CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Austin's Urban Forest Plan

A Master Plan for Public Property

The City of Austin

Urban Forestry Board

2013

Our Vision…
Austin's urban forest is a healthy and sustainable mix of trees, vegetation, and other components that comprise a contiguous and thriving ecosystem valued, protected, and cared for by the City and all of its citizens as an essential environmental, economic, and community asset.

Comment [HL1]: ADDED PER ENVIRONMENTAL BOARD REQUEST. ADDITIONAL USE OF THE WORD PUBLIC TO THE PLAN HIGHLIGHTED IN YELLOW.

Comment [HL2]: RECOMMENDATION FROM TEXAS FOREST SERVICE STAFF – ADD TAGLINE 'A MASTER PLAN FOR PUBLIC PROPERTY'.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Acknowledgements

We would like to thank the citizens of Austin, Texas, who contributed 1,592 responses and provided helpful feedback to shape and guide this plan.

URBAN FORESTRY BOARD

Patrick Brewer	Peggy Maceo
Chris Kite	Len Newsom
Nicholas Classen	Dan VanTreeck
Ryan Fleming	

CITY OF AUSTIN STAFF

Angela Hanson	Walter Passmore
Leah Haynie	Alan Halter
Emily King	Keith O'Herrin

OTHER CONTRIBUTING CITY OF AUSTIN STAFF

Cheyenne Krause	Michael Embesi
Keith Mars	Jessica Wilson
Rob Grotty	Humberto Rey
Tonya Swartzendruber	Jon Meade
Josh Portie	Carol Haywood
Lucia Athens	Mitzi Cotton
Mario Porras	Mark Cole
John Robinson	Jim Linardos
Mike Personett	Ray Henning
David Lambert	Andy Halm
Mark Baker	Michael Bogard
Christopher Meyer	Pamela Abee-Taulli
Kristin Carlton	Pharr Andrews
Denise Delaney	Margaret Valenti
Carl Wren	Kathryn Murray
Matt Hollon	Justice Jones
Bonny Holmes	Larry Schooler

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Table of Contents
(Will include page numbers when document is finalized.)

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

List of Figures

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

EXECUTIVE SUMMARY

The goal of Austin's Urban Forest Plan is to establish a broad-scoped, long-range vision for Austin's public urban forest. It will provide a framework for City departments to use as a guide for managing Austin's urban forest resources in the form of Departmental Operational Plans, and will include a roadmap for implementation to reach that comprehensive vision. The end result will be a superior plan that identifies positive aspects, responsibilities, and innovations, but serves also as a model to the abutting neighbor, regional property owner, and the global community.

The creation and adoption of Austin's Urban Forest Plan seeks to guide overall citywide urban forest management such that policies and department operational plans conform to community visions. Ultimately, community visions inform local urban forestry policies that are embodied in our existing Imagine Austin comprehensive plan, City Code, and other policy documents.

Comment [HL3]: REQUEST FROM NICK TO REMOVE –
"but serves also as a model to the abutting neighbor, regional property owner, and the global community." This seems to be self-serving and doesn't add value to the Summary; it is speculation.

STAFF RESPONSE: STAFF THINKS THIS SHOULD STAY IN THE PLAN. THE HOPE IS THAT THE PLAN WILL ACT AS A CATELIST AND MODEL FOR NEIGHBORING COMMUNITIES AND PRIVATE PROPERTY OWNERS.

Comment [HL4]: SUGGESTION FROM ENVIRONMENTAL BOARD DR. MAXWELL TO MOVE THIS TO BEGINNING OF DOCUMENT FROM CHPT 2. STATE OF THE URBAN FOREST - RESOURCE MANAGEMENT SECTION.

STAFF COMMENT – DONE.

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Community Voices

The Urban Forestry Board and City of Austin staff engaged the public at key intervals to prioritize the elements of the Plan. One method was through Leaf the Tree pop-up activities designed to capture a sample of public opinion concerning Austin's urban forest. Gathered on these two pages is a sample of the comments received from the community.

For a full list of public comments, including all email and SpeakUp Forum discussions, please visit austinurbanforestry.org.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Introduction

This chapter introduces Austin's Urban Forest Plan by providing information on why we should care about our trees and vegetation and the benefits derived from them. In addition, this chapter lays out Austin's vision, goals, and guiding principles.

WHAT IS AN URBAN FOREST?

SCOPE OF THIS PLAN

BENEFITS OF THE URBAN FOREST

THE NEED FOR A PLAN

GOALS OF THE PLAN

PROCESS

A VISION FOR AUSTIN'S URBAN FOREST

GUIDING PRINCIPLES

COMMUNITY VOICES

Austin is an attractive and vibrant combination of its unique cultural and physical landscape. As the city has grown and changed, Austinites have voiced their love and concern for the impact of that growth and a changing climate on trees and vegetation. As

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

the city faces an unknown future, broad comprehensive planning becomes of paramount importance to support the health and long term-vitality of our <mark>public</mark> green infrastructure resource.

WHAT IS AN URBAN FOREST?

At first glance, the term "urban forest" seems like an oxymoron. A forest in a city...how could that be? To understand what we mean by urban forest, it is important to first understand the term "urban" which is a geographic area bound by a municipal jurisdiction and containing a large concentration of people—typically 50,000 or more people according to the United States Census Bureau (2013). The "forest" element consists of all trees and vegetation within an urban area regardless of public or private ownership. A city's urban forest increases the quality of life for people residing there. The key to ensuring increased quality of life lies in maximizing the various benefits we derive from trees and vegetation located in our parks, along our streets, and in our yards.

Defining "Urban Forest"
"The aggregate of all community vegetation and green spaces that provides a myriad of environmental, health, and economic benefits for a community" (Sustainable Urban Forests Coalition, 2013).

SCOPE OF THIS PLAN

The urban forest does not stop at the edge of our local parks, natural areas, residential yards, and green spaces. It includes trees located within the public right-of-way (i.e. along streets, medians, and sidewalks), along our waterways, and many similar places.

Whether a tree is publicly or privately owned is greatly tied to land ownership. In the United States, urban foresters primarily focus on trees situated on public lands even though, in many cities, the major portion of an urban forest is situated on private land and forest ecosystems exist beyond political boundaries. Sure enough, single-family residences in Austin provide the second-highest acreage of tree canopy coverage after parkland and open space (City of Austin, 2006 tree canopy data). Despite this reality, this plan focuses on trees and vegetation located on public lands over which the City of Austin can exert the most direct influence. The following list contains various land owned by the City. These are the most common areas in which the City manages and maintains the urban forest. See the map on the following page to view the distribution of these land components throughout Austin.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

> **Comment [HA5]:** The AUFP draft, which unduly concentrates on city-owned trees, should be re-written with much greater emphasis on private residential and commercial parcels and other governmental jurisdictions, which comprise 90-95 percent of Austin's urban forest.
>
> *TAGGED FOR UFB THEMED PRIVATE/PUBLIC DISCUSSION.

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Parkland

- Neighborhood parks (Eastwoods)
- Pocket parks (Comal)
- District parks (Pease)
- Golf courses (Hancock)
- Greenbelts (Barton Creek Greenbelt)
- Metropolitan parks (Zilker)
- Nature preserves (Decker Tallgrass Prairie Preserve)
- School parks (Kealing Junior High)

Other

- Street right-of-way
- Medians
- Sidewalks
- Infrastructure easements
- Hike and bike rails
- Riparian areas (Waller Creek, Lady Bird Lake, Barton Springs Pool)
- Planting strips/triangles
- Cemeteries

What is the Public Right-of-Way?

The City of Austin's public rights-of-way is a land area owned and maintained by the City. It consists of the street surface, sidewalks, and grassy areas between the street pavement and a property boundary. In Austin, it is usually defined as the roadway plus 10 feet behind the curb. This definition of the City rights-of-way may vary depending on the physical conditions at any given location. The public rights-of-way covers approximately 47 square miles in Austin (City of Austin, 2013 right-of way & public parcels data).

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Figure 1.1 | City of Austin Owned Land & Parkland
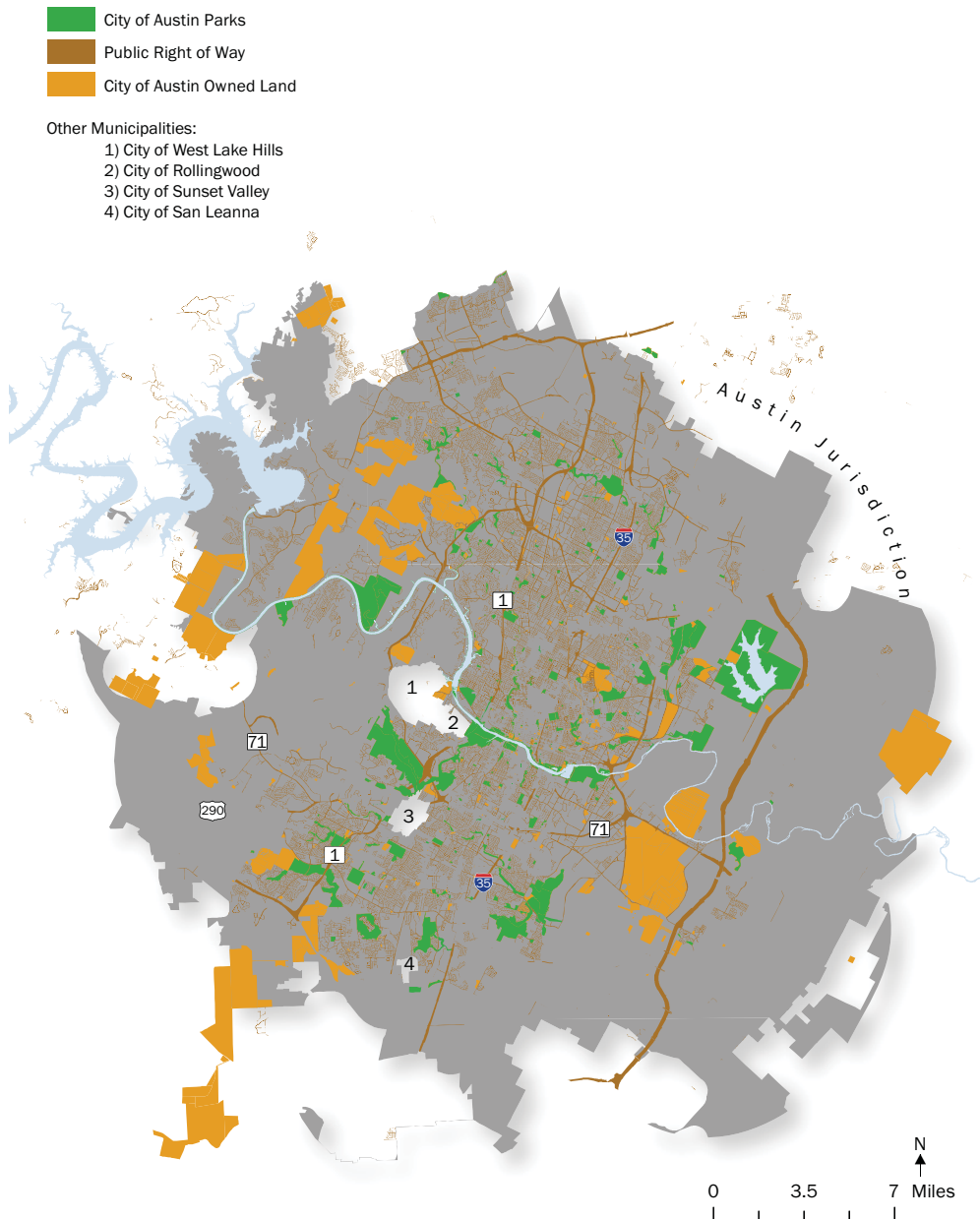
City of Austin Parks
Public Right of Way
City of Austin Owned Land

Other Municipalities:
1) City of West Lake Hills
2) City of Rollingwood
3) City of Sunset Valley
4) City of San Leanna

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

BENEFITS OF THE URBAN FOREST

Today, urban forests are increasingly considered an element of a much larger green infrastructure (GI) network that provides benefits to humans (Benepe, 2013, ImagineAustin, 2012; Young, 2011; American Planning Association, 2009). Within this network, the urban forest plays an integral role in Austin's health and vitality by providing social, ecological, and economic benefits to the community and by enhancing the quality of life for Austin residents. The following are a few benefits commonly provided by trees:

Figure 1.2 |Tree Benefits

Environmental	Frequently Cited Sources
• Air pollution removal	Nowak et al. 2006; Nowak 2002; Akbari et al. 2001
• Noise pollution reduction	Nowak et al. 2006; Nowak 2002; Akbari et al. 2001
• Water quality enhancement	Cappiella et al. 2005
• Carbon sequestration	Nowak et al. 2002
• Rainfall/stormwater interception	Nowak et al. 2007; Raciti et al. 2006; Beattie et al. 2000
• Flood mitigation	Cappiella et al. 2005
• Urban heat island mitigation	Streiling & Matzarakis 2003; Akbari et al. 2001; Rosenfeld et al. 1998
• Shading/reducing energy usage	Donovan & Butry, 2009; Akbari et al. 2001
• Controlled stream channel erosion	Raciti et al. 2006; Cappiella et al. 2005
• Habitat provided for wildlife	Rudd et al. 2002; Fernandez-Juricic, 2000

Social	
• Crime reduction	White et al. 2011; Donovan & Prestemon, 2010
• Traffic calming	Naderi, 2008; Wolf & Bratton, 2006
• Increased public health	Bell et al. 2008; Mitchell & Popham, 2008; Lovasi et al. 2008; Ulrich 1984
• Education/school testing	???

Economic	
• Increased property values	Donovan & Butry, 2010; Crownover, 1991
• Improved retail business	Werner et al. 2001; Wolf, 2004
• Enhanced rental rates	Donovan & Butry, 2011; Laverne & Winson-Geideman, 2003
• Infrastructure cost savings	McPherson, 2006

Despite these benefits, Austin's urban forest faces many challenges. Accelerated land development, harsh environments brought on by climate change, recent periods of drought, increased public use, and public safety related to an aging tree population are but a few concerns associated with our urban forest in Austin. In addition, the fact that trees do not

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

naturally propagate themselves in a highly urbanized area, like they do in natural ecosystems, means the urban forest will not replenish itself as successfully without deliberate human intervention.

Case Study | Urban Heat Island Mitigation

Temperatures get hotter in the city than in rural areas because highways, buildings, parking lots, and other manmade surfaces absorb, and retain far more heat than materials in the natural environment. Shade trees that shelter homes and other structures are a great way to mitigate effects of urban heat. Trees help reduce energy use and utility costs as well as protect homes from sun damage and deterioration.

Top 5 Threats to the Urban Forest Through the Eyes of Citizen Participants

1. Development
2. Drought
3. Climate change
4. Soil compaction
5. Invasive species

Source: City of Austin, Urban Forestry Program, 2012

THE NEED FOR A PLAN

Austin's population has increased by 20% each decade since 1970 (U.S. Census Bureau, 2010). With increasingly more people living in Austin, the need to strategically approach the care and replenishment of the urban forest has reached a critical point. Impacts from continuing growth and development, combined with long-term drought conditions, have created an imperative to move forward with the development of a broad-scoped, Comprehensive Urban Forest Plan for public property.

Imagine Austin | Priority Action CE A22

"Create an urban forest plan that identifies tree canopy goals, establishes a budget, and presents implementation measures...create a green infrastructure program to protect environmentally sensitive areas and integrate nature into the city" (ImagineAustin, 2012, p.247).

> **Comment [HL6]:** INSERTED FULL QUOTE PER NICK'S REQUEST.

The requirement for a Comprehensive Urban Forest Plan was initially established in Austin's City Code in 1992 (§ 6-3-5). Twenty years later, in 2012, the adoption of Austin's new comprehensive plan, ImagineAustin, placed priority on protecting and expanding Austin's

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

green infrastructure elements through the creation of an urban forest plan. Austin's Urban Forest Plan is the direct implementation of ImagineAustin's call to action.

GOALS OF THE PLAN

- Establish a broad-scoped, long-range vision for Austin's urban forest.
- Provide a road map to implementation to reach the vision for the urban forest.
- Provide a framework for City departments to use as a guide for managing their urban forest resources.

With a plan in place to support Austin's urban forest, the City will be able to 1) support the health and vitality of the community and its public spaces and 2) manage the needs of a dynamic component of the City's infrastructure. A primary concern is the assurance of public well-being and safety, and enhancement of urban forest benefits through preservation, care and maintenance, and replenishment. A thriving, healthy urban forest is a reflection of the City's ability to preserve individual trees and vegetation communities, restore and/or repair degraded lands, protect lands for environmental services, encourage the removal of non-native, invasive species, and replant trees and vegetation. A city that plans its urban forest is a city that truly and comprehensively plans for its future and the future livelihood of its citizens.

PROCESS

The Urban Forestry Board, established by Austin City Code § 2-1-183, was tasked with developing and subsequently revising a Comprehensive Urban Forest Plan for public property with administrative assistance from the City of Austin Urban Forester (§ 6-3-5). The Urban Forestry Board is currently comprised of seven members appointed by the City Council who act in an advisory capacity to the City Council, the City Manager, and the director of the Parks and Recreation Department in all matters related to the urban forest. The duties of the Urban Forester (§ 6-3-4), include management of the public urban forest, oversight and supervision of City departments' work involving urban forest management, and ensuring preservation and replenishment of the public urban forest.

"With the assistance of the urban forester, the [urban forestry] board shall develop and revise the [comprehensive urban forest] plan."

— Austin City Code
§ 6-3-5

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Since 1992, attempts were made to develop the Code-mandated plan but none resulted in a final product. Working collaboratively, the Urban Forestry Board and Urban Forester took up the cause in February 2011 and kicked off the process to produce Austin's first Comprehensive Urban Forest Plan for <mark>public trees and vegetation</mark>. With renewed support and energy, the Urban Forestry Board working group met 16 times from 2011 through 2013.

Two public engagement initiatives reached out into the community with the goal of engaging the public in a discussion on the topic of Austin's urban forest. In April 2012, a public meeting was held for comment on the urban forest plan vision statement, vision components and guiding principles. The Urban Forest Opinion Poll was also conducted through an online survey tool and received 876 responses. July 2013 featured pop-up Leaf the Tree Activities around town to gather a broad sampling of input from the community, and three surveys were initiated on the topics of policy, funding and performance indicators. A public education campaign was initiated to raise awareness and engage the public. In August 2013 a second public meeting was held as a community workshop and open house to prioritize resources and encourage face-to-face discussion. See Community Voices on page 11 and Appendix A for more information on the public engagement and education process.

For marketing purposes the Urban Forestry Board chose to refer to the Plan as the Austin Urban Forest Plan, A Master Plan for Public Property. Hereafter in this document the Comprehensive Urban Forest Plan will be referred to as the Austin Urban Forest Plan.

> **Comment [HL7]:** STAFF ADDITION 10-28-13.

A VISION FOR AUSTIN'S URBAN FOREST

Austin's urban forest is a healthy and sustainable mix of trees, vegetation, and other components that comprise a contiguous and thriving ecosystem valued, protected, and cared for by the City and its citizens as an essential environmental, economic, and community asset.

VISION COMPONENTS

Thriving
A thriving urban forest is one that is optimized according to site and ecosystem capacity.

Contiguous

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

A contiguous urban forest is composed of interconnected, forested corridors for transportation, community, recreation, and wildlife throughout the city.

Healthy Ecosystem
A healthy urban forest is composed of a diverse, native, and uneven-aged palate of species adapted to the unique growing conditions of ecosystem types.

Valued
A valued urban forest is recognized as an asset that is essential to the well-being of the community and the ecosystem.

Protected
Trees are protected through sustainable site design and land management practices so that long-term ecosystem health is maintained.

