

CITY OF LAS VEGAS URBAN FORESTRY MANAGEMENT PLAN

Approved by Planning Commission
11.18.25, 25-0461-GPA

Approved by City Council
12.17.25, Resolution R-xx-2025



TABLE OF CONTENTS

3 Acknowledgements to:

4 Executive Summary

- 4 Planning Process
- 5 What Do We Have?
- 8 What Do We Want?
- 8 How Do We Get There?
- 9 Road Map

10 Introduction

- 10 Growing Shade, Growing Value:
The Role of Trees in Las Vegas’s Future
- 11 Key Actions (goals) and Desired outcomes from Las Vegas 2050 Management Plan

12 Benefits of Trees and Canopy in Las Vegas

- 12 Trees are Essential Infrastructure
- 13 The Role of Trees in a Desert Environment
- 16 Trees and Human Health: Strengthening Body and Mind
- 16 Building Safer, Stronger Communities
- 17 Boosting Economic Vitality
- 17 Trees Are a Lifeline for Las Vegas

18 What Do We Have?

- 18 History of Trees in Las Vegas
- 20 Land Cover Classification:
Setting the Baseline
- 29 Long Term Planting Plan
- 30 Las Vegas’s Community Tree Resource
- 39 Make the Right Decision, on the Right Tree, at the Right Time
- 42 Current Operations
- 47 Indicators of a Sustainable Urban Forest
- 48 Standard Operating Procedure (SOP) for City Urban Foresters

50 What Do We Want?

- 51 Survey Findings
- 51 Factors Shaping Participation
- 52 Stakeholder Themes
- 54 Looking Ahead

56 How Do We Get There?

- 56 Implementation
- 58 UFMP Objectives
- 82 Implementation Matrix
- 83 Urban Forestry Implementation Roadmap

84 How Are We Doing?

86 Appendices

- 86 Standard Operating Procedure (SOP) for City Urban Foresters
- 90 Priority Planting Maps
- 98 Las Vegas Utilizes smart tree inventory
- 102 Final Reflections: Quantitative Patterns, Qualitative Signals
- 103 Implications for Urban Forest Management
- 104 Indicators of a Sustainable Urban Forest
- 108 Las Vegas UFMP Webpage Content Outline
- 110 Informational Graphic Content

112 City of Las Vegas Tree Ordinance **Draft**

126 References

25-0461
11/10/2025



ACKNOWLEDGEMENTS TO:

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- ✦ Rosa Cortez, Deputy City Manager
- ✦ Davey Resource Group, Inc.
- ✦ University of Nevada Las Vegas College of Urban Affairs in partnership with the MGM Resorts Public Policy Institute for their contribution of the citizen engagement survey report focused on urban forestry.
- ✦ All groups that participated in the Stakeholder Interviews
 - Regional Transportation Commission of Southern Nevada
 - Green Schoolyards America
 - Southern Nevada Arborist Group (SNAG)
 - Southern Nevada Water Authority
 - Las Vegas Valley Water District
 - Desert Research Institute — Heat Lab
 - Make The Road NV
 - ImpactNV
 - Clark County
 - Nevada Division of Forestry
 - University of Nevada, Las Vegas
 - Nevada Plants
 - The Nature Conservancy
 - Ann Casey
- ✦ The people of Las Vegas that made their voices heard — thank you!

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Heat mitigation
Shade and Urban Tree Canopy
NRS 278.160 (a)(2)
Pursuant to Assembly Bill 96 (2025)

25-0461
11/10/2025

EXECUTIVE SUMMARY

Las Vegas is a city defined by extremes — heat, growth, and resilience. This Urban Forestry Management Plan (UFMP) was created to help the City meet those extremes with shade, equity, and long-term climate solutions. At its core, the plan follows an adaptive management approach and asks three fundamental questions: What do we have? What do we want? How do we get there?

Developed through advanced GIS analysis, Smart Tree Inventory data, extensive stakeholder engagement, and a public attitudes survey conducted by the University of Nevada Las Vegas (UNLV), the UFMP is the City's first comprehensive framework for managing its trees as essential infrastructure. It sets a clear path forward for protecting and expanding canopy in a way that is **data driven, community informed, and designed for resilience in the face of extreme heat.**

PLANNING PROCESS

The Urban Forestry Management Plan was developed through a collaborative process that integrated technical assessment with community input.

TECHNICAL FOUNDATION

- ✦ High-resolution and LiDAR-based Land Cover Assessment
- ✦ The nation's first Urban Forestry Management Plan utilizing Smart Tree Inventory data, creating digital documentation for more than 32,000 trees
- ✦ Land Surface Temperature mapping (day and night)
- ✦ Priority Planting Analysis to target the most impactful sites

COMMUNITY FOUNDATION

- ✦ A full Operations Review of City programs and policies
- ✦ In-depth stakeholder interviews with major partners across Las Vegas
- ✦ Community engagement research led by the University of Nevada, Las Vegas

The result is a plan rooted in science, shaped by expert voices, and aligned with community values. It is both a snapshot of where we are today and a roadmap for where we must go. Together, these tools produced the City of Las Vegas Urban Forestry Resource Analysis and a Long-Term Planting Plan that outline both the current state of the canopy and a clear path forward.

Overall Plan Theme: Shade and Extreme Heat Response

The central purpose of this plan is to address extreme heat through expanded tree canopy. Serving as a component of the City's broader heat mitigation plan pursuant to NRS 278.160(a)(2), this Urban Forestry Plan uses shade as both a strategy and a symbol. The visual metaphor — a sun above a tree, with the canopy shading the community below — illustrates how trees provide cooler summer temperatures, improved human health, cleaner air, stronger neighborhoods, safer streets, and more accessible green spaces.

25-0461
11/10/2025

WHAT DO WE HAVE?

Las Vegas may be known for its neon lights and desert landscapes, but its urban forest tells a parallel story of cultural legacy, community resilience, and environmental necessity. The city's very name — Las Vegas, meaning *The Meadows* in Spanish — recalls natural springs once shaded by cottonwoods.

Early greening efforts by civic groups like the Mesquite Club in the 1900s, and community-driven park projects after WWII, established trees as part of Las Vegas's identity. Institutional support followed: Tree City USA designation in 1989, the first comprehensive tree inventory in 2013, and the hiring of the City's first Urban Forester in 2016. Each step reflected a growing recognition that trees are not amenities but essential infrastructure.

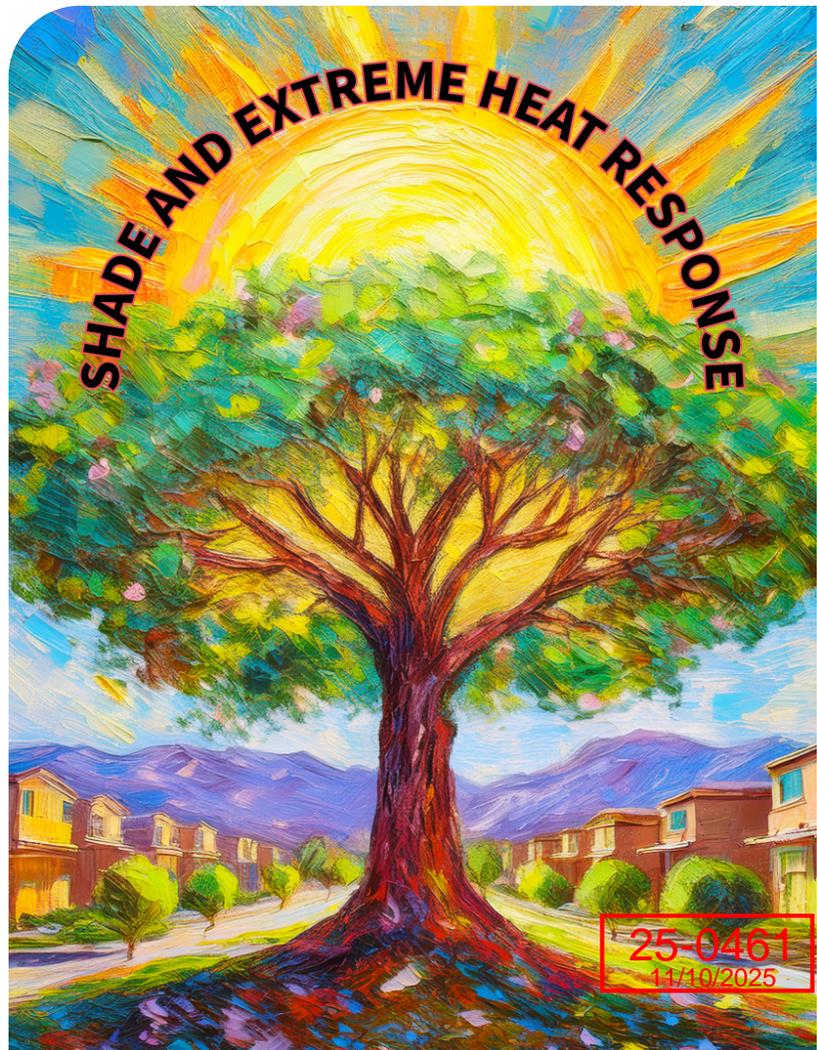
Today, urban forestry in Las Vegas is about more than beautification — it is a strategy for climate resilience, public health, and equity. Cutting-edge tools like the Smart Tree Inventory — an AI-enabled, LiDAR-based system that measures, maps, and monitors the City's urban forest — has made Las Vegas a national leader in data-driven management, enabling the City to optimize ecosystem services, identify struggling trees before they fail, and plan for long-term canopy growth.

Development pressures, limited water resources, and climate extremes underscore the need for careful policy and strategic investment. The City's 2050 Management Plan confronts these issues directly, setting ambitious goals: planting 60,000 new trees and ensuring equitable access to green space across neighborhoods.

State-level direction through AB 96 (2025) reinforces these commitments, aligning urban forestry with Nevada's climate adaptation and water efficiency goals.

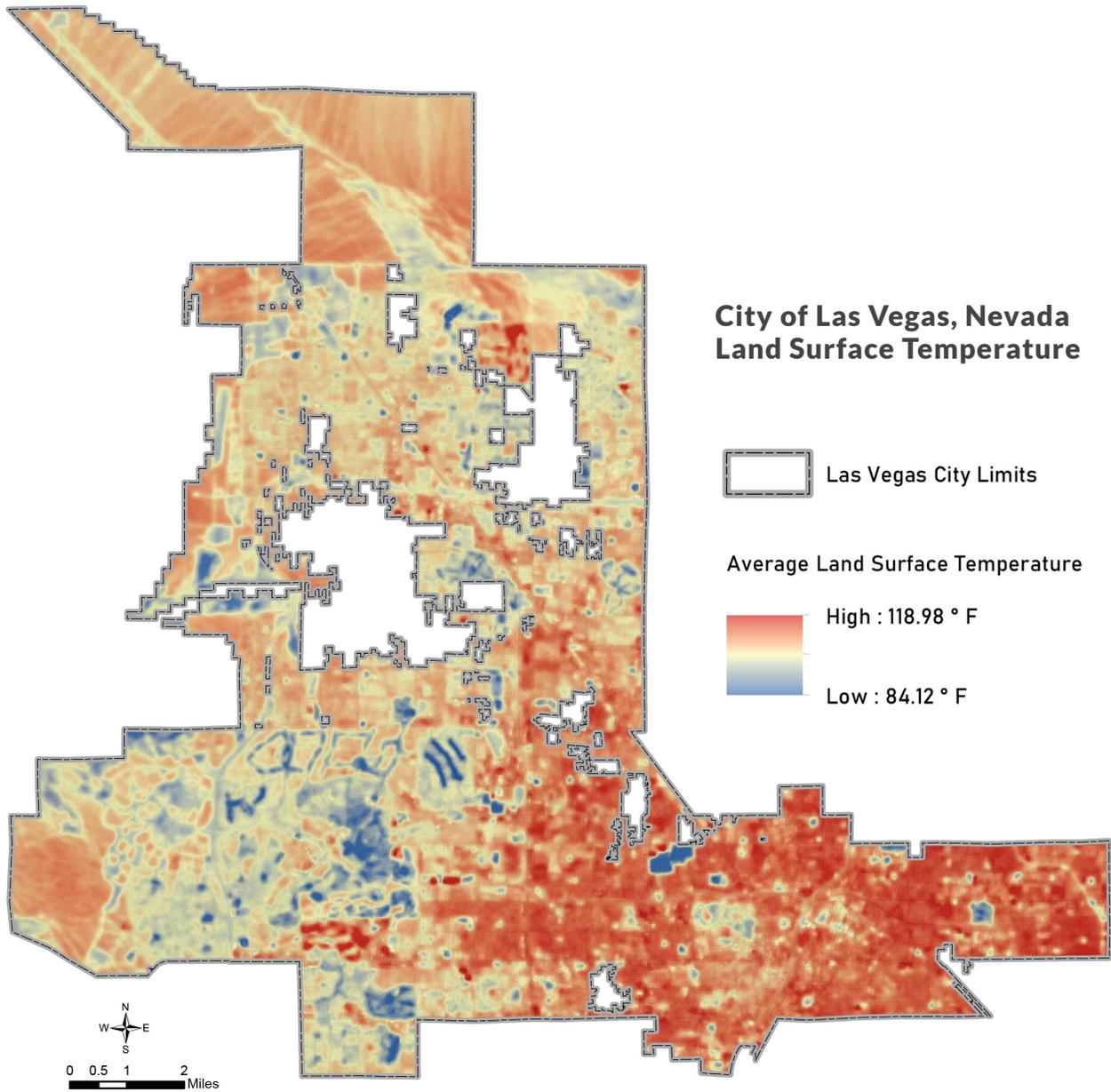
Recent public debate has raised the question of whether trees alone can combat extreme heat. The City's position is clear: trees are not a silver bullet, but they are indispensable. Las Vegas is a climate frontier city — proving that with smart planning and resilient design, even the toughest deserts can grow livable shade.

Las Vegas's urban forest is a living system — shaped by its past, challenged by its climate, and guided by its people. This Urban Forestry Management Plan builds on more than a century of work to ask not only "What do we have?" but "Where do we grow from here?"



HEAT MAPS AND SMART TREE INVENTORY DATA GUIDE LAS VEGAS URBAN FORESTRY

MAP. A MAP OF THE DAYTIME LAND SURFACE TEMPERATURES—USEFUL WHEN PLANNING TREE PLANTING STRATEGIES IN THE AREAS OF MOST NEED.

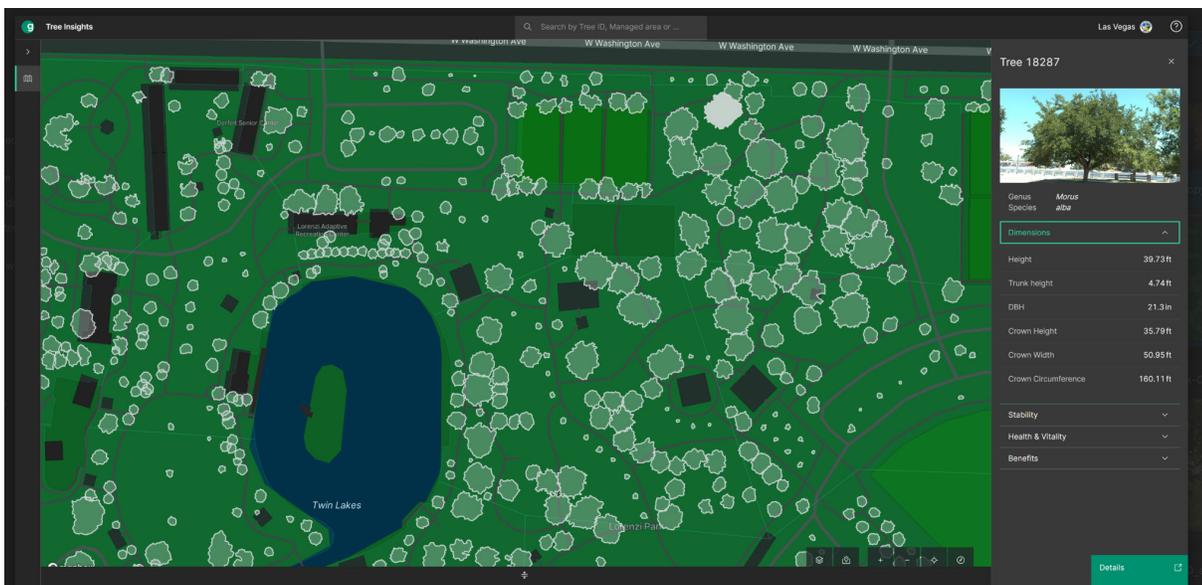


25-0461
11/10/2025

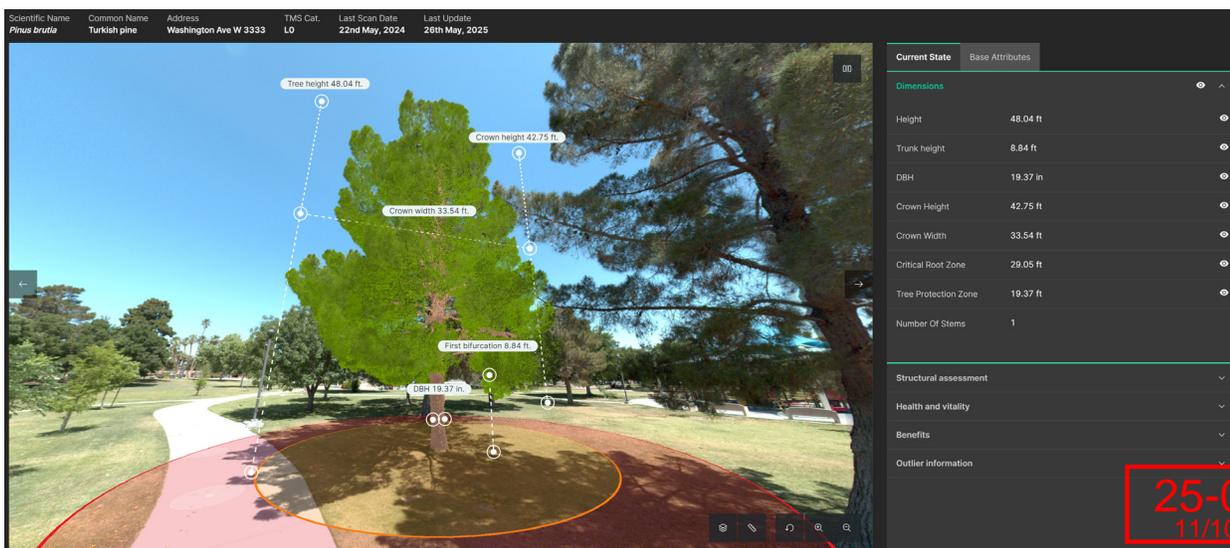
For the first time in our nation’s history, the City of Las Vegas Urban Forestry Management Plan was shaped and fueled by a Smart Tree Inventory — a next-generation approach that combines high-resolution LiDAR scanning, artificial intelligence, and Certified Arborist inspection verification to capture detailed biometric data for every tree. This technology reveals not only where trees are, but how they are performing — including structure, health, and canopy coverage at the individual and citywide scale.

When integrated with land cover analysis, heat mapping, and priority planting data, this smart dataset allows the City to visualize where canopy is providing the greatest cooling benefit and where gaps leave neighborhoods most vulnerable to extreme heat. Together, these tools empower the City to strategically guide planting and maintenance efforts, ensuring that future investments deliver maximum impact for shade, equity, and climate resilience.

SCREENSHOT OF THE CANOPY COVER VISUAL INVENTORY TOOL ACTIVELY BEING USED BY THE CITY’S URBAN FORESTER



SCREENSHOT OF THE DIGITAL TWIN STRUCTURAL AND CANOPY BIOMETRIC VISUALIZATION TOOL, AVAILABLE FOR USE IN MANAGING THE CITY’S URBAN FOREST.



25-0461
11/10/2025

WHAT DO WE WANT?

Las Vegas residents strongly support expanding the city’s urban forest. A recent survey conducted by UNLV and the MGM Resorts Public Policy Institute found that 84% of respondents favor increasing tree canopy along streets and in public spaces, and 74% support tree planting programs on private property. Willingness to participate, however, declines when upfront costs are introduced: participation rates drop sharply when trees exceed \$50 or when maintenance costs rise above \$15 per month.

These findings underscore three critical factors shaping community participation: **perceptions of environmental tradeoffs, awareness of tree benefits, and cost considerations.** Residents are aware of water scarcity, but most do not view tree planting as a direct conflict with conservation goals when framed as part of a broader sustainability strategy. Understanding of tree benefits is uneven, with lower-income and minority communities less likely to recognize the social, health, and property value advantages of canopy cover. Financial barriers also remain a key obstacle, especially in neighborhoods with historically low canopy cover.

The City’s urban forest goals – including planting 60,000 new trees by 2050 – will require strategies that align with these public attitudes: clear communication about the role of trees in heat mitigation, targeted outreach to underrepresented communities, and programs that minimize cost burdens. By prioritizing equity and affordability, Las Vegas can expand its canopy in a way that resonates with residents and builds long-term resilience.

HOW DO WE GET THERE?

This Urban Forestry Management Plan contributes directly to the goals outlined in NRS 278.160 (Conservation Element), as amended by AB 96 (2025), which requires Nevada municipalities to address Extreme Heat in their planning frameworks. Urban forestry is recognized here as a primary strategy for reducing urban heat island effects, conserving natural resources, and improving long-term community resilience.

This plan advances the City of Las Vegas 2050 Management Plan Forestry Goal:

“Prioritize increasing tree canopy across all areas of the city for multiple public health and environmental benefits.”

Within this framework, the UFMP establishes three guiding objectives:

- ✦ Expand and sustain an equitable, climate-resilient urban tree canopy.
- ✦ Strengthen tree care, protection, and enforcement across all sectors.
- ✦ Build an integrated urban forestry partnership network for scalable action.



These objectives are expressed as a set of adopted or adaptable policies that can be incorporated into staff reports, City Council actions, or implementation programs:

- ✦ The City will **prioritize equitable tree planting and canopy growth** in neighborhoods most impacted by extreme heat.
- ✦ The City will **enforce tree protections and limit canopy loss from development waivers**, requiring compensatory planting where removal is unavoidable.
- ✦ The City will **adopt and maintain a preferred tree species list** that emphasizes climate-resilient, water-smart selections and best-practice planting standards.
- ✦ The City will **expand urban forestry staffing and workforce training**, recognizing tree care as essential infrastructure management.
- ✦ The City will **align urban forestry data and planning** with regional partners through shared inventory systems and communication tools.
- ✦ The City will **center soil health, integrated pest management, and adaptive maintenance practices** as foundations of canopy resilience.
- ✦ The City will **educate and engage residents** as co-stewards of the urban forest, providing resources, outreach, and opportunities for participation.

ROAD MAP

The Urban Forestry Management Plan concludes with a timeline for implementation, presented as a visual roadmap linking each recommendation to near-term, mid-term, and long-term goals. This roadmap illustrates how sustained investment, community engagement, and interdepartmental coordination will achieve canopy expansion and ensure that trees remain a defining feature of a cooler, healthier Las Vegas.



25-0461
11/10/2025



INTRODUCTION

GROWING SHADE, GROWING VALUE: THE ROLE OF TREES IN LAS VEGAS'S FUTURE

In one of America's hottest, fastest-warming cities, trees are crucial infrastructure, not just landscape features. As Las Vegas faces intensifying heat, increased water restrictions, and increased urbanization, trees are one of the City's most powerful tools for creating a livable, healthy, and resilient future. As Dr. Henao of the Desert Research Institute affirmed, "shade is the most important benefit of trees" in cities like Las Vegas. Unlike artificial shade structures, trees deliver a suite of irreplaceable benefits: adaptive shade, evapotranspiration cooling, stormwater capture, carbon sequestration, wildlife habitat, and a sense of place and dignity for residents and visitors alike.

Urban forestry is one of the few municipal responsibilities where the assets increase in value with time. Every tree, if properly cared for, offers a growing return in the form of shade, cooler streets, cleaner air, energy savings, improved quality of life, and the actual value of the tree as an asset. For those entrusted with stewarding the City's urban forest, the job is both urgent and full of opportunity.

The urban forest includes all trees growing across the City – those shading sidewalks, lining roadways, enriching parks, and growing on private land. As climate pressures mount, maintaining and expanding this living infrastructure is both more challenging and more essential than ever.

25-0461
11/10/2025

KEY ACTIONS (GOALS) AND DESIRED OUTCOMES FROM LAS VEGAS 2050 MANAGEMENT PLAN



EQUITABLE

An equitable Las Vegas provides opportunity for all, with access to education, health care, resources and jobs no matter where in the City one lives, all while acknowledging that each neighborhood has its own distinctive character and clean environment



RESILIENT

A resilient and sustainable Las Vegas deliberately prepares the City against acute shocks and chronic stresses like health crises, drought, extreme heat, or flash flooding



HEALTHY

A healthy Las Vegas improves physical and mental health outcomes, improves safety, sustains families and encourages healthy choices for all residents



LIVABLE

A livable Las Vegas emphasizes quality of life in a distinctive way that is unique to the City and meets emerging market trends and demands



INNOVATIVE

An innovative Las Vegas meets new demands of residents while continuing to attract the boldest and brightest by pioneering smart city technologies that drive new markets and diversify the economy

EQUITABLE	RESILIENT	HEALTHY	LIVABLE	INNOVATIVE
Improved environment conditions provides cleaner air, water and health outcomes for all, especially when prioritized for those with the most needs	Protecting, restoring and adapting places in the context of the unique natural resources in Las Vegas will allow for reduced water use and improved environmental and health outcomes	Improved environment, connectivity and recreation opportunities will allow for healthier choice options including physical, mental and safety	Las Vegas residents take pride in the unique environmental and parks aspects of the City. These elements are part of the DNA of what makes Las Vegas a great place to live	Proactively addressing environmental opportunities and challenges in the context of extreme climate change will require innovative solutions that can become global models
				

KEY ACTIONS

- SNPLMA must continue to be supported as it has proven to be an effective tool for concentrating urban growth, while providing funding for open space.
- Utilize Tule Springs National Monument to its potential as a valuable open space asset for the City.
- Preserve and maintain open space as a balance to man-made development.
- Preserve and protect areas of important environmental/ecological consideration, and incorporate such areas into the park and recreation system.
- Use native and adaptive plants to meet environmental objectives and reduce maintenance requirements.
- Continue to partner with agencies, organizations, and businesses to enhance natural resource access and management.
- Reclaim areas of environmental/ecological deterioration using available resources from the public, quasi-public and private sectors

OUTCOMES

- The number of threatened species identified by the Clark County MSHCP is reduced
- The number of endangered species identified by the Clark County MSHCP is reduced
- No net loss of identified habitat areas of threatened or endangered species
- No net loss of identified wetlands or desert areas
- Identified natural areas and arroyos have been restored
- Existing and new identified invasive species have been eradicated or contained

25-0461
11/10/2025



BENEFITS OF TREES AND CANOPY IN LAS VEGAS

TREES ARE ESSENTIAL INFRASTRUCTURE

As one of the fastest-warming, driest cities in the U.S., Las Vegas recognizes trees not merely as aesthetic enhancements, but as vital infrastructure. Trees are essential for cooling neighborhoods, purifying the air, safeguarding public health, enhancing community life, and bolstering the economy. A tree's value grows over time, providing an average return of \$2.25 for every \$1 invested over the tree's useful life.

Urban forests are a vital investment in the safety, livability, and resilience of every community, especially in a city characterized by extremes.

25-0461
11/10/2025

THE ROLE OF TREES IN A DESERT ENVIRONMENT

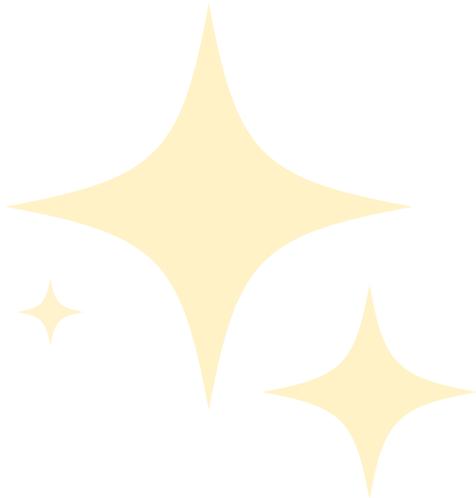
1. CREATING COOLER, SAFER CITIES

Las Vegas has warmed by 5.7 °F since 1970, ranking as the second-fastest-warming city in the nation. This rapid trend underscores the need to expand tree canopy and shade to protect residents, neighborhoods, and infrastructure from extreme heat.

Key insights:

- ✦ Longer, more intense heatwaves now pose a major public-health risk.
- ✦ Neighborhoods with low canopy face the highest surface temperatures.
- ✦ Trees deliver the most effective and economical shade solution — while built structures can cost hundreds of thousands of dollars, trees provide long-lasting shade and cooling for only a fraction of the cost.
- ✦ Expanding canopy directly supports equity, resilience, and community well-being in heat-vulnerable areas.

In desert environments, trees are the foundation of cooling, blocking solar radiation and reducing surface and radiant temperatures by 20–45 °F. Research from the Desert Research Institute confirms that shaded areas consistently feel cooler and safer, making tree canopy a critical layer of heat protection citywide.



Shade-driven benefits:

- ✦ Reduces heat exposure for pedestrians and residents
- ✦ Lowers pavement, vehicle, and building surface temperatures
- ✦ Improves walkability, comfort, and outdoor usability
- ✦ Extends pavement and infrastructure lifespan

Beyond shade, trees generate measurable physiological and psychological benefits. Peer-reviewed studies show that even brief exposure to trees and greenery can:

- ✦ Lower cortisol levels and reduce stress within minutes
- ✦ Decrease heart rate and blood pressure, improving cardiovascular health
- ✦ Enhance mood, focus, and cognitive recovery
- ✦ Reduce anxiety, fatigue, and aggression, improving overall well-being

These measurable effects underscore that trees do more than cool cities — they restore and rebalance the human body and mind.

Design factors for lasting performance:

- ✦ Native and desert-adapted species
- ✦ Placement near streets, buildings, and gathering areas
- ✦ Healthy soils and efficient irrigation
- ✦ Integration with reflective or permeable surfaces

Unlike built structures, trees are living infrastructure that strengthens with age while delivering climate, ecological, and human-health benefits. Nationwide, urban forests prevent roughly 1,200 heat-related deaths annually, affirming that trees are both a public-health intervention and a cornerstone of desert-city resilience.

25-0461
11/10/2025

2. MAKING EVERY DROP COUNT

Water scarcity is an increasing challenge for Las Vegas as Colorado River supplies diminish – a reality documented by the U.S. Environmental Protection Agency, the Southern Nevada Water Authority, and the City of Las Vegas 2050 Management Plan. Trees contribute to water sustainability by:

- ✦ Thriving on **minimal irrigation** when selecting drought-adapted species like mesquite, palo verde, and desert willow.
- ✦ **Intercepting rainfall**, reducing runoff by 20–60% and slowing erosion.
- ✦ Improving **soil water retention** by enhancing soil structure and increasing infiltration rates.

Strategically placed drought-adapted trees, efficient irrigation practices, and strong public education will advance canopy goals and planting efforts—creating a cooler, healthier, and more livable Las Vegas.

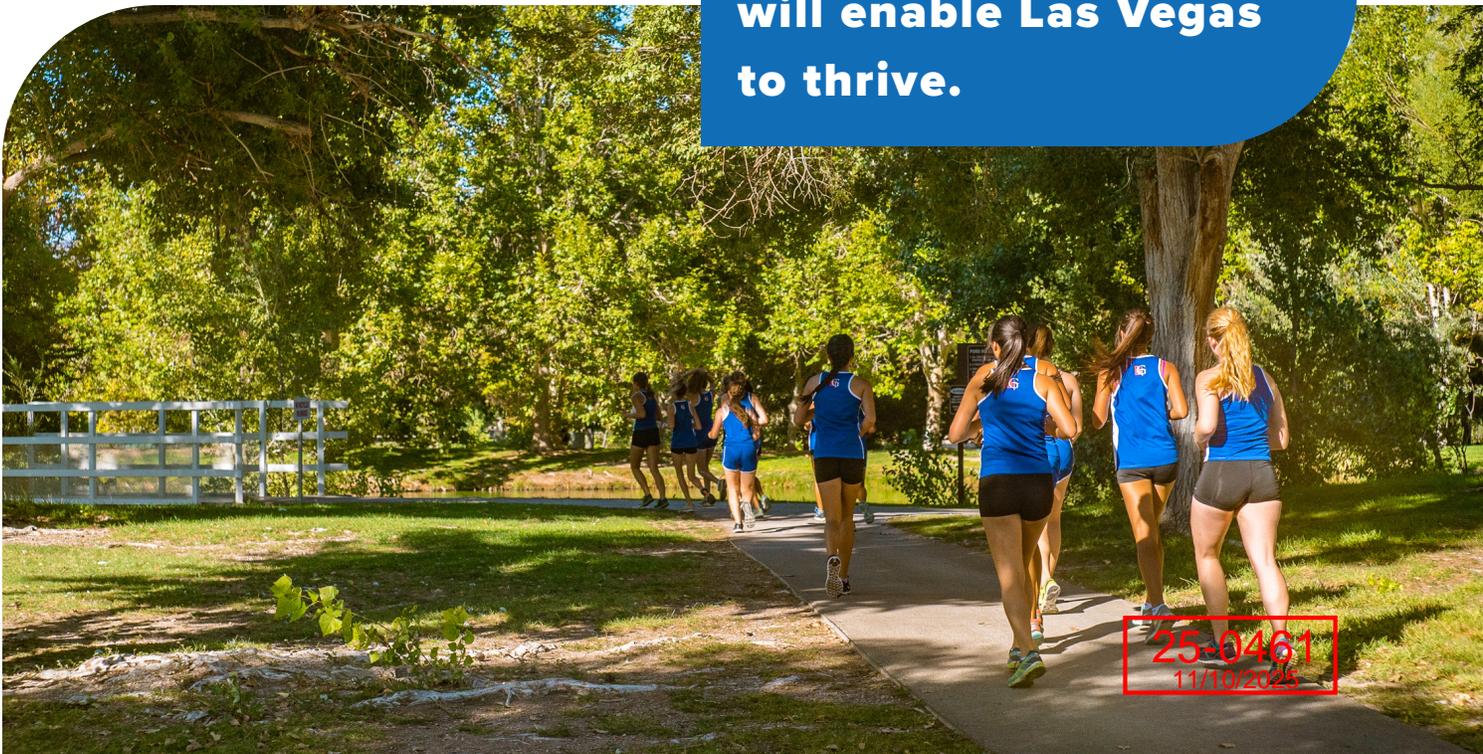
3. IMPROVING AIR QUALITY AND PUBLIC HEALTH

Las Vegas ranks among the top 25 most-polluted U.S. cities for ozone and particulate pollution. Trees defend public health by:

- ✦ **Filtering airborne dust, ash, and smoke.**
- ✦ **Absorbing harmful gases** like ozone, nitrogen dioxide, and sulfur dioxide.
- ✦ **Reducing ozone formation** by cooling surfaces and shading urban heat hotspots.

Nationwide, trees prevent 850 deaths and 670,000 acute respiratory incidents annually by cleaning the air.

A well-planned urban forestry strategy, coupled with deliberate water management, will enable Las Vegas to thrive.



4. SEQUESTERING CARBON AND COMBATING CLIMATE CHANGE

Trees collect and store carbon:

- ✦ A single large tree absorbs up to **48 pounds of carbon dioxide** per year.
 - Roughly the same as the emissions from driving an average gas car about 55–60 miles.
- ✦ An acre of trees captures the equivalent emissions of driving **26,000 miles**

Investing in the care and preservation of Las Vegas’s tree canopy is crucial for combating urban carbon emissions.

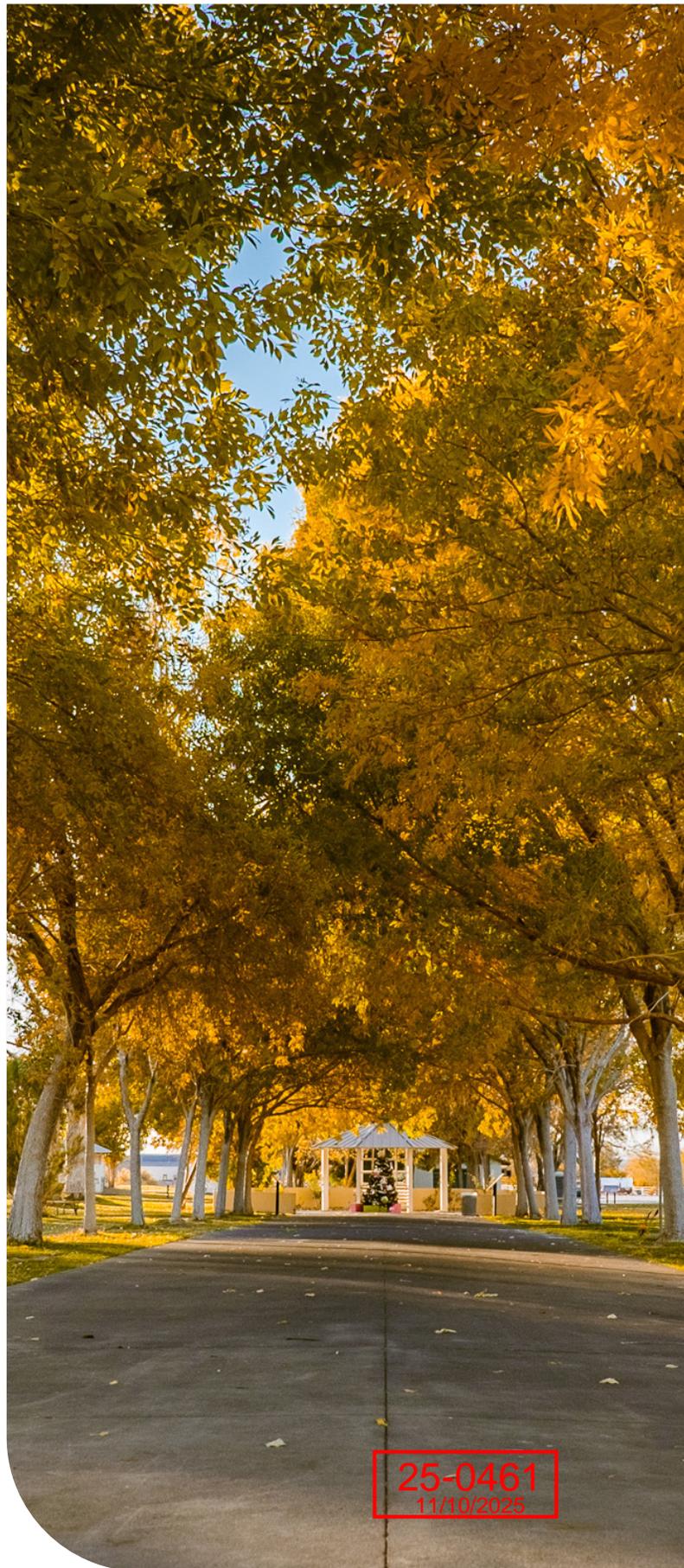
5. SUPPORTING WILDLIFE IN URBAN LANDSCAPES

Trees create critical habitat for:

- ✦ Migratory birds seeking nesting and resting places.
- ✦ Native bees and pollinators that rely on desert tree blooms.
- ✦ Mammals, reptiles, and beneficial insects that sustain desert ecosystems.

