen involvement in determining park, recreation, and open space needs and desires of the community.</p> <p>Provide parkland in areas of the City that are currently deficient.</p> <p>Seek the means to develop and support a system of urban parks and open space that link neighborhoods to growth centers, as well as other park, recreation, and community facilities.</p> <p>Pursue implementation of the Confluence: The Trinity River Strategic Master Plan in cooperation with Streams and Valleys, Inc., the Tarrant Regional Water District, and the U.S. Army Corps of Engineers.</p> <p>Seek grants and other non-City funding resources for riparian buffer conservation, park development, including bike trail linkages and other projects.</p> <p>Pursue implementation of the Park, Recreation, and Open Space Master Plan, and The 2020 Update.</p>
Chapter 8: Human Services	<p>Develop, coordinate, or participate in educational programs, outreach events, community meetings, and collaborations that celebrate our city's diversity, promote cooperative efforts, increase communication with the community, reduce disparities, reduce prejudice, and promote tolerance.</p>
Chapter 9: Neighborhood Capacity Building	<p>(Strategies)</p> <p>Utilize best practice approaches to address neighborhoods that have moderately declining indicators, e.g., Middle Neighborhoods initiative.</p> <p>Conduct surveys of distressed Neighborhood Improvement Strategy Program selected neighborhoods to determine major issues from neighborhood's perspective.</p>
Chapter 10: Economic Development	<p>Use the Neighborhood Empowerment Zone program to promote the development of designated urban villages and other targeted redevelopment areas.</p> <p>Attract redevelopment and new development in the corridors linking the major districts of Downtown, the Historic Stockyards, and the Cultural District.</p> <p>Use the City's interim land banking policy to expedite redevelopment and reuse of underutilized property and to support the creation of successful transit-oriented developments (TOD).</p>
Chapter 11: Transportation	<p>Emphasize public transportation, bicycle, and pedestrian improvements in designated growth centers, urban villages, and transit-oriented developments.</p> <p>Promote street system patterns that provide greater connectivity between streets and between developments to reduce traffic demands on arterial streets, improve emergency access, and make bicycling and walking more attractive transportation options.</p> <p>Preserve and maintain the existing street infrastructure.</p> <p>Incorporate the needs of pedestrians, bicyclists, transit riders, and persons of all ages and abilities when planning and designing transportation projects.</p>
Chapter 12: Education	<p>Work cooperatively with school districts to address issues that affect both City and ISDs, such as land use, transportation, and historic buildings.</p>

Chapter 13: Historic Preservation	<p>Require that practical alternatives be demonstrated at the same level of consideration as preferred approaches where demolition, relocation, or inappropriate alteration are involved.</p> <p>Require that applicants proposing additions or new construction provide the type of existing and proposed drawings, streetscapes, contextual plans, photos, and renderings that enable an assessment of the degree to which the proposed work reflects designing in context.</p>
Chapter 14: Urban Design	<p>Use urban design as a tool to revitalize central city neighborhoods and commercial districts to ensure they are highly desirable places, and to redirect a significant amount of future population and employment growth into these areas.</p> <p>Implement policies, strategies, and regulations that ensure good urban design, such as mixed-use and urban residential zoning, form-based codes, and TOD and urban villages development.</p> <p>Build on transportation plans and policies to improve the influence of good urban design on complete streets projects, land use and transportation integration, and transportation project delivery.</p> <p>Improve design standards for public and civic building, and spaces.</p> <p>Require site design focused on improving the human experience.</p> <p>Improve the quality and urban design impact of development standards with regular reviews and amendments.</p>
Chapter 17: Fire & Emergency Services	<p>(Goals)</p> <p>Respond to and mitigate emergency and service calls in a timely and competent manner with adequate resources.</p> <p>Reduce the adverse impacts of emergencies and disasters through all-hazard preparedness programs and initiatives.</p> <p>Facilitate educational activities that produce a greater understanding of emergency preparedness amongst governmental agencies and the public.</p> <p>Coordinate an integrated emergency management system with internal and external agents in a timely manner.</p>
Chapter 18: Water Supply & Environmental Quality	<p>Promote water efficiency and water reuse to ensure resiliency and sound stewardship of public resources.</p> <p>Evaluate development proposals and infrastructure investments based on the impacts to land use and the overall water and wastewater systems.</p> <p>Maintain and renew existing infrastructure.</p> <p>Continue using the Community Facilities Agreement and Design Procurement Agreement programs to develop water, wastewater and reclaimed water infrastructure in conjunction with new private development.</p> <p>Monitor air quality and establish practices and plans to minimize air pollution.</p> <p>Regulate sources of air pollutants to minimize adverse impact on human health and the environment.</p> <p>Ensure no adverse impact from the construction of stormwater projects.</p> <p>Review all building and development permits for compliance with National Flood Insurance Program regulations, and the floodplain Provisions Ordinance standards.</p> <p>Do not mitigate flooding by moving it to a different location.</p> <p>Minimize impervious land cover in areas of new development and significant redevelopment.</p>

Encourage redevelopment and infill in order to reduce the amount of new impervious surfaces outside Loop 820.

Use natural areas to retain and filter storm water runoff.

Maintain environmental compliance through inspections, permitting and enforcement.

Encourage development practices that help reduce the higher temperatures in urban areas that accelerate ground-level ozone formation (the urban heat island effect), such as planting shade trees and using appropriate highly reflective (high albedo) paving surfaces and roofing materials.*

* Bold blue font color indicates a plan’s goal or policy that directly aligns with the Urban Forest Master Plan’s recommendations.

Use City projects to demonstrate the effectiveness of these development practices.

Pursue and implement methods to minimize waste generation, reduce recycling contamination, increase re-use, recycle, and composting of materials.

Assure the long-term disposal capacity for the City municipal solid waste.

Support volunteer efforts to reduce litter.

Pursue methods to reduce the impact of the urban heat island effect on Fort Worth.

Promote energy efficiency and use of renewable energy.

Increase the efficiency and cost-effectiveness of providing City services by promoting development in urban villages, transit-oriented developments, and mixed-use growth centers.

Support innovative development projects that showcase low-impact development practices, conserve riparian buffers, and extend greenway networks with hike/bike trails.

Promote sustainable development practices within the public and private sectors.

Encourage development and building practices that reduce environmental impacts.

Protect riparian corridors as natural buffers to conserve natural habitats.

Facilitate orderly and sustainable development through technical guidance, outreach, and education to encourage responsible environmental stewardship.

Promote a safe city and protect public health through environmental monitoring and compliance.

Chapter 19: Public Health Promote traditional walkable neighborhoods and other pedestrian-oriented developments – including Urban Villages, Mixed-Use Growth Centers, and Transit-Oriented Developments – which encourage human interaction, walking, bicycling, mixed uses, slower traffic, public places, and attractive streetscapes.

Chapter 22: Development Regulations (Policies)

Emphasize the importance of deliberately considering the interaction of land use, transportation, and urban design.

Encourage the creation of pedestrian and bicycle networks that are continuous and provide safe, comfortable, and convenient alternatives to connect neighborhoods to schools, parks, shopping, services, jobs, and other destinations.

Support the integration of land use, transportation, and urban design to achieve an urban form that supports more effective use of resources, mobility options, more aesthetically-pleasing and active public spaces, and sensitivity to historic and natural resources and neighborhood character.

Utilize the overlay districts to provide landowners with flexible development options.

Utilize the rezoning process to create zoning standards that respond to the needs of master-planned redevelopment projects.

(Strategies)

City staff will continue updating the Zoning Ordinance and Subdivision Ordinance to more closely reflect modern land use regulations and practices; to identify and mitigate regulatory impediments to desirable development; to mitigate the impacts of development on traffic and the natural environment; and to address technical and administrative issues.

Effectively implement the new Open Space Conservation Program and the Urban Forestry Program through rezoning reviews, preliminary plat reviews, and Board of Adjustment considerations.

Proactively engage with developers to identify priority Open Space Conservation opportunities and work with the Open Space Conservation team to protect high priority open space, while supporting beneficial development.

Leverage development regulations, urban design, and preservation tools to support more effective use of resources, enhanced mobility options, more aesthetically-pleasing and active public spaces, and increased sensitivity to historic and natural resources.

2019 Environmental Master Plan

Category	Goals (paraphrased)
Chapter 1: Our Environment	<p>Promote a safe city and protect public health through environmental monitoring and compliance.</p> <p>Improve overall environmental quality in our community with responsible environmental planning and management.</p> <p>Create and maintain a clean, attractive city by reducing litter and other environmental pollutants.</p> <p>Facilitate orderly and sustainable development through technical guidance, outreach and education to encourage responsible environmental stewardship.</p>
Chapter 2: Land Quality	<p>(Goals)</p> <p>Ensure city compliance with federal and state environmental regulations for soil, groundwater and the built environment.</p> <p>Reduce impacts of soil and groundwater pollution to the environment and human health.</p> <p>Mitigate blight and encourage the revitalization of previously-developed properties and brownfields.</p> <p>Provide expert environmental inspection and monitoring services for land assets.</p> <p>Provide technical guidance, outreach and education to encourage environmental stewardship of land resources.</p> <p>(Actions)</p> <p>Evaluate environmental ordinances for BMPs, and update the City of Fort Worth MSD ordinance.</p> <p>Create a publicly accessible online GIS mapping tool to share site data.</p> <p>Select and implement a database management software system for tracking field operations, capturing metrics and records management.</p>
Chapter 3: Air Quality	<p>(Goals)</p> <p>Ensure municipal compliance with federal and state environmental regulations for air quality.</p> <p>Monitor air quality and establish practices and plans to minimize air pollution.</p> <p>Achieve air quality compliance through inspections and enforcement.</p>

Provide technical guidance, outreach and education to encourage responsible actions for air quality.

(Actions)

Coordinate with partnering city departments and community partners to conduct air quality related studies and use this data to inform policy decisions.

Develop citywide municipal green building and urban canopy strategic plans.*

Lead an interdepartmental team to develop a sustainability strategic action plan for the city.

Select and implement an air quality database management software system for tracking field operations, capturing metrics and records management.

Provide air quality outreach materials to city departments.

Collaborate with city departments to provide incentive programs for ozone emission reduction.

Develop customized air quality messaging for communities and neighborhoods, with a focus on communities with historically high air quality complaints.

Develop and implement air quality programs for School Green Teams.

Develop and track traditional and social media campaigns to encourage actions that improve air quality and provide air quality information and alerts.

Promote ozone awareness and reduction practices on the city website and public media, with increased promotion during the ozone season.

Develop an annual Clean Air Awards program for local businesses and industries who demonstrate clean air trends in their company and corporate policies, and maintain a clean compliance history.

Develop an award or recognition program for residents, community organizations and volunteers who demonstrate excellent environmental stewardship promoting air quality.

* Bold blue font color indicates a plan's goal or policy that directly aligns with the Urban Forest Master Plan's recommendations.

Chapter 4:
Surface Water
Quality

(Goals)

Ensure city compliance with federal and state environmental regulations for surface water quality.

Monitor surface water quality and establish watershed management practices and plans in the community.

Control surface water pollution to support stream health and surface water quality.

Maintain environmental compliance through inspections, permitting and enforcement.

Provide technical guidance, outreach and education to encourage responsible environmental stewardship.

(Actions)

Develop a comprehensive watershed plan comprised of a watershed characterization plan and a sampling and monitoring plan. Include a priority list for watersheds to be characterized.

Develop a greenspace plan and encourage the incorporation of green infrastructure and LID into city codes and development plans.

Collaborate with other city departments and external partners to develop greenprint plans.

Coordinate with partners to support the development of implementation plans and watershed protection plans.

Review municipal ordinances and make recommendations for changes to meet MS4, TMDL or related surface water quality requirements, as needed.

Evaluate the feasibility of developing a green infrastructure and LID guidance manual and/or demonstration sites.

Evaluate database management software options for tracking field operations, collecting field data and records management.

Create a web-based mapping application for public use to share watershed and water quality data.

Develop and annually maintain a prioritized list of watershed management projects.

Develop and annually maintain post-construction inspection procedures, including training and enforcement activities.

Identify training opportunities for Water Quality staff (e.g., professional development, regional conferences, etc.).

Develop customized water quality messaging for individual communities and neighborhoods. Include areas with a high number of complaints to address the root cause of the issue.

Provide local businesses and industries published regulatory compliance information, as well as best practices for preventing water pollution and discharges to the MS4.

Develop and implement water quality programs for School Green Teams.

Develop traditional and social media campaigns to encourage actions that improve water quality and prevent discharges to the MS4.

Develop an award or recognition program for residents, community organizations and volunteers who demonstrate excellent environmental stewardship promoting surface water quality.

Confluence: The Trinity River Strategic Master Plan	
Category	Strategies (paraphrased)
Community	<p>Foster a sense of ownership and community stewardship along the river.</p> <p>Develop neighborhood-specific amenities that respond to local needs, desires, and cultures.</p>
Connectivity	<p>Ensure that walking and bicycling facilities are suitable for users of all ages and abilities, support trail safety, and encourage user courtesy.</p>
Economic Development	<p>Create complementary development nodes that form a balanced, interesting and engaging urban condition.</p> <p>Use river open spaces and recreation amenities to catalyze development.</p>
Education	<p>Utilize the river corridor’s natural features to create environmental, historic and cultural education opportunities.</p> <p>Educate the public about water quality, conservation, and strategies to keep the river healthy and clean.</p>
Environment	<p>Create nodes and corridors of habitat and open space to balance conservation and development and to enhance the ecological integrity of the river and streams.</p> <p>Dedicate acquisition and preservation funds to establish large open spaces in and adjacent to the Trinity River for habitat restoration.</p> <p>Integrate the urban and natural environments by weaving natural elements into new development projects.</p> <p>Naturalize the river channel in targeted areas, and identify additional places for preservation or remediation.</p> <p>Preserve and expand the existing tree canopy and identify opportunities for additional vegetation.</p>

* Bold blue font color indicates a plan’s goal or policy that directly aligns with the Urban Forest Master Plan’s recommendations.

	Conduct an ecological ‘gap analysis’ of the river system to prioritize future restoration and enhancement projects that can increase the overall health of the river.
Flood Control	Create innovative infrastructure improvements that provide flexible, natural, and recreational amenities during non-flood events. Rehabilitate areas of erosion and utilize natural systems to mitigate flood risk where possible.
Health	Provide safety and comfort on trails for users of all fitness levels and abilities.
Recreation	Support the development of innovative management practices for all recreation facilities along the river.
Sense of Place	Promote the distinct identities of each river segment. Foster a cohesive design aesthetic along the river corridor that is sensitive to neighborhood-specific contexts. Highlight the river’s natural condition as a central characteristic.
Water Quality	Develop integrated, watershed-wide stormwater treatment policies that ensure long-term water quality for the Trinity River. Develop a coordinated approach to water quality, engage with partners, and build collaborations across jurisdictions and agencies throughout the watershed. Adopt water conservation and reuse strategies to foster a sustainable water system. Promote low-impact development to minimize stormwater runoff and pollutants entering the water system.

2019 Active Transportation Plan

Category	Policies (paraphrased)
1. Coordinated	Implement the Complete Streets Implementation Plan to ensure interdepartmental and interagency coordination during project scoping and consideration of all users and modes, connected travel networks, and nearby land uses. On TxDOT projects, continue to coordinate with TxDOT to ensure comfortable sidewalks and appropriate bicycle facilities are included in all projects for the land use context where identified in this plan. Work with school districts to encourage the development of a Safe Routes to School Program. Work with partner agencies, schools, and jurisdictions to actively promote land use and development principles that contribute to a safe and comfortable walking and bicycling environment. Develop a complete street review checklist for departments involved in the street design review process. Develop a prioritization strategy for corridor planning efforts across all City departments.
2. Connected	Promote street system patterns that provide greater connectivity between streets and developments to reduce traffic demands on arterial streets, improve emergency access, and make bicycling and walking more attractive transportation options.
3. Safe and Comfortable	Support efforts in lowering speed limits in areas where bicyclist and pedestrian safety is a priority.
4. Accessible	Adopt ADA infrastructure standards for all infrastructure types in the active transportation network. Inventory and prioritize corrections to accessibility barriers at traffic signals, such as lack of curb ramps, or presence of physical barriers in the pedestrian right of

way as defined in the ADA Transition Plan. Update and implement the ADA Transition Plan.

5. Equitable	Achieve the sidewalk condition and gap-filling targets established in the Race and Culture Task Force final report.
7. Community Awareness and Culture	Review Subdivision and Zoning codes to develop and adopt changes that incorporate language that supports and promotes bicycling and walking such as connectivity and development requirements. Require training in Complete streets annually for City Staff, and as a prerequisite or requirement of design contracts.
8. Funding	Review and update policy on sidewalk maintenance responsibility.
9. Economic Vitality	Update subdivision ordinance to require dedication of easement along planned trail corridors during platting between subdivision and destinations (schools, parks, shopping, etc.). Improve transportation infrastructure around areas of weaker economic vitality to revitalize the area and attract new tenants.

Transit Moves Fort Worth (Next Steps section)

Category Actions (paraphrased)

Short-term: Improve and expand services and lay groundwork for bigger improvements	Develop and begin implementation of bus stop improvement program. Implement Complete Streets improvements along transit-oriented streets.
Mid-term: Continue to expand and develop high capacity transit	Continue to implement pedestrian and biking improvements to make it easier to get to and from transit. Continue implementation of bus stop improvement program. Continue to implement Complete Streets improvements along transit-oriented streets.
Long-term: A visionary citywide system	Continue to implement pedestrian and biking improvements to make it easier to get to and from transit. Continue implementation of bus stop improvement program. Continue to implement Complete Streets improvements along transit-oriented streets.

2019 Transportation Engineering Manual

Category Standards (paraphrased)

Chapter 3 – Street Design	<u>Non-Traversable Medians</u> : Landscaping, especially vertical features such as trees and taller shrubs close to the travel way, is an important element of a Complete Streets approach to calming traffic. Medians typically have openings at intersections and major driveways. <u>Depressed Median</u> : Depressed medians are often used for Stormwater management purposes, in keeping with Green Infrastructure practices supported by the City.
Chapter 4 – Bicycle Facilities	<u>Bicycle Boulevard Treatments</u> : Bicycle boulevard treatments include traffic calming measures such as street trees, traffic circles, chicanes, and other horizontal speed controls.

Chapter 5 –
Pedestrian
Zone

Local Streets: Accessibility, minimum width, street landscape buffer, shade (through street trees).

Activity Streets: Wider sidewalks and shade elements at transit stops Street buffer may be hardscaped with trees in tree wells.

Neighborhood Connectors: Accessibility, minimum width, street landscape buffer, shade (through street trees).

Sidewalk / Pedestrian Zone: It may be necessary in some locations for the Sidewalk/Pedestrian Zone to curve to form a more direct route to an intersecting walkway, to preserve significant trees, or to provide more separation between the sidewalk and the roadway.

Furnishing Zone:

Utilities, street trees, and other sidewalk furnishings should be set back from the curb face a minimum of 18 inches but should be sure not to obstruct the Sidewalk/Pedestrian Zone.

Green infrastructure elements should be designed to make use of stormwater runoff from the sidewalk and the street. Permeable paving may be considered.

Street Trees and Plantings.*

Street trees improve walkability by providing necessary shade and filtered light.

As vertical elements in the streetscape, trees help to frame and define the street wall, accentuate spaces and focus view corridors.

Canopy trees provide an enclosure to the street that reinforces the sense of intimacy and scale. Motorists respond to this enclosure, often reducing their speed.

Street tree enclosure can have positive effects in slowing traffic and increasing driver attentiveness and awareness of their surroundings.

Street trees and plantings can be installed in different zones of the parkway to accommodate adjacent land use and activities and anticipated pedestrian circulation.

Planting in the public right-of-way typically occurs in the Furnishing Zone and medians; however, this is not the only place that can accommodate planting. Wherever there is an opportunity for landscape features, street, or development projects should also look for opportunities to incorporate plantings.

Landscaped areas in the Frontage Zone can be excellent places to plant trees as they offer open areas for roots to spread. This is particularly the case when the Frontage Zone consists of (or is adjacent to) lawn panels or other open spaces.

Plantings are still possible in the Frontage Zone adjacent to building foundations; however, to avoid any intrusive roots, barrier material is recommended.

The MTP allows in-street trees to be placed in bulbouts between parking areas.

A medium or large tree shall be planted a minimum of 2 feet from the face of the curb, sidewalk, or other structure.

A small tree or shrub shall be planted a minimum of 1.5 feet from the face of the curb, sidewalk, or other structure.

A minimum planting area of 3 feet must be available between back of curb and sidewalk to plant any small tree or large shrub and a minimum of 4 feet to plant large trees. A large tree shall be defined as a species that reach a height of 50 feet at maturity.

In residential areas a minimum spacing of twenty-five feet is recommended between shade trees planted on parkways and is required in commercial districts or major arterial streets.

* Bold blue font color indicates a plan's goal or policy that directly aligns with the Urban Forest Master Plan's recommendations.

Tree Wells:*

Tree grates, or permeable metal structures surrounding a tree base, allow water to enter the root system. Silva cells take this one step further by simultaneously supporting large tree growth and an underground infiltration system.

In densely urban areas or those with limited sidewalk width, ADA-compliant tree grates may be necessary.

At street level, they appear to be individual features with sidewalk segments separating each well.

Consider installation on Activity Streets and Mixed-Use Streets.

Consider rectangular (rather than square) tree wells, as they maximize the width of pedestrian zones.

A 6-foot minimum Pedestrian Zone should be left adjacent to a tree well

A typical tree well width is 6 feet.

Allow 15 feet of space between tree wells.

Continuous Planting Strip:*

At the street level, they appear to be a continuous feature with a large area of visible landscape planting and are occasionally separated by sections of sidewalk.

They can be installed in the Furnishing Zone or mid-way between the curb and the building face on Mixed-Use Streets, Commercial Connectors, Neighborhood Connectors, and Industrial Streets.

They can be installed in the Frontage Zone on Local Streets and some Neighborhood Connectors.

A 6-foot minimum pedestrian zone should be left adjacent to the landscaping feature in areas with greater pedestrian volumes.

On local streets, a 5-foot minimum pedestrian zone should be left adjacent to the landscaping feature.

Landscaping features should be placed to avoid intersection sight triangles as set forth in Chapter 6 of this manual. Caution should be applied when locating legs of visibility area.

The typical planting strip width is 6 feet.

Allow a 12-foot minimum of space between utility poles and tree centers.

Utilities:

Well-placed utilities and other infrastructure reduces clutter on the sidewalk, improves pedestrian safety, reduces maintenance conflicts with other street amenities, and allows for more landscaping and trees.

The relocation of overhead utility lines can provide an aesthetic benefit and allow for better sidewalk accessibility, growth of trees and increased opportunities for sidewalk enhancements and amenities.

Above-ground electrical lines are typically not insulated and therefore necessitate the regular pruning of street trees and may prevent the planting of new trees that are appropriately scaled for the street. As a result, the myriad benefits of street trees, aesthetic, cooling effect, air quality, etc., are often compromised. An alternative, where the lines cannot be undergrounded or relocated, may be to replace the existing electrical lines with insulated, braided lines used in back yard conditions. Tree branches can grow around these electrical lines without concern that a fire will started if the lines break. Trees will still need to be pruned when limbs put pressure on power lines.

Seating: Public seating can be integrated into other street elements such as the edge of planters and steps or as protection around trees.

* Bold blue font color indicates a plan's goal or policy that directly aligns with the Urban Forest Master Plan's recommendations.

Chapter 6 – Intersection Design Curb Extensions (Bulbouts): Curb extensions also increase space for additional landscaping including street furniture, benches, and trees.

Chapter 8 – Access Control and Off-street Parking Parking Lot Design: Parking spaces adjacent to landscape areas may project into the landscape area and be reduced to 16 feet in length when separated from the landscape area by curbing or approved wheel stops.

Chapter 9 – Transit Accommodation Transit-specific Streetscape Elements: Incorporating green infrastructure into the transit street design can help improve water quality, manage stormwater runoff, improve aesthetics, calm traffic, and enhance comfort. Green infrastructure can be integrated into sidewalks, medians, and other features.

2016 Master Thoroughfare Plan (rev. 2020)

Category Considerations (paraphrased)

Target Speed Target Speed approach attempts to control vehicle speeds via means beyond horizontal and vertical curvature; most notably, via lane widths and vertical elements (such as street trees).

Non-Traversable Median (NTM) Typically, medians are raised (as opposed to depressed), as shown in most of the photos below. Landscaping – especially vertical features such as trees and taller shrubs, close to the travel way – is an important element of a Complete Streets approach to calming traffic.

Complete Streets Landscaping Elements The City’s subdivision ordinances include requirements to include street trees at 50-foot spacing within arterial parkways that back up to residential fences. It is highly encouraged that such trees be placed in the furnishing zone (between the curb and any pedestrian or bicycle facility). Street trees are encouraged in the parkway areas of all thoroughfares, and in raised medians as well. These items are critical to calming traffic on arterial streets, and should be incorporated into all thoroughfare designs.

The placement of trees and shrubs can have traffic calming effects. When trees of a caliper considered non-frangible (six inches or more) are placed in medians, it is best to have at least an eight-foot median, with trees set back from edges four feet; this means that all MTP medians except the narrow median are candidates for trees of this size. Trees not expected to have calipers of six inches or greater can be placed closer to median edges, and thus can be included in narrow medians as well. Trees are often set back 100 feet from intersections (based on speed) for safety and sight-distance reasons. Additional (non-traffic) benefits of a tree canopy along a thoroughfare right-of-way include (1) cooler temperatures at street level helping to preserve pavement life, (2) rainwater capture – by both tree canopy and root systems – potentially helping reduce flooding when storm drains are already near peak capacity, (3) more efficient absorption of emissions (and conversion to oxygen) than trees planted away from thoroughfares, and (4) potential economic benefits from increasing the street’s attractiveness as a gathering place.

Tree-related Ordinances, Regulations, and Standards

The City of Fort Worth's Urban Forest Master Plan includes a review of all tree-related ordinances to examine how the regulations align with the needs and priorities of the city, the people, and the urban forest. To do this, input from the City staff must be integrated and aligned with industry standards, comparable cities, state requirements, and City goals. The following framework for the review of Fort Worth's Urban Forestry Ordinance and related regulations and resources follows an approach that ensures the urban forest policies created today build towards beneficial outcomes for decades to come.

The following sections are also included in the Urban Forest Master Plan (Appendix C).

Desired Outcomes

The following outcomes were identified in the Request for Proposals for Urban Forestry Master Plan Services, through discovery phase with the Project Team, and during stakeholder and focus groups.

Increase tree canopy cover while allowing for responsible development.

The 2007 Urban Forestry Ordinance established a tree canopy goal of 30% citywide. Due to the City's decentralized structure for urban forestry activities across multiple departments, the City does not have a comprehensive strategy for monitoring and growing its tree canopy. The City is seeking to amend the current code sections to work towards this established tree canopy goal while balancing growth and development.

Enhance protection standards for trees in sensitive areas such as the Cross Timbers forest and riparian ecosystems.

The City of Fort Worth is seeking to evaluate opportunities for enhanced urban forest preservation, particularly in ecologically sensitive areas such as the Cross Timbers forest and riparian ecosystems. In recent years, East Fort Worth neighborhoods in the Cross Timbers ecological region have experienced significant impacts from development, such as tree canopy loss, flash flooding, and habitat fragmentation. Recommended strategies should sustain and enhance urban forest resources and provide methods to measure progress.

Align environmental, stormwater, and urban forestry requirements for the process of land grading permits during development.

Article X for Grading Permits was adopted into Chapter 12 of the City Code (Environmental Protection and Compliance) in 2012. Since its adoption, staff have discovered opportunities to amend this section of the code to better align the goals and processes of various departments for a more cohesive and effective permit process.

Ordinance Evaluation Project Framework

The project framework and timeline are outlined by Tasks A-I in the chart below.

City of Fort Worth, TX Tree Code Review & Recommendations									
Task List	Dec	Jan	Feb	Mar	Apr	May	Jun	July	
A Internal Research Document Gathering									
B UFMP Stakeholder & Focus Group Meetings									
C Ordinance Audit & Benchmarking									
D Summary of Research Findings									
E Draft Recommended Tree Code Amendments									
F Summary of Draft Amendments									
G Project Team Meeting for Review and Feedback									
H Incorporate Feedback									
I Final Recommended Tree Code Amendments									

Research

Initial research was gathered referencing available policies and ordinances from the Fort Worth website and documents provided by City staff. The project team added to this list as materials were discussed during the stakeholder meetings and focus groups. The tables below provide an overview of which resources were reviewed and used during the Tree Code Review process. A complete index of these materials is included in the workbook deliverable.

Fort Worth Code Sections						
Code Part	Chapter	Article	Section	Subsection	Public/Private	Link
Part II: City Code	Chapter 2: Administration	Article XII: Fee Schedules	Section 2-321 Development Application Fees	(a) - (b)	Private	Link
Part II: City Code	Chapter 2: Administration	Article XII: Fee Schedules	Section 2-322 Penalties and Mitigation Fees	(a) - (b)	Private	Link
Part II: City Code	Chapter 12.5: Environmental Protection and Compliance	Article X: Grading Permit				Link
Part II: City Code	Chapter 15: Gas	Article II: Gas Drilling and Production	Division VII: Onsite and Technical Regulations	15-43 Fences and Landscaping (c)	Private	Link
Part II: City Code	Chapter 33: Trees, Shrubs, etc.	-	-	-	Public	Link

Appendix A: Zoning Regulations	Chapter 6: Development Standards	Article 3: Landscaping, Buffers, and Urban Forestry	Section 6.300 Bufferyard and Supplemental Building Setback	6.300 (k) (1)	Private	Link
Appendix A: Zoning Regulations	Chapter 6: Development Standards	Article 3: Landscaping, Buffers, and Urban Forestry	Section 6.301 Landscaping	6.301 (j)	Private	Link
Appendix A: Zoning Regulations	Chapter 6: Development Standards	Article 3: Landscaping, Buffers, and Urban Forestry	Section 6.302 Urban Forestry	-	Private	Link

Relevant Documents				
Document Name	Year	Specific Section	Page	Summary
Texas House Bill 7	2017	-	All	State bill requires any local municipality imposing mitigation fees to provide an option for credits based on existing trees; preempts the ability to prevent removal of dead or diseased trees, or those which pose a threat to people or property; limitations on fees; etc.
City of Fort Worth 2022 Comprehensive Plan	2022	Chapter 6: PARKS, RECREATION, & OPEN SPACE; 6-10 Forestry		urban forestry and green infrastructure; 30% canopy goal; 71-acre tree farm; citizen forestry and public education; 250,000 trees in street rights-of-way and countless other trees in parks and other municipal property; special events and outreach
Environmental Master Plan	2019	1.6. Other Important Topics	41	Urban heat island effects, pollinators, sustainability, endangered species, wildlife corridors, greenspaces, water conservation, local food systems, energy conservation, recycling, composting, oil and natural gas operations, and urban forestry
Environmental Master Plan	2019	3.5 Strategies for Air Quality (by Program Area)	86	Air quality planning, references to UHI and tree canopy
Environmental Master Plan	2019	3.5.1.5 Development Actions for PA 1: Air Quality Planning & Management	90	Air quality planning, references to UHI and tree canopy
Environmental Master Plan	2019	3.6.1 Summary of Air Quality Development Actions	102	Air quality planning, references to UHI and tree canopy
Fort Worth Urban Tree Canopy Assessment	2020	Entire document	--	A 2020 high-resolution land cover assessment using 2018 imagery
Confluence: The Trinity River Strategic Master Plan	2019	Chapter 2, Environment, EN-6	41	Expand tree canopy
PARD Forestry Policies & Procedures Manual	--	Entire document	All	Policies and procedures for hazard abatement, plans and permits, uprooted sidewalks, and other public tree management practices
(Draft) PARD Forestry Community Tree Planting Policies & Procedures Manual	--	Entire document	All	Guidelines for grading, inventory, pruning, selection, planting, staking, watering, production, and tree nursery maintenance

Overview of Existing Policies and Ordinances

The City of Fort Worth establishes processes and procedures, standards, goals, and targets throughout multiple plans, policies, and ordinances. Currently, the Code of Ordinances includes tree protection standards throughout multiple sections and chapters. In *Part II: City Code*, Chapter 2 establishes the fee structures for permits, penalties, and mitigation. Chapter 12.5 establishes a permit process for land grading that requires consent from the urban forestry section on the planning and development department prior to approval of a land grading permit. Chapter 15 addresses landscaping standards on private property used for gas drilling and production. Chapter 33 outlines the responsibilities and standards for trees on public property. *Appendix A: Zoning Regulations* includes landscaping standards, buffers, and urban forestry for trees on private property in Sections 6.300, 6.301, and 6.302.

City of Fort Worth 2022 Comprehensive Plan

Fort Worth's Comprehensive Plan includes goals and principles that should guide policies in the Code of Ordinances. Specifically, *Chapter 6: Parks, Recreation, and Open Space* includes *Section 6-10 Forestry*. Within this section, the City acknowledges the urban forest as both an asset and a priority for preservation and enhancement. Urban forestry and green infrastructure are identified as vital initiatives for the City, recognizing the 250,000 trees that the City maintains in streets, rights-of-way, parks, and City property, with a goal set for 30% canopy cover citywide. Additional programs and areas of focus include the 71-acre tree farm, citizen forestry, public education, special events, and outreach.

Environmental Master Plan, 2019

This document defines urban forestry in Fort Worth as the management of tree populations in urban settings for the purpose of improving the environment and providing aesthetic benefits. The plan identifies the 30% citywide canopy cover goal and acknowledges that the Urban Forestry Compliance Section within the Planning & Development Department implements and enforces the city's Urban Forestry Ordinance, which protects trees and works to achieve the city's goal of 30 percent canopy cover. This plan includes recommendations to partner with outside agencies to develop an urban canopy study similar to the State of the Dallas Urban Forest report (Reference 3-12), as well as the Dallas Urban Heat Island Management Study (Reference 3-13), both prepared by the Texas Trees Foundation. Additionally, the plan calls for the development of citywide municipal green building and urban canopy strategic plans.

City of Fort Worth Code of Ordinances

The following code sections address the management of trees on public and private property in Fort Worth. The regulations under Part II of the City Code are related to the fee schedule for permits, fees, and mitigation, the requirements and specifications for landscaping on sites used for gas drilling, and trees on public property, rights-of-way, parks, and City property. Appendix A: Zoning Regulations contains the requirements for trees and landscaping on private property. The Audit and Benchmarking section of this analysis provides a deep dive analysis of Fort Worth's code, comparing it to industry standards and a list of 10 other cities in the region.

Part II: City Code

Chapter 2: Administration

- Article XII: Fee Schedules
 - Section 2-321 Development Application Fees
 - (a) - (b) Urban forestry permit application fees

- Section 2-322 Penalties and Mitigation Fees
 - (a) - (b) Ordinance violations, penalties, and fees

Chapter 12.5: Environmental Protection and Compliance

- Article X: Grading Permit

Chapter 15: Gas

- Article II: Gas Drilling and Production
 - Division VII: Onsite and Technical Regulations
 - 15-43 Fences and Landscaping
 - (c) Landscaping

Chapter 33: Trees, Shrubs, etc.

Appendix A: Zoning Regulations

Chapter 4: District Regulations

- Article 6: Residential District Use Table
 - Section 4.713 Urban Residential (UR) District
- Article 13: Form Based Districts

Chapter 6: Development Standards

- Article 3: Landscaping, Buffers, and Urban Forestry
 - Section 6.300 Bufferyard and Supplemental Building Setback
 - (k) (1) Within the required 50 foot supplemental setback...
 - Section 6.301 Landscaping
 - (j) Modification of landscape requirements.
 - Section 6.302 Urban Forestry

State of Texas House Bill 7 (HB7), 2017

This bill requires any local municipality in Texas which imposes fees for mitigation of tree removal to provide an option to apply for a credit to offset the imposed fees, based on the existing trees on the property. The criteria for credit eligibility are outlined in the bill (see below). It states that no fees may be imposed for certain trees on residential property which are less than 10 inches in DBH. The bill preempts a municipality's ability to prohibit the removal of a dead or diseased tree, or any tree which poses an imminent or immediate threat to people or property.

Credit Criteria:

(d) An application for a credit under Subsection (c) must be in the form and manner prescribed by the municipality. To qualify for a credit under this section, a tree must be:

- (1) planted on property:
 - (A) for which the tree mitigation fee was assessed; or
 - (B) mutually agreed upon by the municipality and the person; and
- (2) at least two inches in diameter at the point on the trunk 4.5 feet above ground.

Chapter 2 of the City's code currently includes both penalties and mitigation fees for urban forestry under Article XII: Fee Schedules, in § 2-322 Penalties and Mitigation Fees. While it lays out a fee schedule of \$300.00/diameter inch or \$7.50/canopy sf, it also states, "Fees to be assessed according to Urban Forestry Ordinance, Section 6.302, when applicant opts for mitigation by payment. Funds deposited into PARD Tree Fund."

Audit and Benchmarking

Fort Worth’s tree-related ordinances and policies were assessed using the following four steps:

1. **Audit of Policies and Ordinances.** In Element 6 of this UFMP, the U.S. Forest Service’s Urban Forest Sustainability and Management Audit (USDA Forest Service, 2015) was used to assess Fort Worth’s urban forestry operations in 11 categories. A summary of relevant metrics, strengths, and opportunities for growth is included below.
2. **Ordinance Review.** PlanIT Geo adapted the Ordinance Checklist from the *Municipal Tree Care and Management in the United States: A 2014 Urban & Community Forestry Census of Tree Activities* to assess Fort Worth’s code with the project objectives in mind. This checklist provided a framework for organizing input and considerations that arose during the initial code review by consultants.
3. **Staff Guidance.** Feedback from staff was collected during focus group sessions and an internal survey. Input was documented and organized using the Ordinance Review framework for clear integration into proposed ordinance recommendations.
4. **Benchmarking Results.** An initial list of 10 cities was compiled using a benchmarking exercise that pulls from Arbor Day’s Tree City USA’s 2021 database of participating cities. Based on the stakeholder meetings and focus group discussions, 10 select cities were added to the code comparison chart. The benchmarking cities were then reviewed using Fort Worth’s UFMP objectives along with the audit and ordinance checklist.

Audit of Policies and Ordinances

The Urban Forest Audit applies the research and findings gathered throughout the planning effort to inform the Plan’s long-term framework for implementation, monitoring, and adaptive management. This audit or “gap analysis” provides a thorough review of existing conditions and identifies opportunities where the City can grow and improve operations. To specifically review audit metrics relating to tree ordinances, 42 components were extracted from the following categories: 1.00 Management Policy & Ordinances, 2.00 Capacity & Training, 4.00 Authority, 7.00 Risk Management, and 9.00 Standards & BMPs.

Audit Key			
Color	Rank	Description	Ranking Rationale / Considerations
Light Red	0) Not Practiced	No mention of the audit element in any documents, nothing uncovered during staff consultations, not in development as part of the UFMP project.	Describes the considerations that influenced the ranking
Yellow	1) In Development	The audit element is either mentioned in various documents but needs improvements or it is being addressed as part of the UFMP project.	Describes the considerations that influenced the ranking
Green	2) Adopted Common Practice	The audit element is mentioned in various documents, and it aligns with industry standards and best practices.	Describes the considerations that influenced the ranking

#	Component Evaluated	Description or Criteria for Evaluation	Ranking Rationale / Considerations
1.01	Urban Heat (Sustainability)	Also referred to as Sustainability. With reference to urban trees. Addresses the long-term health and productivity of the natural resource.	Most documents that mention sustainability relate to development not trees though the UF Ordinance is in place for tree protection
1.02	No Net Loss	Can refer to trees, basal area, or canopy.	Not specifically mentioned but ordinances have mitigation requirements
1.03	Risk Management	Should reference: ANSI A300 Part 9, ISA BMP, and prioritization funding mechanisms.	PARD Forestry P&P Manual, Storm Mitigation Plan
1.04	Tree Canopy Goals	Overall community/campus goal, or by designated "zone".	30% canopy but needs intervals, targets, and priorities
1.05	Tree Protection	Construction and/or landscape maintenance.	Ordinances, critical root zone mentioned in various permit documents, construction standards
1.06	Utility	Utility pruning, planting, and installation policy (e.g. boring vs. trenching).	PARD Forestry P&P Manual
1.07	Human Health – Physical & Psychological	Recognizes and addresses the human health benefits of the natural resource (e.g. exercise, air quality, stress management, shade). Could also include Urban Heat Island (UHI) policies.	Benefits of trees are stated in various documents but less emphasis on UHI reduction and human health
1.08	Wildlife Diversity / Habitat / Protection	Mammals, birds, or reptiles.	Trinity River Plan, Comp Plan, others emphasize wildlife and riparian protection. No documents found that specifically mention the Cross Timbers though
1.09	Performance Monitoring	Recognizes the annual or biennial calculation of metrics (e.g. some component of ecosystem services) for the purpose of tracking management performance.	Performance metrics in budget documents. Specific KPIs to be developed as part of the UFMP
1.10	Ordinance (Private)	Tree protection and management for trees on private property.	UF Ordinance in place but will be reviewed with recommendations as part of the UFMP
1.11	Ordinance (Public)	Tree protection and management for public trees.	Ordinance in place but will be reviewed with recommendations as part of the UFMP
1.12	Development Standards	US Green Building Council's LEED® rating systems (or similar internationally) LEED v4 BD+C (Sustainable Sites) LEED 4 ND (Neighborhood Pattern & Design, Green Infrastructure) ASLA's SITES® Rating System	Canopy % requirements for development projects, Complete Streets Design, design standards and placement/spacing for trees

1.13	High-Conservation Value Forests	Programs or policies for identification, acquisition, and/or protection of groups of trees or forests that provide unique public benefits.	No specific mention of conservation of forested areas, particularly no mention of the Cross Timbers
1.14	Urban Interface (WUI)	Programs or policies that improve management of the urban interface for fire and/or invasive species.	Only mentioned in the Tarrant County hazard mitigation and emergency management plans
2.01	Certified Arborist - Staff	International Society of Arboriculture	Certified Arborist is mentioned in the ordinances. No mention elsewhere except for mentions of the "City Forester"
4.02	Staff Authority	Designated staff with authority over the program and day-to-day activity. Including designated line item.	Clearly defines the role of the City Forester
4.04	Tree Board, Commission, or Advisory Council	Establishes a board for public participation (advisory or with authority).	Urban Design Commission (UDC) in place and Park Board in place, with the UDC hearing requests for waivers from the urban forestry ordinance and the Park Board providing policy recommendations to the City Manager and the City Council about citizen needs and requests that will improve the services of the Department
7.06	Standard of Care Adopted	Controlling authority has adopted a Standard of Care (SOC) or risk management policy.	PARD Forestry Policies & Procedures Manual provides specifications
7.07	Tree Risk Specification	Is there a written specification that meets requirements of ANSI A300 (Part 9)? And, has it been discussed with the controlling authority with relevance to the controlling authority's threshold for acceptable risk?	PARD Forestry Policies & Procedures Manual provides specifications
9.01	ANSI Standards	Reference and adherence to ANSI Standards for arboricultural practices (A300), safety (Z133), or Nursery Stock (ANSI Z60.1) (any or all).	PARD Forestry P&P Manual, Planting Manual draft
9.02	Ages/Diameter Distribution	Specific management for the development of an age-diverse tree population	Guidance provided in the UFMP
9.03	Arborist Standards	Standards of practice for arborists (i.e. Certification).	City website and pruning permit mention arborist standards. PARD Forestry P&P Manual, Planting Manual draft
9.04	Best Management Practices (BMPs)	Establishes or references tree maintenance BMPs (i.e. written comprehensive standards & standards).	Planting specs on City website mention BMPs but not in detail and no citation of ISA BMPs. PARD Forestry P&P Manual, Planting Manual draft
9.05	Fertilization and Mulching	Fertilization or mulching standards required for conserved & planted trees.	Mulching requirements found in several documents. PARD Forestry P&P Manual, Planting Manual draft

9.06	Lightning Protection	BMP written to the ANSI A300 Standard.	Nothing listed in the PARD Forestry P&P Manual or elsewhere
9.07	Planting	Planting and transplanting standards required/specified.	Planting specs on City website lay out the standards for planting as does the Neighborhood Tree Planting Program - Free Trees flier
9.08	Pruning	Pruning standards required for conserved & planted trees.	Standards exist in several documents. PARD Forestry P&P Manual, Planting Manual draft
9.09	Removal	Infrastructure damage, stump grinding, etc.	The Tree Removal Application has some guidance. PARD Forestry P&P Manual, Planting Manual draft
9.10	Support Systems (Guying and Bracing)	BMP written to the ANSI A300 Standard.	Stakes and ties mentioned in several documents but no specifications.
9.11	Tree Risk	Tree risk assessment procedures; ISA BMP or equivalent.	Storm Mitigation Plan, JEOC Tree Debris SOP, PARD Forestry P&P Manual
9.12	Construction Management Standards	Written standards for: tree protection, trenching/boring in CRZs, pre-construction mulching, root or limb pruning, watering (any or all).	Critical root zone mentioned in the ordinances and other documents. PARD Forestry P&P Manual
9.13	Design Standards	Standards for design that specifically require trees; standards for placement, soil treatment, and/or drainage.	Tree spacing, number of trees, buffer yards, etc. listed in various documents. PARD Forestry P&P Manual, Planting Manual draft
9.14	Genus/Species Diversity	Suggests or requires diversity of plant material.	The Tree Planting Permit states "projects with 21+ trees in parkway must have no more than 30% of trees from the same subgenus" and "projects between 5 and 21 trees in parkway must have no more than 50% of trees in the same subgenus". A recommended tree list is also in the ordinance and other documents. Detailed in the PARD Forestry P&P Manual and the Planting Manual draft
9.17	Minimum Planting Volume	Minimum required root zone volume.	Mentions the size of the planting hole but more guidance is needed
9.18	Minimum Tree Size	Minimum caliper for tree replacements, and/or minimum size of existing trees to receive tree density or canopy credit.	UF Ordinance requires trees with 2.5" to 3" caliper. PARD Forestry P&P Manual, Planting Manual draft
9.19	Root Protection Zone (CRZ)	Defines adequate root protection zone; Critical Root Zone (CRZ).	Critical root zone mentioned in the ordinances and other documents. PARD Forestry P&P Manual details protection of CRZ
9.20	Safety	Safety logs, trainings, reference to ANSI Z133 Safety Standard	Safety relating to wildfire and fire-proof landscape is mentioned. Storm Mitigation Plan, PARD Forestry P&P Manual
9.21	Topping	Prohibits topping or other internodal cuts (public & private).	Tree Pruning Permit mentions the prohibited act of topping. PARD Forestry P&P Manual

9.22	Tree Species List	Identifies and publishes a list of the most desirable, recommended, or preferred species (native and non-native species); alternatively, a list of species prohibited.	Recommended and prohibited trees mentioned in various documents. PARD Forestry P&P Manual, Planting Manual draft
9.23	Tree Quality Standards	Written standards for tree selection at nursery in addition to Z60.1.	ANSI standards mentioned in the Tree Pruning Permit. City's website mentions "locally grown stock" and protection of trees before they're planted but no mention of Z60.1 or similar. PARD Forestry P&P Manual, Planting Manual draft
9.24	Utility Right-of-Way (ROW) Management	Requirements for planting, pruning, and/or removal of trees within a utility ROW.	Mention of utility ROW management is in regard to underground utilities and to plant smaller-statured trees under power lines. PARD Forestry P&P Manual provides specs
9.30	Watering Standards		Various documents state the watering requirement post-planting. PARD Forestry P&P Manual and the Planting Manual draft provide specs

Strengths

Overall, the City's existing tree ordinances, development standards, Comprehensive Plan, and the citywide canopy goal of 30% contribute to strong audit results in support of policies and ordinances.

- The City's code has sections for Urban Forestry (private trees) and Forestry (public trees). The Forestry Section follows urban forestry best practices.
- Staff and contractors are trained in tree risk assessments and the City has an adopted standard of care.
- The processes are in place so that Urban Forestry is involved in all private development reviews and Forestry coordinates with departments.
- The City and partners actively manage invasive plant species and pests and diseases as resources allow and has lists and resources for recommended and prohibited trees.
- Standard details are adopted for tree protection during construction and development.
- The Development Advisory Committee and the Urban Design Commission are involved in processes that impact trees in the city.

Opportunities

The City should explore changes to tree ordinances based on the recommendations developed as part of the Plan and with input from staff, stakeholders, and the community.

- Enhance tree protection and enforcement in the right-of-way and on private property will support a "no net loss" strategy for retaining the benefits of urban forests.
- Appropriate levels of public and private tree ordinances as well as expanding the programs and protection for heritage and significant trees would advance the city in this category.
- Establish legacy tree status at 36" DBH (compared to significant tree status at 27" DBH).
- Increase protection standards heritage trees on private property by requiring the critical root zone (CRZ) to be calculated based on a higher multiplier than what is currently required (1 foot for every inch of DBH). Include protection measures for heritage trees which are located on adjacent properties to a project site if their CRZ crosses the property line.
- Improve requirements for additional City staff to be Certified as Arborists, with Tree Risk Assessment Qualified (TRAQ). Personnel to be accredited by the International Society of Arboriculture shall be given time to maintain these credentials.
- Identify workflow efficiencies and maintain standard operating procedures and contractor specifications.
- Explore the need and frameworks for an urban forestry-specific commission or working group to support the goals of the Plan.
- Clarify roles and responsibilities between Forestry and Urban Forestry.
- Maintain an inventory of trees in public rights-of-way to identify, monitor, plan, prioritize, mitigate risk, and to inform tree pests and diseases, climate change impacts, storm events, invasive species, and the natural or premature senescence of trees.
- Implement risk management standards and best practices.
- Align recommended changes to tree-related ordinances with the goals for the Plan, the development community, and the residents of Fort Worth.
- Include focus on utility vegetation management with Oncor, alternative solutions to tree and sidewalk conflicts (i.e., design standards), urban wood utilization, citing of industry standards and best practices in ordinances and manuals, a tree manual for tree care professionals and property owners, strengthened tree preservation requirements, and monitoring/enforcing ordinances to ensure trees planted through development projects survive or are replaced.

Ordinance Review

A 2014 study of 667 municipal urban forestry programs in the United States included a comparison of tree ordinances using a list of twenty-five ordinance topics categorized as credential, management, planting, and preservation (Hauer, 2016). This study provided the framework for the ordinance checklist exercise. Additional categories and topics were included based on engagement sessions with City staff to produce a more comprehensive and relevant assessment for Fort Worth.

Ordinance Review Framework	
Category	Description
Authority + Credential	Designation of authority over trees by a specific City department, staff person, board, committee, or professional. Ordinances may include requirements for specific professional licenses or certifications.
Canopy	Requirements to meet canopy goals, whether citywide or by specific districts or land uses. May include per-tree canopy projections to use as a tool for tree selection, or a process to calculate canopy projections.
Tree Preservation	Criteria for determining which trees are protected using factors such as size, species, or other characteristics of the tree or the location of the tree. Often include definitions and thresholds for signature tree, heritage tree, legacy tree, and similar.
Tree Protection During Construction	Standards for protecting trees during construction and development activity such as a critical root zone, fencing and signage, or restrictions on activity near trees.
Tree Planting Standards	Specifications for the planting of trees, including minimum standards for tree size, species selection, soil volume, spacing from other trees and infrastructure, site selection processes, and criteria for tree planting locations.
Tree Maintenance and Management	Specifications for the maintenance of trees, including strategies for managing specific obstacles such as pests and disease or invasive species removal. Ordinances may include specific references to industry standards or best management practices.
Mitigation	Requirements to replant on site or off site, including options to contribute to a mitigation fund or other mechanism that assists in the compensation of trees and canopy cover.
Enforcement	Inspections and permit processes to confirm compliance, or fees, fines, and other penalties for noncompliance.

The assessment of Fort Worth’s municipal ordinances using this framework is included below. With this initial review of the ordinances, key considerations are included to highlight potential focus areas for code recommendations.

Authority + Credential

Fort Worth’s ordinances currently include two requirements to utilize the knowledge of a city forester, city arborist, or certified arborist:

- In code section 6.302(g)(4)(b)(2), the code outlines requirements for getting credit for existing tree canopy cover using protected trees only. One requirement is that a tree survey is submitted by a Texas licensed landscape architect, certified arborist, Texas licensed landscape contractor or Texas certified nurseryman.
- Under “Tree protections and maintenance,” the city arborist/forester is designated as the authority to approve a grade change within the critical root system of a tree in code section 6.302(d)(1)(d)(6).

Fort Worth's code designates the Department of Park and Recreation as having authority over all public trees in code section 33-1 Supervision and Control.

Key Considerations:

- Define ISA Certified Arborist.
- Require ISA Certified Arborist report for situations which need professional guidance.
- Clarify roles, responsibilities, and timelines for maintenance of street trees after planting.

Canopy

A citywide canopy cover goal of 30% is included in the purpose section of the 6.302 Urban Forestry ordinance. This 30% threshold is provided for with a variety of specifications throughout section 6.302. As such, one- and two-family residential properties are required to meet a 40% canopy requirement. This is reduced to 25% for new subdivisions if certain criteria are met. Existing platted residential lots over one acre are required to meet a retained canopy cover of 25% and an overall canopy cover of 40%. Other land use requirements are as follows:

- Multifamily = existing or retained canopy shall cover 50% open space
- Institutional = 30% existing or retained canopy
- Commercial = 30% existing or retained canopy
- Mixed use = existing or retained canopy shall cover 50% open space
- Industrial = 20% existing or retained canopy
- Parking surface areas = 40% existing or retained canopy (potential additional credits)
- Public projects = 30% existing or retained canopy (potential mitigation fund option)
- Agricultural = 25% existing or retained canopy (additional requirements)

An exemption is provided for commercial, institutional, and industrial uses when existing structures are expanded by less than 30% and less than 3,000 sq. ft.

An urban forestry development agreement allows multi-tract developments to combine property area to allow for conservation of concentrated canopy in certain parts of the development and reduction of canopy cover below the 30% threshold in other areas, while reaching an overall canopy cover of 30% for the entire development.

Key Considerations:

- Conduct an historical canopy assessment to track canopy growth and loss over time. Reassess canopy requirements using a data-based decision making process.
- Introduce intervals, targets, and priorities for citywide canopy cover goal.
- Increase enforceability of the per-property canopy requirements, including inspections.
- Relocate the "6.302(e)(1)c. Phased development of subdivisions" section to "6.302(g) Urban Forestry Plan/Permits" and expand it to include multifamily, commercial, and industrial. Use education and outreach to make it easier and more enticing for developers to use for the expanded list of uses.
 - Reference [Conservation Design for Subdivisions](#) by Randall Arendt for additional ideas and specifications for preserving conservation area and creating effective open spaces.

- Enhance the “6.302(h) Urban forestry development agreement” section to make it easier and more enticing for developers to use for large-tract industrial, commercial, and multi-family developments in addition to the airport uses.
 - Consider lowering the minimum acreage requirement from 1,000 acres to 500 or 750 acres for wider applicability. For scale:
 - 1,000 acres = 1.56 square miles
 - 1,000 acres = 750+ football fields
 - FW Champions Circle = 500 acres
 - FW Meacham Airport = 745 acres
 - FW Gateway Park = 791 acres
 - Central Park in NYC = 843 acres
 - Perot Field FW Alliance Airport = 1,198 acres
 - FW Nature Center = 3,621 acres

Tree Preservation

Tree removal permits and urban forestry permits are separate processes in Fort Worth. A tree removal permit is required for the removal of a single tree that is six inches or greater. An urban forestry permit is required when more than one tree is proposed for removal, and when a building permit is required for construction of a new building.

An urban forestry permit and plan are required before or at the time of application for a building permit. The urban forestry plan is outlined as a two-part process, the first of which is to document existing conditions on the property, and the second is to overlay the existing conditions with proposed improvements and tree preservation, removals, and tree plantings. These requirements are canopy-based rather than based on tree count, however special circumstances are outlined for preservation of all species 27” or larger citywide, or post oaks or blackjack oaks 18” or larger in DBH east of Interstate Highway 35W in recognition of the naturally occurring Post Oak Savannas within the Cross Timbers Zone. Table A at the end of the Urban Forestry code section is inconsistent with the verbiage found in 6.302(g)(5)(a) and should be made clear for effective implementation of the code.

- Table A = Protected Trees
- Table F = Preferred Tree List (large, medium, and small trees)

Key Considerations:

- Make DBH thresholds consistent between verbiage and tables (e.g. post oak trees and blackjack oak trees protected at 18” or 20” east of I-35W)
- Improve the process to implement the requirements for preservation of post oak trees and blackjack oak trees on the east side of Fort Worth.
- Update preferred and protected tree lists. Include scientific names.
- Compare species and size requirements for tree preservation in other Texas cities.
- Compare canopy as a tree preservation requirement in other Texas cities.

Tree Protection During Construction

Sections 6.302(d)(1) and 6.302(d)(2) of the Fort Worth code regulate protections standards for trees on private property during construction. These standards are robust but are only effective with adequate levels of enforcement. These sections outline measures for protection of the root zone, bark, and canopy of the trees. The “critical root zone” is defined

as a radius from the trunk at one foot per inch diameter measured at breast height (DBH), and fencing is required to protect this area.

When trees are being protected and counted towards canopy coverage requirements for the property, additional protective measures apply, including a list of activities which are prohibited within the critical root zone. Boring, grade change, trenching, root pruning, paving, and interference with underground utilities are all regulated by this code section.

Key Considerations:

- Signage explaining tree protection measures can increase their effectiveness.
- Require inspection of tree protection fencing and signage prior to issuance of land grading permit.

Tree Planting Standards

The code section for 6.300 Bufferyard and Supplemental Building Setback identifies planting standards for trees in bufferyards between residential and industrial land uses. Specifically, section 6.300(k)(1) states that medium trees shall be planted every 15 feet on center and large trees planted every 30 feet on center.

An incentive exists in section 6.301(j) to preserve stands of native trees to be approved for a minor modification to the landscape requirements.

Fort Worth's Urban Forestry ordinance identifies planting standards in subsection 6.302(d)(3), which requires tree planting to achieve the goal of canopy coverage using a credit system. The specific canopy cover percentages vary by land use as outlined in subsection 6.302(e). In order to count towards canopy coverage for the property, the trees must be 2.5" – 3" caliper and meet the following requirements:

1. Large canopy tree with typical crown width of 50 feet in diameter. Two thousand square feet (minimum spacing of 40 feet on center);
2. Medium canopy tree with typical crown width of 30 feet in diameter. Seven hundred square feet (minimum spacing of 24 feet on center); and
3. Small canopy tree with typical crown width of ten feet in diameter. One hundred square feet (minimum spacing of eight feet on center).

Additionally, a minimum of 16 square feet of permeable surface is required for all tree plantings per section 6.302(d)(3)(e).

In 6.302(d)(3)(b), the code references Table H as the preferred species list, however this is in fact Table F. The city forester may approve other species on a case by case basis.

Key Considerations:

- Correct table references.
- Expand landscape incentives to encourage preservation over new plantings.
- Improve enforceability of canopy cover during inspections using GIS-based tools and analysis.
- Update preferred tree species list.

- Compare minimum permeable area and soil volume standards with industry standards.
- Include references to industry standards: ANSI A300, ISA BMP for Tree Planting, and Amer Standard for Nursery Stock Z6.
- Replace required permeable surface area with soil volume requirements based on mature size of tree species.
- Address use and removal of staking hardware (aligned with industry standards and best practices such as ANSI-300 transplanting standard).
- Include mulching standards.
- Reference the ANSI-300 transplanting standard.

Tree Maintenance and Management

The maintenance of over public trees is regulated by Chapter 33 of the City Code. The standards for maintenance outlined in this section are minimal. It establishes the authority of PARD to plant, preserve, spray, trim, cable or remove any tree on public property, but does not specify standards of care. When any part of a tree is in contact with electrical wires, those wires are to be removed or insulated.

For trees on private property, not much is stated regarding maintenance standards. The urban forestry plan and permit process is outlined in In 6.302(g) to require a permit for the removal of more than one tree or for the construction of new structures on a property.

Key Considerations:

- Include references to industry standards: ANSI A300 for Tree Care Operations
- Define and prohibit tree topping.
- Require regular tree maintenance and establish pruning cycles for public trees.

Mitigation

The City of Fort Worth's ordinances have strong mitigation requirements that are located throughout various sections of the code. The required plantings are based on two primary factors: meeting the % canopy cover requirement and replacement of trees removed (if certain criteria warrant it).

Subsection 6.302(d)(3)(d) requires replacement of new plantings if the newly planted trees die within two years of the date of project completion. Similarly, subsection 6.302(d)(4) requires that any tree which counted towards preservation credits be replaced if that tree dies or becomes hazardous and a threat to public safety or property due to construction activities within five years following the date of issuance of the certificate of occupancy. Subsection 6.302(g)(5)b.2 requires a 5:1 ratio when significant/large trees are removed. Subsection 6.302(d)(5) outlines the requirements of mitigation of significant or large trees, for meeting one of the following options:

1. An area one and one-half times the area of the canopy of the tree identified for removal is retained on the same site. The one and one-half retention of existing trees shall be of the same species as the tree being removed in the Post Oak Savanna as indicated on Exhibit "A" or from the protected list if not in the Post Oak Savanna and be in excess of the required tree coverage on the site/tract;

2. Planting of new trees from the preferred list (see Table F of subsection (I) below) at five times greater in canopy area than the removed specific tree canopy. The additional planting of five to one (5 to 1) will be in excess of the required tree coverage on the site;
3. Payment into the tree fund based upon the total diameter of the specific tree times \$200 per diameter inch, or \$4.94 per square foot of canopy; or
4. Urban design commission approves a plan that mitigates the removal of significant or large trees."

For public projects, an option is provided for fee-in-lieu of plantings at a rate of \$600 per required tree, which is paid into the tree fund.

Key Considerations:

- Confirm that fees are consistent and clear across code sections.
- Consider additional and innovative uses of the tree fund.

Staff Guidance

City Staff provided input on a wide variety of topics during the focus group sessions, including valuable insights on the policies, ordinances, and processes supporting urban forestry and tree management in Fort Worth. The comments directly related to the City's codes and ordinances are summarized in the chart below using the Ordinance Review Framework Categories.

Staff Guidance for Ordinances and Policies	
Ordinance Category	Staff Comments
Authority + Credential	<ul style="list-style-type: none"> ▪ n/a
Canopy	<ul style="list-style-type: none"> ▪ Expand canopy keeping in mind areas that were originally prairie. ▪ Expansion of canopy is a desired outcome and measure of success.
Tree Preservation	<ul style="list-style-type: none"> ▪ Include preservation incentives for developers. ▪ Get developers to think about preservation in the design phase. ▪ H district is currently exempt and should have minimum requirements. ▪ Homeowners of 1-acre lots are told they need an UF plan but it is an onerous request. ▪ Could utilize form-based code framework for stormwater retention incentives for the preservation / retainment of large trees. ▪ Encourage low impact design to preserve trees and use natural features without impeding the function of stormwater management like drainage and retention. ▪ Currently, developers are not using the stormwater credits. "Stormwater Utility Fee Credit" on page F-11. ▪ Guidance on how to protect riparian areas and the trees within them. ▪ Preservation of the eastern Cross Timbers area is not happening. Update the UF ordinance with incentives to protect trees especially in the Cross Timbers

Tree Protection During Construction	<ul style="list-style-type: none"> ▪ Code enforcement downtown could work with developers to make recommendations on when, how, and where to move trees within the site. ▪ Guidance on how to get developers to correct the issue(s) on construction sites ▪ Need more effective communication and documentation to ensure tree protection measures are met. ▪ Need to provide an example for demolition contractors on how to operate around trees.
Tree Planting Standards	<ul style="list-style-type: none"> ▪ Need to have standards and design for UF in downtown and have the resources and knowledge to assist in making recommendations on where to plant trees. ▪ Plant a variety of tree species in riparian corridors to provide aesthetics and benefits ▪ Tree nurseries only have a limited stock of native tree species. ▪ More focus and consideration of soils for tree planting and management. ▪ Develop incentives for below ground improvements such as Silva Cells to allow for more root space and better soil quality. Improve and tighten processes and best practices (in progress). ▪ As community centers are redeveloped, new plantings need to have adequate water and plant trees so the canopy provides the most effective shade.
Tree Maintenance and Management	<ul style="list-style-type: none"> ▪ There is a lack of shade along streets, parks, and transit stops. Maintenance of projects is an issue and areas may be neglected after the project. The responsibility for maintenance is unclear or inconsistent. ▪ More shade and trees in underserved neighborhoods. Increased shade along streets and in parks in neighborhoods that need assistance. ▪ Irrigation to new trees is critical. ▪ Tree abatement program helps with the maintenance of trees and removes low risk trees and clears branches. Forestry handles these contracts but the neighborhood program funds it. Funds cannot be used for trees on private property. ▪ Weed trimmer damage to trees. Clarification of Best Management Practices (BMPs) needed. ▪ Consider different recommendations and management approaches for forestry vs urban forestry.
Mitigation	<ul style="list-style-type: none"> ▪ Design districts are not required to mitigate for removal of mature trees. ▪ The eastern Cross Timbers has a special consideration in the UF ordinance and oaks are being removed and developers just pay the mitigation fee. ▪ Provide reasonable mitigation options for developers (alternatives to tree for tree or inch for inch).

Enforcement	<ul style="list-style-type: none"> ▪ UF Permit Process <ul style="list-style-type: none"> ○ Subdivision Plats: developers are required to begin the urban forestry permitting process prior to getting plats approved, but the processes are usually concurrent. Preliminary plat and final plat have UF reviews. ○ Grading, fill, building permits: typically require urban forestry permitting before the project. ○ Clarifications needed to reinforce workflows and SOPs that trigger urban forestry review. ○ Recommend evaluating the permit process to make it as time efficient and effective as possible especially when last minute changes occur. ○ Consider UF permitting for demolition of single-family residential structures on lots less than 1 acre. UF authorization on small residential lots may slow down the process if reviewers are backlogged. ○ The Nature Center is subject to UF permits that are designed for urban areas and not natural areas. Perhaps consider Forestry permit waivers for management of trees in the Nature Center. ▪ Penalties <ul style="list-style-type: none"> ○ Determine the penalties and enforcement when trees were illegally removed ○ UF code includes penalties for removal of canopy, so Code Department could apply UF violations and monitor canopy loss with aerial imagery. Most illegal removals and dumping of debris occur off-site and out of the neighborhood, so it is hard to track and penalize. ○ UF requested notification of responsible parties with unpermitted tree removal. This is a challenge because of the difficulty in finding the responsible party. ▪ Inspections <ul style="list-style-type: none"> ○ Inspectors cannot gauge canopy percentages; they use the count of trees. ○ Difficult to monitor whether trees >6" are being removed, difficult to enforce. Need to inspect sites before land clearing starts. ○ Need more consistent enforcement on street trees and canopy cover for parking lots ○ Planning only has 3 staff so when street trees are planted there is no one to inspect them and Urban Forestry doesn't look at them from the form-based code. The trees only get reviewed in the landscape plans.
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Benchmarking Results

The ordinances from five benchmarking cities were compared with Fort Worth’s tree-related ordinances to find opportunities for information-sharing and cross-referencing urban forestry standards. The five cities were chosen for their overall relevance to Fort Worth, using the following criteria as a guide:

- Proximity to Fort Worth. Only cities within Texas were reviewed and selected for this exercise. Cities within 50 miles of Fort Worth were placed at a high priority, while El Paso and San Antonio were selected using additional criteria.
- USDA Cold Hardiness Zone. Fort Worth is in zones 8a and 8b, while the cities selected are located within zones 8a, 8b, and 9a. A wide variety of species can grow in North Central Texas, so looking to other cities across the state can have a positive impact on Fort Worth’s urban forest as heat intensifies and the climate continues to change.
- Population. Cities with a large population (at least 250,000) were prioritized using the U.S. Census Population Estimates, July 1, 2021, (V2021).

CITIES SELECTED FOR CODE COMPARISONS			
Texas City	Population	Proximity (miles)	USDA Cold Hardiness Zone
<i>Fort Worth</i>	<i>935,508</i>	-	<i>8a + 8b</i>
Dallas	1,288,457	32.4	8a + 8b
Arlington	392,786	15.1	8a
Plano	288,253	49.2	8a
El Paso	678,415	603.7	8a + 8b
San Antonio	1,451,853	268.1	8b + 9a

Summary of Benchmarking Findings

On the following page, a table shows the results of the ordinance comparison and scoring exercise. Using 28 ordinance topics, Fort Worth’s ordinances were compared with those of Dallas, Arlington, Plano, El Paso, and San Antonio. If the ordinance addressed the topic, it received a Y (one point). If it did not address the objective, the city received an N (zero points), percentage scores were calculated for each category, and percentage scores were calculated for a grand total for each city.

Fort Worth, Dallas, and San Antonio tied for the highest score of 86%, Arlington scored 68%, El Paso 57%, and Plano 46%.

BENCHMARKING RESULTS						
Ordinance Topic	Fort Worth	Dallas	Arlington	Plano	El Paso	San Antonio
Authority + Credential						
ISA Certified Arborist required	Y	Y	Y	N	Y	Y
Staff authority over public trees	Y	Y	Y	Y	Y	Y
Authority over street trees	Y	Y	Y	Y	Y	Y
Subtotal	100%	100%	100%	67%	100%	100%
Canopy						
Canopy Cover	N	N	N	N	N	N
Canopy Goal/Requirement	Y	Y	N	N	N	Y
Canopy Goal Year/Trajectory	N	N	N	N	N	N
Subtotal	33%	33%	0%	0%	0%	33%
Tree Preservation						
Protected Tree (DBH)	Y	Y	Y	N	N	Y
Heritage Tree (DBH)	Y	N	N	N	N	Y
Exemptions	Y	Y	Y	N	N	Y
Subtotal	100%	67%	67%	0%	0%	100%
Tree Protection During Construction						
Dripline or root area definition	Y	Y	Y	N	Y	Y
Signage and fencing	Y	Y	Y	N	Y	Y
Subtotal	100%	100%	100%	0%	100%	100%
Tree Planting Standards						
Tree species list (preferred, required, prohibited, etc.)	Y	Y	Y	N	Y	Y
Tree size (caliper, height, projected canopy, etc.)	Y	Y	Y	Y	Y	Y
Minimum tree well or soil area	Y	Y	N	N	Y	Y
Minimum spacing	Y	Y	Y	N	N	Y
New private development	Y	Y	Y	Y	Y	Y
Subtotal	100%	100%	80%	40%	80%	100%
Tree Maintenance/Management						
References to BMPs and industry standards	Y	Y	Y	Y	Y	Y
Tree removal permit process established	Y	Y	Y	Y	Y	Y
Pest/disease strategy	Y	N	N	Y	Y	Y
Subtotal	100%	67%	67%	100%	100%	100%
Mitigation						
Public trees	Y	Y	Y	Y	Y	Y
Private trees	Y	Y	Y	Y	N	Y
On site	Y	Y	Y	Y	N	Y
Off site	N	Y	N	N	N	N
In lieu of fees	Y	Y	Y	Y	N	Y
Subtotal	60%	100%	80%	80%	20%	80%
Enforcement						
Inspections	Y	Y	N	Y	Y	Y
Tree Permit Fee	Y	Y	Y	N	N	Y
Fines and fees	Y	Y	Y	Y	Y	N
Other penalties for noncompliance	Y	Y	N	N	Y	Y
Subtotal	100%	100%	50%	50%	75%	75%
Grand Totals	86%	86%	68%	46%	57%	86%

Learning from the Benchmarked Cities

While Fort Worth’s lowest score is in the canopy section, no other city received a higher score than 33% in that category. Fort Worth’s ordinance is deficient in mitigation, which is a vital element to making policy effective. Only one inspection is required in the landscape regulatory process, which is a final landscape inspection before issuance of the final building permit. This structure makes any enforcement extremely difficult. Every other city in the study has some level of required mitigation for private trees with associated fee schedule, fines, and other penalties for noncompliance.

ORDINANCE CATEGORY: AUTHORITY + CREDENTIAL					
Fort Worth	Dallas	Arlington	Plano	El Paso	San Antonio
100%	100%	100%	67%	0%	100%
Tree survey = arborist City decisions and public trees = City Forester	Tree survey = arborist City decisions and public trees = City Forester, park board, park department	Tree survey/sampling by a qualified arborist, forester, or landscape architect City decisions and public trees = City of Arlington Tree Board	Does not mention “arborist” Park and street trees = parks and recreation director	Project arborist City decisions and public trees = City arborist and Director of Parks and Recreation	feasibility report for transplanting existing trees = arborist City decisions and public trees = City Arborist, urban forester
ORDINANCE CATEGORY: CANOPY					
Fort Worth	Dallas	Arlington	Plano	El Paso	San Antonio
33%	33%	0%	0%	0%	33%
30% citywide and additional regulations by land use and zoning	Street Typology and Canopy Cover Goals Residential 40% Mixed Use 35% Commercial & Freeways 30% Industrial 25% Parkways 45%	n/a	n/a	n/a	Single-family residential 38% Multi-family and nonresidential 25% CRAG area 15%
ORDINANCE CATEGORY: TREE PRESERVATION					
Fort Worth	Dallas	Arlington	Plano	El Paso	San Antonio
100%	67%	67%	0%	0%	100%
Protected tree = 6” Heritage tree = 27” or 18”	Protected tree = 12” post oaks 24” American elm, bois d’arc, cedar elm, chittamwood, common persimmon, eastern red cedar, green ash, all other oaks, pecan, all walnut species, and white ash	Significant Stand = clustering of at least three trees, of two and one-half inches of caliper or greater in size and trunks spaced at no greater than 10 foot intervals	n/a	n/a	significant tree = 6” Ashe Juniper 10” Huisache, Mesquite, Arizona Ash, Hackberry, Texas persimmon 5” Texas redbud, Texas Mountain laurel, Condalia, Possum haw, Hawthorne

ORDINANCE CATEGORY: PROTECTION DURING CONSTRUCTION

Fort Worth	Dallas	Arlington	Plano	El Paso	San Antonio
100%	100%	100%	0%	100%	100%
critical root zone = radius from the trunk at one foot per inch diameter measured at breast height (DBH) fencing	critical root zone = the circular area of ground surrounding a tree extending one foot per diameter inch of the tree, measured from the tree trunk or stem. Drip line = a vertical line that runs from the outermost point of the crown of a tree to the ground.	A minimum of 75 percent of the critical root zone shall be preserved for trees 3-10" caliper or 100% for trees greater 10"+ caliper	n/a	tree protection zone on public trees =, proper safe guards and root protection zones as outlined in the Arboricultural Specifications Manual must be approved by the city arborist. fencing	root protection zone ... in conformance with the Texas A & M University, Extension Landscape Horticulture, "Protecting Existing Landscape Trees from Construction Damage Due to Grade Changes," protective barrier

ORDINANCE CATEGORY: PLANTING STANDARDS

Fort Worth	Dallas	Arlington	Plano	El Paso	San Antonio
100%	100%	80%	40%	80%	100%
Lists = Recommended List of Native Plants, preferred Tree List Size = 2.5" - 3" DBH Soil area = 16 sq.ft. of permeable surfaces Spacing = large trees 40', medium trees 24', small trees 8'	Lists = approved tree list, unprotected tree list Size = 2"+ for single-family and duplexes, 3"+ for large/medium trees in other uses and surface parking lots, height = 6' Soil area = small tree = 24" depth and 25 sq.ft. of open area (50 cu.ft.) large or med tree = 36" depth and 160 sq.ft. open area (480 cu.ft.) legacy tree = 36" soil depth and 500 sq.ft. open area (1500 cu.ft.) Spacing = small - small = 10' small - medium = 10' medium-medium = 20' medium - large = 20' large - large trees = 25' from electric lines: small trees = 0' medium trees = 15' large trees = 20' legacy trees = 30'	Lists = approved tree list Size = Street trees shall be a minimum height of 10 feet and 3-inch caliper at the time of planting Soil area = n/a Spacing = Street trees shall be spaced between 25 and 30 feet apart on center, as appropriate for the species provided	Lists = n/a Size = instructions to measure Soil area = n/a Spacing = n/a	Lists = approved tree list Size = Container stock shall be grown for at least 8-months Soil area = Small tree- 25 sq.ft. of surface area and 75 cu.ft. of soil. Medium tree- 48 sq.ft. of surface area and 144 cu.ft. of soil. Large tree- 100 sq.ft. of surface area and 300 cu.ft. of soil. Spacing = n/a	Lists = recommended list, all xeriscape methods Size = 1½ inches for single trunk trees Soil area = pervious area of not less than one hundred sixty-two (162) square feet or 18 feet by nine feet (18' x 9') as required in parking areas Spacing = not more than 100'

ORDINANCE CATEGORY: MAINTENANCE/MANAGEMENT					
Fort Worth	Dallas	Arlington	Plano	El Paso	San Antonio
100%	67%	67%	100%	100%	100%
<p>BMPs/Standards = yes, but no direct mention of ANSI</p> <p>Permit = UF permit process</p> <p>Pest/Disease = Infested trees are exempt</p>	<p>BMPs/Standards = ANSI A300, ISA BMP for Tree Planting, Amer Standard for Nursery Stock Z60,</p> <p>Permit = Tree removal application</p> <p>Pest/Disease = n/a</p>	<p>BMPs/Standards = plant quality and species standards of the North Central Texas SmartScape program</p> <p>Permit = yes</p> <p>Pest/Disease = Infested trees are exempt</p>	<p>BMPs/Standards = American Standard for Nursery Stock ANSI Z60.1.</p> <p>Permit = yes</p> <p>Pest/Disease = Native or well adapted species of trees may be exempted with approval by the Di-rector of Planning or designee if diseased, presenting a public health or safety hazard, or in severe decline.</p>	<p>BMPs/Standards = American Standard for Nursery Stock ANSI Z60.1.</p> <p>Permit = yes</p> <p>Pest/Disease = The city may order that the owner of any private property containing a tree(s) that is dead or infested by transmissible disease or infested with insects, remove in the case of a dead tree, or treat or allow the city to treat, the infected or infested tree(s) located on private property.</p>	<p>BMPs/Standards = ANSI A300 Street tree planting and pruning standards</p> <p>Permit = Landscape and tree preservation permit processes</p> <p>Pest/Disease = if a listed species is infested by fungi, disease or pests, a substitution may be recommended. In no case shall monoculture be permitted.</p> <p>Tree Mitigation Fund can go towards invasive species control and disease management</p>

ORDINANCE CATEGORY: MITIGATION					
Fort Worth	Dallas	Arlington	Plano	El Paso	San Antonio
60%	100%	80%	80%	20%	80%
<p>Public trees = n/a</p> <p>Private trees = 5:1 ratio when significant/large trees are removed, Warranty/replacement of any preserved tree within 5yrs of c/o</p> <p>On-site = Planting of new trees from the preferred list at 5x greater in canopy area than the removed. The additional planting of five to one (5 to 1) will be in excess of the</p>	<p>Public trees = 1:1 tree replacement</p> <p>Private trees = Historic trees: 3:1 Significant: 1.5:1 Class 1: 1:1 Class 2: 0.7:1 Class 3: 0.4:1</p> <p>On-site = yes, above</p> <p>Off-site = alternative methods of compliance with tree replacement requirements:</p>	<p>Public trees = yes, replacement</p> <p>Private trees = Non-Developmental and Development related. Tree points system. Incentives for preserving stands of trees and native species</p> <p>On-site = yes, above</p> <p>Off-site = n/a</p>	<p>Public trees = 1:1 tree replacement</p> <p>Private trees = warranty period and replacement: shall closely match adjacent specimens of the same species and shall be subject to all requirements of this specification.</p> <p>On-site = yes, above</p> <p>Off-site = n/a</p>	<p>Public trees = In some cases, a removed tree must be replaced by the City.</p> <p>Private trees = n/a</p> <p>On-site = n/a</p> <p>Off-site = n/a</p> <p>In-lieu Fees = n/a</p>	<p>Public trees = 1:1 tree replacement</p> <p>Private trees = yes</p> <p>On-site = Significant 1:1, Heritage 3:1</p> <p>All tree species of Ash (all Fraxinus species) Hackberry (all Celtis species) Huisache, Ashe Juniper and Mesquite will be mitigated at 1:1.</p>

<p>required tree coverage on the site;</p> <p>Off-site = n/a</p> <p>In-lieu Fees = \$300.00/diameter inch or \$7.50/canopy sf. Private trees = total diameter of the specific tree X \$200 per diameter inch, or \$4.94 per square foot of canopy; Public projects may elect to mitigate required canopy coverage through payment into the tree fund at a rate of \$600 per required tree.</p>	<p>Use of other property for tree replacement.</p> <p>In-lieu Fees = Reforestation fund</p>	<p>In-lieu Fees = Tree replacement fee of \$100 per caliper inch</p>	<p>In-lieu Fees = \$175.00 per caliper inch, based on the total number of caliper inches to be mitigated</p>	<p>Off-site = n/a</p> <p>In-lieu Fees = The city arborist shall determine the probable maximum amount of tree mitigation required (measured in dollars) that may be attributable to the development.</p>
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ORDINANCE CATEGORY: ENFORCEMENT

Fort Worth	Dallas	Arlington	Plano	El Paso	San Antonio
100%	100%	50%	50%	75%	75%
<p>Inspections = Verification by the planning and development department of installation in compliance with this section shall be required.</p> <p>Permit Fees = Waivers to UF Ordinance; waiver from tree planting and nonprotected trees: \$550; Waiver from preservation of protected trees: \$1,000; Waiver from preservation of significant trees or large trees - city wide: \$5,000; Waiver from preservation of significant tree or large trees east of I35: \$3,000 (lower threshold)</p>	<p>Inspections = all landscaping must be completed before the final inspection of any building on the lot. If there is an approved landscape plan for the lot, the landscaping must comply with that plan before the final inspection.</p> <p>Permit Fees = \$100</p> <p>Fines = fine of not less than \$2,000.00 per protected tree removed or seriously injured without authorization</p> <p>Other penalties = not less than \$2,000.00 per day</p>	<p>Inspections = n/a</p> <p>Permit Fees = \$10 per tree, with a minimum charge of \$30 and a max of \$150</p> <p>Fines = up to \$2,000 for each offense</p> <p>Other penalties = n/a</p>	<p>Inspections = yes, by owner/representative, either at place of growth or at site before planting, for compliance with requirement for genus, species, variety, size, and quality. Remove rejected plant materials immediately from project site and replace with acceptable material at no additional cost to the Owner.</p> <p>1. Notify owner's representative of sources of plant materials 30 days in advance of delivery to project site.</p> <p>Permit Fees = n/a</p> <p>Fines = Any person, firm, or corporation found to be violating any term or provision of this ordinance shall</p>	<p>Inspections = Landscape and irrigation systems shall be installed in accordance with the approved plan. Installation shall be completed prior to the building final inspection.</p> <p>Permit Fees = n/a</p> <p>Fines = sum not exceeding two thousand dollars. Each day that a provision of this chapter is violated shall constitute a separate offense.</p> <p>Other penalties = Revocation of permit. Permits may be revoked in accordance with the provisions in</p>	<p>Inspections = mitigation trees that are planted on the property and that die within twelve (12) months of final inspection are subject to the mitigation requirements set forth in subsection (g)</p> <p>Permit Fees = \$100</p> <p>Fines = n/a</p> <p>Other penalties = follows civil penalties schedule</p>

<p>Fines = \$500 admin fee + \$300/diameter inch or \$7.50/canopy sf (non-significant trees), or \$600/diameter inch or \$15/canopy sf (significant trees)</p> <p>Other penalties = In cases of offenses involving the illegal removal of trees or noncompliance with an approved permit or urban forestry plan, the removal of each tree constitutes a separate offense. In cases of continuing violation, each separate day that a violation continues constitutes a separate offense.</p>	<p>for any other violation of this division</p>		<p>be subject to a fine in accordance with Section 1-4(a) of the City Code of Ordinances for each offense. Every day a violation continues shall constitute a separate offense.</p> <p>Other penalties = n/a</p>	<p>Chapter 18.02 of this Code. Citations: Employees authorized by the city manager</p>	
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Proposed Urban Forestry Code Changes

A systematic approach was utilized to provide recommendations to modify Fort Worth’s tree-related codes, including the review of relevant ordinances and documents, input from staff and stakeholders, the organization of feedback into varying levels of impact, and the integration of code research, industry standards, and best management practices. The recommendations included in this report have been organized using the following framework, terms, and definitions.

Framework

Code Section

The precise section or subsection of the impacted language is identified for clarity and conciseness. The alphanumeric pathway relates to the revised code section as included in Appendix F of the Technical Report for easy navigation.

Recommended Changes

A simple description of the intended change is provided. The draft code language is provided in Appendix F of the Technical Report in the strikethrough underlined version of the code.

Level of Impact

- Minor: non-substantive change that modifies the code language or formatting for clarity, consistency, and interpretability; no change in meaning or intent.
- Moderate: adds requirements or processes to strengthen the impact of existing codes; or
- Major: substantive change that modifies the meaning or intent of existing regulations and procedures; potentially creates new code sections

Common Courses of Action

- Define: Add/modify definition
- Make Consistent: align code language across sections
- Relocate: rearrange code language/sections
- Clarify Authority: identify who is responsible for a specific tasks or responsibility
- Insert/modify requirement: Require professional certification or license, report, survey, or other document
- Clarify Process: reinforce the language around an existing process
- Modify Process: change the language around an existing process
- Retitle: change the title of an existing code chapter, section, etc.
- Add Reference: include a reference to an outside agency, industry standards, data, research, and/or best management practices
- Modify/Add Threshold: create a new threshold or modify an existing one.
- Create a Tiered System: modify the existing threshold to create a tiered system
- Conduct a study, survey professionals, and/or gather industry research to inform potential change
- Create: A new code section, requirement, chapter, etc.
- Remove: A code section, requirement, chapter, etc.

Recommendations

The following recommended changes to Fort Worth’s Code of Ordinances are based on findings from the initial ordinance audit, input from City Staff, and inspiration from additional cities explored through the benchmarking exercise. Where possible, duplicative comments and feedback have been combined into the key recommendations identified below. Changes are primarily proposed for the urban forestry regulations in *Section 6.302 Urban Forestry*, in *Chapter 6: Development Standards of the Zoning Regulations*, although changes to other sections for consistency and clarity are vital to the success of these regulations. Details about the draft code section, level of impact, and courses of action are provided on the previous page.

1. Define authority by stating the requirement of an “ISA Certified Arborist.”

Existing Code Section: 9.101 Definitions

Draft Code Section: 9.101 Definitions

Level of Impact: Minor

Course of Action: Add definition.

2. Require an ISA Certified Arborist report for tree surveys and situations that need professional guidance.

Existing Code Sections: 6.302 (d)(1), 6.302 (g)

Draft Code Sections: 6.302(d)(1), 6.302(h)(5)a.1., and 6.302(h)(5)b.2

Level of Impact: Moderate

Course of Action: Insert requirement, add reference, and clarify authority.

3. Update the preferred and protected tree lists based on recommendations in the UFMP.

Existing Code Section: 6.302 (l) Tables

Draft Code Section: 6.302(m) Tables

Level of Impact: Major

Course of Action: Modify standards.

4. **Make corrections to the table references in the tree planting standards as they are currently inaccurate and do not reference the correct tables.**

Existing Code Section: 6.302(d)(3)
 Draft Code Section: 6.302(d)(3)
 Level of Impact: Minor
 Course of Action: Edit for consistency.

5. **Include references to tree planting industry standards to ensure trees are planted at the right depth and follow best practices for staking and mulching.**

Existing Code Sections 6.302(d)(3)
 Draft Code Section: 6.302(d)(3)d. and 6.302(d)(3)e.
 Level of Impact: Moderate
 Course of Action: Insert requirement and add reference.

6. **Update the minimum soil volumes with industry standards for the planting standards section.**

Specifically, ANSI Standards recommends 1,000 cubic feet for average soil volume. Consider updating the minimum widths for landscape strips to align with industry standards— 8 feet for medium and large trees, 6 feet for small trees (assumes 1,000 cubic feet of soil volume for large trees measured at a depth of 3 feet).

Existing Code Sections: 6.302(d)(3)e
 Draft Code Section: 6.302(d)(3)d
 Level of Impact: Moderate
 Course of Action: Insert requirement and add reference.

7. **Clarify exemptions for existing versus proposed right-of-way and easements pertaining to required preservation and mitigation.**

Existing Code Sections: 6.302(c)(8), 6.302(l)Table 6.12 and Table 6.17
 Draft Code Section: 6.302(e)(2)b.4.
 Level of Impact: Moderate
 Course of Action: Clarify.

8. **Require signage for tree protection measures mandated as part of construction projects.**

Existing Code Section: 6.302(d)(1)
 Draft Code Section: 6.302(d)(2)
 Level of Impact: Moderate
 Course of Action: Insert requirement.

9. **For tree maintenance and management, include references to ANSI A300 for Tree Care Operations, define and prohibit tree topping.**

Existing Code Sections: 6.302(d)(1) and 9.101 Definitions
 Draft Code Section: 6.302(d)(3)e. and 9.101 Definitions
 Level of Impact: Minor
 Course of Action: Add definitions.

10. **Remove the details under Section J, Penalty in the Urban Forestry Ordinance and instead add a reference to Chapter 2-321 Development Application Fees and Chapter 2-322 Penalties and Mitigation Fees of Fort Worth, TX Code of Ordinances.**

Existing Code Sections: 6.302(J), Chapter 2-321, and Chapter 2-322

Draft Code Section: 6.302(j), Chapter 2-321, and Chapter 2-322

Level of Impact: Minor

Course of Action: Edit for consistency and add reference.

11. Expand the phased development process to include multifamily, commercial, and industrial in addition to single-family and two-family residential.

Existing Code Section: 6.302(e)(1)c

Draft Code Section: 6.302(e)(1)c and 6.302(g)

Level of Impact: Moderate

Course of Action: Modify process and relocate language.

12. Enhance the urban forestry development agreement process to make it easier and more enticing for developers to use for large-tract industrial, commercial, and multi-family developments in addition to the airport uses.

Existing Code Section: 6.302(h)

Draft Code Section: 6.302(i)(2)a.

Level of Impact: Moderate

Course of Action: Lower threshold.

13. Clarify urban forestry requirements for zoning designations that are exempt from preservation requirements (e.g., Urban Residential and Form-Based Districts). Require mitigation for removal of significant or legacy trees. Ensure canopy requirements are consistent with setback requirements and reflect mandatory street tree installation where applicable.

Existing Code Sections: 6.302(c) and 6.302(e)

Draft Code Section: 6.302(c) and 6.302(e)

Level of Impact: Moderate

Course of Action: Clarify requirements for consistency and improved protection of significant trees.

14. Increase the mitigation requirements and fee-in-lieu payments for development projects in the Cross Timbers that align with the value of the trees and the citywide canopy goal.

It is recommended that the minimum diameters for preservation of post oaks and blackjack oaks be reduced from 27" to 24" citywide and east of Interstate Highway 35W be reduced from 18" to 16" to recognize the significance and growth rates of these trees. Consider the feasibility and appropriateness of creating a Cross Timbers overlay district for clear delineation of regulation differences.

Existing Code Sections: 6.302(g)(5)

Draft Code Section: (proposed) 4.409 Cross Timbers Overlay District and 6.302(h)(6)b-d

Level of Impact: Major

Course of Action: Create new section and add reference for consistency.

15. Make the diameter at breast height (DBH) thresholds reflect the natural land cover type.

For instance, in the Cross Timbers the minimum diameter for tree preservation could be smaller than the minimum diameter of trees in natural prairie areas. Alternately, the

minimum diameter could be species specific, with smaller minimum diameters for preferred tree species.

Existing Code Section: 6.302(b)(1), 6.302(g)(5)

Draft Code Section: (proposed) 4.409 Cross Timbers Overlay District, 6.302(b)(1), and 6.302(h)(6)b-d

Level of Impact: Major

Course of Action: Create new section and add reference for consistency.

16. Explore the feasibility and framework for creating Cross Timbers mitigation banks to create large tracts of new canopy cover. Align land acquisition strategies with the Open Space Conservation program.

Existing Code Sections: N/A

Draft Code Section: (proposed) 4.409 Cross Timbers Overlay District

Level of Impact: Major

Course of Action: Create new section.

17. Offer incentives for developers that preserve large tracts of canopy in development projects such as allowing the transfer of development rights (TDR) or to allow greater building heights. Other incentives may include reducing the number of required minimum parking spaces depending on the number of trees preserved, canopy retained, or trees planted.

Existing Code Sections: N/A

Draft Code Section: 6.302(f)

Level of Impact: Major

Course of Action: Insert new section.

18. Record the tree survey associated with phased development for public access and internal tracking of development

Existing Code Sections: 6.302(e)(1)c

Draft Code Section: 6.302(h)(8)

Level of Impact: Moderate

Course of Action: Insert requirement.

19. Require a tree survey for development projects larger than one acre.

On heavily wooded sites, Fort Worth only requires applicants to delineate the extent of the canopy and identify significant trees, rather than complete a full tree survey.

Existing Code Sections: 6.302(g)(3), 6.302(g)(4)

Draft Code Section: 6.302(G)(3)(a)(i)

Level of Impact: Moderate

Course of Action: Add new requirement.

20. Invasive species shall not count towards the required canopy cover %. Require removal of invasives.

Existing Code Section: N/A

Draft Code Section: 6.302(h)(5)a.6.

Level of Impact: Moderate

Course of Action: Add new requirement.

21. Allow flexibility for timing of tree planting to avoid planting in the summer.

Existing Code Section: 6.302(d)(3)

Draft Code Section: 6.302(d)(3)h.

Level of Impact: Moderate

Course of Action: Add new requirement.

22. Amend preservation requirements to align with existing tree canopy cover.

Creation of a Cross Timbers overlay district could be used to delineate areas with higher preservation requirements.

Existing Code Sections: 6.302(g)(4)

Draft Code Section: (proposed) 4.409 Cross Timbers Overlay District

Level of Impact: Major

Course of Action: Create new section.

Next Steps

Track Impacts of State Legislation

The 2023 Texas legislative session considered two bills which could impact local regulation of trees on private property. One of these bills, HB 2127 passed. The other, HB 2239, did not. The City should consult with its legal department regarding potential impacts of HB 2127 and monitor future sessions for reintroduction of proposed legislation such as HB 2239 that could preempt Fort Worth's ability to regulate and protect trees. A brief synopsis of these two bills is included below with strategies for mitigating the impact of the bills if they are determined to impact existing or proposed tree ordinances.

H.B. 2127 – Relating to State Preemption of Certain Municipal and County Regulation

This bill is written to prevent local municipalities from creating a “patchwork” of regulations across the state unless expressly allowed. It is a broad bill that has the potential to impact eight sectors of local government, including agriculture, business and commerce, natural resources, and property. The state of Texas operates under a hybrid structure of Home Rule (cities that can set local regulations) and General Law (cities that are limited to local regulations which the state laws expressly permit them to set). In Texas, cities with a population of more than 5,000 have the ability to adopt a charter to establish Home Rule status. Fort Worth enacted such a charter in 1924.

This bill removes the ability for local municipalities (regardless of Home Rule or General Law status) to enact new policies or to enforce existing policies relating to any of the eight sections outlined in the bill (see below) unless explicitly authorized by state statute. It is possible that portions of the existing urban forestry ordinance along with recommended changes drafted in this UFMP would not be enforceable unless expressly authorized by state statute.

HB 2127 relevant language:

Sec. 102A.001. LIABILITY FOR CERTAIN PREEMPTED REGULATION.

Any person, including a taxpayer, adversely affected by a municipal or county ordinance, order, rule, or policy adopted or enforced by a municipality, county, municipal official or county official acting in their official capacity in violation of any

of the following provisions has standing to bring and may bring an action against the municipality, county or official:

- (1) Section 1.004, Agriculture Code;
- (2) Section 1.109, Business & Commerce Code
- (3) Section 1.004, Finance Code;
- (4) Section 30.005, Insurance Code;
- (5) Section 1.005, Labor Code;
- (6) Section 229.901, Local Government Code;
- (7) Section 1.003, Natural Resources Code; or
- (8) Section 1.004, Occupations Code / Property Code.

It is difficult to plan for the impacts of such a sweeping bill, but some strategies which may be explored include:

- Rather than regulating the removal of trees, explore the regulation of tree debris and brush. If City or County facilities already practice an intake process for tree debris, consider enhancing the requirements to include increased credentials, permissions, or permitting for entry.
- Consider enhancing the business tax receipt/license registration process for tree care professionals and arborists at the City or County level.
- Conduct robust community engagement and public education campaigns about the benefits of trees, how to care for trees, and increase resources for planting on public and private property.
- Create incentives for homeowners to reduce their utility bill rates in return for proving a certain percentage of canopy cover, permeable surfaces, on-site water collection such as rain barrels, or Xeriscaping.
- Create incentives for developers to preserve trees by reducing permit fees, allowing flexibility in project site planning, and providing variances and bonuses on a project-by-project basis.

HB 2239 - Relating to Municipal Regulation of an Ashe Juniper Tree

This bill specifically targeted the Ashe juniper tree, so that local municipalities could not enforce preservation or mitigation measures on the removal of that species. This bill proposed to modify an existing state policy that prevents local government from prohibiting the removal of trees which are dead, diseased, or pose a threat to persons or property. If this bill had been signed into law, the result could have a major impact on the ashe juniper and on associated ecosystems.

The Ashe juniper (*Juniperus ashei*) or “cedar tree” is often regarded as a weed or undesirable tree by the general public. However, the species provides critical habitat for the endangered Golden-cheeked Warbler bird in much of the state. The bird’s endangered status is primarily due to the loss of habitat due to development, so careful consideration should be given to public education should a similar bill pass in the future.

HB 2239 relevant language:

(h) A municipality may not prohibit the removal of or impose a tree mitigation fee for the removal of ~~{a tree that}~~:

- (1) a tree that is diseased or dead; ~~{or}~~
- (2) a tree that poses an imminent or immediate threat to persons or property; or
- (3) an Ashe juniper tree.

HB 2239 would have had limited impact in Fort Worth as the local species is eastern redcedar (*Juniperus virginiana*), which the bill did not address. However, future iterations of this bill may be broader in scope to impact additional species.

Public Education and Engagement

The recommended ordinance changes and draft redline ordinance are provided as a starting point for ordinance amendment. It is recommended that City staff review and update them as needed to best support the UFMP goals. This will require holding meetings and workshops with various interest groups throughout Fort Worth to obtain broad-based support for proposed changes. The process should allow sufficient time to obtain and address stakeholder comments. If ordinance revisions are adopted, City staff should be prepared to launch a public education campaign using social media and leveraging existing public meetings to include announcements and presentations about the changes.

Manuals, Guides, and Forms

Should the City of Fort Worth adopt the proposed code changes, City Staff will need to update all existing manuals, guides, and forms that reference outdated tree and landscape codes. New guides should be easily understood by staff in any City Department and any resident of Fort Worth. Often, permit application forms need to be created or heavily modified upon adoption of new tree-related regulations so that the process is streamlined for both the applicant and City staff.

Sources

Hauer R. J. and Peterson W. D. 2016. Municipal Tree Care and Management in the United States: A 2014 Urban & Community Forestry Census of Tree Activities. Special Publication 16-1, College of Natural Resources, University of Wisconsin – Stevens Point. 71 pp.

Lavy, Brendan & Hagelman, Ronald. (2019). Protecting the urban forest: Variations in standards and sustainability dimensions of municipal tree preservation ordinances. *Urban Forestry & Urban Greening*. 44. 126394. 10.1016/j.ufug.2019.126394.

View [Appendix F](#) of the Technical Report for specific recommended changes to the Urban Forestry Ordinance.

COMMERCIAL FUTURE LAND USE IN THE EASTERN CROSS TIMBERS

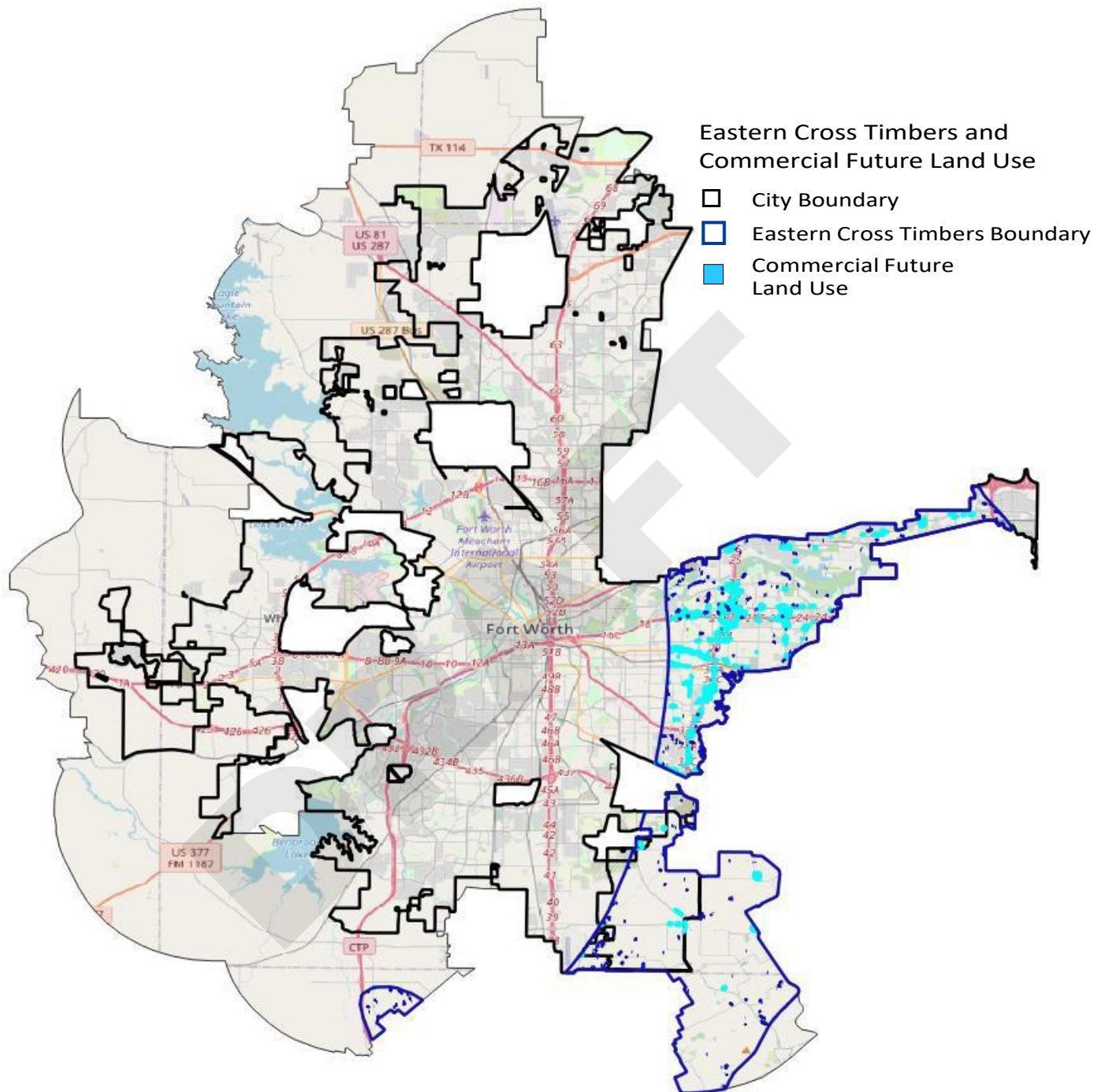


Figure 5. Map displaying the commercial future land use in the Eastern Cross Timbers

The map above provides the location of the commercial future land use as an example for considering changes to the Urban Forestry Ordinance. It is recommended the City explore updates to the Urban Forestry Ordinance requirements regarding development in the Eastern Cross Timbers by considering more robust planting and canopy retention requirements due to the natural landscape that exists in this region of the city. Currently, commercial development is required to have 30% existing or retained canopy cover. Based on the available planting space determined by the 2020 tree canopy assessment, it is recommended that these areas require 40% existing or retained canopy cover.

COMMERCIAL FUTURE LAND USE IN THE SOUTHERN PRAIRIE AREAS OF THE CITY

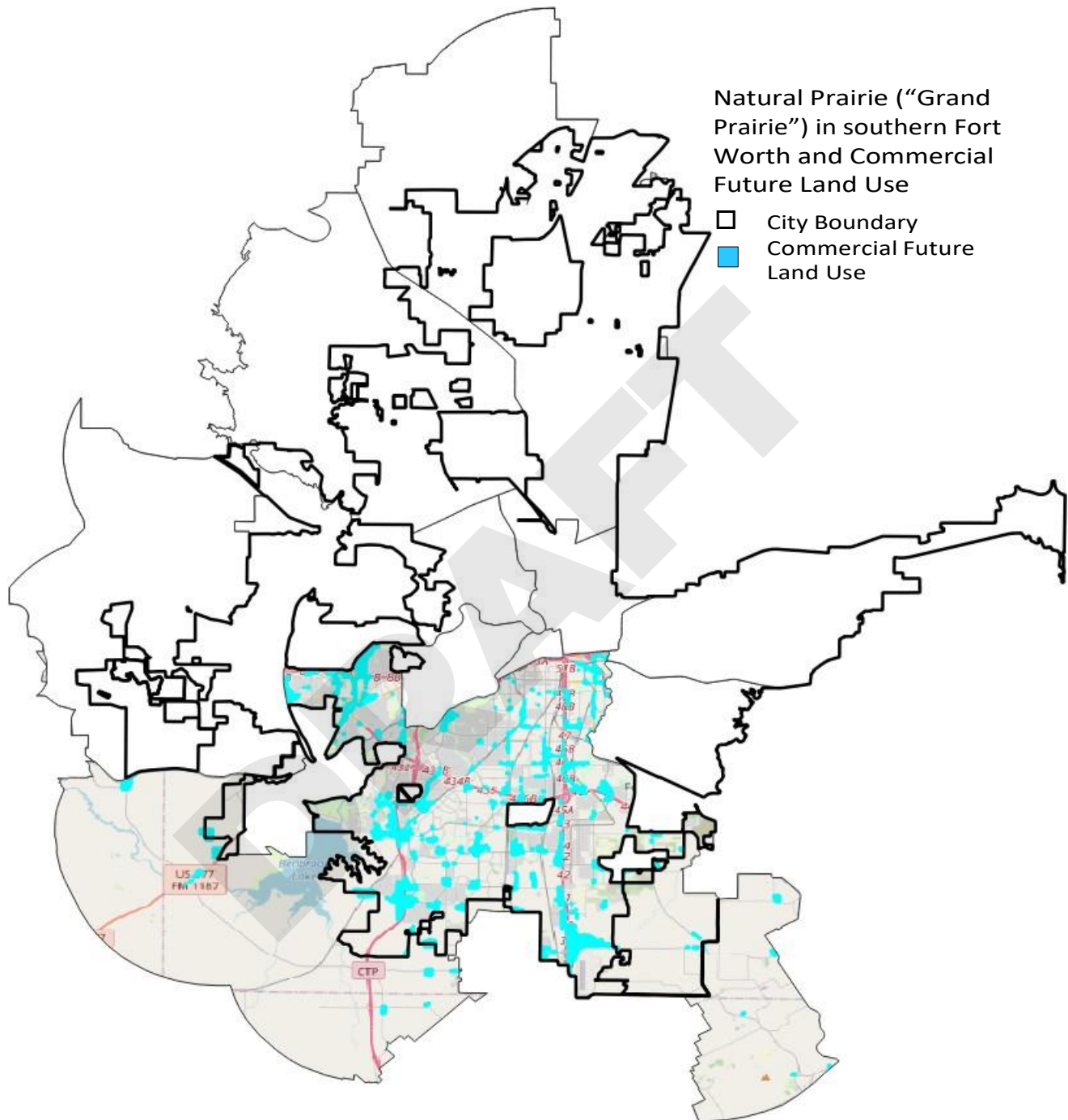


Figure 6. Map displaying the commercial future land use in the southern region of the city with natural prairie

Canopy goals and tree planting and preservation regulations by future land use as defined in the Urban Forestry Ordinance should be more nuanced to account for the natural ecosystems. For example, the geology and soil conditions in the Grand Prairie are not conducive to a large urban forest with 30% canopy coverage, as it is for a tall grass prairie. Additional soil conditioning and preparation, along with increase and long-term irrigation is needed to establish a large urban forest. Alternatively, minimal soil conditioning and preparation, and minimal irrigation is needed to establish the native vegetation, prairieland, which was historically found in this area.