Cared For
A well cared for urban forest is proactively managed for health, longevity, and safety.

GUIDING PRINCIPLES
The guiding principles were established during the initial phase of the plan's development and apply to all areas and phases of the plan, its development, and its implementation.
1. **Greatest Good Philosophy**
2. **Wise Use of Resources**
3. **Sustainable**
4. **Science-Based Decision Making**
5. **Public Safety**
6. **Industry Recognized Best Management Practices**

COMMUNITY VOICES
Public engagement efforts produced more than 2,360 total responses from online sources and multiple events that occurred throughout Austin. The list below details the major public engagement strategies undertaken for this plan. For more information on the public engagement process please see Appendix A. For a full list of comments please see Appendix __.

### MAJOR PUBLIC ENGAGEMENT STRATEGIES
- Leaf-the-tree pop-up events

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

- Online and hardcopy surveys
- Community workshop and open house public meetings
- Radio and newspaper media outreach
- Social media and website outreach
- Email correspondence

The remainder of this chapter displays some major findings from the most recent surveys conducted in 2013. These results provide a snapshot of general public interest of the urban forest and citizen preferences as they relate to Austin's Urban Forest Plan.

Figure 1.3 | Public Interest in Urban Forestry
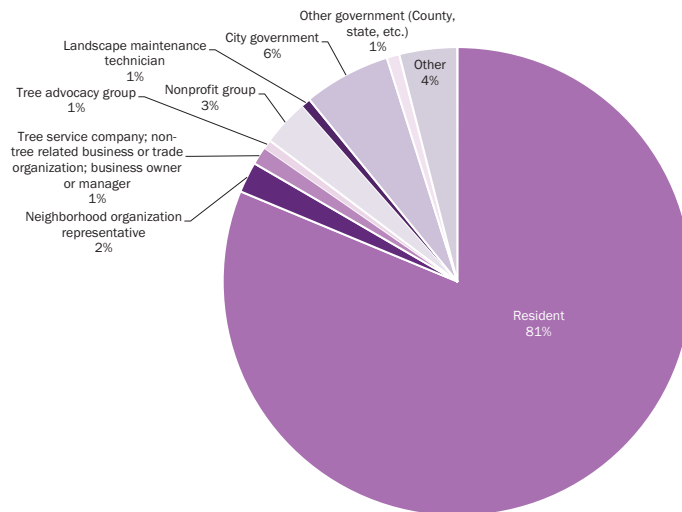
CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

State of Austin's Urban Forest

This chapter presents baseline information regarding Austin's urban forest resources as they stand today. Information such as this is the first step in future planning as it serves as a benchmark for monitoring present achievements against future goals.

REGIONAL CONTEXT

OUR URBAN FOREST'S HISTORY

INDICATORS OF SUSTAINABLE URBAN FORESTRY

VEGETATIVE RESOURCE

COMMUNITY FRAMEWORK

RESOURCE MANAGEMENT

URBAN FORESTRY CHALLENGES

Comment [HA8]: This chapter should include a much expanded data-collection plan, including methodologies and quality control, since performance indicators currently are not supported by accurate quantitative data.

STAFF RESPONSE: The Plan uses the best data available and addresses future data needs in the Implementation chapter under the Implementation Actions - Performance Indicators section and with Policy Element UF-11 Data Collection and Management.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

REGIONAL CONTEXT

The Austin metropolitan region is nested within multiple ecosystems defined by similarities and differences in biotic and abiotic traits such as geology, vegetation, climate, soils, land uses, wildlife, and hydrology. When a small area's local ecosystems exhibit enough similarities in these traits over a larger geographic region, the area is deemed an ecoregion.

Ecoregion
A region of ecosystems defined by a distinctive geography and ecological characteristics.

Austin lies at the confluence of three ecoregions as defined by the Environmental Protection Agency and the Texas Parks and Wildlife Department (Bryce, 1999). These regions include the Northern Blackland Prairie (including the Floodplains and Low Terraces of the Colorado River), the Edwards Plateau (including the Balcones Canyonlands and Live Oak-Mesquite Savanna subregions), and the Oak Woods and Prairies. A survey of Austin's local ecoregions serves as a base understanding of quality, quantity, and type of environmental resources existing within Central Texas. Such an understanding establishes and informs ecosystem management principles and policies. In an attempt to contextualize Austin's regional forest resource, the following surveys the physical and cultural landscape of Austin that has historically shaped the state of our urban forest.

AUSTIN ECOREGIONS

Edwards Plateau | West of the Balcones Escarpment lies the Edwards Plateau. The plateau is an uplifted geological region and the largest of Austin's ecoregions. Moving west , the terrain becomes rugged with eroded limestone and granite rock forming what is known as the Texas Hill Country. Historically, the Edwards Plateau was a grassland savanna with intermittent forest patches. Originally, fire played a major role in determining vegetation types within the Edwards Plateau. That ended whe wildfire suppression and overgrazing converted this area from grassland to brushland (Texas A&M Forest Service, 2008; Texas Parks and Wildlife, Edwards Plateau ecological region). As a result, Ashe juniper and mesquite dominate the landscape today. Cattle avoid the juniper's bitter-tasting seed, allowing for selective removal of other plant and tree species.

Balcones Canyonlands and Live Oak Mesquite Savanna | The Balcones Canyonlands and Live Oak-Mesquite Savanna subregions provide variation on the plateau. The Live Oak-Mesquite Savanna dominates most of the western and northern portion of the

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

Edwards Plateau, although intermittent finger-like portions exist in the eastern portion of the Plateau. The Live Oak-Mesquite Savanna subregion is dominated, as its name suggests, by mesquite shrubland and live oak trees. Elsewhere, limestone canyons cut by tributaries of the Colorado River identify the Balcones Canyonlands. Karst topography further characterizes the terrain, the result of acidic rainfall reacting with limestone bedrock, which creates Swiss cheese-like formations in the ground. Water percolating through the porous limestone contributes to recharge of the Edwards Aquifer lying below. Slopes are particularly steep along stream courses, with soil depth varying by topography. Hilltops usually have thin soils while flat areas and lowlands have thicker soils. Vegetative cover in the Canyonlands consists of evergreen woodlands and deciduous forests composed of Texas mountain laurel, Lacey oak, Black cherry, Bigtooth maple, Ashe juniper, sumac, acacia, and Honey mesquite.

Blackland Prairie | The Blackland Prairie is a grassland ecoregion covering the eastern portion of Austin. Its boundaries form a thin strip spanning from the Red River in the north to San Antonio in the south. Its Cretaceous chalk, marl, and limestone formations created productive black clay soils suitable for farming. Initially the prairie consisted of tallgrasses; however, agricultural production converted much of the terrain into cropland and grazing pastures (Texas Parks and Wildlife, Blackland Prairie ecological region). The region is identified as the most altered ecoregion in Texas with 1% of the native Blackland Prairie remaining today (Ramos and Gonzalez, 2011; Clymer Meadow Preserve website, 2013). Like the Edwards Plateau, this region was historically influenced by natural fires; however, human settlement has introduced woody vegetation including pecan, Cedar elm, hackberry, mesquite, and various oaks.
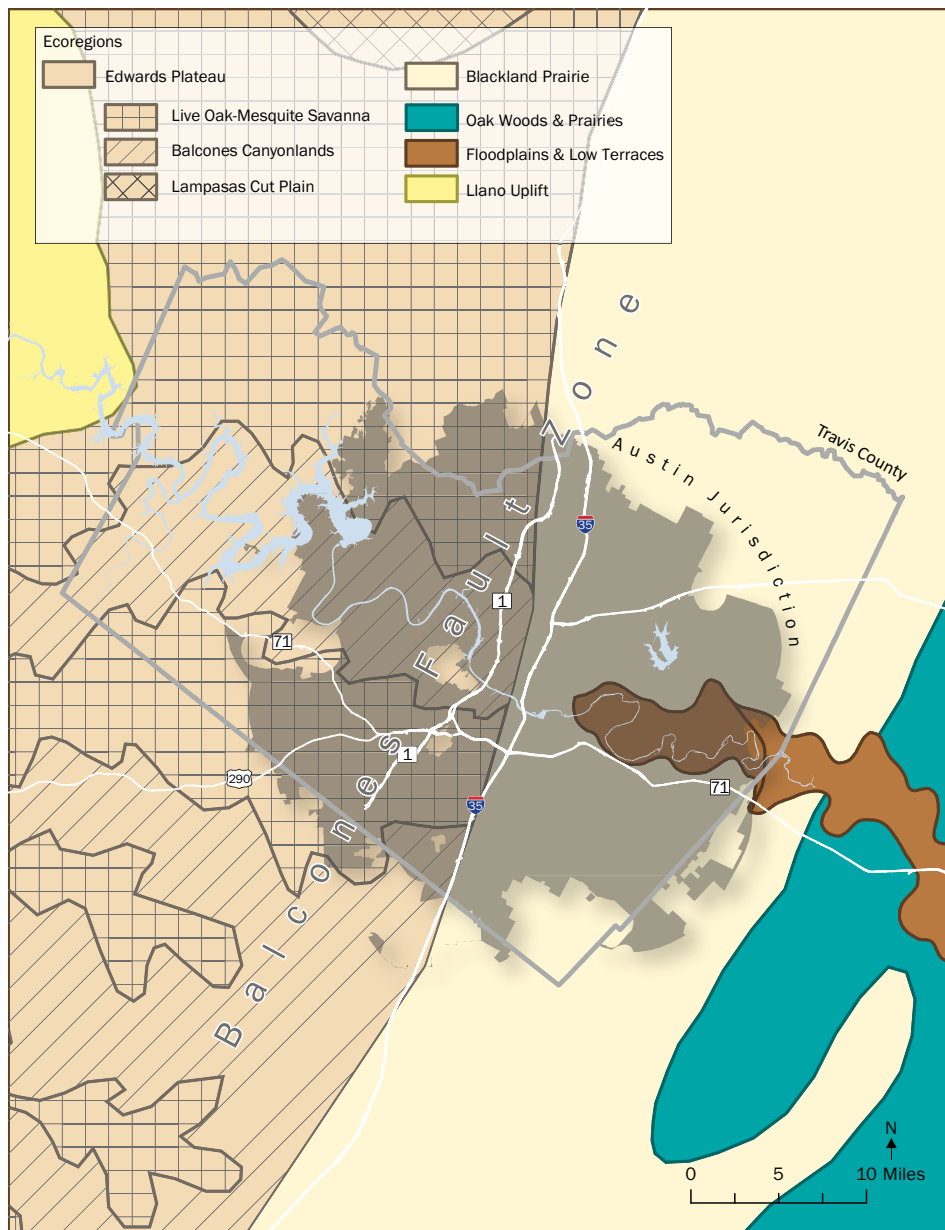
DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public
Comment INCORPORATED, includes unresolved comments for discussion and new comments.

**Figure 2.1 | Austin
Ecoregions**

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

Floodplains and Low Terraces | The Floodplains and Low Terraces subregion is part of the Blackland Prairie and includes the broad floodplains of the Colorado River. Historically, bottomland forests contained bur oak, Shumard oak, sugar hackberry, elm, ash, eastern cottonwood, and pecan, although most forested land has been converted to agricultural land.

Oak Woods and Prairies | The Oak Woods and Prairies region is characteristic of savanna grasses, brushlands, and forest patches. Originally a diverse savanna of native grasses and patches of Post Oak trees, the region has given way to denser undergrowth due to fire suppression, farming, overgrazing, soil disturbance, and land parcelization beginning in the 1800s. Today, common species found in the region include blackjack oak, water oak, winged elm, hackberry, yaupon, and concentrations of loblolly pines near Bastrop.

Focus Point | Balcones Escarpment
Austin straddles a major geologic formation—the Balcones Fault. This is an inactive yet distinct fault zone stretching north to Waco. The surface expression of the fault is the Balcones Escarpment, which impacts local climate patterns and greatly influences east-west spanning ecosystems to create unique variation in vegetation types, soils, topography, species biodiversity, and climate patterns throughout the region.

Culturally speaking, the Balcones Escarpment has influenced human settlement throughout Central Texas' history (Palmer, 1986; City of Austin, Community Inventory Report, 2011). Early European economies in Central Texas were delineated by arable soils. In the west, shallow clay soils covering limestone bedrock discouraged farming yet promoted cattle grazing, while the fertile black soils to the east promoted agriculture (Johnson, 2013). As a result, most of Austin's agricultural lands exist today east of Austin.

AUSTIN'S CLIMATE

Austin spans the climatic transition zone between humid East Texas and semiarid lands of West Texas. Summers are hot with temperatures exceeding 90°F most summer days, while winters are mild with daytime temperatures hovering around 50°F (NOAA, 2010). Weather patterns stem from Mexico's Atlantic and Pacific coasts. Occasional Arctic cold fronts intrude from the north. Austin experiences unreliable precipitation with peak rainfall typically occurring in May and September. Average yearly rainfall is near 30 inches, with periodic droughts and occasional flooding impacting normal precipitation levels. Because Austin sits

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

between climatic regions, water levels are variable, which ultimately influences vegetative species growing throughout the Central Texas region.

Figure 2.2 | Total Annual Precipitation in Austin (1943-2012)
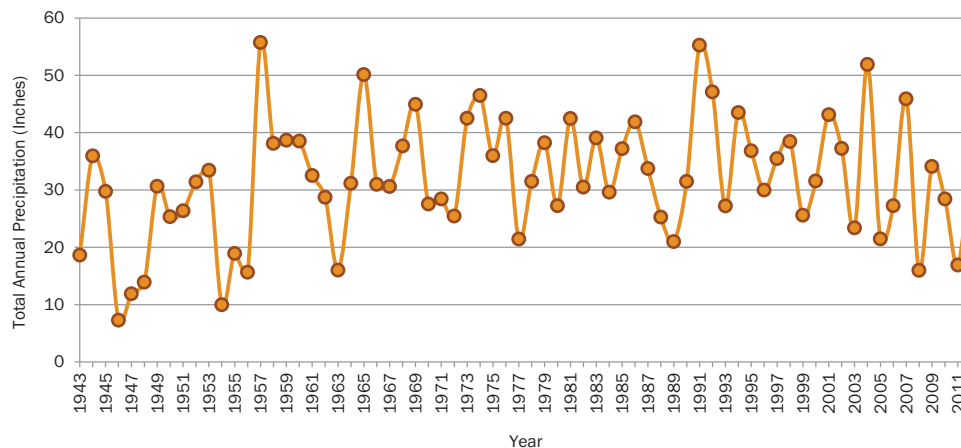
Figure 2.3 | Austin Climate Graph (1943-2012)

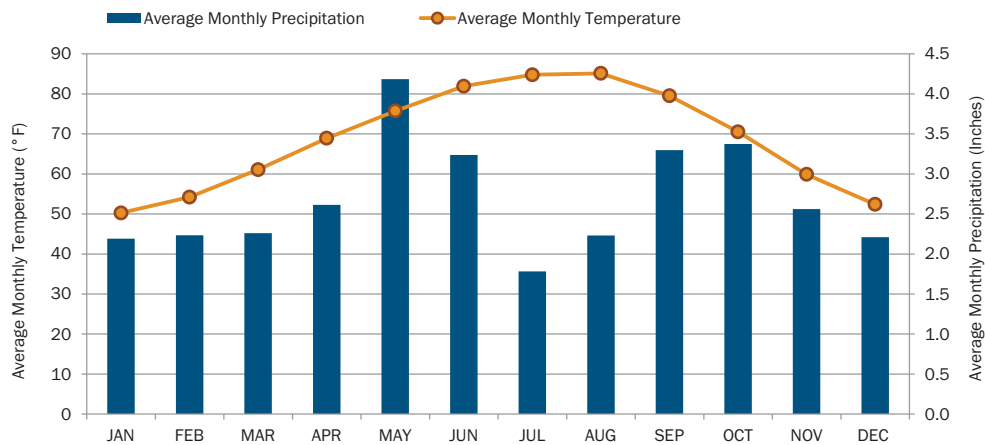DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Figure 2.4 shows the most common wind patterns in Austin averaged over an eight-year period. This shows that Austin winds blow from the south and southeast 40% of the time and north or northeast 21% of the time, typically at speeds from 4 to 18 mph. These are light to breezy style winds. Winds blow much less from the east and west. Wind patterns are important to consider since they can greatly impact the structure of trees and vegetation throughout their lifetime. Intense or extended winds may topple entire trees or limbs.

Figure 2.4 | Average Annual Wind Prevalence in Austin (1984-1992)
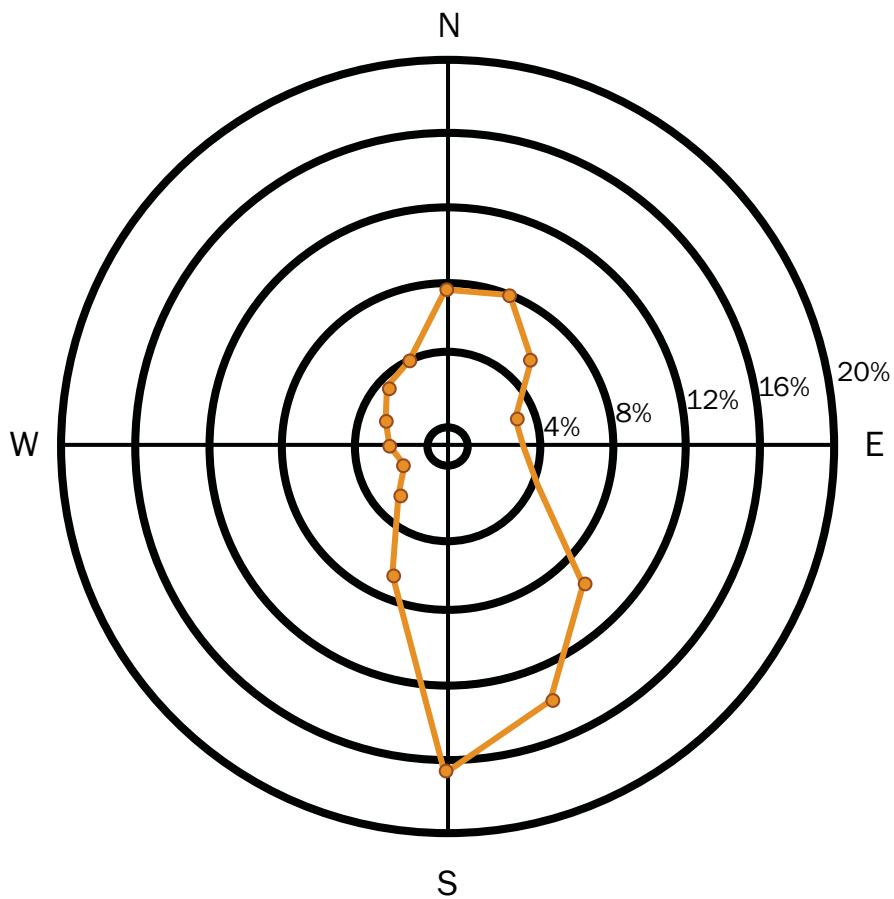

Wind Rose | A Graph of Austin's Wind Patterns

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

The graph at right displays the direction from which the wind blows (from the outer circle toward the center). The size of the orange area within each circle shows the amount of time that wind blows from a particular direction.

Drought: 2010-2011

Between October 2010 and September 2011, Texas experienced what could possibly be its worst drought in recorded history. Low precipitation resulted in devastating crop and vegetation loss throughout the state. For example, Texas lost an estimated 5.6 million urban trees—roughly 10% of Texas' urban forests—resulting in a projected $560 million to remove said dead trees (Texas A&M Forest Service, 2012, February). On the other side, drought-related tree mortality in rural areas across Texas was estimated at 301 million trees with roughly 6.6% of tree loss occurring in Central Texas (Texas A&M Forest Service, 2012, September). These numbers are significant considering that Central Texas was estimated to have the largest count of live trees (1,540 million), out of any other Texas region, prior to the recent drought (Texas A&M Forest Service, 2012, September).