Planting trees supports biodiversity and strengthens ecological resilience within the urban environment.

“I hope more trees are planted everywhere in our city”
-Voice of the Community



25-0461
11/10/2025

TREES AND HUMAN HEALTH: STRENGTHENING BODY AND MIND

Beyond their environmental value, trees are powerful public-health assets. A growing body of global and regional research demonstrates that exposure to trees measurably improves both mental and physical well-being, reinforcing their role as essential city infrastructure.

Documented health benefits include:

- ✦ Reduced stress and anxiety through lower cortisol levels and calmer autonomic responses
- ✦ Improved cardiovascular health, with measurable reductions in heart rate and blood pressure
- ✦ Enhanced immune function, linked to natural aerosols emitted by trees that activate disease-fighting cells
- ✦ Improved sleep, focus, and mood regulation, supporting long-term mental resilience
- ✦ Lower rates of depression and anxiety disorders in neighborhoods with greater canopy cover
- ✦ Greater emotional balance, empathy, and community cohesion in greener urban areas

Current research shows that regular exposure to trees—even for a few minutes—initiates measurable physiological changes, reducing stress hormones, moderating heart rate variability, and improving cognitive performance. The cumulative impact across communities is profound: greener neighborhoods report lower chronic-disease rates, stronger social ties, and higher overall life satisfaction.

Public-health outcomes:

- ✦ Communities with abundant tree canopy experience fewer heat-related illnesses and lower mortality during extreme heat events.
- ✦ Tree access is associated with reduced healthcare costs and improved preventative health outcomes.
- ✦ A landmark study found that adding just 10 trees on a city block provides mental-health benefits equivalent to a \$10,000 increase in annual income (Kardan et al., 2015).

Simply put, trees strengthen both body and mind — acting as living systems of restoration that support emotional well-being, physical health, and neighborhood vitality. Investing in urban forestry is therefore not only an environmental strategy, but a public-health intervention that enhances quality of life for all residents.



BUILDING SAFER, STRONGER COMMUNITIES

Trees are essential for creating safer, more connected neighborhoods:

- ✦ **Traffic Calming:** Trees along streets visually narrow the roadway, encouraging slower vehicle speeds.
- ✦ **Crime Reduction:** A **10% increase in tree canopy** is associated with a **12–15% reduction** in violent and property crimes.
- ✦ **Social Cohesion:** Tree-lined streets and shaded parks encourage neighbor interactions, building community trust and engagement.

BOOSTING ECONOMIC VITALITY

Urban trees contribute directly to Las Vegas's economic success:

- ✦ **Lower Utility Bills:** Strategic shade from trees can reduce cooling costs by up to 56% and heating costs by 3%.
- ✦ **Higher Property Values:** Homes and businesses with mature trees see property value increases of up to 10%.
- ✦ **Business Growth:** Shoppers are willing to spend 9–12% more at businesses with shaded, tree-lined storefronts.

In a city built around outdoor entertainment and tourism, comfortable and shaded public spaces are a direct driver of economic prosperity – Main Street and East Fremont are prime examples of economic growth post-canopy growth.

Adding just 10 trees on a block has been shown to have a mental health benefit equivalent to a \$10,000 increase in income.





WHAT DO WE HAVE?

HISTORY OF TREES IN LAS VEGAS

1100 AD

Indigenous Roots & Early Settlements

For thousands of years, Indigenous peoples, including the Ancestral Puebloans and the Nuwvi (Southern Paiute), relied on the natural springs and creeks of the Las Vegas Valley. These wetlands supported dense stands of cottonwood and mesquite trees – natural oases in the Mojave Desert. The Las Vegas Creek and its tributaries were lifelines, creating shaded corridors long before the modern city was established.

Late 1800s – Early 1900s

Foundations of a City Canopy

The modern urban forest began to take shape with the arrival of settlers.

1905

Establishment of the San Pedro, Los Angeles, & Salt Lake Railroad

The establishment of the San Pedro, Los Angeles & Salt Lake Railroad in 1905 catalyzed the founding of Las Vegas.

1911

Mesquite Club Founded

Influenced in part by civic groups like the Mesquite Club, the beginning of an organized urban forestry movement in Las Vegas began to take shape.

Mid-1900s

Parklands & Historic Neighborhoods

Green infrastructure expanded as the city grew. Areas such as Lorenzi Park, Floyd Lamb Park, Berkley Square, and John S. Park were established in the early 20th century through post-WWII and built to incorporate tree-lined streets, fruit orchards, lush front yards, and even manmade lakes that evolved into a public resource for passive recreation and ecological restoration. Over time, many of these areas transitioned to xeriscape landscaping in response to water scarcity, though remnants of the legacy canopy remain.

1937

Fremont Street Becomes Tree-Lined, Marking the Transformation of the Urban Core

Fremont Street, the city's main downtown artery, was treeless at the time of the city's founding, but by 1937, was shaded by mature trees – a testament to the growing value placed on shade and streetscape aesthetics.

1912

Mesquite Club Plants 2,000 Trees

Mesquite club plants 2,000 trees across the city on the first Arbor Day – one cottonwood for nearly every lot in town.

25-0461
11/10/2025

Late 1900s
Institutional Milestones & Shifting Standards

1989
Las Vegas Designated a Tree City USA for the First Time
 Las Vegas has retained that recognition every year since.

2000s
The City's Urban Forest Faces New Threats
 Dominated by monocultures like Afghan pine, the tree population suffered severe losses due to limited environmental tolerances, pests, and inadequate soil volumes.

2013
A Regional Inventory Conducted by the Nevada Division of Forestry
 A regional inventory conducted by the Nevada Division of Forestry identified more than 117,000 public trees and 262 species across Las Vegas, Boulder City, and Mesquite—an affirmation of growing diversity and management capacity.

2016
City Hires First Urban Forester
 City hires first Urban Forester to address the need for systemic reform, and launched a city-owned nursery that now cultivates over 2,800 trees across 75 species tailored to the region's unique climate. Las Vegas was later added to the U.S. Forest Service's Forest Inventory and Analysis (FIA) program, further elevating its national relevance.

2016 – 2020
Urban Forestry Design Standards Advance

These reforms lay the groundwork for a climate-resilient, structurally diverse, and high-performing urban canopy, and include:

- Tree well sizes have been expanded from 5x5 feet to 5x8 feet, with additional soil volume infrastructure (such as soil/silva cells) designed to improve longevity, vitality, and survivability.
- Tree quality standards now emphasize healthy nursery stock with strong root systems, proper branching structure, and species suited to site-specific conditions. Planting protocols have been refined to include correct root collar placement, soil amendments, and adequate initial irrigation.
- Equally important are ongoing maintenance standards, including regular monitoring, training pruning, mulching, and irrigation adjustments during establishment, which ensure that the City's design and planting investments are protected.

2025
UFMP

The development of this Urban Forest Management Plan is a direct extension of that vision – prioritizing environmental resilience, public health, and equity across Las Vegas's evolving landscape.



2024
Urban Forest Management Plan Launch to Support 2050 Climate & Livability Goals
 In response, the City's 2050 Master Plan calls for planting 60,000 trees, reaching 25% canopy cover, and ensuring 85% of residents live within a third of a mile of green infrastructure, reaching 25% canopy cover.

2023
40+ Mature Trees Removed from the Las Vegas Strip to Accommodate Infrastructure for the Formula 1 Grand Prix

Present Day
Contemporary Challenges & Vision for 2050
 Urban forestry continues to face complex trade-offs amidst tensions between development and ecological preservation.

2020s
Federal Grants, Community Partnerships, & Equity Initiatives
 Urban forestry in Las Vegas has also become a tool for equity. A recent U.S. Forest Service grant to UNLV supports tree planting and workforce development in underserved areas. In historic Berkeley Square, for example, tree canopy had dropped to 13% by 2010. Restoration projects — including the planting of sweet acacia, catclaw acacia, and vitex — have aimed to bring shade back to this important community.

TIMELINE REFERENCES: CAMPANA ET AL 2024; CITY OF LAS VEGAS 2009; CITY OF LAS VEGAS 2021; CITY OF LAS VEGAS 2023; FULWOOD ET AL 2024; MOONEY 2002; MOOR 2007; NEVADA DIVISION OF FORESTRY 2013; RAYLE AND RUTER 2007; RAYLE AND RUTER 2013; RAYLE AND RUTER 2015; RAYLE AND RUTER 2017; SEYMOUR AND RANGER 2000; STEINER 1980; USDA FOREST SERVICE 2025

25-0461
 11/10/2025

LAND COVER CLASSIFICATION: SETTING THE BASELINE

Understanding Las Vegas’s land cover is the foundation for assessing the health and potential of its urban forest. In 2024, Davey Resource Group, Inc. completed a baseline Urban Tree Canopy (UTC) assessment based on 2022 data, the most recent available at the time. The analysis found that tree canopy covers approximately 5,542 acres — about 8.7 square miles, or 6.1% — of Las Vegas’s total

90,885 acres (142 square miles). By classifying the city’s surfaces—whether tree canopy, turf, desert, water, or impervious cover—the assessment establishes a clear picture of how land is used today and where opportunities exist for canopy growth. This baseline not only highlights the current benefits provided by trees but also reveals critical gaps that will guide future planting, planning, and policy.

MAP 1.. LAND COVER CLASSIFICATION IN LAS VEGAS BASED ON 2022 AERIAL IMAGERY. TREE CANOPY IS MOST CONCENTRATED IN SEVERAL PARK AREAS AND GOLF CLUBS IN THE SOUTHERN PORTION OF THE CITY INCLUDING ANGEL PARK, SUMMERLIN, LAS VEGAS, AND DESERT PINES/

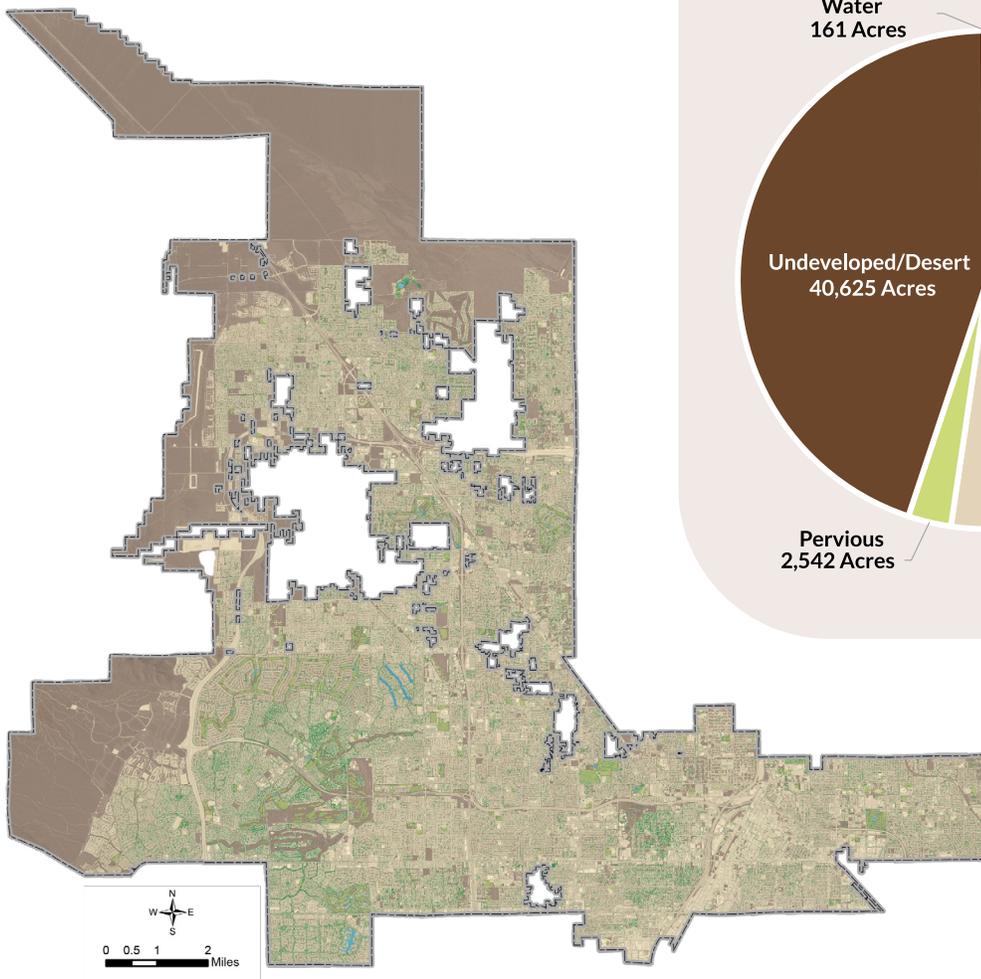
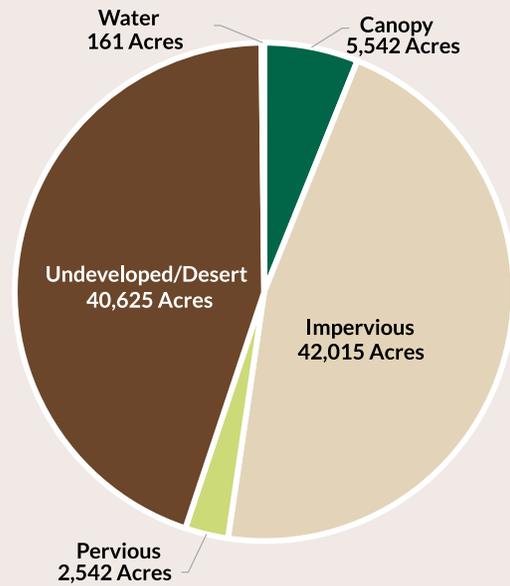


FIGURE 1. DISTRIBUTION OF LAND COVER TYPES ACROSS THE CITY OF LAS VEGAS.



Land Cover Classification	
	Tree Canopy
	Impervious Surfaces
	Irrigated/Green Vegetation
	Non-Irrigated Vegetation/Dry Land
	Open Water

25-0461
11/10/2025

CITY OF LAS VEGAS

142 square miles = 90,885 ACRES

OVERALL CANOPY COVER

6.1% (5,542 ACRES)
TREE CANOPY ACROSS LAS VEGAS

WHY? CORE METRIC

IMPERVIOUS SURFACES (roads, parking lots, structures)

46.2% (42,015 ACRES)
WHERE TREES CANNOT BE PLANTED

WHY? URBAN HEAT ISLAND CONTRIBUTING FACTOR

TREE CANOPY IN PARKS

123.3 ACRES
WITH AN AVERAGE OF
6.9% COVERAGE

WHY? HIGHLIGHTS THE CONNECTION TO RECREATIONAL SPACES

WARD-LEVEL EQUITY INSIGHT

HIGHEST:	LOWEST:
WARD 2	WARD 6
9.2%	3.4%

WHY? UNDERSCORES DISPARITIES AND THE NEED FOR EQUITABLE INVESTMENT



LET'S PLANT 60,000 TREES BY 2050!

25-0461
11/10/2025

TREE CANOPY LOSS OVER TIME

17.0% DECREASE
IN CANOPY FROM
2016 (6,674 ACRES) ▶ 2022 (5,542 ACRES)

WHY? COMMUNICATES URGENCY AND DECLINE

PUBLIC VS. PRIVATE CANOPY DISTRIBUTION OVER TIME

551 ACRES	VS.	4,949 ACRES
PUBLIC		PRIVATE
(3.3%)		(6.7%)

WHY? EMPHASIZES THE ROLE OF RESIDENTS AND THE NEED FOR PRIVATE INVOLVEMENT

CARBON STORAGE VALUE

187,360 tons OF CARBON
STORED

VALUED AT **~\$32 MILLION**

WHY? QUANTIFIES ECOLOGICAL SERVICE BENEFITS IN RELATABLE TERMS

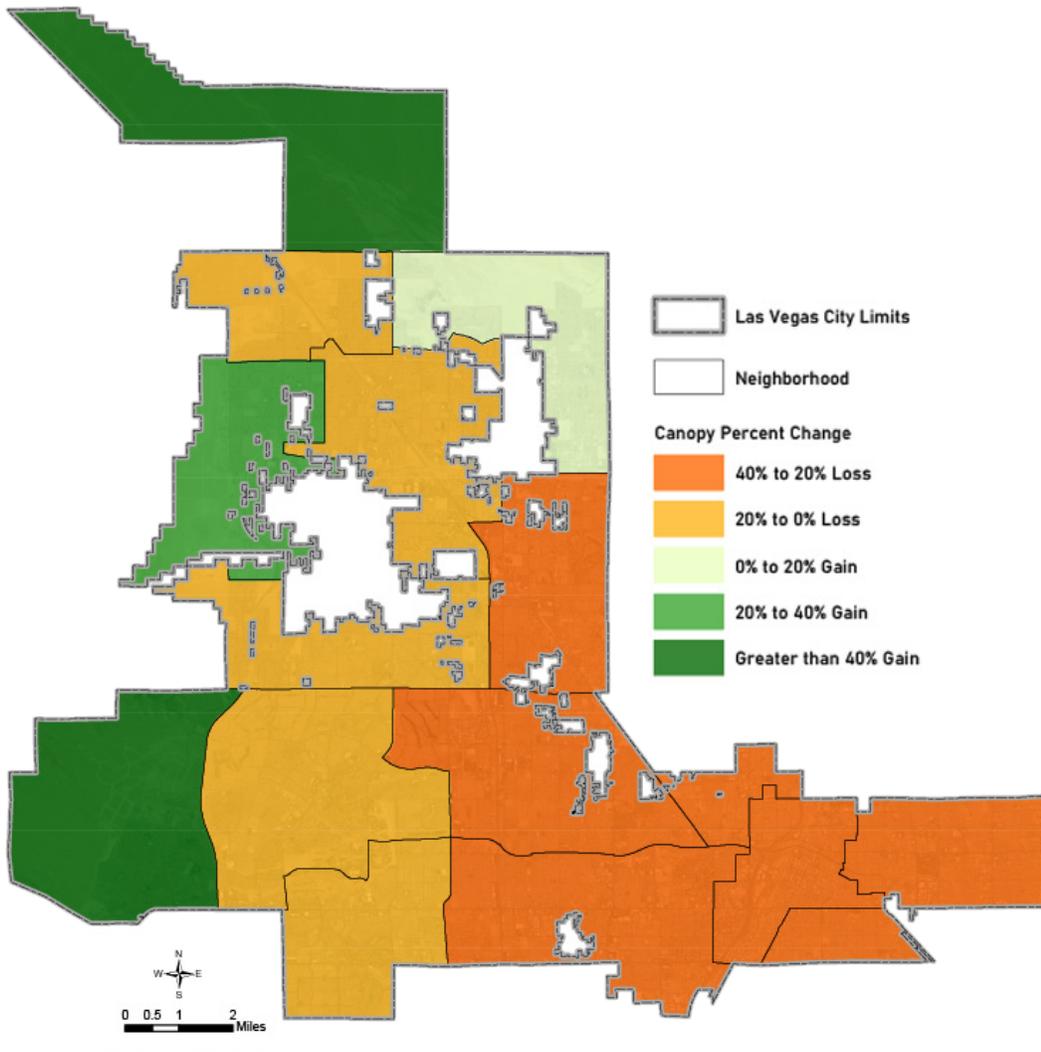
POTENTIAL FOR GROWTH

THERE'S ROOM TO GROW – 21,671 ACRES
OF POTENTIAL PLANTING SITES!

21,671 acres of plantable land
across the city

WHY? SHOWS THERE IS ROOM AND HOPE FOR EXPANSION

MAP 2. CITY OF LAS VEGAS CANOPY CHANGE BY NEIGHBORHOOD 2016 TO 2022 (2050 MASTER PLAN)



What is an Urban Tree Canopy Assessment?

An urban tree canopy assessment (UTC) uses aerial imagery to measure the total amount and distribution of tree canopy on both public and private property within a community as viewed from above. This information can be used to better understand the city’s urban tree canopy—where it is located, how it is changing over time, the benefits it provides to residents, where canopy should be preserved, and where potential future tree planting opportunities exist. Las Vegas is encouraged to reference these results, utilize the data for additional analyses, and continue to seek new tools and information to measure progress, report accomplishments, and inform management decisions.

25-0461
11/10/2025

Possible Planting Area

Las Vegas’s 2024 baseline assessment revealed a 17% decline in overall tree canopy compared to the previous analysis, underscoring the urgency to expand canopy cover across the city. To identify where new trees can be planted, Davey Resource Group evaluated all land types within city limits—excluding unsuitable areas such as ball fields and high-transmission corridors.

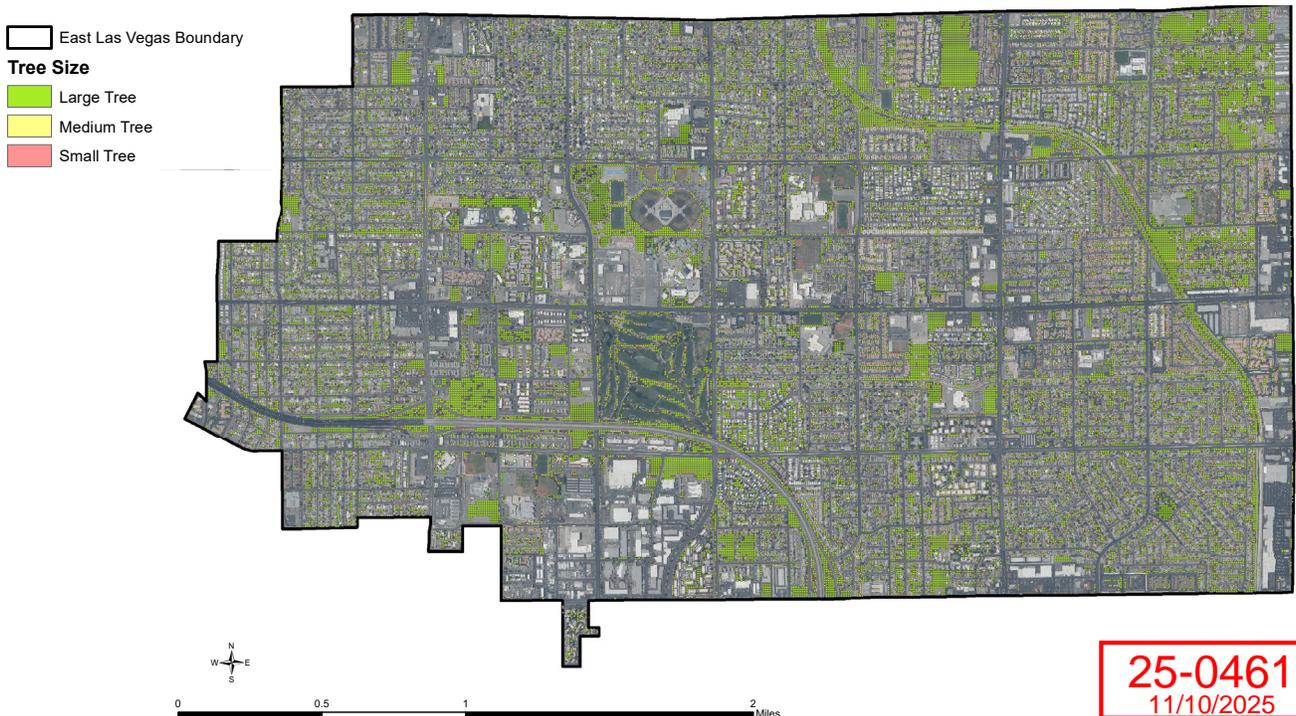
The analysis identified 36,811 acres of potential planting area, including irrigated vegetation, dry land, and bare soil. Of this, 15,140 acres are undeveloped—primarily in the city’s northern and western regions—while 21,671 acres fall within urbanized areas suitable for strategic canopy expansion.

If all potential areas were planted and existing canopy maintained, Las Vegas could theoretically reach 46.7% canopy cover; focusing only on developed areas would yield a potential 29.9% maximum canopy. However, because many of these areas consist of non-irrigated soils, careful site selection and water management will be critical to ensure long-term tree survival and resource efficiency.

MAP 3. PRIORITY TREE PLACEMENT ANALYSIS BY SIZE CLASS WITHIN DOWNTOWN LAS VEGAS



MAP 4. PRIORITY TREE PLACEMENT ANALYSIS BY SIZE CLASS WITHIN EAST LAS VEGAS



Tree Canopy Cover And Change Within Geographic Boundaries

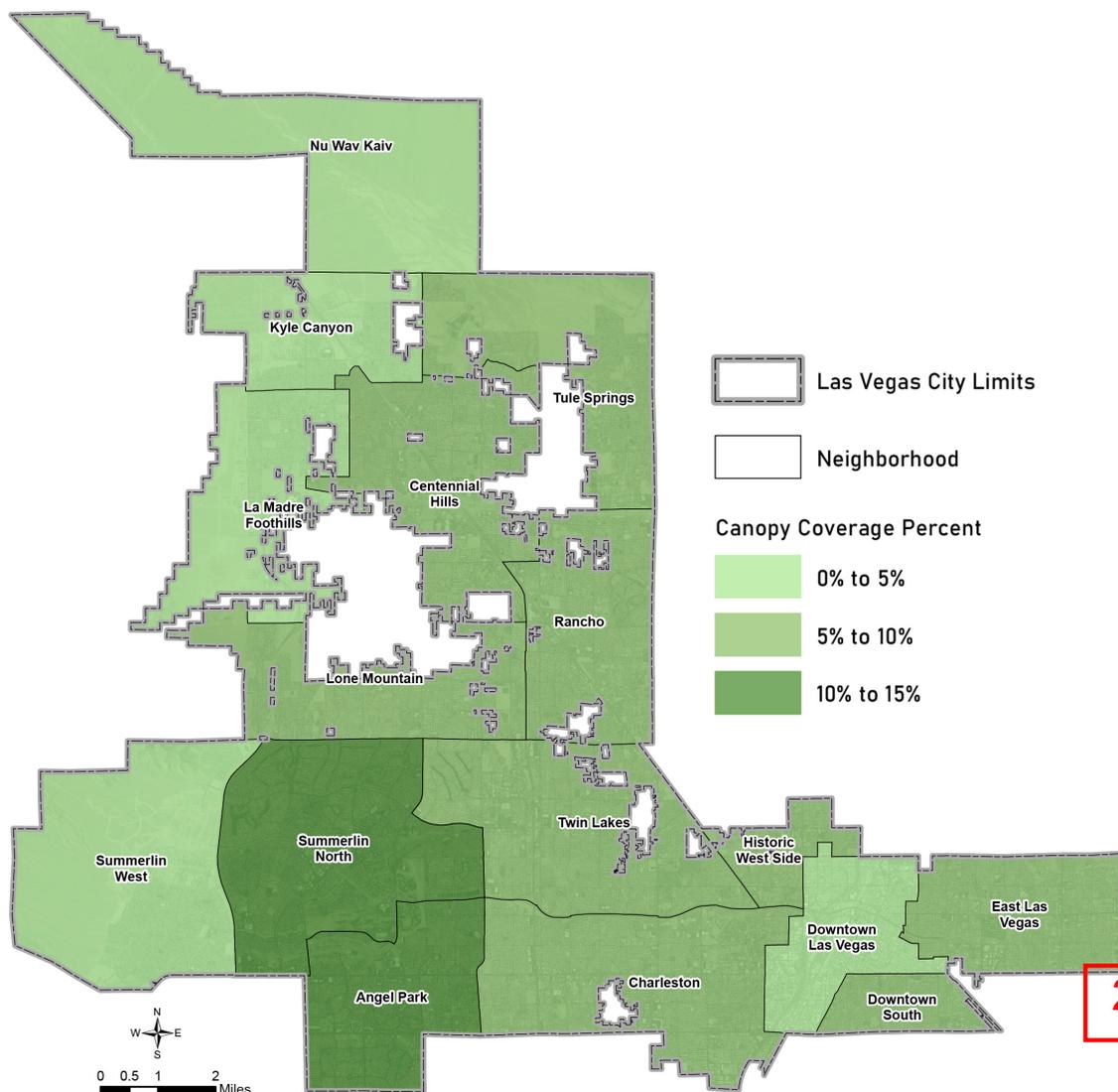
Land area that is shaded by trees, summarized by social and political boundaries.

Understanding the spatial distribution of canopy across the community can allow managers and stakeholders to use equity data to inform planting plans and canopy goals.

Public and Private Land

Nearly **90%** of Las Vegas's tree canopy is **located on privately owned property**. Overall, the average canopy cover is greater on **privately owned (6.7%)** than **publicly owned lands (3.3%)**. Private lands also have a higher maximum potential canopy (57.4%) than public lands (25.3%).

MAP 5. TREE CANOPY COVER PERCENT IN LAS VEGAS 2050 MASTER PLAN NEIGHBORHOODS BASED ON 2022 AERIAL IMAGERY. TREE CANOPY COVER IS GREATEST IN SUMMERLIN NORTH (13.4%) AND ANGEL PARK (12.7%), TWO NEIGHBORHOODS IN THE SOUTHWEST PART OF TOWN THAT CONTAIN LARGE GOLF CLUBS. CANOPY COVER IS LOWEST IN NU WAV KAIV (<.01%), THE CITY'S LARGEST AND NORTHERNMOST NEIGHBORHOOD



25-0461
11/10/2025

2050 Master Plan Areas

The City includes 16 neighborhoods that cover a total of 99,815 acres, nearly the full city boundary, and contain 6,403 acres of tree canopy (6.4% canopy cover). Areas range in canopy cover from over 13% to less than .01%. According to the potential planting analysis, canopy cover could be increased in all neighborhoods. Planting new trees in neighborhoods with less existing canopy will help to improve equity and give all residents better access to shade and the numerous other benefits trees provide.

Wards

The wards are headed by elected officials that provide direct representation for the constituents in each ward and were redistricted in 2020. Canopy cover ranges from 3.4% in Ward 6 (the largest ward) to 9.2% in Ward 2. All wards lost canopy between 2016-2022, but the greatest loss was 32.5%.



TABLE . TREE CANOPY COVER AND CANOPY CHANGE IN LAS VEGAS'S 6 WARDS, SORTED BY WARD SIZE.

Ward	Acres	Canopy Acres	Canopy %	Impervious Acres	Irrigated/ Green Veg. Acres	Non- irrigated Veg. Dry Land Acres	Open Water Acres	Potential Canopy %	% Change 2016-2022
Ward 6	26,360	892	3.38	7,077	339.63	18,041	11.35	72.02	-11.75
Ward 2	18,966	1,748	9.22	7,535	765.03	8,861	56.39	57.28	-4.19
Ward 4	16,317	901	5.52	7,857	584.60	6,895	79.77	47.08	-14.19
Ward 1	11,202	908	8.10	7,434	315.81	2,545	0.25	31.80	-25.63
Ward 5	9,805	610	6.22	6,316	359.23	2,515	5.26	34.14	-28.34
Ward 3	8,235	484	5.88	5,797	177.53	1,769	7.93	27.98	-32.53
Total	90,885	5,542	6.1%	42,015	2,542	40,625	160.94	51.43%	-17.00%

25-0461
11/10/2025

Census Tracts

Examining tree canopy cover by census tract can provide managers with additional perspective as the results can be compared with US Census data. There are 206 census tracts in Las Vegas which encompass the full city boundary. Amongst the top 10 largest census tracts by acreage, tree canopy varies from less than .01% to 22.4%. Tract 204 has the lowest canopy cover (<.01%) and approximately aligns with the Nu Wav Kaiv neighborhood at the northern edge of town. Tract 204 also has the most non-irrigated vegetation/dry land (8,915 acres) and a relatively low amount of impervious surfaces (40 acres) and therefore has a high potential canopy value. Tract 85 is situated in southwest Las Vegas near the Summerlin North neighborhood and has the most canopy acres (223.9) and highest canopy cover (22.4%). The majority of census tracts lost canopy from 2016-2022 with the exception of tracts located along the western and northernmost borders of town. Prioritizing planting new trees in census tracts that lack existing canopy, have lost significant amounts of canopy to development, or contain higher levels of underserved populations will help the City to improve its tree equity.

Las Vegas has 87 parks that cover approximately 1,800 acres.

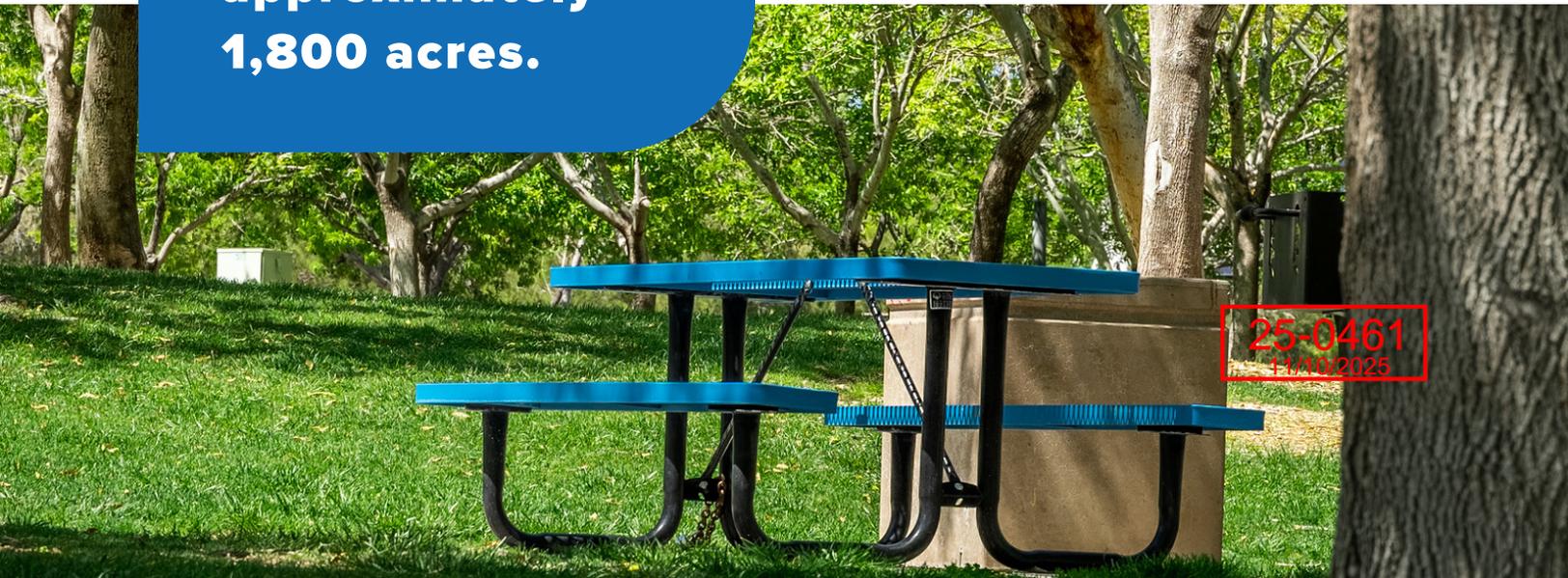
Parks

Las Vegas's 87 parks span 1,797 acres and contain 123.3 acres of tree canopy—a 6.9% canopy cover, slightly higher than the citywide average of 6.1%. Canopy distribution varies widely, with larger undeveloped areas and retention basins, such as those at Floyd Lamb Park at Tule Springs, lowering overall percentages. In developed park areas, canopy density is notably higher, contributing to cooler microclimates and enhanced carbon storage. Studies show that tree canopy provides greater cooling and ecological benefits than other green surfaces such as turf (Li and Wang, 2021). With 27.3% of park land consisting of irrigated vegetation, opportunities remain strong for targeted canopy expansion.

Tree Canopy Cover Compared With Neighboring Communities

How Las Vegas's urban forest compares with other communities in a similar climate.

Communities vary in acreage, land use, and population, but comparison can be beneficial for providing context to the expanse and distribution of canopy cover in Las Vegas. Las Vegas's canopy cover (6.1%) falls in the bottom range among communities with known canopy cover and similar climates. Phoenix, AZ has the highest canopy cover (12.4%) followed by Henderson, NV (7.2%) and Reno, NV (6.8%).

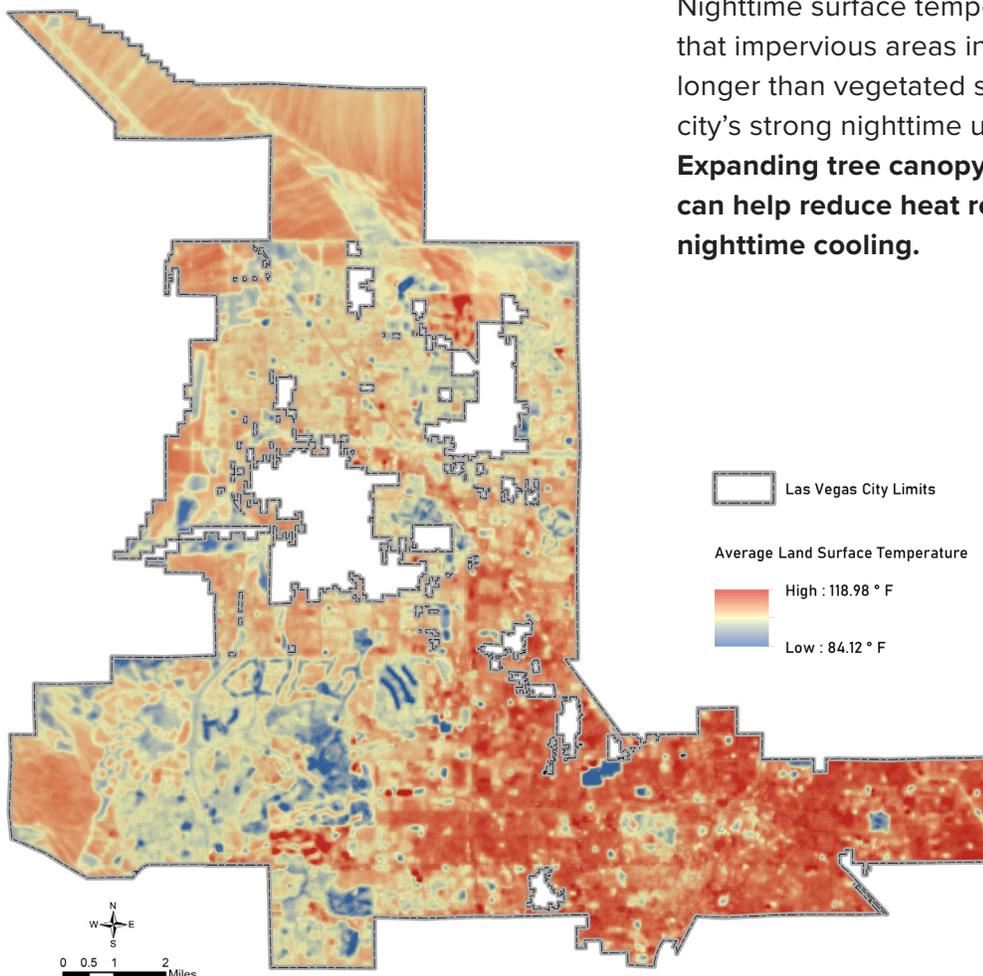


Land Surface Temperature And Urban Heat Islands

How daily surface temperatures in Las Vegas vary spatially.

