Urban Forest Management Plan

2018 | Iowa City, IA

City of Iowa City

Urban Forest Management Plan

- Iowa City, IA -

Acknowledgements

- The City of Iowa City -

Parks and Recreation Department

Parks and Forestry Division

City of Iowa City Parks and Recreation Commission

The City Council of Iowa City

Citizens of Iowa City

- The Iowa Department of Natural Resources Urban Forestry -

- Plan-It Geo, LLC -

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Our vision for the ***future of Iowa City*** *is to create a healthy and* ***sustainable urban forest*** *that is properly managed and* ***cared for****, benefiting our citizens with* ***improved economic and environmental well-being, increasing public safety****, and enabling our employees to provide* ***cost-effective maintenance***

Our urban forest will have a large variety of trees consisting of various sizes, ages, and species. The trees will be selected and maintained according to the Best Management Practices (BMPs) established by the International Society of Arboriculture (ISA)

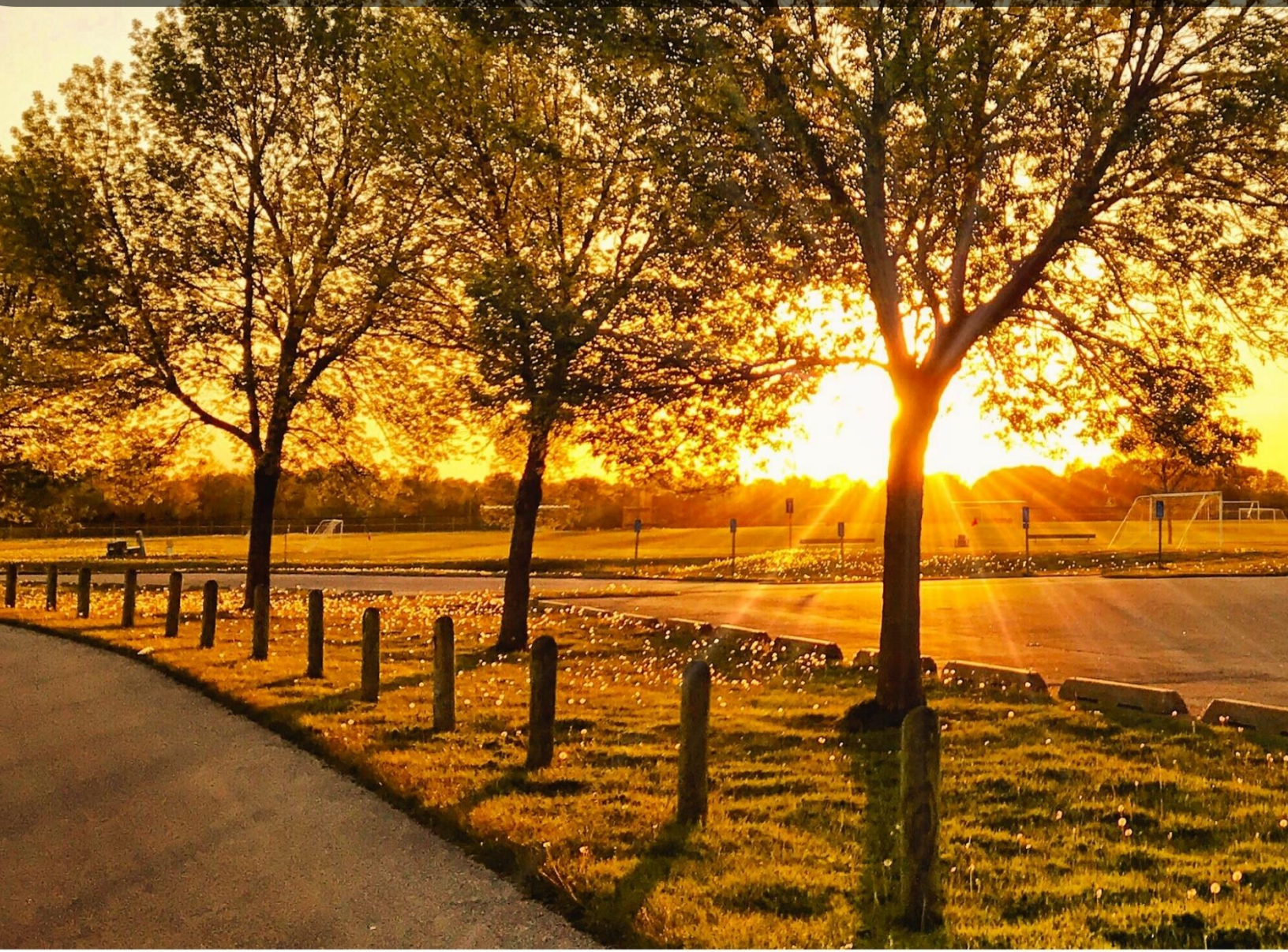

Table of Contents

Tables & Figures

List of Tables

List of Figures

- Iowa City, IA -

Urban Forest Management Plan

October 2018

Executive Summary

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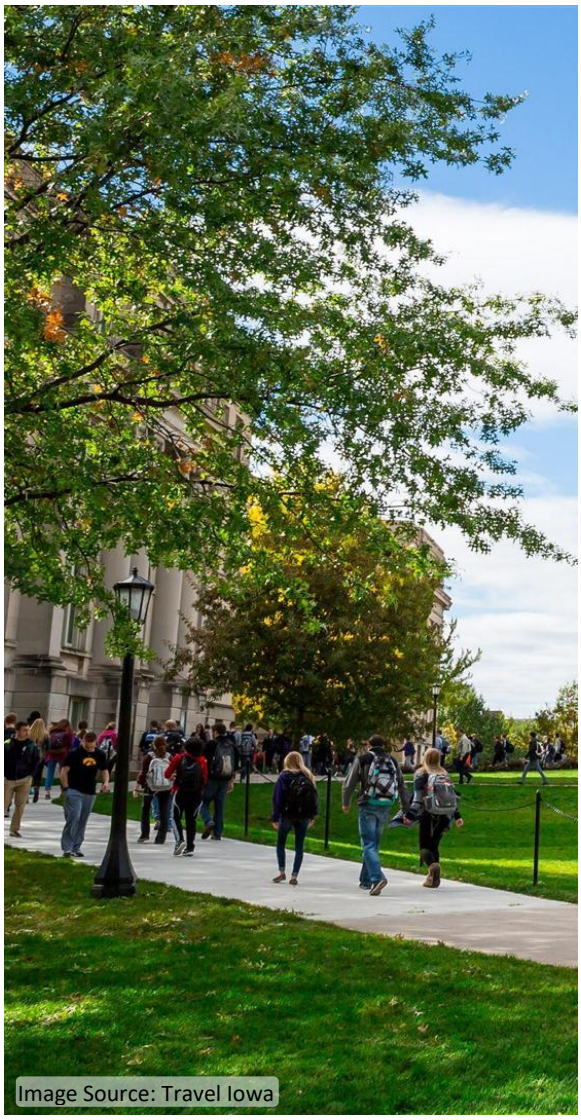


Image Source: Travel Iowa

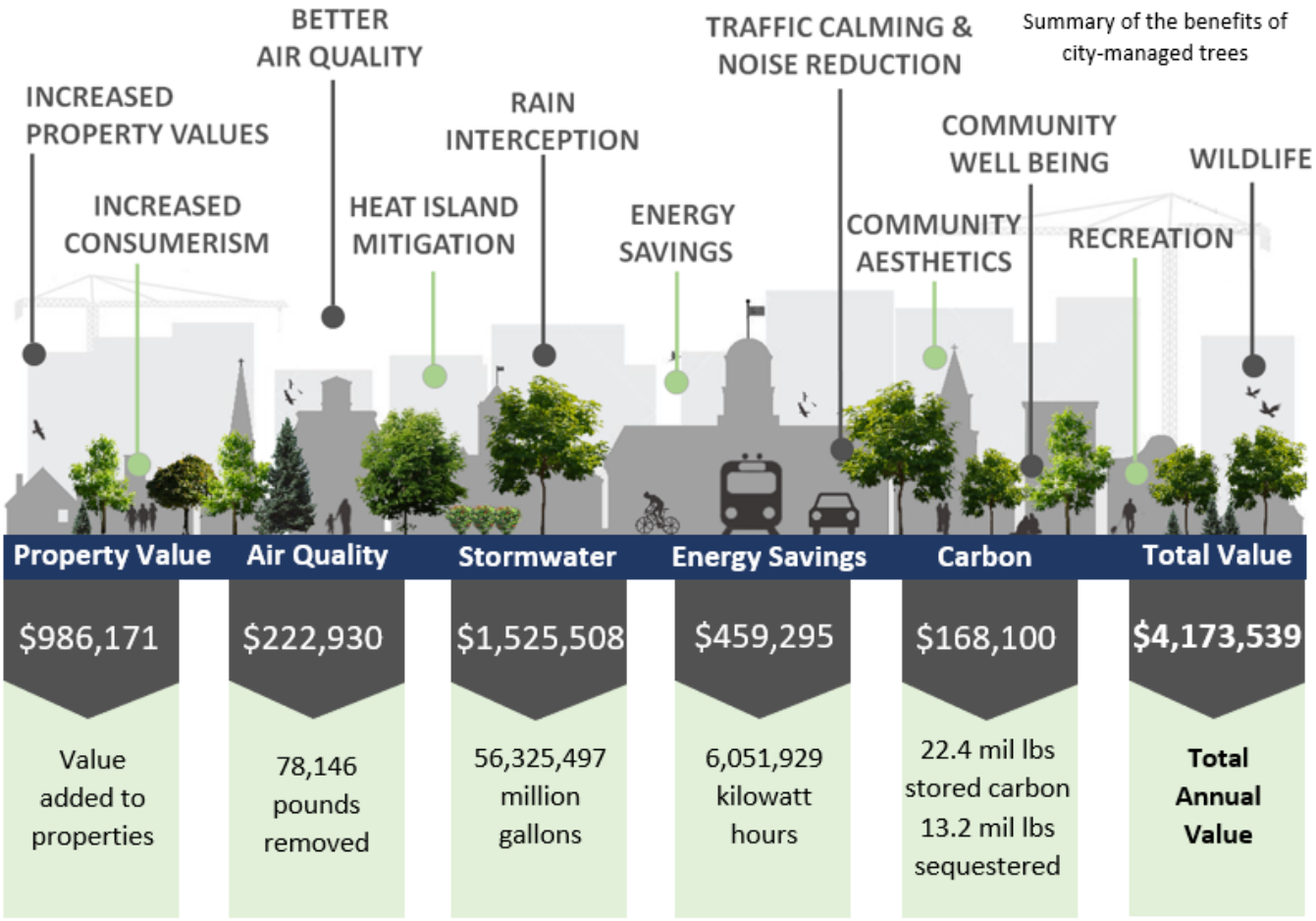
INTRODUCTION

Iowa City is dedicated to building a thriving urban and community forest for a healthy and vibrant city. Realizing the community forest is a valued asset, Iowa City, herein referred to as "the City", invested in a collaborative planning process, involving extensive urban forest resource and program analysis to develop a clear, concise and timeline oriented Urban Forest Management Plan. The overall goal of the planning process was to develop a sustainable Urban Forestry Program, led by the Division of Parks and Forestry, who is committed to this measured, monitored, and strategic long-term investment. The strategic planning process engaged City staff, with the interest of the community, to evaluate all aspects and components of a comprehensive community forestry program. Together, this team developed goals and strategies to guide the City's Urban Forestry Program over the next 20 years. Clear criteria and performance indicators of urban forestry and the measures to monitor progress will allow for future planning and adaptive management over the coming years with the clear goals for the community set.

Bringing to light the importance of urban forest planning, in 2014, the emerald ash borer (EAB) insect pest was found in the City. This Asian pest feeds on ash trees and quickly causes tree mortality. With approximately 2,000 ash trees across city-maintained areas, Parks and Forestry and partners are actively developing a plan to address EAB. Additionally, community outreach is being conducted due to the substantial number of ash trees on private property. Threats to the urban forest such as EAB and unforeseen pests necessitates development of this Urban Forest Management Plan. Learn more about EAB at https://www.icgov.org/emeraldashborer. The EAB infestation, past pest and disease issues such as Dutch Elm Disease, and potential future issues warrant the need for proper urban forest planning.

Starting the ambitious planning effort began with the Parks and Forestry spearheading the comprehensive street and park tree inventory of trees managed by the City. Over 45,000 trees were inventoried to collect tree species, size, condition, and maintenance needs. Over 5,000 potential tree planting sites were also mapped, which will help as the City implements the Plan to increase tree diversity and overall tree canopy, providing more environmental, economic, and social benefits to the community. The information collected from the inventory informed the strategies in the Plan for diversifying the urban forest and prioritizing risk tree and routine maintenance. With this data, the value of the city-managed trees can also be quantified, providing valuable information to the community as the City pursues enhanced community interest, support, and engagement with the urban forest.

The Benefits & Value of the City-Managed Trees



The trees in Iowa City provide value in terms of increased property values, air quality improvements, reduction in stormwater values and an increase in water quality, energy savings from the shade of their canopy and protection from cool winds, and their ability to sequester and store carbon. These values, originating from research conducted by the U.S. Forest Service in 13 states across the country, equate to nearly

$4.2 million total annual value to Iowa City

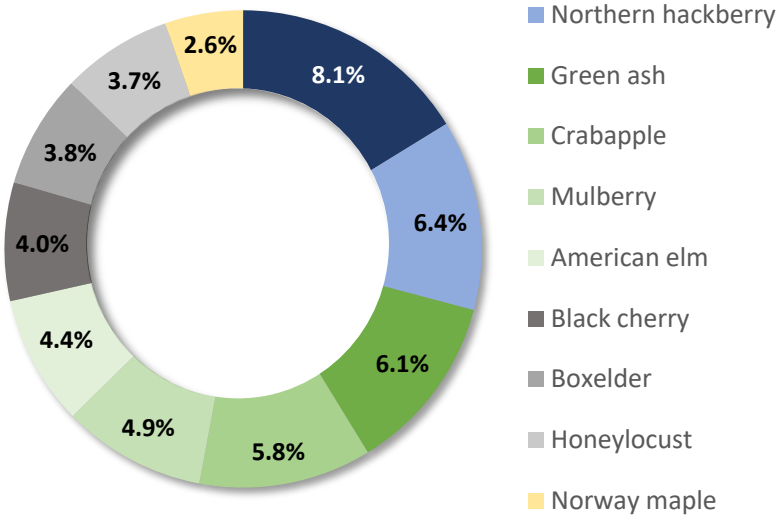
The City wants to sustain and enhance these benefits trees provide to the community by developing and following this strategic Urban Forest Management Plan. At the same time, stresses from the urban environment including air pollution, pests and diseases such as emerald ash borer, invasive species, climate change, damage by vehicles, increased impervious surface, infrastructure conflicts, soil compaction, and maintenance neglect reduce the diversity and magnitude of these benefits and may lead to tree-related problems. With this understanding it was imperative that the City develop an Urban Forest Management Plan which will be a roadmap that first looked at the questions of *What do we have? What do we want? How do we get what we want?* and, *How are we doing?* The following will provide an overview of this process completed for the City to develop the goals, strategies, and measures to answer these questions.

What Do We Have?

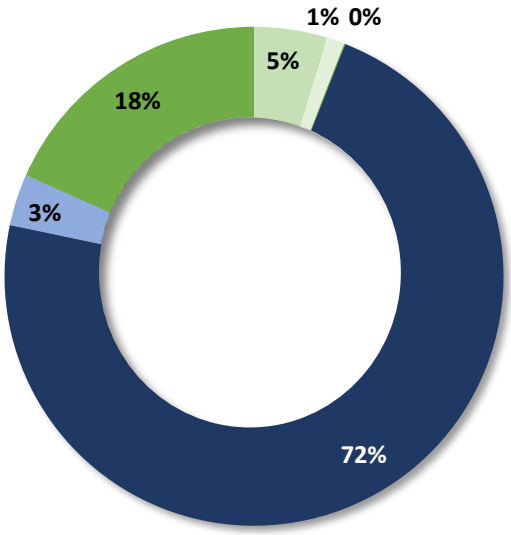
The first step in the planning process is to get baseline information about the natural resource and the programs and factors influencing it. An analysis of the street and park tree inventory was conducted to understand Iowa City's urban forest characteristics and maintenance needs and to identify trends.

Of the 45,000 street and park trees, there are nearly 180 unique tree species, with the top 10 shown in the chart (right). It includes large canopy trees like silver maple and northern hackberry as well as smaller, flowering trees like crabapple. One concern that will be addressed is the abundance of green ash and other ash (3,516 trees) which are at risk to the emerald ash borer, a pest that quickly leads to tree mortality causing surges of immediate tree removals. The charts below show that overall, the trees in the City are in good or fair condition with an average diameter of 12 inches but 18% require immediate priority pruning and 2,110 trees are recommended for removal.

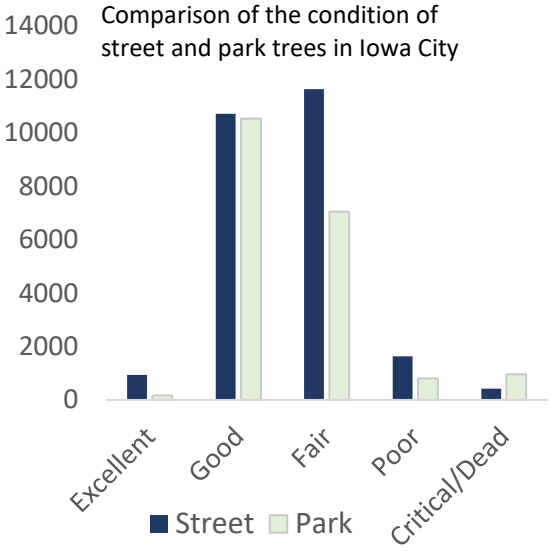
Top 10 tree species in Iowa City



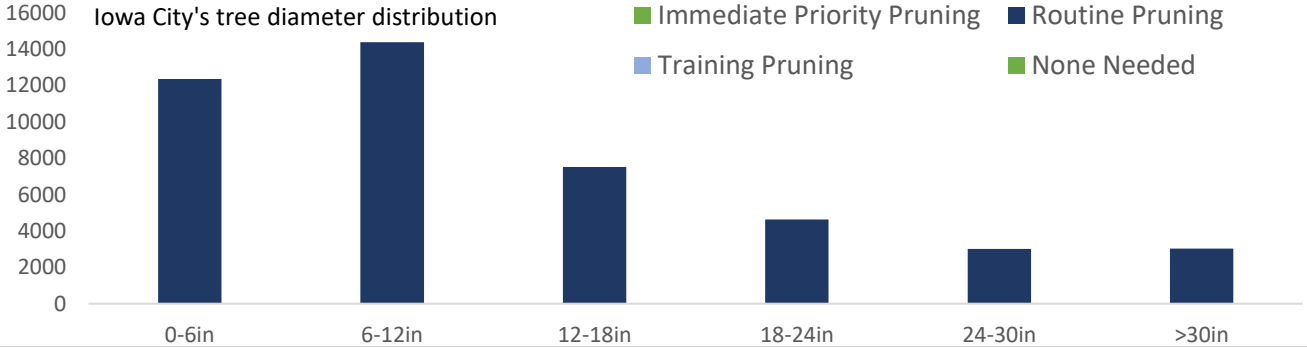
Maintenance needs summary of street and park trees



Comparison of the condition of street and park trees in Iowa City



Iowa City's tree diameter distribution



An analysis of the urban forest program was also conducted using the U.S. Forest Service's Urban Forest Sustainability and Management Audit that evaluates every aspect of urban forest management and condition by categories such as Management Policy and Ordinances, Professional Capacity and Training, and Funding and Accounting. This audit identified the gaps in the City's urban forest as it pertains to the *Vegetation Resource* (the trees), the *Resource Management* (the staff), *Community Framework* (the people), and *Institutional Framework* (the agencies) to inform the goals, strategies, and measures provided in this Plan as described below.

What Do We Want?

Based on the audit, gaps were identified and the status of each Criteria and Performance Indicator as it pertains to the vegetation resource, resource management, community framework, and institutional framework, were documented on the spectrum (low, moderate, good, optimal). Each criterion has the information to determine where the City is at on the spectrum and how to get "What we want".

How Do We Get What We Want?

With an understanding of the City's current urban forestry program and tree resource based on the analyses, and the desire for "Optimal" in the Criteria and Performance Indicator spectrum, goals and strategies were developed. Each goal has an overarching theme and contains the strategies to achieve the goal as well as the reference of the Criteria it addresses and the responsible agency for initiating it and monitoring progress.

EDUCATION

Goal One: Promote proper tree care through education and enforcement

ORGANIZATION & MANAGEMENT

Goal Two: Improve efficiencies and collaborate to propel urban forest management

PLAN IMPLEMENTATION

Goal Three: Build the team and the reinforcements to implement the Plan

URBAN FORESTRY PROJECT FUNDING

Goal Four: Seek alternative mechanisms for funding and projects to accomplish the strategies

Iowa City's 20-Year Framework for Urban Forest Management

Criteria	Table 9. Vegetation Resource – Performance Indicators Low	Moderate	Good	Optimal	Key Objective
V1 Tree species diversity	Fewer than five species dominate the entire tree population citywide	No species represents more than 20% of the entire tree population citywide	No species represents more than 15% of the entire tree population citywide	**No species represent more than 10% of the entire tree population citywide**	Establish a diverse and resilient tree population citywide
V2 Diameter distribution of trees in the City	1 of 6 DBH ranges match the McPherson Ideal Distribution % (+/- 2%)	2 of 6 DBH ranges match the McPherson Ideal Distribution % (+/- 2%)	**4 of the 6 DBH ranges match the McPherson Ideal Distribution % (+/- 2%)**	6 of the 6 DBH ranges match the McPherson Ideal Distribution % (+/- 2%)	Provide for uneven aged Distribution citywide

Criteria	Resource Management – Performance Indicators Low	Moderate	Good	Optimal	Key Objective
R7 Tree planting and establishment on public and private land	Tree planting and establishment is *ad hoc*	**Tree establishment is directed by needs derived from a tree inventory**	Tree establishment is directed by needs derived from a tree inventory and is sufficient to meet canopy cover objectives	Tree planting and establishment program are driven by the UFMP objectives for canopy cover, species diversity, and species distribution objectives to ensure urban forest sustainability	Tree planting and establishment is directed by objective criteria set in the urban forest management plan
R8 High risk tree maintenance	Highest priority removals only are addressed within 5 years of notice	All high priority removals and some immediate pruning is addressed within	**All high priority removals and most immediate pruning is addressed within**	Proactive mature tree care (lightning protection, cabling, etc.) is conducted	Maintain public safety and the longevity of the trees and the

Are We Getting What We Want?

Using an adaptive management approach will require the consistent monitoring of all the City's criteria for urban forest sustainability. The City will be able to judge if its' new approaches to urban forest conservation are being effective, develop relationships between management actions and outcomes, and identify significant trends. This will allow the City to adjust management actions over time as changes occur both in the physical/biological environment and in the expectations of the City's residents.

Iowa City's urban and community forest is a defining and valued characteristic of making the city a desirable place to live, work, and play. It is a resource that has a history and legacy of care and management; however, the resource could be more efficiently managed and enhanced. The assessment, criteria and indicators, goals and strategies, and measures for adaptive management that are presented in this Urban Forest Management Plan have been created to provide a framework to effectively, proactively, and sustainably manage trees. While it will take work and additional resources to implement the UFMP, its implementation will help ensure that Iowa City's urban and community forest will continue to be a valued part of the community.

“Urban trees and forests are considered integral to the sustainability of cities as a whole. Yet, sustainable urban forests are not born, they are made. They do not arise at random, but result from a community-wide commitment to their creation and management.”

| Clark et al.: Urban Forest Sustainability

Introduction

The trees found in our transportation corridors, parks, yards, and natural areas constitute an "urban forest" and are valuable community assets that play a major role in sustaining the quality of life enjoyed by residents of Iowa City. Although these natural features may appear long-lived, resilient, and ubiquitous; in reality, they have inherent limitations and a set of threats that necessitate the City to take steps to protect, manage and expand this resource so future generations will continue to enjoy its services and benefits.

The term "urban forest" encompasses a diverse range of trees and forests found throughout urban, suburban, and exurban landscapes in the City. This variety requires the City to adopt a wide-range of management approaches. The strategies used to manage native forest ecosystems only have limited application to managing street and residential trees and, vice-versa. There is a growing consensus that urban forests are an important component of community infrastructure and a resource that must be carefully managed, protected, and included in planning efforts.

The inherently close interaction between people and trees in Iowa City requires active and diligent management of the urban and community tree and forest resources to ensure public safety. A scientifically grounded management program is necessary in order to maximize the value and minimize the risk associated with trees within this complex and dynamic human ecological system in Iowa City. The initial step in meeting these challenges is the identification and organization of baseline information in the form of an inventory that describes the location, composition, structure, and health of the trees. The 2016-2018 Street and Park Tree Inventory and an analysis of the City's urban forestry program accompanied the development of this management plan designed to enhance urban forest sustainability.

This Plan was developed through a collaborative effort supported by the City. It summarizes the urban forestry program and the resources in place to protect and enhance it. The Plan provides the goals, strategies, and measures required to develop and maintain a thriving urban forest for City residents and future generations to enjoy.

"Urban forest sustainability is defined in terms of maintaining healthy and functional vegetation and associated systems that provide long-term benefits desired by the community. This definition places significant emphasis on the role of the communities and institutions who manage the urban forest."
| Dwyer et al. 2003

Overview of the Benefits of Iowa City's Trees

Iowa City's urban forest plays a significant role in maintaining the health and vitality of urban life. The urban forest provides a wealth of benefits to neighborhoods and residents through the reduction of energy consumption, the removal of pollutants from the air and water, reduction in stormwater flows, increased valuation of private property, increased worker productivity, reduction in stress and violent crime, as well as providing recreational opportunities and aesthetic diversity. In summary, urban forests provide "triple bottom line" benefits: *social, economic,* and *environmental*.

Trees provide services which can be assigned a financial value, using the peer-reviewed i-Tree research, which are summarized below based on the 2016-2018 street and park tree inventory.