Focus Point | Bastrop Wildfire 2011

The 2011 Bastrop County Complex Fire burned from September through October across 16,200 acres of pine and mixed pine-deciduous forests just east of Austin. The fire most likely started from electrical power line sparks igniting dry vegetation. It was the most destructive wildfire in Texas history, destroying more than 1,000 homes and burning an estimated 1.5 million trees of at least 5-inch diameter (Hanna, 2011; Texas A&M Forest Service, 2011). The fire's severity was exacerbated by the lengthy drought and by strong winds created by Tropical Storm Lee. Together, these factors created prime conditions for a devastating wildfire.

OUR URBAN FOREST'S HISTORY

Traveling to Austin in the 1850s, legendary landscape architect Frederick Law Olmsted wrote, "the country around the town is rolling and picturesque, with many agreeable views of distant hills and a pleasant sprinkling of wood over prairie slopes" (Olmsted, 1857). Since then, Austin's natural landscape has changed greatly from a "sprinkling of wood over prairie slopes" to a forested city. This forestation is a result of human activities and a level of support for our urban forest throughout history.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

The importance of trees to Austinites is largely solidified in historical events and City rules initiated by local residents. These human actions continue to impact local policies and goals in preserving a healthy urban forest citywide. The following timeline details important historical events impacting Austin's urban forest over the years.

Focus Point | Austin's Tree Lady

Margret Hofmann was Austin's best-known tree advocate. Hofmann's fame as Austin's "Tree Lady" began in 1973 when she challenged the removal of an ancient Live Oak on South 1st Street, establishing her "Think Trees" campaign. Soon after, Hofmann served a short-lived but influential City Council term from 1975 to 1977, in which she advocated protecting trees from destruction in the face of new development. Her efforts materialized in Austin's first major heritage tree registry and the passage of Austin's first modern tree protection ordinance in 1983. Hofmann's tree-minded legacy persists today, influencing local environmental activism and City decisions. In 2010, the City passed its Heritage Tree Ordinance to further protect Austin's aged urban forest, owing its formation to Hofmann. Her legacy is honored in Margret Hofmann Oaks Park standing across from City Hall at the intersection of South 1st and Cesar Chavez streets.

OVERVIEW OF KEY HISTORICAL TREE-RELATED ORDINANCES, REGULATIONS

1983

Ordinance | March 1983 [1983-0324-N] Establishes a new chapter 9-11 of the Austin city code of 1981 to be entitled "Trees." This provided for the protection of the largest and most valuable trees in the city of Austin. Also established the City Arborist position.

1996

Ordinance | March 1996 [19960328-B] Public Tree Care Ordinance. Regulating the planting, maintenance, and removal of trees on public property; establishing the office of Urban Forester; the issuance of written approvals for the maintenance, and removal of trees on public property; the removal of vegetation that obstructs public travel on private property; the protection of public trees; value recovery when public trees are damaged or removed; for trees as part of street improvements; prescribing penalties for violations of its provisions.

2010

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Ordinance | February 2010 [20100204-038] Amendments to CH. 25-8, subchapter B, article 1 and section 6-3-48 relating to tree protection; protected tree provisions; and adding new division for heritage trees.

2012
Ordinance | June 2012 [20120614-058] Adoption of the Imagine Austin Comprehensive plan.

2013
Resolution | June 2013 [20130627-070] City Manager "to assess the value and benefits that public trees provide to the community and to various municipal functions… using existing city resources… quantify the value and benefits of…trees."

For a full list of historical Ordinances, Resolutions and Code, please see the Appendix.

INDICATORS OF SUSTAINABLE URBAN FORESTRY

The remaining three sections present baseline information regarding Austin's urban forest resources. Such information helps in understanding our current situation and serves as a benchmark for monitoring present achievements against future goals.

This analysis follows a nationally recognized framework for evaluating strategic urban forest planning and management through the implementation of urban forestry criteria and indicators proposed by Kenney et al. (2011). This framework was born out of The Montréal Process in 1994—an intergovernmental call for sustainable forest management worldwide—and later modified by Clark et al. (1997).

Austin's Score: 73/120
Appendix A displays a performance indicator report card for Austin. Scoring of each indicator was confirmed by available datasets and City staff. Targets are provided when applicable. Performance rankings follow low, moderate, good, and optimal standards. To date, Austin urban forestry scores 73.5 out of a maximum 120 points toward an optimally performing, sustainable urban forestry program.

The following three sections mirror the Kenney et al. approaches to urban forestry sustainability: vegetative resource, community framework, and resource management. Each approach houses a set of criteria and performance indicators for measuring urban forestry

management success. These off-the-shelf criteria were reviewed and modified when deemed appropriate.

In cases where issues were not addressed by these criteria, new criteria were created. There are 30 total criteria for Austin. The following sections provide a snapshot of Austin's urban forest in terms of the most comprehensive indicators available at this time. These indicators will be updated and reported on, when new data become available, culminating in a reoccurring "state of the urban forest" report.

The full list of Austin's performance indicators is shown on the following page. They are displayed in order of citizen prioritization as revealed through online polling and public engagement events. Citizen-guided prioritization will help set up the order in which urban forestry policies are implemented in the future.

Vegetative Resource: What things are most important when we decide how healthy our urban forest is?
1) Native vegetation
2) Species suitability
3) Relative canopy cover
4) Species distribution
5) Condition of the urban forest
6) Publicly owned natural areas
7) Urban forest pests
8) Size-class distribution

Community Framework: What is the most important way that community members can become involved with taking care of the urban forest?
1) Complete urban forest recognition
2) General urban forest awareness
3) Neighborhood action
4) Public agency cooperation
5) Involvement of State and Federal landholders
6) Regional urban forest cooperation
7) Green industry cooperation

Resource Management - Coordination, Support, and Planning: What is more important for the City to spend money on to keep the urban forest healthy?
1) Urban forest establishment planning and implementation

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

2) Municipality-wide funding
3) City-wide urban forest funding
4) City staffing
5) Urban forest inventory
6) Tree canopy cover inventory
7) Urban forest risk management

Resource Management - Protection and Practices: What is more important for the City to focus on in order to protect our urban forest and manage it sustainably?
1) Urban forest protection from development
2) Water use and drought response
3) Urban forest habitat suitability
4) Wildlife and human habitat
5) Sustainable practices
6) Carbon sequestration and woody biomass

VEGETATIVE RESOURCE

The vegetative resource refers to the physical components of an urban forest including but not limited to trees, plants, grasses, soils, and water. Managing these physical resources by monitoring criteria such as tree canopy cover, age structure, and species diversity will help plan for a healthy and resilient urban forest well into the future. This section covers the following indicators:

- Tree canopy distribution
- Species composition
- Age structure
- Tree condition
- Tree values and benefits

Tree Canopy Distribution | Tree canopy is a simple measurement of an urban forest's spatial distribution. Canopy refers to a tree's aboveground layer of leaves, branches, and stems. When tree canopy density is high, we receive various benefits from trees such as cleaning our air, cooling our homes through shading, and providing habitat for wildlife. Monitoring tree canopy distribution is one way to measure the health of our urban forest over time and to ensure we continue receiving benefits.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

Comment [HA9]: Baseline data in the Vegetative Resource section either do not exist or are based on inaccurate data.

STAFF RESPONSE: The Plan uses the best data available and addresses future data needs in the Implementation chapter under the Implementation Actions - Performance Indicators section and with Policy Element UF-11 Data Collection and Management.

Comment [HA10]: The use of a very small, biased, and outdated database, to extrapolate tree canopy and inventory measures across the city is invalid and misleading. Inventory and canopy data are 5 and 7 years old, respectively, and do not address current conditions resulting from intervening development and severe drought….Furthermore, due to the absence of ground-proofing and other quality control, the canopy data is likely inaccurate though the error rate remains unknown.

STAFF RESPONSE: The Plan uses the best data available and addresses future data needs in the Implementation chapter under the Implementation Actions - Performance Indicators section and with Policy Element UF-11 Data Collection and Management.

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

The percent of land covered by tree canopy provides a baseline indicator of an urban forest's extent, and is easily acquired with relatively little cost. Tree canopy covers an estimated 31% of Austin's land area (City of Austin's full purpose and 5 mile extraterritorial jurisdiction (ETJ) area) and has consistently decreased since the 1970s, as shown in Figure 2.5 on the next page.

Canopy goals | A distraction?

Often cities set tree canopy cover targets to be achieved through tree planting programs. American Forests (1996) recommends overall citywide canopy cover of 40% for humid cities and 30% for arid cities. Although new tree plantings are necessary in ensuring forest regeneration, tree planting programs attempting to achieve canopy cover goals often distract communities from other, equally-important management opportunities. Kenney et al. (2011) proclaim tree canopy cover does not paint a full picture of the urban forest. Species diversity, condition, age distribution, and mortality rates are equally important in forestry management.

Canopy goals in other U.S. cities

Baltimore 40% by 2040
Denver 18% by 2025
Fairfax 45% by 2037
Philadelphia30 by 2025
Phoenix25% by 2030
Seattle30% by 2037

Figure 2.5 | Historic Tree Canopy Cover

Year	% Tree Canopy Cover	Source
1977	39%	Rodgers & Harris, 1983
1982	37%	Crownover, 1991
1990	34%	Crownover, 1991
1996	34%	American Forests, 1996
2006	31%	City of Austin, 2006

Comment [HA11]: STAFF COMMENT (Alan Halter): Currently working on determining this % for 2010 tree canopy data.

Recent declines in canopy cover are most likely due to natural factors such as extended drought periods, as well as human impacts such as urban development. To put these

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

numbers into perspective, American Forests recommends 30% tree canopy cover within arid cities and 40% cover within humid cities. Since Austin lies at a climatic transition zone between humid and dry, identifying appropriate canopy levels for Austin proves difficult. Furthermore, municipalities which have established canopy cover goals tend to focus urban forest management resources on tree planting instead of a comprehensive approach including care, maintenance, preservation, and planning. Nevertheless, measuring tree canopy distribution helps to identify forest loss over time and to inform tree-planting programs in underserved communities.

At the neighborhood level, variations in tree canopy distribution are more complex. Many areas with high population density actually contain some of the highest tree canopy cover (e.g., Hyde Park). In fact, residences and open space areas contain the largest shares of tree canopy cover in Austin. The map on the following page shows a clear distinction between east and west Austin with greater tree canopy cover occurring in west Austin, and lower tree canopy cover occurring in east Austin. For instance, the Edwards Plateau region to the west contains the majority canopy coverage at 165,595 acres while the Blackland Prairie region to the east contains only 44,148 acres of tree canopy cover. This pattern is consistent with the natural and cultural histories of Central Texas, and reflects the dominance of agricultural practices resulting in fewer trees occurring in far east Austin. Additionally, the prevalence of high canopy cover may reflect distributions of wealthier neighborhoods in west Austin while lower canopy cover percentages reflect distributions of less affluent neighborhoods in east Austin. Studies show a positive relationship between income and the demand for trees as rich communities have larger budgets and larger private lot sizes for trees to grow (Zhu and Zhang, 2008).

Austin Tree Canopy Map | Austin's tree canopy varies across the city. The map at right shows a clear distinction between east and west Austin with greater tree canopy cover occurring west of IH35 in the Edwards Plateau region, and lower tree canopy cover occurring east of IH35 in the Blackland Prairie region. Intuitively, many areas adjacent to or near water features show high tree canopy percentages.

Open space, single family, and undeveloped lands contain the highest distribution of tree canopy cover in the city (City of Austin, 2006 tree canopy data). In open-space park areas, the amount of land covered by tree canopy (37,705 acres) is substantial—roughly 50 times the size of Central Park in New York City.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

Comment [HL12]: SUGGESTED DELETION BY AHTF -
"identifying appropriate canopy levels for Austin proved difficult. Furthermore, establishing percent canopy goals can place unnecessary resources (i.e. time, money, labor) in well-intentioned but poorly planned endeavors."

Rationale: Kenney's discussion is about not focusing entirely on a canopy goal but also analyzing tree health, age distribution, species distribution, invasives, etc. Kenney never suggests not to do a tree inventory or not to have a canopy goal. The plan states that identifying canopy levels for Austin can be difficult." It is not too difficult to establish a canopy goal in between 30-40% for a region that represents Austin. The plan states that "establishing canopy goals can place unnecessary resources (time, money, labor) in well-intentioned but poorly planned endeavors." However, only minimum resources are needed to establish a canopy goal. Resources are needed to obtain complete and accurate data (tree inventory and GIS), but this data is needed anyway to manage the forest and to identify the state of the forest.

STAFF RESPONSE – Rewrote sentence to try and address larger issue of canopy cover.

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Focus Point | Tree Inventory Assessment (2008)

Examining the characteristics of a city's tree population helps resource managers understand the urban forest as it stands today and helps them prioritize future management focus. Species composition, age, condition, and tree values and benefits indicate the relative importance of individual tree species to Austin's urban forest.

A 2008 tree inventory sampled 14,925 park and street trees in Austin to gather information on tree attributes. This number was extrapolated to over 300,000 trees on public lands based on the City's total parkland area and major street lengths. There are approximately 200,000 trees growing on Austin's developed park lands, and 155,762 street trees. The inventory also indicated 190,940 planting spaces available in street rights-of-way. The 2008 inventory was limited by cost and time, so the sample size was small; the true number of Austin's public trees is likely much higher. In addition, the inventory omitted trees within natural areas, greenbelts, and preserves. Regardless, this is the most recent and largest sample of information for trees growing on public lands in Austin. City staff is currently undertaking a more up-to-date tree inventory and analysis using the U.S. Forest Service's i-Tree Eco software.

Species Composition | Within transit corridors and parks, Austin's public tree population consists of 166 different species mostly constituting deciduous trees. Cedar Elm (*Ulmus crassifolia*) is the dominant species followed by Southern Live Oak (*Quercus virginiana*) and Crape Myrtle (*Lagerstroemia indica*).

> **Comment [HA13]:** Inventory data is derived from a biased, non-statistical sample of less than 5 percent of city-owned trees.
>
> STAFF RESPONSE: The Plan uses the best data available and addresses future data needs in the Implementation chapter under the Implementation Actions - Performance Indicators section and with Policy Element UF-11 Data Collection and Management.

> **Comment [HL14]:** STAFF COMMENT (Alan Halter): Caveats added to address sample size, outdated data sample, and future data updates with i-Tree Eco project.

**DRAFT – DRAFT – DRAFT – DRAFT - DRAFT**

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

What is a deciduous tree?
Deciduous trees shed their leaves annually during the cold season. They typically exhibit broadleaf leaves that are flat and thin as opposed to needle-like or scale-like leaves. Examples of deciduous trees include oak, ash, and pecan.

Older oaks and semi-mature non-native invasive trees thrive in many areas of Austin as well. Non-native invasive trees, such as Glossy Privet (*Ligustrum lucidum*), were not surveyed in 2008 and are therefore not discussed in this section although it is important to mention they pose a significant challenge in park management as they crowd out native plants. For more information, contact Austin's Invasive Species Management.

Figure 2.7 | Top 10 Tree Species in Public Rights-of-Way and Parks
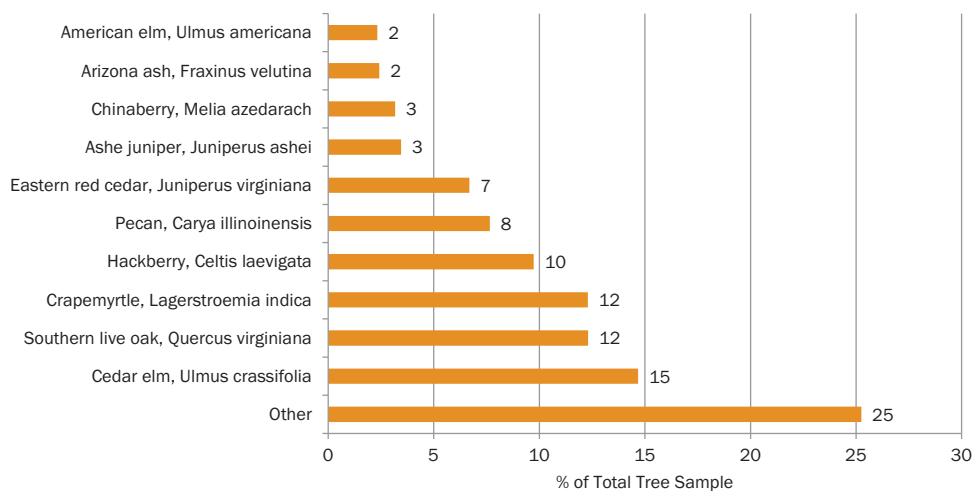
Species diversity ensures forest resiliency against arboreal diseases (e.g., oak wilt) and devastating insect infestations (e.g., elm bark beetle). Figure 2.7 shows the top 10 species representing 75% of the total tree population. According to a recommended rule of thumb, called the 10/20/30 rule, no single species should constitute more than 10% of the total tree population, no single genus should comprise more than 20%, and no single family should contain more than 30% (Clark et al, 1997). As shown in Figure 2.7, the top three species each comprise more than 10% of the total tree population, while no single genus represents greater than 20% of the population. The graph above shows its prevalence as Austin's eighth most common tree species within street rights-of-way and parks.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Invasive Species | Chinaberry

Chinaberry, *Melia azedarach* is a top 10 species in Austin's rights-of-way and parks. It accounts for roughly 3% of the tree population in these areas. Chinaberry is invasive to Austin and is listed as one of Austin's top 24 invasive species (City of Austin, *Central Texas Invasive Plants Field Guide*, 2013). The tree is known to crowd out native plants as its leaves alter pH and nitrogen levels in the soil.

Age Structure |
Age structure refers to the abundance of individual trees in a population according to their age. Documenting a tree population's age structure provides insight into the overall age of the urban forest, the value of individual tree species, and future maintenance costs. A diverse age structure of young to old trees ensures new generations replace older generations, thus reducing the possibility of substantial tree mortality due to age.

Multiple avenues exist for determining tree age. Because a tree's trunk diameter and the age of a tree are closely related, tree diameter at breast height (DBH) is often used as a proxy for determining tree age. This is the most widely used and easiest technique. In Austin, DBH is measured at 4.5 feet above the ground.

A healthy urban forest consists of uneven age distributions where young trees comprise a larger share of the total tree population relative to larger diameter classes to compensate for tree mortality. Austin's street and park tree population follows closely to the Richards-recommended DBH shares. Overall, Austin's public tree age structure consists of 45% young trees (less than 8 inches DBH), 47% established trees (8-23 inches DBH), and roughly 7% mature trees (24 inches DBH or greater). See Figure 2.8 Alternative version

Of the top 10 public tree species in Austin, Crape Myrtle, *Lagerstroemia indica*; Sugarberry, *Celtis laevigata*; and Chinaberry, *Melia azedarach* all have their largest share of trees in the small size class (<8 inches DBH). Considering large-stature trees, Pecan, *Carya illinoinensis* and Southern Live Oak, *Quercus virginiana* represent the largest single shares in the large class size (24+ inches DBH).

The prevalence of Crepe Myrtles, a naturally small-growing species, may be affecting the overall age structure shown in Figure 2.8.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

> **Comment [HL15]:** SUGGESTED VERSION BY AHTF –
> A healthy urban forest consists of uneven age distributions where young trees comprise a larger share of the total tree population relative to larger diameter classes to compensate for tree mortality. Austin's street and park tree population deviates from the Richards-recommended DBH shares, especially regarding the recommended percentage of mature trees. Overall, Austin's public tree age structure consists of 45% young trees (less than 8 inches DBH), 47% established trees (8-23 inches DBH), and roughly 7% mature trees (24 inches DBH or greater). See Figure 2.8. The recommended percentage for mature trees is 10%. This difference of 3% means that Austin has a deficit of 9,750 heritage trees and should shift priority to preservation rather than planting. Preservation can be increased by protecting mature trees (especially those of protected and heritage tree size) and their critical root zones, watering some prominent trees during drought, increasing tree protection and preservation regulations, and enforcing strict adherence to tree regulations.
>
> STAFF RESPONSE: New paragraph and table added on next page to address this comment.