Capturing land surface temperature is essential to monitoring heat islands, air quality, and overall well-being for residents in Las Vegas. Trees and their canopy distribution can greatly affect the surface temperatures of an area. Parks or areas with evenly distributed canopy cover have a cooling effect on their surroundings.

MAP 6. DAILY LAND SURFACE TEMPERATURES IN LAS VEGAS, NV AVERAGED FROM TWO LANDSAT 8 IMAGES TAKEN DURING THE LATE AFTERNOON DURING SUMMER CONDITIONS ON AUGUST 5, 2021 AND AUGUST 16, 2022. TEMPERATURES RANGE FROM 84.1 °F TO 118.9 °F WITH AN AVERAGE OF 95.5 °F. THE COOLEST LAND SURFACE TEMPERATURES WITHIN CITY LIMITS OCCUR IN THE SOUTH CENTRAL PORTION OF THE COMMUNITY AND CORRESPOND TO AREAS WITH MORE CANOPY COVER.



Trees, especially large mature trees, help buffer the temperatures and provide relief.

To establish an understanding of how urban forest canopy affects heat islands, land surface temperature analyses were conducted using daytime and nighttime Landsat 8 imagery.

Daytime land surface temperatures range from **84.1 °F to 118.9 °F**. Most areas within Las Vegas city limits have high land surface temperatures, with a mean of 95.5 °F. **There is a 30°F difference when comparing much of the built community to parks and other areas with green infrastructure.** Unshaded sidewalks, streets, and parking lots in the built areas of the city are among the greatest contributors to the creation of urban heat islands, while the coolest land surface temperatures within city limits occur in the south central portion of the community and correspond to areas with more canopy cover.

Nighttime surface temperature mapping shows that impervious areas in Las Vegas retain heat longer than vegetated surfaces, reinforcing the city's strong nighttime urban heat island effect. **Expanding tree canopy in these hotter zones can help reduce heat retention and improve nighttime cooling.**

25-0461
11/10/2025

Benefits of Las Vegas's Tree Canopy

i-Tree Canopy (v7.1) was used to estimate and quantify the ecosystem benefits from Las Vegas's tree canopy cover (public and private trees) to air quality, stormwater runoff, and carbon sequestration. The analysis estimates that Las Vegas's tree canopy is storing 187,360 tons of carbon in woody biomass, valued at \$32 million, and **annually providing \$2.1 million in quantifiable benefits**, including:

- ✦ Removing 207 tons of air pollutants, including carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), sulfur dioxide (SO₂), and particulate matter (PM₁₀), valued at \$907,690
- ✦ Reducing stormwater runoff by approximately 40,810,000 gallons annually valued at \$364,683
- ✦ Sequestering an additional 5,050 tons of carbon, valued at \$860,725.

TABLE 2. ANNUAL BENEFITS PROVIDED BY LAS VEGAS'S URBAN FOREST, INCLUDING ALL TREES WITHIN THE CITY ON BOTH PUBLIC AND PRIVATE PROPERTY, TOTAL OVER \$2.1 MILLION PER YEAR.

Benefit	Value (\$/yr.)	% of Benefit
Pollution Removal	\$907,690	42.55
Stormwater	\$364,683	17.10
CO ₂ Sequestration	\$860,725	40.35
Total	\$2,133,098	100%

Las Vegas's tree canopy is providing \$2.1 million annually in benefits.



25-0461
11/10/2025

LONG TERM PLANTING PLAN

To support the goals established in the 2050 Master Plan and and City Council Resolution R-43-2022, the City of Las Vegas has developed a Long-Term Planting Plan that utilizes the results of the Land Cover Assessment, and subsequent Tree Placement Analysis, to establish a strategic plan for equitably and systematically expanding their tree canopy.

The Planting Plan outlines the resources the City has and strategies the City can take to reach their goals and address climate resilience, canopy equity, and holistic urban development. The City’s strategy emphasizes planting trees in both public and private spaces that are native or regionally adaptive. The trees will be located in areas of greatest need, particularly neighborhoods with vulnerable populations disproportionately affected by heat exposure, through a phased approach with the highest-priority neighborhoods first. To ensure long-term success, the initiative includes resilient urban design practices, enhanced public outreach, and robust educational programs that promote landscape stewardship across the community.

Goals of the Long Term Planting Plan include:

- ✦ Planting 60,000 regionally appropriate trees
- ✦ Increasing citywide tree canopy to 20% (18,177 acres) by 2035 and 25% (22,721 acres) by 2050
- ✦ Ensuring that at least 85% of residents live within one-third of a mile from green infrastructure such as parks or tree-lined corridors

Tree-related topics addressed in the Planting Plan include appropriate species selection and species diversity incorporating the 10-20-30 rule (described in the following section), site selection based on the principle of “right tree right place,” preservation of large, mature trees, risk management of hazard trees, and a chronological planting timeline with milestones. The Planting Plan also includes recommendations about community engagement, workforce integration, budgeting, cost estimations, and strategies for funding the work.

Some of the maps from the Tree Placement Analysis are included in the Appendix of this UFMP, and the City can also refer to the separate Planting Plan document for the full details.



LAS VEGAS'S COMMUNITY TREE RESOURCE

Community Tree Resource Analysis

A tree resource is best understood by examining its composition based on metrics including species diversity, age distribution, relative condition or health, and size or canopy coverage. These metrics form the foundation for planning and management decisions. Analyzing this data allows managers to assess the contribution of individual trees and species to the overall urban forest, both today and into the future. These insights inform decision making and help project the long-term potential of the resource.

In 2024, the City of Las Vegas contracted with Davey Resource Group, Inc. (DRG) to conduct an inventory of community trees. The tree inventory data was used in conjunction with i-Tree Eco benefit-cost modeling software to develop a detailed and quantified analysis of the current structure, function, benefits, and value of the community tree resource. In contrast to the Land Cover Assessment, which assessed tree canopy on all public and private land throughout the city, this analysis only includes public trees. The full results of the community tree inventory are included in the [Resource Analysis](#).

Resource Structure

Las Vegas's community tree inventory includes 32,027 trees. Additional trees that were not inventoried but that are part of the City's urban forestry network are located in the City's natural area and open space parks. The following information characterizes Las Vegas's existing community tree inventory:

- ✦ **133 unique tree species** are represented.
- ✦ The top three most prevalent species are: *Pinus brutia* (Turkish pine, 13.9%), *Fraxinus velutina* (velvet ash, 10.4%), and *Acacia stenophylla* (Shoestring acacia, 5.9%). These species account for 30.2% of the community tree resource.
- ✦ change to 50.6% of trees are 8 inches or less in diameter and only 2.3% are larger than 24".
- ✦ 96.4% of trees are in fair or better condition.
- ✦ Community trees are estimated to provide 235.9 acres of canopy cover, which is nearly 0.3% of all land cover and 4.3% of all canopy in the city.
- ✦ To date, Las Vegas's community trees are storing 5,7021.09 tons of carbon in woody and foliar biomass.
- ✦ Approximately 74.4% of trees are at risk to pests and pathogens, including polyphagous shot hole borer (*Euwallacea fornicatus*), defoliating moths (*Malacosoma californicum*, *Hyphantria cunea*, *Thyridopteryx ephemeraeformis*), and pine shoot beetle (*Tomicus piniperda*).

To replace Las Vegas's 32,027 community trees with trees of equivalent size, species, and condition, would cost \$62,103,524.41.

25-0461
11/10/2025



Species Diversity

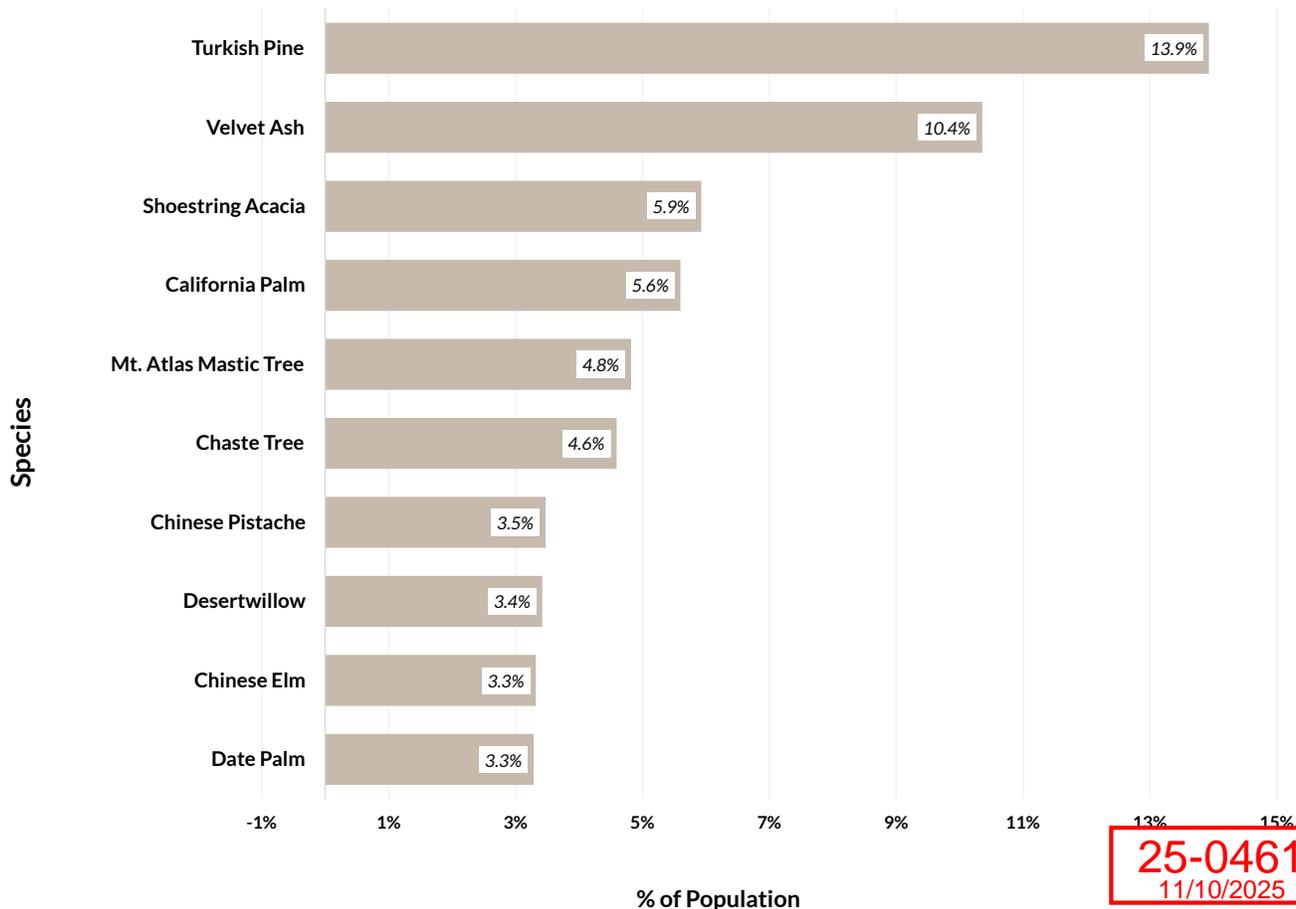
Maintaining diversity in an urban forest is vital. Dominance of any single species or genus can have detrimental consequences in the event of disease or pest outbreaks/infestations* or changes in environmental stressors. Over reliance on any one species of tree has the potential to lead to significant loss of canopy and its associated benefits. Species diversity is calculated as the proportion of any one species relative to the total community tree collection.

Recognizing that all tree species have a potential vulnerability to pests and disease, urban forest managers have long followed a

rule of thumb that no single species should represent greater than 10% of the total population and no single genus more than 20% (Santamour, 1990). In Las Vegas's community tree population, Turkish Pine (*Pinus brutia* 13.9%) and Velvet Ash (*Fraxinus velutina* 10.4%) exceeds this widely accepted rule at the species level. In Las Vegas, no genera or family exceeds the recommendation. Managers should continue to strive for increased diversity to promote greater resiliency and reduce the risk of a significant loss in benefits should any species become a liability.

FIGURE 2. SPECIES DIVERSITY OF LAS VEGAS'S COMMUNITY TREE RESOURCE. THE TOP THREE MOST PREVALENT SPECIES COMPRISE OVER 30% OF THE TOTAL COMMUNITY TREE POPULATION, AND THE TOP TWO SPECIES EXCEED THE INDUSTRY RECOMMENDATION OF 10%.

TOP 5 SPECIES - HIGHEST % OF POPULATION



Relative Age Distribution

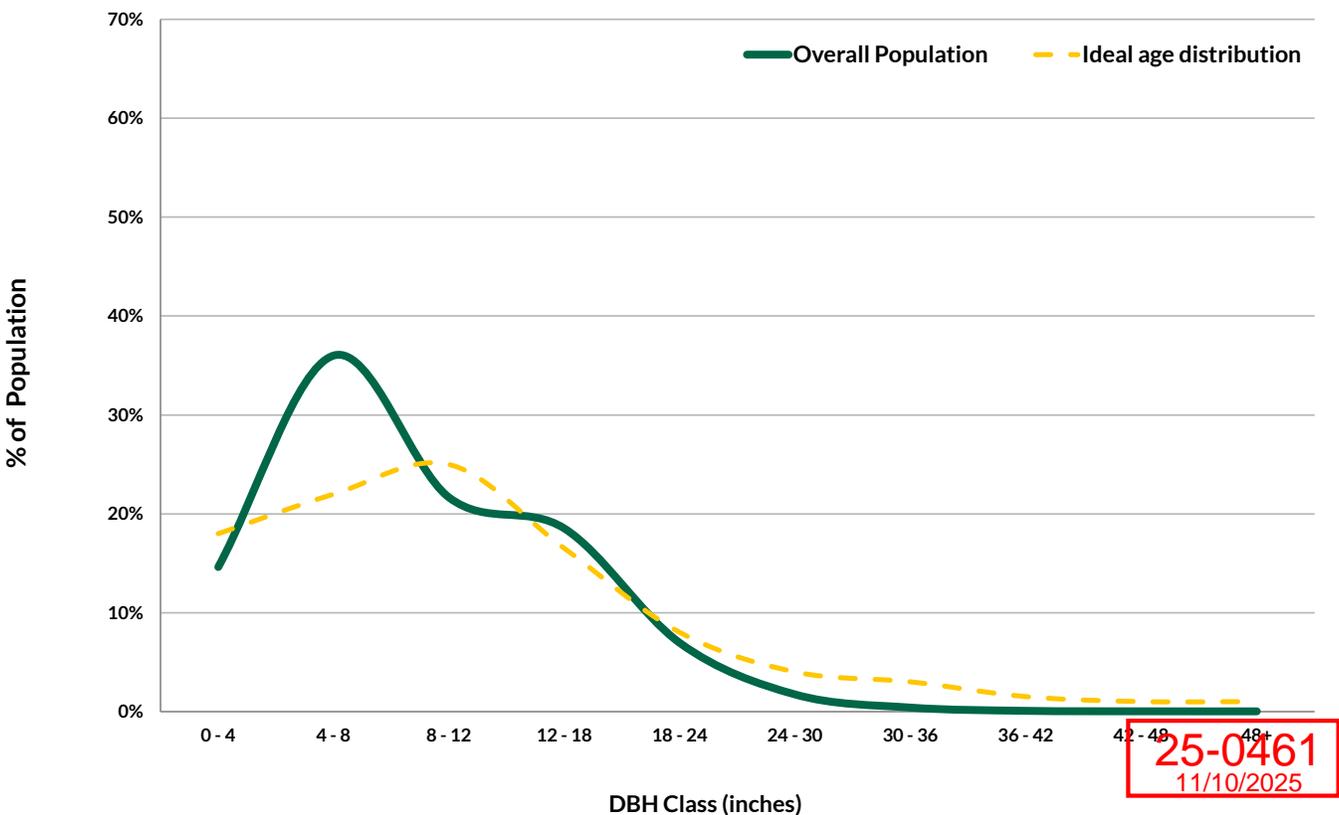
The **age distribution** of the urban forest is a key indicator of overall condition and maintenance needs. It can be estimated by examining **diameter at breast height (DBH)**—smaller diameters generally indicate younger trees.

- ✦ **Why it matters:** Tree age influences current and future **costs, benefits, and replacement needs**.
- ✦ **Succession planning:** Planting young trees as mature ones decline ensures **continuous canopy cover** and stable **maintenance budgets**.
- ✦ **Ideal balance:** A healthy forest should have roughly **40% young trees (<8" DBH)** and only **10% large trees (>24" DBH)** to offset age-related mortality.

In Las Vegas, the community forest reflects a young population—**50.6%** of trees are **under 8 inches**, while only **2.3%** exceed **24 inches**. This indicates an actively **establishing urban forest** with limited representation of mature canopy.

Analyzing the **age structure of key species** (see Resource Analysis) helps managers anticipate **maintenance cycles**, forecast **budget needs**, and guide **future species selection** to maintain long-term canopy resilience.

FIGURE 3. RELATIVE AGE DISTRIBUTION OF LAS VEGAS'S COMMUNITY TREE POPULATION. THE MAJORITY OF ALL TREES (50.6%) ARE SMALLEST AGE CLASS, INDICATING A YOUNG POPULATION WITH MANY NEW TREES BEING PLANTED.



25-0461
11/10/2025





Management and Investment

- ✦ **Annual Investment (2024):** The City invested approximately **\$1.7 million (\$53.14 per tree; \$2.92 per capita)** to manage its community trees.
- ✦ **Annual Returns:** Las Vegas's urban forest provides an estimated **\$2.1 million in annual benefits**, generating a positive **return on investment** and demonstrating the tangible value of ongoing tree care.
- ✦ **Conservative Estimate:** These values represent only **quantifiable benefits** and do not fully capture broader advantages such as **wildlife habitat, property value increases, reduced crime, or improved public health and well-being**.
- ✦ **Future Opportunity:** By expanding **canopy cover** through strategic **tree planting, maintenance, and preservation**, the City can **amplify these returns**—enhancing shade, cooling, carbon storage, and overall livability across neighborhoods.

Benefits of Las Vegas's Community Trees

- ✦ **Environmental Functions:** Trees improve **air quality, slow stormwater, and remove pollutants**, reducing municipal infrastructure costs. Their growth also **sequesters carbon** in stems and roots, storing it long-term.
- ✦ **Economic Value:** The **i-Tree Eco model** was used to estimate quantifiable ecosystem services from trees on **City-managed properties** (e.g., parks, streetscapes, and public spaces).
- ✦ **Measured Benefits (excluding energy savings):** Community trees currently provide approximately **\$111,489 in annual measurable environmental benefits**, including pollutant removal, stormwater reduction, and carbon sequestration.
- ✦ **Unquantified Benefits:** The analysis excludes several significant yet harder-to-measure impacts—such as **energy savings from shading, climate moderation, and psychological, social, and economic gains**—meaning the true value of Las Vegas's community trees is likely **far higher**.

25,0461
11/10/2025

Air Pollution

Urban trees improve air quality by **absorbing gaseous pollutants** such as ozone (O₃), sulfur dioxide (SO₂), and nitrogen dioxide (NO₂) through their leaves. They also help lower emissions from vehicles and buildings by reducing energy use and providing shade.

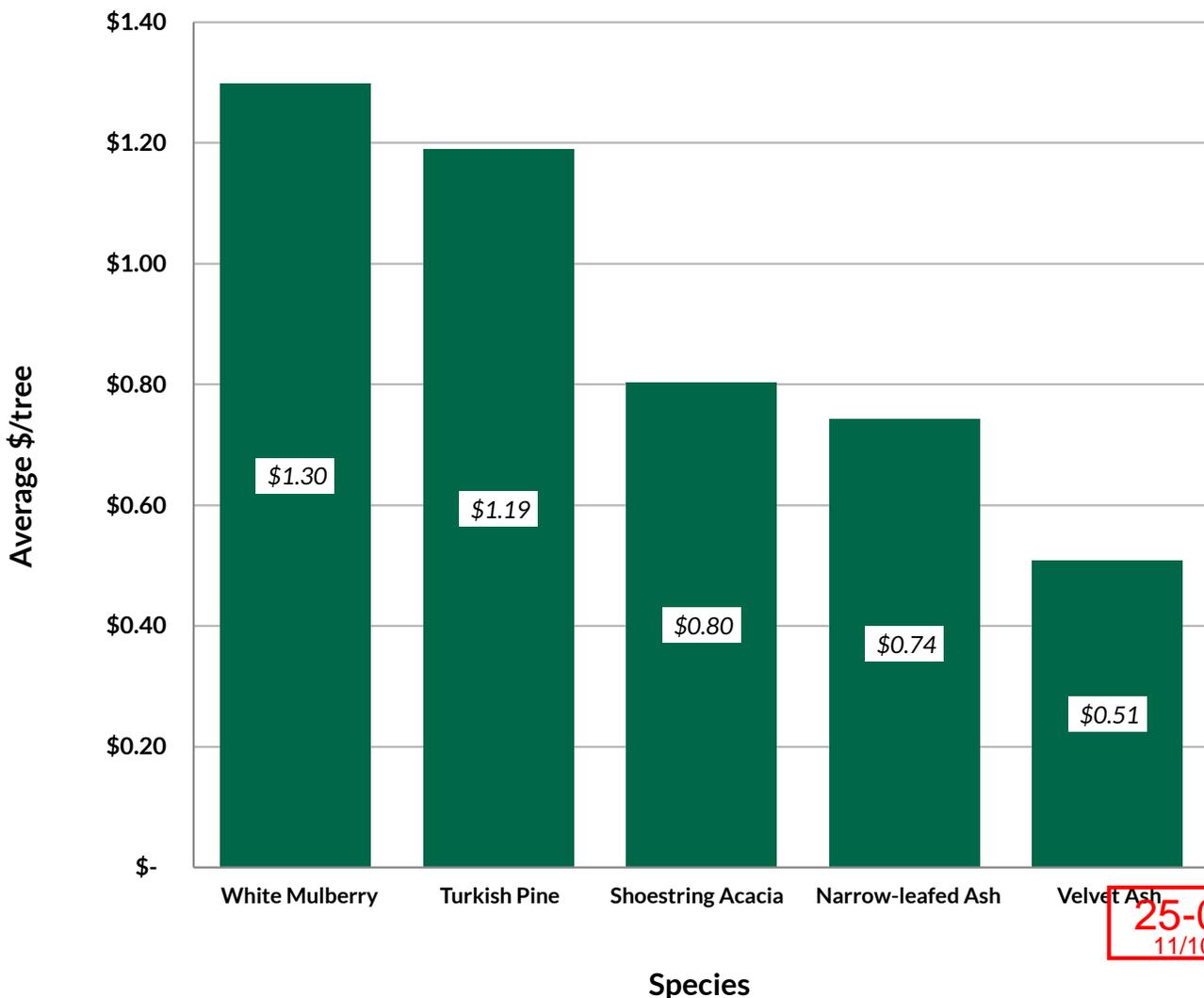
Trees **increase oxygen levels** through photosynthesis and **reduce ozone formation** by cooling the air with transpiration and canopy shade. These combined effects lower local air temperatures and improve air quality.

Trees also **intercept fine particulate matter** (PM_{2.5} and PM₁₀), helping protect respiratory health across the community.

The **total value of air pollutants removed** by community trees is estimated at **\$16,465.06 annually**, averaging **\$0.51 per tree**. Among prevalent species, *Morus alba* (white mulberry, \$1.30/tree), *Pinus brutia* (Turkish pine, \$1.19/tree), and *Acacia stenophylla* (shoestring acacia, \$0.80/tree) remove the most pollutants per tree.

Combined, these three species account for **45.2% of the total annual benefit**, or roughly \$7,441.30 per year, highlighting their exceptional contribution to local air quality improvement.

FIGURE 4. TOP 5 SPECIES FOR AIR POLLUTION REMOVAL BENEFITS



25-0461
11/10/2025



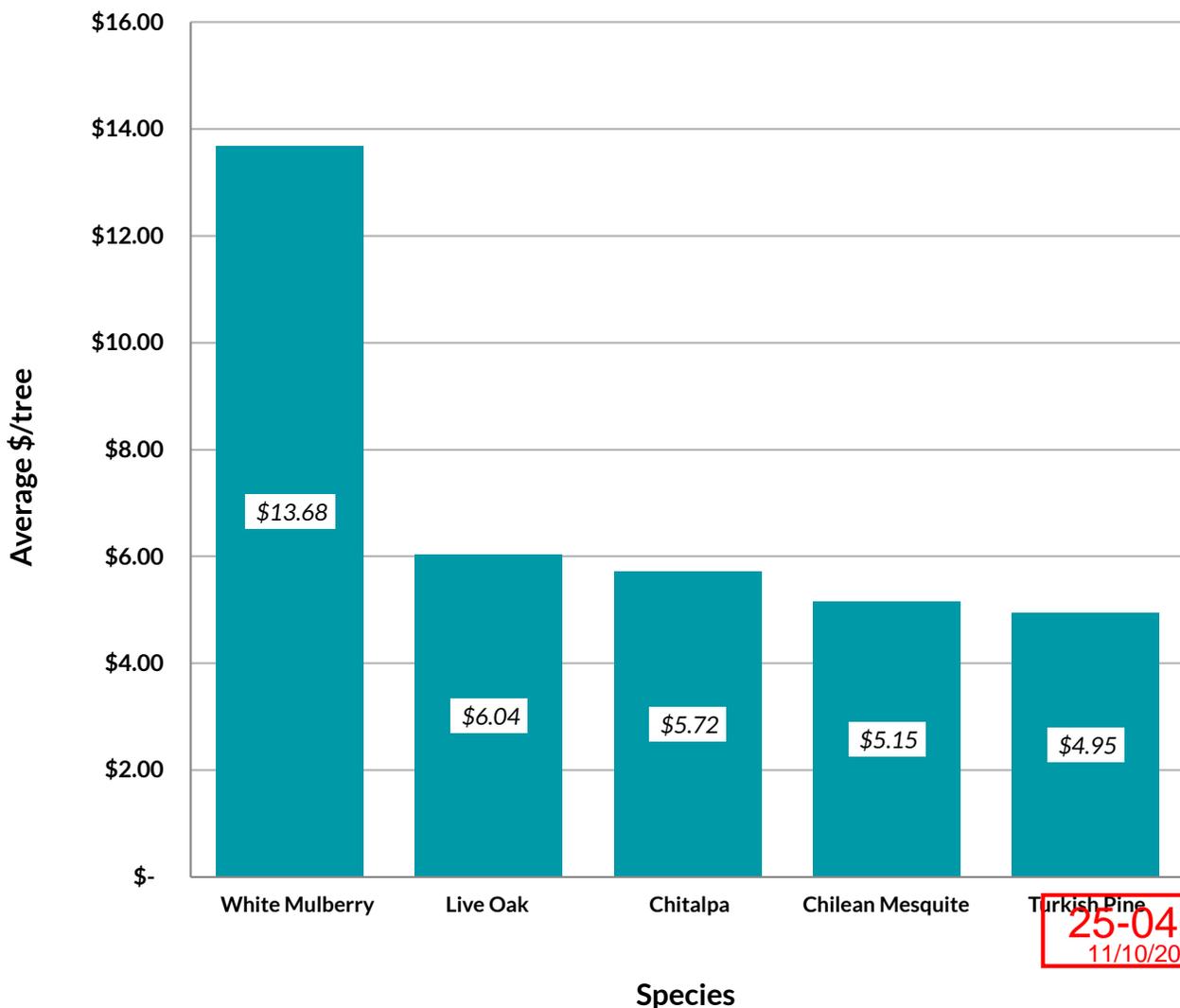
Carbon Sequestration

Urban trees reduce atmospheric CO₂ directly, through growth and the sequestration of CO₂ in wood, foliar biomass, and soil, and indirectly, by lowering the demand for heating and air conditioning, thereby reducing the emissions associated with electric power generation and natural gas consumption.

To date, Las Vegas's community trees are estimated to be storing 5,721.09 tons of carbon (CO₂) in woody and foliar biomass valued at \$2,475,672.37 million. Annually, the community

tree resource directly sequesters an additional 272.64 tons of carbon valued at \$ 117,977.50 with an average value of \$3.68 per tree. Among prevalent species, *Morus alba* (white mulberry \$13.68/tree), *Quercus virginiana* (southern live oak, \$4.04/tree), and *Chitalpa tashkentensis* (Chitalpa, \$5.72/tree) provide the greatest annual per-tree benefits to atmospheric carbon removal, sequestering more than 68.6 tons of carbon annually. These three species account for 13.5% of overall carbon benefit and 6.5% of the overall population.

FIGURE 5. TOP 5 SPECIES FOR CARBON BENEFITS



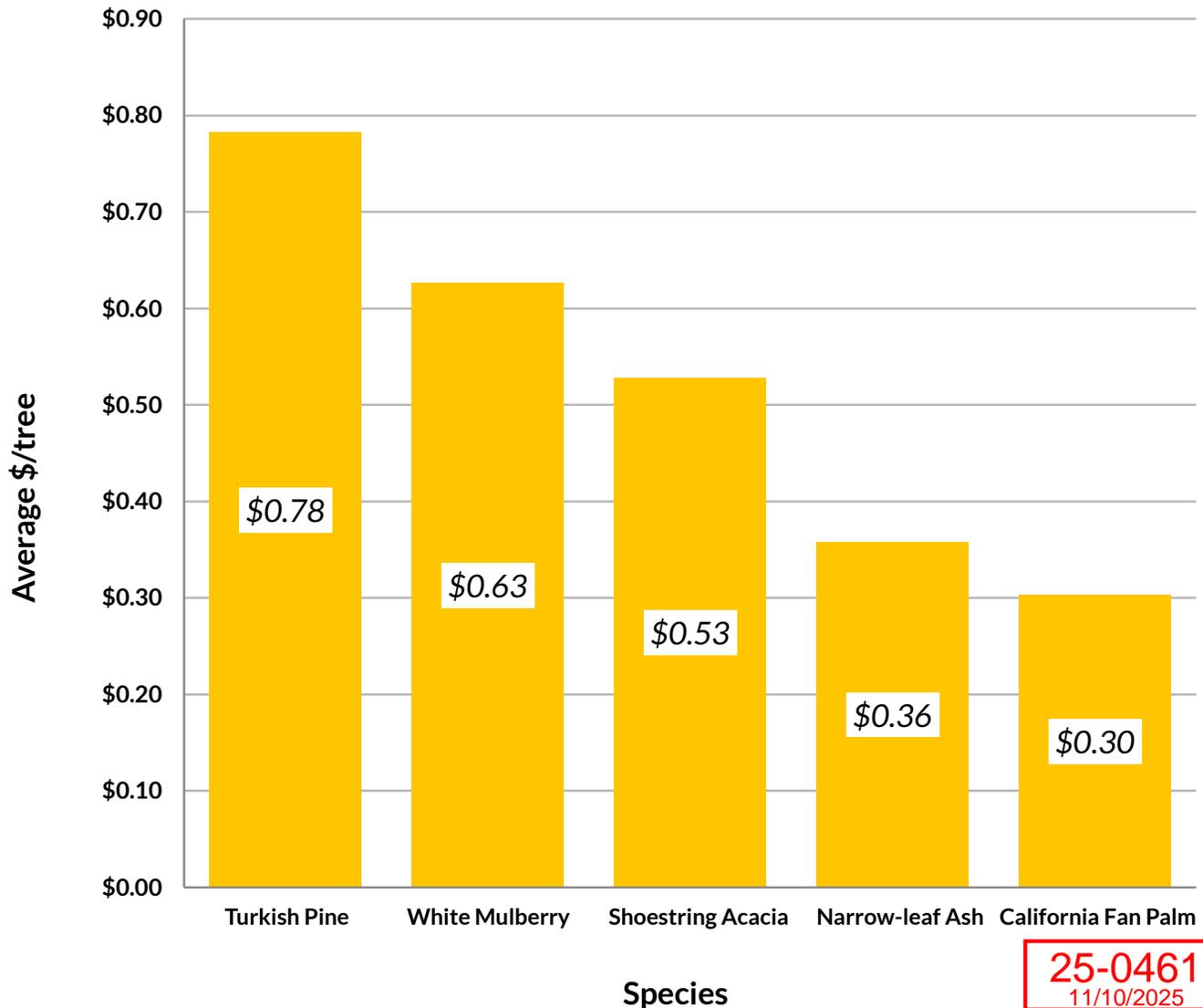
25-0461
11/10/2025

Stormwater Runoff Reduction

Urban trees reduce the amount of stormwater runoff and pollutant loading by intercepting rainfall through their leaves and branch surfaces, thereby reducing runoff volumes and delaying the onset of peak flows, increasing the capacity and rate of soil infiltration by rainfall through root growth and decomposition, and reducing soil erosion and surface flows by diminishing the impact of raindrops on bare soil through tree canopies.

Las Vegas's community tree resource is estimated to contribute to the avoidance of nearly 1.1 million gallons of stormwater runoff annually through the interception of precipitation on the leaves and bark of trees for an average of 34.09 gallons per tree. The total value of this benefit is \$9,756.25 annually, an average of \$0.30 per tree. *Pinus brutia* (narrow-leaf ash) provides 35.8% of the estimated total and provides the most per tree benefit of \$0.78.

FIGURE 6. TOP SPECIES FOR STORMWATER BENEFITS



Replacement Value

Replacement value accounts for the historical investment in trees over their lifetime and is a way of describing the value of a tree population (and/or average value per tree) at a given time. To replace all 32,027 community trees in Las Vegas with trees of equivalent size and condition would cost \$62,103,524.39, an average of \$1,939.10 per tree. The population of *Pinus brutia* (Turkish pine) has the highest replacement value of \$22,094,249.28 and accounts for the greatest proportion of the overall replacement value (35.6%).

This species has the highest importance value in the inventory and a well-established age distribution.

The replacement value for Las Vegas's community tree resource reflects the vital importance of these assets to the community. With proper care and maintenance, the value will continue to increase over time. It is important to recognize that replacement values are separate and distinct from the value of annual benefits produced by this resource and in some instances the replacement value of a tree may be greater than or less than the benefits that a particular tree may provide.

The replacement value for Las Vegas's community tree resource reflects the vital importance of these assets to the community.



Annual Benefits of Most Prevalent Species

The most prevalent tree species in Las Vegas’s community tree resource, *Pinus brutia* (Turkish pine, 13.9%), is providing the highest annual benefit, a value of \$30,898.25. The high annual benefit is attributable to its prevalence in the population, nearly ideal age distribution, and stature. *Morus alba* (white mulberry) is providing \$7,365.00 in annual benefits and the highest per tree benefit, an average of \$15.60 per tree. The second most prevalent tree species in Las Vegas’s community tree resource, *Fraxinus velutina* (Velvet ash, 10.4%) is providing a value of \$12,900.73, which is attributable to its prevalence in the population and moderate stature. Among the prevalent species, *Acacia farnesiana* (sweet acacia) is providing the least amount in annual benefits (\$345.14) and the lowest per tree benefit (average of \$0.93 per tree).

TABLE 3. SUMMARY OF ANNUAL BENEFITS PROVIDED BY LAS VEGAS'S MOST PREVALENT SPECIES.

Species	# of Trees	% of Pop.	Carbon Seq. (ton/yr.)	Carbon Seq. (\$/yr.)	Avoided Runoff (gal./yr.)	Avoided Runoff (\$/yr.)	Pollution Removal (ton/yr.)	Pollution Removal (\$/yr.)	Replacement Value (\$)
Turkish Pine	4,462	13.93	51.07	22,101	390,769	3,492	2.54	5,305	22,094,249
Velvet Ash	3,317	10.36	24.04	10,404	90,928	813	0.77	1,685	5,837,930
Shoestring Acacia	1,899	5.93	8.96	3,879	112,230	1,003	0.73	1,524	2,899,321
California Fan Palm	1,794	5.60	4.74	2,051	60,902	544	0.40	827	1,331,573
Mt. Atlas Mastic Tree	1,544	4.82	10.68	4,621	10,645	95	0.09	197	1,291,019
Chaste Tree	1,470	4.59	9.56	4,135	7,434	66	0.06	138	1,484,303
Chinese Pistache	1,112	3.47	10.75	4,650	12,480	112	0.11	231	1,345,629
Desert Willow	1,096	3.42	6.41	2,774	20,768	186	0.13	282	1,026,060
Chinese Elm	1,064	3.32	9.78	4,230	11,956	107	0.10	222	1,190,825
Date Palm	1,052	3.28	1.59	688	24,664	220	0.16	335	2,075,732
Honey Mesquite	1,012	3.16	8.79	3,802	12,384	111	0.11	229	1,457,453
Live Oak	924	2.89	12.89	5,579	24,873	222	0.16	338	1,077,936
Chilean Mesquite	781	2.44	9.29	4,020	13,326	119	0.11	247	1,410,229
Jerusalem Thorn	756	2.36	7.37	3,188	10,069	90	0.09	187	1,101,286
Chitalpa	697	2.18	9.22	3,989	8,121	73	0.07	150	936,488
Narrow-leaf Ash	666	2.08	4.99	2,161	26,668	238	0.23	494	1,186,106
Velvet Mesquite	492	1.54	4.23	1,832	5,616	50	0.05	104	683,700
White Mulberry	472	1.47	14.92	6,457	33,075	296	0.28	613	2,474,802
Indian Rosewood	427	1.33	2.09	905	2,957	26	0.03	55	267,459
Sweet Acacia	370	1.16	0.47	205	5,106	46	0.04	95	458,262
Blue Paloverde	358	1.12	3.71	1,605	6,501	58	0.06	120	583,687
all other species	6,255	19.55	57.14	24,702.12	200,321.95	1,790.08	1.37	3,088.91	9,889,477.00
	32,027	100%	272.64	\$117,977.47	959,543	\$9,756.23	7.74	\$16,465.03	\$62,103,524.34

250461
 11/10/2025



MAKE THE RIGHT DECISION, ON THE RIGHT TREE, AT THE RIGHT TIME

SMART TREE INVENTORY AND MANAGEMENT

Las Vegas is positioned at the leading edge of data-driven tree care. The Smart Tree Inventory has already established a digital baseline for 32,040 public trees, with biometric data, canopy metrics, and imagery available for each. This is more than a snapshot—it is the foundation of a Smart Tree Management Program that moves the City beyond reactive practices into proactive, measurable urban forest stewardship.