The southern region of the city consists of primarily this natural prairie. As an example of how the ordinance could be adjusted to account for this, currently, commercial development is required to retain or plant trees for 30% overall canopy cover. It is recommended that this canopy requirement remain in the Urban Forestry Ordinance for this region, but the overall canopy requirement increase to 40% for commercial development in the Eastern and Western Cross Timbers. Adjustments could also be made to the preservation requirements depending on the natural ecosystem. These examples would support the citywide canopy goal of 30%. The following provides recommended changes to canopy goals by future land use for the City's consideration in implementing a strategy to achieve the 30% canopy goal citywide.

POTENTIAL OR RECOMMENDED TREE CANOPY GOALS BY FUTURE LAND USE

Table 6. Potential changes to future land use canopy cover requirements to be considered for updates to the Urban Forestry Ordinance

Future Land Use A	Public Park, Recreation, Open Space (PUBPK)	
Metric	#	Description
Existing UTC %	23%	
PPA %	69%	in geography
Planting Target	10%	of the total PPA acres
Modeled Canopy	30%	modeled canopy
Total # of Trees	90,188	total needed

Future Land Use B	Infrastructure (INFRA)	
Metric	#	Description
Existing UTC %	15%	
PPA %	57%	in geography
Planting Target	27%	of the total PPA acres
Modeled Canopy	30%	modeled canopy
Total # of Trees	49,037	total needed

Future Land Use C	Institutional (INST)	
Metric	#	Description
Existing UTC %	12%	
PPA %	50%	in geography
Planting Target	36%	of the total PPA acres
Modeled Canopy	30%	modeled canopy
Total # of Trees	77,141	total needed

Future Land Use D	Low Density Residential (LDR)	
Metric	#	Description
Existing UTC %	19%	
PPA %	54%	in geography
Planting Target	39%	of the total PPA acres
Modeled Canopy	40%	modeled canopy
Total # of Trees	48,645	total needed

UTC = Urban Tree Canopy Cover and PPA = Possible Planting Area based on the 2020 assessment.

Future Land Use E	Medium Density Residential (MDR)	
Metric	#	Description
Existing UTC %	13%	
PPA %	40%	in geography
Planting Target	17%	of the total PPA acres
Modeled Canopy	20%	modeled canopy
Total # of Trees	11,918	total needed

Future Land Use F	High Density Residential (HDR)	
Metric	#	Description
Existing UTC %	13%	
PPA %	57%	in geography
Planting Target	13%	of the total PPA acres
Modeled Canopy	20%	modeled canopy
Total # of Trees	1,117	total needed

Future Land Use G	Single Family Residential (SF)	
Metric	#	Description
Existing UTC %	22%	
PPA %	56%	in geography
Planting Target	33%	of the total PPA acres
Modeled Canopy	40%	modeled canopy
Total # of Trees	854,794	total needed

Future Land Use H	Suburban Residential (SUB)	
Metric	#	Description
Existing UTC %	30%	
PPA %	63%	in geography
Planting Target	17%	of the total PPA acres
Modeled Canopy	40%	modeled canopy
Total # of Trees	116,634	total needed

Future Land Use I	Rural Residential (RURAL)	
Metric	#	Description
Existing UTC %	23%	
PPA %	69%	in geography
Planting Target	25%	of the total PPA acres
Modeled Canopy	40%	modeled canopy
Total # of Trees	570,390	total needed

UTC = Urban Tree Canopy Cover and PPA = Possible Planting Area based on the 2020 assessment.

Future Land Use J	Urban Residential (UR)	
Metric	#	Description
Existing UTC %	35%	
PPA %	45%	in geography
Planting Target	12%	of the total PPA acres
Modeled Canopy	40%	modeled canopy
Total # of Trees	2,341	total needed

Future Land Use K	Mixed-Use (MU)	
Metric	#	Description
Existing UTC %	12%	
PPA %	49%	in geography
Planting Target	27%	of the total PPA acres
Modeled Canopy	25%	modeled canopy
Total # of Trees	100,762	total needed

Future Land Use L	Neighborhood Commercial (NC)	
Metric	#	Description
Existing UTC %	15%	
PPA %	54%	in geography
Planting Target	29%	of the total PPA acres
Modeled Canopy	30%	modeled canopy
Total # of Trees	69,362	total needed

Future Land Use M	General Commercial (GC)	
Metric	#	Description
Existing UTC %	8%	
PPA %	61%	in geography
Planting Target	37%	of the total PPA acres
Modeled Canopy	30%	modeled canopy
Total # of Trees	101,897	total needed

Future Land Use O	Vacant, Undeveloped, Agricultural, Floodplain (AG)	
Metric	#	Description
Existing UTC %	16%	
PPA %	81%	in geography
Planting Target	11%	of the total PPA acres
Modeled Canopy	25%	modeled canopy
Total # of Trees	143,581	total needed. Tree planting not required for Agricultural zoned properties, only preservation

UTC = Urban Tree Canopy Cover and PPA = Possible Planting Area based on the 2020 assessment.

The tables above provide a hypothetical scenario where the tree canopy requirements by future land use are modified in the Urban Forestry Ordinance to achieve the citywide canopy cover goal of 30%. Special use cases should continue to be applied as defined by the Urban Forestry Ordinance.

The City should evaluate these metrics and refine based on priorities and input from stakeholders though this would provide a more balanced approach to tree preservation, protection, and planting for developers and considers the current land cover type (i.e., Cross Timbers versus natural prairie).

PHASE ONE CHANGES TO THE URBAN FORESTRY ORDINANCE

The following recommendations can be completed in the short-term to improve protocols, communications, clarity, and compliance. These recommendations align with industry standards and best practices and input received from stakeholder engagement. Redlining and strikethrough of the Urban Forestry Ordinance is provided as a separate resource to support implementation. Refer to Appendix C of the Urban Forest Master Plan for the final evaluation and recommendations for Fort Worth’s tree ordinances.

- ❖ Implement an educational campaign raising awareness about the purpose of the Urban Forestry Ordinance and offer simplified summaries of the requirements.
- ❖ Define authority by stating the requirement of an “ISA Certified Arborist” and require an ISA Certified Arborist report for situations that need professional guidance.
- ❖ For tree preservation, make the diameter at breast height (DBH) thresholds reflect the natural land cover type. For instance, in the Cross Timbers the minimum diameter for tree mitigation could be smaller than the minimum diameter of trees in natural prairie areas. Changes to the tree preservation minimum diameters should also be considered for projects in areas where trees are excluded for health reasons.
- ❖ Update the preferred and protected tree lists based on recommendations in the UFMP.
- ❖ Require signage for tree protection measures mandated as part of construction projects.
- ❖ Require inspection of tree protection fencing and signage prior to issuance of land grading permits.
- ❖ Make corrections to the table references in the tree planting standards as they are currently inaccurate and do not reference the correct tables. For example, Section D.3.b of the Urban Forestry Ordinance should reference Table F and the Significant Tree definitions in Table H should align with the ordinance definition. View the redlined version of the Urban Forestry Ordinance for additional details.
- ❖ Update the minimum soil volumes with industry standards for the planting standards section. Based on ANSI Standards, the average soil volume recommended is 1,000 cubic feet. Consider updating the minimum widths for landscape strips to align with industry standards— 8 feet for medium and large trees, 6 feet for small trees (assumes 1,000 cubic feet of soil volume for large trees measured at a depth of 3 feet).
- ❖ Include references to industry standards such as ANSI A300, ISA BMP for Tree Planting, and American Standard for Nursery Stock Z60.1 in the planting standards section to ensure trees are planted at the right depth and follow best practices for staking and mulching.

- ❖ For tree maintenance and management, include references to ANSI A300 for Tree Care Operations, define and prohibit tree topping.
- ❖ Increase the mitigation requirements and fee in lieu for development projects in the Cross Timbers that align with the value of the trees and the citywide canopy goal. It is recommended that the minimum diameters for preservation of post oaks and blackjack oaks be reduced from 27" to 24" citywide and east of Interstate Highway 35W be reduced from 18" to 16" to recognize the significance and growth rates of these trees. Consider the feasibility and appropriateness of creating a Cross Timbers overlay district for clear delineation of regulation differences.
- ❖ Explore the feasibility and framework for creating Cross Timbers mitigation banks to create large tracts of new canopy cover. Align land acquisition strategies with the Open Space Conservation program.
- ❖ Offer incentives for developers that preserve large tracts of canopy in development projects such as allowing the transfer of development rights (TDR) or to allow greater building heights. Other incentives may include reducing the number of required minimum parking spaces depending on the number of trees preserved, canopy retained, or trees planted.
- ❖ Remove the details under Section J, Penalty in the Urban Forestry Ordinance and instead add a reference to Chapter 2-321 Development Application Fees and Chapter 2-322 Penalties and Mitigation Fees of Fort Worth, TX Code of Ordinances.
- ❖ Correct discrepancies within the Zoning Ordinance for the Mixed-Use (MU) and Urban Residential (UR) zoning classes. Clarify urban forestry requirements for these zoning classifications and others not currently included in the Urban Forestry Ordinance.
- ❖ Clarify exemptions for existing versus proposed right-of-way and easements.
- ❖ Explore the potential for creating buffer zones for riparian areas and floodplains to preserve and plant trees in these zones as appropriate without conflicting with flood and stormwater management. Refer to Chapter 7, Article VIII Floodplain Provisions.

View [Appendix F](#) of the Technical Report for specific recommended changes to the Urban Forestry Ordinance.

Discussion

It is important to examine existing City plans and resources when developing a plan for the urban forest. Trees in Fort Worth are an integral part of the city's infrastructure and should be integrated into the overall urban planning process.

City plans include a range of information about the city's infrastructure, including transportation systems, water and sewer systems, and other essential services. These plans include information and regulations about zoning and land use, which have a significant impact on the urban forest. Understanding these regulations and how they affect the urban forest is critical to developing an effective plan.

Additionally, existing Fort Worth plans provide valuable information about the city's environmental goals and objectives, such as protecting the environment, supporting human health and safety, and improving air quality. The urban forest plays an important role in achieving these goals, and incorporating them into the Urban Forest Master Plan can help

to ensure that the city is working towards a more sustainable and resilient future and that it is supported by stakeholders.

Furthermore, examining existing City plans identified areas where the urban forest may be underutilized or where there are opportunities for expansion. By integrating the urban forest into the overall planning process, the city can create a more cohesive and sustainable urban environment that benefits residents and the natural world.

From the review of over 100 City documents and resources, the primary plans included:

- ❖ 2022 Comprehensive Plan
- ❖ 2019 Environmental Master Plan
- ❖ Confluence: The Trinity River Strategic Master Plan
- ❖ 2022 Fort Worth Open Space Strategy Report
- ❖ 2019 Active Transportation Plan
- ❖ Transit Moves Fort Worth
- ❖ 2019 Transportation Engineering Manual
- ❖ 2016 Master Thoroughfare Plan (rev. 2020)
- ❖ Fort Worth Code of Ordinances Chapter 33 Trees, Shrubs, Etc.
- ❖ Fort Worth Code of Ordinances Chapter 6, Article 3 Landscaping, Buffers and Urban Forestry

These plans each reference Fort Worth's urban forest and trees as part of their goals, policies, strategies, or design standards. The Comprehensive Plan's Land Use element plays a critical role in how trees are preserved or incorporated into development design and construction. The Parks, Recreation, & Open Space element supports best practices and expansion of parks and amenities, and the Water Supply & Environmental Quality element emphasizes the use of trees to provide shade to reduce urban heat and associated ozone levels. The Environmental Master Plan recommends developing citywide municipal green building and urban canopy strategic plans in the Air Quality chapter. The Transportation Engineering Manual provides specific design standards that incorporate trees to support the Complete Streets policy, and multi-modal transportation. Specifically, the Pedestrian Zone chapter includes design standards for street trees, tree wells, and continuous planting strips.

Integrating the urban forest into the overall planning process can help to create a more sustainable and resilient city for both current and future generations.

View [Appendix F](#) of the Technical Report for specific recommended changes to the Urban Forestry Ordinance.

PLANNING ELEMENT:



INTERNAL ENGAGEMENT

PURPOSE:

To understand existing internal infrastructure and processes around tree management, and to identify shared strengths, challenges, and desired outcomes

ELEMENT 2: INTERNAL ENGAGEMENT

Purpose

Conducting surveys and interviews with staff from diverse City departments and backgrounds is crucial in developing a cohesive Urban Forest Master Plan, as these individuals possess valuable knowledge and expertise that can inform the planning process. City staff in various departments have different perspectives and roles in planning, managing, or altering the city's urban forest, and their input can help to create a comprehensive and integrated plan. Through this engagement, trends across departments can be identified such as strengths, challenges, priorities, and desired outcomes as it relates to trees and the Plan.

The results of the internal engagement were reviewed to develop recommended strategies and resource allocations to support the City's programs for public and private trees, including educational programs, ordinance recommendations, and incentives for planting and preserving trees on private property. It also served as an opportunity to identify efficiencies relating to program structures, staffing levels, and funding.

In summary, the purpose of the internal engagement included:

- ❖ Identify potential conflicts and synergies.
- ❖ Gather data and insights.
- ❖ Build support and collaboration.
- ❖ Cross-share information and resources among staff.
- ❖ Ensure implementation and sustainability.

Process

Online Survey

The planning team coordinated with the City staff on the Project Team to identify the staff and their respective departments and programs that interact with trees in the city. Once the list was finalized a preliminary survey was prepared via Google Forms to enable consistent reporting and analyses and to set the stage for department meetings. The survey was also prepared as a fillable document (Adobe PDF) and translated into Spanish to accommodate all invited staff. The response rate to the surveys were monitored and the status was shared with the Project Team for the members to encourage more participation from the City staff. The survey was open from January through mid-March 2023. Preliminary summaries were conducted over the course of the survey period to inform and facilitate discussions during the department meetings. Once the survey was closed, an analysis and summary of the responses was completed and incorporated into the Technical Report and Urban Forest Master Plan.

Internal Stakeholder Meetings and Interviews

Once the staff list was finalized and while the online survey was underway, remote meetings via Microsoft Teams were scheduled for each City department. The meetings took place throughout the months of January and February 2023. A master slide deck was prepared in Microsoft PowerPoint and tailored to each department to provide a background on the project and to facilitate discussion about trees and their programs. The questions and the framework for the meeting were constructed to streamline urban forest management,

strengthen communications and coordination, improve efficiencies, and support sustainable and resourceful practices.

The UFMP planning team consisting of Texas Trees Foundation and PlanIT Geo coordinated schedules and provided a background on the purpose, timeline, and approach to develop the plan. Each department meeting followed a similar framework with the overview presentation followed by four focus questions/requests:

- As it relates to trees, describe your responsibilities, programs, and services.
- Describe the tree-related strengths.
- Identify and discuss the tree-related challenges.
- Share existing measures of success or desired outcomes of the UFMP.


These focus questions included guiding themes to facilitate discussion. The themes included “processes”, “management”, “resources”, “technology”, and “communications”.

Meeting Approach: Questions

1. Describe your current responsibilities, services, and programs.
2. What are the strengths of your operations relating to trees?
3. What are the challenges you’re facing in operations?
4. What would constitute success to you in your operations?

Guiding Themes

Processes	Management	Resources	Technology	Communications
Series of actions or steps taken to achieve outcomes.	The organization, coordination, and supervision of activities.	Resources needed to effectively and efficiently provide services.	Use of technology to increase efficiency and levels of service.	Exchange of information.
Plans, policies, standards, SOPs, MOUs, etc.	Staffing structure, tree-related management activities.	A stock or supply of money, inventory, staff, information, and other assets.	Software, devices, tools, and equipment.	Internal: among agencies and staff. External: among residents and partners.






Figure 7. Primary focus questions and guiding themes for internal staff meetings and interviews

The departments involved along with the grouping and order of meetings were as follows:

- ❖ Development Services on January 13, 2023.
- ❖ Code Compliance on January 18, 2023.
- ❖ Park and Recreation on January 24, 2023.
- ❖ Diversity & Inclusion and Neighborhood Services on February 1, 2023.
- ❖ Transportation and Public Works on February 6, 2023.
- ❖ Other departments and programs on February 10, 2023.

Each meeting was recorded and multiple members from the planning team attended to facilitate discussion and take notes. These notes were prepared from each department meeting and organized into the focus question categories listed above. The draft notes were then shared with Texas Trees Foundation, edited, and sent to the meeting attendees to review and update the notes as needed. A final summary for each department was completed along with a combined summary for all department meetings.

Results

Online Survey

The online survey received a total of 39 responses, 8 of which were completed using the Spanish-translated version of the survey. Of the 39 responses, 12 of the staff also participated in the staff meetings discussed further below. The summary of the responses received for the 9 questions is provided below followed by the chart summaries.

Question 1) Please provide the following so we can better understand how you interface with the trees in the City of Fort Worth and contact you for follow up interviews or questions (Name, Title, Contact Information)

Summarized in the table below.

Title	Title (cont.)
City Forester	Aviation System Director
Director, Neighborhood Services Department	Assistant City Manager
Administrative Assistant	Neighborhood Program Coordinator
Natural Scientist Supervisor	Contract Compliance Specialist
Professional Engineer	Hon.
Urban Design Senior Planner	Natural Resource Technician
Environmental Program Manager	Senior Accountant
Senior Planner	Fleet Mechanic 2
Assistant Development Services Director	Buyer
Neighborhood Services Manager	Park Operations & Natural resource Planner, Green Infrastructure Practitioner (GIP)
Customer Solutions Analyst	District Superintendent
AD TPW - Regional Transportation and Innovation	Maintenance
Assistant Director, Development Services	Arborist I
Senior Planner	Arborist I
Manager - Preservation & Design Planner	Field Operation Crew Leader
Floodplain Administrator	Green House
Landscape Architect	N/A
Equity Data Analyst	N/A
Senior Planner	Crew Leader Field Operations
TOTAL	39

Table 7. Titles for the staff participating in the online survey

Question 2) What is the nature of your work as it relates to trees in the city?

Primarily, staff are advocates for public tree and park improvements (41%), involved in enforcing City Code and ordinances (38%), and/or responsible for development permitting, land use, and regulatory considerations (36%).

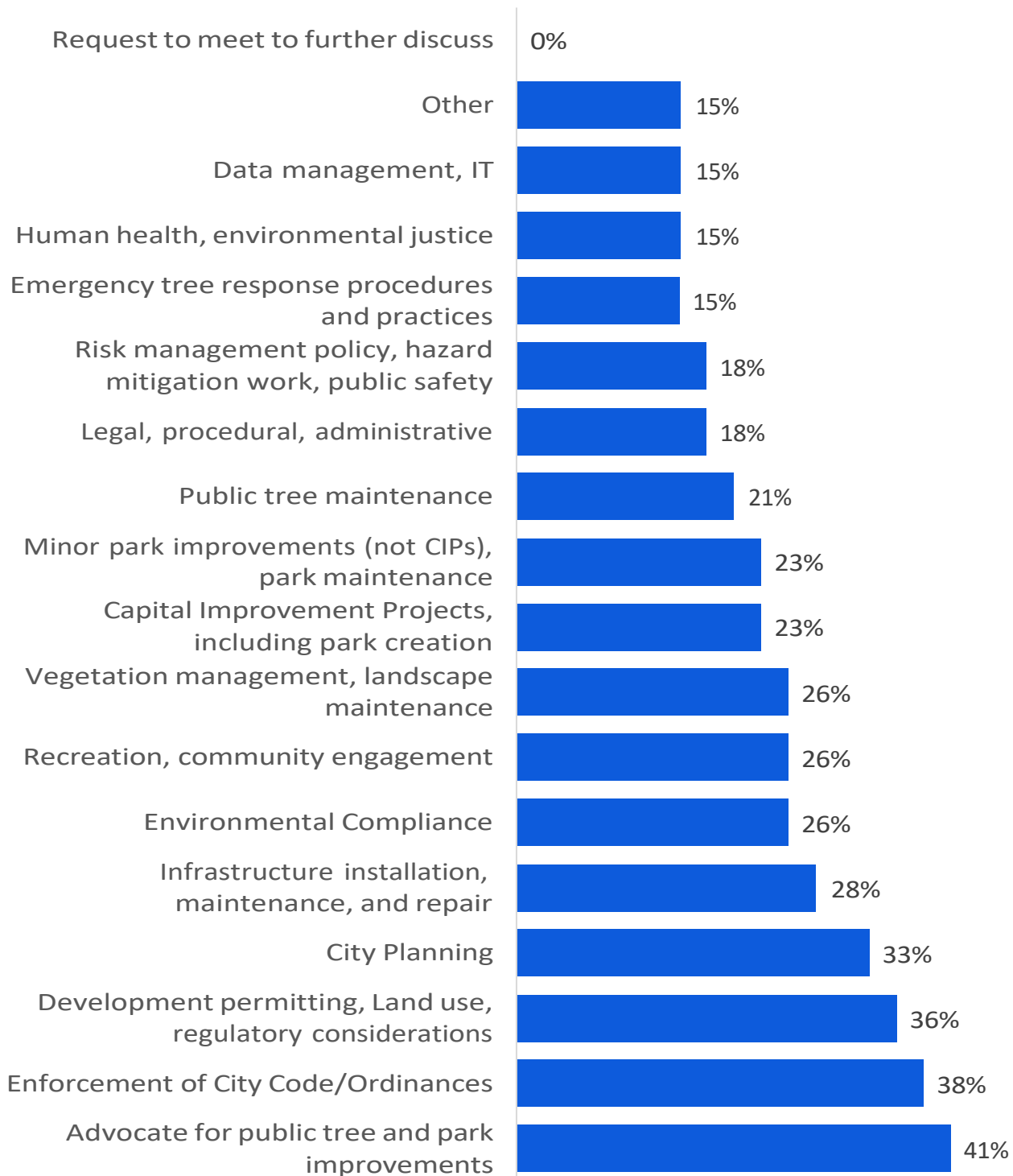


Figure 8. Staff feedback on the nature of their work as it relates to trees

Other Comments: Neighborhood Improvement Program; Tree Planting; Assistant City Manager – Park and Recreation, Human Resources, Library Services; Purchasing; I plant trees (translated); Plant trees, greenhouse, parks (translated)

Question 3) What do feel are the most important benefits of trees to the community? (Select up to 3 options)

Staff expressed the importance of trees having a role in reducing air and surface temperatures (87%), improving air quality (62%), and increasing the walkability and time spent outdoors for community residents (44%).

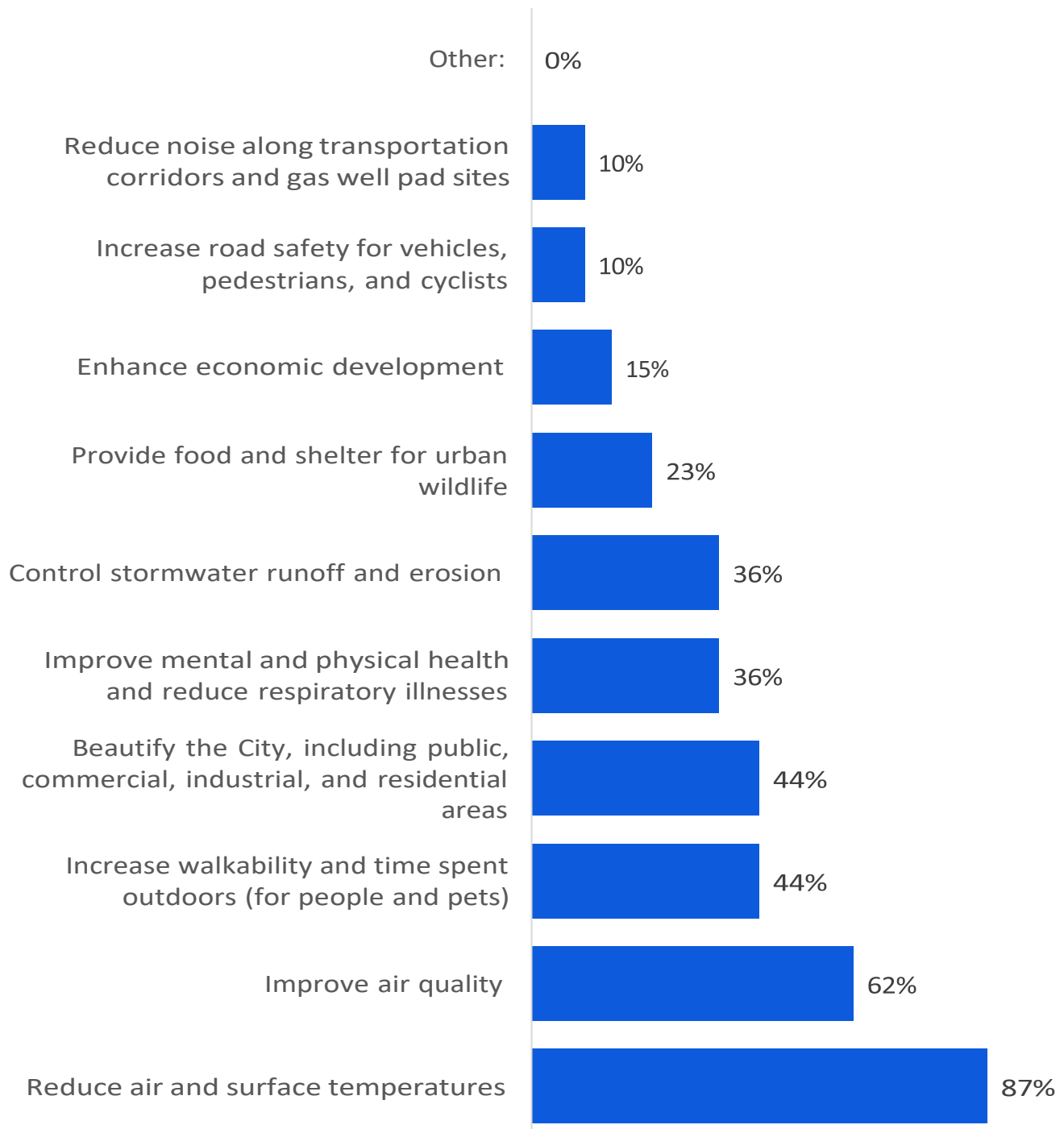


Figure 9. Staff feedback on the most important tree benefits

Other Comments: None

Question 4) What are the current issues, concerns, challenges, information/resource gaps, or inefficiencies experienced or seen, if any, as they relate to your work/role described in #2? Regarding concerns or challenges, the majority of respondents identified staffing-related challenges (56%), budget-related concerns (49%), infrastructure conflicts without clear procedures or solutions (41%), and the need to establish or strengthen collaboration and partnerships (41%).

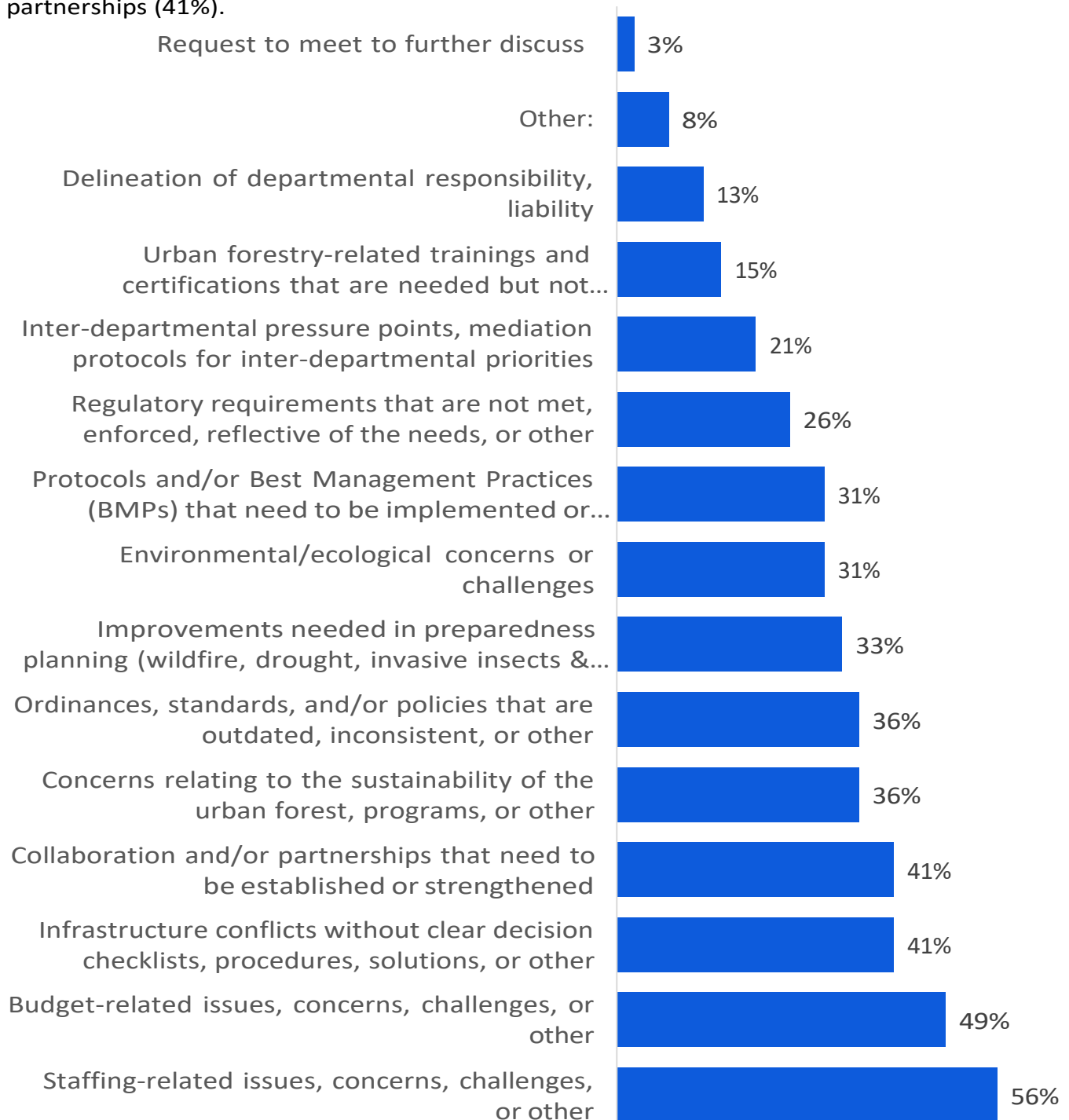


Figure 10. Staff feedback on the tree-related issues, concerns, and challenges

Other Comments: No expectations of developers to retain trees or thoughtful development to maximize tree retention. It is no-holds barred development always at the expense of trees; Coordination with communities about equity of placement; Not familiar with the program to provide an option

Question 5) What results and outcomes of the Plan would you like to see to assist and support your work or role as it relates to the trees and related services in Fort Worth?

Staff would like to see the UFMP address the resources needed for the Forestry and Urban Forestry Sections along with improved citywide urban forest management (54%). In addition, staff would like to see an increase in staffing levels for Forestry and Urban Forestry that are in line with the needs of the urban forest and the community (49%). 49% would also like to see improved communications between departments and sections.

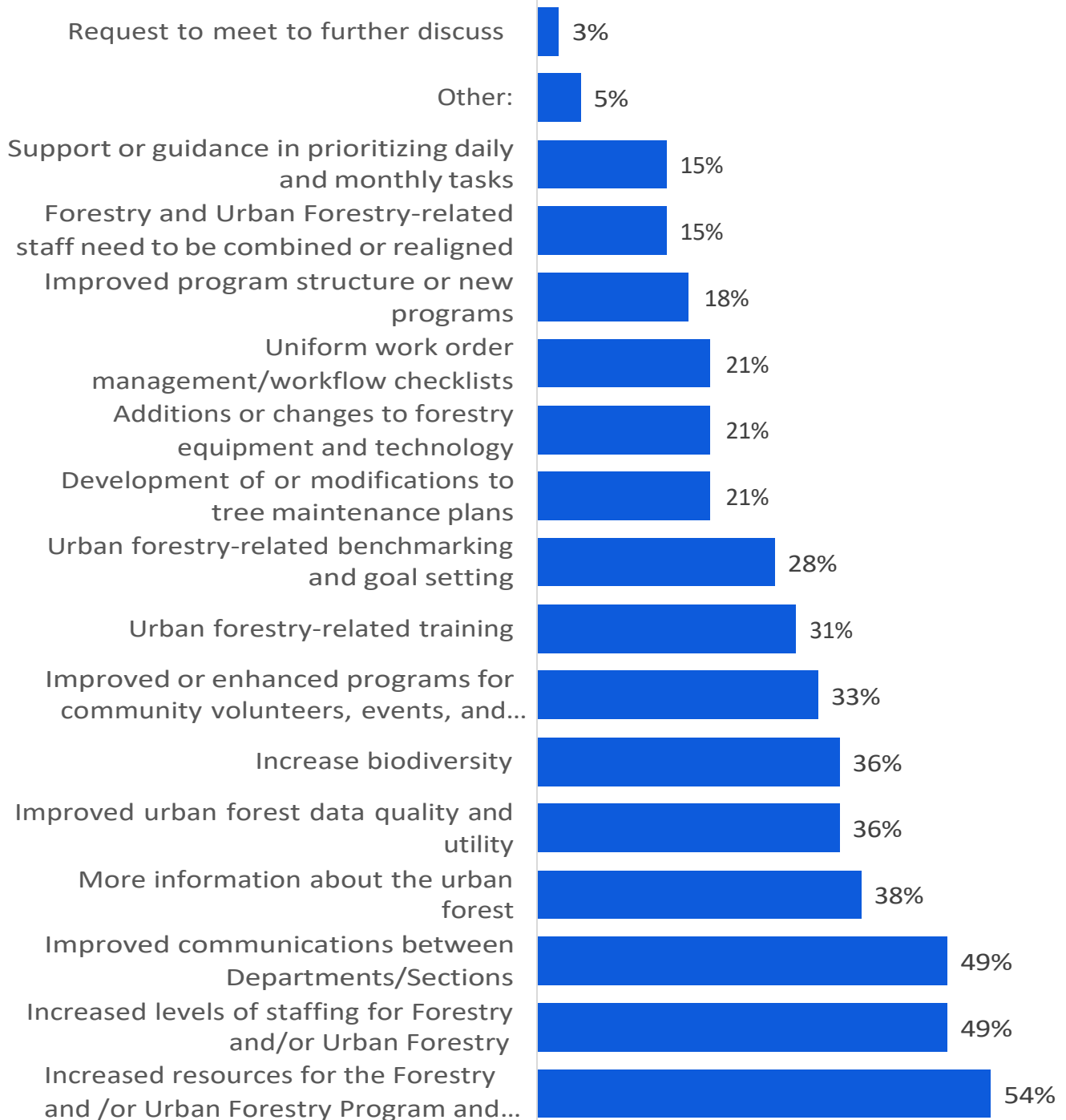


Figure 11. Staff feedback on the desired results and outcomes of the Plan

Other Comments: Clear information for public to know the difference between Forestry and Urban Forestry; Education/engagement for developers on why it's important to retain existing trees

Question 6) Please select from the following to summarize your viewpoints and priorities relating to trees and the urban forest in the city.

The respondents' viewpoints and priorities relating to the city's trees include a desire to see more trees with a plan and resources for maintaining them (62%); the development of goals and strategies that address sustainability, increased temperatures, and prolonged droughts (46%); and better implementation of best management practices and standards (44%).

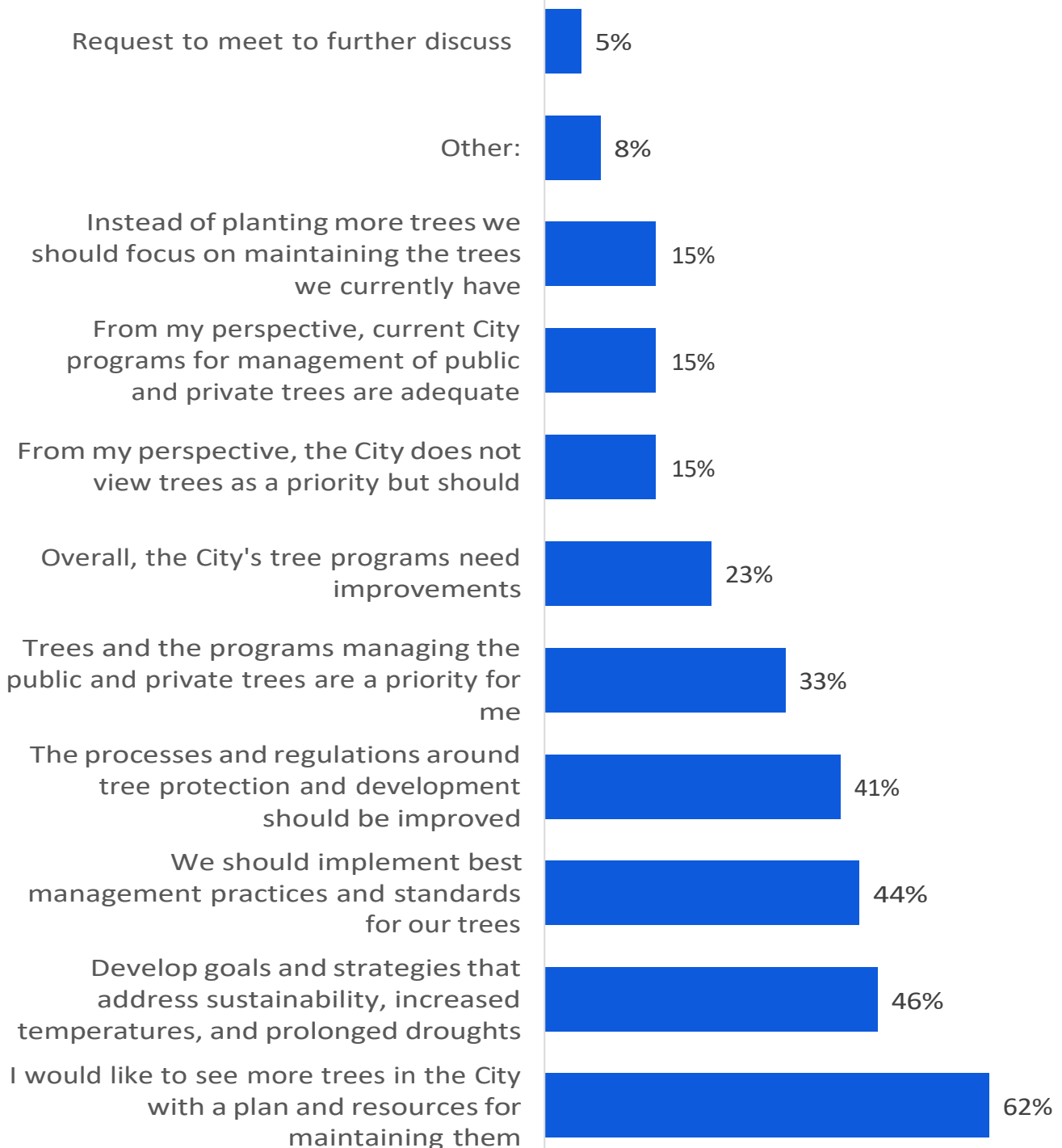


Figure 12. Staff feedback on the viewpoints and priorities relating to the city's urban forest

Other Comments: We need to set firmer and clearer expectations of developers in regard to existing trees; Regulations on invasive species should be implemented; Not familiar with the program to provide an opinion

Question 7) Overall, what do you feel are the most important tree-related goals for the city?

Overall, staff feel the most important tree-related goals for the City include increasing funding to increase tree canopy cover (72%), ensuring equitable tree canopy coverage throughout the city (56%), increasing preservation and planting in areas which have had significant tree canopy loss (56%), and reducing urban heat island effects in the city (51%).

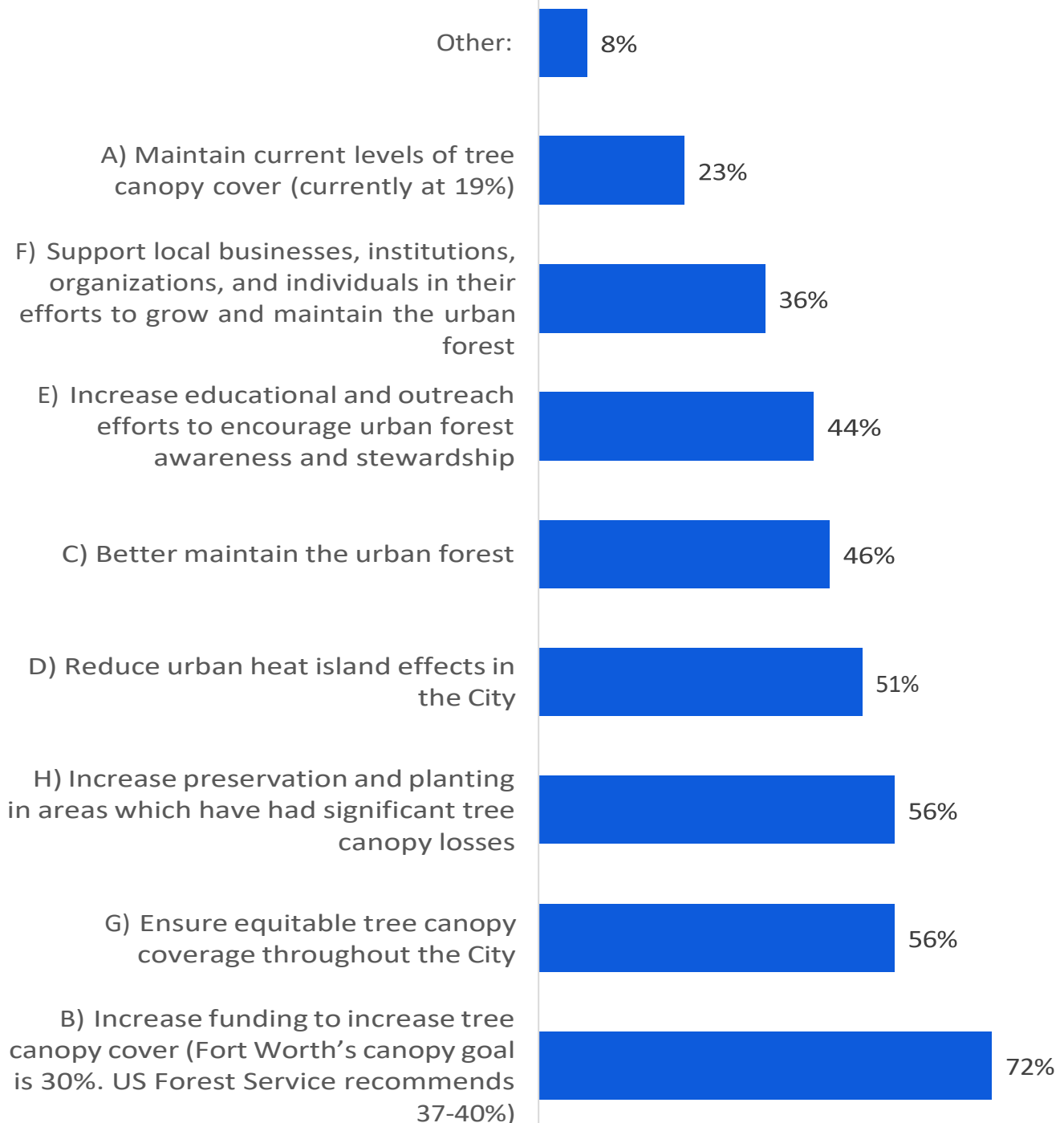


Figure 13. Staff feedback on the most important tree-related goals for the city

Other Comments: Stop developers from clear-cutting trees; Preserve existing trees, plant natives whenever possible please

Question 8) From the list above, what are the three (3) most important goals (list letter)?

When asked to prioritize these tree-related goals for the city (up to 3 selections), staff responded with a need to increase funding to increase tree canopy cover (59%), ensuring equitable tree canopy coverage throughout the city (44%), and reducing urban heat island effects in the city (33%).

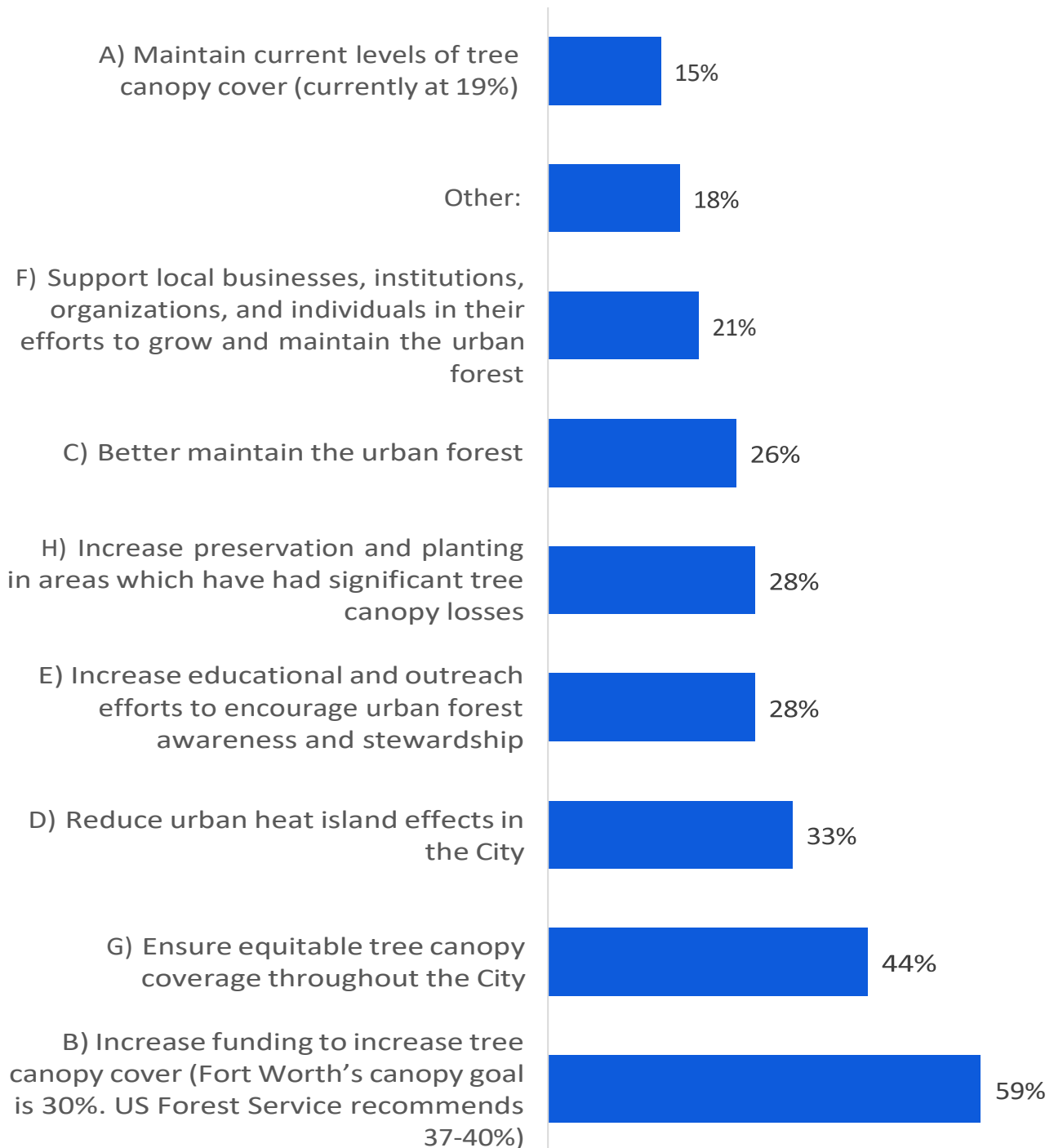


Figure 14. Staff feedback on the top three important tree-related goals for the city

Other Comments: Preservation, maintenance, funding; Stop developers from clear-cutting trees; Include natural areas (not just individual trees) to increase canopy cover (option B); Trees to match the soil types (translated); Financial increase for the city (translated); Increase funding to increase tree growth (translated)

Question 9) Are there any other questions or considerations with regard to the future of Fort Worth's urban forest that are not addressed in the previous questions?

Summarized in the table below.

For number 6. I don't necessarily need to meet I just am still new enough to not honestly know all the city's and Urban forestry's guidelines to adequately answer.

The relationship between urban forest and stormwater infrastructure and facilities.

Utility conflicts with trees is something that should be addressed.

Consider equity in future goals for canopy coverage and how to support local efforts to maintain and increase the urban forest.

maintaining riparian area around creeks and channels to reduce erosion and improve water quality.

Urban Forestry Ordinance should be based on actual canopy data, and that data be sustained and managed by the see to track progress in all tree preservation and planting programs (Development Services, Parks, Neighborhood Services, etc.) combined.

While the City's urban forestry processes need work, the issue is actually on the private side. Developers are not expected to retain existing trees, because development is considered sacrosanct in Fort Worth.

Where possible, focus tree restoration & preservation along stream corridors.

Update the Preferred Tree List

Climate change and its impact on the urban forest: How will changing temperatures, precipitation patterns, and other factors affect the health and growth of trees in Fort Worth's urban forest? Biodiversity in the urban forest: How can the city ensure that the urban forest includes a diverse range of species to promote resilience and adaptability in the face of changing conditions? Urban forest management and maintenance: What strategies and resources can the city put in place to ensure that the urban forest is properly maintained and managed to promote its health and sustainability? Community involvement and education: How can the city engage and educate the community about the importance of the urban forest, and encourage their involvement in its care and maintenance? Funding and resources for the urban forest: What funding sources and resources can the city tap into to support the ongoing health and sustainability of the urban forest? Integration with other urban infrastructure and development plans: How can the city integrate the urban forest into other plans and initiatives related to transportation, development, and other urban infrastructure? Monitoring and evaluation: What metrics and methods can the city use to monitor and evaluate the health and sustainability of the urban forest over time?

Prioritizing public communication, emphasis on *quality* trees.

Notes added to the PARD Mtg Summary document

I see businesses (including at City facilities) plant trees per the ordinance, but when those trees die, I do not see replacement. An inspector is needed to ensure trees per the ordinance are maintained and thriving or replaced and reinspected.

Not everything is very clear and specified at least for what I understood (translated)

Only the increase in labor personnel to allow maintaining the trees without much stress (translated)

We need more personnel for the departments because the city is going bad (translated)

Improve the tools for workers who work in the trees (translated)

Improve the equipment for the workers to make the job more efficient (translated)

Table 8. Additional comments and considerations shared by staff

Internal Stakeholder Survey Infographic

FORT WORTH'S URBAN FOREST MASTER PLAN INTERNAL STAKEHOLDER SURVEY

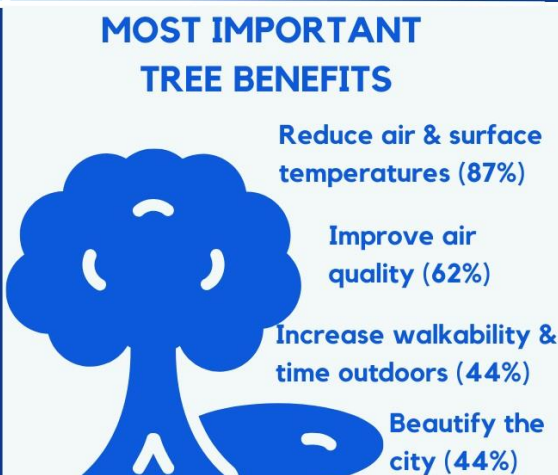
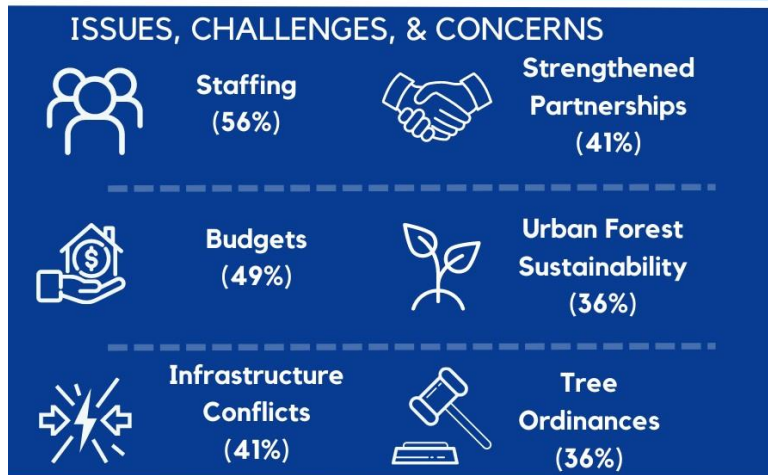
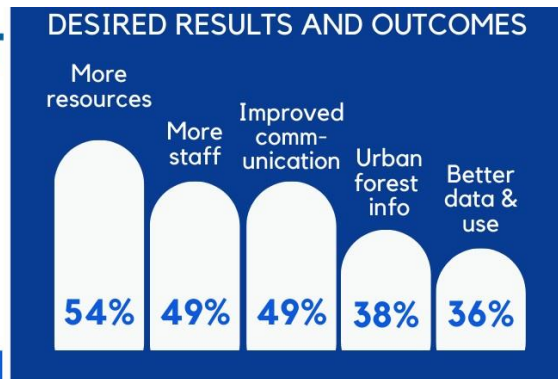
Shared online through Google Forms and Fillable PDFs

11 City Departments

39 Responses received (8 Spanish responses)

Survey Timeline:
January - March 2023

To view more information on the project, head to www.texas trees.org/fortworthufmp



- ### TITLES OF PARTICIPANTS
- Administrative Assistants
 - Arborist I
 - Assistant City Manager
 - Aviation System Director
 - City Forester
 - Contract Compliance Specialist
 - Customer Solutions Analyst
 - Directors
 - District Superintendent
 - Environmental Program Manager
 - Equity Data Analyst
 - Field Operation Crew Leader
 - Fleet Mechanic II
 - Floodplain Administrator
 - Landscape Architect
 - Maintenance
 - Natural Resource Technician
 - Natural Scientist Supervisor
 - Neighborhood Program Coordinator
 - Neighborhood Services Manager
 - Park Operations & Natural Resource Planner
 - Professional Engineer
 - Senior Accountant
 - Urban Design Senior Planner

Image Description 1. A summary infographic of the feedback received from the internal stakeholder survey

Internal Stakeholder Meetings and Interviews

A total of 53 City staff participated in the meetings representing nine unique departments. The planning team was supported by members of the Development Services Department for the majority of meetings in addition to the Development Services meeting itself. This enabled an opportunity to share information, resources, and processes amongst staff in other departments as questions and topics were raised. Of the 53 staff that attended the meetings, 12 of them completed the survey as well. A total of 80 staff were engaged either through the survey or the meetings.

The nine departments included: Development Services, Code Compliance, Park and Recreation, Diversity & Inclusion, Neighborhood Services, Transportation and Public Works, and other departments and programs (Library, Municipal Court, Planning & Data Analytics).

The report that details the meetings is provided as a separate document but summarized below:



Figure 15. Summary of the departments and staff participating in the internal stakeholder meetings

Table 9. Summary of the strengths and challenges discussed during internal stakeholder meetings

Strengths	Challenges
New Urban Forestry Inspector position (DSD)	More inspectors for Code enforcement (DSD)
Urban Forestry has funding for a public communications campaign (DSD)	Ensuring trees survive when planted and protected for development projects (DSD)
The Urban Forestry ordinance exists, and a good framework in place for permits (DSD)	Design districts do not have preservation requirements (DSD)
Urban Forestry involved in each step of the plat process (CC)	Consistent enforcement of ordinances (DSD)
Canopy requirements for commercial development (CC)	Confusion internally and externally about the roles of Urban Forestry compared to Forestry (DSD)
Coordination and communication among departments (CC)	Tree preservation not required for demolition of single-family residential structures (unless Urban Residential) (CC)
Low impact design is encouraged (CC)	Urban heat and prolonged droughts, extreme temperature changes impacting the urban forest (PARD)
Native tree giveaways through Rolling Hills Tree Farm (CC)	Limited budget to meet the needs of each neighborhood (PARD)
Hazard abatement with in-house crews (PARD)	Clarifying differences between PARD maintenance and maintenance done by Oncor (PARD)
Positive public feedback from door hanger surveys (PARD)	Only 2 in-house crews for hazard abatement for the entire city (PARD)
Park Dedication Fund (PARD)	Weed trimmer damage to trees (PARD)
Proper pruning practices (PARD)	Invasive species, irrigation needs (PARD)
2011 public tree sample inventory (PARD)	Low staff for Open Space program (PARD)
Good coordination with TPW for tree inspections (PARD)	Ball & burlap trees have a low success and are resource demanding (PARD)
Proper pruning training for staff (PARD)	Oaks can be removed from the eastern Cross Timbers for a minor mitigation fee (PARD)
Park Operations watered trees during drought (PARD)	Limited availability of native trees in nurseries (PARD)
Tree diversity in parks and open space, the Nature Center and its January 2023 attendance, and the Cross Timbers are a vital resource (PARD)	Street trees planted for development projects become PARD responsibility, but PARD solely conducts hazard abatement and lack of staff for inspecting the trees (PARD)
Prioritizes neighborhoods in need (NS)	Loss of natural areas, not keeping pace with development (PARD)
Cross Timbers Natural Program members engaged in projects (D&I)	Lack of shade along streets, in parks, and at transit stops (NS)
Mitigation applied when a significant tree needs removed for storm drain updates (TPW)	Developers are not using stormwater credits (TPW)
Sustainability planning at the forefront (Code Environmental)	

* DSD = Development Services Department; CC = Code Compliance; PARD = Park & Recreation Department; NS = Neighborhood Services; D&I = Diversity & Inclusion; TPW = Transportation & Public Works

Table 10. Summary of the desired Plan outcomes as discussed at the internal stakeholder meetings

Desired Outcomes

Incentives for developers to protect, plant, and preserve trees.

Clarifications on the roles and responsibilities of Urban Forestry and Forestry.

More staffing and resources for inspections and enforcement of tree-related ordinances.

Creating a framework for review and inspection of street trees planted as part of development.

Strengthened tree preservation across the board.

Resources and responsibilities for irrigation and watering to improve the survival of trees.

Planting the right tree species for changing conditions and to maintain diversity.

Planting trees with the optimal soil volume and healthy soils, applying the right tree right place principle.

A public communications plan for ongoing education/engagement.

Considering the native land cover and intended use when setting canopy goals and priority planting areas (e.g., riparian areas, stormwater management structures, native prairie land).

Better management and repurposing of woody debris.

Integrating tree data (e.g., urban tree canopy assessments) and the Plan with other plans and initiatives (e.g., Comprehensive Plan, environmental and sustainability planning).

Capitalizing on what the tree farm and the Nature Center offers.

Documentation or updates to tree-related standard operating procedures.

Tree inventory data needed to inform management, planting, and hazard abatement.

Trainings for inspectors in other departments that interface with or encounter trees.

Thinking holistically about the urban ecosystem (riparian, cross timbers, prairie, soils, and wildlife).

Availability of tree species at nurseries (and quality stock) and contractors for low-impact development / green infrastructure installation and maintenance.

Interest in sharing and seeing other case studies of innovative approaches to urban forest management.

Needing benchmarks, key performance indicators, and methods for monitoring and reporting to evaluate and communicate successes or shortcomings.

Summary of Urban Forestry and Forestry Sections

The Development Services Department's mission is to work together to build thriving neighborhoods and an equitable community by helping people make sound decisions to create safe, orderly, and sustainable development. The Department collaborates with developers and community stakeholders to guide growth through innovative, inclusive, and accountable relationships and provide an exemplary customer experience. After a merger in fiscal year 2021, the Department has five sections— Administration / Executive Leadership, Development Coordination, Permitting and Inspections, Zoning and Design Review, and Infrastructure Development.

The Development Coordination Division has five unique sections. The Developer Contract section is responsible for managing contracts for the developer installation of public and private infrastructure. The Project Facilitation section assists in expediting development projects through inter-departmental project teams and acting as the developer's liaison through the process while ensuring the City's regulations and project requirements are met. The Strategic Operations section manages the permitting system. The Platting Section administers the City's subdivision regulations and implements the City's annexation policy. The Permitting and Inspections Division reviews and inspects all construction projects for compliance with codes. The Zoning and Design Review Division is comprised of three sections— Zoning, Design Review, and Appeals. The Zoning Section administers the City's zoning regulations including all Urban Forestry regulations. The Design Review Section administers the City's historic preservation and urban design ordinances. Lastly, the Infrastructure Development Division has five sections— Transportation Development Review, Infrastructure Plan Review, Stormwater Development Services, Parkway, and Water Development Services.

The Park and Recreation Department is responsible for planning, designing, developing, and maintaining the city's network of parks, management of public trees and hazard abatement, as well as the planning and administration of the city's recreational programs. The Park Operations Division manages operations for park recreation, programs, and contracts and performs grounds maintenance for the city parks, medians, rights-of-way, commercial corridors, tax-foreclosed properties, and various other departments' city-owned properties.

The Planning and Resource Management Division contains the Forestry Section and manages the park system needs and inventory, administers and manages new parkland acquisition, oversees park development projects and infrastructure maintenance, and cares for the public trees on city-owned property and rights-of-way. The Community Tree Planting Program under the direction of the Planning and Resource Management Division provides a variety of trees on public property that are of exceptional quality, drought resistant, well adapted to the urban environment, and in good health and form. The trees are grown and transplanted from the City's tree farm to city facilities, parks, golf courses, parkways, medians, and capital improvement projects. Trees are also provided to residents to be planted on city rights-of-way. The Community Tree Planting Program also provides education and training for the Citizen Forester Program and trains volunteers for tree planting, data collection, and ongoing care and maintenance of the City's tree farm.

The Community Tree Planting Program Fund is a special revenue fund for managing revenues generated primarily from tree removal fees and gas revenues and are used for planting trees on public property in partnership with third parties.

Discussion

The City of Fort Worth has several departments that are responsible for trees. The Park and Recreation Department is responsible for trees in public spaces, such as parks and streets. The Development Services Department assists with enforcement of trees in private development projects. The Code Compliance and Environmental Department assists with the enforcement of tree-related regulations and environmental planning. The Urban Forestry Ordinance is an appendix, rather than the City Code, so officers are less familiar with it, and there is likely some confusion whether it is actually their responsibility. Historically, enforcement has been largely the responsibility of the Urban Forestry section. The Transportation and Public Works Department is responsible for the planning, design, construction, maintenance, and operations of transportation-related infrastructure, and working with PARD Forestry where this involves public trees. The Fort Worth Open Space Conservation Program has a mission to conserve high-quality natural areas as the city grows, and the Fort Worth Nature Center and Refuge is a 3,600-acre natural area comprised of forests, prairies, and wetlands.

It is important for these departments to collaborate and coordinate on tree-related planning, maintenance, and conflicts. This will ensure that trees are considered at the initial planning and design phases and that they are integrated into other City programs. In turn, the City can experience higher levels of efficiency, implement sustainable and resourceful practices, provide higher levels of service to the community, and ensure the urban forest is resilient and equitable across all neighborhoods. As the city aims to increase canopy cover to 30%, programs such as the Park and Recreation's Neighborhood Tree Planting Program will be vital to success. Planting these 5-gallon trees within the parkway or the edge of the roadway will require ongoing coordination among departments to ensure that they do not conflict with other infrastructure, that they receive the post-planting care needed for establishment, and that they are proactively maintained as they become established in the urban forest.

By conducting the internal stakeholder surveys and meetings, shared strengths, concerns, challenges, and opportunities were identified across departments and programs. These sessions also offered an opportunity for staff to share information, resources, and protocols across departments and programs.

From these sessions, it was uncovered that the City should consider updating or amending tree-related ordinances for improved tree preservation; improving internal and external communications; updating or creating operating procedures and protocols; increasing planting efforts to support canopy goals, equity, and addressing urban heat; addressing changing conditions and extreme weather; and securing resources for tree inspections as part of development projects, public tree maintenance and hazard abatement, tree plantings, and plant health care (watering, pest and disease management, and invasive species removal). Another opportunity that is taking shape as a result of this Plan is the partnership between the City and the Texas Trees Foundation.

The information gathered from this internal engagement informed the comprehensive urban forest audit conducted as part of the Plan and it supported the development of the Plan's goals, strategies, and performance indicators. In addition, it created the space for open discussion regarding the city's trees and related programs and established a framework for the City to consider this dialogue in support of mainstreaming sustainable urban forest management.

2002

NANCY LEE BASS
COWGIRL HALL

PLANNING ELEMENT:



EXTERNAL ENGAGEMENT

PURPOSE:

To understand the interests, priorities, and viewpoints of the community, inform ongoing engagement, and build support for the urban forest



ELEMENT 3: EXTERNAL ENGAGEMENT

Purpose

The purpose of a public outreach, education, and engagement strategy ensured the Plan was developed with input from the community and that the input and feedback received reflected the needs and priorities of the community. As stated by James Clark in *A Model of Urban Forest Sustainability* (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.”

The feedback collected throughout the five-month community engagement process was designed to provide meaningful engagement reaching a broad range of residents and stakeholders. The collected feedback is crucial to the success of the Urban Forest Master Plan and will help guide the City to develop a plan to preserve, manage, and grow Fort Worth’s urban forest. The gathered feedback helped the urban forestry planners and the City gain an understanding of the community’s values and preferences related to urban trees.

Process

The engagement process prioritized engaging with the communities most impacted by planning processes, especially those who have been historically left out of civic conversations, such as low-income communities, limited-English proficient individuals, and communities of color.

The project team successfully provided grassroots outreach support, in English and Spanish, throughout the project to help engage a wide variety of stakeholders and residents, as well as provided online engagement tools for digital accessibility.

The project team developed and designed a suite of highly visual outreach and engagement materials to promote the pop-up events, workshops, bilingual survey, focus groups, as well as other activities and strategies for interacting with the community that prefer to participate in person or virtually. Through various checkpoints of the process, the project team identified underrepresented groups and hosted pop-up events in strategic locations to increase their representation.



Figure 16. Summary of the primary and supporting engagement activities

Announcement and information about the project began in late October 2022. Shortly after, promotion of the community survey and a link to the survey was posted on the project website (www.texastrees.org/FortWorthUFMP). Information and the link to the survey was also posted on the City’s Forestry and Urban Forestry webpages.

An overview of other promotion and awareness efforts included:

- ❖ 5 promotional videos to increase awareness and participation.
- ❖ Periodic postings in English and Spanish on Facebook, Instagram, Linked In, Twitter, and NextDoor.
- ❖ Email (blasts and personalized) to registered neighborhood and homeowners associations.
- ❖ Press releases by Texas Trees Foundation and the City in November 2022.
- ❖ A video about the urban forest and the project hosted by the Mayor.
- ❖ Outreach to various community organizations, chambers of commerce, and individuals identified as partners by Park and Recreation Forestry.
- ❖ City Councilmembers were sent a formatted write-up for use in newsletters and/or the City Council webpage and a graphic for posting on social media in January 2023.
- ❖ 2 homeowner association meetings.
- ❖ 2 virtual community workshops.
- ❖ 2 interviews with Fort Worth Report.
- ❖ Distribution of informational flyers at Glenwood Creek Cleanup Event and Health Fair in October 2022.
- ❖ In-person participation in the following:
 - The City’s Arbor Day event on November 4, 2022.
 - Handley Craft Fair on November 5, 2022.
 - Lola’s Farmers Market on December 11, 2022.
 - Hispanic Chamber Networking Event on January 27, 2023.
 - La Gran Plaza (exhibit space outside La Gran Biblioteca) on March 11, 2023.



Image Description 2. Examples of the promotional videos prepared to support the development of the Plan

EXTERNAL STAKEHOLDERS ENGAGED

Development / Real Estate

- ❖ American Society of Civil Engineers (ASCE) Texas, Fort Worth Branch
- ❖ Fort Worth Development Advisory Committee
- ❖ Greater Fort Worth Association of Realtors
- ❖ Greater Fort Worth Builders Association
- ❖ Hispanic Real Estate Brokers Association
- ❖ Real Estate Council of Fort Worth
- ❖ National Association of Hispanic Real Estate Professionals (NAHREP)

Community / Environmental

- ❖ Climate Reality Project, DFW Chapter
- ❖ Community Design Fort Worth
- ❖ Community Frontline
- ❖ Downtown Fort Worth Inc
- ❖ Fort Worth Audubon Society
- ❖ Fort Worth Neighborhood and Homeowners Associations
- ❖ Friends of Fort Worth Nature Center & Refuge
- ❖ Friends of Tandy Hills Natural Area, Inc.
- ❖ Girl Scouts Texas Oklahoma Plains
- ❖ Greater Fort Worth Sierra Club
- ❖ Keep Fort Worth Beautiful
- ❖ Kids Environmental Education Network
- ❖ League of Women Voters, Tarrant County
- ❖ Near Southside Inc.
- ❖ Riverside Alliance
- ❖ RxPlore / Fort Worth Climate Safe Neighborhood Coalition
- ❖ Scenic Texas / Scenic Fort Worth
- ❖ Texas Blossoms / Eastside Blossoms
- ❖ Trust for Public Land
- ❖ Urban Land Institute
- ❖ Fort Worth Urban Forestry Advisory Committee
- ❖ Texas Master Naturalists, Cross Timbers Chapter

Horticulture / Arboriculture

- ❖ American Society of Landscape Architects (ASLA) Texas, DFW Section
- ❖ Botanic Research Institute of Texas (BRIT) / Fort Worth Botanic Garden
- ❖ Cross Timbers Urban Forestry Council (CTUFC)
- ❖ CTUFC Citizen Foresters
- ❖ Fort Worth Botanical Society
- ❖ Fort Worth Garden Club, Inc
- ❖ Tarrant County Master Gardeners Association
- ❖ Texas Nursery and Landscape Association (TNLA) Region V

Transportation / Watershed Management

- ❖ Fort Worth Bicycling Association
- ❖ North Tarrant Express Mobility Partners
- ❖ Streams and Valleys
- ❖ Tarrant Transit Alliance
- ❖ Trinity Metro

Business

- ❖ Fort Worth Hispanic Chamber of Commerce
- ❖ Fort Worth Metropolitan Black Chamber of Commerce
- ❖ Greater Fort Worth Chamber of Commerce
- ❖ Tarrant County Asian Chamber of Commerce
- ❖ Visit Fort Worth

Education

- ❖ Fort Worth Independent School District
- ❖ Tarleton University, Fort Worth Campus
- ❖ Tarrant County College
- ❖ Texas Christian University
- ❖ Texas Wesleyan University
- ❖ UNT Health Science Center

Government Agencies & Associations

- ❖ North Central Texas Council of Governments
- ❖ North Texas Tollway Authority
- ❖ Tarrant Regional Water District (TRWD)
- ❖ Texas A&M Forest Service
- ❖ Texas Department of Transportation (TxDOT) Fort Worth District
- ❖ Trinity River Vision Authority (TRVA)
- ❖ US Army Corps of Engineers (USACE), Fort Worth District

Regional & State Agencies

- ❖ Texas A&M AgriLife Extension Service District 4

*** Over 60 Organizations ***

Table 11. Summary of the external stakeholders and focus groups

Community Engagement Results

PUBLIC ENGAGEMENT: INTERACTIVE ONLINE SURVEY

Total Participation: 4,056 people viewed the survey

Total Completed Survey Responses: 1,232 people (1,197 online, 35 paper surveys received)

Total Spanish Survey Responses: 45 people

COMMON THEMES



ENFORCE AND STRENGTHEN CITY ORDINANCES



PRIORITIZE TREE PLANTING IN HISTORICALLY UNDERSERVED AREAS



PRESERVE THE FORT WORTH PRAIRIE



PLANT TREES TO PROVIDE SHADE AND COOLING



FUND TREE MAINTENANCE PROGRAMS AND PUBLIC TRAINING

Figure 17. Common themes throughout all engagement events and sessions

COMMUNITY VISION FOR TREES IN FORT WORTH



Figure 18. Summary of the community priorities for the urban forest

THE COMMUNITY'S FAVORITE TYPES OF TREES



Figure 19. The community's favorite types of trees based on the engagement events and sessions

THE COMMUNITY'S PRIORITY AREAS FOR TREE PLANTINGS

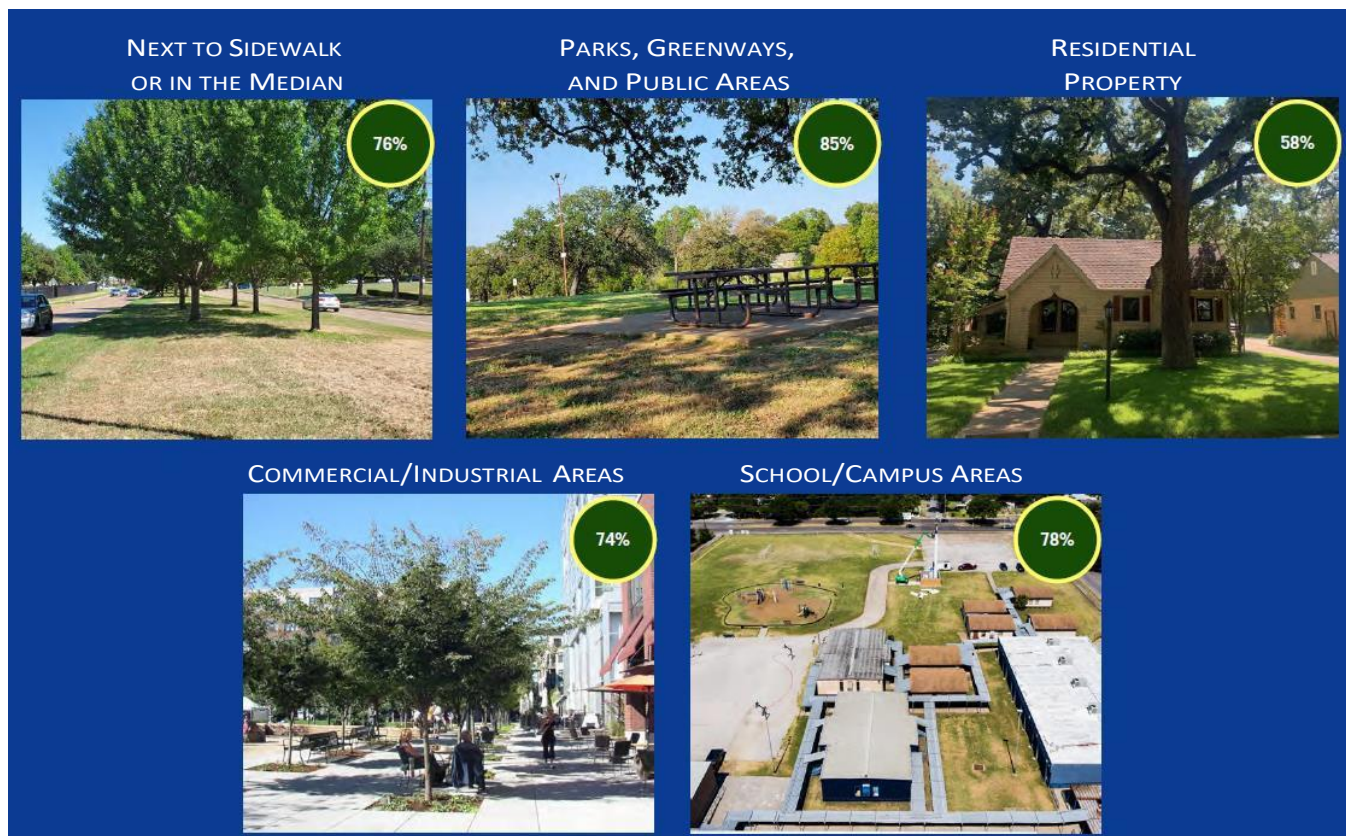


Figure 20. Summary of the community's priorities for tree planting

COMMUNITY PRIORITIES FOR CITY PROGRAMS AND RESOURCES

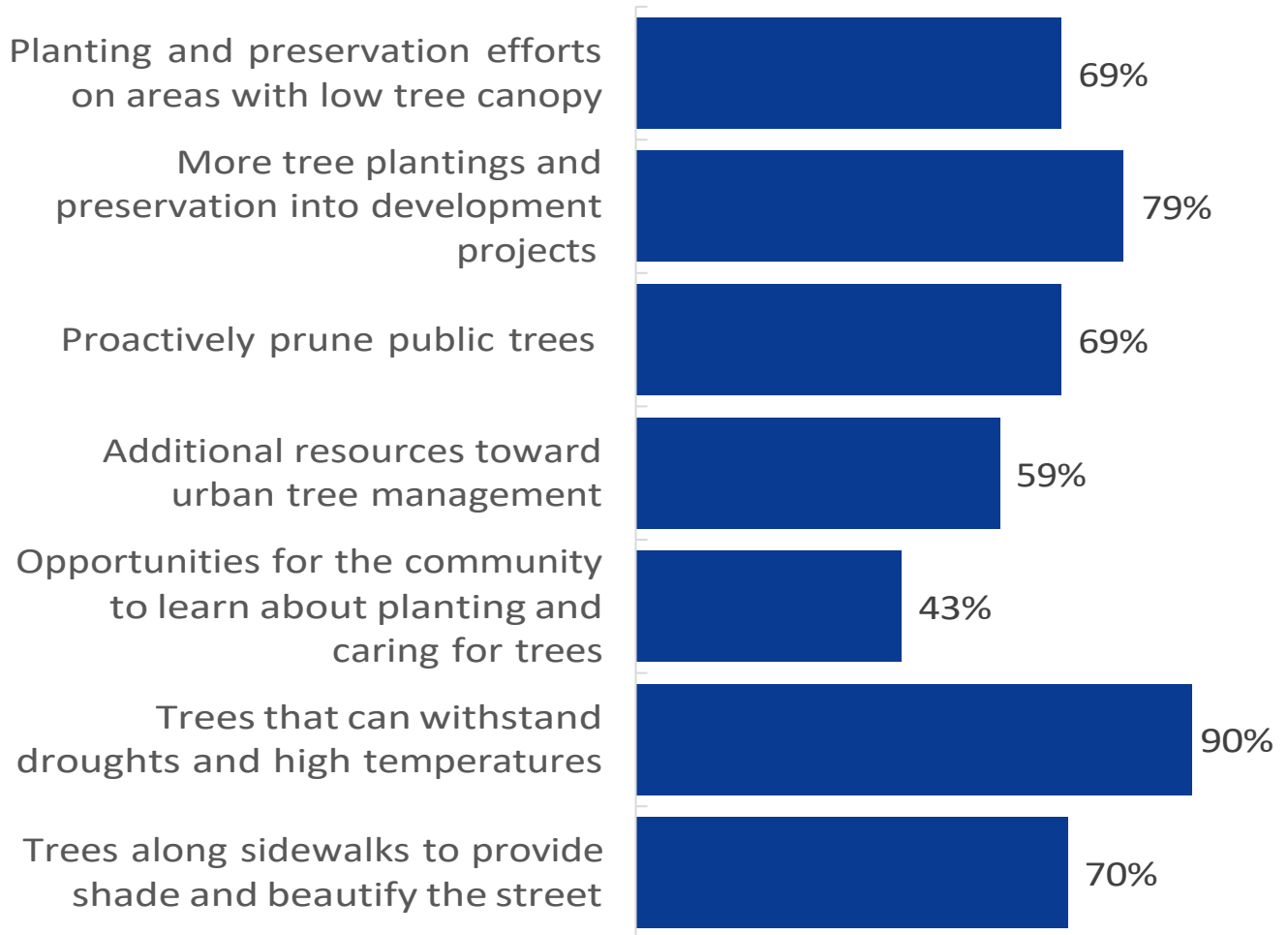


Figure 21. Public viewpoint on priorities for City programs

OVERALL COMMUNITY ENGAGEMENT - DEMOGRAPHICS

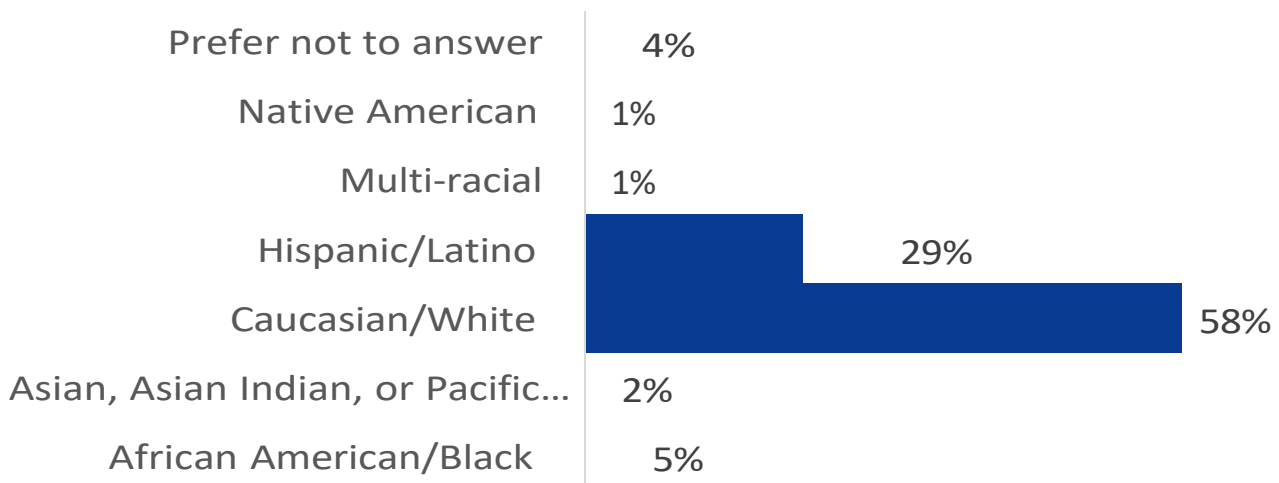


Figure 22. Summary of the demographics of the community engagement participants

Focus Group Results

TRANSPORTATION FOCUS GROUP KEY TAKEAWAYS

- ❖ Plant trees to maximize their multiple benefits:
 - Protect vulnerable roadway users.
 - Calm traffic.
 - Provide shade and protection from weather events to pedestrians and cyclists as well as transit users, especially at bus stops that do not have a shelter.
 - Provide wind breaks on trails and roads.
 - Utilize trees as a wayfinding tool.
 - Combat noise pollution.
 - Enhance aesthetics.
- ❖ Plant trees with following criteria in mind:
 - Maintain ADA requirements and be planted ensure access for people of all ages and abilities.
 - Maintain visibility for roadway users.
 - Minimize impact of fallen leaves.
- ❖ Consider low-water use options for ongoing water management of trees.
- ❖ Regularly monitor and adjust the city's list of trees as needed.
- ❖ Make it easier to permit parkway tree planting.
- ❖ Use innovative technologies like silva cells to ensure that tree roots don't upheave sidewalks.

WATERSHED MANAGEMENT FOCUS GROUP KEY TAKEAWAYS

- ❖ Preserve trees in the following locations:
 - Near existing creeks.
 - Near hydraulic section.
- ❖ Create a riparian buffer for flood mitigation.
- ❖ Provide shade to the Trinity Trails for people, especially during the hot summer.
- ❖ Add trees along the Trinity River to improve the public's perception of the area.
- ❖ Incorporate pollution control near the river from new development and idling cars.
- ❖ Create an equitable distribution of trees city-wide.
- ❖ Plant trees with following criteria in mind:
 - Consider careful and thoughtful placement of trees by considering their maturity, size, and underground utilities.
 - Ensure trees are not causing unintended impacts to drainage.
- ❖ Update development regulations so that suburban developments allow for proper drainage and include native landscaping.
- ❖ Ensure that development is not making flooding worse.
- ❖ Consider opportunities to add GSI improvements to parking lots.
- ❖ Consider public programs such as "adopt-a-rain garden".

* Note, the feedback received from focus groups is provided as a summary for consideration in the UFMP and may not reflect industry standards and best practices or the City's priorities.

DEVELOPMENT FOCUS GROUP KEY TAKEAWAYS

- ❖ Trees that work well:
 - Cedar elm trees are more resilient to construction and do not drop nuts or fruit.
 - Live oak trees work well in subdivision developments.
 - Baldcypress trees are drought tolerant and naturally occur by waterbodies.
 - Baldcypress work well in parking lots but can be messy trees.
 - All oak trees are great for development.
 - Pecan trees are self-pruning and branches can fall.
 - Crapemyrtle trees are dependable.
 - Bur oaks grow slowly.
- ❖ Provide the option for use of sample plots of the existing tree canopy for a site. This helps developers determine if the tree canopy is important to a site without a big cost.
 - City of Denton Example: Tenth-acre plot sample.
- ❖ Consider options for group planting to provide meaningful tree coverage.
- ❖ Provide developers with incentives in tree ordinances and adding LID features.
- ❖ Provide clear requirements in ordinances: Subdivision ordinance does not address conflicts with streets and their requirements.
- ❖ A digital canopy database to be used by developers would be helpful.
- ❖ Allow for flexibility as not every site is the same and provides an efficient process where developers do not need to go to the commission or board for everything.
- ❖ Streamline and/or add more administrative approval processes.
- ❖ Create design standards, such as installing electrical at the base of a tree.
- ❖ Larger trees should be encouraged downtown and in areas with pedestrian traffic to slow down cars.
- ❖ Consider overhead power lines before planting trees.
- ❖ Plant trees in the fall not in the summer, especially in Texas.

ENVIRONMENTAL FOCUS GROUP KEY TAKEAWAYS

- ❖ Focus on planting native trees and trees that work best for the city's context.
- ❖ Update industrial uses of trees to make them consistent with current zoning.
- ❖ Provide education around planting and caring for trees.
- ❖ Require pocket parks in zoning districts that encourage infill in the center city.
- ❖ Address climate change in the UFMP.
- ❖ Invest in evidence-based urban planning and public health promotion.
- ❖ Frame tree objectives in economic development terms for elected officials, decision makers, and different audiences.
- ❖ Explore green building and rooftops.
- ❖ Partner with school districts to add trees to campuses and school grounds.
- ❖ Partner with the following organizations:
 - Blue Zones
 - Girl Scouts

* Note, the feedback received from focus groups is provided as a summary for consideration in the UFMP and may not reflect industry standards and best practices or the City's priorities.

- ❖ Transform floodplains to public places and parks.
- ❖ Invest in high-value, slow growing, trees like bur oaks.
- ❖ Provide opportunities to promote equitable distribution of trees, especially with evidence that translates to elected officials.
- ❖ Consider opportunities for permeable surfaces.
- ❖ Consider trees that grow food and sustain wildlife.
- ❖ Showcase evidence that trees improve health and reduce crime and climate change.
- ❖ Integrate health care into the UFMP.
- ❖ Illustrate that the urban forest is saving tax dollars, creating a better place to live, and protecting property values.
- ❖ Add measurability on health quality.
- ❖ Add measurability on temperature reduction.
- ❖ Compare long-term vs short-term costs and benefits.
- ❖ Engage with low-income and socially vulnerable communities.
- ❖ Improve tree equity across the city, which will lead to improved health/social outcomes.

GREEN INDUSTRY FOCUS GROUP KEY TAKEAWAYS

- ❖ Update tree lists to make sure they are consistent with the changing environment.
- ❖ Distribute information like rating trees on how well they transplant.
- ❖ Enforce ordinances and policies, including the illegal removal of trees.
- ❖ Consider that Mexican Plums are sensitive to extreme heats.
- ❖ Consider that Vitex trees are more durable to heat and work well in medians.
- ❖ Provide more information on how to maintain and care for trees once they've been planted.
- ❖ Encourage younger tree planting as they acclimate to their environment better and live longer.
- ❖ Limit the planting of large canopy trees to offset costs by developers.
- ❖ Modify requirements to allow for various types of tree canopies.
- ❖ Reevaluate the 40-foot spacing requirement.
- ❖ Consider requiring percentages of trees to encourage diverse canopy.
- ❖ Prioritize native plants when possible.
- ❖ Consider non-native trees like the Chinese Pistachio tree.
- ❖ Include ordinance information for streamlining the removal of a tree on a site.
- ❖ Establish commitment from neighborhoods to maintain and care for planted trees.
- ❖ Encourage preservation and planting on the edge as it is more pleasing for people and provides shade to hardscapes.
- ❖ Consider smart preservation that does not impede logical development.
- ❖ Connect city trails to waterways and coordinate with Streams and Valleys.
- ❖ Add street tree requirements.
- ❖ Simplify ordinances in a way that developers can understand.

* Note, the feedback received from focus groups is provided as a summary for consideration in the UFMP and may not reflect industry standards and best practices or the City's priorities.

- ❖ Find a local Silva Cell installer as it works well when implemented correctly.
- ❖ Work with developers and the public on wants and needs.

REAL ESTATE FOCUS GROUP KEY TAKEAWAYS

- ❖ Criteria for planting trees:
 - Use native fauna that doesn't require supplemental irrigation.
 - Prioritize quality of planting, species hardiness, bio-diversity and irrigation efficiency.
 - Think about ecoregions rather than canopy.
 - Consider small canopy trees in appropriate areas.
- ❖ Create infill ordinances that allow automatic waivers to preserve existing trees.
- ❖ Communicate that trees raise the value of properties and are a big part of the character of a property.
- ❖ Reevaluate the trees listed on the current ordinance. It allows for and sometimes encourages a lot of unhealthy trees.
- ❖ Engage and gather input from the development community along with NALA as they plant and cut down more trees than others.
- ❖ Encourage incentives for the development community.
- ❖ Provide a clear path to variance and alternative means of compliance.
- ❖ Add flexibility to the ordinances.
- ❖ Define why a specific percentage of canopy cover is a good goal.
- ❖ Consider different requirements in locations where trees don't currently grow.
- ❖ Make "one size fits all" ordinances more flexible for different projects and ecoregions.
- ❖ Update outdated ordinances to make them more progressive and appropriate.
- ❖ Provide more education to commercial property purchasers so that they are aware of tree regulations.
- ❖ Work with groups like REC, NCTCOG, etc. to create and provide brochures, websites, etc. for education.

* Note, the feedback received from focus groups is provided as a summary for consideration in the UFMP and may not reflect industry standards and best practices or the City's priorities.

EXAMPLES OF PUBLIC MESSAGING



City of Fort Worth
December 22, 2022 at 11:15 AM · 🌐

The City of Fort Worth and Texas Trees Foundation need your help with the first Fort Worth Urban Forest Master Plan (UFMP). With research and analysis underway, the next step is to get community feedback with a brief survey. Community input is vital to this project. Take the survey today: <https://bit.ly/FortWorthUFMP>

To learn more, visit: <https://cfw.pub/3Vmw4h8>

3 2 comments 2 shares



City of Fort Worth
6d · 🌐

The City of Fort Worth and the Texas Trees Foundation need your help! With research and analysis underway, the next step is to get community feedback with a brief survey: <https://bit.ly/FortWorthUFMP>

Watch Fort Worth Mayor Mattie Parker speak about the benefits and importance of the Urban Forest Master Plan: <https://youtu.be/aINuL9hnp50>

For more information, please visit: <https://cfw.pub/3tDjsXL>

27 9 comments 6 shares

CITY OF FORT WORTH URBAN FOREST MASTER PLAN



City of Fort Worth Urban Forest Master Plan



WE WANT TO HEAR FROM YOU!

The City of Fort Worth in conjunction with the Texas Trees Foundation (TTF) is developing an Urban Forest Master Plan to create a shared vision and road map for managing Fort Worth's trees in order to enhance the quality of life in the City.

Your feedback is crucial to the success of this project. The goal of this community engagement process is to gather an understanding of the communities vision, values, and preferences related to urban forestry. The community feedback received from this engagement process will help guide the City's Urban Forest Master Plan.



The City of Fort Worth in conjunction with the Texas Trees Foundation (TTF) is developing an Urban Forest Master Plan to create a shared vision and road map for managing Fort Worth's trees in order to enhance the quality of life in the City.

The quality, health, and connectivity of the City's urban forest is a major contributor to the quality of life for residents of Fort Worth. Fort Worth is feeling the impacts of rising temperatures and decreased air quality common to growing urban areas. Loss of existing tree canopy magnifies these impacts.

Together we can proactively address the challenges and opportunities facing our trees and develop a plan to preserve, manage, and grow Fort Worth's urban forest. Your feedback is crucial to the success of this project. The goal of this community engagement process is to gather an understanding of the community's vision, values, and preferences related to urban forestry. The community feedback received from this engagement event will help guide the City's Urban Forest Master Plan.



We Want to Hear From You!

Share your ideas with us by taking our brief survey (¡También en español!)

Scan the QR code below with your mobile device's camera or visit this link: <https://bit.ly/FortWorthUFMP>



WIN A GIFT CARD!
By completing this survey and sharing your email address, you will be entered in to a raffle to win a gift card. Up to 4 survey respondents will be randomly selected to win the prize!

Tell us your thoughts about trees by engaging with the boards to the right!

SHARE YOUR IDEAS WITH US BY TAKING OUR BRIEF SURVEY!

Scan the QR code below or visit this link: <https://bit.ly/FortWorthUFMP>



RAFFLE PRIZE!

By completing this survey and sharing your email address, you will be entered in to a raffle to win a gift card. Up to 4 survey respondents will be randomly selected to win the prize!

PROJECT WEBSITE:
<https://www.texastrees.org/FortWorthUFMP>



PROJECT CONTACT:
Cheri Cuevas
cheri@texastrees.org



FOR MORE INFORMATION, CHECK OUT THE PROJECT WEBSITE:
<https://www.texastrees.org/FortWorthUFMP>

Figure 23. Examples of the posts on the City's social media accounts (top) and flyers created to encourage engagement (bottom)

WHERE PUBLIC PARTICIPANTS LIVE AND WORK

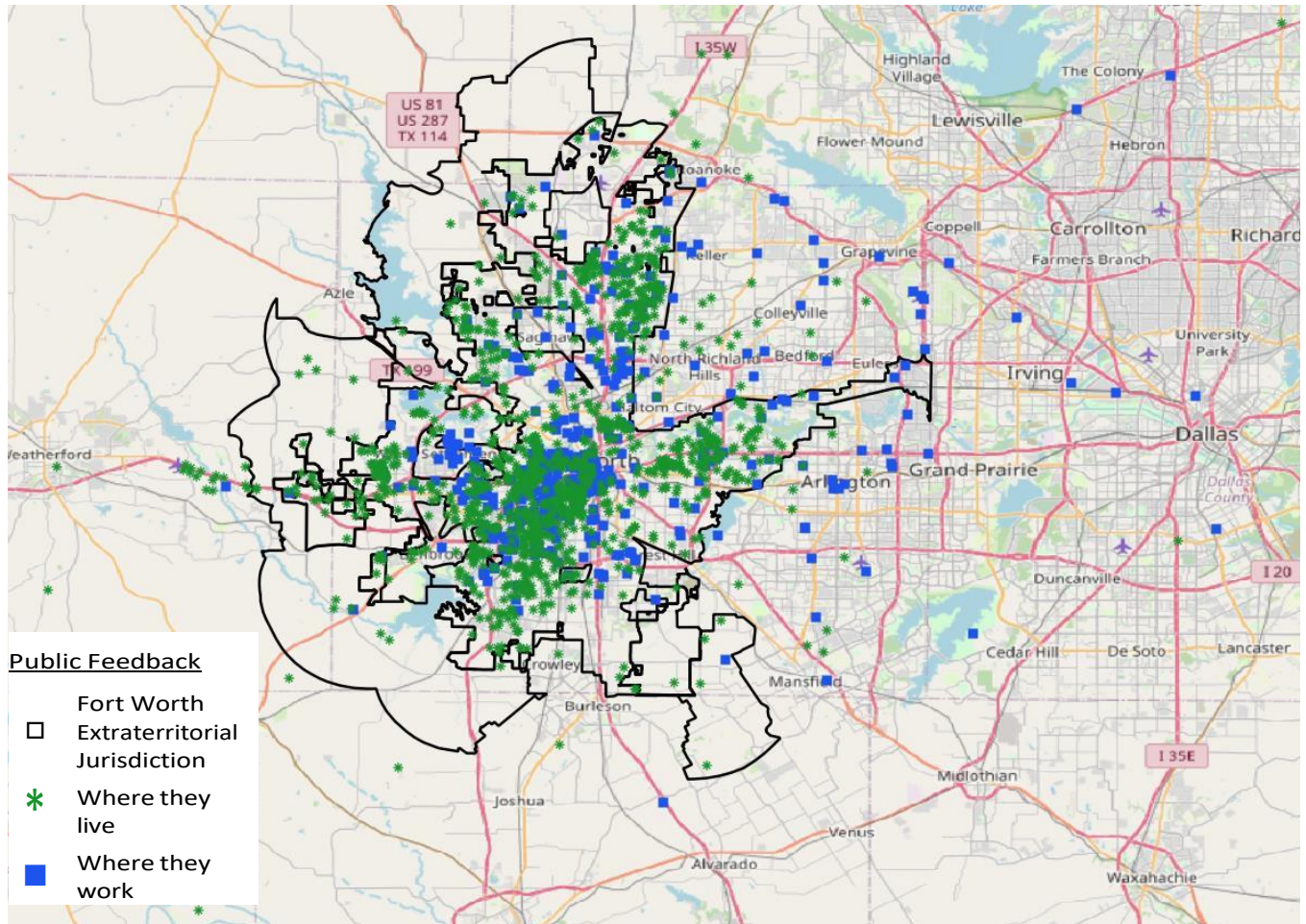


Figure 24. Overview of the locations where public participants live and work

PUBLIC FEEDBACK ON SIGNIFICANT AREAS AND PRIORITY AREAS

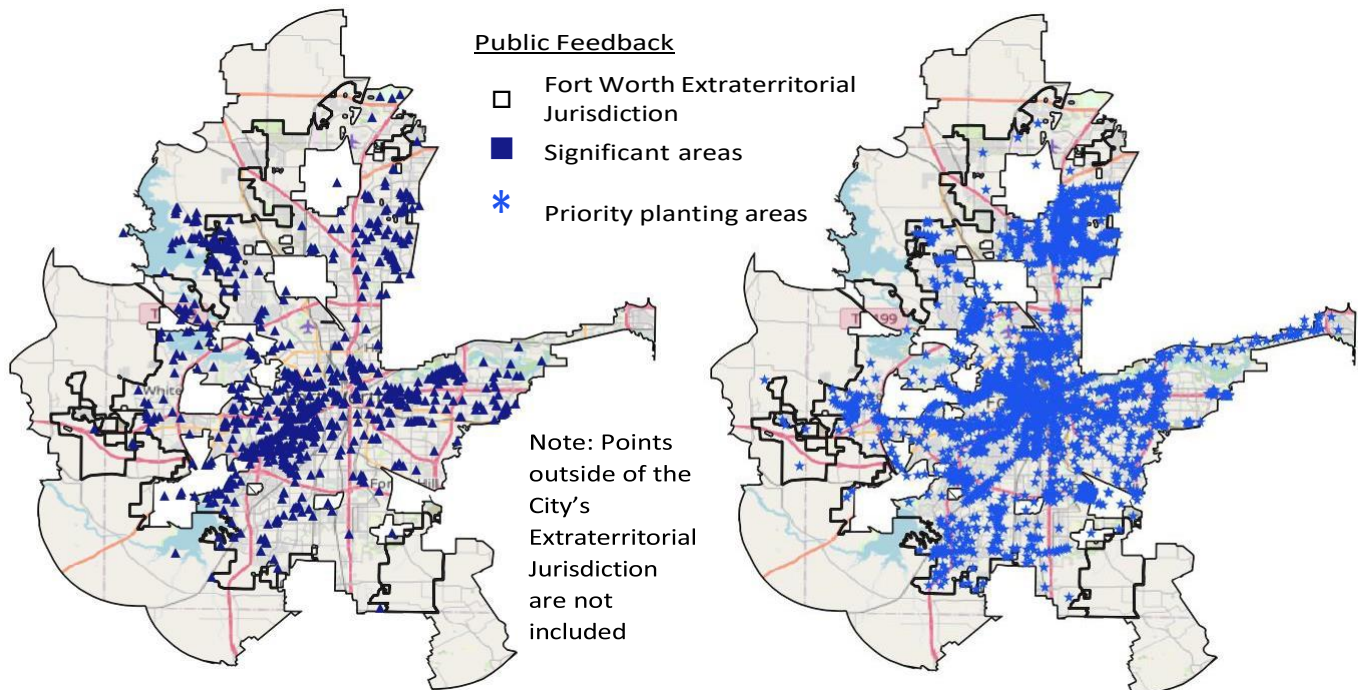


Figure 25. Public input on significant areas (left) and priority planting areas (right)

A CLOSER LOOK AT THE PUBLIC'S VIEW ON SIGNIFICANT AREAS

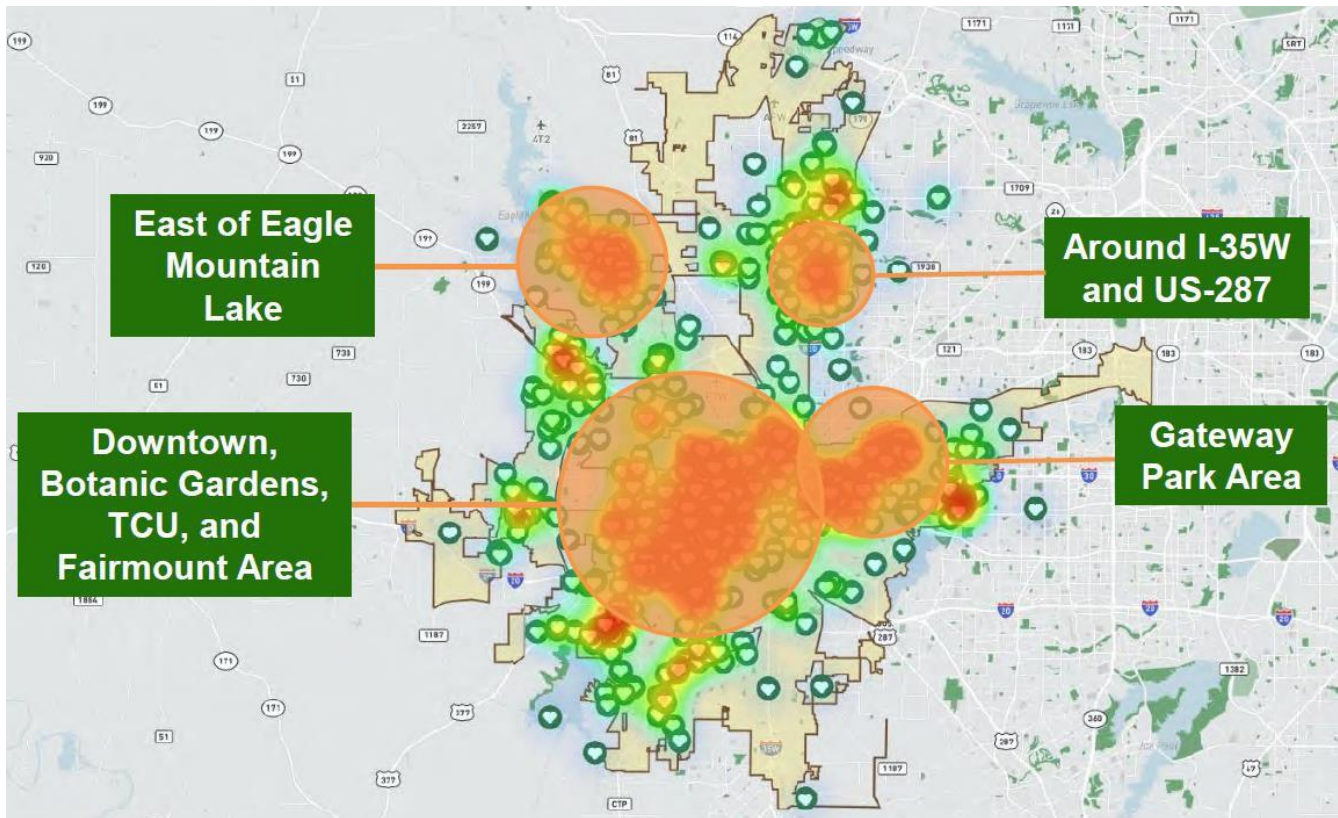


Figure 26. Map and descriptions of the most common significant areas identified by the public

A CLOSER LOOK AT THE PUBLIC'S VIEW ON PRIORITY PLANTING AREAS

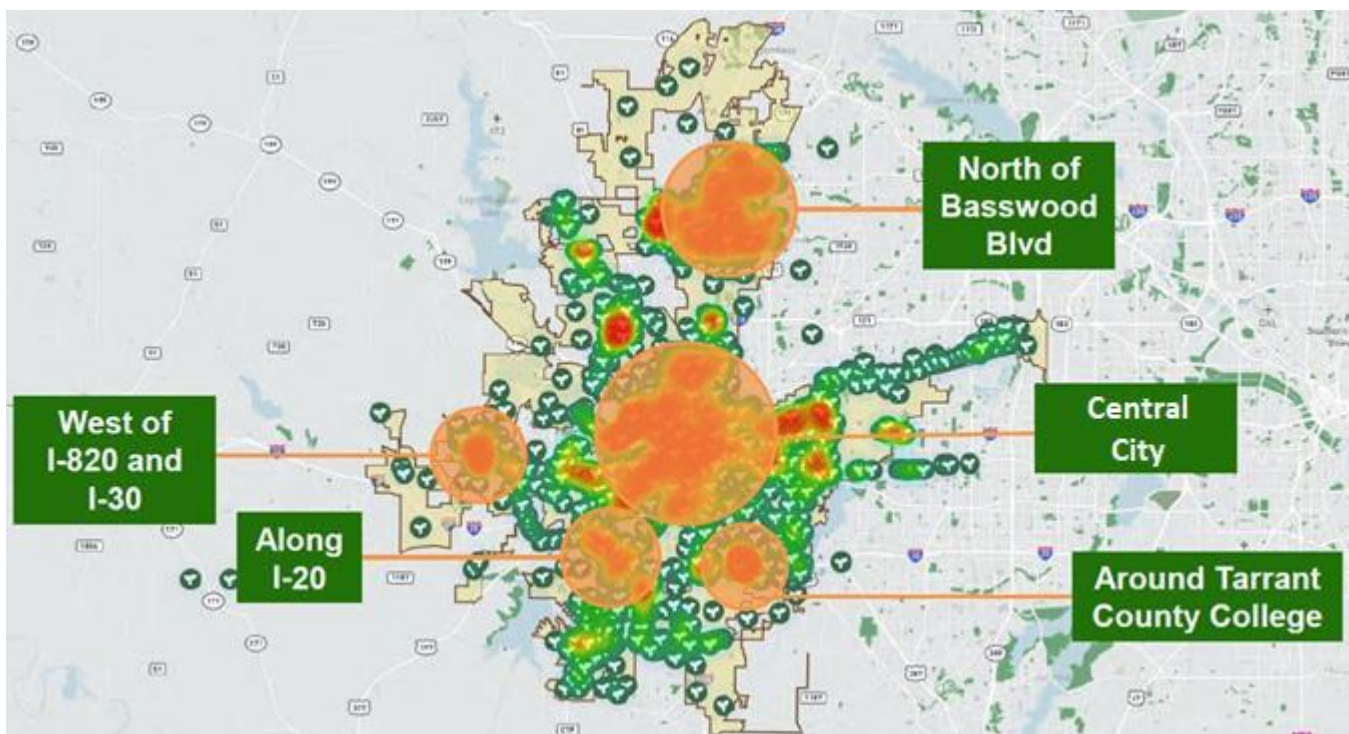


Figure 27. Map and descriptions of the most common priority planting areas identified by the public

Discussion

Gathering public feedback on the types of trees they want to see planted, the priority areas for planting, the priorities for City programs, and meeting with external stakeholders is a critical component in developing a shared vision and commitment to the Urban Forest Master Plan.

