2021 TREE MANAGEMENT PROGRAM EVALUATION REPORT

CITY OF LAUREL, MISSISSIPPI

The City of Laurel Mississippi

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Acknowledgments

The City of Laurel

Parks and Recreation Department

Tree Board

Citizens of Laurel

The Mississippi Forestry Commission

PREPARED BY

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Executive Summary

Situated in the Pine Belt region of southeast Mississippi, the City of Laurel ("the City", "Laurel") is proud of its 37-year history of being recognized as a Tree City USA, the longest a city in Mississippi has held that title from the Arbor Day Foundation. The City's urban forest, consisting of tree-lined streets, natural areas and parks, as well as the trees in parking lots and around buildings, plays an important role in the community and provides numerous benefits to its residents. Embarking on this Tree Management Program Evaluation Report ("Report"), the City of Laurel has determined this important resource should be properly cared and planned for to ensure future generations will continue to live in a beautiful and vibrant city well into the future.

The City of Laurel, in commencing this Report, has decided that a healthy, thriving, and resilient urban forest benefitting all citizens can only be built upon a comprehensive understanding of this essential infrastructure. The goal of this report is a sustainable urban forest, one that enhances the benefits of trees while supporting City staff in the maintenance and care of Laurel's urban forest. Achieving this goal requires proper management, sustainable funding, adequate staffing, effective policies, and maintenance activities consistent with arboricultural best practices.

Of the many benefits provided by the City's urban forest, some are directly identifiable and quantifiable, while others are experienced. Recently, urban forests have been recognized as key elements to mitigating the effects of climate change by helping cities adapt to increasing temperatures and other impacts of a changing climate. The City's 2035 Comprehensive Plan, adopted in 2014, recognized that "the protection of natural resources is a vital component in improving and sustaining the overall quality of life in a community" and recommended developing "overlay districts, where appropriate, that require design and landscaping standards that will enhance major corridors or employment centers within the city."

Building on these past efforts, this Report aims to provide much needed training and program recommendations as well as a first-time assessment of baseline tree data through a Citywide canopy coverage assessment and on-the-ground sample inventory of park trees. With this, the City's legacy as the oldest Tree City USA in the state continues to grow and recognizes that caring for this asset is an important part of maintaining a sustainable, and dynamic city for generations to come.

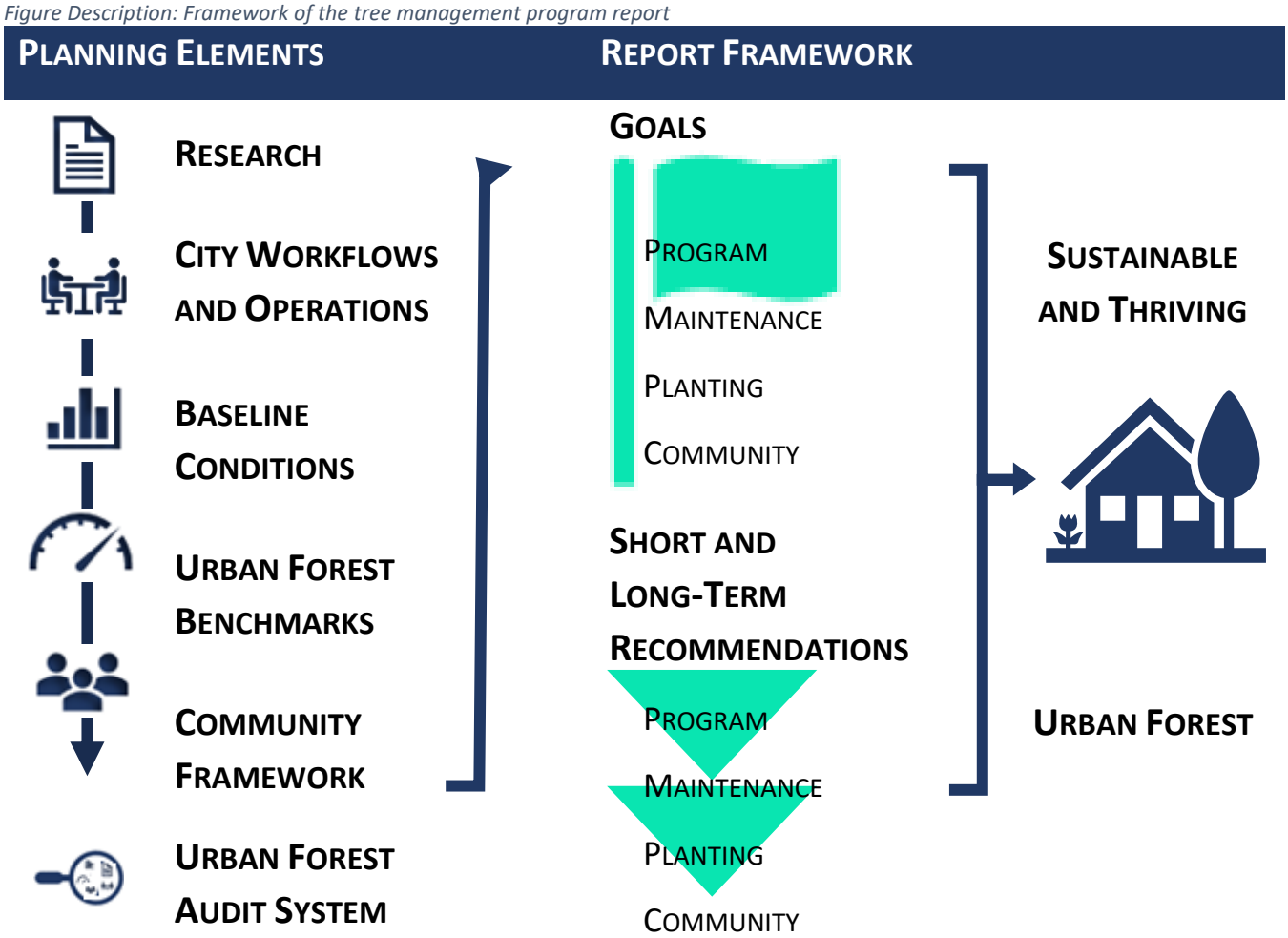
The Planning Process

For the evaluation of the City programs that manage and influence the urban forest, a team of urban forestry planners were assembled to complete the City of Laurel's Tree Management Program Evaluation Report ("Report"). The Report, supported by the City and its residents, advises the program structure(s) and management as it relates to the protection and enhancement of trees and associated benefits along streets and trails, parks and open space, riparian areas, and, to an extent, the trees on private property throughout Laurel. Through the planning process, a baseline assessment of the urban forestry programs was completed along with potential and recommended program structures, staffing requirements, budgetary needs, resource allocation, and action items supported by the City, its partners, and constituents.

To provide urban forestry program guidance supported by action items in the Report, a series of planning elements were completed. This systematic process of analysis consists of extensive research of existing City policies and plans, deep dives into City operational workflows and procedures, baseline assessments of urban forest conditions and structure, comparison of baseline conditions to industry standards and analogous communities, and gathering of community feedback and perceptions. The outcomes of these planning elements informed the Urban Forest Audit System— an auditing process developed by the U.S. Forest Service and tailored to the City of Laurel.

The comprehensive Urban Forest Audit System evaluates all elements relating to urban forest management, sustainability, and the community of Laurel to identify strengths and opportunities that shape the Report's goals and recommendations. The following figure provides an illustration of the process followed by a summary of the goals in the Report, generated from the Urban Forest Audit System framework and categories.

Figure Description: Framework of the tree management program report



Report Findings

Table Description: Conclusions to the Tree Management Program Evaluation project's planning elements

Element	Conclusion
1) Existing Policies and Plans	The City has a strong foundation of policies providing the framework for updates relating to tree preservation, standards, and best practices. The City's Comprehensive Plan alludes to urban forestry elements, but a strategic Urban Forest Management Plan is needed to connect these elements. The City should implement actions in this Report to update policies and inform existing and ongoing City plans.
2) City Workflows and Operations	The Parks and Recreation Division and the urban forest would benefit from additional staffing and resources. An Urban Forestry Program would enable cohesive planning and management to improve efficiencies, provide support, and improve the levels of service provided to City residents. Departments currently coordinate tree maintenance in parks and streetscapes effectively within the constraints of resources.
3) Baseline Conditions	It is estimated the City has 12,600 public trees— of which 10,245 are street trees. The City's entire urban forest provides benefits and services in the amount of $1.5M annually. The City has several tree-related datasets to support an Urban Forestry Program but should consider a comprehensive inventory of street trees and trees in maintained areas of parks. A sample inventory of trees in wooded areas and open space should also be considered. The City public tree population would benefit from increased species and age diversity driven by a strategic planting and management plan.
4) Urban Forest Benchmarks	The City should evaluate its staffing levels if an Urban Forestry Program is established to better manage the public tree population at levels consistent with industry standards and cities of similar population size. According to the benchmarking research, Laurel is managing more trees per full-time employee compared to cities of similar population size (4,200 trees per staff compared to 1,899 trees per staff). And compared to cities of similar population size, Laurel has a lower budget per public tree ($4.77 compared to $32.33) and a higher number of total public trees (12,600 compared to 4,894). The budget for urban forest management should align with the recommended actions in this Report. Laurel should consider developing a science-based Citywide tree canopy goal, a common urban forestry benchmark, from which progress can be measured.
5) Community Framework	Feedback received as part of the Comprehensive Plan effort indicate a desire from residents to have a thriving and livable community supported by a healthy natural environment. Their vision for Laurel also considers job opportunities, infrastructure, ordinances, and improvements to Downtown. The City utilizes existing partners and programs to implement urban forestry related services and activities. The Parks and Recreation Division should implement the partner and program opportunities provided in this Report as feasible.
6) Urban Forest Audit System	Overall, the City scored 45 percent based on the U.S. Forest Service's Urban Forest Audit system that evaluates 11 categories of urban forest management and sustainability. A low scoring was anticipated since the City is only in the initial steps of establishing an Urban Forestry Program. Implementation of actions in this Report will improve the City's ranking and frequent auditing exercises should be conducted to measure progress and adjust strategies in an adaptive management approach.

Urban Forestry Goals

URBAN FORESTRY PROGRAM GOAL: THE CITY IS ADEQUATELY STAFFED, TRAINED, AND STRUCTURED TO PROVIDE HIGHER LEVELS OF SERVICE, SUPPORTED THROUGH POLICY, RESULTING IN A HEALTHY URBAN FOREST EQUITABLY BENEFITING THE CITIZENS OF LAUREL.

TREE MAINTENANCE GOAL: LAUREL PROACTIVELY MANAGES THE PUBLIC TREES, CONTINUES TO GROW AND EXPAND A HEALTHY CANOPY, EFFECTIVELY MITIGATES RISK, AND OPTIMIZES URBAN FOREST BENEFITS.

TREE PLANTING GOAL: THE CITY OF LAUREL MAINTAINS ITS CURRENT TREE CANOPY COVER THROUGH A NO-NET-LOSS APPROACH AND CONTINUES TO PLANT TREES THAT ARE RESILIENT TO CLIMATE CHANGE AND OTHER RISKS RESULTING IN AN EQUITABLE DISTRIBUTION OF TREE CANOPY AND ASSOCIATED BENEFITS.

COMMUNITY ENGAGEMENT GOAL: SUSTAINABLE URBAN FOREST MANAGEMENT AND EQUITY IS ACHIEVED THROUGH A PARTNERSHIP WITH THE CITY AND ITS RESIDENTS RESULTING IN IMPROVED WELL-BEING, HUMAN HEALTH, AND LOCAL ECONOMIES.

Overview of Urban Forestry Recommendations

Program Recommendations

Staffing: Maintain staffing levels, certifications, and training. Update Standard Operating Procedures.

Budget: Establish funding for comprehensive public tree inventory and continue to apply for grants. Utilize the inventory to build the case for more funding. Continue to fund the urban forest management program.

Structure: Inform the public of the current tree maintenance responsibility. Strengthen interdepartmental communications, protocols, manuals, and Standard Operating Procedures.

Management: Continue the tree maintenance and removal program and update the inventory as maintenance is completed. Align maintenance and planting with City planning efforts, adhere to current industry standards, and continue to obtain Tree City USA status.

Code and Policy: Align resources and planning efforts with departments and partners, engage in City department planning, provide guidance on tree planting and preservation for City projects.

Tree Maintenance Recommendations

Tree Removals

- Inventoried Trees: Prioritize the 51 high-risk removals in years 1-3.
- Public Tree Population: Prioritize the estimated 1,121 high-risk removals in years 1-3.

Immediate Pruning

- Inventoried Trees: Prioritize immediate pruning for 85 trees in years 1-3.
- Public Tree Population: Prioritize immediate pruning of the estimated 1,029 trees in years 1-7.

Rotational Pruning

- Inventoried Trees: Beginning in year 3, prune 118 inventoried trees per year on a seven-year rotation.
- Public Tree Population: Beginning in year 1, prune 1,431 trees per year on a seven-year rotation.

Training Pruning

- Inventoried Trees: Beginning in year 1, prune 28 trees per year on a three-year rotation.
- Public Tree Population: Beginning in year 1, prune 334 young trees per year on a three-year rotation.

Tree Planting Recommendations

Planting Strategy: Develop a planting strategy that addresses equity, canopy loss, benefits, diversity, partnerships, and post-planting care.

Preservation Policies: Establish or strengthen City Code and policies relating to tree preservation.

Analyze Available Planting Space: Utilize the i-Tree Canopy data to refine possible planting areas into feasible and preferred planting areas that are based on inventories, resources, and public input.

No-Net-Loss: For every public tree removed, plant at least one replacement tree based on a planting strategy.

Community Engagement Recommendations

- Maintain Tree City USA status.
- Coordinate outreach as a Citywide effort.
- Update the City's website based on this Report.
- Utilize volunteers and support volunteer trainings.
- Strengthen and establish partnerships to achieve common goals.

Call to Action

Trees are an integral part of the community and the ecological systems in which they exist. They provide significant economic, social, and ecological benefits such as carbon sequestration, reduction of urban heat islands, energy savings, reduction of stormwater runoff, water quality improvements, healing and calming qualities, and increase the value of business and residential properties. A program providing strategic tree planting and maintenance will help Laurel become more sustainable and reduce the negative impacts on the ecosystem from urban development. Trees are as necessary as water, infrastructure, and energy to sustaining healthy communities.

Implementation of the strategic actions described in the Report will achieve the urban forestry goals and associated co-benefits desired by the City and its residents to the extent possible with available resources. Through this process, an Urban Forestry Program for Laurel may be established, supported with the appropriate staffing levels and resources for services.

Successful implementation of this Report is heavily dependent upon engagement between the City and its residents. The framework of this strategic Report allows the City to take actions to develop an Urban Forestry Program while building on previous work, effectively monitor progress, and efficiently adapt in an ever-changing environment.

It is the City's responsibility to facilitate the implementation of the Tree Management Program Evaluation Report based on the status of resources and funding. Recommendations provided for each goal are prioritized based on short- and long-term needs to propel the Urban Forestry Program towards improved management. Successful implementation of the Report will bring Laurel's trees and forests to a higher level of service that is more equitably distributed across the City to benefit present and future generations.

A. Project Introduction

A.1) Benefits of the Urban Forest

The City of Laurel ("City", "Laurel") is dedicated to building a thriving urban and community forest for a healthy and vibrant city. Realizing the community forest is a valued asset, Laurel invested in a collaborative planning process, involving extensive urban forest resource and program analysis to develop a clear, concise, and timeline-oriented Tree Management Program Evaluation Report. The overall goal of the planning process was to provide recommendations to the City to develop a sustainable Urban Forestry Program that is committed to this measured, monitored, and strategic long-term investment. The strategic planning process engaged City staff, the community, and urban forestry consultants to evaluate all aspects and components of a comprehensive urban forestry program. Together, this team developed goals and actions to guide the City towards the establishment of a program and implement activities to sustain this vital resource.

The vibrant urban forest in Laurel creates a community atmosphere and this ecosystem continues to grow and change. Sustaining it will require ongoing human intervention. The goal of this intervention is a sustainable urban forest— an urban forest that optimizes the benefits of trees while meeting established safety and economic goals. Achieving this requires robust management, diverse funding, adequate staffing and levels of service, appropriate and effective policies, and maintenance actions consistent with best practices.

A sustainable urban forest can be defined as "the naturally occurring and planted trees in cities which are managed to provide the inhabitants with a continuing level of economic, social, environmental, and ecological benefits today and into the future" (Clark and Matheny et al. 1997).

Urban forests are increasingly important to urbanized areas and the people who live and work in these built landscapes. Trees offer many benefits, some of which are directly identifiable and quantifiable, and others that are experienced. A 2021 assessment of the City's urban forest canopy found that this living infrastructure shades approximately **42 percent** of the community and provides economic, environmental, and aesthetic benefits: **$86,600** annually in air filtration, **$1.3 million** annually in carbon sequestration, and more than **$30 million** in overall carbon storage services.

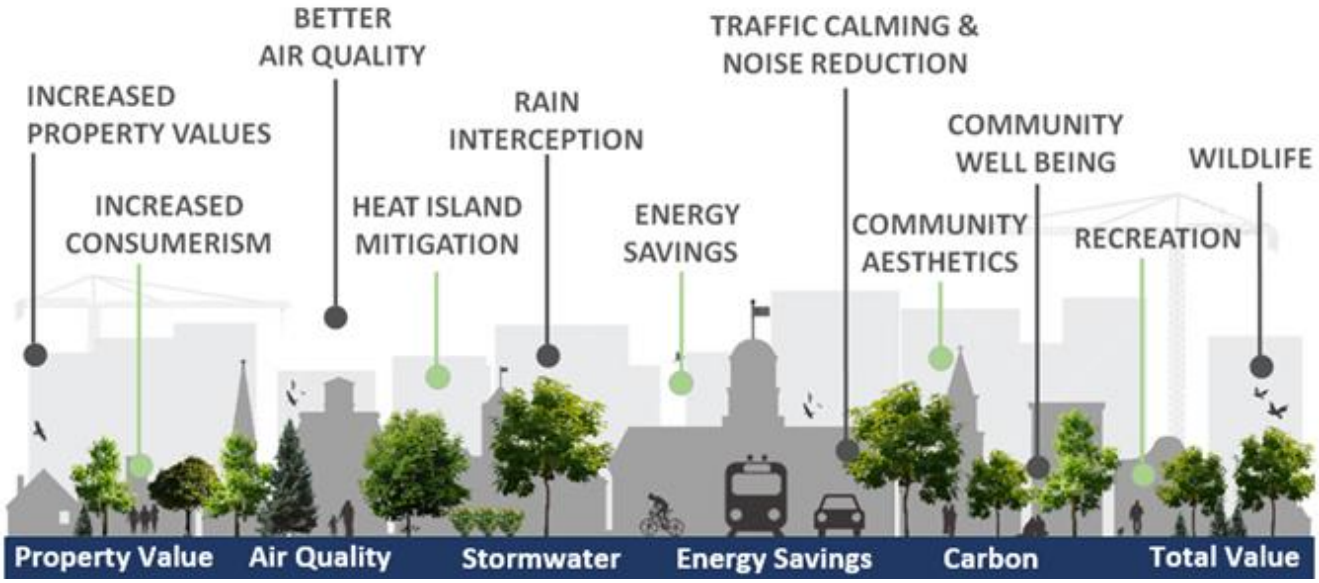


Figure 1. Illustration of the benefits provided by urban trees

A.2) Planning the Urban Forest

Properly caring for and managing an urban forest has positive ripple effects throughout a community. The more trees growing in a community, the more benefits that community receives. The better condition those trees are in, the more benefits they can potentially provide to the community. Many studies have shown the benefits a healthy urban forest has on a community and have recognized "urban trees as an essential component of health-supportive environments." (Wolf, KL et al. 2020). A community that is engaged with its urban forest will responsibly plant, care for, and nurture its trees, while inspiring others to do the same and supporting the City's urban forest management program. A thriving urban forest is only possible through a civic commitment and partnerships with all stakeholders.

The responsibility of public tree management has changed in structure and duties over the course of the City's establishment and growth. While the City included recommendations for natural resources in the 2035 Comprehensive Plan, urban forestry issues were not addressed and as of 2021 the City does not have a dedicated city arborist or city forester or specific internal policies and procedures in place to properly manage their urban forest. Maintenance of trees is provided by the landscaping crew in the Parks and Recreation Department, however staff require adequate training regarding tree maintenance standards and best practices and the City is lacking the data on trees that are their responsibility to manage. To achieve long-term sustainability of the urban forest, the City desired an evaluation of the existing structures and mechanisms in place to manage the public trees in Laurel.

"The City Beautiful", as Laurel is known, came to be thanks in large part to its forests. Shortly after incorporating as a city in 1882, Laurel experienced economic growth following a surge in timber harvesting and milling, which, at its peak of production following World War I, shipped out more yellow pine lumber than anywhere else in the world. In many ways this period of growth led to much of the City's development and expansion in the early-to-mid 1900's, including a methodically planned system of parks led by one of the nation's leading city planners at the time, Frederick Law Olmstead, Jr. The City benefits from these distinct features to this day, but there are internal and external elements that place considerable pressure on the City's identity and future—an identity and future of which the urban forest uniquely shapes and influences.

Cities around the world, including Laurel, face issues such as an aging and declining tree canopy; disproportionate maintenance of trees; improperly maintained trees; inconsistent enforcement of tree preservation ordinances; tree and sidewalk conflicts; pests and diseases; development impacts on trees; unsustainable funding sources; insufficient management staffing; and the effects of climate change. Specifically, the region is experiencing dramatically intensifying extreme weather and climate impacts, including drought, long-term water shortages, flooding, and extreme heat. In many instances, these impacts are already exceeding the designed capacity of city infrastructure to protect the health and safety of residents, businesses, and neighborhoods, which in turn threatens the fiscal viability of cities and regions. Urban trees can play a significant role in making cities resilient to weather and climate extremes, and in protecting human and ecosystem health and safety. To do so, trees must be consciously selected, planted and managed as the central component of an urban forest where individual trees are managed as part of a greater system with the purpose of improving the urban environment and enhancing benefits.

Yet the ability of urban trees and urban forests to achieve desired benefits is often drastically limited due to poor maintenance and management stemming from insufficient municipal budgets, lacking urban forest management systems and programs, limited training of tree care professionals, and a lack of enforcement of tree-management best practices to support tree health. Consequently, improper pruning of trees is commonplace in many cities, resulting in limiting the beneficial functions of trees, leaving trees more susceptible to pests and disease, and leading to premature tree death. Urban trees face multiple challenges to surviving and thriving. Trees that die years prematurely will not create the root systems and canopies needed to reach their benefit potential and maximize their return on investment. Planting and maintaining an urban forest that exists in concert with other green infrastructure must include management by trained individuals, a foundation of appropriate policies, the use of tree inventory data, an understanding of baseline conditions and canopy extent, collaboration among

departments to mainstream urban forest management, a community with a shared vision for the urban forest, and a roadmap for management.