Key Inspection Findings

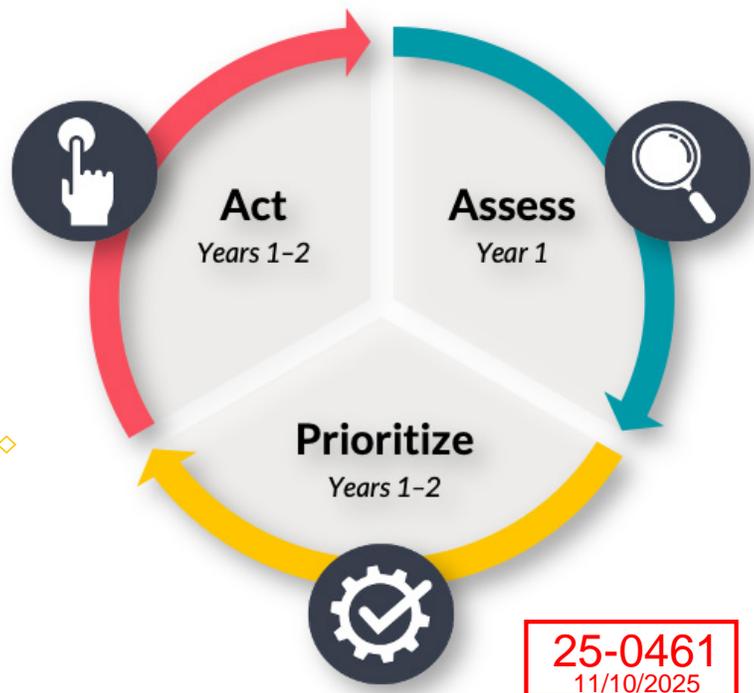
- ✦ 8,036 outlier trees flagged by machine learning models.
- ✦ 1,407 trees recommended for field inspection due to deviations in growth patterns or visible signs of stress.
- ✦ Outlier detection based on biometric ratios (height, crown volume, DBH, leaf area) provided an early warning system for potential decline or structural imbalance.
- ✦ Remote inspections validated findings and helped triage where to send arborists first, maximizing field efficiency.



WHY SMART MATTERS

Traditional management often defaults to block-cycle pruning and complaint-driven response—a “guess, act, pray” model. The Smart Tree Management framework shifts this to “assess, prioritize, act”:

- ✦ **Assess:** Use LiDAR, imagery, and biometric modeling to detect risk and performance trends across the canopy.
- ✦ **Prioritize:** Rank trees and zones by condition, public safety risk, and long-term asset value.
- ✦ **Act:** Direct field crews and resources where they will have the greatest impact.



OUTLIER METHODOLOGY AND CASE STUDIES

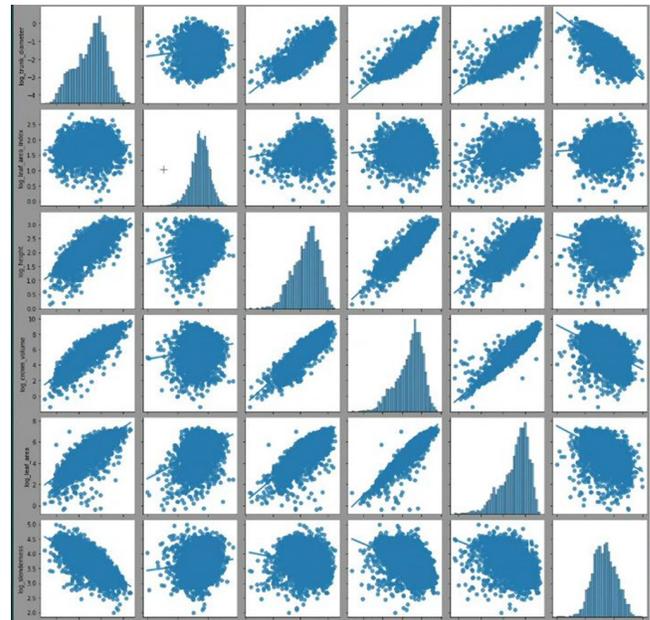
The system applies six biometric ratios to flag anomalies. These ratios—such as Height-to-Crown Volume or DBH-to-Leaf Area—reflect real-world growth dynamics and expose stress adaptations, pruning legacies, or suppressed vitality.

By surfacing trees that fall significantly outside the norm, this approach provides a quantitative basis for identifying declining trees, high performers, and those with potentially unstable structural forms. It also supports evidence-based evaluation of long-term outcomes from past tree care practices.

- ✦ **Case Study: Velvet Ash** – structurally sound, but canopy biomass far below expectation. Remote imagery confirmed dieback and stress responses, warranting field inspection.
- ✦ **Case Study: Turkish Pine** – consistently under across all biometric ratios, suggesting chronic decline from soil or irrigation limitations.

See full outlier case studies in the appendix for more details.

FIGURE 7. LOG-TRANSFORMED PAIR PLOT OF TREE METRICS WITH OUTLIERS ACROSS SEVERAL DIMENSIONS



Together, these cases illustrate how Smart Tree Inventory reveals issues during routine patrols, giving City of Las Vegas arborists a head start on risk management and succession planning.

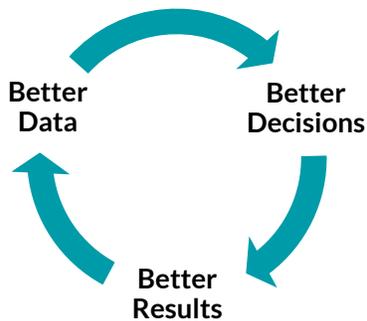
25-0461
11/10/2025



FROM INVENTORY TO MANAGEMENT

The next step is integrating this data into a continuous cycle of monitoring and action. TreeKeeper provides the platform: each tree's profile—location, species, condition, leaf area index, clearance, distance to wires, images—becomes a living record. Scanning the urban forest at two-year intervals track change over time, producing a digital twin of the City's urban forest.

With each cycle, Las Vegas can measure progress, validate past decisions, and adjust strategies. This creates a feedback loop:



IMPLICATIONS FOR URBAN FOREST MANAGEMENT

By adopting Smart Tree Management, the City can:

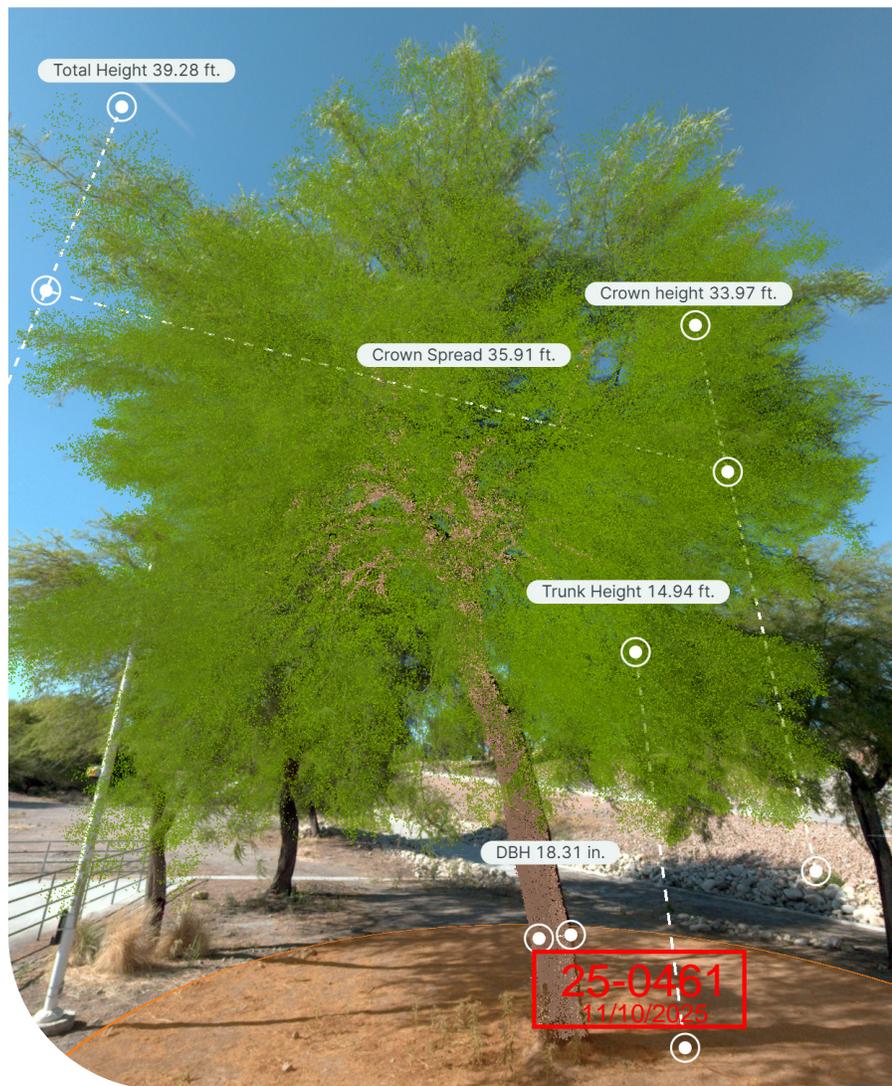
- ✦ **Reduce Risk:** Outlier detection focuses inspections on the highest-priority trees, reducing storm hazards and liability.
- ✦ **Improve Efficiency:** Access to biometric data allows managers to evaluate tree health online, streamline inspections, and focus resources on preventative maintenance.
- ✦ **Extend Asset Life:** Early detection of stress allows timely intervention, extending tree life and ecosystem service delivery.
- ✦ **Track Outcomes:** Objective metrics (dieback %, Leaf Area Index canopy growth) enable performance reporting tied to UFMP goals.

Key Performance Indicators identified in the Smart Tree framework include:

- ✦ **80% risk reduction** through earlier detection and triage.
- ✦ **25% maintenance cost efficiency** from proactive, not reactive, care.
- ✦ **30% increase in asset lifespan** through better planting selection and long-term monitoring

THE LESSON

When trees deviate from expected growth patterns, it signals a story worth investigating. Smart Tree Inventory gives Las Vegas the ability to hear those signals—before they become failures—ensuring that arborists make the **right decision, on the right tree, at the right time.**



CURRENT OPERATIONS

CITY OF LAS VEGAS TREE NURSERY

A Local Resource for Long-Term Canopy Success

The City of Las Vegas Tree Nursery is central to meeting the City’s urban forestry goals by providing a consistent, climate-adapted supply of high-quality trees for public planting. By producing healthy stock with strong root systems, the nursery improves tree survival, reduces maintenance costs, and supports long-term canopy stability. A diverse mix of species allows trees to be matched to specific locations and functions, creating buffers against pests, disease, and climate impacts. This approach is both fiscally responsible and strategically resilient, ensuring the urban forest continues to deliver shade, cooling, air quality benefits, and neighborhood character for decades.



Nursery Benefits at a Glance:

- ✦ Reduces physiological issues associated with commercial tree production by using advanced nursery technology, including specialized liners and propagation equipment
- ✦ Employs growing practices and procedures that minimize root defects and structural branching defects, ensuring long-term viability, vigor, safety, health, and benefits
- ✦ Provides a responsible and sustainable approach to producing trees
- ✦ Grows regionally appropriate species that can withstand heat, drought, and urban stress
- ✦ Reduces costs associated with purchasing and transporting nursery stock from out of state
- ✦ Ensures availability for priority planting areas identified through Smart Tree Inventory and canopy analysis
- ✦ Supports workforce training, education, and community planting events
- ✦ Enables direct alignment with the City’s 2050 Master Plan goals for shade equity and sustainability
- ✦ In partnership with the Nevada Division of Forestry, expanded successful operation of a locally tailored tree nursery system to meet City needs, cultivate commercially unavailable trees to experiment with and expand tree species palette.

With this nursery, Las Vegas is not only planting trees – it’s cultivating a resilient, locally rooted future for generations to come.

25-0461
11/10/2025

STAFFING AND CAPACITY

The City of Las Vegas currently employs only one Urban Forester to manage the entire public tree population of 32,040 trees. This role carries responsibility for planting, risk assessment, inspections, storm response, long-term planning, administrative duties, and communication with stakeholders. Managing the City’s urban forest at this scale with one position is not sustainable.

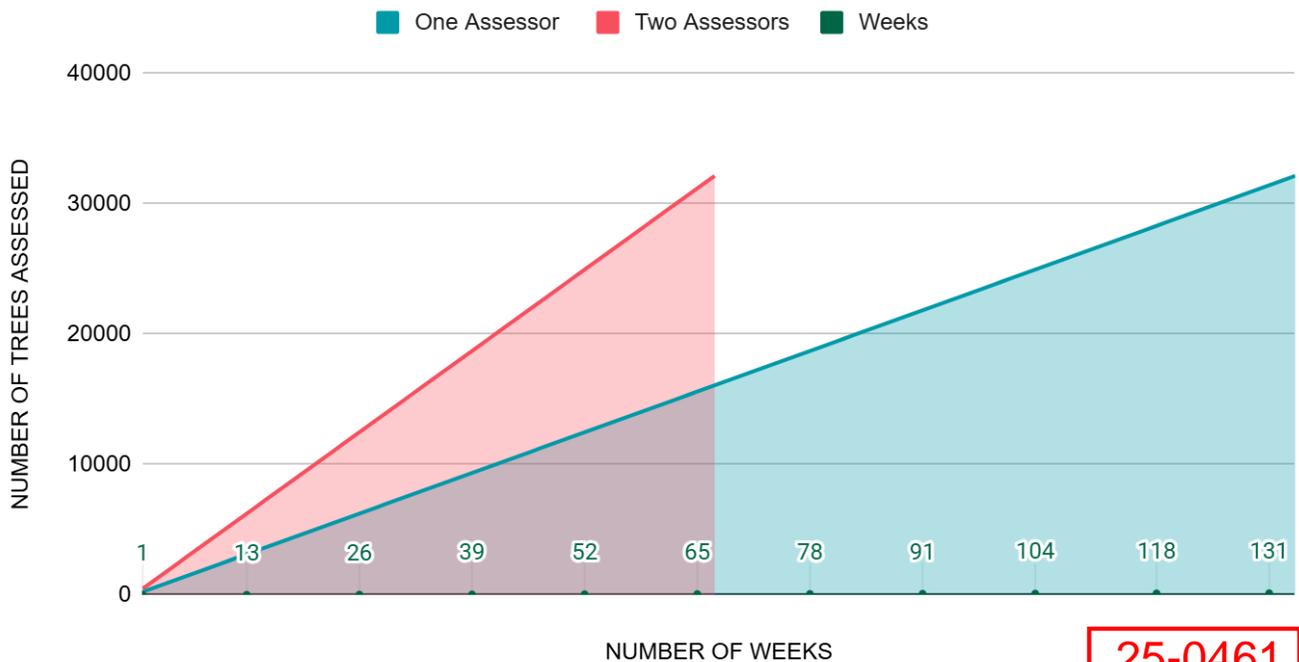
The chart below demonstrates the potential impact of adding dedicated tree risk assessors. With only one assessor, it would take more than 130 weeks (over two years) to inspect all trees once. With two assessors, the cycle could be cut in half, bringing annual inspections within reach and providing far more timely risk management for public safety.

This is not just a matter of efficiency; it is a matter of safety, liability, and capacity to meet the canopy and sustainability goals outlined in the City’s 2050 Master Plan. A single Urban Forester cannot realistically sustain all of the following at once:

- ✦ Conducting and updating tree inventory and risk assessments
- ✦ Planning and implementing planting and maintenance cycles
- ✦ Responding to urgent work orders and storm damage
- ✦ Managing contractors and interdepartmental communication
- ✦ Tracking and reporting canopy growth and climate resilience progress

FIGURE 8. PROJECTED TREE RISK ASSESSMENT TIMELINES UNDER DIFFERENT STAFFING SCENARIOS.

Tree Risk Assessment Cycle Scenarios CITY OF LAS VEGAS URBAN FORESTRY



25-0461
11/10/2025

PATH TOWARD A SUSTAINABLE TEAM

A structured staffing plan can bring the program from a single forester to a fully functional team over several years. The table below summarizes the proposed positions and approximate salary ranges.

The intent is to begin modestly by adding one Tree Inventory Specialist in Year 1. Performance tracking should demonstrate the increase in completed inspections, establishing the return

on investment. This evidence then provides a basis to request a second assessor in Year 2. Over time, as the team grows, specialists can be promoted internally (e.g., to Supervisor), ensuring both continuity and opportunity for advancement.

This phased approach builds toward a minimum five-person Urban Forestry team, capable of meeting public safety requirements, advancing canopy goals, and sustaining the urban forest for future generations.

TABLE 3. PROPOSED STAFFING STRUCTURE AND ASSOCIATED PROGRAM COSTS FOR A SUSTAINABLE URBAN FORESTRY TEAM.

Level	Job Title	Short Description	Salary per Year	Maximum Program Cost Increase per Year
Level 5	Urban Forester	Oversees all Urban Forestry Operations and Management	\$115,000-145,000	\$525,000
Level 4	Urban Forestry Supervisor	Direct lead of UF Tree Inventory Specialists and Planning Associate - is the Deputy Urban Forester - direct report to the Chief Urban Forester	\$95,000-115,000	\$380,000
Level 3	Urban Forestry Planning Associate	Administrative Tasks and supplemental storm patrol assessment	\$85,000-95,000	\$265,000
Level 2	Urban Forestry Tree Inventory Specialist 2	Cyclical Risk Assessment	\$65,000-85,000	\$170,000
Level 1	Urban Forestry - Tree Inventory Specialist 1	Cyclical Risk Assessment	\$65,000-85,000	\$85,000

25-0461
11/10/2025



POLICIES AND PROCEDURES

POLICY AND REGULATION

City policies and regulations are the foundation of the urban forestry program. These regulations outline important requirements and specifications for the planting, installation, and care of both trees on public and private property. A strong regulatory framework is key to protecting and preserving the urban forest from activities that impact the community's trees. The development of the Plan included a comprehensive review of City policies, development and construction standards, ordinances, and other regulations that apply to the urban forest. The following summarizes the key findings from that review process.

Federal and State Law

Endangered Species Act

Signed in 1973, the Endangered Species Act provides for the conservation of species that are endangered or threatened throughout all or within a significant portion of their range, as well as the conservation of the ecosystems on which they depend. The listing of a species as endangered makes it illegal to “take” (i.e., harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to do these things) that species. Similar prohibitions usually extend to threatened species.

Migratory Bird Treaty Act (MBTA)

Passed by Congress in 1918, this Act defines that it is unlawful to pursue, hunt, take, capture, kill, possess, sell, purchase, barter, import, export, or transport any migratory bird, or any part, nest, or egg of any such bird, unless authorized under a permit issued by the Secretary of the Interior.

The Migratory Bird Treaty Act can impact forestry operations during times when birds are nesting, which may delay work to avoid violating the MBTA.

City Code

Las Vegas Municipal Code has several chapters and sections that involve Urban Forestry and trees.

- ✦ **Section 13.48.110** provides guidelines for the construction and maintenance of tree canopies, addressing how they should be protected during construction activities.
- ✦ **Section 14.08.140** specifies restrictions on irrigation, including the prohibition of watering trees and other vegetation between certain hours from May to August to conserve water.
- ✦ **Section 14.11.090** establishes additional water use restrictions during drought conditions, including limits on the irrigation of trees and other landscaping elements.
- ✦ **Section 19.06.040** establishes standards for landscaping, including requirements for the incorporation of trees into site design plans.
- ✦ **Section 19.12.030** details the requirements for incorporating trees into landscaping and design plans, emphasizing the importance of using appropriate species and maintaining proper spacing.
- ✦ **Section 19.12.040** covers standards for tree maintenance, pruning, and irrigation to ensure healthy growth and compliance with city regulations.
- ✦ **Section 19.14.080** discusses additional landscaping requirements for specific zoning districts, including the placement and maintenance of trees.

The UFMP recommends amending the Las Vegas Municipal Code, and updating it to include best practices and incorporating recommendations from this plan. (See appendix)

25-0461
11/10/2025

The U.S. Mayors Climate Protection Agreement

The Climate Protection Agreement is an agreement by United States Mayors to combat climate change, transforming their cities to handle the challenges of climate and population growth. Under the Agreement, participating cities commit to take the following three actions

1. Strive to meet or beat the Kyoto Protocol targets in their own communities, through actions ranging from anti-sprawl land-use policies to urban forest restoration projects to public information campaigns;
2. Urge their state governments, and the federal government, to enact policies and programs to meet or beat the greenhouse gas emission reduction target suggested for the United States in the Kyoto Protocol — 7% reduction from 1990 levels by 2012; and
3. Urge the U.S. Congress to pass the bipartisan greenhouse gas reduction legislation, which would establish a national emission trading system



INDICATORS OF A SUSTAINABLE URBAN FOREST

The development of the Plan included an evaluation of industry-defined sustainability indicators to assess current conditions in the urban forest resource, programming, and engagement (as defined by Clark et al. 1997 and Kenney et al. 2011). The sustainability indicators can be used to understand what areas of the program can be improved to meet industry recommendations.

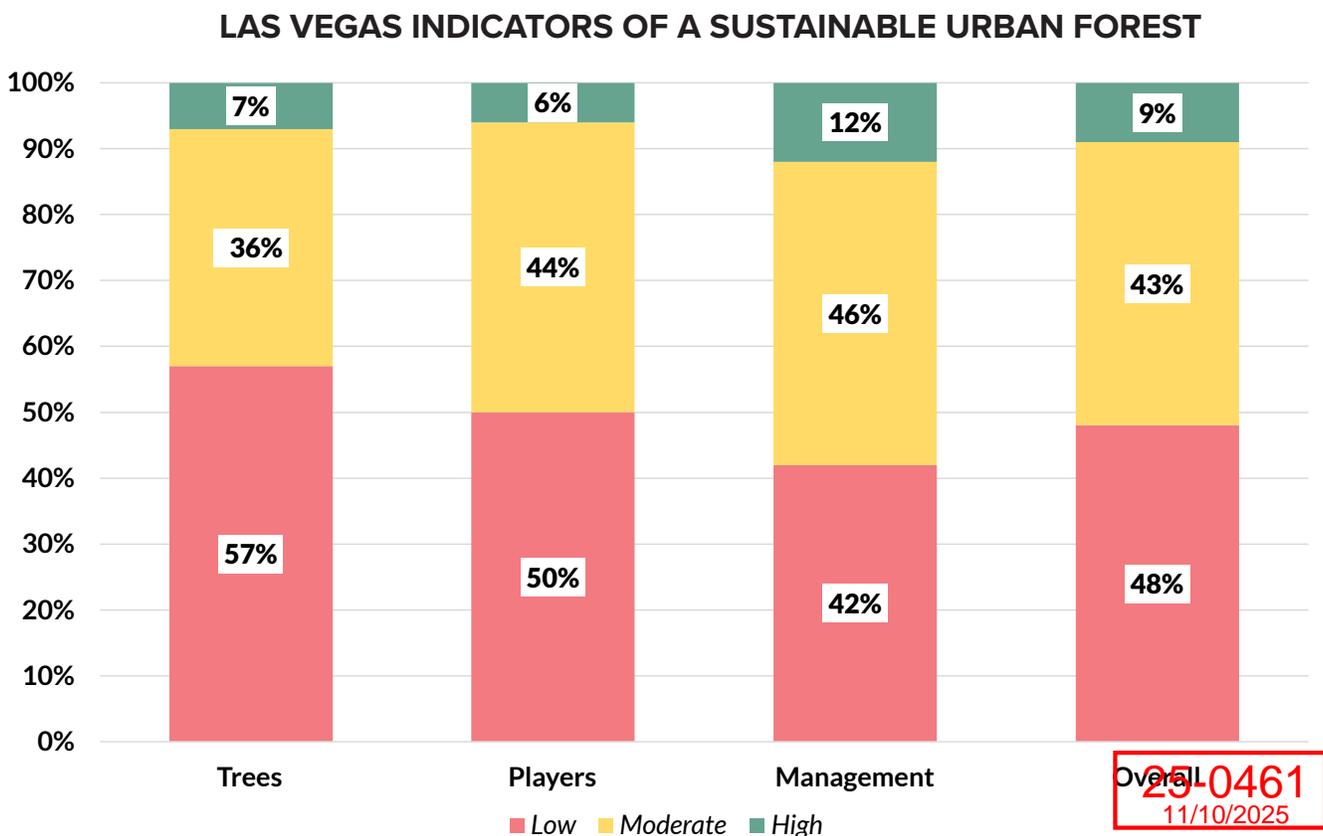
This tool identifies 28 urban forest indicators, organized into three broad categories: **The Trees, The Players,** and **The Management Approach.**

“The Trees” category rates 7 indicators related to Las Vegas’s physical trees and urban forest resource, including the total amount of canopy, whether that canopy is equitably distributed,

characteristics of the tree population such as size distribution, species diversity, and condition, and even characteristics about tree planting sites such as suitability and soil volume. Within “The Trees” category, Las Vegas rated 57% of indicators as low, 36% as moderate, and 7% as high.

“The Players” category rates 8 indicators related to the interaction and cooperation of people and groups influencing Las Vegas’s urban forest such as stakeholders, community members, and various City departments. Some of these indicators refer to members of the general public, neighborhood groups, potential funders, and other members of the green industry. Within “The Players” category, Las Vegas rated 50% of indicators as low, 44% as moderate, and 6% as high.

FIGURE 9. SUMMARY OF LAS VEGAS'S ASSESSMENT OF THE INDICATORS OF A SUSTAINABLE URBAN FOREST (AS DEFINED BY CLARK ET AL. 1997 AND KENNEY ET AL. 2011).

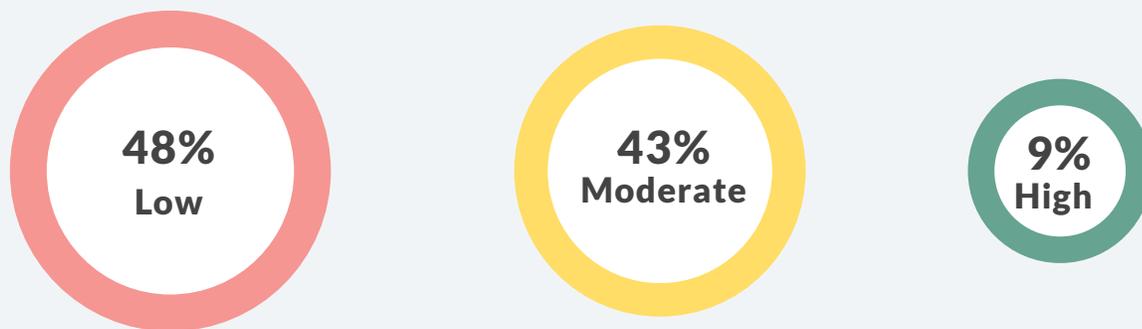


“The Management Approach” category rates 13 indicators that describe the City’s management of its urban forest resource, including whether or not the City has various assessments, plans or policies in place such as an inventory, canopy assessment, management plan (such as this one), tree protection policy, etc., as well as its levels of maintenance, staffing, and funding. Within “The Management Approach” category, Las Vegas rated 42% of indicators as low, 46%

as moderate, and 12% as high – the most high ratings of the three categories.

In total, the three categories collectively contain 28 indicators. Las Vegas rated 48% of these as low, 43% as moderate, and 9% as high. Refer to the following table and figure for a summary of Las Vegas’s assessed levels in the three categories. The detailed results for each category are also included in the Appendix.

SUMMARY OF LAS VEGAS’S ASSESSMENT OF THE INDICATORS OF A SUSTAINABLE URBAN FOREST:



STANDARD OPERATING PROCEDURE (SOP) FOR CITY URBAN FORESTERS

Water Conservation Through Soil Care, Mulching, Plant Selection, Soil Volume Optimization, and Efficient Irrigation

Located in the appendices of this plan is a technical section on best practices for:

1. Soil care (assessment, compaction testing, amendments, biochar, compost).
2. Mulching techniques (depth, materials, benefits).
3. Plant selection & hydrozoning (native/drought-tolerant species, grouped irrigation).
4. Soil volume requirements (standards by canopy/DBH, design examples).
5. Irrigation design & management (system types, smart controllers, hydrozone grouping).
6. Cost/labor considerations (bundling interventions, reducing inefficiencies).
7. Best Practices for Wildland Fire Management in the Wildland-Urban Interface (WUI)
8. Pest Management Strategies for the City of Las Vegas Urban Forestry Operations

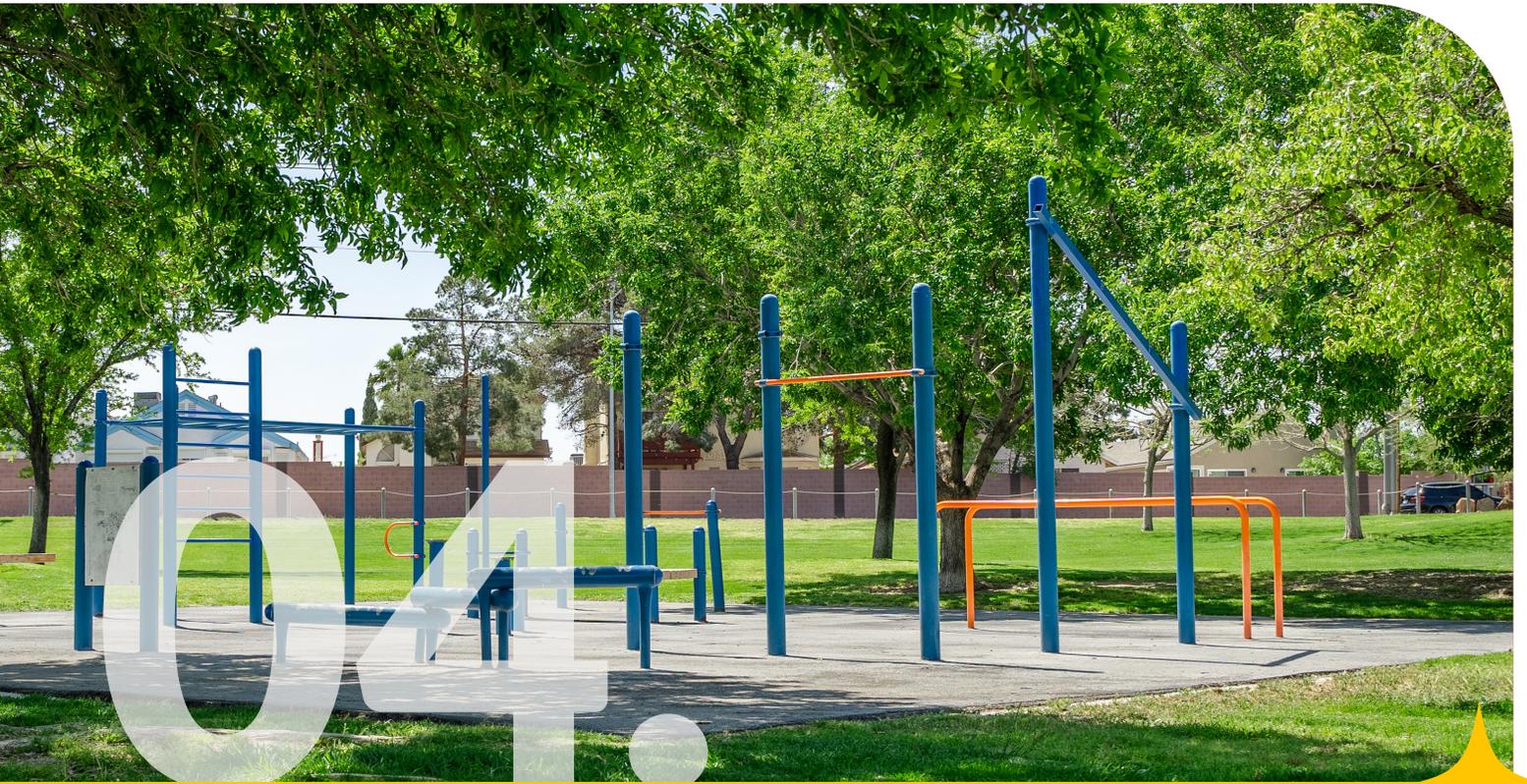
25-0461
11/10/2025



TABLE 4. LAS VEGAS’S ASSESSED LEVELS IN THE SUSTAINABILITY INDICATORS IN THE TREES, THE PLAYERS, AND THE MANAGEMENT APPROACH CATEGORIES. (INDICATORS THAT WERE RATED IN BETWEEN TWO LEVELS ARE SHOWN WITH BOTH COLUMNS FILLED IN.) THE DETAILED RESULTS FOR EACH CATEGORY ARE INCLUDED IN THE APPENDIX.

INDICATORS OF A SUSTAINABLE URBAN FOREST		Assessed Performance Level		
		Low	Mod	High
THE TREES	Urban Tree Canopy Data	1		
	Equitable Distribution	1		
	Size/Age Distribution		0.5	0.5
	Condition of Public Trees (Streets, Parks) Data		1	
	Trees on Private Property Data	1		
	Species Diversity	1		
	Suitability		1	
THE PLAYERS	Neighborhood Action		1	
	Large Private & Institutional Landholder Involvement	1		
	Green Industry Involvement	1		
	City Department/Agency Cooperation		0.5	0.5
	Funder Engagement	0.5	0.5	
	Utility Engagement	0.5	0.5	
	Developer Engagement		1	
	Public Awareness		1	
	Regional Collaboration	1		
THE MANAGEMENT APPROACH	Tree Inventory		1	
	Canopy Assessment			1
	Management Plan	1		
	Risk Management Program	0.5	0.5	
	Maintenance of Publicly-Owned Trees (ROWS)	1		
	Maintenance of Publicly-Owned Trees (Natural Areas)	1		
	Planting Program		0.5	0.5
	Tree Protection Policy	0.5	0.5	
	City Staffing and Equipment		1	
	Funding	0.5	0.5	
	Disaster Preparedness & Response	1		
	Resilience		1	
	Communications		1	
TOTAL	13.5	2	1	

25-0461
11/10/2025



WHAT DO WE WANT?

Expanding the urban forest in Las Vegas will require active participation and support from local residents. Achieving meaningful growth of the canopy across the valley depends on coordinated efforts to plant trees on both public and private land. To better understand community perceptions and guide policy development, the UNLV College of Urban Affairs, in partnership with the MGM Resorts Public Policy Institute, conducted a citizen engagement survey of 1,000 residents stratified by race, income, and housing status. The study explored three key areas to inform implementation strategies and long-term sustainability.

AWARENESS AND PERCEPTIONS

The survey measured residents' awareness of the City's plans and gathered their views on the benefits and challenges associated with expanding the urban tree canopy. These insights will help shape outreach and education strategies to build stronger community support.

RECEPTIVENESS TO PROGRAMS

The study also evaluated public receptiveness to government-led tree planting initiatives. Because expanding canopy will likely require plantings on private property, this feedback helps the City tailor programs to align with community preferences.

WILLINGNESS TO PAY

Finally, the survey assessed willingness to pay for participation in tree planting initiatives. Using price discovery methods, it estimated how much residents are willing to contribute toward tree purchase and ongoing maintenance.

25-0461
11/10/2025

SURVEY FINDINGS

The survey revealed strong overall support for urban forest expansion. Of those surveyed, 74% expressed support for non-profit or government-led programs that would plant trees at private residences. An even larger share, 84% indicated support for expanding tree canopy along streets and in public spaces.

However, support declined when financial contributions were introduced. Participation dropped to 61% if residents were required to purchase their own tree, with most respondents identifying \$25–\$50 as the acceptable cost range. Willingness fell to below 10% if the cost exceeded \$50.

When asked about monthly maintenance costs, primarily associated with additional water use, 82% of respondents remained willing to participate, with an acceptable range between \$5–\$10 per month. Willingness fell below 10% if projected costs exceeded \$15 per month.

These findings highlight both the enthusiasm and the limits of resident participation, offering valuable insights into how programs must be designed to ensure broad, equitable adoption.



FACTORS SHAPING PARTICIPATION

Additional analysis revealed three primary factors influencing willingness to participate:

ENVIRONMENTAL TRADE OFFS

Respondents demonstrated awareness of the region’s water scarcity and considered whether tree planting might worsen water challenges. Only those who believed trees would significantly increase water use were systematically less likely to participate. Importantly, opinions about the City’s turf removal initiative did not correlate with willingness to support urban forestry programs. This indicates that residents are capable of distinguishing between different environmental strategies and “recognize the value of integrating heat mitigation efforts – such as increased tree canopy – within a broader water sustainability framework.”

UNDERSTANDING TREE BENEFITS

Awareness of benefits such as reduced urban heat, improved property values, and enhanced mental health was positively correlated with willingness to participate. Yet, disparities emerged: lower-income individuals, renters, and racial/ethnic minority respondents were less likely to recognize these benefits. This points to a potential equity concern that must be addressed through targeted education and outreach.

COST CONSIDERATIONS

The survey reinforced what prior studies have shown: financial costs, both for acquiring and maintaining trees, are a major barrier – especially in neighborhoods that already have less canopy coverage. Participation dropped sharply when purchase or maintenance costs rose above modest thresholds, underscoring the importance of affordable or no-cost options.