Figure 1. Summary of the benefits of City-managed trees

The total annual benefits of Iowa City's inventoried trees (45,014 trees, 43,898 with benefits values) are estimated at $4,173,539 (street trees make up 66% of that value). Stormwater retention represents 36% of the monetary value ($1,525,508) followed by property values. Increases in property values are estimated at over $986,171 though it should be noted that the research is dated and uses regional estimates. It is still important to demonstrate that trees add value to properties in terms of aesthetics, well-being, increased tourism, sense of community, etc. Energy savings is valued at $459,295, or 11% of the total value. If the young trees continue to grow and are maintained properly and new trees are planted after removals, these benefits are likely to sustain and potentially increase.

At the same time, stresses from the urban environment including air pollution, pests such as emerald ash borer (EAB), diseases, invasive species, climate change, damage by vehicles, increased impervious surface, infrastructure conflicts, soil compaction, and maintenance neglect reduce the diversity and magnitude of these benefits and may lead to tree-related problems. This understanding influenced the desire and, ultimately, the need to develop Iowa City's Urban Forest Management Plan.

This strategic plan for the management of Iowa City's urban forest addresses the numerous challenges to growing and maintaining a healthy urban forest in an efficient manner. Management of the urban forest, with its long biological life cycles and slow growth, is a long-term investment. The Plan recognizes that attempts to enhance its vigor, longevity, and diversity must reflect this reality.

Purpose of the Urban Forest Management Plan

Understanding the benefits and functions of our urban forest, the City has developed this Urban Forest Management Plan.

> *"Without a management plan, the governments and individuals responsible for taking care of an urban forest will not be effective in meeting the true needs of the trees and the community. A management plan establishes a clear set of priorities and objectives related to the goal of maintaining a productive and beneficial community forest."* | American Public Works Association, 2007

Plan Purpose

- Summarize the current state of the urban forest resource, resource management, community framework, and institutional framework
- Provide the criteria and indicators for achieving goals of sustainable urban forest management
- Provide methods of measures and monitoring of the criteria and indicators to enable adaptive management
- Provide goals and strategies to advance the City along the criteria and indicators of urban forestry spectrum

How the Plan Was Developed

Developing the Urban Forest Management Plan was a gradational process where the results of each step informed the next, leading to development of the goals, strategies, and adaptive management measures.

Program & Data Analysis

First, research was conducted to gather information about the City's urban forest. This involved an extensive review of existing plans, policies, ordinances, practices, and initiatives.

Data pertaining to the City's urban forest such as the street and park tree inventory were gathered and analyzed to identify the urban forest structure, maintenance needs, and potential risks. Results from the analysis were then applied to the Urban Forest Program Audit (described on the next page) and ultimately, to the Plan's Goals and Strategies.

After initial information and data were gathered and analyzed, the City staff provided additional input to inform development of the Plan.

Figure 2. Plan development process

Criteria & Performance Indicators | Measures, Goals, & Strategies

Using the results of the steps listed above, the Plan was developed by establishing Criteria and Performance Indicators for urban forest management and sustainability. This process identifies where the City is currently on a management and sustainability spectrum and a description of the criteria for advancing on the spectrum. Table 1 on the next page summarizes the outcomes which are described in the Criteria & Indicators for Urban Forest Goals & Strategies section. This shows Iowa City's status. While the City is achieving near optimal levels for some elements, there exists a need for improvement in others.

Based on the City's current status, goals and strategies were developed to advance the City's urban forest resource and program along this spectrum. Monitoring and methods for measuring progress were established to enable the City to evaluate the status and adjust and adapt strategies accordingly.

Table 1. Summary of the status of the City of Iowa City's urban forestry program and resource

The Urban Forest Sustainability and Management Spectrum						
Category	**Spectrum Level:**	**Low**	**Moderate**	**Good**	**Optimal**	**Total**
The Urban Forest ("Vegetation Resource")		0	3	1	1	5
Management of the Urban Forest ("Resource Management")		2	5	7	3	17
Community & the Urban Forest ("Community Framework")		1	2	1	0	4
Agencies & the Urban Forest ("Institutional Framework")		0	4	0	0	4
Total		**3**	**14**	**9**	**4**	**30**

As seen in the table above, overall, the City resides in the "Moderate" level of urban forest management and sustainability according to the Criteria & Performance Indicators. These criteria and indicators were established by the U.S. Forest Service and industry professionals and were tailored to Iowa City. Of the total 30 urban forestry criteria, the City is moderately performing 14 of these instead of performing or achieving these at the "Good" or "Optimal" level. This illustrates the need for improved urban forestry management. Criteria where the City is performing lower than "Good" were evaluated to develop the goals, strategies, and adaptive management measures.

The following describes the planning process in more detail.

Program & Data Analysis → Criteria and Performance Indicators → Measures → Goals & Strategies

Urban Forest Program Audit

The Urban Forest Sustainability & Management Audit for analyzing the City's program

	Categories									
Category & Element	**Policy**	**Capacity**	**Funding**	**Authority**	**Inventories**	**Plans**	**Risk**	**Disaster**	**Practices**	**Community**
Management Policy and Ordinances	27									
Professional Capacity and Training		1								
Funding and Accounting			2							
Decision and Management Authority				2						
Inventories					12					
Urban Forest Management Plans						8				
Risk Management							3			
Disaster Planning								3		
Practices, Standards, and BMPs									22	
Community										18
	Policy	**Capacity**	**Funding**	**Authority**	**Inventories**	**Plans**	**Risk**	**Disaster**	**Practices**	**Community**

To effectively provide urban forest goals and strategies, the City's urban forest and the management program were reviewed and analyzed through an extensive research and information gathering process. The process involved utilizing a model for strategic urban forest planning that was first introduced by James R. Clark et al. (1997). It recommends the use of a series of management criteria and performance indicators (C&I) to measure urban forest management success. Built into this process for the City's Plan is the updated comprehensive criteria and performance indicators developed by W. Andy Kenney et al. (2011). See the "Criteria Key" in the Recommended Methods for Monitoring Performance Criteria section for an adapted list of these C&I's for Iowa City.

To summarize this approach, the Vegetation Resource criteria and performance indicators are used to monitor the urban forest resource to provide an accurate assessment within the City's changing environment. The Community and Institutional criteria and performance indicators assess changing economic and social conditions

critical to urban forest sustainability. The Resource Management criteria and performance indicators provide the means for measuring how well management is proceeding in sustaining or enhancing these urban forest conditions and for tracking subsequent changes.

The process of analyzing the urban forest following these respected guides was conducted using the U.S. Forest Service's Urban Forest Sustainability and Management Audit which applies the aforementioned resources. This audit completed for Iowa City involved extensive information and document gathering and research to identify policies, practices, programs, and standards pertaining to 11 categories of urban forest sustainability and management as defined by Clark et al. (1997), Kenney et al. (2011), and the U.S. Forest Service.

Categories of the Urban Forest Sustainability and Management Audit and Percent Achieved

- Management Policy and Ordinances: 64% Achieved
- Professional Capacity and Training: 38% Achieved
- Funding and Accounting: 58% Achieved
- Decision and Management Authority: 75% Achieved
- Inventories: 62% Achieved
- Urban Forest Management Plans: 75% Achieved
- Risk Management: 56% Achieved
- Disaster Planning: 36% Achieved
- Practices, Standards, and BMPs (Best Management Practices): 83% Achieved
- Community: 71% Achieved

Overall: 68% Achieved (view a detailed summary of the Audit results in Appendix A)

Each category has a series of elements pertaining to the category. For example, the Management Policy and Ordinances category has the elements, "Climate Change", "No Net Loss", "Risk Management", "Tree Canopy Goals", "Tree Protection", "Utility", "Human Health – Physical & Psychological", "Wildlife Diversity / Habitat / Protection", "Performance Monitoring", "Public and Private [tree] Ordinances", "Development Standards", "High-Conservation Value Forests", and "Urban Interface (WUI)". All available documents, plans, etc. were reviewed, noted, and tallied in the audit worksheet. After the research and discovery phase, each category's element was "ranked" as 0) Not Practiced, 1) In Development, 2) Adopted Common Practice, 3) Exceeds Common Practice based on the City's current status. In the audit, this ranking provides an evaluation of the level at which the City is achieving each category and overall urban forest management and sustainability.

This urban forest audit identified the gaps in the City's urban forest as it pertains to the Vegetation Resource, the Resource Management, Community Framework, and Institutional Framework to inform the goals, strategies, and measures provided in this Plan. For more information on the U.S. Forest Service's Urban Forest Sustainability and Management Audit, visit https://www.interfacesouth.org or view an example in Appendix A.

Street and Park Tree Inventory Analysis

In addition to the analysis of the urban forestry program and the categories of urban forest sustainability and management, a street and park tree inventory was conducted beginning in December of 2016 and completed in March of 2018. This inventory was completed by International Society of Arboriculture Certified Arborists using the tree inventory software, Tree Plotter, developed and used by Plan-It Geo, contracted for the inventory. For a description of the tree inventory methodology and protocols, see Appendix B.

This Plan summarizes the City's tree structure, maintenance needs, and potential risks which were used to inform maintenance recommendations and overall urban forest management and enhancement while pursuing sustainability of the resource.

Tree inventory crew
Image Source: Plan-It Geo

"What Do We Have?"

State of the Urban Forest

To summarize the analysis of the urban forest resource and programs impacting it which informed the goals and strategies in this Plan

Image Source: Plan-It Geo

Overview of the City's Urban Forestry Program

Iowa City, located in Johnson County, IA was established in 1839 and encompasses 25 square miles, making it one of Iowa's larger communities with a July 2016 population estimate of 74,398. As part of the development of the City's IC2030 Comprehensive Plan Update, the public was asked what they like most about the City in one word. Based on the results, elements such as parks, trails, community, walkable, neighborhoods, and green were some of the highest counts. This emphasizes the important role that the City's urban forestry program has in creating and maintaining a place that the community enjoys.

Staffing

The Parks and Forestry Division of the Parks and Recreation Department is responsible for the care and maintenance of all City-owned trees located in parks, easements, and City rights-of-way. Other duties include snowplowing in the winter and other miscellaneous duties to assist in the maintenance of public green space. There are 1,800 acres of managed parks and natural areas throughout the City and the recent inventory tallied nearly 50,000 trees in parks and along streets that Parks and Forestry manages.

The staff within the Division includes the Superintendent, a Senior Maintenance Worker (SRMW), one Maintenance Worker III (MWIII), one Maintenance Worker II (MWII), and two Maintenance Worker I (MWI) positions. Also, during the months of April through October a Variable Employee is staffed.

Training and Experience Requirements

SRMW: Degree in Forestry or related field, International Society of Arboriculture (ISA) Certified Arborist certification, Pesticide Applicator License, and a Commercial Driver's License (CDL).

MWIII: High School degree and two years of experience, Pesticide Applicator License, and CDL. In addition to these requirements, the current MWIII staff is also an ISA Certified Arborist, ISA Certified Municipal Arborist, and has the ISA Tree Risk Assessment Qualification (TRAQ).

MWII: Two years of experience and a CDL.

MWI: One year of experience and a CDL.

Funding & Budget

For the Parks and Forestry Division to operate, the majority of the budget comes from the General Fund and approximately 10% comes from the Road Use Tax. Variable, small amounts also come from the Division's Memorial Tree Fund.

Budget Summary

(2018)

Tree Planting & Initial Care..... $67,145.00

Tree Maintenance & Removals..... $123,000.00

Management & Wages $479,551.15

Equipment, Operating Supplies, Training, and Tech Support..... $110,778.00

In addition to the General Fund and Road Use Tax, the Division actively pursues available grants for tree planting and maintenance. Each year, the Division orders seedlings from the State Nursery for free to do timber stand improvement projects in several parks with wooded areas. For areas along streets within the public right-of-way, the Division often utilizes the MidAmerican Energy "Plant Trees, Save Energy" program. The amount varies each year for the program's Trees Please Grant. For 2018 the City will receive $10,000.

Current Tree Maintenance Practices

The Parks and Forestry Division operates and maintains the urban forest with an established maintenance and planting schedule. The 2016-2018 street and park tree inventory consists of over 45,000 trees and nearly 5,000 planting sites. The summary of this data is provided in Tree and Planting Sites Inventory Summary section. The purpose of the inventory was to gather accurate and current data about the structure of the urban forest as well as the maintenance needs and priorities. This Plan provides recommendations for maintenance program improvements.

The City has staff and equipment for conducting tree maintenance and planting in-house. Maintenance equipment includes a pickup truck, two wood and debris chippers, a grapple wood truck, and a watering trailer. Depending on the size of the tree, the type of equipment, and existing workloads, maintenance is contracted.

The City Code established the location and responsibility of trees within the public right-of-way. It also provides the site development and design standards, tree nursery standards, and proper maintenance procedures. These ordinances and standards from the City Code (City Code: 16-1A) pertaining to the urban forest are summarized in the Ordinance Review & Summary section of this Plan. Recommendations for adding and/or improving these are provided in the Criteria & Indicators for Urban Forest Goals & Strategies section.

Summary of the City's Maintenance Practices

- Routine pruning such as the removal of dead, disease, dying, damaged, poor structured tree limbs, and for clearance is conducted daily and requests from the public are integrated into the pruning schedule.
- Tree risk management is conducted during routine pruning and the updated inventory will assist the Parks and Forestry with prioritization and scheduling.
- MidAmerican Energy is responsible for tree pruning for clearance around power lines.
- Young tree pruning is completed during the winter months.
- Oaks (*Quercus*) are only pruned in the winter months to prevent oak wilt (*Bretziella fagacearum*). If oaks need to be pruned outside of this timeframe, pruning cuts are treated.
- Trees requiring immediate removal or pruning are addressed as soon as possible using in-house and contracted tree care companies depending on the extent and workloads.
- Newly planted trees are typically mulched and the trees are watered for the first 2 years depending on the level of precipitation. After 2 years, the adjacent property owner is asked to assist. Information on proper tree care and watering requirements is provided.
- The number of trees planted on an annual basis is between 150 and 200 trees depending on the season and available staff time and resources.
- The tree maintenance staff understand locations where trees are needed. The 2016-2018 tree and planting site inventory will assist staff in prioritizing locations for planting.
- If the property owner has public right-of-way adjacent to his or her property and would like to plant a tree, a tree planting permit application must be completed and sent to the City for review. Optionally, the property owner may contact the City to have a tree planted for them though the planting will depend on the specific situation, whether it is a replacement tree, and current Forestry budget constraints. The Planting in the Right-of-Way brochure and Tree Planting Permit application are available online.
- The City has tree inventory management software known as Tree Plotter and Work Order Management that contains all inventory points and data. This Plan provides a summary of the data and will assist the maintenance staff with future maintenance and planting.
- Minimal vegetation control chemicals are used throughout the City's managed parks and natural areas. Turf areas and open green spaces are not routinely sprayed to control undesirable vegetation. Mechanical techniques (hand weeding, mowing/trimming, over-seeding and mulching) and landscape design techniques (such as prairie-style and new perennial design) are used to reduce the need for vegetation control chemical use.

Ordinance Review & Summary

To provide urban forest program goals, recommendations, and strategies, an extensive ordinance, policy, and practices review was conducted following the U.S. Forest Service's Urban Forest Sustainability and Management Audit. The following provides a high-level summary of these pertaining to or affecting urban forestry and is not intended to be comprehensive but to highlight the importance placed on urban trees. The City Code is available at: http://www.sterlingcodifiers.com/codebook/index.php?book_id=953.

Table 2. Summary of the ordinance review

Element	Title	Description (summarized)
No Net Loss of Tree Canopy	City Code, Title 14, Chapter 5, Article E "Landscaping and Tree Standards", 14-5E-6: PRESERVATION OF EXISTING TREES, E, Table 5E-2 "Schedule of Substitution Values"	Tree planting requirements for the removal of trees: 36" or > DBH* = 3 required trees 12-35" DBH = 2 required trees 2-12" DBH = 1 required tree *DBH = diameter at breast height (4.5')
Tree Risk Management	City Code, Title 6, Chapter 1, 6-1-2: PUBLIC NUISANCE DEFINED; PUBLIC NUISANCES ENUMERATED, B. "Diseased Or Damaged Trees Or Plant Materials"	Any dead, diseased, or damaged trees be injurious to other trees, property, or people should be managed appropriately.
Tree Protection	City Code, Title 18, Chapter 3, 18-3-2: DESIGN STANDARDS, E: "Landscape Preservation"	The landscape shall be preserved in its natural state by minimizing tree and soil removal. Structures and other site improvements shall be located where the maximum number of trees are preserved on the site. Provides development plan criteria which requires trees to be preserved.
	City Code, Title 14, Chapter 5, Article E "Landscaping and Tree Standards", 14-5E-5: PROTECTION AND MAINTENANCE, C	Explains the property owner's [all types except single-family] tree maintenance and replacement responsibility.
	City Code, Title 14, Chapter 5, Article E "Landscaping and Tree Standards", 14-5E-6: PRESERVATION OF EXISTING TREES, A-E	Describes tree root protection requirements such as a minimum protection zone extending to the tree's canopy drip line. Describes the role of the city forester and that the preserved trees must survive for at least five years or else replacement is required.
	City Code, Title 10, Chapter 8, 10-8-5: DAMAGE TO TREES OR PLANT MATERIALS PROHIBITED, A & B	Describes tree protection during construction and the role of the city forester.
	Ordinance 05-4186, 12-15-2005 Street Tree Requirements, and listed in City Code, Title 14, Chapter 5, Article E "Landscaping and Tree Standards", 14-5E-7: STREET TREE REQUIREMENTS	Provides minimum tree spacing, number, and minimum planting site width for street trees adjacent or within the public right-of-way.
Invasive Management	City Code, Title 14, Chapter 5, Article I "Sensitive Lands and Features", 14-5I-6: JURISDICTIONAL WETLANDS, F. "Design Standards" 5 & 6	No planting of foreign or invasive species, including intrusive native varieties, in regulated wetland or buffer areas is prohibited. – recommend a species list
Arborist Standards	City Code, Title 10, Chapter 8, 10-8-10: ARBORICULTURAL SPECIFICATIONS AND STANDARDS OF PRACTICE	The city forester is authorized to establish specific standards for tree planting and maintenance.

Tree Pruning	City Code, Title 10, Chapter 8, 10-8-7: TRIMMING TREES AND PLANT MATERIALS	Describes the pedestrian and vehicle tree clearance standards established by the city forester.
Tree Nursery Stock Requirements	City Code, Title 14, Chapter 5, Article E "Landscaping and Tree Standards", 14-5E-7:STREET TREE REQUIREMENTS, B. "Street Trees Within Public Right Of Way"	Any tree planted within the street right of way must have a single trunk, with a minimum of four feet (4') from grade to the first branch, at the time of planting.
Minimum Soil Volume	City Code, Title 14, Chapter 5, Article E "Landscaping and Tree Standards", 14-5E-4: TREE PLANTING REQUIREMENTS, C. "Siting Requirements"	The minimum planting area required for large trees is 256 square feet and 120 square feet for small trees.
Tree Species List	City Code, Title 14, Chapter 5, Article E "Landscaping and Tree Standards", 14-5E-3: GENERAL REQUIREMENTS AND MEASUREMENTS, A. "Permitted Species"	The city forester is to establish the list of recommended trees for planting.

Related Plans & Initiatives

In addition to the tree and landscape preservation and enhancement listed in the City Code, trees and the entire urban forest also have high importance in other City and region plans, studies, and initiatives. This incorporation of trees and urban forests in these efforts displays the appreciated value considered by many organizations and entities. The following describes these efforts at a high-level which were reviewed during the discovery phase of the Urban Forest Sustainability & Management Audit.

Table 3. Existing efforts with urban forestry references presenting opportunity to integrate with the UFMP

Document	Impacting the Urban Forest
IC2030: Comprehensive Plan Update (2013)	- Goals for growth and proper land use - Preserving and enhancing the environment and resources - Goals and strategies for parks and open space use and connectivity
Gather Here Park Master Plan (2017)	- Individual park plans for improving the service, availability and use
Natural Areas Master Plan (2018)	- Inventory and analysis of the City's parks and natural areas - Describes how to restore and manage these areas in order to preserve their ecological functions and increase biodiversity (the STAR Community)
South District Plan (2015)	- Goals for tree-lined streets - Goals for parks, trails, and open space
Climate Action and Adaption Plan (in progress)	- Strategies to achieve emissions targets. An opportunity for this UFMP to be integrated as trees play a major role in climate change mitigation
Others	- Complete Streets - Sidewalk Infill Program - Bicycle Master Plan - Trails Master Plan - Downtown Redevelopment Plan - University Heights Community - Johnson County conservation efforts

Other City Department Interaction

The many elements, challenges, and locations of trees managed by the City require cohesive management and interactions among departments, divisions, and organizations to maintain and enhance it. To illustrate the complexity of urban forest management, the following provides an example of some of the entities involved or impacting trees to any extent. It shows that managing the urban forest cannot afford inward looking and requires inclusiveness among the entire City.

Table 4. Departments and entities that impact urban forest management

- ↓ Parks and Recreation Department
  - Parks and Forestry Division
  - Recreation Division
  - Facilities Division
  - Cemetery Division
- → Parks and Recreation Foundation – the 501(c)3 that oversees the Endowment Fund
- → Parks and Recreation Commission
- ↓ Neighborhood and Development Services Department (NDS)
  - Sustainability Services
  - Neighborhood Services
    - Urban Planning
    - Neighborhood Outreach
      - Neighborhood Council of Iowa City
      - Program for Improving Neighborhoods (PIN) Grant
      - 36 Neighborhood Associations
    - Community Development
      - UniverCity Neighborhood Partnership Program
    - Metro Planning Organization of Johnson County (MPOJC) – Complete Street policy and County Master Plan
- → Neighborhood Open Space Program (between NDS and the Finance Department)
- → City Attorney's Office – involved with legal issues regarding urban forests
- → City Managers Office and Communications Division
- ↓ Public Works Department
  - Engineering Division – oversees the Complete Streets Policy
  - Streets and Traffic Engineering
  - Wastewater/Water
  - Transit
  - Refuse/Recycling
- → Planning and Zoning Commission
- → Climate Action Steering Committee
- → Board of Adjustment

Existing and Potential Partners in Urban Forestry

Beyond the City interactions there are opportunities and existing partnerships to grow the urban forest. Some examples and their strengths and opportunities to bring to a partnership are provided below.

Table 5. Examples of potential partners in implementing strategies of the UFMP

Opportunity for Partnership and Support					
Organization	Grants	Technical Support	Training, Education, and Resources	Advocacy	Volunteer
Iowa Department of Natural Resources	X	X	X		
Iowa Urban Tree Council	X	X	X		
Trees Forever, Inc.			X		
University of Iowa and ISU Forestry Extension			X		
Project Green				X	
Neighborhood Associations					X
Iowa City Downtown District					X
Iowa City Community School District					X
MidAmerican Energy	X				

Volunteer Engagement & Public Education

Community support, education, and involvement are essential to an urban forestry program. The City is actively pursuing enhancement of this with the 2016-2018 tree inventory and software, development of this Plan, Arbor Day events for public and private schools with local media coverage, and by acquiring the Arbor Day Foundation's Tree City USA award annually since 1979. In 2018 the City was awarded the Tree City USA Growth Award. The potential partnerships described above are opportunities for increasing public engagement and education. Also, the tree inventory software application could be used by the community to learn about the trees around them, the many benefits the trees provide, and areas planned for tree maintenance.

Arbor Day celebration in Iowa City, learn about the City's trees on the app, and the Iowa City Planting in the Right-of-Way brochure

TREE AND PLANTING SITES INVENTORY SUMMARY

Using the inventory data in Microsoft Excel, Access, ArcGIS, and the City's Tree Plotter app, analyses were conducted to determine the state, characteristics, and trends of the city-managed trees. The inventory does not account for trees along stream corridors or undeveloped City property.

The information is provided to guide future maintenance and management and to better plan for the health and longevity of the City's urban forest.

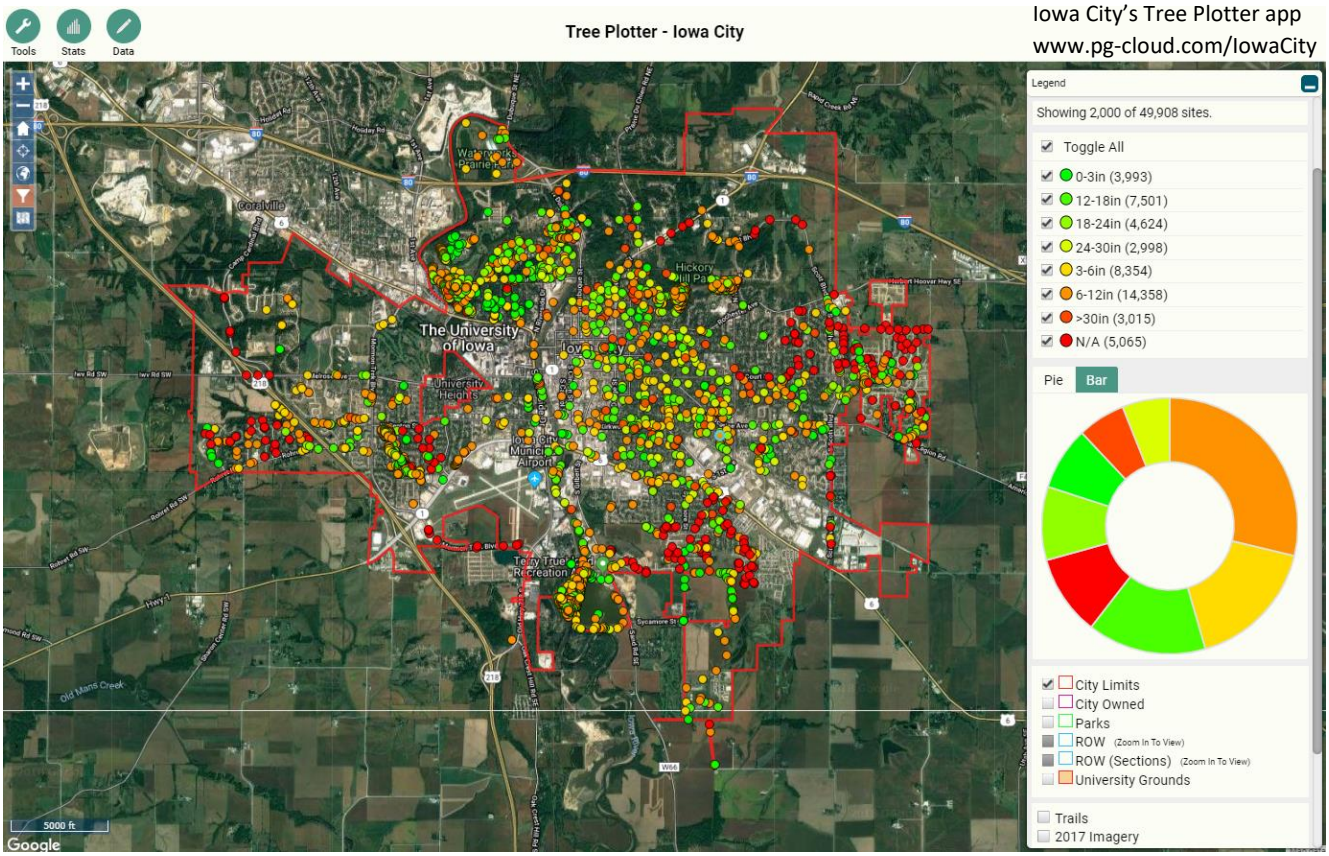
This analysis and summary was conducted using the inventory data completed in March of 2018 which, as of March, consisted of 45,014 trees and 4,972 planting sites. Of those 45,014 trees, 25,451 are street trees and 19,563 points are park trees. Planting sites were only mapped along or within the City's rights-of-way, not in parks. It should be noted that the City is actively managing trees and updating the inventory database so these counts and overall summaries may vary slightly.