A.3) Project Purpose

For the evaluation of the City programs that manage and influence the urban forest, a team of urban forestry planners were assembled to complete the City of Laurel's Tree Management Program Evaluation Report ("Report"). The Report, supported by the City and its residents, advises the program structure(s) and management as it relates to the protection and enhancement of trees and associated benefits along streets and trails, parks and open space, riparian areas, and, to an extent, the trees on private property throughout Laurel. Through the planning process, a baseline assessment of the urban forestry programs was completed along with potential and recommended program structures, staffing requirements, budgetary needs, ordinance evaluation, resource allocation, and tree management and overall program recommendations supported by the City, its partners, and constituents.

The Report is intended to identify the City's goals and priorities for managing its trees and forests; analyze the current status of the City's urban forest resources and its management program; and to identify the methods, resources and personnel that are needed to achieve the City's goals. This Report establishes a clear set of attainable goals, priorities, and objectives related to the goal of maintaining a productive and beneficial community forest.

This project includes:

- Research consisting of existing policies, plans, and resources to gauge the City's readiness for improved urban forest management;
- Discussions and research to chart the City's existing workflows and operations relating to the urban forest;
- Assessments and analyses of existing urban forest characteristics;
- Benchmarking research to compare elements of the City's urban forest to industry standards and analogous communities;
- Community framework analysis to identify existing and potential partners and programs;
- A systematic audit to identify strengths and opportunities as it relates to urban forest management, sustainability, and community;
- Findings and interpretations of planning element outcomes to develop recommendations to achieve goals;
- Case studies and analyses supporting recommendations.

A.4) Project Approach

The development of the City of Laurel's Tree Management Program Evaluation Report consisted of the implementation of **five unique planning elements**, the results of which were applied to a systematic and industry-approved audit system. The outcomes of these baseline assessments informed the strategic goals and recommendations to guide Laurel's urban forest and the programs that manage it towards improved levels of management, sustainability, and equity of services and benefits.

The baseline assessment was established by conducting an audit of existing conditions and operations. This diligent approach to urban forest management first looks at the resource at a broad scale—the **existing policies and plans (element #1)** to gauge the City's readiness and available resources to achieve optimal levels of urban forest sustainability. Next, **existing City workflows and operations (element #2)** reviews were conducted through City staff meetings and questionnaires to discuss the current public tree management framework. This identified the existing infrastructure and processes around tree management, the gaps and areas for improvement, strategies to improve efficiencies, and resource needs. After the policy and operational framework were reviewed, the **baseline conditions (element #3)** of the urban forest were assessed through high-level and in-depth data analysis to identify gaps in resourcing and canopy coverage. Results from the data analyses and meetings informed the comparisons of analogous communities and industry standards to establish **urban forest benchmarks (element #4)**. To inform the strategies for closing these gaps, existing **community engagement (element #5)** activities and approaches were reviewed to identify opportunities for future engagement to continually monitor community interests, viewpoints, and feedback relating to the management of the urban forest.

Lastly, outcomes of the planning elements were audited using the **Urban Forest Sustainability and Management Audit System (element #6)** developed by the U.S. Forest Service and partners. Results of this audit identified the City's strengths and vulnerabilities relating to urban forest management. The outcomes of this audit system provide the framework of the Report's goals and recommended actions. Optimal levels of urban forest management identified through this audit establish the criteria and system for adaptive management processes to continually improve as the City's environment, public perception, and resources change over time.

Based on the results of the urban forest audit the goal and action framework were established with an emphasis on recommendations to formulate an urban forestry program in the City. The recommendations in this Report focus first on the current capacity followed by long-term recommendations as incremental increases to the City's budget and supporting resources occurs. The long-term recommendations are based on the review by the urban forestry consultants for this project, City goals, industry standards, comparable cities, and available resources. The goal and action framework provide the guidance for implementation within the City's current capacity and incremental increases to resources. In any scenario, actions provided in this Report will improve the City's approach to urban forest management, sustainability, and levels of service within the confines of available resources and budgets.

A.5) Evaluation Report Framework

The framework of the Report aligns with the project's planning approach. The methods for analyzing Laurel's urban forest and resources are described in the Methodology section and outcomes of the planning elements are summarized in the Findings. Based on the findings, strengths and opportunities were identified to inform the goal and action framework. The studies in the appendices provide guidance to support implementation of the actions.

1) Methods: Description of the Planning Elements and process.
2) Findings: Results of the Planning Elements.
3) Strengths and Opportunities: Interpretations of the Findings.
4) Recommendations in the Goal and Action Framework.
    A) Program Guidance: Staffing, Budget, Structure, Activities, Code and Policy.
    B) Maintenance Guidance: Priority Removals, Priority Pruning, Risk Management, Routine Pruning, Young Tree Training, Stump Removals, Tree Care (fertilizer, mulch, watering).
    C) Planting Guidance: Locations, Tree Species (recommended tree species list), Timing, Factors (space, maintenance required, function).

D) Community Outreach and Education Guidance: Existing and Potential Partners and Programs, Guidance by Sector (residents, business owners, landscapers and tree companies), Tree Board Support.
E) Summary of Recommendations: Program, Maintenance, Planting, Community, Monitoring and Adaptive Management Guidance.
F) Goals: By Urban Forest Audit theme to address shortcomings and leverage strengths.

5) Supporting Studies: Support implementation of the Report's actions.

B. Methodology

B.1) Research

Extensive document gathering, research, interviews, and consultations were conducted using the information discovery framework outlined in the U.S. Forest Service's Urban Forest Sustainability and Management Audit System ("Urban Forest Audit"). This framework consisted of acquiring plans, documents, manuals, and anecdotes based on 11 urban forest management categories and 129 category-specific elements. The information obtained from this process was analyzed, indexed, interpreted, and documented.

B.2) City Workflows and Operations

The urban forestry consultants provided City staff with a questionnaire in early 2021 to discuss the interactions and operations relating to urban forestry throughout City departments. The responses were organized based on the structure of the Urban Forest Audit System described in Section B.6 of this Report.

1) Management Policy and Ordinances
2) Professional Capacity and Training
3) Funding and Accounting
4) Decision Management Authority
5) Tree-Related Inventories
6) Tree-Related Plans
7) Risk Management
8) Disaster Planning
9) Standards and Best Management Practices
10) Community
11) Green Asset Evaluation

Responses were organized into comprehensive notes and aligned with the Urban Forest Audit System to inform the evaluation of the City's programs, resources, and community framework that shape the urban forest. Through this process recurring themes, resource needs, and workflow gaps were identified. The results of this analysis are provided in Section C.2: City Workflows and Operations Findings.

B.3) Baseline Conditions

To identify gaps in resourcing and canopy coverage across the entire City's geography, relevant information was analyzed and summarized. The City's urban forest was measured in terms of extent, composition, size, health, and resilience using the following datasets:

Land cover: U.S. Forest Service's i-Tree Canopy and Landscape applications[1] to complete a random point-based land cover assessment using Google imagery.

A) Land cover classifications were identified.
   1. Tree/Shrub (T)
   2. Grass/Herbaceous (H)
   3. Impervious Buildings (IB)
   4. Impervious Road (IR)
   5. Impervious Other (IO)
   6. Parking Lots (PL)
   7. Soil/Bare Ground (S)
   8. Water (W)

B) City Boundary added to i-Tree Canopy and parameters set.

C) Randomized sample points generated in i-Tree Canopy and classified with land cover classes above.

D) Assigned land cover type by randomized point conducted until the standard error reached +/- 2.0 percent (1,000 points).

E) Exported results from i-Tree Canopy and integrate into i-Tree Landscape.

F) Generated reports in i-Tree Canopy and i-Tree Landscape.

2021 Public Park Tree Sample Inventory: Completed by International Society of Arboriculture (ISA) Certified Arborists.

B) Priority areas were identified.
   1. Boston Park
   2. Gardiner Park
   3. Mason Memorial Park

C) Inventory data was collected in PlanIT Geo's TreePlotter software application.
   1. Location (Lat/Long), Address, Land Use, Unique ID, Status, Date Assessed, User
   2. Species, Diameter at Breast Height (4.5 feet, DBH), Condition, Observations
   3. Growing Space, Primary Maintenance Need, Secondary Maintenance Need

D) Data was analyzed in TreePlotter, Microsoft Excel, and ArcGIS.

[1] www.itreetools.org Since 2006, i-Tree has been a cooperative effort between the USDA Forest Service and partners.

B.4) Urban Forest Benchmarks

The purpose of Planning Element 4, Urban Forest Benchmarks, is to understand the level of effort and capacity necessary to satisfy the City's adopted goals, to identify industry trends and best practices, and to ensure urban forest sustainability. Benchmarks help to gauge the City's investment in community tree management compared to other communities facing similar issues in urban forest management. To complete these benchmarks, the following process was applied:

Phase 1 of the benchmarking process utilized the Arbor Day Foundation's Tree City USA 2019 dataset and compared statistics provided by the City of Laurel to other regional cities that also participate in the Tree City USA program. Using this dataset, Laurel's urban forestry budget and activities compared to relevant cities were analyzed. Relevant cities were determined by 1) proximity (nationwide), 2) proximity (statewide), 3) population size (nationwide), 4) population size (statewide), and finally 5) within 50 miles and most similar population size (best match). See the table below for the best match communities in Mississippi. Once this list of relevant cities was created, City staff were invited to help further refine pertinent benchmarking locations and data points in order to provide the most relevant and useful end product. The Tree City USA dataset is largely focused on: urban forestry budgets, per capita funding information, and volunteer hours. The data further describes the number of trees planted, removed, and pruned by City staff. This data is useful in determining adequacy of urban forestry program funding as well as understanding workloads of those City employees involved in urban forestry operations.

Table 1. Summary of Tree City USA communities used as part of the Phase 1 benchmarking research

City	Proximity (mi)	Population Difference
Laurel, MS	0	0%
Ocean Springs, MS	92	3%
Oxford, MS	184	3%
Hernando, MS	221	13%
Keesler AFB, MS	90	15%
Ridgeland, MS	78	30%
Horn Lake, MS	231	32%
Cleveland, MS	171	33%
New Albany, MS	194	51%
Waveland, MS	98	65%
Lucedale, MS	64	84%
Magnolia, MS	84	88%
Tupelo, MS	176	105%
Meridian, MS	55	122%
Biloxi, MS	90	148%
Hattiesburg, MS	32	166%
Gulfport, MS	91	288%

Phase 2 of benchmarking included a comparison of Laurel's urban forestry operations to findings from an in-depth study conducted by researchers Richard Hauer and Ward Peterson titled, *Municipal Tree Care and Management in the United States – a 2014 Urban and Community Forestry Census of Tree Activities*. In this study, researchers interviewed urban forestry programs in various regions across the U.S. and among varying population classes. Specific study areas include: community and staff profiles, funding, tree management policy and planning, volunteers and partnerships, contracting tree care activities, community tree populations, tree operations and management, and assistance programs. Data from this study was compared to data obtained through the City for the purposes of determining program health as compared to accurate data across a range of scales and locations. For Laurel, benchmarking values were cross-examined with the southern region communities and communities in the 10,000 to 25,000 population range.

View the 2014 study by Hauer et al. at: https://www.uwsp.edu/cnr/Pages/Forestry---MTCUS.aspx.

PHASE 3 of the process presented the above information to the City for data updates or clarifications to establish the City's benchmarks. This phase also included internal quality controls to ensure data comparisons were as accurate as possible. Information gathered during this process informed the development of realistic and attainable goals and actions in this Report.

B.5) Community Framework

The community framework planning element closely examines the resources, approaches, programs, and partners providing education and engagement opportunities relating to or supporting elements of the urban forest. Much like the City staff consultations, this planning element exists to gauge existing efforts and identified opportunities for strengthening the partnership between the City and community to achieve higher levels of urban forest management and sustainability. Improving the community framework will ensure benefits of the urban forest and programs that manage it are shared by all.

Evaluations considered the following:

- Existing and potential partners
- Existing and potential programs
- 2035 Comprehensive Plan public engagement findings
- Industry and regional community outreach and engagement recommendations

Source: Mississippi Forestry Commission

B.6) Urban Forest Audit System

The findings from the five planning elements were evaluated to identify strengths and opportunities relating to Laurel's sustainable urban forest management. The research conducted and the information gathered during these initial planning processes provided the information needed to complete a comprehensive evaluation of Laurel's urban forest resource and management procedures. The outcomes of this evaluation, herein referred to as the Urban Forest Audit, is a culmination of all planning elements to define the framework of the Report's goal and action framework.

This auditing system documented the City's level of urban forest sustainability and management as defined by the U.S. Forest Service, industry professionals and researchers, and local parameters from which progress can be measured.

Developing the Report was a systematic process where the results of each step informed the next, leading to development of the goals, actions, and targets. Information gathered from the planning elements was documented and then systematically evaluated following the U.S. Forest Service's Urban Forest Sustainability and Management Audit (UFSMA) system[2]. The following provides an overview of the approach.

Information Discovery

The first step in the planning process involved an extensive review of existing plans, policies, ordinances, practices, data, and initiatives to establish a baseline using the UFSMA. This audit is an industry-accepted process and region-specific evaluation of 11 categories of urban forest sustainability and management as they relate to the City of Laurel. Documents and resources were reviewed and indexed as part of the information discovery process and references to urban forestry were identified to inform the evaluation and recommendations in this Report.

Urban Forest Sustainability and Management Audit

This auditing system is designed to provide a framework for comprehensively evaluating urban forest management programs. The primary objectives of the audit are defined by the UFSMA authors and adapted by the project team:

- Engage the full spectrum of the organizations' management team.
- Provide program direction that increases the level of professionalism in management.
- Conduct a gap analysis of management practices and the health of urban forests.
- Provide strategic direction to improve the health of the urban forest.
- Optimize management for environmental justice and equitable distribution of resources.

The process of analyzing the urban forest involved extensive information and document gathering and research 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 Forest Service. The 11 categories are listed in the following table:

[2] The Urban Forest Sustainability and Management Audit, developed by the USDA Forest Service Urban Forestry South, is based on the urban forest sustainability and management review checklist developed in cooperation with Agnes Scott College Office of Sustainability and the ASC Arboretum Advisory Council and the City of Austin, TX. J. Abbot, et al., 2015. www.urbanforestrysouth.org

Table 2. Urban Forest Sustainability and Management Audit categories and framework

1)	Management Policy and Ordinances
2)	Professional Capacity and Training
3)	Funding and Accounting
4)	Decision Management Authority
5)	Tree-Related Inventories
6)	Tree-Related Plans
7)	Risk Management
8)	Disaster Planning
9)	Standards and Best Management Practices
10)	Community
11)	Green Asset Evaluation

Each category has a series of subtopics pertaining to the specific category. As an example, the following subcategories are in the Management Policy and Ordinances category:

Table 3. Subcategories or elements of the Urban Forest Sustainability and Management Audit system

1.01	Climate Change (Sustainability)
1.02	No Net Loss
1.03	Risk Management
1.04	Tree Canopy Goals
1.05	Tree Protection
1.06	Utility
1.07	Human Health (Physical/Psychological)
1.08	Wildlife Diversity / Habitat
1.09	Performance Monitoring
1.10	Private Tree Ordinances
1.11	Public Tree Ordinances
1.12	Development Standards
1.13	High-Conservation Value Forests
1.14	Urban Interface (WUI)

All available documents and plans were reviewed and tallied in the audit worksheet as part of the information discovery phase. Based on the evaluation of the documents and outcomes of all five planning elements (i.e., Policies and Plans, City Workflows and Operations, Baseline Conditions, Urban Forest Benchmarks, and Community Engagement) each subcategory within the 11 categories was "ranked" using the following system:

0) Not Practiced = component does not exist or is not practiced; 0 points
1) In Development = component is in development as part of this project; 1 point
2) Adopted Practice = component is routinely practiced; 2 points
3) Exceeds Adopted Practice = the component is exceeded; 3 points

The points were then totaled for an overall rating to provide a summary of Laurel's level of achieving management levels for the given category. This process was completed for each of the 11 categories and summarized in the following format:

Table 4. Summary tables for the Urban Forest Audit System process

AUDIT CATEGORY	SOC* (% ACHIEVED)	BASE** (%) ACHIEVED	OVERALL RATING	**OVERALL (% ACHIEVED)**
Management Policy and Ordinances	%	%	#	%
Professional Capacity and Training	%	%	#	%
Funding and Accounting	%	%	#	%
Decision Management Authority	%	%	#	%
Tree-Related Inventories	%	%	#	%
Tree-Related Plans	%	%	#	%
Risk Management	%	%	#	%
Disaster Planning	%	%	#	%
Standards, Best Management Practices	%	%	#	%
Community	%	%	#	%
Green Asset Evaluation	%	%	#	%
TOTAL	%	%	#	**%**

*Standard of Care (SOC) elements represent the minimum group of urban forestry management "best practices" that a municipality should consider for implementation. SOC refers to the degree of prudence and caution required of an individual who is under a duty of care (i.e., legal obligation of the controlling authority, owner, or manager) to minimize risk. Neither state, regional, nor national minimum management components have been established for SOC but these are interim recommendations for consideration.

**Base Practices (BP) elements represent additional urban forest management activities or components that may effectively expand a program beyond the SOC group (see footnote above). These elements are typically precursors to other "non-core" elements in the category.

C. Evaluation Findings

The systematic evaluation of the City of Laurel's urban forest management processes, resources, staffing, structure, and policies was conducted by completing the six planning elements: 1) Existing Policies and Plans, 2) City Workflows and Operations, 3) Baseline Conditions, 4) Urban Forest Benchmarks, 5) Community Engagement, and 6) Urban Forest Audit System. The City's project team evaluated the outcomes and findings of these planning elements and the urban forestry consultants revised these based on feedback to provide a comprehensive analysis that informs the baseline assessment and recommendations in this Report. The following section provides a summary of these findings.

C.1) Research

The purpose of this element is to gauge the City's commitment and readiness for urban forest sustainability. Measuring alignment of existing policies and plans ensures a strong connection among the programs that manage the urban forest and the projects and initiatives that support them. Proper alignment of urban forestry program recommendations reduces the risk of wasting resources and enables success of key projects that support urban forestry goals. Programs cannot live in isolation, therefore, cross-examining various plans and documents brings to light any projects or initiatives that are a misplacement of resources and time. 14 documents and resources were reviewed and indexed as part of the information discovery process and a total of 62 references to urban forestry elements were identified. These documents included:

Primary Documents

- **2035 Comprehensive Plan:** Passed in 2014, the City's official policy guide to create goals and objectives for long-term growth. Chapter 6, Natural Resources, does not adequately address the City's urban forest, however Chapter 8, Housing, and Chapter 9, Land Use, specify the need to include trees in future development. Trees and the urban forest are broadly addressed in the Comprehensive Plan's goals:
  - Goal 1, Develop a comprehensive system of parks, recreation facilities and open spaces to foster healthy living.
  - Goal 2, Create a renewed sense of place for the City of Laurel, Objective 4: Develop landscaping that will enhance major corridors and the visual appeal of the City.
  - Goal 3, Preserve and protect the character and quality of life in Laurel, Objective 1: Create and enforce ordinances that preserve the architectural and historical character of the city and protect environmental resources within the city.
  - Goal 5, Develop and maintain quality public services.
  - Summary and Recommendations
    - Chapter 4, Community Character:
      - (3) Develop an Agri-Tourism marketing plan for the region to celebrate the lumber heritage and to promote regional attractions, including Landrums, Mitchell Farms, Fulmers, and the DeSoto National Forest.
      - (6) Develop a "Plant Laurel" initiative to plant throughout the city to promote the namesake of the city.
      - (7) Work with the Historic Preservation Committee to develop design standards that promote development and facilitate infrastructure improvements while still preserving the historic character of the city.
    - Chapter 6, Natural Resources
      - (2) Develop overlay districts, where appropriate, that require design and landscaping standards that will enhance major corridors or employment centers within the city.
    - Chapter 7, Community Facilities
      - (5) Facilitate the funding and construction of the Rails-to-Trails Program along the abandoned street car rail line to provide a multi-use path for all citizens.
      - (16) Establish greenways to protect natural areas of the community.

        - (24) Continue mapping current infrastructure in GIS to maintain an accurate database of existing infrastructure.
    - Chapter 8, Housing
        - (3) Require new multi-family housing developments, within the city, to include adequate amounts of green space and sidewalks.
        - (8) Continue to preserve areas of historical or cultural significance through ordinances.
        - (9) Require new developments to include Traditional Neighborhood Design elements such as street trees, lighting and landscaped entrances.
    - Chapter 9, Land Use
        - (2) Establish zoning, landscaping, and architectural standards that protect and enhance existing neighborhoods and allow for infill development.
        - (5) Continue to preserve trees through existing ordinances.
        - (8) Promote transitional open spaces to buffer intense land uses from other uses.
    - Chapter 10, Transportation
        - (6) Implement traffic calming devices, such as roundabouts, divided boulevards, and land- scaping where appropriate, to maintain safety.
        - (7) Promote an integrated transportation system that connects neighborhoods through sidewalks, pedestrian trails and bike paths.
        - (8) Develop an ordinance that requires sidewalks in new development where connectivity is needed or feasible.
        - (11) Implement bike lanes and sidewalks near schools to promote healthy transportation options for students.
- **Adopted Budget FY 2020-2021:** The budget document is the blueprint for financial and policy decisions implemented during each fiscal year. It also includes the staffing structure, budgets, and activities relating to urban forest management.
- **City Code Chapter 24, Tree Ordinance:** The Tree Ordinance Chapter of Laurel's City Code creates the establishment and structure of a City Tree Board, sets forth tree planting and pruning requirements and prohibitions, and outlines penalties for ordinance violation.
- **Zoning Ordinance Sections 506 and 606:** Landscape and landscaping standards for development.
- **City Code Chapter 9.2, Regulations of Stormwater Retention:** Design standards with tree requirements.
- **2021 i-Tree Canopy Assessment:** A point-based aerial image sampling method to determine the extent of various land cover types, specifically, tree canopy cover.
- **2021 Tree Canopy and Land Cover Assessment Report:** A summary report of the 2021 i-Tree Canopy Assessment.

Supporting Documents and Resources

- City Website and State of the City
- City Staff Questionnaire

Based on the review of all plans, documents, and resources, references to categories and subtopics within the Urban Forest Audit System (see Section B.6) were documented and indexed by category in the Discovery Matrix.