25-0461
11/10/2025

STAKEHOLDER THEMES

WHO WE SPOKE WITH

In addition to the resident survey, the City engaged with a broad network of regional partners – including: Regional Transportation Commission (RTC) • Green Schoolyards America(GSA) • Southern Nevada Arborist Group (SNAG) and local nursery partners • Southern Nevada Water Authority (SNWA) • Las Vegas Valley Water District • Make the Road NV • Clark County • UNLV School of Public Policy • ImpactNV • Nevada Plants • City of Las Vegas residents and HOAs • Nevada Division of Forestry (NDF) • City of Las Vegas Public Works • The Nature Conservancy (TNC) • UNLV Science/Urban Forest Center) • Desert Research Institute Heat Lab

Despite different perspectives, several overarching themes emerged:

WHAT WE HEARD (OVERARCHING THEMES)

Storm response and public safety: Post-storm patrols are inconsistent. Hanging limbs, split wood, and uproots are not always triaged quickly.

⚠️ Signal for action: Stand up a zone-based storm patrol schedule with trained risk assessors and clear work-order routing to pruning crews.

Turf conversion is stressing trees: Turf removal without irrigation redesign and establishment care reduces survivability.

⚠️ Signal for action: Pair AB 356 turf conversions with tree protection standards, wetting-pattern redesigns, and success monitoring.

Data must drive management: Keeping the inventory current is a shared priority across departments and partners.

⚠️ Signal for action: Maintain a biannual Smart Tree Inventory cycle and publish performance dashboards (risk cycles, planting, establishment).

Interdepartmental communication needs structure: Partners need a regular forum to align projects, standards, and timelines.

⚠️ Signal for action: Monthly Urban Forestry status call and quarterly cross-sector roundtables; shared work queues for development reviews and field issues.

Workforce, training, and basic tree literacy: City crews, contractors, and HOA vendors need consistent training on planting, structural pruning, irrigation, and hazard recognition.

⚠️ Signal for action: Phased staffing plan (Inventory Specialists, Supervisor, Planning Associate) plus a citywide training program and contractor directory.

Water scarcity and extreme heat require smarter species and siting: Stakeholders emphasized heat-tolerant, drought-resilient, and diverse species with adequate soil volume.

⚠️ Signal for action: Update the Preferred Species List, require canopy-based design metrics, and use heat-island data to prioritize planting locations.

25-0461
11/10/2025



Enforcement and developer engagement:

Waivers, topping, and undersized planters undermine canopy goals.

⚠️ Signal for action: Strengthen code language and enforcement staffing, create an Urban Forestry Liaison for the development process, and adopt minimum soil volume and pruning standards.

Regional alignment and data sharing:

There is a strong appetite for a shared inventory framework and joint messaging.

⚠️ Signal for action: Advance interoperable TreeKeeper formats and participate in the Urban Tree Canopy Coalition to coordinate species lists, training, and outreach.

Transit, schools, and equity corridors are high-leverage sites:

Bus stops need shade plus solar lighting. Schools are priority cooling zones. Underserved neighborhoods need visible progress.

⚠️ Signal for action: Co-design tree-friendly transit guidelines with RTC, set a schoolyard canopy target, and align plantings with Safe Routes to School and high UHI blocks.

Public communication and trust: Residents want clear, practical guidance on water-wise trees and where plantings are happening.

⚠️ Signal for action: Launch a tree landing page with searchable lists, “do not plant” guidance, new-planting updates, QR codes for feedback, and neighborhood progress stories.

TABLE 5. SUMMARY OF STAKEHOLDER THEMES AND CORRESPONDING ACTIONS FOR THE CITY OF LAS VEGAS URBAN FORESTRY PROGRAM.

Theme	What success looks like in 12 months
Storm response	Zone maps, trained patrols after events, time-to-mitigation tracked in TreeKeeper
Turf conversion	Standard details for irrigation redesign around trees, survivability checks at 3, 6, 12 months
Data-driven management	Biannual inventory cadence, public Key Performance Indicators for risk cycles, planting, establishment
Interdepartmental alignment	Monthly UF status call notes, shared ticketing for RTC and PW issues
Workforce & training	1 Inventory Specialist hired, training modules delivered to Parks, PW, and vendors
Heat & water	Updated species list with canopy and water-use notes; planting targeted by UHI layers
Enforcement & development	Fewer waivers, canopy/soil volume standards in plan review, pruning limits adopted
Regional coordination	Shared inventory fields with Clark County/NDF; quarterly coalition workshops
Transit & schools	Pilot “shade + solar” bus stop standards; two schoolyard pilots underway
Public communication	Tree landing page live, QR pilot for resident feedback, quarterly planting updates

25-0461
11/16/2023

THEME-TO-ACTION SNAPSHOT

Cross-Theme Principle

Balance matters. Residents and stakeholders agree: Las Vegas needs more trees—but not at any cost. They want programs that are inclusive, coordinated, water-wise, and accountable. Drought-tolerant planting must be paired with heat-tolerant canopy that truly cools streets and sustains communities. The path forward is *right tree, right place, right water — supported by trained people and shared data.*

LOOKING AHEAD

UNLV’s findings demonstrate that there is clear and widespread public interest in expanding Las Vegas’s urban tree canopy. The challenge lies in designing programs that are inclusive, affordable, and aligned with community values. While the survey results highlight the pathways for success, they also underscore the risks of overlooking equity and affordability.

The specific recommendations offered by UNLV — such as targeted outreach and engagement, clear public messaging, and financial assistance programs — are essential next steps. Combined with the stakeholder themes summarized here, these recommendations are carried forward in the following chapter, *How Do We Get There?*, where they form the foundation of strategies to ensure Las Vegas’s canopy expansion is both equitable and sustainable.





WHAT DO WE WANT?

From Residents and Stakeholders Together

- ✦ Heat Relief – Trees that cool streets, homes, and schools
- ✦ Green Space + Nature – More shade in parks, yards, and neighborhoods
- ✦ Beauty + Identity – Trees that reflect Las Vegas’s character and history
- ✦ Health + Air – Cleaner air, improved mental health, lower energy bills
- ✦ Safe Streets – Walkable corridors, shaded bus stops, safe school routes
- ✦ Water-Wise Canopy – Right tree, right place, right water
- ✦ Data-Driven Care – Smart inventories, risk patrols, and performance tracking
- ✦ Targeted Outreach – Equity-focused engagement and neighborhood input
- ✦ Clear Messaging – Simple, consistent tree lists, “do not plant” guidance, QR feedback
- ✦ No-Cost Tree Programs – Affordable or free options for households
- ✦ Microgrants & Cost-Sharing – Incentives for schools, HOAs, and residents
- ✦ Training & Workforce Growth – Skilled crews, career ladders, and certified contractors
- ✦ Regional Alignment – Shared inventories, codes, and canopy targets across jurisdictions

25-0461
11/10/2025



HOW DO WE GET THERE?

IMPLEMENTATION

This section outlines the goals, recommendations, and key actions identified to guide the growth, care, and management of the urban forest throughout the City of Las Vegas. Grounded in a comprehensive assessment of existing policies, operations, programs, and regulations—as well as community and stakeholder input—these recommendations reflect both current needs and long-term strategies.

In addition to the recommendations presented here, the planning process also produced the City of Las Vegas Long-Term Planting Plan, described previously in the Land Cover Assessment section and with some resulting maps included in the appendices of this plan. The City should reference the species and site selection recommendations identified in the Planting Plan, continually reassess progress in meeting the milestones outlined, and adjust their management decisions as necessary in order to meet the goals set forth in the Planting Plan.

25-0461
11/10/2025

How These Recommendations Were Developed

In collaboration with the City of Las Vegas, Davey Resource Group developed the following recommendations based on an extensive engagement and research process. This included three days of in-person interviews (with preparation and follow-up discussions) with 15 groups representing City departments, regional non-profits, Southern Nevada Water Authority, Las Vegas Valley Water District, Regional Transportation Commission of Southern Nevada, Clark County, Nevada Division of Forestry, University of Nevada Las Vegas (UNLV), and others.

An internal Operations Review of the Parks and Recreation Department's Urban Forestry Program was also conducted to understand department-level challenges in achieving canopy goals outlined in the City's 2050 Master Plan. Additional insights were drawn from consultations with regional climate researchers, soil and arboricultural scientists from the Davey Institute of Tree Sciences, and the Trees in Dry Cities Coalition. UNLV further supported the process by providing survey data from over 1,000 residents, grounding the plan in community perspectives.

Together, these efforts ensure the following recommendations reflect both technical expertise and the voices of those who live and work in Las Vegas.



UFMP OBJECTIVES



EXPAND AND SUSTAIN

an equitable, climate-resilient urban tree canopy.



STRENGTHEN

tree care, protection, and enforcement across all sectors.



BUILD

an integrated urban forestry partnership network for scalable action.



LEGEND

Timeline



Ongoing → Actions conducted every year (annual monitoring, reporting, campaigns).



Short-Term → Actions implemented within 1–5 years.



Mid-Term → Actions implemented within 5–10 years.



Long-Term → Actions implemented within 10–30 years.

Cost Scale



\$ → Internal staffing time primarily.



\$\$ → Outside consulting services (\$25,000–\$100,000).



\$\$\$ → Capital improvements (\$100,000–\$1 million).



\$\$\$\$ → Major capital projects (\$1–10 million).



\$\$\$\$\$ → Regional or Citywide infrastructure scale (over \$10 million).

Ease of Implementation (Level of Effort)



A → Easy (staff time, minimal barriers)



B → Moderate (staff + partner support needed)



C → Complex (multi-department or regulatory hurdles)



D → Challenging (requires major new resources or structural changes)

25-0461
11/10/2025

RECOMMENDATION A. PREFERRED SPECIES LIST & STANDARDS

POLICY STATEMENT:

The City will update and maintain a regionally appropriate Preferred Tree Species List and strengthen planting and maintenance standards to ensure high-quality, climate-resilient trees are consistently selected, planted, and maintained.

CURRENT CHALLENGES:

Local nursery supply in and around the Las Vegas market often lacks standards and quality trees suited to the region's extreme heat. This results in reliance on outdated or poorly performing species. Poor maintenance practices and low-quality stock shorten the lifespan and usefulness of what should be long-lived specimens.

OBJECTIVE:

Expand and sustain an equitable, climate-resilient urban tree canopy.

KEY ACTIONS

- ✦ Revise and maintain the City's Preferred Tree Species List by removing outdated or failing species based on performance data and adding heat and drought-tolerant, structurally resilient, low-maintenance species.
- ✦ Develop public-facing guidance tools such as a searchable online species guide for residents, developers, and contractors, including rankings for drought tolerance, canopy size, pest resistance, and a "Do Not Plant" list with clear reasoning.
- ✦ Partner with regional research institutions (e.g., UNLV, Cooperative Extension, Desert Research Institute) to capture survivability, water use, and pest resistance data, and to pilot new species in monitored plantings.
- ✦ Collaborate with nurseries through roundtables and public-private partnerships to expand availability of quality, climate-ready trees and raise production standards.
- ✦ Integrate solar compatibility standards into planning and design guidelines, ensuring placement and pruning reduce conflicts between trees and solar panels.
- ✦ Establish a formal review cycle (every 3–5 years) for the Preferred Species List using survivability data, inventory insights, and stakeholder input.
- ✦ Track tree planting efforts in GIS, including both City-planted and resident-distributed trees, and conduct follow-up performance evaluations.

25-0461
11/10/2025



IMPLEMENTATION:

TIMELINE  

Short-Term (1–5 years) for list revisions, public tools, nursery collaboration, and GIS tracking; Ongoing for updates and performance reviews.

COST  

\$ (staff time, annual updates)
 \$\$ (consulting + pilot studies)

EASE  

A–B (relatively straightforward, requires partner coordination)



RECOMMENDATION B. TREE PROTECTIONS & WAIVER REFORM

POLICY STATEMENT:

The City will revisit its previously drafted Tree Protection Ordinance, update it with current data and standards, and formally adopt it to strengthen tree protections and reform waiver policies that preserve and expand canopy. This action will align with AB 96 (2025), which amends NRS 278.160 to require municipalities to address extreme heat within their conservation elements.

CURRENT CHALLENGES:

Urban forest health across Las Vegas continues to be compromised by weak protections and inconsistent enforcement. While a draft Tree Protection Ordinance exists, it was never adopted, leaving a critical gap in policy. As a result, trees often suffer from mechanical damage, irrigation loss following turf conversions, and improper structural care. In HOA and commercial landscapes, practices like topping and inadequate planting techniques accelerate premature mortality. Routine granting of tree waivers—particularly in parking lots and large-scale developments—further undermines canopy goals. With limited enforcement capacity, inspections are inconsistent, and follow-up on violations are often delayed.

OBJECTIVE ALIGNMENT:

Strengthen tree care, protection, and enforcement across all sectors.

KEY ACTIONS

- ✦ Revisit and adopt the existing draft Tree Protection Ordinance, updating it with Smart Tree Inventory data, canopy assessments, and stakeholder feedback to ensure alignment with City canopy goals and state requirements under AB 96 (2025).

Codify clear standards within the ordinance, including:

- ✦ Prohibiting substitution of palms for shade trees in canopy-required areas.
- ✦ Setting maximum allowances for palms as ornamental accents only.
- ✦ Establishing penalties and fine structures for unauthorized removals, severe pruning, or canopy loss due to negligence.
- ✦ Reform waiver policies by reducing exemptions and requiring compensatory planting when waivers are granted. Annual canopy modeling will be used to set and track waiver reduction targets.
- ✦ Mandate post-construction maintenance and survival standards for all trees in permitted projects, ensuring irrigation and care responsibilities are documented and enforceable.
- ✦ Retroactively evaluate compliance with existing canopy requirements using LiDAR scans and inventory data, applying corrective measures where gaps are identified.
- ✦ Expand enforcement capacity by increasing staffing, adding dedicated inspection roles, and developing a public-facing reporting system for violations (e.g., topping, removals, or missing required trees).
- ✦ Clarify and communicate responsibilities under LVMC Title 13.40 and 13.44 to property owners, HOAs, and developers, supported by pre-application meetings with planners.
- ✦ Prioritize HOA neighborhoods with historically high removal but low replacement rates for targeted enforcement and outreach.

25-0461
11/10/2025

IMPLEMENTATION:

TIMELINE  

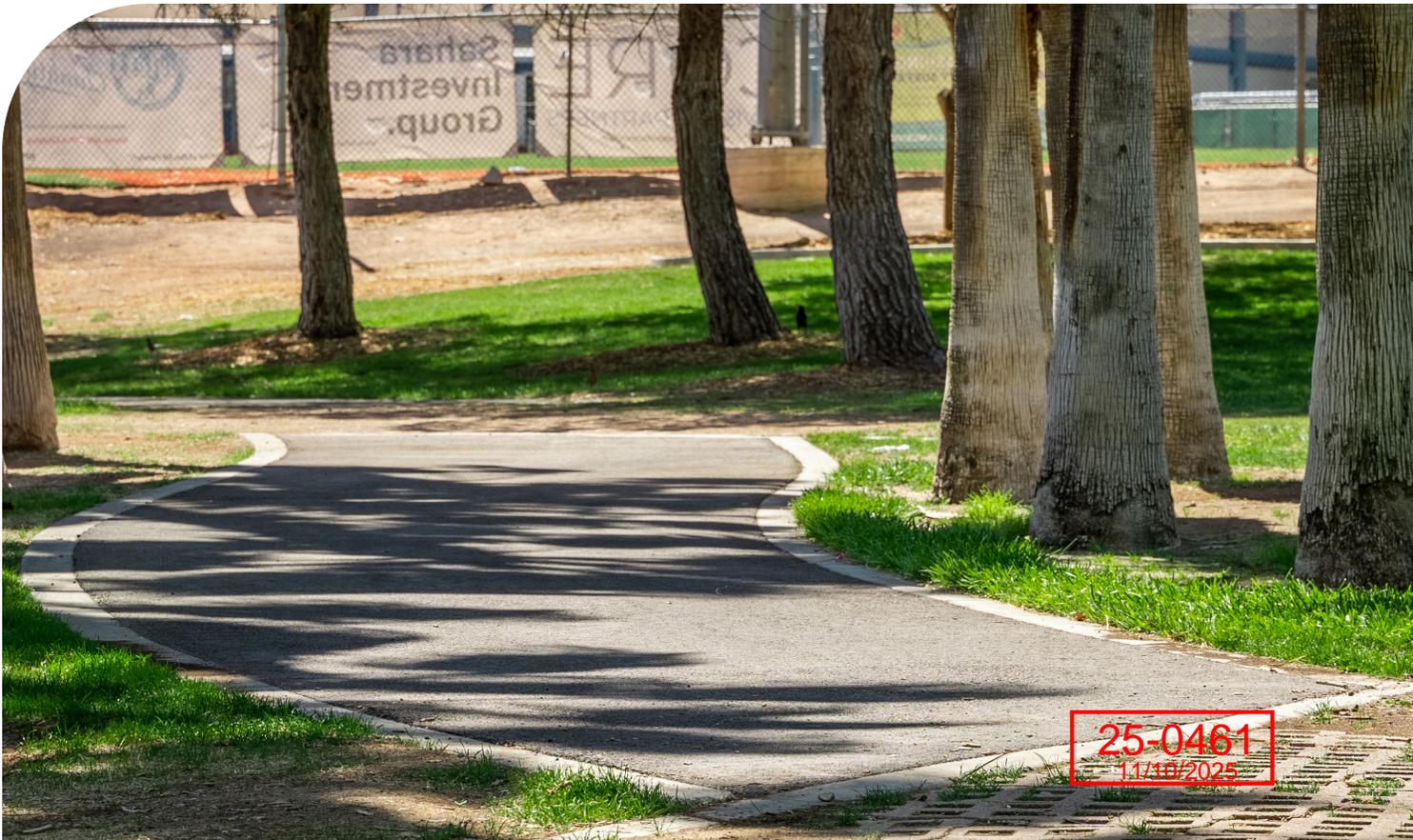
Short-Term (1–5 years) for ordinance adoption and waiver reform;
Ongoing for monitoring, enforcement, and compliance.

COST  

\$\$ (legal/consulting support for ordinance updates, moderate staffing increases) –
\$\$\$ (expanded enforcement systems and public reporting tools).

EASE 

B (ordinance already drafted and AB 96 provides political momentum, though staffing expansions and enforcement mechanisms will require sustained resources).



RECOMMENDATION C. REGIONAL ALIGNMENT & SHARED DATA SYSTEMS

POLICY STATEMENT:

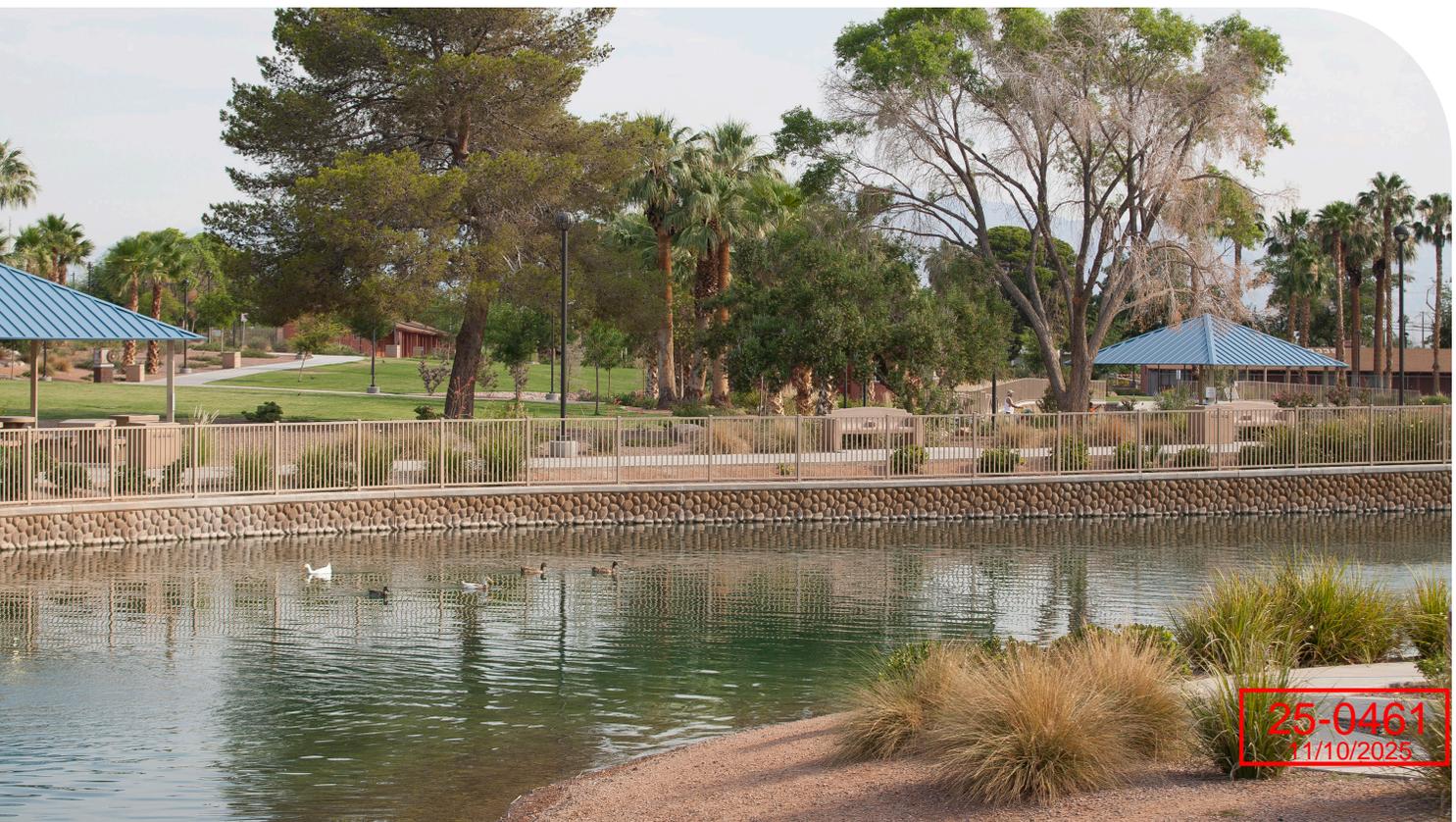
The City will align regional urban forestry planning and benchmarking by establishing shared inventory protocols, data exchange systems, and coordinated communication strategies that connect agencies, jurisdictions, and community partners across Southern Nevada.

CURRENT CHALLENGES:

Urban forestry efforts in Las Vegas remain fragmented, with agencies, municipalities, and nonprofits often working in silos. There are no consistent data standards or regional canopy metrics, and tree inventory updates have been sporadic, limiting the ability to track progress or assess tree health. This lack of integration reduces efficiency and creates missed opportunities for coordinated action with partners such as the Regional Transportation Commission of Southern Nevada, utilities, Clark County, and neighboring cities. Public outreach is also underutilized, often duplicative, and lacks unified messaging, reducing impact.

OBJECTIVE ALIGNMENT:

Build an integrated urban forestry partnership network for scalable action; expand and sustain an equitable, climate-resilient urban tree canopy



KEY ACTIONS:**Establish regional coordination frameworks:**

- ✦ Convene quarterly regional meetings with public agencies, nonprofits, utilities, and academic institutions to align canopy goals, coordinate projects, and share expertise.
- ✦ Host monthly internal coordination calls among City departments with forestry-relevant roles to streamline internal communication.

Develop a “Regional Data Protocol”:

- ✦ Lead a working group with regional urban forestry leads (cities, counties, utilities, school districts) to align on data collection, storage, and reporting standards.
- ✦ Draft Memoranda of Understanding (MOUs) to clarify data ownership, attribution, privacy, update frequency, and governance models.
- ✦ Design a repeatable framework for updating and publishing inventory and canopy data that can be adopted across jurisdictions.

Build regional capacity through training and outreach:

- ✦ Launch an annual urban forestry skill-building and training event open to staff, contractors, and community members.
- ✦ Collaborate with Nevada System of Higher Education (NSHE) institutions, such as UNLV and DRI, to design repeatable community perception surveys and canopy mapping efforts.
- ✦ Develop joint outreach campaigns across agencies to improve public awareness, using consistent messaging about trees as infrastructure, heat mitigation, and water-smart solutions.

Formalize cross-agency partnerships:

- ✦ Create protocols for work requests and service coordination with utilities, school districts, and other external partners with tree management responsibilities.

IMPLEMENTATION:**TIMELINE**

Short-Term (1–5 years) to launch coordination, protocols, and events;
Ongoing for data-sharing and governance.

COST

\$\$ (moderate consulting, facilitation, and technology platform costs).

EASE

B (requires multiple partners and formal agreements, but early wins possible with convening and communication efforts).

25-0461
11/10/2025

RECOMMENDATION D. WORKFORCE TRAINING & STAFFING EXPANSION

POLICY STATEMENT:

The City will expand workforce training, staffing, and cross-departmental capacity to ensure trees are properly planted, maintained, inspected, and managed through both routine care and emergency response.

CURRENT CHALLENGES:

Las Vegas's ability to grow and sustain its urban forest is limited by insufficient trained personnel across City departments and contracted crews. Many contracted workers lack arboricultural knowledge, leading to improper planting, pruning, or irrigation practices that reduce survivability. City staff are already overextended and unable to consistently provide follow-up care, routine maintenance, or storm response. After major weather events, tree risk assessments are inconsistently performed, leaving public safety hazards unaddressed. Parks and Recreation staff who work daily around trees are not trained or tasked with identifying early signs of tree decline.

The City currently employs a single Urban Forester responsible for more than 32,000 public trees in addition to administrative duties, planning, and emergency response. This is not sustainable and prevents the City from achieving its canopy and climate goals. Without additional staff, critical work such as timely tree care maintenance, cyclical tree risk assessments, and inventory updates will continue to fall behind.

KEY ACTIONS:

Expand staffing and inspection capacity:

- ✦ Develop a phased hiring plan that begins with one Urban Forestry Tree Inventory Specialist in Year 1, with annual performance reporting used to justify adding a second specialist in Year 2.
- ✦ By Year 3, elevate one specialist into a supervisory role while hiring a Planning Associate to support administrative and storm-response needs.
- ✦ By Year 4, complete the build-out to a five-person full-time team, including an Urban Forestry Supervisor, providing career advancement opportunities and sustainable capacity.
- ✦ Recruit and train ISA Certified Arborists and other credentialed professionals (Tree Care Industry Association, American Society of Consulting Arborists, Society of American Foresters).
- ✦ Explore alternative staffing models such as cross-training Parks and Public Works staff in basic inspection and reporting protocols.
- ✦ Advocate for sustained funding through general fund allocations, grants, or permit fees to support new positions long-term.
- ✦ Update and adopt standard operating procedures (SOPs) for proactive inspections, code enforcement, and follow-up care.

25-0461
11/10/2025

Staffing Growth Plan

A phased hiring plan balances cost with capacity and ensures measurable return on investment.

Level	Job Title	Short Description	Salary per Year	Maximum Program Cost Increase per Year
5	Urban Forester	Oversees all Urban Forestry operations and management	\$115,000–145,000	\$525,000
4	Urban Forestry Supervisor	Direct lead of Tree Inventory Specialists and Planning Associate; deputy to the Urban Forester	\$95,000–115,000	\$380,000
3	Urban Forestry Planning Associate	Handles administrative tasks and supplemental storm patrol assessments	\$85,000–95,000	\$265,000
2	Tree Inventory Specialist 2	Performs cyclical risk assessments	\$65,000–85,000	\$170,000
1	Tree Inventory Specialist 1	Performs cyclical risk assessments	\$65,000–85,000	\$85,000

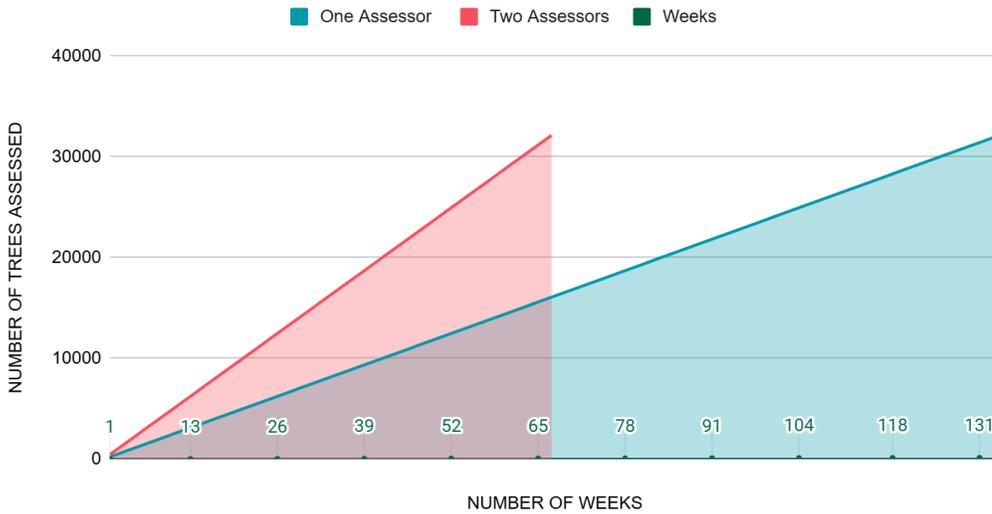
The accompanying chart demonstrates how many trees can be assessed per year with one versus two assessors. With only one, it takes over 130 weeks to complete a full cycle; with two, the same cycle can be completed in nearly half the time. “By Year 4, phased hiring grows the City’s Urban Forestry Team from one to five full-time staff, creating sustainable capacity for management, growth, and safety.”

By Year 4, phased hiring grows the City’s Urban Forestry Team from one to five full-time staff, creating sustainable capacity for management, growth, and safety.

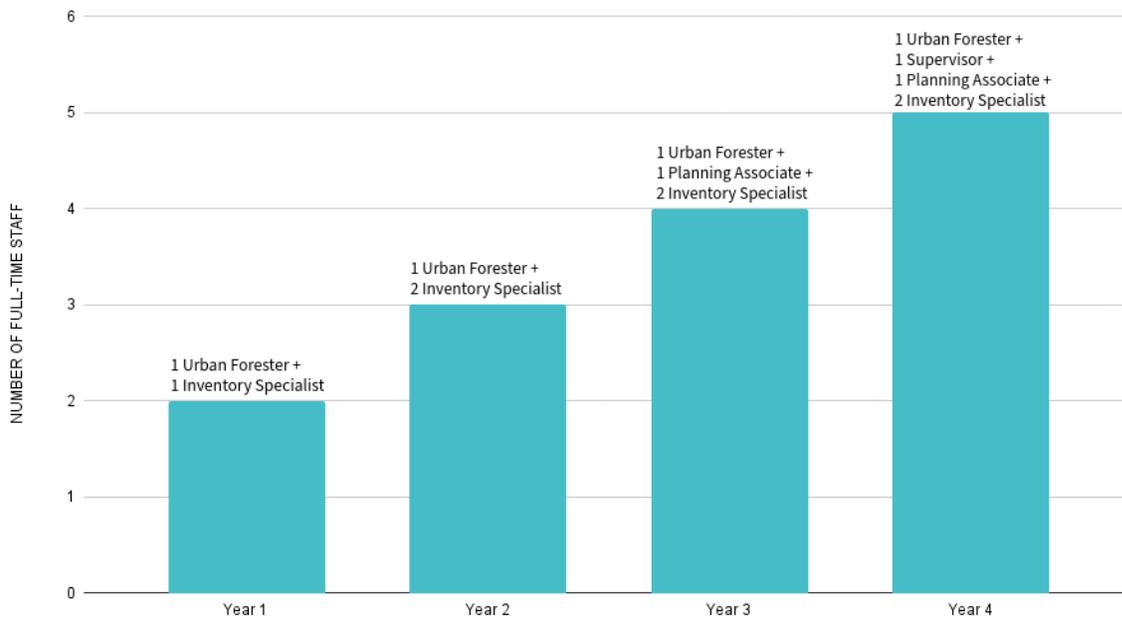
25-0461
11/10/2025

Tree Risk Assessment Cycle Scenarios

CITY OF LAS VEGAS URBAN FORESTRY



Phased Staffing Growth for City of Las Vegas Urban Forestry Team



25-0461
11/10/2025



Strengthen developer engagement:

- ✦ Designate an Urban Forestry Liaison to serve as a single point of contact for developers.
- ✦ Create forestry-focused training modules for developers, landscape architects, and engineers, offered through professional associations or licensing boards.
- ✦ Cross-train planners, permit techs, and staff from Community Development, Parks, and Public Works to deliver consistent urban forestry guidance during pre-application and permitting.

Enhance storm response capacity:

- ✦ Implement a storm response patrol system by zones, with at least one trained tree risk assessor in each.
- ✦ Develop a storm-response training program including safety, hazard tree assessment, PPE, field triage, and public communication.
- ✦ Partner with regional agencies to align training with FEMA-compliant hazard tree assessment standards.
- ✦ Expand capacity through seasonal hires, pre-qualified contractors, and a “response reserve roster” of trained volunteers or vendors for post-storm mobilization.

IMPLEMENTATION:**TIMELINE**

Short-Term (1–5 years) for staffing expansion, liaison designation, SOP development, and developer training;

Mid-Term (5–10 years) for full storm-response patrols and reserve roster.

COST

\$\$\$ (significant staffing investments; storm readiness infrastructure).

EASE

C (requires sustained funding, interdepartmental coordination, and long-term institutional commitment).

25-0461
11/10/2025

RECOMMENDATION E.

EQUITABLE TREE PLANTING IN PRIORITY COMMUNITIES

POLICY STATEMENT:

The City will focus tree planting in heat-vulnerable, low-income neighborhoods and school campuses to expand equitable access to shade, livability, and public health benefits, while respecting the operational requirements of key partners like the Clark County School District (CCSD).

CURRENT CHALLENGES:

Tree canopy in Las Vegas is unevenly distributed, with the lowest coverage in neighborhoods that experience the highest surface temperatures and socioeconomic vulnerability. These areas face disproportionate heat-related health risks and reduced livability. School campuses, which could serve as community shade anchors, often lack meaningful canopy due to limited engagement with CCSD during tree planning efforts. Security requirements — such as camera sightlines and supervision visibility — have historically caused friction with planting initiatives. Without tailored strategies, greening efforts risk being rejected or unsustainable.

Similarly, public transit zones and walk-to-school corridors remain under-shaded, with infrastructure constraints limiting canopy opportunities. These gaps directly affect heat relief for residents who rely on walking, biking, or transit.

KEY ACTIONS:

Partner with CCSD to green schoolyards and campuses:

- ✦ Initiate formal outreach to CCSD leadership and principals to align canopy expansion with safety, visibility, and circulation requirements.
- ✦ Designate a City Urban Forestry Liaison to coordinate communication with CCSD facilities, sustainability, and operations staff.
- ✦ Prioritize pilot projects at schools in equity-priority zones, using them to model best practices for species selection, irrigation design, and long-term care.
- ✦ Develop co-funding opportunities with education, public health, or sustainability partners to support campus greening.
- ✦ Establish formal planting agreements with CCSD that define roles, responsibilities, irrigation commitments, and maintenance protocols.

Target equity-priority neighborhoods and walk-to-school routes:

- ✦ Use GIS and environmental justice data to identify neighborhoods and school zones most in need of canopy.
- ✦ Conduct walkability and shade assessments for routes to schools, overlaying demographic and heat-vulnerability indicators.
- ✦ Integrate planting into capital projects with RTC and Public Works to provide shade along transit corridors and pedestrian networks.
- ✦ Engage parents, teachers, and youth in planting and stewardship to build community ownership.

Institutionalize long-term accountability:

- ✦ Create a centralized tracking system for school and neighborhood planting agreements.
- ✦ Monitor survivability, canopy growth, and equity outcomes using the City's tree inventory system.
- ✦ Expand planting agreements and pilot templates to additional public facilities in equity-priority areas (libraries, parks, affordable housing).

25-0461
11/10/2025

IMPLEMENTATION:**TIMELINE**

Short-Term (1–5 years) for equity mapping, walk-to-school planting, and initial CCSD partnerships;
 Mid-Term (5–10 years) for formalized agreements, tracking system, and scaling to other facilities.

COST

\$\$\$ (substantial investments in planting, irrigation, and shared maintenance responsibilities, though cost-sharing opportunities exist).

EASE

C (requires interagency collaboration, formal agreements, and long-term co-management).



RECOMMENDATION F. PUBLIC EDUCATION & TREE STEWARDSHIP

POLICY STATEMENT:

The City will expand education, outreach, and engagement programs to build public understanding of the benefits of trees, improve long-term survival of plantings, and empower residents, HOAs, developers, and students as active stewards of the urban forest.

CURRENT CHALLENGES:

Mature trees are often removed without replacement, and new plantings frequently fail due to misconceptions about water use, lack of care knowledge, and minimal follow-up support. Residents and developers have limited guidance or incentives to prioritize canopy, while HOAs and commercial property managers often default to inconsistent or harmful practices. Tree giveaways, while popular, see high mortality when recipients lack clear instructions or ongoing support. Broader campaigns that frame trees as critical infrastructure remain underutilized and fragmented.

IMPLEMENTATION:

TIMELINE



Short-Term (1–5 years) for giveaway reform, education campaigns, and digital hub;
Mid-Term (5–10 years) to scale steward networks and embed campaigns citywide.

COST



\$\$ (moderate investments in communications, staff, and digital infrastructure).

EASE



B (requires coordination across departments, schools, utilities, and HOAs, but leverages existing partnerships and outreach channels).

25-0461
11/10/2025



KEY ACTIONS:**Educate Developers & HOAs:**

- ✦ Integrate tree code requirements and care standards into the pre-application development process.
- ✦ Host quarterly development roundtables to align on tree protection and incentives for exceeding planting minimums.
- ✦ Develop HOA-focused stewardship toolkits and host annual clinics demonstrating proper irrigation, pruning, and long-term care.

Launch a Citywide Tree Literacy Campaign:

- ✦ Promote trees as essential infrastructure for energy savings, property value, and health.
- ✦ Develop multilingual, culturally relevant materials tailored to different groups (e.g., renters, homeowners, Spanish-speaking residents, commercial property owners).
- ✦ Collaborate with utilities, housing programs, and sustainability initiatives to co-brand and distribute campaigns in high-need neighborhoods.

Develop a Digital Tree Care Hub:

- ✦ Create a mobile-friendly “Tree Selection and Care Portal” with a simplified Preferred Trees List, “Do Not Plant” guidance, seasonal care tips, and irrigation instructions.
- ✦ Promote the hub through giveaways, permits, and community events.
- ✦ Expand Tree Giveaway Programs with Stewardship Support:
- ✦ Align giveaways with equity-focused goals, prioritizing low-canopy, high-heat neighborhoods.
- ✦ Require basic contact/location information to track distribution and survival.
- ✦ Provide follow-up reminders at 3, 6, and 12 months; offer incentives (e.g., mulch, workshops, prizes) for survival updates.
- ✦ Use giveaways to recruit Community Tree Stewards who mentor neighbors and host planting activities.