Tree inventory crew image source: Plan-It Geo

Some of the analyses and summaries were completed separately for street and park trees because of the differences in management techniques.

The following section provides the results of the analysis of the street and park tree inventory analysis by structure and maintenance needs. This analysis informed the tree maintenance and overall resource strategies.

Iowa City's tree inventory displayed in the City's Tree Plotter software application



Iowa City's Tree Plotter app
www.pg-cloud.com/IowaCity

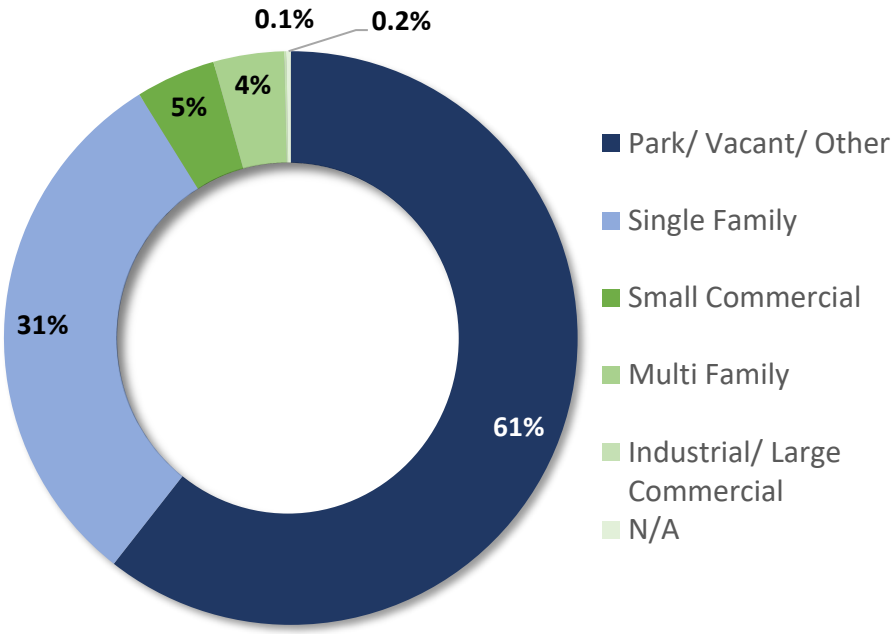
The Structure of City-Managed Trees

Urban forest structure describes the tree population in terms of its species composition, number of trees, age classes, and tree distribution. These summaries assist urban forest managers in proper tree management and planting to ensure long lasting canopy and benefits distributed equally across the City.

Trees by Land Use

Before summarizing trees by structure and maintenance needs, it is important to understand the distribution of trees in relation to land use. The land use affects the type of maintenance needed or previously conducted; the adjacent landowners and their views, perspectives, and willingness to assist; and the resources available for a tree in a particular land use. The following chart describes the distribution of trees across land uses.

Figure 3. Land use distribution of inventoried trees



Park Tree Distribution

The City maintains trees approximately 50 parks. Based on the inventory, a total of 19,563 trees are in maintained areas of parks and trails. This includes trees plotted as “stump”, “removed”, and “dead”. The following provides a summary of the parks with the highest number of trees but a table of total trees by park is provided in Appendix C.

Table 6. Parks with the highest tree count

Park Name	Count	% of Park Trees
Iowa river rc trail	1554	7.9%
Willow creek park	2355	12.0%
Hickory Hill park	2468	12.6%
Peninsula Park	2918	14.9%
Terry Trueblood Recreation Area	3605	18.4%

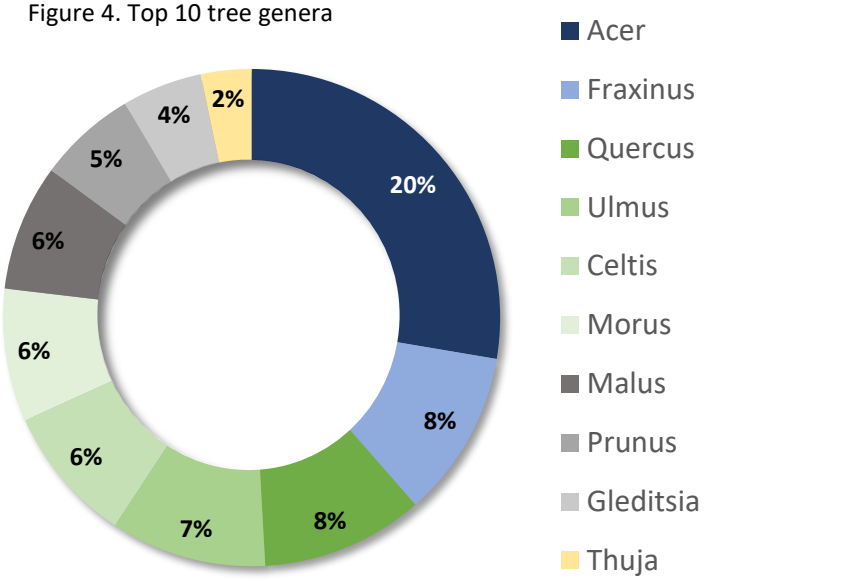
Tree Diversity and Composition

Tree composition data are essential since the types of trees present in a community greatly affect the amount of benefits produced, tree maintenance activities, and budgets. Based on the inventory data there exists a total of 66 unique genera (includes "N/A", "Conifer", and "Broadleaf") with the top five comprised of *Acer* (20%), *Fraxinus* (8%), *Quercus* (8%), *Ulmus* (7%), *Celtis* (6%). The top ten genera comprise 72% (32,385) of the total street and park tree population.

Table 7. Top 10 genera

Genus	Count	% Whole
Acer	8958	20%
Fraxinus	3527	8%
Quercus	3422	8%
Ulmus	3280	7%
Celtis	2903	6%
Morus	2804	6%
Malus	2666	6%
Prunus	2074	5%
Gleditsia	1688	4%
Thuja	1063	2%
Total	32385	72%

Figure 4. Top 10 tree genera

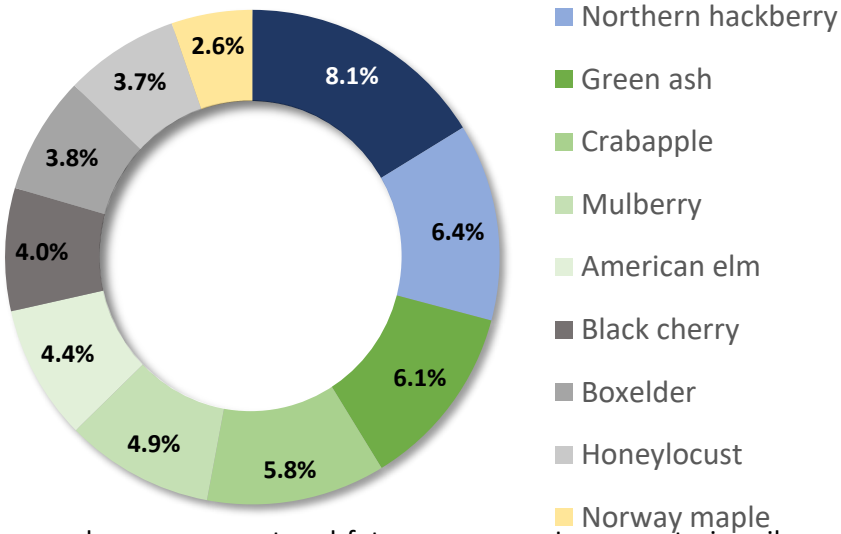


Based on the inventory data there exists a total of 178 unique tree species (includes generalized species classifications such as "Ash" and "Birch"). The top ten species comprise 50% of the population, the highest belonging to silver maple (8.1%), followed by northern hackberry (6.4%), and green ash (6.1%). The following provides a summary of the top ten species identified in the 2016-2018 tree inventory.

Table 8. Top 10 species

Common Name	Count	% Whole
Silver maple	3650	8.1%
Northern hackberry	2903	6.4%
Green ash	2727	6.1%
Crabapple	2631	5.8%
Mulberry	2185	4.9%
American elm	1987	4.4%
Black cherry	1807	4.0%
Boxelder	1732	3.8%
Honeylocust	1688	3.7%
Norway maple	1189	2.6%
Total	**22499**	**50%**

Figure 5. Top 10 tree species



The abundance of maple, particularly silver maple, pose present and future concerns. Large, maturing silver maples tend to shed branches presenting a potential risk. Also, silver maples grow large and are often multi-stemmed, resulting in high maintenance costs when overly mature or diseased silver maples require removal. It is also always important to maintain species diversity at the street block and neighborhood level, which maintains citywide tree diversity and pest/disease resiliency.

Size and Age Distribution

The distribution of tree ages influences the structure of the urban forest as well as the present and future costs. An uneven-age urban forest offers continued flow of benefits and a more uniform workflow allowing managers to more accurately allocate annual maintenance funds.

Figure 6. Iowa City's tree diameter distribution versus ideal distribution

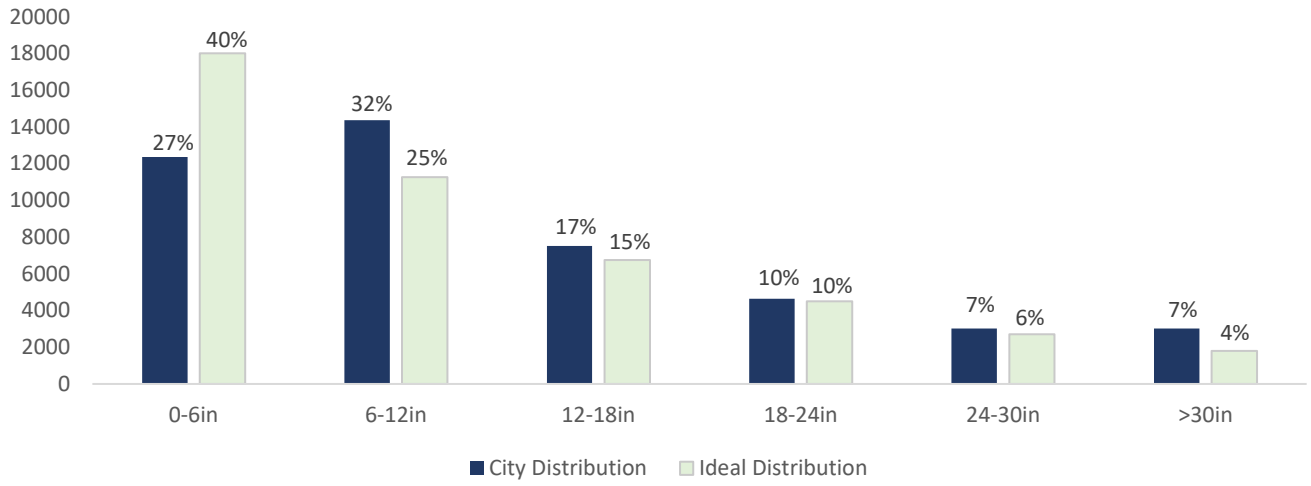


Figure # shows the distribution of size classes (DBH or diameter at breast height, 4.5') for the inventoried trees that were assigned a value. According to the figure, the 6-12in DBH range comprises the majority of the tree inventory database with 14,372 trees or 32% and the 24-30in DBH range makes up the smallest portion with 3,019 trees or 7%, slightly less than the >30in range with 3,027 trees. Street trees average 13.1", park trees with 11.1" and an overall average of 12.2" DBH.

According to Figure #, the aggregated data does not reflect the ideal urban forest distribution (McPherson, Soares et al. 2011) due to the count of the 0-6in and 6-12in DBH ranges. Ideally, the 0-6in range would represent 40% of the population and the 6-12in range would represent 25% of the population. The distribution of individual tree ages within a tree population influences present and future costs as well as the flow of benefits. An ideal age/size distribution in the tree population allows managers to allocate annual maintenance costs uniformly over many years and assures continuity in overall tree canopy coverage and associated benefits which are often dependent on the growing space of individual trees (e.g. open grown versus restricted growing areas).

To optimize the value and benefit of trees, the community forest should have a high percentage of large canopy trees which provide more ecosystem benefits. At the same time, there must be a sufficient number of younger, smaller trees in the tree population to account for the loss of trees over time and thereby maintain a sustainable community forest. In traditional forest management, this is similar to an uneven-aged stand or tree population.

The Management Needs of City-Managed Trees

Tree characteristics and outside forces affect the management needs for urban trees. An analysis of the condition and maintenance requirements assists managers in planning the urban forest. Tree condition indicates how well trees are managed and how well they perform given site-specific conditions. Tree maintenance needs are inventoried for public safety reasons and for the health and longevity of the trees. Understanding the maintenance needs assists tree managers in establishing daily work plans and has also complemented the development of the Urban Forest Management Plan.

Urban Forest Condition

The inventory data was analyzed to identify trends in tree management needs and condition. Local information on the condition of street and park trees plays an important role in community planning, municipal budgeting,

and use of resources. Each inventoried tree was rated for the condition of the wood and the foliage on a scale of “excellent”, “good”, “fair”, “poor”, and “critical/dead” using the inventory arborists’ expertise in tree species physiology and responses to factors affecting each tree.

The tree health (condition) chart shows that of the 45,014 trees inventoried, the majority (47%) are in good condition. 1,384 (3%) trees are critical or dead and 2,428 (5%) trees are in poor condition. Trees that are dead or dying should be removed, with priority to remove the highest risks. Trees that are in poor condition should be monitored, maintained, treated, and/or removed depending on each tree’s situation.

Figure 7. Condition of street and park trees

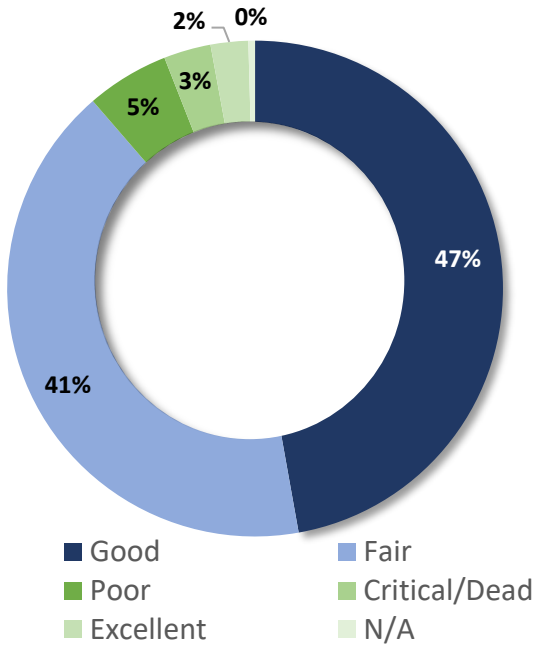


Figure 8. Comparison of the condition of street and park trees

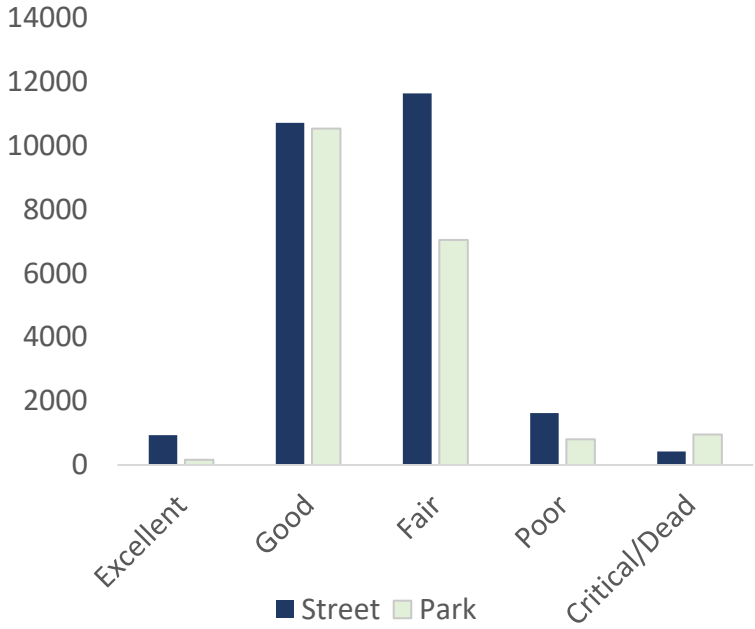
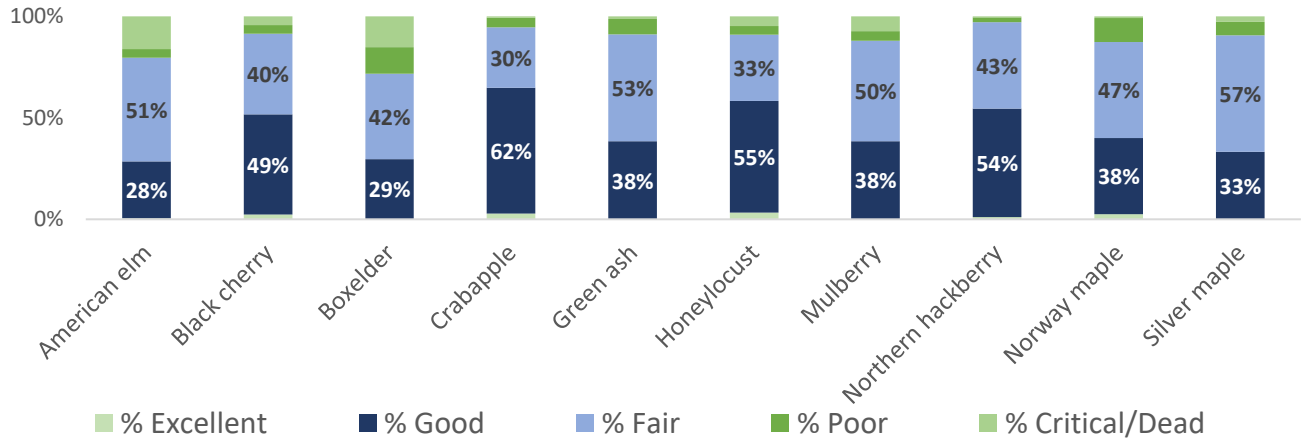


Figure 8 shows the condition of street versus park trees. As illustrated, street trees have a better overall condition though there exists more critical or dead trees in parks. These summaries are addressed in the street and park tree maintenance recommendations.

The top ten tree species comprise 50% of the total urban forest so the condition of these species needs to be evaluated to determine their performance in an urban environment. The figure below summarizes the condition distribution of each of the top ten species.

Figure 9. Condition distribution among the top 10 species



The evaluation of condition of the top ten species shows that the majority of trees are rated as either good or fair condition.

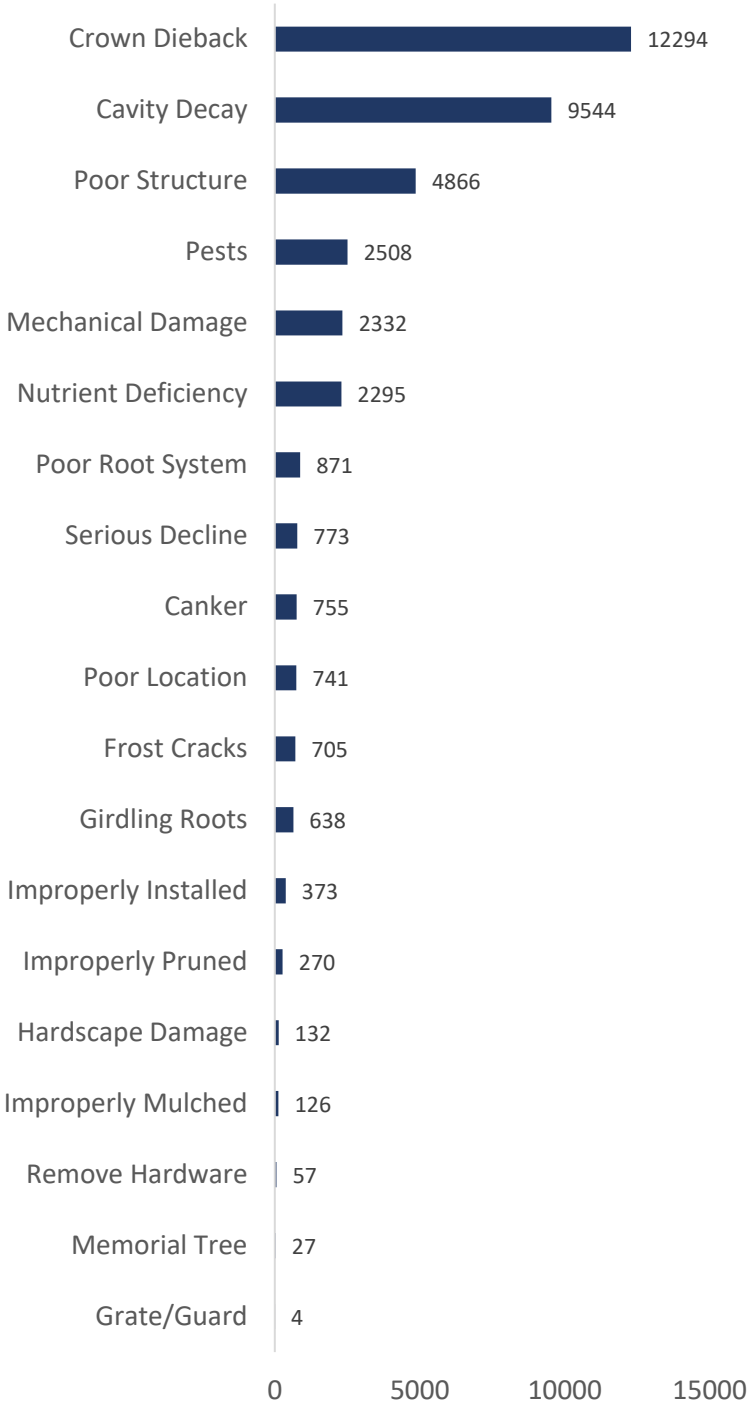
Tree Observations

Observations were noted during the inventory to indicate common issues of the street and park trees such as mechanical damage, cavity decay, and improper mulching practices. A total of 39,311 observations were noted for 23,866 trees. The chart to the right summarizes the observations for the 45,014 trees inventoried (as of March 2018).

Mechanical damage to the trunk of a young tree

Improperly pruned tree
Source of images: Plan-It Geo

Figure 10. Count of tree observations



The trees noted with crown dieback (12,294 trees) should be monitored, especially the trees still in fair or good condition to determine if additional decline can be prevented or reduced. Other observations such as mechanical damage, poor structure, poor location, and improper installation/pruning/mulching may be a result of anthropogenic causes. While some observations can be treated, many cannot be corrected and should instead be prevented, such as mechanical damage and large girdling roots. These observations are useful in understanding trends in maintenance practices, stress, and signs and symptoms of potential issues which help to form the recommendations in this Plan.

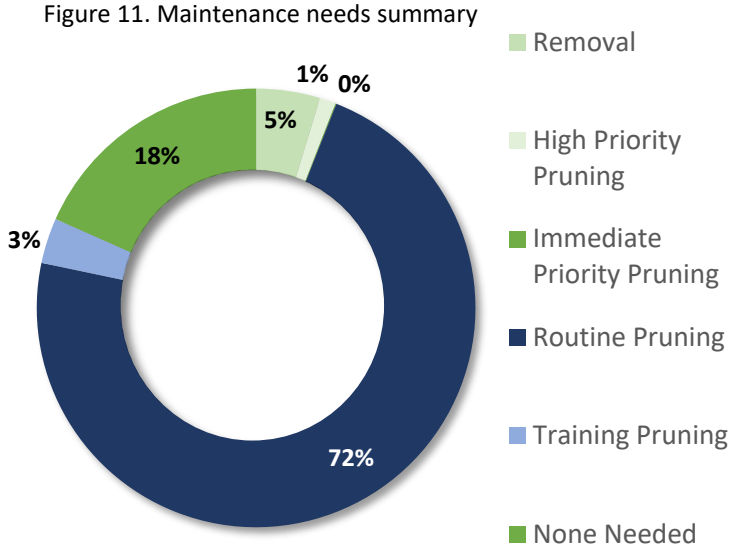
Maintenance Needs of Street and Park Trees

The inventory included an assessment of the maintenance needs, if any, for each tree. This information along with location, tree size, and the Tree Plotter application were used to guide the management recommendations. The table and chart below provide a summary of the maintenance required for both street and park trees.

Table 9. Summary of maintenance needs for street and park trees

Maintenance Need	Count	%
Removal	2110	5%
High Priority Pruning	532	1%
Immediate Priority Pruning	31	0.1%
Routine Pruning	32398	72%
Training Pruning	1501	3%
None Needed	8223	18%
NA	219	0.5%
Total Whole	**45014**	**100%**

Figure 11. Maintenance needs summary



Of the 45,014 total trees, 44,795 trees have a maintenance value. The majority of trees are noted for routine pruning with 72%. Trees recommended for removal comprise 5% of the inventory with 2,110 trees and for high priority pruning and immediate pruning, a total 532 (1%) and 31 (0.1%) trees, respectively, were noted.