Engaging with the community and gathering their feedback is essential to developing a plan that meets their needs and priorities. It allows the public to participate in the planning process and feel heard, making them more invested in the success of the project.

Public feedback can help identify community priorities and goals, which can then be integrated into the Urban Forest Master Plan. This ensures that the Plan aligns with the community's vision for their city.

Input from the public can also help identify the types of trees and priority areas for planting that will have the most significant environmental and social benefits. For example, planting trees in areas with poor air quality can help reduce air pollution, while planting trees in areas with high temperatures can help reduce the urban heat island effect.

Meeting and engaging with external stakeholders, such as local businesses, community groups, and environmental organizations, can help ensure that the Urban Forest Master Plan aligns with broader community goals and is supported by a wide range of stakeholders. Collaboration with external stakeholders can also lead to partnerships and funding opportunities.

External Stakeholder Input on Plan Development and Implementation

The engagement with the public and with external stakeholders and focus groups gathered viewpoints, insights, concerns, and shared priorities relating to trees and programs in the city. An observation across the meetings was that the residents and many external stakeholders and focus groups (referred to herein as stakeholders) are ‘speaking the same language’ when it comes to describing the challenges and opportunities inherent in expanding an equitable urban forest and addressing urban heat. There were several instances where stakeholders noted related challenges, opportunities, and initiatives. Some of the most pertinent ones include:

- ❖ The City must set precedents and fulfill the leadership role that they occupy;
- ❖ Necessity to identify where policy goals align;
- ❖ Mindshift is required in which trees are seen as an integral part of city fabric and urban infrastructure;
- ❖ Ultimately, an equity-driven agenda for the urban forest requires an augmentation of social and political wills;
- ❖ Unified approach required in terms of streamlining planning documents—stakeholders identified conflicting City policies around planning and other building guidelines, including zoning, that can infringe on the city’s own capacity to advance planting goals;
- ❖ Community-based public campaigns are necessary to demonstrate the need to expand urban tree canopy;
- ❖ Partnerships with private sector and external organizations may be necessary; and
- ❖ Changes to City programs and additional staff may be required for the management of the urban forest. Staff may be needed to improve monitoring and enforcement of

tree-related regulations as part of development projects. Since the City performs hazard abatement and not proactive maintenance of street trees, resources and education for the public are essential to healthy trees and meeting canopy goals;

- ❖ Planting more trees to achieve canopy goals needs to be strategic in addressing equity, urban heat, and changing conditions by planting in priority areas and planting trees that can withstand prolonged droughts and high temperatures, extreme weather events and temperature changes, and matching the trees with the soils they are planted in. Consideration of the intended use of the land and the native vegetative cover types are also critical in achieving canopy goals. For example, preserving natural prairie land, not interfering with stormwater management infrastructure, and maintaining the intended use of open space, riparian corridors, and recreational areas; and,
- ❖ Planting more trees to achieve canopy goals will put additional stress on the already limited staffing and resources. Therefore, community partnerships are essential for a sustainable, equitable, and expanding urban forest.

To fully implement the recommendations to increase canopy and achieve canopy goals, integration of urban forest planning with responsible City authorities and divisions is necessary.

Community Participation to Support Implementation

Across all the engagement sessions with the public and meetings with external stakeholders and focus groups (stakeholders) there was a consistent theme about the strategies and tactics for engaging community-based organizations, seen as a core constituency or advocacy group, in the management of the urban forest. The City creating an Urban Forestry Advisory Committee, working group, or similar may be recommended as part of the Urban Forest Master Plan. Based on the stakeholder engagement sessions held throughout the planning period, one of the priorities is to support and empower community members to participate and shape the tree planning and maintenance process. This can be accomplished through community-led tree planting initiatives in racially and ethnically diverse neighborhoods. Within the engagement theme, several specific areas emerged to define the challenges and opportunities currently facing the city and relevant stakeholders as it relates to the tree canopy goal and supporting services and programs. Some of these include:

- ❖ Involvement of individuals and smaller groups needs to strike a balance between tailored approaches that require extensive time and resources with those that are more generalizable across diverse communities.
- ❖ Involving communities in tree planting in public areas versus private areas have very different approaches to engagement. While the private areas have the greatest potential for expanding the urban forest— in part because most of the city is privately owned— engaging communities in public plantings can help to advance a cultural change that can help to engage others, including private property owners.
- ❖ Local community-based organizations, including culturally-based groups and neighborhoods associations have an important role as local champions and trusted partners for engagement and understanding immediate needs of community members.
- ❖ Length of engagement matters (allows for caring of trees).
 - Methods of outreach should tap into existing neighborhood assets;

- Engagement is much more than the tree and must build long-lasting connections to empower individuals.
- ❖ Partnerships with similar, yet not identical mission statements are essential. The City needs to expand the stakeholders who are actively engaging communities in relation to the urban forest. Considerations include members from the cyclist, affordable housing, and public safety communities.
- ❖ Engagement should be bilingual (e.g., Spanish) where applicable and respond to local interests of specific residents.
 - Consider the need for allowing for specific, culturally specific trees, and the simultaneous advantage of engaging community members while expanding canopy;
 - Enable diverse models of engagement and approaches to help build personal connections to tree planting work, similar to approaches often taken by community-based organizations.
- ❖ Employment and workforce training opportunities for local ambassadors and key partners should also be considered. The ability to compensate local community partners' work and outreach is important to building trust. While it is important to educate the public about the importance of urban trees and forests, research shows that although trees may be seen as a 'moral good,' such programs may be seen with suspicion by community members. The City's past and ongoing outreach are opportunities to dovetail when engaging the public about the urban forest, but it is suggested that rather than leading with education and the importance of trees to combat the urban heat crisis, the City should consider an approach that meets communities needs first. Through future community-level planting plans, implement an engagement process to discover the role that greening the particular neighborhood might offer.

Summary

The Urban Forest Master Plan addresses equity through planting efforts to achieve canopy goals and other recommendations. The City and its partners will need to communicate the value to community members about how the Plan's recommendations will support or address their local challenges. Disinvested communities typically want more equitable policies, living-wage jobs, higher household incomes, safer neighborhoods, affordable housing, a more usable and connected urban network, pedestrian infrastructure, more frequent transit service, better funding for schools, and specific initiatives to engage youth and families.

Showing the value of an equity-based tree program and a canopy goal that helps to advance these well-known needs will create an immediate and citywide constituency for making Fort Worth more sustainable through actions at the neighborhood level.



PLANNING ELEMENT:



**DATA
ANALYSES**

PURPOSE:

To examine the extent, structure, opportunities, and vulnerabilities of the city's urban forest

ELEMENT 4: DATA ANALYSES

Purpose

The Data Analyses element to the Technical Report serves as Fort Worth’s “State of the Urban Forest” and offers an opportunity to evaluate the urban forest resource, the opportunities to preserve and enhance it, and the existing and potential challenges or vulnerabilities facing the trees in urban areas. Through these analyses, the appropriate strategies to sustain and enhance the urban forest, and the metrics to measure progress, were developed. To introduce the process, results, and the discussion around the data analyses, background on the region’s natural environment is first presented to provide context.

Background

Fort Worth is a city rich in natural features, diverse cultures, and varying landscapes. The city has undergone significant development and is predicted to experience continued growth in the future. However, residents expressed concerns about the potential effects of this growth and the changing conditions, such as prolonged heat and extreme drought, on the green spaces and the urban forest. Addressing these concerns is a priority for the City, exemplified by its Urban Forestry and Forestry programs, tree regulations, sustainable practices and initiatives, goals to increase tree canopy cover citywide, community programs, and the support for the Urban Forest Master Plan.

Fort Worth is the oldest and longest-running Tree City USA in Texas, a designation the city first received in 1978. It hired its first city forester in 1926. It created a wildlife sanctuary in 1964 that later became the Fort Worth Nature Center and Refuge, which at 3,600 acres is one of the largest city-owned nature centers in the U.S.

In 2009, the Urban Forestry Ordinance (No. 18615-05-2009) was adopted by City Council as an amendment to the comprehensive Zoning Ordinance. Prior to adoption, a Citizen Advisory Committee was formed in 2004 in response to citizen concerns regarding the practice of clear cutting and to study tree preservation practices in other cities in order to recommend possible regulations related to tree preservation in Fort Worth. In 2006, Ordinance Number 17228 was approved to provide regulations for the protection and replacement of trees in the city. Shortly after approval, City staff recognized a need to amend the regulations to provide clarity and to make the provisions easier to implement. To do so, the ordinance was moved to a separate subsection under Article 3 “Landscaping and Buffers” in the Zoning Ordinance. The Urban Forestry Ordinance now resides in Chapter 6, “Development Standards” as a new section, Section 6.302 “Urban Forestry”.

The purpose of Section 6.302 is twofold. First, it aims to achieve 30% tree canopy coverage citywide and promote a multi-aged urban forest. This is accomplished by addressing the preservation and protection of healthy and significant trees, as well as providing for the replacement and replanting of trees that are removed during development. Second, it supports the expansion of the city’s tree canopy cover through the planting of new trees.

The City of Fort Worth has a long history of valuing its natural environment and the urban forest. In recent years, Fort Worth voters approved a \$15 million bond proposition for its Open Space Conservation Program (2019). The City’s initiative to support the Urban Forest Master Plan is an important progression towards Fort Worth’s efforts to protect and expand its

natural environment and amenities that support community well-being, urban ecosystems, and local economies.

Process

The State of the Urban Forest provides analyses of the historical landscapes, changes to the natural environment and the conversion to an urban forest, challenges facing trees in urban areas, and the current extent of the urban forest across public and private property to identify priority planting areas, potential recommendations for changes to tree canopy goals, and priority areas for preservation.

While the urban forest encompasses all landscapes and trees within the city's boundaries, this assessment's recommendations focus on trees and opportunities in urban areas of the city along with the city's Cross Timbers Region— an expansive critical area located east of I-35W consisting of old growth, drought-stressed, and slow-growing trees— many of which predate not only statehood, but also the birth of the United States.

The studies in this section include:

- ❖ **Tree Species Composition:** The composition of trees across various landscapes based on the 2011 sample inventory of street trees and regional research and data.
- ❖ **Tree Benefits and Services:** The ecosystem benefits of public trees and the entire urban forest based on regional research and data.
- ❖ **Critical and Sensitive Areas:** The history, composition, and changing conditions of areas such as the Cross Timbers and open space.
- ❖ **Threats to the Urban Forest:** The challenges facing trees in urban areas and the changes to the landscape based on development and urban heat.
- ❖ **Tree Canopy Cover:** The extent of urban tree canopy cover and available planting space based on the 2020 assessment using 2018 imagery. Canopy change analyses are based on a study utilizing the U.S. Forest Service i-Tree Canopy software and Google Earth historical imagery.
- ❖ **Integrated Analysis:** A composite of analyses that incorporates the previous studies to provide potential priority areas for planting and revised canopy goals.

Results: Tree Species Composition




The Fort Worth region is a mixture of remnant (pre-settlement) trees and planted trees. Reviews of regional data indicate tree species diversity in urban areas of the city is higher than that of nearby native landscapes. Parks, natural areas, and other open spaces tend to have a higher proportion of remnant native vegetation, whereas planted trees (both native and non-native) dominate developed areas. Non-native species are found throughout. Because portions of the region were historically prairie with the exception of some floodplain forests, there are more tree species planted in prairies than were present historically.

Public Tree Counts

Specific to the public trees across Fort Worth, the City does not have a comprehensive inventory. For public trees, the City has a 2011 sample inventory trees based on the U.S. Forest Service’s i-Tree criteria where a 6.6% sample was collected. From the study, there are an estimated 260,964 public street trees (standard error of +/- 38,353 trees, based on 2011 numbers). Given the city’s planting efforts, an estimate of 300,000 street trees is used for this study. The sample inventory gathered insights on the extent, composition, structure, and maintenance needs of public street trees though the data does not reflect current conditions due to a freeze that took place in 2021 causing decline or loss of many ash trees. Also, tree plantings, maintenance, and removals have taken place since 2011 and the trees have likely changed in size and condition over time.

The graphic below summarizes the types of public trees and the available tree count estimates. Additional details are available in the Plan’s Technical Report.

Table 12. Summary of the estimated number of public trees in Fort Worth

Types of Public Trees	Tree Count Estimates*
	<p>Public Street Trees</p> <p>300,000</p>
	<p>Public Park Trees</p> <p>Unknown</p>
	<p>Public Property Trees</p> <p>Unknown</p>
<p>Total Number of Public Trees</p>	<p>Unknown</p>

* The public street tree estimate is based on a 2011 sample inventory representing 6.6% of the tree population (standard error of +/- 38,353 trees). It is recommended the City conduct an inventory of public trees to gather these values.

Urban Forest Composition

The following provides a summary of the estimated tree composition for Fort Worth’s public street tree population based on the 2011 sample inventory. The composition of the citywide urban forest is unknown at the time of the study. It is recommended the City or partners conduct an i-Tree Eco sample inventory for a better understanding of the citywide urban forest composition and to complete a comprehensive public tree inventory, beginning with street trees as recommended in the Plan.

Table 13. Most common public street tree genera based on a 2011 sample inventory

Tree Genera	Tree Type	%	Estimated Total
<i>Celtis</i>	Sugarberry	34%	89,337
<i>Quercus</i>	Oak	15%	38,076
<i>Ulmus</i>	Elm	14%	37,047
<i>Lagerstroemia</i>	Crape myrtle	5%	14,093
<i>Fraxinus</i>	Ash	4%	10,041
<i>Carya</i>	Hickory, pecan	3%	6,926
<i>Sapindus</i>	Soapberry	3%	6,684
<i>Pyrus</i>	Pear	2%	5,353
<i>Morus</i>	Mulberry	2%	3,992
<i>Bumelia</i>	Chittamwood	1%	3,811
Most Common Tree Genera (Top 10)		83%	215,358
Other Tree Genera (44 tree genera)		17%	45,606
TOTAL		100%	260,964

Table 14. Most common public street trees by common name based on a 2011 sample inventory

Common Name	Scientific Name	%	Estimated Total
Sugarberry	<i>Celtis laevigata</i>	34%	89,337
Cedar elm	<i>Ulmus crassifolia</i>	11%	27,884
Shumard oak	<i>Quercus shumardii</i>	6%	14,879
Common crapemyrtle	<i>Lagerstroemia spp</i>	5%	14,093
Live oak	<i>Quercus virginiana</i>	5%	13,277
Green ash	<i>Fraxinus pennsylvanica</i>	4%	9,799
American elm	<i>Ulmus americana</i>	3%	7,863
Pecan	<i>Carya illinoensis</i>	3%	6,926
Post oak	<i>Quercus stellata</i>	3%	6,805
Western soapberry	<i>Sapindus drummondii</i>	3%	6,684
Most Common Trees (Top 10)		76%	98,970
Other Tree Species (78 tree species)		24%	63,419
TOTAL		100%	260,964

The summaries provided in the previous tables provide insights on the composition of public trees along streets in the public rights-of-way. Based on the 2011 sample, there are 54 unique tree genera. The ten most common tree genera make up 83% of the street trees with *Celtis* (sugarberry), *Quercus* (oak), and *Ulmus* (elm) as the most common. The ten most common tree species account for 76% of the street trees with sugarberry, cedar elm, and Shumard oak as the most common street tree.

The variety of tree species in an urban forest is known as species diversity. Having a greater diversity of tree species increases the amount and type of benefits produced. It also helps to protect the urban forest from pests, diseases, and extreme weather events. A commonly accepted diversity goal is for no single tree species to account for more than 10% of the population, no genus more than 20%, and no family more than 30% (Santamour, 1990). This rule can be applied to the city, neighborhood, and block level. Based on the street tree analysis, the *Celtis* tree genus exceeds the 20% threshold. Sugarberry and cedar elm exceed the 10% threshold for species diversity.

The following provides an illustration of the most common street trees in Fort Worth.

MOST COMMON PUBLIC STREET TREES IN FORT WORTH

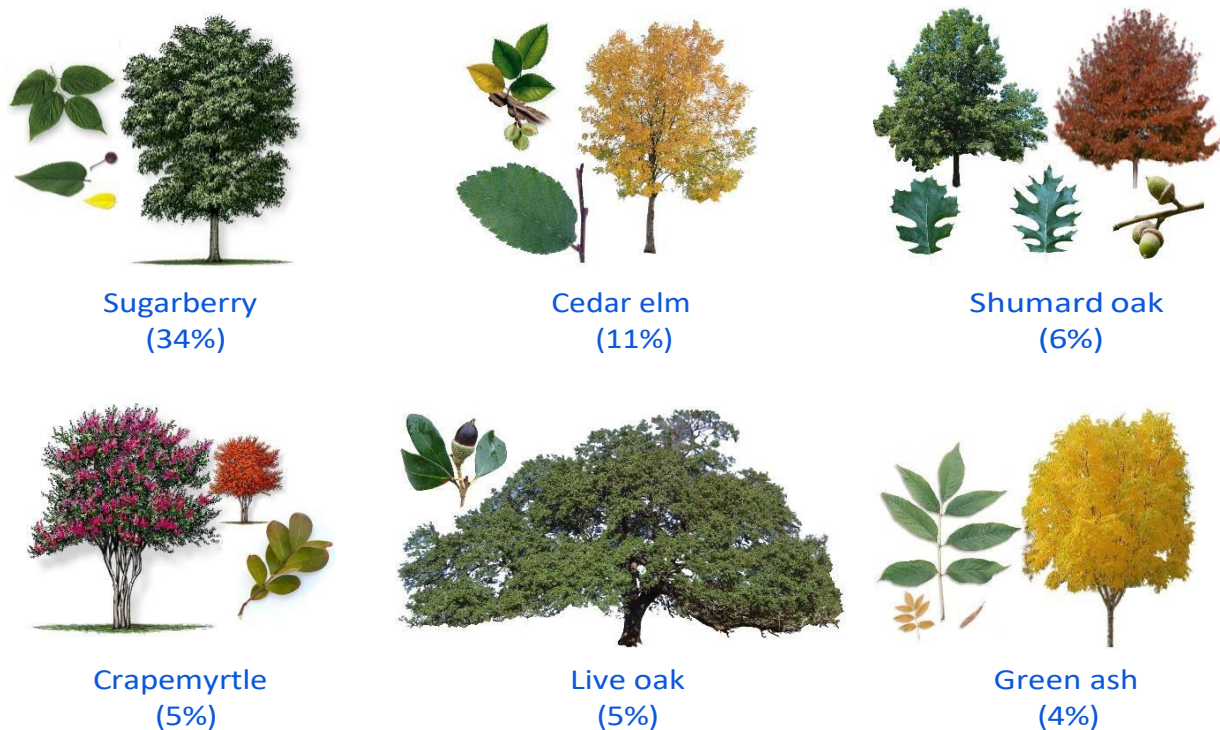


Figure 28. The most common public street trees in Fort Worth

Urban Forest Structure

The distribution of tree sizes and relative age classes influences the structure of the urban forest as well as the present and future costs. Relative age is based on a generalization of a tree's size since trees have various growth rates and form. While Fort Worth does not have data on the structure of the urban forest, the 2011 sample inventory provides insights into the structure of the public tree population.

An unevenly aged population of street trees offers a continued flow of benefits and a more uniform workflow allowing managers to accurately allocate annual maintenance schedules and budgets. To optimize the value and benefits, the street trees should contain a high percentage of large canopy trees which provide greater ecosystem benefits. On the other hand, there must be a suitable number of younger, smaller trees to account for and eventually replace large and mature trees in decline. Having a healthy percentage of young

trees will ensure a sustainable tree population as well as age distribution in future years. To compare Fort Worth’s public tree structure to industry-recommended standards, the “ideal distribution” is used (Richards, 1983 and 1993). The diameter at breast height (DBH measured at 4.5-feet above grade) is used to measure relative age.

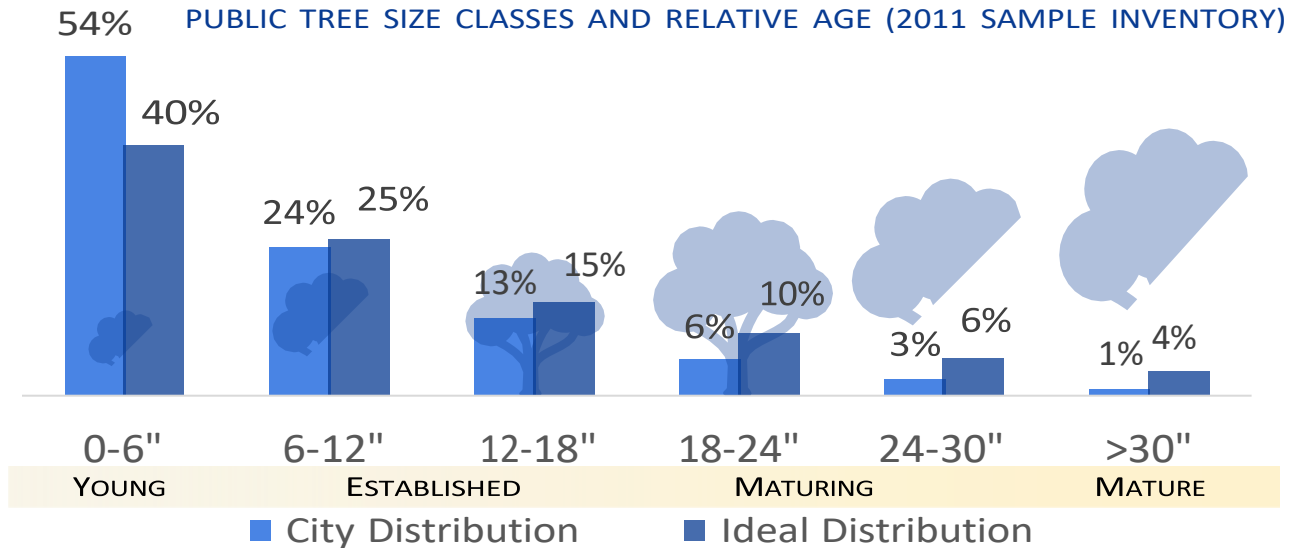
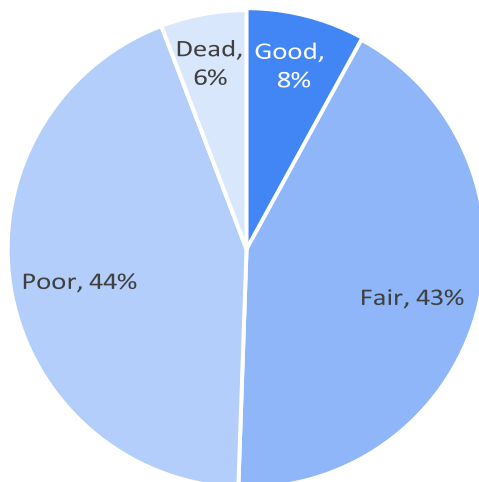


Figure 29. Comparison of the size distribution of Fort Worth’s street trees to the ideal distribution (Richards, 1983)

According to the study, the distribution of size classes for Fort Worth’s street trees is similar to the ideal distribution. Most trees are young, smaller sized trees compared to large maturing trees. This may be a result of the City’s tree planting efforts. A well-maintained public tree inventory enables the City to monitor this distribution and adjust management approaches to ensure a continual flow of benefits and a balance of maintenance needs over time.

PUBLIC TREE CONDITION (WOOD)



PUBLIC TREE CONDITION (LEAVES)

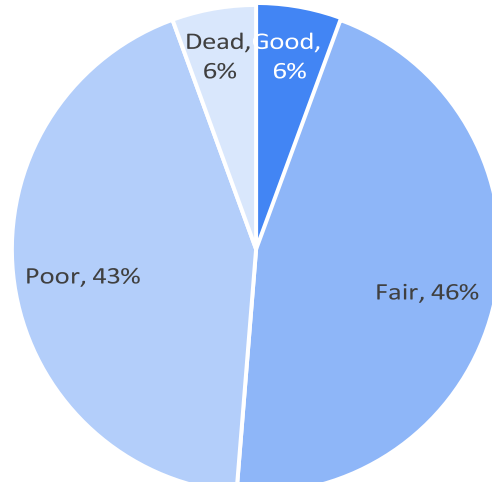


Figure 30. Summary of the condition of public trees based on the 2011 sample inventory

The condition of the wood and leaves of public trees was assessed in 2011 and it was found that the majority of trees have a poor condition rating for the wood structure (44%) and most tree leaf condition is fair with 46%. Note, the condition of trees have likely changed since the inventory was conducted but this may serve as a baseline for comparison to future inventory efforts.

Results: The Value, Services, and Benefits of Trees

While the urban forest is a vital component of a city's infrastructure, it also plays an important role in supporting and improving the quality of life in communities. A tree's shade and beauty contribute to a community's quality of life and soften the often hard appearance of urban landscapes and streetscapes. When properly maintained, trees provide communities with abundant environmental, economic, and social benefits that far exceed the time and money invested in planting, pruning, protection, and removal. Fort Worth's trees provide numerous tangible and intangible benefits such as pollution control, cooling and energy reduction, stormwater management, property value increases, wildlife habitat, education opportunities, human health and well-being, and aesthetics.

CARBON STORAGE



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

STRESS REDUCTION

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



CLEANER AIR

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



WILDLIFE HABITAT



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

STORMWATER MANAGEMENT



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

SHADE AND COOLING

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



LOWER ENERGY BILLS



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

SOIL STABILIZATION



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

Data sources and links: [US Forest Service](#), [the Arbor Day Foundation](#), and [the EPA](#).

Figure 31. Overview of the benefits and services provided by trees in communities

Benefits and Services Defined

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

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

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

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

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

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

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

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

Carbon Stored: Tallies all of the carbon dioxide (CO₂) stored in the urban forest over the life of its trees as a result of sequestration. Carbon stored is measured in pounds.

Carbon Sequestered: Presents annual reductions in atmospheric CO₂ due to sequestration by trees and reduced emissions from power plants due to reductions in energy use. This is measured in pounds and has been translated to tons for this study. The model accounts for CO₂ released as trees die and decompose and CO₂ released during the care and maintenance of trees.

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

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

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

Trees and the urban forest are vital components of a city’s public infrastructure. They create quantifiable cost savings for both the City and private property owners alike and create economic benefits for the entire community. The quality of life of the residents in any community also depends on the urban forest, as trees make a vital and affordable contribution to the sense of community, pedestrian-friendly neighborhoods, energy savings, and air quality. Trees are one of the few infrastructure investments that grow in value over time. The following data was derived from Alliance for Community Trees (2011):

BENEFITS AND SERVICES DESCRIBED



Reduce Stress and Improve the Quality of Life

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



Clean the Air and Breathe Easier

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



Save Energy and Lower Energy Costs for Buildings

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



Positively Influence Climate to Ensure Sustainability

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



Reduce the Need for Street Maintenance

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



Raise Property Values

Trees are sound investments, for businesses and residents alike, and their value increases as they grow. Sustainable landscapes can increase property values up to 37%. The value of trees appreciates over time because the benefits grow as they do. For businesses, trees have added value, including higher revenues. Shoppers seek out leafy promenades that frame storefronts. Research shows that shoppers spend more—between 9 and 12% more—on products in tree-lined business districts. A study by Donovan & Butry in 2008 shows trees increase value to the home where they reside but also contribute to increased property values of adjacent homes and properties. As an additional benefit, increased property values resulting from trees lead to quicker home sales (Wolf 2007).



Conserve Water and Soil

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



Cooler Pavement Diminishes Urban Heat Islands

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



Protect Wildlife and Restore Ecosystems

Planting and protecting trees can provide habitat for hundreds of birds and small animals. Urbanization and the destruction of valuable ecosystems have led to the decline of many of species. Adding trees, particularly native trees, provides valuable habitat for wildlife.



Build Safe Communities and Decrease Crime

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



Calm Traffic and Make Neighborhoods Safer and Quieter

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

BENEFITS OF FORT WORTH'S URBAN FOREST

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 Fort Worth's trees are summarized below using the findings from the 2020 Urban Tree Canopy (UTC) Assessment. Since the City does not have a comprehensive or updated sample inventory of public trees, research is used to provide estimates. The benefits for the citywide urban forest are based on the acres of canopy determined from the 2020 canopy assessment and calculated using the U.S. Forest Service's i-Tree Canopy tool. The following summarizes the benefits of Fort Worth's 19% tree canopy.



Figure 32. Summary of the benefits and services provided by Fort Worth's urban forest

Results: Critical and Sensitive Areas Including the Cross Timbers



Image Description 3. Images of the Cross Timbers including woodlands and prairies (Source: Cross Timbers Urban Forestry Council)

Tarrant County includes four different types of terrain, each with its unique ecological factors: the Western Cross Timbers, the Fort Worth Prairie, the Eastern Cross Timbers and Blackland Prairie all stretch across the county. City expansion (annexation) is primarily in the northern and western parts of Fort Worth which contain large tracts of prairies.

Fort Worth is often referred to as the area “where the west begins” due to the native prairie land that spanned thousands of acres. The prairie ecosystem within the city is made up of native tallgrass, one of the most endangered in North America. These prairies and the Cross Timbers in Fort Worth are critical areas that comprise an intricate mixture of woodlands and grasslands. A transition zone lies between the eastern deciduous forests and the grasslands of the southern Great Plains. The East and West Cross Timbers enclose the Fort Worth Prairie on their respective sides. Despite sharing a common sandy soil base, these regions exhibit distinct differences.

This ecosystem is an integral part of Fort Worth's natural landscape and contains a number of endangered species and rare archeological sites. In recent years, however, waves of development have been drastically altering the landscape of the Cross Timbers. Thousands of acres of land have been cleared to make way for new residential communities and businesses. These disturbances have done widespread damage to the natural biodiversity of the region and to the native inhabitants of the area. The soils of the Cross Timbers have been disturbed by construction, causing a loss of nutrients that sustain the local flora and fauna. Tree cover has also been reduced, leading to increased temperatures and stormwater runoff.

Rapid development has heavily impacted the various plant and animal species of the Cross Timbers. In addition, the construction of new roads has caused water to flow faster, eroding the area's sensitive soils and further damaging the fragile plant life. Although it is clear that development in Fort Worth has had a devastating effect on the Cross Timbers, the Urban Forest Master Plan and other initiatives in the region have prioritized redressing these impacts. Several organizations have worked hard to preserve and protect the area, and many businesses and citizens have shown support for preserving the region's unique landscape and wildlife. In addition, new urban planning initiatives are being put in place to minimize the impacts development has on the Cross Timbers and to ensure the region's economic sustainability. Ultimately, it is up to the citizens of Fort Worth to preserve their city's natural heritage and protect the Cross Timbers. Through the development of the Urban Forest Master Plan, a shared commitment to the vision and goals was formed in support of critical areas such as the Cross Timbers.

DESCRIPTION OF THE CROSS TIMBERS

Cross Timbers and Prairie Map

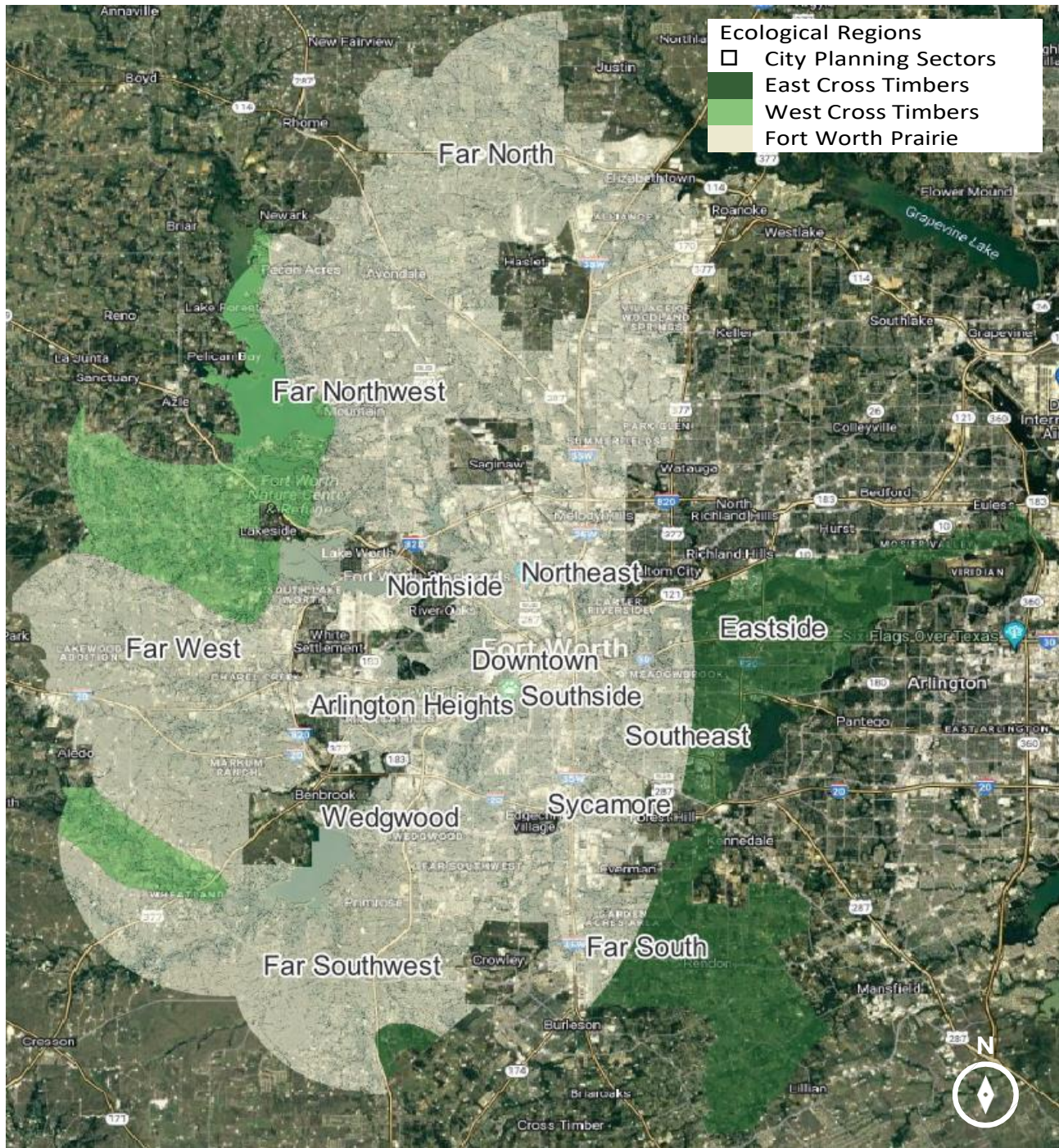


Figure 33. Map of the ecological regions in Fort Worth including the Cross Timbers and prairie

The East Cross Timbers: The East Cross Timbers is a narrow strip of tree-covered land that includes portions of Denton, Tarrant, Johnson, and Hill counties. The region used to be referred to as the Monte Grande (Grand Forest) by early settlers and travelers and later called the Lower Timbers. Today, there are several large tracts of undisturbed woodlands though it is perhaps the most fragmented vegetative region in Texas.

The woodlands are predominantly post oak, blackjack oak, cedar elm, hickory, osage orange, eastern red cedar, mesquite, bumelia, hawthorn, greenbriar, and a variety of other brush and grass species. These species are suitable for the soils in this region which consist of slightly acidic, sandy or sandy loam (Texas Parks & Wildlife).

This region has experienced land clearing for tame-grass pastures, croplands, ranches, and developments. There is a considerable amount of land zoned for urban growth and expansion throughout this region that will continue to impact wildlife habitat resources in the future.



Fort Worth Prairie: This region between the East and West Cross Timbers encompasses several counties including Tarrant County. This region is mostly treeless and is characterized by gradual slopes and thin soil over hard limestone. Shifts in the limestone layers and upheavals of underlying layers over time have resulted in the scenic topography that the region is known for.

This region was once covered with vast tall-grass native prairies though many of these have been degraded with only remnants existing today. The shallow soils prevented cultivation and instead, the land was used for livestock grazing operations. These operations began with early settlers and extensive areas are still used for livestock grazing though the native plant communities have been altered over time. Urban sprawl and developments have rapidly extended into the sub-region as the human population increased in the region.

Features of the Fort Worth Prairie extend into the West Cross Timbers along the eastern boundary, forming irregular transitions of diverse tree and brush species common to both zones. Extensive open grasslands and brushy rangelands occur in the West Cross Timbers sub-region (Texas Parks & Wildlife).



West Cross Timbers: The West Cross Timbers located west of the Fort Worth Prairie region includes portions of Tarrant county and other counties in North Central Texas. Early settlers and travelers referred to this region as the Upper Timbers due to its higher elevation.

The history of the region's geology is complex which resulted in a variety of soil types, features, plant communities, and terrain. In most areas of the West Cross Timbers, the terrain is hilly with steep sandstone and limestone slopes and plateaus. Certain areas of the West Cross Timbers are composed of sandy loam soils which are productive for agricultural crops. The areas with grassland primarily have limestone surface formations and shallow clay soils.

Tree and shrub species in this region primarily consist of oak species including post oak, blackjack oak, shin oak, Spanish oak, and live oak. Other plant species include Texas ash, mesquite, osage orange, ashe juniper, eastern red cedar, cedar elm, skunkbush sumac, elbowbush, lotebush, tasajillo, rough-leafed dogwood, flame-leaf sumac, hawthorn, and hackberry (Texas Parks & Wildlife).

Today, the Fort Worth Nature Center & Refuge in the West Cross Timbers north of Lake Worth provides residents and visitors with a look into history. The natural area comprised of forests, prairies, and wetlands was designated in 1964 to create a wildlife sanctuary and nature preserve for the Fort Worth community. The Nature Center covers over 3,600 acres and includes 20 miles of trails, making it one of the largest city-owned nature centers in the country. The Nature Center offers education, events, and other activities and is an exemplary example of land stewardship and resource management. The Fort Worth Nature Center & Refuge (FWNC&R) is a division of the City's Park and Recreation Department and is supported by the Friends of the Fort Worth Nature Center & Refuge (FONC), a non-governmental organization that provides financial support and staff training (Fort Worth Nature Center & Refuge, 2023).



PROTECTING CRITICAL AND SENSITIVE AREAS: OPEN SPACE CONSERVATION PROGRAM

The Open Space Conservation Program, a partnership between the City and the nonprofit organization Trust for Public Land, was originally launched in 2019 amid growing concerns over the loss of thousands of acres of natural prairie each year due to development— 2,800 acres per year as of 2020 (Samsel, H., Star-Telegram, 2020). Based on projections from the real estate industry, North Central Texas could see a loss of 20,000 more acres of natural prairie over the next 15 to 20 years (D Magazine, 2022). In June 2020, the program made its first purchase of a property known as Broadcast Hill using funding from the City’s oil and gas trust fund in addition to \$64,000 in donations from residents. The 50-plus acre property near Tandy Hills Natural Area in east Fort Worth sets the stage for future land acquisitions that are likely to be funded through a combination of grants, the oil and gas trust fund, and the City’s bond program.

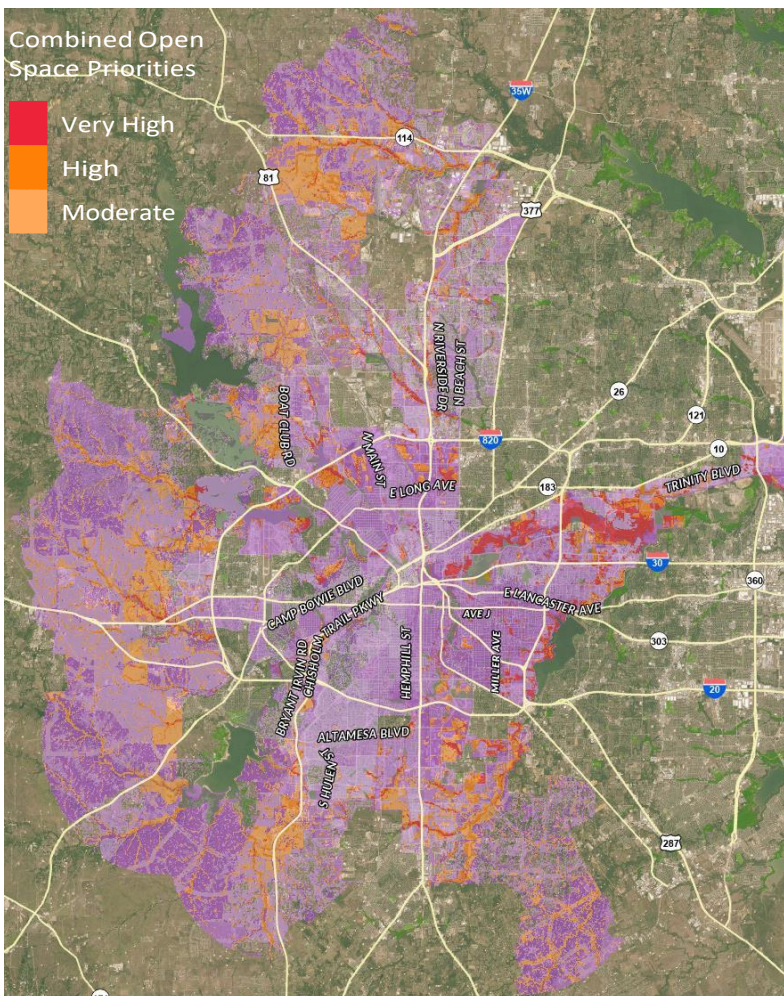


Figure 34. Map providing an example of the Open Space Conservation Program's prioritization tool

In 2020, the City and open space partners gathered public feedback through an online survey and public meetings regarding support for a permanent preservation program and how to use these natural areas that are acquired. The Trust for Public Land is now implementing a tool to assist the City in prioritizing new areas for acquisition and ongoing conservation. Themes for prioritization include flood control, ecosystem restoration, recreation, equity, community health, and water quality (City of Fort Worth and the Star-Telegram, 2020).

PROTECTING CRITICAL AND SENSITIVE AREAS: NEIGHBORHOOD-LEVEL EFFORTS

In addition to land acquisition and conservation efforts the City, partners, and residents of Fort Worth have taken action to address the impacts of a fragmented Cross Timbers and the increase in urban heat. Neighborhood organizations, such as the Fort Worth Climate Safe Neighborhood Coalition that was established in 2022, are committed to changing the environment to create green spaces that support biodiversity, equitable access, sustainability, and increases in urban tree canopy cover and other nature-based solutions. The Coalition's early advocacy efforts focused on Glenwood Park by removing nine tons of trash from the park in 2022 and celebrated Earth Day at the park in 2023. The Coalition hopes to co-develop a master plan for the park to support nature-based solutions that preserve and restore natural areas and in turn, provides equitable access, vital habitats, and addresses urban heat (Alexander, G., et al., Fort Worth Report, 2022).



Another example of a neighborhood-level effort is the Prescriptions to Promote Life Outdoors and Real Exploration (RxPLORE) program, a collaborative effort led by the Harris College of Nursing at TCU. The goal of the program is to generate new evidence for nature-based health promotion while translating current evidence into intervention design. The program has teamed with the Texas Parks and Wildlife Department and Fort Worth's Park and Recreation Department with its first event in 2019 at the Fort Worth Nature Center and Refuge providing 64 "family nature prescriptions". Through these and future efforts, the program aims to disconnect people from technology and connect them to nature— a practice that can build support for the city's urban forest (Texas Christian University, 2020).

The Texas Trees Foundation's Cool Schools Program is another example where neighborhood-level efforts can make regional impacts on the loss of natural areas and the rise of temperatures in urban areas. The program connects students and teachers to nature by planting trees and creating fun and engaging outdoor experiential learning areas, according to the Foundation's website. By creating these spaces, the youth become aware and engaged in the natural environment. The program has been implemented in Dallas and elsewhere in the state and it is an opportunity for Fort Worth to support the city's goal of increasing tree canopy cover.

Many other examples exist or are taking shape that are in support of the goals of the Urban Forest Master Plan. Together, these programs and the City can address urban heat, inequitable tree canopy cover, loss of critical areas, and other challenges facing trees and the natural environment in the region.

Results: Development, Fragmentation, and Land Use Change

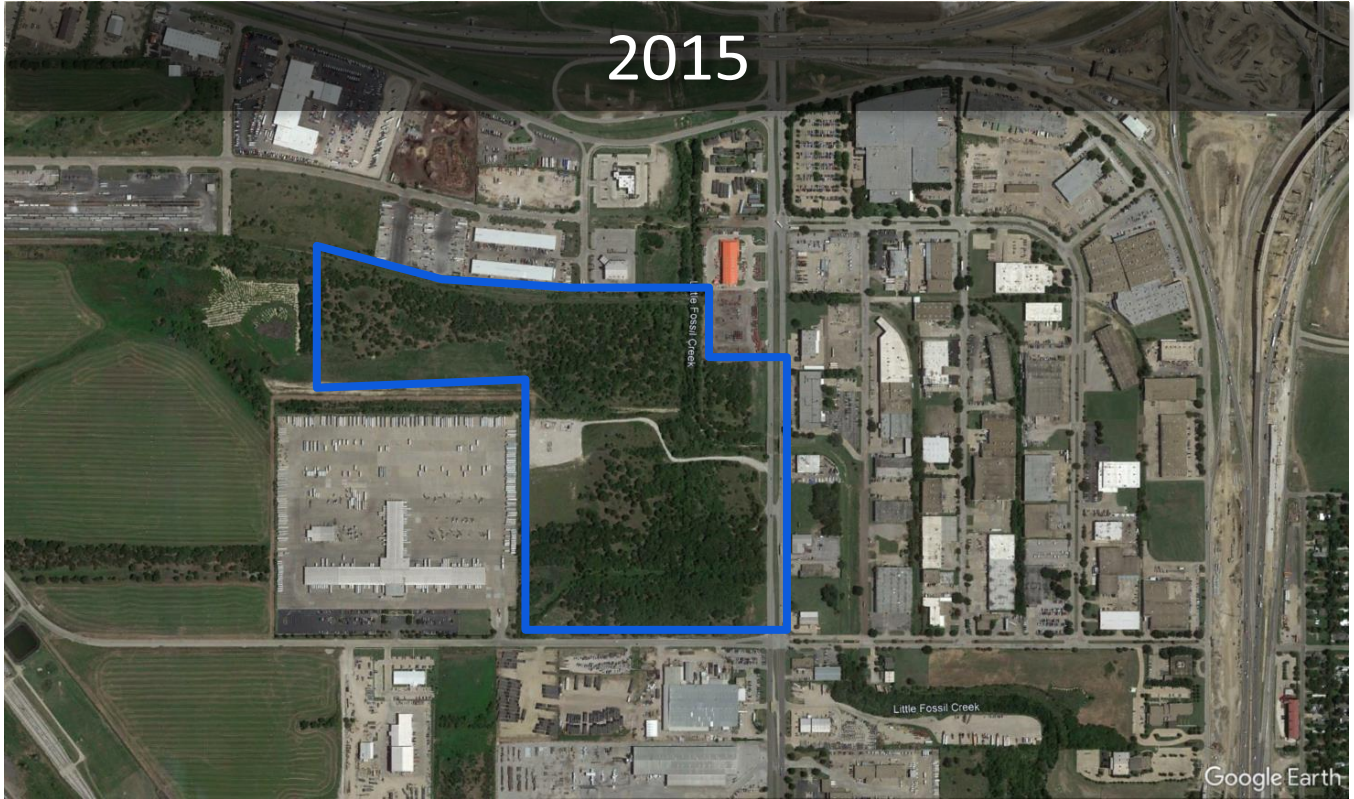
Development is the primary driver of forest change in the Fort Worth region. From 2010 to 2021, the city added more than 194,000 persons and experienced a population growth of 25%. The City of Fort Worth is 13th in the nation by population and at the current rate of population growth, the city is projected to be home to approximately 1,000,000 people by 2027 (City of Fort Worth, TX). Infrastructure projects such as roadway expansions impact greenspaces. Increasingly, mixed-use and multi-family developments are beginning to infill Fort Worth's neighborhoods to accommodate population growth. This "urban infill" may increase pressure on existing trees and natural areas, limit space for new trees, and exacerbate the already challenging urban growing conditions by increasing the heat island effect, radiant heat, and soil moisture evaporation.



Land use change and development alter natural species composition, distribution, and the functional capacity of the urban forest. While this can be detrimental, Fort Worth has programs for tree planting, regulations for tree preservation, best practices and requirements for landscaping, and other related environmental regulations and initiatives that provide mutually beneficial outcomes for the developer, the community, and the urban forest. During the development of the Urban Forest Master Plan, it was identified that the preservation and planting requirements are not balanced with the loss of trees due to development and that the regulations and incentives for preserving Fort Worth's tree canopy cover do not deter developers from extensive tree removals. In addition, public perception is that the policies and importance of preserving and expanding tree canopy cover are not communicated nor do they resonate with developers. The City should consider the recommended changes and additions to tree regulations prepared as part of the Technical Report and Plan. As long as Fort Worth has robust but balanced tree preservation and protection regulations, the trees on both public and private property will have the opportunity to provide the community with critical air, water, and public health benefits.

Land use change and development are also detrimental to tree genetic diversity and the buffering potential of remnant natural systems. Fragmentation of the natural environment leads to isolated tree populations where certain species are unable to pollinate easily and exchange genetic material. This can reduce biological and genetic diversity. Fragmentation not only results in less connectivity among natural areas but also changes the structure of existing sites. As sites become fragmented and the amount of ecosystem space is reduced, many plants and animals that rely on connected habitats may be extirpated from the region (Saunders et al., 1991). Additionally, habitat edges are more vulnerable to pollution runoff from nearby roads and industry and are more likely to contain non-native invasive species. These trees on the edges are also more prone to wind damage and windthrow, meaning they can be uprooted by wind. Trees that are newly exposed to the edges are no longer protected by other trees. As such, they have not built up the wood strength or resistant wood that comes with prolonged exposure to wind.

LOSS OF TREE CANOPY COVER DUE TO DEVELOPMENT



Construction Began between 2018 and 2019 (east central Fort Worth, 32.831762, -97.323902)



Figure 35. Example of the loss of tree canopy cover due to development

Results: Urban Heat and Extreme Weather

Urban areas are generally warmer than rural locations, a phenomenon known as the urban heat island effect. These urban heat islands are identified and measured by estimating the difference in temperature between monitoring stations in urbanized areas and rural areas.

The Dallas–Fort Worth climate is classified as humid subtropical, with eight months above 68 degrees Fahrenheit and dry winters. The greatest amount of the annual precipitation results from thunderstorm activity, which occurs most frequently in the spring, which is often heavy rainfall over brief periods of time (Winguth, A.M.E., et al. 2013). In 2011, the region experienced especially high temperatures and severe drought where daytime temperatures exceeded 100 degrees Fahrenheit for 71 days, the longest on record at the time. The extreme temperatures coinciding with severe drought have a drastic negative impact on the city’s urban forest as well as the health and well-being of the community.

Moderate and severe drought is a normal part of most Texas summers. Drought exacerbates stressful urban conditions including poor soil quality, inadequate soil volume, irregular supplemental water, and the urban heat island effect. In 2011, Texas experienced the worst drought ever recorded at the time. The Texas A&M Forest Service estimated that 10% of trees were lost statewide in 2011, and weakened and stressed trees continued to succumb to secondary stressors in subsequent years. Drought stress also makes trees more vulnerable to insects and disease. The following provides an overview of the vulnerability to urban heat and changing conditions of some of the common trees in North Central Texas in both urban and rural areas.

Figure 36. The effects of vegetation and trees on urban heat islands in cities

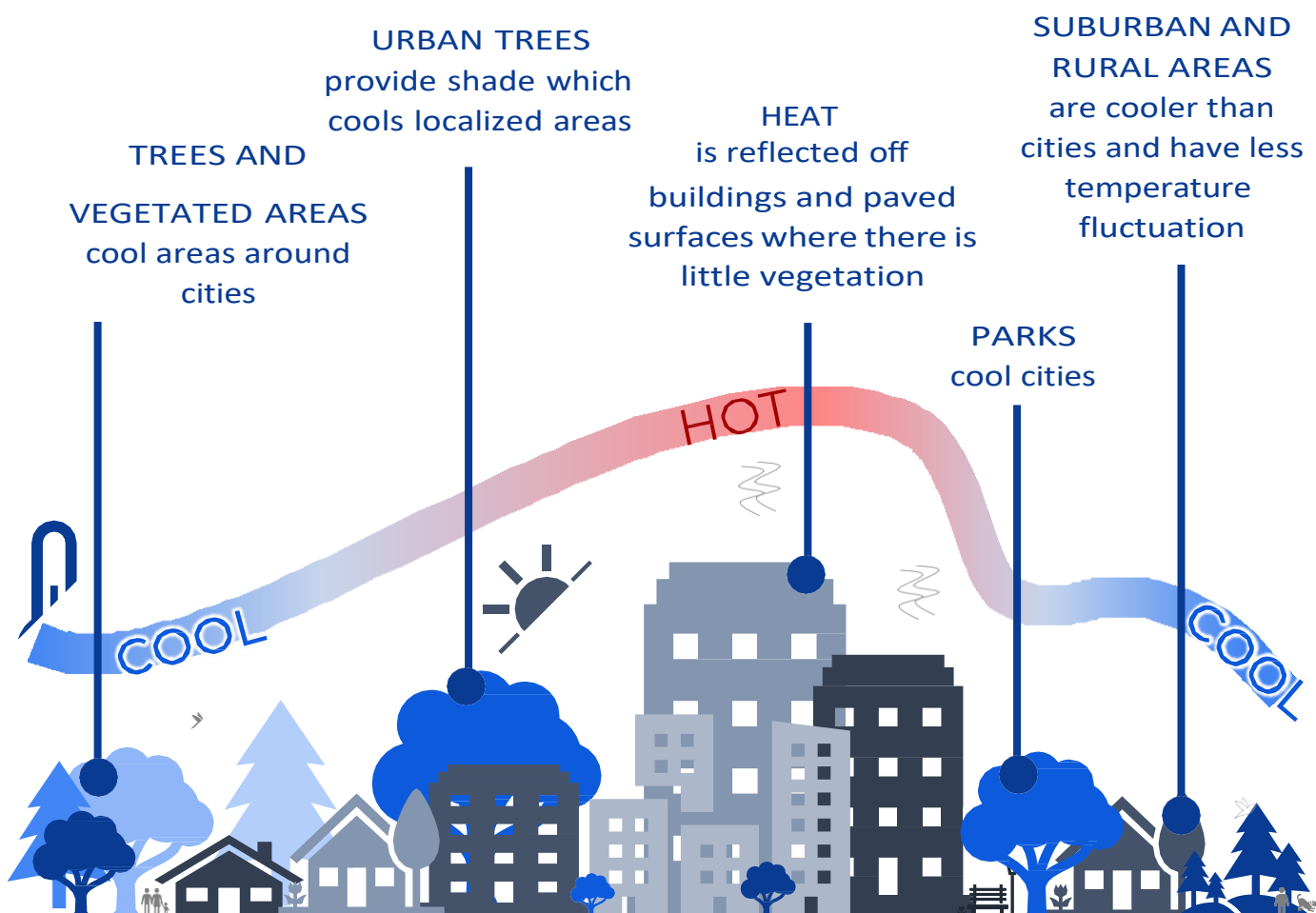


Figure 37. Urban heat vulnerability for common trees of North Central TX (Source: USFS Climate Tree Atlas)

Predicted Habitat Change	Tree Species Common Name	Tree Species Scientific Name	Percent of Fort Worth's Street Trees
Species Habitat Predicted to INCREASE	Cedar elm	<i>Ulmus crassifolia</i>	11%
	Live oak	<i>Quercus virginiana</i>	5%
	Pecan	<i>Carya illinoensis</i>	3%
	American elm	<i>Ulmus americana</i>	3%
	Gum Bully/Brazos	<i>Sideroxylon lanuginosum ssp.</i>	1%
	Bumelia	<i>Ianuginosum</i>	1%
	Eastern redcedar	<i>Juniperus virginiana</i>	0.02%
	Ashe juniper	<i>Juniperus ashei</i>	NA
NEW Habitat	Water oak	<i>Quercus nigra</i>	0.01%
Species Habitat Predicted to NOT Change	Green ash	<i>Fraxinus pennsylvanica</i>	4%
	Eastern cottonwood	<i>Populus deltoides</i>	1%
	Blackjack oak	<i>Quercus marilandica</i>	0.4%
	Black willow	<i>Salix nigra</i>	0.3%
	Osage-orange	<i>Maclura pomifera</i>	0.3%
	Boxelder	<i>Acer negundo</i>	0.2%
	Winged elm	<i>Ulmus alata</i>	NA
	Slippery elm	<i>Ulmus rubra</i>	NA
Species Habitat Predicted to DECREASE	Sugarberry	<i>Celtis laevigata</i>	34%
	Common persimmon	<i>Diospyros virginiana</i>	0.5%
	Red mulberry	<i>Morus rubra</i>	0.5%
	Bur oak	<i>Quercus macrocarpa</i>	0.5%
	Black walnut	<i>Juglans nigra</i>	0.4%
	Chinkapin oak	<i>Quercus muehlenbergii</i>	0.2%
	White ash	<i>Fraxinus americana</i>	0.03%

The table above provides species that may be found growing in Fort Worth (though they may not be native) and their predicted vulnerability to habitat loss due to changing conditions. Many of the most common tree species may fare well with changing conditions though there are vulnerable species to continue to monitor such as sugarberries. Based on the 2011 sample inventory, 36% or 94,660 street trees are potentially vulnerable to changing conditions according to the study. This table should be revised as information on the resilience, adaptation, and vulnerability of native tree species becomes available

The City of Fort Worth is in the USDA plant hardiness zone 8a, meaning the average annual extreme minimum temperatures range from 10 to 15 degrees Fahrenheit. As stated in earlier sections, Fort Worth's conditions are expected to change with prolonged high temperatures and droughts, extreme and rapid temperature changes, and increased frequency and intensity of storm events. The U.S. Forest Service Climate Change Tree Atlas (www.fs.usda.gov/ccrc) was used to examine the current distribution of tree habitats in North Central Texas, and how these habitat distributions might change in response to different scenarios.

The Atlas uses a set of environmental predictor variables to describe where suitable habitats are located. The Climate Change Tree Atlas contains 134 native tree species in the eastern United States. Fort Worth is on the western edge of the model's south-central region, and many of Texas's native tree species are not currently modeled in the Tree Atlas. With limited data currently available on the resilience and vulnerability of native Texas tree species, this table provides a glimpse of how the species' composition of Fort Worth's urban forest may change.

The results of this evaluation can assist the City of Fort Worth in making decisions about the types of trees to continue planting, those trees that should likely be phased out, and the new tree species to introduce to the urban forest. The figure above summarizes the tree species that may benefit from changing conditions such as increased temperatures, those tree species where changing conditions may have little to no impact, and those species whose health and performance may decline or worsen as a result of increased temperatures.

Based on the available tree species in the Urban FIA data (www.fia.fs.usda.gov) and in the Climate Change Tree Atlas, insights into the changes to habitat over time and the impact on common trees of North Central Texas are gathered. With the Tree Atlas, habitat changes over time are projected out to the year 2100, roughly 80 years from the time of this study for Fort Worth.

Please note that this study only uses Urban FIA data and the species lists contained in those datasets. As a result, the study does not take into account other regionally native trees, cultivars, or exotic species. Additionally, it's important to consider that local urban conditions and soil may differ from a species' normal or preferred habitat. Also, while some species may perform well with changing conditions, they may not be a preferable species, or they may already be over planted. An example would be hackberry trees. They are expected to perform well with changing conditions and are beneficial to wildlife, but they are widespread. It estimated that one in five trees in North Texas is a hackberry. This means that if a pest or disease that prefers hackberries emerges, much of the canopy is vulnerable. In fact, North Texas experienced an infestation of leafrollers in 2022 (Ray, J., CBS News Texas).

Fortunately, the emergence of the leafrollers occurred when the hot and dry summer gave rise to a sudden downpour of eight inches of rain, causing new foliage to flourish in the late season and at the end of the growing season. This means that the trees had all dormant season to restore their energy. More leaves means more food for the leafrollers and more of the nuisance honeydew or excrement from the leafrollers onto structures and vehicles. Though not detrimental to the hackberries, the story of the leafrollers invading in 2022 is an example of why tree species diversity is so important.

The percentages in the figure are based on the 2011 sample inventory of public trees in Fort Worth. 6.6% of the city's street trees were sampled and a total of 9,313 data points were

collected and 8,629 of those sites contained trees. This results in a total estimate of 260,964 street trees with a standard error of +/- 38,353 trees meaning the population may have between 222,611 and 299,317 trees. Given the city's planting efforts since 2011, the estimate of 300,000 public street trees is used.

According to the study summarized in the previous table, 36% of the tree species have habitats that are expected to decrease. Sugarberry is the most common public street tree based on the 2011 sample inventory making up 34% of all trees. The habitat for sugarberries is expected to decrease. With the 6.6% sample, this represents a total of 89,337 sugarberries that are vulnerable (+/- standard error of 24,008).

Other vulnerable species include common persimmon, red mulberry, bur oak, black walnut, chinkapin oak, and white ash. These trees make up 2% of Fort Worth's public street trees. About 6% of the public trees would have habitats that are not predicted to change. These tree species include green ash (4%), eastern cottonwood (1%), blackjack oak (0.4%), black willow (0.3%), osage-orange (0.3%), and boxelder (0.2%). Winged elms and slippery elms are also in this category but were not listed in the 2011 inventory.

Fortunately, according to the study, 24% of Fort Worth's public street trees would perform well with changing conditions and habitats, though some species may not be favorable. Ashe juniper trees are one example where they are not commonly planted or found along streetscapes and are known to be the worst for those suffering from seasonal allergies.

In the study, 66% of the public street tree composition is represented. This means that the vulnerability of 34% of the trees remains unknown without further research. Also, no such Urban FIA data or Climate Change Tree Atlas exists for Fort Worth or is outside of the scope of this Technical Report. Therefore, monitoring the public trees and the citywide urban forest over time through canopy assessments and inventories is essential to sustainable management.

Mitigation plans and adaptation techniques to these risks can help. It is essential to diversify urban tree species, plant them at appropriate locations, and invest in their maintenance, irrigation, and protection to mitigate the above risks. Fort Worth's Urban Forest Master Plan aims to address many of these concerns. The following provides a summary of the potential threats to the urban forest caused by changing conditions including increased temperatures:



Dallas Morning News Source

- ❖ **Extreme heat:** As temperatures continue to rise, trees in urban and suburban areas will be increasingly vulnerable to heat stress, which can cause leaf scorch, wilting, and even death. Urban trees are particularly susceptible to heat stress because they are surrounded by heat-absorbing surfaces such as asphalt and concrete, which can make temperatures in the urban canopy up to 20 degrees Fahrenheit higher than in nearby rural areas (U.S. Environmental Protection Agency, 2022).

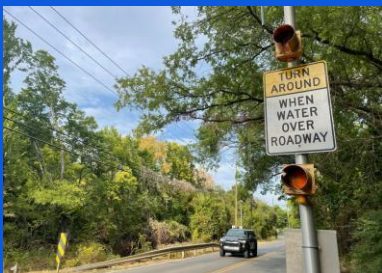


Texas A&M Forest Service Source

- ❖ **Drought:** As temperatures rise, the demand for water in urban areas is likely to increase, putting additional stress on trees. Urban trees also face competition for water from lawns, gardens, and other landscaping, which can make it difficult for them to access the water they need to survive.



- ❖ **Pests and diseases:** Changing conditions can create conditions that are favorable for the spread of pests and diseases. For example, warmer temperatures and increased precipitation can create ideal conditions for pests such as the emerald ash borer and diseases such as Dutch elm disease, which can kill large numbers of trees. In addition, oak wilt which is devastating oaks in North Central Texas (Texas A&M Forest Service, 2022), can proliferate with changing conditions, especially when high winds and extreme weather cause tree limbs to break and wound the tree.



- ❖ **Stronger storms:** Changing conditions include more intense storms, which can damage or uproot urban trees. This can create hazards for people and property and lead to costly cleanup and replanting efforts.

Image Description 4. Summary of the threats to urban forests caused by changing conditions

Regarding future tree selection using the guidance provided in the Atlas, the City should apply these considerations to public tree plantings and recommendations or requirements for private development:

- ❖ Select tree species that are currently present in Fort Worth’s public tree population that are likely to cope with the changing conditions.
- ❖ Select tree species that are currently present, but less common, yet are potentially in a position to expand over time.
- ❖ Select tree species not currently in Fort Worth’s public tree population, but with potential to migrate into the area of interest within 100 years (without planting exotic tree species).
- ❖ Select other species— the Atlas’ analyses are only to be used as general guidelines for species selection. Local influences (e.g., lake and grassland effects, soils) will override the general tendencies across North Central Texas. Therefore, the City should not discard species from consideration if they do not show up on the three lists mentioned in the Climate Change Tree Atlas study. The City should apply local knowledge to select species that may be suited for particular niches in planting projects.
- ❖ The planting of exotic tree species is discouraged and emphasis on planting natives is recommended.

Fort Worth’s urban forest supports healthy communities, and trees are more effective at mitigating the challenges of urban heat than other identified strategies. Trees also offer an array of solutions to other challenges in urban areas while mitigating urban heat.

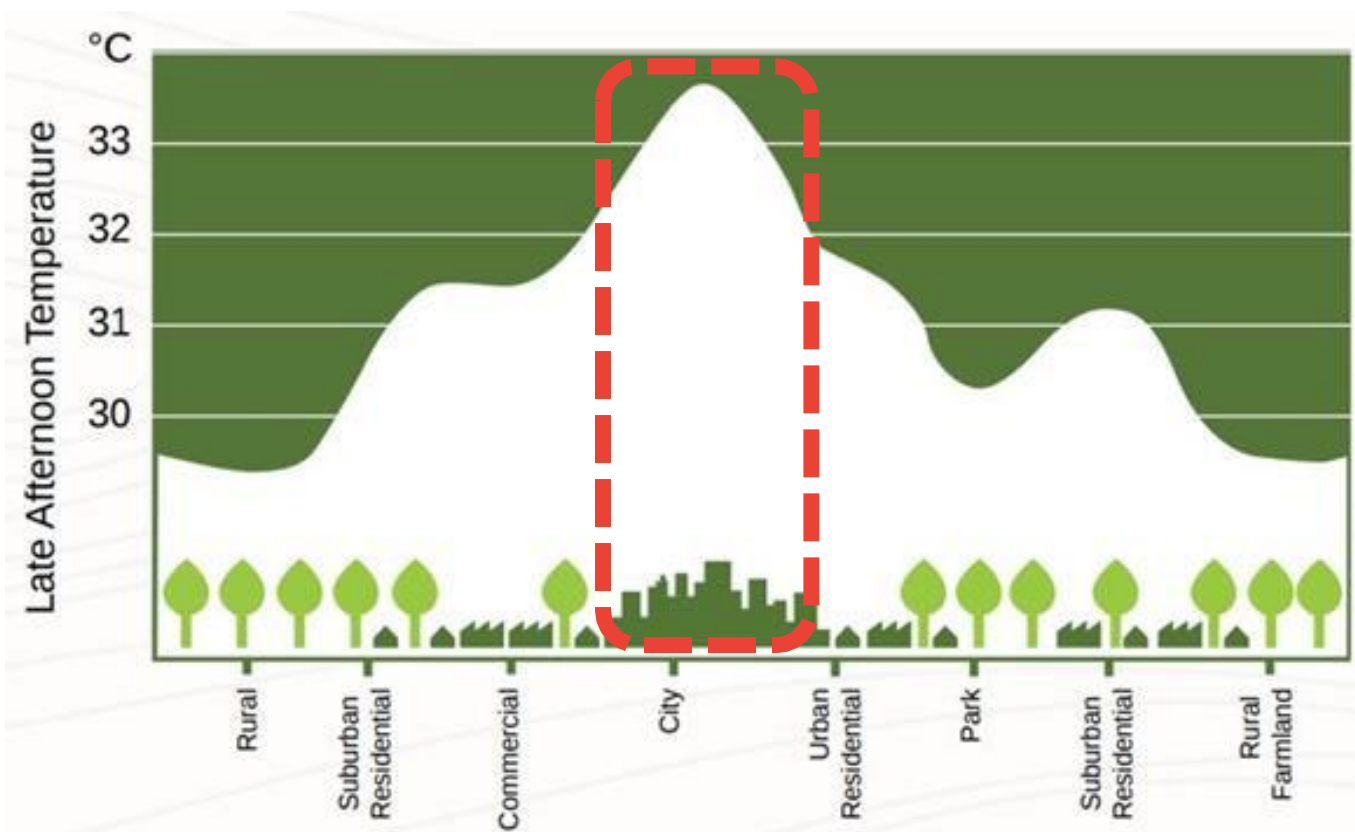


Image Description 5. Air and surface temperatures are greatest in center city regions compared to suburban and rural areas. Source: Texas Trees Foundation

Results: Degradation of Soils

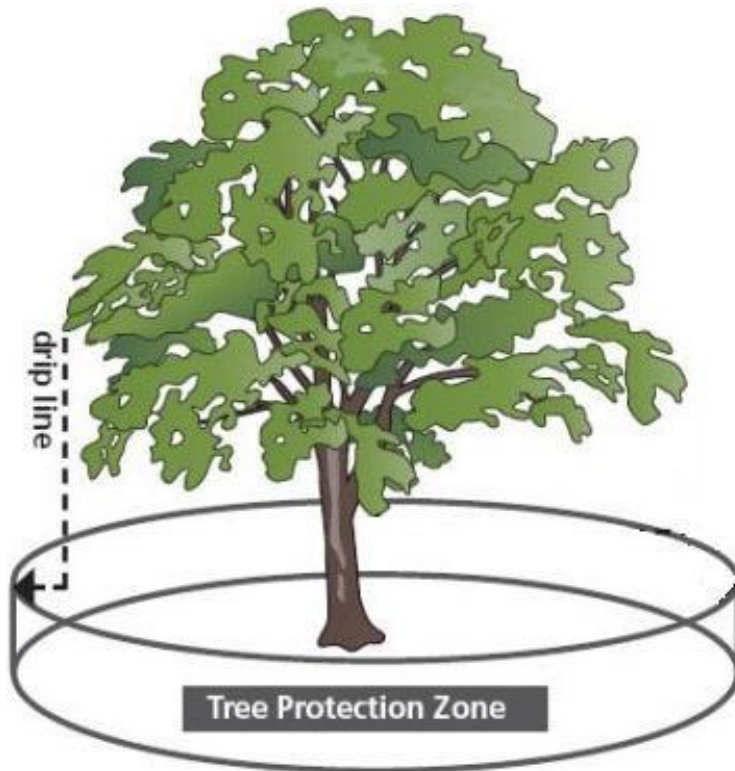


Image Description 6. Example of the tree protection zone

medians, tree lawns, and in tree pits around the city. Park trees, which experience moderate stress, are less affected, and urban woodlands are the least affected by urban stress factors.

Access to water and mineral nutrients require healthy soils for optimal tree growth. Soil has many ecological functions, such as mitigating changing conditions, carbon absorption, water retention, and functions as an environment of microorganism growth. However, soil degradation is occurring in cities as a result of compaction, water shortages due to surface runoff, increased soil temperatures, poor air quality, inadequate available sunlight, salinity, pollution, increased pH, and deficiencies in organic matter and minerals. As a result, microbial activity decreases which reduces the health of the soils and ultimately, the trees.

The right tree planted for the site can enable optimal growth of the canopy and the roots. Widely growing roots stabilize the soil structure, prevent erosion, and improve the soil structure by creating micropores, which facilitate water infiltration deep into the soil profile (Czaja, M., et al. 2020). Therefore, best practices and standards should be in place and enforced to manage soil grading, stormwater runoff, construction and soil compaction, pollution control, tree growing space, root pruning, and low impact solutions such as structural soils and suspended pavement systems.

Changes in land use have altered soils in the region. Although little research is available specific to the North Central Texas region, studies from other urban areas shed light on the likely impacts. The transformation of natural and agricultural lands into urban areas is increasing every year. Dense buildings, heavy traffic, construction work with deep excavation, and the common use of concrete and glass materials leads to the degradation of the environment in relation to tree growth. Because of the dense buildings and limited space for root growth as well as for upper tree branching, unfavorable factors occur at the same time, enhancing tree stress. Trees exposed to urban stress factors at the highest intensity are roadside trees. Their average lifespan is shortened in comparison to rural areas. Similar conditions affect trees growing in

Results: Existing and Introduced Tree 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 includes poor soil quality, inadequate volume, and the urban heat island. Stressed trees are more vulnerable to insects and diseases. In Fort Worth, the primary pest and disease threats include oak wilt, emerald ash borer, hypoxylon canker, Dutch elm disease, and bacterial leaf scorch.



Image Description 7. Cracked bark (top) and infected leaves (bottom) caused by oak wilt

- ❖ Oak wilt: Oak wilt is a primary fungal pathogen that invades the vascular system of oak trees. While all oak trees are susceptible, live oak species (southern live oak and escarpment live oak) and red oak species are the most commonly affected trees in Fort Worth. Both oak groups are found throughout the city. Live oak trees are most commonly impacted by the underground spread of the fungus through root graft connections. Naturally occurring live oak stands with interconnected root systems are found throughout Fort Worth, and they are planted on public and private property. Red oak trees also become infected and play an important role in fungal spore dispersal and the creation of new infection areas. Increased temperatures could reduce the viability and duration of fungal mats (pressure pads) and spores, and the primary insect vector (Coleoptera: Nitidulidae) may be impacted positively or negatively by higher temperatures. General data and models to project insect transmission of oak wilt are lacking (Jagemann et al., 2018).



Image Description 8. Ash tree leaflet (top) and emerald ash borer exit hole (bottom)

- ❖ Emerald ash borer: The emerald ash borer insect was first confirmed in Harrison County, Texas in 2016 and later discovered in Fort Worth in 2018. This insect causes catastrophic loss to all true ash species. According to the Texas A&M Forest Service, urban tree canopy inventories estimate that ash trees comprise approximately 5% of the Dallas/Fort Worth urban forest (Texas A&M Forest Service, May 2022). The majority of naturally occurring ash (*Fraxinus pennsylvanica*, *F. texana*, *F. americana*) exist in riparian areas and undeveloped areas. Most Arizona ash (*F. velutina*) and Texas ash (*F. texensis*) were planted and are located in developed and maintained areas. Texas A&M Forest Service has a monitoring program to assist with early detection.



Image Description 9. Hypoxylon canker on a sycamore in Texas

- ❖ **Hypoxylon canker:** Hypoxylon canker is a common disease of many trees in Texas, such as oak, pecan, elm, sycamore, and yaupon. It invades a tree when resistance is weakened from biotic or abiotic factors, causing white rot decay of the sapwood. There is no cure and it is expected that more of Fort Worth's trees will be affected due to stress from projected biotic and abiotic conditions (Griffin, J., Texas A&M AgriLife Extension).



Image Description 10. Cedar elm leaf (top) and Dutch elm disease beetle larvae galleries

- ❖ **Dutch elm disease:** Dutch elm disease (DED) is caused by a fungus that infects the vascular system of elm trees. DED was found in Texas in the 1970s and small outbreaks have occurred in the Dallas/Fort Worth area, Lufkin, and Waco (Appel, et al., 2021). The disease propagates on a number of different elm species but the majority of cases in Texas have been found on American elms (*Ulmus americana*). Cedar elms (*U. crassifolia*) are susceptible, but they have been found to be the most resistant of the native elms to the disease. American elms naturally occur in floodplains and low terraces, and cedar elms are found in naturally occurring stands throughout Fort Worth and are also widely planted. Elm bark beetles are a primary vector. They breed in dead and dying elms, where the pathogen forms spores in the galleries. As the new populations of beetles emerge from the contaminated galleries, they disperse to feed in twig crotches on healthy elms.



Image Description 11. Bacterial leaf scorch shown on oak leaves (top) and pecan leaves (bottom)

- ❖ **Bacterial leaf scorch:** Bacterial leaf scorch (BLS) is a chronic and eventually fatal disease caused by the bacterium *Xylella fastidiosa*. It is most commonly transmitted by insects with piercing mouthparts, including the leafhopper, sharpshooter, and spittlebug, which pierce and suck leaf tissue. Leaf and dieback symptoms can appear similar to drought and are most noticeable in late summer and early fall. Susceptible trees in Fort Worth include oaks, pecan, sycamore, sugarberry, mulberry, elm, boxelder, sweetgum, and olive (Texas A&M Forest Service, Tree Health Issues: Bacterial Leaf Scorch). There is no cure for BLS, but antibiotic treatments and good cultural practices may help prolong the life of infected trees. High temperatures and drought amplify the stress of BLS. With higher temperatures and drought, the impact of BLS on Fort Worth trees is likely to increase.

Results: Invasive Plant Species

Non-native invasive plant species influence the structure, composition, and function of Fort Worth’s urban forest. It is estimated that non-native invasive tree species comprise 5% of the urban forests in Texas communities, or about 1.7 million trees for cities the size of Fort Worth (Nowak et al., 2016). In addition, there are 37 known noxious non-native invasive weeds that damage or threaten the ecosystem for native trees (Texas Invasive Species Institute, Noxious Weed List). Common invasive tree species in North Central Texas include Chinaberry, glossy privet and other privets in the *Ligustrum* genus, ailanthus or tree-of-heaven, Chinese tallow tree, chaste tree, and salt cedar (Texas A&M Forest Service, Aggressive Invaders).

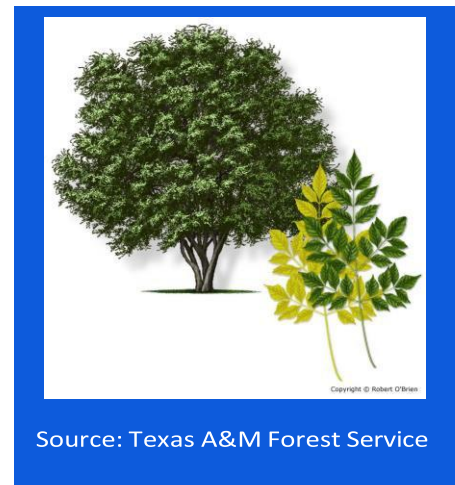


Image Description 12. An example of an invasive plant species— Chinaberry

Results: Wildfire



Image Description 13. Example of grassland wildfire in North Texas

While most wildfires in North Central Texas occur in grasslands and brush areas, pockets of trees within these landscapes are affected. Conversely, trees and the urban forest play a vital role in addressing changing conditions such as urban heat, prolonged drought, and extreme weather events— all of which contribute to increases in the frequency, season, and intensity of wildfires.

According to the Fort Worth Report in August 2022, Texas A&M Forest Service firefighters have responded to more than 7,680 fires in 2022, a pace that has the potential to break the record for number of responses in a single year (Samsel, H., FWR August 2022). And the numbers did just that, the number of wildfires in Texas in 2022 were the worst in over a decade. About 12,400 wildfires occurred, burning more than 650,000 acres across the state (Texas A&M Forest Service).

In Fort Worth, the numbers are just as staggering. Firefighters experienced a more than 700% increase in responses to grass and brush fires in July 2022 compared to the previous year according to the City’s Fire Department (Samsel, H., FWR August 2022). A number of factors are driving the surge in wildfires, including severe drought conditions that began in early 2022 and prolonged high temperatures throughout the summer season. These weather extremes resulted in Fort Worth and the region being in a critical drought in 2022. Fire bans and water restrictions were in place and the City prioritized resources for public awareness, safety, prevention, and management but with extended fire seasons, resources can be limiting.

As the city strives to increase tree canopy cover and address urban heat, areas should be prioritized and the types of trees planted should consider the watering requirements, fire-risk, the wildland urban interface, and trees that contribute the maximum amount of shade and carbon sequestration.

Results: Citywide Tree Equity and Canopy Cover

Urbanization creates significant changes in land use and land cover, affecting the structure, pattern, and function of ecosystems. The public is increasingly concerned about how these changes influence daily life and affect the sustainability of “quality of life” for future generations. Improving air quality, alleviating water shortages, cooling urban heat islands, and reducing stormwater runoff are challenges facing the City of Fort Worth. Rapid growth in Fort Worth is accelerating these problems. The problems need solutions as the City and the region try to protect and restore environmental quality while enhancing economic opportunity.

Tree canopy is a valuable component of Fort Worth’s urban ecosystem. Trees in urban settings are important to improving urban life, as well as human physical and emotional well-being. Research suggests that human beings have an innate affiliation to natural settings, a concept described as biophilia (Kellert, et al., 1993). Numerous studies link access to living trees, outdoor air, and natural light to increased employee and student productivity, faster hospital recoveries, less crime, and an overall reduction in stress and anxiety. Thus, expanding the urban forest is part of the solution to Fort Worth’s social, environmental, and economic problems— it is integral to enhancing public health programs, increasing land values and local tax bases, providing job training and employment opportunities, reducing costs of city services, increasing public safety, improving air quality, sustaining biodiversity and habitats, mitigating urban heat, conserving energy, managing stormwater runoff, and increasing the water holding capacity of soils.

Fort Worth is a vibrant city that will continue to grow. As it grows, it should also continue to invest in its tree canopy. This is no easy task, given financial constraints and trends toward higher density development that may put space for trees at a premium. The challenge ahead is to better integrate the green infrastructure with the gray infrastructure by increasing tree planting, providing adequate space for trees, and designing plantings to maximize net benefits over the long term, thereby perpetuating a resource that is both functional and sustainable.

TREE EQUITY

The city and its warm sunny weather is inviting to tourists, residents, and business owners. But this sunny weather and the surface temperature it triggers during a heat wave can vary dramatically by city and by neighborhood. A big reason for the difference across city neighborhoods is shade and the canopy of trees that line some sidewalks but not others. Through analyses and local assessments, it is observed that the city’s wealthier areas zoned for single-family homes typically attract more city services, like wide sidewalks and trees. As time progresses, that disparity becomes more than a matter of aesthetics. 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 changing conditions continue to affect the Fort Worth and the North Central 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% (EPA, 2023).

Many areas lack adequate tree canopy perhaps due to a series of consecutive policies championed by local authorities, codification through federal actions, and decisions to

disinvest in neighborhoods where people of color resided as regions grew rapidly in population and infrastructure. A pattern was created that is replete in the urban studies literature (Wolch, et al., 2013).

Other possible factors may include the competition for limited physical space, and the increasing dominance of private real estate in driving development processes and occupying areas with pavement that might otherwise contain green space.

Specifically in Fort Worth, trees are generally sparse in socioeconomically disadvantaged areas and more prominent in wealthier neighborhoods. The tree canopy and associated benefits of the urban forest are not equally shared and experienced by all communities. Whatever the cause for canopy disparity, the purpose of this study is to state the baseline conditions and correlations of canopy. Correlations of canopy to other city policies and sociodemographic data are then used to identify priorities and establish goals for increasing tree canopy cover equitably while overcoming and contending with urban planning and development, urban heat, exotic tree pests and diseases, limited resources, and other factors.

TREE EQUITY SCORES (TES)

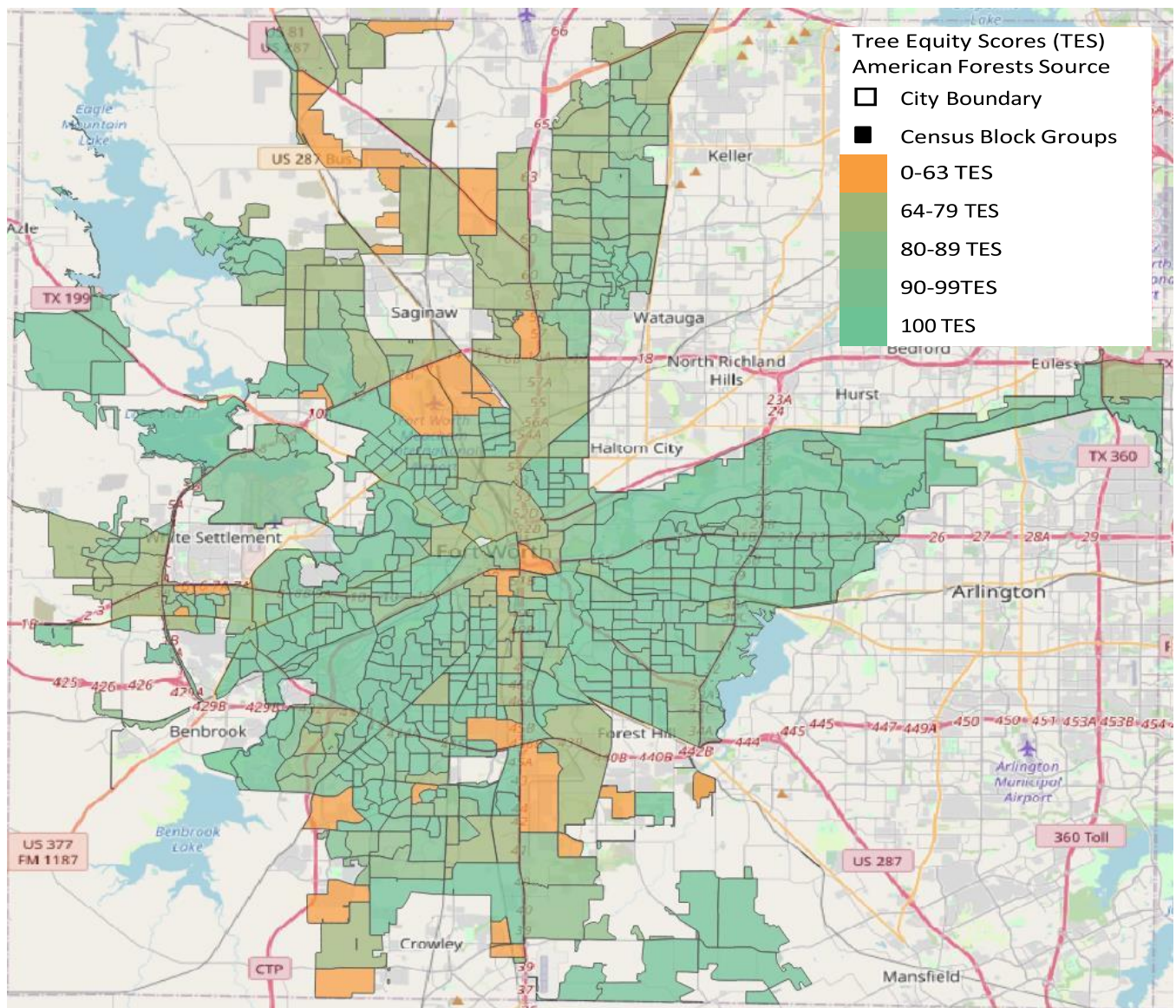
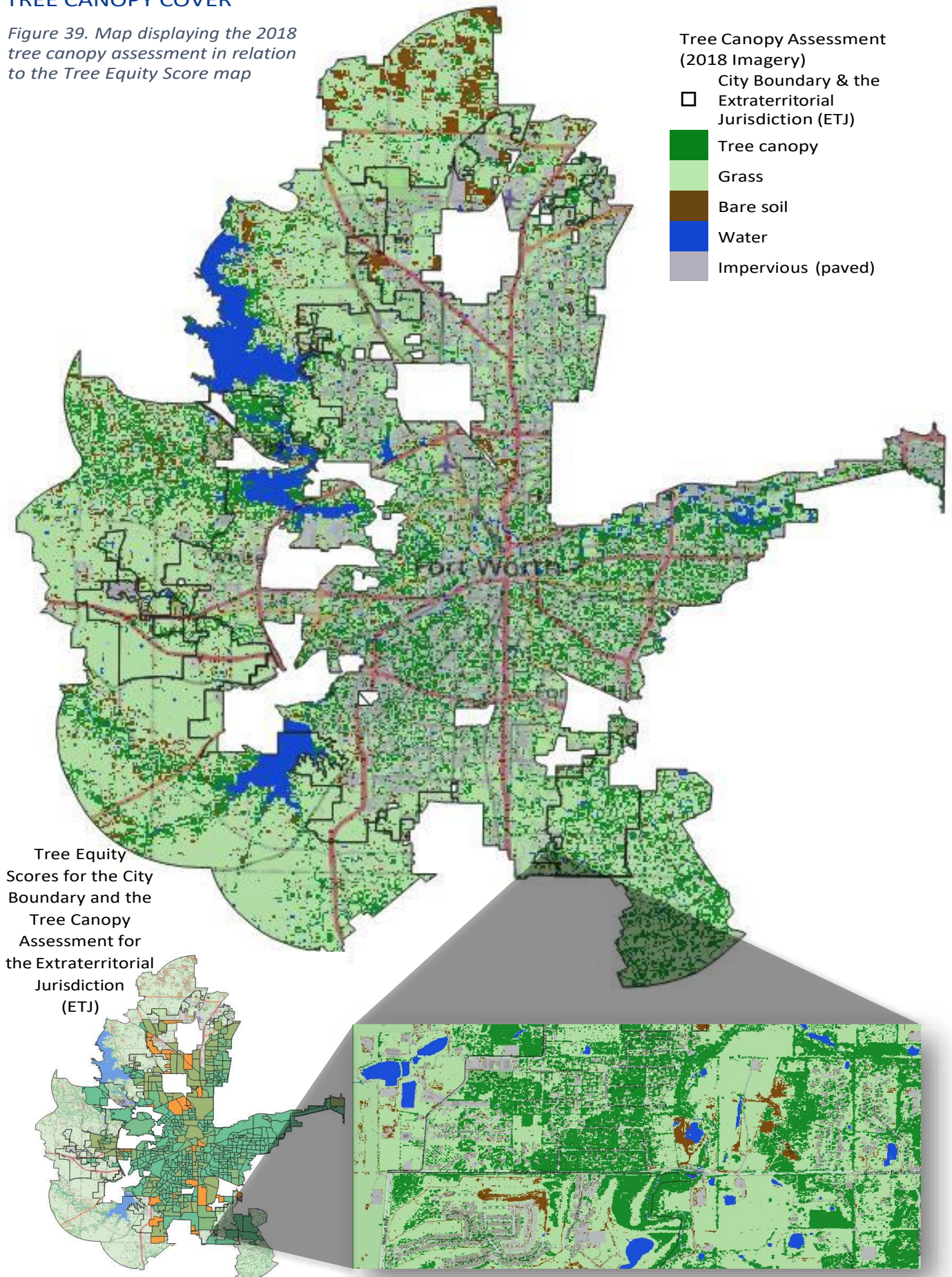


Figure 38. Tree Equity Scores for Fort Worth's Census Block Groups (American Forests)

TREE CANOPY COVER

Figure 39. Map displaying the 2018 tree canopy assessment in relation to the Tree Equity Score map



Focused on addressing this canopy cover inequity, the American Forests organization created the Tree Equity Score (TES, www.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. The scores are based on how much tree canopy and surface temperature align with income, employment, race, age, and health factors. A 0- to-100-point system makes it easy to understand how a community is doing. With the knowledge the score provides, Fort Worth’s community leaders, tree advocates, and residents alike can address climate change and public health through the lens of social equity, attract new resources, factor the scores into technical decisions, guide implementation of the 2023 Urban Forest Master Plan, and track progress toward achieving tree equity. A score of 100 represents tree equity.

COUNT OF CENSUS BLOCK GROUPS BY TREE EQUITY SCORE RANGES

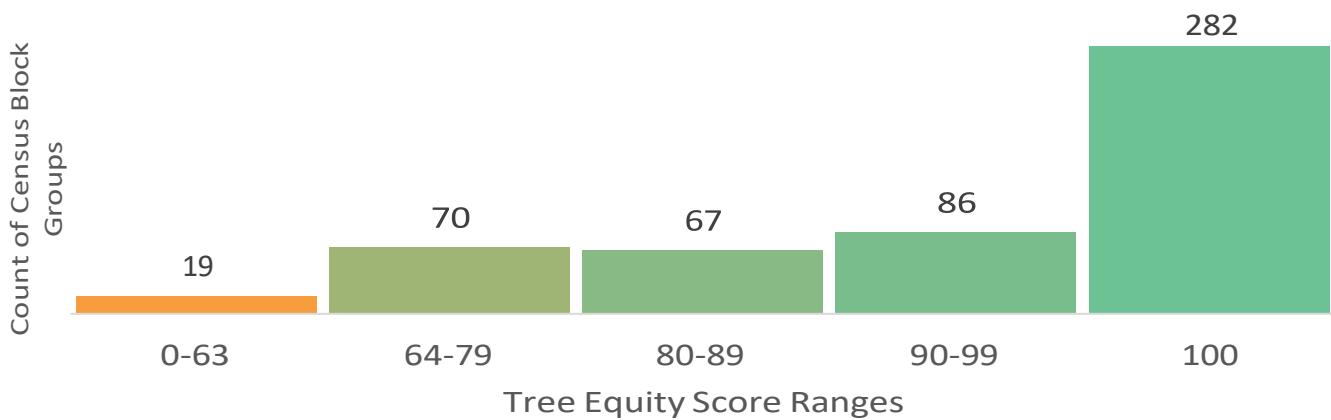


Figure 40. Count of Fort Worth's Census Block Groups by Tree Equity Score range

COMPARING TREE CANOPY COVER (22.6%) AND POPULATIONS OF PEOPLE OF COLOR*

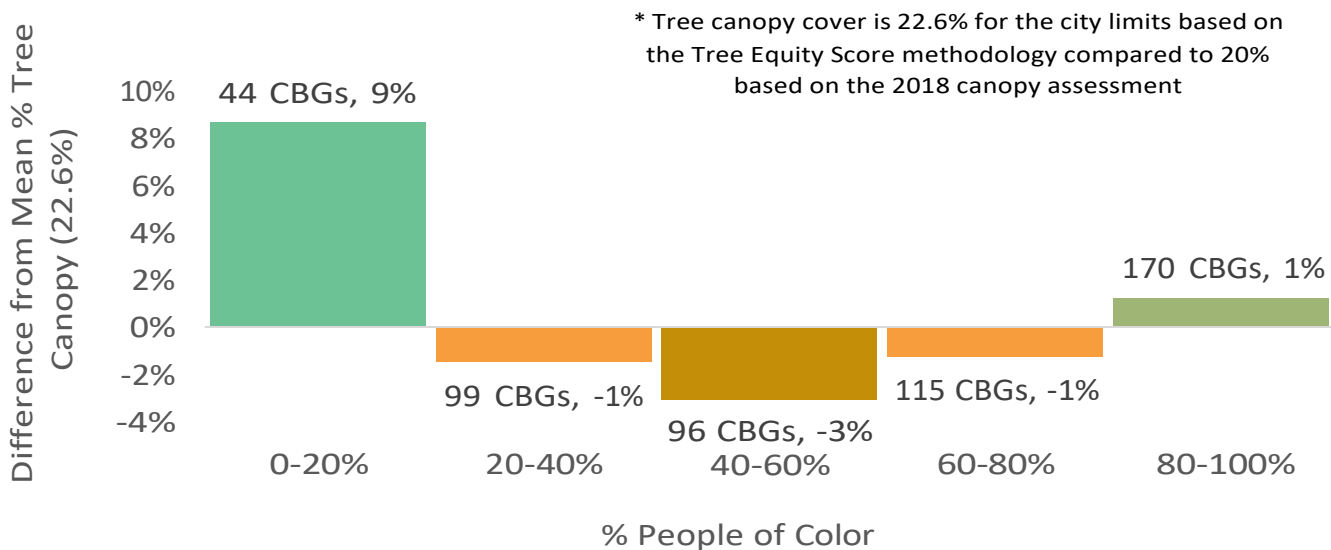
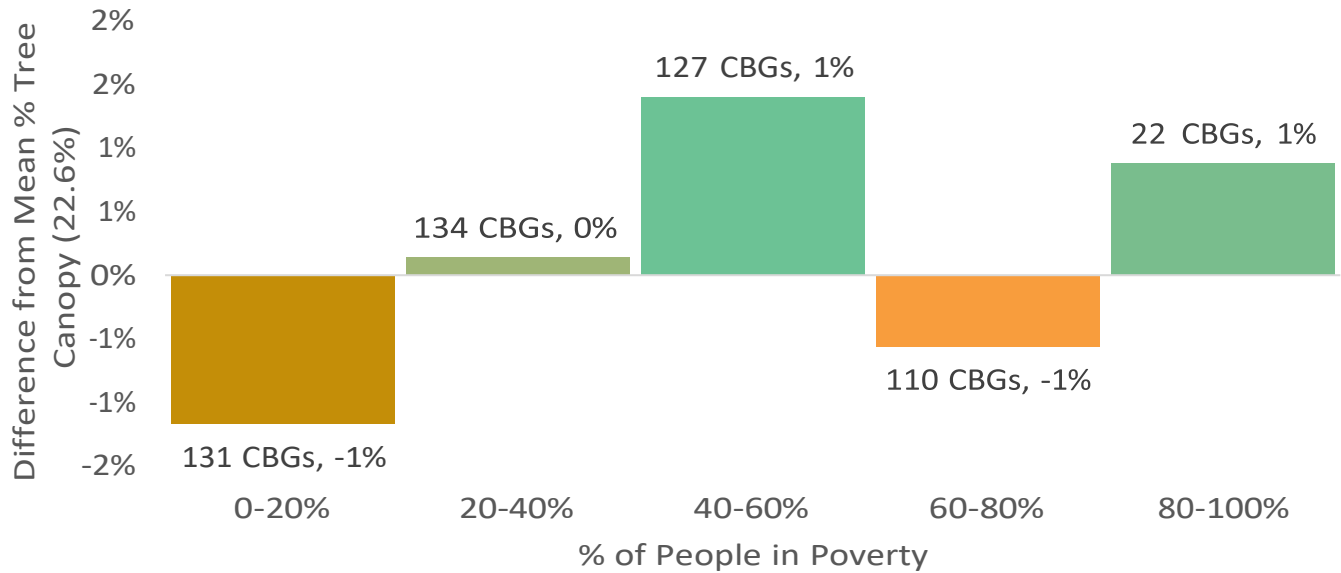


Figure 41. People of color population ranges compared to the mean tree canopy cover

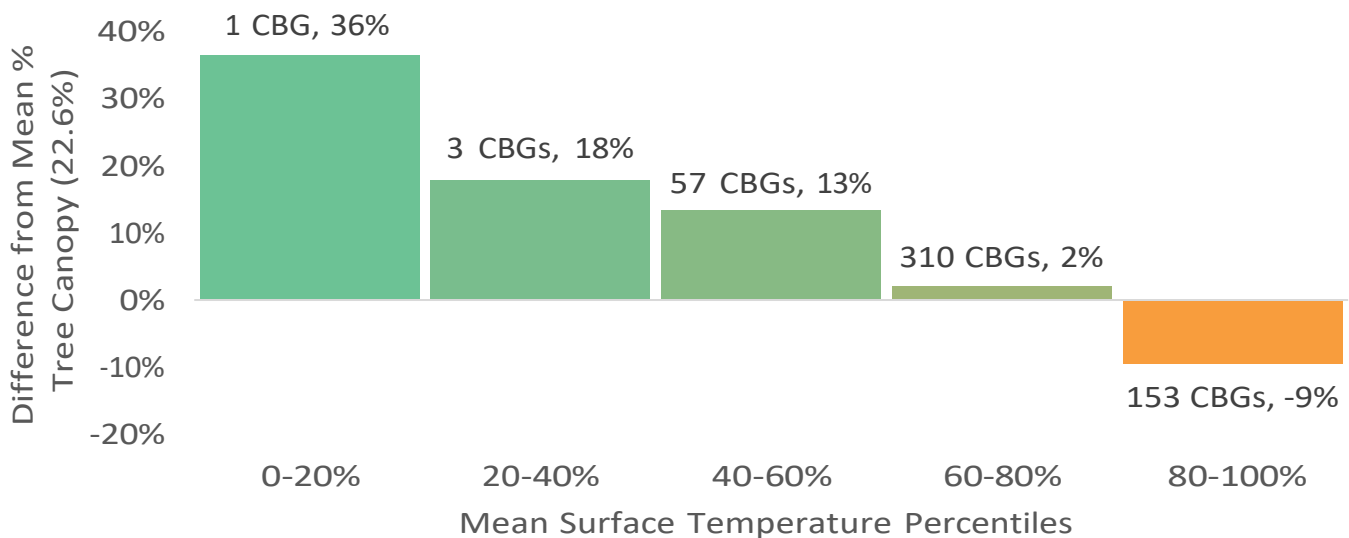
COMPARING TREE CANOPY COVER (22.6%) AND POVERTY POPULATIONS*



* Tree canopy cover is 22.6% for the city limits based on the Tree Equity Score methodology compared to 20% based on the 2018 canopy assessment

Figure 42. People in poverty ranges by Census Block Group compared to the mean tree canopy cover

COMPARING MEAN TREE CANOPY COVER (22.6%) AND MEAN SURFACE TEMPERATURES



* Tree canopy cover is 22.6% for the city limits based on the Tree Equity Score methodology compared to 20% based on the 2018 canopy assessment

Figure 43. Comparison of the mean tree canopy cover to mean surface temperatures by Census Block Groups

MEAN SURFACE TEMPERATURES BY CENSUS BLOCK GROUP

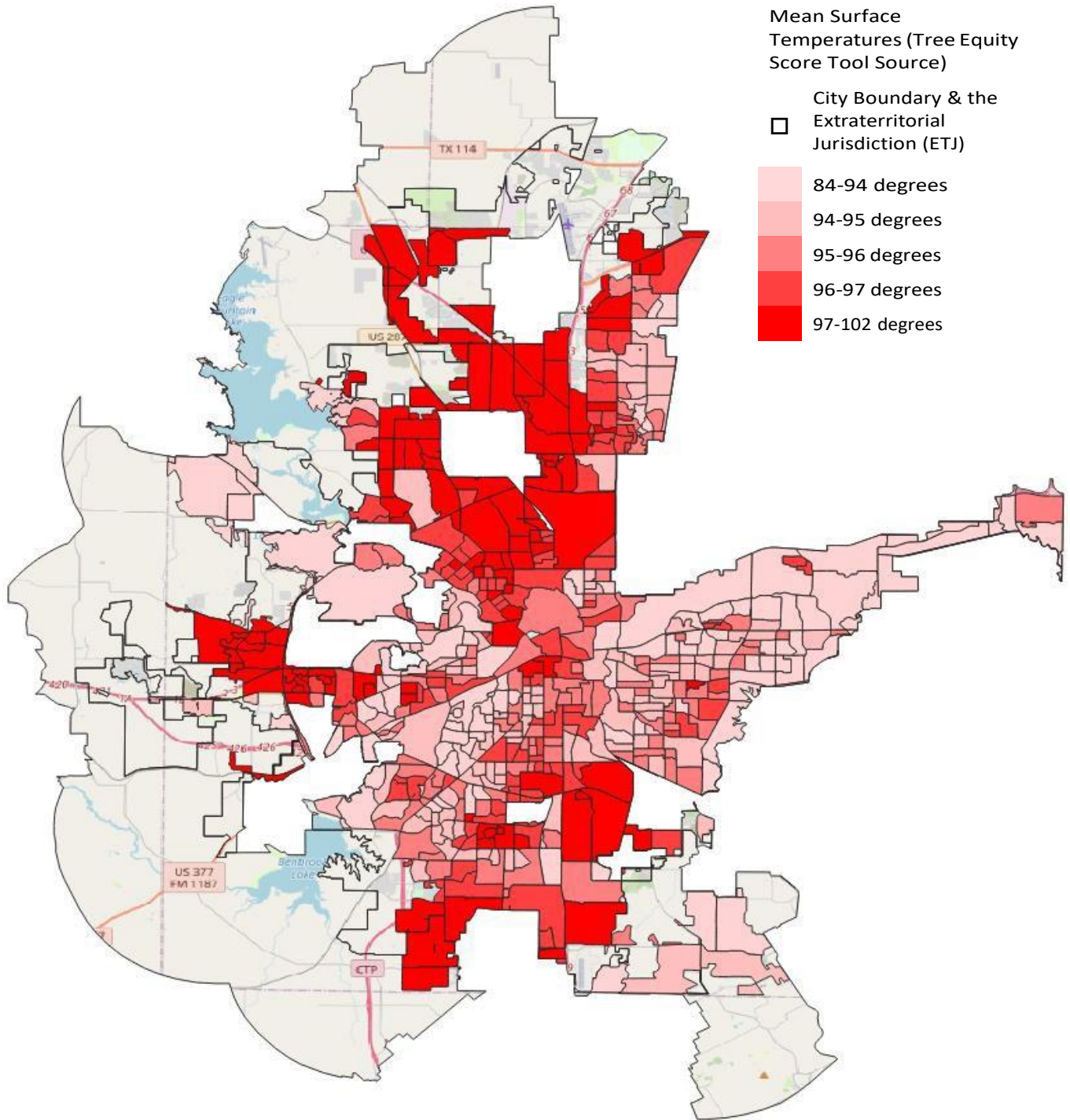


Figure 44. Mean surface temperatures by Census Block Group

FORT WORTH'S TREE EQUITY SCORE AND COMPARISONS



Figure 45. Fort Worth's Tree Equity Score (2023)

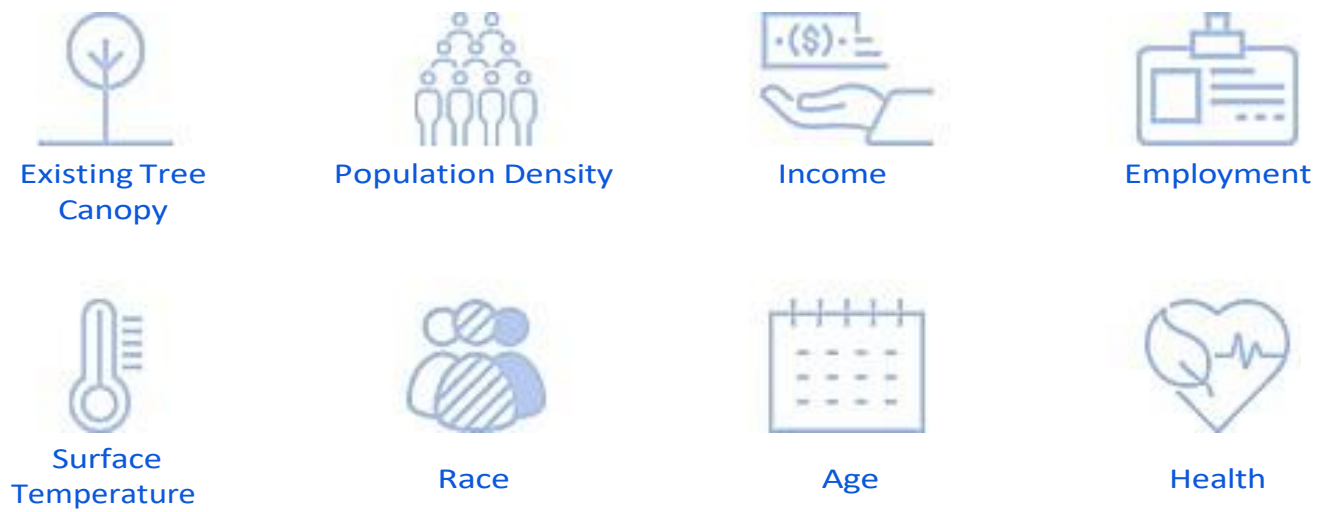


Figure 46. Inputs to calculate Tree Equity Scores

Comparison of Tree Equity Scores in Tarrant County and the City of Dallas (Average Tree Equity Score is 88 out of 100)

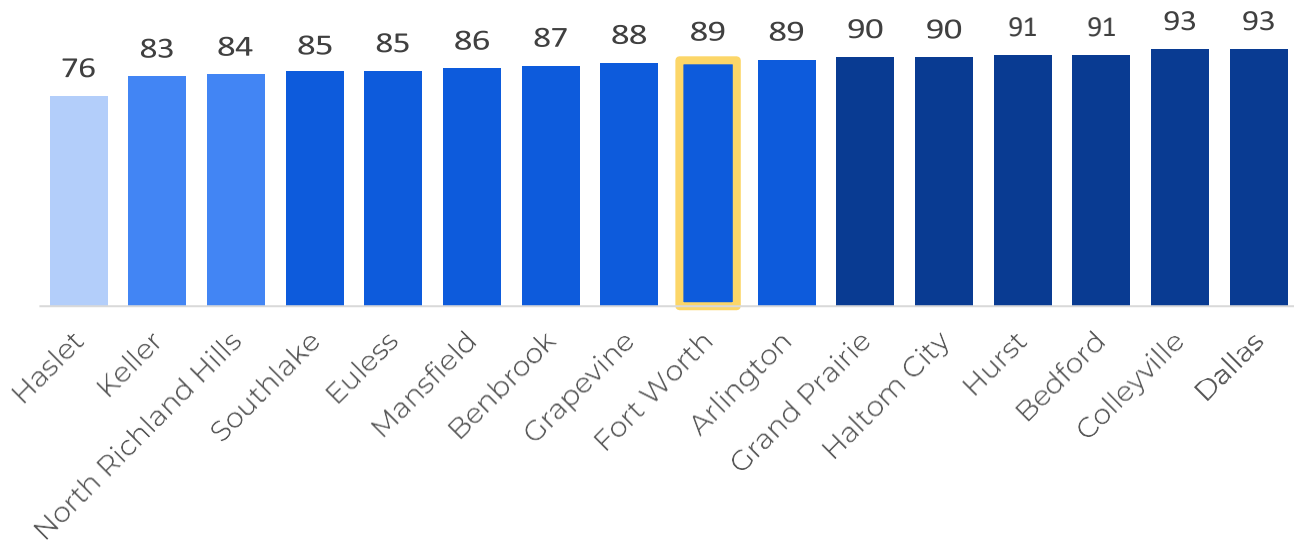


Figure 47. Comparison of Tree Equity Scores of Tarrant County cities plus the City of Dallas, TX (2023). Source: Tree Equity Score Tool, American Forests

Comparison of Tree Equity Scores in Select Peer Cities (Average Tree Equity Score is 85 out of 100)

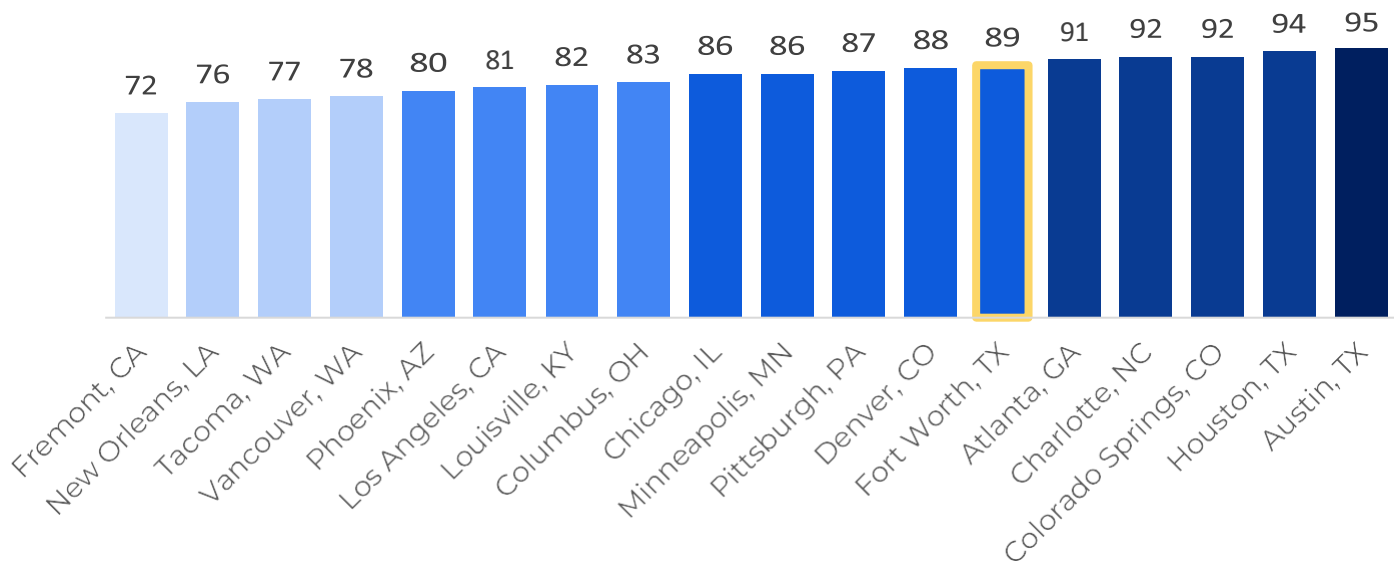


Figure 48. Comparison of Tree Equity Scores for select peer U.S. cities (2023). Source: Tree Equity Score Tool, American Forests

TREE EQUITY SCORE RESULTS

Based on the Tree Equity Score (TES) analysis, Fort Worth's score is 89 out of a possible 100. Compared to other cities in the region, the city ranks 9th out of 20 cities included in the study and benchmarking research as part of the Technical Report. The average TES for these cities is 85. Of the 524 Census Block Groups (CBGs) in Fort Worth, 30% or 156 CBGs are below the city's overall score of 89. A total of 282 CBGs or 54% have a TES of 100 and only 19 CBGs (4%) have a score between 0 and 63.