C.2) City Workflows and Operations

To gather an understanding of the departments and programs managing and influencing the public trees in Laurel, a series of consultations were held in 2021. Two staff members from the City's Parks and Recreation Department attended the meetings along with two staff members from the MS Forestry Commission. In addition, City staff participated in a questionnaire to inform the current workflows and operations surrounding tree management in Laurel. The departments or offices represented include:

Table 5. Summary of departments and staff participants for the consultations

Department	Title
Parks and Recreation (PRD)	Director of Parks and Recreation Program Coordinator
MS Forestry Commission (MFC)	Urban and Community Forestry Coordinator Urban and Community Forestry Partnership Coordinator

The meetings and questionnaires were structured around the categories in the Urban Forest Audit System (see Section B.6) to identify current operations and workflows relating to urban forestry. The following table provides an overview of the topics discussed within these themes:

Table 6. Overview of City staff consultation themes and topics

Discussion Themes	Discussion Details
A) Landscape and Maintenance	Responsibilities, staffing structure, communications, in-house and contracted tree maintenance, specifications, best management practices (BMPs), standards, standard operating procedures (SOPs), service requests, tree inventory data collection and management, training and certifications, emergency and risk management, pest and disease monitoring and treatments, trees and hardscape conflicts, tree planting, trees and utilities, and young tree care.
B) City Code and Policies	Existing Code and ordinances, communications, enforcement, inconsistencies, trees and hardscape conflicts, tree risk management, human health and safety, tree preservation and development standards, emergency and risk management, irrigation, tree pests and diseases, tree planting, and young tree care.
C) Planning, Design, and Development	Requirements for new and existing development, plan review processes, SOPs, communications, tree maintenance and planting requirements, tree preservation and mitigation, Comprehensive Plan, other planning documents.
D) Data and Information Technology	Existing tree-related data, management of data, integration with other asset data, workflows and communications, data sharing, and future datasets.
E) Community Outreach and Education	Existing programs and platforms, current messaging and audiences, procedures and considerations, volunteers, partners and organizations, education opportunities, engaging youth and schools, job opportunities, and equity.

Over the course of these consultations, recurring issues and resource needs were identified. The following provides an overview of these trends that supported the development of this Report:

Table 7. Recurring discussions and trends identified during the City staff consultations

Discussion Themes	Recurring Needs
A) Landscape and Maintenance	❖ Additional International Society of Arboriculture (ISA) Certified Arborists for plan designs, plan reviews, tree installations, tree monitoring, inventory, maintenance, young tree care, watering, and storm response. ❖ An "Arboriculture" or "Urban Forestry" Program to support maintenance needs. ❖ A tree planting program that addresses diversity, resiliency to tree pests, diseases, and climate change, growing space, intended function, and other desires while meeting enhanced levels of ecosystem services and benefits. The planting program should support a Citywide tree canopy cover goal. ❖ A comprehensive inventory of public trees along roadways and within maintained areas of parks. ❖ A sample inventory of public trees in open space, riparian areas, along trails, and within woodlots. ❖ Enhanced management of invasive tree and plant species on public grounds.
B) City Code and Policies	❖ Updates to the specifications in City Code Chapter 24 and the Zoning Ordinance. ❖ An "Arboriculture" or "Urban Forestry" Program to support plan designs and reviews, tree inspections, monitoring, and Code enforcement. ❖ Strengthening of tree preservation policies and ordinances and a volunteer Heritage Tree Program.
C) Planning, Design, and Development	❖ An evaluation of the existing urban forestry program. ❖ Alignment with strategies in the City's Comprehensive Plan and other planning documents. ❖ Updated tree protection standards. ❖ Identification of high-value open space and tree preservation areas. ❖ Updates to zoning-specific tree guidelines.
D) Data and Information Technology	❖ Updated and maintained public street and park tree / open space inventory data. ❖ An "Arboriculture" or "Urban Forestry" Division or Program to manage and update the tree inventory data. ❖ A software program to manage all City assets where tree data is integrated.
E) Community Outreach and Education	❖ Alignment of community outreach efforts with existing programs, partners, and initiatives. ❖ An "Arboriculture" or "Urban Forestry" Program consisting of a Volunteer Coordinator. ❖ Establishment of a shared vision for the City's urban forest. ❖ More frequent public trainings, workshops, and volunteer events.

*The City staff questionnaire was provided to the City team as part of this project.

After completion of the City staff consultations, the existing staffing structure for the management of public trees was identified. An overview of the structure is provided in the following table:

Table 8. Overview of the staffing structure for the management of public trees

Parks and Recreation Department	Parks Division	3 FTEs

C.3) Baseline Conditions

To identify the existing conditions of the urban forest from which goals and actions can be measured, an analysis of existing tree-related datasets was completed as part of the evaluation process. These datasets included the 2021 tree canopy and land cover assessment and the 2021 public park tree sample inventory.

2021 Public Park Tree Sample Inventory

The 2021 public park tree sample inventory data was used to assess tree abundance, distribution, composition, size classes, and primary maintenance needs to help inform the City of the baseline conditions. The findings are summarized below which were used to inform recommendations in this Report. An overview of ecosystem services and benefits is provided in the following section. For the complete analysis and summary, see Appendix H.

Table 9. Overview of the 2021 public park tree sample inventory

1,044	Trees inventoried	3	Parks inventoried
77%	Mason Memorial Park trees	12% 10%	Gardiner Park trees Boston Park trees
27	Unique genera	43	Unique tree species
36%	Oak (*Quercus*) trees	34%	Pine (*Pinus*) trees
22”	Average diameter	55”	Largest diameter
30%	Trees in the 24-30-inch class	22%	Trees larger than 30” DBH
$184k	Annual benefits of the 1,044 park trees inventoried in 2021	$31.2M	Total urban forest benefits

2021 Tree Canopy and Land Cover Assessment

For a high-level understanding of the urban forest resource in Laurel, an assessment of tree canopy cover was completed using the U.S. Forest Service’s i-Tree Canopy application. Using the point-based aerial imagery analysis approach, it was found that as of 2021, the City of Laurel is covered by approximately 42.3 percent tree canopy (+/- 1.56 percent). The findings from this sample are provided in the table below. This broad assessment provides an overview of the canopy cover across all City boundaries—both public and private. From this assessment, the ecosystem services provided by the Citywide tree canopy were also calculated. These services and associated benefits or values are summarized in the Urban Forest Benefits and Services Summary section and detailed in Appendix B.

Table 10. Results of the 2021 tree canopy and land cover assessment using i-Tree tools

Cover Class	Total Points	Percent Cover	± Standard Error
Trees and Shrubs (Canopy)	423	42.3%	1.56
Grass/Herbaceous	273	27.3%	1.41
Impervious Buildings	64	6.4%	0.77
Impervious Road	61	6.1%	0.76
Parking Lots	42	4.2%	0.63
Impervious Other	64	6.4%	0.77
Soil/Bare Ground	48	4.8%	0.68
Water	25	2.5%	0.49

*i-Tree is a peer-reviewed software suite from the USDA Forest Service that provides urban and rural forestry analysis and benefits assessment tools. The i-Tree Canopy application was used for this study (www.itreetools.org). For a complete summary of methods and findings see Appendix B.

Urban Forest Benefits and Services Summary

Table 11. Annual services and benefits of the 2021 public park tree sample inventory (1,044 trees)

Stormwater	Property Value	Energy Savings	Air Quality	Carbon (C)	Total Value
$75,684 7,644,804 gal	$78,916	$13,553 178,558 kWh	$10,151 2,493 lbs removed	$5,434 362 tons C stored 307 tons C sequestered	**$183,738**

*Table 12. Annual services and benefits of the urban forest derived from the 2021 i-Tree Canopy assessment**

Stormwater	Property Value	Energy Savings	Air Quality	Carbon (C)	Total Value
N/A	N/A	N/A	$86,633 189 tons removed	$1,330,213 192,067 tons C stored 8,598 tons C sequestered	**$1.5M** ($30M in stored carbon value)

*See the 2021 i-Tree Canopy report (Appendix B) for ecosystem benefits and services methodology

C.4) Urban Forest Benchmarks

The following summary provides an overview of the urban forest benchmarking results based on the analysis of two datasets; Arbor Day Foundation's 2019 Tree City USA database (phase 1) and the *Municipal Tree Care and Management in the United States – a 2014 Urban and Community Forestry Census of Tree Activities* by R. Hauer and W. Peterson. For a complete summary of the benchmarking research findings, see Appendix F.

Table 13. Summary of phase 1 benchmarking research results

2019 Tree City USA - Laurel		2019 Tree City USA - Regional	
$60k	Tree management budget	$184k	Average budget
$3.80	Per capita forestry budget	$12.34	Average per capita budget
$12k	Tree maintenance budget	$69k	Average maintenance budget
$11k	Tree planting/care budget	$15k	Average planting/care budget
110	Trees pruned	483	Average trees pruned
50	Trees removed	39	Average trees removed
45	Trees planted	80	Average trees planted

Table 14. Summary of phase 2 benchmarking research results

2014 Census - Laurel		2014 Census – Population Group	
$60k	Forestry program budget	$103k	Average forestry budget
12,600	Estimated public trees	4,900	Average count of public trees
$4.77	Budget per public tree	$32.33	Average budget per public tree
$3.24	Budget per capita	$6.22	Average budget per capita
0.68	Public trees per capita	0.28	Average public trees per capita
4,200	Public trees per staff	1,900	Average public trees per staff

C.5) Community Framework

The community framework in the City of Laurel was evaluated based on the existing and potential partners and programs identified during the research and City staff consultations. The following provides an overview of findings that were used to inform the recommendations in this Report.

Table 15. Overview of the community framework findings

Existing Partners	Potential Partners
Mississippi Forestry Commission	Jones County Soil and Water Conservation District
Arbor Day Foundation	Natural Resources Conservation Service, Jones County Field Office
AmeriCorps (Laurel Plays)	Friends of Parks groups
Environmental Protection Agency	Builders' associations, homeowners' associations
Jones County Extension Services	Civic groups, neighborhood organizations
	Garden clubs, Audubon Society, wildlife organizations
	Dixie Electric Power Association, Mississippi Power
	The Nature Conservancy and the Pascagoula River Watershed
	Health campuses, institutions, religious groups
	Mississippi Main Street Association and heritage programs
Existing Programs	**Potential Programs**
Arbor Day Foundation Tree City USA	Arbor Day Foundation's Energy-Saving Trees
Arbor Day Celebration	Arbor Day Foundation's Tree Campus Healthcare
Laurel Tree Board Tree Tips	Urban Forest Non-Profit
Laurel Plays (AmeriCorps)	Community Bank's Crawfest
City Beautiful	Loblolly Festival
	Envirothon, environmental education programs, Project Learning Tree

In addition to the research, the findings from the public engagement as part of the 2035 Comprehensive Plan (2014) development were reviewed to align recommendations in this Report with the community viewpoints and perceptions. A summary of feedback from the Comprehensive Plan is provided below.

Table 16. Feedback received during the development of the 2035 Comprehensive Plan (2014)

Question 1: What do you like best about the City of Laurel?	Small town atmosphere, amount of **parks** and **greenspace**, the arts, recreational opportunities, cultural facilities, lack of traffic congestion, people, **natural beauty**, regional location, churches, **downtown** potential, friendly people
Question 2: What would you like to change about the City of Laurel?	**Infrastructure**, rental property condition, litter, school system, parking, public transportation, shopping opportunities
Question 3: In 20 years, I would like the City of Laurel to be…?	**Beautiful**, friendly, safe, bigger, contain more opportunities, small town atmosphere, known for **natural features** and **livability**, progressive, growing, **vibrant**, accountable, harmonious, known for arts, a place to retire, better transportation, tourist destination, better **ordinances** and enforced, family-oriented, industrious, culturally diverse, drug-free, quiet, a **model** city, **energy** efficient, **agri-tourism** destination, **gateways**, **City Beautiful**

C.6) Urban Forest Audit System

To develop this Report, over 10 documents, plans, and resources were gathered and reviewed by applying the U.S. Forest Service's Urban Forest Sustainability and Management Audit's ("Urban Forest Audit System") Discovery Matrix. This matrix includes a total of 11 urban forest categories, each containing a multitude of supporting elements. Based on the review of resources, a total of 14 resources mention one or more elements within the Urban Forest Audit System. As seen in the table, the Standards and BMPs (Best Management Practices) category has the highest count of references with a total of 22 resources. There are a total 62 instances where the 14 resources reference the 11 categories and supporting elements. The number of resources referencing elements of urban forest sustainability and management demonstrate Laurel's readiness for changes driven by this Report. Strategies and recommendations in this Report align and/or complement components of these supporting resources. For a complete list of categories, elements, and supporting resources, see Section C.1 Research.

Category	Count
Management Policy and Ordinances	17
Professional Capacity and Training	0
Funding and Accounting	0
Decision and Management Authority	3
Tree-Related Inventories	14
Tree-Related Plans	0
Risk Management	0
Disaster Planning	0
Standards and Best Management Practices	22
Community	6
Green Asset Evaluation	TBD
Count Total	**62**

Table 17. Summary of the Urban Forest Audit System evaluation

UFSMA Category	Not Practiced (x0)	In Development (x1)	Adopted Practice (x2)	Exceeds Adopted Practice (x3)	Overall Rating (count x multiplier)	Total Possible
1) Management Policy and Ordinances	5	6	3	0	12	28
2) Professional Capacity and Training	4	4	1	0	6	16
3) Funding and Accounting	4	1	1	0	3	12
4) Decision and Management Authority	0	2	**2**	0	6	8
5) Tree-Related Inventories	4	4	**5**	0	14	26
6) Tree-Related Plans	6	6	0	0	6	24
7) Risk Management	1	6	2	0	10	18
8) Disaster Planning	5	1	1	0	3	14
9) Policies, Standards, and BMPs*	8	15	7	0	29	60
10) Community	2	10	3	0	16	28
11) Green Asset Evaluation	2	7	1	0	9	20
Total (count)	**41**	**62**	**26**	**0**	**114**	**254**

*Best Management Practices (BMPs)

Based on the Urban Forest Sustainability and Management Audit of Laurel's urban forest completed in 2021, the City is at a management and sustainability level of 45 percent. This ranking is to be expected of a city with no formalized urban forestry program and as such, the City of Laurel approved this evaluation project for improvements in urban forest management. While all areas of urban forestry require improvement under the guidance of an urban forestry program, significant improvements could be made in the Funding and Accounting, Tree-Related Plans, and Disaster Planning categories— all of which are below 30 percent when comparing rating to total possible points.

The urban forest sustainability and management objective for Laurel is to achieve a level of "Adopted Practice" for all subcategories. This means that the Total Possible in the table above equates to the count of subcategories for a given category multiplied by the Adopted Practice multiplier of "2". For example, there are 14 subcategories in Management Policy and Ordinances, therefore, the Total Possible is 28. Long-term goals of an urban forestry program in Laurel may acquire the level of Exceeding Adopted Practice for multiple subcategories but this audit focuses on the attainable and measurable level of Adopted Practice.

Based on the audit of 129 subcategories (11 primary categories), Laurel is achieving "Adopted Practice" for 26 (10 percent) of these. 62 subcategories (24 percent) are "In Development". Applying the multipliers of 2 for Adopted Practice and 1 for In Development results in a total score of 114 out of 254 possible points, or 45 percent (detailed in the following table). Cells in bold font indicate a high level of Adopted Practice subcategories for the given category. "Exceeds Adopted Practice" was not considered for any category because the urban forestry program for Laurel is in development during the time of this evaluation.

The Overall Rating for each category in the table above is detailed in the following table that summarizes the overall percent achieved for each category.

Table 18. Outcomes of the urban forest auditing process for Laurel

Category	Description	SOC* (% Achieved)	Base** (% Achieved)	Overall Rating	Overall (% Achieved)
1	Management Policy and Ordinances	50%	33%	12	**43%**
2	Professional Capacity and Training	50%	NA	6	**38%**
3	Funding and Accounting	50%	NA	3	**25%**
4	Decision and Management Authority	75%	100%	5	**75%**
5	Tree-Related Inventories	NA	31%	14	**54%**
6	Tree-Related Plans	NA	17%	6	**25%**
7	Risk Management	67%	50%	10	**56%**
8	Disaster Planning	NA	17%	3	**21%**
9	Standards and BMPs***	50%	50%	29	**48%**
10	Community	50%	NA	16	**57%**
11	Green Asset Evaluation	NA	NA	9	**45%**
Total		**56%**	**43%**	**114**	**45%**

*Standard of Care (SOC) elements represent the minimum group of urban forestry management "best practices" that a municipality should consider for implementation. SOC refers to the degree of prudence and caution required of an individual who is under a duty of care (i.e., legal obligation of the controlling authority, owner, or manager) to minimize risk. Neither state, regional, nor national minimum management components have been established for SOC but these are interim recommendations for consideration. (NA = not applicable)

**Base Practices (BP) elements represent additional urban forest management activities or components that may effectively expand a program beyond the SOC group (see footnote above). These elements are typically precursors to other "non-core" elements in the category. (NA = not applicable)

***Best Management Practices (BMPs)

C.7) Summary of Findings

Table 19. Conclusions to the Tree Management Program Evaluation project's planning elements

Element	Conclusion
1) Existing Policies and Plans	The City has a strong foundation of policies providing the framework for updates relating to tree preservation, standards, and best practices. The City's Comprehensive Plan alludes to urban forestry elements, but a strategic Urban Forest Management Plan is needed to connect these elements. The City should implement actions in this Report to update policies and inform existing and ongoing City plans.
2) City Workflows and Operations	The Parks and Recreation Division and the urban forest would benefit from additional staffing and resources. An Urban Forestry Program would enable cohesive planning and management to improve efficiencies, provide support, and improve the levels of service provided to City residents. Departments currently coordinate tree maintenance in parks and streetscapes effectively within the constraints of resources.
3) Baseline Conditions	The City has several tree-related datasets to support an Urban Forestry Program but should consider a comprehensive inventory of street trees and trees in maintained areas of parks. A sample inventory of trees in wooded areas and open space should also be considered. The City public tree population would benefit from increased species and age diversity driven by a strategic planting and management plan.
4) Urban Forest Benchmarks	The City should evaluate its staffing levels if an Urban Forestry Program is established to better manage the public tree population at levels consistent with industry standards and cities of similar population size. According to the benchmarking research, Laurel is managing more trees per full-time employee compared to cities of similar population size (4,200 trees per staff compared to 1,899 trees per staff). And compared to cities of similar population size, Laurel has a lower budget per public tree ($4.77 compared to $32.33) and a higher number of total public trees (12,600 compared to 4,894). The budget for urban forest management should align with the recommended actions in this Report. Laurel should consider developing a science-based Citywide tree canopy goal, a common urban forestry benchmark, from which progress can be measured.
5) Community Framework	Feedback received as part of the Comprehensive Plan effort indicate a desire from residents to have a thriving and livable community supported by a healthy natural environment. Their vision for Laurel also considers job opportunities, infrastructure, ordinances, and improvements to Downtown. The City utilizes existing partners and programs to implement urban forestry related services and activities. The Parks and Recreation Division should implement the partner and program opportunities provided in this Report as feasible.
6) Urban Forest Audit System	Overall, the City scored 45 percent based on the U.S. Forest Service's Urban Forest Audit system that evaluates 11 categories of urban forest management and sustainability. A low scoring was anticipated since the City is only in the initial steps of establishing an Urban Forestry Program. Implementation of actions in this Report will improve the City's ranking and frequent auditing exercises should be conducted to measure progress and adjust strategies in an adaptive management approach.

D. Strengths and Opportunities

Based on the outcomes of the six planning elements (Existing Policies and Plans, City Workflows and Operations, Baseline Conditions, Urban Forest Benchmarks, Community Engagement, and Urban Forest Audit System) the urban forestry consultants identified the strengths of the programs that manage public trees in the City of Laurel. These strengths offer opportunities for maintaining adequate levels of service and the possibility to achieve optimal levels by implementing actions in this Report.

D.1) Audit Summary

Table 20. Explanation and implications of the Urban Forest Audit results

Category	Implications
1) Management Policy and Ordinances Rating of 43%	**STRENGTHS:** 2035 Comprehensive Plan, City Code Chapter 24 Tree Ordinance, City Code Zoning Ordinance, tree protection stated in Comprehensive Plan. **OPPORTUNITIES:** Strengthen climate change policies, proper tree protection and enforcement in the right-of-way (ROW) and during development will support a "no net loss" strategy for retaining the benefits of urban forests. Establishing tree canopy goals, updating policies relating to urban forests and human health, identifying high value public conservation areas, and creating a heritage tree program would advance Laurel in this category.
2) Professional Capacity and Training Rating of 38%	**STRENGTHS:** Experienced staff are trained in urban forestry best practices and implement industry standards. Staff express interest and need for ISA Certified Arborist accreditation. **OPPORTUNITIES:** Additional staffing would provide internal technical support, community outreach and education support, and support policy development, plan reviews, and enforcement. Expanding the in-house tree maintenance services with additional resources would support current and future tree maintenance and planting demands to benefit Laurel in all categories of this audit. According to the benchmarking research, Laurel is managing more trees per full-time employee compared to cities of similar population size (4,200 trees per staff compared to 1,899 trees per staff).
3) Funding and Accounting Rating of [illegible]	**STRENGTHS:** Urban forestry is budgeted annually. **OPPORTUNITIES:** According to the benchmarking research, compared to cities of similar population size, Laurel has a lower budget per public tree ($4.77 compared to $32.33) and a higher number of total public trees (12,600 compared to 4,894). A diversified, sustainable, and dedicated funding source is needed.