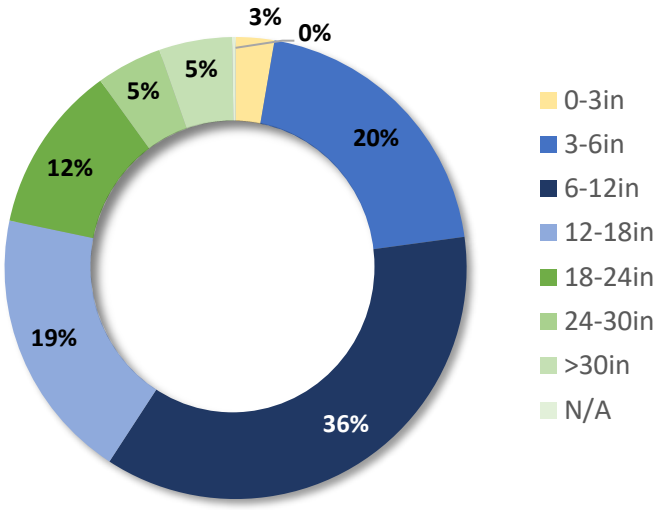
The table to the right distinguishes the maintenance needs of street and park trees separately since maintenance methods are different for the two areas. In summary, parks have more trees recommended for removal with 1,173 trees but less high priority and immediate priority pruning compared to street trees. More street trees require training pruning with a total of 1,262 trees.

Table 10. Summary of maintenance need by street and park

Maintenance Need	Street	Park
Removal	937	1173
High Priority Pruning	381	144
Immediate Priority Pruning	23	8
Routine Pruning	16717	15576
Training Pruning	1262	239
None Needed	6047	2142
Total	**25367**	**19282**

Since the size of the tree often has a large impact on cost, a summary of the trees for removal by DBH is provided in the chart to the right. The 6-12in DBH range has the highest percent with 36% (767 trees) followed by the 3-6in range with 20% (425 trees) and then 18-24in range with 19% (403 trees).

Figure 12. Summary of street and park tree removals by DBH



Summary of Tree Risk Assessment

A Level 2 Qualitative Risk Assessment was completed during the 2016-2018 inventory for street and park trees based on ANSI A300 (Part 9) standards and the protocols in the Best Management Practices: Tree Risk Assessment, published by the International Society of Arboriculture (2011). Details about the risk assessment process are found in Appendix B of this Plan.

Of the 45,014 trees in the inventory, 24,335 trees were assigned a risk rating. Primarily, a Low Risk Rating was assigned with 22,859 trees (94%). Only 9 trees were assigned an Extreme Risk Rating, 5 of which are street trees.

It should be noted that these summaries of removals are as of March 2018. The City is actively managing tree risk and these values may have changed.

Figure 13. Summary of the tree risk assessment for street and park trees

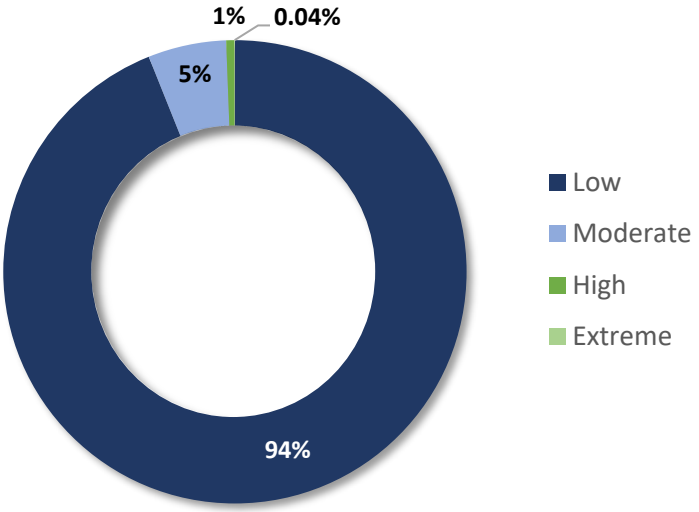
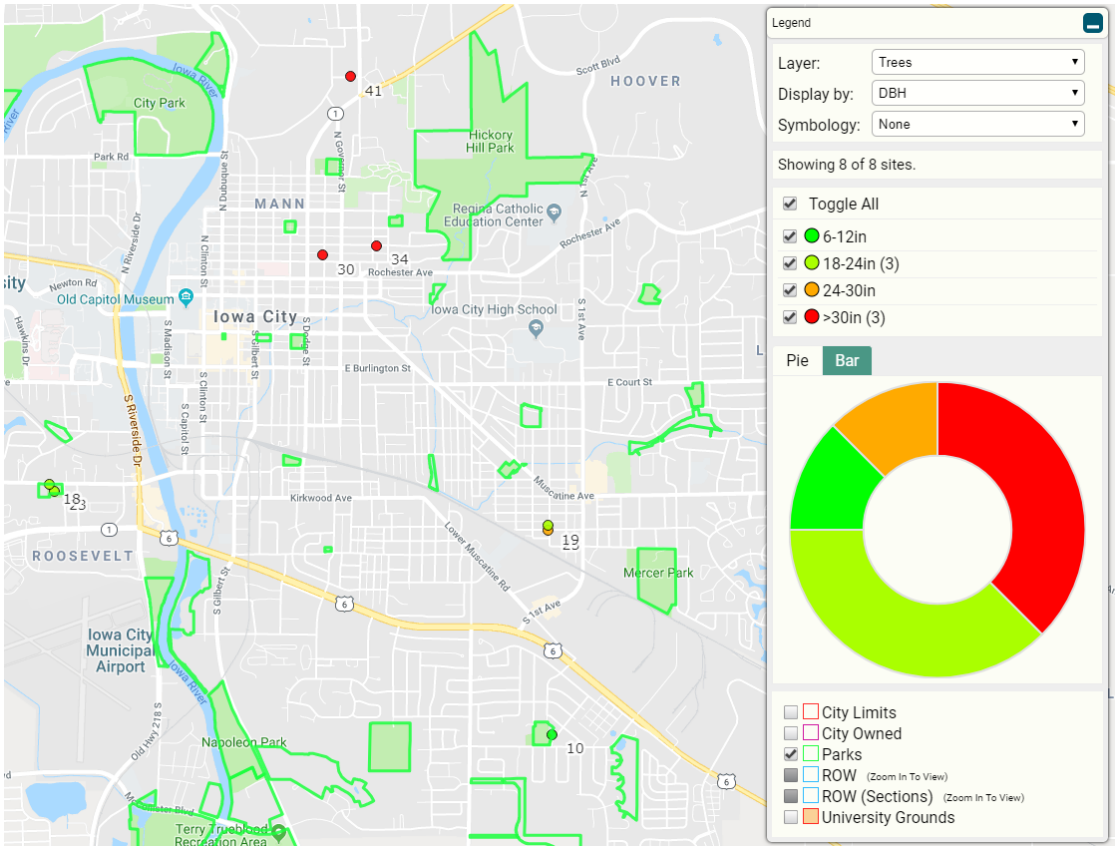


Figure 14. Map of trees with a risk rating of Extreme

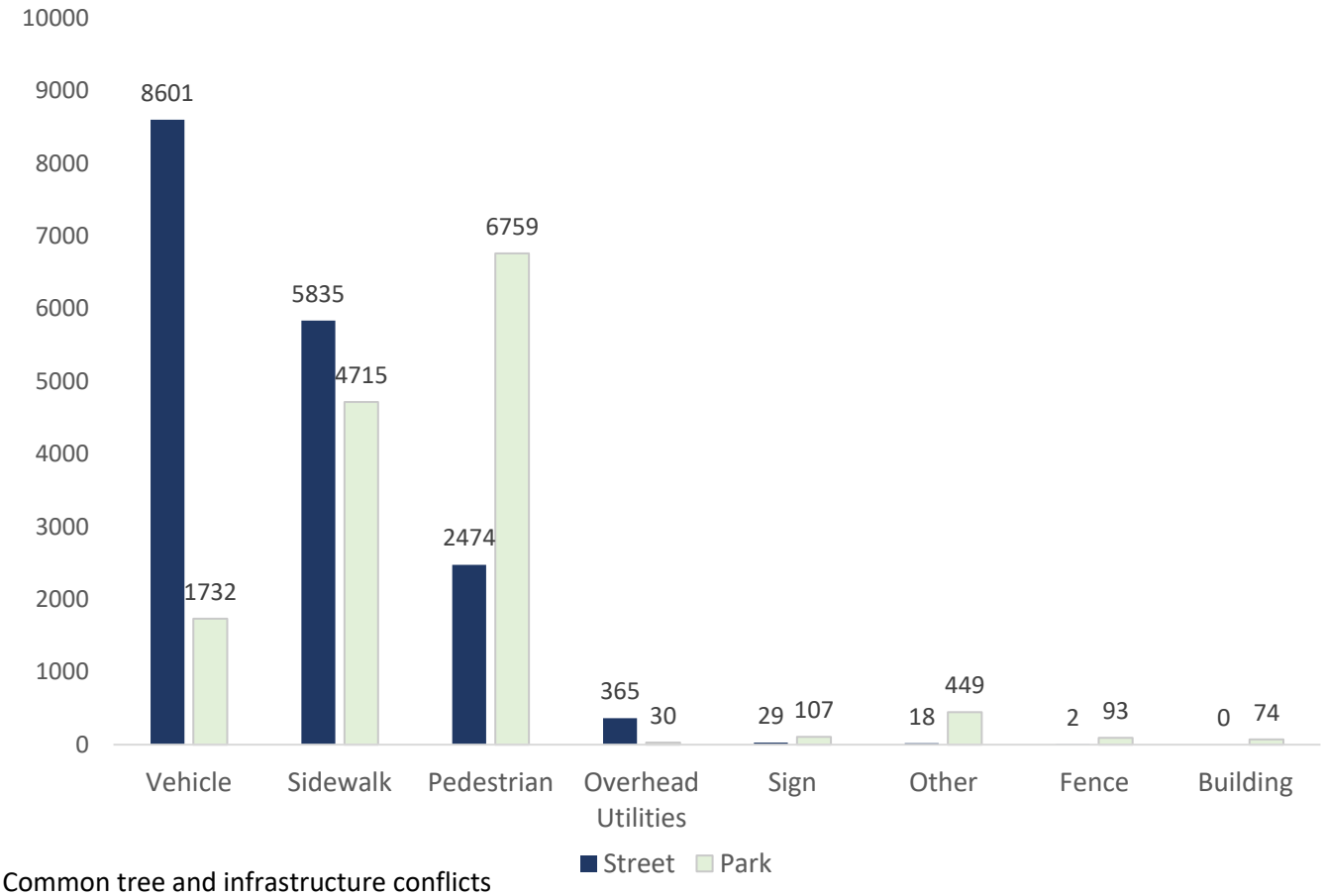


INFRASTRUCTURE CONFLICTS

During the inventory, infrastructure conflicts with existing trees were noted. This information is useful for maintenance crews when reviewing the inventory to determine tree limb clearance needs, potential issues with trees damaging utilities, and to inform future planting efforts and replacement tree selection.

A total of 31,283 infrastructure conflicts were noted with the majority consisting of sidewalks (34%), vehicle (33%), and pedestrian (30%). These percentages are based on the conflicts observed and not based on the total number of trees. For example, a total of 10,550 conflicts with sidewalks were noted out of the total 31,281 conflicts observed inventory-wide. Many of these may not require immediate attention or ever cause issues requiring maintenance but it is important to understand the types and distribution of infrastructure conflicts.

Figure 15. Summary of infrastructure conflicts with street and park trees



Common tree and infrastructure conflicts

From left to right: Tree and sidewalk damage (phillymag.com), tree and wire conflicts (newtownconservators.org), and tree grate and sidewalk conflict (localecologist.org). Photos not taken in Iowa City.

Vulnerability to Emerald Ash Borer of City-Managed Trees

Emerald Ash Borer (*Agrilus planipennis*), also simply called EAB, is a small, metallic-green, invasive wood-boring beetle native to east Asia that attacks and kills ash trees (*Fraxinus* spp.). Adult beetles live on the outside of trees and feed on the leaves during the summer months, while the larvae feed on the living plant tissue, the phloem and cambium, underneath the bark which ultimately kills the tree by disrupting the vascular system.

EAB was first found in Iowa City in 2014 and ash tree mortality is being noticed across the City, on public and private property. The dying ash trees and removals has raised additional awareness and concern from the general public. Since 2014, the City has been managing and addressing the impacts from EAB and has recently identified trees to consider treating. Using the tree inventory data, the criteria for considering treatment for ash trees includes ash trees between 9 inches and 35 inches in diameter, in good condition, and not conflicting with utilities. City staff have identified a total of 400 trees that meet this criteria and are considering treatment. Ongoing public outreach is underway and educational materials are being updated and provided to the public.

Learn more about EAB at https://www.icgov.org/emeraldashborer. Information about the City's EAB response guidelines, outreach methods, cost-share opportunities, and additional charts are found in Appendix H.

The following charts summarize the ash tree population within the City's street and park inventory. These include all trees with the common name ash, white ash, green ash, and black ash. Manchurian ash are not included in the summaries as they are not susceptible to EAB and mountain ash is not a true ash (*Sorbus* genus, not *Fraxinus*). The tree inventory software app should be used to prioritize EAB monitoring and management.

Figure 16. Condition classes of ash trees

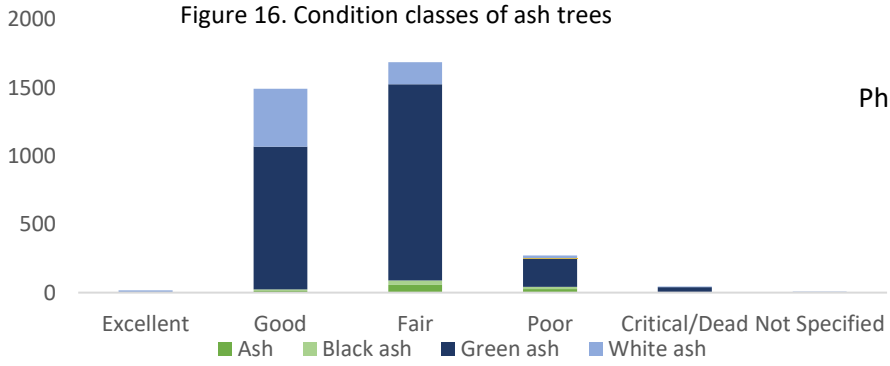
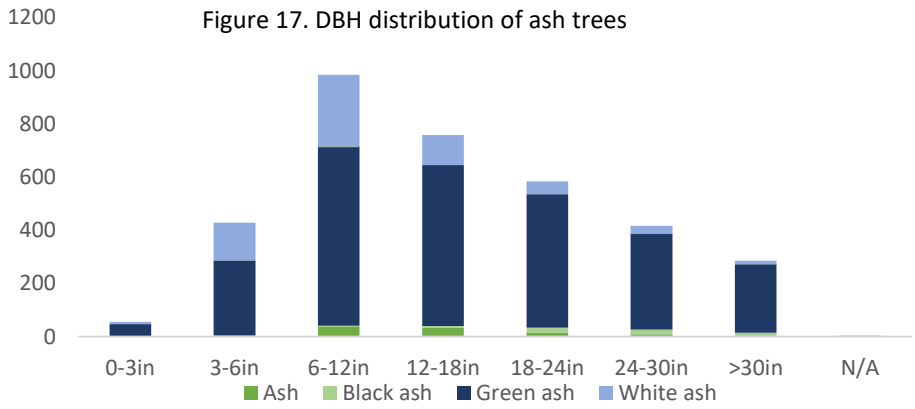


Figure 17. DBH distribution of ash trees



There are a total of 3,515 ash trees in the inventory database, of which 2,300 are street trees. The charts show that of the four ash species in the tree inventory, 1,685 are in fair condition (of which 1,128 are street ash) followed by 1,492 in good condition. 44 are in critical or dead condition and 271 are in poor condition. The ash trees are primarily in the 6-12in DBH range with 984 trees (540 street ash) followed with 758 in the 12-18in range. Green ash have the highest count (2,726) in the inventory compared to other ash species.

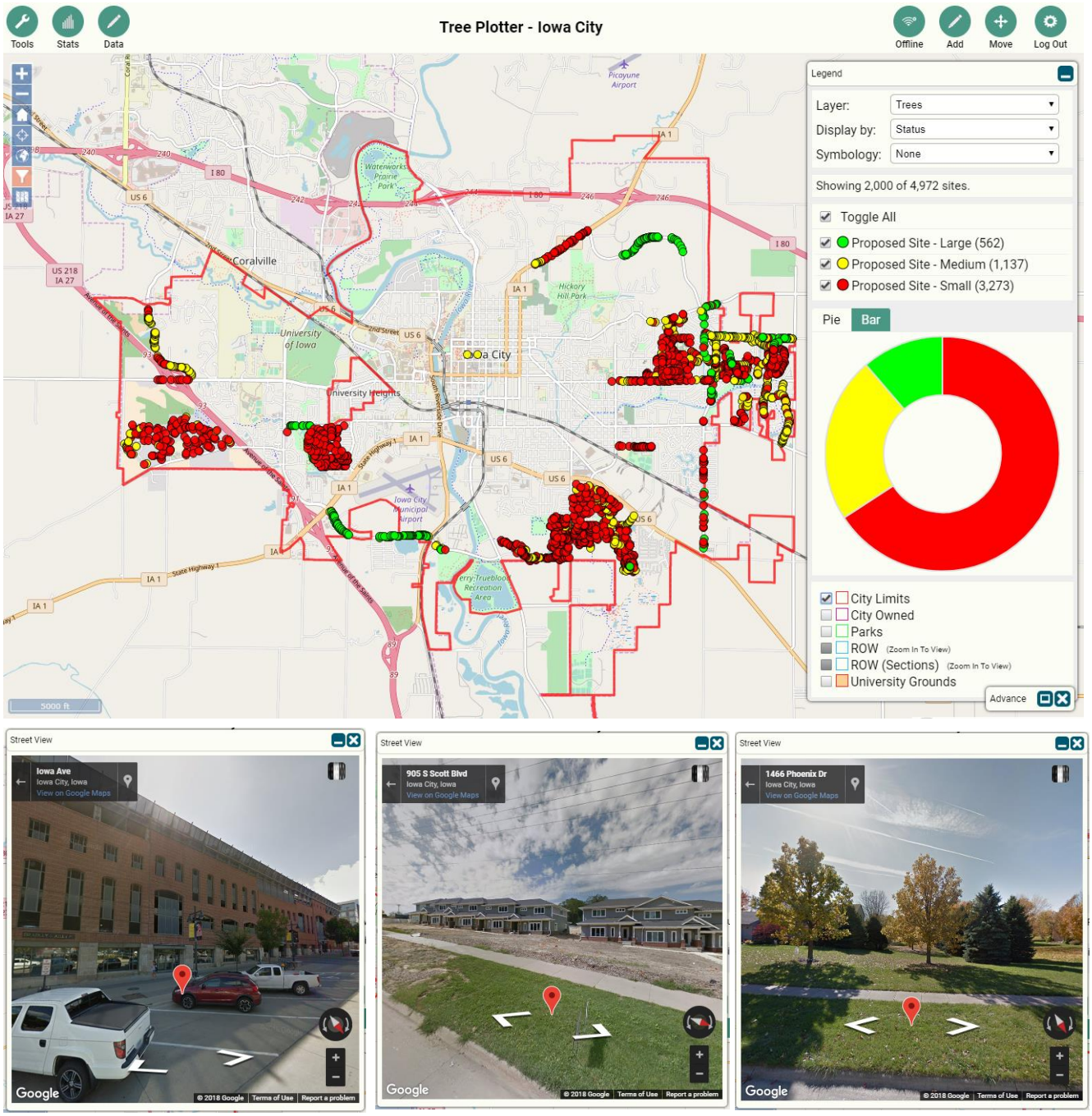
Figure 18. Key characteristics for ash (*Fraxinus*) tree and emerald ash borer (*Agrilus planipennis*) ID
Photo Source: www.csfs.colostate.edu

Possible Planting Sites Summary

The 2016-2018 inventory also included the mapping of potential planting sites that meet the minimum spacing, soil volume, proximity to utilities, etc. as defined by the City and listed in Appendix B. This was only completed for sites adjacent or within the right-of-way. If a site met these parameters, the only information tracked was the location and the qualitative size of the site; Proposed Site – Large, Proposed Site – Medium, and Proposed Site-Small. There were a total of 3,274 Small Sites, 1,137 Medium Sites, and 562 Large Sites inventoried.

Discussion and recommendations for how to prioritize and use the location information is found in the goals and strategies section. The location of these sites is in the map below or the link below provides a view of the active map.

Figure 19. Location and size of planting sites (https://pg-cloud.com/IowaCity/?scenario=PlantingSites)



Examples of the types of planting sites inventoried shown in Google Street View

"What Do We Want?"

Criteria & Indicators for Urban Forest Goals & Strategies

To provide the guidance for action to preserve and enhance Iowa City's urban forest using the assessment of the state of the urban forest

The following sections utilized the information and data that was analyzed and summarized to develop the strategies in this Plan.

The following sections will provide the City with the methods for pursuing urban forest management goals and measuring progress towards optimal levels of management. These optimal performance indicators are listed in the tables below for the Vegetation Resource, Resource Management, Community Framework, and Institutional Framework for Iowa City's urban forest. **The cells in the table that are in bold font and darker green/grey represent the City's current status**. Using these Performance Indicators that follow and the methods for monitoring (listed in the next section) will guide the City towards preserving and enhancing the urban forest over a 20-year timespan. Following this section, a 5-year strategic plan is provided. The strategies are listed within four goals and measures for monitoring achievement are provided in the Adaptive Management & Monitoring section. This process allows the City to gauge progress towards optimal Performance Indicators allowing for adaptive management and short-term strategies with long term impacts.

IOWA CITY'S 20-YEAR FRAMEWORK FOR URBAN FOREST MANAGEMENT

Criteria	Table 11. Vegetation Resource – Performance Indicators Low	Moderate	Good	Optimal	Key Objective
V1 Tree species diversity	Fewer than five species dominate the entire tree population citywide	No species represents more than 20% of the entire tree population citywide	No species represents more than 15% of the entire tree population citywide	**No species represent more than 10% of the entire tree population citywide**	Establish a diverse and resilient tree population citywide
V2 Diameter distribution of trees in the City	1 of 6 DBH ranges match the McPherson Ideal Distribution % (+/- 2%)	2 of 6 DBH ranges match the McPherson Ideal Distribution % (+/- 2%)	**4 of the 6 DBH ranges match the McPherson Ideal Distribution % (+/- 2%)**	6 of the 6 DBH ranges match the McPherson Ideal Distribution % (+/- 2%)	Provide for uneven aged Distribution citywide
V3 Street and park tree health (includes pest and disease)	Less than 30% of trees rates as good health condition	**31 - 60% of trees rated as good health condition.**	61 - 85% of trees rated as good health condition	Greater than 85% of trees rated as good health condition	Healthy trees live longer, produce greater no. of benefits and reduce costs associated with maintenance
V4 Planting and stocking levels	No planting of street trees. Abundant vacant planting sites	**10% of inventoried planting sites are planted (~500 trees)**	50-75% of inventoried planting sites are planted	100% of inventoried planting site are planted (~2,500 – 3,750 trees)	Addition of trees ad value, benefits and improved function. Based on ~5,000 planting sites along within or adjacent to street ROW
V5 Climate change resiliency	Less than 50% of trees are of species considered suitable for Iowa City	**50%-75% of trees are of species considered suitable for Iowa City**	More than 75% of trees are of species considered suitable for Iowa City	At least 90% of the trees are of species for Iowa City	Establish a tree population suitable for the City's urban environment and resilient to climate change
Current State Summary	**0**	**3**	**1**	**1**	**Total: 5**

Criteria	Table 12. Resource Management – Performance Indicators Low	Moderate	Good	Optimal	Key Objective
R1 Urban forest management plan	**Existing urban forest management plan limited in scope and implementation**	Comprehensive plan for publicly owned and managed urban forest resources are accepted and implemented	Strategic multi-tiered plan for public and private urban forest resources is accepted and implemented with adaptive management mechanisms	A comprehensive urban forest management plan for private and public property is accepted and implemented with adaptive management mechanisms	A comprehensive urban forest management plan for private and public property is integrated into plans for sustainability
R2 Citywide funding	Funding for reactive management	Consistent funding for proactive management	**Consistent funding to provide for net increase in urban forest benefits**	Consistent private and public funding to sustain maximum urban forest benefits	Develop and maintain adequate and consistent funding to implement the urban forest management plan
R3 City urban forestry staffing	No training for urban forestry staff	Certified arborist on staff with regular professional development	Certified arborist and professional forester on staff with regular professional development and support staff	**Multi-disciplinary professional team within the urban forestry unit**	Employ and train adequate Professional staff to implement citywide urban forest management plan
R4 Management of publicly and privately-owned natural areas	No information about publicly or privately owned natural areas	Publicly and privately owned natural areas are identified in a generalized “natural area survey” or similar document	Ecosystem structure and function in publicly and privately-owned natural areas is documented	**The ecological structure and function of all publicly owned and privately-owned natural areas are documented and used in making management decisions**	Management decisions are based upon a detailed understanding of the ecological structure and function of all publicly and privately-owned natural areas
R5 Urban forest protection policy development and enforcement	No urban forest protection policy	Policies in place to protect public portion of the urban forest	**Policies in place to protect public and private portions of the urban forest with enforcement**	Integrated municipal wide policies that ensure the protection of the urban forest on both public and private land and are consistently enforced and supported	The benefits derived from the urban forest are ensured by the implementation and enforcement of the urban forest management plan
R6 Urban forest inventory public-private	Sample-based inventory of publicly owned urban forest	**Complete inventory of publicly owned trees**	Complete inventory of publicly owned trees and sample of privately-owned urban forest	Complete inventory of the urban forest resource	Complete inventory of the urban forest resource to direct its management, included age distribution, species mix, tree condition, and assessment