Engage Students & Interns:

- ✦ Partner with UNLV, CSN, and local high schools to connect students to education and outreach programs.
- ✦ Offer structured internships and seasonal roles supporting giveaways, campaigns, and survival monitoring.
- ✦ Recruit interns directly from target neighborhoods to strengthen equity and community ownership.

25-0461
11/10/2025

RECOMMENDATION G. ESTABLISH STANDARD OPERATING PROCEDURES (SOPS) FOR CLIMATE-RESILIENT TREE MANAGEMENT

POLICY STATEMENT:

The City will adopt and enforce modernized tree planting, maintenance, design, and succession standards that ensure long-term tree survival, maximize canopy growth, and minimize conflicts with infrastructure.

CURRENT CHALLENGES:

Premature tree failure is widespread due to poor nursery stock, minimal soil volume, design accommodations for trees, reliance on outdated species, improper planting and pruning, and insufficient follow-up care. Limited nursery availability of resilient alternatives restricts species diversity, while storm events expose the absence of consistent risk assessments and rapid response protocols. Design constraints in transit and utility zones often result in lost canopy opportunities. These issues are further compounded by inconsistent interdepartmental coordination and outdated design standards.

KEY ACTIONS:

- ✦ Establish Tree Survival & Replacement Standards
- ✦ Require all City-led and permitted projects to guarantee a minimum 5-year survival period, with clear maintenance and replacement obligations.
- ✦ Integrate survival standards into development agreements, performance bonds, and capital project contracts.
- ✦ Prioritize monitoring and enforcement in under-canopied, high-heat neighborhoods.
- ✦ Modernize Planting Standards for Climate Resilience
- ✦ Update standard drawings and planting specifications to include soil volume, rooting space, irrigation needs, and species-specific requirements.
- ✦ Ensure standards emphasize climate-ready, drought- and heat-tolerant species, and create an update cycle to align with emerging research.
- ✦ Provide user-friendly illustrations and visual guides for contractors, developers, and residents.
- ✦ Require Utility-Compatible Tree Planting
- ✦ Develop a preferred list of utility-compatible species for planting in overhead and underground easements.
- ✦ Mandate planting of compatible trees in easements to eliminate long-term canopy gaps in historically disinvested neighborhoods.
- ✦ Pre-approve planting and design solutions in collaboration with utilities to reduce conflicts and delays.
- ✦ Require Street Trees for All Frontages
- ✦ Amend City code to require street trees on all development frontages, including small-scale residential and infill projects.
- ✦ Allow in-lieu fees only when planting is infeasible, with reinvestment required in the same priority area.
- ✦ Offer flexible irrigation and design solutions to encourage tree inclusion in retrofits and smaller projects.

25-0461
11/10/2025

IMPLEMENTATION:**TIMELINE**

Near-Term (1–5 years) for survival standards, planting updates, and utility-compatible list;

Short-Term (5–10 years) for citywide code amendments requiring street trees on all frontages.

COST

\$\$ (moderate – updates to code, standards, and monitoring systems; training for contractors and developers).

EASE

B (requires sustained coordination between planning, utilities, and public works, but builds on existing code frameworks and technical standards).



RECOMMENDATION H. IMPROVE URBAN SOIL HEALTH USING COMPOST AND BIOCHAR APPLICATIONS

POLICY STATEMENT:

The City will establish standardized soil health protocols that integrate biologically active compost and biochar applications into all tree planting and establishment practices, ensuring long-term tree vitality, reduced irrigation needs, and alignment with climate goals.

CURRENT CHALLENGES:

Urban soils in Las Vegas are often compacted, sterile, poorly drained, and low in organic matter, severely limiting tree survival and long-term resilience. Current practices rely heavily on synthetic growth hormones that stimulate initial rooting but fail to regenerate healthy soils or sustain microbial activity. Without a citywide protocol for soil enhancement, trees are planted into biologically deficient conditions that compromise establishment and increase long-term maintenance costs.

KEY ACTIONS:

- ✦ Adopt Citywide Soil Standards
- ✦ Require biologically active compost and biochar blends for all City-led and incentivized planting projects.
- ✦ Apply amendments in two phases:
- ✦ Liquid phase: inoculate nursery stock with compost teas before delivery to stimulate early microbial colonization.
- ✦ Solid phase: amend planting holes with compost blended with biochar to enhance rooting, microbial vitality, and long-term soil structure.
- ✦ Train and Standardize Field Practices
- ✦ Develop City-approved specification sheets for compost and biochar use, ensuring consistency across contractors and developers.
- ✦ Provide training for City crews, contractors, and developers on sourcing, preparation, and application techniques.
- ✦ Monitor and Refine Protocols
- ✦ Launch pilot monitoring programs (e.g., fungi:bacteria ratios, survival rates, irrigation demand) in partnership with UNLV, NV Plants, and other regional experts.
- ✦ Track performance of treated vs. untreated planting sites to quantify benefits and refine protocols.
- ✦ Build Regional Supply Chains
- ✦ Collaborate with local producers to develop a reliable supply of biochar and compost products.
- ✦ Prioritize waste-to-resource pathways that recycle organic waste streams into high-quality amendments.

25-0461
11/10/2025



IMPLEMENTATION:**TIMELINE**

Near-Term (1–5 years) for standards, field applications, and training;
 Short-Term (5–10 years) for monitoring programs;
 Long-Term (10–20 years) for regional supply chain development.

COST

\$\$ (moderate – materials, training, monitoring, supply development).

EASE

B (requires cultural shift in planting practices and coordinated procurement, but builds on existing composting infrastructure).



25-0461
11/10/2025

RECOMMENDATION I. IMPLEMENT AN INTEGRATED PEST MANAGEMENT (IPM) STRATEGY FOR URBAN FOREST HEALTH

POLICY STATEMENT:

The City will adopt and implement a proactive Integrated Pest Management (IPM) program that leverages early detection, regional partnerships, adaptive tree care practices, and public engagement to reduce pest- and disease-related canopy loss, strengthen resilience, and safeguard the long-term health of Las Vegas's urban forest.

CURRENT CHALLENGES:

Las Vegas currently lacks a dedicated pest management program or funding structure, leaving tree care reactive and fragmented. The causes of widespread ash decline remain unclear, and threats from pests such as Mediterranean pine engraver beetles are not fully understood. The City's tree inventory has not been updated to track pest vulnerabilities or guide targeted responses. Meanwhile, irrigation changes and turf conversions increase tree stress, amplifying susceptibility to pests and diseases. Without a formal IPM program, Las Vegas risks significant canopy loss and costly emergency interventions.

KEY ACTIONS:

- ✦ Establish a Citywide Pest Monitoring and Response Program – Create a coordinated system of regular inspections, high-risk area monitoring, and rapid response protocols for outbreaks.
- ✦ Collaborate with Regional Experts – Partner with the Nevada Division of Forestry, UNR Cooperative Extension, SNWA, and other experts to identify causes of dieback, co-develop treatments, and share data regionally.
- ✦ Optimize Tree Care During Turf Conversions – Revise irrigation schedules, apply organic mulch, review fertilization practices, and implement BMPs to protect root systems during turf removal and landscape transitions.
- ✦ Evaluate Targeted Treatments – Investigate environmentally responsible and cost-effective measures (e.g., preventive insecticides, soil drenches, or biological controls) supported by adaptive management.
- ✦ Diversify the Urban Forest – Gradually reduce reliance on vulnerable species such as ash and pine; increase planting of climate-adapted, pest-resistant species in partnership with nurseries and growers.
- ✦ Engage the Community in Pest Awareness – Provide outreach materials, workshops, and simple reporting mechanisms (portal, app, hotline) to involve residents in early pest detection and proper tree care.

25-0461
11/10/2025



IMPLEMENTATION

TIMELINE



Near Term (1–5 years) to establish monitoring, optimize turf conversion BMPs, and initiate partnerships and outreach.

Short Term (5–10 years) to evaluate and adopt treatments and begin diversification.

Long Term (10–20 years) for full canopy diversification and sustained program maturity.

COST



\$\$–\$\$\$ (moderate for monitoring and outreach; higher for long-term diversification and treatments).

EASE OF IMPLEMENTATION



B (requires moderate effort; dependent on interdepartmental coordination, staff training, and regional collaboration but supported by existing partnerships).



RECOMMENDATION J. URBAN FORESTRY VISIBILITY, AWARENESS, AND PARTNERSHIPS

POLICY STATEMENT:

The City will elevate the Urban Forestry Program as a trusted, public-facing resource and convener - not a fundraiser - by providing clear guidance for climate-smart planting, creating partnership pathways, and recognizing community and private-sector contributions that align with canopy equity and resilience goals.

CURRENT CHALLENGES:

Public awareness of City standards and priority planting areas is limited; willing partners (residents, nonprofits, utilities, businesses) lack clear “how-to” guidance and intake pathways. Without a visible coordination role, projects can be fragmented, overlook equity priorities, or miss technical specifications that affect survival and long-term maintenance.

GOAL ALIGNMENT:

Expand and sustain an equitable, climate-resilient urban tree canopy; build an integrated partnership network that accelerates planting while maintaining quality and compliance.

KEY ACTIONS:

- ✦ Publicize Tree Purchasing & Planting Guidance – Create user-friendly materials and a web hub that include the Preferred Species List, “Do Not Plant” list with reasons, site prep and irrigation how-tos, and maps of priority planting zones.
- ✦ Serve as a Tree Partnership Facilitator – Establish a simple partner intake form, point-of-contact, and a “Partner Playbook” (roles, approvals, standard specs, survivability expectations, equity siting criteria) for externally funded or donated projects.
- ✦ Leverage Public Recognition Platforms – Launch a recognition toolkit (signage templates, press and social media cadence) and an annual “Urban Forestry Partner Awards” to highlight exemplary projects in equity-priority areas.
- ✦ Align with Regional and Environmental Sustainability and Governance (ESG) Goals – Frame projects within climate adaptation, heat mitigation, and water-smart messaging; provide data summaries partners can use for ESG reporting while meeting City standards and equity objectives.

25-0461
11/10/2025



IMPLEMENTATION

TIMELINE

Short-Term (1–5 years) to publish the guidance hub, launch the partner facilitator function, and stand up recognition;
Ongoing for annual campaigns, awards, and updates.

COST

\$–\$\$ (staff time for content, coordination, and recognition; modest design/website support).

EASE OF IMPLEMENTATION

A–B (builds on existing communications channels; requires light cross-department coordination).



IMPLEMENTATION MATRIX

Recommendation	Timeline	Cost	Ease
A. Preferred Species List & Standards	Short-Term (1–5 yrs); Ongoing reviews 	\$–\$\$ 	A–B 
B. Tree Protections & Waiver Reform	Short-Term (1–5 yrs); Ongoing enforcement 	\$\$–\$\$\$ 	B 
C. Regional Alignment & Shared Data Systems	Short-Term (1–5 yrs); Ongoing coordination 	\$\$ 	B 
D. Workforce Training & Staffing Expansion	Short-Term (1–5 yrs); Mid-Term (5–10 yrs) for storm capacity 	\$\$\$ 	C 
E. Equitable Tree Planting in Priority Communities	Short-Term (1–5 yrs); Mid-Term (5–10 yrs) for scaling 	\$\$\$ 	C 
F. Public Education & Tree Stewardship	Short-Term (1–5 yrs); Mid-Term (5–10 yrs) for scaling 	\$\$ 	B 
G. Climate-Resilient SOPs (Planting, Maintenance, Design, Succession)	Near-Term (1–5 yrs); Short-Term (5–10 yrs) for code amendments 	\$\$ 	B 
H. Soil Health (Compost & Biochar Standards)	Near-Term (1–5 yrs); Short-Term (5–10 yrs) pilots; Long-Term (10–20 yrs) supply chain 	\$\$ 	B 
I. Integrated Pest Management (IPM)	Near-Term (1–5 yrs) start-up; Short-Term (5–10 yrs) treatments; Long-Term (10–20 yrs) diversification 	\$\$–\$\$\$ 	B 
J. Urban Forestry Visibility & Partnerships	Short-Term (1–5 yrs); Ongoing campaigns 	\$–\$\$ 	A–B 

25-0461
11/10/2025



URBAN FORESTRY IMPLEMENTATION ROADMAP

ONGOING (ANNUAL)

- ✦ Species List Reviews (A)
- ✦ Enforcement of Protections (B)
- ✦ Regional Coordination Meetings (C)
- ✦ Education Campaigns & Recognition Programs (F, J)

SHORT-TERM (1–5 YEARS)

- ✦ Revise & Publish Preferred Species List + Online Guide (A)
- ✦ Adopt Tree Protection Ordinance; Reform Waivers (B)
- ✦ Launch Regional Data Protocol & Training (C)
- ✦ Hire & Train Forestry Staff; Designate Liaison (D)
- ✦ Map Equity Zones; Launch Pilot School & Walk-to-School Plantings (E)
- ✦ Reform Tree Giveaway Programs; Digital Tree Care Hub (F)
- ✦ Establish Survival Standards & Modernized Planting SOPs (G)
- ✦ Adopt Soil Standards; Launch Compost + Biochar Field Training (H)
- ✦ Launch Citywide Pest Monitoring Program (I)
- ✦ Publish Guidance Hub; Stand Up Partner Facilitator Role (J)

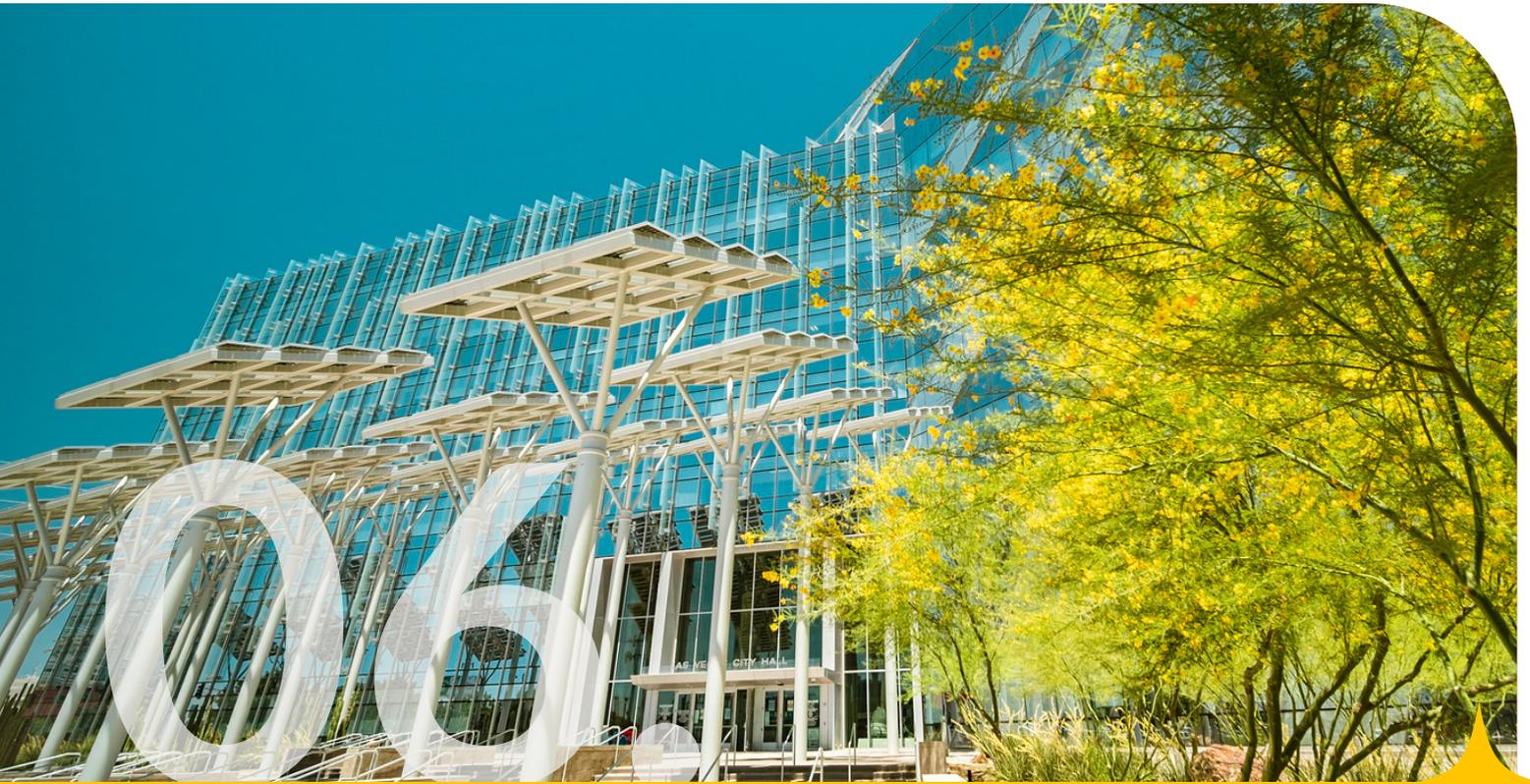
MID-TERM (5–10 YEARS)

- ✦ Expand Storm Patrol Capacity & Response Roster (D)
- ✦ Formalize Planting Agreements w/ CCSD + Expand to Other Facilities (E)
- ✦ Scale Tree Stewardship Networks Citywide (F)
- ✦ Adopt Citywide Code Amendments Requiring Street Trees (G)
- ✦ Pilot Soil Monitoring & Expand Compost/Biochar Use (H)
- ✦ Evaluate Treatments; Begin Diversification of Urban Forest (I)

LONG-TERM (10–30 YEARS)

- ✦ Fully Diversify Canopy by Phasing Out High-Risk Species (I)
- ✦ Mature Supply Chain for Biochar/Compost (H)
- ✦ Long-Term Institutionalization of Enforcement, Coordination, and Visibility Programs (B, C, J)

25-0461
11/10/2025



HOW ARE WE DOING?

Monitoring progress is a vital part of ensuring that the City of Las Vegas’s urban forest remains healthy, resilient, and responsive to changing conditions. Tracking outcomes over time allows the City to evaluate whether current strategies are effective, adapt management practices as needed, and ensure accountability to both community members and long-term goals.

TREE INVENTORY UPDATES

At the core of performance monitoring is the City’s tree inventory. As with any successful urban forestry program, regularly updating inventory data is essential. Ongoing updates allow the City to understand the current status of its tree resource, assess priority needs, and make data-driven decisions. A living inventory also provides the foundation for measuring progress toward canopy goals, identifying gaps in species diversity, and targeting high-need neighborhoods for equitable canopy growth.

SMART TREE INVENTORIES

Las Vegas is leading nationally by investing in **Smart Tree Inventories**, which capture highly detailed biometric and canopy data on a shorter cycle than traditional inventories. The first full scan was completed in 2024, with the next scheduled for 2026. This biennial scanning approach provides arborists and managers with a powerful tool to detect issues earlier, prioritize maintenance, gauge the success of new species, and plan for canopy expansion with precision.

25-0461
11/10/2025

While City arborists regularly identify and address defects through inspections, Smart Inventories provide an additional layer of detail – enabling staff to see structural risks, canopy changes, or emerging stress patterns that might otherwise go unnoticed until later years. By closing the gap between inventory cycles, the City can shift from reactive cleanups to proactive care, ultimately saving time, reducing emergency removals, and lowering long-term costs.

MEASURING CHANGES IN TREE BENEFITS

The benefits of Las Vegas’s urban forest – such as air quality improvement, stormwater capture, and energy savings – should be measured routinely through tools like i-Tree Eco. By applying these models to updated inventory data, the City can track changes in ecosystem services over time, highlight the value of canopy investments, and demonstrate the return on investment of tree planting and care.

INDICATORS OF A SUSTAINABLE URBAN FOREST

The City should continue to use the nationally recognized *Sustainable Urban Forest Indicators* framework as a benchmark for evaluating management practices. These indicators provide a clear set of standards for measuring progress across areas such as canopy cover, operations, funding, community engagement, and policy. A summary of Las Vegas’s current Assessed Levels of the Sustainable Indicators is included in the previous “What Do We Have” of this report, and the complete results for each of the three categories are included in the appendix. Regular assessments against these indicators will help ensure that Las Vegas is keeping pace with best practices in urban forestry management.

TRACKING CLIMATE NORMS AND EMERGING RESEARCH

Las Vegas’s arid climate and exposure to extreme heat make it critical to track climate norms and anticipate changes over the coming decades. Monitoring climate trends will help ensure that tree selection, planting strategies, and maintenance practices remain relevant and adaptive. At the same time, there is significant research underway nationally and globally on how trees respond to heat stress and prolonged drought. Staying current with this research will be essential for updating management practices, ensuring canopy resilience, and supporting innovation in water-smart urban forestry.

MOVING FORWARD

“How Are We Doing?” is not a one-time question – it is an ongoing process. By committing to regular data updates, biennial Smart Tree Inventories, benefit tracking, sustainability benchmarking, and climate-informed adaptation, the City of Las Vegas can ensure that its urban forest continues to deliver shade, beauty, and resilience for generations to come.

In a time of rising heat and environmental pressures, Las Vegas is redefining what it means to cultivate a sustainable urban forest in the desert — one seed, one flower, one leaf, one trunk, one tree at a time.

Implementation Tracker Template in appendices for future staff use.

Create a blank Implementation Tracker for the Urban Forester to fill tangible goals from the entire list - per month, quarter, etc. desired timeline.

25-0461
11/10/2025

APPENDICES

STANDARD OPERATING PROCEDURE (SOP) FOR CITY URBAN FORESTERS

Water Conservation Through Soil Care, Mulching, Plant Selection, Soil Volume Optimization, and Efficient Irrigation

1. SOIL CARE FOR WATER RETENTION

Healthy soils are the foundation of water-efficient landscapes. Proper soil management increases infiltration, enhances water storage, and supports long-term plant vitality.

1.1 Soil Assessment and Diagnosis

Step 1 – Map Review

- Use USDA Web Soil Survey to identify soil type, drainage, and known limitations.
- Always confirm with field inspection.

Step 2 – On-Site Soil Profile Analysis

- **Subsampling Depths:**
 - Turf: 3–6 in.
 - Beds: 6–12 in.
- **Structure Identification:**
 - *Spongy*: Healthy, porous.
 - *Sub-angular blocky*: Stable and desirable.
 - *Platy*: Compacted, poor infiltration.
- **Compaction Test:**
 - Use a penetrometer. >300 psi = severe compaction, requires remediation.
 - Consequences: shallow rooting, reduced stability, drought stress.
- **Laboratory Analysis (recommended):**
 - Send samples for fertility, salinity, and pH testing.

1.2 Soil Improvement Practices

- **Topdressing:** Apply ½–1 in. compost or compost–biochar blend (2:1 ratio).
- **Physical Interventions:**
 - Air tillage, vertical mulching, or hydrofracturing for compaction relief.
 - Soil profile rebuilding: incorporate compost + biochar to 12–14 in. depth.
- **Root Collar Excavation (RCX):**
 - Expose flare, correct grade, remove girdling roots.

1.3 Biochar Use

- **Function:** Enhances microbial activity, reduces leaching, improves water storage.
- **Forms:**
 - Pelleted: turf applications.
 - Granular: planting beds.

1.4 Compost Standards

- Acceptable feedstocks: tree litter, manure, Class A biosolids.
- Certification: STA, USDA-NOP, OMRI.
- Avoid: peat moss, raw mulch, Class B biosolids.
- Application Rates:
 - Turf: ¼–½ in.
 - Beds: up to 1 in.
- Equipment: compost spreaders, mulch blowers.

1.5 Liquid Soil Treatments

- Low-pressure injection of biologically active liquids to improve uptake.
- Benefits: enhances microbial communities, boosts pathogen resistance.

23-0461
11/10/2025



2. MULCHING TECHNIQUES

Mulch conserves soil moisture, regulates temperature, and improves soil health.

Material: Coarse, non-dyed organic mulches (wood chips, bark, shredded wood, straw, cocoa hulls).

Application:

- Depth: 2–4 in.
- Clearance: 2–3 in. away from trunk/stems.

Key Benefits:

- 40% reduction in water loss
- Soil temperature moderation
- Suppression of weeds, erosion control
- Increased organic matter

3. PLANT SELECTION AND HYDRO-ZONING

Strategic plant choice reduces irrigation demand.

Principles:

- Use native, heat- and drought-tolerant species.
- Group plants by water need (hydrozoning).

Examples:

- Zone 1 (High water): Goodding’s Willow, Western Redbud
- Zone 2 (Medium): Nettleleaf Hackberry, Gambel Oak
- Zone 3 (Low): Yellow Palo Verde, Honey Mesquite

Avoid high-water ornamentals in low-irrigation zones.

4. SOIL VOLUME REQUIREMENTS

Adequate soil volume is critical for long-term water efficiency and tree health.

Guidelines:

- Trees by canopy area: 1.5–3.0 cu ft soil per sq ft of canopy (≥ 36 in. depth)
- Trees by DBH: 62.5 cu ft per in. DBH (≥ 36 in. depth)
- Shrubs: ~ 1 cu ft per plant (24–36 in. depth)
- Turfgrass: 6–8 in. amended soil

Design Notes:

- In constrained corridors: min. 250–300 cu ft/tree.
- In parks: 500–625 cu ft/tree.
- Use soil cells, suspended pavement, and connected rooting zones.
- Include drainage and irrigation infrastructure.

5. IRRIGATION DESIGN AND MANAGEMENT

5.1 System Type Selection

- Trees/Shrubs: Drip or micro-irrigation (targeted, efficient).
- Turf: Spray or rotary systems.

5.2 Best Practices

- Emitters ≥ 1 GPH, long/deep cycles (60–90 min).
- Place emitters at/beyond root flare, expand with growth.
- Prevent runoff by matching run times to infiltration rate.

5.3 Technology Enhancements

- Smart controllers (EPA WaterSense).
- Pressure regulation for consistency.

5.4 Retrofits

- Replace sprays with rotating nozzles (WaterSense).
- Install subsurface drip in mulched beds.
- Audit for coverage uniformity (Irrigation Association tools).

5.5 Operations

- Long cycles encourage deep rooting.
- Group irrigation zones by hydrozone, not just plant type.

25-0461
11/10/2025

6. COST AND LABOR CONSIDERATIONS (PER 1,000 SQ FT)

Task	Cost (\$)	Labor (hrs)	Equipment
Compost Topdressing	75–100	2–3	Spreader
Biochar Amendment	120–160	3–4	Rototiller/Air Tool
Liquid Treatments	60–80	1–2	Injection Wand
Mulching	50–85	2	Mulch Blower

Operational Note: Bundle soil, irrigation, and planting tasks within seasonal work cycles to reduce costs and maximize efficiency.

Webpage Content Outline [Client Copy Las Vegas UFMP Webpage Content](#)

7. BEST PRACTICES FOR WILDLAND FIRE MANAGEMENT IN THE WILDLAND-URBAN INTERFACE (WUI)

- Communities adjacent to public lands in desert environments, such as those surrounding Las Vegas, including Summerlin West, Lone Mountain, La Madre Foothills, and Kyle Canyon, face unique wildfire risks due to dry vegetation, invasive grasses, prolonged drought, and limited water resources. Effective wildland fire management in such areas requires a comprehensive approach that combines the following components to reduce risk and protect lives and property:
 - Defensible Space and Fire-Resistant Construction
 - Regularly clear dry vegetation, remove combustible debris, and manage ladder fuels that allow flames to climb into tree canopies.
 - Incorporate fire-resistant building materials such as non-combustible roofing, siding, and ember-resistant vents.
 - Vegetation and Fuels Management
- Manage invasive grasses that significantly increase fire frequency and spread, particularly cheatgrass (*Bromus tectorum*).
- Implement fuel reduction strategies such as targeted grazing, mechanical removal, and selective thinning.
- Land Use Planning and Zoning Regulations
- Zoning regulations should restrict new development in high-risk WUI areas and enforce fire-adapted landscaping requirements that prioritize low-fuel, drought-tolerant plants.
- Establish and maintain fuel breaks between neighborhoods and adjacent wildlands.
- Fire Prevention and Response Measures
- Enforce seasonal fire bans, regulate outdoor equipment use, and increase patrols via collaboration with local law enforcement agencies to deter illegal burning
- Expand water infrastructure such as strategically placed water storage tanks and fire hydrants in remote WUI areas to ensure that firefighting resources are readily available even where municipal water systems are limited.
- Community Engagement and Education
- Provide ongoing public education through the City’s Public Information Officer (PIO) and programs like Firewise USA® to offer guidance tailored to homeowners living in WUI areas, promoting defensible space practices and home hardening techniques.
- Host annual evacuation drills, collaborate with neighborhood associations, and distribute localized fire safety guides help improve community awareness and readiness.
- Las Vegas’s urban forest faces increasing challenges from extreme heat, prolonged drought, and pest infestations. Landscape changes — including new development and the turf removal requirements under Assembly Bill 356 (2021) — may further stress trees if not implemented carefully. These pressures weaken natural defenses and increase vulnerability to pests and disease. A comprehensive

25-0461
11/10/25



pest management strategy, aligned with Integrated Pest Management, Second Edition (2016), is essential to safeguard canopy health.

- Current pest and disease concerns in the region include the Mediterranean Pine Engraver (*Orthotomicus erosus*), which impacts several of the City's most prevalent species such as Aleppo pine (*Pinus halepensis*) and Afghan pine (*Pinus brutia* var. *Eldarica*), as well as a trend of canopy thinning, dieback, and sudden death in ash trees (*Fraxinus* spp.) for which the cause has not been identified. To address these concerns, the City should establish a citywide monitoring & response program that includes routine inspections in high-risk areas, especially during turf conversion and irrigation transitions, and prioritizes early detection of Mediterranean pine engraver activity and ash decline symptoms. They should also identify the cause of ash decline through diagnostic testing and expert consultation, and collaborate with regional experts such as the Nevada Division of Forestry, University of Nevada, Reno Cooperative Extension, and Southern Nevada Water Authority to investigate ash decline and test treatment approaches.
- Similar communities across the Southwest (e.g., Phoenix, Denver, Sacramento) face similar pest pressures and have adopted proactive monitoring and early-detection programs such as GIS-based outbreak tracking to guide rapid intervention (Dagit & Burnap, 2019), targeted pesticide applications for high-value pines (Fettig et al., 2013, tool/equipment sanitation SOPs to reduce pathogen spread, and species diversification to minimize reliance on vulnerable species like pine and ash (Pooler et al., 2024). Las Vegas can draw inspiration from these communities and diversify the urban forest, prioritizing climate-ready, pest-resistant species (e.g., Acacia, Eucalyptus, Saxauls (*Haloxylon*), *Prosopis* (Ghaf), *Havardia*, *Quercus*) and expanding trials through the City nursery and regional growers. Updating the tree inventory to track high-risk species and support diversification will be a critical part of the process.
- Other recommended pest management actions for the City of Las Vegas include:
- Optimize Tree Care During Turf Conversion by transitioning irrigation to deep, infrequent cycles, applying mulch in former turf areas to protect root zones and moderate soil temperatures, and prevent root injury and soil disturbance during excavation.
- Evaluate Targeted Treatments where beetle risk is acute, which includes assessing pine beetle threat levels with site-specific risk assessments tied to irrigation changes and assessing options such as preventative thinning. Las Vegas should also avoid blanket chemical applications unless regionally validated.
- Strengthen Community Outreach & Education by developing materials and workshops for residents and landscape professionals and providing training on early symptom detection, irrigation adjustments, and proper turf conversion tree care.
- Secure Funding (e.g., grants, budget allocations) to sustain monitoring, treatments, and outreach.

25-0461
11/10/2025

PRIORITY PLANTING MAPS

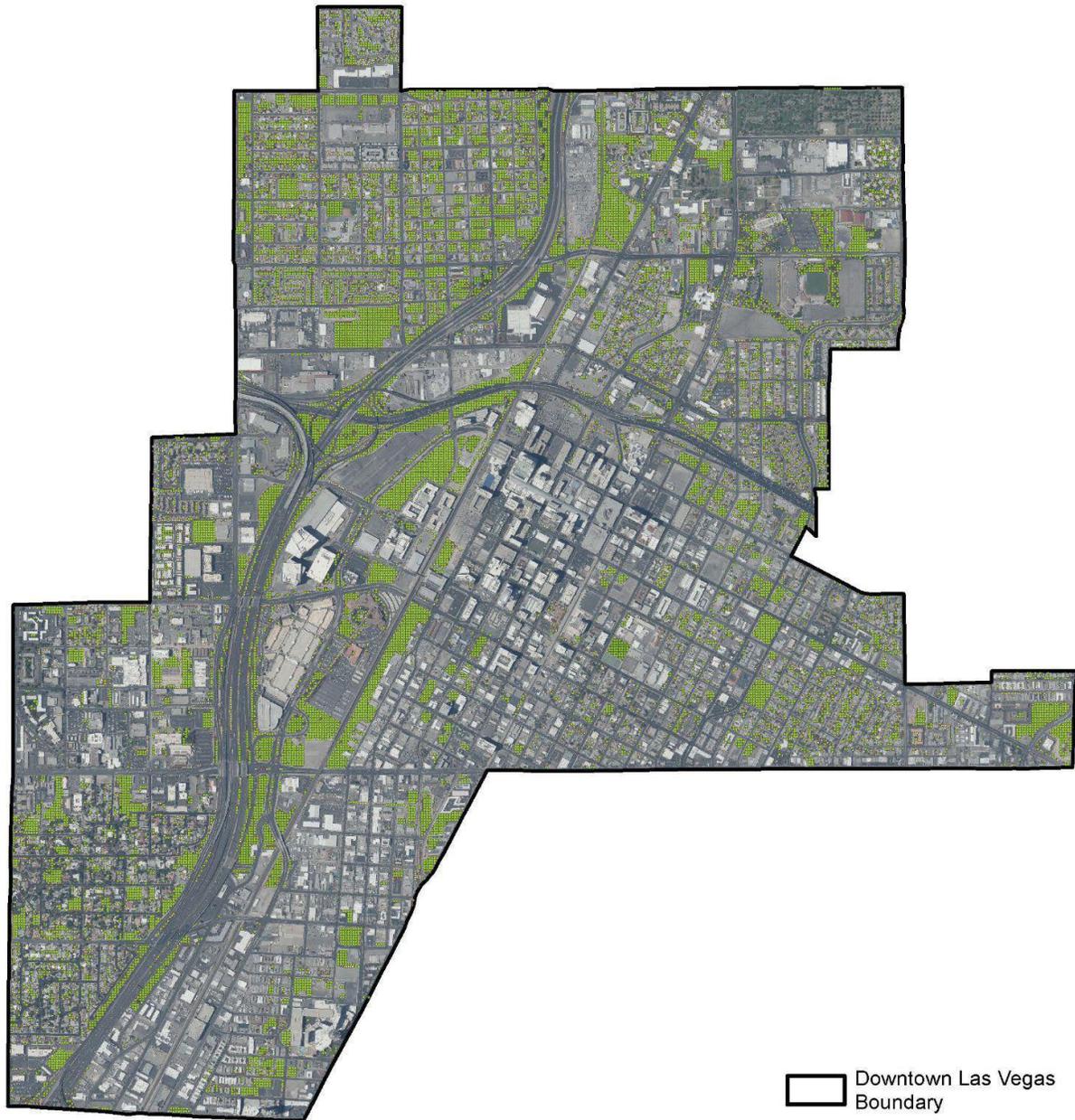
The City of Las Vegas should use these maps as a reference to help guide the planning of future tree planting locations. All points on the maps are considered “shovel-ready” and could technically support the planting of a tree. It is up to the City Urban Forest Managers to decide which locations are to be selected. The City of Las Vegas has PDF copies of these maps for detailed zooming and analysis.