Category	Implications
4) Decision and Management Authority **Rating of 75%**	**STRENGTHS:** The City has staff authority to manage public trees and has the Tree Board. Departments cooperate for effective tree maintenance with limited resources. **OPPORTUNITIES:** If Laurel were to establish an Urban Forestry Program (within a City division or department) and create, revise, and/or clarify standard operating procedures, refine workflows, clarify policy, bolster staff trainings, and acquire additional internal technical support, the City would see advancement in this category.
5) Tree-Related Inventories **Rating of 54%**	**STRENGTHS:** The City has an assessment of Citywide tree canopy cover and a sample inventory of public park trees managed in tree management software. **OPPORTUNITIES:** A better understanding of the public tree population is needed with a comprehensive inventory focused on street and park trees. In addition, the City should conduct a sample inventory of trees in wooded areas and open space for a better understanding of the urban forest composition and health in its entirety. Potential threats such as pests and diseases are unbounded by land ownership, therefore, a better understanding of private trees is also needed. Inventories should remain current and frequently updated.
6) Tree-Related Plans **Rating of 25%**	**STRENGTHS:** Tracking and reporting of urban forest maintenance activities and the 2035 Comprehensive Plan references themes and goals of urban forestry. **OPPORTUNITIES:** Actions in this Report recommend the development of an Urban Forest Management Plan. Management plans specific to neighborhoods, Wards, zoning types, and other planning boundaries should also be considered because of the variation in resources and limitations of these given areas.
7) Risk Management **Rating of 56%**	**STRENGTHS:** Staff trained in tree risk assessments, identified tree risk specifications and mitigation, and actively conducts invasive management. **OPPORTUNITIES:** Additional internal technical support for assessing trees questioned for removal would improve the efficiency, effectiveness, resourcefulness, and appeal of City operations. An inventory of trees in public rights-of-way is necessary to identify, monitor, plan, prioritize, and mitigate risk. A comprehensive understanding of the urban forest through inventories would determine in detail Laurel's vulnerabilities to tree pests and diseases, climate change impacts, storm events, invasive species, and the natural or premature senescence of trees. The City should document tree risk management procedures and the appropriate staff should obtain and/or maintain ISA Tree Risk Assessment Qualification (TRAQ).

Category	Implications
8) Disaster Planning **Rating of 21%**	**STRENGTHS:** The City has typical disaster management plans and protocols in place. City divisions and departments collaborate and share resources effectively in response to storms and trees. **OPPORTUNITIES:** It is recommended for cities to develop an urban forestry disaster plan to establish prevention, response, and recovery protocols. Inventory data should support regional disaster and mitigation plans.
9) Standards and Best Management Practices **Rating of 48%**	**STRENGTHS:** This Report provides recommended amendments to City urban forestry standards and practices. The City has a strong foundation of policies within the Chapter 24 Tree Ordinance and the Zoning Ordinance from which improvements can be made. **OPPORTUNITIES:** Utilize the recommendations provided in this Report to update tree ordinances, policies, standards, and best practices. Trees required for development projects should be monitored and their long-term health needs maintained through enforcement and bonds. Proper tree preservation while not inhibiting smart development is needed. City standards, manuals, and guidelines should include information about the importance of tree species and size diversity, management of public tree risk, tree maintenance safety, urban wood utilization, and watering requirements. Tree-related information in these documents should be consolidated into manuals for residents, business owners, and commercial tree companies. A heritage tree program to protect significant public trees is also recommended.
10) Community **Rating of 57%**	**STRENGTHS:** Laurel is a Tree City USA city for 37 years (as of June 2020) and recognized in 2005 as a Sterling Tree City USA community having received 10 Growth Awards from the Arbor Day Foundation. This recognition demonstrates the value Laurel places on urban forests. The City has a network of partners, conducts events, engages the public through various platforms, addresses service requests, and engages citizens. **OPPORTUNITIES:** It is recommended the City expand its network of partnerships to represent all neighborhoods and demographics and consider supporting the establishment of a tree steward non-profit organization to serve the community and support urban forestry. Laurel should continue to utilize information in this Report, update the City's website, address the concerns and questions posed by the community, conduct outreach to the public, establish a heritage tree program, address underserved areas, host more volunteer events, and facilitate more trainings both internally and for the public. These efforts should align with ongoing initiatives in the City.
11) Green Asset Evaluation **Rating of 45%**	**STRENGTHS:** The City addresses mature and young tree maintenance, proper mulching, tree health, and has a diverse palette of trees for planting. **OPPORTUNITIES:** This category is available for documenting observed outcomes and improvements which will occur as this Report is implemented and a comprehensive Urban Forestry Program is established with supporting inventory data. Currently, the City has exceeded tree species and genus diversity thresholds for the public tree population which should be addressed as the City replants and supports partner plantings.

E. Tree Management Program Goals

Urban Forestry Program Goal: The City is adequately staffed, trained, and structured to provide higher levels of service, supported through policy, resulting in a healthy urban forest equitably benefiting the citizens of Laurel.

Tree Maintenance Goal: Laurel proactively manages the public trees, continues to grow and expand a healthy canopy, effectively mitigates risk, and optimizes urban forest benefits.

Tree Planting Goal: The City of Laurel maintains its current tree canopy cover through a no-net-loss approach and continues to plant trees that are resilient to climate change and other risks resulting in an equitable distribution of tree canopy and associated benefits.

Community Engagement Goal: Sustainable urban forest management and equity is achieved through a partnership with the City and its residents resulting in improved well-being, human health, and local economies.

F. Program Guidance and Recommendations

Urban Forestry Program Goal: The City is adequately staffed, trained, and structured to provide higher levels of service, supported through policy, resulting in a healthy urban forest equitably benefiting the citizens of Laurel.

F.1) Program Guidance

Within communities, trees are one of the most valuable public assets. They are unique from other assets that city departments manage in that they are living, growing organisms and can have potentially very long service lives. The care and management of this valuable resource requires specialized, professional expertise and a unique set of work skills.

The management of individual, landscape trees is called "arboriculture," and staff who participate in the management of these trees are called "arborists." Arborists are men and women who make a career of caring for the urban forest. Their work is physically demanding, often dangerous, and intellectually challenging. As science and experience reveal new information about tree biology, physiology, maintenance and planting, arborists' need for education never stops. Specific education and training, and a comprehensive understanding of trees, site conditions, and long-term management issues is required to properly take care of and plant public trees.

Like the arborist, the "urban forest manager" is a professional experienced in all aspects of arboriculture in the public arena. The urban forest manager is dedicated to the administration of the tree management program to achieve the goals of a safe public forest that maximizes tree benefits for the community in the long term. This broad managerial view and responsibilities enable the professional urban forester to help city staff, elected officials, and citizens make wise decisions and get the most for their investment in trees.

Generally, an urban forestry program has both supervision and operational employees who are supported by administrative and other management employees within the designated department. As reported in the 2014 study titled "Municipal Tree Care and Management in the United States," (Hauer et al.) for Laurel's population group (10,000 to 25,000), municipalities have five (5) daily employees in their municipal tree management programs, on average.

The supervisory position can be termed as the city forester, urban forester, tree warden, community forester, or city arborist; these titles are often used interchangeably to describe positions with similar management responsibilities. They plan and direct the maintenance and planting field work, and are charged with all duties related to the functions, growth, and sustainability of the urban forest management program. In a more developed and established program, the city forester may have an assistant supervisor.

The operational positions are typically a forestry supervisor and/or crew leader, trimmer, and groundworker. city agencies may not use these exact titles depending on the existing personnel job titles and descriptions accepted and already in use by the agency.

Most city agencies have the option of performing urban forestry tasks using in-house staffing and equipment, or using contractors who specialize in various arboricultural and horticultural disciplines and services. Often, a combination of using both in-house personnel and contractors is chosen to ensure that the urban forest management services provided are performed at the lowest possible cost, as efficiently as possible, and with the greatest level of expertise. Additionally, for special projects, or tasks that are not daily responsibilities, city agencies will often use consultants on an as-needed basis. There are potential advantages and disadvantages to using in-house staff and contractors for urban forest management. Both the leadership of the program (the urban forest manager, city forester, city arborist) and the workers in the program (tree planting, maintenance, stump removal, insect and disease control), can be in-house or contracted. By knowing the in-house and contractual crew costs, production rates, and workload, the City can compare costs required to complete a set of work orders,

and to determine the best method of accomplishing the work. The advantages and disadvantages for both levels are generally summarized as these:

In-House Management - Forester/Arborist

Advantages

- Deep ties within the community.
- Has or will build "institutional knowledge."
- Is available at a moment's notice to perform a wider variety of tasks.
- Is directly accountable to the citizens and the department director.

Disadvantages

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

Contracted Management - Urban Forestry Consultant

Advantages

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

Disadvantages

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

In-house Crews and Work Production

Advantages

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

Disadvantages

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

Contractual Crews and Work Production

Advantages

- Funds are paid only for work performed and when completed to specifications and the satisfaction of the city department.
- Labor is available for peak demands and special projects; there is cancellation and no cost when work is not needed or when the weather is poor.
- Contractor provides all required equipment, tools, and supplies; repair, maintenance, and downtime of equipment are not the responsibility of the city department.
- All insurance and workman's compensation is the responsibility of the contractor.
- Contractor provides employee supervision, training, and certifications.
- Liability for damage to public and private property is the responsibility of the contractor.

Disadvantages

- Contractors are bound by the specifications of the contract; their work assignments are not as flexible.
- May not be as quick to respond to emergencies as in-house crews.
- Administrative time is required for contract writing, monitoring, and invoice processing.

This section includes recommendations based on the City of Laurel's current capacity as well as incremental increases in budget and resources.

F.2) Program Related Recommendations

Staffing Recommendations: Purpose

- Quality: The complexity of urban forests requires adept personnel for its appropriate care, growth, and resiliency. A city with quality staff reduces the variance of quality in service.
- Efficiency: A city with adequate staffing levels who are appropriately trained can meet the needs of the community timely and effectively. Staff with an understanding and training in processes affecting the urban forest can align efforts to achieve common goals.
- Safety: Safe practice of arboriculture and urban forestry is critical for City staff, contractors, and the public to reduce the potential risk of public hazards.
- Service: Strengthen program levels for increased tree maintenance responsibilities in public areas to achieve targets of improved urban forest health through proper and routine tree maintenance.

Short-Term Staffing Recommendations (see Appendix M for a complete list)

01. Maintain current staffing levels and associated industry certifications and qualifications. (PS.01S)
02. Strengthen Standard Operating Procedures (SOPs), protocols, and communications as they relate to tree management activities among departments, partners, and contractors. (PS.02S)
03. Continue to provide, at minimum, annual in-house or consultant-led training on tree care safety and first aid. (PS.03S)
04. Ensure tree-related operations are represented by staff with credentials such as International Society of Arboriculture (ISA) Certified Arborists and Tree Risk Assessment Qualification (TRAQ) either directly through the department or supporting department. (PS.04S)
05. Stay current with industry research, science, and technology through various platforms. An example includes management of current and potential exotic tree pest and disease threats. (PS.05S)

Long-Term Staffing Recommendations (see Appendix M for a complete list)

01. Utilize the case study in this Report to propose additional staffing to appropriately manage the public tree population. (PS.01L)
02. Evaluate the roles and responsibilities of the Boards and Commissions influencing urban forestry such as the Laurel Tree Board. (PS.02L)
03. Secure the recommended staffing levels to effectively manage the public park and street tree population on a rotation described in the Report's case studies. (PS.03L)

04. Explore opportunities to strengthen or establish a local non-profit organization devoted to the stewardship of Laurel's urban forest. (PS.04L)

Budget Recommendations: Purpose

- Effectiveness: Appropriate funding levels for urban forestry allow better implementation of this Report and daily operations resulting in a higher level of service to the community.
- Equity: More resources equate to additional levels of service, particularly to historically underserved and lower-income areas.
- Accountability: Appropriate accounting of management activities and accounting of the urban forest itself enable adequate funding that is performance- and attribute-based.

Short-Term Budget Recommendations (see Appendix M for a complete list)

01. Utilize the 2021 inventory of trees in public parks to prioritize the use of tree maintenance and removal funding. (PB.01S)
02. Share the results of the 2021 inventory and the 2021 Tree Canopy Assessment ecosystem benefits and services data to build support for increased funding and community stewardship. (PB.02S)
03. Continue to budget for the management of the public tree population. (PB.03S)
04. Continue to allocate budget towards staff training, certifications, and professional development. (PB.04S)
05. Establish funding for a comprehensive inventory of all public trees. (PB.05S)
06. Continue to apply for grants from federal, state, and regional organizations and agencies to achieve recommendations in this Report. (PB.06S)

Long-Term Budget Recommendations (see Appendix M for a complete list)

01. Use the guidance provided in this Report to request a budget necessary to manage the estimated 12,600 public trees in maintained areas and the new trees planted. (PB.01L)
02. Establish a dedicated, sustained funding source beyond the current departmental budget for urban forestry operations to increase the level of service to meet the community's high standards. (PB.02L)
03. Secure funding to inventory the public tree population every 5-10 years in-house or with certified consultants. (PB.03L)
04. Secure mechanisms for emergency funding in response to storms and disasters. (PB.04L)
05. Secure a budget that more appropriately meets the recommended levels of $44.45 per public tree. Adjust as the urban forest and resources grow and change. (PB.05L)

Program Structure Recommendations: Purpose

- Efficiency: A city with a strong program structure can meet the needs of the community timely and effectively and align efforts with other departments and programs to achieve common goals.
- Collaboration: A well-defined program with established protocols and Standard Operating Procedures can mainstream urban forest management across departments and instill cohesive planning and implementation of city and partner projects.
- Transparency: Improvements to the structure of the urban forestry program can be communicated to the public and the roles and responsibilities are clarified.

Short-Term Program Structure Recommendations (see Appendix M for a complete list)

01. Provide information to the public via City website regarding the current programs and departments responsible for urban forest management and public tree care. (PT.01S)
02. Strengthen communications, protocols, manuals, and Standard Operating Procedures relating to the management of the urban forest. (PT.02S)

Long-Term Program Structure Recommendations (see Appendix M for a complete list)

01. Secure the necessary funding and resources to effectively manage the public park and street tree population. (PT.01L)

02. Establish an Urban Forestry Program with a City division devoted to the management and planning of the urban forest. Consider migrating tree maintenance operations under this new program. (PT.02L)
03. Enhance the Urban Forestry Program or programs that manage the urban forest with the staffing levels recommended in this Report. (PT.03L)

Urban Forest Management Recommendations: Purpose

- Informed: An inventory of Laurel's valuable assets—public trees—provides the data for informed management and resource decisions. An understanding of the population of trees provides baseline information from which progress and change resulting from this Report and an urban forestry program can be measured for adaptive management. The inventory of public trees provides information that can be used to quantify the ecosystem services and benefits provided to Laurel's residents, environment, and economy.
- Inclusivity: The urban forest is comprised of public and private trees spanning a multitude of ecosystems and land uses. Plans for tree across these landscapes ensures all aspects of urban forestry are included in a cohesive, strategic manner. Residential property contains a large portion of the City's total tree canopy cover. Sustaining Laurel's urban forest requires residential collaboration and feedback and fostering long-term relationships to improve outcomes.
- Efficiency: Alignment of operations improves workflows, encourages resourcefulness, and reduces conflicts. Routine systematic tree maintenance reduces surges of maintenance and removal demands, identifies issues before they become more expensive, and optimizes available time and resources.
- Safety: Appropriate management of green assets reduces the risk of tree failures as well as person and property damage. Utilizing industry standards and best practices reduces on-the-job incidents to the extent possible.
- Sustainability: Managing urban forests as City assets will support stormwater management, climate resiliency, and human health goals. Appropriate maintenance and planting will support a healthy, long-lived urban tree canopy equitably distributed across a city.
- Resourcefulness: Public participation and insight provide resourceful and impactful urban forest program growth.
- Community: Active participation in nature-related efforts foster community pride and ownership, and breaks down walls, helping bring communities closer together as they become closer to nature.

Short-Term Urban Forest Management Recommendations (Appendix M for full list)

01. Continue to appropriately address and manage public tree maintenance, removals, plantings, treatments, and inspections as funding allows. Use the guidance provided in this Report. (PU.01S)
02. Update the tree inventory as activities are completed (pruning, removal, planting, other). (PU.02S)
03. Align tree maintenance and planting with other City planning and construction efforts. (PU.03S)
04. Annually revisit contract specifications and in-house policies and directives to ensure that tree care operations adhere to current industry standards, including ANSI A300 Standards for Tree Care Operations, ANSI Z133.1-2012 for Arboricultural Operations Safety Requirements, and ISA Series Best Management Practices (BMPs). (PU.04S)
05. Continue to retain Arbor Day Foundation's Tree City USA status and pursue Growth Awards to again receive Sterling Tree City status (received in 2005). (PU.05S)
06. Coordinate the outreach strategy as a Citywide initiative rather than a departmental effort. (PU.06S)
07. Update the City's website with content recommended in this Report. (PU.07S)
08. Continue to utilize volunteers and support volunteer training opportunities as feasible. (PU.08S)
09. Continue to utilize partnerships to achieve common goals. (PU.09S)

Long-Term Urban Forest Management Recommendations (Appendix M for full list)

01. Adjust the management budget and activities to more closely align with recommendations in this Report (32% of budget for pruning, 30% for removals, 16% for planting, 10% for management, and 12% for "other" activities). (PU.01L)

02. Inventory the public tree population on an industry-recommended rotation of every 5-10 years. (PU.02L)
03. With a comprehensive public tree inventory, conduct a cost-benefit analysis to build the case for additional funding and resources. (PU.03L)
04. Routinely sample the public tree population to assess tree risk in high priority areas. (PU.04L)
05. Use Citywide tree inventory data and best available science for long-term planning and management of existing and future tree pests and diseases impacting the City's urban forest. (PU.05L)
06. Develop a strategic planting plan with goals of urban forest diversity, sustainability, resiliency, and equity. (PU.06L)
07. Establish or strengthen a local non-profit organization as stewards and advocates of the urban forest. (PU.07L)
08. Diversify the types of volunteers using outreach and education about the benefits and importance of trees. Utilize partnerships with neighborhood organizations. (PU.08L)
09. Complete an urban forest audit using similar criteria as the 2021 audit completed for this Report. (PU.09L)
10. Conduct a Citywide tree canopy assessment that analyzes canopy gains and losses over a ~10-year period. (PU.10L)
11. Establish a strategic Urban Forest Management Plan based on a comprehensive inventory and changes to the urban forestry program as a result of this Report and other efforts. (PU.11L)

City Tree Code and Policy Recommendations: Purpose

- Support: An urban forestry program implementing actions without the appropriate support from policy and ordinances is at risk of using resources and time inefficiently and may lack the enforcement necessary for permanent improvements. A weak or outdated framework of policy and ordinances for urban forest management jeopardizes the success of key projects that support this Report.
- Connections: Alignment of policy and ordinances ensures a strong connection among the urban forestry program's high-level strategic goals, and the projects and initiatives that support these goals.
- Holistic: Programs cannot live in isolation. Therefore, cross-examining and aligning various plans, policies, and ordinances brings to light any projects or initiatives that are a misplacement of resources.

Short-Term City Tree Code and Policy Recommendations (Appendix M for full list)

01. Align resources and planning efforts across City departments and partners to meet common goals and improve efficiencies, beginning with the 2035 Comprehensive Plan (see Appendix I for a list of common goals and recommendations). (PC.01S)
02. Tree managing staff should engage in City department planning such as updates to the City's comprehensive plan. (PC.02S)
03. Continue to provide guidance on tree planting and preservation for City and development projects. (PC.03S)

Long-Term City Tree Code and Policy Recommendations (Appendix M for full list)

01. Update City Code, ordinances, policies, and manuals as changes to the program and the City occur. Use Appendix L as guidance. (PC.01L)
02. Effectively preserve existing trees while meeting the needs of development and construction. (PC.02L)
03. Effectively monitor tree-related requirements for development and construction activities. (PC.03L)
04. Establish tree canopy goals and planting targets aligned with goals of tree species and age diversity and urban forest resiliency. (PC.04L)

G. Tree Maintenance Guidance and Recommendations

Tree Maintenance Goal: Laurel proactively manages the public trees, continues to grow and expand a healthy canopy, effectively mitigates risk, and optimizes urban forest benefits.

The following summaries of maintenance needs are based on the collected inventory data and an assessment of the City's programs and available resources. The inventory is comprised of trees that were inventoried in January 2021. Thus, maintenance requirements may have changed during and after completion of the inventory. It should be observed that this is not a full dataset that represents the entire population of trees managed by the City of Laurel and it is recommended to complete the entire public tree inventory consisting of street and park trees in the near future for more accurate tree maintenance guidelines and strategies.

The Tree Maintenance Schedule and Budget Worksheet shown in Table 26 is based on the inventory and data as of January 2021. It describes an ideal budget and schedule in which all tree removals and priority maintenance needs identified in the inventory are taken care of within 1-5 years, 100 percent of all removed or deceased trees are replaced, and all trees in the inventory are routinely pruned in an even cycle. In addition, the recommended pruning cycles for the estimated total public tree population is also provided (Table 27) along with the estimated costs per maintenance activity (Table 28). Closer estimates can be achieved by completing the Citywide inventory and updating the estimated costs per activity as needed.

G.1) Tree Maintenance Overview (2021 Inventory-Based)

Table 21. Overview of tree maintenance needs based on the 2021 inventory (1,044 trees)

Activity	Count	Description
REMOVAL (Years 1-3)	51	Total Trees
	51	High-Risk Removals
IMMEDIATE PRUNE (Years 1-3)	82	Immediate Prune
	3	Critical Concern
ROUTINE TREE PRUNING CYCLE (7-year rotation)	825	Total Public Trees
	118	Trees Per Year
YOUNG TREE TRAINING CYCLE (3-year rotation)	83	Total Young Trees
	28	Trees Per Year

Table 22. Overview of tree maintenance needs based on the estimated public tree population (12,600 trees)

Activity	Count (estimates)	Description
REMOVAL (Years 1-3)	1,120	Total Trees (risk unknown)
IMMEDIATE PRUNE (Years 1-3)	1,026	Immediate Prune or Critical Concern
ROUTINE TREE PRUNING CYCLE (7-year rotation)	10,016	Total Public Trees
	1,431	Trees Per Year
YOUNG TREE TRAINING CYCLE (3-year rotation)	1,002	Total Young Trees
	334	Trees Per Year

Tree Maintenance Recommendations: Purpose

- Safety: An inventory-based tree maintenance approach systematically addresses concerns and preventative pruning to manage public safety and perceptions.
- Health: A well-maintained urban forest maximizes associated ecosystem services and benefits, improves tree health, urban forest resiliency, and longevity.
- Efficiency: A proactive tree maintenance and removal program effectively prioritizes trees based on factors that improve efficiencies as it relates to resources and desired outcomes.
- Understanding: A Citywide tree maintenance program provides managers with a comprehensive understanding of the current conditions of, opportunities for, and potential threats to the urban forest.