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Suggested DBH Classes for a Healthy Street Tree Population

Richards (1982/1983) recommended the optimal distribution of relative age classes for stability in a street tree population. His suggestion breaks tree DBH into the following classes:

40% <8" DBH
30% at 8"-16" DBH
20% at 16"-24" DBH
10% >24" DBH

These classes have been modified to better reflect the City's "protected" and "heritage" tree sizes: 19 inches or greater DBH and 24 inches or greater DBH respectively.

Figure 2.8 | DBH Classes of Austin Trees by Small, Medium, Large Growth
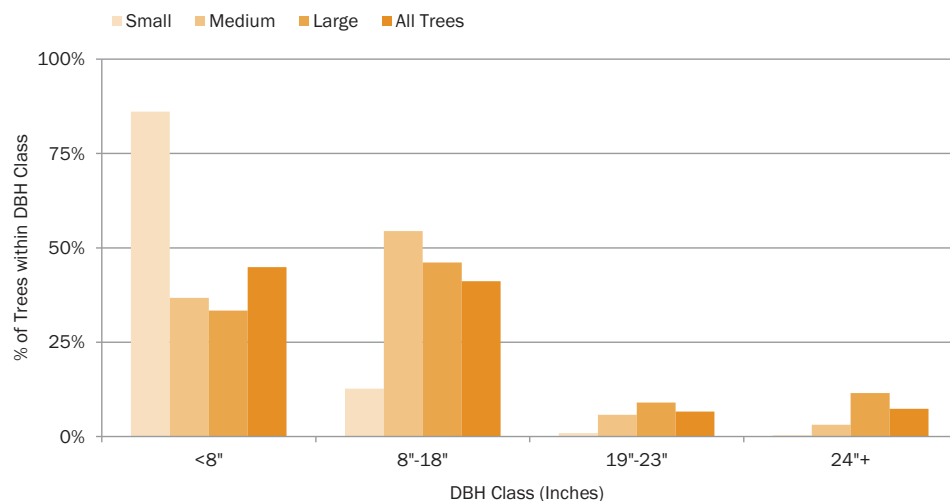
It is important to note the seemingly small percentage deviations from the Richards (1982/1983) recommended percentage for DBH classes. Figure 2.9 displays these differences and estimated amount of trees over or under Austin's public tree count in 2008. For example, public heritage trees in Austin fall short of the recommended percentage by 3%. This means Austin requires an estimated 9,000 more trees in the 24"+ DBH class to meet the recommended goal. Such a deficit points to tree preservation and protection measures. On the other hand, the nearly 22,000 additional trees in the <8"-18" class shows an overabundance of younger and smaller stature trees.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Figure 2.9 | Comparison of Austin DBH Classes vs. Recommended

DBH Class	Recommended %	Austin %	% Difference	Difference in Trees
<8"	40%	45%	5%	+10,000
8"-18"	30%	34%	4%	+12,000
19"-23"	20%	14%	6%	-18,000
24"+	10%	7%	3%	-9,000

Comment [HL16]: STAFF COMMENT - Addition added in response to comment from AHTF about Richards method.

Tree Condition | Tree condition refers to the general health of a tree and provides insight into safety risks to the community and maintenance needs. By evaluating the condition of the urban forest we are then able to determine cost-effective methods for improving and enhancing overall forest health and risk. Determining overall condition of tree structure (wood), functional (leaf) health, and assigning risk factor ratings can be accomplished by ground-level sight inspections. Austin trees are assessed and grouped into the following four categories of condition: good, fair, poor, and dead or dying. The following figures show the majority of structural (wood) health of trees is fair to poor whereas the majority of functional (leaf) health is good to fair.
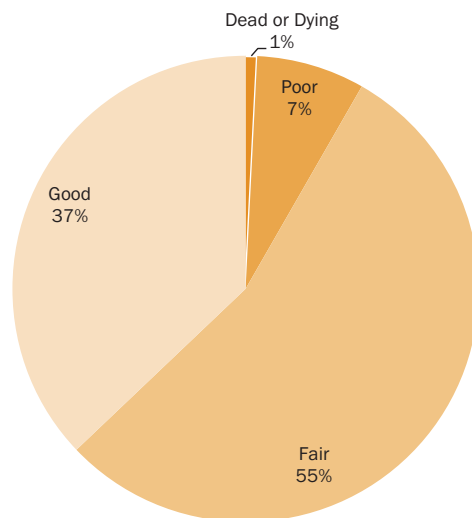
Figure 2.9 | Structural (Wood) Condition by Percentage
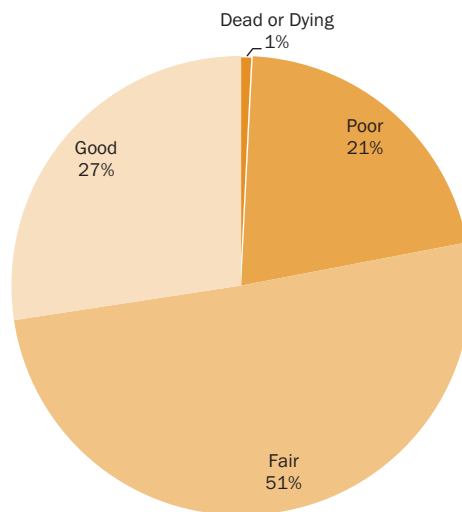
DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Figure 2.10 | Functional (foliage) Condition by Percentage

From this information it was determined in 2008 that many trees in poor health (Sugarberry, Chinaberry, Southern Live Oak, Pecans, and Cedar Elm) required priority removal in 2008. Southern Live Oaks and Cedar Elms, in the street rights-of-way, and Pecans, in parks, required high-priority trimming. Although the trends initially point to Cedar Elm and Southern Live Oak being categorized as troublesome, these species also represent 15% and 12% respectively of trees in the survey and therefore understandably exhibit these high numbers.

Tree Values and Benefits | Today, urban forests are increasingly considered an element of a much larger green infrastructure network providing benefits to people (Benepe, 2013, ImagineAustin, 2012; Young, 2011; American Planning Association [APA], 2009). Cities are increasingly suffering cutbacks in state and federal funding coupled with lack of political leverage to raise taxes. Simultaneously, cities face increased demands for more and more projects (e.g., roadway repair, affordable housing, and expansion of public safety facilities) to meet the demands of population growth. Consequently, urban green infrastructure projects must compete for funding. Thus, the case for tree planting, care, and preservation campaigns, for example, must be made through quantitative arguments assigning dollar values to the benefits and costs associated with trees as green

infrastructure elements. This translates to the economic language to which citizens and policy makers most immediately relate.

Benefit-Cost of Austin's Public Trees

For every dollar spent on Austin's trees, the urban forest provides **$9.87** in benefits back to the city. As a tree grows larger, it provides more benefits. This means, as a whole, the urban forest is one of the few components of public infrastructure that increases in value over time. This infrastructure, like all other more well-known elements (e.g., water pipelines, roads, etc.) requires regular maintenance if it is expected to function at an acceptable level.

Focus Point | Calculating the Worth of Our Public Street Trees

Figure 2.11 displays the most recent cost-benefit analysis of Austin's public street trees. The financial values of these trees were calculated using i-Tree Street—a nationally recognized software developed by the U.S. Forest Service. The software calculates costs and benefits of trees in dollar values according to species type, condition, size, and benefit prices (e.g., cost of electricity per kWh) according to local market conditions. Public park trees were omitted in this analysis because i-Tree Street calculates cost-benefit statistics only for street trees.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Figure 2.11 | Cost-Benefit of Public Street Trees

Benefits	Total $ Value	$ value/tree	$ value/capita
Energy	1,318,664	8.47	1.78
CO2	308,729	1.98	0.42
Air Quality	147,872	0.95	0.20
Stormwater	2,948,331	18.93	3.99
Aesthetics	5,528,383	35.49	7.48
Total	**10,251,979**	**65.82**	**13.87**

Costs	Total $ Value	$ value/tree	$ value/capita
Planting	25,314	0.16	0.03
Contract pruning	429,099	2.75	0.58
Pest mgmt.	0	0.00	0
Irrigation	125,816	0.81	0.17
Removal	183,899	1.18	0.25
Administration	69,634	0.45	0.09
Inspection/service	90,195	0.58	0.12
Infrastructure repair	0	0.00	0
litter clean up	114,916	0.74	0.16
liability/claims	0	0.00	0
Other costs	0	0.00	0
Total	**1,038,873**	**6.67**	**1.40**
Net Benefits	**9,213,106**	**59.15**	**12.46**
Benefit-cost ratio		**9.87**	

Focus Point | Dead Wood

This refers to dead trees and limbs such as standing yet no longer living "snag" trees or downed logs. Although often regarded as an unattractive nuisance or threat to public health, dead wood serves an essential role in supporting wildlife and enhancing biologic processes. Birds, mammals, reptiles, amphibians, invertebrates, and various decomposers seek refuge in, on, or underneath dead wood. The presence of dead wood not only provides habitat but also facilitates the release of vital nutrients back into the urban forest ecosystem by

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

increasing carbon in soils and capturing and retaining moisture. Dead wood is a prime example of an essential yet often overlooked benefit of the urban forest.

Green Infrastructure

ImagineAustin defines green infrastructure as "strategically planned and managed networks of natural lands, working landscapes and other open spaces that conserve ecosystem values and functions and provide associated benefits to human populations."

Green Infrastructure Elements

- Urban forest
- Urban trails
- Parks
- Greenways
- Greenbelts
- Preserves
- Natural areas
- Rivers
- Creeks
- Lakes
- Gardens
- Urban agricultural land
- Open spaces
- Wildlife habitats
- Stormwater features

Supporting Austin's Green Infrastructure

Snapshot of current planning efforts by the City of Austin to support green infrastructure.

ImagineAustin - Green Infrastructure Priority Program | To manage Austin's urban and natural ecosystems in a coordinated and sustainable manner.

Invasive Species Management Plan | A city-wide plan for the control and/or eradication of undesirable aquatic and terrestrial plant species.

Community Fire Mitigation Plan | This Plan will provide the framework for the County's efforts to become a Fire-Adapted Community, will aid regional communities in understanding

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

wildfire risk, and will provide guidance for reducing that wildfire threat to avert potential catastrophic fires.

Climate Protection Plan | Established in 2007, it establishes five goals and associated objectives to achieve significant reductions in greenhouse gasses by 2020.

Green Roof Advisory Plan | A plan to support the growth of green roofs in Austin developed by the Council sponsored Green Roof Advisory Group.

Watershed Protection Management Plan | The Watershed Master Plan assesses erosion, flood, and water quality problems in Austin. It also prioritizes and implements effective solutions that address all three problems. Solutions include projects, programs, and regulations.

Travis County Colorado River Corridor Plan | The plan's goal is to provide orderly growth in the Corridor and help preserve and enhance the area's many valuable environmental, economic, recreational, and cultural resources.

Major Urban Forest Pests
Fungal
Oak Wilt affects the red oak family rapidly, live oaks at intermediate speed, and white oaks less frequently and more slowly. Trees may contract oak wilt via nitdulid beetles or from another infected oak tree's subterranean roots if they graft together from close proximity. There is no treatment for oak wilt; it is a terminal condition.
Hypoxylon canker colonizes and decays sapwood in trees that are already experiencing stress. Oaks are usually targeted but other hardwoods are also susceptible. This fungus usually presents a terminal situation for the trees that it infects.

Insect
Emerald Ash Borer (EAB) – This dime-sized insect is currently decimating ash tree populations across the United States. EAB will target stressed and weakened trees, laying eggs on the trunks. The hatched larvae will bore through the bark into the sapwood to feed until they reach adulthood and bore back through the bark and exit the tree. The larval feeding is what incurs the major damage and once a tree is infected it is usually too late to provide health care.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Nitidulid beetle – One of the major vectors (transporters) of the oak wilt fungus. The beetle will travel from tree to tree, spreading the lethal spores.

Vegetative
Chinaberry – Invasive tree from Asia. Dark green double-compound leaves. Grows more rapidly than most native trees, outcompeting them for sunlight and eventually shading native trees out altogether.
Glossy Japanese Privet (Ligustrum) – Invasive multi-stemmed evergreen tree/shrub native to southeast Asia. Leaves are glossy and waxy to the touch, 2-4 inches, and arranged in an opposite pattern. Grows more rapidly than most native trees and will outcompete them in most scenarios.

Mistletoe – Brittle evergreen plant that group colonizes on the exterior of tree bark. The plant will penetrate bark tissue and absorb water and nutrients in a parasitic fashion. Poisonous to humans.

Bacterial
Bacterial Leaf Scorch – Xylella fastidosa is a bacterium known to cause scorch in tree leaf margins. Transmitted by insects that feed on sapwood fluids. Can cause tree stunting, the dying back of branches and death. Not to be mistaken for oak wilt, since the margin scorch can look similar in red oaks.

COMMUNITY FRAMEWORK

In a truly sustainable urban forest, all members of a community must cooperate to share the responsibility for natural resource management. Community framework is the fabric for which interested citizens as well as public, private, and nonprofit stakeholders work toward sustainable objectives.

This section covers the following indicators:
•   General urban forest awareness
•   Neighborhood action

General Urban Forest Awareness | Awareness is the first step in community cooperation. Generally speaking, trees are seen as important to the Austin community and are acknowledged as beneficial providers of valuable services, but not without associated concerns. For instance, the 2012 Austin urban forest opinion poll, Tree Be-Leafs, found that

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

> **Comment [HA18]:** The Community Framework section needs to include specific measures to increase community outreach and its documentation, due to the AUFP's nearly complete absence of performance data related to neighborhood and community needs, actions, and related incentives.
>
> STAFF COMMENT: This comment should be addressed when the Performance Report Card is reviewed by the UFB/UFBWG.

participants valued trees most for their shade, environmental benefits, and aesthetics (City of Austin, Urban Forestry Program, 2012). On the other hand, citizens expressed concern about power line interference and roots cracking sidewalks. Citizen concerns have prioritized and will continue to prioritize planning, implementation, and education efforts regarding our urban forest.

Neighborhood Action | Neighborhood action requires that citizens understand and participate in public urban forest management. Neighborhood organizations that are led by neighborhood initiatives should inform neighborhood plans that work in partnership with urban forestry standards. Although most Austin neighborhood plans include open space goals, they often lack explicit urban forestry goals. Nevertheless, Austin has an active community involved in parks and natural areas throughout the city. The volunteer efforts of many community-based groups through tree planting initiatives and park cleanup or workdays show community commitment to Austin's natural landscapes. Listed here are just a few examples of community-based tree-related organizations:

Community-Based Groups *(alphabetized in InDesign doc)*
- Barton Creek Greenbelt Guardians
- The Center for Environmental Research at Hornsby Bend
- American Youth Works - Texas Conservation Corps
- AmeriCorps
- Austin-Bastrop River Corridor Partnership
- Austin Parks Foundation
- The Trail Foundation
- TreeFolks
- Keep Austin Beautiful
- Hill Country Alliance
- Austin Tree Task Force
- Austin Heritage Tree Foundation
- Austin Chapter of the National Wildlife Federation Habitat Stewards
- Native Plant Society of Texas
- Capital Area Master Naturalists
- Travis County Master Gardeners
- Austin Neighborhoods Council
- Lady Bird Johnson Wildflower Center

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Focus Point | TreeFolks

TreeFolks is a nonprofit organization established in 1989 that grows the urban forest through tree planting, education, and community partnerships. The organization invites businesses, schools, government, citizen groups, and individuals to join them in creating a healthier environment and enhancing the quality of urban life. As a volunteer green planting organization, TreeFolks provides a valuable service to the Central Texas community. TreeFolks works closely with other groups to educate and involve citizens in tree planting and care. Since its inception, TreeFolks has planted 250,000 trees in the Austin and Central Texas area.

RESOURCE MANAGEMENT

This section describes the internal administrative and management resources available for sustainable management of Austin's urban forest. This not only pertains to physical resource management but also to public and administrative perceptions of management itself. Resource management includes digital inventories, plans, funding, City staff, policies, etc.

This section covers the following indicators:
- Existing policies
- Urban forest establishment through tree planting programs
- Internal program resources

~~The creation and adoption of Austin's Urban Forest Plan seeks to guide overall citywide urban forest management such that policies and department operational plans conform to community visions. Ultimately, community visions inform local urban forestry policies that are embodied in our existing Imagine Austin comprehensive plan, City Code, and other policy documents.~~

> **Comment [HL19]:** SUGGESTION FROM ENVIRONMENTAL BOARD DR. MAXWELL TO MOVE THIS TO BEGINNING OF DOCUMENT.
>
> STAFF COMMENT – DONE.

Existing Policies | The following briefly details the major tree-related policies within the City of Austin to outline how urban forestry resources are managed.

Several City policy documents guide tree protection, preservation, and care within Austin. These include the Land Development Code (e.g., § 6-3-6 Standards of Care for Trees or Plant on Public Property) and the Environmental Criteria Manual.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

The City's Land Development Code serves to regulate land development, public and private, within the city limits and ETJ. Land Development Code 25-8 Subchapter B Article 1 addresses trees and natural area protection during the land development process. Tree regulations for site plans include protecting trees 8-18 inches in diameter at breast height to the extent feasible. Trees 19 inches or greater are considered protected trees and certain species at 24 inches in greater are considered heritage trees. For single-family developments, the protected and heritage tree ordinances apply. For all development, protected and heritage trees must be preserved unless they meet criteria for removal as stated in the Land Development Code.

The Environmental Criteria Manual is the City's technical criteria for complying with the Land Development Code. Section 3 (Tree and Natural Area Preservation) defines design criteria to achieve tree preservation goals derived from the Land Development Code. The section details survey standards, critical root zone preservation standards, mitigation rates, and other details that are required for the development review process.

Focus Point | Development and Tree Preservation

In 1983 the City Council adopted one of the most progressive tree ordinances in the country. The Tree and Natural Area Protection Code is based on the fundamental precepts of sound urban forest management; diversification, preservation, and replenishment. Also, in 2010 City Council unanimously adopted the Heritage Tree Ordinance. Proposed developments are reviewed to assure that a final product complies with the Land Development Code for tree preservation. Code requirements principally address preserving trees, and when trees cannot be preserved and meet code criteria for removal, only then is tree mitigation addressed via tree planting, care for existing trees, and other mitigative measures.

> **Comment [HL20]:** Rewritten for consistency, clarity and accuracy by Keith Mars, City Arborist Program, 10-28-13.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Tree and Natural Area Preservation Ordinance | The Tree and Natural Area Preservation code is designed to assure that trees are an integral part of new development projects. Proposed development projects are evaluated on a case-by-case (and tree-by-tree) basis. The plan review process entails evaluating the existing tree resources on a site, understanding the dynamics of trees and development impacts, and negotiating a solution that results in a development with a balanced mixture of young and mature trees, and a good diversity of species. Trees 8 inches in diameter and larger on a commercial sites (19 inches in diameter on a single-family home sites) are evaluated for protection and replacement. The goal of each review is to assure that a final product is achieved that results in a diversified and sustainable urban forest. Existing trees are preserved when possible; additionally, high quality native and adapted trees are required to be planted on development sites. Environmental Inspectors regulate the site during construction. More specifics on the City of Austin tree ordinance can be obtained within the Land Development Code (LDC) 25-8, Subchapter B.