Ernest & Betty Becker Family
Technology and Recreation Center
City of Las Vegas, Nevada
Tree Placement Analysis



25-0461
11/10/2025

Downtown Las Vegas Neighborhood City of Las Vegas, Nevada Tree Placement Analysis



□ Downtown Las Vegas Boundary

Tree Size

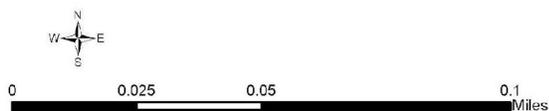
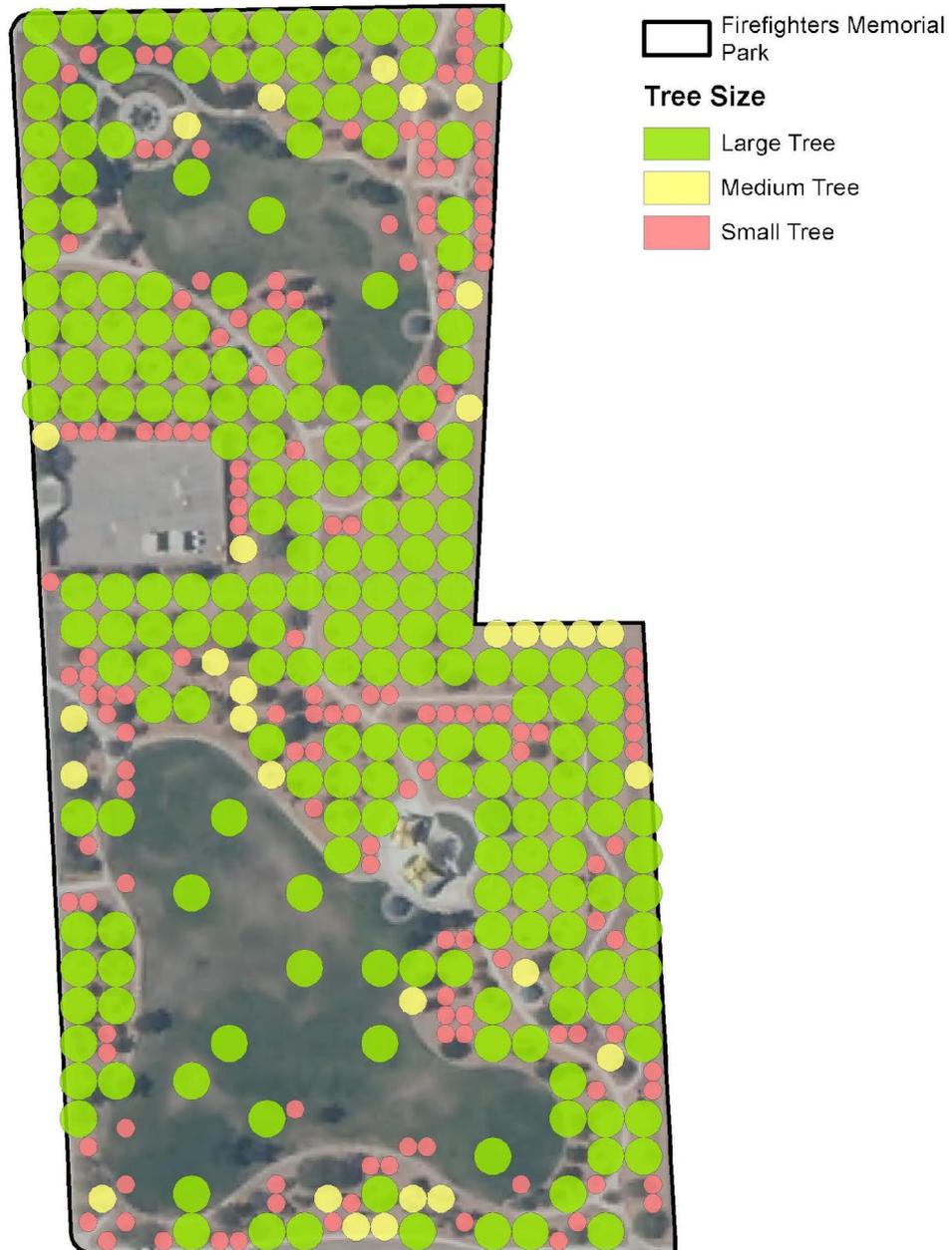
■ Large Tree

■ Medium Tree

■ Small Tree

25-0461
11/10/2025

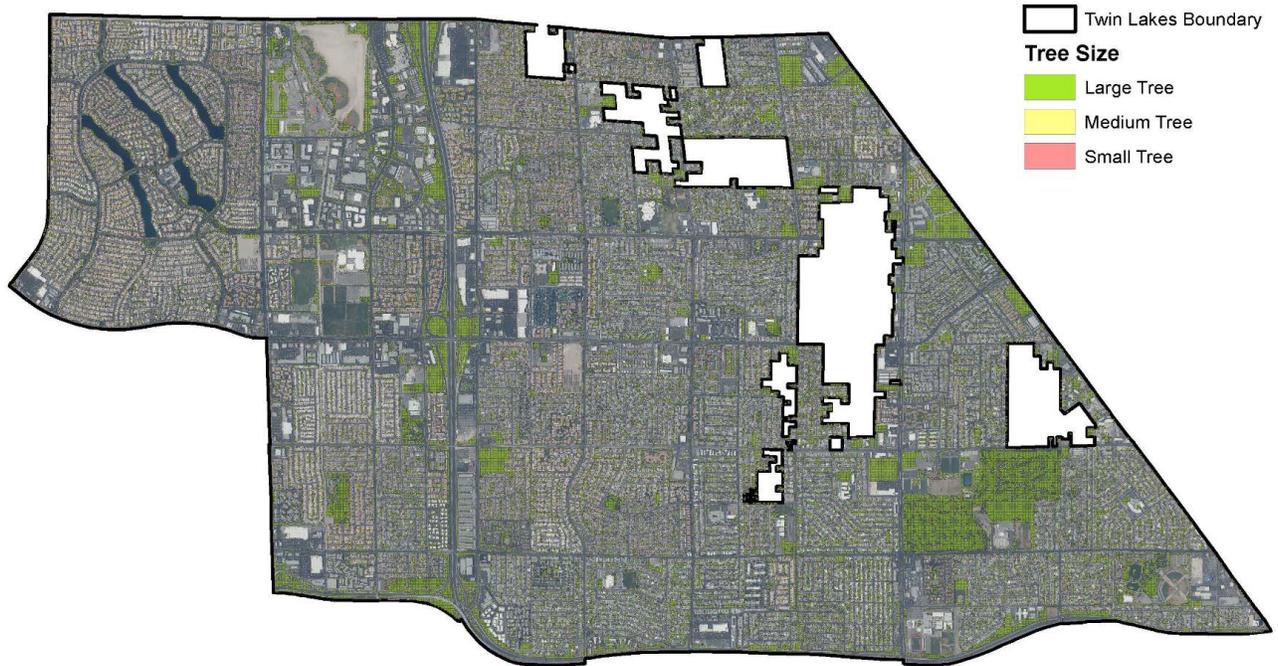
Firefighters Memorial Park City of Las Vegas, Nevada Tree Placement Analysis



25-0461
11/10/2025



Twin Lakes Neighborhood City of Las Vegas, Nevada Tree Placement Analysis



25-0461
11/10/2025

Downtown South Neighborhood City of Las Vegas, Nevada Tree Placement Analysis

-  Downtown South Boundary
- Tree Size**
-  Large Tree
-  Medium Tree
-  Small Tree

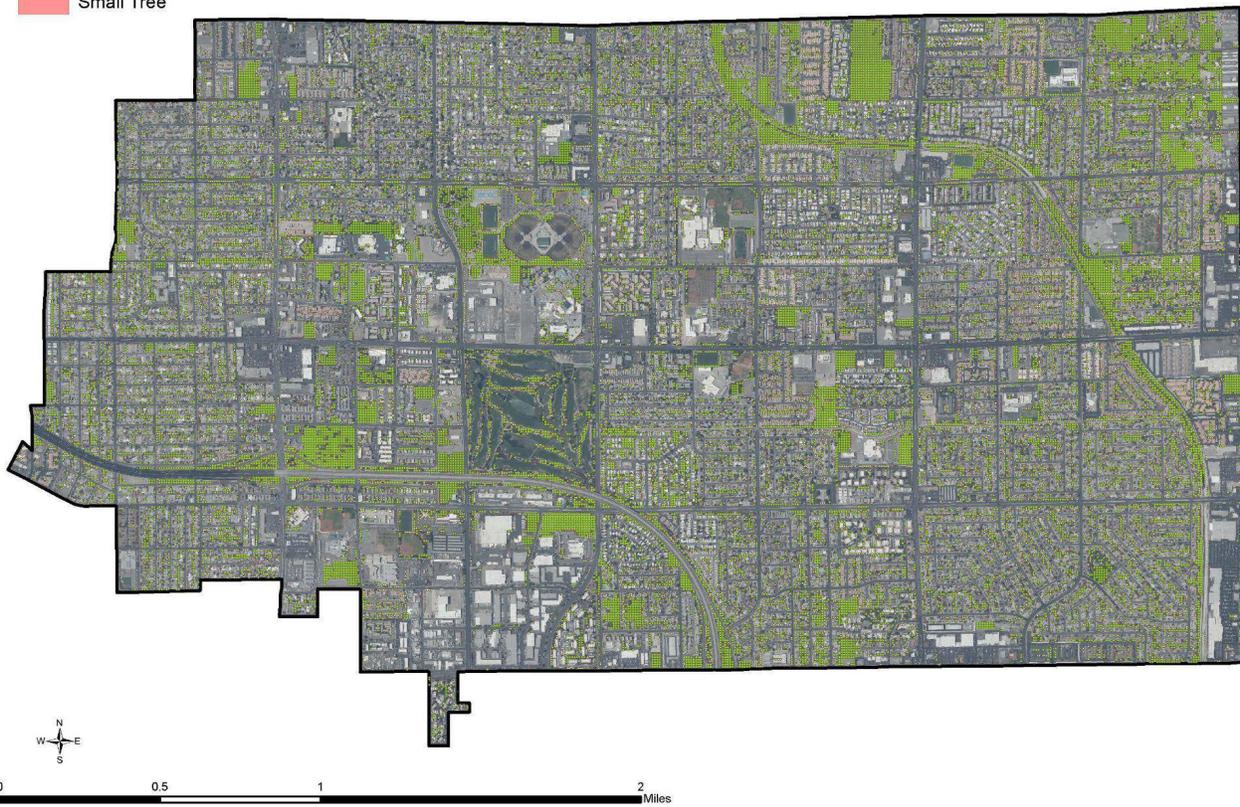


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11/10/2025



- East Las Vegas Boundary
- Tree Size**
 - Large Tree
 - Medium Tree
 - Small Tree

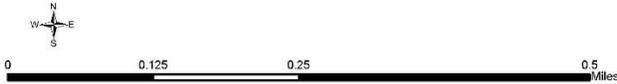
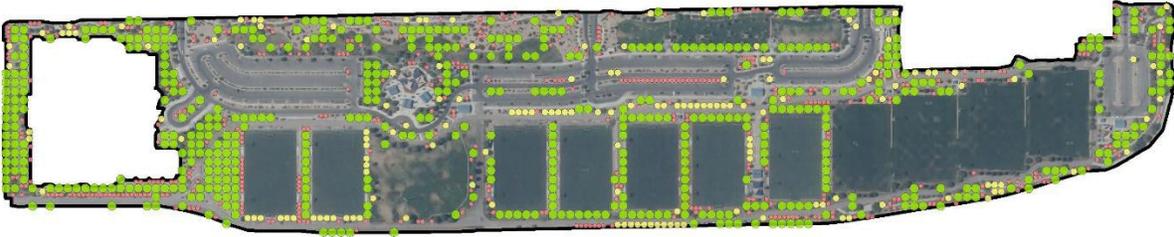
East Las Vegas Neighborhood City of Las Vegas, Nevada Tree Placement Analysis



25-0461
11/10/2025

Kellogg Zaher Sports Complex City of Las Vegas, Nevada Tree Placement Analysis

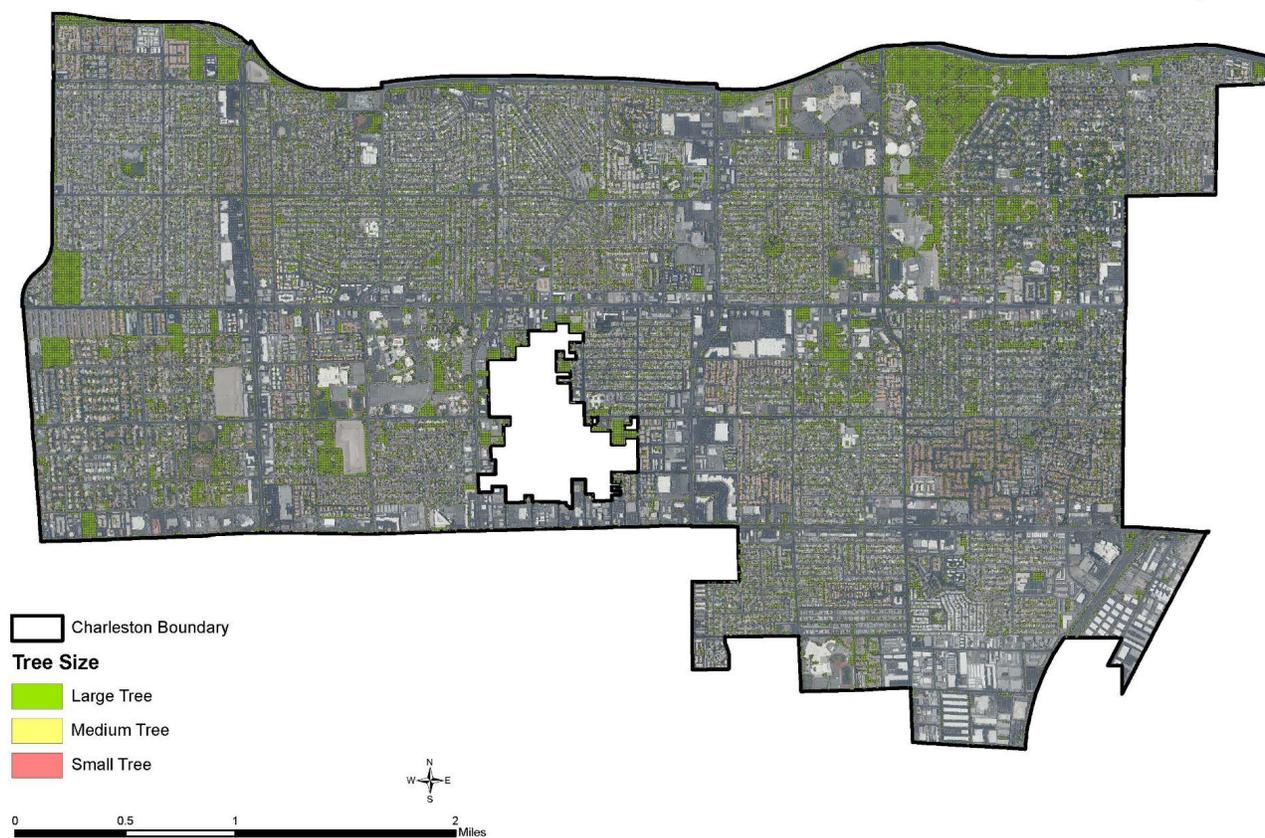
-  Kellogg Zaher Sports Complex Boundary
- Tree Size**
-  Large Tree
-  Medium Tree
-  Small Tree



25-0461
11/10/2025



Charleston Neighborhood City of Las Vegas, Nevada Tree Placement Analysis



25-0461
11/10/2025

LAS VEGAS UTILIZES SMART TREE INVENTORY

As outlined in the “What Do We Have?” chapter, the City of Las Vegas is at the forefront of urban forestry, adopting advanced AI-driven technology to identify potential tree hazards before a risk-assessing arborist ever sets foot on site. This report details how the system flags “outlier” trees — those showing unusual growth patterns or stress signals — that warrant closer inspection by trained professionals.

KEY INSPECTION FINDINGS

Two ISA Certified Arborists conducted a remote view of 8,036 outlier trees. Of those, 1,407 were recommended for field inspection due to significant deviation from expected growth patterns or visible signs of potential structural or physiological concern.

Outlier detection was based on biometric ratios derived from LiDAR data. These “statistical anomalies” identified trees that were growing in ways that departed from species norms – either exceeding expectations or showing signs of decline.

This remote review does not substitute for an on-site tree risk assessment and was never intended to do so. Instead, it serves as an early warning system that flags trees for follow-up inspection, helping cities triage where to send arborists first in the field, ultimately resulting in a more efficient use of resources.

OUTLIER INSPECTION METHODOLOGY

Smart tree analysis uses a machine learning approach to evaluate each tree against six critical morphological relationships:

- Height / Crown Volume
- Height / Leaf Area
- Leaf Area / Crown Volume
- Trunk Diameter / Crown Volume
- Trunk Diameter / Height
- Trunk Diameter / Leaf Area

These ratios are not just mathematical – they reflect real-world insights into how trees grow, adapt, and respond to environmental conditions:

- Height-to-Crown Volume flags trees with vertical growth that exceeds canopy development, often a stress adaptation.
- Leaf Area-to-Crown Volume shows how densely packed a canopy is, which can reveal pest damage, pruning impacts, or optimal performance.
- Trunk Diameter-to-Leaf Area identifies trees where substantial trunk investment is no longer supporting proportional photosynthetic biomass – often the result of topping, dieback, or stress-related canopy loss.

By surfacing trees that fall significantly outside the norm, this approach provides a quantitative basis for identifying declining trees, high performers, and those with potentially unstable structural forms. It also supports evidence-based evaluation of long-term outcomes from past tree care practices.

25-0461
11/10/2025



REMOTE VISUAL INSPECTIONS

Each tree identified as a statistical outlier was subsequently reviewed through a structured remote visual inspection protocol. This phase of assessment was guided by established arboricultural principles and modeled after the International Society of Arboriculture (ISA)'s Level 1 visual tree inspection framework. While not substituting for in-person risk assessments performed by certified arborists, this remote review method enabled trained professionals to conduct preliminary evaluations of tree health and structure using high-resolution, orthorectified imagery.

The objective was to systematically observe and document visible tree characteristics that could support or challenge the biometric anomaly flagged during the LiDAR analysis. For each image, arborists examined:

- Basal flare and trunk taper, to assess stability and root anchorage (when visible)
- Trunk condition, noting any irregularities such as decay, bark loss, cavities, fungal activity, or mechanical injury
- Scaffold branch structure, focusing on form, attachment, and density as measured against seasonal expectations
- Physiological stress indicators, such as apical dieback, defoliation, or the emergence of epicormic sprouts

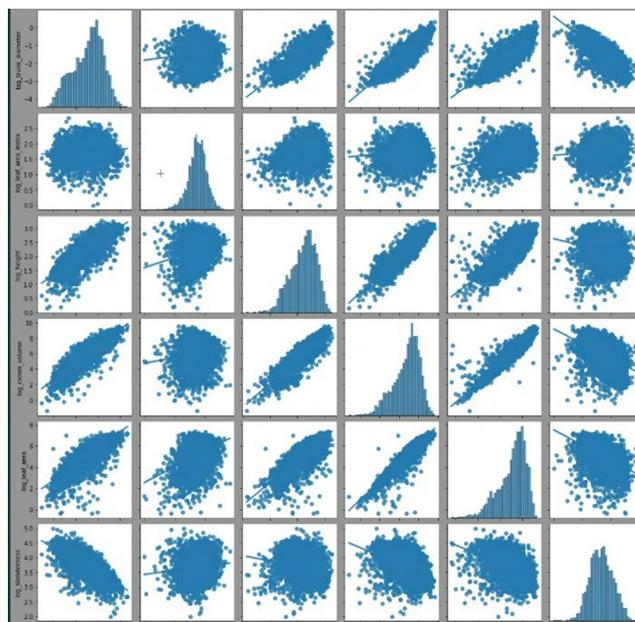
Because the inspection was conducted from a single image vantage point – akin to what one might see during a vehicular or pedestrian survey – it was inherently limited in scope and resolution. The method is not intended to identify internal decay, subsurface defects, or dynamic structural loads, which require in-person or multi-angle examination. Its primary function is to provide a triage tool, evaluating trees for follow-up field inspection based on combined biometric and visual evidence.

Two diagnostic parameters supported this decision-making process:

- Tree Status: A categorical assignment of Alive or Dead, serving as a basic health determination
- Outlier Index (1–6): A relative score indicating the degree to which a tree's growth characteristics deviated from population norms within its species and size class

Trees exhibiting high outlier scores in tandem with observable crown dieback, sparse foliage, asymmetry, or other visual abnormalities were prioritized for physical inspection. This hybrid system enables efficient allocation of field resources, ensuring that certified arborists can concentrate their time and expertise on trees that demonstrate the highest potential for structural instability, health decline, or management

Figure. Log-transformed pair plot of tree metrics with outliers across several dimensions



25-0461
11/10/2025

need.

CASE STUDY SECTION: OUTLIER DETECTION AS A DECISION SUPPORT TOOL

The Smart Tree Inventory system functioned not only as a mapping tool but as a quantitative early-detection mechanism, capable of surfacing complex physiological or structural issues before they escalate into critical failures. The following two case studies illustrate how the integration of biometric data with remote visual analysis can yield actionable insights and support evidence-based urban forest management.

Case Study 1: Velvet Ash (*Fraxinus velutina*)

Biometric Flag: Trunk Diameter to Leaf Area

Remote Biometric Profile

- DBH: 14.16 in
- Tree Height: 31.73 ft
- Crown Width: 24.48 ft
- Crown Volume: 5,827.97 ft³
- Leaf Area (LA): 1,831.56 ft²
- Leaf Area Index (LAI): 5.1

Despite relatively standard structural dimensions, this individual exhibited a leaf area value that fell significantly below expectations for its DBH and crown volume. When visualized alongside peer trees within the dataset, its canopy biomass was markedly underdeveloped, triggering an outlier classification.

Remote imagery supported the biometric findings, revealing:

- Dieback of terminal branches in the upper crown
- Epicormic sprouting along the lower trunk – a typical stress-response often triggered by pressures like root damage, water deficit, or past canopy loss
- Mild crown asymmetry, possibly attributable to prior pruning, phototropic adaptation, or localized resource constraints

Interpretation:

The tree's canopy underperformance may represent a legacy effect from past disturbance (e.g., topping, drought) or a response to chronic stress factors. The presence of regrowth mechanisms suggests potential for stabilization, though ongoing decline remains a possibility

Recommendation:

The tree should be included in the field inspection schedule.

In-person evaluation by a certified arborist can determine whether targeted intervention – such as irrigation, pruning, or soil remediation – could enhance recovery or whether the tree poses an increasing



25-0461
11/10/2025



risk.

Case Study 2: Turkish Pine (*Pinus brutia*)

Biometric Flags:

- Height to Crown Volume
- Height to Leaf Area
- Leaf Area to Crown Volume
- Trunk Diameter to Leaf Area

Remote Biometric Profile

- DBH: 9.32 in
- Height: 27.22 ft
- Crown Width: 11.05 ft
- Crown Volume: 985.52 ft³
- Leaf Area (LA): 354.3 ft²
- Leaf Area Index (LAI): 4.44
- Outlier Index: 4

This conifer exhibited a consistently suppressed growth pattern across multiple biometric ratios. The canopy was not only narrow but insufficiently foliated, particularly for a tree with such vertical extension. The low crown volume relative to height raises questions about the tree's mechanical balance and energy production capacity.

Remote imagery reinforced this analysis, revealing:

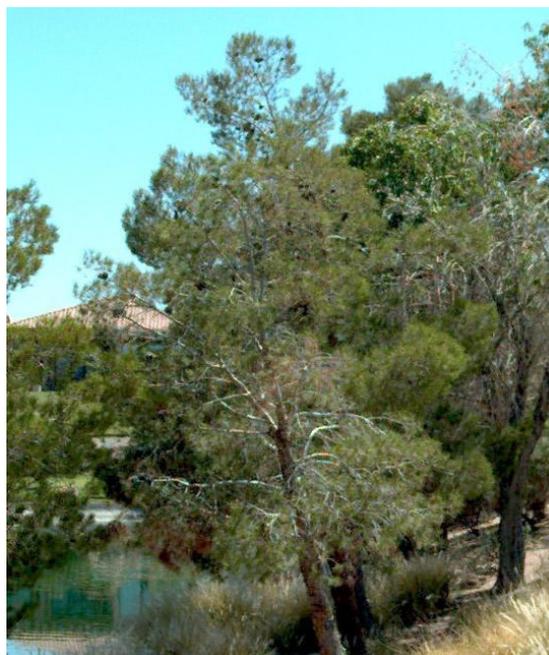
- A sparse canopy with minimal needle density
- Lack of visible seasonal growth or foliar expansion
- No overt structural defects, but a generalized appearance of decline

Interpretation:

The biometric and visual profiles suggest that this individual tree is physiologically underdeveloped, potentially due to environmental limitations such as compacted soils, insufficient water availability, or competition with adjacent vegetation. The upright form indicates no immediate structural instability, but the tree may be experiencing long-term decline.

Recommendation:

The tree should undergo field evaluation to determine if interventions (e.g., soil decompaction, supplemental watering, or root collar excavation) may improve vitality or if it should be considered for successional replacement.



25-0461
11/10/2025

FINAL REFLECTIONS: QUANTITATIVE PATTERNS, QUALITATIVE SIGNALS

Taken together, these case studies underscore the value of integrating quantitative outlier detection with qualitative image review. In the case of the Velvet Ash, the discrepancy between trunk investment and canopy productivity flagged a tree in possible recovery or gradual decline. The Turkish Pine, by contrast, presented an across-the-board underperformance that may reflect chronic environmental suppression. *In both cases, the Smart Tree Inventory system offered visibility into trees that might otherwise appear inconspicuous during routine maintenance patrols.*

Rather than replacing the need for professional fieldwork, this hybrid methodology enhances it – ensuring that certified arborists are deployed where they are most needed, and that data-driven triage supports long-term urban forest resilience.

The lesson is simple: when trees deviate from expected growth patterns, it's worth asking why. That question – backed by smart inventory data and remote visualization – can guide field inspections, prioritize resources, and extend the life and service of trees across Las Vegas.

25-0461
11/10/2025



IMPLICATIONS FOR URBAN FOREST MANAGEMENT

The Las Vegas Urban Forest Management Plan (UFMP) demonstrates a forward-thinking model for modern urban forest stewardship – one that effectively combines remote sensing precision with certified arboricultural expertise.

Key outcomes of the Smart Tree initiative within this plan include:

- Assessment of 32,040 tree sites, generating a baseline digital twin for each individual tree
- Early detection of 1,407 trees recommended for physical field inspection based on biometric anomalies or visual signs of stress
- Integration with TreeKeeper®, providing city staff with real-time access to data, customizable reports, and long-term maintenance planning tools
- Commitment to longitudinal monitoring, with a follow-up LiDAR scan scheduled two years post-inventory to track changes over time

This dual-tiered approach enables the City of Las Vegas to move beyond reactive, complaint-driven tree care into a strategic, data-informed management framework. Each recurring inventory builds upon the last, creating an objective feedback loop that allows the City to continually assess its processes, validate past decisions, and adjust future practices based on measurable outcomes.

Better Data → Better Decisions → Better Results

A continuous cycle that keeps the City informed, adaptive, and ahead of challenges.

Through this iterative cycle, resources can be triaged more effectively, safety risks reduced, and canopy growth enhanced across neighborhoods.

As urban challenges intensify with climate stress, development pressures, and expanding infrastructure, the successful implementation of Smart Tree Inventory technology through the Las Vegas UFMP offers a scalable, science-based model for other municipalities. It is a blueprint for how healthy trees, informed decisions, and resilient communities can thrive together – today and into the future.

25-0461
11/10/2025

INDICATORS OF A SUSTAINABLE URBAN FOREST

The development of the UFMP included an evaluation of industry-defined sustainability indicators to assess current conditions in the urban forest resource, programming, and engagement (as defined by Clark et al. 1997 and Kenney et al. 2011). The sustainability indicators can be used to understand what areas of the program can be improved to meet industry recommendations.

The indicators are broken up into three categories including:

- (1) The Trees,**
- (2) The Players, and**
- (3) The Management Approach.**

Las Vegas's assessed level of performance and rationale for selecting that level for each category are included in the following tables.



THE TREES

The Trees performance indicators analyze how Las Vegas is doing in relation to City-owned trees and urban tree canopy. In this category, Las Vegas is performing at a low to moderate level with 57% of indicators rated as low, 36% rated as moderate, and 7% rated as high.

TABLE. ASSESSED LEVEL AND RATIONALE FOR THE TREES INDICATORS.

INDICATORS OF A SUSTAINABLE URBAN FOREST		Assessed Performance Level		
		Low	Mod	High
THE TREES	Urban Tree Canopy Data	1		
	Equitable Distribution	1		
	Size/Age Distribution		0.5	0.5
	Condition of Public Trees (Streets, Parks) Data		1	
	Trees on Private Property Data	1		
	Species Diversity	1		
	Suitability		1	
THE PLAYERS	Neighborhood Action		1	
	Large Private & Institutional Landholder Involvement	1		
	Green Industry Involvement	1		
	City Department/Agency Cooperation		0.5	0.5
	Funder Engagement	0.5	0.5	
	Utility Engagement	0.5	0.5	
	Developer Engagement		1	
	Public Awareness		1	
	Regional Collaboration	1		
THE MANAGEMENT APPROACH	Tree Inventory		1	
	Canopy Assessment			1
	Management Plan	1		
	Risk Management Program	0.5	0.5	
	Maintenance of Publicly-Owned Trees (ROWS)	1		
	Maintenance of Publicly-Owned Trees (Natural Areas)	1		
	Planting Program		0.5	0.5
	Tree Protection Policy	0.5	0.5	
	City Staffing and Equipment		1	
	Funding	0.5	0.5	
	Disaster Preparedness & Response	1		
	Resilience		1	
	Communications		1	
	TOTAL	13.5	12	2.5

25-0461
11/10/2025



THE PLAYERS

The Players performance indicators analyze how Las Vegas is doing in relation to stakeholders, community members and department cooperation. In this category, Las Vegas is performing at a low to moderate level with 50% of indicators rated as low, 44% rated as moderate, and 6% rated as high.

TABLE. ASSESSED LEVEL AND RATIONALE FOR THE PLAYERS INDICATORS.

INDICATORS OF A SUSTAINABLE URBAN FOREST		Assessed Performance Level		
		Low	Mod	High
THE TREES	Urban Tree Canopy Data	1		
	Equitable Distribution	1		
	Size/Age Distribution		0.5	0.5
	Condition of Public Trees (Streets, Parks) Data		1	
	Trees on Private Property Data	1		
	Species Diversity	1		
	Suitability		1	
THE PLAYERS	Neighborhood Action		1	
	Large Private & Institutional Landholder Involvement	1		
	Green Industry Involvement	1		
	City Department/Agency Cooperation		0.5	0.5
	Funder Engagement	0.5	0.5	
	Utility Engagement	0.5	0.5	
	Developer Engagement		1	
	Public Awareness		1	
	Regional Collaboration	1		
THE MANAGEMENT APPROACH	Tree Inventory		1	
	Canopy Assessment			1
	Management Plan	1		
	Risk Management Program	0.5	0.5	
	Maintenance of Publicly-Owned Trees (ROWS)	1		
	Maintenance of Publicly-Owned Trees (Natural Areas)	1		
	Planting Program		0.5	0.5
	Tree Protection Policy	0.5	0.5	
	City Staffing and Equipment		1	
	Funding	0.5	0.5	
	Disaster Preparedness & Response	1		
	Resilience		1	
	Communications		1	
	TOTAL	13.5	12	2.5

25-0461
11/10/2025



THE MANAGEMENT

The Management performance indicators analyze how Las Vegas is doing in relation to the City’s management of the urban forest. In this category, Las Vegas is performing at a moderate to low level with 42% of indicators rated as low, 46% rated as moderate, and 12% rated as high.

TABLE. ASSESSED LEVEL AND RATIONALE FOR THE MANAGEMENT INDICATORS.

INDICATORS OF A SUSTAINABLE URBAN FOREST		Assessed Performance Level		
		Low	Mod	High
THE TREES	Urban Tree Canopy Data	1		
	Equitable Distribution	1		
	Size/Age Distribution		0.5	0.5
	Condition of Public Trees (Streets, Parks) Data		1	
	Trees on Private Property Data	1		
	Species Diversity	1		
	Suitability		1	
THE PLAYERS	Neighborhood Action		1	
	Large Private & Institutional Landholder Involvement	1		
	Green Industry Involvement	1		
	City Department/Agency Cooperation		0.5	0.5
	Funder Engagement	0.5	0.5	
	Utility Engagement	0.5	0.5	
	Developer Engagement		1	
	Public Awareness		1	
	Regional Collaboration	1		
THE MANAGEMENT APPROACH	Tree Inventory		1	
	Canopy Assessment			1
	Management Plan	1		
	Risk Management Program	0.5	0.5	
	Maintenance of Publicly-Owned Trees (ROWS)	1		
	Maintenance of Publicly-Owned Trees (Natural Areas)	1		
	Planting Program		0.5	0.5
	Tree Protection Policy	0.5	0.5	
	City Staffing and Equipment		1	
	Funding	0.5	0.5	
	Disaster Preparedness & Response	1		
	Resilience		1	
	Communications		1	
TOTAL	13.5	12	2.5	

25-0461
11/10/2025



LAS VEGAS UFMP WEBPAGE CONTENT OUTLINE

The following is a template that the City can adopt and use to create an Urban Forestry landing page within the City's website:

1. WELCOME AND INTRODUCTION

City of Las Vegas Urban Forestry Management Plan 2050

Introduce the UFMP as the City's strategic framework for growing, preserving, and managing trees and green spaces. Emphasize its alignment with the City of Las Vegas 2050 Master Plan, particularly the goals for environmental sustainability, public health, and climate resilience.

2. WHY ARE TREES IMPORTANT?

Feature an infographic or visual that conveys the multiple benefits of trees:

- **Enhance Neighborhood Aesthetics:** Improve quality of life by greening communities.
- **Cooling Effect:** A single mature tree provides cooling equivalent to 10 air conditioners running for 20 hours per day.
- **Air Quality:** Trees capture carbon dioxide and reduce particulates by up to 60% on tree-lined streets.
- **Health and Well-Being:** Shade, cleaner air, and attractive green spaces reduce risks of skin cancer, asthma, and stress-related illnesses.

3. HOW YOU CAN ENGAGE

a. Share Your Voice

Provide a direct link to the Urban Forestry Survey, encouraging residents to:

- Influence future greening decisions.
- Identify neighborhoods that need canopy expansion.
- Support biodiversity and community health.

Target audiences: residents, property owners, renters, and business owners.

b. Plant Trees – 60,000 Trees by 2050

- Step-by-step guide for tree planting.
- Tree Selection Tool to match species to site conditions.
- Direct access to the City's Preferred Tree Species List.
- Interactive Priority Planting Maps to show where canopy growth is most needed.
- Option to link future City tree planting services if available.

c. Care for Your Trees

- Watering Schedule with tips for irrigation methods (berms, slow drip, timed systems).
- Guidance on pruning practices, with links to Tree Planting and Management BMPs.

4. TRACK OUR PROGRESS

Provide residents with tools to stay connected to the City's canopy goals:

- Embed or link to TreeKeeper, allowing the public to monitor progress toward the 60,000-tree planting goal.
- Include interactive maps showing phased planting efforts.

25-0461
11/10/2025



5. STAY CONNECTED WITH YOUR URBAN FOREST

Create a communications hub:

- Email sign-up for updates.
- Social media links for quick engagement.
- Calendar of events (tree plantings, pruning workshops, community forestry days).
- Photos and videos showcasing City forestry operations and events.

6. LEARN MORE

Offer resources for ongoing education:

- Downloadable two-pagers and fact sheets.
- Links to partner organizations, forestry best practices, and additional learning opportunities.

BENEFITS OF THE WEBPAGE

- Enhances public transparency around the UFMP and City canopy goals.
- Creates a two-way communication platform with residents.
- Encourages tree planting and proper care, expanding canopy more effectively.
- Builds stronger community identity, pride, and resilience around the urban forest.
- Aligns with best practices in municipal forestry outreach and digital engagement.

RECOMMENDATION SUMMARY

We recommend the City of Las Vegas adopt this webpage structure as part of its UFMP implementation. This online platform will strengthen community involvement, improve education on tree benefits and care, and provide a transparent way for residents to track the City's progress toward its 2050 urban forestry goals.

25-0461
11/10/2025

INFORMATIONAL GRAPHIC CONTENT

The following content can be used to create information graphics that will help raise public awareness of the tree benefits currently being provided to Las Vegas residents.

Jess - format this into grid style layout - like each section of content has its own borders

Here is an example using the provided Land Cover and Tree Canopy Data:

CONTENT FOR GRAPHIC DESIGN

Land Cover

- Las Vegas encompasses 142 square miles (90,885 acres). The following information characterizes land cover in Las Vegas:
- 6.1% (5,542 acres) tree canopy, including trees and woody shrubs
- 46.2% (42,015 acres) impervious surfaces, including roads, parking lots, and structures
- 21,671 acres of potential planting in the city's urbanized area on land categorized as irrigated/green vegetation and dry land
- 551 acres of tree canopy on public property, an average canopy cover of 3.3%
- 4,949 acres of tree canopy on private property with an average canopy cover of 6.7%
- 123.3 acres of tree canopy is in parks for an average canopy cover of 6.9%
- Canopy cover is highest in Ward 2 (9.2%) and lowest in Ward 6 (3.4%)
- The 206 census tracts vary in tree canopy from <1% to 22.4% cover
- 6,403 acres of tree canopy in Las Vegas's 16 neighborhoods with an average canopy cover of 6.4%
- To date, the urban forest is storing 187,360 tons of carbon in woody and foliar biomass, valued at nearly \$32 million
- Overall canopy cover has decreased 17.0%, from 6,674 acres in 2016 to 5,542 acres in 2022
- The larger Las Vegas Area encompasses 201,370 acres and has 6.9% canopy cover
- Land surface temperatures are highest in southeast Las Vegas

Environmental Benefits

Did you know that the City of Las Vegas Trees provide around \$2.1 million in environmental benefits each year?

- 207 ton of Pollutants REMOVED
- 40,810,000 gallons of Stormwater runoff reduced
- 5,050 tons of CO2 sequestered

Tree Canopy Goal

Did you know:

- City of Las Vegas covers 90,885 acres (142 square miles)
- The current tree canopy cover is 6.1% (5,542 acres)
- There is a 2050 Master Plan to reach 25% canopy cover

Did you know:

- The City of Las Vegas has created a tree planting plan to address key concerns:
 - Reduce heat island effects
 - Reduce stormwater runoff
 - Establish connectivity to green spaces
 - Prevent erosion and soil degradation
 - Improve social/canopy equity

25-0461
11/10/2025



Benefits of Las Vegas Tree Canopy

Trees Clean The Air!

- Reducing particulate matter (dust)
- Absorbing gaseous pollutants
- Providing shade and transpiration
- Reducing power plant emissions
- Increasing oxygen levels

TABLE. AIR POLLUTION BENEFITS

Air Quality	Value (\$)	% of Total Benefit
O ₃	459,691	50.64
PM ₁₀	287,721	31.70
PM _{2.5}	143,696	15.83
NO ₂	10,687	1.18
CO	5,135	0.57
SO ₂	760	0.08
Total	\$907,690	100%

Carbon Sequestration

- City of Las Vegas urban forest Trees are storing 187,360 tons of carbon in woody biomass (*that's \$32 Million Dollars in value!*)
 - Per year, 5,050 tons of carbon worth \$860,725 are added to the storage!

Trees Make Life Better...

- Beautification, comfort, and aesthetics
- Shade and privacy
- Wildlife habitat and ecosystem health
- Opportunities for recreation
- Increases in tourism and revenue
- Property value increases
- Creation of a sense of place and history
- Human health and well being

Las Vegas Owns Trees!

Percentage of Total Tree Canopy on

- Public Property = 10%
- Private Property = 90% *That's you!*

Tree Canopy by Parks

- Las Vegas has 87 parks that cover a total of 1,797 acres
- Las Vegas park tree canopy include 123.3 acres at 6.9%
- The park with the most trees = Children's Memorial Park! 19.3% tree canopy cover
- Runner up is Lorenzi Park at 14.6% tree canopy cover
- Las Vegas parks have cooler surface temperatures than surrounding communities due to higher tree populations
- There is plenty of room to grow more trees! 27.3% of the overall land cover in parks is irrigated/green low-lying vegetation that can be utilized for tree planting projects

Trees Are Cool

Did you know: Trees cool areas of Las Vegas by as much as 30

Average Las Vegas Land Surface Temperatures range from 84.1 to 118.9

25-0461
11/10/2025



CITY OF LAS VEGAS TREE ORDINANCE DRAFT

proposed draft language subject to amendment for final consideration by Planning Commission and City Council.