Short-Term Tree Maintenance Recommendations (2021 Tree Inventory-Based)

(see Appendix M for a complete list)

01. Prioritize trees recommended for removal and remediate based on available budget preferably within the first 1-3 years. Utilize recommendations in the Planting Guidance section to replace removed trees. (TM.01S)
02. Prioritize trees requiring immediate pruning and trees noted as critical concern in the inventory. Remediate concerns based on available budget preferably within the first 1-3 years. (TM.02S)
03. Develop a seven-year rotational pruning regimen for the inventoried trees greater than six inches DBH by City park, quadrant, tree species, or other variable that prunes approximately 118 trees per year (830 trees in seven years). (TM.03S)
04. Develop a three-year rotational pruning regimen for the inventoried trees less than six inches DBH by City park, quadrant, tree species, or other variable that provides training pruning to approximately 28 young trees per year (83 trees in three years). (TM.04S)

Long-Term Tree Maintenance Recommendations (Public Tree Population)

(see Appendix M for a complete list)

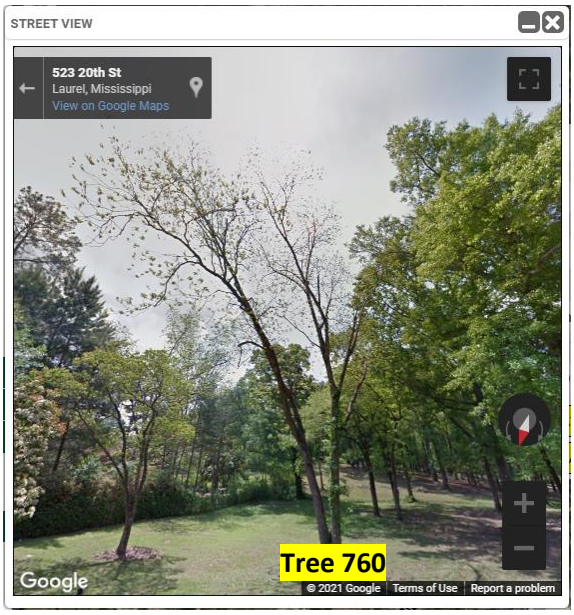
01. Secure the appropriate staffing and resources by implementing the Program Guidance Recommendations (Long-Term Budget Recommendations) to maintain the entire estimated public tree population (~12,600 trees) on a seven-year pruning rotation. (TM.01L)
02. Complete the recommendations in the Program Guidance section (Long-Term Urban Forest Management Recommendations) by conducting a comprehensive public tree inventory to inform maintenance and removals. (TM.02L)
03. Based on the Citywide inventory, prioritize trees recommended for removal and remediate based on available budget preferably within the first 1-3 years. Utilize recommendations in the Planting Guidance section to replace removed trees. (TM.03L)
04. Prioritize trees requiring immediate pruning and trees noted as critical concern in the inventory. Remediate concerns based on available budget preferably within the first 1-3 years. (TM.04L)
05. Develop a seven-year rotational pruning regimen for the public tree population greater than six inches DBH by City park, quadrant, tree species, or other variable that prunes approximately 1,431 trees per year (10,016 trees in seven years). (TM.05L)
06. Develop a three-year rotational pruning regimen for the public tree population less than six inches DBH by City park, quadrant, tree species, or other variable that provides training pruning to approximately 334 young trees per year (1,002 trees in three years). (TM.06L)

G.2) High-Risk Tree Removals Guidance

Based on the inventory, a total of 51 trees were identified for high-risk removal. These trees should be prioritized and budgeted for removal in a 3-year timespan, with the majority removed in years 1 and 2 due to the associated risk.

View the 51 high-risk trees for removal: https://pg-cloud.com/Mississippi/?scenario=LaurelTreeRemovals

Map does not contain all trees in the study



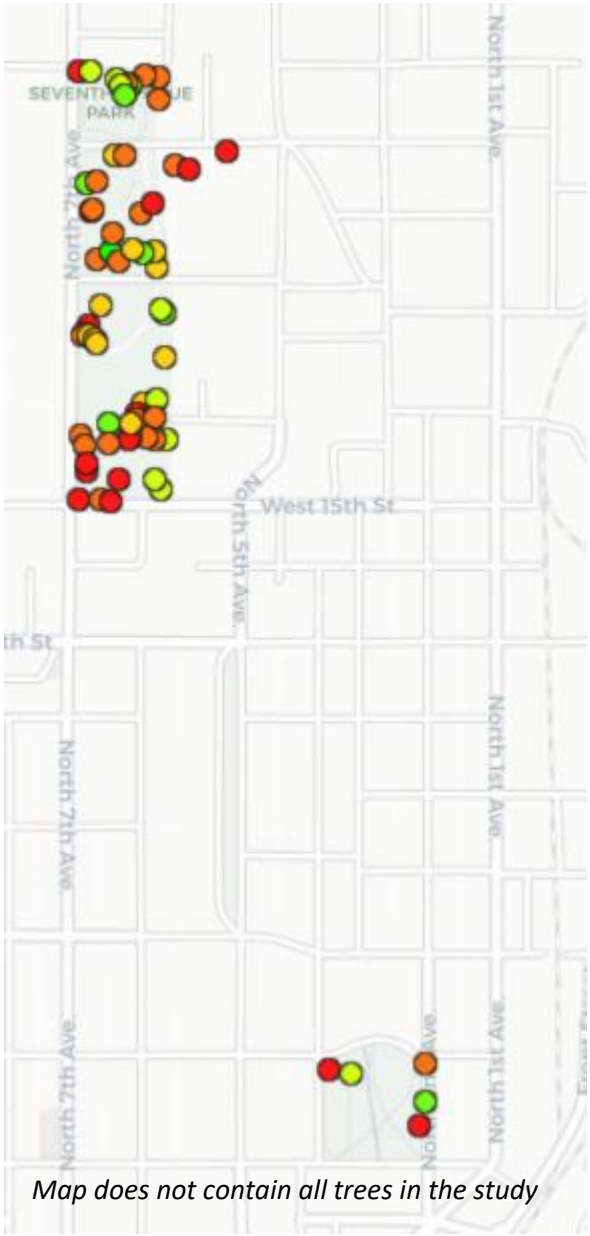
Trees for Removal (51 trees)

- 0-3 inch (1 tree)
- 3-6 inch (5 trees)
- 6-12 inch (18 trees)
- 12-18 inch (8 trees)
- 18-24 inch (6 trees)
- 24-30 inch (2 trees)
- >30 inch (11 trees)

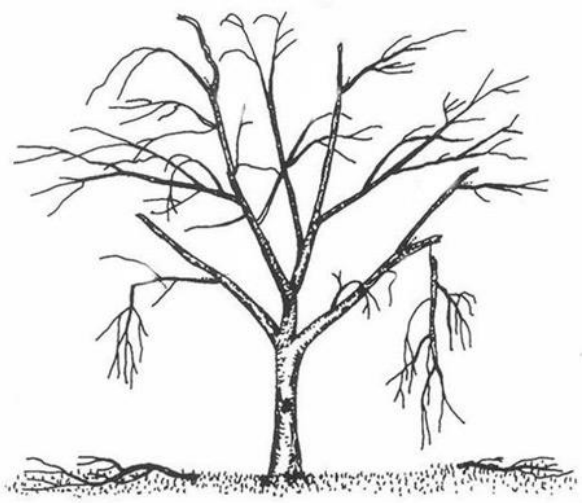
G.3) Immediate Tree Pruning Guidance

Public trees in the inventory that have issues such as a broken or split limb, a hanging branch, or other failure deeming immediate pruning should be prioritized with consideration of the high-risk trees recommended for removal. Based on the 2021 inventory, a total of 85 trees have been identified as needing immediate pruning to remediate public safety and tree health concerns. These immediate pruning needs should be prioritized based on the location, tree size, size of concern, and other factors aligned with the International Society of Arboriculture's tree risk assessment protocols.

View 85 trees requiring immediate pruning: https://pg-cloud.com/Mississippi/?scenario=LaurelImmediatePrune



Map does not contain all trees in the study



Trees for Immediate Pruning (85 trees)

- 3-6 inch (1 tree)
- 6-12 inch (7 trees)
- 12-18 inch (11 trees)
- 18-24 inch (15 trees)
- 24-30 inch (28 trees)
- >30 inch (23 trees)

G.4) Large Tree Routine Pruning Guidance

The City of Laurel currently operates with a reactive tree maintenance regimen where trees are pruned or removed based on citizen service requests or observations made by City staff. The City's tree maintenance staff have effectively mitigated concerns with this approach but stands to improve operations to improve efficiencies and to balance maintenance and removal demands. This can be achieved through programmed or rotational routine pruning of established trees (greater than six inches in diameter at breast height, DBH). Programmed pruning prevents the effects of deferred maintenance which includes a reduction in tree condition and public safety. Numerous studies have shown the detrimental effects deferred maintenance can have on a community's tree population as well as the increased risks to public safety. This Report includes a recommended pruning cycle for the inventoried trees as well as recommendations for rotational pruning for the entire estimated public tree population. Industry recommendations based on analyses of community forestry programs indicate a routine pruning program is most effective on a **seven-year rotation** provided the appropriate resources and budget. Trees on this cycle should generally be six inches in diameter or greater.

Recommended Pruning Rotation for Inventoried Trees

For the inventoried trees in Laurel, this results in a total of **825 trees suitable for routine pruning**. As trees mature, their growth begins to slow and response to excessive stress from pruning to improve the structure is weakened compared to young trees. It is recommended that the City **routinely prune 14 percent of the inventoried trees annually** (118 trees per year based on 825 trees greater than six inches DBH).

View trees for large tree routine pruning: https://pg-cloud.com/Mississippi/?scenario=LargeTreeRoutinePrune

Recommended Pruning Rotation for Public Tree Population

The total estimated public tree population was derived from the 2021 inventory data to determine the number of trees per diameter class for a Citywide pruning rotation. The table below summarizes the estimated distribution of trees by diameter class for all public trees in Laurel and the annual pruning totals.

Table 23. Inventoried and estimated public tree population suitable for rotational pruning

Diameter Class	Inventory Count	%	Public Tree Estimate	Annual Trees to Prune
6-12in	50	5%	603	86
12-18in	103	10%	1,243	178
18-24in	179	17%	2,160	309
24-30in	288	28%	3,476	497
>30in	210	20%	2,534	362
Total for Rotation	**830**	**80%**	**10,017**	**1,431**
Not Suitable	124	12%	1,497	NA
TOTAL	**1,044**	**100%**	**12,600**	**NA**

A total of **10,017 of 12,600 public trees are suitable for routine pruning**. These trees are over six inches in diameter and are not recommended for removal. To **prune 10,017 trees on a seven-year rotation**, a total of **1,431 trees require pruning annually**. The trees for annual pruning may be selected based on street corridors, neighborhoods, planning areas, districts, wards, tree species, or other variables but should be approximately 1,431 trees of varying diameter classes with a focus on efficiency and long-term tree health and vitality.

G.5) Young Tree Training Pruning Guidance

Young tree training for all trees **less than six inches in diameter** (83 trees) should be completed on a **three-year rotation** with frequent monitoring due to their rapid growth. In addition, trees should be added to the rotation as they are planted in new planting sites or as replacement for removals.

In general, young tree training reduces future maintenance costs by improving structural strength, addressing clearance concerns before limbs become large, and increase tree longevity. Details for young tree training are provided in the Appendix and an overview is provided below.

1) Remove broken, diseased, dying, or dead branches.
2) Select a central leader and remove or reduce competing leaders.
3) Select the lowest permanent branch.
4) Select main scaffold branches and remove or cut back competing branches.
5) Select and maintain temporary branches below the lowest permanent branch.

This Report includes a recommended training pruning cycle for the inventoried trees as well as recommendations for pruning for the entire estimated public young tree population. Industry recommendations based on analyses of community forestry programs indicate a routine young tree pruning program is most effective on a **three-year rotation** provided the appropriate resources and budget.

Recommended Training Pruning for Inventoried Trees

For the inventoried trees in Laurel, the three-year pruning rotation results in a total of **28 young trees to prune per year**. As trees are planted, the number of trees to prune per year will increase to ensure all young trees are pruned on a three-year rotation until established, all steps (1-5) above are completed, and are generally over sixes inches in diameter.

Recommended Training Pruning for Public Tree Population

The total estimated young public tree population was derived from the 2021 inventory data to determine the number of trees for a Citywide young tree training pruning rotation. The table below summarizes the estimated distribution of trees by diameter class for all public trees in Laurel and the annual pruning totals.

Table 24. Inventoried and estimated public tree population suitable for young tree pruning rotation

Diameter Class	Inventory Count	%	Public Tree Estimate	Annual Trees to Prune
0-6in	83	8%	1,002	334

A total of **1,002 trees in the estimated 12,600 public tree population are suitable for young tree training**. Operating on a recommended three-year pruning rotation for young trees, approximately **334 trees per year require pruning**. As the urban forest is planted, additional trees will need to be pruned annually.

G.6) Tree Maintenance Schedule for Inventoried Trees (1,044 trees)

Table 25. Recommended schedule for tree maintenance for the 2021 inventoried trees (1,044 trees)

Activity	Diameter Class	Year 1 Trees	Year 2 Trees	Year 3 Trees	Year 4 Trees	Year 5 Trees	Year 6 Trees	Year 7 Trees	Total Trees
Removals	0-3”	1	0	0					1
	3-6”	2	2	1					5
	6-12”	6	6	6					18
	12-18”	3	3	2					8
	18-24”	2	2	2					6
	24-30”	1	1	0					2
	>30”	4	4	3					11
	Subtotal	**19**	**18**	**14**	**0**	**0**	**0**	**0**	**51**
Immediate Prune / Critical Concern	0-3”	0	0	0					0
	3-6”	1	0	0					1
	6-12”	3	3	1					7
	12-18”	4	4	3					11
	18-24”	5	5	5					15
	24-30”	9	9	8					28
	>30”	8	7	7					23
	Subtotal	**30**	**28**	**24**	**0**	**0**	**0**	**0**	**85**
Routine Tree Prune (7-year rotation)	6-12”			10	10	10	10	10	70
	12-18”			15	15	15	15	15	103
	18-24”			25	25	25	25	25	174
	24-30”			40	40	40	40	40	278
	>30”			29	29	29	29	29	200
	Subtotal	**0**	**0**	**119**	**119**	**119**	**119**	**119**	**825**
Young Tree Training (3-year rotation)	0-3”	6	6	6	6	6	6	6	19
	3-6”	21	21	21	21	21	21	21	64
	Subtotal	**27**	**27**	**27**	**27**	**27**	**27**	**27**	**83**
TOTAL TREES		**76**	**73**	**184**	**146**	**146**	**146**	**146**	**1,044**

Based on the 2021 inventory of 1,044 public trees, a total of 51 removals are required and is recommended to remove these trees in years 1-3 due to the potential associated risk. A total of 85 trees require immediate pruning and should also be addressed in the first three years. Once additional budget is secured, rotational pruning of established trees can begin in year 3 for the 825 trees that are suitable for programmed pruning. A total of 83 trees are young trees requiring training pruning. A rotation of three years for young tree training is recommended resulting in a total of 27 young trees pruned per year. In total, maintenance activities address between 73 and 184 trees annually though this only accounts for the inventoried tree population. For the total public tree population, see the next section.

G.7) Tree Maintenance Budget for Inventoried Trees (1,044 trees)

Table 26. Tree maintenance schedule and budget for inventoried trees

Inventory-Based (1,044 trees) Tree Management Worksheet

Laurel, MS **4/12/2021**

Estimated Costs for Each Activity			2022 1		2023 2		2024 3		2025 4		2026 5		2027 6		2028 7		7	Total
Activity	DBH Class	Cost / Tree	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	Year Cost	Trees
Removals (addressed in first 3 years)	0-3"	$50	1	$50	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$50	1
	3-6"	$100	2	$200	2	$200	1	$100	0	$0	0	$0	0	$0	0	$0	$500	5
	6-12"	$300	6	$1,800	6	$1,800	6	$1,800	0	$0	0	$0	0	$0	0	$0	$5,400	18
	12-18"	$850	3	$2,550	3	$2,550	2	$1,700	0	$0	0	$0	0	$0	0	$0	$6,800	8
	18-24"	$1,275	2	$2,550	2	$2,550	2	$2,550	0	$0	0	$0	0	$0	0	$0	$7,650	6
	24-30"	$1,550	1	$1,550	1	$1,550	0	$0	0	$0	0	$0	0	$0	0	$0	$3,100	2
	>30"	$2,100	4	$8,400	4	$8,400	3	$6,300	0	$0	0	$0	0	$0	0	$0	$23,100	11
Activity Total(s)			**19**	**$17,100**	**18**	**$17,050**	**14**	**$12,450**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$46,600**	**51**
Immediate Prune / Critical Concern (addressed in first 3 years)	0-3"	$30	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0	0
	3-6"	$35	1	$35	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$35	1
	6-12"	$80	3	$240	3	$240	1	$80	0	$0	0	$0	0	$0	0	$0	$560	7
	12-18"	$120	4	$480	4	$480	3	$360	0	$0	0	$0	0	$0	0	$0	$1,320	11
	18-24"	$200	5	$1,000	5	$1,000	5	$1,000	0	$0	0	$0	0	$0	0	$0	$3,000	15
	24-30"	$250	11	$2,750	9	$2,250	8	$2,000	0	$0	0	$0	0	$0	0	$0	$7,000	28
	>30"	$450	9	$4,050	7	$3,150	7	$3,150	0	$0	0	$0	0	$0	0	$0	$10,350	23
Activity Total(s)			**33**	**$8,555**	**28**	**$7,120**	**24**	**$6,590**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$22,265**	**85**
Stump Removal	0-3"	$25	1	$25	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$25	1
	3-6"	$50	2	$100	2	$100	1	$50	0	$0	0	$0	0	$0	0	$0	$250	5
	6-12"	$75	6	$450	6	$450	6	$450	0	$0	0	$0	0	$0	0	$0	$1,350	18
	12-18"	$100	3	$300	3	$300	2	$200	0	$0	0	$0	0	$0	0	$0	$800	8
	18-24"	$150	2	$300	2	$300	2	$300	0	$0	0	$0	0	$0	0	$0	$900	6
	24-30"	$200	1	$200	1	$200	0	$0	0	$0	0	$0	0	$0	0	$0	$400	2
	>30"	$250	4	$1,000	4	$1,000	3	$750	0	$0	0	$0	0	$0	0	$0	$2,750	11
Activity Total(s)			**19**	**$2,375**	**18**	**$2,350**	**14**	**$1,750**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$6,475**	**51**
Routine Tree Pruning (7-year cycle beginning at year 3)	0-3"	$20	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0	0
	3-6"	$30	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0	0
	6-12"	$75	0	$0	0	$0	10	$750	10	$750	10	$750	10	$750	10	$750	$3,750	70
	12-18"	$120	0	$0	0	$0	15	$1,766	15	$1,766	15	$1,766	15	$1,766	15	$1,766	$8,829	103
	18-24"	$170	0	$0	0	$0	25	$4,226	25	$4,226	25	$4,226	25	$4,226	25	$4,226	$21,129	174
	24-30"	$225	0	$0	0	$0	40	$8,936	40	$8,936	40	$8,936	40	$8,936	40	$8,936	$44,679	278
	>30"	$425	0	$0	0	$0	29	$12,143	29	$12,143	29	$12,143	29	$12,143	29	$12,143	$60,714	200
Activity Total(s)			**0**	**$0**	**0**	**$0**	**118**	**$27,820**	**118**	**$27,820**	**118**	**$27,820**	**118**	**$27,820**	**118**	**$27,820**	**$139,100**	**825**
Training Prune (3-year cycle)	0-3"	$20	6	$127	6	$127	6	$127	6	$127	6	$127	6	$127	6	$127	$887	19
	3-6"	$30	21	$640	21	$640	21	$640	21	$640	21	$640	21	$640	21	$640	$4,480	64
Activity Total(s)			**28**	**$767**	**28**	**$767**	**28**	**$767**	**28**	**$767**	**28**	**$767**	**28**	**$767**	**28**	**$767**	**$5,367**	**83**
Annual Mortality Removals (1% of 1,044 total trees) (includes stump removal)	Average DBH 22	$1,275	0	$0	0	$0	0	$0	10	$13,311	10	$13,311	10	$13,311	10	$13,311	$53,244	42
Activity Total(s)			**0**	**$0**	**0**	**$0**	**0**	**$0**	**10**	**$13,311**	**10**	**$13,311**	**10**	**$13,311**	**10**	**$13,311**	**$53,244**	**42**
Maintenance Activity Totals			**99**		**92**		**198**		**156**		**156**		**156**		**156**		**1,012**	
Maintenance Cost Total				**$28,797**		**$27,287**		**$49,377**		**$41,898**		**$41,898**		**$41,898**		**$41,898**	**$273,051**	

G.8) Tree Maintenance Schedule for All Public Trees (~12,600 trees)

Table 27. Recommended schedule for tree maintenance for the total public tree population (12,600 trees)

Activity	Diameter Class	Year 1 Trees	Year 2 Trees	Year 3 Trees	Year 4 Trees	Year 5 Trees	Year 6 Trees	Year 7 Trees	Total Trees
Removals	0-3”	30	29	29	5	5	5	5	110
	3-6”	30	29	29	5	5	5	5	110
	6-12”	30	29	29	11	11	11	11	134
	12-18”	30	29	29	15	15	15	15	147
	18-24”	30	29	29	24	24	24	24	182
	24-30”	30	29	29	37	37	37	37	237
	>30”	30	29	29	28	28	28	28	201
	Subtotal	**210**	**203**	**203**	**126**	**126**	**126**	**126**	**1,120**
Immediate Prune / Critical Concern	0-3”	21	21	21	21	21	21	21	147
	3-6”	21	21	21	21	21	21	21	147
	6-12”	21	21	21	21	21	21	21	147
	12-18”	21	21	21	21	21	21	21	147
	18-24”	21	21	21	21	21	21	21	147
	24-30”	21	21	21	21	21	21	21	147
	>30”	21	21	21	21	21	21	21	147
	Subtotal	**147**	**147**	**147**	**147**	**147**	**147**	**147**	**1,026**
Routine Tree Prune (7-year rotation)	6-12”	86	86	86	86	86	86	86	603
	12-18”	178	178	178	178	178	178	178	1,243
	18-24”	309	309	309	309	309	309	309	2,160
	24-30”	497	497	497	497	497	497	497	3,476
	>30”	362	362	362	362	362	362	362	2,534
	Subtotal	**1,431**	**1,431**	**1,431**	**1,431**	**1,431**	**1,431**	**1,431**	**10,016**
Young Tree Training (3-year rotation)	0-3”	167	167	167	167	167	167	167	501
	3-6”	167	167	167	167	167	167	167	501
	Subtotal	**334**	**334**	**334**	**334**	**334**	**334**	**334**	**1,002**
TOTAL TREES		**2,122**	**2,115**	**2,115**	**2,038**	**2,038**	**2,038**	**2,038**	**13,164**

Based on the estimated total public tree population of 12,600 trees, a total of 1,120 removals are estimated. It is recommended that the inventoried trees requiring removal be addressed first followed by other prioritizations. Based on the 2021 inventory, 5 percent of the inventory (51 trees) require removal. Applied to the entire public tree population, it is estimated that 616 trees require immediate removal and should be addressed in years 1-3. The table also accounts for natural mortality. In years 4-7, 1 percent mortality is applied to the estimated total number of trees for the given size class and applied annually resulting in a total of 126 trees to remove per year starting at year 4 and all subsequent years.