Tree Planting Programs | Several tree planting groups, both public and nonprofit-based, guide new tree plantings in Austin. Austin Community Trees serves as a public partnership to plant trees with the ultimate goal of increasing canopy cover to cool Austin neighborhoods. In addition to ACT, Austin's Parks and Recreation Department (PARD) plants trees during the planting season (October-March) in parks, medians, and the right-of-way. Funding comes from Planting for the Future Fund and planting locations are chosen based on neighborhood requests and a park planting prioritization analysis. Within PARD, the Urban Forestry Program plants approximately 500-1,000 trees annually. Areas that are planted are usually the result of a request from neighborhood associations. Plantings conducted on Saturdays with the help of volunteers. The nonprofit organization TreeFolks promotes reforestation in Central Texas through a tree planting program called NeighborWoods, which delivers street trees on private residential property free of charge. The advantage of NeighborWoods lies in its partnership and reach across both public and private realms. The program works closely with PARD staff and is sponsored by the City's Climate Protection Program, Austin Energy, Apache, and Save Barton Creek Association. According to the TreeFolks website, they plant 10,000 trees annually with a total of 250,000 trees in the Austin region to date.

Figure 2.12 (next page) shows the collaborative efforts of tree-related programs and responsibilities across City departments.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Parks and Recreation | PARD primarily responds to tree issues in parks, preserves, and rights-of-way through the City's 311 call service. The department is responsible for more than 2,000 miles of rights-of-way and more than 16,000 acres of park land, according to the City's GIS datasets. The Urban Forestry Program exists within PARD as the primary entity for maintaining, preserving, removing, and planting trees growing on City parks and public property. Activities consist of removing low limbs over the rights-of-way, clearing blind corners, removing and planting trees, and hauling woody debris from streets and parks.

Austin Energy | Austin Energy primarily responds to trees located in power line easements and near street lamps. Activities include pruning trees for electric utility line clearance and partnering with local nonprofits (e.g., TreeFolks) to plant new trees according to goals set in the City's Heat Island Initiative and Climate Protection Program. Austin Energy manages the vegetation under and around its 2,300 miles of overhead distribution and 500 miles of transmission lines. To accomplish this, Austin Energy has instituted a program for the maintenance and management of the vegetation along the lines. Austin Energy's goal is to visit every mile of line once every four to five years to maintain the vegetation around the electric facilities.

Decker Indiangrass Management Plan
This management plan outlines a five-year strategy to initiate the long-term restoration of Blackland Prairie in Decker Tallgrass Prairie Preserve and Indiangrass Wildlife Sanctuary, located within Walter E. Long Metropolitan Park.

NeighborWoods
Through this program TreeFolks, a local nonprofit organization, plants 3,600 trees each year along residential streets and sidewalks.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Figure 2.12 | Tree-Related Responsibilities by City of Austin Departments

Planning & Development Review

	Regulation	Planning	Planting	Maintenance	Education
1. Zoning	√	√			
2. Annexation	√				
3. Environmental Inspection & Enforcement	√	√			
4. Landscape Inspection		√	√		
5. Comprehensive Planning		√	√		√
6. GIS/Data Analysis	√		√		
7. City Arborist Program					
· Land Use & Environmental Review	√	√	√	√	√
· Heritage Tree Ordinance	√	√		√	
· General Permits	√	√		√	
· Tree Ordinance	√	√	√	√	
· Hill Country Roadway Ordinance	√	√			
· Oak Wilt Program				√	√
· Urban forest Grant Program		√	√	√	
8. Urban Design					
· Great Streets	√	√	√		
· TODs	√	√	√		√
· Small-Area Plans	√	√	√		√
9. Neighborhood Planning					
· Austin Community Trees		√	√		√

Parks & Recreation

	Regulation	Planning	Planting	Maintenance	Education
1. Memorial Dedication Tree Planting			√		√
2. Site Plan Review	√	√			
3. GIS/Data Analysis		√	√	√	√
4. Emergency response					√
5. Public Tree Care Permitting	√			√	
6. Tree City USA					√
7. Adopt a Park Volunteer Agreements			√	√	
8. Community Gardens/Food Forests			√		
9. Urban Forester					
· Preserves & Greenbelts		√	√	√	√
· Planting (Parks, ROW, and other public property)			√		
· Maintenance (Parks, ROW, and other public property)				√	
· Public & Private Partnerships		√	√	√	√
· Tree Inventory		√	√	√	√
· Park Planning		√			
· Claims, Legal, & Appraisals	√	√			
· Urban Forestry Board Liaison	√	√			√
10. Strategic & Operational Planning					
· Urban Forest Master Plan	√	√	√		
· Site-specific Planning		√	√		
· Maintenance & Park And Trail Planning		√	√	√	
11. Public Outreach & Education					
· Urban Forest Stewards					√
· Leaf for a Leaf					√
· Arbor Day					√

Public Works

	Regulation	Planning	Planting	Maintenance	Education
1. Capital Improvement Projects		√			
2. ROW Maintenance	√			√	
3. Subdivision Infrastructure Construction		√			
4. Road Improvements				√	
5. Inspection				√	
6. Sidewalk Easements	√	√			
7. Row & Alley: Debris Removal				√	
8. Traffic Signs/Signals Clearance	√			√	
9. Neighborhood Partnering Program	√	√	√	√	

Watershed Protection

	Regulation	Planning	Planting	Maintenance	Education
1. Stream Restoration					
2. Creek Maintenance (Field Operations)		√	√	√	
3. Grow Green					√
4. Flood Mitigation					
5. Watershed Protection Master Plan					
6. GIS/Data Analysis					
7. State of the Environment Report					
8. Riparian Zone Restoration Program					
9. Invasive Species Program		√	√	√	
10. Integrated Pest Management (IPM)			√	√	

Key:

1. **Regulation:** Program helps establish policies regulating some aspect of trees, e.g., protection, mitigation, placement, etc.
2. **Planning:** Program establishes strategic, long term, or comprehensive plans related to trees.
3. **Planting:** Program supports planting of trees, including organization & tree-distribution, watering for 2 years.
4. **Maintenance:** Program relates to City maintenance of trees, including inspection, pruning, removal, long-term irrigation, etc.
5. **Education:** Program provides tree-related education and/or outreach to public.

Austin Water

	Regulation	Planning	Planting	Maintenance	Education
1. Dillo Dirt					
2. Wildland Conservation		√	√	√	√
3. Water Conservation & Enforcement					
4. Water Quality Land Acquisition		√			
5. Water Quality Protection Lands		√	√	√	√
6. Balcones Canyonland Preserve		√	√	√	√
7. Wildland Outreach			√		√
8. Fire Management Program		√		√	
9. Reclaimed Water					

Office of Sustainability

	Regulation	Planning	Planting	Maintenance	Education
1. Sustainable Land Management					
2. Heat Island					
3. Neighborwoods					
4. Tree of the Year					
5. Green Alley (PW-CIP)					
6. Green Roofs Program					
7. Large Shade Tree Contract			√		

Transportation

	Regulation	Planning	Planting	Maintenance	Education
1. Long-Range Transportation Planning					
2. Parking					
3. Signs & Signals					
4. Traffic Engineers					
5. License Agreement	√		√	√	

Austin Resource Recovery

	Regulation	Planning	Planting	Maintenance	Education
1. Large Brush & Yard Trimmings Pick-Up					
2. Bulk Brush					
3. Christmas Tree Recycling					

Austin Energy

	Regulation	Planning	Planting	Maintenance	Education
1. Green Building	√	√			√
2. Power Line Clearance (AE)			√	√	

Fire

	Regulation	Planning	Planting	Maintenance	Education
1. Wildland Fire Interface		√		√	
2. Development Review Support	√	√			

Corporate Purchasing

	Regulation	Planning	Planting	Maintenance	Education
1. Tree-related Contracts & Services					

Office of Emergency Management

	Regulation	Planning	Planting	Maintenance	Education
1. Ice Storms		√			

Economic Growth & Redevelopment Services

	Regulation	Planning	Planting	Maintenance	Education
· Downtown Redevelopment					

Law

	Regulation	Planning	Planting	Maintenance	Education
1. Real Estate					

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

Public Works | Responsibilities of the Public Works Department (Public Works) overlap PARD activities, as most of their efforts relate to trees on rights-of-way and transportation corridors. Public Works removes tree limbs that obstruct traffic signals, and removes debris from streets, alleys, and sidewalks.

Planning and Development Review | The Planning and Development Review Department (PDRD) integrates tree planting goals into the neighborhood planning process by providing free trees through the Austin Community Tree (ACT) program. In addition, PDRD houses the City Arborist's Office, which is responsible for issuing private tree permits on residential and commercial properties. The arborist's goals derive from the City's Land Development Code and Environmental Criteria Manual, which guide tree protection, preservation, and design criteria.

Watershed Protection | The Watershed Protection Department (WPD) manages the urban forest in riparian areas, with most efforts related to erosion problems on stream banks and trees growing on property overseen by the department. In conjunction with PDRD, the WPD works to improve riparian zones along creeks by establishing "no-mow/grow zones" along creek banks to improve erosion control, habitat, and water quality.

Austin Community Trees (ACT) serves to reduce the urban heat island effect by planting new trees on private property near streets and sidewalks. Eligible neighborhoods must have adopted a neighborhood plan, established a neighborhood contact team, and have low tree canopy cover (below 40%) as defined by GIS analysis of the neighborhood. The ACT program exists as a public partnership between the community and organizations that care for trees: PDRD, PARD, and AE.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

URBAN FORESTRY ONGOING CHALLENGES

In 2012, the Urban Forestry Board compiled the top three to four ongoing challenges that prevent the City of Austin from achieving each vision component. Using the Urban Forestry Board's Retreat results as the groundwork for this collaborative process, the working group crafted priority challenges for each of the six vision categories. The following lists these challenges.

1. CONTIGUOUS

- Lack of Integrated land classification and management of public lands
- Fragmented regional comprehensive planning/land classification
- Competing land use/urban development patterns

2. PROTECTED

- Insufficient resources to promote and enforce tree regulations
- Misperception of what a sustainable site is
- Insufficient mechanism to update standards and specifications for tree protection and sustainable site design

3. HEALTHY ECOSYSTEM

- Lack of education and/or utilization of ecosystem-specific appropriate species
- Lack of comprehensive inventory
- Lack of coordinated effort to create a comprehensive local and regional planting plan that supports diversity of age and species
- Lack of resources to accomplish the above things

4. VALUED

- Lack of local government and public awareness and education of the benefits and value of the urban forest
- Inadequate methods for quantifying the ecosystem services and the financial benefits of the urban forest
- Failure by city government to value trees as a public utility deserving of associated funds and regulations

5. THRIVING

- Biotic and abiotic stressors, i.e., invasive species, urban soil, and climate change
- Lack of financial resources for expanding the urban forest to optimal capacity
- Attrition of urban forest due to competing land uses and site design

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

- Lack of quantitative and qualitative information about the urban forest resource

6. CARED FOR

- Lack of resources prevents proactive urban forest maintenance
- Large size and complexity of City of Austin and ecosystem
- Lack of coordinated urban forest planning and management effort on a citywide scale
- Lack of education

Implementation

Chapter 3 outlines implementation—the process of fulfilling goals and visions of the community. It involves policy measures to effect positive change within our urban forest. Our policies parallel the broad scope of this plan, as they are general and strategic, intending to change departmental urban forestry management.

IMPLEMENTATION GOALS

POLICY ELEMENTS

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

IMPLEMENTATION GOALS

Because implementation is the first step in a transformation of public urban forest management, in order for a plan to be effective, and produce change, implementation of the plan must spell out clear, measurable objectives. These objectives must be broad to accommodate the scope of the plan, and must address the strategic purpose (as opposed to a tactical purpose) of the plan. The success of the plan will be measured in terms of the City's response to addressing the items laid out in the form of the Departmental Operational Plans and in making strides in advancing the Urban Forester functions. If implementation goals are met, there should be a marked change in the Performance Indicators, which, as a whole, can be considered a report card on the City's urban forest resource management.

GUIDELINES

Time Frame: The time frame for the Austin Urban Forest Plan (AUFP) is five years. Five years from the date the Plan is adopted, a revised Austin Urban Forest Plan will be created to reflect broad changes in the community that during that time.

Comment [HL21]: REQUEST FROM ENVIRONMENTAL BOARD TO CHANGE TO 5 YEARS.

UFBWG APPROVED THIS.

Reporting: The Urban Forester will develop an annual State of the Urban Forest Report to update the status and trend of the Performance Indicators as well as Departmental progress on developing Departmental Operational Plans to address the Policy Elements.

Public Input: Much of the public input received for Austin's Urban Forest Plan is tactical in nature. In many instances, specific geographic areas or management practices are mentioned. Because the AUFP is a broad, strategic document that is not intended to spell out specific changes to operations performed by City Departments, much of the public input received for the AUFP will be shared with City Departments and will be used to guide the development of Departmental Operational Plans (DOP). The DOPs shall be developed and reviewed by the Urban Forest Board as they become available. The Board will provide input and at those meetings the public will have the opportunity to provide citizen comment.

IMPLEMENTATION STRATEGIES

Based on feedback from the community, Urban Forestry Board, and staff, these implementation strategies will be turned into goals for the Plan.

Overall strategies:

City Departments to develop tactical Departmental Operational Plans based on the AUFP and addressing the Policy Elements

Citywide follow-up items are implemented by the Urban Forester

Improvement of Performance Indicators

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Mechanism established for interdepartmental coordination on urban forest decision-making City of Austin alignment with national standards or benchmarks for urban forest management, especially related to management structure and funding

GOALS
Austin Urban Forest Plan Implementation Goals

1) Performance Indicator
Overall, by 2018, the City of Austin improves its management of the urban forest to an overall level of optimal based on Performance Indicators in the Austin Urban Forest Plan.

> **Comment [HL22]:** REQUEST BY ENVIRONMENTAL BOARD AND OTHERS TO CHANGE TO 2018.
>
> UFBWG APPROVED THIS.

2) Canopy Goal

> **Comment [HL23]:** ADDITIONAL GOAL REQUESTED BY PEGGY. SEE IMPLEMENTATION ACTION 2) CANOPY GOAL FOR IMPLEMENTATION ACTIONS.
>
> SHIFTS OTHER GOALS DOWN BY 1.

2) 3)Departmental Operational Plans
Every land-managing or land-regulating department has a draft Departmental Operational Plan based on the Austin Urban Forest Plan and Action Matrix and is actively implementing within 18 months following adoption of the Comprehensive Urban Forest Plan.

3) 4)Austin Standard of Care
Austin-specific Standard of Care for Trees and Vegetation in place by 24 months following adoption of the Austin Urban Forest Plan and provides common guidance and best-management practices to all Departments.

> **Comment [HL24]:** SUGGESTED CHANGE BY AHTF/NICK – CHANGE 24 MONTHS TO 18.
>
> *NICK WAS CONCERNED ABOUT TIMELINE AND WANTED TO BRING IT TO THE FULL UFB.

4) 5) Coordination
Within 12 months an interdepartmental tree work group coordinates all operational and regulatory functions related to urban forest management and is overseen and coordinated by a single governing authority.

5) 6) Benchmarks
Within 12 months following adoption of the AUFP the City of Austin management structure and funding for urban forestry is well-documented and aligned with national standards and benchmarks. Develop a process for departments to develop and review public comments.

7) Strategy for Addressing Private Trees

> **Comment [HL25]:** ADDITION REQUESTED BY NICK AND PEGGY. SEE IMPLEMENTATION ACTION 7) Strategy for Addressing Private Trees FOR IMPLEMENTATION ACTIONS.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Implementation Actions

1) Performance Indicator

1.1 By eighteen months following adoption of the Austin Urban Forest Plan, the Urban Forester will seek and utilize additional comprehensive public urban forest data collection and analysis, especially where known gaps exist, to improve data reliability and inform future updates to Performance Indicators. Data collection methods should follow nationally-recognized best management practices in acquiring vegetation information for purposes of maintenance, planning, canopy goal establishment, and other comprehensive urban forest management efforts. Data should be collected and stored in formats easily shared between departments and stakeholders. For example, see the International Society of Arboriculture's (2013) *Best Management Practices: Tree Inventories*, 2nd Edition. Recognizing that data collection methods vary according to intended purposes and that all urban forests are unique, inventory options should adjust to achieve desired goals and purposes. Data collection shall include sample tree inventories and GIS data collected in the standard format and with data fields specified by the urban forester.

1.2 (new) The urban forester shall analyze additional tree data as soon as it is obtained, and review Chapters 2 and 3 of the Plan.

1.3 (new) Within three months of obtaining the data, Departments shall establish a canopy goal, a budget, and an implementation plan to achieve the canopy goal.

~~1.2~~ 1.4 (shift from 1.2 – NC) The Urban Forester will report annually, starting 18 months following the adoption of the Austin Urban Forest Plan, on the status of the Performance Indicators and will include additional information on trends or current urban forest issues. The information will be provided in the State of the Urban Forest Report.

~~1.3~~ 1.5 (shifted from 1.3 –NC) The Urban Forester shall coordinate with other departments to establish standardized data collection and formats to improve citywide urban forest data management and analysis.

2) Canopy Goals

2.1 Interdepartmental groups shall establish a canopy goal for each area of the Austin 6 months after the additional data (1.1) is received.

<div align="center">

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

</div>

Comment [HL26]: COMMENT FROM NICK – Adding this text "Data collection shall include sample tree inventories and GIS data collected in the standard format and with data fields specified by the urban forester." will "assure that various departments collect data with the same specified data fields and the same specified standard format so that it can be combined as a whole for the entire city. It doesn't hurt to specify a standard format to be used and data fields to be collected because not everyone follows Best Management Practices (BMP)."

Comment [HL27]: COMMENT FROM NICK – This is to comply with the Environmental Board's recommendation, page 2, 3rd and 4th bullets.

ENVIRONMENTAL BOARD REFERENCE:
Bullet 3 – Adjust or clarify the Departmental Operational Plan Review process to require Departments to address applicable public comments documented in the Plan's Appendices to ensure that public comments gathered at the multiple engagement events help inform operational plans.

Bullet 4 – A review of the Plan implementation should occur much sooner than is indicated in the current draft. The input of the stakeholders and some Board members is very clear about the recommended time frame for review. This is quite urgent because of the drought impacts on many of the trees in the Urban Forest of Austin.

Comment [HL28]: COMMENT FROM NICK – This is to comply with Imagine Austin Priority Action AC A22.

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

2.2 Each department shall establsish a budget and implementation plan to acheieve the canopy goal.

2.3 The Urban Forester will report once per year to the UFB on pregress towards achieving the canopy goals.

2) 3) Departmental Operational Plans

2.1 3.1 The Urban Forester will oversee and provide staff support to Departments in their development of Departmental Operational Plans for urban forest management.

2.2 3.2 The urban forester will utilize the Departmental Operational Plan Action Matrix to facilitate the progress of Departmental implementation of the Austin Urban Forest Plan.

2.3 3.3 (new) The UFB shall review the DOPs in public meetings as they become available.

> **Comment [HL29]:** ADDITION FROM NICK.

2.4 3.4 (new) The urban forester shall establish a process to assure that the public comments in the Appendices of this plan are reviewed and acted on by the departments when writing their DOPs.

> **Comment [HL30]:** ADDITION FROM NICK - This is to comply with the Environmental Board's recommendation, page 2, 2nd bullet. Then renumber the last one 2.5.
>
> ENVIRONMENTAL BOARD REFERENCE: BULLET 2 – Adjust or clarify the Departmental Operational Plan Review process to require Departments to address applicable public comments documented in the Plan's Appendices to ensure that public comments gathered at the multiple engagement events help inform operational plans.

2.3 2.5 (shifted from 2.3) 3.5 The Urban Forester will report once per year to the Urban Forestry Board regarding Departmental progress toward implementing the Austin Urban Forest Plan.