When examining tree canopy cover compared to populations of people of color, CBGs that are comprised of 40-60% people of color have the greatest difference from the mean canopy cover percentage of with 19.5% tree canopy compared to the mean of 22.6%. CBGs where the percentage of people of color is between 0 and 20% have an existing tree canopy coverage that is 9% higher than the citywide mean canopy cover. There are 44 CBGs in this range.

Over half of the CBGs (54%) have a higher amount of canopy cover than the mean amount and in CBGs where low-income populations amount to 80 to 100% of the households, the canopy coverage is 1% higher than the mean. CBGs with 60-80% of the population in poverty have tree canopy cover that is 1% less than the mean.

It was found that the hottest areas of the city have the least amount of tree canopy cover with 9% less than the citywide mean canopy cover amount. There are 153 CBGs in this canopy cover range and the mean surface temperature percentile is between 80 and 100%. The majority (40%) of CBGs have more tree canopy cover than the mean amount in each of the mean surface temperature percentiles except for the 80 to 100% percentile.



Trees shading a park in Oakhurst

CANOPY COVER CITYWIDE AND BY EXTRATERRITORIAL JURISDICTION

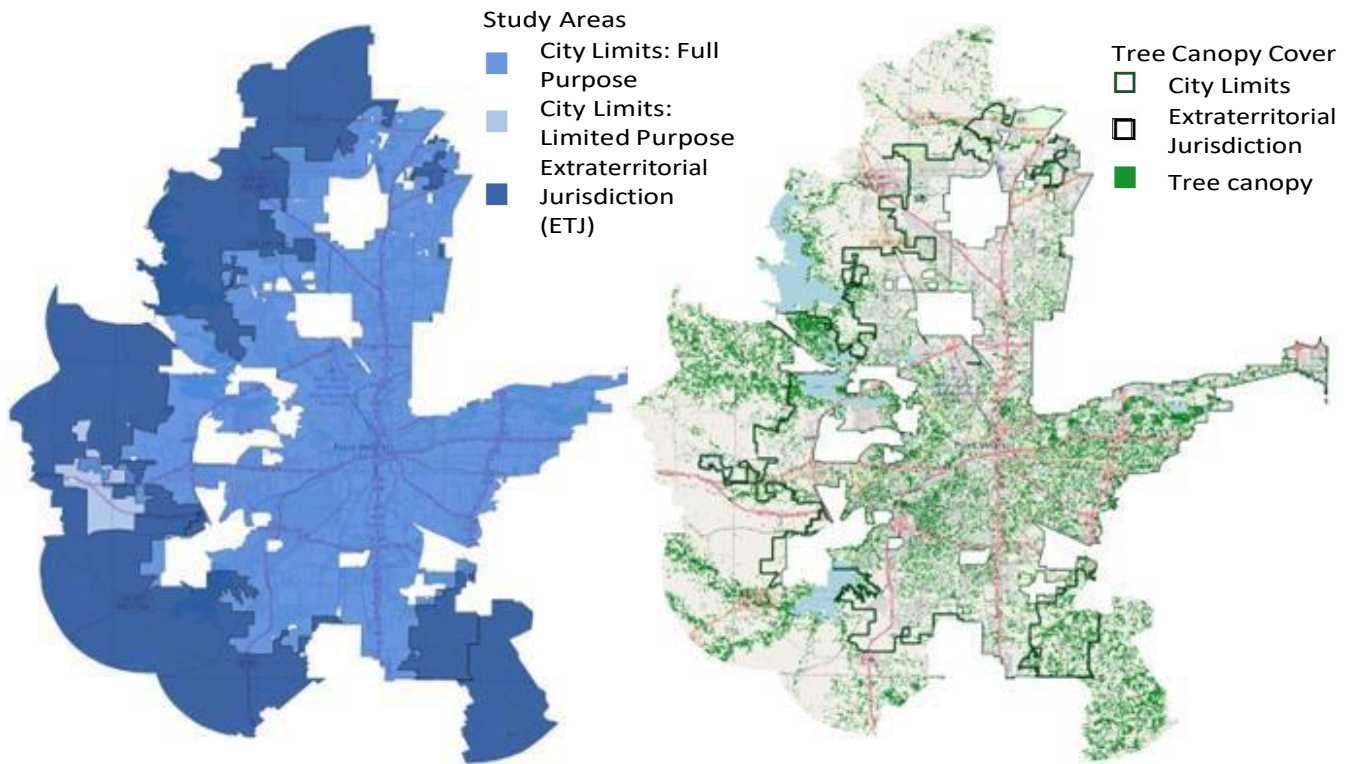


Figure 49. Maps displaying the study areas (left) and the tree canopy cover mapped for these areas (right)

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

The City’s 2020 Urban Tree Canopy Assessment utilized 2018 high-resolution imagery to evaluate the extent and opportunities for tree canopy cover. An assessment of tree canopy was also completed for the entire Tarrant County and Fort Worth’s Extraterritorial Jurisdiction or ETJ. Extraterritorial Jurisdiction is an area outside the city limits where cities can regulate some activities through agreements with the county.

This study is focused on the tree canopy cover for the combined areas of the ETJ, City Limits (full purpose), and City Limits (limited purpose) to support long-range planning and management goals for the urban forest as the city continues to grow and change. The City’s Urban Forestry Ordinance applies to the limited purpose areas, but in the ETJ, it applies only if specified in the development agreement. Therefore, this section refers to all tree canopy when stating “the city’s tree canopy” or “study area”.

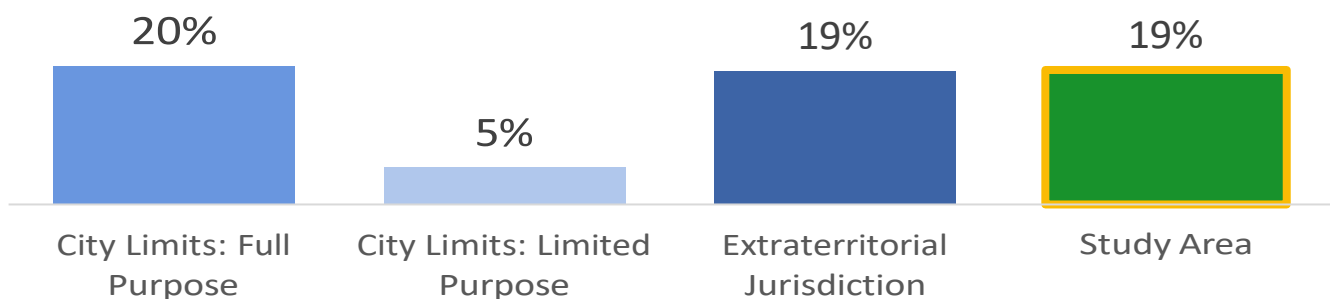
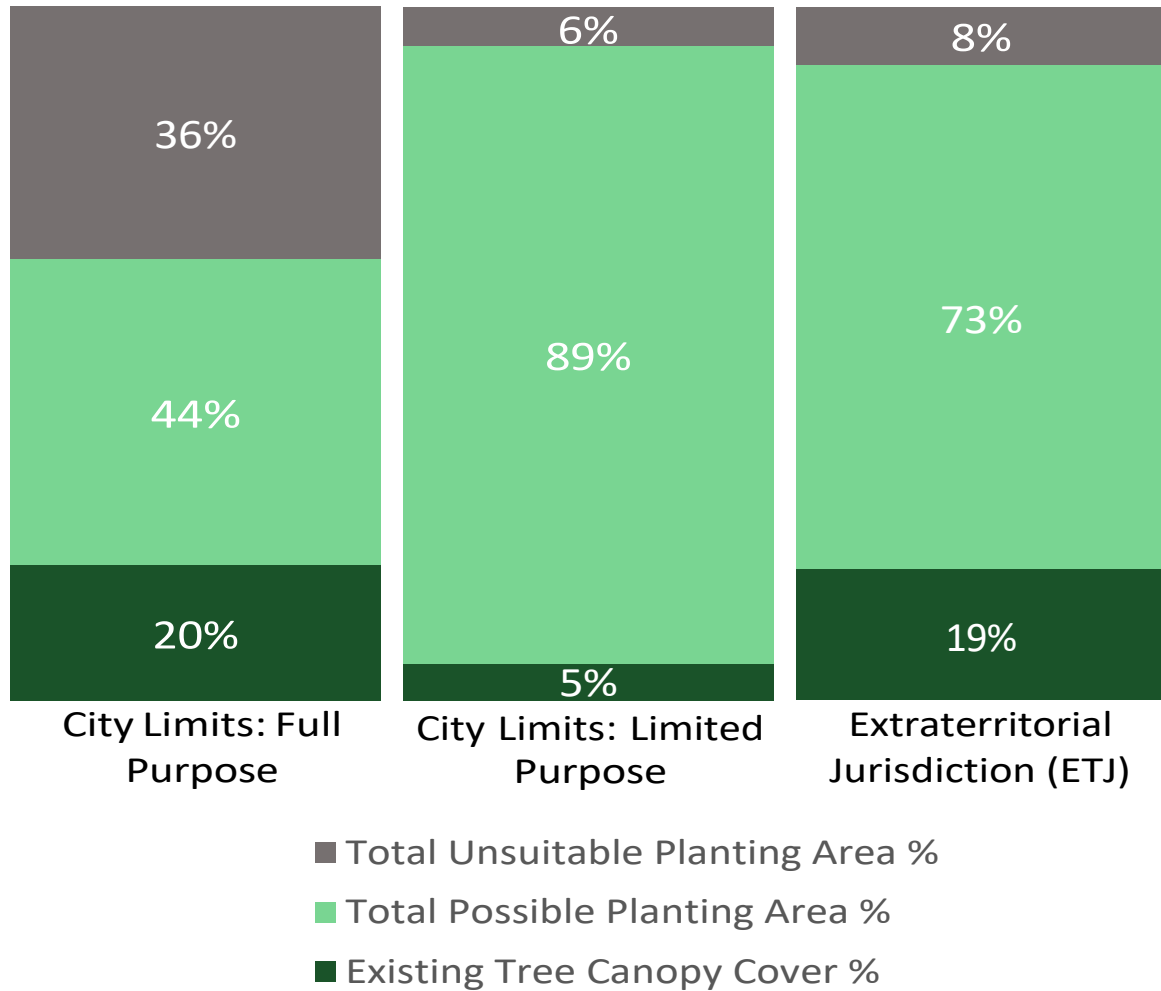


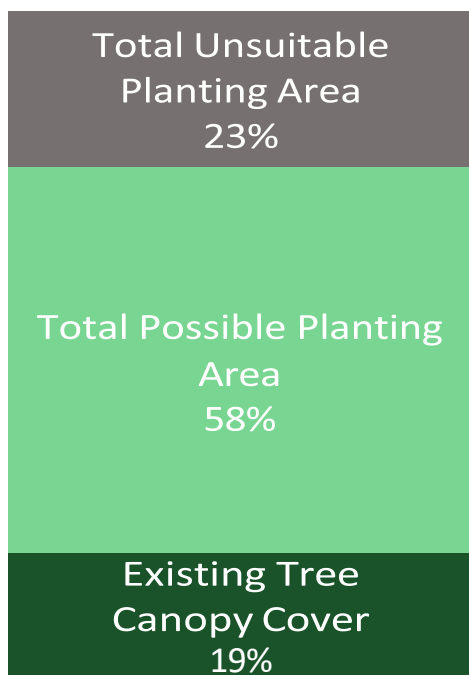
Figure 50. Tree canopy cover percentages for the study areas

COMPARISON OF CANOPY COVER AND AVAILABLE PLANTING SPACE BY STUDY AREAS

Figure 51. Tree canopy metrics summarized by study areas



TREE CANOPY, POSSIBLE PLANTING AREA, AND UNSUITABLE AREAS OF THE FINAL STUDY AREA



Currently, 19% of the city’s (i.e., the ETJ combined with the full purpose and limited purpose city limits) land area is covered by the canopy of trees across public and private boundaries. Another way to look at the extent of this resource— of the 399,558 total land acres for the ETJ and city limits, 75,740 acres of tree canopy shades the city when viewed from above— equivalent to the area of over 57,000 NFL-sized football fields. Within just the city’s full-purpose limits, the tree canopy cover is 20% though as stated earlier, the 19% canopy cover value is used for this study.

Figure 52. Tree canopy metrics for the final study area

The assessment also identified areas where trees could be planted to create additional tree canopy. A total of 52% (206,875 acres) of the study area is either grass, low-lying shrubs, or turf. An additional 6% is made up of soil (23,998 acres) for a combined total of 58% of the study area classified as possible planting area. Of the 230,872 acres of permeable surface acre, 92,948 acres are classified as “unsuitable urban tree canopy”. Examples of unsuitable areas include recreational sport fields, golf courses, and airports. This leaves 35% (137,924 acres) of the study area as Total Possible Planting Area (PPA).

The remaining 23% of the study area consists of 21% (88,282 acres) pavement or other impervious areas and 2% (7,991 acres) water. Combined, these areas are referred to as unsuitable areas for (new) tree canopy cover.

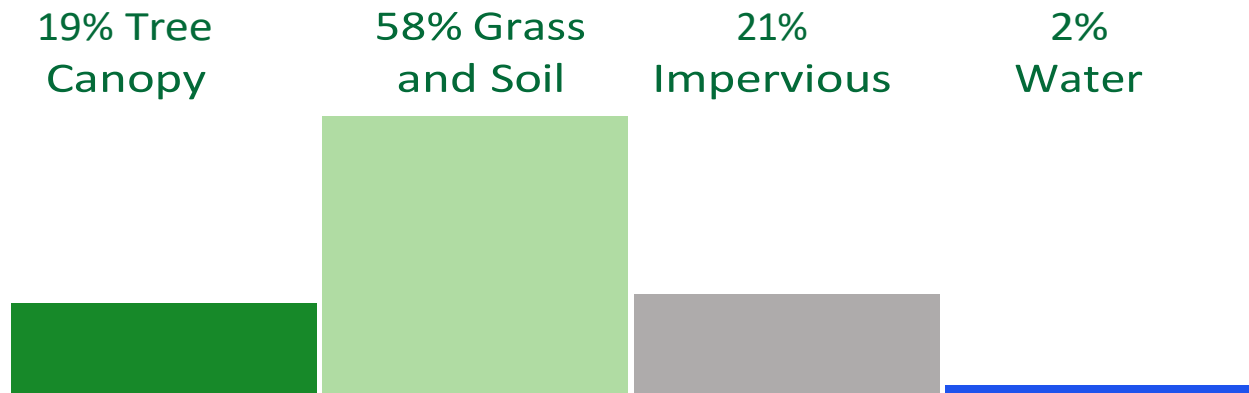


Figure 53. Breakdown of the possible planting area and unsuitable areas within the study area

DESCRIPTION OF CANOPY ASSESSMENT METRICS AND CRITERIA



Figure 54. Examples of the land cover classes mapped for the tree canopy assessment

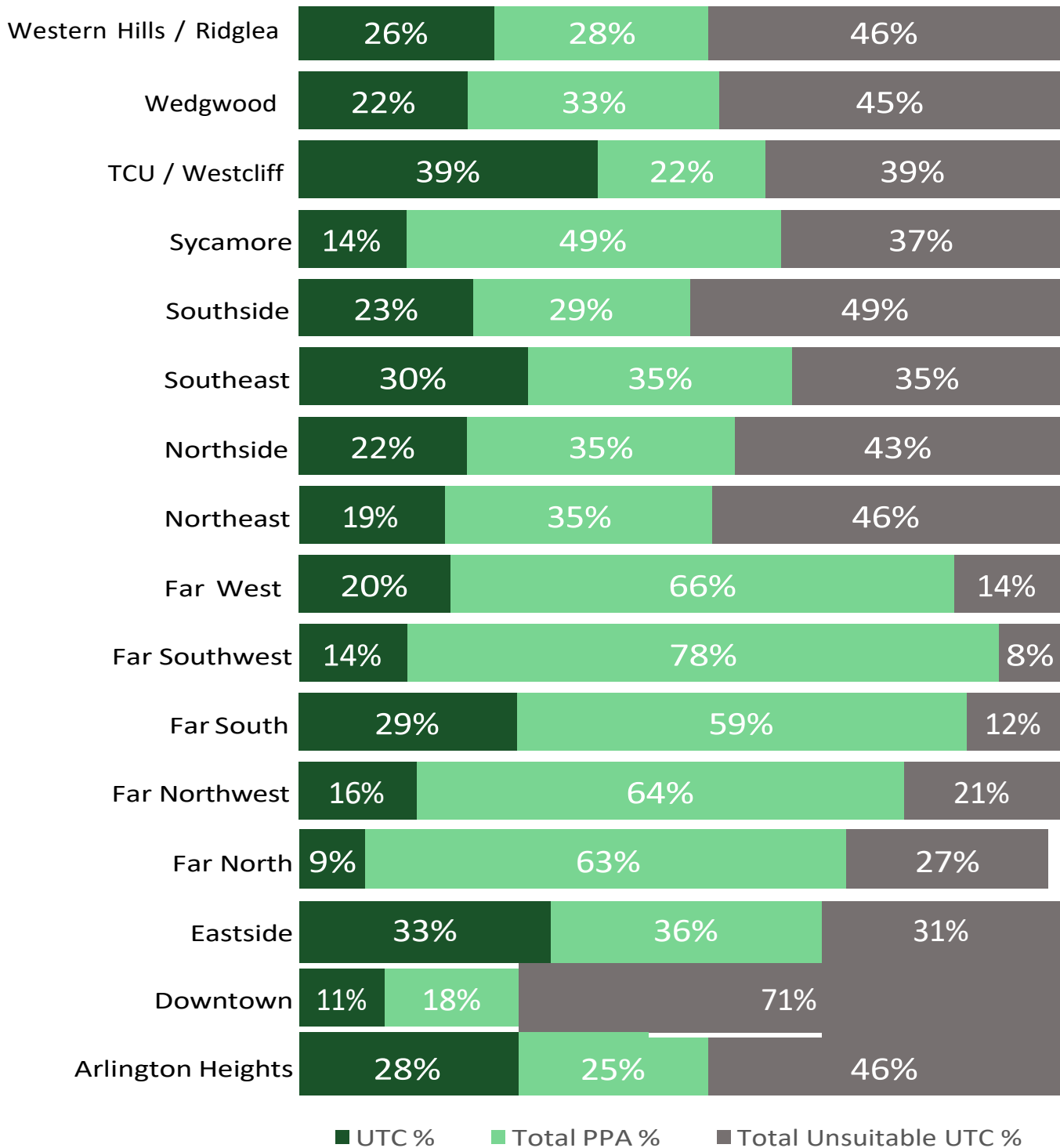


The image on the left shows a polygon around the airstrip at the international airport in Fort Worth. While there is grass within this polygon, it was classified as unsuitable because it is not sensible or permitted to plant trees in this area.

Figure 55. Example of an area not suitable for planting trees

CANOPY COVER AND PLANTING AREA BY PLANNING SECTORS

Figure 56. Tree canopy metrics by City planning sector



The average tree canopy cover for the planning sectors is 22% with the TCU/Westcliff sector having the greatest proportion of canopy (39%). Far West contains the greatest acreage of canopy cover with 13,574 acres and 20% canopy cover. Far Southwest contains the greatest proportion of total possible planting area (Total PPA includes grass and soil) with 78% or 47,846 acres. Downtown has the highest proportion of unsuitable area with 71%. These metrics are a starting point for identifying future planting sites though further evaluations are needed to identify feasible and preferable locations.

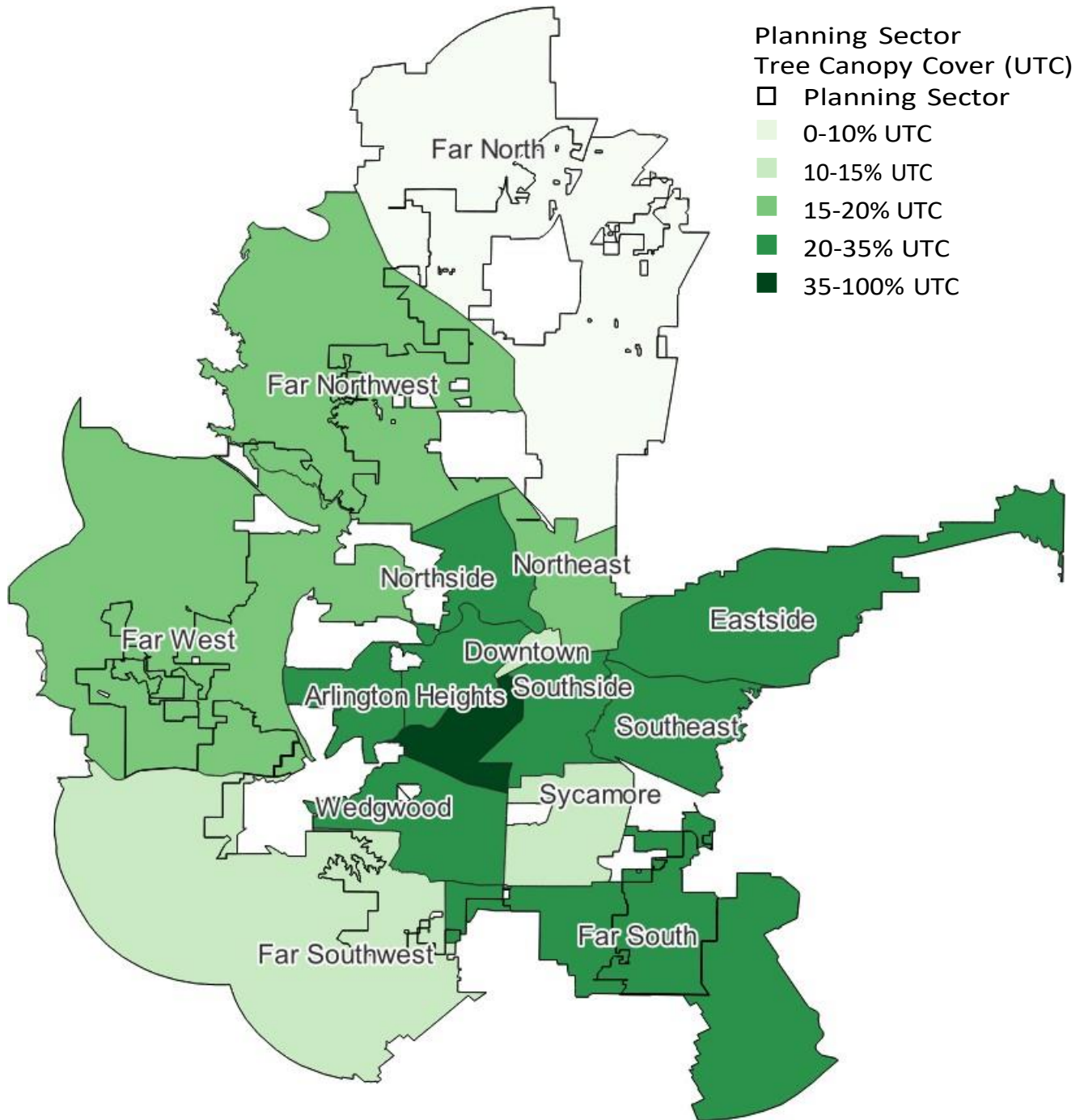
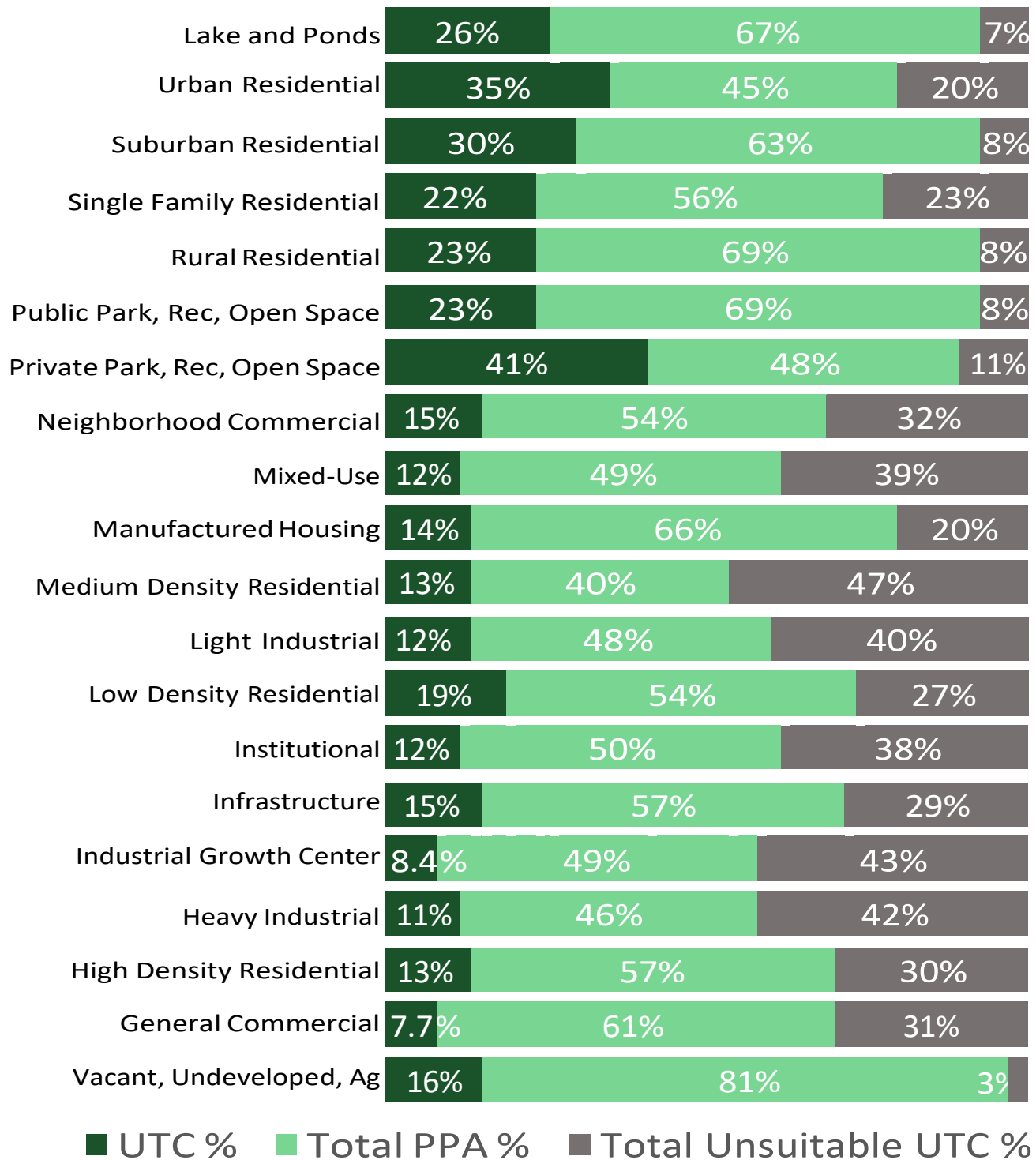


Figure 57. Map of City planning sectors by tree canopy cover range

CANOPY COVER AND PLANTING AREA BY FUTURE LAND USE

Figure 58. Tree canopy metrics by City future land use



The future land use classification of Private Park, Recreation, Open Space has the greatest proportion of tree canopy cover with 41% or 4,140 acres though Single Family Residential has the greatest acreage of canopy cover with 20,778 acres 22% canopy. This land use makes up 6% of the city’s total tree canopy percentage. High Density Residential has the lowest amount of canopy with 40 acres (13%) but General Commercial has the lowest proportion of canopy with 8%. Vacant, Undeveloped, Agriculture has the highest proportion of possible planting area (81%) but Single Family Residential contains the greatest acreage of PPA with 53,758 acres. It also has the greatest acreage of unsuitable areas with 21,816 acres.

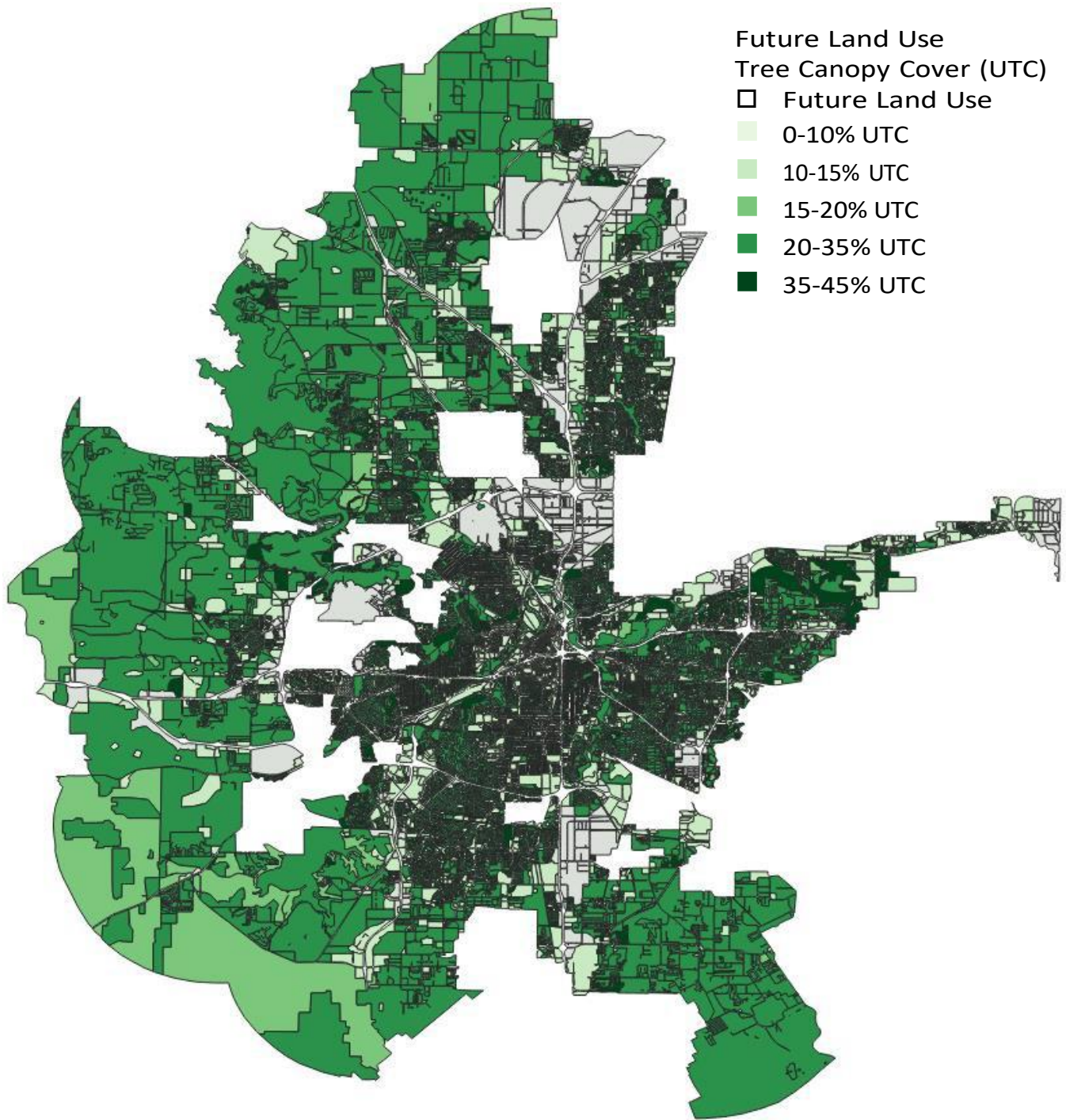


Figure 59. Map of the City's future land use by tree canopy cover range

CANOPY COVER BY CENSUS BLOCK GROUPS

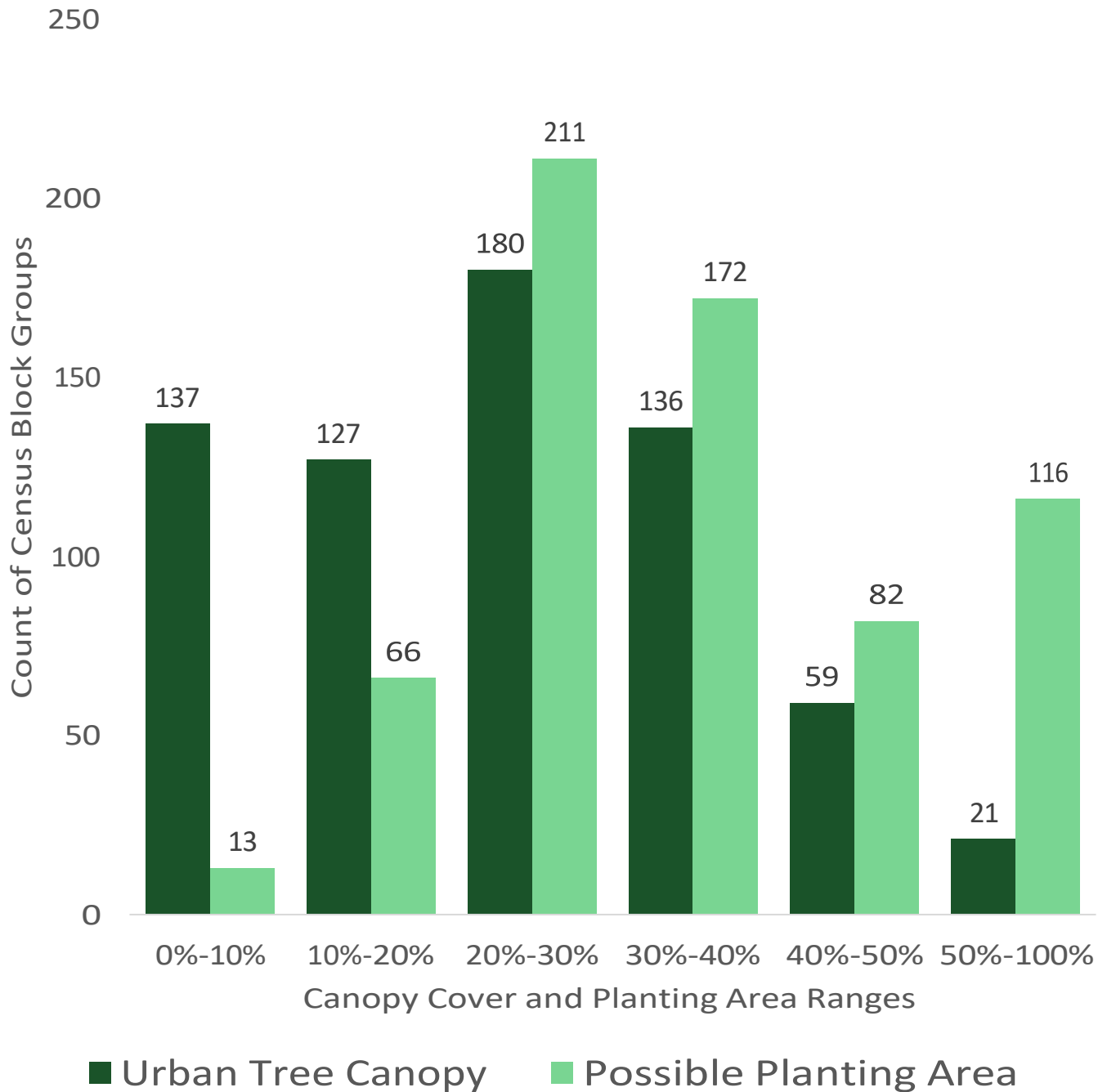


Figure 60. Number of Census Block Groups by canopy cover and planting area ranges

Most (27%) Census Block Groups (CBGs) have a canopy percentage that ranges between 20 and 30% with 180 out of 661 total CBGs. The majority of CBGs also have 20-30% total possible planting area with 211 CBGs or 32%. A total of 137 CBGs (21%) have low tree canopy cover with a range of 0-10% tree canopy cover. Of the 661 CBGs, 21 (3%) have 50% or more tree canopy cover. Regarding impervious area, most CBGs (51%) have 30-50% impervious area and 144 (22%) have 50-100% impervious area.

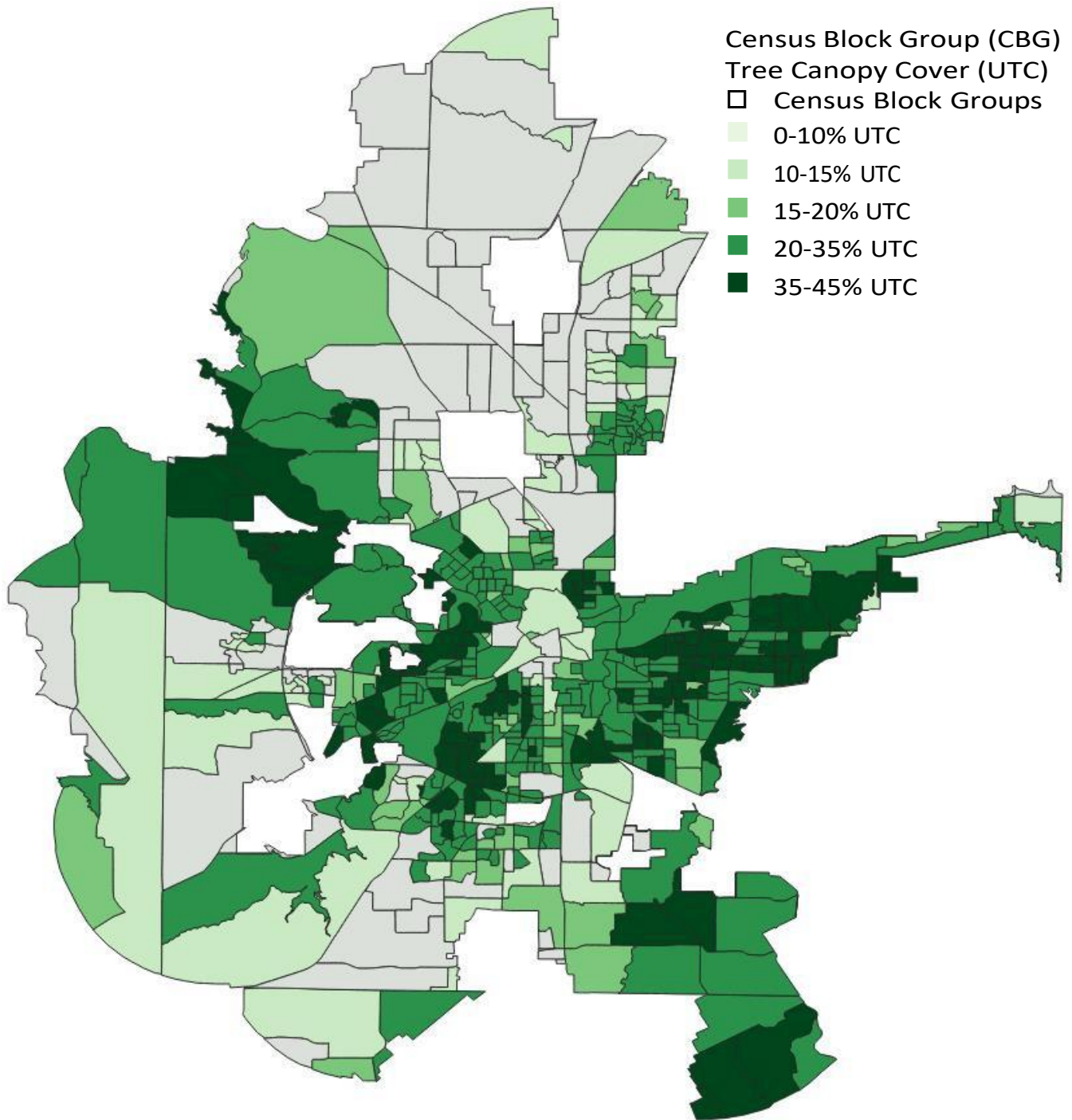


Figure 61. Map of Census Block Groups by tree canopy cover range

TREE CANOPY COVER COMPARISONS

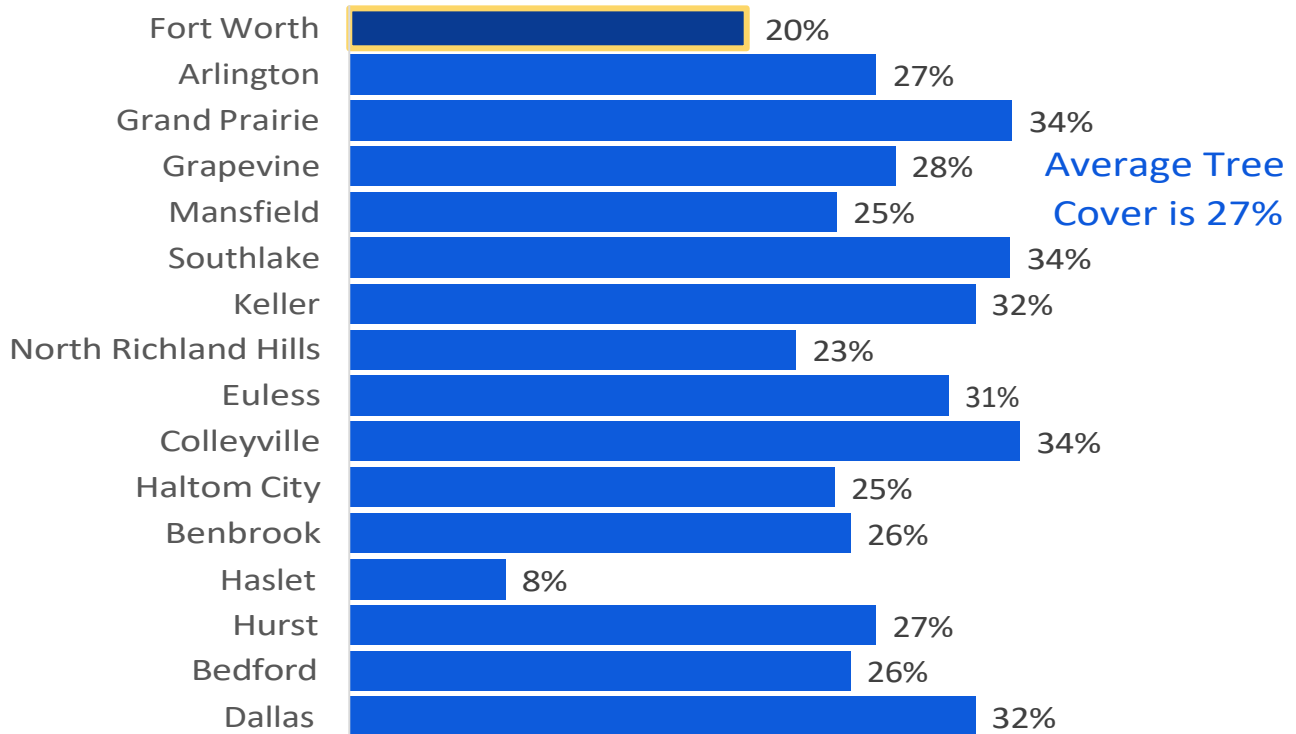


Figure 62. Tree canopy cover in Tarrant County, TX communities plus Dallas, TX. Source: Tarrant County UTC (TTF)

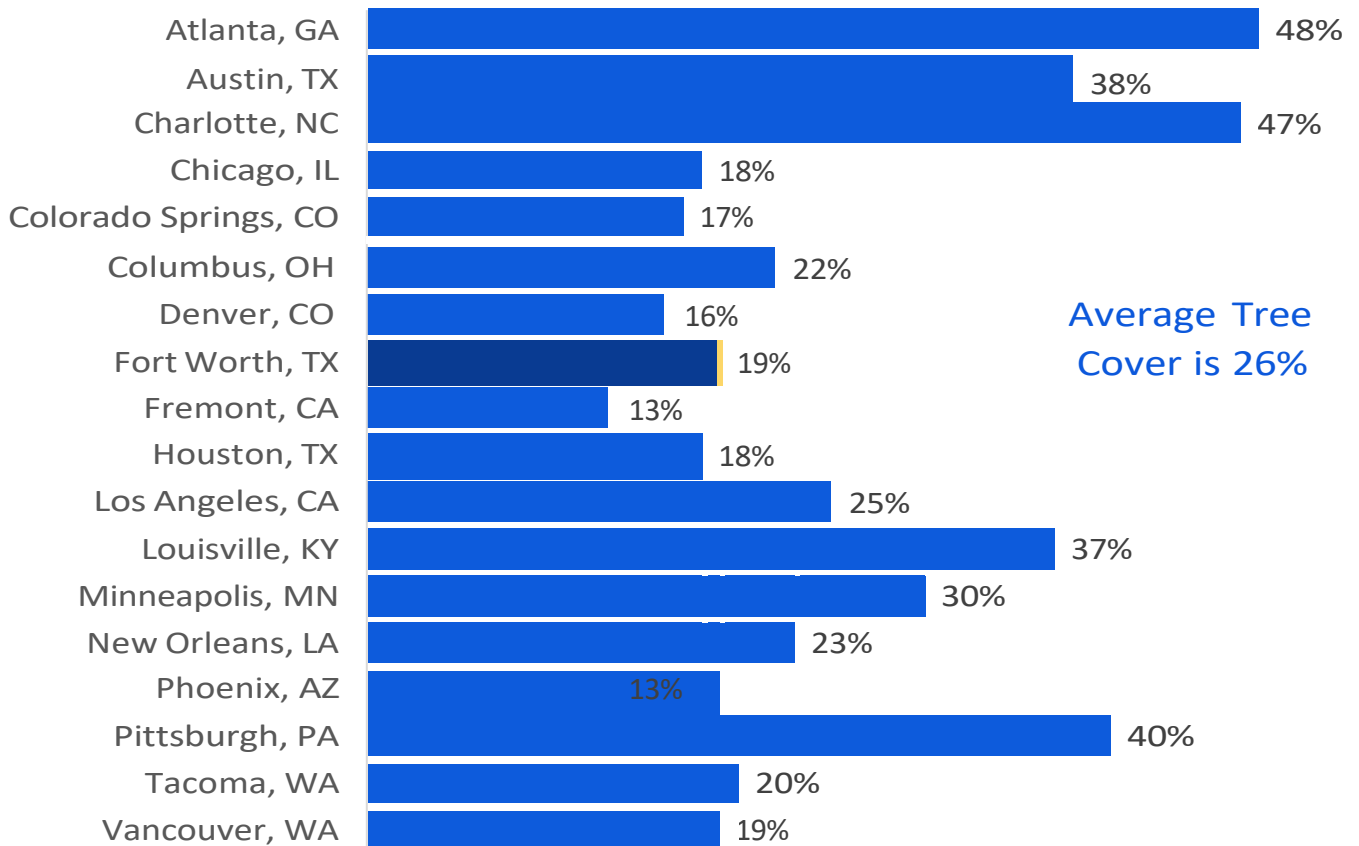


Figure 63. Comparison of tree canopy cover in Fort Worth and in select U.S. cities. Source: Tarrant County UTC (TTF)

CHANGE IN TREE AND OTHER LAND COVER

An analysis of land cover change from 2003 to 2023 was conducted using the U.S. Forest Service’s i-Tree Canopy software and Google Earth. Tree canopy cover, grass, and impervious area were assessed for 2003, 2013, and 2023 using i-Tree Canopy’s point sampling method. A total of 200 randomized points were generated within the city and ETJ boundaries to determine the percentage and area of land cover to achieve a standard error of +/- 3.0 or less for tree canopy cover. Note that the land cover type percentages vary from those reported in the 2020 Tree Canopy Assessment because the canopy cover change analysis uses only sources with available historic data.

The point sampling was first conducted in i-Tree Canopy for 2023 until a standard error of +/- 3.0 was reached. The points were then uploaded to Google Earth and historical imagery was used to cross-examine the classification of points from 2023 to 2013 and 2003 imagery to identify changes in land cover. The following tables and figures provide the results of the change analysis.

Land Cover Change from 2003 to 2023

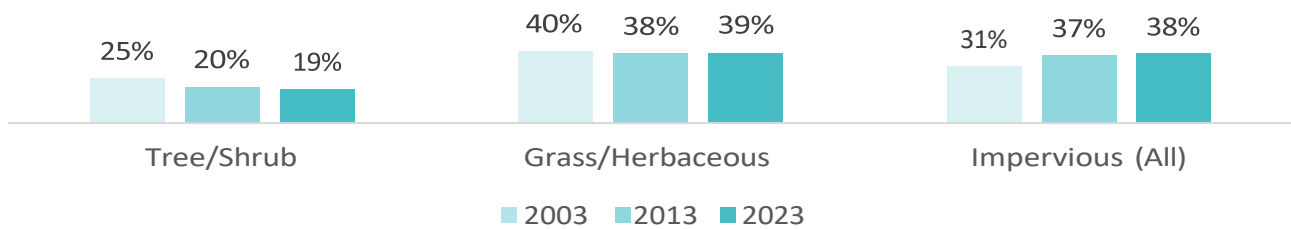


Figure 64. Summary of land cover change from 2003 to 2023 using i-Tree Canopy

Canopy cover changed from 25% in 2003 to 20% in 2013 and 19% in 2023 while grass area stayed relatively the same. Conversely, impervious area increased from 31% in 2003 to 38% in 2023. The average standard error for the three land cover classes was +/- 3.2 meaning the percentages may be lower by 3.2% or higher by 3.2% though the standard error for canopy cover was +/- 2.9%.

Change in Carbon Dioxide Sequestration kT (2003-2023)*

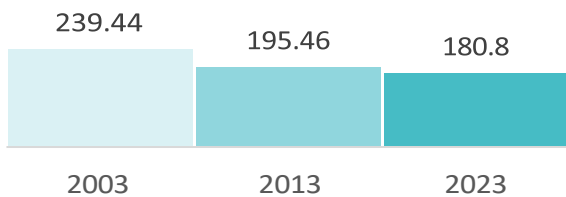


Figure 65. Change in carbon dioxide sequestration by tree canopy from 2003 to 2023

Canopy changing from 25% to 19% in 20 years results in a decline in the amount of carbon dioxide sequestered. The tree canopy in 2003 sequestered 293 kilotons whereas the canopy in 2023 sequesters 181 kilotons. The value of this sequestration in 2003 amounts to \$11.1 million and \$8.4 million in 2023— a loss of \$2.7 million due to canopy decline (table below). In total, an estimated \$5.5 million was lost in terms of benefits by losing 6% of canopy in 20 years.

Value of Tree Canopy Cover from 2003 to 2023

Year	CO2 Equivalent Seq.	CO2 Equivalent SE (+/-)	Air Pollution	Air Pollution SE (+/-)	Avoided Runoff (Kgal)	Avoided Runoff SE (+/-)
2003	\$11,137,152	\$1,382,451	\$11,430,209	\$1,418,828	396.26	49.13
2013	\$9,091,553	\$1,285,740	\$9,330,782	\$1,319,571	323.48	45.75
2023	\$8,409,687	\$1,248,124	\$8,630,974	\$1,280,966	299.22	44.41
Total Loss	\$2,727,465		\$2,799,235			

Seq = sequestration; SE = standard error; Kgal = 1,000 gallons

Table 15. Summary of the change in benefits from 2003 to 2023

i-Tree Canopy Randomized Point Sampling for Land Cover Change Analyses

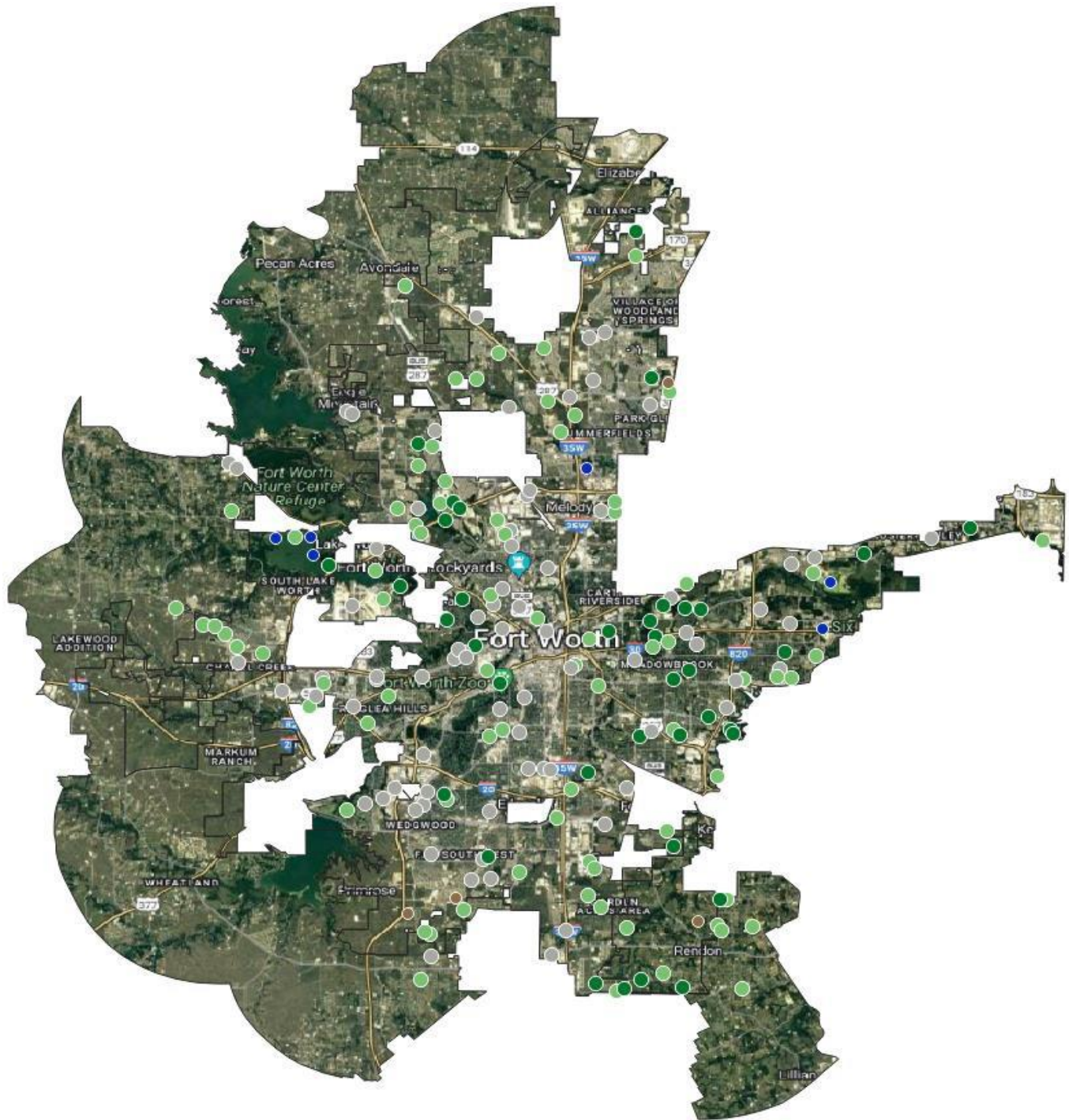


Figure 66. Map displaying the 200 randomized points where land cover was classified based on the location of the point utilizing i-Tree Canopy for the 2003, 2013, and 2023 time periods

Results: Integrated Analysis and Recommendations

Overview

To guide efforts towards a vision for the urban forest, communities with tree canopy assessment data often set tree canopy cover goals based on the existing tree canopy cover amount and the aim to provide an equitable distribution of canopy cover and associated benefits. For Fort Worth, the planning consultants conducted an analysis of available tree canopy data— generated in 2020 from 2018 imagery— and the Tree Equity Score Tool (TreeEquityScore.org) to examine the necessary strategies to achieve the city’s 30% canopy goal. In addition, alternatives were prepared for consideration. The draft canopy goals were developed through examinations of available land area, tree canopy cover, tree equity, other city priorities, future land use, opportunities to mitigate urban heat, preservation of native prairie land and the Cross Timbers, among other considerations.

This section provides guidance to review the action steps for the 30% canopy goal and to consider the alternatives provided. From the review, the City may adopt the goals, approve the recommended target intervals, and implement a tree planting initiative that is supported by City staff, community partners, and all residents of Fort Worth.

The City’s Urban Forestry Ordinance is in support of the city achieving 30% tree canopy cover. City and partner messaging and planning documents reference this goal but through this study and the City’s review, a new goal may be established while preserving the vision for the urban forest. This Plan provides the considerations for refining and formally adopting a measurable and attainable goal. Progress towards these canopy goals should be tracked, measured, and shared to guide urban forest management and maintain community interest and support. With this understanding, the City requested guidance and technical assistance in evaluating the feasibility of the 30% canopy goal and potential alternatives.

Purpose and Approach to Canopy Goals

Across the U.S., cities are setting goals— some based on careful study of current canopy, community needs, and availability of planting space, others base their goals on the principle that more trees are better than fewer, set ambitious campaign goals, then work to mobilize efforts to meet it. In 1997, the American Forests organization established a benchmark of 40% after analyzing the tree canopy in dozens of cities from 1992 to 1997 and working closely with the research community. While incredibly valuable and groundbreaking at the time, technology and research have significantly evolved over the past 20 years, leading to a consensus that more nuanced approaches to canopy goal setting are necessary. Supporting this statement, U.S. Forest Service Research Forester Greg McPherson of the Pacific Southwest Research Station adds, “Tree canopy cover targets are difficult to specify broadly because the opportunities to create canopy are highly variable among cities, even within a climatic region or land use class.”

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

- ❖ Development densities (i.e., dense development patterns with more impervious surfaces have less opportunity for cover);
- ❖ Land use patterns (i.e., residential areas may have more opportunity for canopy than commercial areas, but canopy cover tends to be less in residential areas of disadvantaged communities versus wealthy ones);
- ❖ Ordinances (i.e., parking lot shade ordinances promote cover over some impervious areas);
- ❖ Climate (i.e., canopy cover in desert cities is often less than tropical cities).
- ❖ Native land cover and intended use (i.e., native prairie land).
- ❖ Vulnerable areas with little or no authority over the canopy cover (i.e., university and campus property).

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

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

To examine the requirements of a 30% canopy goal, the urban forestry consultants utilized U.S. Forest Service research and industry best practices. The number of trees required to achieve 30% considered the following:

Table 16. Considerations, criteria, and inputs for the citywide tree canopy goal

Criteria	Input
The year in which canopy goal monitoring begins:	Year 2023
The planning horizon to achieve the canopy goal:	25 years
The local neighborhood-level scales to scale up to the goal:	Planning Sectors, Future Land Use, Ownership Type, and Census Block Groups
The areas to exclude in increasing tree canopy:	Native / natural prairie land, waterbodies and floodplains, stormwater infrastructure areas, recreational sport fields, airports, planned hardscape (buildings)
The limitations of the local level scales:	Such as the limited space downtown and in industrial areas, authority over public land compared to private land, requirements for private development, future land use
The available and preferable planting space:	Applied planting targets i.e., how much of the planting area to stock over 25 years
The shared commitment to achieve the goal:	40% City-led, 30% through development projects; 30% led by partners and landowners
Tree surface area (square feet) at maturity:	Small trees = 490.63 sq.ft (25-foot diameter) Medium trees = 706.50 sq.ft (30-foot diameter) Large trees = 1,256.64 sq.ft (40-foot diameter)
Size of trees at maturity being planted:	Small canopy trees = 10% Medium canopy trees = 30% Large canopy trees = 40%
Potential tree mortality rates (per year):	New tree mortality of 1% Annual mortality of established trees: 1%
Net tree canopy loss due to development:	25 acres / year (assumes updated ordinances, compliance, and enforcement)
Natural regeneration and volunteer growth:	0.002% canopy growth / year
Annual canopy growth:	0.002% canopy growth / year
Available public street planting sites:	TBD
Conversion of impervious surfaces to planting sites:	TBD
Local community-based organizations, programs, and volunteers:	Summarized in the External Engagement section of the Technical Report
The Outcomes:	30% canopy in 25 years 76,200 trees per year, 1.9 million total trees 44,389 acres in added tree canopy \$35.4 million in added annual ecosystem benefits 142,486 tons in carbon sequestration

* Tree diameters, natural regeneration, volunteer growth, and annual canopy growth are based on the U.S. Forest Service's Community Tree Guide (Kelaime, et al., 2007).

Process for Examining the Feasibility of the 30% Canopy Goal

The amount of tree canopy cover and available planting space was analyzed by City Planning Sector, Future Land Use, and U.S. Census Block Group (CBG). For each of these geographies, a percentage of total possible planting area (vegetative and bare soil) to be planted was assigned to each feature (e.g., Northside Planning Sector). This process is referred to as the “planting target” in this study. Planting targets were based on the total amount of plantable space, the existing canopy, limitations of the area (e.g., native prairie land, intended land use, ownership type), available resources, and other City priorities. This approach realizes the unique opportunities, limitations, extent, resources, and characteristics found among various city planning boundaries and CBGs. Canopy goals and planting targets must not be standardized across the city, they should be specific to the area. Using the process described above, a series of recommended implementation frameworks are provided.

The first tier of analysis provides the recommended targets and canopy goals for each Census Block Group. This “ground-up” approach enables realistic goal setting that is scalable to the citywide level. Achieving localized canopy goals will enable Fort Worth to reach the citywide canopy goal of 30% or the alternative goals proposed. Plantable targets were established for each CBG based on land area, existing canopy cover, available planting space, and other considerations such as native vegetative cover types (e.g., prairie), ownership, intended use, and alignment with other priorities (e.g., urban heat reduction, walkability, public health, improved air quality, biodiversity, and stormwater management). For this study, a total of 661 CBGs encompass Fort Worth, each requiring a unique number of trees to plant resulting in an increase in canopy cover.

According to the Tree Equity Score (TES) Tool which includes only the CBGs within the City limits and not the ETJ, there are 242 CBGs out of 524 that are below a score of 100 out of 100. To bring all CBGs within the city to a TES of 100, it would require 864,000 trees. These trees would increase the canopy cover by 6.3% assuming a no-net-loss approach. Since the TES Tool does not include the CBGs in the ETJ, additional analyses were conducted while still aligning with goals for tree equity.

ACHIEVING 30% CANOPY BY CENSUS BLOCK GROUP SCENARIO

# of Trees Per Year	# of CBGs	
<50 Trees	473	The table to the left summarizes the count of CBGs for each range of trees required to achieve 30% canopy in 25 years. This hypothetical scenario assumes that 20% of the available planting space within each CBG would be planted. The scenario was prepared as a means to understand how many trees are required annually over the course of 25 years to achieve 30% canopy. Based on the study, a total of 2.2 million trees are needed or 88,700 trees per year. These calculations are based on the assumptions and metrics provided in the previous table (Table 14).
50 to 100 Trees	73	
100 to 500 Trees	72	
500 to 1,000 Trees	24	
1,000 to 2,000 Trees	11	
2,000 to 3,000 Trees	4	
3,000 to 4,000 Trees	2	
4,000 to 5,000 Trees	1	
5,000 to 6,000 Trees	0	
6,000 to 7,000 Trees	1	
TOTAL	661	

Table 17. Count of Census Block Groups by annual tree planting ranges to achieve 20% stocking and 30% canopy citywide

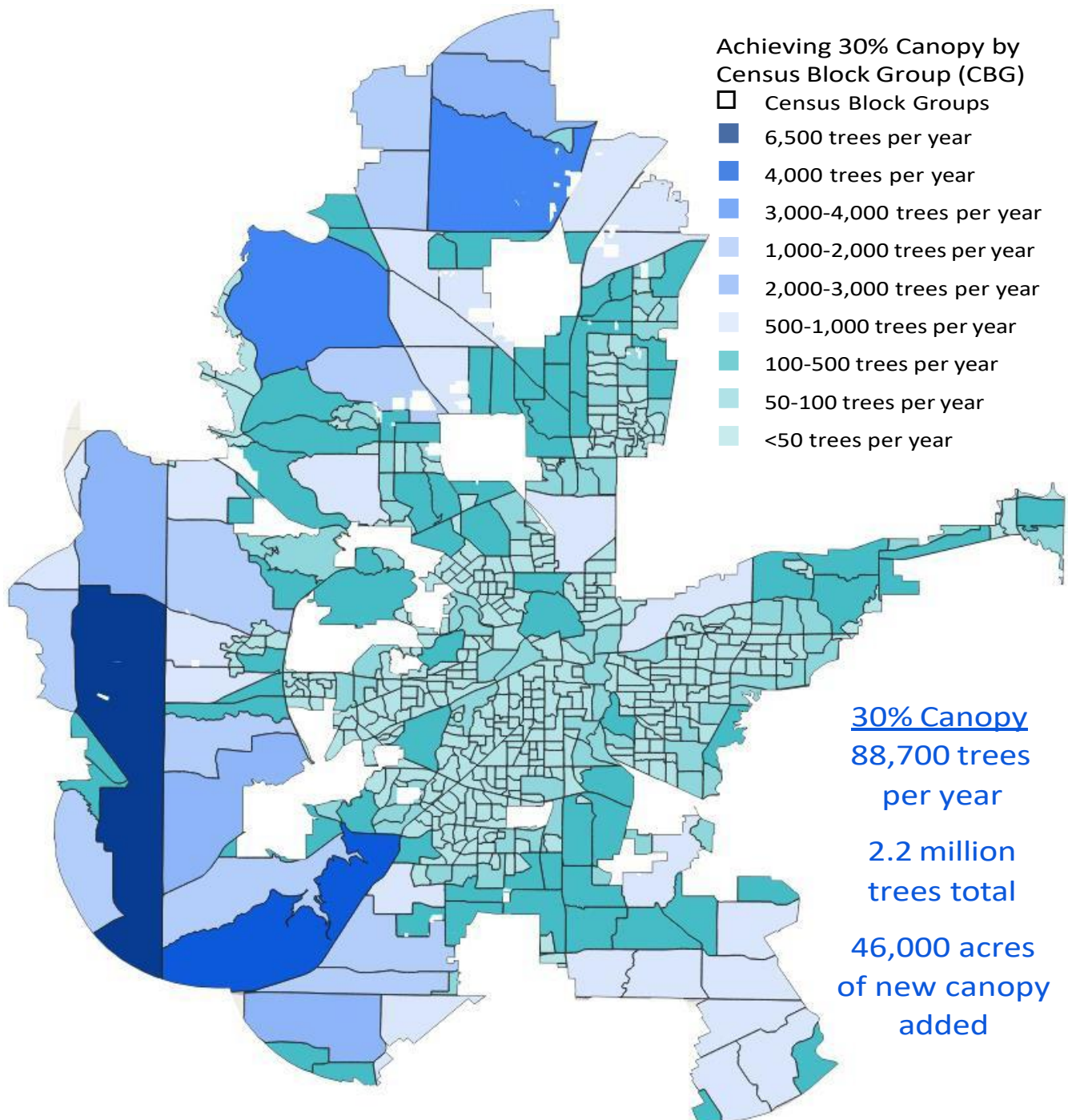


Figure 67. Scenario to achieve 30% canopy by planting 20% of available space in all Census Block Groups

Using this approach, the majority of CBGs (473 of 661) require less than 50 trees to be planted each year for 25 years. The larger CBGs will require more trees with one requiring 6,000 to 7,000 trees per year and 1 CBG requiring 4,000 to 5,000 trees per year. Adjustments may be made to the planting targets (i.e., adjusting the 20% applied to all CBGs) but this provides a scenario to understand the requirements of a 30% canopy goal. The total number of trees account for removals, planting mortality, and natural mortality. Therefore, 2.2 million trees amount to a net total of 1.9 million trees and 30% canopy.

ACHIEVING 30% CANOPY BY FUTURE LAND USE SCENARIO

The second tier examines the canopy and available planting space by future land use category. Each land use has its own limitations, opportunities, and canopy preservation and planting requirements per the Urban Forestry Ordinance. The criteria for setting planting targets (i.e., the amount of plantable space to infill with tree canopy) by future land use category included the amount of existing tree canopy cover, available planting space, the amount of land area, intended use, and the requirements of the Urban Forestry Ordinance (see below).

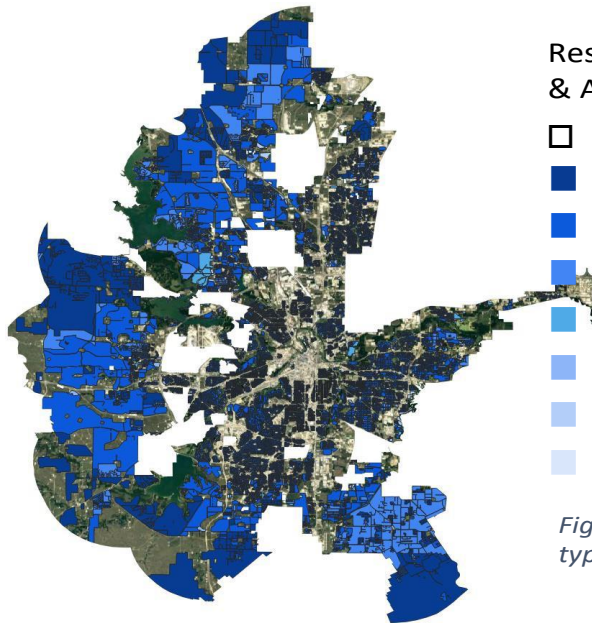
- ❖ One- and two-family residential = 40% canopy (reduced to 25% for certain subdivisions)
- ❖ Existing platted residential lots > 1-acre = 40% canopy
- ❖ Multifamily = existing or retained canopy shall cover 50% open space
- ❖ Institutional = 30% existing or retained canopy
- ❖ Commercial = 30% existing or retained canopy
- ❖ Mixed use = existing or retained canopy shall cover 50% open space
- ❖ Industrial = 20% existing or retained canopy
- ❖ Parking surface areas = 40% existing or retained canopy (potential additional credits)
- ❖ Public projects = 30% existing or retained canopy (potential mitigation fund option)
- ❖ Agricultural = 25% existing or retained canopy (additional requirements)

Exemptions, criteria, and special cases are described in the ordinance section of the Technical Report and in the Urban Forestry Ordinance. Note, the canopy goals presented in this scenario account for all properties within a future land use category, not solely new or redevelopment. Therefore, the canopy goals by land use do not exactly align with the Urban Forestry Ordinance's land use canopy requirements. Lastly, the total number of trees required by future land use account for removals, planting mortality, and natural mortality. Therefore, the net total number of trees amounts to 1.9 million trees to reach 30% canopy cover.

The following provides a scenario in which each future land use category has a planting target and overall canopy goal to achieve 30% canopy citywide.

Table 18. Canopy goals and planting requirements by future land use to achieve 30% canopy citywide

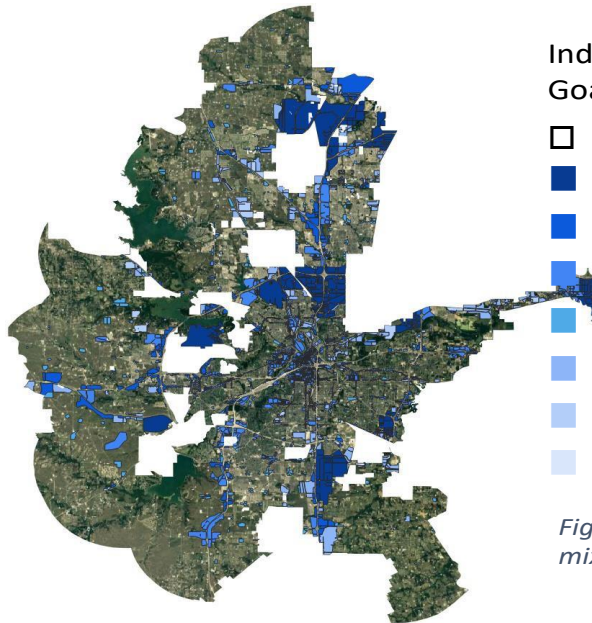
Abbr.	Future Land Use	UTC %	Total # of Trees	Annual Trees Needed	Modeled Canopy
PUBPK	Public Park, Recreation, Open Space	23%	216,450	8,658	40%
INFRA	Infrastructure	15%	32,691	1,308	25%
INST	Institutional	12%	55,713	2,229	25%
PRIPK	Private Park, Recreation, Open Space	41%	21,381	855	45%
LDR	Low Density Residential	19%	26,194	1,048	30%
MDR	Medium Density Residential	13%	11,918	477	20%
HDR	High Density Residential	13%	1,117	45	20%
SF	Single Family Residential	22%	414,446	16,578	30%
UR	Urban Residential	35%	2,341	94	40%
SUB	Suburban Residential	30%	116,634	4,665	40%
RURAL	Rural Residential	23%	570,390	22,816	40%
MH	Manufactured Housing	14%	8,545	342	30%
NC	Neighborhood Commercial	15%	69,362	2,774	30%
GC	General Commercial	7.7%	101,897	4,076	30%
MU	Mixed-Use	12%	100,762	4,030	25%
HI	Heavy Industrial	11%	9,545	382	20%
LI	Light Industrial	12%	46,552	1,862	20%
IGC	Industrial Growth Center	8.4%	125,284	5,011	20%
AG	Vacant, Undeveloped, Agricultural	16%	143,581	5,743	25%
WATER	Lakes and Ponds	26%	930	37	30%
TOTALS		19%	2,075,731	83,029	30%



Residential Land Use Canopy Goals & Annual Tree Requirements

- Future Land Use Boundary
- Rural Residential: 40% (22,816 trees per year)
- Single Family Residential: 30% (16,578 trees per year)
- Suburban Residential: 40% (4,665 trees per year)
- Low Density Residential: 30% (1,048 trees per year)
- Medium Density Residential: 20% (477 trees per year)
- Urban Residential: 40% (94 trees per year)
- High Density Residential: 20% (45 trees per year)

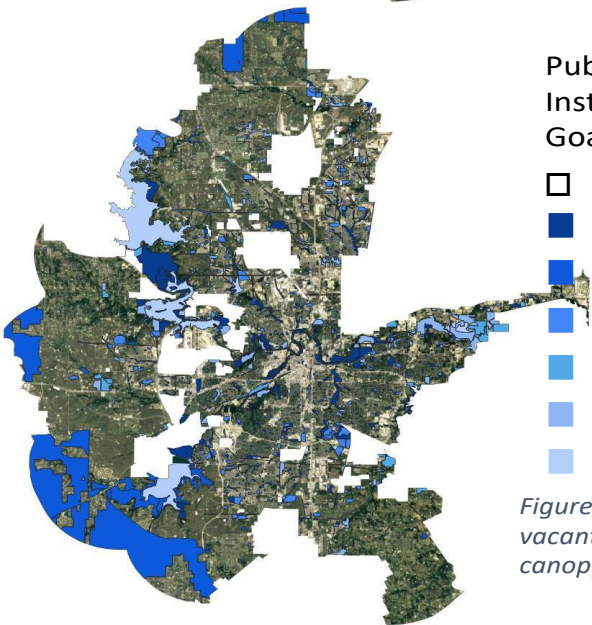
Figure 68. Map and description of the residential future land use types, canopy goals, and planting requirements



Industrial, Commercial, & Mixed-Use Canopy Goals & Annual Tree Requirements

- Future Land Use Boundary
- Industrial Growth Center: 20% (5,011 trees per year)
- General Commercial: 30% (4,076 trees per year)
- Mixed-Use: 25% (4,030 trees per year)
- Neighborhood Commercial: 30% (2,774 trees per year)
- Light Industrial: 20% (1,862 trees per year)
- Heavy Industrial: 20% (382 trees per year)
- Manufactured Housing: 30% (342 trees per year)

Figure 69. Map and description of the industrial, commercial, and mixed-use types, canopy goals, and planting requirements



Public & Private Open Space, Vacant, Ag, Institutional, Infrastructure, & Water Canopy Goals & Annual Tree Requirements

- Future Land Use Boundary
- Public Park, Rec, & Open Space: 40% (8,658 trees per year)
- Vacant, Undeveloped, Ag: 25% (5,743 trees per year)
- Institutional: 25% (2,229 trees per year)
- Infrastructure: 25% (1,308 trees per year)
- Private Park, Rec, & Open Space: 45% (855 trees per year)
- Lakes & Ponds: 30% (37 trees per year)

Figure 70. Map and description of the public and private open space, vacant, agricultural, institutional, infrastructure, and water types, canopy goals, and planting requirements

ACHIEVING 30% CANOPY BY PLANNING SECTOR SCENARIO

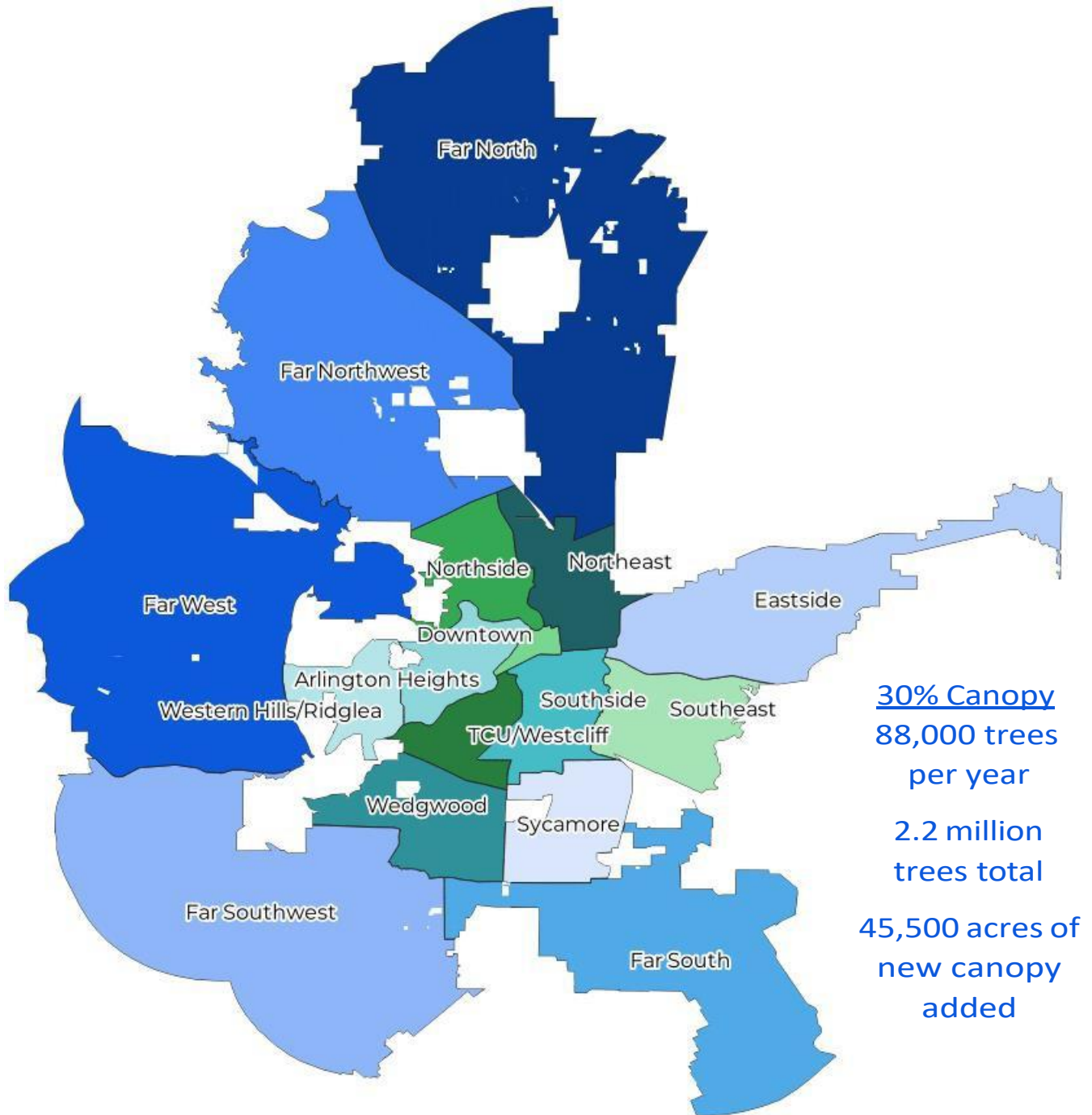
The third tier provides the recommended targets and canopy goals for each City “Planning Sector”. By scaling up from the small-scale Census Block Groups to the larger boundaries of the future land use categories, and to the planning sectors, the City and its partners can communicate neighborhood, regional, and citywide goals, strategies, and monitoring protocols. The following provides a scenario in which each planning sector has a planting target and overall canopy goal to achieve 30% canopy citywide.

Table 19. Canopy goals and planting requirements by planning sector to achieve 30% canopy citywide

Abbr.*	Planning Sector	UTC %	Total # of Trees	Annual Trees Needed	Modeled Canopy
AH	Arlington Heights	28%	6,857	274	30%
DT	Downtown	11%	2,085	83	15%
ES	Eastside	33%	140,758	5,630	44%
FN	Far North	9%	638,900	25,556	26%
FNW	Far Northwest	16%	317,575	12,703	30%
FS	Far South	29%	309,245	12,370	45%
FSW	Far Southwest	14%	184,434	7,377	20%
FW	Far West	20%	500,824	20,033	35%
NE	Northeast	19%	26,233	1,049	25%
NS	Northside	22%	2,948	118	23%
SE	Southeast	30%	1,959	78	30%
SS	Southside	23%	7,327	293	25%
SY	Sycamore	14%	27,305	1,092	20%
TCU/W	TCU/Westcliff	39%	3,322	133	40%
WW	Wedgwood	22%	15,911	636	25%
WH/R	Western Hills/Ridglea	26%	5,394	216	27%
TOTALS		19%	2,191,076	87,643	30%

* Abbreviations for Planning Sectors were created by the urban forestry consultants, not the City

In this scenario, the larger rural planning sectors require a greater number of trees per year to support the citywide 30% canopy goal. Far North would require 26,000 trees per year whereas Downtown requires 83 trees per year. With this approach, 2.2 million trees are needed and amounts to 88,000 trees per year over the 25-year period to reach 30% canopy cover. The total number of trees required by planning sector account for removals, planting mortality, and natural mortality. Therefore, the net total number of trees amounts to 1.9 million trees to reach 30% canopy cover.



30% Canopy
 88,000 trees
 per year
 2.2 million
 trees total
 45,500 acres of
 new canopy
 added

Achieving 30% Canopy by Planning Sector

□ Planning Sector

- Far North: 26% (25,556 trees per year)
- Far West: 35% (20,033 trees per year)
- Far Northwest: 30% (12,703 trees per year)
- Far South: 45% (12,370 trees per year)
- Far Southwest: 20% (7,377 trees per year)
- Eastside: 44% (5,630 trees per year)
- Sycamore: 20% (1,092 trees per year)

- Northeast: 25% (1,049 trees per year)
- Wedgwood: 25% (636 trees per year)
- Southside: 25% (293 trees per year)
- Arlington Heights: 30% (274 trees per year)
- Western Hills/Ridglea: 27% (216 trees per year)
- TCU/Westcliff: 40% (133 trees per year)
- Northside: 23% (118 trees per year)
- Downtown: 15% (83 trees per year)
- Southeast: 30% (78 trees per year)

Figure 71. Scenario to achieve 30% canopy by planning sector canopy goals and planting requirements

REQUIREMENTS FOR THE 30% CANOPY GOAL

Currently, 18.9 or 19% of the study area is covered by tree canopy when viewed from above. The study area includes the full purpose and limited purpose city limits and the Extraterritorial Jurisdiction (ETJ). The following presents the proposed requirements to achieve the canopy goals though the City and partners should evaluate and refine these for approval by staff and City Council.

For the City of Fort Worth, the development of recommendations and requirements to achieve canopy goals were driven by tree canopy cover data, benchmarking research, Tree Equity Scores, analysis of existing and potential resources, City input, and community feedback.

To identify how many trees would be required to achieve the city’s goal of 30% canopy cover in 25 years, a ground-up approach was conducted. This included analyses and calculations for Census Block Groups, future land use, and lastly, planning sectors. Each of these tiers require approximately 2.2 million trees to be planted in 25 years.

Using the analyses and calculations for the Census Block Groups, the number of trees per year to plant can be scaled to represent each planning sector the CBGs are within. The map below provides an example as a visual:

Census Block Groups within Each Planning Sector

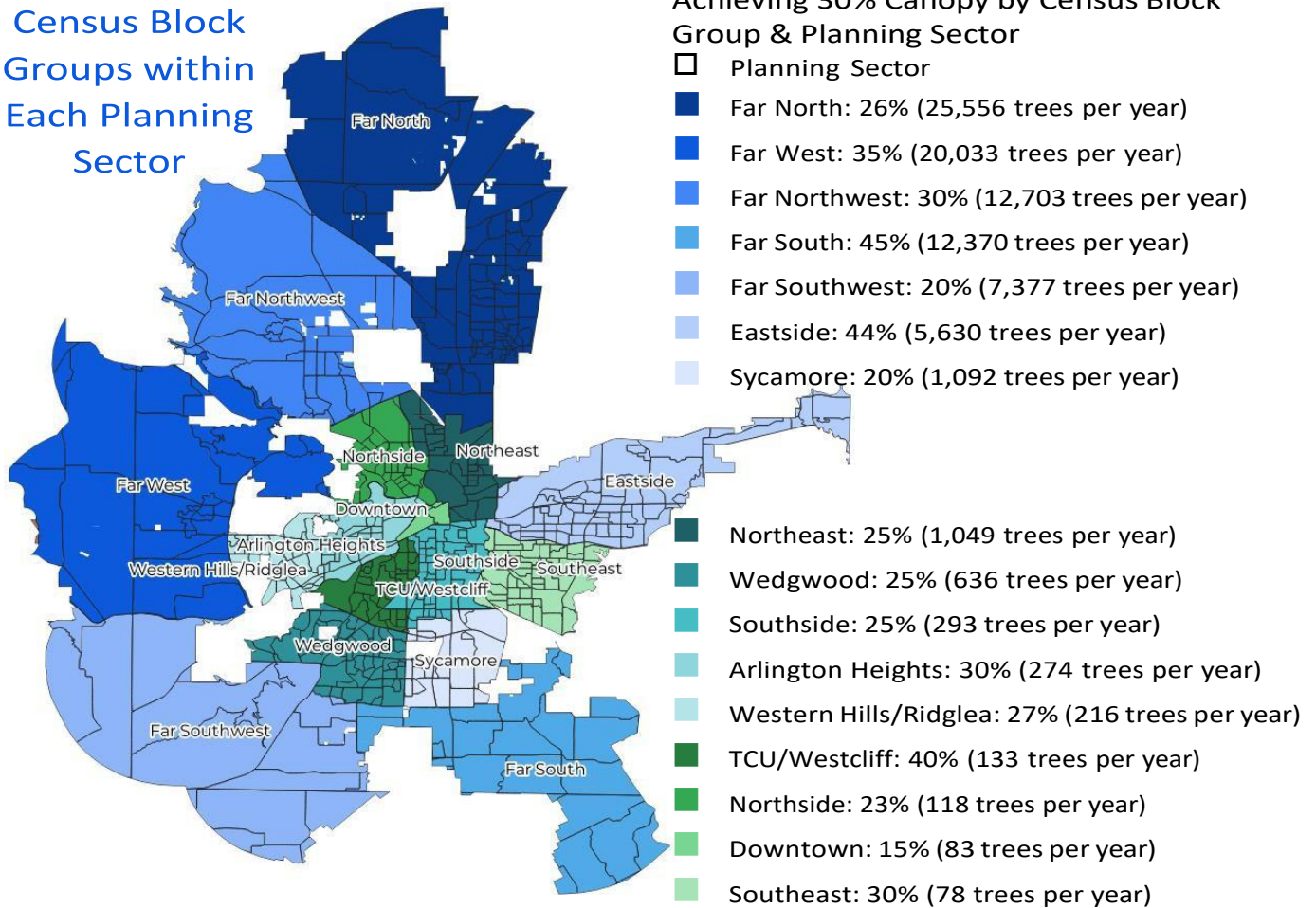
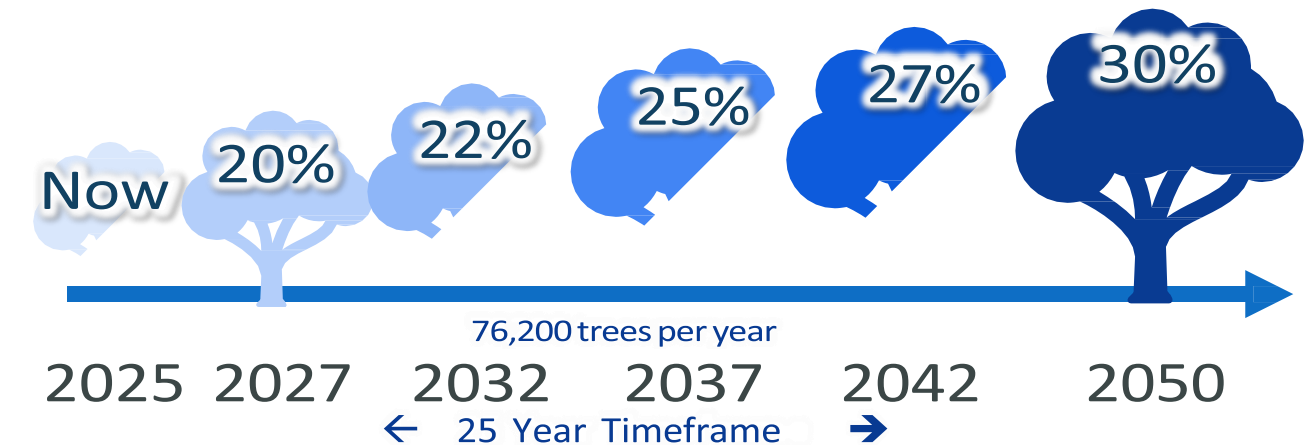


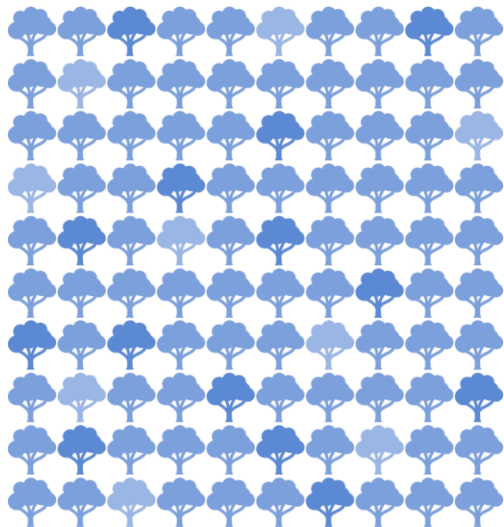
Figure 72. Example of the scaled approach to canopy goals using the Census Block Groups and planning sectors

With this integrated approach, the City of Fort Worth’s ambitious and achievable goal is 30% tree canopy in 25 years (2025 – 2050). To achieve this, the City and all members of the community must commit to preserving the existing canopy and increasing its coverage by 11%, up from 19%, and plant approximately 76,200 trees (net) annually or a net total of 1.9 million trees. These new trees would collectively grow the canopy throughout the city to an area equivalent to over 34,000 professional football fields and would provide additional ecosystem services and benefits in the amount of approximately \$35.4 million annually once established. In addition, the 1.9 million trees would sequester a total of 285 million pounds or 142,500 tons of carbon annually. These calculations and estimates are based on industry research and practices though the assumptions and criteria summarized in Table 14 are incorporated.

30% TREE CANOPY COVER IN 25 YEARS



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



10,000 trees planted across the city that have large canopy cover at maturity equals 300 acres of new canopy cover. Approximately 44,400 acres of new canopy cover is needed to reach 30% by 2050.

Figure 73. Fort Worth’s 30% canopy goal and milestones

ALTERNATIVES TO THE 30% IN 25 YEARS CITYWIDE CANOPY GOAL

For the City's consideration, alternatives to the 30% citywide canopy goal were developed using similar criteria and assumptions. The following provides a summary of the alternatives.

Table 20. Summary of the various canopy goal scenarios for consideration

Scenario:	A*	B	C	D	E
Description	30% in 25 years	25% in 25 years	30% in 30 years	25% in 30 years	No Planting Citywide (1,000 acres of canopy lost / year)
Year Range	2025-2050	2025-2050	2025-2055	2025-2055	2025-2050
Starting Canopy %	19%	19%	19%	19%	19%
New Canopy %	30%	25%	30%	25%	13%
% Change	11%	6%	11%	6%	(6%)
Total Trees Added	1,905,000	1,040,000	1,900,000	1,030,000	0
Total Added Benefits	\$35,354,895	\$19,301,360	\$35,262,100	\$19,115,770	(\$19,911,487)
Total Carbon Sequestered (lbs)	284,972,760	155,575,680	284,224,800	154,079,760	(160,493,517)
Average Trees Per Year	76,200	41,600	63,333	34,333	0
<u>Milestones</u>					
Scenario:	A*	B	C	D	E
Year 1	10k	5k	10k	5k	0
Year 2	10k	5k	10k	5k	0
Year 3	10k	10k	10k	5k	0
Year 4	25k	10k	10k	5k	0
Year 5	50k	10k	10k	5k	0
Years 6-10 (per year)	90k	25k	45k	10k	0
Years 11-15 (per year)	90k	45k	65k	15k	0
Years 16-20 (per year)	90k	50k	80k	40k	0
Years 21-25 (per year)	90k	80k	90k	60k	0
Years 26-30 (per year)			90k	75k	0

* Scenario A is the 30% canopy cover in 25 years summarized in the previous section

The alternative canopy goals described above compare the goal for 30% canopy in 25 years (Scenario A) to a lower tree canopy goal of 25% (Scenario B), extended the timetable to 30 years instead of 25 years (Scenarios C&D), and a hypothetical scenario of no tree plantings across the city (Scenario E) to measure the impact of doing nothing in terms of plantings.

SUMMARY OF THE 30% CANOPY GOAL AND THE REQUIREMENTS AND MILESTONES

Table 21. Summary of baseline conditions, tree canopy goals, and forecasted future benefits and services

Existing Urban Tree Canopy Cover	19% or 75,740 acres (based on 2018 imagery)
Tree Canopy Compared to 19 Fort Worth Area Cities	17th out of 19 (average canopy cover is 27%)
Total Possible Planting Area	58% or 230,872 acres
Tree Equity Score	89 out of 100
Tree Equity Score Compared to TX Cities	9th out of 20 (average score is 85)
Citywide Tree Canopy Goal by 2050	30% in 25 years (2025-2050)
Canopy Milestones	20% by 2030 (Year 5) 22% by 2035 (Year 10) 25% by 2040 (Year 15) 27% by 2045 (Year 20) 30% by 2050 (Year 25)
Total Number of Trees Required	1.9 million trees (or 44,400 new acres of canopy)
Timeframe	25 years (2025 – 2050)
Number of Trees to Plant per Year (avg)*	76,200 (ranges from 10k to 90k trees per year)
Recommended Commitment by the City and by the Community	40% City-led (762k total trees) 30% Planted through development (572k trees) 30% Partners & property owners (572k trees)
Tree Canopy Goal Milestones for 30% by 2050 (City and Public-led)	2025: 10k total new trees (19% canopy) 2026–2030: 95k total new trees (20% canopy) 2031–2035: 450k total new trees (22% canopy) 2036–2040: 450k total new trees (25% canopy) 2041-2045: 450k total new trees (27% canopy) 2045–2050: 450k total new trees (30% canopy)
Total Added Ecosystem Benefits	\$35,354,895 annually once trees are mature
Total Future Carbon Sequestered**	285 million pounds of carbon (\$6.6M annual value)
Total Air Quality Improvements	1,200 tons of pollutants removed (\$12.5M annual value)
Total Stormwater Reduction	1.3 billion gallons prevented (\$9.2M annual value)

* “k” = units of 1,000 ; “M” = units of 1 million

TRACKING THE 30% BY 2050 CANOPY GOAL

Table 22. Summary of the metrics to track the 30% canopy cover by 2050 goal

Metric	2025	2026 - 2030	2031 - 2035	2036 - 2040	2041 - 2045	2041 - 2050	
Canopy %	19% (0.06% ↑)	20% (1% ↑)	22% (2% ↑)	25% (3% ↑)	27% (2% ↑)	30% (5% ↑)	
Total Trees to Reach	City-led (avg)	4,000 trees	38,000 trees	180,000 trees	180,000 trees	180,000 trees	180,000 trees
	Development-led (avg)	3,000 trees	28,500 trees	135,000 trees	135,000 trees	135,000 trees	135,000 trees
	Partner & Property Owner-led (avg)	3,000 trees	28,500 trees	135,000 trees	135,000 trees	135,000 trees	135,000 trees
	Total Trees	10,000 trees	95,000 trees	450,000 trees	450,000 trees	450,000 trees	450,000 trees
Total Trees per Year to Reach Goal (avg)	City-led (avg)	4,000 trees	9,500 trees	36,000 trees	36,000 trees	36,000 trees	36,000 trees
	Development-led (avg)	3,000 trees	7,125 trees	27,000 trees	27,000 trees	27,000 trees	27,000 trees
	Partner & Property Owner-led (avg)	3,000 trees	7,125 trees	27,000 trees	27,000 trees	27,000 trees	27,000 trees
	Total Trees per Year (avg)	10,000 trees	23,750 trees	90,000 trees	90,000 trees	90,000 trees	90,000 trees
Future Added Benefits	\$185,590	\$1,763,105	\$8,351,550	\$8,351,550	\$8,351,550	\$8,351,550	

Priority Planting Areas to Achieve Tree Canopy Cover and Equity Goals

Once the City finalizes the canopy goals and implementation timetable, it is recommended to establish priority areas based on a variety of themes and community needs. Themes may include ownership type (public and private), areas of low existing tree canopy, Tree Equity Scores (TreeEquityScore.org), and greatest amount of available planting space while other themes may address urban heat, walkability, air quality, stormwater reduction, and water quality. Others may evaluate opportunities to address disadvantaged areas, densely populated regions, and human health factors such as asthma cases, median age, and mental health. In any planting prioritization scenario, the scale may include U.S. Census Bureau Census Block Groups, Census Tracts, Zoning Type, Neighborhoods, and Citywide. The following themes can apply to any canopy goal scenario presented in the previous section.

Using the 2020 Tree Canopy Assessment, research and local data, and analyses in a Geographic Information System (GIS), a series of recommended prioritization techniques is provided. The description of the prioritization techniques and scenarios is provided below followed by a series of corresponding priority maps.

- A) Ownership type: Planting opportunities and limitations differ by ownership type. With City authority over public land, prioritizing public areas is an opportunity to initiate and ramp-up plantings toward the canopy goal.
- B) Community-based Organizations and Public Priorities: The development of the Urban Forest Master Plan identified neighborhood groups and public input on priorities for tree planting. In addition, the City has Neighborhood Empowerment Zones (NEZs) and future land use classified as “Institutional”. Alignment of these groups and priorities in low tree equity areas can be one of the greatest opportunities for robust planting initiatives.
- C) Census Block Groups (CBGs) with the greatest possible planting area: CBGs with the highest percentage of total area available for possible planting. Includes vegetative and impervious possible planting areas.
- D) CBGs with low amounts of tree canopy cover: CBGs with the lowest percentage of existing tree canopy cover.
- E) CBGs with high amounts of impervious area and high surface temperatures: CBGs with low tree canopy cover, high impervious area, and high surface temperatures can be planted with trees to reduce urban heat and achieve other health outcomes such as improved air quality.
- F) Tree planting in Census Blocks to reduce stormwater runoff: Trees can be integrated to help manage stormwater, specifically when targeting impervious surfaces. This indicator uses available planting area on impervious surfaces and available planting areas within 100 feet of all surface water bodies.
- G) Tree planting in neighborhoods with high populations of minorities: Tree canopy is negatively correlated with the percentage of minority residents. Planting trees in communities with higher percentages of minority residents can support environmental equity.
- H) Tree planting in neighborhoods with lower-income populations: Tree canopy is positively correlated with higher median income. Planting trees in lower income communities can support environmental equity. CBG suitability is based on the percentage of residents living below the poverty level.
- I) Tree planting for human health: Based on the self-reported data to the Center for Disease Control, trees improve well-being and air quality resulting in improved health.