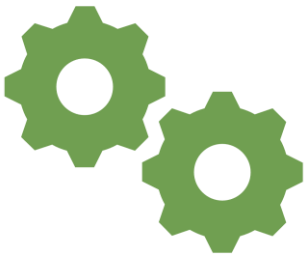
Criteria	Resource Management – Performance Indicators				Key Objective
	Low	Moderate	Good	Optimal	
R7 Tree planting and establishment on public and private land	Tree planting and establishment is *ad hoc*	**Tree establishment is directed by needs derived from a tree inventory**	Tree establishment is directed by needs derived from a tree inventory and is sufficient to meet canopy cover objectives	Tree planting and establishment program are driven by the UFMP objectives for canopy cover, species diversity, and species distribution objectives to ensure urban forest sustainability	Tree planting and establishment is directed by objective criteria set in the urban forest management plan
R8 High risk tree maintenance	Highest priority removals only are addressed within 5 years of notice	All high priority removals and some immediate pruning is addressed within 2 years of notice	**All high priority removals and most immediate pruning is addressed within 2 months of notice**	Proactive mature tree care (lightning protection, cabling, etc.) is conducted and risk is greatly reduced except after storm events	Maintain public safety and the longevity of the trees and the reputation of the urban forest program
R9 Public tree condition assessment and abatement citywide	The condition of the urban forest is unknown	No citywide public tree condition assessment/ remediation program. Request based/reactive system	**Complete public tree inventory including tree risk information. Request-based/ reactive risk abatement program system. Use of work order software**	Inventory of public trees includes detailed tree risk ratings; risk abatement program is in effect eliminating hazards using a work order software	All publicly managed trees are free of recognizable hazards
R10 Routine tree pruning	One-tenth of large trees are pruned on a 5-year rotation (~650 trees per year)	One-eighth of large trees are pruned on a 5-year rotation (~820 trees per year)	**One-fifth of large trees are pruned on a 5-year rotation (~1,300 trees per year)**	One-third of large trees are pruned on a 5-year rotation (~2,170 trees per year)	Improve tree health, longevity, public safety, and clearance conflicts. Based on ~32,600 trees >6” DBH
R11 Young tree maintenance	No young tree training	One-fifth of small trees are training pruned (~500 trees). Newly planted trees are training pruned within 10 years of planting	**One-third of small trees are training pruned (~820 trees). Newly planted trees are training pruned at 3-4 years of planting**	One-half of small trees are training pruned (~1,235 trees). Newly planted trees are training pruned at 3 years of planting	Improve the structure trees at an early age to reduce future maintenance costs and issues. Based on ~12,350 trees <6” DBH

Criteria	Resource Management – Performance Indicators				Key Objective
	Low	Moderate	Good	Optimal	
R12 Ash tree management	No ash tree management for EAB is in place	**An inventory of ash trees and the locations is current**	Ash tree management plan in place	Ash tree management plan is in implementation	Plan and manage ash trees to reduce sudden widespread mortality
R13 Tree site suitability	Tree species are considered in planting site selection	**Guidelines are in place for the selection of suitable species to meet specific site criteria. Best practices and industry standards are in place**	Public trees are planted in sites with adequate soil quality and quantity, and growing space to achieve their growth and form potential. Private owners are provided science-based standards on tree selection and site suitability	All trees are planted in sites that will maximize current and future benefits	Management of urban forest will become more efficient and effective in producing environmental, social and economic benefits
R14 Invasive plant species management	Recognition of invasive species	Recognition of invasive species, are actively discouraged and voluntary control on private and public lands	**Invasive species are recognized, managed, and their use is prohibited**	Invasive plant species management plans are developed and implemented for public and private lands	Elimination of invasive plant species
R15 Public tree condition assessment and abatement along emergency and evacuation routes	The condition of trees along emergency evacuation routes is unknown	No tree condition assessment/ remediation program along emergency routes. Request based/reactive system	Sample-based tree inventory including general tree risk information along emergency/ evacuation routes. Risk abatement is not systematic	**Complete tree inventory which includes detailed tree failure risk ratings; risk abatement program is in effect eliminating hazards along emergency/ evacuation routes**	Emergency and evacuation routes will be clear during the on-set of storms and will require minimal clearing of woody debris following a storm event
R16 Canopy assessment and canopy goals	**No canopy assessment or a low-resolution canopy assessment (e.g. i-Canopy) is completed but no goals are set**	High-resolution canopy assessment is completed but no goals are set	High-resolution canopy assessment and goals are completed and the existing canopy cover equals 25-50% of the goal	High-resolution canopy assessment and goals are completed and the existing canopy cover equals 50-75% of the goal	Understand canopy cover distribution citywide and set goals to increase canopy
R17 Tree preservation best practices	No standards or best practices in place	**Standards in place but outdated and little adherence and enforcement**	Standards and best practices are in place and city forester is contacted to oversee site plan.	City forester is included in the design, placement, and construction or repair of structures and utilities	Street trees near any excavation, demolition, or construction of any building, structure, or utility are preserved or protected
Current State Summary	**2**	**5**	**7**	**3**	**Total: 17**

Criteria	Table 13. Community Framework – Performance Indicators Low	Moderate	Good	Optimal	Key Objective
C1 General awareness of the urban forest as a community resource	Urban forest seen as a community problem	Urban forest seen as important to the community	**Urban forest acknowledged as providing environmental, social, and economical services**	Urban forest recognized as vital to the community's environmental, social and economic well being	The general public understands the importance of the urban forest to the community
C2 Neighborhood cooperation	**Majority of neighborhoods Are unfamiliar with Urban Forest Management Plan**	Isolated or limited number of active neighborhood groups	Majority of neighborhood associations form partnerships with city government to implement the UFMP	All neighborhoods associations form partnerships with city government to implement the UFMP	At the neighborhood level, citizens understand and cooperate in urban forest management
C3 Citizen, municipal, business, commuter interaction	No interaction among constituencies	**Some interaction among constituencies, with conflicting goals**	Informal and/or general cooperation	Formal interaction with staff coordination	All constituencies in the community interact for the benefit from the urban forest
C4 Support by private land holders	Unfamiliar with issues	**Educational materials and advice available to landholders**	Clear goals for tree resources by landholders. Incentives for protection and management of private trees	Landholders develop comprehensive tree management plans (including funding)	Private landholders embrace citywide goals and objectives of the UFMP
Current State Summary	**1**	**2**	**1**	**0**	**Total: 4**

Criteria	Table 14. Institutional Framework – Performance Indicators Low	Moderate	Good	Optimal	Key Objective
I1 City public agency cooperation	Conflicting processes among departments and or agencies that are inconsistent with the urban forest management	**Urban forest management processes are held in common but improvement in cooperation among departments and/ or agencies is needed**	Departments and/ or agencies are functioning and implementing processes consistent with the UFMP on a project specific basis	Municipal standards in place for implementing the UFMP by interdepartmental/ Interagency processes on all municipal projects	Ensure all city departments cooperate with goals and objectives of the UFMP
I2 Design and development industry and other government agency cooperation	Unfamiliar with issues	**Recognition and acceptance of issues**	Implement design and construction objectives consistent with the UFMP	Implement design and construction objectives that exceed UFMP objectives and support citywide green infrastructure	Design and development industries, and other government agencies embrace citywide UFMP goals and objectives
I3 Landscape and arboriculture industry cooperation	No cooperation among segments of the green industry. No adherence to professional standards and ethics	**General cooperation among nurseries, tree care companies, etc.**	Specific cooperative arrangements with City	Shared vision and goals including the use of professional standards and ethics	The landscape and arboriculture industries operate with high professional standards and ethics, and commits to citywide urban forest management plan goals and objectives
I4 Cooperation within the geographic region	Government and planning agencies operate independently	**Government and planning agencies share similar policy vehicles**	Regional planning is in effect	Regional natural resource comprehensive planning is coordinated	Cooperation and interaction among neighboring regional planning agencies and governments to support forest sustainability throughout the region
Current State Summary	**0**	**4**	**0**	**0**	**Total: 4**

"How Do We Get What We Want? & Are We Getting What We Want?"



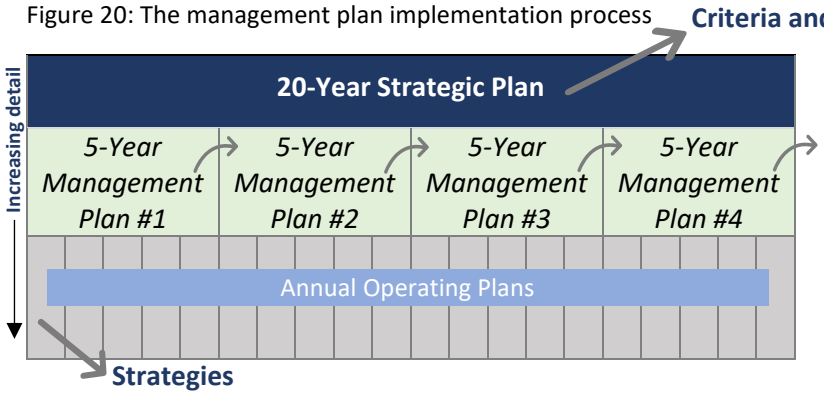
Adaptive Management & Monitoring

A management process to promote flexible decision making that can be adjusted in the face of uncertainties

Adaptive Management

Adaptive Management is a scientific approach to an urban forest management decision process. It promotes flexible decision-making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals; increases scientific knowledge; and reduces tensions among stakeholders.

Figure 20: The management plan implementation process



The Process:
Criteria and performance indicators identify 5-year management strategies which inform annual operating plans. The 5-year management plans allow for an adaptive approach as the City strives to achieve optimal levels of urban forest management and sustainability.

Using an adaptive management approach will require the consistent monitoring of all the City's criteria for urban forest sustainability. The City will be able to judge if its new approaches to urban forest conservation are being effective, develop relationships between management actions and outcomes, and identify significant trends. This will allow the City to adjust management actions over time as changes occur both in the physical/biological environment and in the expectations of the City's residents.

The City can use the Urban Forest Sustainability & Management Audit that was provided as part of the UFMP project to evaluate each element to identify shortcomings and opportunities. View Appendix B for an overview.

Few activities suggested by this strategic plan are as important to the success of urban forest management as monitoring, but this step is often overlooked, poorly designed, and often underfunded by most cities. Monitoring the City's natural resources is a process very similar to those already developed for business. The basic applications have already been developed, and there is little reason to reinvent the processes. This design for the monitoring program incorporates the principles of sampling design theory and experimental design. Careful consideration has been paid to the selection of indicators.

Types of Monitoring

Monitoring here refers to the periodic and systematic measurement of observations of process or object. The City should institute three forms of monitoring in association with the Management Plan: implementation, effectiveness, and validation.

1. The implementation monitoring will determine if the Plan is being implemented as designed. It asks, "Did we do what we set out to do?"
2. Effectiveness monitoring determines if the action achieved the stated goal or objective. It asks, "Did it work?"
3. Validation monitoring determines if assumptions and models being used are valid and effective.

Implementation Monitoring

The Parks and Forestry Division should review, on a semi-annual basis the implementation of the 5-year Management Plan's Strategies. There should be a stakeholder session to discuss accomplishments and recommend strategies for accomplishing the scheduled objectives. Each year these stakeholders should jointly publish a report to be distributed to the Mayor, City Council, Department Directors, and communities.

Effectiveness Monitoring

The 2016-2018 street and park tree inventory serves as the beginning of the effectiveness-monitoring program. Information from Urban Forest Analysis presented in this Plan describes the present state of the urban forest. The use of the criteria and key objectives allow the City to better understand and correlate the effectiveness of its urban forest management practices and policies to reaching specific outcomes using the tree inventory analysis.

Effectiveness monitoring should be conducted every 5 years.

Validation Monitoring

The City should maintain and update the tree inventory on a regular basis. This information will be used for the City to conduct a 5-year analysis of the tree structure, maintenance needs, and potential risks, similarly to how it was completed for this Management Plan.

RECOMMENDED METHODS FOR MONITORING PERFORMANCE CRITERIA

In the Criteria and Performance Indicators section, the table has a column "Criteria". Each row has a criterion with a reference number (i.e. V1 = 1st Criteria in the Vegetation Resource section). These reference numbers are listed for each Strategy and a Criteria Key is provided below for reference.

Criteria Key

V1: Tree species diversity
V2: Diameter distribution of trees in the City
V3: street and park tree health
V4: Planting and stocking levels
V5: Climate change resiliency

R1: Urban forest management plan
R2: Citywide funding
R3: City urban forestry staffing
R4: Management of publicly and privately owned natural areas
R5: Urban forest protection policy development and enforcement
R6: Urban forest inventory public-private
R7: Tree planting and establishment on public and private land
R8: High risk tree maintenance
R9: Public tree condition assessment and abatement citywide
R10: Routine tree pruning
R11: Young tree maintenance
R12: Ash tree management
R13: Tree site suitability
R14: Invasive plant species management
R15: Public tree condition assessment and abatement along emergency and evacuation routes
R16: Canopy assessment and canopy goals
R17: Tree preservation best practices

C1: General awareness of the urban forest as a community resource
C2: Neighborhood cooperation
C3: Citizen, municipal, business, commuter interaction
C4: Support by private land holders

I1: City public agency cooperation
I2: Design and development industry and other government agency cooperation
I3: landscape and arboriculture industry cooperation
I4: Cooperation within the geographic region

Vegetation Resource

V1) Tree species diversity
Measure: Tree inventory data in Tree Plotter and/or MS Excel or Access

V2) Diameter distribution of trees in the City
Measure: Tree inventory data in Tree Plotter and/or MS Excel or Access

V3) Street and park tree health
Measure: Tree inventory data in Tree Plotter and/or MS Excel or Access

V4) Planting and stocking levels
Measure: Tree inventory data in Tree Plotter and/or MS Excel or Access

V5) Climate change resiliency
Measure: NOAA climate zones and the tree inventory data in Tree Plotter and/or MS Excel or Access

Resource Management

R1) Urban forest management plan (acceptance and implementation)
Measure: review by the Parks and Forestry Division

R2) Citywide funding
Measure: annual review by the Parks and Forestry Division

R3) City urban forestry staff funding
Measure: annual review by the Parks and Forestry Division

R4) Management of publicly and privately-owned natural areas
Measure: annual internal review of public land management to include random sampling of resources and utilize the 2018 Natural Areas Master Plan and other plans/studies

R5) Urban forest protection policy development and enforcement
Measure: semi-annual review of process by Parks and Forestry and review of street and park tree inventory data in tree management software relating to tree condition, observations, conflicts, etc.

R6) Urban forest inventory public-private
Measure: semi-annual review of process by Parks and Forestry and review the street and park tree inventory data in tree management software and future inventory data

R7) Tree planting and establishment on public and private land
Measure: Review of the street and park tree inventory data and future tree inventories and analysis

R8) High risk tree maintenance
Measure: Internal review by Parks and Forestry by field sampling and reviewing data in tree and work order management software to determine degree of risk abatement and reduction annually

R9) Public tree condition assessment and abatement citywide
Measure: Internal review by Parks and Forestry by field sampling and reviewing data in tree and work order management software to determine degree of risk abatement and reduction annually

R10) Routine tree pruning
Measure: Internal review by Parks and Forestry by field sampling and reviewing data in tree and work order management software to determine degree of risk abatement and reduction annually

R11) Young tree maintenance

Measure: Internal review by Parks and Forestry by field sampling and reviewing data in tree and work order management software to determine degree of risk abatement and reduction annually

R12) Ash tree management
Measure: Internal review by Parks and Forestry by field sampling and reviewing data in tree and work order management software to determine degree of risk abatement and reduction annually

R13) Tree site suitability
Measure: Internal review by Parks and Forestry by field sampling and reviewing data in tree and work order management software to determine degree of risk abatement and reduction annually

R14) Invasive plant species management
Measure: Internal review of public and private lands using random sampling

R15) Public tree condition assessment and abatement along emergency and evacuation routes
Measure: Internal review by Parks and Forestry by field sampling and reviewing data in tree and work order management software to determine degree of risk abatement and reduction annually

R16) Canopy assessment and goals
Measure: Canopy will be measured citywide and by neighborhoods and other geographic boundaries and canopy goals will be set based on existing and future tree planting efforts and criteria in this Plan

R17) Tree preservation best practices
Measure: City forester is on site for review of construction/repair of structures and utilities that may impact the trees within the right-of-way. Sample inventory and future inventories to see if in effect.

Community Framework

C1) General awareness of the urban forest as a community resource
Measure: Conduct a 5-year community survey

C2) Neighborhood cooperation
Measure: Conduct a 5-year community survey

C3) Citizen, municipal, business, commuter, interaction
Measure: Semi-annual review by Parks and Forestry

C4) Support by private land holders
Measure: Semi-annual review by Parks and Forestry

Institutional Framework

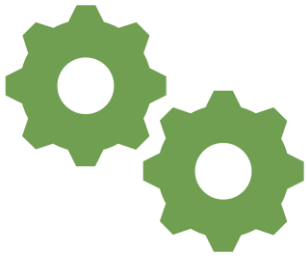
I1) City public agency cooperation
Measure: Semi-annual review by Parks and Forestry

I2) Design and development industry and other government agency cooperation
Measure: Annual random sampling of site specific designs and implementation of future tree inventories

I3) Landscape and arboriculture industry cooperation
Measure: The green industry use of ANSI standards, state BMP's, state nursery grades and standards

I4) Cooperation within the geographic region
Measure: Semi-annual review by Parks and Forestry

"How Do
We Get
What We Want?"



First 5-Year Urban Forest Management Plan Strategies

Strategies for advancing the urban forest by topic areas and the criteria and performance indicators

Once the Criteria and Performance Indicators were identified for the Vegetation Resource, Resource Management, Community Framework, and Institutional Framework, a series of Monitoring Criteria were developed to gauge progress towards optimal levels of urban forest management and sustainability.

The first 5-year management plan represents the initial action needed to lay the foundation for comprehensive urban forest management. Strategies for implementation in the first 5-year Urban Forest Management Plan were chosen so that there was very minimal requirement for any net increases in operational or capital costs. These strategies have to do with the processes, procedures, ordinances, and education to support the institutional, community, and technical capacities needed to move the management of the urban forest forward.

Goals and Strategies for the first 5-Year Urban Forest Management Implementation are arranged by category. Each action is preceded by the year in which it is intended to be initiated or completed. The specific criteria addressed by each action are then listed (see the Criteria and Performance Indicators tables). Finally, the responsible or lead City agency is indicated.

The following pages describe how each Goal and Strategy impacts the City's placement on the Urban Forest Criteria and Performance Indicator Spectrum. The number of Criteria and Performance Indicators affected by the Goals and Strategies reflects the efficiency of these actions. Use this as a guide to share the importance of each strategy and to determine which measure and milestone should be utilized to assess progress.

Assessments and planning lead to improved maintenance, community interaction, and city tree canopy

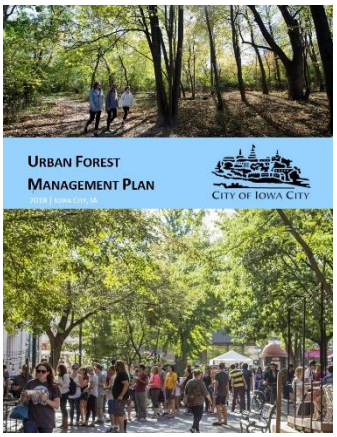




Image sources: Plan-It Geo photo stock

Iowa City's Urban Forest Goals & Strategies and The Impact on the Criteria & Performance Indicators

(V=Vegetation Resource, R=Resource Management, C=Community Framework, I=Institutional Framework)

Education

Goal One: Promote proper tree care through education and enforcement (Table 15)

G1-1	**Year 1:** Update the Planting in the Right-of-Way brochure or create a new brochure that informs and educates residents and City staff about the UFMP, the benefits of trees, and proper tree care. *Criteria*: • V – 1, 2, 3, 4, 5 • R – 1, 4, 5, 7, 11, 13, 14, 16 • C – 1, 2, 3, 4 • I – 1, 2, 3, 4 *Responsible Agency*: Forestry and Parks, Communications
G1-2	**Year 1:** Prepare and implement a Neighborhood Tree Stewardship program to educate residents on tree care and the urban forest. Utilize neighborhood associations and other partners described in the UFMP. *Criteria*: • V – 1, 2, 3, 4, 5 • R – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 • C – 1, 2, 3, 4 • I – 1, 2, 3, 4 *Responsible Agency*: Forestry and Parks, Neighborhood Development Services, Communications
G1-3	**Year 1:** Update and maintain the City's urban forestry webpage to include information about the UFMP and results of the inventory and program analysis for City residents. Include the Tree Plotter link and promote on social media. *Criteria*: • V – 1, 2, 3, 4, 5 • R – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 • C – 1, 2, 3, 4 • I – 1, 2, 3, 4 *Responsible Department*: Forestry and Parks, Neighborhood Development Services, Communications

Criteria Key

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I3: landscape and arboriculture industry cooperation
I4: Cooperation within the geographic region

G1-4	**Year 1:** Provide and maintain a current list of qualified and certified ISA or ASCA arborists working in the City. *Criteria*: • V – 1, 2, 3, 4, 5 • R – 4, 5, 7, 8, 9 10, 11, 12, 13, 14, 15, 16 • C – 2, 3, 4 • I – 2, 3, 4 *Responsible Agency*: Forestry and Parks, Communications
G1-5	**Year 2:** Inspect and monitor ash trees for signs and symptoms of EAB. Prioritize removal of ash trees in poor and critical condition. Develop an EAB management plan. *Criteria*: • V – 3 *Responsible Agency*: Forestry and Parks
G1-6	**Year 3:** In partnership with the University and other entities, conduct training programs on inventory and management of natural areas for public and private property owners. *Criteria*: • R – 4, 6, 12, 14 • C – 4 *Responsible Agency*: Forestry and Parks, Communications, Program Partners
G1-7	**Year 5:** Form a committee of public and private natural resource professionals to review and revise the Tree Species List every five years. *Criteria*: • V – 5 *Responsible Agency*: Forestry and Parks

Criteria Key

V1: Tree species diversity
V2: Diameter distribution of trees in the City
V3: street and park tree health
V4: Planting and stocking levels
V5: Climate change resiliency

R1: Urban forest management plan
R2: Citywide funding
R3: City urban forestry staffing
R4: Management of publicly and privately owned natural areas
R5: Urban forest protection policy development and enforcement
R6: Urban forest inventory public-private
R7: Tree planting and establishment on public and private land
R8: High risk tree maintenance
R9: Public tree condition assessment and abatement citywide
R10: Routine tree pruning
R11: Young tree maintenance
R12: Ash tree management
R13: Tree site suitability
R14: Invasive plant species management
R15: Public tree condition assessment and abatement along emergency and evacuation routes
R16: Canopy assessment and canopy goals
R17: Tree preservation best practices

C1: General awareness of the urban forest as a community resource
C2: Neighborhood cooperation
C3: Citizen, municipal, business, commuter interaction
C4: Support by private land holders

I1: City public agency cooperation
I2: Design and development industry and other government agency cooperation
I3: landscape and arboriculture industry cooperation
I4: Cooperation within the geographic region

Organization & Management

Goal Two: Improve efficiencies and collaborate to propel urban forest management (Table 16)

G2-1	**Year 1:** Utilize the tree inventory and work order management software to keep data current and improve work efficiencies. Use the system to monitor progress towards optimal Vegetation Resource Performance Indicators. *Criteria*: • R – 6, 9 *Responsible Agency*: Forestry and Parks	**Criteria Key** V1: Tree species diversity V2: Diameter distribution of trees in the City V3: street and park tree health V4: Planting and stocking levels V5: Climate change resiliency R1: Urban forest management plan R2: Citywide funding R3: City urban forestry staffing R4: Management of publicly and privately owned natural areas R5: Urban forest protection policy development and enforcement R6: Urban forest inventory public-private R7: Tree planting and establishment on public and private land R8: High risk tree maintenance R9: Public tree condition assessment and abatement citywide R10: Routine tree pruning R11: Young tree maintenance R12: Ash tree management R13: Tree site suitability R14: Invasive plant species management R15: Public tree condition assessment and abatement along emergency and evacuation routes R16: Canopy assessment and canopy goals R17: Tree preservation best practices C1: General awareness of the urban forest as a community resource C2: Neighborhood cooperation C3: Citizen, municipal, business, commuter interaction C4: Support by private land holders I1: City public agency cooperation I2: Design and development industry and other government agency cooperation I3: landscape and arboriculture industry cooperation I4: Cooperation within the geographic region
G2-2	**Year 1:** Provide training of the GIS section, tree maintenance crews, and other staff on the utilization of the citywide urban forest inventory in the tree management software. *Criteria*: • R – 5, 17 • I – 1, 2, 3 *Responsible Agency*: Forestry and Parks, Neighborhood and Development Services	
G2-3	**Year 1:** Review and update arborist standards and best practices, including tree protection and preservation during construction/repair of structures and utilities within the right-of-way. Create a document that describes these and share with other personnel responsible for overseeing design and development and tree care. See Appendix D for an example of Best Practices for Tree Preservation. *Criteria*: • I – 1, 3 *Responsible Agency*: Forestry and Parks	
G2-4	**Year 1:** Create a system of review and risk assessment of street, park, and public space trees that is directly tied to the work order system. Ensure all staff understand the workflow to maintain a current and accurate database of the condition and maintenance needs of trees that is tracked in the inventory software. Track all new plantings in the software as well. *Criteria*: • R – 6, 8, 9, 15 • I – 1 *Responsible Agency*: Forestry and Parks	

G2-5	**Year 2:** Encourage and support the Parks and Recreation Commission to create an Urban Forestry sub-board. *Criteria*: • R – 1, 2, 5 • I – 1, 2 *Responsible Agency*: Forestry and Parks, Parks and Recreation Commission
G2-6	**Year 1:** Present the UFMP to potential partners such as Trees Forever, Inc., University of Iowa, Project Green, Downtown District, Community School District, and Neighborhood Associations to explore partnership opportunities. *Criteria*: • C – 1, 2 • I – 4 *Responsible Agency*: Forestry and Parks, Parks and Recreation Commission
G2-7	**Year 3:** Conduct a high-resolution urban tree canopy assessment citywide and by planning boundary such as neighborhoods. At minimum, conduct an i-Tree Canopy assessment as an initial study. *Criteria*: • R – 16 *Responsible Agency*: Forestry and Parks, Planning
G2-8	**Year 5:** Create an updated Tree Species List and require the use of only these species on all tree planting projects required through code or through use of public funds. *Criteria*: • V – 1, 5 • R – 7 *Responsible Agency*: Forestry and Parks, Communications

Criteria Key

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V2: Diameter distribution of trees in the City
V3: street and park tree health
V4: Planting and stocking levels
V5: Climate change resiliency

R1: Urban forest management plan
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R6: Urban forest inventory public-private
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R8: High risk tree maintenance
R9: Public tree condition assessment and abatement citywide
R10: Routine tree pruning
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I4: Cooperation within the geographic region

PLAN IMPLEMENTATION

Goal Three: Build the team and the reinforcements to implement the Plan (Table 17)

G3-1	**Year 1:** Coordinate a presentation and delivery of the Executive Summary to the Mayor for the consideration that directs all City agencies to actively cooperate in the implementation of the UFMP. *Criteria*: • This strategy supports all criteria and implementation of adaptive management process. *Responsible Agency*: Forestry and Parks
G3-2	**Year 1:** Prepare a draft resolution, for City Council consideration, that recognizes the UFMP as the strategic plan for the management of the urban forest in the City. *Criteria*: • This strategy supports all criteria *Responsible Agency*: Forestry and Parks
G3-3	**Year 1:** Establish an Internal Technical Advisory Committee, comprised of appointed departmental representatives. The committee will meet quarterly to review progress, as part of the adaptive management strategy, identify issues and make recommendations associated with the implementation of the UFMP. *Criteria*: • This strategy supports all criteria *Responsible Agency*: Forestry and Parks
G3-4	**Year 2:** Prepare a Land Development Regulation that requires adherence to ANSI Tree, Shrub, and other wood Plant Maintenance (A300 series). *Criteria*: • I – 3 *Responsible Agency*: Forestry and Parks
G3-5	**Year 3:** Incorporate the criteria and key objectives of the UFMP into the IC2030 Comprehensive Plan, Natural Areas Master Plan, and the Climate Action and Adaption Plan where feasible. At minimum, attend meetings in regard to these plans in order to discuss integrations and where these plans and the UFMP complement one another. *Criteria*: • Institutional Framework – 1 *Responsible Agency*: Forestry and Parks

Criteria Key

V1: Tree species diversity
V2: Diameter distribution of trees in the City
V3: street and park tree health
V4: Planting and stocking levels
V5: Climate change resiliency

R1: Urban forest management plan
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URBAN FORESTRY PROGRAM PROJECT FUNDING

Goal Four: Seek alternative mechanisms for funding and projects to accomplish the strategies (Table 18)

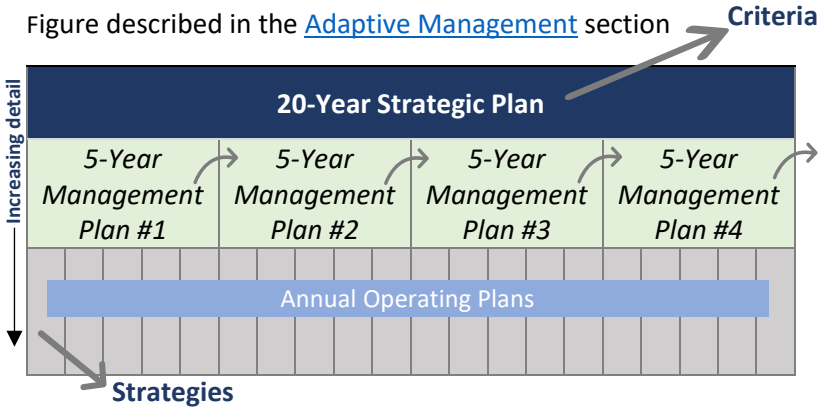
G4-1	**Year 1:** Continue to apply for the MidAmerican Energy Plant Trees, Save Energy "Trees Please" grant and seek additional funding opportunities. *Criteria*: • V – 1, 4 *Responsible Agency*: Forestry and Parks
G4-2	**Year 5:** Contract the 5-year urban forest inventory and analysis with state universities or private consultants. *Criteria*: • R – 6 *Responsible Agency*: Forestry and Parks

Criteria Key
V1: Tree species diversity
V4: Planting and stocking levels

R6: Urban forest inventory public-private

As stated in the Adaptive Management section, the City must approach goal implementation with a flexible decision-making process that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Using an adaptive management approach will require the consistent monitoring of all the City's criteria for urban forest sustainability. The City will be able to judge if its new approaches to urban forest conservation are being effective, develop relationships between management actions and outcomes, and identify significant trends. This will allow the City to adjust management actions over time as changes occur both in the physical/biological environment and in the expectations of the City's residents.