> **Comment [HL31]:** COMMENT ALSO MADE BY PEGGY.

3) 4) Austin Standard of Care

3.1 4.1 By 12 months following adoption of the Austin Urban Forest Plan, the Urban Forester will identify and compile all existing operational or regulatory items regarding urban forest management that guide or direct Departments. This information will identify areas for improvement as well as inconsistencies.

3.2 4.2 By 24 months following the adoption of the Austin Urban Forest Plan, the Urban Forester will facilitate an interdepartmental working group to develop an Austin-specific Standard of Care for Trees and Plants on Public Property, adapted from the current Standard of Care, to provide locally relevant direction regarding public urban forest management.

3.3 4.3 The Urban Forester will brief the Urban Forestry Board regarding the updated Standard of Care by 24 months following adoption of the Austin Urban Forest Plan.
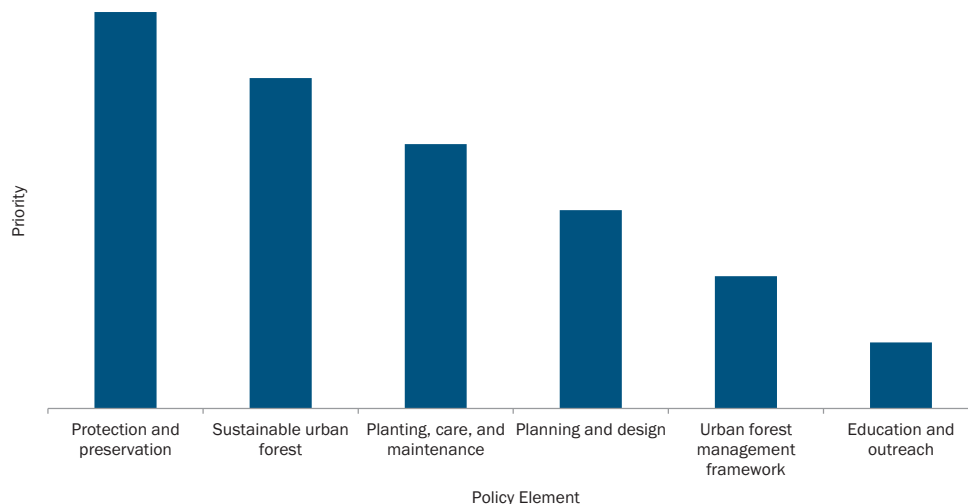
DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

~~3.4~~ 4.4 The Urban Forester will facilitate the incorporation of the Standard of Care into City rules and ordinances utilizing City role/ordinance change processes and rule/ordinance update projects.

~~3.5~~ 4.5 The Urban Forester will educate citizens, developers, and community groups regarding the Standard of Care to encourage its utilization on private property.

~~4)~~ 5) Coordination

~~4.1~~ 5.1 Within 6 months after adoption of the Austin Urban Forest Plan, the urban forester will facilitate an interdepartmental, multi-disciplinary work group comprised of City land management and land regulatory departments and establish a charter for the group. This group will coordinate urban forest policy changes and establish and update citywide Best Management Practices (BMP's) for urban forest management.

~~4.2~~ 5.2 By 24 months following the adoption of the Austin Urban Forest Plan and with information gathered by the Urban Forester and interdepartmental work teams, the City Manager will recommend changes based on recommendations from the interdepartmental group.

~~5)~~ 6) Benchmarks

~~5.1~~ 6.1 By eighteen months following the adoption of the Austin Urban Forest Plan, the urban forester will compile detailed organizational structure and funding information from all City entities that manage the urban forest as well as from other municipalities comparable to Austin to establish and compare urban forest benchmarks. The Urban Forester will present this information to the Urban Forestry Board and the City Manager.

~~5.2~~ 6.2 By twenty-four months following the adoption of the Austin Urban Forest Plan, the City Manager will review benchmark data regarding municipal urban forest management and recommend changes to organization structure and/or funding of urban forest management in Austin.

7) Strategy for Private Trees

7.1 The UFB and the Urban Forester shall develop a strategy that creates an Urban Forest Plan For Private Trees, within 60 days from approval of this plan.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

Comment [HL32]: SUGGESTED CHANGE FROM AHTF/NICK – CHANGE FROM 12 MONTHS TO 3 MONTHS.

UFBWG DECIDED TO GO WITH 6 MONTHS VERSUS 12 OR 3.

Comment [HL33]: COMMENT FROM NICK – Add more items to implement this strategy. This is to comply with the Environmental Board's recommendation, page 1, 2nd, 3rd, and 4th bullets.

ENVIRONMENTAL BOARD REFERENCE: BULLET 2 – Adjust or clarify the Departmental Operational Plan Review process to require Departments to address applicable public comments documented in the Plan's Appendices to ensure that public comments gathered at the multiple engagement events help inform operational plans.

BULLET 3 - The document page 8 refers to the need for a comprehensive plan, and the Committee agrees with that statement. A comprehensive Plan for the entire urban forest of Austin is a serious need given that the drought has impacted that forest greatly and that increasing development of the city also impacting it.

BULLET 4 – The Environmental Board can recommend to City Council that there be a comprehensive plan as a subsequent action to adoption of the current Plan by the City Council. A more comprehensive plan would involve active participation by the City Arborist and other involved in the management of the entire urban forest of Austin.

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

7.2 The UFB and the Urban Forester shall write the Urban Forest Plan For Private Trees within 2 years from approval of this plan.

7.3

POLICY ELEMENTS

The Policy Elements are the guiding framework of Austin's Urban Forest Plan. Individual Policy Elements are seeds of change that collectively provide an overall strategy for achieving the vision for Austin's urban forest. In conjunction with the other parts of this Plan, they provide a comprehensive approach to urban forest planning and will ultimately guide the management of Austin's public urban forest resource. However, since the municipal functions that affect the urban forest, both directly and indirectly, are so varied and widespread across numerous City departments, each single Policy Element must be broad enough to encompass all of those functions. Accordingly, the tactical approach to addressing each Policy Element will be the responsibility of each City department, documented in a Departmental Operational Plan developed in consideration of their mission(s), limitations and constraints, and opportunities.

Policy Element categories were prioritized through the public participation process outlined in Appendix __. While the community felt that each category was important, some issues needed a higher priority than others.

CITY STAFF INPUT

Interdepartmental staff provided feedback and edits to the Policy Elements prior to final editing by the Urban Forestry Board. The following departments provided feedback:

Parks and Recreation Department
Planning and Development Review Department
Austin Fire Department
Austin Water Utility
Watershed Protection Department
Austin Bergstrom International Airport
Office of Sustainability
Public Works Department
Austin Transportation Department

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

> **Comment [HA34]:** In general, this portion of Chapter 3 over-emphasizes city-owned trees, and Policy Elements should place at least as much attention to the large majority of the urban forest not on city property, such as private and commercial properties.
>
> *TAKE THEME OF PUBLIC PRIVATE TO UFB.

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

PUBLIC INPUT

Public input was sought in determining which topical categories are most important for the Austin community. The order in which the Policy Element Categories will appear indicates the order of importance to the Austin community based on the input collected. City departments should note which Categories are most important to the community and prioritize those in the course of implementing the Departmental Operational Plans (DOPs). With guidance and support from the Urban Forester, each City department that interfaces with the urban forest will be required to report on their annual progress in addressing each Policy Element.

Figure 3.1 | Citizen Prioritization of Urban Forestry Policy Elements

Figure 3.2 | What Urban Forest Management Items are Important to Fund?

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.
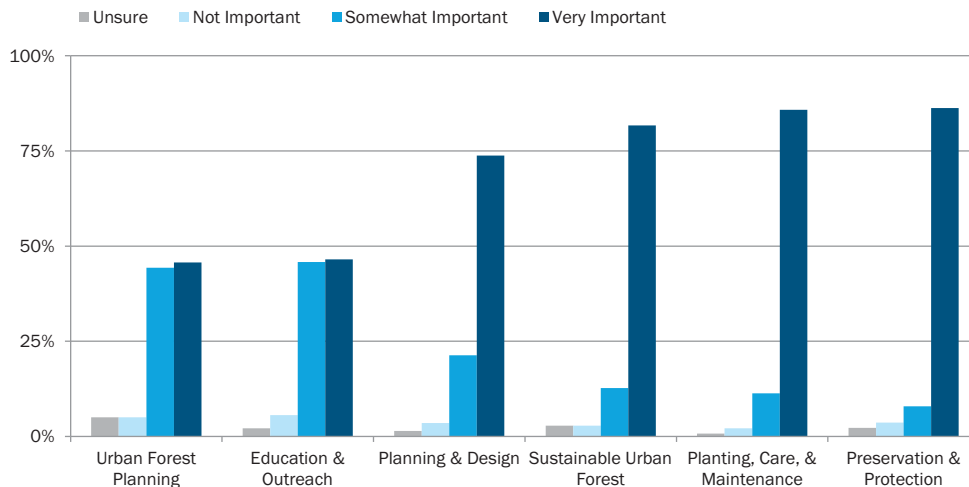
When it comes to urban forest management, citizen responses are mixed in regards to policy element prioritization versus funding, as shown in the figures above. Preservation and protection is clearly a priority that should be given the most funding.

The Policy Element "Test" | Policy Elements are grouped into categories based on their urban forest topical category. The following questions were considered in determining the relevance and appropriateness of including each Policy Element:

Does this policy element support the CUFP vision?
Does this policy element support the guiding principles?
Is this policy element pertinent to public trees and vegetation?
Is this policy element comprehensive?
Does this policy element say "what" and not "how"?
Is this policy element strategic and not tactical or operational?
Will this policy element be relevant for the next 10-20 years?

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

THE POLICY ELEMENT CATEGORIES (Prioritized from public input)

PROTECTION AND PRESERVATION
SUSTAINABLE URBAN FOREST
PLANTING, CARE, AND MAINTENANCE
URBAN FOREST MANAGEMENT FRAMEWORK
PLANNING AND DESIGN
EDUCATION AND OUTREACH

PROTECTION AND PRESERVATION

Policies related to preservation of public urban forest resources through regulation and other approaches that enhance preservation.

PR-1   Comprehensive Regulatory Approaches

Examine existing regulations to ensure the most comprehensive protection and preservation of the natural diversity of the Urban Forest; if needed, develop and implement improved regulatory approaches. Require strict adherence to city tree and vegetation regulations such as the Heritage Tree Ordinance.

PR-2   Protection of Trees and Root Zones During and After Development

Evaluate and enhance current policies for public urban forest protection during and after development to promote the long-term health and survival of trees and vegetation retained during development. Evaluate and modify protection and mitigation practices for long-term tree survival.

PR-3   Protect Steep Slopes

Increase retention of existing trees and vegetation that help stabilize steep slope areas in order to increase public safety, maintain slope stability, decrease soil erosion, and retain environmental function and natural character.

PR-4   Partnerships

Partner with federal, state, regional, and local governmental jurisdictions, community nonprofit organizations, other City departments, the private sector and others to increase preservation and protection of the urban forest such as mulching, and watering mature tree during periods of insufficient rainfall.

> **Comment [HL35]:** REQUESTED ADDITION BY PEGGY.

PR-5   View Obstructions

Establish incentives, regulations and education efforts to reduce conflicts between public and private interests, and prioritize the urban forest in decisions regarding eliminating scenic or commercial view obstructions, except with regard to public safety or in established view corridors.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

PR-6   Vegetation Valuation
Support and update tree valuation methods to closely reflect the complete functional value of vegetation for use when assessing fines, determining damages or estimating loss.

PR-7   Recovering Vegetation Value
When preservation of trees and vegetation is not feasible, require the complete replacement of the functional value of the removed resource, and mitigate as close in proximity to the loss and as soon as possible. Evaluate and modify protection and mitigation practices and policies.

> **Comment [HL36]:** REQUEST FROM NICK - Modify PR-7 by adding the following sentence to the end of it: "Evaluate and modify protection and mitigation practices and policies."
>
> STAFF RESPONSE: ADDRESSED AT UFB WORKING GROUP MEETING. PR-1 AND PR-2 ADJUSTED TO ENCORPORATE THIS REQUEST.

PR-8   Prominent Rare Urban Forest Elements
Provide additional protection for prominent, sensitive, native, and/or rare urban forest elements during and after development. Protect trees based on species type/habitats.

SUSTAINABLE URBAN FOREST
Sustainable Urban Forest policies are related to sustainability of the urban forest resource itself and the resources related to its management, such as water (and city assets).

> **Comment [HA37]:** City expenditures to sustain the urban forest should implement all of these policy elements on both public and private properties.
>
> *TAGGED FOR UFB THEMED PRIVATE/PUBLIC DISCUSSION.

S-1   Species, Age, and Geographic Diversity
Increase species diversity, a regionally appropriate mix of vegetation, mixed-age populations and a varied distribution of species throughout the City to protect and improve the vigor and the resilience of our urban forests. Align urban forest composition with consideration of predicted climate patterns. Plant appropriate native species in appropriate habitats.

S-2   Urban Wood Utilization
Recycle green waste generated by urban forest maintenance and encourage the highest and best sustainable uses of removed trees and woody material, including reuse on site. Strive for 100% green waste recycling or reuse.

S-3   Integrated Pest Management
Incorporate Integrated Pest Management principles into land management practices.

S-4   Wildlife Habitat
Enhance wildlife habitat to the maximum extent based on site use through urban forestry policies, design and management practices.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

S-5   Wildfire Risk

Achieve a balance between community desires for wildfire risk reduction and responsible vegetation management, especially within the Wildland Urban Interface

S-6   Invasive Species Management

Identify and suppress non-native invasive species. Provide public education about the detriment of non-native invasive species to the urban forest, particularly when related to other management policies.

> **Comment [HL38]:** COMMENT FROM ENVIRONMENTAL BOARD MEMBER DEEGAN – How to address invasives effectively.
>
> STAFF RESPONSE: Invasive species management addressed in detail in the Invasive Species Management Plan. This Plan's implementation will be consistent with ISMP goals and objectives.

S-7   Water Conservation

Minimize the need for supplemental irrigation of public trees and vegetation during design and maintenance planning. When utilizing water for supplemental irrigation of public trees and vegetation, maximize the use of non-potable sources (e.g., stormwater, reclaimed water) and adopt practices that conserve potable sources.

> **Comment [HL39]:** COMMENT FROM ENVIRONMENTAL BOARD MEMBER DEEGAN – Do we want to "minimize" waste or provide appropriate level. Could be justification for not watering trees.
>
> STAFF RESPONSE: UFBWG added PCM-9 Prominent Trees to address need for watering.

S-8   Urban Forest Pests

Using the principles and practices of Integrated Pest Management, identify, plan for, and respond to critical urban forest pests to reduce their impact on the community's urban forest.

> **Comment [HL40]:** COMMENT FROM ENVIRONMENTAL BOARD MEMBER DEEGAN – Oak Wilt. Addressed?
>
> STAFF RESPONSE: Yes, Oak Wilt management will be consistent with Integrated Pest Management.

S-9   Partnership

Partner with federal, state, regional, and local governmental jurisdictions, community nonprofit organizations, the private sector and others to accomplish the sustainability goals of Austin's urban forest ecosystem.

PLANTING, CARE, AND MAINTENANCE

Planting, care, and maintenance policies are related to the consideration of existing public urban forest resources and proactive planning for sustainable future urban forest resources, while understanding the inherent conflict between active site use and healthy forests.

> **Comment [HA41]:** All of these policy elements should embrace properties not owned by the city. Comprehensive incentive programs and other means should be identified as policy goals to plant and maintain the urban forest on private residential and commercial properties, as well as on city properties.
>
> *TAGGED FOR UFB THEMED PRIVATE/PUBLIC DISCUSSION.

PCM-1 Planting Priorities

Prioritize tree planting and landscaping on public property to maximize environmental, social, and economic benefits. Avoid and/or minimize conflicts with existing public infrastructure.

> **Comment [HL42]:** COMMENT FROM ENVIRONMENTAL BOARD MEMBER DEEGAN – Prioritize root zone size?
>
> STAFF RESPONSE: Soil volume addressed in PD-4 Soil Volume.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

PCM-2 Species Selection

Encourage the selection of appropriate native species based on project, location, site conditions, and potential future changes in climate patterns.

PCM-3 Urban Forest Planting and Maintenance Plan and Program

Establish and maintain a strategic planting and maintenance program (including pruning, mulching, and watering of mature trees during insufficient rainfall) __ based on national standards and best management practices. Ensure the long-term survival of the urban forest by prioritizing proactive maintenance to reduce resources expended on reactive or emergency response. Maximize urban forest benefits, and reduce urban forest mortality.

PCM-4 Planting Stock

Utilize high-quality planting stock originating from Central Texas seed sources or grown in nurseries that simulate Central Texas growing conditions.

PCM-5 Tree Canopy Cover

Identify canopy goals according to site and ecosystem capacity and develop a plan to achieve them. Include canopy cover goals in Departmental Operational Plans.

PCM-6 Landscape Maintenance Management Plans

Ensure that trees and vegetation are properly cared for and survive, both during the time the plant is becoming established and in perpetuity. Means for doing this include landscape management plans, maintenance agreements, Standards of Care, and/or monitoring especially during periods of insufficient rainfall.

PCM-7 Partnerships

Partner with federal, state, regional, and local governmental jurisdictions, community nonprofit organizations, City of Austin departments, the private sector and others to increase the replenishment, maintenance, and care of Austin's urban forest.

PCM-8 Public Safety

Take reasonable measures to reduce risks of urban forest elements that impact public health and safety.

Comment [HA43]: COMMENT BY TOM HAYES - PCM-5 should include the development and implementation of GIS-based canopy-cover objectives for all private and public parcels in the city.

*TAGGED FOR UFB THEMED PRIVATE/PUBLIC DISCUSSION.

Comment [HL44]: REQUEST BY NICK TO BRING TO UFB -
Move Policy Element "PCM-5 Tree Canopy" from category "Planting, Care and Maintenance" to category "Sustainable Urban Forest", and rename it "S1".

UFBWG discussed and did not approve move.

Comment [HL45]: COMMENT FROM ENVIRONMENTAL BOARD MEMBER DEEGAN – Who? How?

STAFF RESPONSE: Per Standards and Best Management Practices addressed in forthcoming Austin Standards of Care.

Comment [HL46]: ADDITION REQUESTED BY PEGGY.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

PCM-9 Prominent Trees
Do to the community value of prominent trees, additional watering, care and maintenance, and protection shall be provided according to the Standards of Care and Best Management Practices.

URBAN FOREST MANAGEMENT FRAMEWORK
Policies related to City organizational structure and staffing levels, staff qualifications, involvement of City forestry staff in other City disciplines and functions, and funding for urban forest programs and efforts.

UF-1   Management Priorities
Evaluate and document the ecosystem services and benefits of the urban forest. Consider the value of those services and benefits when seeking a balance between multiple and potentially competing needs of the environment, utilities and infrastructure, safety, the rights of property owners, budget priorities, and the desires of the public.

UF-2   Resource Needs
Ensure adequate resources are dedicated to the management of Austin's urban forest and its ecosystem functions to support the City's vision for its urban forest. Identify and quantify gaps in urban forest management funding compared with national benchmarks and incorporate those needs in the Departmental budgeting process.

UF-3   Urban Forestry Funding Allocation
Allocate an appropriate proportion of funding for urban forest management.

UF-4   Funding Sources for Maintenance
Utilize existing funds or develop new funding sources such as assessment districts, user fees, fundraising, donations, grants, tax benefit financing, and/or an urban forest utility fee to fund urban forest management.

UF-5   Departmental Urban Forest Management Plan
Create a Departmental Operational Plan (DOP) for departmental urban forest management, consisting of an analysis of existing conditions and regulatory framework, desired future conditions, and a work plan based on the DOP Action Matrix. Update the DOP to reflect changing policies and regulations, standards of care, best management practices, and accomplishments.