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

A) PRIORITY BY OWNERSHIP TYPE: PUBLIC LAND AND PUBLIC PRIORITY PLANTING AREAS



Figure 74. Map displaying public priorities for planting on public land within Census Block Groups with a Tree Equity Score lower than 80

B1) COMMUNITY ORGANIZATIONS AND PUBLIC PRIORITIES IN LOW TREE EQUITY AREAS

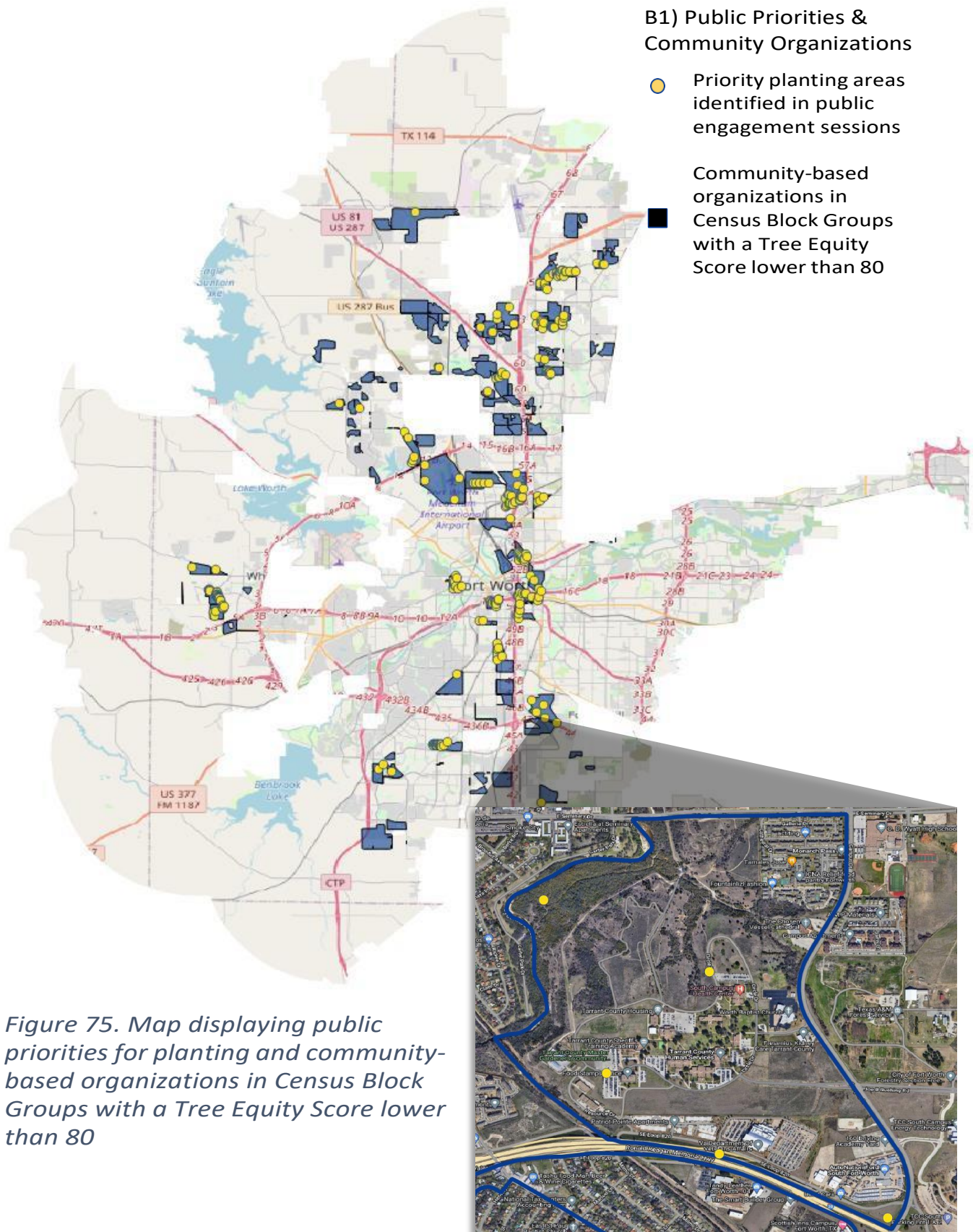


Figure 75. Map displaying public priorities for planting and community-based organizations in Census Block Groups with a Tree Equity Score lower than 80

B2) PUBLIC PRIORITIES FOR PLANTING ON INSTITUTIONAL PROPERTY

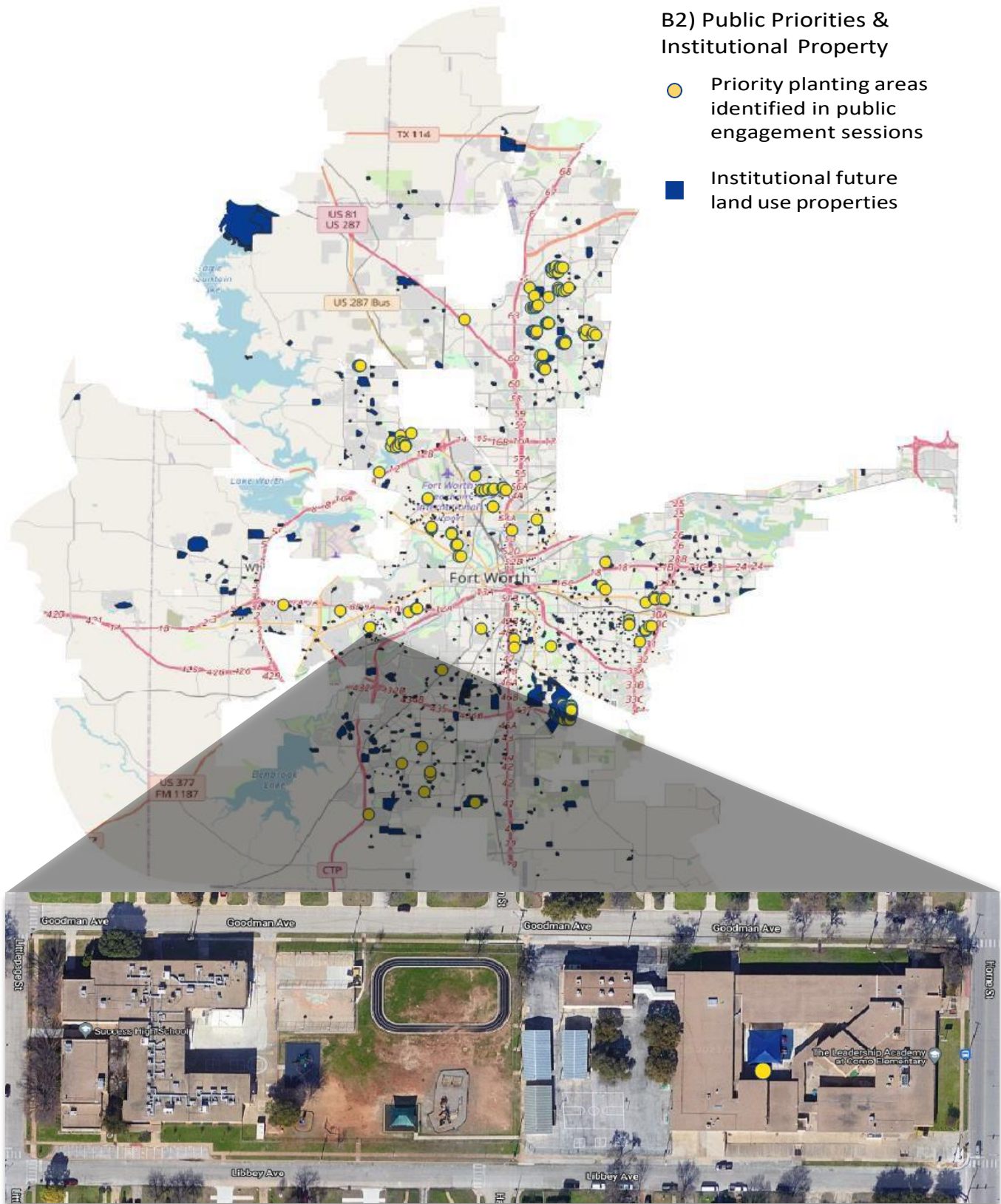


Figure 76. Map displaying public priorities for planting on institutional property such as Success High School

C) CENSUS BLOCK GROUPS WITH THE GREATEST AMOUNT OF AVAILABLE SPACE

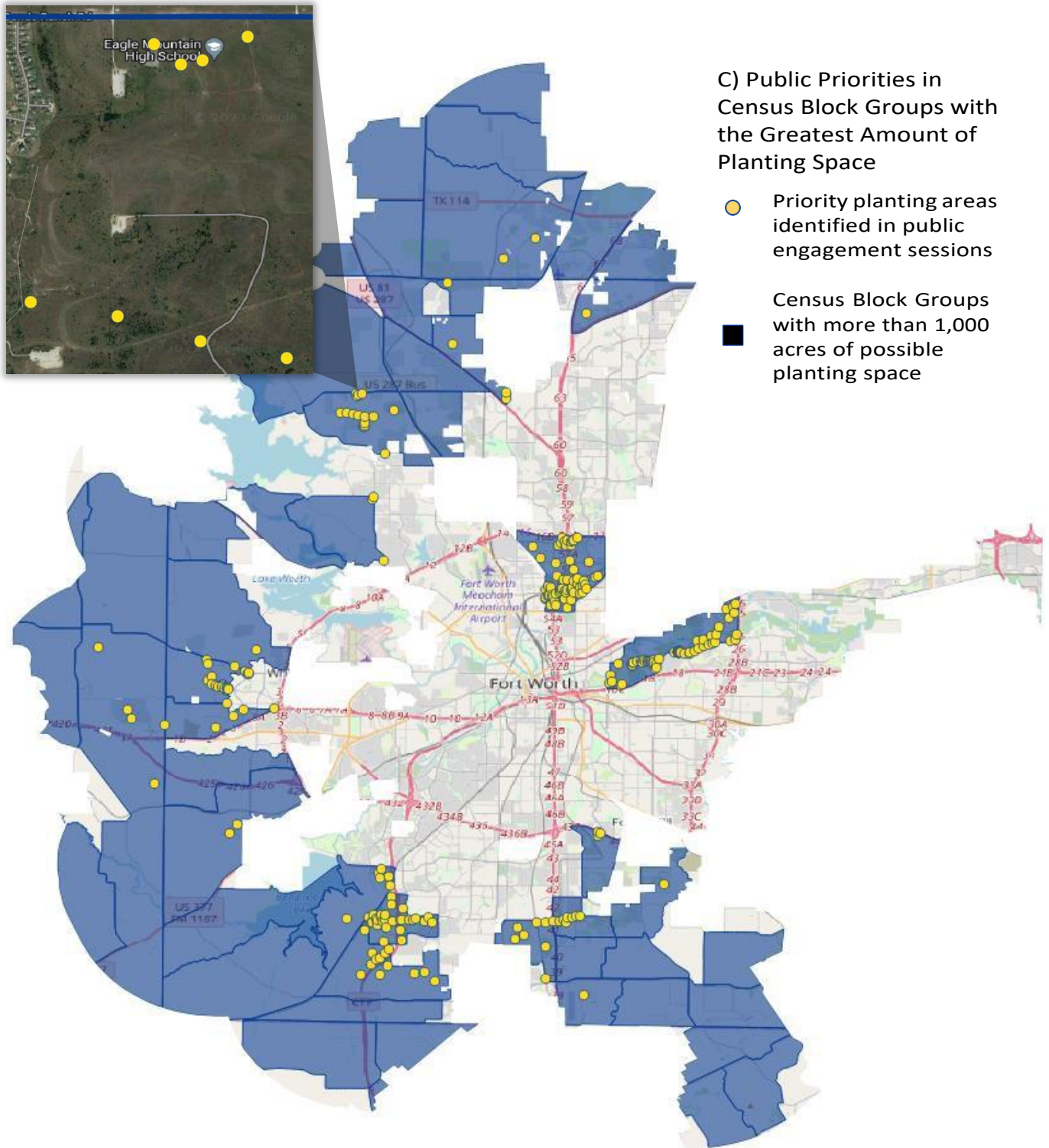


Figure 77. Map displaying public priorities for planting within Census Block Groups with more than 1,000 acres of available planting space

D) CENSUS BLOCK GROUPS WITH THE LOWEST AMOUNT OF TREE CANOPY AND EQUITY

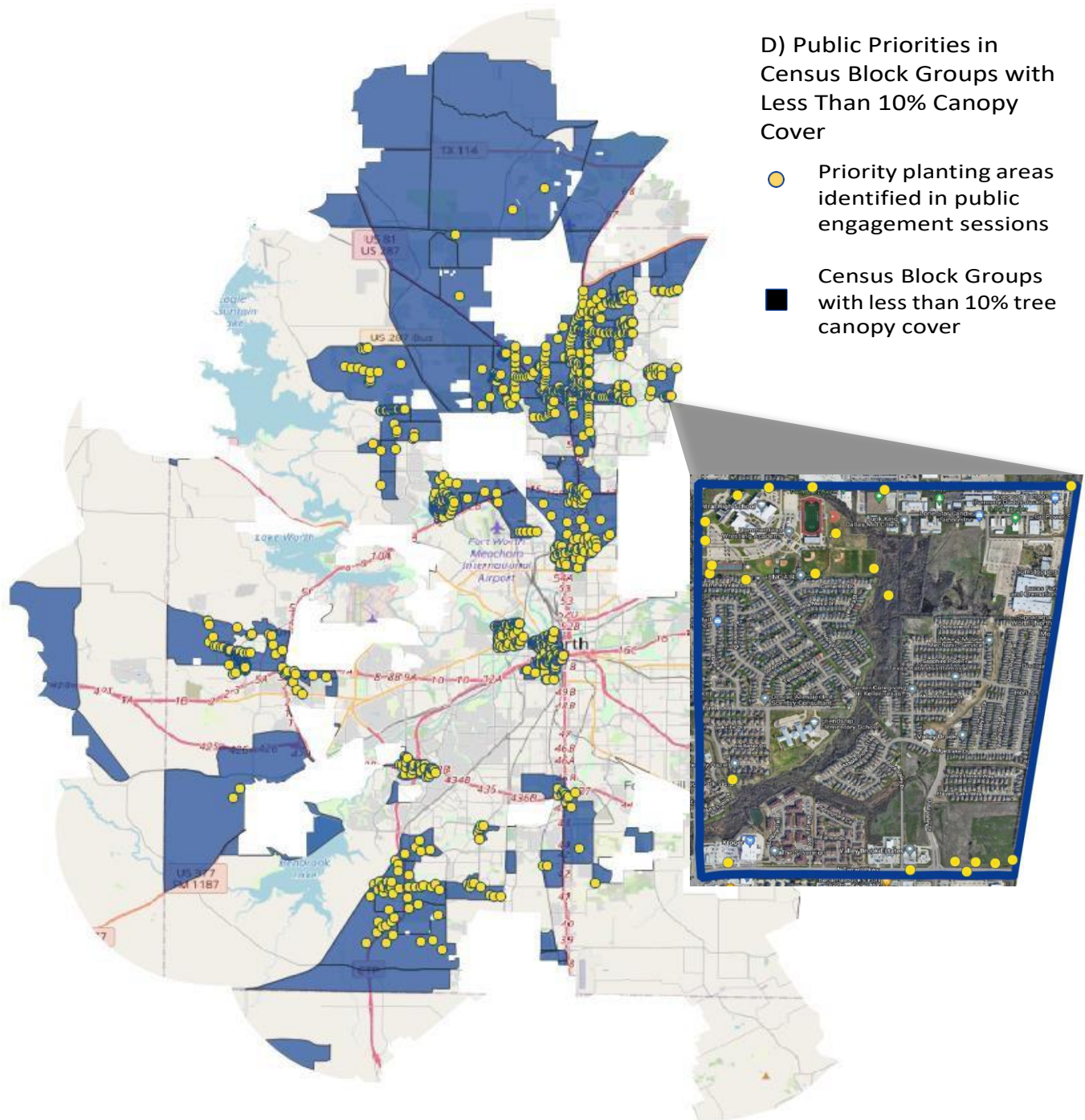


Figure 78. Map displaying public priorities for planting within Census Block Groups that have less than 10% tree canopy cover

E) PUBLIC PRIORITY AREAS TO ADDRESS URBAN HEAT

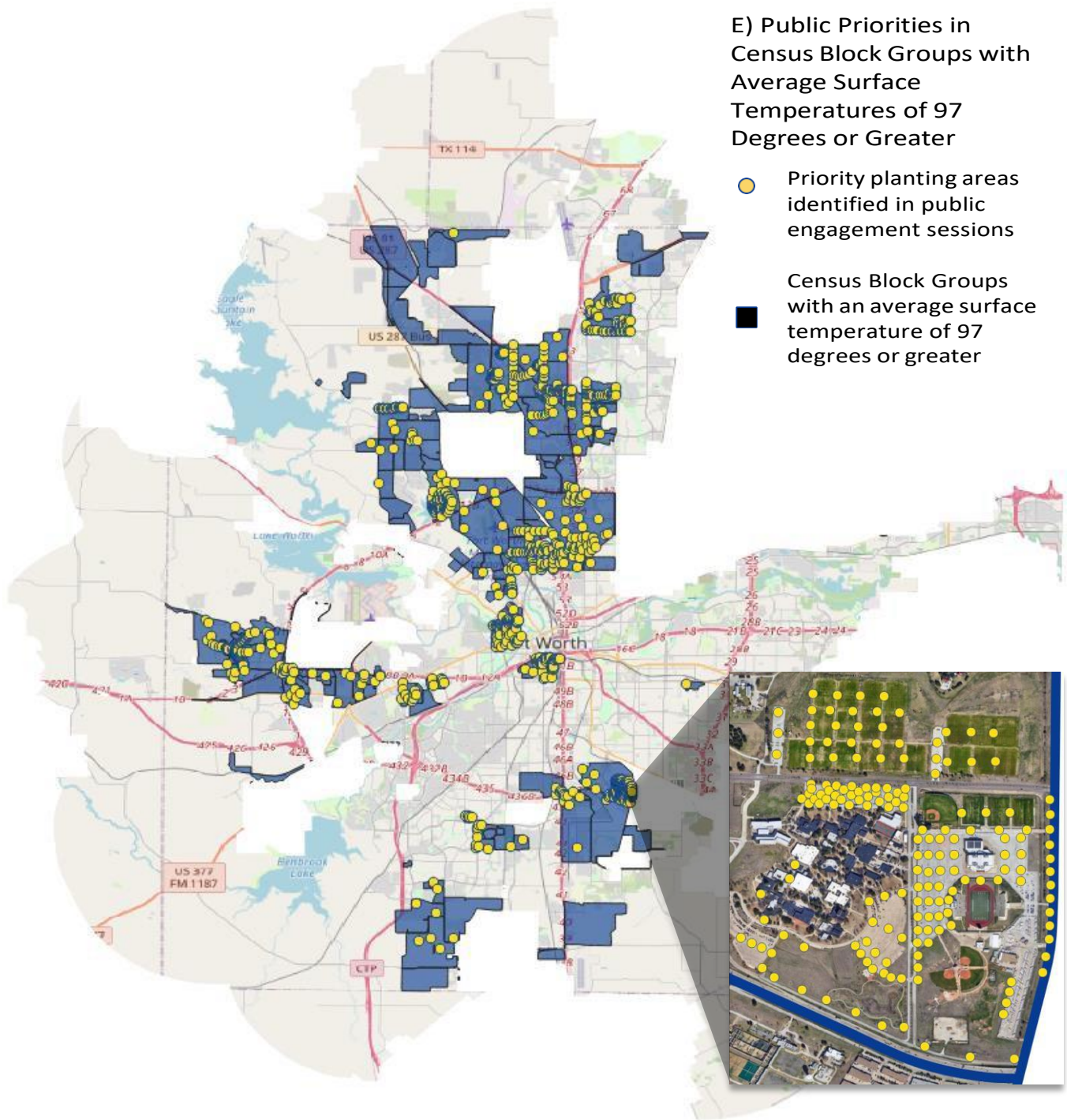


Figure 79. Map displaying public priorities for planting within Census Block Groups that have an average surface temperature of 97 degrees or greater

F) PRIORITIES TO REDUCE STORMWATER RUNOFF AND IMPROVE WATER QUALITY

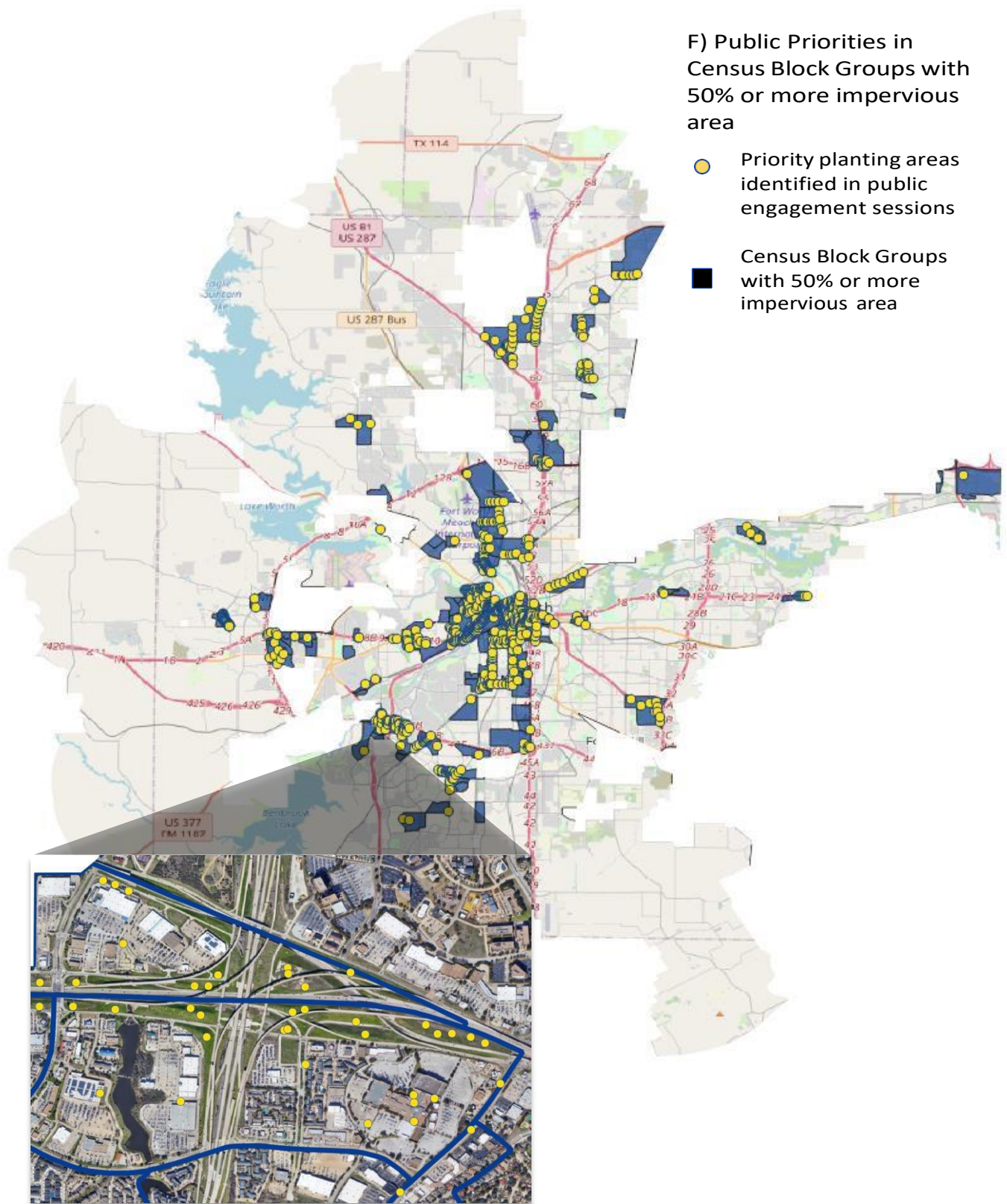


Figure 80. Map displaying public priorities for planting within Census Block Groups that have 50% or more impervious area

G) PRIORITIES FOR PLANTING IN UNDERSERVED COMMUNITIES

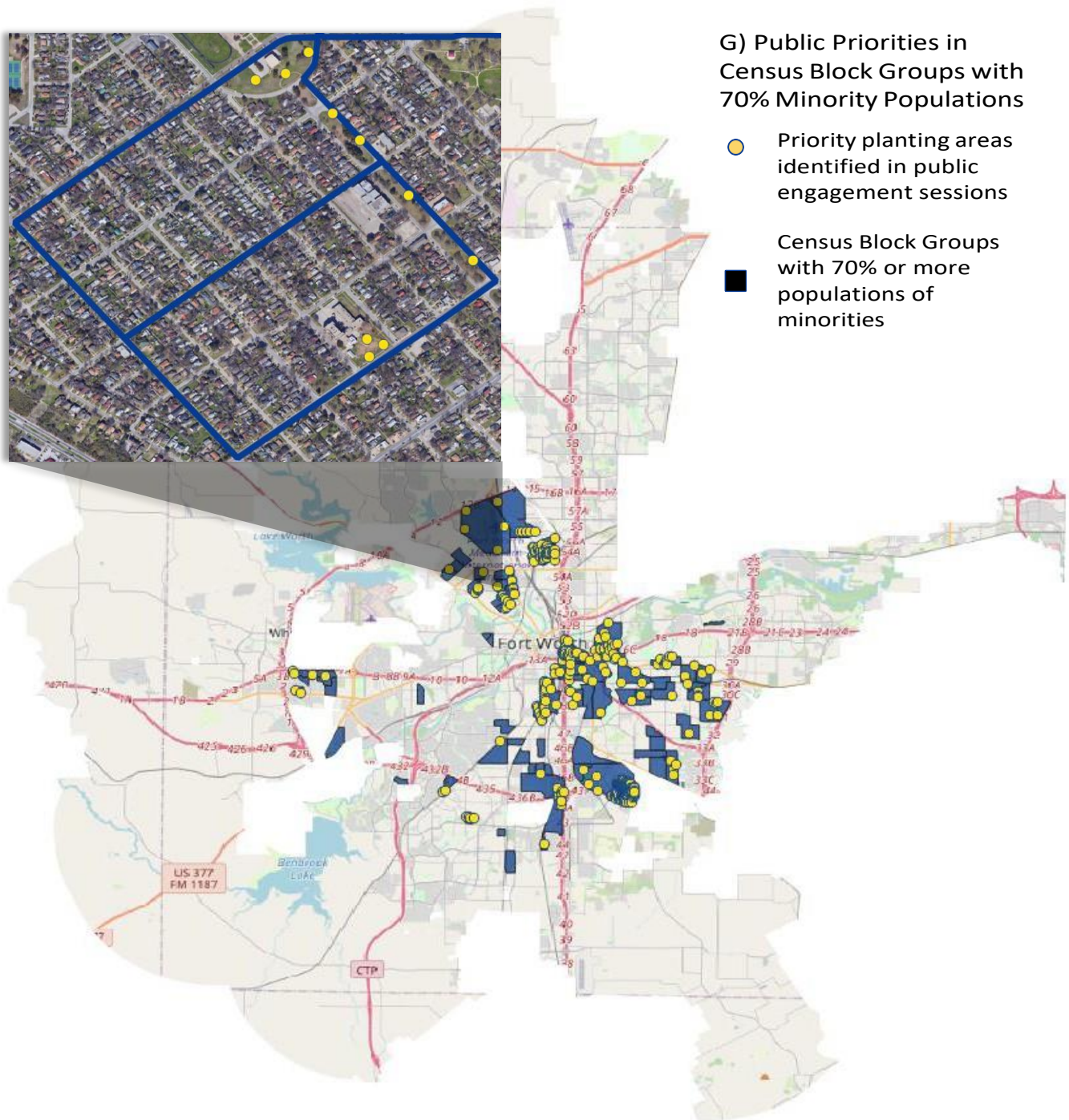


Figure 81. Map displaying public priorities for planting within Census Block Groups with 70% or more minority populations

H) PRIORITIES FOR PLANTING IN LOWER-INCOME COMMUNITIES

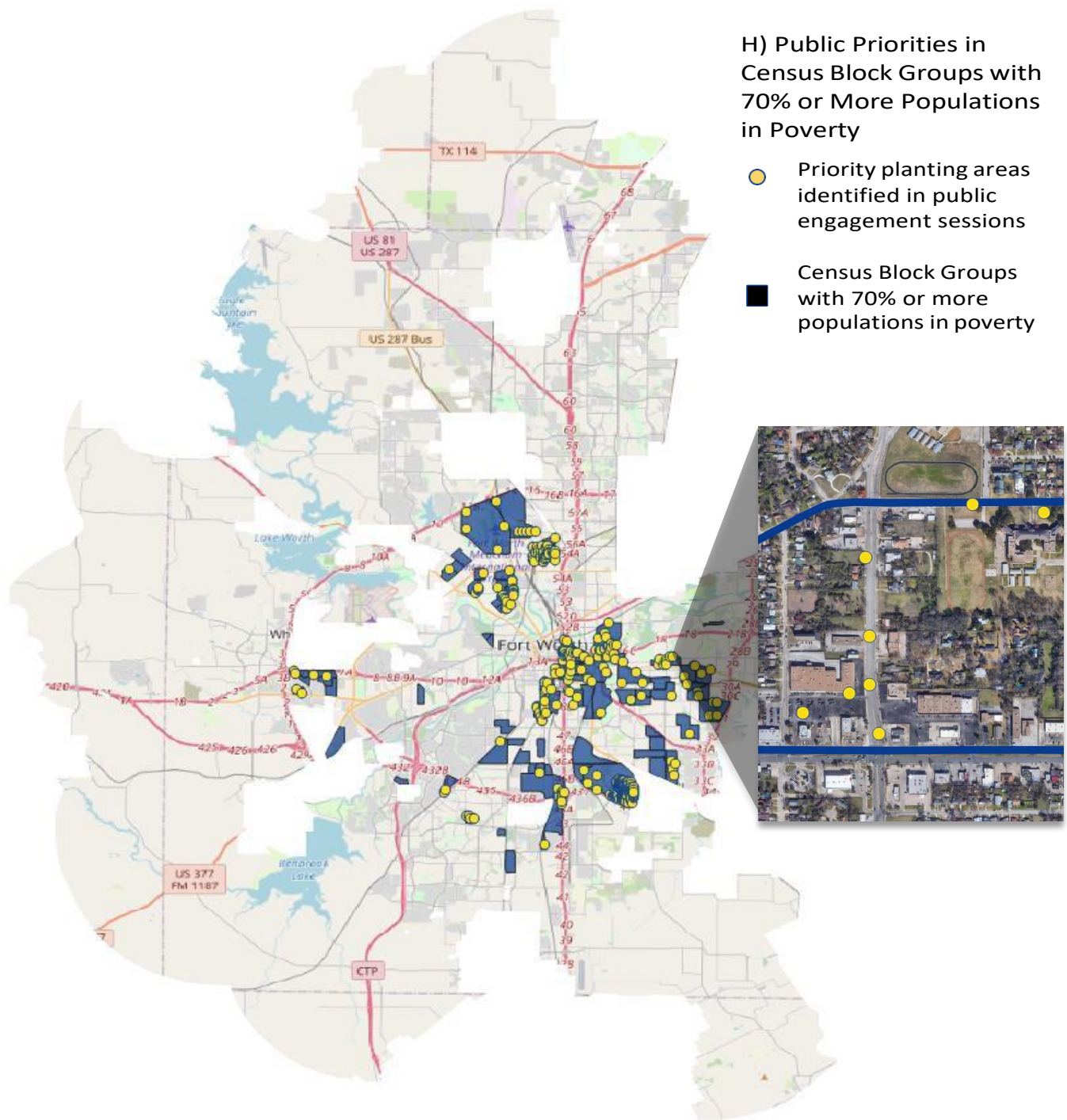


Figure 82. Map displaying public priorities for planting within Census Block Groups with 70% or more populations in poverty

I) PRIORITIES FOR PLANTING TO IMPROVE HUMAN HEALTH

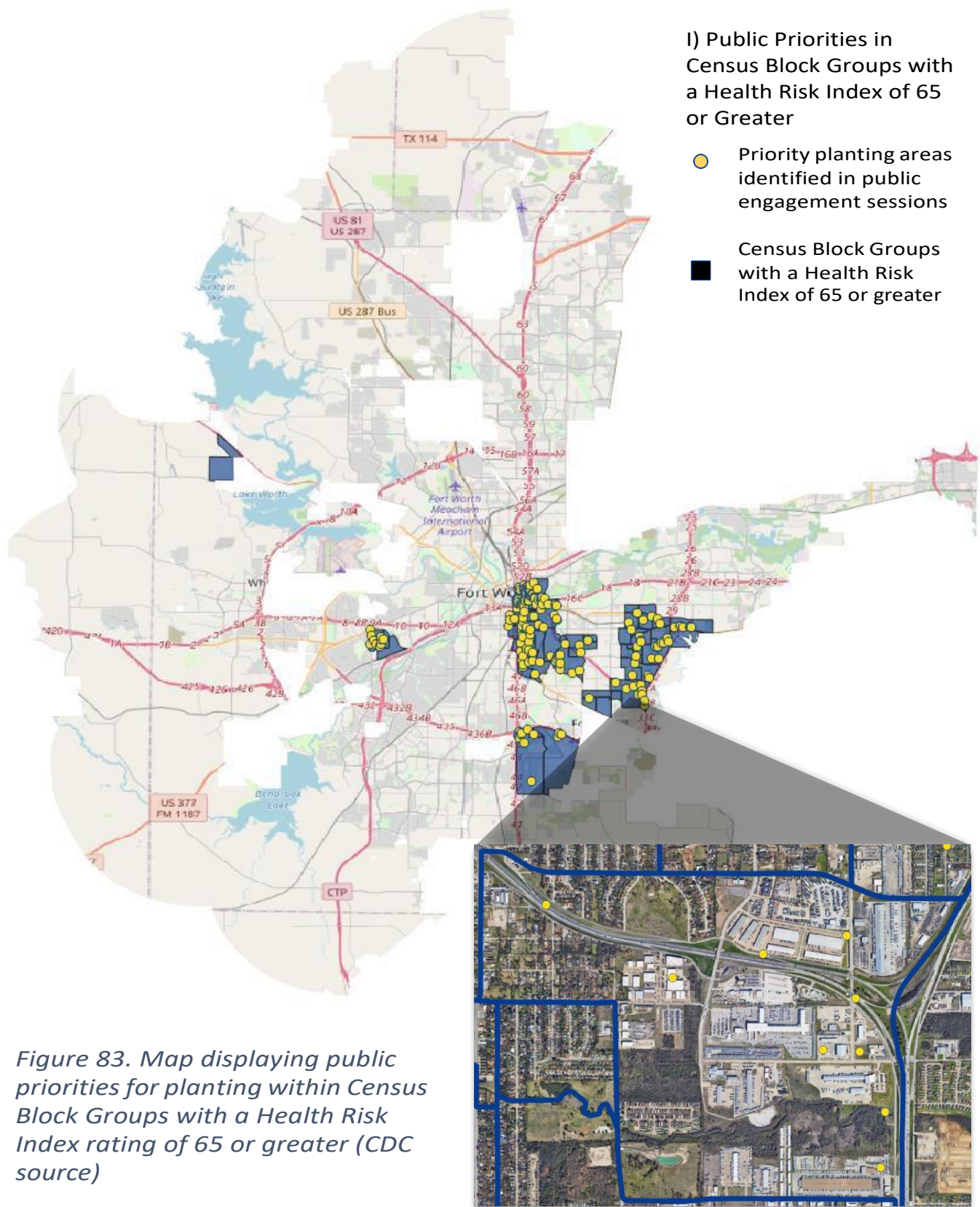


Figure 83. Map displaying public priorities for planting within Census Block Groups with a Health Risk Index rating of 65 or greater (CDC source)

INTEGRATED TREE PLANTING PRIORITY MAP

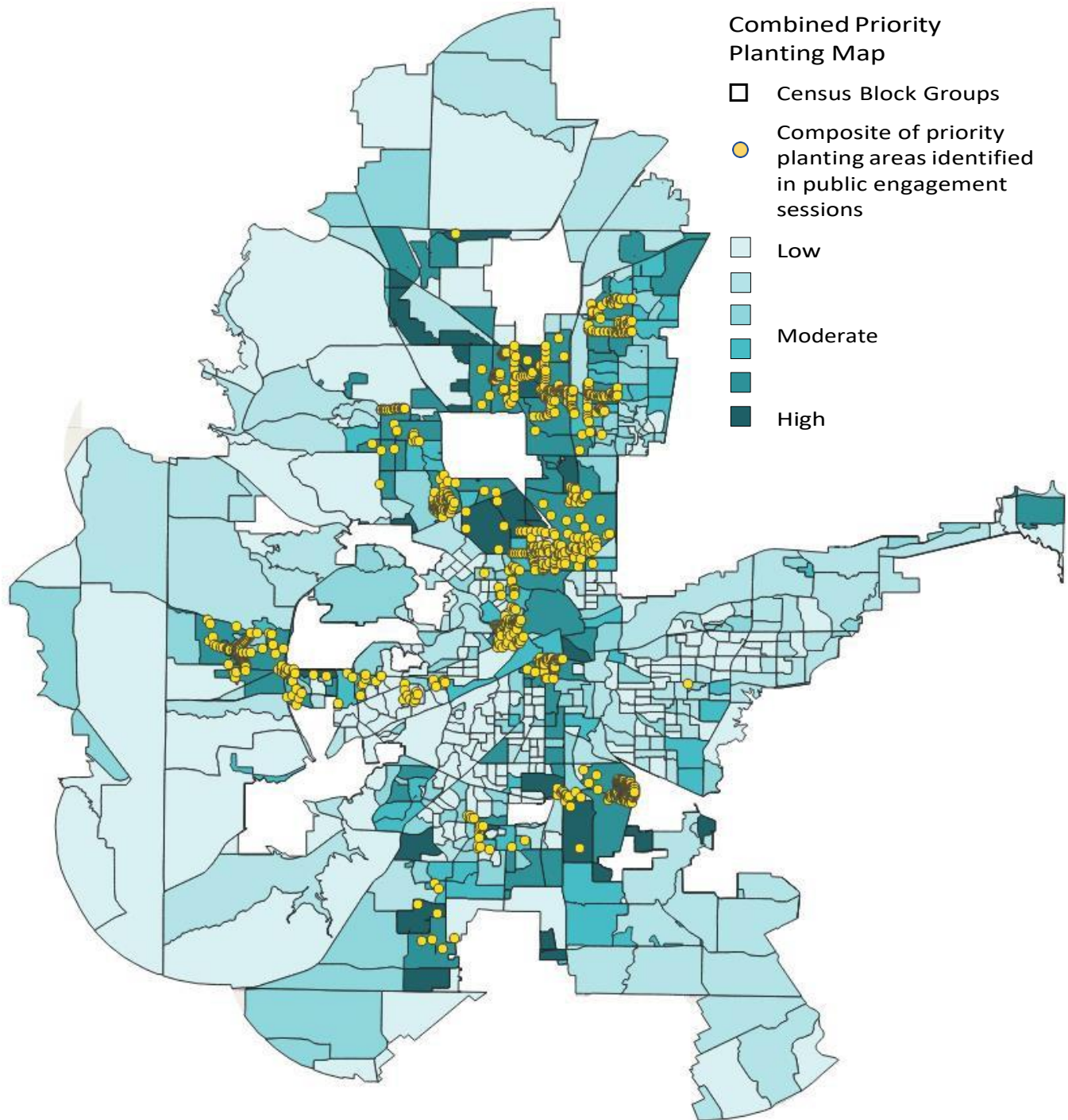


Figure 84. Map displaying the combined priorities of the public for tree plantings and the integrated data analyses

Discussion

In the past few years, regional partners are increasingly acknowledging and confronting the past practices, current perceptions, and accelerating progress to ensure that communities, landscapes, and policies are more intentional about enhancing historically disinvested areas. Driven in part by the City's Urban Forest Master Plan and other City/regional initiatives, ambitious goals to increase tree canopy in areas of greatest need are taking hold. These goals will grow a more equitable urban forest that provides cooling, public health, habitat, energy saving, and other benefits. In addition, the City must commit to plant and maintain trees, update and align policies and procedures to grow and protect public and private trees, and engage the residents of Fort Worth to become advocates and stewards of the city's urban forest.

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

Measuring, tracking, and improving urban tree canopies is an essential component of sustainable urban living. As the city population continues to climb and the natural environment becomes even more urbanized, the value of healthy urban tree canopy is only going up. Unfortunately, the global urban canopy trend is moving in the opposite direction. A worldwide analysis showed urban forest cover on average is slightly, but significantly decreasing. The United States is also losing urban tree canopy, to the tune of 175,000 acres or 36 million trees a year. That represents a loss of \$96 million in tree benefits a year, and those benefits, like heat reduction and public health improvements, are growing in necessity. In Fort Worth, canopy cover changed from 25% to 19% in 20 years (2003 to 2023). This translates to a loss of \$5.5 million in ecosystem benefits such as carbon dioxide sequestration (a \$2.7 million loss) and air pollution (\$2.8 million loss).

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

In Fort Worth, 75% of possible planting area (PPA) is found in areas designated as private land. The City should focus on community outreach and education programs to better inform residents and private landholders of the environmental, health, social, and financial benefits that trees provide and consider other strategies to help preserve existing trees and grow the tree canopy in the 162,000+ acres of plantable space on private properties. The City should explore options to develop grant programs for tree maintenance or removal of hazard or invasive trees within the city to remove barriers for overburdened communities which lack tree canopy. Tree giveaways, tree planting programs, and tree maintenance events can help to promote new tree plantings. To promote new plantings, continue to provide free trees from the Rolling Hills Tree Farm and as part of Forestry's planting program. In addition, utilize the priority planting areas as a means to increase awareness and resources

for the Park and Recreation's Neighborhood Tree Planting Program to continue to provide free 5-gallon trees. To plant more trees on private property, low-canopy and underserved neighborhoods should be prioritized. The City should also continue to develop partnerships with community-based organizations and individual champions throughout neighborhoods to build stewardship at the community level. In addition, the City should continue to conduct volunteer tree planting and tree maintenance events to increase awareness levels in the community.

For Fort Worth, the tree canopy goal of 30% was established and documented in City plans and the Urban Forestry Ordinance. This Technical Report provides alternative considerations and priority areas for tree planting to expand canopy cover. Guidance on how the City can achieve the 30% by 2050 canopy goal (or the alternatives) was provided in terms of the recommended number of trees to plant per year and priority areas. The City and its partners should review and formally approve of the approach in reaching canopy goals and develop a master tree planting plan or canopy action plan. These supporting plans would address priority areas, the number of trees to plant, partners involved and related roles, species recommendations, timing, costs, among other considerations for growing a sustainable urban forest.

Critical to strategic planting to ensure tree equity, sustainability, and urban forest resiliency is a comprehensive inventory of the city's public trees and a well-maintained database to inform decisions. Rather than inferring tree composition, structure, and other metrics from regional research and datasets, the inventory offers essential information that can be monitored and measured overtime for an adaptive management approach. Tree inventories can inform tree managers how well best practices are implemented, tree species performance with changing conditions, ecosystem benefits, and innumerable other indicators for sustainable management.

Although the City will oversee and monitor a public tree inventory and citywide canopy goals, these efforts will inevitably require extensive support from all City departments, community-based organizations, and others aiming to prepare for a hotter and drier climate. As a first step, the City's 2023 Urban Forest Master Plan will provide guidance to prioritize resilient, climate-appropriate trees, preserve and conserve mature trees, and properly manage resources to ensure that trees thrive in the urban environment. The cooperation of the City, partners, organizations, property owners, and others is instrumental to meeting these goals, and this report provides the approach to formally establish a tree canopy goal that will guide this shared commitment.

PLANNING ELEMENT:



**URBAN FOREST
BENCHMARKS**

PURPOSE:

To understand the level of effort and capacity necessary to satisfy the City's adopted goals, and to ensure urban forest sustainability



ELEMENT 5: URBAN FOREST BENCHMARKS

Purpose

To understand the City’s Urban Forestry and Forestry programs and services compared to industry standards, benchmarking research is conducted. The evaluations include comparisons of programs in analogous communities that are cross-examined with industry standards and best practices. The findings can inform the level of effort and the capacity necessary to satisfy the City’s adopted goals and policies. Benchmarks help to gauge the City’s investment in its urban forest compared to other communities facing similar issues in urban forest management. The results of the benchmarking exercise enable the development of realistic strategies and achievable targets that align with comparable communities and industry standards while meeting the needs of the urban forest, its programs, and the community. It will also serve as a platform and tool for monitoring implementation of the Urban Forest Master Plan.

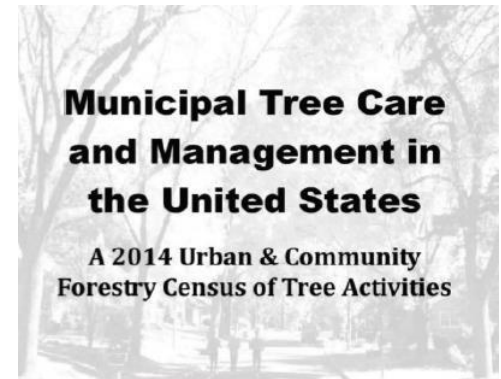
Process

Several data sources were reviewed and compiled to evaluate how Fort Worth’s urban forest and associated programs compared to industry standards and communities of a similar size or geographic location and how its own operations have changed over time.

Phase I of the benchmarking process uses the Arbor Day Foundation’s Tree City USA 2021 dataset and compares statistics provided by the City of Fort Worth and as reported to Arbor Day for Tree City USA accreditation. The dataset includes program metrics for over 3,700 communities and the data is used to identify cities of similar size, location, and program structure that also participate in the Tree City USA program. Using this dataset helps better understand how Fort Worth’s public tree budget and activities compare to relevant cities. Relevant cities are determined by 1) proximity (within 50 and 100 miles of city center), 2) population size (percent difference and cities with more than 100,000 people), and cities outside of these parameters but are areas of interest. The Tree City USA dataset is largely focused on public tree budgets, per capita funding information, and volunteer hours. The data further describes the number of trees planted, removed, and pruned by City staff. This data is useful in determining adequacy of public tree program funding as well as understanding workloads of those City employees involved in public tree operations.



Phase II of benchmarking involves comparing Fort Worth's public tree operations to findings from an in-depth [study](#) conducted by researchers Richard Hauer and Ward Peterson (2014). In this study, researchers interviewed urban forestry programs in various regions across the U.S. and among varying population classes. A total of 670 communities participated in the census. Specific study focus areas include community and staff profiles, funding, tree management policy and planning, volunteers and partnerships, contracting tree care activities, community tree populations, tree operations and management, and assistance programs. Data from this study was compared to data obtained from the City of Fort Worth for the purposes of determining program health as compared to accurate data across a range of scales and locations.



Phase III of benchmarking is comprised of presenting the findings to the City and allowing time for any further data collection or clarifications in order to ensure the highest quality analysis. This phase also includes internal quality controls to ensure data comparisons are as accurate as possible. Information gathered during this process will inform the development of realistic and attainable goals and strategies in the City's Urban Forest Master Plan.

Results

Understanding the public tree policies, management approaches, budgets, and programs of comparable communities and nationwide averages provides comparative data to benchmark the City's performance, present and future. While existing tree data describes the current conditions, benchmarks offer guidance to bring Fort Worth's public tree policies and practices into alignment with similar-sized cities in Texas and nationwide, enhancing urban forest management. A summary of the cities used for benchmarking Fort Worth can be found in the table below.

COMMUNITIES FOR COMPARISON

Comparison Criteria	Community	County	Pop.*	Difference	Distance**
N/A	Fort Worth	Tarrant	938,055	0	0
>50, <100 Miles, >100k Pop	McKinney	Collin	204,902	-733,153	56.9
>50, <100 Miles, >100k Pop	Waco	McLennan	140,000	-798,055	89.2
>50, <100 Miles, >100k Pop	Allen	Collin	107,397	-830,658	55.3
<50 Miles, >100k Pop	Dallas	Dallas	1,300,000	361,945	32.4
<50 Miles, >100k Pop	Arlington	Tarrant	395,500	-542,555	15.1
<50 Miles, >100k Pop	Plano	Collin	287,064	-650,991	49.2
<50 Miles, >100k Pop	Garland	Dallas	247,558	-690,497	46.9
<50 Miles, >100k Pop	Irving	Dallas	239,783	-698,272	25.6
<50 Miles, >100k Pop	Frisco	Collin	212,694	-725,361	47.1
<50 Miles, >100k Pop	Grand Prairie	Dallas	195,200	-742,855	21.1
<50 Miles, >100k Pop	Denton	Denton	147,993	-790,062	37.3
<50 Miles, >100k Pop	Mesquite	Dallas	146,000	-792,055	45.3
<50 Miles, >100k Pop	Lewisville	Denton	109,270	-828,785	33.1
City of Interest	Austin	Travis	961,855	23,800	189.5
City of Interest	El Paso	El Paso	649,121	-288,934	603.7
City of Interest	Fort Hood	Bell	461,481	-476,574	151.9
City of Interest	San Antonio	Bexar	1,434,625	496,570	268.1
City of Interest	Lubbock	Lubbock	258,778	-679,277	314.4
City of Interest	Amarillo	Potter	191,000	-747,055	338.7
City of Interest	Brownsville	Cameron	182,781	-755,274	539.2
AVERAGE			419,574	-544,405	148

Table 23. List of cities and criteria for considering a comparison of benchmarks

* Population as of 2021 TC USA reporting

** Driving distance from the study area in miles

Comparison of Public Tree Budgets Based on Tree City USA Reporting for 2021

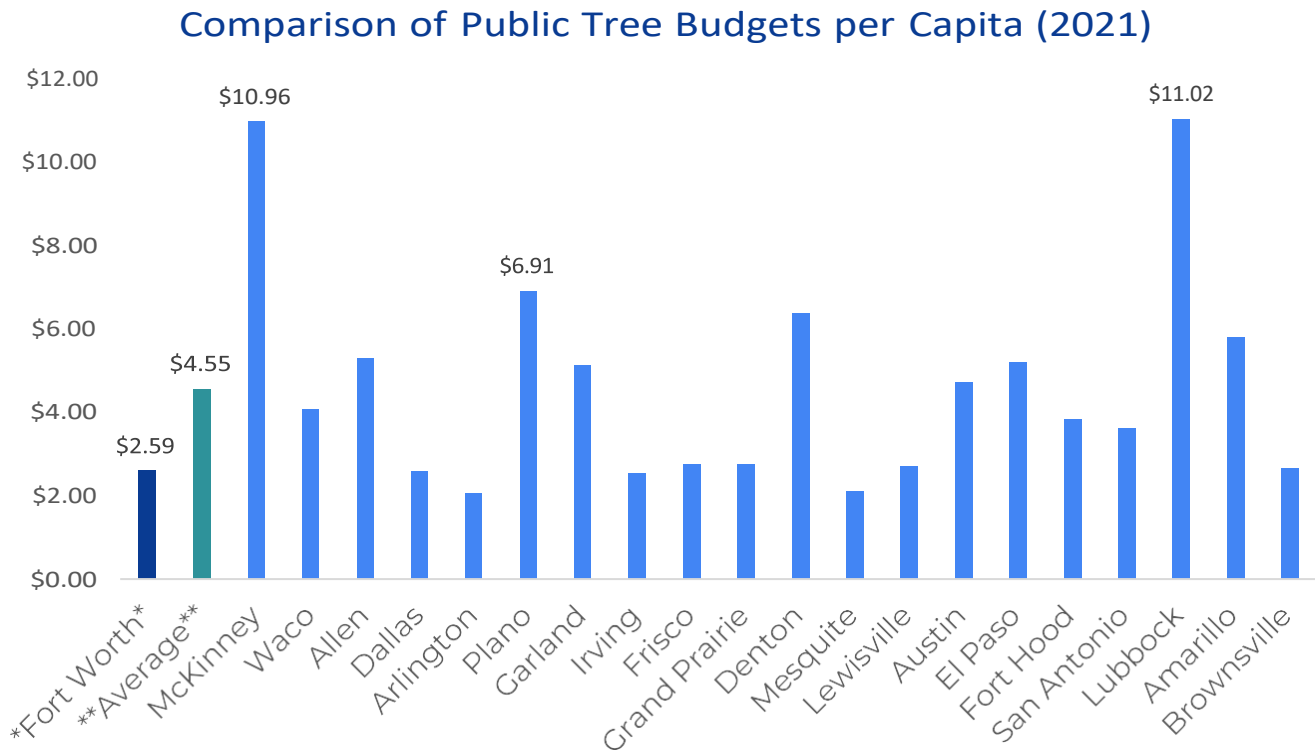


Figure 85. Comparison of public tree budgets per capita in 2021

Comparison of Tree Planting and Initial Care Budgets (2021)

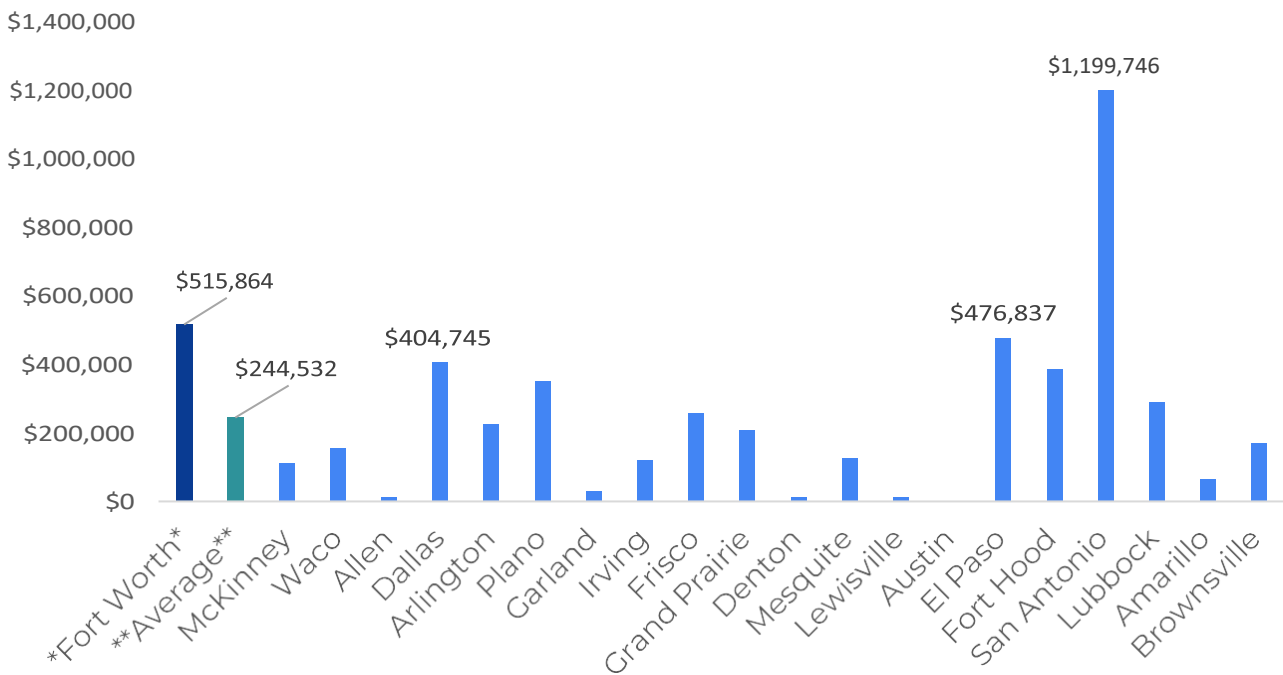


Figure 86. Comparison of tree planting and initial care budgets in 2021

Comparison of Tree Maintenance Budgets (2021)

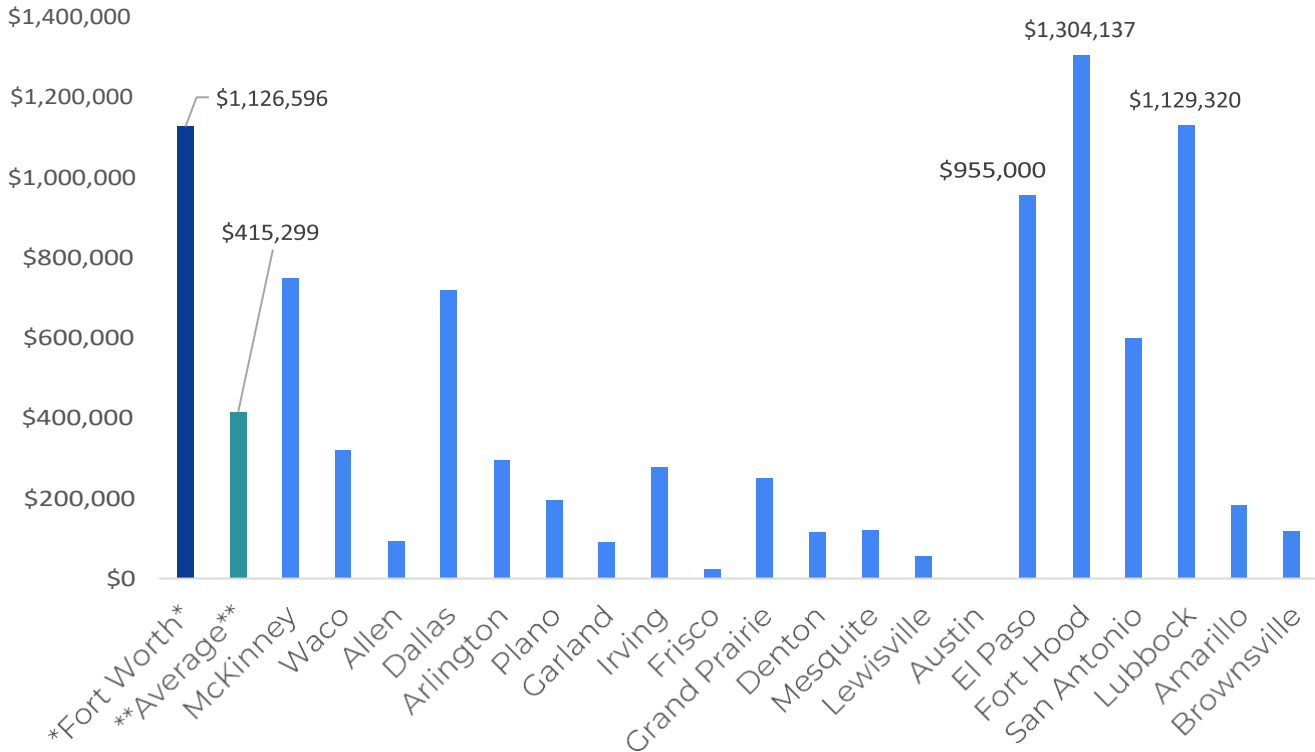


Figure 87. Comparison of tree maintenance budgets in 2021

Comparison of Tree Removal Budgets (2021)

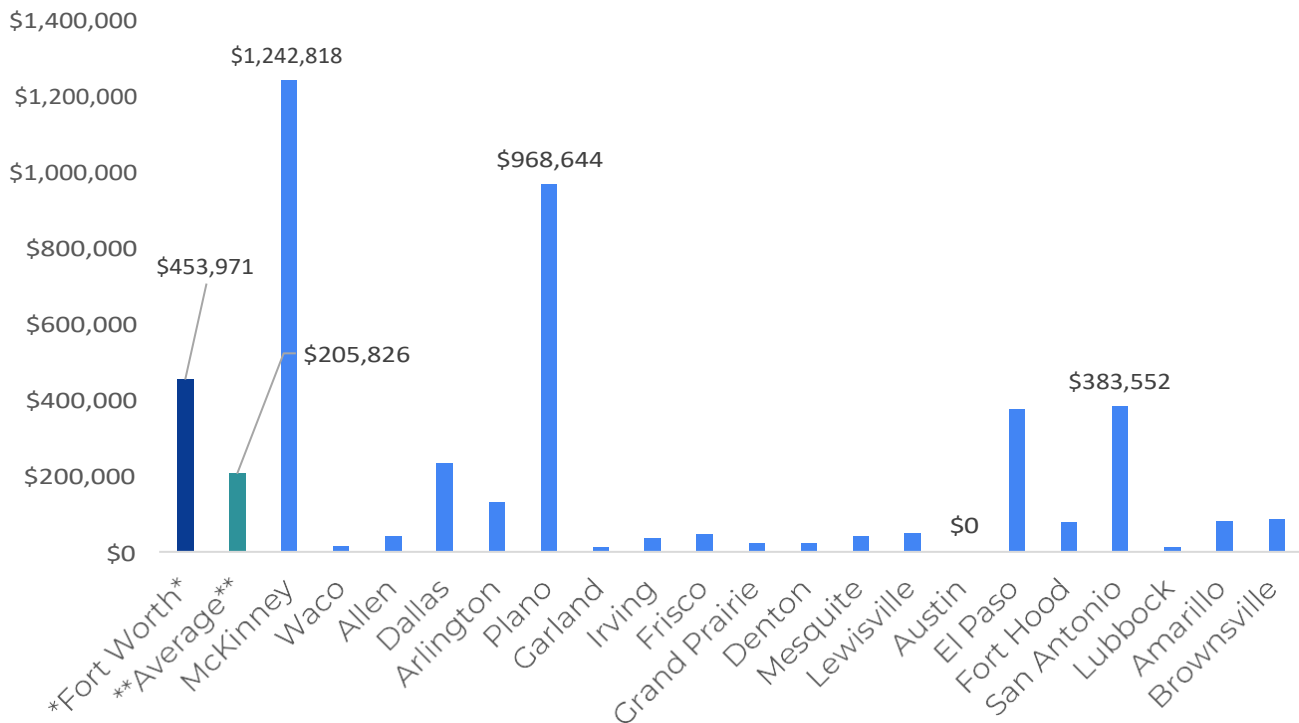


Figure 88. Comparison of tree removal budgets in 2021

Comparison of Public Tree Activities Based on Tree City USA Reporting for 2021

Comparison of Volunteer Hours (2021)

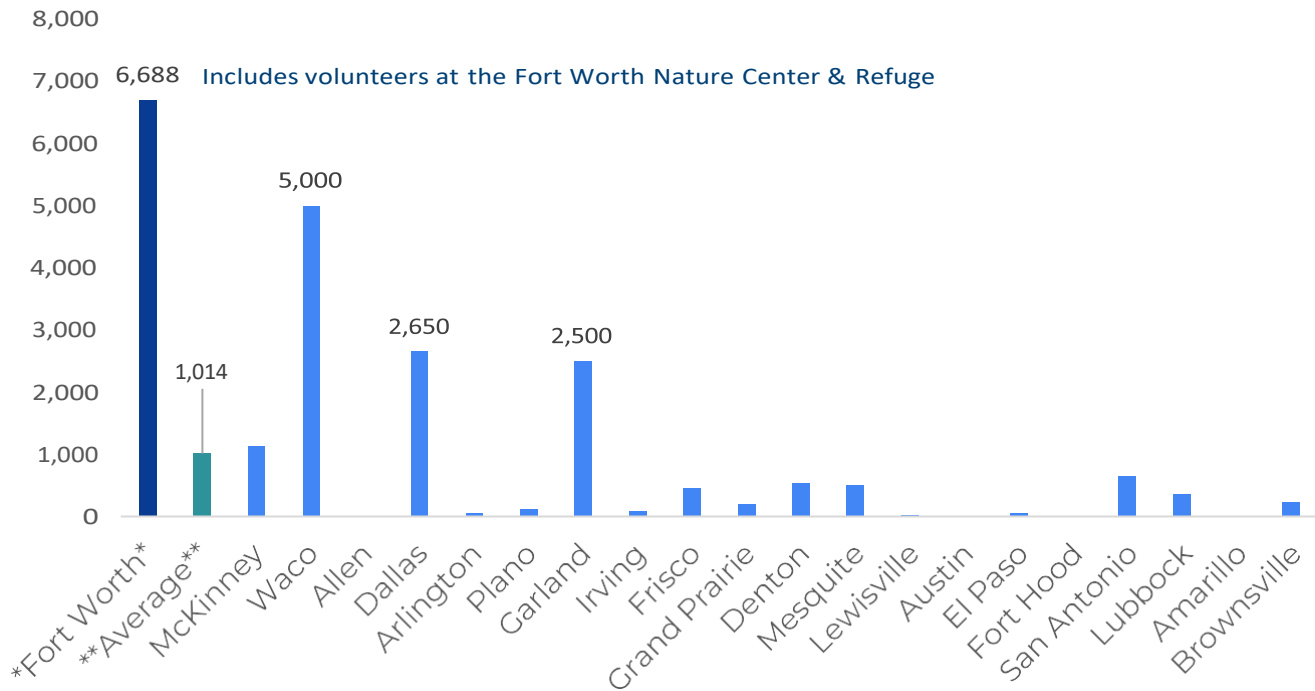


Figure 89. Comparison of volunteer hours in 2021

Comparison of Trees Planted (2021)

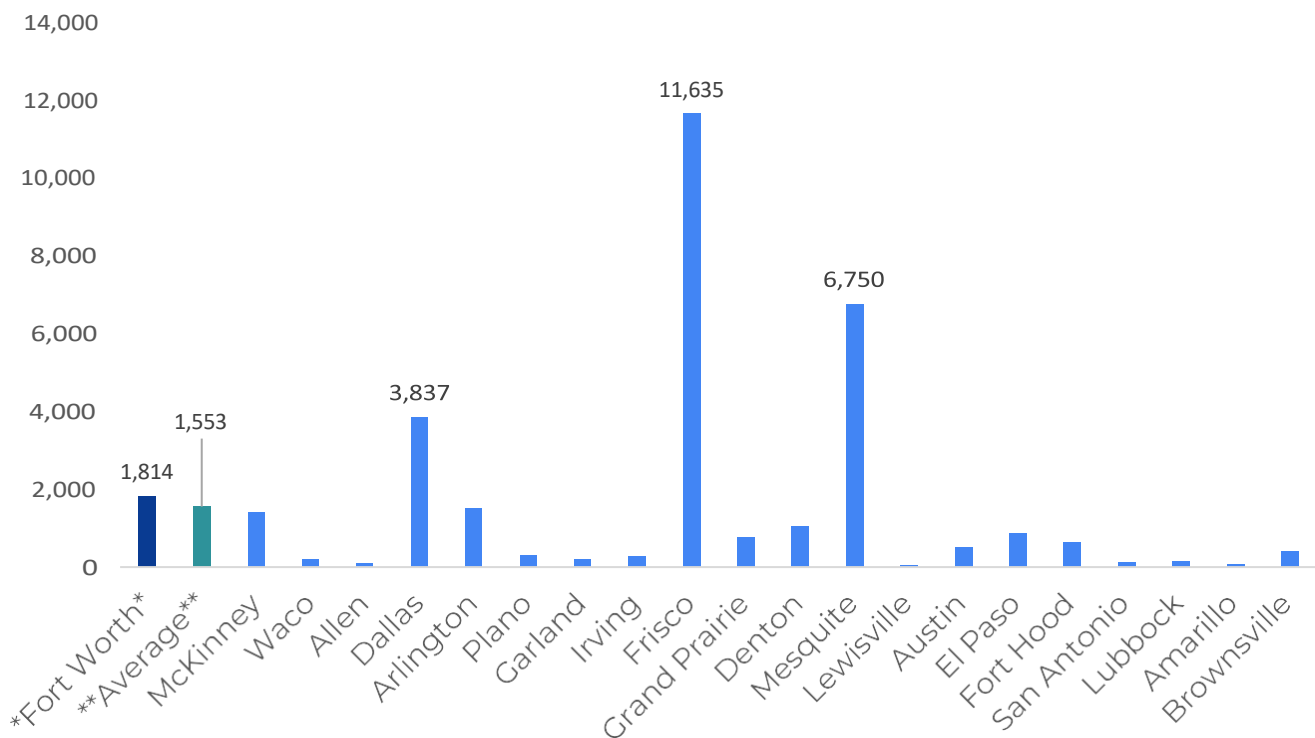


Figure 90. Comparison of the number of trees planted in 2021

Comparison of Trees Pruned (2021)

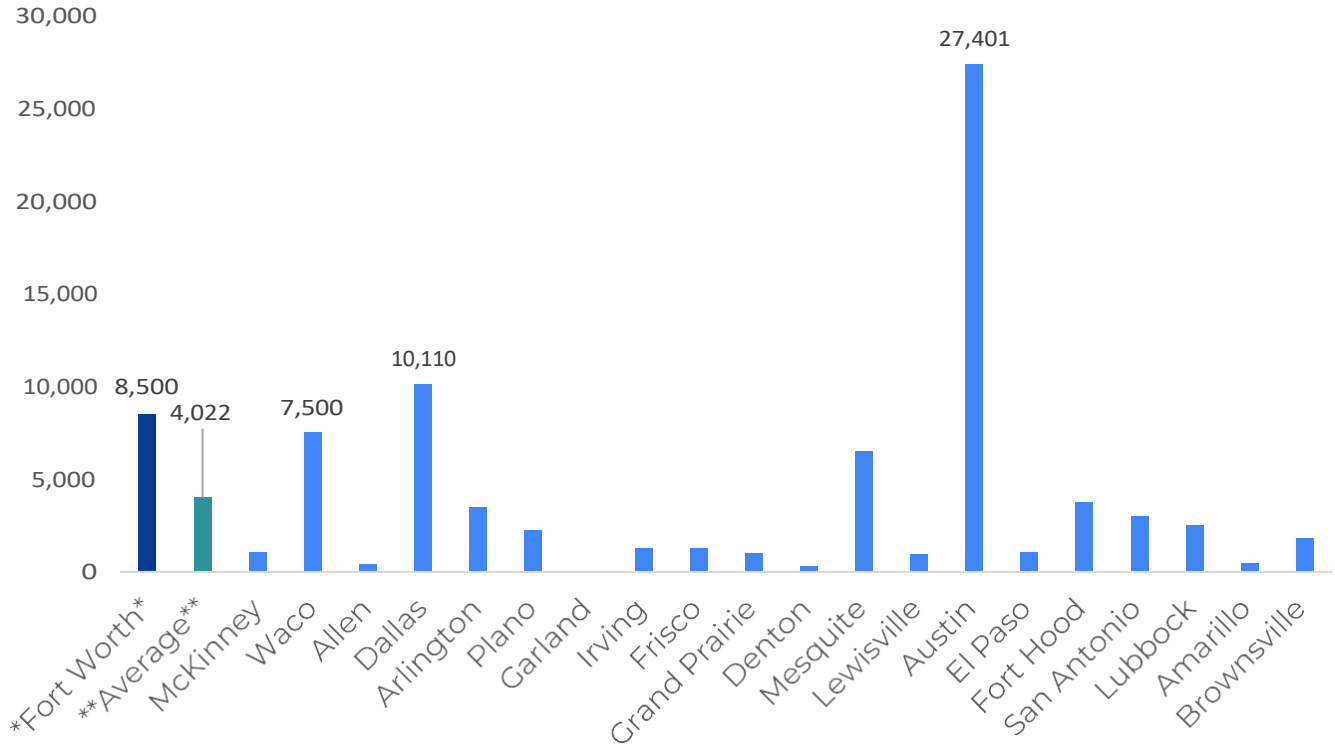


Figure 91. Comparison of the number of trees pruned in 2021

Comparison of Trees Removed (2021)

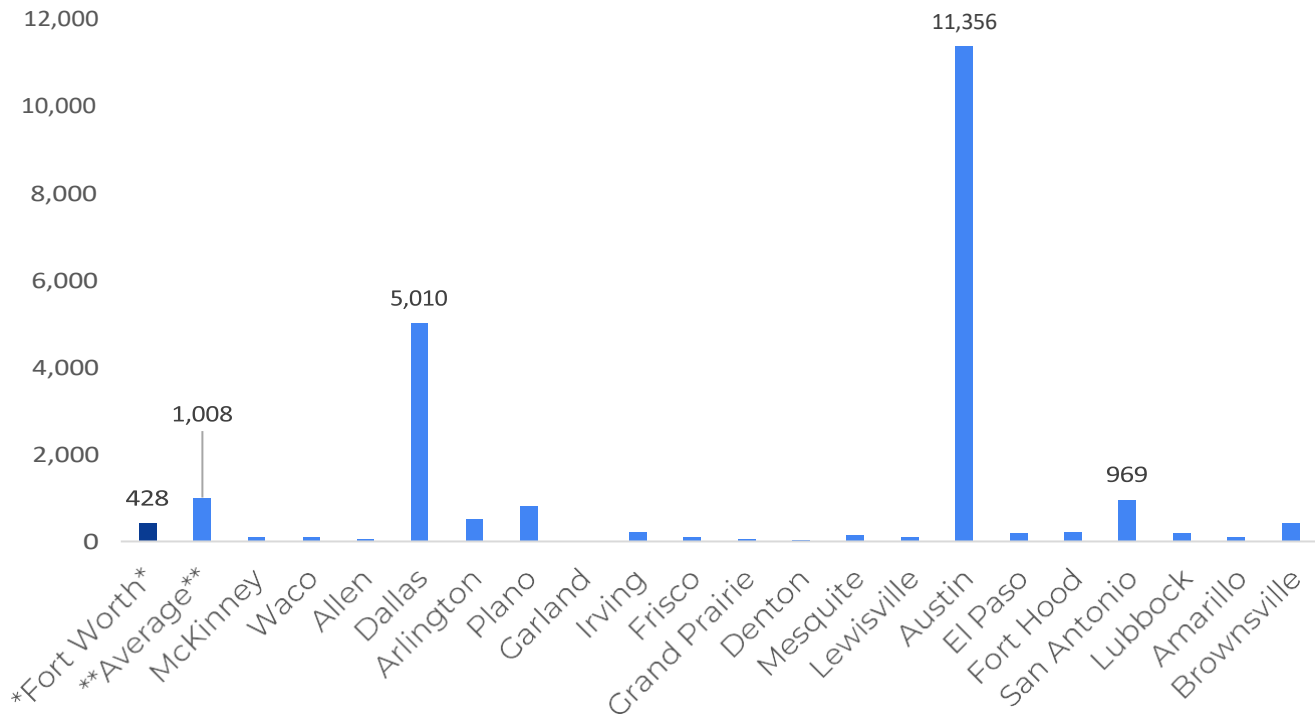


Figure 92. Comparison of the number of trees removed in 2021

SUMMARY OF PUBLIC TREE PROGRAM BUDGETS AND ACTIVITIES IN 2021

Community	Tree Planting and Initial Care	Tree Maintenance	Tree Removal	Management	Utility Line Clearance	Other Expenditures	Overall Budget
Fort Worth	\$515,864	\$1,126,596	\$453,971	\$337,804			\$2,434,235
Average	\$244,532	\$415,299	\$205,826	\$456,443	\$311,670	\$3,771,816	\$2,742,627
McKinney	\$110,713	\$749,240	\$1,242,818	\$143,323			\$2,246,094
Waco	\$155,000	\$320,000	\$15,000	\$80,000	\$0		\$570,000
Allen	\$12,000	\$94,000	\$40,000	\$422,654	\$0	\$0	\$568,654
Dallas	\$404,745	\$718,215	\$231,793	\$1,987,649	\$0		\$3,342,402
Arlington	\$225,000	\$294,000	\$130,500	\$155,000		\$10,000	\$814,500
Plano	\$352,174	\$196,000	\$968,644	\$412,418		\$54,000	\$1,983,236
Garland	\$30,000	\$90,000	\$12,500	\$2,500	\$1,133,253		\$1,268,253
Irving	\$121,979	\$278,742	\$34,623	\$173,837			\$609,181
Frisco	\$257,880	\$22,895	\$45,000	\$257,000	\$0		\$582,775
Grand Prairie	\$209,483	\$250,062	\$22,200	\$55,370	\$0		\$537,115
Denton	\$12,697	\$116,430	\$23,000	\$343,182	\$449,016		\$944,325
Mesquite	\$125,000	\$120,000	\$41,000	\$20,000			\$306,000
Lewisville	\$13,263	\$55,060	\$47,910	\$180,100	\$0		\$296,333
Austin	\$0	\$0	\$0	\$0			\$4,538,953
El Paso	\$476,837	\$955,000	\$375,000	\$1,558,000			\$3,364,837
Fort Hood	\$387,061	\$1,304,137	\$76,765	\$0			\$1,767,963
San Antonio	\$1,199,746	\$599,873	\$383,552	\$3,013,537			\$5,196,708
Lubbock	\$290,254	\$1,129,320	\$12,031	\$331,510	\$1,085,102	\$3,100	\$2,851,317
Amarillo	\$65,718	\$182,969	\$81,030	\$1,000	\$761,000	\$15,468	\$1,107,185
Brownsville	\$169,750	\$118,747	\$85,000	\$110,413	\$0	\$0	\$483,910

Table 24. Summary of all benchmarking research utilizing the 2021 Tree City USA database

Community	Overall Budget	Per Capita Budget
Fort Worth	\$2,434,235	\$2.59
Average	\$2,742,627	\$5.63
McKinney	\$2,246,094	\$10.96
Waco	\$570,000	\$4.07
Allen	\$568,654	\$5.29
Dallas	\$3,342,402	\$2.57
Arlington	\$814,500	\$2.06
Plano	\$1,983,236	\$6.91
Garland	\$1,268,253	\$5.12
Irving	\$609,181	\$2.54
Frisco	\$582,775	\$2.74
Grand Prairie	\$537,115	\$2.75
Denton	\$944,325	\$6.38
Mesquite	\$306,000	\$2.10
Lewisville	\$296,333	\$2.71
Austin	\$4,538,953	\$4.72
El Paso	\$3,364,837	\$5.18
Fort Hood	\$1,767,963	\$3.83
San Antonio	\$5,196,708	\$3.62
Lubbock	\$2,851,317	\$11.02
Amarillo	\$1,107,185	\$5.80
Brownsville	\$483,910	\$2.65

Table 25. Summary of public tree budgets compared to city populations (per capita) in 2021

Comparison of Public Tree Budgets Using the Program Census

The following comparisons utilize the data in the 2014 Urban and Community Forestry Census and adjusted for inflation to align with Fort Worth’s data from 2021.

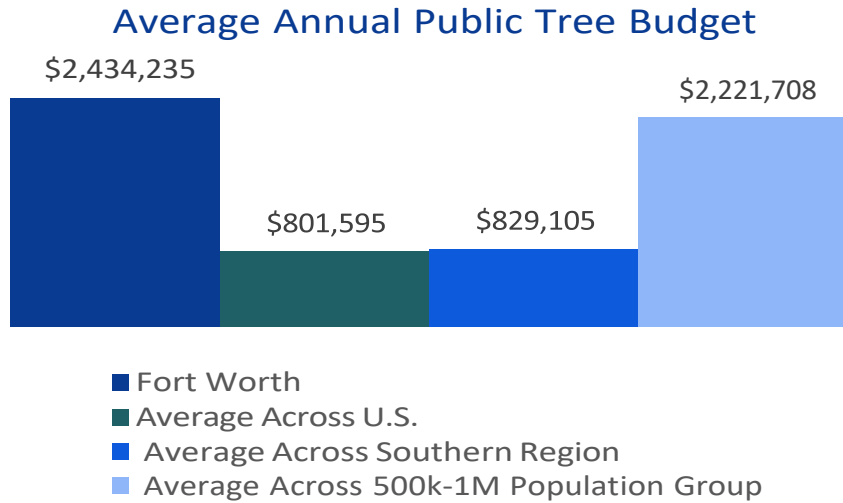


Figure 93. Comparison of public tree budgets nationwide, regionally, and by population group

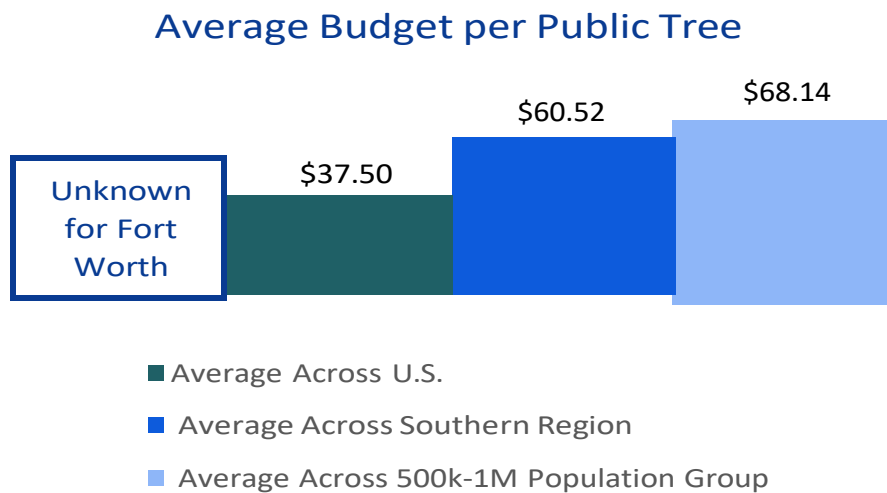


Figure 94. Average budget per tree compared to nationwide, regional, and population group averages

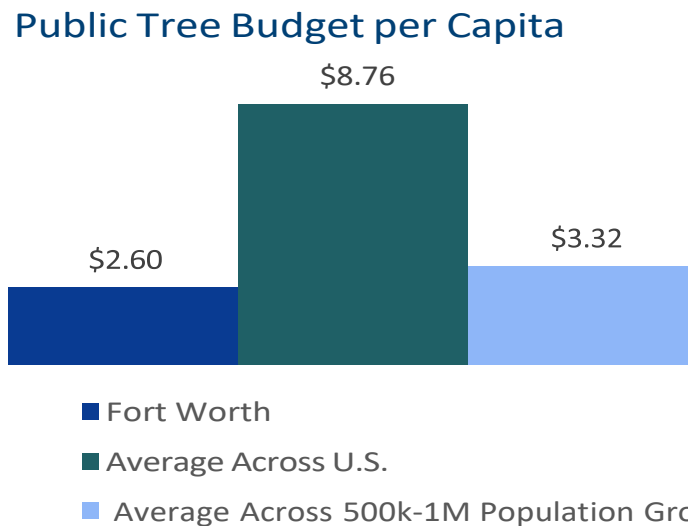


Figure 95. Comparison of program budgets per capita based on nationwide and population group averages

Comparison of Public Tree Counts and Distribution Using the Program Census

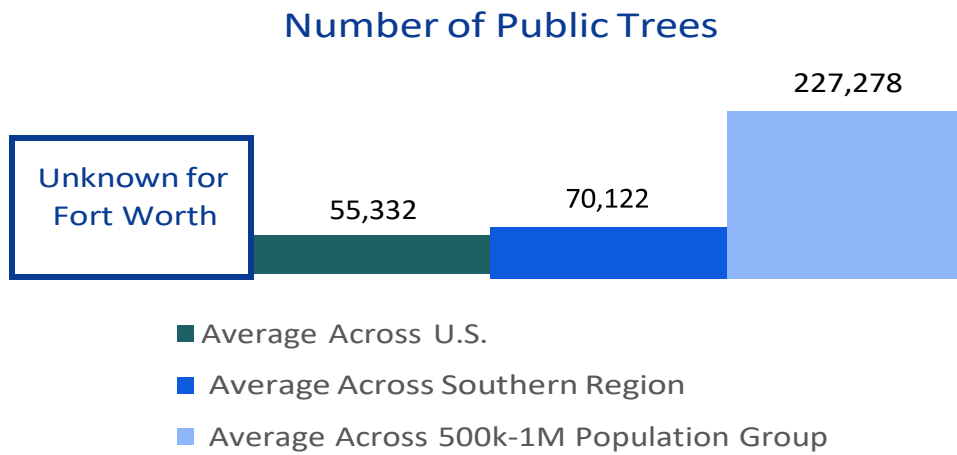


Figure 96. Comparison of the number of public trees by nationwide, regional, and population group averages

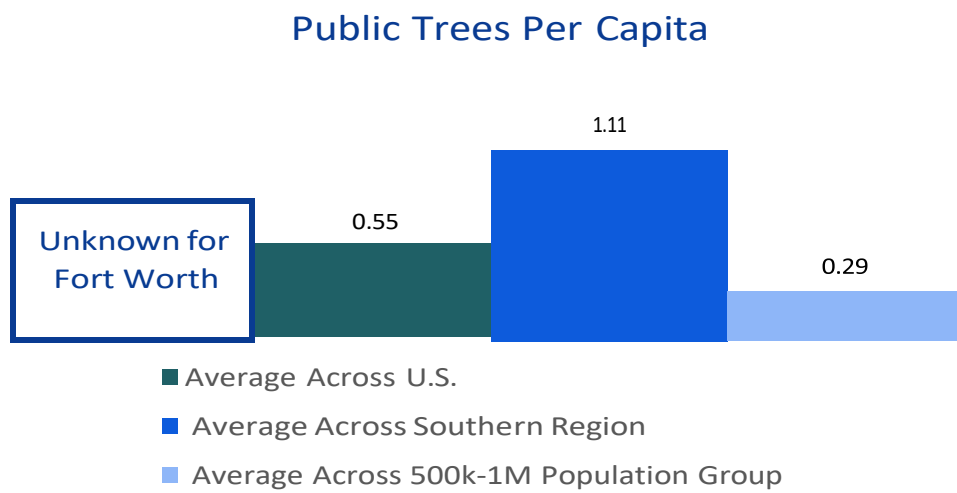


Figure 97. Comparison of public trees per capita to nationwide, regional, and population group averages

Number of Public Trees per Full-time Tree Care Employee

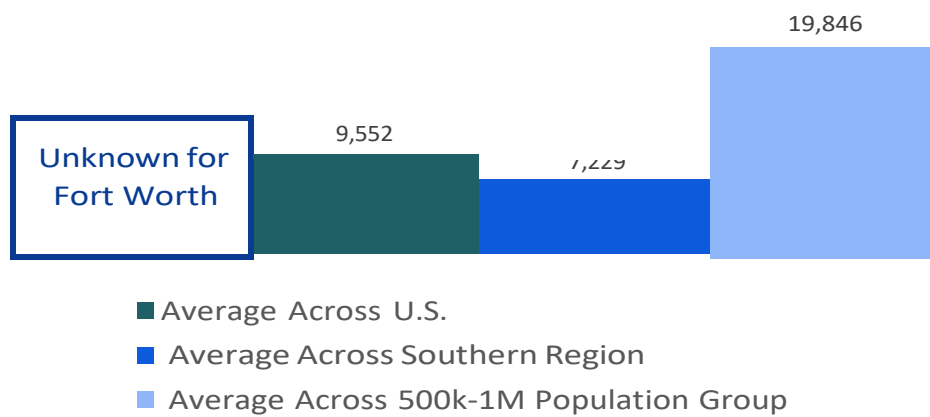


Figure 98. Comparison of the number of public trees per full-time employee to averages

*Benchmarking Research Summary**Table 26. Summary of benchmarking research based on Tree City USA data reported in 2021*

2021 TREE CITY USA – FORT WORTH		2021 TREE CITY USA - REGIONAL	
\$2.4M	Forestry budget	\$2.7M	Average forestry budget
\$2.59	Per capita forestry budget	\$5.63	Average per capita budget
\$516k	Tree planting, initial care, maintenance, and removal budget	\$244k	Average tree planting, initial care, maintenance, and removal budget
\$1.1M	Tree maintenance budget	\$415k	Average tree maintenance budget
\$454k	Tree removal budget	\$206k	Average tree removal budget
\$338k	Program management budget	\$456k	Average program management budget
8,500	Trees pruned	4,022	Average trees pruned
428	Trees removed	1,008	Average trees removed
1,814	Trees planted	1,553	Average trees planted
6,688	Volunteer hours	1,014	Average volunteer hours

Table 27. Summary of the benchmarking research from the Urban and Community Forestry Census

CENSUS – FORT WORTH (2021)		CENSUS – POPULATION GROUP (500K-1M)*	
\$2.4M	Forestry program budget (2021)	\$2.5M	Average forestry budget
TBD	Estimated public trees	227k	Average count of public trees
TBD	Budget per tree	\$76.20	Average budget per tree
\$2.60	Budget per capita	\$3.32	Budget per capita
TBD	Public trees per capita	0.29	Average public trees per capita
TBD	Public trees per staff	20k	Average public trees per staff
13k	Acres of parks and open space	7k	Average acres of parks and open space

* The values from the census were adjusted for inflation. “k” = units of 1,000; “M” = million

Discussion

Based on the benchmarking research of communities with a similar land area and population size, the average budget is greater than Fort Worth's Forestry budget (\$2.5 million compared to \$2.4 million for Fort Worth) and the average community has fewer total trees (227,000 compared to 330,000 for Fort Worth). Benchmarking research of urban forestry programs across the United States can provide valuable insights into the best practices and strategies for managing and improving urban forests. However, there are several caveats to conducting such research, including:

- ❖ **Data availability and comparability:** The availability and quality of data may vary across different states and municipalities, making it challenging to compare urban forestry programs accurately. It can be challenging to obtain standardized data sets that can be compared across locations and timeframes.
- ❖ **Variations in reporting:** The metrics reported to Tree City USA and the urban forestry census may differ city to city. For example, some programs may include the utility vegetation management budgets while others may only report the budget for the urban forestry program. Similarly, some programs may include all staff that interact with trees when reporting their full-time equivalents. An example would be an urban forestry program that is supported by street maintenance crews, code enforcement officers, and development plan review personnel.
- ❖ **Differences in climate and geography:** Urban forests in different regions of the country may face distinct challenges due to differences in climate and geography. For instance, an urban forestry program in the Pacific Northwest may need to prioritize managing large amounts of rainfall and high winds, while a program in the Southwest may need to focus on water conservation and drought management.
- ❖ **Local policies and regulations:** Local policies and regulations can have a significant impact on the management and success of urban forestry programs. For example, different municipalities may have varying levels of funding for their programs or different regulations regarding the planting and maintenance of trees.
- ❖ **Differences in community engagement and participation:** Urban forestry programs may have varying levels of community engagement and participation, which can impact their success. Some communities may be more invested in their local urban forests and more willing to participate in tree planting and maintenance programs, while others may not prioritize such initiatives.
- ❖ **Differences in program goals and priorities:** Programs may have different goals and priorities, depending on the needs and challenges specific to their communities. For example, a program in an area with high air pollution may prioritize planting trees that can absorb pollutants, while a program in an area with a high risk of wildfires may prioritize tree trimming and vegetation management to reduce the risk of fires.

These caveats highlight the need for careful consideration and contextualization when conducting benchmarking research of tree-related programs. The results of the benchmarking should not be considered a definitive evaluation of Fort Worth's Forestry and Urban Forestry programs. The findings are utilized to complement other planning elements such as the engagement, analyses, and the Audit and inform strategies and performance indicators.



PLANNING ELEMENT:



**URBAN
FOREST AUDIT**

PURPOSE:

To identify strengths and challenges relating to sustainable urban forest management and development a framework for Plan monitoring

ELEMENT 6: URBAN FOREST AUDIT

Purpose

The findings from the five planning elements were evaluated to identify strengths and opportunities relating to the sustainable management of Fort Worth’s urban forest. The research, internal and external engagement, data analyses, and benchmarking provide the context for a comprehensive audit or gap analysis of the frameworks for tree management in the city.

The outcomes of this evaluation, herein referred to as the Urban Forest Audit, is a culmination of all planning elements to inform the strategies that can leverage the strengths to address challenges. In turn, the audit framework provides the means for measuring Plan implementation and the necessary indicators to monitor for an adaptive management approach. This system documents the city’s level of urban forest sustainability and management as defined by the U.S. Forest Service, industry professionals and researchers, and local parameters from which progress can be measured.

Process

Developing this Technical Report to support Plan development was an iterative process where the results of each step informed the next, leading to development of the long-term framework for sustainable urban forest management. Careful evaluation of Fort Worth’s urban forest was conducted by using a combination of information obtained through the five planning elements conducted:

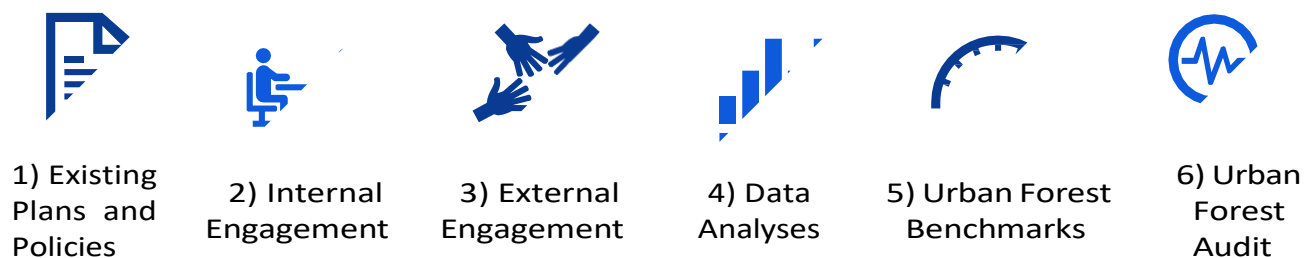


Figure 99. Summary of the planning process to inform the Urban Forest Audit

Information Discovery

Information from these elements was documented and then systematically evaluated following the U.S. Forest Service’s Urban Forest Sustainability and Management Audit (USDA Forest Service, 2015). The first step in the planning process involved an extensive review of existing plans, policies, ordinances, practices, data, and initiatives to establish a baseline and to gather context. The Urban Forest Audit is an industry-accepted process and region-specific evaluation of 11 categories of urban forest sustainability and management as they relate to the City of Fort Worth. The urban forestry consultants leading this evaluation has conducted 19 audits for similar project which provides expert insights into the process, evaluations and rankings, and interpretations of the results.

For Fort Worth, a total of 109 documents and resources were identified, reviewed, and indexed as part of the information discovery process.

A Description of the Urban Forest Audit

The auditing system is designed to provide a framework for comprehensively evaluating urban forest management programs. The primary objectives of the audit are defined by the authors and adapted by the Fort Worth Urban Forest Master Plan consulting team:

- ❖ Engage the full spectrum of the organizations' management team.
- ❖ Provide program direction that increases the level of professionalism in management.
- ❖ Conduct a gap analysis of management practices and the health of urban forests.
- ❖ Provide strategic direction to improve the health of the urban forest.
- ❖ Optimize management for environmental justice and equitable distribution of resources.

The process of analyzing the urban forest involved extensive information and document gathering and research guided by 11 categories in the Urban Forest Audit system.

Table 28. Categories of the U.S. Forest Service Urban Forest Audit

Urban Forest Audit Categories
Management Policy and Ordinances
Professional Capacity and Training
Funding and Accounting
Decision and Management Authority
Tree-related Inventories
Tree-related Plans
Risk Management
Disaster Planning
Standards and Best Management Practices (BMPs)
Community
Green Asset Evaluation

Each category has a series of subcategories pertaining to each category. As an example, the following subcategories are in the Management Policy and Ordinances category:

- | | |
|--|--|
| 1.01 Sustainability / Urban Heat | 1.08 Wildlife Diversity / Habitat / Protection |
| 1.02 No Net Loss | 1.09 Performance Monitoring |
| 1.03 Risk Management | 1.10 Private Tree Ordinances |
| 1.04 Tree Canopy Goals | 1.11 Public Tree Ordinances |
| 1.05 Tree Protection | 1.12 Development Standards |
| 1.06 Utility | 1.13 High-Conservation Value Forests |
| 1.07 Human Health (Physical/Psychological) | 1.14 Wildland Urban Interface (WUI) |

All available documents and plans were reviewed and tallied in the audit worksheet as part of the information discovery phase. Separate from this section, the City's tree-related ordinances, policies, and standards were evaluated to development recommendations for changes or additions. Based on the evaluation of the documents and outcomes of all five planning elements each subcategory within the 11 categories was "ranked" using the following system:

- 0) Not Practiced = component doesn't exist or is not practiced; 0 points
- 1) In Development = component is in development as part of or aside from this Plan; 1 point
- 2) Adopted Practice = component is routinely practiced; 2 points

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

Results

To develop this Plan, 109 documents, plans, and resources were gathered and reviewed by applying the U.S. Forest Service’s Urban Forest Audit’s Discovery Matrix. This matrix includes a total of 11 urban forest categories, each containing a multitude of supporting elements or subcategories. All resources were reviewed to identify references regarding each of the categories and supporting elements.

There are a total of 509 instances where the 109 resources reference the 11 categories and supporting elements. The number of resources referencing elements of urban forest sustainability and management demonstrate Fort Worth’s readiness for changes driven by the Urban Forest Master Plan. Recommendations in this Plan align with components of these supporting resources. For a complete list of categories, elements, rankings, and supporting resources, see [Appendix E](#).

Based on the analysis of findings from the project planning and research, Fort Worth scored a 77% in terms of urban forest sustainability and management as defined by the U.S. Forest Service, partners, and planning consultants. The City of Fort Worth scored above the average of 65% for the 19 audits completed by the urban forestry consultants for similar city projects. Overall, the City scored highest in the Decision and Management Authority, Community, and Risk Management— all of which are above 90%. The Urban Forest Master Plan provides the guidance to maintain these strengths and to address shortcomings as opportunities.

Based on the audit of 129 subcategories (11 primary categories), Fort Worth is achieving “Adopted Common Practice” for 71 (55%) of these. 56 subcategories (43%) are “In Development”. Applying the multipliers of 2 for Adopted Practice and 1 for In Development results in a total score of 198 out of 256 possible points, or 77% (detailed in the following table).

URBAN FOREST AUDIT RESULTS (JUNE 2023)

#	Description	SOC* (%) Achieved)	Base** (%) Achieved)	Overall Rating	Overall (%) Achieved)
1	Management Policy, Ordinances	100%	100%	24	86%
2	Professional Capacity and Training	100%	NA	16	89%
3	Funding and Accounting	100%	NA	8	67%
4	Decision, Management Authority	100%	100%	8	100%
5	Tree-related Inventories	NA	44%	13	50%
6	Tree-related Plans	NA	58%	15	63%
7	Risk Management	92%	100%	17	94%
8	Disaster Planning	NA	100%	11	79%
9	Standards and Best Practices	100%	81%	49	82%
10	Community	100%	NA	27	96%
11	Green Asset Evaluation	NA	NA	10	50%
TOTALS		99%	83%	198	77%

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

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

Discussion

The main purpose of the Urban Forest Audit is to apply the research and findings gathered throughout the planning effort to inform the Plan’s long-term framework for implementation, monitoring, and adaptive management. This audit or “gap analysis” enables the City to control different aspects of its Urban Forestry and Forestry programs with data. This gap analysis identified the shortcomings that the City should overcome and by quantifying them, the program can make improvements. It also enables effective monitoring of Plan strategies in that the audit categories and elements can be revisited at key intervals in the Plan implementation process to measure progress and adapt strategies accordingly.

The information provided in the table above describes the current conditions of Fort Worth’s urban forest, the programs that manage it, and the community frameworks. For monitoring the Plan, the City should use this framework to evaluate implementation progress, report successes, and inform changes to Plan actions. Many of the urban forest audit elements were given a rating of “In Development” as they previously did not exist but are through development and implementation of the Urban Forest Master Plan. This means that the City is already well underway in advancing its program and its Urban Forest Audit score.

URBAN FOREST AUDIT SUMMARY (JUNE 2023)



Figure 100. Summary of the June 2023 Urban Forest Audit for Fort Worth's Plan

Interpreting the Urban Forest Audit Scores

The Urban Forest Audit system should serve as a baseline assessment from which progress can be measured and strategies can be adjusted using an adaptive management approach. Overall, Fort Worth scored a 77 out of 100 based on the consultants’ evaluation. The scores resulting from the evaluation are informative but should not be considered a definitive assessment or a reason for excessive action due to a currently low score or inaction due to a high score. The following provides an interpretation of the scores for the City to consider when implementing the Plan’s corresponding actions.

STRENGTHS AND OPPORTUNITIES UNCOVERED FROM THE AUDITING PROCESS

Table 29. Interpretation of the June 2023 Urban Forest Audit scores







Category	Implications
<p>Management Policy and Ordinances</p> <p>Rating of 86%</p>	<p>STRENGTHS: The City scored relatively average in this category due to the existing tree ordinances, development standards, and the citywide canopy goal of 30% regulated and supported through the Urban Forestry Ordinance. In addition, the City’s Comprehensive Plan includes urban forestry and tree canopy as a vital component in addressing urban heat. As part of the Plan, the citywide canopy goal was revisited to provide alternatives and priority planting areas. The Forestry Policies and Procedures Manual and the draft Community Tree Planting Policies and Procedures manual contributed greatly to the high ranking of this category.</p> <p>OPPORTUNITIES: Enhanced tree protection and enforcement in the right-of-way and on private property will support a “no net loss” strategy for retaining the benefits of urban forests. The City should explore changes to tree ordinances based on the recommendations developed as part of the Plan and with input from staff, stakeholders, and the community. Appropriate levels of public and private tree ordinances as well as expanding the programs and protection for heritage and significant trees would advance the city in this category. Also, the City should explore opportunities for purchasing land for conservation.</p>
<p>Professional Capacity and Training</p> <p>Rating of 89%</p>	<p>STRENGTHS: The City has sections for Urban Forestry (private trees) and Forestry (public trees). The Forestry Section performs and participates in trainings for urban forestry best practices. Staff are knowledgeable of the needs for the urban forest and multiple departments interact with the city’s trees. Urban Forestry is involved in all private development reviews and Forestry coordinates with departments. Urban Forestry recently received a new inspector for development projects and staff in both Forestry and Urban Forestry are performing at optimal levels under the current capacity and resources. Several staff are Certified Arborists.</p> <p>OPPORTUNITIES: The City could improve in this category with more Certified Arborists, Tree Risk Assessment Qualified (TRAQ) personnel accredited by the International Society of Arboriculture, and trainings. The City should explore additional staffing relating to maintenance, planting, permitting, ordinance enforcement, development planning, and community engagement. Staff outside of Forestry and Urban Forestry that interact with public trees could be trained and/or become Certified Arborists. The City should continue to partner with community organizations and stakeholders for the urban forest.</p>

Category	Implications
<p>Funding and Accounting</p> <p>Rating of 67%</p>	<p>STRENGTHS: The City’s adopted budgets have specific line items for the Community Tree Planting Program but no specific line items for Forestry or Urban Forestry-specific staffing and programs. The two sections provide services that focus on providing an urban forest that is safe, healthy, diverse, and able to provide the greatest benefit to people, wildlife, and environment in the city.</p> <p>OPPORTUNITIES: Compared to other Tree City USA cities in the region and with a similar population size, Fort Worth has a lower overall budget and budget per capita for public tree management. Additional funding may be required to implement the goals of the Plan. The City should continue to pursue grants and other funding mechanisms to create a budgeted program that is diversified, sustainable, and dedicated for the growing needs of the urban forest and the services provided. Fort Worth has a strong network of engaged community residents and stakeholders who are in support of additional resources for urban forestry as demonstrated in the responses to the public engagement for the Plan.</p>
<p>Decision and Management Authority</p> <p>Rating of 100%</p>	<p>STRENGTHS: The Urban Forestry and Forestry Sections in Fort Worth are a strength to administer the Urban Forestry Ordinance and public tree management, respectively. The staff in each program closely engage with other City departments, divisions, and sections. The Development Advisory Committee and the Urban Design Commission are involved in processes that impact trees in the city. The City scored high in this category since the audit only contains four subcategories but can be expanded as described in the opportunities below.</p> <p>OPPORTUNITIES: Continue to coordinate with City staff, partners, and contractors. Identify workflow efficiencies and maintain standard operating procedures and contractor specifications. The City should explore the need and frameworks for an urban forestry-specific commission or working group to support the goals of the Plan and City services. It was identified during the internal and external engagement sessions that there needs to be clarifications regarding the roles and responsibilities between Forestry and Urban Forestry.</p>
<p>Tree-related Inventories</p> <p>Rating of 50%</p>	<p>STRENGTHS: Fort Worth completed a sample inventory of public trees in 2011 but extreme weather may have made the inventory outdated due to widespread tree decline and loss from a rapid freezing event. The city has a high-resolution urban tree canopy assessment completed in 2020. The Urban Forestry Section manages tree data for development projects whether it be for preservation, mitigation, protection, or planting. There is an online map of 50+ Heritage Trees in the city with nearly 76,000 views.</p> <p>OPPORTUNITIES: The City should pursue funding and resources to conduct a comprehensive public tree inventory primarily for street trees to better inform maintenance priorities, long-term management, and planting opportunities and strategies. Also, the City should support in a technical capacity the inventory of private property trees including campuses and corporations. In addition, a sample survey of trees in public open space and natural areas would provide data to support sustainable urban forest management. The City should maintain these inventories and conduct reassessments of tree canopy cover every 5 to 10 years to monitor change, track canopy goals, and adapt strategies.</p>

Category	Implications
<p>Tree-related Plans</p> <p>Rating of 63%</p>	<p>STRENGTHS: Tracking and reporting of urban forest management activities, this Plan, and urban forestry and the 30% canopy goal referenced in the Comprehensive Plan were the high points in this category. The City has an Environmental Master Plan, transportation-related plans, and there are plans for the Trinity River.</p> <p>OPPORTUNITIES: Plans for other landscapes comprising the urban forest such as open space, grounds on public facilities, campus/university trees, and green stormwater management, are an opportunity for Fort Worth. Implementation of this Plan will increase the rating. Developing strategic planting plans by street corridor, park, and / or neighborhood to address priority planting areas and tree equity would support the goals in the Plan and assist the city in achieving 30% canopy cover.</p>
<p>Risk Management</p> <p>Rating of 94%</p>	<p>STRENGTHS: Staff and contractors are trained in tree risk assessments and the City has an adopted standard of care. The City and partners actively manage invasive plant species and pests and diseases as resources allow and has lists and resources for recommended and prohibited trees.</p> <p>OPPORTUNITIES: Additional internal technical support for assessing trees questioned for removal would improve the efficiency, effectiveness, resourcefulness, and appeal of City operations. A maintained inventory of trees in public rights-of-way is necessary to identify, monitor, plan, prioritize, and mitigate risk. Inventories would detail Fort Worth’s vulnerabilities to tree pests and diseases, climate change impacts, storm events, invasive species, and the natural or premature senescence of trees. The Plan provides recommendations for implementing risk management standards and best practices.</p>
<p>Disaster Planning</p> <p>Rating of 79%</p>	<p>STRENGTHS: The City’s maintenance staff and contractors address downed trees and limbs and collaborate when extensive response is needed. The Forestry Section performs hazard abatement of public trees as needed. A Storm Mitigation Plan and debris SOP is in place.</p> <p>OPPORTUNITIES: Primarily, a multi-faceted disaster plan for public trees is needed along with coordination between the county and neighboring cities.</p>
<p>Standards and Best Practices</p> <p>Rating of 82%</p>	<p>STRENGTHS: Fort Worth has relatively high rating for this category due to Forestry’s Policies and Procedures Manual and the draft Community Tree Planting Policies and Procedures manual. Tree-related ordinances, the Comprehensive Plan, design standards, and guidance on the City’s website contributed to the score.</p> <p>OPPORTUNITIES: The City should explore the recommended changes to tree-related ordinances to align with the goals for the Plan, the development community, and the residents of Fort Worth. Overall, implementing the Plan will raise Fort Worth’s score in this category but specifically, improvement could occur with utility vegetation management, alternative solutions to tree and sidewalk conflicts (i.e., design standards), urban wood utilization, citing of industry standards and best practices in ordinances and manuals, a tree manual for tree care professionals and property owners, strengthened tree preservation requirements, and monitoring/enforcing ordinances to ensure trees planted through development projects survive or are replaced.</p>

SUMMARY OF FINDINGS

Table 30. Summary of findings in the Technical Report

Element	Conclusion
 <p>1) Existing Plans and Policies</p>	<p>The city has a strong framework of policies and plans that allude to or reference urban forestry, but a strategic Urban Forest Master Plan is needed to connect these elements. The Comprehensive Plan and the Urban Forestry Ordinance specifically recognizes the role of the urban forest, and the City has a strong foundation of tree ordinances. The City should explore changes to ordinances and stay engaged in other City planning efforts to align policies and goals.</p>
 <p>2) Internal Engagement</p>	<p>Multiple City divisions and departments interact or influence the urban forest. Coordination and collaboration have improved in recent years. The Urban Forestry Section oversees private trees in development projects and the Forestry Section manages the public trees. Standard Operating Procedures may be developed to solidify the cooperation and support changes to tree-related staffing. Continued cohesive planning and management will maintain efficiencies and improve the levels of service provided to city residents.</p>
 <p>3) External Engagement</p>	<p>Outreach and engagement should continue based on the findings from the engagement efforts and recommendations in the Plan. The urban forest is valued and cared for by the residents and the community supports tree canopy goals to address equity, urban heat, and sustainability. A coordinated citywide community outreach strategy is recommended.</p>
 <p>4) Data Analyses</p>	<p>The City has a citywide tree canopy assessment and should consider regular updates to measure progress towards canopy goals. The City should pursue a comprehensive public tree inventory to support management and strategic planting plans by neighborhood that supports the long-term canopy goal.</p>
 <p>4) Urban Forest Benchmarks</p>	<p>The City should evaluate its staffing levels, contractor arrangements, and responsibilities to manage the urban forest as it continues to grow and change, particularly resulting from urban heat and development. The budget for urban forest management should align with the recommended actions in this Plan. Fort Worth should also utilize the metrics provided to monitor canopy goals and priority planting areas.</p>
 <p>6) Urban Forest Audit System</p>	<p>Overall, the City scored 77% based on the U.S. Forest Service's Urban Forest Audit system that evaluates 11 categories of urban forest management and sustainability. A slightly above average scoring was anticipated since the City is taking purposeful steps in elevating its urban forest management with the Plan. Implementation of actions in the Plan will maintain strengths and address shortcomings. Frequent auditing exercises should be conducted to measure progress and adjust strategies in an adaptive management approach. The auditing outcomes will provide the City and partners with crucial data for daily and long-term priorities.</p>



RECOMMENDATIONS AND STRATEGIES

PURPOSE:

To provide considerations for the final Urban Forest Master Plan based on the findings from the planning process and industry standards

RECOMMENDATIONS

Background and Framework for Recommendations

The following recommendations are derived from the planning elements presented in the Technical Report. The iterative planning process included research and reviews of existing plans and policies, internal and external engagement, data analyses, benchmarking research, and a comprehensive Urban Forest Audit. The framework for presenting the recommendations utilize the Model of Urban Forest Sustainability (Clark, et al. 1997) first developed in 1997 and revamped in 2011 as the Criteria and Indicators for Strategic Urban Forest Planning and Management (Kenney, et al. 2011).