Figure described in the Adaptive Management section



The Process:
Criteria and performance indicators identify 5-year management strategies which inform annual operating plans. The 5-year management plans allow for an adaptive approach as the City strives to achieve optimal levels of urban forest management and sustainability.

Summary & Conclusion

Iowa City's 2018 Urban Forest Management Plan: Guiding the City along the Urban Forest Sustainability & Management Spectrum

Image source: Classic Blank & McCune

URBAN FOREST MANAGEMENT PLAN SUMMARY

Based on the analysis of the urban forest resource and existing program, criteria and performance indicators, goals and strategies, and the measures and milestones for enhancing Iowa City's urban forest were developed and summarized.

Program & Data Analysis: Collection and review of documents, best practices, initiatives, partners, surveys, and data pertaining to and impacting the urban forest. A review of the 2016-2018 public street and park tree inventory was conducted.

The street and park tree inventory data were analyzed to determine the structure, maintenance needs, potential risks, ecosystem benefits, and available planting space characteristics to inform the Plan. These results were incorporated with the Urban Forest Sustainability & Management Audit that consists of a review and ranking of 11 elements of urban forestry. This resource and program audit informed development of the criteria and performance indicators.

Criteria & Performance Indicators: Indicators of urban and community forest sustainability and management allow the City to identify the current status on the spectrum and the requirements or criteria necessary to advance on a low to optimal spectrum. Criteria and performance indicators were developed based on four categories: Vegetation Resource (the trees), Resource Management (the staff), Community Framework (the people), and Institutional Framework (the inter-agencies).

Measures, Goals, & Strategies: The program and data analyses established criteria and performance indicators and the goals and strategies were developed to advance the City on the Urban Forest Sustainability and Management Spectrum. The measures and milestones were established so the City can evaluate progress and adjust strategies accordingly.

The following provides a summary of the urban forest management planning process and outcomes.

Figure 21. The benefits and values of City-managed trees

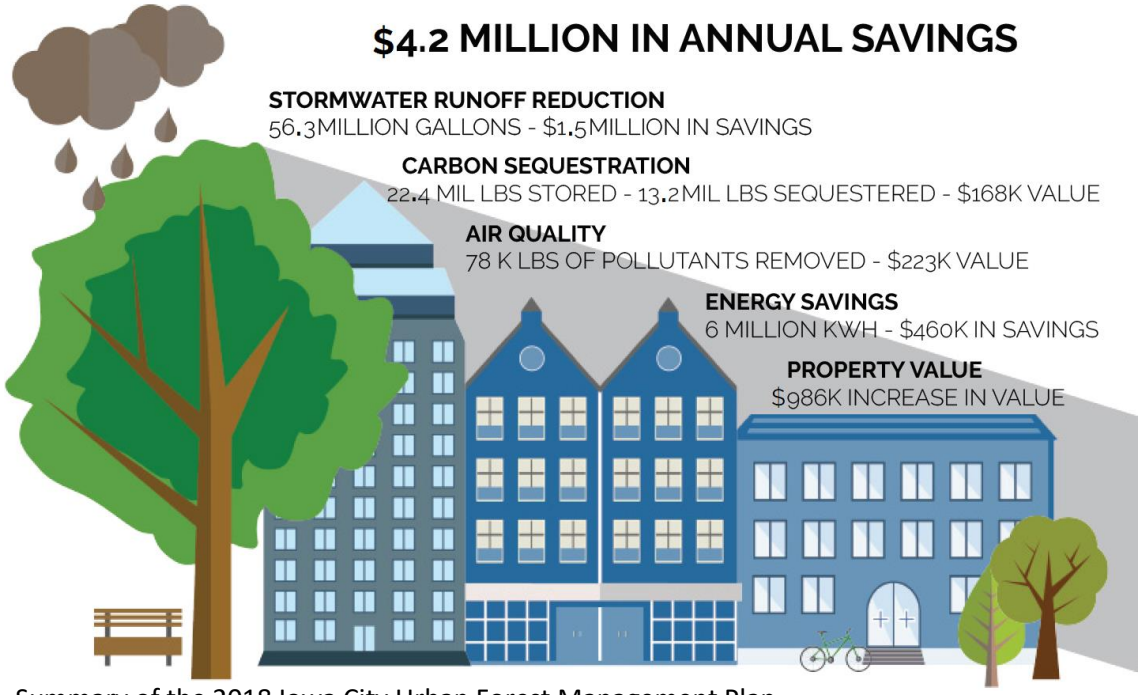


Table 19. Summary of the 2018 Iowa City Urban Forest Management Plan

CITY & PARK TREE INVENTORY SUMMARY						
2016-2018 Inventory (based on April 2018 data)	25,451 street trees 19,563 park trees 4,972 planting sites					
The following summaries are for street and park trees unless otherwise noted						
Tree Diversity	66 genera, 178 species					
Top 5 Species	Silver Maple (8%), Northern Hackberry (6%), Green Ash (6%), Crabapple (6%), and Mulberry (5%)					
Size Distribution	>30”	(7%)	12-18”	(17%)		
	24-30”	(7%)	6-12”	(32%)		
	18-24”	(10%)	0-6”	(27%)		
Average Diameter (@4.5’)	12”					
Tree Condition	Excellent	(2%)	Poor	(5%)		
	Good	(47%)	Critical/Dead	(3%)		
	Fair	(41%)				
Maintenance Needs	Removal	(5%)	Training Pruning	(3%)		
	Priority Pruning	(1%)	None Needed	(18%)		
	Routine Pruning	(72%)				
Removals by Size Class	>30”	(5%)	12-18”	(19%)		
	24-30”	(5%)	6-12”	(36%)		
	18-24”	(12%)	0-6”	(23%)		
EMERALD ASH BORER VULNERABILITY						
Ash Tree Count	3,515					
Counts by Condition	Excellent	(16)	Poor	(271)		
	Good	(1,492)	Critical/Dead	(44)		
	Fair	(1,685)				
Counts by Size Class	>30”	(285)	12-18”	(758)		
	24-30”	(416)	6-12”	(984)		
	18-24”	(584)	0-6”	(485)		
Distribution of Ash	Street	(2,300)	Parks	(1,215)		

URBAN FOREST PROGRAM SUMMARY						
Criteria & Performance Indicators (the "Urban Forest Management & Sustainability Spectrum") Summary	Category	Low	Moderate	Good	Optimal	**Total**
	Vegetation Resource	0	3	1	1	5
	Resource Management	2	5	7	3	17
	Community Framework	1	2	1	0	4
	Institutional Framework	0	4	0	0	4
	Total	**3**	**14**	**9**	**4**	**30**

URBAN FOREST MANAGEMENT PLAN 5-YEAR GOALS
Category: **Education** *Goal One*: *Promote proper tree care through education and enforcement*
Category: **Organization & Management** *Goal Two*: *Improve efficiencies and collaborate to propel urban forest management*
Category: **Plan Implementation** *Goal Three*: *Build the team and the reinforcements to implement the Plan*
Category: **Urban Forestry Program Project Funding** *Goal Four*: *Seek alternative mechanisms for funding and projects to accomplish the strategies*

URBAN FOREST MANAGEMENT PLAN CONCLUSION & NEXT STEPS

Iowa City's urban and community forest is a defining and valued characteristic of the City making it a desirable place to live, work, and play. It is a resource that has a history and legacy of care and management but there are existing and potential threats to this resource and areas for improvement in the care and enhancement of it. This understanding incited the action to develop the Urban Forest Management Plan.

The assessment, criteria and indicators, goals and strategies, and measures for adaptive management that are presented in this Urban Forest Management Plan have been created to provide a framework to effectively, proactively, and sustainably manage the urban forest. This Plan should be disseminated and presented to City agencies to gain awareness, support, and assistance in its implementation. Upon acceptance of this Plan, outreach and education to the residents of Iowa City should be conducted.

As implementation progresses, the City should continually evaluate their progression along the Urban Forest Sustainability and Management Spectrum using the measures and milestones provided. It is inevitable that changes will occur to the vegetation resource, the resource management, community perspectives, and institutional framework and thus, modifications of the strategies should be considered. This Plan provides the 20-year framework to advance along the Urban Forest Sustainability and Management Spectrum. The first 5-year management plan goals and strategies initiate this journey. Each 5-year plan should be evaluated near the end of each term in order to develop the next 5-year goals, strategies, measures, and milestones.

While it will take additional resources and efforts to achieve the goals of the Urban Forest Management Plan, its implementation will help ensure that Iowa City's urban and community forest will continue to thrive, be valued, and provide enhanced benefits to the community and future generations.

"Our vision for the future of Iowa City is to create a healthy and sustainable urban forest that is properly managed and cared for, benefiting our citizens with improved economic and environmental well-being, increasing public safety, and enabling our employees to provide cost-effective maintenance. Our urban forest will have a large variety of trees consisting of various sizes, ages, and species. The trees will be selected and maintained according to the Best Management Practices (BMPs) established by the International Society of Arboriculture (ISA)."

"Trees and forests make Iowa communities stronger. If properly cared for, trees provide a wide variety of benefits to people, communities and the economy. An investment in our trees is an investment in our future."

| Iowa DNR

Appendices:

Appendix A. Urban Forest Sustainability & Management Audit

The U.S. Urban Forest Sustainability & Management Audit was used for evaluating all categories and elements pertaining to Iowa City's urban forest to inform criteria and performance indicators, measures and milestones, goals, and strategies.

The Document & Resource Discovery Stage

1) Identify documents and resources pertaining to each of the categories

	Categories									
Category & Element	**Policy**	**Capacity**	**Funding**	**Authority**	**Inventories**	**Plans**	**Risk**	**Disaster**	**Practices**	**Community**
Management Policy and Ordinances	27	0	0	0	0	0	0	0	0	0
Professional Capacity and Training	0	1	0	0	0	0	0	0	0	0
Funding and Accounting	0	0	2	0	0	0	0	0	0	0
Decision and Management Authority	0	0	0	2	0	0	0	0	0	0
Inventories	0	0	0	0	12	0	0	0	0	0
Urban Forest Management Plans	0	0	0	0	0	8	0	0	0	0
Risk Management	0	0	0	0	0	0	3	0	0	0
Disaster Planning	0	0	0	0	0	0	0	3	0	0
Practices, Standards, and BMPs	0	0	0	0	0	0	0	0	22	0
Community	0	0	0	0	0	0	0	0	0	18
	Policy	**Capacity**	**Funding**	**Authority**	**Inventories**	**Plans**	**Risk**	**Disaster**	**Practices**	**Community**

2) Review and list the documents and resources for each category element

Management Policy and Ordinances		
1.01	Approved Policy Statements	
1.02	Climate Change (Sustainability)	IC2030: Comprehensive Plan Update, Section 7, page 38 & 41 Iowa City Climate Action and Adaptation Plan 2018-2019 Strategic Plan 4-STAR Community Rating
1.03	No Net Loss	City Code, Title 14, Chapter 5, Article E "Landscaping and Tree Standards", 14-5E-6: PRESERVATION OF EXISTING TREES, E, Table 5E-2 "Schedule of Substitution Values"
1.04	Risk Management	City Code, Title 6, Chapter 1, 6-1-2: PUBLIC NUISANCE DEFINED; PUBLIC NUISANCES ENUMERATED, B. "Diseased Or Damaged Trees Or
1.05	Tree Canopy Goals	
1.06	Tree Protection	City Code, Title 18, Chapter 3, 18-3-2: DESIGN STANDARDS, E: "Landscape Preservation" City Code, Title 14, Chapter 5, Article E "Landscaping and Tree Standards", 14-5E-5: PROTECTION AND MAINTENANCE, B & C City Code, Title 14, Chapter 5, Article E "Landscaping and Tree Standards", 14-5E-6: PRESERVATION OF EXISTING TREES, A-E City Code, Title 10, Chapter 8, 10-8-5: DAMAGE TO TREES OR PLANT MATERIALS PROHIBITED, A & B City Code, Title 10, Chapter 9: PARKS AND RECREATION REGULATIONS, 10-9-2: PROHIBITED ACTIONS IN PARKS, A 2

3) Rate the level at which the City is achieving the element

1	Management Policy and Ordinances			
Category	Component Evaluated	Description or Criteria for Evaluation	Comments & Resources	☑
1.00	Approved Policy Statements	Written policy statements approved by a governing body.		
1.01	Climate Change (Sustainability)	Also referred to as Sustainability. With reference to urban trees. Addresses the long-term health and productivity of the natural resource.		1) In Development
1.02	No Net Loss	Can refer to trees, basal area, or canopy.		0) Not Practiced 1) In Development 2) Adopted Common Practice 3) Exceeds Common Practice
1.03	Risk Management	Should reference: ANSI A300 Part 9, ISA BMP, and prioritization funding mechanisms.		1) In Development
1.04	Tree Canopy Goals	Overall community/campus goal, or by designated "zone".		0) Not Practiced
1.05	Tree Protection	Construction and/or landscape maintenance.		2) Adopted Common Practice

appropriate management or current activity.

4) The level at which the City is attaining optimal levels for each category element is calculated

	Verify Category Standard of Care (SOC) Count					
SOC Applicable (Count):	1	1	1	2	2	2
SOC Goal (Sum):	2	2	2	4	4	4
SOC Sum:	NA	NA	NA	NA	3	NA
% Category SOC Attained:	NA	NA	NA	NA	75.0%	NA
	Verify Category Base Practices (BP) Count					
BP Applicable (Count)	3	3	3	3	3	3
BP Goal (Sum):	6	6	6	6	6	6
BP Sum:	NA	NA	NA	NA	4	NA
% Category BP Attained:	NA	NA	NA	NA	66.7%	NA

5) Determines the level at which the City is achieving urban forest sustainability and management to inform criteria and performance indicators, measures and milestones, goals, and strategies

Overall Management Evaluation

		Sum of Evaluations			
Category	Description	SOC (% Achieved)	Base (% Achieved)	Overall Rating	Overall (% Achieved)
1	Management Policy and Ordinances	75.0%	66.7%	18	64%
2	Professional Capacity and Training	100.0%	NA	6	38%
3	Funding and Accounting	75.0%	NA	7	58%
4	Decision and Management Authority	100.0%	0.0%	6	75%
5	Inventories	NA	56.3%	16	62%
6	Urban Forest Management Plans	NA	66.7%	18	75%
7	Risk Management	58.3%	100.0%	10	56%
8	Disaster Planning	NA	33.3%	5	36%
9	Practices, Standards, and BMPs	75.0%	81.3%	48	83%
10	Community	50.0%	NA	20	71%
11	Green Asset Evaluation (Observed Outcomes)	NA	NA	16	80%
	Total	76.2%	57.7%	170	67.5%

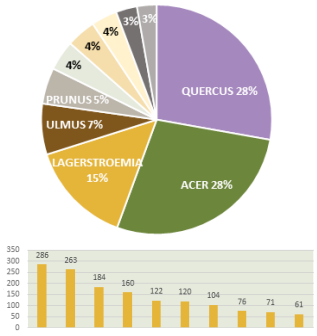
Appendix B. Street & Park Tree Inventory Methodology

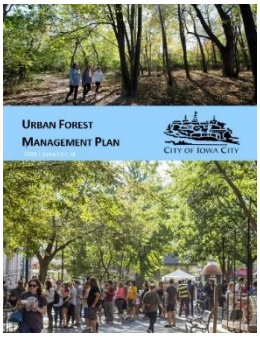
The 2016-2018 street and park tree inventory, facilitated by the Parks and Forestry Division, was conducted in order to establish a baseline assessment of the City's tree structure and maintenance needs. The tree inventory crew used Plan-It Geo's Tree Plotter inventory software to collect the following information:

- Location
- Common Name, Latin Name, and Genus
- Diameter at Breast Height (DBH, measured at 4.5')
- Condition
- Observations
- Maintenance Needs
- Park Name (if applicable)
- Land Use
- Infrastructure Conflicts
- Presence of Wires
- Risk Assessment
- Date Added
- User

In addition to mapping of existing tree points, over 5,000 possible planting sites were mapped based on the criteria established by the City. To help future planting efforts, possible planting sites were mapped and categorized based on the available space.

Though Tree Plotter has built-in functionality to reduce error, after the inventory was completed, the arborists and project managers completed a quality check (QA/QC) process to correct any misplaced tree points, erroneous data, and other inconsistencies. City staff were provided with account information to access, view, manage, update, filter, report, and export tree/planting site data. The data management, filters, and stats/charts/graphs functionality in Tree Plotter were used to complete the inventory data analysis and summaries to inform this Urban Forest Management Plan. The tree inventory software and collected tree/planting site points can be viewed at www.pg-cloud.com/IowaCity.





Tree Plotter Software → Field Inventory → Data and Program Analyses → Urban Forest Management Plan

TREE MAINTENANCE NEEDS CRITERIA & METHODOLOGY

The following maintenance categories were collected:

A. Immediate Removal - Trees designated as immediate removals are dead or have one or more defects that cannot be cost-effectively remedied. EAB infested and stage were noted if present.
B. Removal - Trees designated as removals should be removed, but do not pose a liability as great as the immediate priority or pose minimal liability. EAB infested and stage were noted if present.
C. Immediate Priority Pruning - Trees in this category require pruning to remove deadwood and/or broken branches that pose a potential risk to people or property. These trees have broken and/or hanging limbs, hazardous deadwood and dead, dying or diseased limbs or leaders greater than four inches in diameter. EAB infested and stage were noted if present.
D. High Priority Pruning - Trees in this category require pruning to remove deadwood and/or broken branches that pose a potential risk to people or property. These trees have broken and/or hanging limbs, hazardous deadwood and dead, dying or diseased limbs or leaders greater than two but less than four inches in diameter. EAB infested and stage were noted if present.
E. Routine Pruning - Trees in this category have characteristics that could become risks if not corrected. Deadwood is less than two inches in diameter. EAB infested and stage were noted if present.
F. Training Pruning - This category includes trees less than 20 feet in height with correctable structural problems or minor amounts of deadwood that pose little or no threat of personal injury or property damage. Pruning at this stage is relatively inexpensive but can have significant effects in the future. EAB infested and stage were noted if present.

PLANTING SITE CRITERIA & METHODOLOGY

Planting location - Locations where no tree exists,but fit with current city standards for a tree location. Parameters include: Minimum of 10-30 linear feet *(depending on species)* to the trunk of the nearest tree, minimum of 30 feet from fire hydrants, water lines, driveways and alley entrances, minimum of 10-30 linear feet *(depending on species)* from street light poles, 30 feet from street intersections, parkway must be at least 6 feet wide.

RISK ASSESSMENT CRITERIA & METHODOLOGY

A Level 2 Qualitative risk assessment was completed during the 2016-2018 inventory for street and park trees based on ANSI A300 (Part 9) standards and the protocols in the Best Management Practices: Tree Risk Assessment, published by the International Society of Arboriculture (2011). Trees are subject to various failure scenarios which help determine risk rating. The failure mode (i.e., branch, whole tree, codominant stem) with the greatest risk served as the overall tree risk rating. The specified time period for the risk assessment completed during the 2016-2018 inventory is one year.

Ratings were determined by the following criteria:

A. Likelihood of Failure. Identifies the most probable failure and rates the likelihood that structural defect(s) will result in failure based on observed current conditions.
B. Likelihood of Impacting a Target. The rate of occupancy of targets within the target zone and any factors that could affect the failed tree as it falls toward the target.
C. Categorizing Likelihood of Tree Failure Impacting a Target. The likelihood of failure and target impact are combined in the matrix below to determine the likelihood of tree failure impacting a target.

Likelihood of Failure	Likelihood of Impacting Target			High
	Very Low	Low	Medium	
Imminent	Unlikely	Somewhat Likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat Likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat Likely
Improbably	Unlikely	Unlikely	Unlikely	Unlikely

Consequence of Failure

The consequences of tree failure are based on the level of target and potential harm that may occur. Consequences can vary depending upon the size of defect, distance of fall for the tree or limb, and any other factors that may protect a target from harm. Target values are subjective, but efforts were made to assess them from the City's perspective as discussed during the inventory project kickoff.

Risk Rating

The tree's risk rating was determined based on combining the likelihood of tree failure impacting a target and the consequence of failure in the matrix below.

Likelihood of Failure	Consequences			
	Neglible	Minor	Significant	Severe
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat Likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Appendix C. Count of Trees by City Parks & Trails

(Names as listed in the Tree Plotter app)

Park Name	Tree Count	% Within
test park 2	1	0.0%
Tyrrell mill park	1	0.0%
Trail	4	0.0%
Harlocke Hill park	6	0.0%
Highland park	7	0.0%
Tower court park	9	0.0%
Bristol drive	10	0.1%
Happy hollow park	14	0.1%
Reno street park	15	0.1%
Weatherby park	18	0.1%
Iowa city water	19	0.1%
Black springs circle park	22	0.1%
Frauenholtz-Miller Park	23	0.1%
Creekside park	29	0.1%
Iowa city soccer complex	29	0.1%
Ryersons woods	29	0.1%
Crandic park	30	0.2%
Lower city park	31	0.2%
Brookland park	36	0.2%
Chadek green park	36	0.2%
Sturgis ferry park	37	0.2%
Fairmeadows	40	0.2%
Oak grove park	42	0.2%
Longfellow nature trail	45	0.2%
Thornberry dog park	45	0.2%
Glendale park	47	0.2%
Weber elementry	56	0.3%
Cardigan park	58	0.3%
North Market Park	59	0.3%
City of iowa city	61	0.3%
Pheasant Hill park	62	0.3%
Court Street trail	67	0.3%
College Green	68	0.3%
Villa park	70	0.4%
Wetherby	80	0.4%
Whispering meadows wetland park	82	0.4%
Thornbury trail	105	0.5%
Terrell mill park	106	0.5%
Court Hill Park	166	0.8%
Benton hill park	167	0.9%
Windsor ridge park	175	0.9%
Scott park	194	1.0%

Scott park trail	202	1.0%
Mercer park	223	1.1%
Waterworks Prairie park	283	1.4%
Upper City Park	291	1.5%
Hunters run park	390	2.0%
Kwanis park	441	2.3%
Willow Creek trail	647	3.3%
Oakland cemetery	958	4.9%
Sycamore trail	1027	5.2%
Iowa river rc trail	1554	7.9%
Willow creek park	2355	12.0%
Hickory Hill park	2468	12.6%
Peninsula Park	2918	14.9%
Terry Trueblood Recreation Area	3605	18.4%
	19563	100.0%

Appendix D. Best Practices for Tree Preservation

The following provides an example of how to develop tree preservation best practices and standards structure, building, and utility construction or repair that is within the right-of-way and will directly or indirectly impact trees in proximately to the site.