- 1.1 STATEMENT OF PURPOSE**
- 1.2 DEFINITION**
- 1.3 SPECIAL REVENUE FUND**
- 1.4 GENERAL OVERVIEW**
- 1.5 URBAN FORESTRY MANAGEMENT PLAN**
- 1.6 TREE PLANTING**
- 1.7 TREE PROTECTION**
- 1.8 PROHIBITED ACTIVITIES**
- 1.9 HERITAGE TREE PROGRAM**
- 1.10 TREE REMOVAL, RETENTION AND REPLACEMENT – Public trees**
- 1.11 TREE CARE LICENSING REQUIREMENT**
- 1.12 NUISANCE TREES – Private trees**
- 1.13 INVASIVE SPECIES CONTROL**
- 1.14 LAS VEGAS URBAN FORESTRY BOARD**
- 1.15 TREE PERMIT PROCEDURE**
- 1.16 PERMIT ISSUANCE**
- 1.17 CASH BONDS**
- 1.18 FINAL INSPECTION**
- 1.19 COMPLIANCE**
- 1.20 PENALTY**
- 1.21 CIVIL REMEDIES**

1.1 STATEMENT OF PURPOSE

This Section of the Code is designed to preserve, protect and enhance critical infrastructure – the urban forest that is located on public property. The complete urban forest is comprised of trees across all land uses and ownership. This Section will regulate trees on public property but recognizes that trees on private property are part of the urban forest.

The purpose of this Section is to recognize the services and functions that trees provide as a collective asset to the entire community and to state the goals of the City of Las Vegas with respect to the protection, preservation, care and planting of trees on public property.

This Section of the Code also supports the City of Las Vegas 2050 Master Plan’s applicable goals, outcomes, and key actions, including from:

- A. Chapter 2: Urban Forestry
 - a. Plant and maintain 60,000 diverse and high quality native and adaptive trees on public and private property by 2050
 - b. The City’s tree canopy increases to 20% by 2035 and 25% by 2050 utilizing native and adaptive drought tolerant tree species.
- B. Chapter 2: Environmental Justice
- C. Chapter 4: Complete Streets
- D. Chapter 4: Hazards (Climate-Extreme Heat)

Specific goals of this section are to:

25-0461
11/10/2025



- A. Protect, preserve and enhance the quality of life and general welfare of the City of Las Vegas, its residents, and property owners; and conserve and enhance the City of Las Vegas's natural, physical and aesthetic environment.
- B. Preserve, protect and enhance the urban forest to ensure that trees are properly planted and maintained within the City of Las Vegas so that trees can protect, enhance and preserve the quality of life for people within the City of Las Vegas.
- C. Recognize that trees are an integral part of the infrastructure of the City of Las Vegas and as such should be preserved, protected and cared for as other critical City of Las Vegas infrastructure.
 - a. Trees absorb pollution from the air;
 - b. Trees absorb and sequester carbon dioxide;
 - c. Trees absorb and filter pollution from storm water run-off;
 - d. Trees produce oxygen;
 - e. Trees reduce flooding;
 - f. Trees stabilize soils and reduce erosion;
 - g. Trees cool the surrounding area helping to reduce impacts due to heat islands;
 - h. Trees reduce energy consumption by shielding structures from harsh winds and sun;
 - i. Trees provide a buffer and screen against noise, light and pollution;
 - j. Trees improve property values;
 - k. Trees improve commercial district buyer traffic;
 - l. Areas with trees have lower crime rates;
 - m. Areas with trees have higher levels of community interaction;
 - n. Trees provide important habitat for birds and other wildlife; and
 - o. Trees protect and enhance our quality of life.
- A. Trees provide the City of Las Vegas collective benefits that extend beyond property boundaries throughout the entire City of Las Vegas.
- B. Recognize that larger trees provide larger benefits. When a large tree is removed and replaced with a smaller tree the benefits and services are reduced.
- C. Recognize that some trees may have a condition that constitutes a threat, danger or nuisance to the public or property within the City of Las Vegas or may be dangerous to the health of other trees and vegetation in the City of Las Vegas.

1.2 DEFINITIONS

APPLICANT An owner of a lot, parcel or tract of land for which an application has been filed for a permit, subdivision, or any activity requiring the issuance of a permit.

ARBORIST Any individual experienced in the profession of forestry or a related field and is licensed or certified in forestry by an accredited forestry industry body, e.g. International Society of Arboriculture.

ASCA American Society of Consulting Arborist

BCMA Board Certified Master Arborist. An individual who has attained the BCMA credential from the International Society of Arboriculture.

BUILDING ACTIVITY AREA The portion of a property within which development activity, including grading, excavation, storage of materials, construction access and construction of both main buildings and unattached structures.

CANOPY The upper portion of a tree sometimes called the crown. This section of the tree usually contains branches and leaves.

25-0461
11/10/2025

CONSERVANCY OR PRESERVATION AREA (EASEMENT) An area under legal restriction within which the following requirements are enforced:

1. All existing vegetation shall be preserved for the purpose of retaining the natural character or special environmental state or control;
2. Any area with a special designation providing screening from adjacent uses or a public or private street;
3. No plant material shall be removed from or planted in a Conservancy or Preservation Area without a permit from the City of Las Vegas authorizing removal or planting;
4. Conservancy or Preservation Areas may be established as part of the subdivision process or recorded through a separate instrument pursuant to NRS 111.390-111.440;
5. Structures are prohibited within the Conservancy or Preservation Area;
6. Other restrictions as defined on the map; and
7. In all instances the approved language on the map shall prevail.

CRITICAL ROOT ZONE An area on the ground extending out from the trunk of the tree in all directions a distance of at least one foot for every inch Diameter at Breast Height (DBH)

CUTTING

1. Felling or removal of a tree, or any procedure that results in the death or substantial destruction of a tree.
2. Cutting does not include normal pruning or trimming of trees consistent with good forestry practices.

DAMAGE Impact or loss of function to any tree including but not limited to: removal, root compaction, root removal, girdling, soil contamination, topping, improper pruning, canopy removal, bark removal, poisoning and/or actions resulting in the decline or death of a tree.

DECIDUOUS TREE A deciduous tree is one that loses most or all of its leaves for part of the year.

DEVELOPMENT Any proposed change in the use or character of land, including, but not limited to the replacement of any structure or site improvements, e.g. irrigation installation, driveway replacement, installation of a retaining wall among others. When appropriate to the context, development may refer to the receipt or necessity of any building, tree or site work permit. (See the Landscape Ordinance for more information.)

DIAMETER AT BREAST HEIGHT The diameter of the trunk of the tree measured in inches at a point 4.5 feet above ground line. This forestry standard measurement is used for established and mature trees and is referred to as “DBH”. All reference to diameter size shall be to the DBH.

EASEMENT A nonpossessory property interest that allows the holder of the easement to have a right of way or use property that they do not own or possess.

EVERGREEN TREE A tree that retains most of its leaves for most of the year.

HERITAGE TREE A Heritage Tree is a tree identified on the preferred species list and which has been recorded as such by the City of Las Vegas. Heritage Trees are provided special protection and recognition as outlined in the Heritage Tree Program.

INFRASTRUCTURE The basic underlying framework or features that provide collective services, including but not limited to roads, utilities, drainage facilities and trees.

INVASIVE SPECIES An introduced or exotic species that significantly modifies or disrupts the ecosystem in which it colonizes (e.g. salt cedar).

INVASIVE SPECIES LIST A list of Invasive Species and woody noxious weeds.

ISA International Society of Arboriculture

25-0461
11/10/2025



LANDSCAPE CONTRACTOR A company or individual contracted to perform landscape services.

LANDSCAPE PLAN A plan approved by the City of Las Vegas defining the location and species of plants and associated hardscape including grading.

LANDSCAPE MANAGEMENT PLAN A plan approved by the City of Las Vegas outlining the strategies for care and management of a specific type of landscape.

LANDSCAPING PROFESSIONAL A registered landscape architect, horticulturalist or other similarly degreed, experienced and/or licensed plant professional.

NUISANCE TREES Nuisance trees are trees that may provide potential impacts to other trees, people or structures. This would include, but not be limited to, diseased, infested, structurally unsound trees or known invasive species.

PARCEL A single parcel shall mean any lot of record or zoning lot serving a principal structure or use.

PREFERRED TREE LIST A listing of tree species, located in the City of Las Vegas Urban Forest Management Plan.

PRIVATE TREE A tree planted within the property line of privately owned land or property.

PROPERTY OWNER An individual or organization who owns property located within the corporate limits of the City of Las Vegas.

PUBLIC TREE A tree planted within the property line of publicly owned land or property.

REAR YARD Rear yard as used in this Section, shall have the same meaning as ascribed to in the Zoning Code.

REGULATED ARTICLES Any insects at any living stage of development, any quarantined materials such as wood products including, but not limited to chips, limbs, lumber, firewood, contaminated soils, or any other product or means of conveyance which may be determined by Federal or State departments of agriculture to pose a risk of spread of any infestation or infection.

SIGNIFICANT TREE REMOVAL Removal of a tree greater than 10" DBH or grouping/stand of trees.

SIMPLE TREE REMOVAL Removal of a tree without other associated site impacts or other site improvements.

SITE That parcel of land for which a permit for landscaping or tree removal is sought.

STREET TREE Any tree located on or within the public right-of-way easement.

TRANSPLANTING The removal of any tree for replanting elsewhere.

TRAQ Tree Risk Assessment Qualification. A course of study through the ISA which qualifies an arborist to make determinations related to tree risk.

TREE Any self-supporting woody plant, together with its root system, trunk and canopy; growing upon the earth usually with one trunk, or a multi-stemmed trunk system, supporting a definitely formed crown.

TREE MANAGER The tree owner, property manager or controlling authority who has the responsibility for duty of care.

TREE PERMIT A written authorization from the City of Las Vegas authorizing the applicant to conduct work which may or may not impact a tree.

TREE PRESERVATION PLAN A document required by a permit which identifies, by common name and/or scientific name, certain species of trees of a specified DBH within a particular area. The plan shall list all existing and proposed trees and shall specifically state how each tree is proposed to be destroyed, relocated, replaced, preserved at its present location, introduced into the site from an off-site source, and whether the tree is to receive remediated actions due to construction impacts, e.g. root pruning. The City of Las Vegas may provide that the tree preservation plan excludes those portions of the site which it determines will not be affected by the activity. Any tree preservation plan required by this Section must be dated within thirty-six months of the start date of the proposed activity.

25-0461
11/10/2025

TREE REMOVAL The cutting down, destruction, removal or relocation of any tree, including damaging by poison or other direct or indirect action.

URBAN FORESTER An individual trained and experienced in the profession of forestry who has a forestry degree from an institution of advanced education and/or at least five years' experience in planting and maintaining trees in urban settings and their associated natural ecosystems.

URBAN FORESTRY MANAGEMENT PLAN A detailed plan developed and approved by the City of Las Vegas consistent with the goals of the City of Las Vegas 2050 Master Plan under the direction of a certified arborist or forester which outlines thoughtful strategies for tree planting, species selection, protection, care and preservation of existing trees and meeting of canopy coverage goals for the City of Las Vegas and complies with recognized national standards.

URBAN FORESTRY SPECIAL REVENUE FUND An account of the City budget established pursuant to LVMC Title 4 to receive and hold funds. Funds may be used for projects or activities related to trees throughout the City of Las Vegas.

VIABLE A tree, which in the judgment of the City of Las Vegas, is capable of sustaining its own life processes for a reasonable period of time.

1.3 URBAN FORESTRY SPECIAL REVENUE FUND

The City Council may create, by resolution, a special revenue fund known as the "Urban Forestry Special Revenue Fund" For such Fund, the City Council may authorize:

- A. Revenue or transfers from City's General Fund, bond proceeds, interest, program fees, grants, rebates, fines or donations.
- B. The expenditure of revenues to:
 - (1). Plant public trees;
 - (2). Provide grants for the provision of trees on private property;
 - (3). Maintaining public trees;
 - (4). Outreach, engagement, and events related to trees;
 - (5). Activities relating to the creation and management of the City of Las Vegas tree canopy;
 - (6). The inclusion of subject matter experts on the Urban Forestry Board

1.4 GENERAL OVERVIEW

- A. The City of Las Vegas shall have at least two internal staff who are certified arborists or shall contract with a Board Certified Master Arborist to provide direction and oversight of urban forestry practices within the City of Las Vegas for the proper care and management of the urban forest.
- B. The City of Las Vegas shall have an urban forest inventory of trees on public property. This inventory shall be maintained in a current state by the City of Las Vegas. Re-inventory may be required every 5 years unless the inventory is updated with the pruning cycle or is updated as part of routine tree maintenance.
- C. The City of Las Vegas shall set a goal and timeline to develop and implement an Urban Forestry Management Plan based on an urban forest inventory. This plan shall include clear direction for the protection, preservation and planting of the urban forest and shall be based on the U.S. Forest Service Sustainable Urban Forest Guide.
- D. The City of Las Vegas shall require that any Contractor, working for the City of Las Vegas who may interact with or affect the urban forest utilize a certified arborist for all work pertaining to trees, including but not limited to removal, pruning and planting activities.
- E. All tree planting, selection and management shall be in compliance with the City of Las Vegas Urban Forestry Management Plan and Title 19.
- F. Diverse species of urban trees throughout the City of Las Vegas are critical to the health of the forest structure and protects the City of Las Vegas from catastrophic loss. All tree planting shall contribute to the desired diversity goal of not more than 5% of any one species, 10% of any one genus or 15% of any one family in the inventory of public trees. Species selections shall be made with consideration of the species composition of the City of Las Vegas as reported in the most recent tree inventory and not the

250461
10/23/25



composition of one project.

- G. Diverse age structure of trees throughout the City of Las Vegas is critical to the health of the forest structure and protects the City of Las Vegas from catastrophic loss. Proper care and management and continuous planting of the urban forest is critical for increased longevity of urban trees and shall be in compliance with the most recent edition of American National Standards Institute.
- H. Larger trees provide environmental and social benefits many times those of smaller trees. The City of Las Vegas will protect and preserve trees of all size with the expressed intention of growing and maintaining large trees throughout its public lands.

1.5 URBAN FORESTRY MANAGEMENT PLAN

An urban forestry management plan is the guiding document for the care, management and preservation of the trees that constitute the urban forest. This plan will define the needs and provide recommendations for the management, preservation and planting of trees throughout the community, including outreach to private property owners to help them care for their trees. This plan will also outline the budgetary and staffing needs for management and planting of trees on public property. It is recommended that the Sustainable Urban Forest Guide, produced by the U.S. Forest Service, serve as a guide for development of the City of Las Vegas urban forestry management plan, while maintaining consistency with the City of Las Vegas 2050 Master Plan and other duly-adopted city plans, policies and standards.

- A. The City of Las Vegas shall develop an Urban Forest Management Plan that supports this ordinance. This urban forest management plan shall cover, at a minimum, a five year (preferably ten year) period, including budget projections. This plan shall be reviewed annually by the City of Las Vegas staff and members of the Urban Forestry Board and shall be updated as needed to support the needs of the City of Las Vegas.
- B. Until an urban forestry management plan is in place, the City of Las Vegas shall provide a standard of care, in compliance with International Society of Arboriculture practices, for all publicly owned trees to enable these trees to live to maturity and provide maximum benefits. This would include but not be limited to:
 1. Provide the minimum soil volume required by species as stated in the Preferred Tree List. Have an established watering program to meet the needs of newly planted, adolescent and mature trees. Water needs change as trees establish and mature. The provision of water resources and soil volume shall be based on the stated mature size of a species.
 2. Create a systematic pruning program that places all publicly owned trees on a 5 year pruning cycle. Pruning is to be accomplished under the direction of a certified arborist and in compliance with American National Standards Institute. Care should be taken to follow best management practices including but not limited to good sanitation practices to reduce spread of infectious conditions and restriction of pruning based on specific needs. Pruning objectives shall be based on the instructional guide: Gilman, Edward, et al. *Structural Pruning – A Guide for the Green Industry*. Urban Tree Foundation, 2013.
 3. During the pruning cycle, data on trees to be pruned shall be updated or collected in the tree inventory software. Such data includes: species, canopy size, DBH and location, health rating, hazard potential and tree care activities performed. This information will be used as a guide for City of Las Vegas staff to identify and address potential problems and provide reasonable care as needed.

1.6 TREE PLANTING

This Section applies to all trees planted within the City of Las Vegas.

- A. Trees planted shall be provided no less than the minimum soil volume as prescribed by the Preferred Species List in order to maximize tree growth and survival rates. New projects that place trees in tree wells, paved or hardscape situations (i.e parking lots) with limited exposed soil surface shall employ soil volume strategies (i.e engineered soil mix, soil cells) beneath the surrounding hardscape to meet the soil volume requirements. Porous pavement options are encouraged surrounding these trees.

25-0461
11/10/2025

- B. Plantings within the City of Las Vegas shall be of diverse species composition as dictated in Appendix A. Diverse species composition protects the citizens of the City of Las Vegas from catastrophic loss. Trees shall be selected from the Preferred Species List.
- C. All trees planted shall be planted consistently with the most current edition of American National Standards Institute.
- D. Trees planted in the public right-of-way shall be of symmetrical growth, single stemmed and free of insect pests and disease. Trees shall measure two (2) to two and one-half (2½) inches caliber measured six (6) inches above grade, shall have a root ball to the approved Nursery Standards for the size of the tree with visible root flare. The City of Las Vegas may modify the size requirements of trees upon presentation of unique and particular circumstances.
- E. Trees planted shall be of a quality consistent with the most current American Standards for Nursery Stock as approved by the most current American National Standards Institute or the most current edition of Florida Grades and Standards for Nursery Plants regarding canopy composition, trunk caliper and root structure.
- F. It shall be unlawful to plant any tree or shrub in the public right-of-way, or on other publicly owned property or Conservation or Preservation Area, without prior written approval from the City of Las Vegas.
- G. It shall be unlawful to plant any tree under utility wires that is anticipated to grow to a height within 10' of the wires.
- H. An underground utility location is required prior to planting.

1.7 TREE PROTECTION

This Section applies to any work being conducted that may affect public property trees.

- A. Unless otherwise authorized by this Section, it shall be unlawful for any person to remove, injure or undertake any procedure on any public property tree. This includes, but is not limited to pruning, cutting or spraying a tree; excavating, trenching, tunneling or boring within the drip-line of any tree; attaching rope, cable, wire or other fixtures to any tree, tree guard or support.
- B. In the event of any site improvement on a site which contains public property trees, a Tree Preservation Plan is required, must be approved, and implemented prior to the start of any work or delivery of any materials to the Building Activity Area. The approved Tree Preservation Plan shall be available on the site throughout the entire construction period until final approvals for all site work are received in writing.
- C. A pre-construction inventory assessment shall be conducted by a BCMA or an ASCA registered consulting arborist of all trees located on or adjacent to the proposed site. The assessment shall document, but not be limited to the following attributes: DBH, canopy dimension, defects, existing damage and relative health prior to the beginning of construction activities.
- D. In instances where construction or site work requires heavy equipment that may impact trees on public property, all appropriate tree protection measures must be taken and identified in the Tree Preservation Plan.
 - 1. Protective fencing is required for protection of any tree to be preserved in place. Fencing shall be installed at a minimum distance of one-foot of radius, for every inch DBH of the tree, from the trunk of the tree. In all cases, protective fencing shall be installed beyond the drip line of the tree to be protected. Except in the instances of tree pits, fencing shall be located at the edge of pavement.
 - 2. This fencing shall be orange snow type fencing, a minimum of 4 feet in height and held in place by posts driven into the ground no more than 10 feet apart. In the instance of a project that will take place for more than 6 months, chain link fencing will be required. Chain link fencing shall be six feet in height and held in place by metal posts driven into the ground no more than 10 feet apart. Fencing shall not be removed or relocated unless authorized in writing by the City of Las Vegas.
 - 3. All protective fencing shall be in place before any construction or material delivery is to take place. All protective fencing shall remain in place until final approval of all site conditions is given in writing.

25-0461
11/10/2025



4. No equipment or materials shall be parked, driven or stored within the protective fencing area or on the root zone of any tree.
5. No tree or tree part shall be impacted within the protective fencing area, including the tree canopy.
6. All measures shall be taken to maintain the health of trees and shall meet or exceed the requirements of the most current American National Standards Institute.

1.8 PROHIBITED ACTIVITIES – Publicly owned trees

- A. No person under any circumstance shall:
 1. Cut, break bark or otherwise injure or disturb any tree, tree guard or support;
 2. Fasten or maintain any sign on any tree, tree guard or support;
 3. Reduce the size of an existing tree pit, planting strip or root zone of an existing tree;
 4. Deposit any stone, asphalt, gravel, cement, lumber or other material in such a way as to obstruct the free access of air or water to the roots of any tree or cause compaction of any soil in public lands or the public right-of-way;
 5. Cause or allow any boiler, heater, machine, engine or device generating fumes, fires, gas, smoke, vapor or heat to remain under or adjacent to any tree;
 6. Fasten a bicycle, carriage, animal or motor vehicle of any kind to any tree, tree guard or support;
 7. Authorize or procure any gas, hot water, oil, dye, chemical or other substance harmful to the health or life of the tree to lay, pour, flow, leak, drain or drip on or in to the soil of a tree
 8. Build or kindle a fire within the dripline of any tree; or
 9. Interfere, cause, authorize or procure any interference with the agents or employees of the City of Las Vegas while they are engaged in tree care activities
- B. Liability for Damage
 1. Any person who inflicts damage to a tree on public property or in a public right of way, either willfully or negligently, shall be liable to the City of Las Vegas for costs of professional care in the treatment of the damage.
 2. If the tree dies within three (3) growing seasons as a direct result of such damage, or if the damaged tree is rendered unsuitable and condemned by the City, then the person responsible shall pay:
 - a. the current appraised tree value,
 - b. all costs for the removal of the tree and its stump,
 - c. all costs of replacing the tree with a young tree of approved specifications,
 - d. all costs of any required maintenance including watering, stake removal, fertilizing and pruning.
 - e. all other costs related to adjacent hardscape, irrigation, tree grates etc. effected by the damage. (wording may not be great?)
 3. All work under this subsection shall be performed by the City or contracted by the City, with all costs assessed to the responsible person.

1.9 HERITAGE TREE PROGRAM

- A. A Heritage Tree is a tree eligible to be provided special designation and protection by the City of Las Vegas. These trees are 16" DBH or larger, in sound condition, on the City of Las Vegas Preferred Tree List or the Nevada Big Tree Register and located within the City of Las Vegas lands.
- B. The City of Las Vegas shall create a Heritage Tree Program, as a means of creating public awareness and support for trees, which allows private tree owners to designate their trees as Heritage Trees.

25-0461
11/10/2025

1.10 TREE REMOVAL, RETENTION AND REPLACEMENT - Public lands, right-of-ways and easements

Tree removals affect the entire City of Las Vegas. Larger trees provide larger benefits and as such, trees shall be removed only as a final and necessary option. The planting of smaller trees to replace the value and benefit of larger trees will take decades to achieve and for this reason efforts should be made to preserve and protect trees where they are growing.

- A. It shall be unlawful for any private individual to remove, prune, take action on or cause damage to any tree located on public lands, right-of-ways or city owned easements without first receiving a Tree Permit from the Urban Forestry Board.
- B. No live, dead or dying tree, or grouping of trees on public property may be removed by private citizens.
- C. A nuisance tree is a tree that has already died, is in a state of irrevocable decline as determined by the Urban Forester, has the capacity to damage a person or thing or is an invasive species. Nuisance trees shall be removed except in situations where retention as wildlife habitat is viable (i.e., Floyd Lamb). Retention requires an annual tree risk assessments and specialized 'natural fracture pruning' to address potential hazards and retain the character of the tree.
- D. Any tree species removed on public property or transplanted offsite, which is not identified on the invasive species list, is required for replacement by this Section. These trees shall be replaced with a species identified on the Preferred Species List. All replacements shall be located appropriately as confirmed by a City staff certified arborist.
- E. All stump removals shall require underground utility locations prior to any action.
- F. It shall be encouraged that any species identified on the Invasive Species List be removed. There is no replacement requirement for these removals.

1.11 TREE CARE LICENSING REQUIREMENT

- A. All pruning, cutting, planting, removal, spraying, fertilizing and arboricultural procedures to trees in the City of Las Vegas, including work to private trees, shall be done by a person or company holding a City of Las Vegas Arborist License. Work conducted by City employees shall be done by or under the supervision of an ISA Certified Arborist.
- B. Arborist's License
 - 1. A City of Las Vegas Arborist License (License) shall only be issued to individuals who have passed the required examination prepared by and administered by the International Society of Arboriculture (ISA) and are thereby certified as ISA Certified Arborists.
 - 2. Each License shall bear a unique City Arborist Number and the name and street address of the License holder.
 - 3. All applicants for a License shall make application and pay a fee. The Urban Forestry Board shall set the manner of application and fee schedule by regulation.
 - 4. A yearly license fee shall be levied for each License. License shall be renewed yearly upon presentation of a current ISA certification.
 - 5. The Urban Forestry Board may revoke, suspend or refuse to renew any License, if the Licensee has failed to meet the professional standards of ISA Certified Arborists, lost ISA certification for any reason, failed to perform to the current ANSI A300 Standards and ANSI Z133 Safety Standards or for other good cause.

25-0461
11/10/2025



C. Additional Regulations

1. The Urban Forestry Board may adopt reasonable rules and regulations governing the conduct of business by License holders.
2. Such regulations shall protect the public health and safety, and comply with all other State, Federal or other lawful regulatory requirements.
3. No License holder shall violate or neglect to comply with any such rules or regulations.

1.12 NUISANCE TREES – Pruning or removals of private trees

The City of Las Vegas shall provide a Notice to Remove or Remedy in writing to the owner of any property that has a shade tree which is determined by the City of Las Vegas or designee to be a risk to the life, health, safety or property of the public, interferes with, obstructs or limits the use of public roads, sidewalks or facilities or which is afflicted with any transferable disease or insect infestation, or otherwise is a public nuisance. Any other violations of this chapter is considered a public nuisance. Processes shall comply with Title 9.04.010 with regard to public nuisances.

- A. Any person aggrieved by any decision of the City in the enforcement of any terms or provisions of this chapter may appeal in accordance with Title 9.04.100.
- B. It shall be the duty of the property owner on any parcel to promptly remove or remedy any trees which pose a risk. Pruning which remedies or reduces the likelihood of failure of the identified tree part without complete tree removal is considered good practice.
- C. Infected, Infested Trees Due to a Pest or Pathogen Are Defined as a Nuisance
 1. Any tree which is in a state of irreparable or untreatable decline due to heavy infestation or disease is included in the definition of a nuisance. Infested or infected trees, which are identified by Federal or State Departments of Agriculture to be in quarantine or can potentially infect or infest other trees are defined as a nuisance. This would include but not be limited to Ash (*Fraxinus spp.*) trees infested with emerald ash borer (*Agrilus planipennis*) which are not being treated or whose treatment is ineffectual, Pine (*Pinus spp.*) infested with Mediterranean pine engraver (*Orthotomicus erosus*), Elm trees (*Ulmus spp.*) infected with Dutch elm disease (*Ophiostoma novo-ulmi*) or an advanced infection of Sooty Canker (*Hendersonula toruloidea*) as determined by the City of Las Vegas Urban Forester or an ASCA registered consulting arborist.
 - a. The City of Las Vegas shall enforce State and Federal regulations governing quarantine zone boundaries, and regulated articles.
 - b. For the purposes of this Section, “Regulated Articles” are hereby defined as any insects at any living state of development, any quarantines materials such as wood products including, but not limited to chips, limbs, lumber, firewood or any other product or means of conveyance which may be determined by Federal or State departments of agriculture to pose a risk of spread of any infestation or infection.
 - c. It shall be illegal to move out of established quarantine zone(s) regulated articles unless those articles have met all requirements of the local, Federal and State regulatory agencies.
 - d. It shall be illegal for any person or entity to transfer from a quarantine zone into a non-quarantine zone including the City of Las Vegas any regulated articles.
 - e. Any person or entity found to be in violation of any local, State or Federal regulations related to tree infestations or infections shall be prosecuted to the full extent of the law.
 - f. All contractors working within and near any quarantine zone(s) are required to comply with the quarantine regulations and supply records that may be required for inspection to the City of Las Vegas, County, State or Federal agencies upon request.

25-0461
11/10/2025

2. Trees in Decline or Dead are Defined as a Nuisance

- a. Any tree or part of a tree which is dead, dying, declining or determined to be structurally compromised or weak which could potentially fall on a person, property or structure is defined as a nuisance. Pruning which remedies or reduces the likelihood of failure of the identified tree part without complete tree removal is considered good practice.
- b. It shall be unlawful for any owner - of any lot or land in the City of Las Vegas to permit or maintain on any such lot or land, any tree which is dead, or declining to the state where it may create a potential risk for people, structures or property. It shall be the duty of any such owner to promptly cause the removal of any such tree or mitigation of risk.

1.13 INVASIVE SPECIES CONTROL

A. WOODY PLANTS

Invasive plants cause ecological disruption to natural ecosystems and maintenance issues in cultivated landscapes. The type of impact varies based on the species and the traits of that species. The Invasive Species List, attached to this Section identifies species which shall not be planted and which should be removed and controlled to reduce impacts to other vegetation.

1. Typical impacts include:

- a. Chemical disturbance to the soil limiting development of other species;
- b. Plants growing in undesirable and inappropriate locations;
- c. Desirable and naturally occurring species being displaced;

2. Private Property Owner Outreach

The City of Las Vegas shall develop and implement an outreach plan to educate property owners with identification, remediation strategies and potential impacts of invasive species. Education shall include access to a plant list of alternative species.

B. DISEASES AND INSECTS

1. Impacts to Trees

Diseases and insects can create significant stress to trees and in some instances kill trees. The City shall maintain and update a list of known diseases and insects as identified by NV Division of Forestry and USDA.

2. Invasive Disease and Insect

The City of Las Vegas shall develop an action strategy to deal with any of these diseases or insects and take action to remove the pest, forestall impacts to the trees through treatments or other means or develop a removal and replacement strategy for remediation of the problem.

3. Private Property Owner Outreach

The City of Las Vegas shall develop and implement an outreach plan to educate property owners of the potential impacts and remediation strategies to help tree owners in managing diseases and insects.

1.14 LAS VEGAS URBAN FORESTRY BOARD

A. Establishment

The City of Las Vegas hereby establishes an Urban Forestry Board which shall be a recommending body to provide assistance, direction and expertise to the City of Las Vegas regarding the preservation, protection, planting and management of trees. The Urban Forestry Board shall develop and recommend implementation of an urban forestry management plan for guidance on urban forestry issues.

B. Membership

1. *The Urban Forestry Board shall consist of seven regular members:*

- a. *Five members, appointed by the City Manager, shall be employees of the City of Las Vegas from*

25-0461
11/10/2025



departments relevant to Urban Forestry including but not limited to – Operations and Maintenance, Code Enforcement, Public Works, Parks and Recreation and Planning.

- b. *Two members, appointed by the City Council, shall be individuals with expertise in fields related to Urban Forestry including, but not limited to, Arboriculture, Horticulture, Landscape Architecture or Urban Planning.*
- c. *The Superintendent of Parks and the Urban Forester shall serve as non-voting members of the Board.*
- d. *A member of the Las Vegas City Council may be assigned to be an ex officio member of said Urban Forestry Board without the power to vote.*

The Urban Forestry Board shall consist of nine regular members. Five members shall be employees of the City of Las Vegas from departments relevant to Urban Forestry including but not limited to – Operations and Maintenance, Code Enforcement, Public Works, Parks and Recreation and Planning. (Establish a method of nominating/appointing members - consistent with existing City procedure) Two members shall be individuals with expertise in fields related to Urban Forestry including but not limited to – Arboriculture, Horticulture, Landscape Architecture and Urban Planning. The Superintendent of Parks and the Urban Forester shall serve as non-voting members of the Board. A member of the Las Vegas City Council shall be assigned to be an ex officio member of said Urban Forestry Board without the power to vote.

- 2. The regular term of office shall be for 3 years. Each board member may serve a maximum of two consecutive terms. If a vacancy shall occur in the full membership, the council shall appoint a suitable person to fill such vacancy. Vacancies in full membership shall be filled in the same manner as original appointments. The Urban Forestry Board members shall serve without compensation.
- 3. The members of the Board shall annually elect from their members a chair and vice chair. Officers can be elected for more than one term. The city manager or his/her designee shall be responsible for providing staff support and taking minutes for the commission.

C. Procedures

- 1. The Board shall establish bylaws for its proceedings and may adopt such rules and regulations as may be necessary for the exercise of the powers conferred and the performance of the duties hereby.
- 2. The Board shall file an annual report to the Las Vegas City Council setting forth its past-year activities and recommendations for future action by the City of Las Vegas.
- 3. A quorum shall consist of a majority of total members present at the time of the meeting. A majority vote of the quorum of the Board shall be necessary for any act of the Board.

D. Powers and Duties

The Urban Forestry Board shall have the following powers and duties subject to the approval of the Las Vegas City Council:

- 1. To advise the City Council in the establishment of priorities related to the city's urban forestry program.
- 2. To provide information to the public regarding urban forestry and arboriculture.
- 3. In consultation with the Historic Preservation Officer, to review and approve suitable nominations for heritage tree status as defined. (not sure if this belongs here / necessary)
- 4. To assist in the identification and development of funding sources for urban forestry programs.
- 5. To recommend grant awards for urban forestry programs
- 6. To periodically review and make recommendations regarding the city's Preferred Tree List.
- 7. To oversee the development of and subsequently periodically review and make recommendations to an Urban Forest Management Plan.
- 8. To collaborate with concerned agencies and interests in the preservation of trees, the care of shade trees, processes related to the removal of turf grass near trees and all other activities affecting tree health, longevity or vitality.
- 9. The Urban Forestry Board shall hear any requests for appeal to this Code and make recommendations to be forwarded to the Las Vegas City Council for a final decision.

25-0461
11/18/2025

1.15 TREE PERMIT PROCEDURE – planting and removals on easements / transition strips

The intent of this Section 1.15-1.19 is to establish a procedure through which homeowners and businesses in neighborhoods with City owned transition strips can plant trees within those easements. The primary barrier would appear to be the liability of tree and the maintenance of the tree. Both could be remedied if the City were to conduct routine maintenance of the trees within the transition strip. Property owners would be responsible through the permitting agreement to irrigate the tree and the City would conduct routine maintenance of the trees. The majority of these transition strips, as far as I am aware, are in the downtown Las Vegas – an area significantly impacted by urban heat island.

A. Applicant Submission

An applicant for a simple tree removal or planting on public property shall fill out a Tree Removal or Tree Planting Request online, or in person, and the City of Las Vegas arborist shall make an inspection and render a determination.

The Urban Forester or designee shall review the application. This review shall include an inspection of the site and referral of the application for recommendation to other appropriate administrative departments or agencies. The Urban Forester or designee shall render a decision on the application within thirty working days of its receipt of a properly completed application.

1.16 PERMIT ISSUANCE

A. Issuance

The City of Las Vegas shall issue a permit upon approval of an application and payment of a required fee and bond.

B. Time Limitation

1. A permit shall expire and become null and void if work authorized is not commenced within one year from the date of the permit or if such work when commenced is suspended or abandoned at any time for a period of one year.
2. If work has commenced and the permit becomes null and void or expires because of a lack of progress or abandonment, a new permit for the proposed tree removal, planting activity shall be obtained before proceeding with further work.

1.17 CASH BONDS – in association with a tree removal

- A. If tree replacement is required by this Section, then as a condition of the Tree Permit, the Applicant shall submit a cash bond as identified in the Fee Section of this Code. The bond shall be held for the purpose of assuring that the replacement tree(s) are purchased and planted.
- B. If it is determined that practices which violate any portion of the City of Las Vegas Code have resulted in tree damage, then the City of Las Vegas may require that a cash bond, as determined in accordance with the Fee Section of this Code, shall be submitted at the time the violation occurs. The bond shall be held for the purpose of assuring that all remedial actions to minimize tree damage are taken, and/or for the purpose of assuring tree replacement should any damaged tree die or show noticeable signs of decline as determined by an ISA certified arborist. If it is determined that residual damage may not be apparent, then the bond may be held for a period of 60 months or five years. At the end of which time, if the tree survives and is in good health, as determined by an ISA certified arborist the bond shall be returned. If the tree does not survive, and was not further impacted by an act of God, or is in poor health then replacement shall be required as identified above and according to the Fee Section of the Code.
- C. If the bond is posted for a tree and the property owner wishes to transfer the property, then the bond shall be required to be paid before transfer of the property or shall be refunded to the original property owner once the bond requirements have been met.

25-0461
11/10/2025



1.18 FINAL INSPECTION

Final approval shall be issued when all removal, planting or remediation work concerning trees is completed and a final inspection has been conducted by the City of Las Vegas. All bonds and fees will remain in the custody of the City of Las Vegas until final inspection and approval has been provided in writing.

1.19 COMPLIANCE

The City of Las Vegas shall retain jurisdiction to ensure compliance with this Section and shall have the right to issue a stop work order for non-compliance. No stop work order issued pursuant to this Section shall be removed by the City of Las Vegas unless the applicant has paid a re-inspection fee in accordance with the Fee Schedule of this Chapter.

1.20 PENALTY

Any person found guilty of violating any provision of this chapter shall be assessed at a cost as prescribed in the Fee Section of the Code. Each tree cut down, destroyed, damaged, removed or moved shall constitute a separate offense. In addition to these penalties, if a tree is removed in violation of this Section, all replacement requirements of this Chapter shall be applied.

1.21 CIVIL REMEDIES

In addition to any other remedies provided by this Section the City of Las Vegas shall have the following judicial remedies available for violations of this Section or any permit condition promulgated under this Section.

- A. The City of Las Vegas may institute a civil action in a court of competent jurisdiction to establish liability and to recover damages for any injury caused by the removal or damage of trees in contravention of the terms of this Section.
- B. The City of Las Vegas may institute a civil action in a court of competent jurisdiction to seek injunctive relief to enforce compliance with this Section to enjoin any violation, and to seek injunctive relief to prevent irreparable injury to the trees or properties encompassed by the terms of this Section.

25-0461
11/10/2025

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25-0461
11/10/2025



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25-0461
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25-0461
11/10/2025



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25-0461
11/10/2025



City of Las Vegas Urban Forestry Master Plan 2050 produced by Davey Resource Group, Inc. in collaboration with the City of Las Vegas Long Range Planning Staff and the MGM Resorts Public Policy Institute, Greenspun College of Urban Affairs.



25-0461
11/10/2025