This framework was utilized in 2015 when the U.S. Forest Service developed the Urban Forest Audit implemented as part of the Technical Report. The framework consists of examining and providing recommendations and indicators for the Urban Forest Resource (the trees), the Resource Management (the programs), and the Community Frameworks (the people). The recommendations that follow align with this model and are intended to serve as draft considerations for the final Urban Forest Master Plan. Following the recommendations table, a series of specific strategies are provided to support implementation of the final Plan's strategies.

TECHNICAL REPORT RECOMMENDATIONS CATEGORIES

Urban Forest Resource	Resource Management	Community Frameworks
Urban Tree Canopy	City Planning Documents	Engagement to Implement the Plan
Tree Equity	Program Structure	Communications
Urban Forest Threats	Funding Structure	Volunteers
Public Street Trees	Street Tree Ordinances	Tree Stewards
Public Park Trees	Private Tree Ordinances	Partnerships
Managing Tree Risks	Design Standards & Specs	Education
Proactive Pruning	Pruning Cycles	Working Groups
Future Planting Sites	Tree Inventory	Environmental Justice
Urban Forest Benefits	Tree Maintenance	Volunteers
Public Tree Benefits	Utility Tree Maintenance	
Cost-Benefits	Young Tree Training	
	Planting & Irrigation	
	Private Property Trees	
	Additional Best Practices	
	Funding	

Table 31. Overview of the Technical Report's recommendations categories

Draft Recommendations to Support the Urban Forest Master Plan

Table 32. Recommendations to support the Urban Forest Master Plan

URBAN FOREST RESOURCE		
Urban Tree Canopy		
Category	Recommended Action	Key Considerations
Urban Tree Canopy	Conduct finer scale analyses of tree canopy cover and possible planting space.	The urban tree canopy (UTC) assessment identifies areas where it may be possible to plant trees to increase tree canopy cover. Additional analyses would separate the possible planting areas into what is feasible and of highest priority.
	Refine the recommended tree canopy cover goals and priority planting areas.	By identifying the feasible and most desired areas for planting trees, potential stakeholders, policy changes, and necessary resources, the City and partners can refine the short- and long-term tree canopy cover goals and planting targets.
	Continue to assess tree canopy cover change.	The urban tree canopy cover and other land cover types such as possible planting area and impervious area should continually be assessed on at least a 5-year basis to monitor canopy gains and losses and inform strategy changes. Since the 2020 assessment used 2018 imagery, it is recommended the City begin to prepare for an update.
Tree Equity	Conduct finer scale analyses of tree equity.	The Tree Equity Score Tool provides an analysis of tree canopy cover equity by U.S. Census Block Group. Additional analyses of tree equity by neighborhood or land use provides a finer depiction of tree canopy disparities and opportunities. Assessments should align with updates to the tree canopy cover studies.
	Use the tree equity analysis to support canopy goal setting and priority planting areas.	Tree canopy cover goals should be based on an amalgamation of City and stakeholder priorities and themes— tree equity should be one of the highest tiers for consideration in setting goals.
	Continue to assess tree equity and adjust strategies.	Similar to tree canopy cover change analyses, the change in tree equity on small- and large-scales should continually be measured to inform strategy updates.

Urban Forest Threats	Manage the urban forest to mitigate and reduce the effects of changing conditions and urban heat.	Maintaining tree health and growing an urban forest that addresses changing conditions such as prolonged urban heat should be guided by short- and long-term canopy goals. Tree plantings can address critical impacts such as increased surface temperatures. Preserve and conserve open space and natural areas as they are vital in mitigating changing conditions.
	Assess and manage tree pests and diseases.	Conduct and maintain an inventory of the public tree population by noting tree pests and diseases and reinventory trees on an appropriate cycle (~5 years). Analyze the composition of the urban forest for susceptibility and inform the public of common tree pest and disease signs, symptoms, and treatment/prevention options.
	Enforce tree ordinances and explore possible amendments to align with the goals of the Plan and the community.	Tree canopy data, recommendations in the Plan, and other sources of data will provide valuable information to effectively evaluate tree-related policies and regulations to ensure development impacts on the urban forest are minimized. Long-range planning considers sustaining and maximizing the associated benefits provided by the urban forest while accommodating smart growth.
Public Trees		
Public Street Trees	Manage the public street trees to maintain optimal species and age class diversity.	<p>Ensure the public street tree population does not exceed tree genus and species diversity threshold limits (Santamour, 1990). Meet this standard by planting the appropriate tree species, guided by strategic tree planting plans. The diversity thresholds can be further applied to local-level scales such as neighborhoods and streets rather than simply citywide to further strengthen the city's urban forest resiliency.</p> <p>Manage and plant the public street tree population in order to align with the ideal size distribution and relative age classes (Richards, 1983). For public trees, there should be more young trees than mature trees to compensate for the loss of benefits as older trees decline and are removed. Ensure tree-related ordinances and policies protect the larger maturing trees to maintain age class diversity and associated benefits provided.</p>

	<p>Effectively manage the public street trees to maintain a healthy condition, reduce, minimize or prevent defects, minimize risks, and address maintenance needs.</p>	<p>The City should continue to maintain public trees for which it's responsible by adhering to industry standards and best practices. Proper tree protection during construction and routine inventory of public trees can minimize human-caused defects. The City should manage an inventory to efficiently address hazards and to prioritize tree maintenance. Ideally, public street trees would be pruned every 5 to 7 years, referred to as a proactive pruning program or rotation. Young trees should be pruned more frequently in the first 5 years to improve structure and train their growth to minimize future costs. Education and resources relating to tree maintenance should continue to be shared with adjacent property owners and developers, among other audiences.</p>
	<p>See “Proactive Pruning” within this table for additional recommendations.</p>	<p>See “Proactive Pruning” within this table for additional recommendations.</p>
<p>Public Park Trees</p>	<p>Manage the public park trees to improve structure and maintain optimal species and age class diversity.</p>	<p>Manage and plant the public park tree population to ensure tree species and genus frequency does not exceed the recommended thresholds of no more than 20% of a genus and 10% of a species (Santamour, 1990). Meet this standard by planting the appropriate tree species, guided by strategic tree planting plans. The diversity thresholds can be further applied to local-level scales such as by park rather than simply citywide to further strengthen the city’s urban forest resiliency.</p> <p>Manage and plant the public park tree population in order to align with the ideal size distribution and relative age classes (Richards, 1983). For public park trees, there should be more young trees than mature trees to compensate for the loss of benefits as older trees decline and are removed. Ensure tree-related ordinances and policies protect the larger maturing trees to maintain age class diversity and associated benefits provided.</p> <p>Consider a more frequent pruning rotation for young trees to structurally train their growth to minimize future costs.</p>

	Continue to manage and prevent invasive plant species on public park properties.	All City-led plantings should adhere to a recommended tree species list where trees planted are suitable for changing conditions and maintaining diversity. Only non-invasive species should be planted and natives should be prioritized for plantings. As feasible, invasive species should be removed and opportunities for engaging and educating the public should be considered.
	See “Proactive Pruning” within this table for additional recommendations.	See “Proactive Pruning” within this table for additional recommendations.
Manage Tree Risk	Establish and document tree risk protocols and standards.	Compile, finalize, and document the methods and protocols for monitoring, mitigating, and reducing tree risks using industry standards and best practices. Coordinate the process with City departments.
	Continue to conduct tree risk assessments using industry standards and protocols.	Using risk area maps and the public tree inventory data, conduct tree risk assessments based on the protocols and standards established. Continue to assess tree risk utilizing in-house or contracted professionals for tree and hardscape conflicts.
	Effectively address and mitigate tree risk.	Based on the tree risk assessments and protocols, mitigate priority tree risks as funding permits. Continue to educate the public regarding proper tree maintenance and notify adjacent property owners of probable and imminent risks that must be addressed.
Proactive Pruning	Create a maintenance practice that is based on the public tree inventory and maintenance standards.	Proactive pruning of street trees on an ideal rotation of 5 to 7 years would reduce long-term costs, sustain associated benefits, and reduce risks. Based on the public engagement to develop the Plan, the public supports a City street tree program that proactively prunes priority trees. Additional studies and analyses are necessary to develop such a program but would result in improved urban forest health and sustainability. In the short-term, the City should develop a Tree Maintenance Plan for City-responsible public trees and guidance for adjacent property owners responsible for public street tree maintenance.

Future Planting Sites	Analyze growing space and condition by tree species and other variables.	Conduct a sample or comprehensive inventory of possible street tree planting sites. Utilize the inventory and canopy assessment data to identify priority planting areas on public properties and rights-of-way to increase the stocking level that is guided by strategic tree planting plans.
	Develop a strategy for stocking planting sites aligned with tree canopy cover goals, community desires, among other factors.	To increase tree canopy and address other City priorities— such as equity, urban heat mitigation and reduced utility conflicts— adopt and implement a master tree planting plan, planting strategy, or planting initiative. The strategic planting should be informed by the recommendations in the Plan including community and partner input.
Urban Forest Benefits		
Citywide Urban Forest Benefits and Services	Sustain existing urban forest benefits and services by protecting existing trees.	Continue to enforce and monitor tree ordinances, standards, and best practices for public and private trees. Public outreach and education should provide information regarding tree benefits, pest and disease management, tree regulations, and other information to sustain the urban forest.
	Enhance the urban forest benefits and services through strategic planting.	In addition to strategic street tree planting, the planting of trees on public properties should also be conducted and guided by a strategic tree planting plan. Recommendations, guidance, and resources for private property owners should also be provided to collectively grow the urban forest and associated benefits and services.
	Educate the public about urban forest benefits and proper private tree management to build support and increase tree stewardship.	Most of the urban forest and available planting space resides on private property. Therefore, an education program for the public that discusses urban forest benefits and proper management will help to protect and grow the valuable resource.

Public Street and Park Tree Benefits and Services	Sustain existing public tree benefits and services by protecting and properly maintaining public trees.	Compliance and enforcement of the tree ordinances, standards, and best practices during construction projects and maintenance will continue to protect the existing benefits and services provided by the public tree population.
	Enhance the benefits and services provided by street trees by achieving 90% stocking levels in public rights-of-way.	Utilizing a strategic planting plan guided by tree canopy goals, community input, and other factors will effectively grow the public tree population and increase overall stocking levels.
	Educate the public about urban forest benefits and proper street tree maintenance to build support and increase tree stewardship.	Maintaining street trees is primarily the adjacent property owner’s responsibility. An education program that informs the public of proper tree maintenance and the benefits of street trees will instill stewardship and a healthier public tree population. In addition, the City or its partners should consider developing a tree manual for property owners as a go-to resource for tree regulations, information, and best practices.
	Plant trees that grow into large-canopied specimens where adequate space is available.	Simply achieving 90% stocking levels does not infer enhanced benefits and services. The appropriate tree species for changing conditions and the given site will increase longevity and maximize benefits and services.
Cost-Benefits	Regularly assess the costs and benefits of the urban forest and public tree population to inform management.	Maintaining an inventory of public trees and reassessing citywide tree canopy cover will provide the data to effectively evaluate benefits and services provided by the resource. As improvements to management are achieved through the implementation of the Plan, associated costs will likely reduce and an evaluation will inform monitoring and adaptive management strategies.

RESOURCE MANAGEMENT

City Planning Documents

Category	Recommended Action	Key Considerations
Fort Worth Comprehensive Plan	Participate in the plan update process to include urban forest management context.	Integrating and mainstreaming urban forestry within the Comprehensive Plan builds support, aligns common goals, leverages resources, and ensures long-lasting impacts.
Other City & Partner Planning Efforts	Utilize the tree canopy assessment and recommendations in the Plan support other planning efforts conducting by the City and partners.	The tree canopy goals and forecasted benefits and services provided in the Plan provide essential planning and management data that aligns with numerous City and partner initiatives. Some of these may include stormwater management, urban heat mitigation, water quality, human health and well-being, equity, biodiversity and wildlife, risk management and public safety, severe weather and disaster planning, among other core policies and principles for urban areas. Aligning planning efforts and goals strengthens implementation and builds understanding of the role urban forests play in addressing many of the challenges facing urban areas.

Program Structure and Funding

Program Structure	Periodically assess the cost and framework of the Urban Forestry and Forestry Sections. Evaluate the costs and benefits of forming an Urban Forestry Department which would have jurisdiction over public and private trees.	Tree responsibilities are dispersed across multiple City departments and divisions. It is recommended the City continue to periodically assess the cost and framework, of the Forestry and Urban Forestry Sections. The objective of this assessment would be to ensure the goals of the Plan can be met with the structure of the program. Evaluations and realignment may offer improvements to workflows, efficiencies, clarifications, efficacies, and levels of service.
	Update Standard Operating Procedures, manuals, Organizational Chart, and resources if changes to programs occur.	Clear communication internally to departments and externally to the public along with documentation is essential to streamline the necessary transition that results from any changes to programs, structure, staffing, and services.
Funding Structure	Further study the funding mechanisms most appropriate to support community forest management, and the degree to which residents or the City would generate the funding.	Public survey respondents showed varying opinions for how street tree maintenance and overall urban forest management should be prioritized. Additional public engagement and education efforts should be undertaken to investigate where public support lies.

	<p>Continue to maintain the tree inventory and program records to support budget requests.</p>	<p>Once a comprehensive public tree inventory is completed, the necessary resources and staffing to manage the growing and changing urban forest sustainably should be informed by data derived from tree inventories, public surveys, staff reports, and other sources.</p>
	<p>Periodically assess the Urban Forestry and Forestry staffing levels to ensure the goals for the urban forest and levels of service to the community can be met.</p>	<p>There are an estimated 330,000 public trees in Fort Worth— an estimated 150,000 trees are within the public rights-of-way along streets. Currently, Forestry performs hazard abatement though proactive maintenance of street trees is needed to achieve canopy goals, address tree equity, maximize benefits, maintain public safety, and grow a sustainable urban forest. In-house or contracted tree crews should be consider. In addition, Urban Forestry should have enough staff and resources to effectively review, inspect, and enforce the Urban Forestry Ordinance. Other staffing considerations may include permitting reviews, community engagement, administration, long-range planners, and data managers / GIS staff.</p>

Tree Ordinances and Regulations

<p>Street Trees</p>	<p>Explore City policies and ordinances that support the goals of the Plan, the City, and the community.</p>	<p>Strengthening the foundation of sound policies enables long-term success of the Plan. The City should periodically review policies and ordinances to align with the goals of the Urban Forest Master Plan, the City, and the community. Extensive engagement with community residents, stakeholders, staff, and commissions should be conducted to explore changes to ordinances that align with shared goals and policies.</p>
<p>Private Property Trees</p>	<p>Explore City policies and ordinances that support the goals of the Plan, the City, and the community.</p>	<p>Strengthening the foundation of sound policies enables long-term success of the Plan. The City should periodically review policies and ordinances to align with the goals of the Urban Forest Master Plan, the City, and the community. Extensive engagement with community residents, stakeholders, staff, and commissions should be conducted to explore changes to ordinances that align with shared goals and policies. Considerations may include more stringent tree preservation requirements, incentives for developers to preserve and plant trees, changes to mitigation and fee in lieu, updated design standards (e.g., spacing, species, irrigation), and requirements that support ensuring trees planted and protected survive and thrive.</p>

Landscape Design Standards	Explore updates to the design standards and specifications.	The City should review policies, ordinances, and design standards to support the implementation of the Plan.
Best Practices		
Pruning Cycles	Create a maintenance practice that is based on the public tree inventory and maintenance standards.	The City should continue to conduct hazard abatement, contract tree maintenance, and provide information to the public on best practices for public street tree maintenance and plant health care.
Tree Inventory	Maintain the public tree inventory records.	The City should pursue a comprehensive public tree inventory and explore software and GIS programs for managing the data. The data should be integrated with service requests and tracking maintenance and planting history. Consider public-facing features such as the associated benefits of the inventoried trees and locations where new trees will be or could be planted. The tree inventory should be maintained and updated as changes to the tree population occur such as tree plantings, maintenance, removals, service requests, and work orders.
	Update the public tree inventory periodically.	Completing an updated inventory of street and park trees will ensure management decisions are made with the most recent and accurate information. Consider reevaluations of potential public planting sites to inform planting strategies tied to canopy goals.
	Analyze the inventory to report on ecosystem benefits and utilize as part of budget planning.	With an inventory, the associated benefits and services can be calculated. This information can be used to monitor urban forest performance, adjust management and planting strategies, and connect budget requests to ecosystem service performance.
Tree Maintenance	Review the recommendations in the Technical Report to finalize a public tree maintenance plan.	A tree maintenance plan should be based on an inventory of public trees and include priorities for the City-maintained trees and methods for communicating to the public regarding priority maintenance, risk, and best practices.
	Implement and adhere to best practices and standards for City-led tree maintenance.	Adhering to the ISA Best Management Practices and ANSI Standards ensures proper management of the urban forest and sets an example for private property owners to follow.

	Share resources and information with the public regarding proper tree maintenance.	The majority of public street trees as well as trees comprising the citywide urban forest are the responsibility of private property owners to maintain. To sustain the urban forest, property owners, tree care companies, and property managers need to be aware of the best practices and standards for tree care.
	Continue to require permits for public street tree pruning, planting, and removals and approve based on contractor credentials.	Continue to require permits and qualified and certified individuals to perform the work on public street trees.
	As resources allow, inspect public street tree maintenance and planting conducting by contractors.	Continue to inform contractors of tree regulations and standards, maintain contractor specifications, and inspect the completed work.
Utility Tree Maintenance	Regularly meet with utility companies and utility vegetation management companies to ensure best practices are maintained.	Coordination with companies and agencies involved with utility tree pruning will improve communications and outcomes. It will also ensure adherence to best practices as defined in the ISA Best Management Practices – Utility Pruning of Trees (2004).
Young Tree Training	Establish a young tree maintenance plan for all City-led plantings and structurally prune every three years for at least two cycles.	Young tree maintenance improves a tree's structure and reduces future maintenance costs.
Tree Planting and Irrigation	Adhere to industry standards and best practices when planting trees.	Choosing quality tree nursery stock and growing quality stock at the city's tree nursery for planting is essential to long-term growth and health. The City should continue to adhere to ANSI Z.60.1 Nursery Standards. Development projects should follow the same requirements and trees planted should be inspected to conform with City and industry standards. The City should require replacement of trees planted as part of development that are removed or die within 5 years of planting or City-determined limit.

Maintain and periodically update the recommended and prohibited tree lists and utilize for all City-led projects and require use as part of development projects.

Develop citywide and local species diversity goals by potentially using a three-tiered approach.

Ensure the trees in the list are suitable for Fort Worth's current and changing conditions, that they are native or highly adaptable, not invasive, and support goals for urban forest resiliency to pests and diseases and urban heat. The list and updates to the list should include the following considerations:

Ensure that the total number of species recommended will allow the City to meet the species diversity goals outlined in the Plan. Prioritize trees rated as low water users.

Identify tree species that are not expected to adapt to changing conditions and replace them with suitable species.

Ensure a variety of tree sizes are available, including small and medium-sized tree species to provide options in locations that have limited soil volume. Include attributes in the tree list for the users of the list to make informed decisions aligned with the right tree right place principle.

Tier 1. Citywide Species Diversity Goal: The City should adopt a goal of having no one species comprise more than 10% of the City tree population and no one genus comprise 20%. This goal will help to ensure that the overall inventory is resilient to threats as it is dispersed across the City. The established goal can then be used to further inform a more nuanced plan for individual neighborhoods or geographic areas of the City.

Tier 2. Implement Diversity Goal on Neighborhood Scale: The City should determine smaller geographic portions of the city and apply the species diversity goal to those areas. Boundaries could be formed from existing defined neighborhoods, Planning Sectors, or other set boundaries within the city. This strategy would help to identify what species dominate a specific area and plan for the introduction of new species to provide an additional layer of species diversity and protection from threats. This approach would also necessitate specific planting palettes for each area that factor in the current neighborhood-level species diversity percentages into what species are planted.

Tier 3. Street Level Diversity: The City should incorporate species diversity on a street or street block level. At this scale, species diversity decisions would include determining whether a street is planted with two or three alternating species, and the extent to which monoculture street plantings would be allowed. The planting palette for individual streets would be formed by

		decisions made in Tier 2 of the planning process. This tier would not include maintaining the citywide species diversity goal as continuity and aesthetics are important considerations for developing neighborhood character and would be difficult to achieve with 10 or more species planted on a street.
	Continue to provide information and enforce tree regulations for trees on private property.	Community education campaigns and direct actions such as City ordinances, policies, and permitting programs are the interfaces between the City, the urban forest, and private property. Sharing of information and enforcing tree regulations ensures the tree canopy on private property is sustained.
Additional Best Practices	Implement an Integrated Pest Management (IPM) program for all City-maintained trees as necessary.	A healthy urban forest provides the greatest return on investment. Effective management of tree pests and diseases requires an integrated approach of monitoring, adequate resources, and various treatment techniques.
	Conduct visual assessments of 15% of the public tree population annually to monitor for pests and diseases.	A public tree inventory database and management software can provide information to establish zones or areas of concern where trees are susceptible to pest and disease outbreaks. To identify possible concerns a routine visual assessment of a portion of the tree population each year can potentially halt an outbreak or identify a new concern. Data should be logged in the City's database and used to inform budget requests.
	Provide information and training to the public regarding tree pest and disease signs, symptoms, prevention, and treatment.	Private property has the most trees comprising the urban forest. Education, resources, trainings, and other public engagement can help to grow and manage an urban forest that is resilient to tree pests and diseases.
	Implement best practices to reduce and address tree and sidewalk conflicts.	The Solutions Workbook and Possible Guidelines for Tree and Sidewalk Conflicts is a separate study as part of this project, and it provides guidance for consistent and transparent evaluation of conflicts with alternative solutions to tree removal or sidewalk replacement.

	Explore the financial costs and return on investment to implement an urban wood utilization program.	In addition to the environmental benefits of carbon storage, urban wood utilization programs contribute to the green economy of Fort Worth and can provide employment opportunities throughout the entire process to remove, store, treat, and prepare wood for its second life.
Funding		
Funding Mechanisms	Evaluate the potential funding mechanisms for feasibility.	The Plan provides a series of potential and viable mechanisms to fund urban forest management. Further analyses by the City should be conducted to identify the preferable and most feasible funding mechanisms.
	Refine the analyses to support implementation of feasible funding mechanisms.	Further studies and analyses should be conducted on the preferable and most feasible funding mechanisms.
	Further evaluate the degree to which the residents and/or the City would support and generate the funding.	Respondents showed varying opinions for how street tree and citywide urban forest management should be prioritized. Additional public engagement and education efforts should be undertaken to investigate where public support lies in terms of additional funding and priorities.
	Develop a sustained funding report detailing current and potential funding mechanisms aligned with urban forestry needs.	The report should provide the guidance to effectively implement the feasible funding mechanisms and include a method for evaluating needs to inform adjustments to future budget requests.

COMMUNITY FRAMEWORKS

Community Engagement

Category	Recommended Action	Key Considerations
Engagement to Implement the Plan	Establish consistent messaging and implement an outreach and education program as a Citywide coordinated effort.	A team of City staff and stakeholders should be organized to monitor Plan implementation. To support the Plan, a community outreach strategy should be developed that defines the audiences, approaches, timing, materials, and other considerations to effectively communicate to all communities and demographics.
Multiple Avenues of Communication	Remove barriers that prevent access to information by implementing outreach and education on multiple platforms to reach all demographics and cultures in the city.	Utilize local community partners to identify the existing barriers to information and align efforts to address these within the community outreach strategy.
Volunteer Corps or Tree Stewards Program	Support the expansion of the Citizen Forester Program and other tree stewards programs.	A community network of tree stewards increases capacity, support, and attention to the urban forest.
Partnerships	Strengthen community and regional partners that represent all neighborhoods and demographics in the city.	Consider the technical and funding support from state agencies and federal agencies, community-based organizations, regional organizations, and other conventional and non-conventional partners. Identify shared goals, opportunities to leverage resources, and strategies that are guided by an MOU or similar.
Education	Coordinate with partners to host and support educational activities.	Activities may include articles, seminars, trainings, workshops, events, virtual sessions, and other mediums and channels that reach Fort Worth's diverse population.
Urban Forestry Working Group	Consider establishing an Urban Forestry Commission, working group or similar to support implementation of the Plan and ongoing efforts.	The commission or working group can serve as advocates for the urban forest and support programs such as tree planting, public education and engagement, Tree City USA reporting, events, among other considerations. These groups can serve as ears to the community to gather input and feedback on successes of the Plan and considerations for adjustments to strategies and programs.
Environmental Justice	Utilize partnerships and surveys to address environmental justice concerns and adapt strategies as needed.	Establishing or strengthening partnerships that represent all neighborhoods, communities, demographics, and cultures ensure the urban forest provides benefits and services to all. Consider addressing this by first identifying priority neighborhoods.
Volunteer Coordinator	Support volunteer coordination by collaborating on events.	A volunteer coordinator with specific guidance for urban forestry engagement can promote various events to build community stewardship.

DETAILS SUPPORTING RECOMMENDATIONS

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Considerations for Trees to Support Stormwater Management

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PUBLIC TREE MAINTENANCE PLAN

*In support of the Technical Report's
recommendations and the Fort Worth
Urban Forest Master Plan*

PUBLIC TREE MAINTENANCE PLAN

The following maintenance plan outlines the strategies and procedures that the Park and Recreation Department's Forestry Section will implement to ensure the proper maintenance of public street trees in the city. This plan aims to enhance the aesthetic, environmental, and economic benefits of the urban forest while ensuring public safety and complying with industry standards and best practices.

Objectives

- ❖ To provide a healthy and sustainable urban forest.
- ❖ To ensure public safety by identifying and mitigating potential hazards posed by street trees.
- ❖ To reduce maintenance costs and minimize the impact of street trees on infrastructure.
- ❖ To promote engagement and education about the importance of street trees.

Maintenance Strategies

- A) **Inspection and Assessment:** The Forestry Section will conduct regular inspections of public street trees to identify potential hazards and assess their health and condition. The data should be recorded in a City's GIS or inventory management software program.
- B) **Pruning:** Forestry will continue to conduct hazard abatements in the short term. Industry standards and best practices will be applied. Contractor specifications will match City regulations and policies and align with industry standards. The information from the inspections and assessment will be used to prepare and secure contracts. In the longer-term, the City may secure funding and resources to take on maintenance responsibility of public street trees and begin a phased approach for a proactive pruning program. It is recommended the City conduct and maintain a comprehensive public street tree inventory before considering maintenance responsibility and/or proactive maintenance. The regular pruning schedule will maintain the health and function of street trees, reduce the risk of falling branches, and ensure adequate clearance from power lines, streetlights, and other infrastructure. In turn, the City will be able to maximize benefits and return on investments. Pruning practices will follow the latest industry standards and guidelines to avoid excessive cutting, minimize damage to trees, and promote healthy regrowth.
- C) **Tree Removal:** When necessary, the department will remove street trees that pose a safety risk, have severe health issues, or cause significant damage to infrastructure. The department will also consider replanting new trees in suitable locations to maintain or enhance the urban forest's benefits.
- D) **Tree Planting:** Forestry will establish a tree planting program to replace removed trees or to plant new trees in appropriate locations along public streets. Tree planting strategies will follow the approved Tree Planting Initiative provided in the Technical Report.
- E) **Pest and Disease Control:** Forestry will monitor and control pest and disease outbreaks in public street trees through regular inspections and preventive measures. Forestry will use integrated pest management strategies that minimize the use of pesticides and focus on non-chemical control methods to protect public health and the environment. Additional details are provided in the Pest and Disease Management Strategy provided within the Technical Report.

By implementing a Public Tree Maintenance Plan, the City can ensure proper maintenance of public street trees to provide a healthy and sustainable urban forest, ensure public safety, reduce maintenance costs, and promote community engagement and education about the importance of street trees.

Case Study for Proactive Public Tree Maintenance

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

An inventory and routine monitoring can inform priorities and management strategies. It is estimated that there are approximately 330,000 public trees along streetscapes, in maintained areas of parks, and on public properties. Of those trees, it is estimated that at least 150,000 trees are public street trees.

As stated in earlier sections, public street tree maintenance is primarily the responsibility of the adjacent property owner whereas, public park, median, and property trees are the responsibility of the City to maintain. Therefore, a citywide public tree proactive pruning program cannot be fully implemented at this time. Rather, the Forestry Section can focus on a recommended pruning rotation of the trees for which they are responsible and encourage property owners to proactively maintain the street trees. The following sections summarize the recommended removal and pruning programs for public street trees in the event the City acquires additional maintenance responsibility and supporting resources.

REMOVALS FOR PUBLIC STREET TREES

Tree & Stump Removal Cost by Size Class*	Per Tree Cost	Removals	Costs
0-3"	\$70	1,000	\$70,000
3-6"	\$125	1,000	\$125,000
6-12"	\$307	1,000	\$307,000
12-18"	\$1,095	1,000	\$1,095,000
18-24"	\$1,095	1,000	\$1,095,000
24-30"	\$1,938	1,000	\$1,938,000
>30"	\$3,023	1,000	\$3,023,000
TOTAL	\$1,093 Average	1,000	\$70k - \$3.0M

Table 33. Summary of the estimated costs for removing 1,000 City-maintained public trees

As shown in the table above, in this hypothetical scenario, there are 1,000 trees for removal though the size classes (i.e., diameter at breast height or DBH measured at 4.5-feet above grade) are unknown. Therefore, the table above summarizes the possible range of costs based on regional averages for tree and stump removal by diameter class. Costs per diameter class range from \$70 per tree (0-3-inch class) to \$3,023 per tree (30 inches or greater) and with 1,000 trees, the overall costs range from \$70,000 to \$3,023,000. Note, these cost ranges assume all 1,000 trees are in one diameter class to provide a high and low range of costs that the City can further explore. In 2021, the City removed a total of 428 trees.

IDENTIFYING OPTIMAL PRUNING CYCLES

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

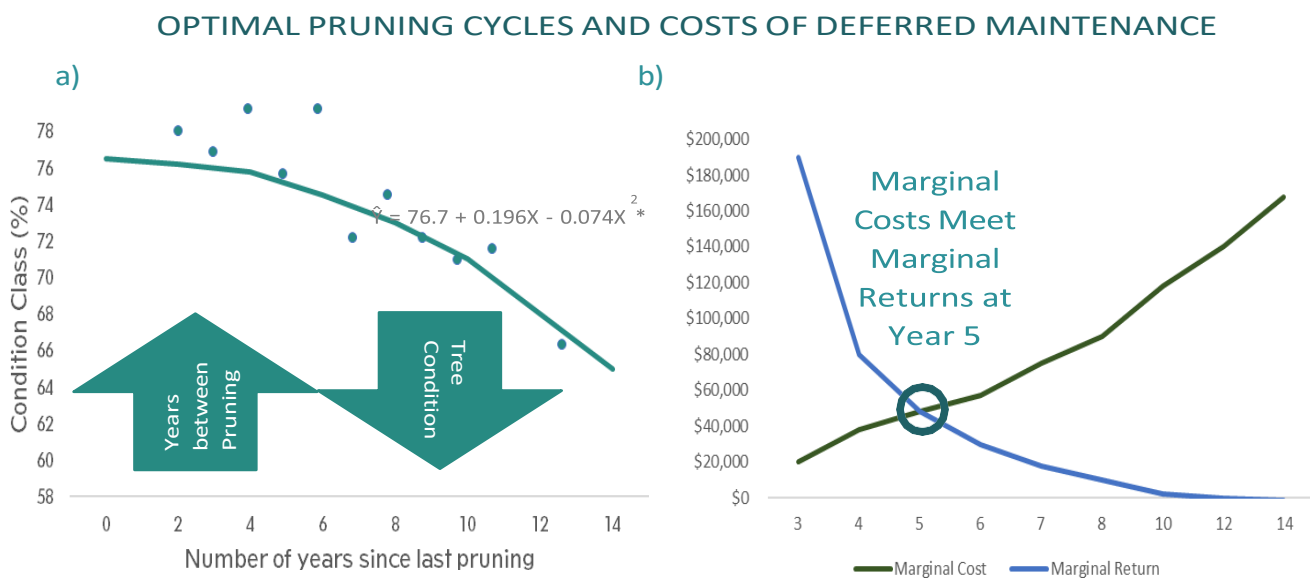


Figure 101. a) Relationship between pruning cycle length (number of years since last pruning) and condition class rating. Asterisk (*) indicates regression is significant at the 0.05 level. b) Marginal cost (loss of tree value) and marginal return (savings in pruning costs) for pruning cycle lengths. For this study, the optimal pruning cycle is where marginal costs and marginal returns intersect— at 5 years. Figure recreated from Miller and Sylvester (1981). - *The Costs of Maintaining and Not Maintaining the Urban Forest: A Review of the Urban Forestry and Arboriculture Literature* (Jess Vogt, Richard J. Hauer, and Burnell C. Fischer, 2015)

AN OPTIMAL PRUNING CYCLE FOR FORT WORTH'S PUBLIC STREET TREES

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

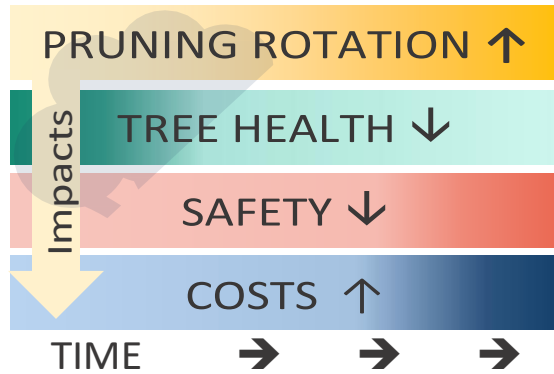


Figure 102. As the years between street tree pruning increases, tree health and safety decrease and costs increase

For Fort Worth specifically, the pruning rotation for public trees that the City is responsible for is unknown and the case is similar for the street trees maintained by adjacent property owners. Numerous studies have shown the detrimental effects a delayed pruning cycle can have on a community's tree population as well as the increased risks to public safety. Not pruning street trees or pruning on such a long rotation is referred to as deferred

maintenance. The costs for deferred maintenance have been closely examined by researchers. Prolonged deferred maintenance has a triple negative effect on costs— it reduces the health and

sustainability of the urban forest, it costs the residents and adjacent property owners as the associated benefits of trees are diminished as tree health declines, and costs the City in terms of increased callouts and liability management.

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

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

ESTIMATED COSTS FOR VARIOUS PROACTIVE STREET TREE PRUNING ROTATIONS

Rotation	# of Trees per Year	Cost per Tree*	Annual Cost	Total Cost
7-year cycle	21,429	\$130	\$2,785,714	\$19,500,000
10-year cycle	15,000	\$130	\$1,950,000	\$19,500,000
20-year cycle	7,500	\$130	\$975,000	\$19,500,000
30-year cycle	5,000	\$130	\$650,000	\$19,500,000

* Based on benchmarking research and industry estimates where costs range from \$70.35 to \$200 per tree with an average of \$130 per tree

Table 34. Summary of the estimated trees and costs for proactive pruning programs

Based on benchmarking research and industry estimates, the costs to conduct contracted proactive pruning (“grid pruning”) range from \$70.35 per tree to \$200 per tree. The alternative to contracted pruning is to conduct the maintenance in-house though additional analyses would be needed to determine the costs. Based on the estimates, a 7-year proactive pruning program for street trees would result in 21,429 trees pruned per year with an annual cost of \$2.8 million. For a 10-year rotation, the annual cost amounts to \$2.0 million, and a 20-year program where 7,500 trees are pruned annually would cost \$975,000 per year. Each of the rotation scenarios result in 150,000 trees pruned therefore, the total costs all amount to \$19.5 million.

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

A complete overhaul of the public tree maintenance budget and the necessary staff to support a 7-year or even a 30-year proactive pruning rotation is not feasible or desirable in the short-term. As an alternative approach, the City could explore phasing the proactive pruning program over time by first addressing public street trees in priority areas.

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

Tree Risk Management

Overview

Risk management is a well-established concept in the management of public spaces. Acceptable levels of risk have been recognized or defined for most basic infrastructure elements such as sidewalks, curbs, streets, playgrounds, and utilities. In many communities, these elements are assessed and managed according to acceptable levels of risk that are specified within written policies or enacted through management practices. Although not all pot-holes can be immediately filled in, not all heaving sidewalks immediately repaired, not all burned-out street light bulbs immediately replaced, a successful risk management program provides a community with a systematic approach to implement corrective actions within a reasonable timeframe.

An urban community consists of both the gray infrastructure (buildings, streets, utilities) and the green infrastructure—the urban forest. Although gray infrastructure has long been assessed and monitored for acceptable levels of risks, green infrastructure has for the most part not received the same subjective evaluations. The urban forest is an integral part of a community’s infrastructure, and trees often dominate the landscape or at least are the most visible part of it. Urban trees contribute to increased quality of life for many communities and their residents. Most people prefer to live, recreate, and work in communities of healthy and well-maintained urban forests. Considerable research documents that people not only prefer to recreate in well-maintained parks with trees, but are willing to pay extra for the privilege. Safety, or at least the perception of safety, is critical if urban forests are to be managed and enjoyed.

Management of Tree Risk

Community managers have the responsibility to create and maintain a safe and useful urban forest for their constituents. Urban foresters need the training, expertise, and data to recognize varying levels of risk, and to manage the forest at an acceptable level of risk. Tree risk management involves the process of inspecting and assessing trees for their potential to injure people or damage property. Traditionally the term “hazard” (or hazardous) had been used in the context of evaluating trees for their failure potential. To many people, “hazard” suggests trees are at immediate risk for failure. In this report, the term “risk” trees is used to define trees with structural defects that may cause the tree or tree part to fail, where such a failure may cause property damage or personal injury. Trees will vary, ranging from low to high risk for failure and may require attention immediately or in the near future. The threshold of risk acceptable to liable parties is dependent upon their policies and objectives. To make objective, science-based decisions on the safety of trees and the urban forest, individual trees and site conditions need to be evaluated for the level of risk that they do or do not present.

Liability and Risk

Community leaders and decision-makers must consider the perceived public liability for tree damage and injury claims. In the extreme, trees are excluded from public rights-of-way to minimize public exposure. In the risk management field this is called risk avoidance. In these cases, the public benefits that trees provide, which usually outweigh the perceived costs, are not delivered to the community. Attempts to attain zero risk often become costly over time, due to premature tree removals, more frequent tree replacements, and loss of benefits that mature trees provide. Instead, a city should actively monitor, prioritize, and mitigate risk as funding permits.

Street Tree Management in Fort Worth

The responsibility to maintain public street trees in Fort Worth is primarily the responsibility of the adjacent property owner. In most cases, a tree permit is required to prune or remove a street tree.

The City of Fort Worth's staff will remove hazardous limbs, trees, or debris in the public right-of-way as they are encountered and as resources allow. This section aims to provide the City with the guidance to effectively assess and mitigate priority risks within the confines of available resources and funding, communicate to property owners, and to monitor contractors for best practices.

Purpose of Tree Risk Management

The purpose of a tree risk assessment is to inspect and assess in detail the structure and quality of the tree, tree parts, surrounding targets, and environmental conditions. An assessment provides the persons or entity responsible for tree care with options for mitigating or reducing risk associated with each tree assessed. By evaluating and ranking the risk potential, tree managers can prioritize mitigation efforts within the limits of available funding and resources.

Trees may appear to be permanent fixtures of our environment though at some point, trees will eventually decline in health, deteriorate in structure, collapse, and decompose. Trees may decline and eventually die from myriad causes including disease, insect attack, drought, uprooting, and catastrophic stem failure in high winds, or from combinations of factors working together. Others may die from old age and go through a natural cycle of senescence before failure. Some trees die and later collapse as their stems and branches decay, and some begin to break up while they are still green. While any large tree poses a risk of failure in high winds, in situations where people and trees must live together in close proximity it is important to identify where a tree has become an unacceptable risk.

Many different kinds of professionals are interested in managing tree risk in communities. For the City of Fort Worth, the Forestry Section manages public trees, and the Urban Forestry Section administers the Urban Forestry Ordinance for private development. These tree managers need reliable information concerning the identification and management of hazard or "risk" trees. In addition, public trees need to be routinely pruned to minimize risk, maintain public safety, improve tree health, strengthen the structure of trees, and provide a continual flow of ecosystem benefits and services.

Procedures for Tree Risk Management

The City should use tree inventory data, inventory software, service requests, and staff observations to continue to prioritize trees for risk assessment and potential mitigation. Risk assessors should use the ISA Level 2 Basic Risk Assessment protocols along with the American National Standards Institute's (ANSI) A300 Standards.

Both empirical data and subjective data should be gathered for each tree. The industry protocols require the assessor to evaluate the tree for conditions and factors that may qualify as a potential risk. The evaluation considers the tree's crown and branches, trunk(s), and roots. If a potential risk is identified in either or all of the tree's components, the site information is collected, and the risk assessment commences. Potential targets such as people or vehicles are noted along with site factors and tree health issues. The tree component causing the potential risk is then examined and documented. For the crown or branches, issues such as deadwood are recorded along with the deadwood size and the level

of load bearing on the branch or branches. The likelihood of failure and impact are recorded, and the likelihood of failure and impact is autopopulated based on the ISA tree risk assessment matrix (see tables below). In addition, the level of consequence is autopopulated as is the risk rating for the specific tree component (e.g., crown and branches). If other tree components such as the trunk or roots pose a potential risk, a similar process is completed. Once all components are assessed, an overall risk rating is autopopulated indicating the risk level as extreme, high, moderate, or low risk.

Table 35. The ISA tree risk assessment matrix to establish a risk rating

Likelihood of Failure	Likelihood of Impact			
	Very Low	Low	Medium	High
Imminent	Unlikely	Somewhat Likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat Likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat Likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Likelihood of Failure	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat Likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Definitions

Tree Risk: Formerly referred to as a hazard tree, a tree with risk has structural defects in the roots, stem, or branches that may cause the tree or tree part to fail, where such failure may cause property damage or personal injury.

Tree Defects: Tree defects are often organized into two categories— 1) injury or disease that seriously weakens the stems, roots, or branches of trees, predisposing them to fail or, 2) structural problems arising from poor tree architecture, including poorly attached stems and branches that lead to weak unions, shallow rooting habits, inherently brittle wood, and other physiological conditions.

Low Risk: The low-risk category applies when consequences are “negligible” and likelihood is “unlikely”; or when consequences are “minor” and likelihood is “somewhat likely” (refer to the table above for terminology). Some trees with this level of risk may benefit from mitigation or maintenance measures, but immediate action is not usually required. Tree risk assessors may recommend retaining and monitoring these trees, as well as mitigation that does not include removal of the tree.

Moderate Risk: Moderate risk situations are those for which consequences are “minor” and likelihood is “very likely” or “likely”; or when likelihood is “somewhat likely” and consequences are “significant” or “severe” (refer to the ISA tree risk assessment matrix table in the overview above). The tree risk assessor may recommend mitigation and/or retaining and monitoring.

The decision for mitigation and timing of treatment depends upon the risk tolerance of the tree owner or manager.

High Risk: High risk situations are those for which consequences are “significant” and likelihood is “very likely” or “likely,” or when consequences are “severe” and likelihood is “likely”. This combination of likelihood and consequences indicates that the tree risk assessor should recommend mitigation measures be taken as soon as is practical. The decision for mitigation and timing of treatment depends upon the risk tolerance of the tree owner or risk manager. In populations of trees, the priority of high-risk trees is second only to extreme risk trees.

Extreme Risk: The extreme risk category applies in situations in which failure is “imminent” and there is a high likelihood of impacting the target, and the consequences of the failure are “severe” (refer to the table above). The tree risk assessor should recommend that mitigation measures be taken as soon as possible. In some cases, this may mean immediate restriction of access to the target zone area to avoid injury to people.





Source: Dallas Morning News

URBAN FOREST EMERGENCY PREPAREDNESS AND RESPONSE STRATEGY

*In support of the Technical Report's
recommendations and the Fort Worth
Urban Forest Master Plan*

URBAN FOREST EMERGENCY PREPAREDNESS AND RESPONSE STRATEGY

A wide range of natural disasters contribute to varying levels of impact and risk in Fort Worth. According to the Federal Emergency Management Agency's (FEMA) [National Risk Index \(NRI\)](#), Tarrant County is in the 98th percentile for risk nationally, and 97th percentile for the state of Texas. Of the 18 natural hazard types factored into the NRI calculation, Tarrant County is potentially impacted by 14 of them: cold wave, drought, earthquake, hail, heat wave, hurricane, ice storm, landslide, lightning, riverine flooding, strong wind, tornado, wildfire, and winter weather. The [Expected Annual Loss \(EAL\)](#) of these natural hazards is calculated with [Social Vulnerability](#) and [Community Resilience](#) to achieve the Risk Index scores. The total EAL for the census tracts in Fort Worth is \$273,352,316.80.

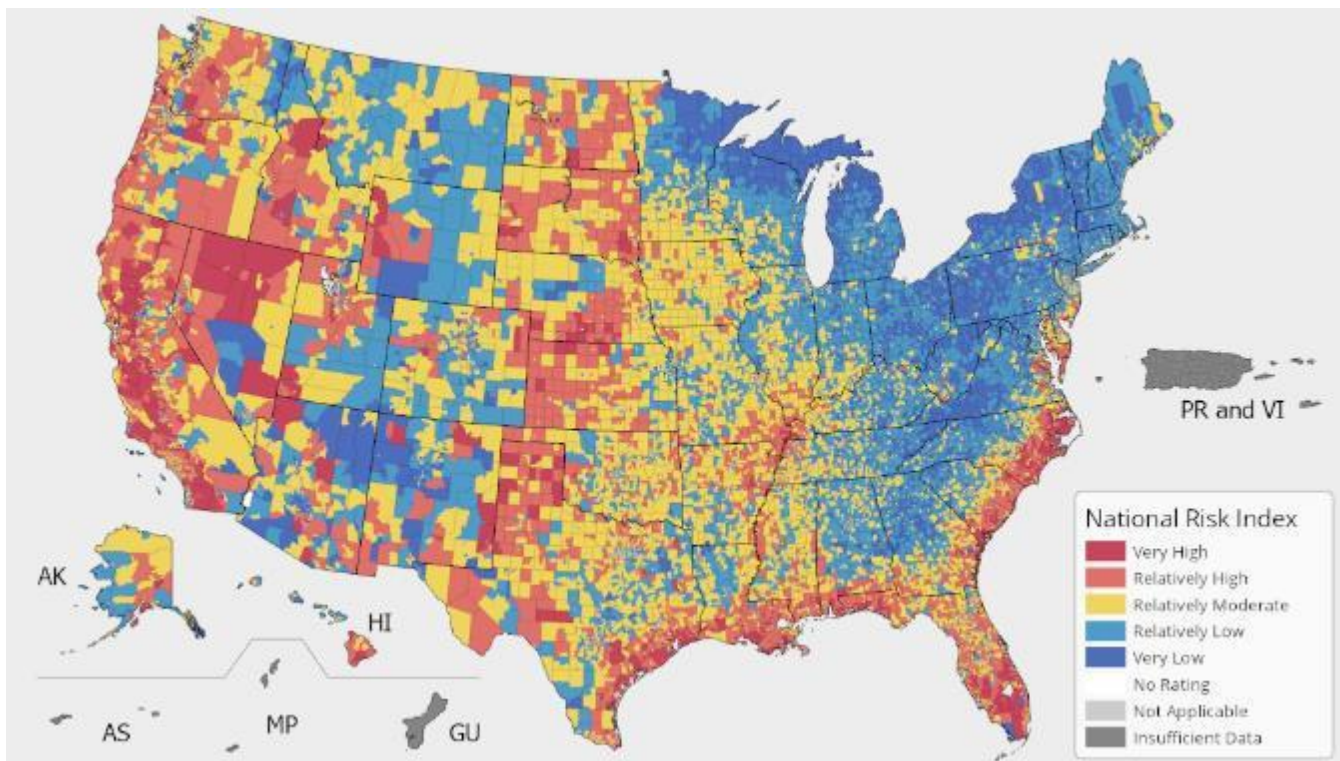


Figure 103. FEMA National Risk Index

An emergency preparedness plan is essential to shaping a proactive urban forestry program for the City of Fort Worth. In this *Urban Forest Emergency Preparedness Plan*, four primary objectives are identified to promote active tree management year-round:

1. Assess and Prioritize
2. Organize and Prepare
3. Response
4. Recover and Regrow

Assess and Prioritize

Maintaining an active tree inventory ensures that the urban forest is prepared for drastic weather events through risk reduction and limitation of unnecessary tree failures. A healthy, diverse, and well managed urban forest is more sustainable and resilient during the stresses associated with disaster.

Maintaining the Inventory

To reduce the risk associated with storm-related tree damage, the City should inspect emergency travel corridors and evacuation routes with trees that are cabled, braced, or otherwise indicated as a high risk annually and before predicted severe weather events. The inspection of these trees is critical to reducing roadway closures during severe weather situations and keeping it clear for emergency response units. High-risk trees should be either removed or maintained to minimize failures as budget allows.

High risk trees can be identified using the International Society of Arboriculture (ISA) Tree Risk Assessment Qualification (TRAQ), which quantifies the likelihood of failure, the impact of the failure and provides a scale to rank these trees. For more information on TRAQ visit the Southern Group of Foresters

Website: <https://southernforests.org/urban/ufst>

Proactive Management

Other crucial preparedness maintenance for these severe storm events should include annual pruning, inspections, updating inventory information and addressing priority tree risks as designated by a certified arborist. Annual maintenance will reduce the overall failures and risk associated with the urban forest overtime as a regimented maintenance plan will transition Fort Worth from a reactive program to a proactive maintenance program. The transition to a proactive management program would develop a resilient urban forest over time and reduce failures during these storm events.

Organize and Prepare

Debris Management

The City debris manager and urban forestry program should meet and identify areas to store and recycle tree debris during weather events. Identifying storage areas within the various sections of the city to deposit trees separate from other debris to provide access to emergency corridors and a more timely clean up. Having separate debris deposit locations for trees and other materials will allow emergency corridors to be opened more quickly and a more timely clean up when emergency arborist crews arrive at the scene. Having designated areas and tree specific debris areas will allow these emergency crews to dispose of materials in a timely fashion and effectively move throughout the city to assist in the recovery efforts after the storm events.

The tree debris needs to be separated from the other debris as chippers and other specialized equipment to properly recycle the tree debris cannot dispose of any metal, plastic, or other materials not entirely of wood. The tree debris can be recycled for mulch or firewood if kept separated. This can be utilized in the city for plantings if mulched and the firewood could be sold if there is a site to store the lumber.

Public Utilities

The City of Fort Worth should partner with Oncor Electric on tree maintenance around utility structures. The partnership should focus on planting appropriate trees around utilities and maintenance that promotes reduction of tree failures that will impact utility infrastructure. The City should identify a liaison who would communicate with Oncor on priority maintenance needs and planting specifications to develop a resilient urban forest. The liaison would help develop planting lists and recommendations to maintaining the urban forest proactively to reduce utility conflicts and meet best management practices. The partnership with Oncor should entail an annual inspection of utility infrastructure and the trees that are adjacent to these structures. The annual inspection would identify tree conflicts with utilities, any major corridors for utilities and roadway access to maintain these structures to reduce closures after severe weather. These priority corridors should be ranked for priority response protocols and debris removal and identify section leaders to manage these corridors.

Urban Forest Strike Team

The City should designate several individuals to attend the [Urban Forest Strike Team](#) training course. This course is a specialized training in the protocols and evaluation of trees after natural disasters and storm events. Identifying staff members who are critical to the recovery of the urban forest and providing them with training in emergency response will allow for a timelier recovery after storms. The staff members who attend this training will become section leads and provide vital data to the command center after storm events to prioritize the cleanup efforts. These trained individuals will be responsible for ensuring the emergency corridors and major roadways are prioritized and cleared to allow emergency services access and provide updates in live time as they evaluate the aftermath of the storm event.

Once the City has identified critical individuals and areas for storm response, these individuals should participate in an annual drill to practice response and recovery scenarios in preparation for hurricane season. Notification to residents that an annual storm preparedness drill is taking place should be done when undertaking this drill. The drill will provide practice to those involved with emergency responsibilities and serve as a refresher on materials and protocols for their individual responsibilities. These annual practices allow individuals to practice in a less stressful situation to help identify areas for improvement and allows them to get comfortable with their duties. These drills will be a time of reflection and provide a time annually to update and change response protocols prior to storm season. The continuous drills will improve recovery and will benefit the City overtime as response and recovery times and procedures will be more effective.

Additional Partners

- ❖ Texas A&M Forest Service <https://tfsweb.tamu.edu/>
- ❖ Texas A&M Forest Service Urban and Community Forestry Program <https://tfsweb.tamu.edu/urbanforestry/>
- ❖ Texas Urban Forestry Council <https://www.arborillogical.com/articles/all-articles/categories/texas-urban-forestry-council/>
- ❖ Cross Timbers Urban Forestry Council <http://ctufc.org/>
- ❖ Texas Division of Emergency Management <https://tdem.texas.gov/>
- ❖ Texas A&M AgriLife Extension Office-Tarrant County <https://tarrant-tx.tamu.edu/>



Response

The City of Fort Worth should utilize the Urban Forest Strike Team and their protocols to respond to severe weather events. The first step should be identifying a command center. The command center would serve as the main hub for reporting and deployment of arborist crews to address storm debris. Ideally the center would have a generator for backup power, reliable internet, and the ability to communicate to essential personnel without interference. Individuals who have attended the Urban Forest Strike Team Training should be appointed as incident leaders. The incident leaders should have priority maps for their sections and verify that all major corridors for emergency services are clear or notify the command center of debris that may be blocking these roadways. Within the sections the leaders should identify downed and larger limb failures across roadways, utility infrastructure damage and major tree failures impacting emergency services. These failures should be noted and reported to the command center for evaluation and ranking of priority. The command center will deploy arborist teams and equipment as needs based off the live updates coming from the field.

Command center will provide emergency arborist crews with maps that identify priority corridors, debris deposit sites and contact information with the designated section leader. The section leaders will set up emergency arborists at priority areas and provide oversight as needed to the crews as recovery efforts begin. Section leaders will be expected to provide updates to the Command Center as emergency crews make their way through sections and finish designated cleanup efforts. Section leads should provide the Command Center hourly updates on recovery efforts regarding evaluations and progress of emergency crews.

Once the initial evaluation of the section has been complete the section leaders should utilize tablets in the field to update the inventory for any removals or tree related losses suffered during the storm event. The emergency crew arborists should provide the section leader with details on what trees are being removed, so the section leaders can in real time update inventory data and keep these records up to date. Maintaining records of the lost trees during storm events is critical in post recovery evaluations and FEMA reporting for losses. Utilizing the existing inventory data and reporting canopy loss will assist in post storm plantings and financial recovery from FEMA.

Recover and Regrow

Post storm events, the City will need to begin recovery efforts and evaluate storm response protocols. An important part of emergency preparedness is to perform after action evaluations and improve upon the current protocols. This evaluation will identify priority planting areas, improvements to response and prepare Fort Worth to establish a sustainable and resilience urban forest.

After-action Report

Post storm recovery, an after-action (AA) report and meeting should be held with section leaders and command center staff. The meeting should review the in the field operations and recovery efforts, any adjustments to protocols, the canopy loss and improvement suggestions for the next storm. A designated individual(s) should write up a report on the overall incident and provide an overview of the canopy loss based off the inventory data. The report and canopy loss data should be reported to FEMA for financial recovery and to the urban forestry program. The urban forestry program should utilize the inventory data and report to plan for planting efforts to replace lost trees and develop a maintenance response plan for post storm recovery. Both the AA report and maintenance response plans is recommended to be shared with residents, to show the canopy loss post incident and provide them with current information on how the City is handling the post storm cleanup and recovery.

Right Tree, Right Place

Utilizing Right Tree, Right Place, especially near utility structures will prepare the overall urban forest for severe storm events. Planting trees properly and matching them to the site will reduce utility conflicts with canopy and improper pruning cuts to meet utility regulations. Proper tree establishment on a site will ensure a resilient urban forest during severe storm events. The planning and establishment of trees in the urban forest is critical to reducing the failures during high wind events. Trees that are planted properly and receive the proper establishment care will adapt to their surroundings and grow accordingly providing proper anchoring roots and branch attachments. It is recommended to follow the best management practices for tree planting to provide adequate soil, space, and planting care for tree establishment.

Planting for Resilience

The City of Fort Worth will need to prepare the urban forest to transition to a more climate resilient forest as severe weather becomes more regular in the region. To prepare the urban forest understanding the current inventory as it relates to the composition of species and genera is required. Using the 10/20/30 rule, which states no more than 10% of a particular species, 20% of one genus and 30% of any single family should be planted in the urban forest. Following this guidance for planting will increase diversity and minimize losses of trees in the event of a severe weather change, that may impact a species or genus of trees. While striving to meet the 10/20/30 rule and becoming more diverse, tree selections should consider the future climate of the region. Selection of heat and drought resist trees should be prioritized or those cultivars that have these traits to be selected from nursery stock. Time spent researching the various attributes of the tree's resiliency should be spent to ensure the

longevity of each planting. The City should seek out trees that help build diversity but also provide resiliency to heat, drought, ice/snow events, wildfire, and other storm events that may become more regular to the region. A few attributes to consider for these types of trees may be the following, but are not limited to:

- ❖ Thicker leaves for drought resistance
- ❖ Thicker bark for wildfire protection
- ❖ Disease and pest resistance
- ❖ Tolerance to excessive heat
- ❖ Stronger branch attachments for snow or ice

Updating the Inventory

Part of essential upkeep of the urban forest is to maintain and update the inventory, especially post storm events. In conjunction with the Urban Forest Strike team reports the Forestry Section, Transportation and Public Works, and other tree managers should update the inventory to reflect the current tree loss and maintenance record for the City. Updating the tree removals and loss from the inventory is critical to help identify planting areas and track current canopy cover in Fort Worth. Canopy cover after storm events may shift priority areas for recovery and establishment. The City should evaluate the tree canopy post storm events and assess the new priority planting areas. Utilizing the tree planting strategy provided in the Technical Report, the City should create a report identifying the priority planting areas and potential species to plant for future planting initiatives.

Additional Resources

Part of being prepared for an emergency is having the knowledge and/or resources to prepare and respond to these emergency situations. Below are some additional resources to gain knowledge about emergency preparedness and data to support local efforts.

- ❖ Texas A & M Forest Service Tree Planting Guide
 - <https://texastreeplanting.tamu.edu/viewalltrees.aspx>
- ❖ Arbor Day Foundation-Right Tree, Right Place
 - <https://www.arborday.org/trees/righttreeandplace/>
- ❖ FEMA National Risk Index
 - <https://hazards.fema.gov/nri/>
- ❖ Southern Group of State Forester-Urban Forest Strike Team
 - <https://southernforests.org/urban/ufst>
- ❖ Oncor Electric
 - <https://www.oncor.com/content/oncorwww/us/en/home/about-us/transmission-systems/vegetation-management-for-transmission.html>



Burke Burnett Park (Source: Google Earth)

TREE PEST AND DISEASE MANAGEMENT STRATEGY

*In support of the Technical Report's
recommendations and the Fort Worth
Urban Forest Master Plan*

TREE PEST AND DISEASE MANAGEMENT STRATEGY

A critical component of the Urban Forest Master Plan is the analysis of Fort Worth's public tree population's vulnerability to existing and potential tree pests and diseases. There are many native and invasive forest and urban forest pests and diseases that can either directly cause mortality or weaken a tree to the point at which it is susceptible to other physical or biological stressors. These pests and diseases often attack trees already weakened by drought or storm damage.

The most damaging insects facing Fort Worth in the near term include the emerald ash borer (EAB) and oak wilt. Without proactive plant health care treatments, Fort Worth's public trees are at risk of infestation and death from emerald ash borer and oak wilt. A significant, but unquantified, percentage of trees in parks and on other public and private properties are also at risk from increased insect and disease infestations.

Emerald ash borer or EAB (*Agrilus planipennis* Fairmaire) is a beetle native to Asia and was first detected in Michigan in 2002 though it is suggested that the beetle was in Michigan for years prior to its discovery. EAB has since been detected in 36 U.S. states (as of January 2023), and also in Ontario and Quebec, Canada. In addition to spreading by natural means, EAB can be transported to new areas in infested firewood, timber, and nursery stock. This beetle has been responsible for the loss of millions of ash trees in North America. EAB's primary host tree is *Fraxinus* or ash trees.

Oak Wilt is an infectious vascular disease caused by the fungus *Bretziella fagacearum*. The fungus invades the water conducting system in susceptible trees. All oaks can be susceptible to oak wilt, but there are particular species that are more susceptible than others, specifically trees in the red oaks group. The fungus is spread through certain beetles such as oak bark beetles and sap beetles (Nitidulidae) and locally through common or grafted roots. This fungus is responsible for killing over a million trees within 76 central counties. (Texas A&M Forest Service)

Tree diseases that may impact Fort Worth's public tree population include bacteria leaf scorch on oaks specifically the red oak group, hypoxylon canker on oaks and other hardwoods, and southern pine beetle affecting pines.

Identifying Tree Pests and Diseases of Concern and Host Trees

Emerald Ash Borer (EAB)

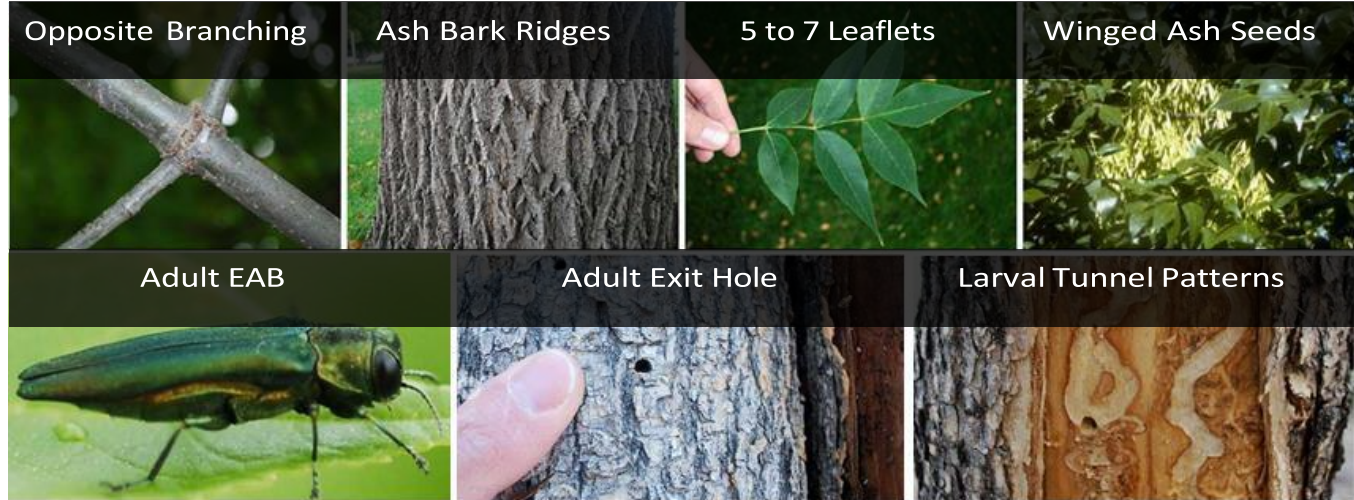


Figure 104. Images to support identifying host ash trees and the emerald ash borer (EAB)

Signs of EAB infestation include:

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

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

Emerald Ash Borer Management

The following provides an overview of the EAB monitoring and management strategy though the City should conduct an inventory of public trees for a better understanding of susceptibility and management options.

Table 36. General guidance for emerald ash borer preparation, management, and recovery

EAB Monitoring and Detection

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

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

Estimate the EAB management costs and prepare budget requests.

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

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

Identify trap trees for EAB.

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

Develop incentives and programs to support private ash tree management.

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

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

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

EAB Emergence

Identify hazard trees in detection / infested areas.

Remove dead or dying ash trees and public areas promptly.

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

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

Continue to educate and support EAB management on private land.

EAB Recovery

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

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

Consider incentives and programs for private landowners to replant.

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

More Information: Texas A&M Forest Service at www.tfsweb.tamu.edu/eab and Texas Trees Foundation at www.texastrees.org.

Oak Wilt

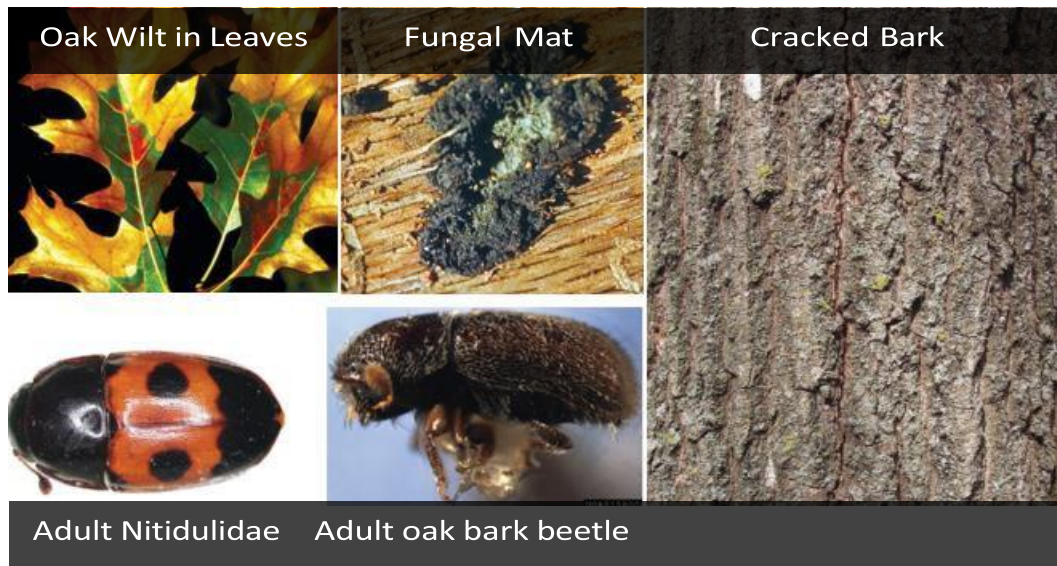


Figure 105. Images to support identifying the oak wilt disease complex

Signs of oak wilt include:

- ❖ Development of chlorotic (yellow) veins, eventually turning necrotic (brown)
- ❖ Rapid defoliation
- ❖ Fungal mat development under the bark of dying oaks
- ❖ Early spring leaves may wilt and turn pale green and brown

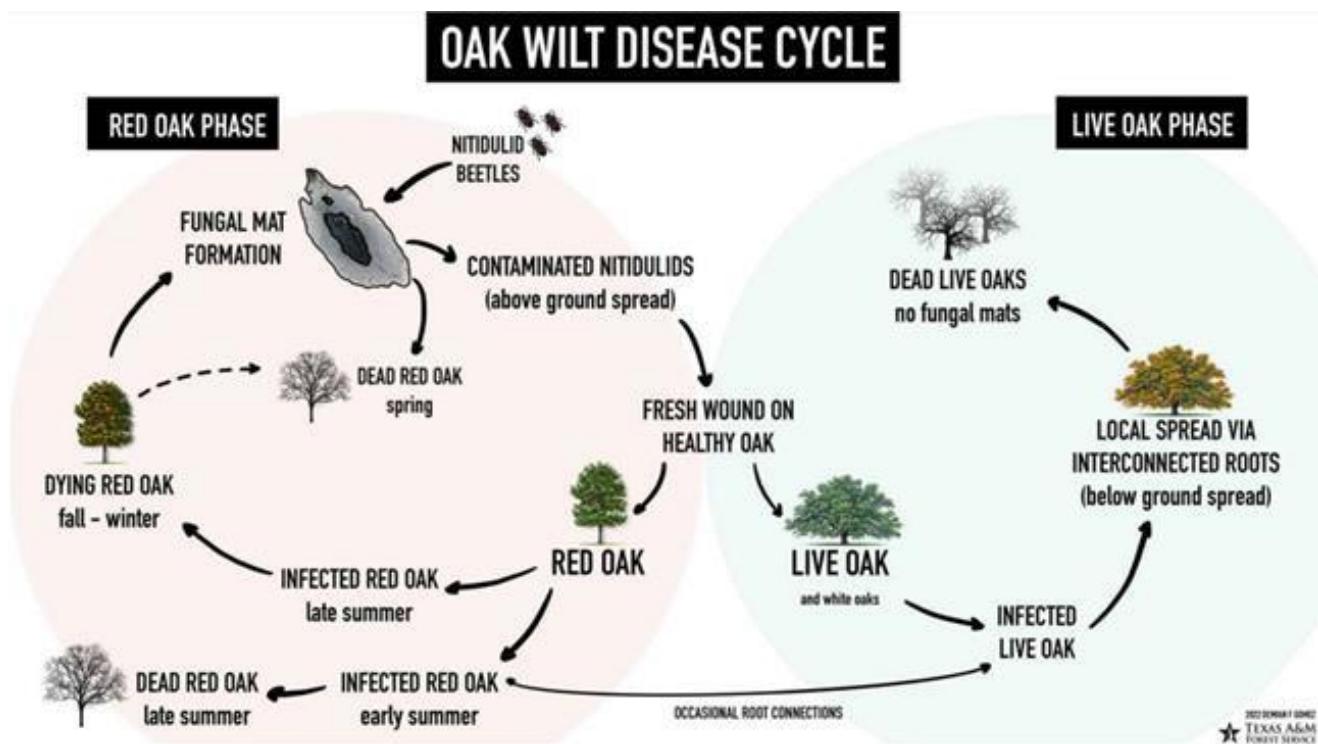


Figure 106. The oak wilt disease cycle (Source: Texas A&M Forest Service)

Strategies and Costs for Emerald Ash Borer Management of Public Trees

The cost of managing emerald ash borer (EAB) in the City of Fort Worth in the public street tree population will vary depending on the specific treatment methods used. However, some general strategies and costs to consider include:

- ❖ **Tree removal:** The cost of removing an ash tree will vary depending on its size and location, but it can typically range from \$500 to \$1,000. Removals should be determined and prioritized based on the size of the tree, location, condition, among other factors. If an ash tree is the prominent feature on a site, treatment options may be considered. The removals should align with the risk reduction removal strategies and can be conducted by management zone or by citywide designated priority.
- ❖ **Tree replacement:** The cost of replacing an ash tree will vary depending on the type of tree being planted, but it can typically range from \$200 to \$800. The replacements should be planted after removal of the ash tree and align with the Planting Strategy section of this Plan.
- ❖ **Inspection and monitoring:** The cost of inspecting and monitoring ash trees for EAB will vary depending on the disbursement of ash trees across Fort Worth and the amount of information collected. Costs typically range from \$1,000 to \$5,000 per year.
- ❖ **Treatment:** The cost of treating ash trees for EAB will vary depending on the treatment method used, but generally, soil or trunk injection treatments of an insecticide. Caution be made when considering insecticides as some can affect pollinator species. Imadacloprid, typically applied to the soil, and emamectin benzoate, applied as a trunk injection, are both effective in controlling EAB for two years but can be harmful to pollinators. Azadirachtin is a natural-sourced insecticide that is applied as a trunk injection and there are conflicting studies and research on the impacts of pollinators but it is also effective for two years in treating EAB. Costs vary depending on the treatment and number of ash trees treated per year, but studies show they typically range from \$100 to \$500 per tree. The City should identify ash trees to treat in perpetuity based on their significance and ash trees to treat in the interim while removals are conducted to spread out the costs over time.
- ❖ **Public education:** Property owners and residents should be aware of the EAB management program and trained to identify new locations of ash trees and possible EAB spotting. Property owners should understand the resources, best practices, and other information regarding EAB management on their property to prevent further spread of the pest.

The total cost of managing EAB in the City of Fort Worth in the public street tree population will likely be in the tens of thousands of dollars per year. However, the cost of inaction could be much higher, as EAB can quickly kill an entire ash tree population.

The City of Fort Worth should develop a formal strategy which includes a combination of tree removal, replacement, inspection, monitoring, and treatment. The objective of the strategy should be to protect the city's ash trees and minimize the costs associated with EAB management. Many of the public ash trees were affected by rapid freezing temperatures that occurred in 2021 though the strategies can be applied to the remaining public ash trees. An essential component to this strategy is the education and outreach to residents and large property owners on the methods for identifying the pest and understanding management options.

Strategies for Oak Wilt Management of Public Trees

The cost of managing oak will in the City of Fort Worth in the public tree population will vary depending on the specific treatment methods used. Some general strategies and costs to consider include:

- ❖ **Tree removal and prevention:** Infected red oaks that die in late summer, fall or early winter should be cut down and burned or disposed of to prevent the fungal mat that may form on these trees in the following spring. The cost of removing an oak tree will vary depending on its size and location, but it can typically range from \$500 to \$1,000. Removals should be determined and prioritized based on the size of the tree, location, condition, among other factors. If an ash tree is the prominent feature on a site, treatment options may be considered. The removals should align with the risk reduction removal strategies and can be conducted by management zone or by citywide designated priority.
- ❖ **Tree replacement:** The cost of replacing an oak tree will vary depending on the type of tree being planted, but it can typically range from \$200 to \$800. The replacements should be planted after removal of the ash tree and align with the Planting Strategy section of this Plan.
- ❖ **Inspection and monitoring:** The cost of inspecting and monitoring oak trees for oak wilt will vary depending on the disbursement of oak trees across Fort Worth and the amount of information collected. Costs typically range from \$1,000 to \$5,000 per year.
- ❖ **Treatment:** The cost of treating oak trees for oak wilt will vary depending on the treatment method used, but generally, trunk injection treatments of a fungicide and/or trenching around the tree. Caution be made when considering fungicide only as the injection does not stop the transmission of the fungus, therefore it is recommended to utilize the injection with trenching best management practices, where possible. Propiconazole is the only fungicide to be effective against preventative treatment to protect live oaks. Costs vary depending on the treatment and number of oak trees treated per year, but studies show they typically range from \$100 to \$500 per tree. The City should identify ash trees to treat in perpetuity based on their significance and ash trees to treat in the interim while removals are conducted to spread out the costs over time.
- ❖ **Public education:** Property owners and residents should be aware of oak wilt management program and trained to identify new locations of oaks and possible oak wilt spotting. Property owners should understand the resources, best practices, and other information regarding oak wilt management on their property to prevent further spread of the pest.

Summary of Strategies for Public Tree Pest and Disease Management

The City of Fort Worth is committed to maintaining a healthy and vibrant tree canopy. Trees provide many benefits to the city, including improving air quality, reducing noise pollution, and providing shade and beauty. However, trees are also susceptible to pests and diseases, which can damage or kill them.

These pest and disease management strategies outline the City's approach to preventing and controlling pests and diseases that affect public trees. The plan is based on the principles of Integrated Pest Management (IPM), which is a holistic approach to pest control that minimizes the use of pesticides.

Goals

The goals of these pest and disease management strategies are to:

- ❖ Protect public trees from pests and diseases.
- ❖ Minimize the use of pesticides.
- ❖ Promote the use of sustainable pest control practices.
- ❖ Educate the public about pests and diseases that affect trees.

Implementation

To achieve the goals for public tree pest and disease management, the City should implement the following strategies:

- ❖ Conduct regular inspections of public trees by a certified arborist.
- ❖ Develop a tree care program that includes proper watering, fertilizing, and pruning.
- ❖ Remove diseased or infested trees and dispose of them properly.
- ❖ Use pesticides only when necessary and in a safe and responsible manner.
- ❖ Monitor the effectiveness of pest control measures and make adjustments as needed.
- ❖ Conduct visual assessments for pest and disease signs or symptoms when conducting risk reduction and preventative maintenance activities for adjacent trees.
- ❖ Maintain records of pest and disease management activities in a GIS or online software program.
- ❖ Educate the public about pests and diseases that affect trees and how to prevent them.

Evaluation

The City should evaluate the effectiveness of these pest and disease management strategies on an annual basis. The evaluation should include a review of the following:

- ❖ The number of public trees affected or potentially affected by pests and diseases.
- ❖ The cost of pest control measures.
- ❖ The public's awareness of pests and diseases that affect trees.
- ❖ The public's satisfaction with the City's pest and disease management program.
- ❖ The City should use the results of the evaluation to make changes to the strategies as needed.



CONSIDERATIONS FOR TREES TO SUPPORT STORMWATER MANAGEMENT

*In support of the Technical Report's
recommendations and the Fort Worth
Urban Forest Master Plan*

CONSIDERATIONS FOR TREES TO SUPPORT STORMWATER MANAGEMENT



The City of Fort Worth recognizes the benefits of a healthy urban forest for stormwater management and aims to integrate trees into its stormwater management strategy while achieving its canopy goals.

This strategy outlines the steps that the City could take to promote tree planting, protect existing trees, and manage stormwater runoff in a way that enhances the urban forest's benefits.

Goals

- ❖ To increase the city's canopy cover to 30% by 2050.
- ❖ To use trees as a cost-effective and sustainable tool for stormwater management.
- ❖ To reduce the negative impact of urban runoff on water quality and quantity.
- ❖ To promote community engagement and education about the importance of trees for stormwater management.

Strategies

- ❖ **Tree Planting:** The City should implement a tree planting program that prioritizes locations where trees can best manage stormwater runoff. Tree species should be selected based on their ability to absorb and store stormwater, tolerate soil moisture, and provide other environmental and social benefits. Native tree species should be prioritized over adaptive species and limit the use of exotic tree species for special use cases only. The program should target areas with low canopy cover and high impervious surfaces to maximize the stormwater management benefits of the urban forest. The Technical Report provides the recommended approach, priority planting areas, and correlating maps and data. Tree plantings should not interfere with other stormwater infrastructure.
- ❖ **Tree Protection:** The City should establish regulations and incentives to protect existing trees that provide stormwater management benefits. The City should also promote best management practices for tree preservation during construction and development to prevent damage to tree roots, trunks, or canopies. Protection measures should focus on preserving mature trees that can provide maximum benefits for stormwater management.
- ❖ **Green Infrastructure:** The City should integrate green infrastructure practices, such as rain gardens, bioswales, and permeable pavement, with tree planting to manage

stormwater runoff. Green infrastructure practices will work in tandem with trees to capture, store, and filter stormwater, improving water quality and reducing the volume of runoff. The City should also work with local developers and landowners to promote green infrastructure practices that incorporate trees into stormwater management.

- ❖ **Monitoring and Evaluation:** The City should establish a monitoring and evaluation system to assess the effectiveness of its stormwater management strategies and track progress toward achieving canopy goals. Tools should be used such as geographic information systems (GIS) and tree inventory data to measure the stormwater management benefits of the urban forest and identify areas where additional tree planting or green infrastructure is needed.
- ❖ **Community Engagement and Education:** The City should work with community partners and organizations to promote public awareness and engagement on the importance of trees for stormwater management. The communications plan as part of the Urban Forest Master Plan implementation should include educational materials and programs that highlight the role of trees in reducing stormwater runoff, improving water quality, and enhancing the urban environment. The City should also encourage community participation in tree planting and maintenance programs to promote community ownership and stewardship of the urban forest.

The City of Fort Worth is committed to integrating trees into its stormwater management strategy while achieving its canopy goals. By implementing this strategy, the City will be able to use trees as a cost-effective and sustainable tool for managing stormwater runoff, improving water quality, and enhancing the urban environment. Increasing public outreach and education can increase awareness and participation in tree planting and maintenance programs for a comprehensive stormwater management program that incorporates the urban forest into the systems.





STRATEGY FOR TREE AND INFRASTRUCTURE CONFLICTS

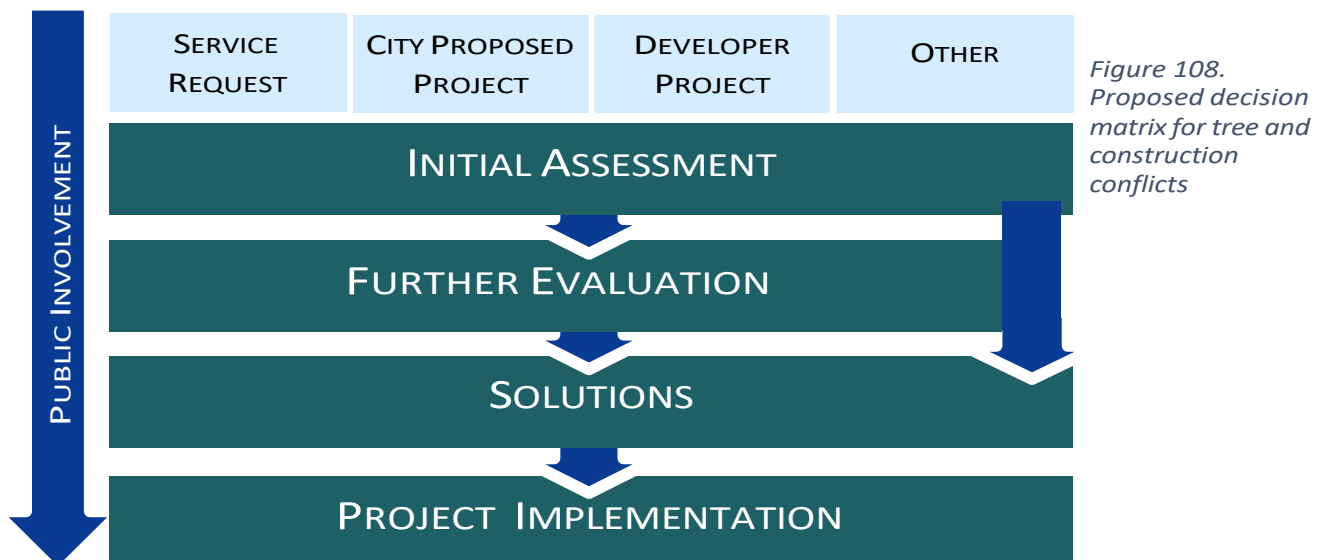
In support of the Technical Report's recommendations and the Fort Worth Urban Forest Master Plan

STRATEGY FOR TREE AND INFRASTRUCTURE CONFLICTS

Decision Matrix

The development of Fort Worth’s Urban Forestry Master Plan identified the need to clarify the decision process to address tree and sidewalk or construction conflicts. A clear decision matrix can help to reduce inter- and inner-department uncertainty and establish or adhere to consistency and fairness. The City’s departments have standard operating procedures and checklists for evaluating conflicts at a project site, but these traditionally have not been available to the public. To make the decision process around the retention or removal of trees more transparent and consistent, a clarified process, decision matrix, and solution toolkit should be developed to highlight the key decision points.

PROPOSED DECISION MATRIX FOR TREE AND CONSTRUCTION/SIDEWALK CONFLICTS



Initial Assessment

The following applies to tree removal requests and proposed projects.

The initial assessment of trees, sidewalks (or other infrastructure), and site at the service request location or project location provides consistency and predictability by collecting the appropriate information. It is recommended to have the Forestry Section involved in the initial assessment process and/or a City staff member with an International Society of Arboriculture Certified Arborist accreditation.

- Tree Preservation Potential. What is the tree quality or health, and is it worth preserving? Is the tree designated as a significant tree or Heritage Tree?
- Tree Mitigation Exploration. If the request to remove the tree is a result of infrastructure damage and the tree exhibits poor health or vigor, can the tree’s health or vigor be mitigated by any means other than removal?

- **Public Safety Risk.** Is the tree a potential hazard that cannot be mitigated by any means other than removal? This includes any tree or tree part that poses a high risk of damage to persons or property located in public places. Use the International Society of Arboriculture’s tree risk evaluation standards.
- **Initial Assessment Timing.** It is recommended that the initial assessment be conducted within 3-4 weeks of receiving a service request for removal. If the assessment is required due to a proposed project, the assessment should occur no later than 30% design or equivalent of design effort (e.g., during an environmental assessment period).
- **Tracking.** Consider tracking the decisions made for the public tree(s) in question in the City’s asset software or similar program.
- For an example Initial Assessment Checklist, see the Example Initial Assessment Checklist further below.

Initial Tree Decision

If the tree removal request was made due to the condition of the tree or other reason not relating to the damage or impediment of infrastructure such as sidewalk, the City Forester or representative may conduct the initial tree decision. If infrastructure is part of the assessment and/or the tree removal request was initiated for a proposed project, the City Engineer or appropriate staff should also be part of the initial tree decision. The appropriate staff will visit the tree and/or proposed project location and assess the tree (and sidewalk, if applicable) conditions. The following actions will result from the assessment:

- **Remove Tree.** The tree removal request was made not as a result of the tree impacting or damaging infrastructure and the tree is identified as unhealthy or unsafe with no remediation possible.
 - Remove the tree and consider the “no net loss” policy of replacing the tree. Some cities implement a 2:1 replacement to removal ratio. The replacement policy should be based on City Code. Replacement of trees can occur on site, same street, or City-approved location. A fee in-lieu should also be considered as an option as described in City Code.
 - Removal of the tree should be prioritized based on other work orders, the risk assessment of the tree, and other factors.
 - The service request, decision, work order, tree information, and tree removal information should be tracked in the City’s asset software or similar program.
- **Retain Tree.** Based on the assessment, the tree is not in decline or the issues can be remediated. Alternatively, if the tree in question is designated as a Heritage Tree or significant tree, the tree may be preserved depending on the tree condition and presence of hazards or risks as described in the City policies and manuals.
 - Document the decision, inform the property owner or project developer.
 - Recommend the remediation activity to the tree if needed.
 - Prioritize and track this information in the asset software or similar program.
 - Conduct follow-ups with the property owner and monitor the tree if necessary.
- **Remove Tree and Replace Sidewalk.** The service request or proposed project identifies a tree that is causing sidewalk conflicts and the tree has been deemed unhealthy and no remediation is possible. The City should reference City Code as to what is defined as unhealthy or hazardous.
 - Remove the tree and consider the “no net loss” policy of replacing the tree. Some cities implement a 2:1 replacement to removal ratio. The requirement to replace

the tree will be the City and City Forester's discretion. The replacement policy should be based on City Code. Replacement of trees can occur on site, same street, or City-approved location. A fee in-lieu should also be considered as an option as described in City Code.

- Removal of the tree should be prioritized based on other work orders, the risk assessment of the tree, and other factors.
- The service request, decision, work order, tree information, and tree removal information should be tracked in the City's tree inventory software or similar program.
- Replace the sidewalk using appropriate design standards and materials and consider designing according to standards that will protect any replacement trees and provide ample soil volume and root space for the new or existing trees.
- Retain Tree and Maintain Sidewalk. A tree in question is in conflict with infrastructure and the assessment determined that the tree is to be retained and the infrastructure (i.e., sidewalk) is to be corrected. The sidewalk will be of standard width and a tree pit of standard width (at minimum) can be installed or retained.
 - Be sure to recommend alternative sidewalk amendments such as width reduction, alternative materials, among other solutions where appropriate.
 - If any root pruning is needed to amend the sidewalk, the City Forester and/or a Certified Arborist hired by the City or property owner should evaluate to determine the appropriate root pruning, branch pruning, soil amendments, and other maintenance required.
 - Documentation in City's asset software as stated before is recommended.
- Evaluate Tree and/or Sidewalk Further. During the initial tree decision, it is not appropriate for extensive explorations of pavement, soils, or tree root systems. There are limitations to the initial assessment and decision. The purpose of the initial assessment is to identify where these future actions are required so that the appropriate schedule and funding can be determined.
 - Documentation in City's asset software as stated before is recommended.

Further Evaluation

The team conducting further evaluation may include an arborist, landscape architect, engineer, or other professionals with expertise relevant to the project details and situation. In addition to collecting information about the trees and infrastructure (i.e., sidewalk) the following additional items may be considered:

Level of impact, future risks, cost/benefit, anticipated sidewalk maintenance if the tree is kept, public/environmental benefit, community values, policy guidance, neighborhood context, historic districts, planned construction, funding forecasts.

Solutions

The following best practices and approaches are provided as examples. The City should review and update these as new or improved practices and materials emerge.

- If Tree Removed, Obtain Valuation. If the tree must be removed, the City should provide guidelines to replace the removed tree. Guidelines should be based on City Code. Ideally, the tree would be replaced at the same location if the site is suitable for trees in the first place. If not possible, the City should have a procedure in place for the relocation of replacement trees.

- If Tree is Retained, Determine Management Approach. Since the initial assessment offered the opportunity to closely examine the tree and the site, future management approaches and decisions should be discussed and documented. These include future tree replacement species for when the tree does over mature and decline or conduct corrective actions to provide clearance for pedestrians, vehicles, utilities, and signs.
- Identify Potential Sidewalk Solutions. The Alternative Solutions Toolkit Overview section provides information and resources regarding sidewalk solution options. Information gathered during the initial assessment and subsequent site visits will support the selection of options that should be presented to City staff and the property owner to ensure goals of sidewalk repair and tree preservation are kept.
- Identify Opportunities to Improve Conditions for New Trees. When trees are planted by the City, the appropriate tree species for the location should be determined and the City should adhere to best practices in site and tree pit preparation to provide enough soil volume to support tree root growth and minimize future pavement damage by roots. If a tree is being planted at or near where the tree removal request was made, an evaluation of why the request was made should be considered. This may include such things as inadequate soil volume, insufficient growing space, tree leaf litter, messy fruit, poor structure, allergies, screening of shade-intolerant garden or landscape vegetation, or a combination of factors.

Project Implementation

Whether the sidewalk repair is occurring at a location where the tree is retained or removed, the sidewalk must adhere to the Americans with Disabilities Act (ADA) requirements and City standards. Tree repaving projects, curb and gutter repairs, and other Capital Projects should also adhere to this evaluation process. All matters relating to the removal or remediation of the tree will be conducted by the adjacent property unless the conflict is within a Capital Improvement Project or the responsibility of public street tree maintenance changes. Regarding tree maintenance, mitigation, or removal, the City should involve the public by:

- Providing a public notice prior to the initial tree assessment.
- Share the results of the initial assessment.
- Share the solution decision.

EXAMPLE INITIAL ASSESSMENT CHECKLIST

[CITY LOGO]

[City of #####] Trees and Sidewalks Operations Plan Initial Street Tree and Sidewalk Assessment Checklist

DATE

Prepared By:

The purpose of this document is to outline **INITIAL ASSESSMENT** for locations where sidewalk work is located within the dripline of an existing street tree.

<i>Project Location/Address</i>	
<i>Tree Species/Diameter</i>	
<i>Street Classification/Type</i>	
<i>Tree Asset Inventory ID</i>	
<i>Sidewalk Segment #</i>	
<i>Is this assessment along a corridor project?</i>	

An [ENGINEER] and [ARBORIST] will look at the site and assess the condition of the sidewalk and the tree.

If the tree has the following characteristics, it should be removed/replaced pursuant to SMC 15.43.030 (C): The City's policy is to retain and preserve street trees whenever possible. Accordingly, street tree removal shall not be permitted unless the Director determines that a street tree:

1. Is a hazardous tree;
2. Poses a public safety hazard;
3. Is in such a condition of poor health or poor vigor that removal is justified; or
4. Cannot be successfully retained, due to public or private construction or development conflicts.

Initial Assessment

1. Is the tree healthy and worthy of preservation?

- Yes
 No

Describe: _____

2. Poor Health – Is this tree in a condition of poor health or poor vigor that cannot be mitigated by any means other than removal?

- Yes
 No

Describe: _____

3. Hazardous Tree— Defined in [CITY CODE CITATION] any tree or tree part that poses a high risk of damage to persons using, or property located in the public place, as determined by the [AUTHORITY] according to the tree hazard evaluation standards established by the International Society of Arboriculture.

- Yes
 No

Describe: _____

4. Minimum Standards—Is there enough space for a [6 foot wide sidewalk and a 5 foot wide] planting strip?

Yes

No

Describe: _____

5. Public Safety Hazard—Does the tree present a public safety hazard that cannot be mitigated by any means other than removal?

- Does the tree location obstruct the visibility for pedestrians, cyclists, and/or cars at an intersection?
- Is the tree impacting a curb ramp such that it no longer meets City of [CITY] ADA requirements?
- Is the tree potentially impacting private property?

Yes

No

Use this space to draw a sketch of the location. Identify existing clearances from nearby infrastructure.

Recommendation for this tree:

–Remove Tree / Replace Sidewalk

A tree is identified to be removed if it is not healthy or if it is hazardous as identified in the Street Tree Ordinance.

–Keep Tree and Maintain Sidewalk

A tree will be kept and the sidewalk will be maintained if a sidewalk of standard width and a tree pit of standard width (at a minimum) can be installed or retained around a healthy tree.

–Evaluate Sidewalk and/or Tree Further

[DEPARTMENT] views trees and sidewalks as important public infrastructure assets. [DEPARTMENT] intends to keep healthy trees and have accessible sidewalks. If standard widths cannot be met then [DEPARTMENT] will take the time and resources to evaluate if alternative approaches (such as sidewalk width reduction, alternative sidewalk materials, adjustments to the tree pit and/or tree root pruning) can be used to retain a tree and provide an accessible sidewalk at problem locations.

NEXT STEPS

If Tree is REMOVED –Replace the removed tree with the minimum 2:1 replacement ratio. Identify if the replacement trees can be located in the same location or on the same street as the removed tree. If not, replacements should be planted as close to the removal as geographically feasible. Identify the estimated cost to remove the tree(s), repair the sidewalk, and plant replacement trees.

If Tree is KEPT –Estimate the cost of the sidewalk repair that would achieve the desired lifecycle for the repair. Estimate sidewalk and tree maintenance needs/costs and any maintenance to the tree that is being retained (e.g., root pruning, branch pruning, soil amendments).

If EVALUATE Further – Use Tree and Sidewalk Evaluation Form (IN DEVELOPMENT) and/or the tree risk assessment should follow ISA TRAQ guidelines: <http://www.isa-arbor.com/education/onlineresources/basicreeriskassessmentform.aspx>

Arborist	Engineer
Title	Title
Date	Date

Alternative Solutions Toolkit Overview

MATERIAL

Paving and Other Surface Materials

These materials can be used to create a walkable surface or to delineate space for people and/or the tree.

DESIGN

Infrastructure-Based Design Solutions

These design considerations can be employed to support a tree and/or sidewalk.

ROOT

Rootzone-Based Materials

These tools can support tree health and guide tree growth below ground.

TREE

Tree-Based Solutions

These solutions are focused on tree selection and tree maintenance.

Table 37. Description of possible alternative solutions for tree and construction conflicts

TOOL TYPE	TOOLS	PROACTIVE	RESPONSIVE	COST*				EXPECTED USEFUL LIFE			
				\$	\$\$	\$\$\$	\$\$\$\$	Month	Year	Decade	Century
MATERIAL	PAVING AND OTHER SURFACE MATERIALS										
	Asphalt	P	R				\$\$\$	M	Y	D	C
	Expansion Joints	P	R				\$	M	Y	D	C
	Pavers	P	R				\$\$-\$\$\$	M	Y	D	C
	Pervious Concrete	P	R				\$\$\$-\$\$\$\$	M	Y	D	C
	Reinforced or Thicker Slab	P	R				\$\$-\$\$\$	M	Y	D	C
	Rockery / Wall	P	R				\$\$-\$\$\$\$	M	Y	D	C
	Beveling	P	R				\$-\$\$	M	Y	D	C
	Porous Asphalt	P	R				\$-\$\$\$	M	Y	D	C
	Shims	P	R				\$	M	Y	D	C
	Tree Guards and Tree Rails	P	R				\$\$-\$\$\$	M	Y	D	C
	Decomposed Granite	P	R				\$-\$\$	M	Y	D	C
Mudjacking (Concrete Leveling)	P	R				\$\$-\$\$\$\$	M	Y	D	C	
DESIGN	INFRASTRUCTURE-BASED DESIGN SOLUTIONS										
	Monolithic Sidewalk	P	R				\$\$\$	M	Y	D	C
	Pavement Thickness	P	R				\$\$\$	M	Y	D	C
	Tree Pit Sizing	P	R				\$	M	Y	D	C
	Bridging	P	R				\$\$\$\$	M	Y	D	C
	Curb Bulbs	P	R				\$\$\$-\$\$\$\$	M	Y	D	C
	Curb Realignment	P	R				\$\$\$-\$\$\$\$	M	Y	D	C
	Curving or Offset Sidewalk	P					\$\$-\$\$\$	M	Y	D	C
	Easement	P					\$-\$\$\$	M	Y	D	C
	Suspended Pavement Systems	P	R				\$\$\$-\$\$\$\$	M	Y	D	C
	Lowered Sites	P	R				\$\$\$-\$\$\$\$	M	Y	D	C
Soil Volume	P					\$-\$\$\$	M	Y	D	C	

TOOL TYPE	TOOLS	PROACTIVE	RESPONSIVE	COST*	EXPECTED USEFUL LIFE				
					\$	\$\$	\$\$\$	\$\$\$\$	Month
ROOT	ROOTZONE-BASED MATERIALS								
	Mulch	P	R	\$	M	Y	D	C	
	Root Barriers	P	R	\$	M	Y	D	C	
	Continuous Trenches	P	R	\$\$\$	M	Y	D	C	
	Foam Underlay	P	R	\$-\$\$	M	Y	D	C	
	Modified Gravel Layer	P	R	\$	M	Y	D	C	
	Root Paths	P	R	\$-\$\$	M	Y	D	C	
	Soil Modification	P	R	\$-\$\$	M	Y	D	C	
	Steel Plates	P	R	\$\$-\$\$\$	M	Y	D	C	
	Structural Soils	P	R	\$\$-\$\$\$	M	Y	D	C	
Subsurface Aeration / Irrigation	P	R	\$\$	M	Y	D	C		
TREE	TREE-BASED SOLUTIONS								
	City Forestry Street Tree List	P	R	\$	M	Y	D	C	
	Corrective Pruning	P	R	\$-\$\$	M	Y	D	C	
Root Pruning	P	R	\$-\$\$	M	Y	D	C		

*General cost notes:

- Sidewalk material costs, when given in linear feet, assume 6-foot sidewalk width
- Costs are planning-level costs and will vary for actual construction
- Costs do not include design, permitting, or other "soft" costs
- Costs not included in tool costs but which would be necessary with use of some solutions include:
 - Drainage structure and connection
 - Curb ramps

Figure 109. Example of alternative solutions for tree and construction conflicts

ASPHALT



JOINTS



PAVERS/RUBBER



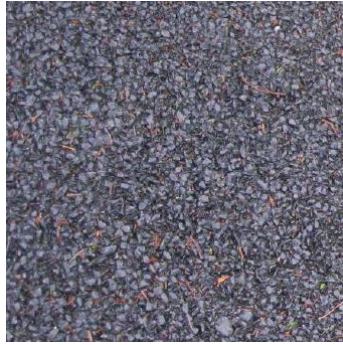
PERVIOUS CONCRETE



BEVELING



POROUS ASPHALT



SHIMS



TREE GUARDS/RAILS



DECOMPOSED GRANITE



MUDJACKING



BRIDGING



BULBOUTS



CURB REALIGNMENT



EASEMENT



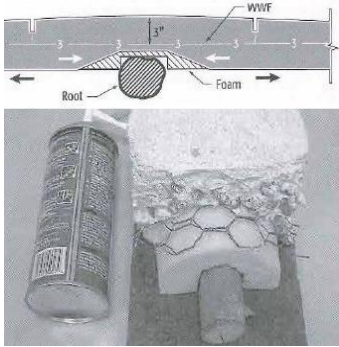
SUSPENDED PAVEMENT



ROOT BARRIERS



FOAM UNDERLAY



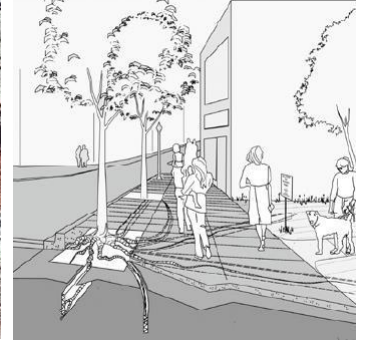
MOD. GRAVEL LAYER



STRUCTURAL SOILS



ROOT PATHS



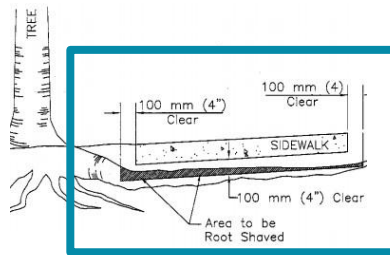
CORRECTIVE PRUNING



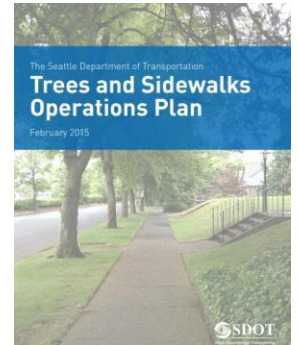
ROOT PRUNING



ROOT SHAVING



Source of Material
Examples & Images:





TREE PLANTING STRATEGY

In support of the Technical Report's recommendations and the Fort Worth Urban Forest Master Plan

TREE PLANTING STRATEGY

To support the City’s goals to preserve and increase tree canopy cover, maximize the benefits of trees sustainably and equitably, and grow a resilient urban forest, Fort Worth should implement a robust planting strategy and program for the public rights-of-way and parks.

A planting strategy for Fort Worth will:

- ❖ Sustain and expand tree benefits to the community, including improving air quality, reducing stormwater runoff, reducing heat, and supporting wildlife habitats.
- ❖ Beautify the city and make it more attractive to residents and visitors.
- ❖ Reduce the urban heat island effect, which can make Fort Worth more comfortable to live in during hot weather.
- ❖ Mitigate the effects of changing conditions, such as heat and extreme weather events.
- ❖ Improve the overall health and well-being of the community, by providing a place for people to relax and enjoy nature.
- ❖ Integrate tree plantings into City projects and improve efficiency.
- ❖ Collaborate and partner with local organizations and community members.
- ❖ Establish community-wide support for preserving and expanding tree cover.

The City of Fort Worth has already taken some steps to promote tree planting, such as the Rolling Hills Tree Farm tree giveaways, the Neighborhood Tree Planting Program, the street tree planting permit, Citizen Forester programs and events, Tree City USA accreditation, Arbor Day events, tree-related ordinances, and planting of trees for City projects. However, the City should establish a strategy for replacing trees that are removed, planting trees in new sites, and choosing the right species for the sites while supporting goals for tree species diversity and resiliency. By developing a planting strategy, the City can ensure that trees are planted in the right places and that they are properly cared for. This will help to ensure that the city’s trees continue to provide many benefits to the community for years to come.

Addressing Public Tree Planting Challenges

A public street tree inventory would inform tree species diversity, the type of nursery stock that is successful, structural pruning needs for new trees, among other vital data to support post-planting care and the planting strategy. The strategy should be revisited once a comprehensive public tree and planting site inventory is completed. This initial strategy will help Fort Worth plant trees with a higher success rate for a more resilient future canopy.

Replacing public trees removed and planting trees in vacant public rights-of-way locations requires an understanding of changing conditions impacts and the performance of tree species in changing conditions. Planting strategies must also recognize the existing and potential tree pests and diseases, concerns regarding invasive tree species and non-natives, opportunities to integrate plantings into City projects, the requirements for post-planting care and long-term maintenance, and community support for plantings adjacent to their property.

Public Tree Vulnerability to Urban Heat and Changing Conditions

Predicted Habitat Change	Tree Species Common Name	Tree Species Scientific Name	Percent of Fort Worth's Street Trees
Species Habitat Predicted to INCREASE	Cedar elm	<i>Ulmus crassifolia</i>	11%
	Live oak	<i>Quercus virginiana</i>	5%
	Pecan	<i>Carya illinoensis</i>	3%
	American elm	<i>Ulmus americana</i>	3%
	Eastern redcedar	<i>Juniperus virginiana</i>	1%
	Gum Bully/Brazos	<i>Sideroxylon lanuginosum ssp.</i>	1%
	Bumelia	<i>lanuginosum</i>	1%
	Ashe juniper	<i>Juniperus ashei</i>	0.02%
NEW Habitat	Hackberry	<i>Celtis occidentalis</i>	NA
NEW Habitat	Water oak	<i>Quercus nigra</i>	0.01%
Species Habitat Predicted to NOT Change	Green ash	<i>Fraxinus pennsylvanica</i>	4%
	Eastern cottonwood	<i>Populus deltoides</i>	1%
	Blackjack oak	<i>Quercus marilandica</i>	0.4%
	Black willow	<i>Salix nigra</i>	0.3%
	Osage-orange	<i>Maclura pomifera</i>	0.3%
	Boxelder	<i>Acer negundo</i>	0.2%
	Winged elm	<i>Ulmus alata</i>	NA
	Slippery elm	<i>Ulmus rubra</i>	NA
	Sugarberry	<i>Celtis laevigata</i>	34%
	Common persimmon	<i>Diospyros virginiana</i>	0.5%
Species Habitat Predicted to DECREASE	Red mulberry	<i>Morus rubra</i>	0.5%
	Bur oak	<i>Quercus macrocarpa</i>	0.5%
	Black walnut	<i>Juglans nigra</i>	0.4%
	Chinkapin oak	<i>Quercus muehlenbergii</i>	0.2%
	White ash	<i>Fraxinus americana</i>	0.03%

Table 38. Vulnerability of habitats to changing conditions for the common trees of North Central Texas (Source: USFS Climate Tree Atlas)

The Climate Change Tree Atlas contains 134 native tree species in the eastern United States. Fort Worth is on the western edge of the model's south-central region, and many of Texas's native tree species are not currently modeled in the Tree Atlas. With limited data currently available on the resilience and vulnerability of native Texas tree species, this table provides a glimpse of how the species' composition of Fort Worth's urban forest may change. The results of this evaluation can assist the City in making decisions about the types of trees to continue planting, those trees that should likely be phased out, and the new tree species to introduce.

In the coming century, Fort Worth is expected to experience an increase in natural hazards and the impacts that result from changing conditions. River and stormwater flooding along with heat stress due to prolonged extreme heat are already taking shape. Average temperatures have been rising over the past century and this trend is expected to continue. Residents will face higher average temperatures, as well as more hot days. Fort Worth experienced more frequent, longer, and hotter heat waves in the summer of 2021 and 2022 and that is expected to continue. The City must continue to adapt and mitigate the worst impacts where possible, and support those who lack sufficient resources to prepare for changing conditions or recover from emergencies.

The Urban Forest Master Plan provides strategies to address these concerns by guiding the City towards proactive maintenance and a robust planting program. Mitigation plans and adaptation techniques to these risks can help. It is essential to diversify urban tree species, plant them at appropriate locations, and invest in their maintenance, irrigation, and protection to mitigate the above risks. The following provides an analysis and summary of Fort Worth's urban forest's vulnerability and susceptibility to the effects of changing conditions including urban heat. It can also be applied to the public trees.