Damage to City-owned trees due to permit-holder negligence or accident shall be repaired only by the Forestry section. Forestry shall remove and replace any trees, determined to be excessively damaged. The cost of all such repairs, removals, replacements, and an amount of value lost will be the liability of the permit-holder and billed accordingly.

The directional bore route is outside of the tree border and under or behind the sidewalk for this project.

To preserve the tree's root system and maintain structural stability, no open cut excavation or bore pits allowed within 8 ft of City street trees. This includes Hand Holes. Boring entry and exit points should be located in areas that avoid root damage.

Any tree roots encountered are to be cleanly cut using hand tools. Do not remove roots using excavation equipment.

Cables, ducts, conduits, and other utilities installed in the right of way shall maintain a 5' minimum horizontal clearance from all City street trees.

In order to avoid damage to tree roots, branches, and trunks of City street trees, no construction equipment or materials shall be placed, parked, or stored on any unpaved area within the drip line of any City owned tree.

The City's Urban Forestry Inspector shall frequently monitor construction sites containing City street trees and any change in tree conditions will be recorded. Any questions or concerns regarding City trees contact Forestry Inspector _____at

The top four feet of all excavations in the right of way and in all boulevard medians shall be backfilled with clean viable soil. No concrete, slurry, gravel, sand or other such material shall be used for backfill. Restoration shall be to original grade unless otherwise specified.

New poles, anchors, vaults, hand holes, or other above-ground structures must be located outside the drip line of City street trees.

The median islands may contain a buried irrigation system and components. Any irrigation damaged or disturbed will be reported to the Forestry Inspector. Any repairs needed will be completed by the Forestry department at the contractor's expense. Boulevard medians shall not be used to store equipment or materials.

OCCUPANCY AND DEPOSIT COMMENTS FOR WHEN TREES ARE INSIDE THE PROJECT LIMITS: I normally take a deposit on any trees in the right away that might get damaged during larger projects and if trees are damaged or removed I will keep the fee.

If they know the tree needs to be removed due to construction or other reasons, we will add a Forestry Service Fee to the permit giving them permission to remove the tree and charge them $100.00 per diameter inch.

Examples:

All City street trees near any excavation, demolition, or construction of any building or structure must be sufficiently guarded and protected by those responsible for such work as to minimize potential injury to the trees and to maximize their chance for survival.

There are City Street trees with in the project limits. A deposit of _____ is required. Deposit represents equity value of City street trees in work area. Deposit will be returned upon completion of project if trees are not damaged or removed.

Removal of 2 City street trees has been proposed as part this permit. The permit holder will be responsible for the cost of removing said street trees in the City's right of way. The value of the trees will be added to the permit as a Forestry Service fee. Value of tree is based on $100.00 per diameter inch of the trunk at 4 1/2 feet above ground.

Private sprinkler notes:

There are City of ### street trees located in the public right-of-way. These trees are maintained by the Forestry department. If, during the removal or installation of any City street trees by Forestry crews that result in damage to an irrigation system located in the public right-of-way, the Owner of said system shall bear all responsibility and costs associated with its repair.

Should a private irrigation system become obsolete, nonfunctional, poorly maintained, or protruding from grade, the City may require repair or removal of all or a portion of such system within 30 days of written notice from the City to do so. If the owner fails to so repair or remove, then after two such written notices to the owner, the City may cause removal of the system at the owner's expense.

Sprinkler heads are to be installed a <u>minimum of four (4) feet away</u> from any city owned tree.

Lawn watering systems in the right of way are for personal convenience, and may be disrupted without notice at any time by the City in performance of its work. Any costs associated with such disruption including water loss, repair, and replacement shall be solely the responsibility of the owner of the watering system.

Appendix E. Tree Maintenance Best Practices

Urban forests play a significant role in maintaining the health and vitality of urban life. The urban forest provides a wealth of benefits to neighborhoods and residents through the reduction of energy consumption, the removal of pollutants from the air and water, reduction in stormwater flows, increased valuation of private property, increased worker productivity, reduction in stress and violent crime, as well as providing recreational opportunities and aesthetic diversity. At the same time stresses from the urban environment including air pollution, damage by vehicles, increased impervious surface, soil compaction, and maintenance neglect reduce the diversity and magnitude of these benefits and may lead to tree-related problems.

The inherently close interaction between people and trees in cities requires active and diligent management of the urban and community tree and forest resources to ensure public safety. To enhance tree canopy and associated benefits, trees need to be properly maintained and planted.

Tree Maintenance Best Practices

The following provides an overview of tree maintenance best practices. It is not intended to be an extensive or comprehensive summary of best practices. All tree maintenance practices should follow the American National Standards Institute's (ANSI) A300 Standards (Parts 1-10).

Reasons for Tree Pruning

1. *Pruning for Safety*
   Involves removing branches that could fall and cause injury or property damage, trimming branches that interfere with lines of sight on streets or driveways, and removing branches that grow into utility lines. Safety pruning can be largely avoided by carefully choosing species that will not grow beyond the space available to them and have strength and form characteristics that are suited to the site.

2. *Pruning for Health*
   Involves removing diseased or insect-infested wood, thinning the crown to increase airflow and reduce some pest problems, and removing crossing and rubbing branches. Pruning can best be used to encourage trees to develop a strong structure and reduce the likelihood of damage during severe weather. Removing broken or damaged limbs encourages wound closure.

3. *Pruning for Form*
   Improves the structure of trees and removes branches that are more likely to fail. Branches that are poorly attached may be broken off by wind and accumulation of snow and ice. Branches removed by such natural forces often result in large, ragged wounds that rarely seal.

4. *Pruning for Aesthetics*
   Involves enhancing the natural form and character of trees or stimulating flower production.

To reduce the need for pruning it is best to consider a tree's natural form. It is very difficult to impose an unnatural form on a tree without a commitment to constant.

Common Types of Tree Pruning

1. *Crown Cleaning*
   Consists of the selective removal of dead, dying, diseased, and weak branches from a tree's crown. No more than 25% of the live crown should be removed in any one year, even for young trees.

2. *Crown Thinning*
   Primarily for hardwoods, thinning is the selective removal of branches to increase light penetration and air movement throughout the crown of a tree. The intent is to maintain or develop a tree's structure and form. To avoid unnecessary stress and prevent excessive production of epicormic sprouts, no more than one-quarter of the living crown should be removed at a time. If it is necessary to remove more, it should be done over successive years.

   Branches with strong U-shaped angles of attachment should be retained. Branches with narrow, V-shaped angles of attachment often form included bark and should be removed.

3. *Crown Raising*
   The practice of removing branches from the bottom of the crown of a tree to provide clearance for pedestrians, vehicles, buildings, lines of site, or to develop a clear stem for timber production. After pruning, the ratio of the living crown to total tree height should be at least two-thirds. On young trees temporary branches may be retained along the stem to encourage taper and protect trees from vandalism and sunscald.

4. *Crown Reduction*
   Most often used when a tree has grown too large for its permitted space. This method, sometimes called drop crotch pruning, is preferred to topping because it results in a more natural appearance, increases the time before pruning is needed again, and minimizes stress (see drop crotch cuts in the next section). Crown reduction pruning, a method of last resort, often results in large pruning wounds.

Figure 22. Types of tree pruning

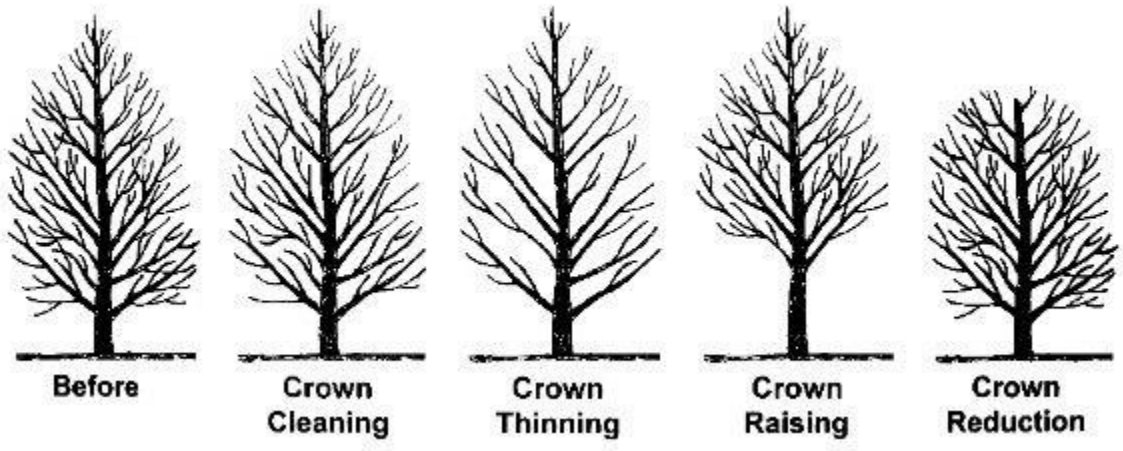
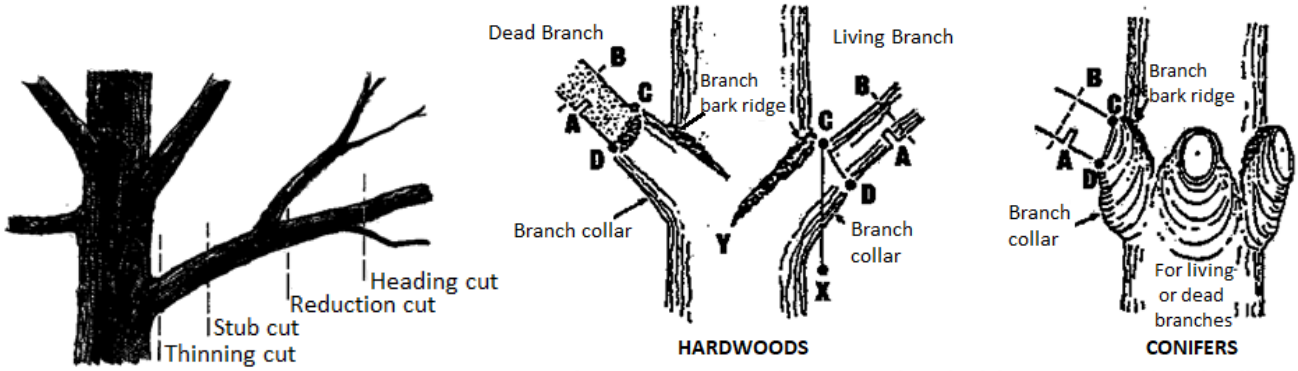


Image source: www.owentree.com

Tree Pruning Cuts

Pruning cuts should be made so that only branch tissue is removed and stem tissue is not damaged. To find the proper place to cut a branch, look for the branch collar that grows from the stem tissue at the underside of the base of the branch. On the upper surface, there is usually a branch bark ridge that runs parallel to the branch angle, along the stem of the tree. A proper pruning cut does not damage either the branch bark ridge or the branch collar. A proper cut begins just outside the branch bark ridge and angles down away from the stem of the tree, avoiding injury to the branch collar.

Figure 23. Types of pruning cuts and the proper branch cutting technique



Natural target pruning properly removes a branch while protecting the branch collar, which is essential for wounds to heal. First cut A, second cut B, and third cut C-D.

Photo source: Pennsylvania State University Urban Forestry Extension

Utility Tree Maintenance Best Practices

Utility Tree Pruning Overview

The city should work with the utility companies to ensure proper pruning practices are followed and that open communication between the company, the city, and the public are maintained. The International Society of Arboriculture provides guidelines for maintaining trees near power lines (*Best Management Practices – Utility Pruning of Trees*, G. Kempter).

Maintaining power lines free of tree growth is based on a consistent, planned trimming cycle of the utility vegetation management company. This approach improves electric service to all the customers who get their power from that line. A sensible approach to trimming trees means having a thorough maintenance plan that improves the safety and reliability of electric service to residents. Residents and the city staff should not attempt to trim any vegetation growing near or on any overhead power lines.

Utility Tree Maintenance Techniques

1. *Directional Pruning*
   Removes entire branches and limbs to the main trunk of the tree and future growth is directed away from the power lines. Reduction cuts are used for removing these branches and limbs and should be pruned properly back to a lateral branch that is at least one-third the diameter of the branch being removed. This allows for good wound closure and protects apical dominance and reduces sprouts.

   Avoid topping or rounding over trees. This removes more foliage than directional pruning, increases the number of tree wounds, stresses the tree, causes unstable decay, and increases water sprouts.

2. *Right Tree Right Place*

Selecting the right tree for the site can reduce potential safety hazards and improve the reliability of the electric service. Smaller trees near power lines do not need to be excessively pruned and do not lose their natural form.

3. *Recommended Trees*
   Trees potentially suitable for planting adjacent to power lines includes fringetree (*Chionanthus virginicus*), wax myrtle (*Morella cerifera*), crape myrtle (*Lagerstromea indica*), and Japanese privet (*Ligustrum japonicum*). Additional species should be considered and listed in a recommended species list.

Figure 24. Example of trees directionally pruned for clearance from power lines

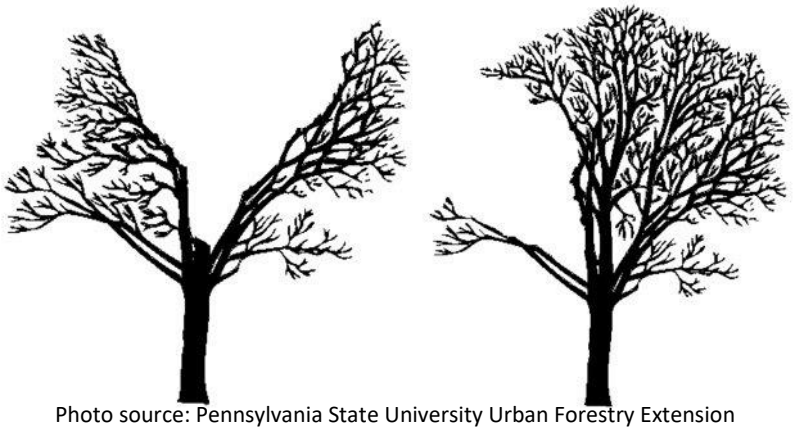


Photo source: Pennsylvania State University Urban Forestry Extension

Young Tree Maintenance Best Practices

Proper pruning is essential in developing a tree with a strong structure and desirable form. Trees that receive the appropriate pruning measures while they are young will require less corrective pruning as they mature.

Young Tree Maintenance Techniques

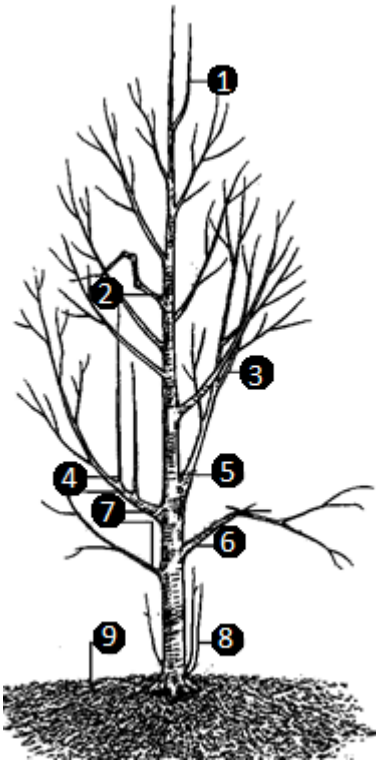
1. *Consider the Nature Form and Desired Growth*
   Accentuate the natural branching habit of a tree and correct any structural problems over time, if needed, to not stress the tree.

2. *Pruning in 1-2 Years after Planting*
   Prune as little as possible after planting to ensure there are enough temporary branches to produce food for new growth of roots, trunk, and branches. Prune only dead, broken, malformed, or diseased branches. Remove codominant leaders to maintain one dominant trunk. Prune for clearance if absolutely necessary. Keep size of branch removed to less than one inch in diameter.

3. *Pruning 2-3 Years after Planting*
   Prune any dead, broken, malformed, or diseased branches. Remove any suckers from the base of the tree. Next, determine the permanent branch structure by considering:
   - Remove, thin, or cut back any competing leaders
   - Remove crossing or rubbing branches, keeping the branch that maintains the natural form
   - Thin excessively crowded branches but do not lions-tail
   - Remove branches with narrow angles between the branch and trunk (consider species)
   - Remove branches to maintain well-spaced branches along and around the trunk. Ideal mature trees will have lateral branches that are 18-24 inches apart (depending on species)

- Avoid pruning near time of bud break
- Prune flowering trees after flowering

Figure 25. Example of branches to be pruned for newly planted trees to promote good structure



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

Photo source: Pennsylvania State University Urban Forestry Extension

Tree Planting Best Practices

The following provides an overview of best practices that should be considered and followed before during and after planting trees.

- Trees to be planted should be selected from an approved tree planting list developed to maintain and enhance species diversity that are suitable for Plant Hardiness Zone 9b and changing climates.
- Planting material will conform to the latest version of the American Standard for Nursery Stock (American National Standards Institute [ANSI] Z60.1). Trees to be planted should be of standard quality or better, and should be true to name and type of their species variety.
- Trees should not be planted in tree lawns less than 2 feet in width or in planting pits less than 5 feet long by 5 feet wide.
- Trees should not be planted within 50 feet of any major intersection, or within 20 feet of a fire hydrant, a driveway, or a pole supporting a light.
- The burlap and twine from balled-and-burlap trees should be removed from the tree and the tree pit. Wire tree baskets may remain on the root ball, but the top one-third should be clipped and removed from the planting hole.
- Mulch should be placed around trees in a minimum 3-foot circle and 3-inch depth to protect trees from lawnmower damage and competition from turf; mulch will be kept away from tree trunks.
- Newly planted trees should be irrigated weekly during droughts in the growing season for three years.

Appendix F. Urban Forestry Resources

Local Resources

- EAB - https://www.icgov.org/emeraldashborer
- Tree Plotter app - https://pg-cloud.com/IowaCity/
- Planting in the ROW brochure - https://www8.iowa-city.org/weblink/0/doc/1540628/Electronic.aspx
- Tree Planting Permit - https://www8.iowa-city.org/weblink/0/doc/1480598/Electronic.aspx
- Scout Projects brochure - https://www8.iowa-city.org/weblink/0/edoc/1564002/Scout%20Project%20Brochure.pdf
- DNR Urban Forestry - http://www.iowadnr.gov/Conservation/Forestry/Urban-Forestry/UrbanForestryCouncil
- ISU Forestry Extension - https://www.extension.iastate.edu/forestry/
- Common trees of IA -https://www.extension.iastate.edu/forestry/iowa_trees/trees/index.html
- Iowa City tree removal procedure - https://www.icgov.org/city-government/departments-and-divisions/parks-and-recreation/parks-and-forestry/tree-removal
- Iowa City Trail Map - https://www8.iowa-city.org/weblink/0/doc/1512414/Electronic.aspx
- Design Guidebook - Maximizing Climate Adaptation Benefits with Trees

Community Outreach and Education

- The Nature Conservancy "Health Trees, Healthy Cities": https://www.conservationgateway.org/ConservationPractices/cities/hthc/Pages/default.aspx/training-resources
- US Forest Service "Outreach Services Strategies for all Communities": http://actrees.org/files/What_We_Do/OutreachStrategies.pdf
- Project Learning Tree: https://forestry.ces.ncsu.edu/ncplt/

Emerald Ash Borer & Other Pests

- Iowa DNR EAB Page: http://www.iowadnr.gov/Conservation/Forestry/Forest-Health/Emerald-Ash-Borer
- IA Department of Ag "Iowa Tree Pests: http://www.iowatreepests.com/eab_home.html

Regional Urban Forestry

- National Urban and Community Forestry Advisory Council: https://www.fs.fed.us/managing-land/urban-forests/ucf/nucfac
- American Forests: http://www.americanforests.org/
- Urban Forestry Index: www.urbanforestryindex.com
- TreeLink: www.treelink.org
- Trees Are Good: www.treesaregood.org
- American Grove: http://thegrove.americangrove.org/
- Society of Municipal Arborists: http://www.urban-forestry.com/
- Arbor Day Foundation: www.arborday.org
- Alliance for Community Trees: https://www.arborday.org/programs/alliance-for-community-trees/
- Tree Care Industry Association: http://www.tcia.org/

Tree Ordinances

- Guidelines for Developing and Evaluating Tree Ordinances (automatic download):
- https://ir.library.oregonstate.edu/downloads/pg15bm22x
- Sample Tree Ordinance:
- https://www.arborday.org/programs/treecityusa/documents/sample-tree-ordinance.pdf
- Example Tree Contracting Specifications: https://www.springfieldmo.gov/DocumentCenter/View/11756
- Trees and Development Guidelines: http://www.a2gov.org/departments/field-operations/forestry/Pages/StreetTreesDevelopment.aspx

- American Public Works Association "Urban Forestry Best Management Practices for Public Works Managers: Ordinances, Regulations, & Public Policies": https://www2.apwa.net/Documents/About/CoopAgreements/UrbanForestry/UrbanForestry-3.pdf

Urban Forest Storm Preparedness

- IA DNR Disaster Preparedness: http://www.iowadnr.gov/About-DNR/Social-Media-Press-Room/Disaster-Assistance
- Urban Forest Strike Teams: http://articles.extension.org/pages/71461/urban-forest-strike-teams
- APA "Hazardous Tree Management and Post-Disaster Tree Management": https://www.planning.org/research/treemanagement/

Trees and Stormwater

- Urban Watershed Forestry Management: http://www.forestsforwatersheds.org/
- EPA Green Infrastructure: http://water.epa.gov/polwaste/green/upload/stormwater2streettrees.pdf
- OKI Regional Council of Governments "Trees & Stormwater": http://treesandstormwater.org/

Urban Forests and Climate Change

- US Forest Service "Urban Forests and Climate Change": https://www.fs.usda.gov/ccrc/topics/urban-forests-and-climate-change

Tree Management Best Practices

- ANSI A300 Standards: https://tcia.org/TCIA/BUSINESS/ANSI_A300_Standards_/TCIA/BUSINESS/A300_Standards/A300_Standards.aspx?hkey=202ff566-4364-4686-b7c1-2a365af59669
- ANSI A300 Pruning Specification Writing Guide: https://www.tcia.org/TCIAPdfs/Resources/Arboriculture/A300TreeCareStandards/A300Pruning-SpecificationWritingGuide-20170413.pdf

Trees and Utilities

- Penn State Extension "Questions about Trees and Utilities": https://extension.psu.edu/questions-about-trees-and-utilities
- Utility Arborist Association "Common Questions about Electric Utility Pruning": https://uaa.wildapricot.org/page-18073
- VA Cooperative Extension "Trees and Shrubs for Problem Landscape Sites: Overhead Utility Easements" (automatic download): https://www.urbanforestrysouth.org/resources/library/ttresources/trees-and-shrubs-for-problem-landscape-sites-overhead-utility-easements/at_download/file
- The eXtension Foundation "Trees for Energy Conservation": http://articles.extension.org/trees_for_energy_conservation
- Arbor Day Foundation "Energy-Saving Trees": http://energysavingtrees.arborday.org/#About

Urban Wood Utilization

- http://ncufc.org/urban_wood_utilization_introduction.php

Planning Resources

- US Forest Service and Davey Institute "Sustainable Urban Forest Guide": http://www.itreetools.org/resources/content/Sustainable_Urban_Forest_Guide_14Nov2016.pdf
- WI DNR "Technical Guide to Developing Urban Forestry Strategic Plans & Management Plans: http://dnr.wi.gov/topic/UrbanForests/documents/UFPlanningGuide.pdf
- Municipal Urban Forestry Staff American Public Works Association "Urban Forestry Best Management Practices for Public Works Managers: Staffing": https://www2.apwa.net/Documents/About/CoopAgreements/UrbanForestry/UrbanForestry-2.pdf
- Tree Boards: http://www.tufc.com/pdfs/treeboard_handbook.pdf

Urban Forestry Funding

- Davey Resource Group "Funding Your Urban Forest Program": http://www.urban-forestry.com/assets/documents/funding-your-uf-program-jenny-gulick.pdf

- Alliance for Community Trees “Funding Sources”: http://actrees.org/resources/tools-for-nonprofits/fundraising-tools-for-nonprofits/
- Penn State Extension “Sustaining and Funding an Urban Forestry Program”: https://extension.psu.edu/sustaining-and-funding-an-urban-forestry-program
- American Public Works Association “Urban Forestry Best Management Practices for Public Works Managers: Budgeting & Funding”: https://www2.apwa.net/Documents/About/CoopAgreements/UrbanForestry/UrbanForestry-1.pdf

Tree and Urban Forest Ecosystem Benefits

- US Forest Service i-Tree: www.itreetools.org
- US Forest Service Midwest Community Tree Guide: https://www.fs.fed.us/psw/publications/documents/psw_gtr199/psw_gtr199.pdf
- US Forest Service “The Urban Forest and Ecosystem Services”: https://www.fs.fed.us/psw/publications/mcpherson/psw_2016_mcpherson001_livesley.pdf

Tree Assessment Resources

- US Forest Service Urban Tree Canopy Assessments (UTC): www.nrs.fs.fed.us/urban/utc/
- Plan-It Geo Urban Tree Canopy Assessments: http://www.planitgeo.com/urban-tree-canopy
- i-Tree Canopy Assessments: https://canopy.itreetools.org/
- Plan-It Geo Tree Inventory Software: www.treeplotter.com