Comment [HA47]: Provision of a range of incentives for private landowners to better manage their trees should be included in policy elements related to funding (UF-2, UF-3, and UF-4). Similarly, data collection (UF-11), land classification (UF-13), and regulatory review (UF-14) should all fully incorporate non-city landowners.

*TAGGED FOR UFB THEMED PRIVATE/PUBLIC DISCUSSION.

Comment [HL48]: COMMENT FROM ENVIRONMENTAL BOARD MEMBER DEEGAN – Should this Plan establish this? Seems a judgment call could be made here.

STAFF RESPONSE: This Plan will call for departments to establish their own management priorities and will be vetted by the Urban Forestry Board.

Comment [HL49]: COMMENT FROM ENVIRONMENTAL BOARD MEMBER DEEGAN – What are funding mechanisms? Who does City Council give the money to? Departmental budgets? Also, very important _____ level staff. F_____ __ and Enterprise.

STAFF RESPONSE: Addressed through Implementation Action 4.2.
4.2 By 24 months following the adoption of the Austin Urban Forest Plan and with information gathered by the Urban Forester and interdepartmental work teams, the City Manager will recommend changes based on recommendations from the interdepartmental group.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

UF-6   Standards of Care for Trees and Plants

Incorporate City of Austin Standards of Care for Trees and Plants into Departmental Operational Plans. Regularly contribute recommendations to City of Austin's Standards of Care for Trees and Plants revisions, coordinated by the Urban Forester, according to the best available science and current best management practices, accepted standards, and guidelines to support the DOP.

> **Comment [HL50]:** COMMENT FROM ENVIRONMENTAL BOARD MEMBER DEEGAN – "Who is responsible for a tree and who holds them accountable once SOC is decided?
>
> STAFF RESPONSE – THE URBAN FORESTER. SEE IMPLEMENTATION GOALS.

UF-7   Coordination of Efforts and Partnerships

Develop partnerships with other City departments and coordinate with federal, state, regional, and local governmental jurisdictions, local community nonprofits and the private sector, to preserve, restore, manage, and design our urban forest.

UF-8   Staff Qualifications and Training

For all staff engaged in urban forest management, care, and maintenance, employ qualified individuals and provide regular training to maintain qualifications up to and above recognized standards and best practices. Ensure that decisions are being made and maintenance is being performed according to City of Austin Standards of Care and industry best practices.

> **Comment [HL51]:** COMMENT FROM ENVIRONMENTAL BOARD MEMBER DEEGAN – Shouldn't PARD do this?
>
> STAFF RESPONSE – PARD AND ALL OTHER APPLICABLE DEPARTMENTS SHOULD ALSO ADDRESS STAFF TRAINING AND QUALIFICATIONS FOR THOSE INVOLVED IN URBAN FOREST MANAGEMENT.

UF-9   Contracts

When outsourcing tree care and maintenance, retain contractors who have demonstrated qualifications to perform urban forest management according to City of Austin Standards of Care and industry best practices. Incorporate such standards and best practices into contract specifications.

UF-10 Urban Forester Support

Provide support to the Urban Forester and other departments to meet mandated directives assigned to the Urban Forester.

UF-11 Data Collection and Management

Collect data regarding Austin's urban forest to support the creation of Departmental Operational Plans (DOP) and inform urban forest management decisions. Data collection methods should follow nationally-recognized best management practices in acquiring vegetation information for purposes of maintenance, planning, canopy goal establishment, and other comprehensive urban forest management efforts. Data should be collected and stored in formats easily shared between departments and stakeholders. Collaborate with federal, state,

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

regional, and local governmental jurisdictions, community nonprofits, and the private sector to collect and manage data.

UF-12 Urban Forest Risk Management
Consider and incorporate urban forest risk into city functions related to emergency management planning.

UF-13 Land Classification
Develop and adopt a common land classification system for properties owned/managed by the City. The classification system will provide the framework for development of class-specific Standards of Care for Trees and Vegetation.

UF-14: Regulatory Review
Identify and modify City regulations that conflict with or otherwise hinder achievement of the vision for the urban forest. Where possible, work with intra- and inter-departmental partners and external stakeholders to better align the City regulations with the City's urban forest vision.

PLANNING AND DESIGN
Policies related to the consideration of existing public urban forest resources and planning for sustainable future urban forest resources on a site-level scale.

> **Comment [HA52]:** Policy elements concerning planning and design should encompass private landowners as appropriate.
>
> *TAGGED FOR UFB THEMED PRIVATE/PUBLIC DISCUSSION.

PD-1   City Design Coordination
Establish coordination among City departments and utility providers when planning and designing public projects that include landscaping, urban forest protection, planting, supplemental irrigation, maintenance, and urban forest impacts.

PD-2   Infrastructure Design
Design streets, sidewalks, utilities, and other infrastructure with a thorough consideration of existing and proposed vegetation, site use, and standards of care during the planning, design, and construction processes.

PD-3   Soil Quality
Encourage retention and use of native soils for areas in new developments. Where native soils and growing conditions are not sufficient or optimal, encourage use of soils engineered to be supportive of long-term urban forest health that also provide a sustainable growing environment for the urban forest.

> **Comment [HA53]:** Should include the development of incentive programs, along with education and outreach, to improve soil conservation and low-impact landscaping approaches for sustainable stormwater management on private residential and commercial properties.
>
> *TAGGED FOR UFB THEMED PRIVATE/PUBLIC DISCUSSION.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

PD-4   Soil Volume

Increase the dedicated airspace and root volume available for urban forest elements to account for long-term desired growth and to assist with achieving the canopy coverage and maintenance goals.

> **Comment [HL54]:** COMMENT FROM ENVIRONMENTAL BOARD MEMBER DEEGAN – Critical in CBD.
>
> STAFF RESPONSE: AGREED. NO CHANGE NEEDED.

PD-5   Reduce Soil Compaction

Avoid the compaction of soils and encourage soil protection and enhancement during and after development to increase or maintain infiltration of stormwater on-site and reduce run-off. Design for site uses that minimize soil compaction in critical areas.

> **Comment [HL55]:** COMMENT FROM ENVIRONMENTAL BOARD MEMBER DEEGAN – Critical in CBD.
>
> STAFF RESPONSE: AGREED. NO CHANGE NEEDED.

PD-6   Landscaping and Stormwater Management

Align the City's landscape regulations and specifications with the integration of landscaping elements and low-impact development stormwater management approaches. Incentivize use of techniques that can effectively achieve multiple urban forestry and stormwater management objectives. Some examples include native vegetation preservation, native soil retention and soil amendment, stormwater dispersion and bio-engineering.

> **Comment [HA56]:** (STAFF COMMENT: The following statement is repeated from the previous page.) Should include the development of incentive programs, along with education and outreach, to improve soil conservation and low-impact landscaping approaches for sustainable stormwater management on private residential and commercial properties.
>
> *TAGGED FOR UFB THEMED PRIVATE/PUBLIC DISCUSSION.

> **Comment [HL57]:** COMMENT FROM ENVIRONMENTAL BOARD MEMBER DEEGAN – Can trees be accessed LID features
>
> STAFF RESPONSE: WE HOPE SO. THIS WILL BE DETERMINED WHEN WATERSHED PROTECTION DEPARTMENT COMPLETES THEIR DOP.

PD-7   Partnerships

Partner with federal, state, regional, and local governmental jurisdictions, community nonprofit organizations, the private sector and others to enhance the planning and design of public and private development and improvements in Austin.

PD-8   Planning Infrastructure Maintenance

Consider the needs and benefits of Austin's urban forest in conjunction with other infrastructure systems when planning for the long-term maintenance of infrastructure and utilities.

PD-9   Tailored Incentives

Develop incentives, programs and/or regulations that are tailored to the needs and characteristics of differing land uses.

PD-10 Urban Forest and Transportation

Utilize or enhance urban forest elements in transportation designs to improve flow and traffic safety and encourage alternative transportation.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

PD-11 Designing for Human Health

Establish or retain urban forest elements during planning and design to maximize physical and mental human health as well as social health benefits.

PD-12 Design with Maintenance in Mind

Incorporate pre-planning site assessments and design vegetation plans with consideration for long-term maintenance and resource use. Design for minimal long-term maintenance and resource use while still meeting site use goals.

EDUCATION AND OUTREACH

Policies related to public education, outreach, stewardship, and training of citizens, private entities, and nonprofit organizations for urban forest promotion to achieve the vision for the urban forest.

EO-1   Education

Provide appropriate resources (e.g., staff, technical, and educational materials) to communicate with the public about the vision, goals, objectives, policies, incentives, standards, and regulations related to the management of Austin's urban forest. Increase awareness of urban forest ecosystem issues and support citywide urban forest education efforts.

EO-2   Promote Stewardship

Develop capacity programming that leverages the commitment of citizen volunteers to engage in stewardship of Austin's urban forest. Promote events for mulching and watering for young and mature trees.

EO-3   Incentives

Develop voluntary and incentive-based programs to build broader community support for the urban forest.

EO-4   Partnerships

Partner with federal, state, regional, and local governmental jurisdictions, community nonprofit organizations, the private sector and others in education and outreach efforts to improve collaboration, leverage resources, and ensure consistent messaging.

EO-5   Records and Information

Collect and make available urban forestry information to the public.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

Comment [HL58]: COMMENT FROM ENVIRONMENTAL BOARD MEMBER DEEGAN – All new City trees should be irrigated?

STAFF RESPONSE: THE URBAN FORESTRY PROGRAM STANDARD FOR NEWLY PLANTED TREES IS THREE YEARS OF IRRIGATION. THIS SHOULD BE INCORPORATED INTO THE AUSTIN STANDARD OF CARE.

Comment [HA59]: Should include policy element addressing the development of a range of design recommendations and model projects to improve urban forest elements on private residential and commercial properties.

*TAGGED FOR UFB THEMED PRIVATE/PUBLIC DISCUSSION.

Comment [HA60]: All of these policy elements related to education and outreach should clearly state that the goal is stewardship of the entire urban forest, without undue focus on the relatively small portion of the forest on city properties.

*TAGGED FOR UFB THEMED PRIVATE/PUBLIC DISCUSSION.

Comment [HL61]: ADDITION REQUESTED BY PEGGY.

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

EO-6   Education of Urban Forest Service Providers

Ensure that private urban forest service providers, individuals who wish to provide professional urban forest maintenance services, and others whose work may impact the urban forest are educated about Austin's policies, regulations, and Standards of Care.

EO-7   Public Demonstration Projects

Develop and support publicly accessible pilot projects that demonstrate sound urban forest management including mulching, and watering young and mature trees. Document and implement effective strategies

Comment [HL62]: ADDITION REQUESTED BY PEGGY.

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Glossary

Abiotic – nonliving (ISA, 2013)

Age structure - the abundance of individual trees in a population according to their age.

Biotic – "pertaining to living organisms" (ISA, 2013).

Community framework - the fabric for which interested citizens as well as public, private, and nonprofit stakeholders work toward sustainable objectives.

Critical root zone (CRZ) – "area of soil around a tree where the minimum amount of roots considered critical to the structural stability or health of the tree are located" (ISA). "A CRZ is assigned to each tree based on trunk diameter size. In Austin, a minimum of 50% of the CRZ is required to be left undisturbed by development to achieve minimal conformance with City Code regulations. The formula for calculating CRZ is tree diameter in inches X 2, then convert to feet = CRZ diameter" (City of Austin, PDRD, 2013).

Dead or dying condition – "Majority of dead limbs and scaffold. Canopy nearly or completely dead. Restrictions to the site likely to cause failure or death of the tree. Tree may already be compromised" (ArborPro, Inc., 2008).

Dead wood – dead branches or other wood from a tree.

Deciduous - trees that shed their leaves annually during the cold season. They typically exhibit broad, thin, flat leaves as opposed to needle-like or scale-like leaves. Examples of deciduous trees include oak, ash, and pecan.

Diameter at breast height (DBH) – The diameter of a tree measured at 4.5 feet above ground in the United States (ISA, 2013).

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

Ecoregion - "areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. They are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components. These general purpose regions are critical for structuring and implementing ecosystem management strategies across federal agencies, state agencies, and nongovernment organizations that are responsible for different types of resources within the same geographical areas" (EPA, 2010).

Escarpment - a steep slope or cliff resulting from a fault.

Fair condition – "Decent branch placement, less than ideal scaffold spacing, some co-dominance present, past pruning less than ideal but possibly correctable. Canopy relatively thin, foliage chlorotic, vigor and shoot elongation below norm for species, minor pests or possibility of infestation. Some restriction imposed by deficiencies such as proximity to competing species, proximity to sidewalks, grade changes, poor irrigation, overhanging adjacent trees" (ArborPro, Inc., 2008).

Fault zone – an area in which the earth fractures, forming a geologic fault.

Genus - taxonomic group composed of species having similar fundamental traits. Botanical classification under the family level and above the specific epithet (i.e., species) level (ISA, 2013).

Good condition – "Good to Excellent branch placement, lack of uncorrectable co-dominant leaders, good pruning history. Canopy generally full and balanced, good foliage color, vigor and shoot elongation typical of species, lack of visible or uncontrollable pests. Conditions ideal to favorable for full development to species potential, sufficient room for canopy and root growth, irrigation and soils exist to sustain development" (ArborPro, Inc., 2008).

Green infrastructure - "strategically planned and managed networks of natural lands, working landscapes and other open spaces that conserve ecosystem values and functions and provide associated benefits to human populations" (ImagineAustin, 2012).

Greenbelt – a land use designation for a linear area that prevents urban development and ensures natural growth within its boundary.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Heritage tree – "a tree that has a diameter of 24 inches or more, measured 4.5 feet above natural grade, and is one of the following species: Texas ash, Bald cypress, American elm, Cedar elm, Texas madrone, Bigtooth maple, all Oaks, Pecan, Arizona walnut, or Eastern black walnut" (City of Austin Code, § 25-8-602).

Invasive species - non-native organisms likely to spread, disrupting the natural balance of an ecosystem (ISA, 2013).

i-Tree Eco – "i-Tree Eco is a software application designed to use field data from complete inventories or randomly located plots throughout a community along with local hourly air pollution and meteorological data to quantify urban forest structure, environmental effects, and value to communities" (USDA, U.S. Forest Service, 2013).

i-Tree Street – "an analysis tool for urban forest managers that uses tree inventory data to quantify the dollar value of annual environmental and aesthetic benefits: energy conservation, air quality improvement, CO2 reduction, stormwater control, and property value increase" (USDA, U.S. Forest Service, 2013).

Nature preserve – "Preserve land is a unique type of park land that is set aside because it provides essential endangered species habitat, includes a unique natural feature such as a cave or stream, or provides a prime example of a specific type of ecosystem" (City of Austin, PARD, 2013).

Ordinance – a local law enacted by an authoritative municipality.

Performance indicator – a measurement of sustainable urban forestry management success as first explained by Kenney et al. (2011). Each indicator contains associated criteria and objectives. Performance indicators rank levels of City performance: low (1), moderate (2), good (3), and optimal (4).

Poor condition – "Inferior branch placement, crowded scaffold, co-dominance likely, correction or mitigation necessary and likely extensive, restructuring needed to repair past pruning practices. Canopy sparse, dead twigs, stunted or absent new growth, declining number of growing points, pest presence visible or likely. One or more restrictions severe enough to hamper the ability of the tree to develop fully as listed above. Recent changes to the site may manifest themselves symptomatically in the future" (ArborPro, Inc., 2008).

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Prairie – a type of grassland ecosystem containing grasses and shrubs as the main vegetation types and exhibiting a limited amount of annual rainfall.

Protected tree – "a tree with a diameter of 19 inches or more, measured 4.5 feet above natural grade" (City of Austin Code, § 25-8-602).

Public property – "means real property owned or controlled by the city with unrestricted public access, excluding a utility or drainage easement on private property" (City of Austin Ordinance 1983-0324-N).

Public right-of-way – an area of land owned and maintained by the City. It consists of the street surface, sidewalks, and grassy areas between the street pavement and a property boundary. In Austin, it is usually defined as the roadway plus 10 feet behind the curb (City of Austin, Transportation Department, 2013).

Public tree – "a tree with at least two-thirds of its trunk diameter on public property" (City of Austin Code, § 6-3-1).

Resource management – internal administrative and management resources available for sustainable urban forestry management.

Savanna – a type of grassland ecosystem characterized by seasonal water availability and scattered trees.

Snag tree – a type of coarse woody debris that is standing, dead or dying.

Species – "taxonomic group of organisms composed of individuals of the same genus that can reproduce among themselves and have similar offspring" (ISA, 2013).

Sustainability - the ability to maintain ecological, social, and economic benefits over time (ISA, 2013).

Transit corridor – major streets with significant population density, mix of uses, and transit facilities, within close proximity, to encourage and support transit use. 16 arterial streets were selected for Austin's 2008 tree inventory (ArborPro, Inc., 2008).

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Tree canopy - collective branches and foliage of a tree or group of trees' crowns. Aggregate or collective tree crowns (ISA, 2013).

Tree condition - the general health of a tree related to both foliage and structure.

Tree inventory - record of trees within a designated area that provides specified identification and condition information to be used for management decisions and actions (ISA, 2013).

Urban forest - "The aggregate of all community vegetation and green spaces that provide a myriad of environmental, health, and economic benefits for a community" (Sustainable Urban Forests Coalition, 2013).

Urban forester – "an individual trained in or practicing urban forestry" (ISA, 2013).

Urban forestry – "management of naturally occurring and planted trees and associated plants in urban areas" (ISA, 2013).

Urban heat island – (built-up areas that are hotter than nearby rural areas. The annual mean air temperature of a city with 1 million people or more can be 1.8–5.4°F (1–3°C) warmer than its surroundings. In the evening, the difference can be as high as 22°F (12°C)" (EPA, 2013).

Vegetative resource - The physical components of an urban forest related to vegetative growth.

Wind rose – "A wind rose gives a very succinct but information-laden view of how wind speed and direction are typically distributed at a particular location" (USDA, 2013).

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

Bibliography

Akbari, H. and S. Konopacki. (2005). Calculating energy-saving potentials of heat-island reduction strategies. Energy Policy 33(6):721-756.

Akbari, H., Pomerantz, M., & Taha, H. (2001). Cool surfaces and shade trees to reduce energy use and improve air quality in urban areas. Solar Energy, 70(3), 295-310. DOI: 10.1016/S0038-092X(00)00089-X

American Planning Association. (2009). Planning the urban forest: Ecology, economy, and community development (Report No. 555) (J. Schwab, Editor). Chicago, IL.

American Forests. (1996). *Urban ecological analysis for Austin, Baltimore, Milwaukee.* Washington DC.

Anderson, L., & Cordell, H. (1988). Influence of trees on residential property values in Athens, Georgia: A survey based on actual sales prices. Landscape and Urban Planning, 15, 152-164. DOI: 10.1016/0169-2046(88)90023-0

ArborPro, Inc. City of Austin, Urban Forestry Program. (2008). Urban forest inventory report for the transit corridors and parks City of Austin, Texas. Retrieved from City of Austin, Urban Forestry Program website:
http://austintexas.gov/sites/default/files/files/Parks/Forestry/austinufr2008.pdf

Beattie, J., C. Kollin, & Moll, G. (2000). Trees tackle clean water regs. American Forests, 106(2), 18.

Bell, J. F., J.S. Wilson, and G.C. Liu. 2008. Neighborhood greenness and 2-Year changes in body mass index of children and youth. American Journal of Preventive Medicine 35(6):547-553.

Benepe, A. (2013, April 18). Green infrastructure as parks: How need, design, and technology can make cities better [Commentary Retrieved April 23, 2013, from Sustainable Cities Collective website: http://sustainablecitiescollective.com/nature-cities/143601/parks-green-infrastructure-green-infrastructureparks-how-need-design-and-techn?utm_source=feedburner

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

Bryce, S.A., Omernik, J.M., and Larsen, D.P. (1999). Ecoregions – a geographic framework to guide risk characterization and ecosystem management: Environmental Practice, v. 1, no. 3, p. 141-155.