As stated above, climate change poses a number of threats to Fort Worth's overall urban forest. Details on some of the most significant threats include:

- ❖ **Extreme heat:** As temperatures continue to rise, trees in urban and suburban areas will be increasingly vulnerable to heat stress, which can cause leaf scorch, wilting, and even death. Urban trees are particularly susceptible to heat stress because they are surrounded by heat-absorbing surfaces such as asphalt and concrete, which can make temperatures in the urban canopy up to 20 degrees Fahrenheit higher than in nearby rural areas (Environmental Protection Agency).
- ❖ **Drought:** As temperatures rise, the demand for water in urban areas is likely to increase, putting additional stress on trees. Urban trees also face competition for water from lawns, gardens, and other landscaping, which can make it difficult for them to access the water they need to survive.
- ❖ **Pests and diseases:** Changing conditions can create environments that are favorable for the spread of pests and diseases. For example, warmer temperatures and increased precipitation can create ideal conditions for pests such as the emerald ash borer and diseases such as Dutch elm disease, which can kill large numbers of trees. In addition, oak wilt is another disease that may become more widespread and harder to control as the weather changes.
- ❖ **Stronger storms:** Changing conditions are expected to lead to more intense storms, which can damage or uproot urban trees. This can create hazards for people and property and lead to costly cleanup and replanting efforts.

General Guidance for Planting Strategies

Fort Worth should plant public trees with a focus on selecting trees that are resilient and diverse and apply this on a local level such as by neighborhood, land use, street corridor, and/or project. The following guidance considers planting resilient, climate-adapted and diverse trees, applied at a local level.

Environmental Adaptability: Select tree species that can survive and thrive in the current and future urban growing environments and conditions. A recommended tree list should be maintained and updated as conditions evolve. The list should focus on tree species primarily for public street tree plantings but may also be considered for public parks and as recommendations for planting on private land. The tree species recommended should be urban tolerant, insect and disease resistant, low maintenance, and supportive of diversity goals.

Adaptability to Changing Conditions and Urban Heat: Different neighborhoods and even specific projects will have different environmental challenges related to urban heat. Planting locations and species selection should take both existing and future conditions into consideration. These include prolonged drought and heat impacts, stormwater flooding, high winds, rapid weather and temperature changes and extremes, and standing water from heavy rain.

Public Education: The City should provide additional information to the public on weather- and heat resilience-related characteristics for the tree species in the list. These may include tolerance levels to drought, extreme heat, and flooding, indicators of native or non-native origins, and the amount of shade it could potentially provide. The updates to the list should be accessible and user-friendly for the public to consider in their planting projects to support growing a sustainable urban forest in Fort Worth.

Diversity: At the neighborhood level, inventory tree data should drive planting decisions around diversity and goals. These include no single species making up more than 10% of the population, no single genus making up more than 20% of the population, and no single tree family making up more than 30% of the population.

New Tree Sourcing: Continue to grow trees at the City's nursery and consider working with local and regional tree nurseries to ensure the species and quantities of trees that will be needed in the coming years are available.

Monitoring and Adapting: Citywide data, monitoring of the public tree population, and the Plan will help guide the City in making updates to the recommended and approved tree lists. For specific planting projects, the project site and neighborhood-specific data should be considered when making a final decision on the species of trees to plant.

Other Considerations

Use drought-resistant trees that do best in the Fort Worth climate. Some possible examples are bur oak, Shumard oak, baldcypress, cedar elm, catalpa, blackjack oak, blackgum, honey locust, Mexican live oak, Mexican plum, mockernut hickory, mulberry, black walnut, pecan, osage orange, persimmon, post oak, redbud, sassafras, southern red oak, sugarberry, sycamore, water oak, winged elm, and yaupon (Dreesen, Texas A&M Extension, 2000). Note, no tree is truly drought tolerant but once established, many trees can survive droughts. The list above is not intended to replace the precautions discussed in the previous sections.

- ❖ Consider planting trees that require less water.
- ❖ Plant trees in soil that has already been amended to help increase water retention and better withstand long periods of drought.
- ❖ Plant more native trees and shrubs, as they are better adapted to local conditions and naturally require less water.
- ❖ Select trees that can tolerate harsher conditions, including salt and wind.
- ❖ Utilize both deep root and shallow root trees, as the deep root trees will be better equipped to access water during droughts and the shallow root ones can capture more of the spring rains.
- ❖ Select trees with a wide canopy to all take advantage of the sun and to slow down precipitation to enable it to infiltrate the soil.
- ❖ Plant trees with high canopy surfaces to optimize the amount of shade and wind protection that can be provided.
- ❖ Use trees strategically to reduce urban heat island effect, such as by planting trees that have high albedo and along streets and parking lots that provide ample sunlight.
- ❖ Use mulch and drought-tolerant ground covers around the base of the trees in order to reduce water shade and evaporation, and retain soil moisture.
- ❖ Water trees for three to five years or until established. Consider updating tree ordinances to require developers or the property owners to maintain and water trees that were planted as part of development projects.
- ❖ Based on the canopy goals and analyses completed in the Technical Report, to achieve 30% tree canopy cover citywide by 2050 (25 years), a total of 76,200 trees per year are required. It is recommended that 40% of the plantings be led by the City while 30% be planted through development projects and 30% be planted by City partners and private landowners. For the City, this amounts to an average of 30,500 trees per year. At an average industry cost for planting, materials, transportation, and labor of \$480 per tree, the annual cost would be \$14.6 million if 1- or 2-inch caliper trees are planted. It should be noted that the costs are reduced significantly with the City's in-house tree nursery, volunteers to support planting, planting of seedlings in riparian areas and for restoration projects, and the anticipation that the community will take on a lead role to support the City's efforts in mitigating heat, redress inequities, improving human health, and improving air and water quality.



Maintenance and Care to Support Increased Canopy

In North Central Texas, water is a major constraint in the context of expanding tree canopy. Professional urban foresters, arborists, and landscapers understand the importance of watering trees in the first few years as a means for increasing the likelihood of survivorship as well the strategies to ensure proper watering is accomplished. In many cities and as is the case for Fort Worth, many street trees and trees as part of development projects do not reach their full aging potential. Research shows that on average urban street trees reach about one-third or one-half their normal life span (Hilbert, D., et al. 2019).

In addition to financing tree canopy, another priority is the issue of tree maintenance. The City will need to address the responsibility of watering newly planted (or existing) trees. In North Central Texas where temperatures are expected to increase, watering is the determining factor in the ultimate success or failure of a planting program. In Fort Worth, there currently exists ambiguity over the responsibility for street tree maintenance including watering. The lack of clarity about who will maintain newly planted trees, especially those street trees planted as part of development projects, can put the City and the residents at odds. Additionally, with limited funding for establishment care, plans to expand canopy will need to consider alternative options for ensuring adequate maintenance and explicitly identify relevant responsibilities. With a generally understood ‘establishment period’ for new street trees suggesting a minimum of five years, expanding tree canopy into disinvested areas of the city will also require a time-horizon that integrates responsibilities with an enforcement plan.

The vastness of the city can pose severe limitations for municipal managers or arborists to take on full responsibility, and engaging community groups may ultimately prove more effective. These considerations suggest a need to develop systematic neighborhood-based maintenance and responsibility plans that are co-produced by those directly involved in tree care. These plans will need to revolve around several questions, including: What mechanism will allow municipal decision makers to support communities with financial and logistical needs for maintaining public, right-of-way trees? How might community-based responsibilities for tree care engage local organizations through incentives and/or other supports? What systems of accountability and enforcement are necessary and socially acceptable for ensuring an equitable distribution of responsibilities?

The concern of watering also brings up several related questions about equity. The current structure of street tree maintenance responsibility in Fort Worth may not be able to address the ongoing needs of the current and growing urban forest. For example, primarily, it is the adjacent property owner’s responsibility to water and maintain the street trees. Overall, the public understands the benefits of trees and the importance of watering, but the City needs to establish a clear process for expanding tree canopy while implementing successful watering and post-planting care to increase the likelihood of survival. Questions the City needs to address include: would adjacent property owners be responsible for the watering and care, would neighborhood or local community associations be responsible, or is it a combination of shared responsibility?

In recent years during periods of prolonged drought, the City’s Park Operations in the Park and Recreation Department switched from mowing to forming public tree watering teams. While this exemplifies the City’s coordination, collaboration, and commitment to public infrastructure, it is not a sustainable approach to maintaining young trees especially as temperatures are expected to continue to rise.

Simply expanding tree canopy without the necessary water distribution and maintenance mechanisms and protocols will result in potential loss of capital and labor resources. To address the watering challenges there are several options for the City to consider.

1. First, improve code enforcement for conservation of existing tree canopy, which often does not require as much water and/or maintenance. Whether identifying large, mature trees, and/or native species, the lack of enforcement of existing code is an important barrier to addressing current concerns.
2. Second, prioritize low income, historically disinvested areas as priority for expanding tree canopy, since resources are limited, and attention and stewardship of new planting can potentially achieve greater support. While tree giveaways might be a viable option, their subsequent maintenance, which falls upon the recipient of the tree, poses additional barriers. In Texas communities outdoor water use is driven primarily by water rate changes which often change during periods of drought or increased water scarcity. For lower income communities, water shortages and related rate increases will likely lead to a rapid loss of water potential for newly planted trees.
3. Finally, current policies in Fort Worth do not seem to be expanding tree canopy at a pace to keep up with their loss. The tree mitigation requirements and fee in-lieu are not sufficient and pose risks to large canopy trees. The City should consider the recommendations provided in the Technical Report and Urban Forest Master Plan to address these concerns.

Equitable Financing

The City should identify sustainable funding sources and streams to support the current programs and to implement the goals in the Urban Forest Master Plan. These new and improvised funding sources need to procure funding and be distributed equitably. Fort Worth is well positioned to champion funding strategies— both internally and externally—that enable the planting and maintenance of the existing and future trees.

From the perspective of urban forest equity, planting trees in higher income neighborhoods and roadways is generally more cost-effective, due to physical constraints that are generally more challenging in lower income areas. For example, wealthier areas generally contain larger parkway strips, larger lots, and more expansive open spaces that reduce costs for planting, and therefore require fewer financial resources for expanding urban forest canopy. On the other hand, lower income areas with greater amounts of impervious surfaces, greater development densities, and fewer areas for immediately planting trees, pose greater infrastructure constraints, which can exacerbate inequities in the consideration of costs when expanding tree canopy. The removal of asphalt and/or concrete requires financial and labor resources, while the higher ambient temperatures in highly sealed areas may decrease survivorship of newly planted trees, without adequate water and/or maintenance. As such, the need for greater financial and maintenance support for planting trees in historically marginalized areas of a city will likely create challenges in decision-making processes. The following section explores one potential option for decision-makers to consider when advancing an equity-based tree planting program.

Trees as Inclusive Infrastructure

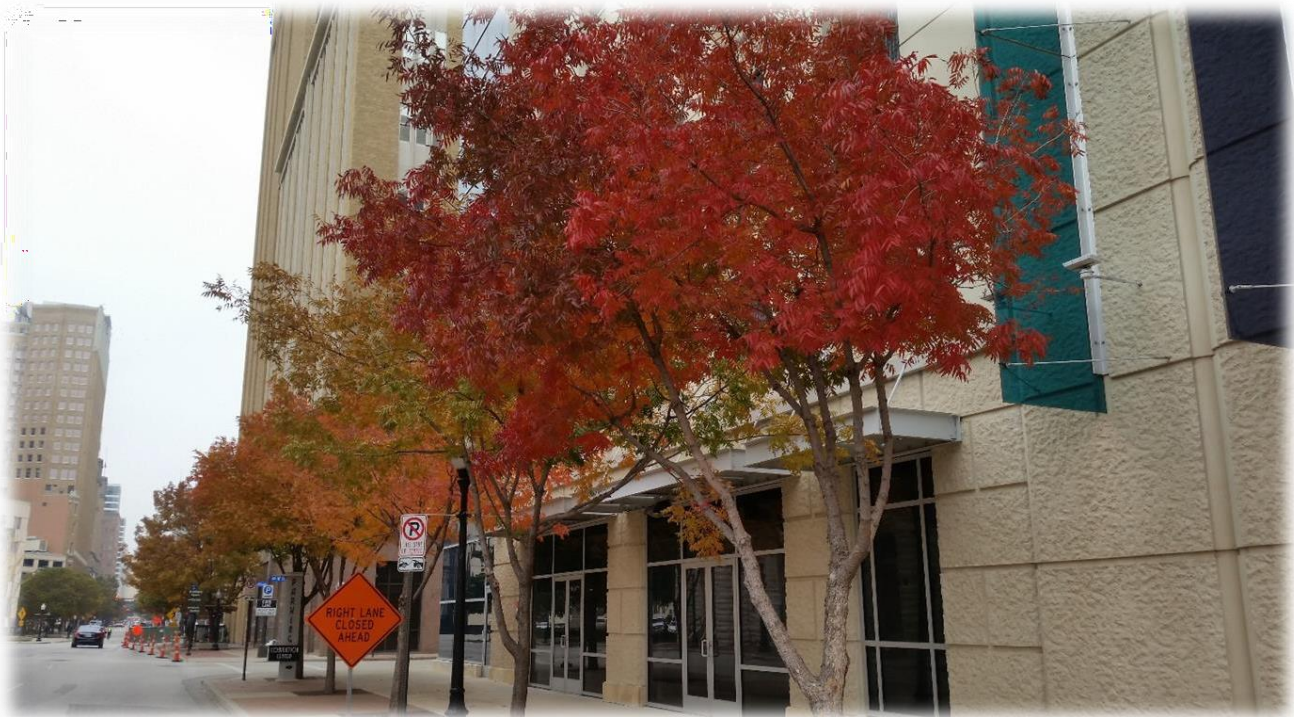
Generally, street trees are one of the most overlooked strategies for improving public health and addressing urban heat. For several decades, urban forestry researchers and practitioners have been focusing on educating the public about the role that trees play in improving the public's health. With changing conditions and extreme heat as a major concern now and in

the coming decades, the City will need to assess the extent to which earlier messaging has been effective. In some areas and audiences, the message has been effective but the public funding for trees is not enough to achieve canopy goals or stem the loss of canopy due to urban heat and development. This demonstrates that currently, budget priorities are not reflecting the important role of the urban forest. Though public health benefits of trees are important, other priorities may prevail such as roads and houses. When assembling the messages around trees, the City should evaluate and identify the shared goals that can be addressed through tree planting such as municipal stormwater management projects and urban heat mitigation or adaptation.

Fort Worth has policies, programs, and initiatives geared toward sustainability. These strategies and plans to address changing conditions and urban heat should view trees not just as an environmental priority, but as a crucial public health investment. If trees can be treated as an essential part of the street, then they can more effectively be coupled with other infrastructure programs. Simply put, trees are the most cost-effective way to cool down the urban environment. In other words, trees have become one of the best technologies for fighting urban heat and addressing public health.

To support the City in integrating urban forestry into sustainability and urban heat mitigation practices, a series of metrics were calculated surrounding the tree canopy goals. Most notably, the 30% tree canopy goal would increase the total citywide canopy coverage by 44,400 acres resulting in \$35.4 million in added ecosystem services and benefits including 285 million pounds of carbon sequestered after the trees reach maturity.

Measures of success should not necessarily be limited to the total number of planted trees. The City should also consider how many trees are doing well a decade later, establish targets relating to carbon services and other benefits, and measure the experience of community members in areas where trees were recently planted.



Summary of Fort Worth’s Tree Planting Strategy

- ❖ In the short-term, plant trees as replacements after trees are removed.
- ❖ Implement a no-net-loss approach to tree planting in the first five years.
- ❖ In the mid-term, plant more trees than the number of trees removed.
- ❖ Continue to offer free trees through the City’s nursery and other programs.
 - ❖ In the long-term, align the number of trees to plant with the city’s tree canopy cover goals.
- ❖ Utilize a recommended tree list to identify viable species for the given site.
- ❖ Align tree planting efforts with the timing for tree removals.
- ❖ Conduct a sample or comprehensive inventory of available public street planting sites.
 - ❖ Identify the post-planting and long-term care costs and responsibilities. Utilize the best practices in the Technical Report for watering protocols and strategies.
- ❖ Maintain species and age diversity recommendations.
 - ❖ Align tree species selection with other goals and intended uses for the site such as stormwater management, habitat, biodiversity, pollinators, urban agriculture, shade, improved air quality, traffic calming, among others.
- ❖ Gather community input on the types of trees preferred adjacent to their property.
 - ❖ Train community members on best practices for tree planting and maintenance and conduct events with community organizations to plant trees.
 - ❖ Consider partnerships with utility companies to support the planting of small-statured trees under primary wires and to implement best practices for utility pruning.
 - ❖ Continue to propagate and produce trees from the City’s in-house tree nursery and coordinate with local nurseries to grow a diverse palette of tree species. Be sure to maintain industry standards for nursery quality.
 - ❖ Continue and expand the Neighborhood Tree Planting Program to meet the needs of the community and to support the 30% citywide canopy goal.
 - ❖ Regularly monitor the progress, successes, and missed opportunities regarding the planting program.

Summary

A stroll downtown or elsewhere in Fort Worth can quickly identify the tensions that exist between the gray and green infrastructure. The opportunities and challenges for advancing an equity-centered approach to expanding tree canopy are innumerable, though the adoption and implementation of tree canopy goals is an immediate opportunity to advance such approaches. Expanding tree canopy will require recentering priorities that help to undo the decades of racist and highly inequitable construction of the existing landscape. Public policy is the core of the priority setting, and only through active engagement with community groups and development of political will, can the City transform the current distributional inequities of tree canopy, and all the related challenges that these inequities create.



ONGOING PUBLIC ENGAGEMENT, OUTREACH, AND EDUCATION STRATEGY

*In support of the Technical Report's
recommendations and the Fort Worth
Urban Forest Master Plan*

ONGOING PUBLIC ENGAGEMENT, OUTREACH, AND EDUCATION STRATEGY

Engagement to Implement the Plan

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

- ❖ **Current Canopy Extent and Value of Fort Worth’s Trees.** The message should present the current canopy level and benefits the canopy provides. This is typically the first message to send out to the public, as all other messages should connect back to this one. This can also be a way to “roll out” the Urban Forest Master Plan to the public. Include information such as why Fort Worth needs tree canopy, what the current canopy level is, and the plans to improve the management of the trees that comprise the canopy. Educating local business owners on the impact that a shady commercial district can have on sales and educating property owners about the impact that trees have on property values are other useful methods for boosting the desire for increased canopy along main thoroughfares and neighborhood streets while also engaging the public. The important value of mature trees could be also highlighted, as people often do not realize that the large tree they have is a value to their property, the community, wildlife, and the environment.
- ❖ **How You Can Get Involved.** What are the next steps you want people to take? The City should decide the answer and insert this “ask” in every outreach piece or effort. The City could organize a tree giveaway (usually saplings) at Arbor Day for people to plant on private property. Or the City could create an Adopt-A-Tree program, whereby residents sign up to take care of a street tree, including providing regular water and mulch. Another option for getting the community involved is to expand the Landmark Tree Program where residents are encouraged to find and nominate the largest or otherwise significant trees in the City. Lastly, citizens can donate funds or volunteer at a tree planting event.
- ❖ **Tree Threats.** Public and private trees can die, decline, or become safety risks as a result of insect and disease infestation as well as inadequate maintenance. With education, the residents of Fort Worth can become aware of the common threats to the tree canopy and what they can do to help. The City should provide education on existing tree pest and disease concerns and what the City is doing about these threats on public land, and options for management on private land. Since the majority of the trees that comprise the City’s urban tree canopy are on private property, it is vital for the City to educate the public on how to detect insect and disease threats, provide information about management and treatment options, and relay the importance of reforestation in the event trees are removed. Informing residents about tree removals and other significant tree work is essential for

maintaining the City's relationship with

the community. When an established public tree must be removed, the City should continue its current practice of notifying abutting or adjacent property owners of the need for removal or the City’s course of action to expedite the removal if necessary.

- ❖ **General Tree Care Education for Property Owners.** There are several actions people take that are detrimental to trees at all stages of life, including improper mulching, poor pruning, and sustained and continued damage to the bases of trees with equipment such as weed trimmers and mowers. Easy tips and tidbits of information to share with residents for trees on their own properties can help improve tree maintenance and increase tree health and survival rates. Some examples include:
 - ❖ Demonstrate how to properly mulch a tree. Too often mulch is placed around tree trunks in a “mulch volcano”, which is extremely detrimental to the tree. A simple message of how to mulch properly can improve tree health and longevity.
 - ❖ Provide guidance on how and when to prune trees. Incorrect pruning can lead to poor tree structure or wounds that may never heal. Include basic best practices for pest and disease identification, monitoring, and treatments to reduce the potential of pest proliferation.
 - ❖ Explain tree planting and tree care techniques. This could be especially helpful for homeowners who are considering planting a tree in their yard but unsure where to start.
 - ❖ Explore opportunities for partners to support urban agriculture, food forests, community orchards, and fruit gleaning on private property.
 - ❖ Encourage recycling or composting leaves on-site.

Use Multiple Avenues of Communication

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

- ❖ **Social Media.** Social media sites such as Facebook, Instagram, and Nextdoor can create buzz and promote involvement in the current urban forestry activities occurring locally. To reach even more people, the City should consider coordinating with allied community gardens, non-profits, educational institutions, and businesses to get messages posted on their social media sites as well.
- ❖ **Website.** The City of Fort Worth’s Urban Forestry webpage contains important information about the Forestry and Urban Forestry programs, including details about tree planting, the tree inventory, tree regulations, among other things.
- ❖ **Presentations to City leadership and local business and neighborhood groups.** Identify key audiences, partners, and potential champions for the tree programs and sections. Making short presentations at regular or special meetings where people already are relieves individuals from having to go to yet another meeting in the evenings. Initial outreach could be based on letting the audience know about Fort Worth’s urban forest and the work called for in this Plan. Be sure to have an “ask” at the end of the presentation. What do you want them to do next? This work often unearths new partners and funding sources that might otherwise go untapped.
- ❖ **Do a survey or poll.** Consider community feedback via a short online survey or poll to identify urban forestry issues people in Fort Worth are concerned or care about. The poll can also be used to gauge reactions to new urban forest management procedures and regulations, and their willingness to participate in volunteer work or

to donate funds or other resources.

- ❖ Cultivate partnerships for communication. Partnerships can be initiated with organizations that can help promote, enhance, and preserve Fort Worth’s urban forest. Organizations can include local businesses, local utilities, regional non-profits, homeowner associations, neighborhood associations, and schools and other educational institutions. Other audiences to engage can include youth groups, landscape architecture firms, faith-based groups, and nurseries and landscape contractors. Actions that can be taken by each partner should be defined before approaching them for support.
- ❖ Encourage local campuses to become a Tree Campus USA. If local campuses were to pursue this distinction and join the City’s Tree City USA legacy, then more entities would be supporting Fort Worth’s urban forest. One standard a campus would need to achieve annually is for students to participate in one or more Service Learning Projects. These projects are intended to provide an opportunity to engage the student population with trees. College students could help the City’s tree programs and sections perform many tasks, such as tree planting, tree care, and public outreach.
- ❖ Publish and promote an annual State of the Urban Forest Report. An annual “State of the Urban Forest Report” can be produced using updated tree inventory data, tree planting statistics, i-Tree tools, and other program information. It should provide information on the number and condition of public trees, as well as maintenance, planting, and management accomplishments. It should also present a summary of the current year’s annual work plan and identify emerging issues and budget or resource needs. The Implementation and Monitoring Plan is a separate report provided as part of the Urban Forest Master Plan. These plans provide the recommended metrics and approach for evaluating and reporting on the state of the urban forest.
- ❖ Add signage to the landscape. Signs placed in high traffic areas can spark interest in trees and the urban forest. Something as simple as species name or a notable fact about a tree can encourage people to learn more and to get more involved.
- ❖ Create Story Maps. The story about Fort Worth’s urban forest, the programs that manage it, and the community that shapes and benefits from it can be told through maps that illuminate and contextualize the story. Maps are the visual representation of where events happen. As such, maps and stories complement each other, and story maps serve as an integrated presentation. Story maps use geography as a means of organizing and presenting information. They tell the story of a place, event, issue, trend, or pattern in a geographic context. They combine interactive maps with other rich content—text, photos, illustrations, video, and audio—within intuitive user experiences. Content may include the Urban Tree Canopy Assessment, the tree inventory and summary report, the Landmark Trees programs, other programs and events, and content from the Urban Forest Master Plan such as tree canopy goals, ecosystem benefits, and the urban forest vision, goals, strategies, and actions.

Expand Volunteer Programs and Training

Consider expanding the Citizen Forester program with emphasis on a young tree care program to assist with new tree planting and new tree care such as watering, mulching, and pruning. This type of program is more involved than an “Adopt-A-Tree” program, as the young tree care volunteers are specially trained to care for young trees and to serve as advocates and educators within their networks. As such, this type of program involves initial and continuing training, frequent mentoring, and overall coordination of the process and volunteers. It also provides yet another engagement opportunity and encourages partnership opportunities with a variety of groups, such as neighborhood associations, master gardeners, scout troops, church affiliated groups, youth groups, high school community service programs, and others to accomplish new and young tree care tasks. Often times, local non-profit organizations oversee these types of programs.

Trees to include in a “Young Tree Care” program are generally less than six inches in diameter. These younger trees sometimes have branch structures that can lead to potential problems as the tree ages. If these problems are not corrected, they may worsen as the tree grows, which increases risk and creates potential liability. With direction from City staff or trained professionals, volunteers could be trained to carry out the young tree program. Beyond pruning, young trees need watering and mulching to become established, and may require fertilization and other Plant Health Care (PHC) treatments until they reach maturity. This program expands on the Citizen Forester program of tree stewards for Fort Worth.

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

Strengthen and Explore New Partnerships

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

The City should continue to maintain and strengthen partnerships with agencies and organizations that provide technical service and grant opportunities. For example, state urban forestry programs offer urban forestry grants. These partners among many other local, regional, and national partners can support Fort Worth in implementing the Urban Forest Master Plan.

Also, a local community organization devoted to trees and people in the city is an essential component and partner to ensure long-term success of the Plan. Organizations like the Texas Trees Foundation can communicate the outcomes of the Plan, coordinate volunteer events, raise funding, increase awareness and provide education and training, among other services and programs that increase the City’s capacity. In addition, these local community partners can assist the City in improving its tree equity and environmental justice by being the boots on the ground and listening to local residents. With any community partner involved in urban forestry, it is important the City establish a memorandum of understanding (MOU) or standard operating procedure (SOP) to ensure the partnership is mutually beneficial to both parties, the community, and the urban forest.

Public Education

Public education is one of the true keys to reaching the goals of an urban forestry program. Only by educating the public, City officials, developers, and contractors working within City limits will a community be able to achieve urban forest protection and planting goals. Ordinances and guidelines alone will not guarantee success since developers, contractors, and others often have competing priorities and agendas, and trees and ordinances may be viewed as a nuisance to them.

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

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

- ❖ Hold a seminar or public meeting to discuss the tree inventory project, its results, and its importance for the City.
- ❖ Develop monthly evening or weekend seminars related to tree care and landscaping; bring in guest experts from various disciplines in the green industry.
- ❖ Write a monthly "Tree Talk" article for local newspapers or social media.
- ❖ Update City of Fort Worth Parks and Community Services Department publication, "Native & Adapted Trees for Fort Worth & Tarrant County" which was published in the late 1990's or early 2000's.
- ❖ Develop a Tree Care door hanger brochure to go to each residence where new trees are planted; educating residents about proper tree care could help eliminate trunk damage and improper mulching and pruning of new trees.
- ❖ The City could start giving away one-gallon tree seedlings to any volunteers who get involved with City projects. This is a great reward and a way to spread the word about trees. Fort Worth could capitalize on the idea and attach the same Tree Care door hanger brochure or a different informational brochure to each of these trees.
- ❖ Co-host tree planting programs with local garden club, non-profits, or other groups.
- ❖ Embrace story telling within the urban treescape. Connect the trees to the history of the area through complementary art, placards, or signage. Consider establishing tree walks that highlight some of Fort Worth's greatest tree specimens and provides tree identification training. Consider story maps. Utilize the public-facing features of the City's tree inventory management software as a platform for engagement and education.
- ❖ Encourage citizen scientist activities that involve the urban forest. For example, the Nature Conservancy's "Healthy Trees Healthy Cities" app can be used to monitor tree health and check trees for pests. Local professors and non-profit groups that work with citizen science may be able to help plan projects and recruit citizen scientists.
- ❖ Continue to be a Tree City USA city and expand public awareness of celebration

through social media.

- ❖ Expand the annual Arbor Day celebration to help it become a community tradition. The Arbor Day celebration could be further developed as an all-day Saturday event, preferably held in a popular park/public space setting in the City. Expanding on short programs on planting and pruning trees and including children’s programs about trees can help increase public interest in the City’s tree programs. Additionally, the City could invite contractors to conduct demonstrations on tree planting, trimming, landscaping, and species selection. Organizers could also set up booths with tree information. Refer to the National Arbor Day Foundation (ArborDay.org) for publications that provide great Arbor Day ideas to assist in planning of this event.

Establish an Urban Forest Working Group

Forming an Urban Forest Working Group, Tree Working Group, Urban Forest Commission or similar is one step Fort Worth can take to sustain an urban forest program and increase community engagement. The powers and responsibilities of a working group can be established by the City. By forming and empowering a working group, Fort Worth can place the responsibility for important community decisions in the hands of volunteers with designated powers. The formation of the working group can be a crucial element in developing broad-based support for community trees and ensuring long-term success and growth of Fort Worth’s urban forest efforts. The working group can also serve to monitor implementation of the Urban Forest Master Plan and provide annual updates to City Council.

Proposed Responsibilities of the Urban Forestry Working Group

The Urban Forestry Working Group should reflect the values and standards of the community and should help champion an urban forestry effort. The recommended roles and responsibilities of Fort Worth’s working group may include the following:

- ❖ Reduce involvement of a municipal council for tree-related matters.
- ❖ Administer tree removal appeals processes.
- ❖ Advise community leaders and staff on administering the urban forest.
- ❖ Stimulate and organize tree planting and maintenance.
- ❖ Participate in the Heritage Trees Program.
- ❖ Support urban forest projects such as inventories, management plans, and ordinances.
- ❖ Settle community disputes caused by tree removal, planting, or maintenance.

Environmental Justice

The equitable distribution of resources is a key driver of environmental justice. This Urban Forest Master Plan aims to grow the urban forest and address the fact that existing canopy resources and associated benefits are unequally distributed. Urban tree canopy expansion and maintenance requires a financial investment on the part of the City, primarily from tax dollars. As a result, tree canopy coverage tends to be larger and more established in wealthier neighborhoods, and tree canopies are often less than ideal in communities that are economically disadvantaged.

Along with funding, community support for the urban forest and this Plan are necessary to succeed. Communication should begin months before a tree planting starts and should build trust between the entity spearheading the tree plantings and the community the tree planting is taking place in. Connecting with trusted community leaders to introduce the idea

of an expanded tree canopy, holding outreach events at an earlier stage in the plan, and taking local opinion into account when it comes to tree species selection can develop a partnership, rooted in trust, with the area's residents. A big part of keeping that trust is staying consistent through action. Following up with these communities to hear and address any concerns while consistently maintaining the new plantings will help ensure a fully developed urban forest. The framework of the Urban Forest Master Plan guarantees the presence of environmental justice principles in Fort Worth's Forestry program.

The tree planting initiatives and Citywide tree canopy cover goals to be finalized by the City will address community equity and environmental justice by identifying areas in most need of tree canopy cover, tree plantings, and urban forestry services. And, as the City expands its network of partners, different populations within a neighborhood will be better represented.

Support the City's Volunteer Efforts

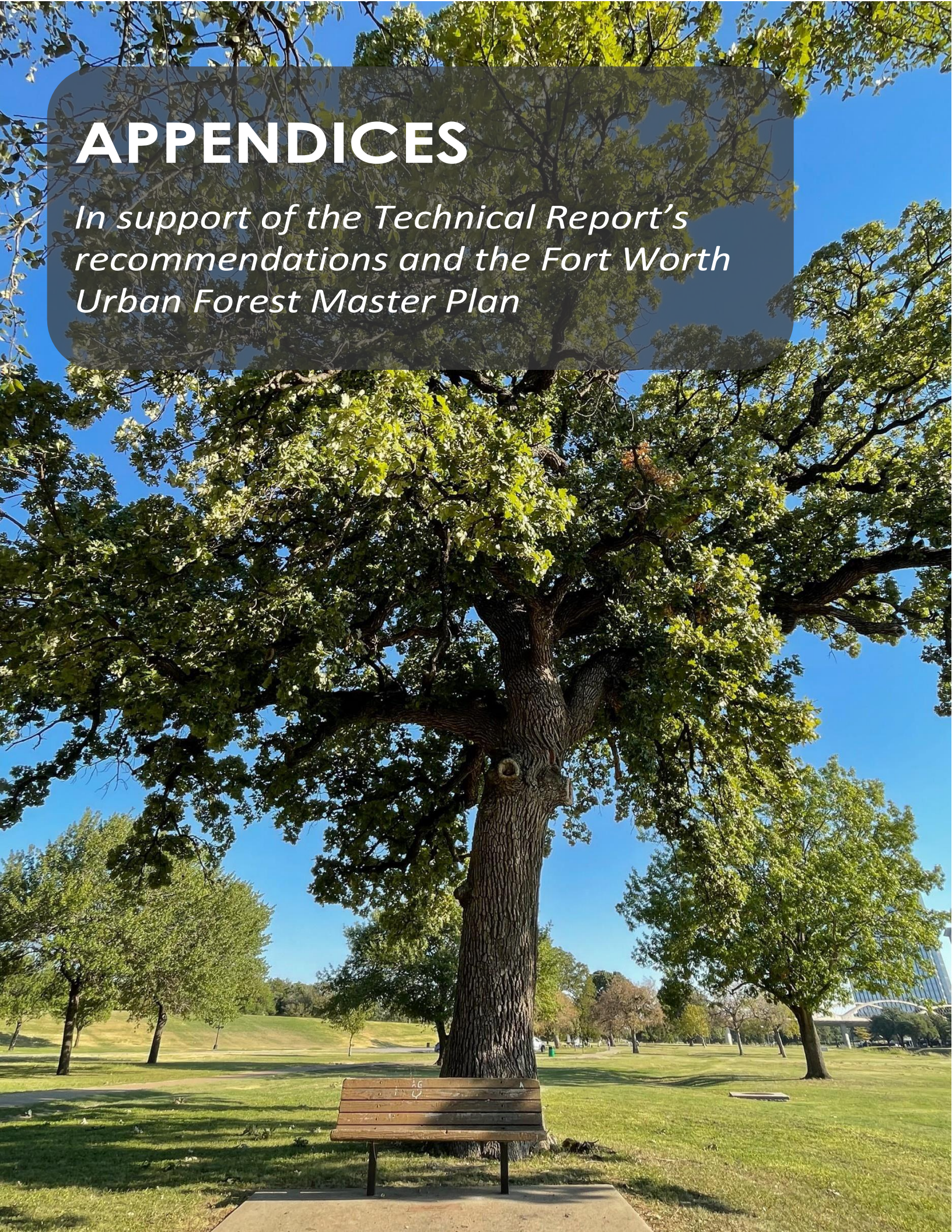
To streamline community education and engagement across the City's programs and projects that influence the natural environment (i.e., Urban Forestry, sustainability, recycling, among others) and to achieve goals of the Urban Forest Master Plan, the City's volunteer efforts should be supported with partnerships, organizations, the potential Urban Forestry Working Group, and adjunct staff support. The management of volunteers, events, messaging, partnerships, and programs will build support for the Forestry program and Urban Forestry Ordinance through volunteers and ensure all demographics and cultures have an equal opportunity to experience and discuss the City's urban forest.

Community Engagement Summary

Outreach and engagement with the community of Fort Worth begins with clear messaging and information gathered from the Urban Forest Master Plan. To make a greater impact and to fully recognize all communities in Fort Worth, it is recommended the City identify a local non-profit community organization with a mission that supports the urban forest. Texas Trees Foundation (TTF) recently celebrated 40 years of addressing urban forestry issues in Dallas and has served as a catalyst in creating a reimagined green legacy for North Texas. Scientific research has led their vision of transforming outdoor spaces into greener, cleaner, cooler, and healthier communities, while educating the public of the social, economic, environmental, and health benefits that trees provide. TTF is committed to supporting other cities in North Texas such as Fort Worth. In addition to a community partner, a City Urban Forestry Working Group adds capacity and creates more advocates for the Forestry program. Lastly, a community of tree stewards that are trained in tree planting and post-planting care will increase Forestry program capacity and build support for long-lasting impacts.

APPENDICES

*In support of the Technical Report's
recommendations and the Fort Worth
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Appendix B. Industry Standards and Best Practices

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

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

Tree Inventory Best Practices



The City of Fort Worth does not have an up-to-date public tree inventory. To maintain efficient management, grow a sustainable and resilient urban forest, communicate the benefits of trees, and adapt Plan strategies, a comprehensive public tree inventory needs to be completed, maintained, and updated as changes occur such as maintenance, removals, and plantings. It will be necessary for the City to reassess each public tree to update the condition, size, observations, and maintenance needs that will

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

Tree Maintenance Best Practices

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

Reasons for Tree Pruning

1. *Pruning for Safety*

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

2. *Pruning for Health*

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

3. *Pruning for Form*

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

4. *Pruning for Aesthetics*

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

Common Types of Tree Pruning

1. *Crown Cleaning*

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

2. *Crown Thinning*

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

3. *Crown Raising*

The practice of removing branches from the bottom of the crown of a tree to provide clearance for pedestrians, vehicles, buildings, lines of site, or to develop a clear stem for timber production. After pruning, the ratio of the living crown to total tree height should be

at least two-thirds. On young trees temporary branches may be retained along the stem to encourage taper and protect trees from vandalism and sunscald.

4. Crown Reduction

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

Figure 110. Examples of the types of tree pruning

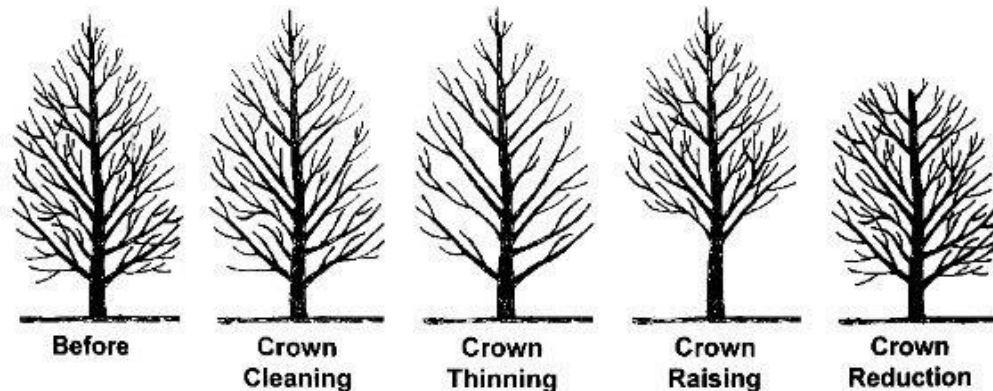


Image source: Arbor Day Foundation

Tree Pruning Cuts

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

Figure 111. Types of pruning cuts and proper branch cutting technique

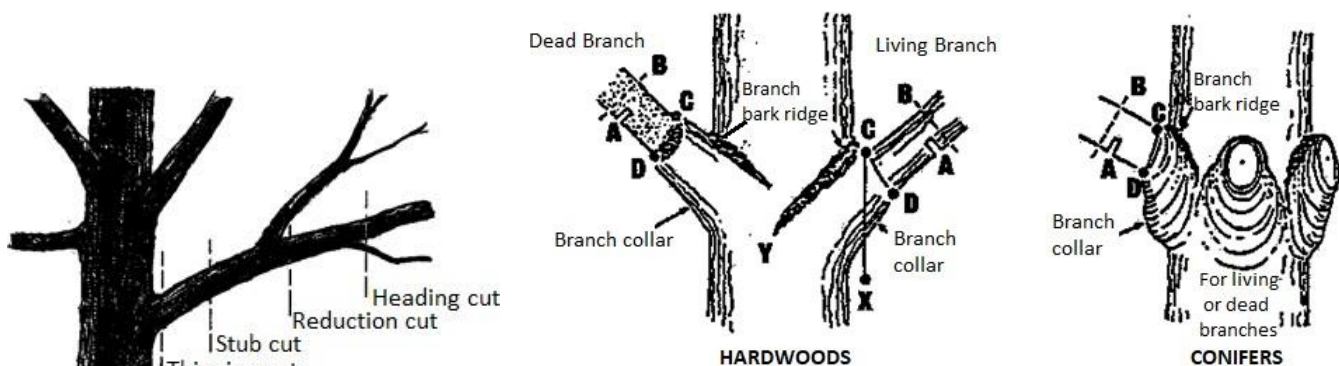


Image source: Arbor Day Foundation

Utility Tree Maintenance Best Practices

Utility Tree Pruning Overview

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

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

Utility Tree Maintenance Techniques

1. *Directional Pruning*

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

2. *Right Tree Right Place*

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

3. *Recommended Trees*

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

Figure 112. Examples of trees directionally pruned for clearance from power lines



Image source: Arbor Day Foundation

Young Tree Maintenance Best Practices

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

Young Tree Maintenance Techniques

1. Consider the Natural Form and Desired Growth

Accentuate the natural branching habit of a tree and correct any structural problems over time, if needed, to not stress the tree.

2. Pruning in 1-2 Years after Planting

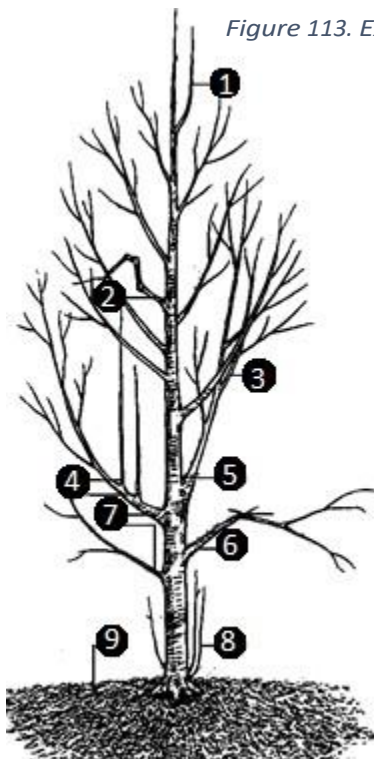
Prune as little as possible after planting to ensure there are enough temporary branches to produce food for new growth of roots, trunk, and branches. Prune only dead, broken, malformed, or diseased branches. Remove codominant leaders to maintain one dominant trunk. Prune for clearance if absolutely necessary. Keep size of branch removed to less than one inch in diameter.

3. Pruning 2-3 Years after Planting

Prune any dead, broken, malformed, or diseased branches. Remove any suckers from the base of the tree. Next, determine the permanent branch structure. Apply the following:

- ❖ Remove, thin, or cut back any competing leaders.
- ❖ Remove crossing or rubbing branches, keep the branch that maintains the natural form.
- ❖ Thin excessively crowded branches but do not lions-tail.
- ❖ Remove branches with narrow angles between the branch and trunk (consider species).
- ❖ Remove branches to maintain well-spaced branches along the trunk. Ideal mature trees will have lateral branches that are 18-24 inches apart (depending on species).
- ❖ Avoid pruning near time of bud break.
- ❖ Prune flowering trees after flowering.

Figure 113. Example of branches to be pruned for newly planted trees to promote good structure



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

Image source: Arbor Day Foundation

Tree Planting Best Practices

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

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

Tree Irrigation Considerations and Best Practices

- ❖ Current limiting factor is budget for watering newly planted trees.
- ❖ With dry and increasingly hot summers this is a critical requirement for new tree establishment.
- ❖ Establishing new trees requires four to five years of supplemental irrigation during the summer months.
- ❖ Based on industry estimates, 400 trees currently costs \$100,000, so every 100 new trees planted requires an additional \$25,000.
- ❖ Development of a certain size or where frontage improvements trigger tree planting should be required to install permanent in-ground irrigation systems.

Private Property Tree Management Best Practices

One factor to developing a sustainable urban forest is the extent to which the City can effectively influence the management of trees on private property as most of the urban forest exists on privately-owned land. These private property trees are managed differently than street trees and are under the purview of Development Services with new development reviewed by the Urban Forestry with support from Forestry if street trees are involved. The City's methods by which it can influence tree management on private property are a combination of indirect actions, such as community education campaigns, and direct actions, such as City ordinances, policies, and permits. While each method has a different approach to influence private property owners, the goal is the same: to grow and maintain healthy trees on privately-owned land.

An attractive quality of a robust community education campaign is voluntary participation from private landowners to contribute to reaching environmental and sustainability goals by implementing City standards for tree management. While some private landowners will adopt and implement City tree management standards, it is not reasonable to expect all private landowners to do so, which is the impetus for City ordinances, policies, and permit procedures to further enforce tree management standards on private property.

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

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

Additional Best Practices for Urban Forest Management

Pest and Disease Management

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

Encourage Naturally Occurring Biological Control

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

Use Alternate Plant Species

With tree inventory data that describes the composition of tree species in the urban forest, concentrations of susceptible trees and problematic trees can be thoroughly identified and understood. The information can be utilized to update the palette of trees that are planted by the City to reduce the likelihood of tree pest and disease issues. Some well-known

alternate tree species that are resistant to tree pests and diseases include the ‘Frontier’ elm or Asian elm species that are resistant to Dutch Elm Disease and powdery mildew resistant cultivars of crapemyrtle. In addition, the City should consider reducing or eliminating the planting of trees that are prone to honeydew producing aphids and oak trees should not be planted where oak root fungus is known to exist or propagate.

Use Cultural Practices

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

Tree and Infrastructure (Sidewalk) Conflicts

The City should refine and formally adopt the decision checklist and protocols provided in the Technical Report and include alternative solutions in design guidelines and standards. Alternative solutions may offer cost savings in some instances though generally, the City’s sidewalk program is underfunded. Primarily, the City maintains and replaces sidewalks and curb and gutters as needed and as funding enables. In most Texas cities that are not responsible for sidewalk maintenance but offer or would like to offer a cost-share program, funds are generated through a ballot-approved Sales and Use Tax. Sales tax rates for funding sidewalk programs average 0.2 percent. In addition to local funds, state or federal grants exist to support cost-share programs. And though grant funding may be available for sidewalk repair it is not a consistent long-term option. Other funding options or mechanisms include special citywide assessments, bonds, improvement districts, or tax incremental financing.

Whenever new development triggers frontage improvements there are opportunities for improved street tree planting and would be an appropriate time to levy enhanced use fees and consider alternative solutions to tree removal or sidewalk replacement. The City should explore these options such as the Sales and Use Tax to address sidewalk repair and replacement needs per the Americans with Disabilities Act (ADA) requirements.

Urban Wood Utilization

Trees in the urban environment are part of a continuous cycle. A tree is planted, it grows for a period of time, and then inevitably it declines and must be removed. Historically, tree removal has been considered a negative side of urban forestry. The cost of removing a tree and then disposing of the resulting debris is seen as a burden to homeowners and municipalities alike and creates a gap in the urban tree cycle. Urban wood utilization is a term and practice describing the reuse of wood with the goal of diverting organic waste

from landfills where materials decompose and release methane, a greenhouse gas contributing to climate change. Wood biomass from the urban forest is often disposed of rather than put to use in some new manner. To complete the cycle of urban trees there is a need and opportunity to make use of the resulting biomass to keep the carbon in the wood rather than be released into the atmosphere. Good logs can be milled into lumber for furniture, flooring, or kitchenware and lower quality materials can be used as a biofuel to displace fossil-fuel use or composted into quality soil amendments like mulch.

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

To develop an urban wood utilization or urban wood use program, it is recommended the City start simple and allow the program to evolve. One of the first steps is to inventory the volume of biomass generated annually and identify other local partners that can add to the volume. From the inventory, the City can assess its operational, equipment, personnel, and administrative needs and begin to identify local and regional markets and partners that have a demand or need for biomass. With this understanding, the program can then establish goals and begin implementation. Additional information and resources are available online.

Appendix C. Potential Funding Mechanisms for Urban Forestry

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

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

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

City Tree Account

According to the City's 2022 budget, the Community Tree Planting Program Fund is a special revenue fund for managing revenues generated primarily from tree removal fees and gas revenues and are used for planting trees on public property in partnership with third parties. These fees are regulated through the City's Urban Forestry Ordinance. These special revenue funds can be utilized for tree planting, equipment replacement, facility repair and maintenance, and staffing. Five positions in the General Fund are partially funded by the Community Tree Planting Fund, amounting to 4.40 full-time equivalents. In addition to these fees for removal, the City should explore other tree-related penalties, fees, and fines that can be allocated to the Community Tree Planting Program Fund. These funds could potentially be used for acquiring and maintaining wooded areas within the city, planting and maintaining trees, identifying and maintaining Heritage Trees, propagating seedlings, urban forestry education, or other purposes as determined by City Council.

Stormwater Utility

Stormwater management has been a growing financial burden for many communities across the country, even before the effects of changing conditions such as weather extremes had begun to take hold. To pay for the increasing costs, cities have been implementing user fees for stormwater management services. These charges are called stormwater fees or stormwater utility fees because they are modeled after the way municipalities have historically billed residents for other utility services like water and sewer. Stormwater fees provide local governments with a stable source of revenue to pay for their growing stormwater management costs, Urban forests are a well-documented complement to grey infrastructure for treating and mitigating stormwater. Therefore, many communities include urban forestry in stormwater fee payouts.

In Fort Worth, developers have not been utilizing the stormwater credit system which supports implementing low-impact design and green infrastructure such as trees to meet

stormwater control and management requirements. All real property located in the city contributes drainage runoff and/or benefits from the City's surface water (i.e., stormwater/drainage) system and services. For city's with a stormwater fee that contributes to urban forestry services, property owners are required to pay monthly charges to cover operations and maintenance of stormwater facilities and capital expenditures for surface water improvements and a portion of the funds generated can be allocated to urban forestry efforts in the city such as the Fort Worth's Neighborhood Tree Planting Program, staffing and events, and possibly public tree maintenance.

Special Assessment Districts

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

In Fort Worth, several special assessment districts may be considered, including Public Improvement Districts (PIDs), Tax Increment Financing (TIF) Districts, Business Improvement Districts (BIDs), General Improvement Districts (GIDs), Special Improvement Maintenance Districts (SIMDs), and Local Improvement Districts (LIDs). Others include water districts, fire protection districts, sanitation districts, and parks and recreation districts.

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

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

Parcel Tax

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

Parcel taxes are designed to encompass entire cities and therefore, are good candidates for a citywide street tree program, as opposed to the district-level approach that often occurs

under special assessments. Parcel taxes typically fund more than just street trees. For example, a tree maintenance tax per parcel may include provisions for the maintenance of parks and open space and improvements to recreation facilities.

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

A parcel tax for urban forestry operations and maintenance (O&M) may be levied as a flat tax, or it may be based on lot size (square footage). To evaluate the feasibility of this funding mechanism, studies should evaluate the parcel tax amount required to finance goals in the Plan such as a City-operated street tree program.

Generally, a parcel tax can be based on the total number of parcels and the area in which they cover compared to the total city land area. Or parcel tax can be based on lot size through a tiered system, or an average lot size can be used. Considerations and adjustments to these numbers must be made for properties with multiple right-of-way trees, HOA-managed trees, and maintenance responsibility stated in plat plans.

General Obligation Bonds

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

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

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

Additional Financing Options

Parking Benefit District

Parking Benefit Districts (PBDs) generate revenue within a special district for improvements and services related to streets, streetscapes, and landscapes. Because revenue derives from parking meters, visitors to PBDs fund the majority of improvements. As a result, local governments may create PBDs via ordinance without requiring a vote of property owners,

setting them apart from other special assessment districts. Although only commercial areas with parking meters provide revenue, improvements may be implemented beyond PBD boundaries. The ordinance that creates the PBD determines the share of revenue that must be applied to improvements within the district, known as the “local return” portion. A committee of residents, property owners, and business owners advises the local agency administering the PBD on how to expend revenue. Adjustments to City policy regarding the agency receiving excess meter revenue may be required to enable the use of this financing option for a street tree program.

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

General Fund

The Park and Recreation Department is primarily funded through the General Fund. Cities that use the General Fund for urban forestry typically fund street tree planting, establishment, and maintenance activities through the Capital Improvement Plan (CIP). For the General Fund, appropriations typically do not keep pace with the needs of urban forest management to keep it sustainable. Because the General Fund is not a dedicated funding stream with a consistent budget amount, and is subject to changing economic conditions and political support, the General Fund is a volatile funding source. Nonessential services are the first target for cuts when expenditures exceed revenues, and there is no guarantee that one year’s appropriations will equal the next. Reliance on the General Fund is not ideal for long-term planning of a program that will require a substantial commitment of resources (e.g., new staff, funding for partners).

A mixed General Fund and Special Assessment model is often considered an appropriate compromise but can lead to decreases in General Fund budget allocations over time, as the assessment bears a large share of the burden of maintenance.

Partnerships

A number of opportunities for partnerships exist to help implement a public tree program in Fort Worth and cover a portion of the costs. Continued collaboration with Texas Trees Foundation, Texas A&M Forest Service, community groups, and corporations would advance the City’s planting agenda, particularly if the City’s urban forestry programs do not have the resources to conduct all the work.

Many communities across the country partner with local non-profit organizations (NPOs) or community-based organizations (CBOs) that conduct tree planting and support preservation of natural areas. These organizations can serve as public advocates and utilize available resources through partnerships with local universities, volunteer engagement, and production of annual reports to focus on neighborhood initiatives. The City may also wish to consider creation of an Urban Forest Trust Fund or Endowment to allow private donations. The Plan provides recommendations and action steps to strengthen partnerships with local community organizations.

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

Urban Forest Mitigation Cost

The City could explore changes or additions to tree code as it relates to mitigation and incentives for tree preservation and planting. In development projects, if existing trees are approved for removal, the developer pays a mitigation cost for the removal of those trees. Costs are typically based on the type of project or property, type of tree (e.g., Heritage and/or native trees) fixed fee schedules, appraisal values of trees, and the diameter of the tree(s) removed. The City should explore adjustments to these fees that align with the impact of the removal, the loss of benefits and asset value, and the labor involved in managing the fee system. The objective is to incentivize developers to reduce impacts to trees as part of development and preserve the city's existing tree canopy cover.

Gas Well Funds and Landfill Gas Revenue

There are more than 600 drilling sites and 1,900 gas wells across the city. Two City staff are responsible for conducting annual inspections along with inspections in accordance with the Urban Forestry Ordinance. To offset air quality issues that originate from these sites, additional mitigation fees could be applied to tree planting programs in the city (Samsel, et al., 2022).

In early 2023, the City explored the feasibility of selling methane gas generated by its southeast landfill. Normally the City captures and burns some of the methane through flaring, but selling it would allow the city to generate funding (Mantas, 2023). The City could explore potential application of this funding for its urban forestry programs.

Inflation Reduction Act

In the short-term, the Inflation Reduction Act can be considered for long-term impacts. A \$1.5 billion investment in the Forest Service Urban and Community Forestry Program from federal government's Inflation Reduction Act was approved to increase equitable access to trees and green spaces in urban and community forests. Funds were allocated to each state's Urban and Community Forestry Program. For Texas, a total of \$21,750,000 was allocated in April 2023. Additional information is available at www.fs.usda.gov/managing-land/urban-forests.

Recommendations for Funding Mechanisms

Data and recommendations in the Urban Forest Master Plan can be used to support budget requests to address goals such as the proactive pruning programs, number of tree plantings to reach canopy goals, citywide public tree inventory collection, updated canopy assessments, staffing levels, and community programs. The City should also continue partnering with neighborhood partners and applying for traditional urban forestry grants. In addition, the City can utilize the tree canopy data and other information in the Plan to explore non-conventional grant opportunities that address themes such as air quality, energy conservation, water quality, climate change mitigation, biodiversity, human health and well-being, among others.

The following provides an overview and evaluation of the potential funding mechanisms for Fort Worth.

Table 39. Overview of the options evaluated for funding Fort Worth’s urban forestry goals

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

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

Table 40. Summary of financing options for Fort Worth's urban forestry goals

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

Financing Options	Attributes	Process	Opportunities	Challenges
Additional Options				
Parking Benefit District (PBD)	Revenue from parking meters for range of right-of-way improvements.	Enacted via local ordinance specifying boundaries, rates, use of funds; City administers with committee input.	No ballot approval required; visitors bear burden over residents.	Typically funds more than trees.
General Fund	City's primary funding pool for wide range of municipal services.	Annual budget via City's legislative process.	History of funding for tree planting and establishment.	Not a guaranteed source of funding; no guaranteed funding amount; funds at risk if budget shortfalls.
Partnerships	Non-profits, corporate partners, grant funding; for tree planting and establishment.	Various, depends on City's processes.	Decrease costs, increase capacity, develop a tree steward organization and program.	Union resistance, sustainable funding stream required.
Carbon Offsets and Gas Well Mitigation	Trees improve air quality by capture particulate matter and compounds in the air through their photosynthesis processes and through leaf and other biomass absorption.	The Urban Forestry Section inspects sites per the Urban Forestry Ordinance. Mitigation fees are applied.	Trees can improve air quality and offset the impacts of the gas well sites. A program similar to carbon trading could be explored.	Mitigation fees may require voter approval or ordinance changes. There are already challenges in monitoring and enforcing ordinances with only two staff in Urban Forestry to conduct annual inspections of sites.
Pest Control Fee	A fee for forestry related services such as pest control and replanting.	A forestry fee specific to pest control added to the public service utility billing as a levy.	Opportunity to offset costs of managing and recovering from tree pests and diseases.	Increased fee may require voter approval. The City must analyze pest control costs to establish the appropriate fee amount.

Appendix D. Estimated In-house Arborist Costs

Table 41. estimated staff and associated costs for a proactive public tree maintenance program

Recommended Staff	Hours per Staff	Cost per Hr per FTE	# of New Staff	Total Cost	Estimated Cost per Staff
A) Crew Supervisor	2,088	\$45.98	2	\$192,012	\$96,006
B) Arborist	2,088	\$40.23	4	\$336,001	\$84,000
C) Seasonal	1,044	\$24.71	0.5	\$25,797	\$25,797
<i>Subtotal</i>	--	--	6.5	<i>\$553,811</i>	<i>\$205,804</i>
Equipment	Hours	Cost / Unit	# of Units	Total Cost	Annual Cost
F450 Pickup	1	\$57,000	2	\$114,000	--
1 F450 Pickup hours	1,000	\$16.94	1,000	--	\$33,880
Chipper	1	\$25,000	2	\$25,000	--
Chipper hours	1,000	\$16.94	1,000	--	\$33,880
Bucket/Chip Truck	1	\$200,000	2	\$200,000	--
Bucket/Chip Truck hours	1,000	\$16.94	1,000	--	\$33,880
<i>Subtotal</i>	--	--	--	<i>\$339,000</i>	<i>\$101,640</i>
Gear	Hours	Cost/Unit	# of Units	Total Cost	Annual Cost
PPE	--	\$200	7	\$1,400	\$150
Uniforms	--	\$250	7	\$1,750	\$188
Chainsaw	--	\$800	4	\$3,200	\$400
Rake	--	\$25	4	\$100	\$13
Shovel	--	\$25	4	\$100	\$13
Brush Bucket	--	\$40	4	\$160	\$20
Cart	--	\$50	2	\$100	\$25
Other (e.g., blower)	--	\$500	2	\$1,000	\$250
<i>Subtotal</i>	--	--	19	<i>\$7,810</i>	<i>\$1,058</i>
TOTAL COST				\$900,621	
ANNUAL COST					\$656,508

A case study was provided for the City to consider additional staffing for proactive public tree maintenance in the future. In this scenario presented above, the City would add four in-house arborists and two crew supervisors with the option for a seasonal part-time employee. Based on regional estimates and local costs, a total of \$553,811 is estimated annually for staff salaries, including fringe benefits. To equip the new staff with resources for the proactive pruning program, the initial costs for equipment amounts to \$339,000 plus \$7,810 for gear with an average annual cost of \$102,698 after initial purchase. Costs do not include professional training and certifications though a budget of \$10,000 annually is recommended.

Appendix E. 2023 Urban Forest Audit Results

Urban Forest Audit Scoring Key

Table 42. Urban Forest Audit results for Fort Worth, TX (June 2023)

Not Practiced (0)	In Development (1)	Adopted Practice (2)
<i>Management Policy</i>		
Category	Component Evaluated	Description or Criteria for Evaluation
1.00	Approved Policy Statements	Written policy statements approved by a governing body.
1.01	Sustainability & Urban Heat	Also referred to as Sustainability. With reference to urban trees. Addresses the long-term health and productivity of the natural resource.
1.02	No Net Loss	Can refer to trees, basal area, or canopy.
1.03	Risk Management	Should reference: ANSI A300 Part 9, ISA BMP, and prioritization funding mechanisms.
1.04	Tree Canopy Goals	Overall community/campus goal, or by designated “zone”.
1.05	Tree Protection	Construction and/or landscape maintenance.
1.06	Utility	Utility pruning, planting, and installation policy (e.g. boring vs. trenching).
1.07	Human Health – Physical & Psychological	Recognizes and addresses the human health benefits of the natural resource (e.g., exercise, air quality, stress management, shade). Could also include Urban Heat Island (UHI) policies.
1.08	Wildlife Diversity/Habitat/Protection	Mammals, birds, or reptiles.
1.09	Performance Monitoring	Recognizes the annual or biennial calculation of metrics (e.g. some component of ecosystem services) for the purpose of tracking management performance.
1.10	Ordinance (Private)	Tree protection and management for trees on private property.
1.11	Ordinance (Public)	Tree protection and management for public trees.
1.12	Development Standards	US Green Building Council’s LEED® rating systems (or similar internationally) LEED v4 BD+C (Sustainable Sites) LEED 4 ND (Neighborhood Pattern & Design, Green Infrastructure) ASLA’s SITES® Rating System
1.13	High-Conservation Value Forests	Programs or policies for identification, acquisition, and/or protection of groups of trees or forests that provide unique public benefits.
1.14	Urban Interface (WUI)	Programs or policies that improve management of the urban interface for fire and/or invasive species.

Capacity and Training

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

Funding and Accounting

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

Authority

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

Tree-related Inventories

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

Tree-related Plans

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

Risk Management

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

Disaster Planning

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

Standards and Best Management Practices

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

Standards and Best Management Practices (continued)

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

Community

Category	Component Evaluated	Description or Criteria for Evaluation
10.00	Activities that Build Community	
10.01	Social Media Website or Similar	Does your community/campus use social media platforms or similar to document and publicize your urban forestry program, activity, or events?
10.02	Education	The urban forest is used as an educational laboratory for class activity; Kids in the Woods, PLT, high school, or college level.
10.03	Private Property Tree Program	Does your community sponsor this program locally?
10.04	Tree Inventory and Management Software	Public access to the community tree resource via an on-line mapping program (i.e. any Web Map Service; WMS).
10.05	Public Perception	Is public management consistent with private property requirements for tree protections and care? Does the Campus/public tree management reflect neighborhood norms?
10.06	Recognition Programs	Programs that raise awareness of trees or that use trees to connect the community to significant events or activities.
10.07	Arbor Day Celebration	Whether or not associated with Tree City USA.
10.08	Arboretum designation	Internal or third party arboretum designation.
10.09	Significant trees	For example: size, history.
10.10	Memorial/Honorarium	Tree planting or tree care programs than honor/memorialize individuals, organizations, or events.
10.11	Social Media	Does your community/campus make use of Twitter, Facebook, Blogs for internal or external outreach?
10.12	Active Communications	Press releases, regular news articles (print), "State of the Urban Forest" reports, periodic analysis of threats and opportunities.
10.13	Tree Care	Are volunteers trained and used for basic tree care (e.g. mulching, pruning, planting).
10.14	Tree Campus USA®, Tree City USA®, Tree Line USA®	Community/campus meets current qualifications for any of these programs.
10.15	Volunteer Opportunities	Ad hoc or scheduled. Any/all age groups. Tree Campus USA student activities.

Green Asset Evaluation

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

Appendix F. Recommended Tree Ordinance Amendments

CHAPTER 6 ARTICLE 3_6.302 URBAN FORESTRY

§ 6.302 URBAN FORESTRY.

(A) PURPOSE.

It is the purpose of this section to achieve 30% tree canopy coverage citywide and to promote a multi-aged urban forest. This may be accomplished by addressing the preservation and protection of healthy and significant trees, providing for the replacement and replanting of trees that are removed during development, and establishing additional tree canopy.

(B) APPLICABILITY OF URBAN FORESTRY REQUIREMENTS.

~~The provisions of this section shall apply, unless otherwise exempted by subsection (c), to the following: These requirements shall be applicable to all development as described below, unless subject to the exemptions in subsection (c) below:~~

- (1) Removal of any ~~trees of six inches or greater in diameter~~ tree not identified in Table A. Unprotected Tree Species List;
- (2) Construction of new structures for which a building permit is required;
- (3) Expansion of structures used for commercial/institutional and industrial uses that increase the footprint of existing structures by at least 30% or add at least 3,000 square feet to existing structures;
- (4) Clearing of all or a portion of property, including grading or construction of a new parking lot;
- (5) Subdivision of land greater than one acre for the construction of one- or two-family dwellings, including contiguous lots with the same owner that total more than one acre;
- (6) Construction of manufactured home parks and recreational vehicle parks for which a permit is required and private recreation facilities located in manufactured housing subdivisions;
- (7) Mixed use ("MU") zoned properties. These properties must provide, through either preservation or planting, 50% canopy coverage of required open space;
- (8) New agricultural development that requires tree removal; and
- (9) Public projects that will physically change the surface or will include removal of trees six inches or greater.

(C) EXEMPTIONS FROM URBAN FORESTRY REQUIREMENTS.

The following are not subject to urban forestry requirements:

- (1) Structures that do not create or expand building square footage or temporary structures such as job shacks associated with construction activities, when no trees greater than six inches are removed;
- (2) Any single residential lot with a one- or two-family dwelling that is one acre or less in size;
- (3) Change in use of an existing structure, unless the structure is expanded in accordance with subsection (b)(3) above;
- (4) Any area within a design district unless the standards for that district do not ~~address urban forestry include~~ required canopy coverage and mitigation for removal of significant trees;
- ~~(5) Construction or expansion of structures in the "H" central business district;~~
- (6) Any area located within an airport operating area as defined by § 3-1 of the city code;

- (7) Any tree that is deemed to be in unsafe condition, or is injurious to common good, or to electrical, gas or water utilities, or sewer pipes, pavement or improvements, or is infested and dangerous to other trees or conflicts with other ordinances or regulations; and
- (8) Gas well sites and natural gas pipeline compressor stations, except as outlined in Chapter 15, gas drilling of the city code.
- (9) Tree species identified in Table A. Unprotected Tree Species List are not recognized as protected and do not require a permit for removal.

(D) GENERAL REQUIREMENTS.

The following requirements apply to all development:

- (1) Tree protections and maintenance.
 - a. Procedures required prior to development activities.
 - 1. Protective fencing. Prior to development activities, the contractor or subcontractor shall construct and maintain, for each preserved tree or tree cluster on a tract, a protective fence which encircles the outer limits of the critical root zone of the tree to protect it from development activities. All protective fencing shall be in place prior to commencement of any site work and remain in place until all exterior work has been completed. Fencing shall meet the state minimum standards of a four-foot orange plastic mesh net with T-posts, including a top rail or other type of support. Significant trees shall be protected with a minimum four-foot chain link fence with support cables and T-posts.
 - 2. Signage. Signs shall be installed on the protective fencing at a minimum of every 300 linear feet, to be visible on all sides of the fenced-in area. The size of each sign must be a minimum of one (1) foot by one and one half (1.5) feet and shall contain the following text in both English and Spanish: "TREE PROTECTION ZONE: KEEP OUT."
 - 3. Bark protection. In situations where a preserved tree remains in immediate area of intended construction and the city forester determines the tree bark to be in danger of damage by development activities, the contractor or subcontractor shall protect the tree by enclosing the entire circumference of the tree with two-inch by four-inch lumber encircled with wire or other means that does not damage the tree. The intent is to protect the bark of the tree against incidental contact by large construction equipment.
 - 4. Canopy coverage protection. All trees being preserved for canopy coverage under subsection (g)(4) below or a significant or large tree covered under subsection (g)(5) below due to size will be protected during any development activities. Development activities will include vegetation removal, grading, demolition, installation of utilities and/or construction of structures and site amenities.
 - b. Protective measures (as defined in this section) must occur on all trees located within 50 feet of development activities.
 - c. Protective measures are required within the critical root zone radius from the trunk at one (1) foot per inch diameter measured at breast height (DBH).
 - d. The following activities within the critical root zone are prohibited:
 - 1. No material intended for use in construction or waste material accumulated due to excavation or demolition shall be placed within the limits of the critical root zone of any preserved tree;

- 2- No equipment shall be cleaned or other liquids deposited or allowed to flow overland with the limits of the critical root zone of a preserved tree. This includes, without limitations, paint, oil, solvents, asphalt, concrete, mortar or similar materials;
 - 3- No signs, wires or other attachments, other than those of a protective nature, shall be attached to any preserved tree;
 - 4- No vehicular and/or construction equipment traffic or parking shall take place within the limits of the critical root zone of any preserved tree other than on existing street pavement;
 - 5- No heavy equipment, including, but not limited to, trucks, tractors, trailers, bulldozers, bobcat tractors, trenchers, compressors and hoists shall be allow inside the critical root zone of any preserved tree on any construction site without the specific approval of the city forester;
 - 6- No grade change within the critical root zone of any preserved tree without submission of ~~a certified arborist/forester~~ report written by an ISA Certified Arborist dealing with protections and the report acceptance by the city forester; or
 - 7- No filling activity in the critical root zone of any preserved tree may occur as a permanent condition which may damage the tree. Tree wells may be used to ensure that the root zone is protected.
- e- Inspections during development.
- 1- An inspection of the tree protection measures shall be conducted and approved by the XXXXX prior to issuance of the land grading permit.
 - 2- The City will conduct periodic inspections of the site during the permitted activity in order to ensure compliance with this section.
 - 3- The XXXXX is authorized to issue a stop work order to any person, firm, owner, contractor, or agent performing work that violates or fails to comply with any of the measures outlined in this Chapter. Penalties for violation are provided in section 6.302(j) Penalties for violation.
- f- Replacement of any preserved tree which dies within five (5) years due to construction or development activities will be the responsibility of the original applicant. Replacement will be new trees with a minimum of three (3) inches each in diameter and equal to five times the lost canopy. Tree replacement will be guaranteed for an additional period of two years.

(2) Construction methods.

- a- Boring. Boring of utilities under preserved trees shall be required in those circumstances where it is not possible to trench around the critical root zone of the preserved tree. When required, the length of the bore shall be the width of the critical root zone at a minimum and shall be a minimum depth of 48 inches.
- b- Grade change. In situations where the city forester approves a grade change within the critical root zone of a preserved tree, procedures and special conditions shall be approved by the city forester in advance of any work.
- c- Trenching. All trenching shall be designed to avoid trenching across the critical root zone of any preserved tree, unless otherwise approved by the city forester. All work within the critical root zone requires advance approval by the city forester. The placement of underground utility lines such as electric, phone, gas, etc., is encouraged to be located outside the critical root zone of

preserved trees. Trenching for an irrigation system shall be placed outside the critical root zone, except into the critical root zone perpendicular to the tree trunk and in the manner that has the least possible encroachment into the critical root zone. Boring is required for all underground utility lines that cross the critical root zone.

- d. Root pruning. All roots two inches or larger in diameter which are exposed as a result of trenching or other excavation shall be cut off square with a sharp medium tooth saw and covered with pruning compound within two hours of initial exposure.
- e. Underground utilities. All onsite underground utilities with backfill other than onsite material shall have a clay dam every 200 feet for the entire length of the utility placement.
- f. Paving. No paving is allowed within the critical root zone of any preserved tree unless otherwise approved by the city forester. Approvals will be based upon best management practices for tree preservation.

(3) Tree planting to achieve the goal of canopy coverage.

- a. Trees planted to provide canopy coverage shall be a minimum of two and one-half (2.5) to three (3) inches each in diameter and will be credited its canopy coverage at normal maturity. These credits are as follows:
 1. Large canopy tree with typical crown width of 50 feet in diameter. Two thousand square feet (minimum spacing of 40 feet on center);
 2. Medium canopy tree with typical crown width of 30 feet in diameter. Seven hundred square feet (minimum spacing of 24 feet on center); and
 3. Small canopy tree with typical crown width of ten feet in diameter. One hundred square feet (minimum spacing of eight feet on center).
- b. Tree planting requirements: Table ~~H.F~~ is a list of desirable and adapted trees for the Fort Worth area. ~~Other trees~~ Tree species other than those in Table ~~H.F~~ will be considered by the city forester and granted on a case-by-case basis. The approval of additional species will be judged on adaptability, long-term health, and growth characteristics of the tree type.
- c. The minimum size of tree planted will be two and one-half (2.5) to three (3) inches in diameter. The caliper measurement of the trunk shall be taken at a point six (6) inches above the ground if the resulting measurement is no more than four (4) inches in diameter. If the resulting measurement is more than four (4) inches, the measurement of the caliper shall be taken at 12 inches above the ground. If the tree is multi-trunk, the main stem will be given full credit for its diameter and all other stems will receive one-half credit. The total of all must be three (3) inches or greater.
- d. Minimum soil volume. A minimum of 16 square feet of permeable surfaces must be provided for all tree plantings. In order to achieve a minimum soil volume of approximately 1,000 cubic feet as recommended in the ANSI Standards, the following planting standards apply:
 1. Each large and medium tree shall be provided a minimum planting width of eight (8) feet and a planting depth of three (3) feet.
 2. Each small tree shall be provided a minimum planting width of six (6) feet and a planting depth of three (3) feet.
- e. All planting and maintenance of mitigation trees or trees planted to achieve the goal of canopy coverage shall conform to ANSI Z60.1, the American Standard for Nursery Stock, ANSI A-300

Standards for Tree Care Operations, and follow all tree care Best Management Practices (BMPs) published by the International Society of Arboriculture.

- ~~1-~~ Topping, tipping, or flush cutting of trees will not be deemed a form of pruning. These actions harm trees unnecessarily and are therefore a violation of the chapter.
 - f. All newly planted trees that die within two (2) years of the date of project completion will be replaced. The replacement tree carries the same two (2) -year replacement requirement. The requirement to replace the trees shall run with the land.
 - ~~g-~~ Expansion of structures used for commercial/institutional and industrial uses: Tree plantings to achieve canopy coverage will be based only on the square footage of the expansion footprint rather than the entire site to ensure at least minimal tree replacement. Only tree removal permits for trees greater than six (6) inches in diameter are required for expansions under 3,000 square feet.
 - ~~h-~~ Flexibility in planting season: the city forester may choose to approve required tree plantings to occur within 6 months of project completion to avoid harsh weather conditions and provide for the health and long-term success of the tree. Inspections are required and must be approved by the agreed upon date.
- (4) Warranty/replacement. Any preserved tree that dies or becomes hazardous and a threat to public safety or property due to construction activities within five years following the date of issuance of the certificate of occupancy shall be replaced following the criteria outlined above for tree preservation and significant tree replacement by the original applicant or assigned party.
- (5) A certificate of occupancy shall not be issued until the requirements of subsection (g) below are met.

(E) SPECIFIC REQUIREMENTS BASED ON LAND USE.

The city's goal to achieve a city-wide tree canopy cover of at least 30% and to promote the functional distribution of that canopy throughout various land uses as development occurs through a combination of planting and retention goals and requirements for tree canopy cover. In support of the overall goal of tree canopy cover for the city, the following land use requirements shall apply and remain in effect unless a change in use occurs which would impact required canopy coverage-.

(1) Properties located within the Cross Timbers Overlay District

(2) One- and two-family residential land uses.

- a. Minimum retained or planted canopy coverage shall be 40%;
- b. ~~For~~ new subdivisions: the 40% canopy coverage requirement for one- and two- family residential land uses will be reduced to 25% if:
 - ~~1-~~ One (1) tree per residential lot is planted on all lots up to 5,000 square feet in area;
 - ~~2-~~ One (1) additional tree for each additional 5,000 square feet of lot area, or fraction thereof is planted, up to a maximum of nine trees per residential lot; and
 - ~~3-~~ The remaining portion of the 25% canopy coverage may be provided in public rights-of-way, parks, homeowner's association lots or boundary street parkways.
 - ~~4-~~ Significant trees removed from proposed rights-of-way and easements in new residential subdivisions will require the following mitigation:
 - i. Replacement will be new trees with a minimum of three (3) inches each in diameter and equal to five (5) times the lost canopy. New trees may be provided

in public rights-of-way, parks, homeowner's association lots or boundary street parkways.

ii. Payment into the tree fund based upon the total diameter of the specific tree times \$200 per diameter inch, or \$4.94 per square foot of canopy.

~~e. Phased development of residential subdivisions: residential subdivisions that are to be developed in phases must provide a plan that complies with the retention requirements at full build-out as approved on the preliminary plat. If a final plat requests credit for trees in undeveloped phases or units that are planned for future development, it will be necessary for all subsequent plats to identify trees for retention or provide mitigation as needed to obtain the required canopy coverage percentage. Updated plans must be provided to urban forestry as the subdivision is developed.~~

d. Canopy for existing platted residential lots over one (1) acre:

1. Retained canopy coverage of 25%; and
2. Overall canopy coverage of 40%.

(3) Multifamily land uses. Minimum retained or planted canopy coverage shall be 50% of open space.

(4) Institutional land uses. Minimum retained or planted canopy coverage shall be 30%.

(5) Commercial land uses. Minimum retained or planted canopy coverage shall be 30%.

~~a. Those that fall within the Central Business "H" District shall meet a minimum retained or planted canopy coverage of 25% of open space.~~

(6) Mixed use land uses in "MU" mixed-use zoning. Minimum retained or planted canopy coverage shall be 50% of open space.

(7) Industrial land uses. Minimum retained and planted canopy coverage shall be 20%.

(8) Surface parking areas.

- a. Minimum canopy coverage shall be 40%;
- b. ~~Canopy canopy~~ coverage shall be achieved through preservation of existing trees or tree planting within the parking field and drives;

e. No requirement for one- and two-family residential uses; and

d.

1. Credit shall be given for preserved or planted trees located outside the subject property within the parkway of adjacent streets.

2. Trees planted to provide canopy coverage shall be a minimum of three (3) inches each in diameter and will be credited its canopy coverage at normal maturity. These credits are as follows:

- i. Large canopy tree with typical crown width of 50 feet in diameter. Two thousand square feet (minimum spacing of 40 feet on center);
- ii. Medium canopy tree with typical crown width of 30 feet in diameter. Seven hundred square feet (minimum spacing of 24 feet on center); and

- iii. Small canopy tree with typical crown width of ten (10) feet in diameter. One hundred (100) square feet (minimum spacing of eight feet on center).

(9) Public projects (e.g., water, sewer, street or drainage).

- a. Minimum retained and planted canopy coverage shall be 30%; and
- b. Public projects may elect to mitigate required canopy coverage through payment into the tree fund at a rate of \$600 per required tree. No mitigation or payment in to the tree fund shall be required if the public project does not prevent the surface from being restored to its original condition or where the public project will not require tree removal.

(10) Agricultural land uses.

- a. Minimum canopy retention shall be 25%.
- b. New agriculture development will require documentation of the existing canopy coverage and a detailed tree survey of the property prior to clearing or grading of the property. The tree survey will include the location, size and species of tree. At the time of development a payment of \$200 per diameter inch will be required for up to 25% of the removed trees over six inches in diameter. The canopy coverage and total diameter inch total will run with the land provided approved documentation is recorded in the applicable county deed records.

(F) TREE PRESERVATION INCENTIVES

In an effort to balance priorities for tree preservation with growth and development, the City of Fort Worth has identified the following incentives to preserve significant trees in return for a potential increase in development intensity, subject to approval by the XXXXXX. Only one incentive may be used per property per application unless otherwise approved by the Director.

<u>Incentive</u>	<u>Criteria</u>	<u>Zoning Districts Where Applicable</u>
<u>Setback variance</u>	<u>The Director may administratively approve a rear yard and/or side yard setback of not more than 5 feet in order to preserve a signature tree. A minimum setback of 3 feet from the property line shall be maintained where the required setback is not less.</u>	<u>###</u>
<u>Building height variance</u>	<u>For each significant tree preserved, the required building height may increase by 10 feet, provided that the total building height does not exceed 120% of the required building height.</u> <u>This incentive may not be used in single-family zoning districts. FAA and airport building height rules and regulations supersede this incentive.</u>	<u>###</u>
<u>Parking reduction</u>	<u>For each significant tree preserved, the required number of parking spaces may be reduced by 0.5 spaces, provided the total reduction does not exceed five (5) percent of the total required parking spaces.</u>	<u>###</u>

<u>Density bonus</u>	<p><u>For multi-family residential uses and mixed-use development, the maximum density may increase by 1 unit for each significant tree preserved on a property so long as all other building, parking, and landscaping requirements are met.</u></p> <p><u>Lot density shall not exceed # units per acre.</u></p>	###
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(G) ~~(F)~~ DELINEATION OF ARTIFICIAL LOT.

If a developer wishes to develop a portion of a one (1) acre or larger tract, the developer may request that the development services director delineate the portion of the tract to be developed as an artificial lot, for purposes of calculating urban forestry requirements for the development. Artificial lots may be delineated in any type of development, including schools and places of worship. All artificial lots shall meet the following requirements:

- (1) Contain the entire area on which the development is to occur, including all paved areas;
- (2) Contain a land area of less than 50% of the entire tract, or, if the proposed artificial lot contains more than 50% of the entire tract, the director must determine that a substantial amount of the tract is not affected by the proposed development; and
- (3) Be delineated on the urban forestry plan as provided in subsection (g) below.

(H) ~~(G)~~ URBAN FORESTRY PLAN/PERMITS.

No activity subject to the urban forestry requirements shall be conducted without the required permit for such activity, as further described below.

- (1) Tree removal permit Permits.
 - a. Tree removal permit is required prior to the removal of a single protected tree as defined in § 9.101.
 1. ~~Prior to the removal of a single tree. No permit shall be issued if the remaining canopy coverage is less than the 25% minimum retention; or~~
 2. ~~For the removal of any tree six inches or greater in diameter.~~
 - b. Submittal requirements:
 1. Completed tree removal permit application form;
 2. Site plan noting the location, size and species (diameter of trees six inches or greater) and canopy coverage of each protected tree with a diameter of six inches or greater, indicating the tree requested for removal.
 - c. Criteria for approval.
 1. A minimum of 25% of the property's total canopy coverage is retained.
- (2) Urban forestry permit.

- a. Urban forestry permit is required:
 - 1. For the removal of more than one (1) tree;
 - 2. For construction of new structures on properties where a building permit is required, unless exempted under subsection (c) above.
 - b. An urban forestry plan is required to be submitted with the urban forestry permit.
 - c. An approved urban forestry permit will run with the land and shall therefore be recorded in the applicable county deed records. If the project scope or configuration changes prior to any disturbance of the land, the approved urban forestry permit is invalid and the owner/developer shall apply for a new permit.
 - d. An urban forestry permit shall expire on the fifth anniversary of the date the permit was issued if no progress has been made toward implementation of the urban forestry plan.
- (3) Urban forestry plan.
- a. Submission of an urban forestry plan is required for the issuance of an urban forestry permit and is required before or at the time of application for building permit. At the time of submission of the urban forestry plan, the applicant shall elect a method of preservation of existing canopy under subsection (g)(4) below.
 - b. If no trees exist on the site, the applicant shall document the existing conditions and comply with urban forestry plan application requirements below, but shall not be required to elect a method of preservation of existing canopy under subsection (g)(4) below.
- (4) Urban forestry plan application requirements. Prior to any platting activity, site plan preparation and submission for development, demolition, disruptive activities (including clearing and grading) or tree removal, the following information must be submitted through a two-part process.
- a. Part One: documentation of existing conditions.
 - 1. The first submittal shall include two copies of a scaled diagram of the subject property in which development, disruption or tree removal is proposed. The scaled diagram may be an engineered drawing, survey, air photo or other illustration. Part One will reflect the existing conditions by including the following information:
 - i. Boundaries of the property and its calculated area, i.e., acres, square feet;
 - ii. Location map showing the proximity of the property to the nearest streets;
 - iii. Outline of the existing tree canopy area on the property and the calculated area (square feet or acres) of existing canopy coverage. Properties with no existing canopy shall indicate such conditions;
 - iv. Scaled existing or proposed utilities regulated by the public utility commission and/or Texas railroad commission. Indicate the calculated area (square footage or acres) for these rights-of-ways or easements;
 - v. Location of each significant or large tree as defined in § 9.101, its species and canopy area; and
 - vi. Tables B, C, D and E in subsection (l) below.
 - 2. Upon completion and approval of Part One documentation, tree removals will be granted if a minimum of 50% of the existing tree canopy is retained. The documentation

of pre-development canopy coverage shall be maintained with the property until development occurs. The required retention indicated in Part One documentation will be achieved within the area remaining after the initial clearing.

3. Part One documentation shall expire on the second anniversary of the date of approval if no progress has been made toward completion of a Part Two submission.
 - b. Part Two: Components of the urban forestry plan. Part Two will overlay the proposed improvements and removals/preservations/ plantings. Two copies shall be provided and shall include the following information:
 1. Scaled site plan depicting the location of proposed structures, parking areas, drives and amenities;
 2. Tree canopy areas that are desired to be removed;
 3. Location and description of trees (large, medium or small canopy crown) that will be planted from Table F to reach the minimum canopy as stated in subsection (e) above; and
 4. Tables G and H in subsection (l) below.
- (5) General preservation methods of tree canopy. At the submission of an urban forestry plan/permit application, the applicant shall elect one of the following tree preservation of existing canopy compliance methods.
- a. Method "A." Preservation of existing canopy coverage regardless of tree species:
 1. At least 25% of the existing canopy coverage must be retained, regardless of tree species, on all properties greater than one acre, provided however, significant or large trees must be preserved as outlined in subsection (g)(5) below. The existing canopy can be determined via recent air photo, on the ground survey or other approved method by the city forester or an ISA Certified Arborist;
 2. Property located in floodplains or located in areas that will be dedicated to public spaces may be counted toward the required 25% minimum retention;
 3. Calculation of all canopy coverage and retention areas will not include utility rights-of-way or easements covered under the rules and regulation of the public utility commission and/or Texas railroad commission;
 4. To remove more than the minimum retention will require a waiver from the urban design commission; and
 5. The overall canopy coverage percentage requirement must be met by planting the size and species of protected preferred trees in Table F A, Protected Trees, in subsection (l) below.
 6. Invasive species shall not count toward the canopy coverage. Invasive species are required to be removed.
 - b. Method "B." Preservation of existing canopy coverage using protected trees only. Protected trees must be on the site to use this method. See Table A of subsection (l) below for a list of unprotected trees:
 1. For property greater than one acre, at least 25% of the protected trees must be retained, provided however, significant or large trees must be preserved as outlined in subsection

(g)(5) below. The total overall retained and planted canopy coverage for the applicable land use must meet a total of 5% over the required minimum canopy coverage. (e.g., residential coverage would be a minimum of 45%, commercial coverage would be a minimum of 35% and industrial would be a minimum of 25%); and

- 2- An onsite tree survey noting the location, size and species (diameter of trees six inches or greater) and canopy coverage of each protected tree with a diameter of six inches or greater will be required. This survey shall be completed and signed/sealed by one of the following: Texas licensed landscape architect, ISA Certified Arborist ~~certified arborist~~, Texas licensed landscape contractor or Texas certified nurseryman.

(6) Preservation of significant or large trees.

- a. Significant or large trees 27 inches in diameter (84.82 inches in circumference) for the entire city.
- b. Post oaks and blackjack oaks 24 inches in diameter (75.40 inches in circumference) citywide.
- c. Post oaks and blackjack oaks ~~or 18 16~~ inches in diameter (~~56.55~~ 50.27 inches in circumference) ~~for Post Oaks and Blackjack Oaks~~ east of Interstate Highway 35W can only be removed by permit of the city forester. The reduced diameter for post ~~Oaks oaks~~ and ~~Blackjack Oaks~~ blackjack oaks east of IH 35W is in recognition of the naturally occurring ~~Post Oak Savannahs~~ post oak savannahs within the Cross Timbers ~~Zone~~ Overlay District. Preservation of a significant or large tree will be credited to the required canopy cover one and one-half times the actual canopy size.
- d. Refer to § 4.409 Cross Timbers Overlay District for additional standards relating to significant or large trees.
- e. Significant or large trees may be removed if one of the following conditions is met:
 - 1- An area one and one-half times the area of the canopy of the tree identified for removal is retained on the same site. The one and one-half retention of existing trees shall be of the same species as the tree being removed in the ~~Post Oak Savanna~~ post oak savannah as indicated on Exhibit "A" or from the protected list if not in the ~~Post Oak Savanna~~ post oak savannah and be in excess of the required tree coverage on the site/tract;
 - 2- Planting of new trees from the preferred list (see Table F of subsection (I) below) at five times greater in canopy area than the removed specific tree canopy. The additional planting of five to one (5 to 1) will be in excess of the required tree coverage on the site;
 - 3- Payment into the tree fund based upon the total diameter of the specific tree times \$200 per diameter inch, or \$4.94 per square foot of canopy; or
 - 4- Urban design commission approves a plan that mitigates the removal of significant or large trees.

(7) Urban forestry plan amendments.

- a. Minor amendments. Minor amendments to an approved urban forestry plan may be approved administratively if one of three conditions below is met:
 - 1- An increase in the total canopy;
 - 2- Adjustments in the type of tree to be planted, considering that trees from the list of preferred trees must be replaced with trees from said list; or
 - 3- Any adjustments in planting location required due to site specific issues including traffic circulation, safety, drainage or utilities, given that the adjustments include only the

relocation of trees of the same type and size as provided on the approved urban forestry plan. These adjustments cannot include the removal or transplantation of a tree not considered in the approved urban forestry plan.

- b. Amendments that do not meet any of the conditions in subsection (g)(6)a. of this section must be submitted to and approved by the urban design commission before construction begins.

(8) Phased development: any project that is a single-family or two-family residential subdivision, multifamily, commercial, or industrial development that is to be developed in phases must provide a plan that complies with the retention requirements at full build-out as approved on the preliminary plat. If a final plat requests credit for trees in undeveloped phases or units that are planned for future development, it will be necessary for all subsequent plats to identify trees for retention or provide mitigation as needed to obtain the required canopy coverage percentage. Updated plans must be provided to urban forestry as the project is developed. All final plans shall be recorded in the applicable county deed records.

(I) ~~(H)~~ URBAN FORESTRY DEVELOPMENT AGREEMENT.

(1) The urban forestry development agreement (“agreement”).

- a. The agreement is intended to facilitate the development of large tract developments, other than single-family or two-family developments, under common ownership which would meet or exceed an overall canopy coverage of 30% for all properties included in the agreement. The intent of a development agreement is to allow areas with more extensive canopy to remain and contribute to the 30% overall coverage while allowing the canopy in other development areas to be reduced. Individual properties that are subject to the agreement are required to maintain canopy coverage requirements for different land use types as outlined in subsection ~~(h)(1)e.~~ (i)(1)c below.
- b. The original application for an agreement shall include an initial spreadsheet of minimum canopies and acreages, the form of which is provided in Table I of subsection (I) below. Thereafter, Table J of subsection (I) below shall be completed with the provided canopies and acreages included at the time of each subsequent submittal as property/tracts are being developed. These updates shall be provided at the time of submittal of each individual Part One document. No approval shall be granted nor tree removals to be completed without the submission of the Table J form as set forth in subsection (I) below.
- c. The agreement must be presented to the city council for approval prior to its execution. Any amendments may be approved administratively if the regulations of this subsection (h) are satisfied. The initial submission for approval of an agreement shall include:
 - 1. A map all of the properties to be included in the agreement, identified by land use and acreage;
 - 2. Individual maps of each land use type (commercial, industrial, etc.); and
 - 3. Table I of subsection (I) below.

(2) Overall Part One permit. An overall Part One permit as part of an agreement will be issued if the following conditions are met:

- a. Minimum acreage allowed shall be ~~1,000~~ 500 acres with all of the acres to be located within the same watershed. Applicant shall provide an exhibit depicting all of the property/tracts and acreages that will be subject to the agreement;
- b. The property/tracts subject to the agreement shall be separated by land use type, but shall not include single-family or two-family development. Applicant will provide exhibits for each land use type for the initial submittal and will update for subsequent submittals. Canopy requirements will be tracked by land use type;

- e. The minimum canopy coverage for each tract described in an agreement shall be:

Commercial	15%	Parking	40%
Industrial	10%	Parking	20%
Airport industrial	5%	Parking	20%
Multifamily	25% of required open space		

- d. All of the acreage to be included in an agreement shall be under common ownership at the time of the agreement, under a currently approved overall Part One, or part of an approved concept plan or preliminary plat. A list shall be provided of any separate corporations to be included in an agreement documenting that all are part of the same parent company. The list shall be provided with the initial overall Part One submission and shall provide the filing number associated with the articles of incorporation filed with the Texas Secretary of State.
- e. The overall Part One permit shall not expire for a period of 15 years and may be renewed for additional ten-year periods. Renewals will be approved administratively if the permit remains under the same terms and conditions of the original agreement approved by the city council or with amendments approved administratively. Progress shall be defined as the platting, permitting or vertical construction on the properties. The expiration period in subsection (g)(3)a.3. above shall apply to the individual Part One submissions. Individual Part One permits shall be defined as property/tracts that are submitted for approval after the date of execution of the agreement.
- f. The agreement shall run with the land and properties which are included in the original agreement and subsequently sold shall remain under the terms of the agreement regardless of future ownership. The agreement shall be recorded in the real property records in the county which the property subject to the agreement is located. Recordation shall be the responsibility of the applicant, including the cost of recording fees. Within 14 days after execution and recordation, a copy of the recorded documentation shall be provided to the city. The Part One permit shall not be issued until the recorded copy is received.
- g. Future acquired properties by the original applicant of the agreement may be included in the agreement after a recalculation of the canopy coverage and approval by staff if the conditions of this section are met. Acquired properties not included in the agreement shall be subject to the regulations of this section. Additional properties may not be included into the agreement within three years of the end of the initial term of the agreement. No properties shall be allowed to be added to the agreement during any renewal terms.

(J) ~~(H)~~ APPEALS.

- (1) If the city forester, or other city official, refuses to accept or issue an urban forestry plan/permit, or if the applicant disagrees with the decision of city staff, the applicant may request an appeal of the decision to the urban design commission within ten days after the decision of city staff. The appeal shall be in writing and shall be transmitted to the executive secretary of the urban design commission within ten days after receipt of notification that the city forester will not accept the urban forestry plan/permit.
- (2) The urban design commission shall consider the appeal within 30 days after the appeal is received by the board's executive secretary, unless the applicant requests a later hearing in writing. The urban design commission shall not release the applicant from the requirements of this ordinance, unless the applicant first presents credible evidence from which the urban design commission can reasonably conclude application of this ordinance to the applicant would be likely to deprive the applicant of rights protected by law.
- (3) The urban design commission may take the following actions on an appeal:
 - a. Deny the appeal, in which case the urban forestry plan/permit shall not be accepted or granted;

- b. Grant the appeal and direct the city forester to accept and approve the urban forestry plan/permit;
or
 - e. Grant the appeal subject to such provisions, conditions or limitations as deemed appropriate by the urban design commission.
- (4) In no event shall acceptance of an application guarantee that the city will issue the urban forestry plan/permit, unless the permit application is in compliance with all applicable codes, laws and regulations.
- (5) Appeals of the urban design commission will be heard by the district court.

(K) ~~(J)~~ PENALTIES FOR VIOLATION.

Fees, penalties, and fines are outlined in Chapter 2-321 Development Application Fees and Chapter 2-322 Penalties and Mitigation Fees of Fort Worth, TX Code of Ordinances.

- ~~(1) Any person, firm or corporation who violates, disobeys, omits, neglects or refuses to comply with or who resists the enforcement of any of the provisions of this ordinance may be issued a citation and upon conviction thereof may be fined in an amount not to exceed \$500. In cases of offenses involving the illegal removal of trees or noncompliance with an approved permit or urban forestry plan, the removal of each tree constitutes a separate offense. In cases of continuing violation, each separate day that a violation continues constitutes a separate offense.~~
- ~~(2) Any person, firm or corporation who violates, disobeys, omits, neglects or refuses to comply with or who resists the enforcement of any provision of this ordinance may be subject to a civil penalty in accordance with § 2-322 of the city code for the removal of trees. The civil penalty authorized by this subsection may be imposed by the director in addition to the misdemeanor penalty in paragraph (1) of this section. The imposition of a civil penalty may be appealed to the city council. Any appeal must be made in writing and must be filed with the director within ten calendar days following the date of the initial written decision. The director shall refer the appeal to the city council and the decision of the city council shall be final. The aggrieved shall bear the burden of proof to show why, by preponderance of the evidence, the civil penalty should not be assessed. The imposition of a civil penalty under this section suspends all permits or permit applications issued to or for the benefit of the property and all work under such any permits until the civil penalty is fully paid.~~
- ~~(3) Where illegal tree removal has occurred and the physical evidence has been removed from the site, the civil penalty will be assessed based on calculations using any remaining physical evidence, photos and documents available to the city, calculated in accordance with § 2-322 of the city code for significant or large trees removed or damaged.~~
- ~~(4)~~
- ~~a.—The owner of a single lot within a one-family or two-family residentially-zoned district who removes or causes to be removed trees without first obtaining the required permit may be issued an after-the-fact permit. An after-the-fact permit shall be issued if:

 - ~~1.—The applicant can demonstrate that the criteria for removal in the after-the-fact application would meet the regulations in effect at the time the tree was removed; and~~
 - ~~2.—The applicant has paid the fee for an after-the-fact permit which shall be double the fee of a urban-forestry permit.~~~~
 - ~~b.—A citation may be issued for a misdemeanor and upon conviction shall be fined not more than \$500 for the removal or damage of each tree.~~

c. ~~If the applicant cannot demonstrate that the criteria for removal in the after the fact application would have met the current regulations, then an after the fact permit shall not be issued and the person shall be in violation of this section, subject to both criminal and civil penalties.~~

d. ~~A second after the fact permit shall not be issued if:~~

- ~~1. Another violation of this section occurs by a person previously issued an after the fact permit; or~~
- ~~2. The after the fact permit was issued on the same site on which an after the fact permit was issued within five years of the date of the second violation.~~

~~(l) (k)~~ ENFORCEMENT.

Any code compliance officer, the city forester or his or her designee shall have the authority to enforce the provisions of this section.

~~(m) (j)~~ TABLES.

Table A. Protected Trees <u>Unprotected Tree Species List</u>	
<u>Common Name</u>	<u>Latin Name</u>
<u>Arizona Ash</u>	<u><i>Fraxinus velutina</i></u>
<u>Black Willow</u>	<u><i>Salix nigra</i></u>
<u>Brazilian peppertree</u>	<u><i>Schinus terebinthifolius</i></u>
<u>Callery pear or Bradford pear</u>	<u><i>Pyrus calleryana</i></u>
<u>Chinaberry</u>	<u><i>Melia azoarach</i></u>
<u>Chinese Tallow</u>	<u><i>Triadica sebifera</i></u>
<u>Golden rain tree</u>	<u><i>Koelreuteria elegans</i></u>
<u>Hackberry</u>	<u><i>Celtis occidentalis</i></u>
<u>Horseapple/Bois d'Arc (female/fruited)</u>	<u><i>Maclura pomifera</i></u>
<u>Mimosa</u>	<u><i>Alibizzia julibrissen</i></u>
<u>Paperbark</u>	<u><i>Melaleuca quinquenervia</i></u>
<u>Siberian Elm</u>	<u><i>Ulmus pumila</i></u>
<u>Silver Maple</u>	<u><i>Acer saccharinum</i></u>
<u>Tree of Heaven</u>	<u><i>Ailanthus altissima</i></u>
<u>Other tree species designated as noxious or invasive by the Texas Department of Agriculture's Administrative Code 19.300 Noxious and Invasive Plant List and/or by the Texas Invasives partnership in their online plant database or other current publication.</u>	
<u>Trees under 6" in DBH diameter unless planted as mitigation.</u>	
<u>Redbud</u>	<u><i>Cercis canadensis</i></u>
<u>Mexican Plum</u>	<u><i>Prunus mexicana</i></u>
<u>Cherry Laurel</u>	<u><i>Prunus caroliniana</i></u>
<u>Eve's Necklacc</u>	<u><i>Sophora affinis</i></u>

Crab Apple	<i>Malus angustifolia</i>
Bradford Pear	<i>Pyrus calleryana</i> var. <i>Bradford</i>
Golden Raintree	<i>Koelreuteria paniculata</i>
Caddo Maple	<i>Acer barbatum</i> var. <i>Caddo</i>
Red Maple	<i>Acer rubrum</i>
Bigtooth Maple	<i>Acer grandidentatum</i>
Bur-Oak	<i>Quercus macrocarpa</i>
Chinquapin Oak	<i>Quercus muhlenbergii</i>
Live Oak	<i>Quercus virginiana</i>
Shumard Red Oak	<i>Quercus shumardii</i>
Texas Red Oak	<i>Quercus texana</i>
Post Oak	<i>Quercus stellata</i>
Blackjack Oak	<i>Quercus marilandica</i>
Pecan	<i>Carya illinoensis</i>
Lacebark Elm	<i>Ulmus parvifolia</i>
Cedar Elm	<i>Ulmus crassifolia</i>
American Elm	<i>Ulmus americana</i>
Bald Cypress	<i>Taxodium distichum</i>
Black Walnut	<i>Juglans nigra</i>
Green Ash	<i>Fraxinus pennsylvanica</i>
Texas Ash	<i>Fraxinus texensis</i>
Southern Magnolia	<i>Magnolia grandiflora</i>

Table B. Net Urban Forestry Area

Net Urban Forestry Area	Square Feet	Acres
Gross area of property		
Utility rights-of-way or easements regulated by the public utility commission/Texas railroad commission	—	—
Net urban forestry area		

Table C. Required Tree Canopy Area

	Square Feet	Acres
Net urban forestry area		
Land use/canopy coverage ratio		

One- or two-family (40% coverage)	x	
One- or two-family with trees planted on individual lots (25% coverage)		
Commercial (30% coverage)		
Industrial (20% coverage)		
Additional 5% if only protected trees are being preserved		
Required canopy coverage		

Table D. Minimum Canopy Retention		
	Square Feet	Acres
Existing tree canopy area		
Preservation requirement	X 0.25	X 0.25
Additional 5% if only protected trees are being preserved		
Minimum retention		

Table E. Significant Tree Removal			
	Calculation	Inches Dbh	Canopy Sq. Ft.
All Post Oaks/Blackjack Oaks 20 post oaks/blackjack oaks <u>16</u> inches dbh (if east of I-35)			
All other trees 30-27 inches dbh (regardless of species or location)			
Total of significant trees to be preserved			
Significant tree preservation credit	(sq. ft. x 1.5)		
Total of significant trees to be removed	()		
Removal options (choose one):			
Retention of existing canopy 1.5X the canopy of removed significant trees—in excess of minimum retention	(sq. ft. x 1.5)		
Planting additional trees 5X the canopy of removed significant trees—in excess of total planting	(sq. ft. x 5)		
Payment into tree fund for total inches dbh of significant trees removed @ \$200 per inch dbh	(sq. ft. x \$200)		
Urban design commission approved plan that mitigates the removal of the significant tree(s)			

Table F. Preferred Tree List

Table F. Preferred Tree List	
Large Canopy Trees	
Pecan #	<i>Carya illinoensis</i>
Deodar Cedar	<i>Cedrus deodara</i>
Green Ash	<i>Fraxinus pennsylvanica</i>
Southern Magnolia #	<i>Magnolia grandiflora</i>
Bur Oak *	<i>Quercus macrocarpa</i>
Chinquapin Oak	<i>Quercus muhlenbergii</i>
Shumard Oak #	<i>Quercus shumardii</i>
Texas Red Oak	<i>Quercus buckleyi</i>
Live Oak *	<i>Quercus virginiana</i>
American Elm	<i>Ulmus americana</i>
Cedar Elm *	<i>Ulmus crassifolia</i>
Lacebark Elm	<i>Ulmus parvifolia</i>
Medium Canopy Trees	
Caddo Maple *	<i>Acer barbatum</i> var. <i>Caddo</i>
Bigtooth Maple *	<i>Acer grandidentatum</i>
Common Persimmon	<i>Diospyros virginiana</i>
Texas Ash	<i>Fraxinus texensis</i>
Ginkgo	<i>Ginkgo biloba</i>
Kentucky Coffeetree	<i>Gymnocladus dioicus</i>
Eastern Red-Cedar *	<i>Juniperus virginiana</i>
Golden Raintree	<i>Koelreuteria paniculata</i>
Eldarica (Afghan) Pine *	<i>Pinus eldarica</i>
Italian Stone Pine	<i>Pinus pinea</i>
Chinese Pistache *	<i>Pistacia chinensis</i>
Honey Mesquite *	<i>Prosopis glandulosa</i>
Blackjack Oak *	<i>Quercus marilandica</i>
Monterrey (Mex. White) Oak *	<i>Quercus polymorpha</i>
Western Soapberry *	<i>Sapindus drummondii</i>
Pond Cypress	<i>Taxodium ascendens</i>
Bald Cypress *	<i>Taxodium distichum</i>
Small Canopy Trees	
Japanese Maple #	<i>Acer palmatum</i>
Common Button-bush	<i>Cephalanthus occidentalis</i>
Redbud *	<i>Cercis canadensis</i>
Desert Willow *	<i>Chilopsis linearis</i>
Rough-leaf Dogwood #	<i>Cornus drummondii</i>

Texas Persimmon *	<i>Diospyros texana</i>
Carolina Buckthorn #	<i>Frangula caroliniana</i>
Yaupon Holly *	<i>Ilex vomitoria</i>
Deciduous Holly	<i>Ilex decidua</i>
Creape Myrtle Crapemyrtle *	<i>Lagerstroemia indica</i>
Mexican Plum *	<i>Prunus mexicana</i>
White Shin Oak *	<i>Quercus sinuata var. breviloba</i>
Flameleaf Sumac *	<i>Rhus lanceolata</i>
Eve's Necklace *	<i>Sophora affinis</i>
Mexican Buckeye *	<i>Ungnadia speciosa</i>
Rusty Blackhaw	<i>Viburnum rufidulum</i>
* Drought tolerant species	

Table G. Tree Preservation and Planting Area

	Square feet	Acres
Area of existing tree canopy retained		
Planting		
____ large canopy trees @ 2,000 square feet per tree		
(minimum spacing of 40 feet on center)		
____ medium canopy trees @ 700 square feet per tree		
(minimum spacing of 24 feet on center)		
____ small canopy trees @ 100 square feet per tree		
(minimum spacing of 8 feet on center)		
____ additional trees		
Total preservation and planting		

Table H. Parking Canopy Area

Parking Areas for Commercial or Industrial Uses	Square Feet	Acres
Area of parking and drives		
Required canopy coverage of parking areas	X 0.4	X 0.4
Required canopy coverage		
Area of canopy coverage being provided		

Table I. Initial Urban Forestry Development Agreement

Overall Canopy (enter Land Use Type) - Part 1		
<i>Net Urban Forestry Area</i>	<i>Square Feet</i>	<i>Acres</i>
Gross area of property		
Utility easements		
Net urban forestry area		
<i>Required Tree Canopy Area</i>	<i>Square Feet</i>	<i>Acres</i>
Net area		
Canopy ratio		
Required tree canopy coverage		
<i>Preservation/Retention of Existing Canopy</i>	<i>Square Feet</i>	<i>Acres</i>
Existing tree canopy		
Preservation requirement (20, 30, 40%)		
Minimum retention of existing tree canopy		
Area of existing tree canopy retained		
Preservation ratio		
<i>Retention of Canopy for Significant and Large Tree Canopy Removal</i>	<i>Square Feet</i>	<i>Acres</i>
Significant and large tree canopy to be removed		
Preservation requirement (150%)		
Minimum retention of existing tree canopy for removal of significant and large tree canopy		
Area of existing tree canopy retained for removal of significant and large tree canopy		

Table J. Urban Forestry Development Agreement Canopy Tracking

UFC #	Project Name	Project Address	Site Acreage	Usage Class	Canopy Coverage Required (sq. ft.)	Canopy Coverage Provided (sq. ft.)	Off Site Mitigation? (Y/N)	Beginning Land Balance	Ending Land Balance

(Ord. 18615-05-2009, § 3, passed 5-12-2009; Ord. 24030-02-2020, § 22, passed 2-4-2020; Ord. 24838-05-2021, § 1, passed 5-11-2021, eff. 5-27-2021)

CHAPTER 9 DEFINITIONS

CHAPTER 9: DEFINITIONS

Section

9.100 Use of certain words

9.101 Defined terms

§ 9.100 USE OF CERTAIN WORDS.