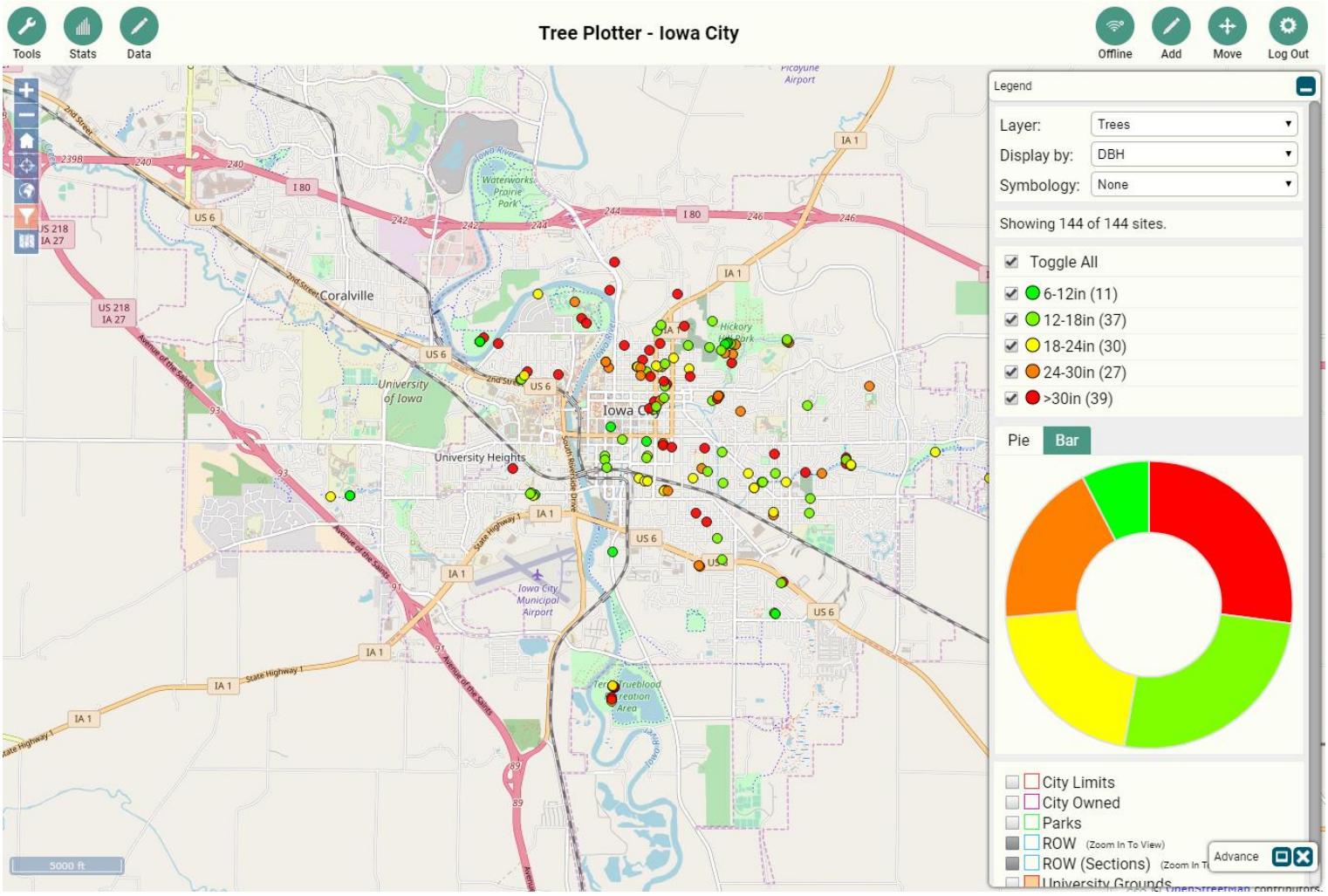
Other Resources

- American Forests “Vibrant Cities Lab”: http://www.vibrantcitieslab.com/
- Urban Forestry South “Resources and Links”: https://www.urbanforestrysouth.org/resources/links
- ISA International Dictionary Online: https://wwv.isa-arbor.com/education/onlineresources/dictionary
- Plan-It Geo Reports and Plans: https://issuu.com/planitgeoissuu

Appendix G. Tree & Planting Site Maps

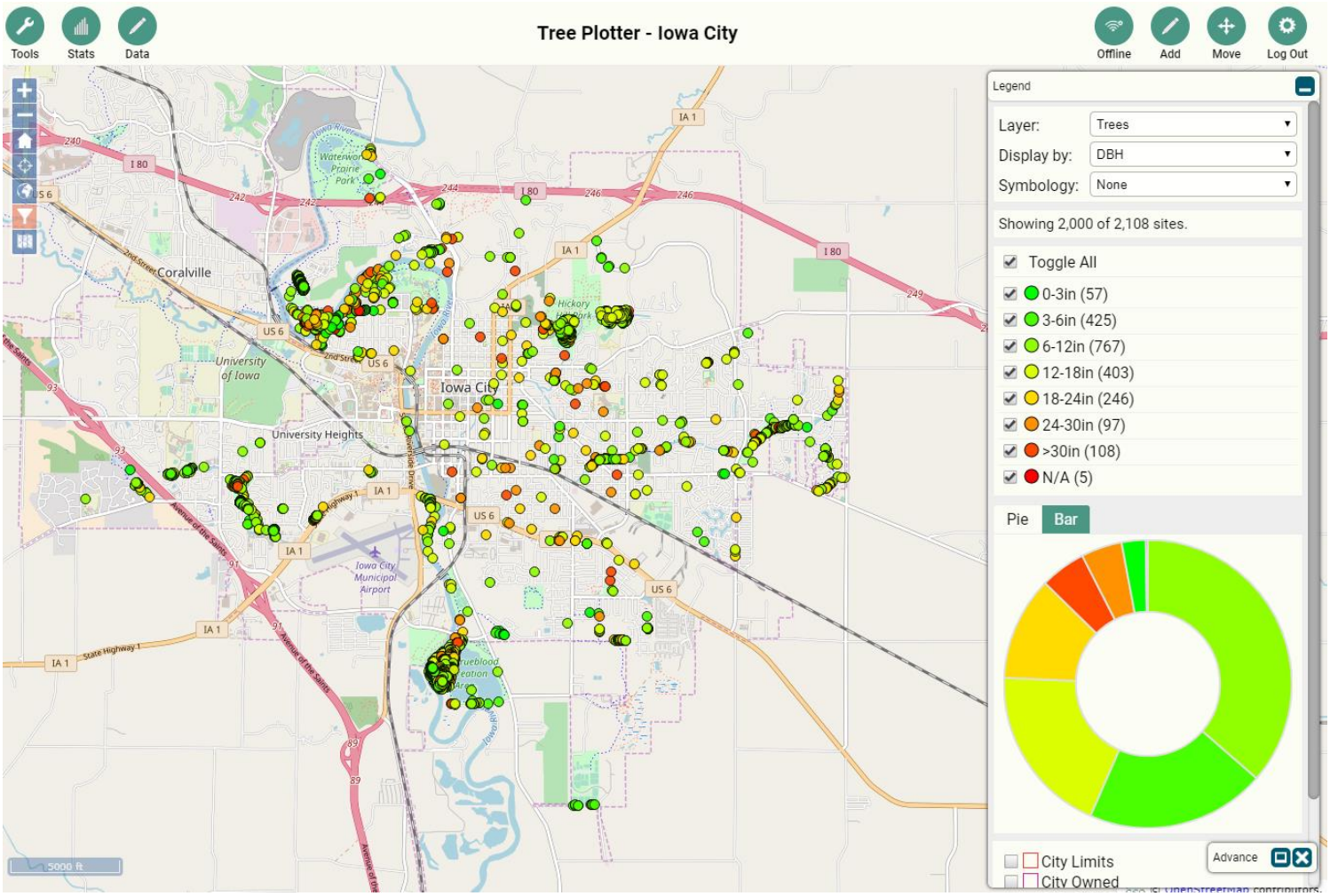
High and Extreme Risk Trees

https://pg-cloud.com/IowaCity/?scenario=HighRiskTrees (requires an account)



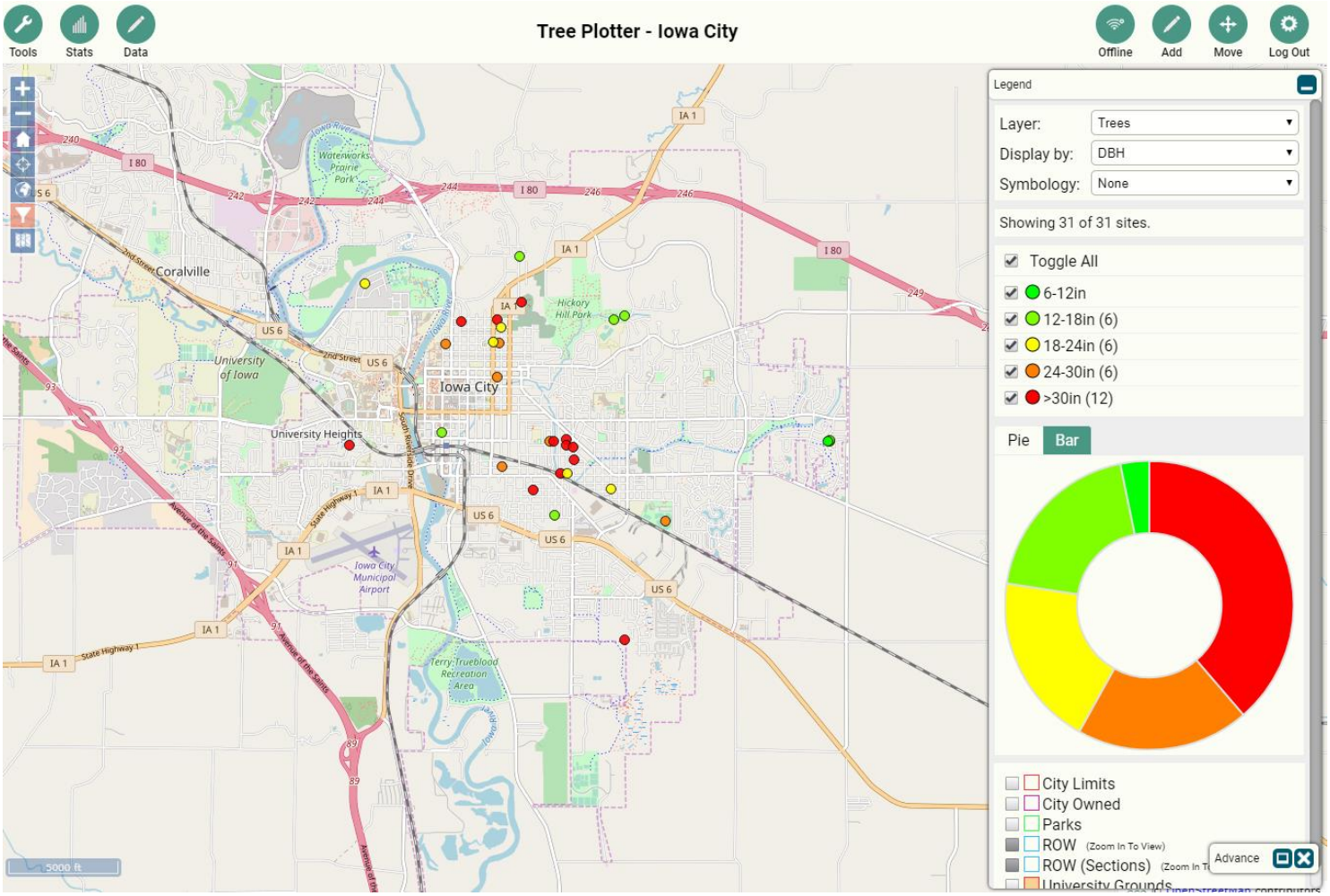
TREES RECOMMENDED FOR REMOVAL

https://pg-cloud.com/IowaCity/?scenario=TreesForRemoval (requires an account)



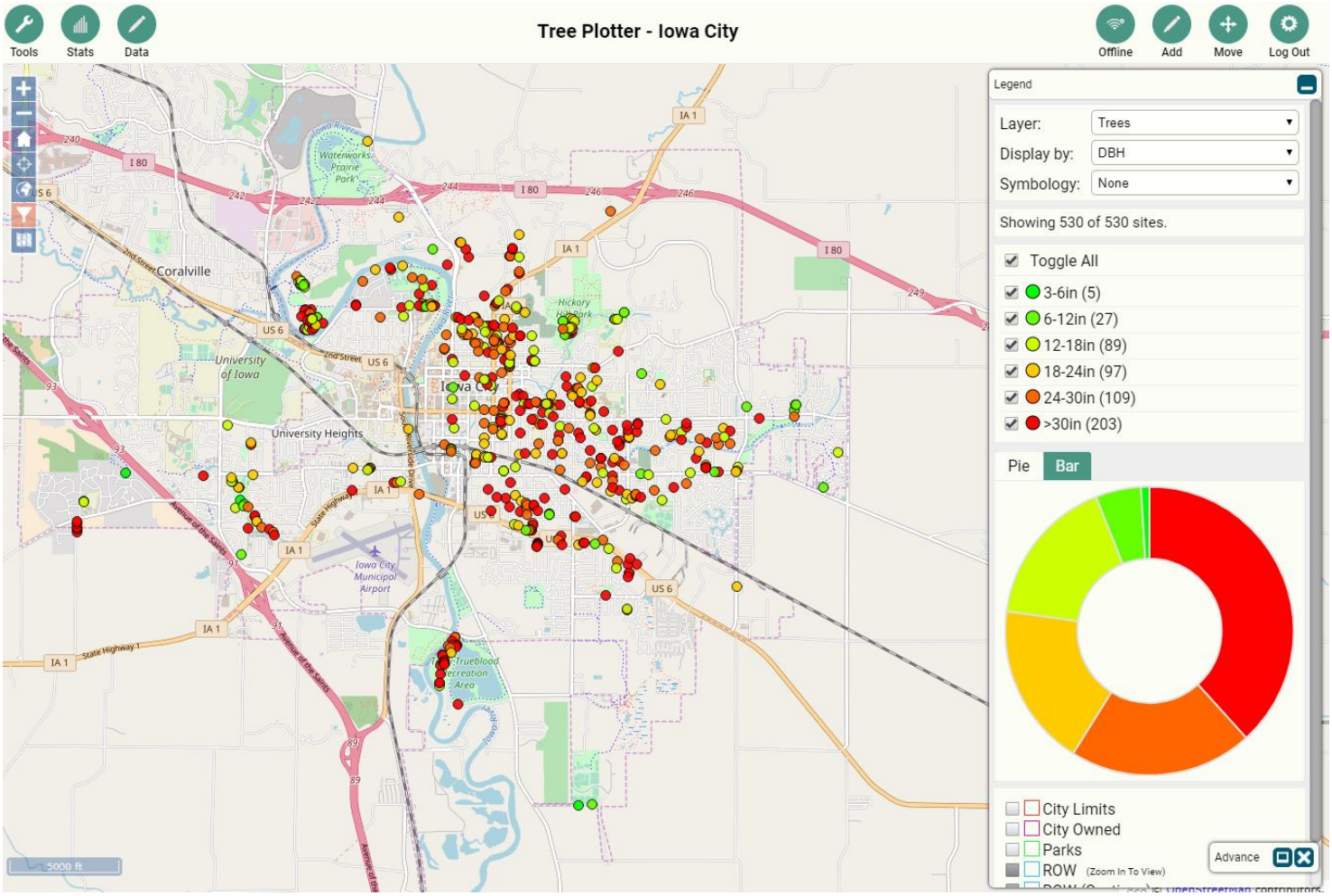
TREES RECOMMENDED FOR IMMEDIATE PRIORITY PRUNING

https://pg-cloud.com/IowaCity/?scenario=ImmediatePruning1 (requires an account)



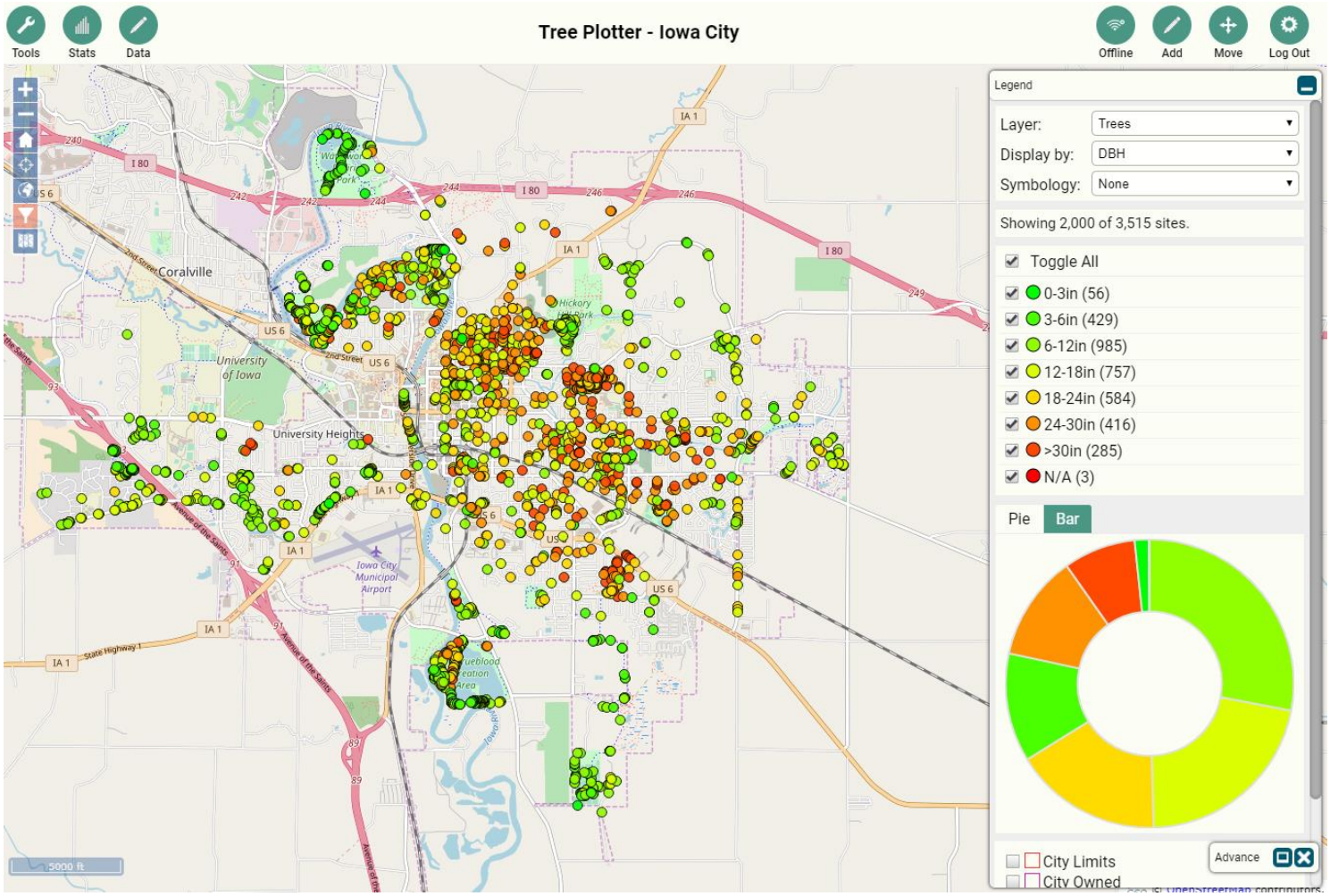
TREES RECOMMENDED FOR HIGH PRIORITY PRUNING

https://pg-cloud.com/IowaCity/?scenario=HighPriorityPruning1 (requires an account)



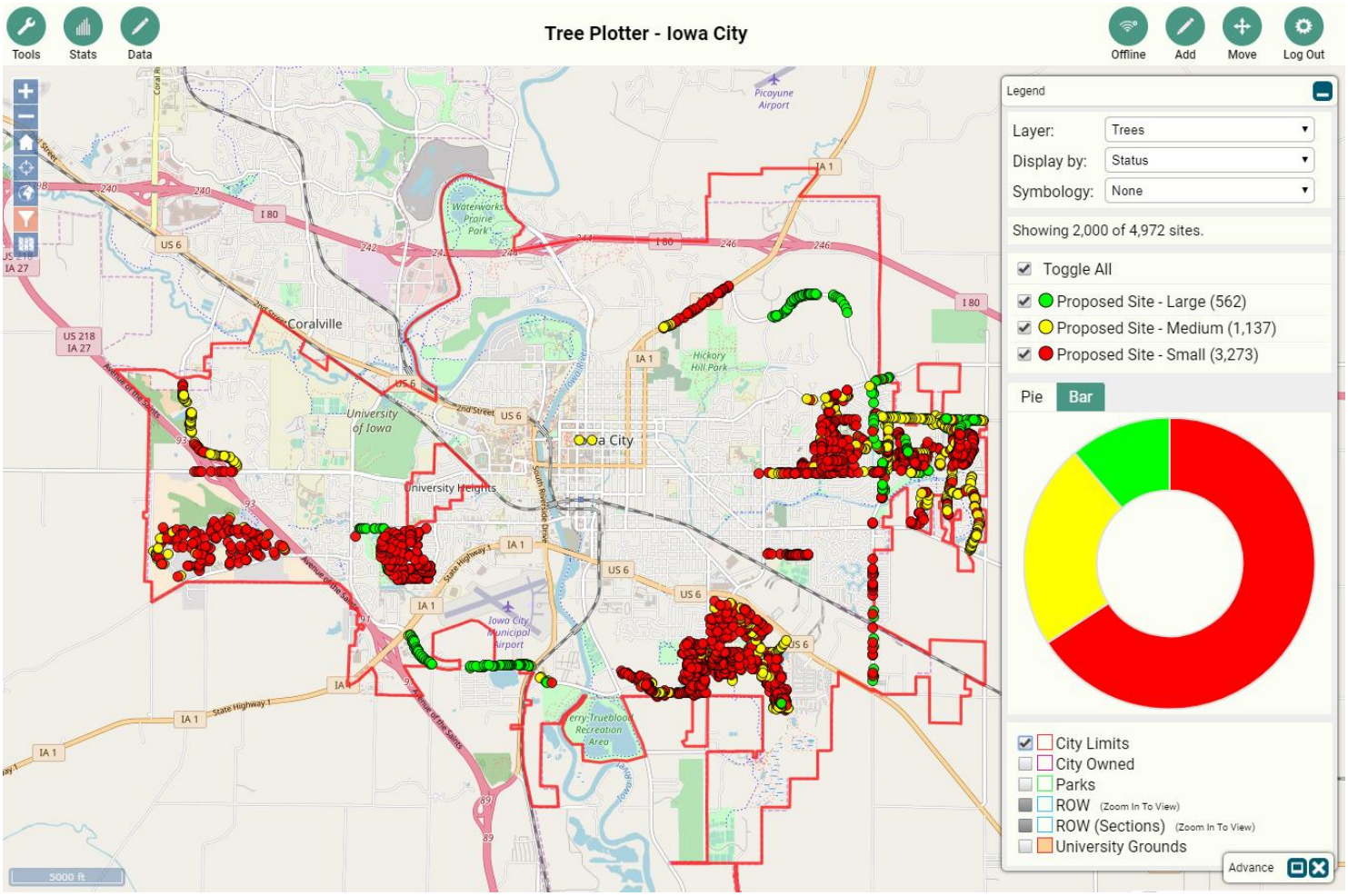
LOCATION AND DBH OF ASH TREES

https://pg-cloud.com/IowaCity/?scenario=AshTrees (requires an account)



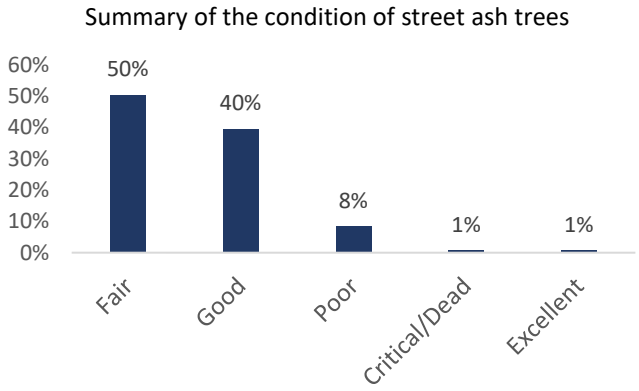
LOCATION AND SIZE OF PLANTING SITES

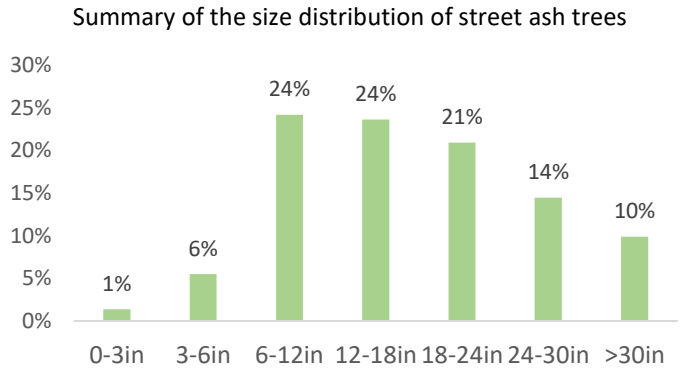
https://pg-cloud.com/IowaCity/?scenario=PlantingSites-Size (requires an account)



Appendix H. EAB Management Guidelines & Community Outreach

Summaries of Ash Trees along Streets





EAB Guidelines & Outreach Approach

The City's approach to emerald ash borer (EAB) management and a summary of ash tree distribution is described in the Vulnerability to Emerald Ash Borer of City-Managed Trees section on page 22.

This appendix provides more detail on the guidelines for EAB management and community outreach. As feasible, the City will seek to save trees that are mature but not past ~75% of their expected life expectancy as determined by qualified City staff. Among the treatable trees, the City will prioritize trees that contribute the most to streetscapes, for example, at intersections and highly visible areas. The City will seek to avoid extensive eradication of ash trees along any one city block at a given time to minimize the visual, economic, and ecosystem impacts. The City will use these infestations as opportunities to increase tree diversity during replanting.

The citizens of Iowa City can be informed about EAB and the management procedures, plans, options, and status on the City's website (www.icgov.org/emeraldashborer) and through outreach materials that are in development. Citizens will be given the opportunity to treat or cost-share on the treatment of public trees that they want to save. These guidelines and approaches may be applied to future tree pest and disease issues.

The City provided a presentation on the Emerald Ash Borer Response Plan in March of 2016. In the presentation, information regarding homeowner treatment options was provided. The table below summarizes the options available for homeowners to treat ash trees on their private property.

Type of Application	Active Ingredient	Tree Size Trunk circumference (diam. @ 4.5ft -dhb)	Time of Application
Soil drench	Imidacloprid (1.47%)	Up to 60" (20" dbh)	Mid-April to mid-May or Early Aug to mid-Sept
Soil drench	Imidacloprid (21.4%)	Up to 60" (20" dbh)	Early Aug to mid-Sept
Soil drench	Imidacloprid, Clothianidin	Up to 60" (20" dbh)	Mid-April to mid-May or Early Aug to mid-Sept
Granular	Dinotefuran (2%)	Up to 36" (12" dbh)	Mid-April to mid-May
Granular	Imidacloprid, Clothianidin	Up to 36" (12" dbh)	Mid-April to mid-May
Granular	Imidacloprid	Up to 36"	Mid-April to mid-May


CITY OF IOWA CITY