According to the 2021 inventory, 8 percent of the trees require immediate pruning. Applied to the 12,600 total estimated public tree population, a total of 1,026 trees require immediate pruning. This amount is distributed across diameter classes and across a seven-year timespan.

A total of 830 trees (80 percent) of the trees inventoried in 2021 are suitable for routine pruning. Applied to the 12,600 estimated public tree population, a total of 10,016 trees are eligible for this programmed pruning. Using the diameter class distribution from the 2021 inventory, the number of trees per size class were applied to the table above to give an estimate of the number of trees to prune per year. This results in a total of 1,431 trees to be pruned per year for a seven-year rotation.

Young tree training follows a similar protocol to routine tree pruning though set to a three-year rotation with a total of 334 trees to prune annually or 1,002 total young trees.

G.9) Tree Maintenance Budget for Estimated Population (12,600 trees)

Table 28. Tree maintenance schedule and budget for public tree population estimate

Population-Based (12,600 trees) Tree Management Worksheet

Laurel, MS **4/12/2021**

Estimated Costs for Each Activity			2022 1		2023 2		2024 3		2025 4		2026 5		2027 6		2028 7		7	Total
Activity	**DBH Class**	**Cost / Tree**	**# of Trees**	**Total Cost**	**# of Trees**	**Total Cost**	**# of Trees**	**Total Cost**	**# of Trees**	**Total Cost**	**# of Trees**	**Total Cost**	**# of Trees**	**Total Cost**	**# of Trees**	**Total Cost**	**Year Cost**	**Trees**
Removals (addressed in first 3 years)	0-3"	$50	30	$1,500	29	$1,450	29	$1,450	5	$250	5	$250	5	$250	5	$250	$5,400	110
	3-6"	$100	30	$3,000	29	$2,900	29	$2,900	5	$500	5	$500	5	$500	5	$500	$10,800	110
	6-12"	$300	30	$9,000	29	$8,700	29	$8,700	11	$3,300	11	$3,300	11	$3,300	11	$3,300	$39,600	134
	12-18"	$850	30	$25,500	29	$24,650	29	$24,650	15	$12,750	15	$12,750	15	$12,750	15	$12,750	$125,800	147
	18-24"	$1,275	30	$38,250	29	$36,975	29	$36,975	24	$30,600	24	$30,600	24	$30,600	24	$30,600	$234,600	182
	24-30"	$1,550	30	$46,500	29	$44,950	29	$44,950	37	$57,350	37	$57,350	37	$57,350	37	$57,350	$365,800	237
	>30"	$2,100	30	$63,000	29	$60,900	29	$60,900	28	$58,800	28	$58,800	28	$58,800	28	$58,800	$420,000	201
Activity Total(s)			**210**	**$186,750**	**203**	**$180,525**	**203**	**$180,525**	**125**	**$163,550**	**125**	**$163,550**	**125**	**$163,550**	**125**	**$163,550**	**$1,202,000**	**1,121**
Immediate Prune / Critical Concern (addressed in first 3 years)	0-3"	$30	21	$630	21	$630	21	$630	21	$630	21	$630	21	$630	21	$630	$4,410	147
	3-6"	$35	21	$735	21	$735	21	$735	21	$735	21	$735	21	$735	21	$735	$5,145	147
	6-12"	$80	21	$1,680	21	$1,680	21	$1,680	21	$1,680	21	$1,680	21	$1,680	21	$1,680	$11,760	147
	12-18"	$120	21	$2,520	21	$2,520	21	$2,520	21	$2,520	21	$2,520	21	$2,520	21	$2,520	$17,640	147
	18-24"	$200	21	$4,200	21	$4,200	21	$4,200	21	$4,200	21	$4,200	21	$4,200	21	$4,200	$29,400	147
	24-30"	$250	21	$5,250	21	$5,250	21	$5,250	21	$5,250	21	$5,250	21	$5,250	21	$5,250	$36,750	147
	>30"	$450	21	$9,450	21	$9,450	21	$9,450	21	$9,450	21	$9,450	21	$9,450	21	$9,450	$66,150	147
Activity Total(s)			**147**	**$24,465**	**147**	**$24,465**	**147**	**$24,465**	**147**	**$24,465**	**147**	**$24,465**	**147**	**$24,465**	**147**	**$24,465**	**$171,255**	**1,029**
Stump Removal	0-3"	$25	30	$750	29	$725	29	$725	5	$125	5	$125	5	$125	5	$125	$2,700	108
	3-6"	$50	30	$1,500	29	$1,450	29	$1,450	5	$250	5	$250	5	$250	5	$250	$5,400	108
	6-12"	$75	30	$2,250	29	$2,175	29	$2,175	11	$825	11	$825	11	$825	11	$825	$9,900	132
	12-18"	$100	30	$3,000	29	$2,900	29	$2,900	15	$1,500	15	$1,500	15	$1,500	15	$1,500	$14,800	148
	18-24"	$150	30	$4,500	29	$4,350	29	$4,350	24	$3,600	24	$3,600	24	$3,600	24	$3,600	$27,600	184
	24-30"	$200	30	$6,000	29	$5,800	29	$5,800	37	$7,400	37	$7,400	37	$7,400	37	$7,400	$47,200	236
	>30"	$250	30	$7,500	29	$7,250	29	$7,250	28	$7,000	28	$7,000	28	$7,000	28	$7,000	$50,000	200
Activity Total(s)			**210**	**$25,500**	**203**	**$24,650**	**203**	**$24,650**	**125**	**$20,700**	**125**	**$20,700**	**125**	**$20,700**	**125**	**$20,700**	**$157,600**	**1,116**
Routine Tree Pruning (7-year cycle beginning at year 3)	6-12"	$75	86	$6,461	86	$6,461	86	$6,461	86	$6,461	86	$6,461	86	$6,461	86	$6,461	$45,225	603
	12-18"	$120	178	$21,309	178	$21,309	178	$21,309	178	$21,309	178	$21,309	178	$21,309	178	$21,309	$149,160	1,243
	18-24"	$170	309	$52,457	309	$52,457	309	$52,457	309	$52,457	309	$52,457	309	$52,457	309	$52,457	$367,200	2,160
	24-30"	$225	497	$111,729	497	$111,729	497	$111,729	497	$111,729	497	$111,729	497	$111,729	497	$111,729	$782,100	3,476
	>30"	$425	362	$153,850	362	$153,850	362	$153,850	362	$153,850	362	$153,850	362	$153,850	362	$153,850	$1,076,950	2,534
Activity Total(s)			**1,431**	**$345,805**	**1,431**	**$345,805**	**1,431**	**$345,805**	**1,431**	**$345,805**	**1,431**	**$345,805**	**1,431**	**$345,805**	**1,431**	**$345,805**	**$2,420,635**	**10,016**
Training Prune (3-year cycle)	0-3"	$20	167	$3,340	167	$3,340	167	$3,340	167	$3,340	167	$3,340	167	$3,340	167	$3,340	$23,380	501
	3-6"	$30	167	$5,010	167	$5,010	167	$5,010	167	$5,010	167	$5,010	167	$5,010	167	$5,010	$35,070	501
Activity Total(s)			**334**	**$8,350**	**334**	**$8,350**	**334**	**$8,350**	**334**	**$8,350**	**334**	**$8,350**	**334**	**$8,350**	**334**	**$8,350**	**$58,450**	**1,002**
Maintenance Activity Totals			**2,332**		**2,318**		**2,318**		**2,162**		**2,162**		**2,162**		**2,162**		**15,615**	
Maintenance Cost Total				**$590,870**		**$583,795**		**$583,795**		**$562,870**		**$562,870**		**$562,870**		**$562,870**	**$4,009,940**	

G.10) Maintenance Budget Summaries and Comparison

Budget for the Inventoried Trees (1,044 trees)

Table 29. Estimated tree maintenance costs for the inventoried trees

Activity & Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	SUBTOTAL
Removals	$17,100	$17,050	$12,450	$0	$0	$0	$0	**$46,600**
Annual Mortality Removals	$0	$0	$0	$13,311	$13,311	$13,311	$13,311	**$53,244**
Immediate Prune / Critical Concern	$8,555	$7,120	$6,590	$0	$0	$0	$0	**$22,265**
Stump Removal	$2,375	$2,350	$1,750	$0	$0	$0	$0	**$6,475**
Routine Tree Pruning	$0	$0	$27,820	$27,820	$27,820	$27,820	$27,820	**$139,100**
Training Prune	$767	$767	$767	$767	$767	$767	$767	**$5,367**
SUBTOTAL	**$28,797**	**$27,287**	**$49,377**	**$41,898**	**$41,898**	**$41,898**	**$41,898**	**$273,051**

Budget for the Public Tree Population Estimate (12,600 trees)

Table 30. Estimated tree maintenance costs for the total public tree population (estimate)

Activity & Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	SUBTOTAL
Removals	$186,750	$180,525	$180,525	$163,550	$163,550	$163,550	$163,550	**$1,202,000**
Immediate Prune / Critical Concern	$24,465	$24,465	$24,465	$24,465	$24,465	$24,465	$24,465	**$171,255**
Stump Removal	$25,500	$24,650	$24,650	$20,700	$20,700	$20,700	$20,700	**$157,600**
Routine Tree Pruning	$345,805	$345,805	$345,805	$345,805	$345,805	$345,805	$345,805	**$2,420,635**
Training Prune	$8,350	$8,350	$8,350	$8,350	$8,350	$8,350	$8,350	**$58,450**
SUBTOTAL	**$590,870**	**$583,795**	**$583,795**	**$562,870**	**$562,870**	**$562,870**	**$562,870**	**$4,009,940**

As shown in Table 29 above, the total seven-year maintenance costs for the inventoried trees amounts to $273,051 (planting costs excluded, see table 32 for planting costs) with an average annual cost of $39,000. Inventoried trees recommended for removal are addressed in years 1-3 and an estimated mortality rate of 1 percent is applied to the inventory population for years 4-7.

Table 30 shows the total seven-year maintenance cost for the estimated 12,600 total public trees amounts to $4 million, an annual average of $572,849. These maintenance activities are based on the proportion of maintenance needs for the 1,044 inventoried trees applied to the total public tree population estimate.

Current Budget Compared to the Recommended Budget for All Public Trees

Table 31. A comparison of the current annual budget and the recommended budget for tree maintenance of the total tree population

	Current (annual)		Recommended (annual)	
Activity	**Count (trees)**	**Budget**	**Count (trees)**	**Budget**
Removals	50	$22,000	125 – 210	$163,550 - $186,750
Immediate Prune	110	$12,000	147	$24,465
Stump Removal	NA	NA	125 – 210	$20,700 - $25,500
Routine Tree Pruning	NA	NA	1,431	$345,805
Training Prune	NA	NA	334	$8,350
SUBTOTAL (annual)	**160**	**$34,000**	**2,162 – 2,332**	**$562,870 - $590,870**

H. Tree Planting Guidance and Recommendations

Tree Planting Goal: The City of Laurel maintains its current tree canopy cover through a no-net-loss approach and continues to plant trees that are resilient to climate change and other risks resulting in an equitable distribution of tree canopy and associated benefits.

H.1) General Planting Guidance

Tree planting is critical to the health and longevity of Laurel's urban forest. However, tree planting should be methodically planned with a specific purpose in mind. One of the best ways to do this is to define and adopt an official planting strategy to be included in an urban forest management plan. The first step in developing a planting strategy is to define the goals. Often times, this goal aligns with a citywide tree canopy cover goal and the timeframe to achieve it. A planting strategy is crucial to urban forest sustainability and should be based on data, available resources, partnerships, and community input. Some of the more common goals that define a planting strategy include:

- **Equitable Distribution.** With this goal, priority of planting is given to areas determined to be the most in need based on the goal of an even distribution of benefits trees provide to all residents. Beyond equal distribution, an area defined to be "in-need" is determined locally and can be a combination of priorities or focused on one specific priority.
- **Areas of Predicted Future Canopy Loss.** Older neighborhoods with a more established tree canopy can anticipate significant losses in future years. One method to planning future planting efforts is to target these replanting areas now to aid in a less drastic succession of trees over time.
- **Benefits-Based Plantings.** Areas that have a specific issue like poor air or water quality, or a large percentage of older residents sensitive to heat stress, may work to plant trees based on the anticipated benefits in years to come.
- **Regular, Methodical Planting in Concert with Cyclical Tree Care Efforts.** Planting may be most effective if it follows the City's inventory, and pruning and removal cycle of care. Regular methodical planting can also be considered a worthy goal.
- **Species Diversity.** Planting strategies should not only identify where to plant but also what is being planted. Species diversity in Laurel is currently an issue, with high levels of water oaks and loblolly pines. A policy on this issue should be included in the strategy.
- **Partners in Planting.** Laurel's planting strategy should also include who is doing the planting. This work can be done by City partners, neighborhood groups, developers, and other interested parties, thus allowing the City to focus on specialized care (pruning, removals, assessments).

Suggested policies on planting to be considered in an urban forest management plan for Laurel may include referencing aging canopy to emphasize that every tree the City removes must be replaced, and to ensure that annual inventory work includes cataloging future planting sites, and expediting tree planting work as planting funds become available. Further analysis is also recommended to analyze the impact of development (losses, canopy saved, replacement plantings in developments). Results of that analysis will further define an effective planting program.

Larger trees provide more services to the community. They intercept more stormwater, remove more air pollution, provide more energy savings, and sequester more carbon. However, it is important to understand that this increase in services is exponential. For this reason, preservation of large trees should be a higher priority for communities than planting alone.

Laurel's vision for the urban forest should be to maintain and enhance the services trees provide to residents. Therefore, prioritizing care for existing trees (over planting new trees) is critical for a healthy community.

Tree Planting Recommendations: Purpose

- Sustainability: The urban forest must be resilient to climate change and other risks. Tree plantings should be diverse and offset the loss from development, tree pests and diseases, storms, and other causes to sustain environmental, economic, and social benefits and services provided by trees.
- Equity: The associated benefits and services provided by the urban forest should be shared by all neighborhoods and demographics achieved by implementing a strategic tree planting program.
- Community: City and partner-led tree planting events offer opportunities for the community to participate in the planning, planting, and post-planting care. This engagement can foster stewardship and ownership of the urban forest by the community to achieve long-term goals.

Short-Term Tree Planting Recommendations (see Appendix M for a complete list)

01. Conduct additional analyses of the i-Tree Canopy assessment to refine possible planting areas— moving from "possible" to "feasible" and "preferable". (TP.01S)
02. Reduce the planting of water oaks (*Quercus nigra*) and loblolly pines (*Pinus taeda*). (TP.02S)
03. For each public tree removed, replace with a new tree if the site is suitable for a "no-net-loss" approach. (TP.03S)
04. As feasible, inventory potential public planting sites using the City's TreePlotter software and prescribe a recommended tree species for the given site. (TP.04S)
05. For every public tree planted, ensure the tree meets the American National Standards Institute's (ANSI) Z60.1 nursery stock standards. (TP.05S)
06. Ensure every public tree planted has a post-planting care plan consisting of young tree training, watering, mulching, staking, and monitoring as needed. (TP.06S)
07. Implement planting recommendations utilizing the Recommended Tree Species List provided in this Report (Appendix A). (TP.07S)

Long-Term Tree Planting Recommendations (see Appendix M for a complete list)

01. Set planting goals as a Citywide effort including departments, partners, and the community. (TP.01L)
02. Based on a Citywide public tree inventory, update the Recommended Tree Species List. (TP.02L)
03. Develop a Strategic Tree Planting Plan that broadly identifies location, tree species, timing, annual care, and other criteria aligned with the tree planting and canopy goals. Implementing the planting plan should achieve goals of urban forest diversity, sustainability, resiliency, and equitable distribution of associated benefits and services. (TP.03L)
04. Insert planting goals into an urban forest management plan and convey those goals to project partners. (TP.04L)
05. For public tree plantings, assess available planting sites in the inventory and agree on which partner will be focused on planting in the coming years, and how that fits into the annual care plan. (TP.05L)
06. Ensure all public trees planted are captured in the tree inventory management software such as the City's TreePlotter application. (TP.06L)
07. For private tree plantings, convey the goals and data to large landholders, neighborhood groups, and other players to encourage planting on private lands. (TP.07L)

H.2) Recommended Planting Targets and Costs

Table 32. Recommended planting regimen and costs based on the total public tree population

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Subtotal
Replacement Trees	210	203	203	125	125	125	125	**1,116**
Costs	**$65,100**	**$62,930**	**$62,930**	**$38,750**	**$38,750**	**$38,750**	**$38,750**	**$345,960**

The table above provides a recommended planting regimen based on the number of public trees removed per year. The associated annual costs account for purchasing and planting. The post-planting care and young tree training costs are evaluated and summarized in the tree maintenance cost estimates.

I. Community Engagement Guidance and Recommendations

Community Engagement Goal: Sustainable urban forest management and equity is achieved through a partnership with the City and its residents resulting in improved well-being, human health, and local economies.

I.1) Community Engagement Overview

Urban forests and community health are inextricably linked— the better an urban forest, the greater a community's health. A community that is engaged with its urban forest will responsibly plant, care for, and nurture its trees, while inspiring others to do the same and supporting the City's urban forest management program. A thriving urban forest is only possible through a civic commitment and partnerships shared by all.

Community engagement helps cities improve the efficiency, legitimacy, and transparency of their decision making. By embracing and encouraging participation, it enables managers and policy makers to make more informed decisions by engaging with, and carefully mapping out the needs, opinions, and visions of local communities on issues that matter to them. It promotes sustainable decisions by recognizing and communicating the needs and interests of all participants, including decision makers. This increases acceptance of decisions and community commitment to outcomes as local knowledge from diverse groups shapes and creates inclusive, effective solutions. The flow on effect is increased trust in organizations and governance to make better public decisions.

Trees should be recognized as integral to the quality of life for all residents and important contributors to the City's urban character and natural environments. A healthy, thriving, and sustainable urban forest should be a longstanding community priority that is thoughtfully managed in a way to maximize a range of public benefits including a thriving ecosystem, a vibrant economy, and a livable community shared by all under a common vision and commitment. Partnerships between the City and the community are vital to urban forest sustainability.

I.2) Community Engagement Recommendations

Community Engagement Recommendations: Purpose

- Inclusivity: Residential property contains a large portion of the City's total tree canopy cover. Sustaining Laurel's urban forest requires residential collaboration and feedback and fostering long-term relationships to improve outcomes.
- Transparency: Program and funding transparency are essential in building resilient community partnerships.
- Resourcefulness: Public participation and insight provide resourceful and impactful urban forest program growth.
- Community: Active participation in nature-related efforts foster community pride and ownership, and breaks down walls, helping bring communities closer together as they become closer to nature.

Short-Term Community Engagement Recommendations (see Appendix M for a complete list)

01. Update the City's website and materials based on information from the Report. (CE.01S)
02. Formalize clear and consistent design and language for urban forestry outreach materials. (CE.02S)
03. Share quarterly informative urban forestry and tree-related content to a social media, City website, and other communication platforms. (CE.03S)
04. Continue to work closely with the City's Tree Board and align the roles and responsibilities of the Board with recommendations in this Report. (CE.04S)
05. Support the Tree Board in providing information in this Report to the public and reporting on its implementation. (CE.05S)
06. Support volunteer training opportunities as feasible. (CE.06S)

07. Prioritize citizen service requests and update the City website with frequently asked questions and resources. (CE.07S)
08. Gather feedback from the public regarding viewpoints, perceptions, and opportunities relating to the urban forest. (CE.08S)
09. Continue to track and annually report urban forestry activities of all partners to maintain Arbor Day Tree City USA designation. (CE.09S)
10. Continue to strengthen partnerships with civic groups, Homeowners' Associations, volunteers, and neighborhoods. (CE.10S)
11. Conduct biannual community surveys to gauge public viewpoints and receive feedback on implementation of the UFMP, and program success. Survey responses should inform future urban forest decision making. (CE.11S)

Long-Term Community Engagement Recommendations (see Appendix M for a complete list)

01. Coordinate the outreach strategy as a Citywide initiative rather than a departmental effort. (CE.01L)
02. Develop strategies to remove barriers to participation for all community members. Barriers to address include ADA communications compliance, internet availability, language, cultures, location, transportation, etc. (CE.02L)
03. Engage neighborhoods with volunteer tree planting events. Prioritize areas with lower urban tree canopy and other considerations such as underserved communities. (CE.03L)
04. Explore options to facilitate and/or subsidize tree planting for private property owners through tree-giveaways and cost-shares. Support local, regional (e.g., watersheds), and national programs (e.g., Arbor Day Foundation) that provide such giveaways. (CE.04L)
05. Strive to achieve the Arbor Day Foundation's Growth Award for higher levels of tree care and community engagement and pursue another Sterling Tree City award. (CE.05L)
06. Recognize exemplary urban forest stewards and volunteers representing youth, residents, organizations, and business owners. Consider a tree donation or tree fund framework for costs associated with this program. (CE.06L)
07. Collaborate with nurseries to propagate a more diverse palette of trees that meets the City's tree diversity requirements and updated planting recommendations. (CE.07L)

J. Summary of Recommendations

(see Appendix M for a complete list)

J.1) Program Recommendations

Staffing: Maintain staffing levels, certifications, and training. Update Standard Operating Procedures.

Budget: Establish funding for comprehensive public tree inventory and continue to apply for grants. Utilize the inventory to build the case for more funding. Continue to fund the urban forest management program.

Structure: Inform the public of the current tree maintenance responsibility. Strengthen interdepartmental communications, protocols, manuals, and Standard Operating Procedures.

Management: Continue the tree maintenance and removal program and update the inventory as maintenance is completed. Align maintenance and planting with City planning efforts, adhere to current industry standards, and continue to obtain Tree City USA status.

Code and Policy: Align resources and planning efforts with departments and partners, engage in City department planning, provide guidance on tree planting and preservation for City projects.

J.2) Tree Maintenance Recommendations

Tree Removals

- Inventoried Trees: Prioritize the 51 high-risk removals in years 1-3.
- Public Tree Population: Prioritize the estimated 1,121 high-risk removals in years 1-3.

Immediate Pruning

- Inventoried Trees: Prioritize immediate pruning for 85 trees in years 1-3.
- Public Tree Population: Prioritize immediate pruning of the estimated 1,029 trees in years 1-7.