For the purpose of this ordinance certain terms and words are herewith defined as follows.

- (a) Words used in the present tense include the future.
- (b) Words in the singular number include the plural and words in the plural number include the singular.
- (c) The word “building” includes the word “structure.”
- (d) The word “shall” or “will” is mandatory, and not directory.
- (e) The word “may” is permissive.

(Ord. 13896, passed 10-12-1999)

§ 9.101 DEFINED TERMS.

ACCESS EASEMENT, PRIVATE COMMON. An area created by plat or separate instrument filed with the office of the county clerk other than a dedicated street or place, or an alley, which is maintained free and clear of buildings, structures and other obstructions for the purpose of providing free passage of vehicles.

ACCESSORY BUILDINGS. As follows.

(1) **ACCESSORY BUILDING, HABITABLE.** A subordinate building on the same premises as a principal building for exclusive use for accessory uses as defined in “Accessory Uses,” containing habitable space for living, sleeping or eating.

(2) **ACCESSORY BUILDING, NON-HABITABLE.** A subordinate building on the same premises with a principal building for exclusive use for accessory uses as defined in “Accessory Uses,” including, but not limited to, private workshops and storage sheds located on residential lots.

ACCESSORY USE. A use which is clearly incidental to the use of the principal building or the primary use of the property and which is located on the same premises as the primary use.

ACCIDENTAL POTENTIAL ZONE I (APZ-I). The rectangular area beyond the clear zone which still has a measurable potential for aircraft accidents relative to the clear zone and is 3,000 feet in width by 5,000 feet in length.

ACCIDENT POTENTIAL ZONE II (APZ-II). The rectangular area beyond the APZ-I which has a measurable potential for aircraft accidents relative to APZ-I or the clear zone and is 3,000 feet in width by 7,000 feet in length.

ACHROMATIC. For the purpose of Chapter 5, Article 2, Sexually Oriented Businesses, ACHROMATIC is colorless or lacking in saturation or hue. The term includes, but is not limited to, grays, tans and earth tones. The term does not include black or any bold coloration that attracts attention.

ADULT ARCADE. Any place to which the public is permitted or invited wherein coin-operated or slug operated or electronically, electrically or mechanically controlled still or motion picture machines, projectors or other image-producing devices are maintained to show images to five or fewer persons per machine at any one time, and where the images so displayed are distinguished or characterized by an emphasis on matters exhibiting, depicting or describing “specified sexual activities” or “specified anatomical areas” as defined herein.

ADULT BOOKSTORE AND ADULT VIDEO STORE. A commercial establishment that as one of its principal business operations offers for sale or rental for any form of consideration one or more of the following:

(1) Books, magazines, periodicals or other printed matter, photographs, films, motion pictures, video cassettes or video reproductions, slides or other visual representations which are distinguished or characterized by an emphasis on matters exhibiting, depicting or describing “specified sexual activities” or “specified anatomical areas;” or

(2) Instruments, devices or paraphernalia, which are designed for use in connection with “specified sexual activities.” This does not include items used for conception control or for protection from sexually transmitted diseases.

ADULT ENTERTAINMENT CABARET. A nightclub, bar, lounge or similar commercial establishment that provides or features to customers live performances by employees or entertainment personnel which is intended to provide sexual stimulation or sexual gratification to customers and are distinguished or characterized by any one or more of the following:

(1) An emphasis on the exposure of “specified anatomical areas;”

(2) An emphasis on “specified sexual activities;”

(3) An emphasis on “semi-nudity,” “nudity,” “state of semi-nudity” “state of nudity” or “simulated nudity;” or

(4) A combination of any of the above.

ADULT MOTEL. A hotel, motel or similar commercial establishment that rents or otherwise permits a room to be occupied by the public in exchange for any form of consideration, that:

(1) Offers accommodations to the public, tenant or occupier of the room for any television transmissions, films, motion pictures, video cassettes, slides or other photographic reproductions which are distinguished or characterized by an emphasis on matters exhibiting, depicting or describing “specified sexual activities” and/or “specified anatomical areas;” and has a sign visible from the public right-of-way or otherwise advertises the availability of this type of adult accommodations to the public;

(2) Offers a sleeping room(s) for rent for a period of time that is less than ten hours; or

(3) Allows a tenant or occupant of a sleeping room to subrent the room for a period of time that is less than ten hours.

ADULT MOTION PICTURE THEATER. A commercial establishment which regularly features non-live performances or entertainment such as films, motion pictures, video cassettes, slides or similar photographic reproductions which are distinguished or characterized by an emphasis on matters exhibiting, depicting or describing “specified sexual activities and/or “specified anatomical areas.”

ADULT THEATER. A theater, concert hall, auditorium or similar commercial establishment which regularly features persons who appear in a state of nudity or features live performances which are distinguished or characterized by an emphasis on the exposure of “specified anatomical areas” or by an emphasis on “specified sexual activities.”

AD VALOREM TAX LIMITATION. For purposes of the Historic Preservation Ordinance, AD VALOREM TAX LIMITATION means a program established by law under which the total amount of taxes that may be assessed by

the City would be capped or frozen based on actual taxes paid in a qualifying year. For purposes of determining taxes to be paid in a qualifying year, other applicable property tax exemptions, such as a homestead exemption, will be applied but the historic site tax exemption would not.

ADVERSE EFFECT. For purposes of the Historic Preservation Ordinance, ADVERSE EFFECT means a direct or indirect effect on the significance or integrity of a historic property that is or would be caused by an action. An indirect effect may be caused by an action but may occur later in time or farther removed in distance but is still reasonably foreseeable.

AICUZ. The air installation compatible use zone report of the Department of Defense.

AIRPORT. The Fort Worth Alliance Airport, Dallas-Fort Worth International Airport, Fort Worth Meacham International Airport, Naval Air Station Fort Worth Joint Reserve Base and Fort Worth Spinks Airport located in Tarrant, Dallas, Denton, Johnson and Tarrant Counties.

AIRPORT ELEVATION. The elevation as established in the most current approved airport layout plan set.

AIRPORT HAZARD. Any structure, tree, installation, electronic and/or visual interference, or use of land or water which obstructs the airspace required for the flight of aircraft in landing or taking off at the airport or is otherwise hazardous to such landing or taking off of aircraft.

AIRPORT HAZARD AREA. Any area of land or water under the imaginary surfaces as established in 14 C.F.R. Part 77, "Objects Affecting Navigable Space – Imaginary Surfaces" upon which an airport hazard might be established if not prevented as provided in § 4.405.

AIRPORT HEIGHT CONTROL AREA. The space between the earth's surface and the imaginary surfaces as established in 14 C.F.R. Part 77, "Objects Affecting Navigable Space – Imaginary Surfaces."

AIRPORT LAYOUT PLAN. A graphic representation of the current and future airport facilities as determined from the review of the aviation forecasts, facility requirements and alternatives analysis.

ALLEY. A right-of-way that affords only a secondary means of access to adjacent property.

AMUSEMENT REDEMPTION MACHINE.

(1) Any electronic, electromechanical or mechanical contrivance, including sweepstake machines, designed, made and adapted solely for bona fide amusement purposes, and that by operation of chance or a combination of skill affords the user, in addition to any right of replay, an opportunity to receive exclusively non-cash merchandise prizes, toys or novelties, or a representation of a value redeemable for those items and is in compliance with Tex. Penal Code § 47.01(4)(b).

(2) AMUSEMENT REDEMPTION MACHINE does not include:

a. A machine that awards the user non-cash merchandise prizes, toys or novelties solely and directly from the machine, including claw, crane or similar machines; nor

b. A machine from which the opportunity to receive non-cash merchandise prizes, toys or novelties, or a representation of value redeemable for those items, varies depending upon the user's ability to throw, roll, flip, toss, hit or drop a ball or other physical objects into the machine or a part thereof, including basketball, golf, bowling or similar machines. A representation of value means cash paid under authority of sweepstakes contestants as provided by the Tex. Business and Commerce Code § 43, or a gift certificate or gift card that is presented to a merchant in exchange for merchandise.

[ANSI. Acronym for American National Standards Institute.](#)

[ANSI A300. The United States industry-developed, national consensus standards of practice for tree care.](#)

[ANSI Z133. The United States industry-developed, national consensus safety standards of practice for tree care.](#)

[ANSI Z60.1. The United States industry-developed, national consensus standards for nursery stock.](#)

ANTENNA. Any exterior apparatus designed for telephonic, radio or television communications through the sending and/or receiving of electromagnetic waves, excluding satellite dish antennas and antennas accessory to residential uses. **ANTENNAS ANCILLARY TO RESIDENTIAL USES** shall mean television antennas and amateur radio equipment not used for commercial purposes, including ham radio and CB equipment.

APARTMENT. A room or a suite of rooms within an apartment house arranged, intended or designed for a place of residence of one family or group of individuals living together as a single housekeeping unit.

APPLICANT.

(1) For the purpose of Chapter 5, Article 2, Sexually Oriented Businesses, **APPLICANT** is:

a. A person in whose name a specialized certificate of occupancy to operate a sexually oriented business will be issued;

b. Each individual who signs an application for a sexually oriented business as required by this section;

c. Each individual who is an officer of a sexually oriented business for which a specialized certificate of occupancy application is made, regardless of whether the individual's name or signature appears on the application;

d. Each individual who has a 20% or greater ownership interest in a sexually oriented business for which a specialized certificate of occupancy application is made, regardless of whether the individual's name appears on the application; and

e. Each individual who exercises substantial de facto control over a sexually oriented business for which a specialized certificate of occupancy application is made, regardless of whether the individual's name or signature appears on the application.

(2) For purposes of the Historic Preservation Ordinance, an **APPLICANT** is a property owner, or a designated and duly authorized representative or agent of the property owner, that submits an application pursuant to the Historic Preservation Ordinance; provided, however, that when the city submits an application, it is not necessary for it to be the property owner.

AQUAPONICS. The combination of aquaculture (farming of aquatic species) and hydroponics (plants) to grow food crops or ornamental crops and aquatic species together in a recirculation system without discharge or exchange of water.

ARCHAEOLOGY. The science or study of the material remains of past life or activities and physical site, location or context in which they are found, as delineated in the Department of the Interior's Archaeological Resources Protection Act of 1979.

ASSISTED LIVING FACILITY. A facility providing responsible adult supervision of or assistance with routine living functions of an individual in instances where the individual's condition necessitates that supervision or assistance.

AUTOMOBILE. All passenger cars, as well as light-duty trucks, vans and sport utility vehicles.

AUTOMOBILE SALES AREA. An open area or lot used for the display or sale of automobiles, where no repair work is done except minor reconditioning of the cars to be displayed and sold on the premises, and no dismantling of cars or sale or keeping of used car parts or junk on the premises is allowed.

AWNING/CANOPY. A wall mounted, cantilevered structure providing shade and cover from the sun.

BALCONY. A cantilevered platform projecting from the wall of an upper-story of a building with a railing along its outer edge, often with access from a door or window.

BASEMENT. A story below the first story as hereinafter defined. See also STORY.

BASE-YEAR TAXABLE VALUE. For purposes of the Historic Preservation Ordinance, the BASE-YEAR TAXABLE VALUE means the taxable value of a structure, and the land necessary for access to and use of the structure, on the city's certified appraisal roll as of December 31 of the year prior to the date upon which the HPO determines that an application for a historic site tax exemption is complete. For avoidance of doubt and consistent with state law, "taxable value" as used herein means a property's appraised value less all applicable property tax exemptions.

BED AND BREAKFAST HOME. A property with an existing structure as of December 1, 1993, that is designed for and occupied as a one-family residence providing overnight accommodations to transient guests. The structure serves as the primary residence or homestead of its owner-operator with the bed and breakfast home considered to be an accessory use and not the primary use of the property. The person who owns the property must also be the operator of the establishment.

BED AND BREAKFAST INN. A property providing overnight accommodations to guests operated by an owner and/or operator, with premises being a commercial enterprise. This term excludes any bed and breakfast home.

BELT COURSE. A horizontal course of brick or stone flush with or projecting beyond the face of a building.

BICYCLE PARKING SPACE. Parking accommodation for one bicycle to a city approved bicycle rack.

BICYCLE RACK. The city approved fixture that parks at least two bicycles and includes at least a four feet wide by six feet long dimension.

BIORETENTION AREA. Structural stormwater areas, including dry and wet swales, which capture and treat runoff using soils and vegetation in shallow basins or landscaped areas.

BLOCK. A piece or parcel of land entirely surrounded by highways or streets, other than alleys. In cases where the platting is incomplete or disconnected, the director of public works shall determine the outline of the BLOCK.

BOARDINGHOUSE or LODGING HOUSE. A dwelling with at least one common exterior entrance where separate sleeping rooms are available for rent for a period of seven consecutive days or longer to persons for compensation, pursuant to previous arrangements, and excluding hotels or motels. The owner, agent or rental manager may or may not reside within the dwelling.

BUILDING. A structure having a roof supported by columns or walls for the housing or enclosure of persons, animals or chattels.

BUILDING FACADE. The face of a building that delineates the edge of conditioned floor space.

BUILDING, HEIGHT OF. See § 6.100.

BUILDING PERMIT. Authorization given by the City of Fort Worth to erect, construct, renovate, maintain or conduct any other specified activity on any building or structure, or on any installations or facilities therein. The term BUILDING PERMIT shall include, but not be limited to, building permits, electrical permits, mechanical permits and plumbing permits.

CALIPER. The diameter of a tree, measured at a point six inches above the ground line if the resulting measurement is no more than four inches. If the resulting measurement is more than four inches, the measurement is made at a point 12 inches above the ground line.

CAMPUS DEVELOPMENT. A campus development is defined as a unified group of buildings and/or facilities located on a contiguous parcel(s) and operated as a place of worship, school or hospital.

CARE FACILITY. An institutional use of a building or property whereby a publicly or privately funded program enables persons to receive medical, psychological, emotional or other rehabilitative care as an out-patient or live-

in patient. This definition does not include those institutional uses provided for elsewhere in this ordinance, nor does it include foster care programs or community homes.

CARPORT/PORTE COCHERE, PRIVATE. An open-sided extension of the roof of the principal building, or an accessory open-sided detached building/structure on the same lot, used for the shelter or storage of occupant owned motor vehicles as an accessory use only.

CARPORT, PRIVATE. An accessory open-sided detached building/structure on the same lot, used for the shelter or storage of occupant owned motor vehicles as an accessory use only.

CAR WASH. A facility for the washing or steam cleaning of vehicles as follows:

(1) **SELF-SERVICE.** Facilities where a vehicle may be manually washed, sprayed, dried or vacuumed by its owner or operator with equipment provided by the facility. Typically, no employees will be on-site at the facility.

(2) **AUTOMATED-SERVICE.** Facilities where a vehicle is driven by the owner or operator through an automated tunnel for washing and drying but the owner or operator vacuums the vehicle with equipment provided by the facility. Minimal staff will be on-site at the facility.

(3) **FULL-SERVICE.** Facilities where operating functions are performed entirely by the facility with the use of washing, waxing, drying, and vacuuming equipment supplemented with manual detailing. Employees will be on site at the facility.

CERTIFICATE OF APPROPRIATENESS. For the purposes of the Historic Preservation Ordinance, a Certificate of Appropriateness is a signed and dated document evidencing the approval of the historic and cultural landmarks commission or the historic preservation officer, as appropriate, for work proposed by an owner or applicant of a historic property.

CERTIFIED LOCAL GOVERNMENT PROGRAM. A local, state, and federal government partnership to empower local communities to better protect historic properties by identifying local priorities, meeting recognized historic preservation standards and providing access to financial and technical services to further the identification, evaluation, designation and protection of buildings, sites, districts, structures, and objects.

CHIEF OF POLICE or CHIEF. The chief of the Fort Worth police department or a designee or any employee(s) of the police department assigned by him or her to perform the duties prescribed in this article.

CITY ENFORCEMENT PERSONNEL. An authorized representative of any of the following departments or divisions:

- (1) Department of planning and development;
- (2) Code compliance;
- (3) Health department;
- (4) Fire department;
- (5) Police department; and
- (6) Marshal's office.

CITY FORESTER. For the purpose of tree preservation, that person or persons designated by the director of planning and development to provide administrative review and approval of urban forestry plans/permits (urban forestry compliance section).

CIVIC CLUB. See LODGE.

CLEAR ZONE (CZ). The trapezoidal area lying immediately beyond the end of the runway and outward along the extended runway center line for a distance of 3,000 feet. Dimensions are 1,500 feet in width at the runway

threshold and 2,284 feet in width at its outer edge. The CLEAR ZONE represents the highest potential for aircraft accidents.

CLINIC. Offices for one or more health practitioners engaged in treating the sick or injured on an outpatient basis.

CLUSTER SUBDIVISION. A grouping of individual building lots or sites in close proximity, each of which or the majority of which has less land area than required for isolated individual lots, with the additional area in the cluster subdivision being devoted to open space, recreation space, car spaces and access facilities in addition to required yards.

CO-LOCATION. Placement of an antenna on an existing telecommunication tower, stealth telecommunication tower, transmission tower, building, light or utility pole or water tower or other structure, where the antenna are located on the existing structure.

COMMERCIAL COPY. A message displayed on a sign which relates solely to the economic interests of the advertiser and its audience; a message pertaining to price and product advertising, goods and services.

COMMERCIAL/INSTITUTIONAL USE.

(1) For the purpose of the landscape provisions of § 6.301, the following uses are considered to be commercial/institutional:

- a. Any use allowed by right in the commercial districts, including public and private schools and places of worship;
- b. Private recreation facilities in manufactured housing subdivisions in the “MH” district;
- c. Principal and special exception uses in the “CF” district; and
- d. The following uses, which are permitted only in “PD” districts: halfway houses, gambling facilities or other operations featuring games of chance (including bingo parlors), and horse, dog and automotive racing.

(2) Uses subject to the unified residential development provisions set out in § 6.506 are not included.

COMMERCIAL MULTI-UNIT CENTER. For the purpose of Chapter 5, Article 2, Sexually Oriented Businesses, COMMERCIAL MULTI-UNIT CENTER is a building or structure (including a shopping mall or strip shopping center) containing three or more separate premises, each of which is offered by lease or otherwise for separate occupancy or control and each of which occupies an enclosed area having its own door or entranceway opening onto public property, a public way or a common area.

COMMERCIAL PRINT CENTER. A commercial establishment open to the general public that is primarily involved in the electronic duplication of graphic and printed materials for personal or business use, and which also provides other products and services including, but not limited to, photocopying, electrostatic printing, laser printing, word processing services, computer generated graphics, computer aided design services, video imaging and reproduction services, on-site computer rental and on-site teleconferencing. Offset printing, or similar printing processes, shall not be permitted.

COMMERCIALLY MANUFACTURED VEHICLE. A mobile vending unit originally manufactured as a mobile food vehicle to be used for the preparation of food which was manufactured by a person regularly in the business of manufacturing mobile food vehicles for sale. Commercially manufactured shall not include any vehicle that is converted or retrofitted to be a mobile food vehicle.

COMMUNITY CENTER. A building dedicated to social or recreational activities, serving the city or a neighborhood and owned and operated by the City of Fort Worth, or by a non-profit organization dedicated to promoting the health, safety, morals or general welfare of the city.

COMMUNITY GARDEN. A shared garden space managed by a public or nonprofit organization, a neighborhood association, person or group of individuals in the community, to grow plants and harvest food or ornamental crops for use by those cultivating the land and their households.

COMMUNITY HOME. A community-based residential home as defined by the Community Homes for Disabled Persons Location Act, Tex. Human Resources Code, Chapter 123. Not more than six persons with disabilities and two supervisors may reside in the community home at the same time. The limitation on the number of persons with disabilities applies regardless of the legal relationship of those persons to one another.

COMPLETE APPLICATION. For purposes of the Historic Preservation Ordinance, a COMPLETE APPLICATION is an application that contains all information required by the Historic Preservation Ordinance and all that is necessary to fully support the sufficiency of a request, including, without limitation, a full description and illustration of the nature and scope of a request, and which must include the signature of the applicant verifying the information provided.

CONVICTION. For the purpose of Chapter 5, Article 2, Sexually Oriented Businesses, CONVICTION is a conviction in a federal court or a court of any state or foreign nation or political subdivision of a state of foreign nation that has not been reversed, vacated or pardoned. CONVICTION includes disposition of charges against a person by probation.

COOKING EQUIPMENT. A stove, range or other such appliances, which requires a 220V or gas connection that is used, designed or intended to be used for the cooking and preparing of food.

CORNICE. A projecting shelf along the top of a wall, along the exterior trim at the meeting of a roof and wall, or at the uppermost division of an entablature.

COTTAGE INDUSTRY. Small scale assembly and light manufacturing of commodities (including electronics) fully enclosed within the building without producing any noise, noxious odors, gas, or other pollutants. This category shall include workshops and studios for cottage industries such as pottery, glass-blowing, metal working, screen printing, weaving.

COURTYARD. An open unoccupied space other than a yard, on the same lot with a building and which is bounded on three or more sides by the building.

CRITICAL ROOT ZONE. Area around the trunk of the tree that is equal to a radius of one foot per inch diameter measured at breast height (DBH) - four and one-half feet.

CULTURAL MOTIF. For purposes of the Historic Preservation Ordinance, CULTURAL MOTIF is a recurrent architectural element or dominant style found in the design of a building.

CUSTOMER. For the purposes of Chapter 5, Article 2, Sexually Oriented Businesses, a CUSTOMER is any person who:

(1) Enters the premises and patronizes a sexually oriented business, whether or not in exchange for the payment of an admission fee or any other form of consideration, gratuity or as a guest of a member; or

(2) Purchases, rents or otherwise partakes of any sexually oriented merchandise, goods, entertainment or other services while on the premises.

DATA CENTER. Real and personal property consisting of buildings or structures specifically designed or modified to house networked computers and data and transaction processing equipment and related infrastructure support equipment, including, without limitation, power and cooling equipment, used primarily to provide, as a service to persons other than the company operating the data center, data and transaction processing services, outsource information technology services and computer equipment colocation services, or, used primarily to provide, to a single user, including the user's affiliates, customers, lessees, vendors and other persons authorized by the user, data and transaction processing services.

DAY CARE CENTER. A facility that provides non-medical care and supervision for more than six children, elderly persons or persons with physical and/or mental disabilities. This definition does not include those uses defined as a community home.

DECKING. The surface material that forms the floor of the structure.

DEMOLITION. For the purpose of the Historic Preservation Ordinance, an act or process which destroys a site or structure in its entirety, or which destroys a part of a site or structure and permanently impairs its structural, historic or architectural integrity.

DEMOLITION BY NEGLECT. For purposes of the Historic Preservation Ordinance, DEMOLITION BY NEGLECT is the consistent failure to maintain a structure that causes, or is a substantial contributing factor of, the deterioration of building materials to such an extent that the structure is no longer safe or its rehabilitation is no longer feasible, ultimately leading to its demolition.

DEVELOPMENT PLAN. For the purposes of Chapter 4, § 4.202, Manufactured Home (“MH”) District, a graphic representation, drawn to scale, in a horizontal plane, delineating the outline of land included in the plan and all proposed use locations, with accurate dimensions indicating the relation of each use to that adjoining and to the boundary of the property.

DIAMETER AT BREAST HEIGHT OF AN EXISTING TREE (DBH). That measurement of the size/diameter of a tree as determined by measuring at four and one-half feet above the soil level. For a multi-trunk tree, the diameter shall be the total diameter of the largest trunk plus one-half the diameter of each additional trunk.

DIAMETER OF AN EXISTING TREE. That measurement of the size/diameter of a tree as determined by measuring at four and one-half feet above ground. For a multi-trunk tree, the diameter shall be the total diameter of the largest trunk plus half the diameter of each additional trunk.

DISMANTLED VEHICLE. A vehicle that has, intentionally or unintentionally, one or more significant parts removed. A SIGNIFICANT PART is any part that is need to safely operate the vehicle, including, but not limited to, a wheel or tire, windshield, door, side quarter panel, trunk, hood, roof, steering wheel or transmission. A vehicle can be considered dismantled under this definition whether or not it is in an operative condition.

DISPLAY AREA/FACE. That area made available by a sign structure for the purpose of displaying an advertising message, such area to exclude nonstructural trim.

DISRUPTIVE ACTIVITY. Any permanent change to existing surface conditions including clearing, grading, trenching, boring and similar activities. DISRUPTIVE ACTIVITY will not include normal mowing or removal of trees less than six inches in diameter.

DOCK, PIER OR BOATHOUSE (OR ANY COMBINATION). A structure that permits the landing and mooring of vessels, including the anchoring system, cables, floats, electrical, plumbing and any other related components or materials installed in conjunction with the construction, maintenance or use of the dock for the landing and mooring of vessels, but excluding the walkway.

DRIVE-IN RESTAURANT OR BUSINESS. A restaurant or business that provides car service and/or a drive-through window, either exclusively or in conjunction with walk-in service.

DRIVEWAY. Any hard surface parking area that provides access to private property from the right-of-way to the required off-site parking behind the building line. A RESIDENTIAL DRIVEWAY may consist of compacted gravel base confined by a border.

DRY SWALE. A system that consists of an open conveyance channel with a filter bed of permeable soils that overlay an under drain system. Flow passes into and is detained in the main portion of the channel where it is filtered through the soil bed. Runoff is collected by a perforated pipe and gravel under drain system to the outlet.

DWELLING, MULTIFAMILY. One or more buildings containing or aggregating three or more one-family dwelling units.

DWELLING, ONE-FAMILY. A building designed exclusively for residential occupancy by not more than one family.

DWELLING, TWO-FAMILY. A building designed exclusively for residential occupancy by two families.

DWELLING UNIT. A building, or any portion thereof, containing a complete set of independent living facilities for occupancy and use by one family, including permanent provisions for living, sleeping, eating, sanitation and cooking within a kitchen for the exclusive use of the occupants whose intent is to inhabit the dwelling unit.

DWELLING UNIT, ACCESSORY. Non-rented or leased living facilities within a detached building located on the same lot, parcel or tract of the primary dwelling unit for use or occupancy by temporary guests or a member of the family of the main dwelling unit, which does not contain cooking equipment.

EMERGENCY ACCESS EASEMENT. An area created by plat or separate instrument filed with the office of the county clerk other than a dedicated street or place, or an alley, which is maintained free and clear of buildings, structures and other obstructions for the purpose of providing free passage of service and emergency vehicles.

EMPLOYEE.

(1) For the purpose of Chapter 5, Article 2, Sexually Oriented Businesses, EMPLOYEE is any person who renders any service whatsoever to the customers of a sexually oriented business or who works on the premises of a sexually oriented business that receives any form of compensation, including tips or gratuities, from the operator, manager, customers, other employees or entertainment personnel and in exchange therefore:

a. Renders any work, service, performance or exhibition whatsoever, directly or indirectly, to or for a customer; or

b. Renders any other support service whatsoever, directly or indirectly, for or on behalf of the furtherance of the business operations.

(2) EMPLOYEE includes, but is not necessarily limited to, bartenders, cashiers, dancers, disc jockeys, escorts, hosts, hostesses, models, masseurs, outcall persons, strippers, models, waiters, waitresses or other persons working on or about the premises.

EMPLOYMENT CENTER. For the purposes of § 4.305, an EMPLOYMENT CENTER is a distinct cluster of economic activities that employ at least 30,000 people, have interrelated or complementary land uses and can be identified by distinct geographic boundaries. EMPLOYMENT CENTERS may include one large employer or a conglomeration of employers.

ENDANGERED. For the purpose of the Historic Preservation Ordinance, threatened by deterioration, damage or irretrievable, irreplaceable loss due to neglect, disuse, disrepair, instability, lack of financial resources and/or impending demolition.

ENTERTAINMENT. For the purposes of Chapter 5, Article 2, Sexually Oriented Businesses, any variety of live or non-live performances, services, exhibitions or displays by entertainment personnel which are distinguished or characterized by an emphasis on matters exhibiting, depicting or engaging in “specified sexual activities” or while exposing “specified anatomical areas,” or which provide sexual gratification or sexual stimulation to customers.

ENTERTAINMENT PERSONNEL. For the purposes of Chapter 5, Article 2, Sexually Oriented Businesses, any person, including persons traditionally regarded as “independent contractors,” who receives any form of compensation, including tips or gratuities, from the operator, customers, employees or other entertainment personnel and in exchange therefore:

(1) Renders any live entertainment, service, performance, exhibition or display whatsoever, directly or indirectly, to or for a customer or the furtherance of the business operation; and

(2) Shall include but is not necessarily limited to bartenders, cashiers, dancers, disc jockeys, escorts, hosts, hostesses, models, masseurs, out call-persons, strippers, models, waiters, waitresses or other persons working on or about the premises.

ESCORT. For the purpose of Chapter 5, Article 2, Sexually Oriented Businesses, ESCORT is a person who, for consideration, agrees or offers to act as a companion, guide or date for another person, or who agrees or offers to privately model lingerie or to privately perform a striptease for another person.

ESCORT AGENCY. For the purpose of Chapter 5, Article 2, Sexually Oriented Businesses, ESCORT AGENCY is a commercial venture that furnishes, or offers to furnish, or advertises to furnish escorts for a fee, commission, tip or other consideration.

ESTABLISHMENT. For the purpose of Chapter 5, Article 2, Sexually Oriented Businesses, ESTABLISHMENT is:

- (1) The opening or commencement of any sexually oriented business as a new business;
- (2) The conversion of an existing business, whether or not a sexually oriented business, to any sexually oriented business;
- (3) The addition of any sexually oriented business to any other existing sexually oriented business; or
- (4) The relocation of any sexually oriented business.

EVENT CENTER OR RENTAL HALL An establishment that is leased on a temporary basis before the event by individuals or groups who reserve the facility to accommodate private functions, including but not limited to banquets, weddings, anniversaries, receptions, business organizational meetings, and other similar functions, to which the general public is not admitted and for which no admission charge is imposed. Such establishments may include kitchen facilities for the preparation of food and areas for dancing, dining and other entertainment activities that customarily occur in association with banquets, weddings or receptions. An event center does not include a game room, bar, pool hall, dance hall, night club or concert hall.

EXTERIOR ARCHITECTURAL FEATURE. The architectural style, design, general arrangement and components of all of the outer surfaces of a building or structure, as distinguished from the interior surfaces enclosed by such outer surfaces. Such exterior architectural feature shall include, by way of example but not by limitation, the kind, color, texture of the building material and the type and style of all windows, doors, lights, signs and other fixtures appurtenant to such building or structure.

EXTERIOR PORTION. For the purpose of Chapter 5, Article 2, Sexually Oriented Businesses, EXTERIOR PORTION is any part of the physical structure of an enterprise, including, but not limited to, a wall, veneer, door, fence, roof, roof covering or window, which is visible from any public way or public property.

FACADE. The faces or elevations of a building visible from a public way or space; usually limited to the front face of a building in an urban environment.

FAMILY. Any individual or two or more persons related by blood, adoption, marriage or guardianship, or not more than five unrelated persons operating as a single housekeeping unit and expressly excluding lodging, boarding, fraternity, and sorority houses.

FARMERS' MARKET. An outdoor marketplace for the distribution and sale of food products directly to consumers that are grown, made and offered for sale by the producing farmers and including unique products and goods created and sold by local artisans, not to include mass produced products.

FBC ADMINISTRATOR. The Development Services Director or designee responsible for the day-to-day administration of the Stockyards Form Based Code and Design Guidelines.

FEEDING PEN, ACCESSORY. An area used for feeding of livestock as an accessory use only to farming and ranching activities.

FEEDING PEN, COMMERCIAL. An area where livestock are confined and are fed in any quantity or in any manner other than grazing on growing herbage, for any purpose other than as a normal accessory use to farming and ranching activities. Pasturing of livestock on growing herbage, including rental of grazing land for pasturing, shall not be considered as a COMMERCIAL FEEDING PEN use.

FENESTRATION. The design, proportioning and disposition of windows and other exterior openings of a building.

FLOOD. A general and temporary condition of partial or complete inundation, by water or mud, of lands not normally inundated and that are used or usable by man.

FLOOD, 50-YEAR. A flood having an average frequency of occurrence of once in 50 years although such flood may occur in any year. A 50-YEAR FLOOD is determined by statistical analysis of stream flow records, and rainfall and run-off characteristics in the watershed.

FLOOD, INTERMEDIATE REGIONAL. A flood having an average frequency of occurrence of once in 100 years although such flood may occur in any year. An INTERMEDIATE REGIONAL FLOOD is determined by statistical analysis of stream flow records, and rainfall and run-off characteristics in the watershed.

FLOODPLAIN. Land which has a history of flood or is subject to recurrent flooding as determined by the City of Fort Worth public works department.

FLOOR AREA. The sum total of the area of all buildings on the unified residential development site excluding utility rooms and mechanical rooms, measured between the outer perimeter walls of the buildings, provided that space in a building or structure used for parking of motor vehicles shall not be computed in the floor area. Courtyards or balconies open to the sky and roofs which are utilized for recreation, etc., shall not be counted in the FLOOR AREA but shall be a part of the recreational space.

FOOD, NON-POTENTIALLY HAZARDOUS. Food products that are not potentially hazardous, such as popcorn, pretzels and nuts, and as further defined in Chapter 16, Health and Sanitation of the city code of the City of Fort Worth.

FOOD, POTENTIALLY HAZARDOUS. Natural or synthetic food products that require temperature control as further defined in Chapter 16, Health and Sanitation of the city code of the City of Fort Worth.

FOOTCANDLE. Unit of light density incident on a plane (assumed to be horizontal unless otherwise specified), and measurable with an illuminance meter, a.k.a., light meter.

FORECOURT. An open area at grade, or within 30 inches of grade, that serves as an open space, plaza or dining area.

FRATERNITY OR SORORITY HOUSE. A building containing the general facilities and sleeping rooms for members of a fraternity or sorority.

FRESH WATER FRACTURE PONDS. A pit used for the collection and storage of fresh water for the purpose of fracture stimulation of gas wells.

FRIEZE. The horizontal part of a classical entablature, often decorated with sculpture in low relief.

FRONTAGE. All the property adjacent to one side of a street between two intersecting streets, measured along the street line.

FULL CUTOFF. Attribute of a lighting fixture from which no light is emitted at or above a horizontal plane drawn through the bottom of the fixture and no more than 10% of the lamp's intensity is emitted at or above an angle ten degrees below that horizontal plane, at all lateral angles around the fixture.

FULLY SHIELDED. Attribute of a lighting fixture provided with internal and/or external shields and louvers to prevent brightness from lamps, reflectors, refractors and lenses from causing glare at normal viewing angles.

GALLERY. A covered passage extending along the outside wall of a building supported by arches or columns that is open on three sides.

GAMBLING DEVICE. Any electronic, electro- mechanical or mechanical contrivance that for a consideration affords the player an opportunity to obtain anything of value, the award of which is determined solely or partially by chance, even though accompanied by some skill, whether or not the prize is automatically paid by the contrivance. The term includes, but is not limited to, gambling device versions of bingo, keno, blackjack, lottery, roulette, video poker or similar electronic, electromechanical or mechanical games, or facsimiles thereof, that operate by chance or partially so, that as a result of the play or operation of the game award credits or free games, and that record the number of free games or credits so awarded and the cancellation or removal of the free games or credits.

GAME ROOM. A building, facility or other place where one or more amusement redemption machines are present.

GARAGE, PRIVATE. Space in a principal building, or an accessory building on the same lot, used for the shelter or storage of occupant owned motor vehicles as an accessory use only.

GARAGE, PUBLIC. A building other than a private or storage garage used for the care or repair of self-propelled vehicles or where such vehicles are kept for remuneration, hire or sale.

GARAGE, STORAGE. A building or portion thereof, other than a private garage, used exclusively for parking or storage of self-propelled vehicles, but with no other services provided except facilities for washing.

GARAGE, TERRACE. A private garage placed in front of the building line due to the steep topography of the lot.

GLARE. Excessive brightness in the field of view that is sufficiently greater than the brightness to which the eyes are adapted, to cause annoyance or loss in visual performance and visibility, so as to jeopardize health, safety or welfare.

GROSS FLOOR AREA. For any building shall be measured by taking the outside dimensions of the building at each floor level, except that portion of the basement used only for utilities or storage, and any areas within the building used for off-street parking.

GROUP HOME I. A family based facility which contains not more than 15 residents and three supervisory personnel and which provides 24-hour care in a protected living arrangement for the mentally and/or physically impaired, developmentally disabled or victims of abuse or neglect. This classification includes congregate living facilities for the elderly, maternity homes, emergency shelters during crisis intervention for victims of crime, abuse or neglect, and residential services licensed by the Texas commission on alcohol and drug abuse, but not primarily for criminal rehabilitation.

GROUP HOME II. Same definition as group home I except that there is no limit on number of residents.

HALFWAY HOUSE. A facility providing for the housing and rehabilitation or training of adults on probation, parole, early or pre-release or any other form of executive, judicial or administrative release from a penal institution, including without limitation community residential facilities established in accordance with Tex. Code of Criminal Procedure Ann. Art. 42.18, as amended from time to time. HALFWAY HOUSE includes facilities which provide in-patient treatment for chemical dependency to persons on probation, parole, early or pre-release or any other form of executive, judicial or administrative release from a penal institution if such persons are ordered to obtain such treatment for chemical dependency as a condition of release. For purposes of this definition, an adult is a person age 18 or over.

HARD-SURFACE (PARKING). Any porous or non porous surface suitable for the function of driving and parking of vehicles; nonporous surfaces are typically asphalt and concrete.

HEIGHT. For the purpose of determining the height limits in the airport/airfield overlay districts and shown on the airport height control map, the datum shall be measured in mean sea level elevation unless otherwise specified.

HIGHWAY I-30 AND/OR I-35. For the purpose of Chapter 5, Article 2, Sexually Oriented Business, HIGHWAY I-35 AND/OR I-30 shall mean any property located within 300 feet of the right-of-way line of the prospective interstate highway. Measurement of the distance shall be made in a straight line, without regard to intervening structures or objects, from the nearest portion of the right-of-way line of the highway to the nearest property line of the property sought to be used, or used, as a sexually oriented business.

HISTORIC CONTEXT. For purposes of the Historic Preservation Ordinance, HISTORIC CONTEXT means information about historic trends and properties grouped by an important theme in the prehistory or history of Fort Worth, the State of Texas, or the United States during a particular period of time.

HISTORIC PROPERTY. For purpose of the Historic Preservation Ordinance, a HISTORIC PROPERTY is a building, site, structure, or object designated or pending designation as highly significant endangered, historic and cultural landmark (either individually or within a historic and cultural landmarks district), or demolition delay.

HISTORIC PROPERTY, CONTRIBUTING. For purposes of the Historic Preservation Ordinance, a CONTRIBUTING HISTORIC PROPERTY is a building, site, structure, or object that adds to the historic significance of a designated historic property.

HISTORIC PROPERTY, NON-CONTRIBUTING. For purposes of the Historic Preservation Ordinance, a NON-CONTRIBUTING HISTORIC PROPERTY is a building, site, structure, or object that does not add to the historic significance of a designated historic property and which is designated as a non-contributing resource in the design standards and guidelines for such district if such design standards and guidelines exist. Such designation is meant to provide greater latitude for utilization of the historic property; however, all modifications must conform to the applicable design standards and guidelines.

HOBBY. An accessory use carried on by the occupant of the premises in a shop, studio or other workroom, purely for personal enjoyment, amusement or recreation; provided that the articles produced or constructed in said shop, studio or workroom are not sold either on or off the premises, and provided such use will not be obnoxious or offensive by reason of vibration, noise, odor, dust, smoke or fumes.

HOME OCCUPATION. An accessory use of a dwelling unit for gainful employment that is conducted by a member of the family residing in the dwelling which is clearly customary, incidental and a subordinate secondary use of the dwelling unit as a residence and does not alter the exterior of the property or affect the residential character of the neighborhood.

HOME SCHOOL. A private school as defined in the Tex. Education Code § 21.033, which is taught by a parent or parents, legal guardian or other designated adult member of the household in which the student resides.

HOSPICE. Temporary residence for patients and their families receiving medical or psychological care from licensed institution. May include family counseling, group therapy, psychiatric treatment and training of family members by authorized practitioners in the provision of a caring environment for supplying the physical and emotional needs of the ill and their families.

HOSPITAL, GENERAL. An institution providing in-patient medical or surgical care for the acutely sick or injured, who are generally confined for relatively short periods of time. Included as an integral part of the institutions are such related facilities as laboratories, out-patient departments, educational facilities, food services and staff offices.

HOSPITAL, LONG-TERM. An institution providing in-patient medical treatment of an intensive and specialized nature for the chronically ill, who are generally confined for periods of time exceeding 30 days. LONG-TERM HOSPITALS include homes for alcoholic, narcotic or psychiatric patients, and institutions for patients with a contagious disease, such as tuberculosis sanitariums.

HOTEL. One or more buildings containing individual living or sleeping units specially designed as temporary quarters for transient guests, including provisions for meals and personal services. This definition shall include hotels, extended stay hotels, motels and inns.

ILLUMINANCE. Quantity of light, measured in footcandles.

INDOOR AMUSEMENT. A privately established and operated facility that provides indoor amusement opportunities for a fee, including, but not limited to, an arcade or pool hall, but not a bar or similar facility that serves alcohol, or a dance hall, night club, concert hall, or event center or rental hall or sexually oriented business that is otherwise categorized.

INDOOR RECREATION. A privately established and operated facility that provides indoor recreational opportunities for a fee, including, but not limited to, roller, ice skating and hockey rinks; batting cages, gymnasium or indoor arena, basketball, handball and tennis courts, but not for any use involving animals.

INDUSTRIALIZED HOUSING. Residential structure that is designed for the occupancy of one or more families; constructed in one or more modular components built at a location other than the permanent site or using two or more International Standards Organization (ISO) shipping containers; and designed to be used as a permanent residential structure when the module or modular component is transported to the permanent site and erected or installed on a permanent foundation system; and meets the building, plumbing, electrical and mechanical requirements and standards as set out in state law.

INDUSTRIAL USE. For the purpose of the landscape provisions of § 6.301, INDUSTRIAL USE includes:

(1) Any use allowed by right in the industrial districts, with the exception of commercial/institutional uses, as defined in this chapter; and

(2) All uses permitted only in a “PD” planned development district with the exception of halfway houses, gambling facilities or other operations featuring games of chance (including bingo parlors) and horse, dog and automotive racing.

INFILL HOUSING. Any detached single-family dwelling developed, reconstructed or enlarged by more than 50% of the original structure five years or more following final plat of the property.

INTERESTED PARTY. For the purpose of the Historic Preservation Ordinance, an INTERESTED PARTY is a person who has an interest in a matter that is the subject of a public hearing or administrative decision. A person has an interest if the person:

(1) Is the applicant or the record owner of property that is the subject of a public hearing or administrative decision;

(2) Is a designee of a registered neighborhood association that has an interest within the historic district;

(3) An adjacent property owner located in the same historic district; or

(4) Is an organization committed to preserving the City of Fort Worth’s historic identity with demonstrated experience in historic preservation.

KENNEL.

(1) Any building, lot or premises where four or more dogs or cats (at least eight weeks of age) are kept. This shall not include residentially zoned premises or premises which are used for residential purposes, at which the occupant is keeping his or her own dogs or cats; or

(2) Any building, lot or premises where dogs or cats are kept or housed, for which remuneration is received.

ISA CERTIFIED ARBORIST. A specialist in the care and maintenance of trees who is certified by and in good standing with the International Society of Arboriculture (ISA).

KINDERGARTEN. A facility providing educational care for pre-school age children. See DAY CARE CENTER.

KITCHEN. Any room or portion of a room containing cooking equipment and facilities for the refrigeration, preparation, cooking of food, and washing of cooking and eating utensils and used or intend or designed for cooking and preparing food. The installation of a 220V or gas connection in any room or portion of a room that is used or intended to be used as cooking equipment for the preparation of food shall be considered a kitchen.

LAKEFRONT PROPERTY LINE. The property line that borders the waters of Lake Worth as shown on the final plat of record or survey for the property.

LANDMARK. For the purpose of the Historic Preservation Ordinance, a structure or property which is of value in preserving the historical, cultural, architectural or archeological heritage, or an outstanding example of design or a site closely related to an important personage, act or event in history. Such structures or property should be preserved and restored to their historical character and should be protected from modifications which detract from their historical significance.

LANDSCAPE AREA. Area of required landscaping provided in conformance with Chapter 6, Article 3.

LANDSCAPE PLAN. A plan illustrating bufferyard features and landscaping required per Chapter 6, Article 3 of the zoning ordinance, and to illustrate trees along arterial streets required per § 31-103(b) of the subdivision ordinance. Buffer yards are required along common property lines of one- or two-family districts adjacent to nonresidential districts for which certain trees may be credited. In addition, LANDSCAPE PLANS are required for commercial, industrial and manufactured home uses to include shrubs and sod (all references to trees have been removed from the landscaping requirements per Ord. 17367). Trees are required along arterial streets for residential subdivisions of three lots or more.

LARGE ANIMALS. For purposes of § 5.307, LARGE ANIMALS shall be any equine animal including, but not limited to, a horse, stallion, mare, gelding, filly, colt, mule, hinny, jack, jennet, any species of the bovine family; including, but not limited to, any cow, calf, steer or bull, any llama, sheep, ram, ewe, lamb; any goat, billy, nanny or kid; or an emu, ostrich or rhea.

LIFT COMPRESSOR. A device that raises the pressure of a compressible fluid (gas) in order to lift gas from the well.

LINE COMPRESSOR. A device that raises the pressure of a compressible fluid (gas) in order for the gas to be transported through a pipeline.

LIVE/WORK SPACE. A dwelling unit or sleeping unit in which a significant portion of the space includes a nonresidential use that is operated by the tenant.

LODGE. An association of persons meeting regularly for their mutual benefit or for the promotion of some common purpose, supported jointly through payment of membership dues, all members having the right to vote on club policies and business.

LOT. Land occupied or to be occupied by a building and its accessory buildings, together with such open spaces as are required under this ordinance, and having its principal frontage upon a street or officially approved place.

LOT, ARTIFICIAL. For the purposes of § 6.301(b), portion of a one acre or larger tract that contains the area to be developed as an individual project and that encompasses all improvements, including parking, related to the project.

LOT, CORNER. A lot situated at the junction of two or more streets.

LOT COVERAGE. The total lot area covered by the foundation of the main structure, attached and detached garages, carports, porte cocheres, accessory detached habitable areas, porches, patios and entry areas compared to the total site area. Any portion of the foundation not covered by roof is not considered in lot area calculations.

Sheds, arbors, cantilevered (unsupported) upper story areas, eave overhangs and uncovered patios are not considered in lot coverage calculations.

LOT DEPTH. The average horizontal distance from the front street line to the rear line.

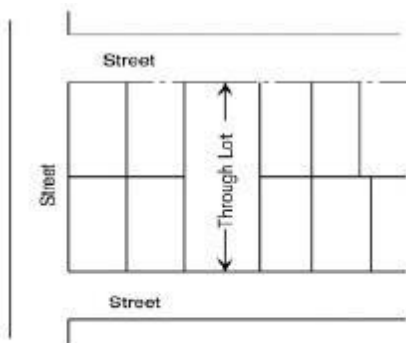
LOT, INTERIOR. A lot, the side line of which does not abut on any street.

LOT LINES. The lines bounding a lot as defined herein.

LOT, MANUFACTURED HOME. A plot of land within a manufactured home park or recreational vehicle park as indicated on the development plan, which is designed to accommodate one manufactured home or recreational vehicle respectively.

LOT OF RECORD. A lot which is part of a subdivision, a plat of which has been recorded in the office of the county clerk.

LOT, THROUGH. A lot, other than a corner lot, having frontage on two or more streets.



Through Lot

Through Lot

LOT WIDTH. The mean horizontal distance between side lines measured at right angles to the depth.

LUMEN. The light-output rating of a lamp (light bulb).

MANUFACTURED HOME or MANUFACTURED HOUSING. Includes the terms HUD-Code manufactured home and mobile home, and collectively means and refers to both and shall include one or more International Standards Organization (ISO) shipping containers.

MANUFACTURED HOME, HUD-CODE. A structure, constructed on or after June 15, 1976, according to the rules of the United States Department of Housing and Urban Development, transportable in one or more sections, which, in the traveling mode, is eight body feet or more in width or 40 body feet or more in length, or, when erected on-site, is 320 or more square feet, and which is built on a permanent chassis and designed to be used as a dwelling with or without a permanent foundation when connected to the required utilities, and includes the plumbing, heating, air-conditioning and electrical systems. The term does not include a recreational vehicle as that term is defined by 24 C.F.R. § 3282.8(g).

MANUFACTURED HOME PARK. A unified development of lots arranged on a tract of land under common ownership, which has been planned and improved for the placement of two or more manufactured homes for non-transient occupancy. For purposes of this definition only, a LOT means a plot of ground within a manufactured home park which is designed to accommodate one manufactured home.

MANUFACTURED HOME SUBDIVISION. A unified development of lots for the placement of one manufactured home per platted lot for non-transient occupancy, established for the purpose of having individually owned lots.

MANUFACTURED HOME USE. For the purpose of the landscape provisions set out in Chapter 6, Article 3, MANUFACTURED HOME USE shall include manufactured home parks and recreational vehicle parks allowed by right in the “MH” manufactured home district.

MASSAGE. Any method by which a person utilizes his or her hands, feet or an instrument for treating the superficial parts of a customer’s body for medical, hygienic, exercise, entertainment, relaxation or stimulation purposes by rubbing, stroking, kneading, tapping, pounding or vibrating.

MASSAGE PARLOR/BATH. Any commercial business, unrelated to a sexually oriented business operation, which provides massage treatment of a non-sexual nature by a licensed masseuse as a primary service.

MASSAGE THERAPY/SPA. Any medical or therapeutic practice unrelated to a sexually oriented business operation operated by or employing licensed psychologist, physicians, physical therapists, registered nurses, chiropractors, licensed practitioners or athletic trainers engaged in the practice of healing arts and the treatment of disease, ailments and disorders of the body.

MINIMUM BUILDING STANDARD CODE. That article of the city code so designated.

MINI-WAREHOUSE. A building or group of buildings containing individual compartmentalized storage units for the inside storage of a customer’s goods or wares, where no unit exceeds 1,000 square feet in floor area.

MIXED USE. Structure or project containing residential and nonresidential uses.

MOBILE HOME. A structure that was constructed before June 15, 1976, transportable in one or more sections, which, in the traveling mode, is eight body feet or more in width or 40 body feet or more in length, or, when erected on-site, is 320 or more square feet, and which is built on a permanent chassis and designed to be used as a dwelling with or without a permanent foundation when connected to the required utilities, and includes the plumbing, heating, air-conditioning and electrical systems.

MOBILE VENDING UNIT. A vehicle establishment that is designed to be readily moveable and from which merchandise is sold or food is sold or served. The term includes, but is not limited to, a commercially manufactured vehicle.

MOBILE VENDOR, FRESH MARKET. A licensed mobile vending unit that sells nonhazardous, fresh fruits and vegetables. Any product that is cut and processed shall follow Division 4 of the Health Code. No less than 75% of the products for sale shall be produce and any additional product shall be nonhazardous, packaged food.

MOBILE VENDOR FOOD COURT. A primary land use located on one or more platted lots where two or more mobile vending units congregate to offer food or beverages for sale to the public, functioning as a single business and may provide restrooms, tables, play areas, a permanent structure for alcohol sales and other outdoor entertainment open to the customers of all vendors.

MOTOR VEHICLE JUNK YARD or STORAGE YARD. Any business and any place of storage or deposit which displays, or in or upon which there are displayed, to view from a public right-of-way, two or more registered or unregistered motor vehicles which are unfit for reconditioning for use on the public highways, or used parts of motor vehicles, or old iron, metal, glass, paper, cordage or other waste, or discarded or secondhand material which has been a part or intended to be a part of any motor vehicle, the sum of which parts or material shall be equal in bulk to two or more motor vehicles, but excluding vehicles in operable condition specially adapted or constructed for racing or operation on privately owned drag strips or raceways, vehicles retained by the owner for antique collection purposes rather than for salvage or for transportation, and vehicles stored as the property of a member of the Armed Forces of the United States who is on active duty assignment outside the continental and territorial limits of the United States.

MULLION. A vertical strip that divides windows and doors.

MULTIFAMILY DISTRICT. The term multifamily district shall refer collectively to the “CR, “C,” “D,” “DHR1” and “DHR2” districts. The term also includes any “PD” districts that include multifamily uses.

NAS FW JRB. The Naval Air Station Fort Worth Joint Reserve Base.

NATIONAL REGISTER OF HISTORIC PLACES. The official federal list of buildings, districts, and sites (including structures and objects) significant in American history and culture, architecture, archeology, and engineering maintained by the National Park Service and administered on a state-wide basis of the Texas Historical Commission. Restrictions on these properties exist only when there is an undertaking that uses federal funds or that requires a federal permit or license.

NEIGHBORHOOD RECREATION CENTER. A privately established and operated facility located in a residential subdivision that provides recreational opportunities for residents of the subdivision and their guests.

NET LAND AREA. For the purposes of § 6.506, all of the privately owned property embraced within the outer perimeter property lines, not including dedicated public streets. Dedicated rights-of-way for open space, drainage or access, approved private streets or dedicated easements which can be used by the land occupants for private purposes shall be included in net land area. Where land is dedicated for future opening or widening of a public street such land shall not be computed as net land area.

NET SITE AREA. For the purposes of Chapter 6, Article 3, Landscaping and Buffers, the area used to calculate landscape requirements. This area is calculated as follows:

(1) For undeveloped sites. All areas of a site except:

- a. The footprint of proposed buildings and other proposed structures; and
- b. Any bufferyard areas required by Chapter 6, Article 3.

(2) For developed sites. All areas of a site except:

- a. The footprint of existing buildings and structures;
- b. The footprint of proposed buildings and structures;
- c. Existing parking lots not in excess of 10% over the number of required parking spaces and paved access areas; and
- d. Any bufferyard areas required by Chapter 6, Article 3.

NONCOMMERCIAL COPY. A message displayed on a sign that pertains to political, social or ideological issues.

NONCONFORMING USE, BUILDING OR YARD. A use, building or yard that does not (by reason of design, use or dimensions) conform to the regulations that apply in the district where the use, building or yard is situated. These uses, buildings or yards were legally in existence at the time the ordinance was passed to make them nonconforming. A use, building or yard established after the passage of an ordinance that does not conform to the ordinance regulations of the district in which it is situated shall be considered to be illegal.

NONRESIDENTIAL DISTRICT. The term NONRESIDENTIAL DISTRICT shall refer collectively to the districts listed in §§ 4.100(c) and (d), as well as the “EP,” “OM” and “IP” districts.

NOXIOUS. An element creating an impact that may interfere with the enjoyment and use of property, including smoke, odors, noise, vibration, glare or heat.

NUDE MODELING BUSINESS. Any establishment where an employee or entertainment personnel performs a massage or “specified sexual activities” while appearing in a “state of nudity,” “simulated nudity” or while

displaying “specified anatomical areas,” and is also provided or allowed to be observed, sketched, drawn, painted, sculptured, photographed or similarly depicted to customers.

NUDE MODELING STUDIO. Any establishment where an employee or entertainment personnel appears in a “state of nudity,” “simulated nudity” or displays “specified anatomical areas,” and is also provided or allowed to be observed, sketched, drawn, painted, sculptured, photographed or similarly depicted to customers.

NUDITY or a STATE OF NUDITY.

(1) Appearing while any of the following portions of the human body are less than completely and opaquely covered:

a. The appearance of a bare buttock, vulva, anus, anal cleft, pubic region, pubic hair, male genitals, female genitals or female breast; or

b. A state of dress which fails to completely and opaquely cover a buttock, vulva, anus, anal cleft, pubic region, pubic hair, male genitals, female genitals or any part of the female breast or breasts that is situated below a point immediately above the top of the areola of the female breast.

(2) For purposes of this definition, body paint, body dyes, tattoos, liquid latex, whether wet or dried and other similar substances shall not be considered an opaque covering.

NUDITY, SIMULATED. A state of dress in which any artificial device of covering is worn on a person and exposed to view so as to simulate an actual “state of nudity.”

NURSING AND CARE HOME. An institution providing meals and resident care and services for persons who are generally admitted for periods of time exceeding 30 days. Such service includes custodial or attendant care, and may or may not provide for routine and regular medical and nursing services. **NURSING AND CARE HOMES** include homes for the aged, and convalescent and rest homes.

OBJECT. For purposes of the Historic Preservation Ordinance, an **OBJECT** is a construction that is primarily artistic in nature or relatively small in scale and simply constructed that is affixed to property or immovable.

OFF-STREET. Off the right-of-way of a street or place.

ONE- AND TWO-FAMILY DISTRICTS. Collectively, the “A-2.5A,” “A-43,” “A-21,” “A-10,” “A-7.5,” “A-5,” “AR,” “B,” “R1” and “R2” districts.

OPEN SPACE. For the purposes of calculating open space for unified residential developments in accordance with § 6.506, the net land area minus all building footprints, parking areas, access drives and fenced patios. **OPEN SPACE** must be open to the sky and cannot be paved, except for necessary sidewalks, active recreation areas and patios that are adjacent to dwelling units and not enclosed by a fence.

OPERATED or CAUSED TO BE OPERATED. For the purpose of Chapter 5, Article 2, Sexually Oriented Businesses, **OPERATED or CAUSED TO BE OPERATED** is to cause to function or to put or keep in operation. A person may be found to be operating or causing to be operated a sexually oriented business whether or not that person is an owner, part owner or operator of the business.

OPERATOR. For the purpose of Chapter 5, Article 2, Sexually Oriented Businesses, **OPERATOR** is:

(1) The person(s) in whose name a valid specialized certificate of occupancy has been issued for a sexually oriented business pursuant to the city’s comprehensive zoning ordinance, Appendix A of this code;

(2) Each individual listed as an applicant on the application for a sexually oriented business specialized certificate of occupancy;

(3) Each individual who is an officer of a sexually oriented business for which a specialized certificate of occupancy has been issued, regardless of whether the individual’s name or signature appears on the application;

(4) Each individual who has a 20% or greater ownership interest in a sexually oriented business for which a specialized certificate of occupancy has been issued, regardless of whether the individual's name appears on the application;

(5) Each individual who exercises substantial de facto control over a sexually oriented business for which a specialized certificate of occupancy has been issued, regardless of whether the individual's name or signature appears on the application;

(6) The person(s) in whose name a specialized certificate would be required in order to lawfully operate a sexually oriented business pursuant to the city's comprehensive zoning ordinance, Appendix A of this code;

(7) Any individual who is in control of the operations of a sexually oriented business, either on an hourly basis, daily basis, weekly basis or shift basis or any combination thereof; or

(8) The person(s) who operates or causes to be operated any form of sexually oriented business, which is subject to regulation pursuant to the city's comprehensive zoning ordinance.

OUTCALL BUSINESS. For the purpose of Chapter 5, Article 2, Sexually Oriented Businesses, OUTCALL BUSINESS is a commercial venture that provides employees or entertainment personnel who, in exchange for a fee, commission, tip or other consideration, goes to the location requested by the customer and while there:

- (1) Privately models lingerie or other intimate wearing apparel;
- (2) Privately performs a strip tease;
- (3) Privately performs a semi-nude or nude modeling session; or
- (4) Bathes or massages the customer; and

(5) But shall not include persons otherwise engaged in legitimate, non-sexually oriented activities or services such as licensed private nurses, licensed physical therapists, aides for the elderly or handicapped, social secretaries or similar persons whose business or service relationship with their patron is not characterized by sexually oriented activities.

OUTDOOR STORAGE. Outdoor storage of any inert material or goods that would not be a nuisance or offensive due to odor, fire, health or other restriction of city code, and excluding trash, junk, garbage, salvaged waste or materials.

PARKING AREA, PUBLIC. An open area other than a street, alley or place used for the temporary parking of more than four self-propelled vehicles and available for public use whether free, for compensation or as an accommodation for clients or customers.

PARKING SPACE. A space set aside for the sole purpose of parking a vehicle on a temporary basis.

PARKING, TANDEM. Parking spaces arranged one behind another, for example, in a driveway.

PARKWAY. The area of public right-of-way located between the curb or edge of pavement and the property line.

PASTURE LAND. For purposes of calculating the required square footage of land for each animal in § 5.307, Large Animals, of Chapter 5, Supplemental Use Standards, PASTURE LAND shall be the designated open space, excluding any residential structures and accessory structures unrelated to the keeping of large animals.

PAWN SHOP. A shop that lends money in exchange for valuable personal property as security. This definition includes the sale of such securities after repossession and the sale of new merchandise generally found in retail stores.

PERSON. For the purposes of Chapter 5, Article 2, Sexually Oriented Businesses, any individual, proprietorship, partnership, corporation, association or other legal entity.

PILASTER. A shallow rectangular feature projecting from a wall, having a capital and a base and architecturally treated as a column.

PLACE OF WORSHIP. A building in which persons regularly assemble for religious worship.

PLANT, ADAPTED. A plant originally found in other parts of the nation or world that thrives in the North Central Texas area.

PLANT, GROUPING. A collection of native and or adapted plants united in a group.

PLANT, NATIVE. A plant that lives or grows naturally in a particular region without direct or indirect human intervention.

POLE SIGN. A detached sign which is supported by one or more poles in or upon the ground.

PORCH. A raised structure attached to a building, forming a covered entrance to a doorway.

POROUS SURFACE (PARKING). A parking surface constructed of materials that permit water to enter the ground by virtue of their nature or by large spaces in the material, such as pre-cast and mold in-place concrete blocks, concrete grids, interlocking bricks and plastic mats with hollow rings, hexagonal cells or porous concrete.

PORTE COCHERE, PRIVATE. A roofed structure located on the same lot, which extends from the roof of the principal building and over an adjacent driveway that is designed to let vehicles pass from the street to an interior courtyard and used for the shelter of those getting in and out of vehicles.

PREMISES.

(1) A single tract or platted lot.

(2) In addition, multiple adjacent tracts or platted lots under common ownership will be deemed to be a SINGLE PREMISES if they meet the following requirements:

a. Lots or tracts are not separated by intervening streets, alleys, utility or railroad rights-of-way or other interruption;

b. Property contains a single primary use; and

c. Property is not used for one- or two-family residential purposes.

(3) Tracts or platted lots that are at cross corners or that are connected by narrow strips of land too small to serve as emergency access easements shall not be considered to be adjacent.

PRESERVATION. For purposes of the Historic Site Tax Exemption, PRESERVATION means the act or process of applying measures necessary to sustain the existing form, integrity, and materials of the exterior of a historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction.

PRESERVED TREE. Any healthy tree retained for the purpose of meeting the requirements under § 6.302.

PRIMARY STREET. The principal frontage for a building site, as defined during site plan review by the development services director or designee.

PRINCIPAL BUILDING/PRIMARY STRUCTURE. A structure in which the primary use of the property is conducted.

PRINCIPAL BUSINESS OPERATION. For the purposes of determining whether a business is subject to regulation pursuant to Chapter 5, Article 2, Sexually Oriented Businesses, PRINCIPAL BUSINESS OPERATION shall mean and include any non-live, sexually oriented retail sale or rental business activity as defined herein which amounts to 35% or more of the total business operation at a particular location. The 35% criteria may be determined by

percentages of floor space utilized, inventory of items for sale or rental, display areas, presentation time of entertainment or performances, or gross revenue of the business as measured over any continuous 90-day period. However, the 35% criteria shall not apply to any sexually oriented business featuring or offering any form of live performances, entertainment, modeling or other live activity, as all such live activity is subject to regulation as a “sexually oriented business.”

PRIVATE SCHOOL. For the purposes of Chapter 5, Article 1, Home Occupations, PRIVATE SCHOOL shall mean a non-public school facility located in a dwelling unit that provides students their primary education in math, reading, spelling, grammar, good citizenship and other academic instruction by someone other than the student’s parent, legal guardian or an adult member of the household in which the student resides.

PRODUCTION AREA. Raised beds and rows; not to include buildings or structures, including structures that involve the growing of crops.

PRODUCTION UNIT. For purposes of a site plan, a production unit shall include all property, contiguous or noncontiguous, that is used for toward the production of agricultural crops. Uses may include direct production of the land, accessory structures such as greenhouses, storage buildings, and tanks, and storage of other equipment as appropriate and allowed in the zoning district. A land use CO will be required for each noncontiguous lot.

PROJECTED FRONT YARD. See § 6.101(f).

PROTECTED TREE. Any tree ~~not identified~~ listed in Table A, § 6.302.

PROTECTIVE MEASURES. Protective fencing surrounding the critical root zone and bark protection to ensure that all prohibited activities in the critical root zone are prevented, including for trees on adjacent properties. In addition, appropriate construction methods as outlined in § 6.302 of the zoning ordinance, “Landscaping and Buffers” shall be followed.

PUBLIC PARK. For the purposes of Chapter 5, Article 2, Sexually Oriented Businesses, a PUBLIC PARK is any land area dedicated to and/or maintained by the city for traditional park-like recreational purposes, but shall not include:

- (1) Privately-owned amusement parks; or
- (2) Privately-owned or privately-managed golf courses.

PUBLIC OPEN SPACE EASEMENT (P.O.S.E.). See § 5.305.

PUBLIC PROJECT. Capital improvement project that includes a disruptive activity that will prevent the surface from being restored to its original condition. PUBLIC PROJECTS shall specifically exclude utilities regulated by the public utility commission or the railroad commission.

QUOIN. A differentiated exterior angle or corner of a masonry wall, or one of the stones or bricks forming such an angle, usually differentiated from adjoining surfaces by material, texture, color, size or projection.

RECLAMATION. The process of restoring an area affected by surface mining operations to its original or other substantially beneficial condition considering past and possible future uses of the area and the surrounding topography.

RECONSTRUCTION. For purposes of the Historic Site Tax Exemption, RECONSTRUCTION means the act or process of depicting, by means of new construction, the form, features, and detailing of the exterior of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location.

RECREATIONAL SPACE. For the purposes of § 6.506, outdoor space which is made available and maintained in a suitable condition to afford occupants space for passive and active recreational pursuits to the exclusion of all other uses and/or recreation rooms or buildings available to all occupants of the development.

RECREATIONAL VEHICLE.

(1) A vehicle which is

- a. Built on a single chassis;
- b. Four hundred square feet or less when measured at the largest horizontal projections;
- c. Self-propelled or permanently towable by motor vehicle or light duty truck;
- d. Designed primarily not for use as permanent dwelling but as temporary living quarters for recreational, camping, travel or seasonal use; and
- e. Required by Texas law to have a valid vehicle registration when traveling upon public streets.

(2) RECREATIONAL VEHICLE shall not include a manufactured home.

RECREATIONAL VEHICLE PARK. A unified development on a tract of land under common ownership designed primarily for transient service, on which recreational vehicles of the general public are parked or situated.

REGULARLY. For the purposes of Chapter 5, Article 2, Sexually Oriented Businesses, offering, featuring, promoting or advertising a happening, occurrence or activity on a recurring basis or at fixed intervals, or as a customary and regular aspect of the business.

REGULATED STRUCTURE. For purposes of § 5.307, Large Animals, of Chapter 5, Supplemental Use Standards, a REGULATED STRUCTURE shall be any of the following:

- (1) A residence, structure or building used for human habitation, other than the person's habitation;
- (2) A restaurant, café or eating establishment; or
- (3) A church, school, hospital, convalescent home or nursing home.

REHABILITATION. For purposes of the Historic Site Tax Exemption, REHABILITATION is the act or process of making possible a compatible use for a property through exterior repair or alterations while preserving those portions or features that convey its historical, cultural, or architectural values.

RELIGIOUS INSTITUTION. For the purposes of Chapter 5, Article 2, Sexually Oriented Businesses, a building in which persons regularly assemble for religious worship and activities intended primarily for purposes connected with such worship or for propagating a particular form of religious belief.

RELOCATION, ALTERNATIVES. For purposes of the Historic Preservation Ordinance, ALTERNATIVES when referring to relocation refers to options other than the proposed relocation that may be a practical means of saving a historic property from demolition.

RELOCATION, INTERIM AND LONG-TERM PROTECTION. For purposes of the Historic Preservation Ordinance, INTERIM AND LONG-TERM PROTECTION when referring to relocation means effective planning and protective measures initiated before relocation that address the methods, scope, scale, and timeline of a relocation and rehabilitation of a historic property.

RELOCATION, RARITY. For purposes of the Historic Preservation Ordinance, RARITY when referring to relocation means a historic property that is one of the older structures in a historic district or has a design that has a distinctive character that is rare in Fort Worth.

RELOCATION, SETTING OF THE EXISTING AND RECIPIENT SITE. For purposes of the Historic Preservation Ordinance, **SETTING OF THE EXISTING AND RECIPIENT SITE** when referring to relocation means the physical environment of a historic property (and its recipient site) that illustrates the character of the place. Integrity of setting remains when the surroundings of a place to navigation have not been subjected to radical change.

RELOCATION, STREETScape INTEGRITY. For purposes of the Historic Preservation Ordinance, **STREETScape INTEGRITY** when referring to relocation, streetscape integrity refers to the effect of reinforcing the intactness of a streetscape through the relocation of similar historic properties.

RELOCATION, STRUCTURAL INTEGRITY. For purposes of the Historic Preservation Ordinance, **STRUCTURAL INTEGRITY** when referring to relocation refers to the effect on the structural soundness of a historic property or other nearby historic properties due to relocation.

RENT or SUBRENT. For the purposes of Chapter 5, Article 2, Sexually Oriented Businesses, the act of permitting a room or other portion of the premises to be occupied in exchange for any form of consideration.

REPAIR AND MAINTENANCE, ORDINARY. For the purposes of the Historic Preservation Ordinance, any work, the purpose and effect of which is to correct any deterioration or decay of or damage to a structure or property, or any part thereof, and to restore the same, as nearly as may be practicable, to its condition prior to such deterioration, decay or damage, using the same materials or those materials available which are as close as possible to the original and all of which must comply with applicable codes and ordinances. **ORDINARY REPAIR AND MAINTENANCE** does not include a change in design, material or outward appearance, but does include in-kind replacement or repair.

RESIDENTIAL DISTRICT. Collectively, the districts listed in § 4.100(b), as well as the “DHR1,” “DHR2,” “MH,” “MU-1” and “MU-2” districts and “PD” planned development districts that allow residential uses.

RESTAURANT. A place which is regularly open in a bona fide manner; which is used and kept open for the service of food to customers for compensation; which has suitable seating for guests; which has suitable facilities for preparation and service of an assortment of foods commonly ordered at various hours of the day or night and the serving of food is the primary business of such place, and which may, as an accessory use, provide patrons with space for dancing or permit patrons to dance. Includes restaurants legally authorized (by duly issued permits from the city and state) to sell alcoholic beverages for consumption on the premises; provided however that gross receipts for alcoholic beverages shall not exceed 50% of the total gross receipts.

RESTAURANT, DRIVE-IN. Any restaurant providing car service.

RESTORATION. For the purposes of the Historic Site Tax Exemption, **RESTORATION** means the act or process of accurately depicting the form, features, and character of the exterior of a historic property as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period.

RETAIL SALES, GENERAL. A facility for the retail sale of merchandise, including without limitation bicycle sales or repairs; bird store; Christmas tree sales; cigar or tobacco store; confectionery store; craft or novelty store; department store; dry goods or notions store; electronic media sales or servicing; florist shop; fur storage or sales; gasoline sales; gift shop; hardware, paint or wallpaper store; jewelry store; musical instruments, sales and supplies; optical goods sales; pet shop; piano store; and variety store.

RETAIL SMOKE SHOP. A store that derives 90% or more of its gross annual sales from the sale of tobacco, cigarettes, smoking and electronic smoking devices, or related products and accessories and does not sell alcoholic beverages for onsite consumption.

ROOMER, BOARDER or LODGER. A person occupying any room or group of rooms used or intended to be used for living, sleeping, but not for cooking or eating purposes and paying compensation for said rooms or group of rooms by prearrangement for a week or more at a time to an owner or operator who is not related by blood, adoption or marriage to such person. Any person occupying such room or group of rooms and paying such

compensation without prearrangement or for less than a week at a time shall be classed for purposes of this ordinance not as a ROOMER, BOARDER or LODGER, but as a guest of a commercial lodging establishment (bed and breakfast home or inn, hotel or motel).

ROWHOUSE. See TOWNHOUSE.

RPZ. The runway protection zone at the ends of the runways for the municipal airports.

RUNWAY. The paved surface of an airport designated for the landing and taking off of aircraft.

RUSTICATION. Rough masonry materials often located at the base of a classical building; the rough stones being expressive of strength and therefore, logically, required at the base.

SCHOOL. For the purposes of Chapter 5, Article 2, Sexually Oriented Businesses, SCHOOL includes any of the following:

(1) Public and private, primary and secondary educational facilities providing education up through and including the twelfth grade level; and

(2) Licensed day care centers, meaning a facility licensed by the State of Texas or by the City of Fort Worth that provides care, training, education, custody, treatment or supervision for more than six children under 14 years of age, and for less than 24 hours per day.

SCREENING FENCE. A solid fence or wall constructed so that no person can see the area surrounded by the fence. (See § 5.304.)

SECRETARY OF THE INTERIOR'S STANDARDS FOR THE TREATMENT OF HISTORIC PROPERTIES. The standards established by the Secretary of the Interior and set out in 36 C.F.R. Part 68, as amended or may be amended in the future.

SECRETARY OF THE INTERIOR'S PROFESSIONAL QUALIFICATIONS STANDARDS. The standards established by the Secretary of the Interior and set out in 36 C.F.R. Part 61, Appendix A, as amended or may be amended in the future, for advising federal, state, and local agencies on professional qualifications standards for the identification, evaluation, documentation, registration, treatment, and interpretation of historic and archeological resources.

SERVICE BUILDING. For the purposes of Chapter 4, § 4.202, manufactured home ("MH") district, a structure housing toilet, lavatory and such other facilities as may be required.

SETTING. For purposes of the Historic Preservation Ordinance, setting of a heritage structure, site, or area is defined as the immediate and extended environment that is part of, or contributes to, its significance and distinctive character. Beyond the physical and visual aspects, the setting includes interaction with the natural environment and past or present social or spiritual practices, customs, traditional knowledge, use or activities and other forms of intangible cultural heritage aspects that created and formed the space as well as the current and dynamic cultural, social, and economic context.

SEXUALLY ORIENTED BUSINESS.

(1) Any commercial venture whose operations:

a. Include the providing, featuring or offering of employees or entertainment personnel who appear on the premises while in a state of nudity or simulated nudity and provide live performances or entertainment for customers; or

b. As a "principal business operation" (35% or more) as defined herein, provide, feature or offer non-live, sexually-explicit entertainment, materials, or items for sale or rental to customers; or provide or offer a service or exhibition of materials or items which are intended to provide sexual stimulation or sexual gratification to its

customers, said materials or items being distinguished by or characterized by an emphasis on subject matter depicting, describing or relating to “specified sexual activities” and/or “specified anatomical areas;” and

c. Include, but are not limited to, any form of sexually oriented business, adult arcade, adult bath, adult bookstore, adult video store, adult cabaret, adult entertainment cabaret, adult motel, adult motion picture theater, adult theater, nude modeling business, massage parlor, nude modeling studio, adult out-call establishment, escort agencies, sexually oriented encounter center or other business establishment conducting sexually oriented activity as defined or regulated herein.

(2) The term SEXUALLY ORIENTED BUSINESS shall not be construed to regulate:

a. An otherwise lawfully operating retail business which does not offer or feature sexually explicit merchandise, material or items for sale or rental to customers as a “principal business operation” (35% or more) and does not offer or feature any form of live sexually oriented entertainment;

b. Any clothing business that offers wearing apparel for sale to customers but does not exhibit merchandise on live models;

c. A bar, nightclub or lounge or other non-sexually oriented business that occasionally promotes a swimsuit or similar contest in which the contestants do not appear “nude” or in “a state of nudity;”

d. Any medical practice operated by or employing licensed psychologists, physicians, physical therapists, registered nurses, chiropractors or athletic trainers engaged in practicing the healing arts; or

e. Any educational courses conducted at a proprietary school licensed by the State of Texas, or conducted by a private college or university which operates educational programs in which credits are transferable to a junior college, college or university licensed by the State of Texas; and where in order to participate in a class a student must enroll at least three days in advance of the class and where no more than one nude model appears before the class at any one time.

SEXUALLY ORIENTED ENCOUNTER CENTER. A commercial enterprise that, for any form of consideration or prize, offers physical activities, contact, wrestling or tumbling between male and female persons, or between persons of the same sex, when one or more of the persons is in a “state of nudity” or “simulated nudity” and the activity is intended to provide sexual stimulation or sexual gratification to its customers.

SHELTER. A facility providing temporary housing primarily to indigent, needy, homeless or transient persons and which may also provide ancillary services such as counseling and/or vocational training, bathing, dining and food preparation.

SHOOTING GALLERY. An area used for target practice by use of a firearm other than one used for or with live ammunition and for the sole purpose of amusement, games of chance or other arcade type activity.

SHOOTING RANGE. An area used for the discharge of firearms using live ammunition, including target, silhouette, skeet, trap, black powder, self-defense or similar recreational and/or professional shooting.

SHORT TERM HOME RENTAL. The rental for compensation of dwellings or accessory dwelling units for the purpose of overnight lodging for a period of not less than one night and not more than 30 consecutive days other than ongoing month-to-month tenancy granted to the same renter for the same unit as their primary residence. This is not applicable to hotels, motels, and bed and breakfasts homes or bed and breakfast inns.

SIDE STREET. The frontage that is not a primary street, as defined during site plan review by the development services director or designee.

SIGN.

(1) Any surface, fabric, display or visual medium, including the component parts, which bears letters or sculptured matter, including logos, used or intended to be used to convey information or to attract attention to

the subject matter of such sign. Graphics which carry no advertising shall not be construed to be a sign, except where such graphics pictorially display products or business that convey an advertising intent. The term SIGN includes the sign structure.

(2) For the purpose of Chapter 5 Article 2, Sexually Oriented Businesses, SIGN means any on-premises display design, pictorial or other representation that is constructed, placed, attached, painted, erected, fastened or manufactured in any manner whatsoever so that it is visible from the outside of a sexually oriented business and used to seed the attraction of the public to any goods, services or merchandise available at the sexually oriented business. The term SIGN also includes any representation painted on or otherwise affixed to any exterior portion of a sexually oriented business establishment or to any part of the tract upon which the establishment is situated.

SIGN, ANIMATED. A sign employing visible moving parts or the changing of colors.

SIGN, ATTACHED. A sign attached to, applied on or supported by, any part of a building (such as a wall, window, canopy, awning, arcade or marquee).

SIGN, CHANGEABLE COPY. An on-premises sign that is characterized by changeable copy, letters, symbols or numerals that are not permanently affixed to the structure, framing or background allowing the letters, characters or graphics to be modified from time to time manually or by electronic or mechanical devices, such as but not limited to, a bulletin board, electronic message board or projected image sign. However, an athletic scoreboard or sign located on the athletic field sign of a fence shall not be an electronic CHANGEABLE COPY SIGN. CHANGEABLE COPY SIGNS may not be used to display commercial messages relating to products or services that are not offered on the premises.

SIGN, DETACHED. A sign which is supported by structures, supports or foundations in or upon the ground and independent of support from any building.

SIGN, FLASHING. A sign or part of a sign that contains units which cause such sign or part thereof to appear to flash or blink. FLASHING SIGNS shall not include running light signs, twinkle signs or those signs having only one on-off cycle in any period exceeding six seconds.

SIGN, ILLEGAL. Any sign erected, constructed, enlarged or altered which does not conform to the provisions of the zoning ordinance, the sign code (Chapter 29 of the city code) or other applicable ordinances in effect at the time of erection, construction, enlargement or alteration.

SIGN, ILLUMINATED. Any sign illuminated in any manner by an artificial light source.

SIGN, INFLATABLE OR BALLOON. Air or gas filled balloons or similar devices used to advertise or define a fixed location.

SIGN, NONCONFORMING. A sign that was lawfully installed in compliance with all city ordinances applicable at the time of installation, but that does not comply with the current provisions of this zoning ordinance, the sign code (Chapter 29 of the city code) or other applicable ordinances.

SIGN, OFF-PREMISES. A sign which is a primary use and advertises businesses, commodities, activities, services or persons which are not usually available or present upon the premises upon which such sign is located, or which directs persons to any location not on the premises. Any sign with more than 10% of the sign devoted to such use shall be deemed to be an OFF-PREMISES SIGN.

SIGN, ON-PREMISES. A sign which advertises the business name, owner and/or commodities, activities or services offered on the premises where such sign is located and where at least 90% of the sign is devoted to the advertisement of such business name, owner, commodities, activities or services.

SIGN, PORTABLE. A sign designed, constructed or used to facilitate the placing or moving of same from one location to another.

SIGN, PUBLIC INTEREST. A sign conveying a message of interest to the public in general, including:

(1) Time and temperature signs;

(2) Signs and notices containing identification of nonprofit service clubs, religious organizations or charitable associations and containing information relating to meetings, locations, fund-raising or other nonprofit activities; and

(3) Signs relaying news messages and financial and stock market messages.

SIGN, PROJECTED IMAGE. A sign which involves a fixed and non-moving image projected on the face of a wall or structure from a distant electronic device, such that the image does not originate from the plane of the wall or structure.

SIGN, REVOLVING. A sign which revolves on, around or about a structural support. A structural support can be a pole, building or other type of support. Revolving parts within or upon a display surface shall not be construed as a REVOLVING SIGN.

SIGN, ROOF. Any sign erected, constructed or maintained on the roof of a building.

SIGN, RUNNING LIGHT OR TWINKLE. A sign with low wattage outline lighting which appears to flash. Any sign employing more than four complete on-off cycles per second shall be considered a RUNNING LIGHT OR TWINKLE SIGN.

SIGN STRUCTURE. Any structure which supports or is intended to support any sign.

SIGN, TEMPORARY. Any sign, other than a window sign, intended to be displayed for a limited period of time only, including by way of example but not of limitation, any sign, banner, pennant, valance, inflatable or balloon or advertising display constructed of cloth, canvas, light fabric, wallboard or other light materials, with or without frames or wheels.

SIGN, WINDOW. Any commercial copy located on the internal and/or external surface of a window or a glass door, or is located less than ten feet from the window or a glass door of any establishment for the purpose of being visible to and read from the outside of the building.

SIGNIFICANT OR LARGE TREE. A tree 27 inches in diameter (84.82 inches in circumference) for the entire city or 18 inches in diameter (56.55 inches in circumference) for Post Oaks and Blackjack Oaks east of Interstate Highway 35 West.

SINGLE HOUSEKEEPING UNIT. Individuals occupying a dwelling unit that have established ties and familiarity with each other; share a lease agreement, have consent of the owner to reside on the property, or own the property; jointly use common areas and interact with each other; and share the household expenses, such as rent or ownership costs, utilities, and other household and maintenance costs, or share responsibility for household activities. If the unit is rented, all residents over the age of 18 have chosen to jointly occupy the entire premises of the dwelling unit, under a single written lease with joint use and responsibility for the premises.

SITE. For purposes of the Historic Preservation Ordinance, a SITE is the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possess historic, cultural, or archeological value regardless of the value of any existing structure.

SITE, DEVELOPED. For the purpose of the landscape provisions in Chapter 6, Article 3, a premises that contains existing structures or buildings for which a building permit was required.

SITE PLAN. A plan showing the location all the protected trees by size and species that are six inches or greater on the site, the location of all easements, the location of all proposed buildings, a grading plan, if applicable; the protected trees desired to be removed, the protected trees that shall remain on the site, and an accompanying document indicating the reason for the proposed removal of any protected tree, and if applicable, a description

on how the existing healthy protected trees proposed to be retained will be protected from damage from construction.

SITE, UNDEVELOPED. For the purposes of the landscape provisions in Chapter 6, Article 3, a premises that does not contain a structure or building for which a building permit was required.

SMALL BOX DISCOUNT STORE. A retail store with a floor area less than 10,000 square feet that offers for sale an assortment of physical goods, products or merchandise directly to the consumer, including food or beverages for off-premise consumption, household products, personal grooming and health products and other consumer good. Small box discount stores do not include retail stores that: contain a prescription pharmacy; sell gasoline or diesel fuel; primarily sell specialty food items (e.g. meat, seafood, cheese, or oils and vinegars); dedicate at least 15% of floor area or shelf space to fresh foods and vegetables.

SPATIALLY DISCRETE. For purposes of the Historic Preservation Ordinance, SPATIALLY DISCRETE means two or more historic properties separated by non-significant areas where the space between the historic properties is not related to the significance of a historic district and visual continuity is not a factor in the significance.

SPECIFIED ANATOMICAL AREAS. The following portions of the human body:

- (1) Genitals, whether or not in a state of sexual arousal;
- (2) Pubic region or pubic hair;
- (3) Buttock(s);
- (4) The portions of the female breast(s) beginning from a point immediately above the top of the areola and continuing downward to the lowest portion of the breast(s); or
- (5) Any combination of the above.

SPECIFIED SEXUAL ACTIVITIES. Includes one or more of the following:

- (1) The fondling, massaging or other erotic touching or stimulation of “specified anatomical areas” or of an erogenous zone;
- (2) Normal or perverted sexual activity, actual or simulated, including intercourse, oral copulation or sodomy;
- (3) Masturbation, actual or simulated; or
- (4) Excretory functions as part of or in conjunction with any of the activities above.

STABILIZATION. For the purpose of the Historic Preservation Ordinance, the act or process of applying measures designed to re-establish a weather resistant enclosure and the structural stability of an unsafe or deteriorated structure or property while maintaining the essential form as it presently exists.

STABLE, COMMERCIAL. A structure in which livestock used for pleasure riding or driving are housed or kept for hire, including a riding track.

STABLE, PRIVATE. Space in a principal building or an accessory building on the same lot used for stabling of livestock owned by the occupants, exclusively as an accessory use.

STATE HISTORIC PRESERVATION OFFICE (SHPO). The state office responsible for administering federal historic preservation programs as defined in the National Historic Preservation Act of 1966, as amended and or may be amended in the future. The Executive Director of the Texas Historical Commission serves as the SHPO for the State of Texas.

STEALTH TELECOMMUNICATION TOWER. A facility that is designed in such a way that the facility is not readily recognizable as telecommunication tower or telecommunication equipment. STEALTH FACILITIES may include, but

are not limited to, totally enclosed antennas; wireless facilities that replicate, duplicate or simulate the construction of common structures such as flagpoles, monopoles with totally enclosed antennas or light poles and that serve as a function of the use(s) of the site; and camouflaged wireless facilities that are constructed to blend into the surrounding environment.

STOOP. A small raised platform that serves as an entrance to a building.

STORE, GENERAL MERCHANDISE. A retail facility offering a variety of merchandise, including, but not limited to, the following: food, beverages, clothing, automotive supplies, personal hygiene items, toys, sports equipment, books, electronic equipment and household items. Does not include retail facilities specifically listed in the retail sales and service section of the nonresidential use table in § 4.803.

STORE, HOME IMPROVEMENT. A retail facility the primary focus of which is to offer a variety of merchandise for home improvement, including, but not limited to, building materials and supplies, appliances, plants, gardening supplies and home furnishings. Does not include retail facilities specifically listed in the retail sales and service section of the nonresidential use table in § 4.803.

STORE, LARGE RETAIL. A store for the retail sale of merchandise with a footprint exceeding 50,000 square feet, including without limitation a general merchandise store, home improvement store, antique shop, appliance sales or supply store, new or used clothing store, new or used furniture store, greenhouse or plant nursery, grocery store, pawn shop or facility for general retail sales. A LARGE RETAIL STORE that sells to members only or that also offers merchandise at wholesale is not excluded from this definition.

STORY. That part of a building included between the surface of one floor and the surface of the floor next above, or if there be no floor above, that part of the building which is above the surface of the highest floor thereof. A TOP STORY ATTIC is a half story when the main line of the eaves is not above the middle of the interior height of said story. The FIRST STORY is the highest story having its interior floor surface not more than four feet above the curb level, or the average elevation of the finished grade along the front of the building were it set back from the street.

STREET. A public or private thoroughfare which affords principal means of access to adjacent property.

STREET, LIMITED LOCAL. As defined in the City of Fort Worth plan commission rules and regulations, § 403(b), Street Design: Limited Local Streets, a street not more than 600 feet in length ending in a cul-de-sac and serving no more than 25 dwelling units; a loop-type street not more than 1,600 feet in length having at least one 90-degree bend and serving no more than 80 dwelling units; or a street not more than 800 feet in length serving no more than 45 dwelling units.

STRUCTURE. Anything constructed or erected with a foundation for habitable or nonhabitable purposes, which requires location on the ground, or attached to something having a location on the ground. For signage, this includes but is not limited to advertising signs, billboards and poster panels, but exclusive of customary fences or boundary or retaining walls, sidewalks and curbs.

STRUCTURE FOR THE PURPOSES OF § 4.405 STRUCTURES. An object permanently or temporarily constructed or installed by humans, including, but without limitation, buildings as measured at its highest peak, towers, spires, architectural features, smokestacks and overhead transmission lines.

STRUCTURAL ALTERATIONS. Any change in the supporting members of a building, such as bearing walls, columns, beams or girders, or any substantial change in the roof or in exterior walls.

STRUCTURAL SOIL. An artificially engineered medium that meets or exceeds road bearing-load requirements for structurally sound pavement design and installation while supporting tree growth, remaining root penetrable and encouraging deep root growth away from the pavement surface. Examples include C.U. Structural Soil, Permatill and Utelite E-Soil.

SUBSTANTIAL TREATMENT. For purposes of the Historic Preservation Ordinance, SUBSTANTIAL TREATMENT means treatment at a cost that equals or exceeds the greater of (i) \$3,000.00 or (ii) 20% of the appraised value of a structure as of the year prior the year in which a historic site tax exemption application is deemed complete as determined by the HPO.

TELECOMMUNICATION TOWER. A facility, including self-supporting lattice towers, guy towers or monopole towers, but not including stealth telecommunication towers, designed to support one or more antennas and to contain ancillary facilities designed and used for the purpose of transmitting, receiving and relaying voice, data and other similar signals to or from various wireless communication devices. For purposes of this definition, amateur radio transmission facilities not used for commercial purposes and facilities used exclusively for the transmission of television and radio signals are not TELECOMMUNICATION TOWERS.

TEMPORARY GUEST. A nonpaying guest of the occupants of the primary residence who does not utilize an accessory dwelling unit or primary residence as an address for any purposes and whose stay does not exceed more than 14 days in a consecutive 30-day period. A roomer, boarder or lodger shall not be considered a TEMPORARY GUEST.

TEMPORARY IRRIGATION. An irrigation system that is used to establish native and adaptive plant species and is removed after one year of establishment period.

TERMINAL, MOTOR FREIGHT. The use of property or buildings for the temporary parking of motor freight vehicles or trucks of common carriers, during loading and unloading and between trips, including necessary warehouse space for storage of transitory freight.

TOPPING. According to arboricultural industry standards, topping refers to inappropriate pruning techniques to reduce tree size that may result in unnecessary risk, tree stress, or decay.

TOWNHOUSE or ROWHOUSE. A one-family dwelling constructed as part of a series of dwellings, all of which are either attached to the adjacent dwelling or dwellings by party walls or are located immediately adjacent thereto with no visible separation between walls or roof, and each dwelling being located on a separately platted lot. A townhome in the urban residential, low intensity mixed-use, low intensity mixed-use greenfield, high intensity mixed-use and high intensity mixed-use greenfield districts shall be defined as a development containing three or more attached dwelling units consolidated into a single structure.

TRANSFER OF OWNERSHIP OR CONTROL. For the purpose of Chapter 5, Article 2, Sexually Oriented Businesses, TRANSFER OF OWNERSHIP OR CONTROL of a sexually oriented business means and includes any of the following:

- (1) The sale, lease or sublease of the business;
- (2) The transfer of securities that constitute a controlling interest in the business, whether by sale, exchange, or similar means; or
- (3) The establishment of a trust, gift or other similar legal device that transfers the ownership or control of the business, except for transfer by bequest or other operation of law upon the death of the person possession the ownership or control.

TRANSIENT OR SHORT TERM RESIDENT. Individuals occupying a dwelling unit, including rental of a home or room, for a period of less than 30 days. The definition also includes the usage of property for a daily or weekly rental as a commercial business.

TRANSMISSION TOWER. A tower and ancillary support equipment providing transmissions via radio, TV infrared or other similar means of signal transmission between towers and receivers.

TREATMENT. For purposes of the Historic Site Tax Exemption, TREATMENT means rehabilitation, preservation, reconstruction, restoration or any combination of those activities as they are defined in this zoning ordinance. Treatment also includes "treated".

TREE. Any object of natural growth.

TREE REMOVAL. The cutting, destroying, removing, moving, poisoning, banding, marking or effectively destroying through damaging, any tree six inches or greater in diameter, regardless of species, situated on property regulated by the zoning ordinance without first obtaining an urban forestry plan/permit from the city forester.

TREE REMOVAL PERMIT. A permit required for the removal of a single tree as required under § 6.302.

TUTOR/PRIVATE EDUCATION CLASSES. For the purposes of Chapter 5, Article 1, Home Occupations, TUTOR/PRIVATE EDUCATION CLASSES shall mean a person or persons employed to provide, in a dwelling unit, additional, specialized or remedial instruction to another, which supplements the person's core education.

UNIFIED RESIDENTIAL DEVELOPMENT. A grouping of residential structures developed in accordance with the unified residential development provisions of § 6.506 on a tract of land under single ownership or unified control, such as a homeowner's association, as opposed to development of one dwelling on one lot of record.

URBAN AGRICULTURE/URBAN GARDEN/URBAN FARM. A public or private, for profit or nonprofit agricultural operation consisting of the planting and harvesting of crops, the raising of fowl, and beekeeping. This does not include the raising of large animals for production except as allowed in the Land Use Charts, per § 5.146 Supplemental Standards.

URBAN FORESTRY PERMIT. A permit required under § 6.302 for the removal of more than one tree or the construction of new structures on properties greater than one acre for where a building permit is required.

URBAN FORESTRY PLAN. A plan showing the location of existing canopy coverage and any trees that are classified as large or significant as per § 6.302(g)(3). on the site, the location of all easements, the location of all proposed buildings, a grading plan, if applicable; the trees desired to be removed, the trees that shall remain on the site, and an accompanying document indicating the reason for the proposed removal of any tree, and if applicable, a description on how the existing healthy trees proposed to be retained will be protected from damage from construction.

URBAN MANOR HOUSE. A building with two to five attached dwelling units consolidated in a single structure. A manor house is located on a single lot and must contain common walls. Dwelling units within a building may be situated either wholly or partially over or under other dwelling units.

VENDOR, CERTIFICATE OF OCCUPANCY. For the purposes of § 5.406, a VENDOR CERTIFICATE OF OCCUPANCY shall include a determination of the location of the vendor for verification of the proper zoning, verification that the safety code requirements are met and submission of a letter from the property owner, all applicable code compliance department permits and sales tax registration.

VENDOR, DOOR-TO-DOOR. A person who travels by foot or vehicle from door-to-door, house-to-house, building-to-building or place-to-place, within the city, for the purpose of offering for sale, or soliciting orders for future delivery, of food, goods, services or merchandise.

VENDOR, FOOD. A food vendor that sells food products, either potentially hazardous or non-potentially hazardous, from an informal fixed location out of a vehicle that is pulled or is portable under its own power.

VENDOR, MERCHANDISE. A merchandise vendor that sells merchandise products from an informal fixed location.

VENDOR, TRANSIENT FOOD. A food vendor that sells food products, from a pushcart or out of a mobile vending unit that is pulled or is portable under its own power, for sale to the general public from an informal location, other than a public street or thoroughfare, for a period of not more than 60 consecutive minutes at any one location.

WALKWAY (OR BRIDGE). A passage that provides access from the land to a boat dock, marina or other floating facility.

WAREHOUSE. A facility greater than 500 square feet in floor area for the inside storage of commodities.

WATER TABLE (ARCHITECTURAL). A projecting course of molded brick between the upper and ground floor. The wall above the water table steps back several inches.

WATER USE AND ACCESS EASEMENT. An easement granted by the City of Fort Worth enclosed on one side by the lakefront property line, on a second side by the waters of Lake Worth, and on the third and fourth side by two lines, each beginning at opposite ends of the lakefront property line and each being a projection of the side lot lines of each lot as shown on the plat of record or survey for the property.

WET SWALE. A system that consists of an open conveyance channel which has been excavated to the water table or to poorly drained soils.

YARD. An open space other than a courtyard, on the same lot with a building, unoccupied and unobstructed from the ground upward, except as otherwise provided herein. In measuring to determine the width of a side yard, the depth of the front yard or the depth of a rear yard, the least horizontal distance between the lot line and the main building shall be used.

YARD, FRONT. A yard across the full width of a lot extending from the street to the largest required setback of either the required, established, platted building line or projected front yard. Setbacks shall be measured from the front property line. Each street frontage shall be considered a front yard except that in one- and two-family districts, the yards with street frontage may be considered a side or rear yard if there are no other front yards projecting along that same block face. Determination of what type of yard it should be will be dependent upon the setback that is necessary to maintain uniformity along the block face.

YARD, PROJECTED FRONT. See § 6.101(f).

YARD, REAR. A yard extending across the full width of the lot and measured between the rear line of the lot and rear line of the main building, except that area included in the side yard as defined below.

YARD, SIDE. A yard between the building and the side line of the lot and extending from the front yard to the required minimum rear yard.

(Ord. 14331, § 1, passed 9-5-2000; Ord. 14337, § 8, passed 9-12-2000; Ord. 14556, § 1, passed 3-20- 2001; Ord. 14713, § 4, passed 7-17-2001; Ord. 14780, § 1, passed 9-18-2001; Ord. 14872, § 1, passed 11-27-2001; Ord. 15112, § 4, passed 5-21- 2002; Ord. 15166, § 3, passed 7-23-2002; Ord. 15249, § 1, passed 9-17-2002; Ord. 15283, § 1, passed 10-8-2002; Ord. 15331, § 5, passed 11-12- 2002; Ord. 15405, § 1, passed 1-14-2003; Ord. 15406, § 1, passed 1-14-2003; Ord. 15830, § 1, passed 1-13-2004; Ord. 15839, § 5, passed 1-20- 2004; Ord. 15848, § 2, passed 1-27- 2004; Ord. 16118, § 2, passed 9-14-2004; Ord. 16119, § 3, passed 9-14-2004; Ord. 16183, § 2, passed 10-19- 2004; Ord. 16330, § 13, passed 3-8-2005; Ord. 16270, § 2, passed 1-18-2005; Ord. 17093, § 7, passed 8-8-2006; Ord. 17228, § 2, passed 10-3- 2006; Ord. 17276, § 1, passed 11-7-2006; Ord. 17513, § 1, passed 4-17-2007; Ord. 17514, § 2, passed 4-17-2007; Ord. 17522, § 5, passed 4-24- 2007; Ord. 18009, § 4, passed 3-4-2008; Ord. 18208-07- 2008A, § 3, passed 7-29-2008; Ord. 18434-1-2008, § 2, passed 1-6-2009, eff. 1-14- 2009; Ord. 18504-03-2009, § 9, passed 3-3-2009, eff. 3-11-2009; Ord. 18615-05-2009, §§ 3, 4, passed 5-12-2009; Ord. 18745-08-2009, § 6, passed 8-4-2009; Ord. 18746-08-2009, § 3, passed 8-4- 2009; Ord. 18823-09-2009, §§ 3, 4, passed 9-15- 2009; Ord. 18902- 11-2009, § 3, passed 11-3-2009; Ord. 19013- 01-2010, § 4, passed 1-26-2010; Ord. 19026-02- 2010, § 8, passed 2- 2-2010; Ord. 19227-07-2010, § 5, passed 7-13-2010; Ord. 19428-11-2010, § 2, passed 11-9-2010; Ord. 19515-01- 2011, § 2, passed 1-4-2011; Ord. 19587-03-2011, § 5, passed 3-8- 2011; Ord. 20158-04-2012, § 3, passed 4-3-2012; Ord. 20454-10-2012, § 8, passed 10-9-2012; Ord. 20510-12-2012, § 4, passed 12-4-2012, eff. 12-11- 2012; Ord. 20666-03-2013, § 4, passed 3-19-2013, eff. 4-9-2013; Ord. 20898-09-2013, § 2, passed 9- 10-2013, eff. 9-25-2013; Ord. 20901-09-2013, § 2, passed 9-10-2013; eff. 9-25-2013; Ord. 21032-11- 2013, § 2, passed 11-12-2013; Ord.

21499-10-2014, § 2, passed 10-14-2014, eff. 10-23-2014; Ord. 21715-04-2015; § 1, passed 4-7-2015, eff. 4-25-2015; Ord. 21945-10-2015, § 1, passed 10-13-2015, eff. 10-17-2015; Ord. 22154-04-2016, § 6, passed 4-5-2016, eff. 4-21-2016; Ord. 22335-08-2016, § 7, passed 8-2-2016; Ord. 22337-08-2016, § 3, passed 8-2-2016; Ord. 22703-05-2017, § 6 passed 5-2-2017; Ord. 22810-08-2017, § 5, passed 8-1-2017, eff. 9-7-2017; Ord. 23110-02-2018, § 1, passed 2-6-2018; Ord. 23166-04-2018, §§ 2, 4, passed 4-3-2018; Ord. 23971-12-2019, § 2, passed 12-3-2019, eff. 12-11-2019; Ord. 24030-02-2020, § 22, passed 2-4-2020; Ord. 25514-05-2022, § 1, passed 5-10-2022, eff. 5-18-2022; Ord. 25955-01-2023, § 1, passed 1-10-2023, eff. 1-20-2023)

ARTICLE 4-4.409 CROSS TIMBERS OVERLAY DISTRICT

ARTICLE 4: OVERLAY DISTRICTS

§ 4.409 CROSS TIMBERS OVERLAY DISTRICT.

(a) *Purpose and intent.*

- (1) The City of Fort Worth strives to preserve its critical natural areas such as the Cross Timbers ecological regions. These areas, located on the east and the west sides of Fort Worth, contain large swaths of undisturbed old growth slow-growing trees. The city council recognizes the need to protect this valuable asset and limit development in these areas through the establishment of the Cross Timbers Overlay District. The strategies outlined in this section align with the Fort Worth Open Space Program for land acquisition and conservation.
- (2) The Cross Timbers Overlay District is intended to:
 - a. Raise awareness about the importance of the unique Cross Timbers ecosystem while ensuring its preservation and enhancement;
 - b. Encourage preservation of specific species in the Eastern Cross Timbers and Western Cross Timbers ecoregions; and
 - c. Provide an avenue for off-site mitigation originating from projects across the city to contribute to the maintenance and acquisition of large swaths of land in the Cross Timbers ecoregion

(b) *Applicability.*

- (1) The provisions of this article shall apply to any land, tract, parcel, or lot which is within the boundaries of the Cross Timbers Overlay District.
- (2) The following are “tree species of concern” for protection and preservation in the Cross Timbers ecoregion, particularly in old-growth scenarios:
 - a. Post oak (*Quercus stellata*)
 - b. Blackjack oak (*Quercus marilandica*)
 - c. Black hickory (*Carya texana*)
 - d. Plateau live oak (*Quercus fusiformis*)
 - e. Eastern redcedar (*Juniperus virginiana*)
 - f. Sumac (*Rhus spp.*)

(c) *Administration.*

- (1) The Planning Director is the final authority for the administration of this section unless otherwise specified herein. The City Forester assists in administering subsections (f) and (g).

(d) *Overlay district boundaries.*

- (1) The Cross Timbers Overlay District boundaries are aligned with the Cross Timbers ecoregion boundaries defined by the United States Environmental Protection Agency.

(e) *Zoning classification.*

- (1) *Cross Timbers Overlay District.* The Cross Timbers Overlay District is designed as an overlay to the base zoning district. Property located within this zoning overlay must also be designated as being within one of the base zoning districts.
- (2) *Zoning designation.* The zoning designation of the property located within the Cross Timbers Overlay District shall consist of the base zoning symbol and the overlay symbol as a suffix. For example, if a parcel is zoned "A-5" and is also located in the Cross Timbers Overlay District, the zoning of the parcel would be "A-5/CT."

(f) *Cross Timbers Urban Forest Mitigation Banks.*

(1) City-owned mitigation bank.

- a. The City of Fort Worth holds a mitigation bank within the Cross Timbers ecoregion to allow projects across Fort Worth to purchase mitigation bank credits in a fund that will continue to preserve and protect the Cross Timbers ecoregion.

(2) Privately-owned mitigation banks.

- a. Any person who owns at least one (1) acre of land within the boundary of the Cross Timbers Overlay District may apply to the Planning Division to create an urban forest mitigation bank from which applicants may buy credits.
- b. A complete application shall be submitted to the Planning Division with the following contents included:
 - i. A tree survey and arborist report completed by an ISA Certified Arborist indicating that the subject property contains the “tree species of concern” listed in (e)(2) above;
 - ii. Draft easements, covenants, or deed restrictions for the land included in the urban forest mitigation bank;
 - iii. The number of urban forest mitigation bank credits available for sale and the designation of those credits as either:
 - 1. If permitted by state law, existing forest credits, where 1 acre of urban forest mitigation bank credit equals 2 acres of existing forest; or
 - 2. Planted forest credits, where 1 acre of urban forest mitigation bank credit equals 1 acre of planted forest.
- c. Purchasing and selling mitigation credits.
 - i. The Planning Director must approve an urban forest mitigation bank plan prior to sale of credits.
 - ii. Statement of acknowledgement signed by the property owner stating that the urban forest mitigation bank credits are valid and available for purchase.
 - iii. Statement of acknowledgement signed by the purchaser of the credits has an approved urban forestry plan filed with the Planning Division, and that the project is located within the boundaries of Fort Worth.
 - iv. The urban forest mitigation bank credits acquired must be equal to the purchaser’s off-site mitigation requirements under the approved urban forestry plan.

(g) *Enforcement and penalties.*

- (1) The “tree species of concern” listed in subsection (b)(2) of this code are regulated by § 6.302 Urban Forestry.
- (2) Fees, penalties, and fines outlined in Chapter 2-322 Penalties and Mitigation Fees of Fort Worth, TX Code of Ordinances.
 - a. The Director may incur fines at three (3) times the rate for any violation meeting the following criteria:
 - i. The subject tree is a “tree species of concern” as defined in subsection (b)(2) of this code;
 - ii. The subject tree is a significant tree as defined in § 9.101; and

The subject tree is located on property within the Cross Timbers Overlay District boundaries.

DRAFT

**URBAN FOREST
MASTER PLAN
TECHNICAL REPORT
OCTOBER 2023**