Cappiella, K., Schueler, T., & Wright, T. (2005). Urban watershed forestry manual: Methods for increasing forest cover in a watershed (Technical Report No. NA-TP-04-05). USDA Forest Service, Northeastern Area.

City of Austin. The Code of the City of Austin, Texas. Available from City of Austin, Office of the City Clerk website via American Legal Publishing Corporation: http://www.amlegal.com/nxt/gateway.dll/Texas/austin/title25landdevelopment?f=templat es$fn=default.htm$3.0$vid=amlegal:austin_tx

City of Austin, Watershed Protection Department. (2013). *Central Texas invasive plants volunteer field guide*. Retrieved from City of Austin, Watershed Protection Department website: http://austintexas.gov/sites/default/files/files/Watershed/invasive/2013_Invasives_guide _small.pdf

City of Austin, Parks and Recreation Department. (2013). *Nature preserves.* Retrieved from City of Austin, PARD website: http://austintexas.gov/department/nature-preserves-0

City of Austin, Parks and Recreation Department. (2013). *Austin Parks and Recreation Department: Parkland inventory.* Retrieved from City of Austin, Parks and Recreation Department website: http://www.austintexas.gov/sites/default/files/files/Parks/GIS/Inventory/Austin_PARD_Ha s_2013.pdf

City of Austin, Planning and Development Review Department. (2013). Tree and natural area preservation: The critical root zone. Retrieved from City of Austin, PDRD website: http://www.austintexas.gov/page/tree-natural-area-preservation-codes

City of Austin, Transportation Department. (2013). Rights-of-way management. Retrieved from City of Austin, Transportation Department website: http://austintexas.gov/department/right-of-way-management

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

City of Austin. (2012). *Imagine Austin comprehensive plan: Vibrant, livable, connected.* Retrieved from City of Austin, ImagineAustin Download Center website: ftp://ftp.ci.austin.tx.us/npzd/ustingo/web_IACP_full_reduced.pdf

City of Austin, Urban Forestry Program. (2012). Tree Be-Leafs: An urban forest opinion poll.

City of Austin. (2011). Community inventory report: Natural environment. *ImagineAustin.* (Draft). Retrieved from City of Austin, ImagineAustin Download Center website: ftp://ftp.ci.austin.tx.us/npzd/compplan/inventory-naturalenvironment.htm

Clymer Meadow Preserve website. (2013). Retrieved July 11, 2013, from: http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/texas/placeswepr otect/clymer-meadow-preserve.xml

Crownover, J. (1991). Canopy cover analysis: City of Austin, Texas.

Donovan, G., & Butry, D. (2011). The effect of urban trees on the rental price of single-family homes in Portland, Oregon. Urban Forestry and Urban Greening, 10(3): 163-168. DOI: 10.1016/j.ufug.2011.05.007

Donovan, G., & Butry, D. (2010). Trees in the city: Valuing street trees in Portland, Oregon. Landscape and Urban Planning, 94: 77-83. DOI: 10.1016/j.landurbplan.2009.07.019

Donovan, G., & Prestemon, J. (2010). The effect of trees on crime in Portland, Oregon. Environment and Behavior, 44(1), 3-30. DOI: 10.1177/0013916510383238

Donovan, Geoffrey, H., & David Butry. (2009). The value of shade:Estimating the effect of urban trees on summertime electricity use. Energy and Buildings. 41(6): 662-668.

Environmental Protection Agency. (2013). Heat island effect. Retrieved from EPA website http://www.epa.gov/hiri/

Environmental Protection Agency. (2010). Level IV Ecoregions of Texas Metadata. Retrieved from EPA website: ftp://ftp.epa.gov/wed/ecoregions/tx/tx_eco.html

Fernandez-Juricic, E. (2000). Avifaunal use of wooded streets in an urban landscape. Conservation Biology 14(2): 513-521.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

Griffith, G.E., Bryce, S.A., Omernik, J.M., Comstock, J.A., Rogers, A.C., Harrison, B., Hatch, S.L., and Bezanson, D. (2004). *Ecoregions of Texas* (color poster with map, descriptive text, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:2,500,000).

Halley, S. (2011). *Background summary comprehensive urban forest management plan for the City of Austin.* (Unpublished draft).

Halter, A. (2013). *Determining existing, possible, and preferable urban tree canopy for Austin, Texas* (Graduate thesis). The University of Texas, Austin, TX.

Hanna, M. (2011). Bastrop wildfire losses rise. Retrieved from Insurance Council of Texas website: www.insurancecouncil.org/news/2011/Dec082011.pdf

International Society of Arboriculture. (2013). Online international dictionary. Retrieved from ISA website: http://www.isa-arbor.com/education/onlineResources/multiLingualDictionary.aspx

Jackson, L.E. 2003. The relationship of urban design to human health and condition. Landscape and Urban Planning, 64(4): 191-200.

Johnson, E. *Edwards Plateau*. (2013) Handbook of Texas Online. Published by the Texas State Historical Association. Retrieved from http://www.tshaonline.org/handbook/online/articles/rxe01

Kemp, S. (2008). *Mapping the history, iconography, and politics of the urban forest in Austin, Texas* (Graduate thesis). The University of Texas, Austin, TX.

Laverne, R., & Winson-Geideman, K. (2003). The influence of trees and landscaping on rental rates at office buildings. Journal of Arboriculture, 29(5), 281-290.

Locke, D., Grove, J., Lu, J., Troy, A., O'Neil-Dunne, J., & Beck, B. (2010). Prioritizing preferable locations for increasing urban tree canopy in New York City. Cities and the Environment, 3(1), 18.

Lovasi, G.S., J.W. Quinn, K.M. Neckerman, M.S. Perzanowski, and A. Rundle. 2008. Children living in areas with more street trees have lower asthma prevalence. Journal of Epidemiology and Community Health 62, 647-649.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

McPherson, E. (2006). Trees are $$$ -- Realizing the Benefits of Trees. Davis, CA: Center for Urban Forest Research, Pacific Southwest Research Station, USDA Forest Service. http://www.fs.fed.us/psw/programs/uesd/uep/products/powerpoint/psw_cufr631IndianaAA-1-11-06-3.swf

Mitchell, R. and F. Popham. 2008. Effect of exposure to natural environment on health inequalities: An observational population study. Lancet 372:1655-60.

Naderi, J. Kweon, B., & Maghelal, P. (2008). The street tree effect and driver safety. Institute of Transportation Engineers Journal, 78, 69-73. http://www.walkable.org/assets/downloads/StreetTreeEffectandDriverSafety_ITEfeb08_.pdf

Nowak, D., & Crane, D. (2002). Carbon storage and sequestration by urban trees in the USA. Environmental Pollution, 116, 381-389. DOI: 10.1016/S0269-7491(01)00214-7

Nowak, D., Crane, D., & Dwyer, J. (2002). Compensatory value of urban trees in the United States. Journal of Arboriculture, 28(4), 194-199.

Nowak, D., Crane, D., & Stevens, J. (2006). Air pollution removal by urban trees and shrubs in the United States. Urban Forestry and Urban Greening, 4(3-4), 115-123. DOI: 10.1016/j.ufug.2006.01.007

Nowak, D.J., R.E. Hoehn, D.E. Crane, J.C. Stevens, and J.T. Walton (2007). Assessing urban forest effects and values: New York City's urban forest. Resour. Bull. NRS-9. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 22 pp. http://www.nrs.fs.fed.us/pubs/rb/rb_nrs009.pdf (accessed 01/26/2011).

National Oceanic and Atmospheric Administration. (2010). Austin climate summary [Fact sheet]. Retrieved March 14, 2013, from National Weather Service website: Retrieved from NOAA website: http://www.srh.noaa.gov/ewx/?n=ausclidata.htm

Olmsted, F. (1857). *A Journey through Texas or, a Saddle-Trip on the Southwestern Frontier.* Austin: University of Texas Press, p. 111.

Palmer, E. (1986). *The Balcones Escarpment: Land use and cultural change along the Balcones Escarpment 1718-1986.* In Abbot, P., & Woodruff, C., The Balcones Escarpment,

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

Central Texas: Geological Society of America (pp. 153-162). Retrieved from http://www.lib.utexas.edu/geo/balcones_escarpment/pages153-162.html

Raciti, S. (2006). Urban tree canopy goal setting: A guide for Chesapeake Bay communities. USDA Forest Service, Northeastern Area.

Ramos, R., & Gonzalez, A. (2011). Decker Tallgrass Prairie Preserve & Indiangrass Wildlife Sanctuary management plan. Executive summary. Retrieved from http://www.austintexas.gov/edims/document.cfm?id=157957

Richards, N.A. (1983). Diversity and stability in a street tree population. Urban Ecology, 7(2), 159-171. DOI: 10.1016/0304-4009(83)90034-7

Rodgers, L., & Harris, M. (1983). Remote sensing survey of pecan trees in five Texas cities. Journal of Arboriculture, 9(8), 208-213. Retrieved April 24, 2013, from http://joa.isa-arbor.com/request.asp?JournalID=1&ArticleID=1901&Type=2

Rosenfeld, A.H., H. Akbari, J.J. Romm, and M. Pomerantz. (1998). Cool communities: Strategies for heat island mitigation and smog reduction. Energy and Buildings 28(1): 51-62.

Rudd, H., J. Vala, and V. Schaefer. (2002). Importance of backyard habitat in a comprehensive biodiversity conservation strategy: A connectivity analysis of urban green spaces. Restoration Ecology 10(2): 368-375.

Streiling, S., and A. Matzarakis. (2003). Influence of single and small clusters of trees on the bioclimate of a city: A case study. Journal of Arboriculture 29(6): 309-316.

Sustainable Urban Forests Coalition. (2013). How does the SUFC define urban forests? Retrieved from Sustainable Urban Forests Coalition website: http://www.urbanforestcoalition.com/

Takano, T., K. Nakamura, and M. Watanabe. (2002). Urban residential environments and senior citizens' longevity in megacity areas: The importance of walkable green spaces. Journal of Epidemiology and Community Health 56(12): 913-918.

Texas A&M Forest Service. (2008). Texas eco-regions: Edwards Plateau. Retrieved from http://texastreeid.tamu.edu/content/texasEcoRegions/EdwardsPlateau/

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

Texas Commission on Environmental Quality. (2013). Austin annual wind rose data 1984-1992. Retrieved from TCEQ website:
http://www.tceq.texas.gov/assets/public/compliance/monops/air/windroses/ausall.gif
Texas Parks & Wildlife. Edwards Plateau ecological region. Retrieved from
http://www.tpwd.state.tx.us/landwater/land/habitats/cross_timbers/ecoregions/edwards_plateau.phtml

Texas Parks & Wildlife. Blackland Prairie ecological region. Retrieved from
http://www.tpwd.state.tx.us/landwater/land/habitats/cross_timbers/ecoregions/blackland.phtml

United States Census Bureau. (2013). *Rural and urban classification.* Retrieved September 9, 2013, from U.S. Census Bureau website: http://www.census.gov/geo/reference/urban-rural.html

Ulrich, R. (1984). View through a window may influence recovery from surgery. Science. 224: 420-421

United States Department of Agriculture, Natural Resources Conservation Service. (2013). Wind rose data. Retrieved from USDA, NRCS website:
http://www.wcc.nrcs.usda.gov/climate/windrose.html

United States Department of Agriculture, U.S. Forest Service. (2013). i-Tree Eco/Street overview. Retrieved from USDA, U.S. Forest Service website: http://www.itreetools.org

Werner, B., Chandler, T., Raser, J., & O'Gorman, M. (2001). Trees Mean Business: A study of the economic impacts of trees and forests in the commercial districts of New York City and New Jersey. Retrieved from
http://www.urbanforestrysouth.org/resources/library/ttresources/trees-mean-business

White, Rachel E., Geoffrey H. Donovan, Jeffrey P. Prestemon. 2011 Trees thwart shady behavior. Nursery Management and Production. February: 30-33.

Wolf, K. & Bratton, N. (2006).Urban trees and traffic safety: Considering U.S. roadside policy and crash data. Arboriculture & Urban Forestry, 32(4), 170-179

Wolf, K. (2004). Trees and business district preferences: A case study of Athens, Georgia, U.S. Journal of Arboriculture, 30(6), 336-346.

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

Young, R. (2011). Planting the living city. Journal of the American Planning Association, 77(4), 368-381. DOI: 10.1080/01944363.2011.616996

Geospatial Data Sources

The following data sources were used in this plan to analyze information and/or to create maps using Geographic Information Systems software. Geospatial data sources can be found on the City of Austin's GIS Data Sets website or through a public request for information. Geospatial data from other agencies may be acquired from their respective websites or ftp portals.

City of Austin parks [feature class file]. (2013). Austin, Texas: City of Austin. Available: ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html

City of Austin parcel [feature class file]. (2010). Austin, Texas: City of Austin. Available: ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html

Jurisdictions [feature class file]. (2013). Austin, Texas: City of Austin. Available: ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html

PARD maintained unowned [feature class file]. (2013). Austin, Texas: City of Austin. Available: ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html

Tree canopy [feature class file]. (2010). Austin, Texas: City of Austin (unpublished). Available: ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html

Tree canopy [feature class file]. (2006). Austin, Texas: City of Austin. Available: ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html

Lakes [feature class file]. (2010). Austin, Texas: City of Austin. Available: ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html

Land use [feature class file]. (2010). Austin, Texas: City of Austin. Available: ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html

Right of way [feature class file]. (2013). Austin, Texas: City of Austin. Available: ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html

Building footprints [feature class file]. (2006). Austin, Texas: City of Austin. Available: ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html

Street centerline [feature class file]. (2006). Austin, Texas: City of Austin. Available: ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html

Transportation planimetrics [feature class file]. (2003). Austin, Texas: City of Austin. Available: ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html

Natural regions of Texas [shapefile]. (1994). Austin, Texas: Texas Parks and Wildlife Department. Available: http://www.tpwd.state.tx.us/landwater/land/maps/gis/data_downloads/

Natural subregions of Texas [shapefile]. (1994). Austin, Texas: Texas Parks and Wildlife Department. Available: http://www.tpwd.state.tx.us/landwater/land/maps/gis/data_downloads/

Level IV ecoregions of Texas [shapefile]. (2010). Corvallis, Oregon: Environmental Protection Agency. Available: ftp://ftp.epa.gov/wed/ecoregions/tx/

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Additional Comments:

PERFORMANCE INDICATORS:

18. Size Class Distribution Of Trees measured via relative diameter at breast height (used to provide for uneven aged urban forest citywide and at neighborhood level).

    a. **Use the Richards' recommendations for a healthy age distribution instead of the relative rating**. Two different techniques for Age Distribution are used in the plan. The plan uses the relative diameter in the Performance Indicators section, but the Richards' healthy age structure (distribution) based on diameter is discussed in the plan in pages 39-40.

    b. **Change score in the Species Class Distribution Performance Indicator from "Good" to "Moderate"**. A "Good" score is given in the Relative Diameter Performance Indicator, but only 7% of the trees are 24 inches or larger (heritage tree size), not the Richards' recommended 10%. In addition, 45% of the trees are young trees (smaller than 8 inches in diameter), but the recommended percentage is 40%. Since Forestry estimates that there are 325,000 trees in Austin, this means that Austin is deficient by 9,750 heritage trees but has an excess of 16,250 young trees. This age distribution does NOT deserve a "good" rating.

    c. **Change target in Plan from "Good" to "Optimal".** Currently, target is to get a "Good" score in this performance indicator, but this has already been obtained according to plan. Consequently, there will be no improvement with the plan regarding age distribution even though Austin is deficient by 10,000 heritage trees to meet Richards' recommendations for a healthy age distribution.

19. Species Suitability

    a. **Change target in Plan from "Good" to "Optimal."** Currently, target is to get a "Good" score in this performance indicator, but this has already been obtained according to plan. Consequently, there will be no improvement with the plan regarding species suitability.

    b. **Change score from "Good" to in between "Moderate" and "Good"** because often, bottomland species are planted upland and trees that need to be near water are planted in medians and small areas (Bald Cypresses). There may be "Good" tree species suitability to the larger Central Texas area, but not to the specific planting area.

20. Species Distribution (diversity)

    Change score in the Species Distribution Performance Indicator from "Low" to "Moderate." A "Low" score is given in the plan based on "<5 species dominate the entire tree population", but page 38 and Figure 2.7 show 6 top species and that no species represents >20% of entire population, which is the Moderate score.

21. Publicly Owned natural areas

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

Change score from "good" to between "Moderate" and "Good", because GIS data has not been ground-proofed or otherwise assessed for quality control. Data can erroneously include non-canopy elements such as structures, dumpsters, etc.

Comment [HL73]: CHANGED.

22. Green Industry Cooperation

Comment [HL74]: CHANGED.

Change score from "Good" to between "Moderate" and "Good" because not all green companies cooperate.

23. Neighborhood Action

Comment [HL75]: CHANGED.

Change score from "Good" to between "Moderate" and "Good" because not all neighborhoods participate actively or include urban forestry goals in their plans.

24. Water Use and Drought Response

Comment [HL76]: CHANGED.

Change score from "Good" to between "Moderate" and "Good" because there is no plan to address urban forest irrigation response to drought regarding watering large trees during the drought. In addition, only a few trees are being irrigated with recycled water due to lack of recycled water infrastructure (only one location in East Austin can provide recycled water for PARD water trucks).

25. Wildlife and Human Habitat

Comment [HL77]: CHANGED.

Change score from "Good" to between "Moderate" and "Good" because there are no city policies to provide food for people and habitat for wildlife. Parks do not have understories or all of the components for wildlife (shelter, food, water, shade). City programs reach only a small number of the citizens and neighborhoods.

26. Urban Forest Habitat Suitability

Comment [HL78]: CHANGED.

Change score from "Good" to between "Moderate" and "Good" because often the wrong tree species are planted in the wrong sites (Bald Cypresses planted in medians and small upland areas, tree species not from the area are planted in Austin to get "diversity", trees from Houston are planted here because the Apache Foundation provides them).

DRAFT – DRAFT – DRAFT – DRAFT - DRAFT

CLEANED UP VERSION – INCLUDES TECHNICAL Writer, UFBWG Approved Edits to date (10-24-13) and Public Comment INCORPORATED, includes unresolved comments for discussion and new comments.

General Comments

- Make sure printing in black and white is legible—not at present

- Incorrect uses of "comprise" and e.g./i.e.

- Simplify wording

- Consider an acronym list

- R-O-W/ROW/rights-of-way

STAFF COMMENT (Alan Halter): This needs to be reviewed by City staff to determine if we want to use DBH or RDBH as the official indicator. As it stands, this indicator is correct being scored as "Good" because, according to the 2008 public tree inventory, no DBH class exceeds 50% of the entire sample, and no DBH class represents 50%-75% of the sample population (See Appendix A, pg. 7). The disparity in excess young trees vs. deficient heritage trees is mentioned on pg. 40.

STAFF COMMENT (Alan Halter): Targets were previously determined by City of Austin staff working group. The choice to maintain a level of performance is a viable option considering that obtaining an "Optimal" level of performance may not be entirely achievable; only theoretically desirable. Consider revising target if deemed necessary and achievable.

STAFF COMMENT (Alan Halter): Maintaining a performance level is a viable option and the reason for not specifying a higher performance level is most likely due to City staff knowledge of impracticality in reaching "Optimal" level.

STAFF COMMENT (Alan Halter): Score was changed from "Low" to "Moderate" after fact checking the data associated with this indicator. According to the 2008 sample inventory, it is true that no individual species makes up >20% of the tree population.