Rotational Pruning

- Inventoried Trees: Beginning in year 3, prune 118 inventoried trees per year on a seven-year rotation.
- Public Tree Population: Beginning in year 1, prune 1,431 trees per year on a seven-year rotation.

Training Pruning

- Inventoried Trees: Beginning in year 1, prune 28 trees per year on a three-year rotation.
- Public Tree Population: Beginning in year 1, prune 334 young trees per year on a three-year rotation.

J.3) Tree Planting Recommendations

Planting Strategy: Develop a planting strategy that addresses equity, canopy loss, benefits, diversity, partnerships, and post-planting care.

Preservation Policies: Establish or strengthen City Code and policies relating to tree preservation.

Analyze Available Planting Space: Utilize the i-Tree Canopy data to refine possible planting areas into feasible and preferred planting areas that are based on inventories, resources, and public input.

No-Net-Loss: For every public tree removed, plant at least one replacement tree based on a planting strategy.

J.4) Community Engagement Recommendations

- Maintain Tree City USA status.
- Coordinate outreach as a Citywide effort.
- Update the City's website based on this Report.
- Utilize volunteers and support volunteer trainings.
- Strengthen and establish partnerships to achieve common goals.

K. Monitoring and Adaptive Management

This Tree Management Program Evaluation Report should be updated and revised periodically to reflect changes in the urban forest resource structure and function, to incorporate changes in industry standards, to consider community response, and to measure the progress of the urban forest partners in implementing the recommendations and reaching the established goals. This process should be implemented by a City Project Team or an Urban Forest Working Group using the Evaluate, Monitor, Report, and Revise methodology.

Knowing how the City of Laurel and its partners are doing will require a continual process of evaluation. This section presents examples of how to monitor, analyze, and revise the Report, which will keep stakeholders informed of the status of the urban forest program. To monitor progress toward implementing the Report recommendations, an evaluation similar to the U.S. Forest Service's Urban Forest Audit conducted to develop the initial Report should be completed. This evaluation will identify progress and shortfalls compared to the baseline audit.

In addition, a report card could be created based on outcomes of the audit and distributed to the public every two to three years. This will measure the progress toward implementing the Report recommendations. The following example provides a suggested reporting structure to measure success toward accomplishing each goal. Other indicators to measure progress may need to be developed to ensure a thorough and accurate evaluation.

K.1) Evaluate

The U.S. Forest Service's Urban Forest Audit System provides a framework for routine evaluations of the urban forest, the programs that manage it, and the community that shapes and benefits from it. The methodology and findings summarized in this Report provide the guidance for completing the updated audit. It is recommended the City Project Team or the Urban Forest Working Group complete a bi-annual audit to inform any alterations to actions and strategies.

The audit system consists of 11 categories of urban forest management, sustainability, and community. Within the 11 categories are approximately 130 elements. Each element was ranked or scored based on the consultants' evaluations in 2021 for the Tree Management Program Evaluation Report project. The City Project team or Urban Forest Working Group should complete an update to this ranking bi-annually to inform reporting, monitoring, and revision of the Report as described in the following sections.

K.2) Monitor

Measuring accomplishment of the recommendations will require ongoing analysis. The outcomes of the Urban Forest Audit System in the "Evaluate" section can be used to monitor change over time. These benchmark values should be tracked and a state of the urban forest report should be prepared and distributed to the public every 5 to 10 years. Analysis may include an updated tree inventory, i-Tree benefits analyses, or urban tree canopy assessments. The state of the urban forest report should include the benchmark values as outlined in the Report and the Urban Forest Audit System as of 2021, so that the City can measure and compare changes to the urban forest. The report should reflect changes to the audit system that are measured.

Laurel's Urban Forest Benchmark Values

Table 33. Laurel's urban forest benchmark values

URBAN TREE CANOPY (UTC) COVER (2021)	
UTC	42%
Recommended Canopy Goal	No-Net-Loss
Total Number of Trees to Plant	334 public trees, private trees unknown
ESTIMATED TREE COUNT	
Total Public Trees in Maintained Areas (estimate)	12,600
Public Trees Inventoried	1,044
Total Public Trees (streets, parks, trails, facilities, riparian, natural)	Unknown
TREE SPECIES DIVERSITY (SPECIES EXCEEDING 10%)	
Public Inventoried Trees (2021)	Water oaks (14%), loblolly pines (31%)
TREE BENEFITS	
Citywide	2021: $1.5 million (annual) | $31.2M total
Inventoried Public Trees (1,044 trees)	2021: $183,738 (annual)
TREE AND BUDGET DISTRIBUTION	
Public Trees per Capita	0.68
Budget per Capita	$3.24
Budget per Public Tree	$4.77
Tree Management Staff	3 full-time employees
Total Public (managed) Trees per Staff	4,200
MANAGEMENT ACTIVITIES (2019)	
Public Trees Pruned	110 trees
Public Trees Removed	50 trees
Public Trees Planted	45 trees
Number of Volunteers Hours	400 hours
URBAN FOREST AUDIT SYSTEM (TOTAL SCORE OF 2021: 45%)	
Management Policy and Ordinances	43%
Professional Capacity and Training	38%
Funding and Accounting	25%
Decision and Management Authority	75%
Tree-Related Inventories	54%
Tree-Related Plans	25%
Risk Management	56%
Disaster Planning	21%
Standards and Best Management Practices	48%
Community	57%
Green Asset Evaluation	45%

K.3) Report

Based on the evaluation of Report implementation progress, the City Project Team or Urban Forest Working Group should track, record, and report on the metrics described below that are measures or indicators of success for each goal and supporting recommendations.

Table 34. Evaluation, monitoring, and reporting techniques to achieve the urban forestry goals

1	**URBAN FORESTRY PROGRAM GOAL:** The City is adequately staffed, trained, and structured to provide higher levels of service, supported through policy, resulting in a healthy urban forest equitably benefiting the citizens of Laurel. ❖ List all City and partner-led planning efforts. ❖ Describe related planning efforts. ❖ List opportunities to align recommendations with other planning efforts. ❖ List recommended changes to City Code, policies, and manuals. ❖ List audit score and recommendations achieved, ongoing, not started.
2	**TREE MAINTENANCE GOAL:** Laurel proactively manages the public trees, continues to grow and expand a healthy canopy, effectively mitigates risk, and optimizes urban forest benefits. ❖ Report the number of public trees pruned and removed. ❖ Report the number of trees managed for pests and diseases. ❖ Report the condition, structure, and diversity of the public trees. ❖ Report the volume of woody biomass utilized. ❖ List audit score and recommendations achieved, ongoing, not started.
3	**TREE PLANTING GOAL:** The City of Laurel maintains its current tree canopy cover through a no-net-loss approach and continues to plant trees that are resilient to climate change and other risks resulting in an equitable distribution of tree canopy and associated benefits. ❖ Report the tree planting and canopy goals established. ❖ Report progress towards canopy goals and tree planting targets. ❖ Report the number of trees planted through CIP and other programs. ❖ Report the number of trees planted in development projects. ❖ List audit score and recommendations achieved, ongoing, not started.
4	**COMMUNITY ENGAGEMENT GOAL:** Sustainable urban forest management and equity is achieved through a partnership with the City and its residents resulting in improved well-being, human health, and local economies. ❖ List the existing and potential outreach platforms and initiatives. ❖ List existing and potential partners. ❖ Report the number of planting events and trees planted. ❖ Report the history of Tree City USA and supporting awards. ❖ Report the number of volunteers, events, and volunteer hours. ❖ Report the number of private tree plantings as feasible. ❖ Report the number of trainings, workshops, and attendees. ❖ Report the results of public surveys. ❖ Recognize exemplary urban forest stewards and share their stories. ❖ List audit score and recommendations achieved, ongoing, not started.

K.4) Revise

Completion of this Report is the first step towards meeting a vision for Laurel's urban forest. Continual monitoring, analysis, and reporting will help to keep urban forest partners involved and focused on accomplishing the actions. This Report should be reviewed and modified as necessary every 2 to 5 years; however, the Report will need formal review prior to the development of an urban forest management plan (UFMP). The UFMP will provide a clear roadmap of strategies to achieve an urban forestry vision and long-term goals supported by the City departments, its partners, and the community. The development of the UFMP should coincide with updates to the City's Comprehensive Plan, other relevant planning efforts, and City policies. Recommendations and goals of each should be compared. Revisions to the Plan should occur with major events, such as newly discovered pests or diseases, changes in program budget and resources, or significant changes to industry standards or legal codes.

Table 35. Example of the Report implementation, evaluation, and revision process

Year 1	Year 2	Year 3	Year 4	Year 5
Implement	*Evaluate, Monitor, and Report*	*Revise and Adapt*	*Implement*	*Evaluate, Monitor, and Report*
Short-Term Actions	Short-Term Actions	Short-Term Actions	Short-Term Actions	Urban Forest Management Plan and Long-Term Actions

L. Conclusion

Source: Downtown Laurel

Trees are an integral part of the community and the ecological systems in which they exist. They provide significant economic, social, and ecological benefits, such as carbon sequestration, reduction of urban heat islands, energy savings, reduction of stormwater runoff, improvement of water quality, enhancement of human health and wellness, and increase the value of properties. Planting and maintaining trees help Laurel become more sustainable and reduce the negative impacts on the ecosystem from urban development. Trees are as necessary as water, infrastructure, and energy to sustaining healthy communities. The health of the urban forest is directly linked to the health of the region.

The goal framework in Laurel's Tree Management Program Evaluation Report is based on outcomes of the audit system and in alignment with existing plans to allow the City to evaluate recommendations, incrementally implement actions, effectively monitor progress, and efficiently adapt in an everchanging environment. Successful implementation of actions in this Report will bring Laurel to a higher level of service that is more equitably distributed across the City resulting in a sustainable and thriving urban forest that benefits all residents and future generations.

Laurel's trees, forests, and other natural resources are recognized as integral to sustaining life and health for all City residents. A healthy, thriving, and sustainable urban forest should be a community priority, to be thoughtfully managed and cared for by partnerships between the City and its residents to maximize public safety and benefits that include a thriving ecosystem, vibrant economy, improved human health, and livable communities shared by all who live, work, and recreate in Laurel. James Clark, author of *A Model of Urban Forest Sustainability* (1997) emphasizes the importance of implementing this Report in a quote that states:

"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."

As stated in this quote, an effective Urban Forestry Program supported by the City's passion for the natural environment and associate benefits will lead Laurel to a more sustainable and thriving urban forest.

Appendices and Supporting Case Studies

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Appendix A. Recommended City-Wide Tree Species List

Small Statured Trees

Tree Type	Common Name	Scientific Name	Size Class	Height (feet)	Width (feet)	Features
Maple	Japanese Maple	*Acer palmatum*	Small	25'	25'	Foliage Fall color
Buckeye	Red Buckeye	*Aesculus pavia*	Small	25'	20'	Flowers Fruit
Buckeye	Painted Buckeye	*Aesculus sylvatica*	Small	15'	10'	Flowers Fruit
Serviceberry	Serviceberry	*Amelanchier spp*	Small	30'	20'	Flowers Fall color
Pawpaw	Pawpaw	*Asimina triloba*	Small	30'	20'	Fruit Fall color
Redbud	Eastern Redbud	*Cercis canadensis*	Small	30'	35'	Flowers Foliage
Olive	Fringe Tree	*Chionanthus virginicus*	Small	30'	20'	Flowers
Dogwood	Flowering Dogwood	*Cornus florida*	Small	25'	30'	Flowers Fall color
Smoketree	Smoketree	*Cotinus coggygria*	Small	15'	15'	Flowers
Hawthorn	Cockspur Hawthorn	*Crataegus crus-galli*	Small	30'	30'	Flowers
Hawthorn	Mayhaw	*Crataegus opaca*	Small	35'	30'	Flowers Fruit
Crapemyrtle	Crapemyrtle	*Lagerstroemia indica*	Small	30'	20'	Flowers
Magnolia	Saucer Magnolia	*Magnolia* x *soulangeana*	Small	35'	25'	Flowers
Crabapple	Flowering Crabapple	*Malus spp*	Small	25'	20'	Flowers
Hophornbeam	Eastern Hophornbeam	*Ostrya virginiana*	Small	35'	25'	Fall color
Mock Orange	Mock Orange	*Philadelphus virginalis*	Small	10'	10'	Flowers
Rose	Carolina Cherry Laurel	*Prunus caroliniana*	Small	35'	20'	Evergreen Flowers
Cherry	Japanese Flowering Cherry	*Prunus serrulate*	Small	25'	20'	Flowers

A detailed interactive worksheet is provided as part of the Tree Management Program Evaluation project.

Medium Statured Trees

Tree Type	Common Name	Scientific Name	Size Class	Height (feet)	Width (feet)	Features
Maple	Chalk Maple	*Acer leucoderme* (syn. *Acer saccharum ssp. Leucoderme)*	Medium	30'	30'	Fall color
Maple	Red Maple	*Acer rubrum*	Medium	50'	40'	Fall color
Birch	River Birch	*Betula nigra*	Medium	60'	40'	Bark Fall color
Hornbeam	American hornbeam	*Carpinus caroliniana*	Medium	30'	35'	Bark Fall color
Catalpa	Southern Catalpa	*Catalpa bignonioides*	Medium	60'	40'	Flowers
Yellowwood	Yellowwood	*Cladrastis kentukea*	Medium	45'	45'	Flowers Fall color
Sumac	American Smoketree	*Cotinus obovatus*	Medium	30'	30'	Fall color Fruit
Persimmon	Persimmon	*Diospyros virginiana*	Medium	70'	30'	Fruit Fall color
Silverbell	Carolina Silverbell	*Halesia carolina*	Medium	40'	35'	Flowers Fall color
Goldenrain Tree	Goldenrain Tree	*Koelreuteria paniculata*	Medium	30'	25'	Flowers Fall color Fruit
Magnolia	Sweetbay Magnolia	*Magnolia virginiana*	Medium	60'	20'	Flowers Evergreen
Tupelo	Black Tupelo 'Firestarter'	*Nyssa sylvatica* 'Firestarter'	Medium	40'	25'	Wildlife Fall color
Sourwood	Sourwood	*Oxydendrum arboreum*	Medium	30'	15'	Flowers Fall color
Red Bay	Red Bay	*Persea borbonia*	Medium	60'	30'	Evergreen
Oak	Sand Post Oak	*Quercus margaretta*	Medium	35'	35'	Stature
Oak	Blackjack Oak	*Quercus marilandica*	Medium	50'	40'	Wildlife Stature
Rose	American Mountain Ash	*Sorbus americana*	Medium	35'	20'	Fruit Flower Fall color
Rose	European Mountain Ash	*Sorbus aucuparia*	Medium	40'	25'	Fruit Flower Fall color
Cypress	Pond Cypress	*Taxodium ascendens*	Medium	60'	25'	Stature Foliage Bark
Elm	Winged Elm	*Ulmus alata*	Medium	60'	40'	Bark Fall color
Elm	Chinese Elm	*Ulmus parvifolia*	Medium	60'	60'	Bark Fall color
Zelkova	Japanese Zelkova	*Zelkova serrata*	Medium	60'	60'	Fall color

A detailed interactive worksheet is provided as part of the Tree Management Program Evaluation project.

Large Statured Trees

Tree Type	Common Name	Scientific Name	Size Class	Height (feet)	Width (feet)	Features
Maple	Florida Maple	*Acer barbatum* (syn. *Acer saccharum ssp. floridanum*)	Large	60'	30'	Fall color
Maple	Red Sunset Maple	*Acer rubrum* 'Franksred' RED SUNSET	Large	50'	40'	Fall color
Maple	October Glory Red Maple	*Acer rubrum* 'October Glory'	Large	50'	40'	Fall color
Pecan	Pecan	*Carya illinoinensis*	Large	100'	75'	Fruit
Sugarberry	Sugarberry	*Celtis laevigata*	Large	80'	60'	Flowers
Hackberry	Hackberry	*Celtis occidentalis*	Large	100'	60'	Bark Wildlife Fall color
Filbert	Turkish Filbert	*Corylus colurna*	Large	50'	30'	Wildlife
Beech	American Beech	*Fagus grandifolia*	Large	80'	80'	Bark Fall color
Ginkgo	Ginkgo	*Ginkgo biloba*	Large	80'	40'	Foliage Fall color
Honeylocust	Honeylocust	*Gleditsia triacanthos*	Large	45'	40'	Fall color
Honeylocust	Shademaster Honeylocust	*Gleditsia triacanthos* 'Shademaster'	Large	45'	40'	Fall color
Kentucky Coffeetree	Kentucky Coffeetree	*Gymnocladus dioicus*	Large	60'	40'	Fall color
Sweetgum	Sweetgum	*Liquidambar styraciflua* 'Rotundiloba'	Large	80'	40'	Fall color
Tuliptree	Tulip Poplar	*Liriodendron tulipifera*	Large	90'	40'	Fall color Stature Flower
Magnolia	Southern Magnolia	*Magnolia grandiflora*	Large	80'	50'	Evergreen Flowers
Tupelo	Blackgum	*Nyssa sylvatica*	Large	60'	35'	Fall color
Pine	Shortleaf Pine	*Pinus echinata*	Large	100'	40'	Evergreen
Pine	Slash Pine	*Pinus elliottii*	Large	90'	45'	Evergreen
Pine	Longleaf Pine	*Pinus palustris*	Large	90'	45'	Evergreen Fruit
Pine	Loblolly Pine	*Pinus taeda*	Large	90'	45'	Evergreen
Pistache	Chinese Pistache	*Pistachia chinensis*	Large	30'	25'	Fall color
Sycamore	American Sycamore	*Platanus occidentalis*	Large	110'	100'	Stature
Sycamore	London Planetree	*Platanus x acerifolia*	Large	100'	75'	Bark
Oak	White Oak	*Quercus alba*	Large	100'	70'	Stature
Oak	Swamp White Oak	*Quercus bicolor*	Large	70'	70'	Fall color
Oak	Scarlet Oak	*Quercus coccinea*	Large	75'	45'	Wildlife Fall color
Oak	Southern Red Oak	*Quercus falcata*	Large	80'	55'	Wildlife Stature
Oak	Laurel Oak	*Quercus laurifolia*	Large	60'	60'	Evergreen

Large Statured Trees (continued)

Tree Type	Common Name	Scientific Name	Size Class	Height (feet)	Width (feet)	Features
Oak	Bur Oak	*Quercus macrocarpa*	Large	100'	45'	Wildlife Stature
Oak	Swamp Chestnut Oak	*Quercus michauxii*	Large	80'	70'	Wildlife Stature
Oak	Water Oak	*Quercus nigra*	Large	100'	60'	Stature
Oak	Nuttall Oak	*Quercus nuttallii*	Large	80'	60'	Wildlife Stature
Oak	Cherrybark Oak	*Quercus pagoda*	Large	130'	70'	Stature Wildlife
Oak	Willow Oak	*Quercus phellos*	Large	80'	40'	Wildlife Fall color Stature
Oak	Shumard Oak	*Quercus shumardii*	Large	110'	55'	Wildlife Fall color
Oak	Swamp Post Oak	*Quercus similis*	Large	100'	60'	Wildlife Stature
Oak	Post Oak	*Quercus stellata*	Large	60'	50'	Wildlife Stature
Oak	Live Oak	*Quercus virginiana*	Large	80'	100'	Evergreen
Sassafras	Sassafras	*Sassafras albidum*	Large	70'	40'	Fall color Foliage
Cypress	Baldcypress	*Taxodium distichum*	Large	70'	30'	Stature Fall color
Linden	American Basswood	*Tilia americana*	Large	80'	50'	Stature
Elm	Cedar Elm	*Ulmus crassifolia*	Large	80'	60'	Stature
Zelkova	Wireless® Japanese Zelkova	*Zelkova serrata* 'Schmidtlow'	Large	25'	35'	Fall color

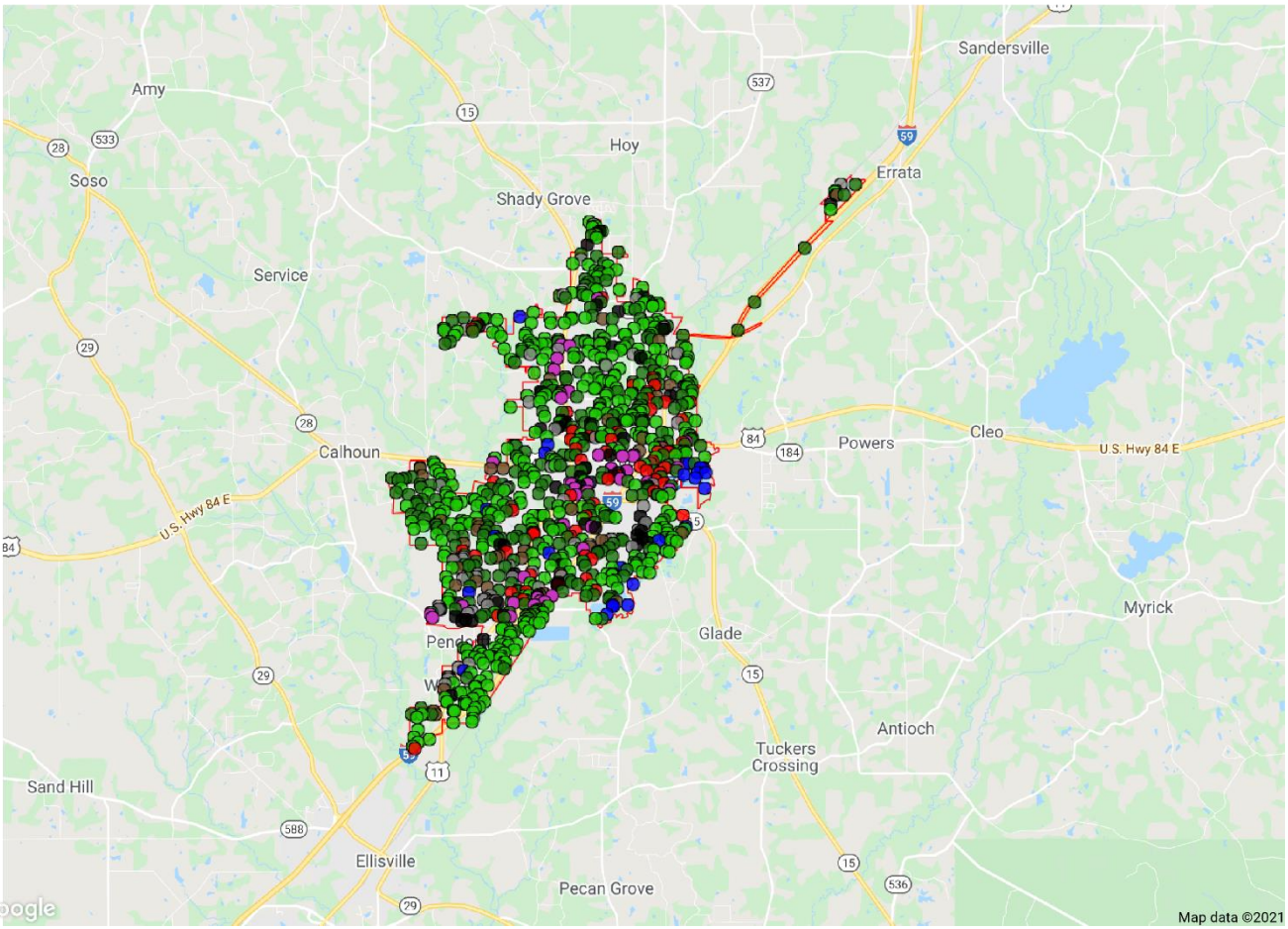
A detailed interactive worksheet is provided as part of the Tree Management Program Evaluation project.

Appendix B. i-Tree Canopy Report

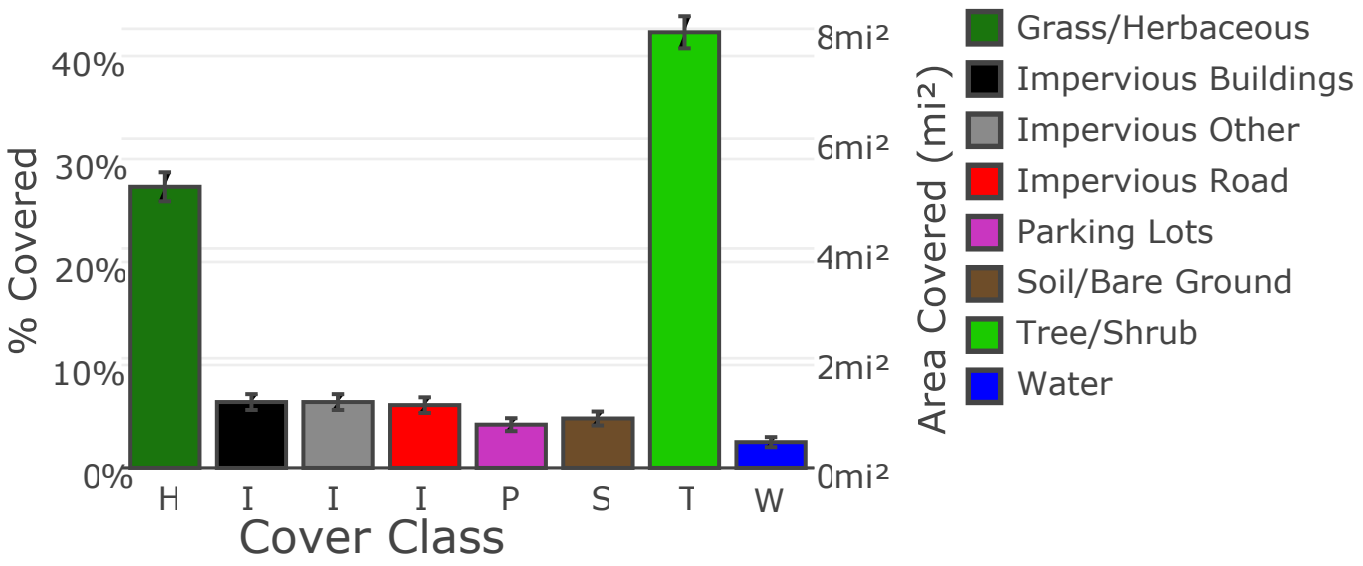
i-Tree Canopy v7.1

Cover Assessment and Tree Benefits Report

Estimated using random sampling statistics on 3/25/2021



Land Cover



Abbr.	Cover Class	Points	% Cover ± SE	Area (mi^2) ± SE
H	Grass/Herbaceous	273	27.30 ± 1.41	5.13 ± 0.26
IB	Impervious Buildings	64	6.40 ± 0.77	1.20 ± 0.15
IO	Impervious Other	64	6.40 ± 0.77	1.20 ± 0.15
IR	Impervious Road	61	6.10 ± 0.76	1.15 ± 0.14
PL	Parking Lots	42	4.20 ± 0.63	0.79 ± 0.12
S	Soil/Bare Ground	48	4.80 ± 0.68	0.90 ± 0.13
T	Tree/Shrub	423	42.30 ± 1.56	7.94 ± 0.29
W	Water	25	2.50 ± 0.49	0.47 ± 0.09
TOTAL		**1,000**	**100**	**18.77**

Tree Benefit Estimates: Carbon (English units)

Description	Carbon (kT)	± SE	CO_2 Equiv. (kT)	± SE	Value (USD)	± SE
Sequestered annually in trees	7.80	±0.29	28.60	±1.06	$1,330,213	±49,129
Stored in trees (Note: this benefit is not an annual rate)	174.24	±6.44	638.87	±23.60	$29,716,375	±1,097,523

Currency is in USD and rounded. Standard errors of removal and bene t amounts are based on standard errors of sampled and classified points. Amount sequestered is based on 0.982 kT of Carbon, or 3.601 kT of CO_2, per mi^2/yr and rounded. Amount stored is based on 21.940 kT of Carbon, or 80.446 kT of CO_2, per mi^2 and rounded. Value (USD) is based on $170,550.73/kT of Carbon, or $46,513.84/kT of CO_2 and rounded. (English units: kT = kilotons (1,000 tons), mi^2 = square miles)

Tree Benefit Estimates: Air Pollution (English units)

Abbr.	Description	Amount (T)	± SE	Value (USD)	± SE
CO	Carbon Monoxide removed annually	2.22	±0.08	$112	±4
NO_2	Nitrogen Dioxide removed annually	12.02	±0.44	$248	±9
0_3	Ozone removed annually	128.68	±4.75	$18,936	±699
SO_2	Sulfur Dioxide removed annually	7.25	±0.27	$72	±3
PM2.5	Particulate Matter less than 2.5 microns removed annually	12.55	±0.46	$61,077	±2,256
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	26.21	±0.97	$6,189	±229
TOTAL		**188.93**	**±6.98**	**$86,633**	**±3,200**

Currency is in USD and rounded. Standard errors of removal and bene t amounts are based on standard errors of sampled and classified points. Air Pollution Estimates are based on these values in T/mi^2/yr @ $/T/yr and rounded:

CO 0.280 @ $50.52 | NO2 1.513 @ $20.64 | O3 16.204 @ $147.15 | SO2 0.913 @ $9.91 | PM2.5 1.580 @ $4,866.66 | PM10* 3.301 @ $236.08 (English units: T = tons (2,000 pounds), mi^2 = square miles)

Tree Benefit Estimates: Hydrological (English units)

Abbr.	Benefit	Amount (Mgal)	± SE	Value (USD)	± SE
AVRO	Avoided Runoff	7.26	±0.27	$64,858	±2,395
E	Evaporation	656.43	±24.24	N/A	N/A
I	Interception	658.59	±24.32	N/A	N/A
T	Transpiration	824.51	±30.45	N/A	N/A
PE	Potential Evaporation	3,480.95	±128.56	N/A	N/A
PET	Potential Evapotranspiration	3,097.49	±114.40	N/A	N/A

Currency is in USD and rounded. Standard errors of removal and bene t amounts are based on standard errors of sampled and classified points. Hydrological Estimates are based on these values in Mgal/mi²/yr @ $/Mgal/yr and rounded:

AVRO 0.914 @ $8,936.00 | E 82.657 @ N/A | I 82.930 @ N/A | T 103.822 @ N/A | PE 438.319 @ N/A | PET 390.034 @ N/A (English units: Mgal = millions of gallons, mi² = square miles)

About i-Tree Canopy

The concept and prototype of this program were developed by David J. Nowak, Jeffery T. Walton, and Eric J. Green eld (USDA Forest Service). The current version of this program was developed and adapted to i-Tree by David Ellingsworth, Mike Binkley, and Scott Maco (The Davey Tree Expert Company)

Limitations of i-Tree Canopy

The accuracy of the analysis depends upon the ability of the user to correctly classify each point into its correct class. As the number of points increase, the precision of the estimate will increase as the standard error of the estimate will decrease. If too few points are classified, the standard error will be too high to have any real certainty of the estimate.

Additional support

Use of this tool indicates acceptance of the EULA.

Appendix C. Case Study Supporting Program Recommendations

Current and Recommended Program Structure, Staffing, Budget, and Duties

	Current	Recommended
Department	Parks and Recreation Department	Parks and Recreation Department
Responsibilities (2021)	Park Tree Maintenance Park Tree Removal Hazard Street Tree Maintenance Hazard Street Tree Removal Park and Street Tree Plantings	Park Tree Maintenance Park Tree Removal Hazard Street Tree Maintenance Hazard Street Tree Removal Park and Street Tree Plantings Routine Street Tree Pruning
Staffing (2021)	(1) Parks and Recreation Director (2) Administrative Assistants (1) Recreation Supervisor (1) Program Coordinator (3) Tree Maintenance Staff 4,200 staff per public tree (3 FTE)	(1) Parks and Recreation Director (2) Administrative Assistants (1) Recreation Supervisor (1) Program Coordinator (2) Park Tree Maintenance Staff (4) Street Tree Maintenance Staff (2,500 public trees per FTE)
Budget (2019)	$60,050 $4.77 per public tree $3.24 per capita	$115,120 for recommended per capita budget ($560,070 optimal budget for $44.45/tree) $44.45 per public tree $6.22 per capita
Activity Specifics (see Figure 2 Existing and recommended urban forestry budget allocation)	Public Tree Maintenance (2019): 110 trees with $12,000 budget (20%) Public Tree Removals (2019): 50 trees with $22,000 budget (37%) Public Tree Plantings (2019): 45 trees with $11,050 budget (18%) Urban Forest Management (2019): $15,000 budget (25%)	Public Tree Maintenance: 32% of budget Public Tree Removals: 30% of budget Public Tree Plantings: 16% of budget Urban Forest Management: 10% of budget Other: 12% of budget

Appendix D. Budget Analysis

Figure 2. Existing and recommended urban forestry budget allocation

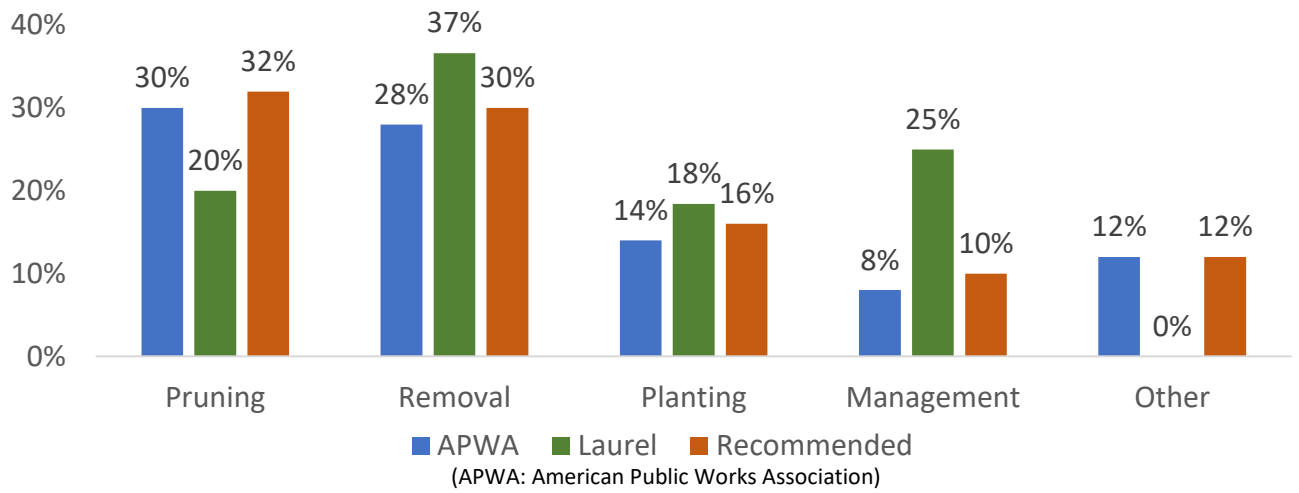


Table 36. Budget analysis and recommendations for public tree pruning in Laurel

Scenario Description	Total Budget	Public Tree Pruning				
		Pruning Budget	% of Budget	# of Trees	Cost/Tree	Pruning Rotation (years)
Current	$60,050	$12,000	20%	110	$109	115
Inventory Analysis Recommendation	$694,555	$345,805	50%	1,431	~$242	7
Recommended Per Capita Budget	$115,120	$36,838	32%	338	$109	37
Recommended Per Tree Budget	$560,070	$179,222	32%	1,644	$109	8
Recommended Pruning Rotation	$613,125	$196,200	32%	1,800	$109	7
Incremental Budget Increase (5%)	$63,053	$20,177	32%	185	$109	68
Incremental Budget Increase (10%)	$66,055	$21,138	32%	194	$109	65
Incremental Budget Increase (15%)	$69,058	$22,098	32%	203	$109	62
Incremental Budget Increase (25%)	$75,063	$24,020	32%	220	$109	57
Incremental Budget Increase (50%)	$90,075	$28,824	32%	264	$109	48
Incremental Budget Increase (75%)	$105,088	$33,628	32%	309	$109	41
Incremental Budget Increase (100%)	$120,100	$38,432	32%	353	$109	36
Improved Pruning Rotation (30-year)	$143,063	$45,780	32%	420	$109	30
Improved Pruning Rotation (20-year)	$214,594	$68,670	32%	630	$109	20
Improved Pruning Rotation (10-year)	$429,188	$137,340	32%	1,260	$109	10

Table 37. Budget analysis and recommendations for public tree removals in Laurel

Scenario Description	Total Budget	Public Tree Removals			
		Removal Budget	% of Budget	# of Trees	Cost/Tree
Current	$60,050	$22,000	37%	50	$440
Inventory Analysis Recommendation	$694,555	~$180,000	26%	~200	~$900
Recommended Per Capita Budget	$115,120	$34,536	30%	78	$440
Recommended Per Tree Budget	$560,070	$168,021	30%	382	$440
Recommended Pruning Rotation	$613,125	$183,938	30%	418	$440
Incremental Budget Increase (5%)	$63,053	$18,916	30%	43	$440
Incremental Budget Increase (10%)	$66,055	$19,817	30%	45	$440
Incremental Budget Increase (15%)	$69,058	$20,717	30%	47	$440
Incremental Budget Increase (25%)	$75,063	$22,519	30%	51	$440
Incremental Budget Increase (50%)	$90,075	$27,023	30%	61	$440
Incremental Budget Increase (75%)	$105,088	$31,526	30%	72	$440
Incremental Budget Increase (100%)	$120,100	$36,030	30%	82	$440
Improved Pruning Rotation (30-year)	$143,063	$42,919	30%	98	$440
Improved Pruning Rotation (20-year)	$214,594	$64,378	30%	146	$440
Improved Pruning Rotation (10-year)	$429,188	$128,756	30%	293	$440

Table 38. Budget analysis and recommendations for public tree plantings in Laurel

Scenario Description	Total Budget	Public Tree Plantings			
		Planting Budget	% of Budget	# of Trees	Cost/Tree
Current	$60,050	$11,050	18%	45	$246
Inventory Analysis Recommendation	$694,555	~$38,750	6%	~125	~$310
Recommended Per Capita Budget	$115,120	$18,419	16%	75	$246
Recommended Per Tree Budget	$560,070	$89,611	16%	364	$246
Recommended Pruning Rotation	$613,125	$98,100	16%	399	$246
Incremental Budget Increase (5%)	$63,053	$10,088	16%	41	$246
Incremental Budget Increase (10%)	$66,055	$10,569	16%	43	$246
Incremental Budget Increase (15%)	$69,058	$11,049	16%	45	$246
Incremental Budget Increase (25%)	$75,063	$12,010	16%	49	$246
Incremental Budget Increase (50%)	$90,075	$14,412	16%	59	$246
Incremental Budget Increase (75%)	$105,088	$16,814	16%	68	$246
Incremental Budget Increase (100%)	$120,100	$19,216	16%	78	$246
Improved Pruning Rotation (30-year)	$143,063	$22,890	16%	93	$246
Improved Pruning Rotation (20-year)	$214,594	$34,335	16%	140	$246
Improved Pruning Rotation (10-year)	$429,188	$68,670	16%	279	$246

Table 39. Budget analysis and recommendations for public tree management activities in Laurel

Scenario Description	Total Budget	Urban Forest Management	
		Management Budget	% of Budget
Current	$60,050	$15,000	25%
Inventory Analysis Recommendation	$694,555	$60,000	9%
Recommended Per Capita Budget	$115,120	$11,512	10%
Recommended Per Tree Budget	$560,070	$56,007	10%
Recommended Pruning Rotation	$613,125	$61,313	10%
Incremental Budget Increase (5%)	$63,053	$6,305	10%
Incremental Budget Increase (10%)	$66,055	$6,606	10%
Incremental Budget Increase (15%)	$69,058	$6,906	10%
Incremental Budget Increase (25%)	$75,063	$7,506	10%
Incremental Budget Increase (50%)	$90,075	$9,008	10%
Incremental Budget Increase (75%)	$105,088	$10,509	10%
Incremental Budget Increase (100%)	$120,100	$12,010	10%
Improved Pruning Rotation (30-year)	$143,063	$14,306	10%
Improved Pruning Rotation (20-year)	$214,594	$21,459	10%
Improved Pruning Rotation (10-year)	$429,188	$42,919	10%

Table 40. Budget analysis and recommendations for other urban forestry activities in Laurel

Scenario Description	Total Budget	"Other" Urban Forest Activities	
		"Other" Budget	% of Budget
Current	$60,050	$0	0%
Inventory Analysis Recommendation	$694,555	$70,000	10%
Recommended Per Capita Budget	$115,120	$13,814	12%
Recommended Per Tree Budget	$560,070	$67,208	12%
Recommended Pruning Rotation	$613,125	$73,575	12%
Incremental Budget Increase (5%)	$63,053	$7,566	12%
Incremental Budget Increase (10%)	$66,055	$7,927	12%
Incremental Budget Increase (15%)	$69,058	$8,287	12%
Incremental Budget Increase (25%)	$75,063	$9,008	12%
Incremental Budget Increase (50%)	$90,075	$10,809	12%
Incremental Budget Increase (75%)	$105,088	$12,611	12%
Incremental Budget Increase (100%)	$120,100	$14,412	12%
Improved Pruning Rotation (30-year)	$143,063	$17,168	12%
Improved Pruning Rotation (20-year)	$214,594	$25,751	12%
Improved Pruning Rotation (10-year)	$429,188	$51,503	12%

Figure 3. Urban forestry program budget analysis and scenarios

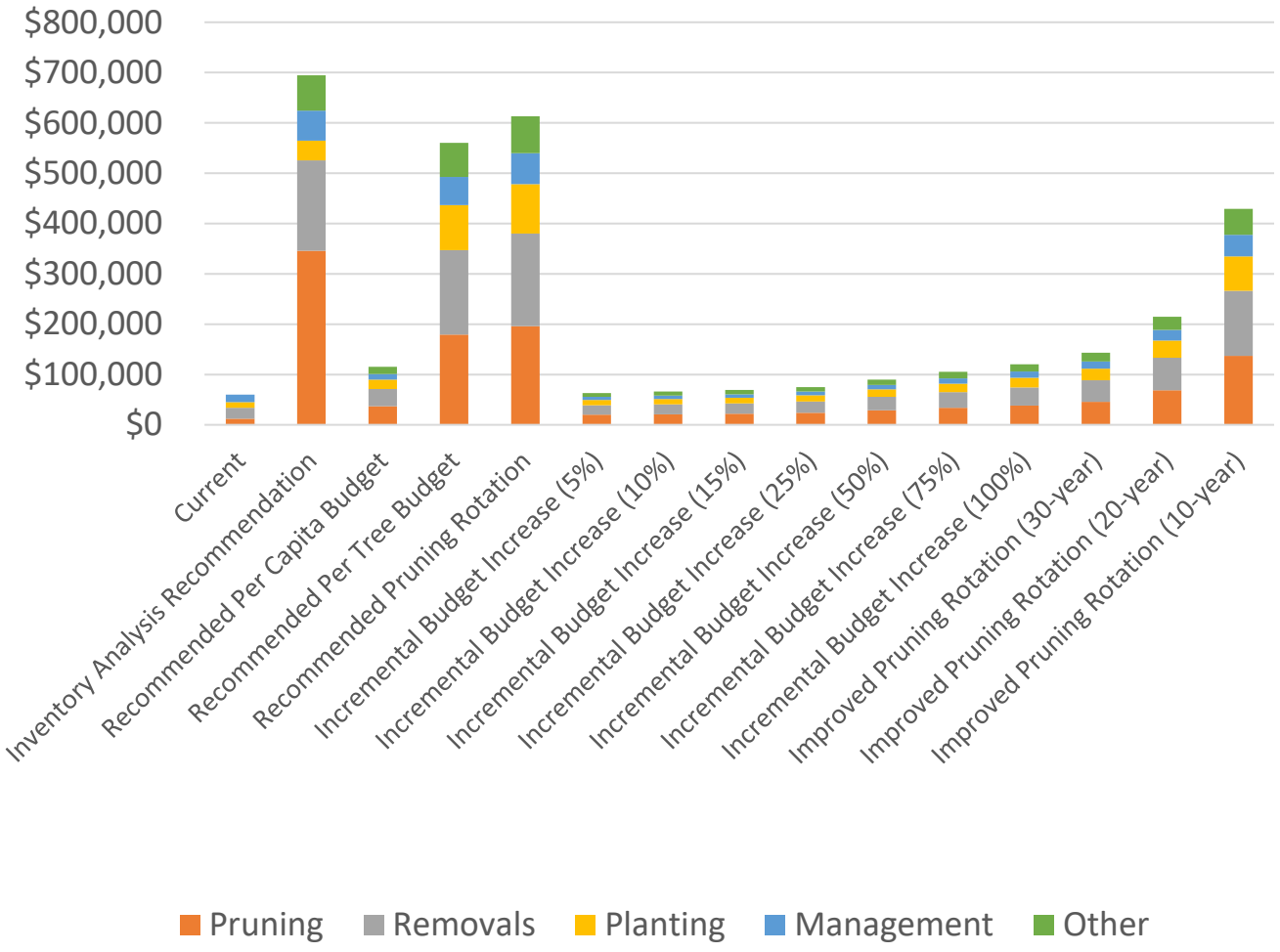


Figure 4. Public tree pruning rotation scenarios and analysis

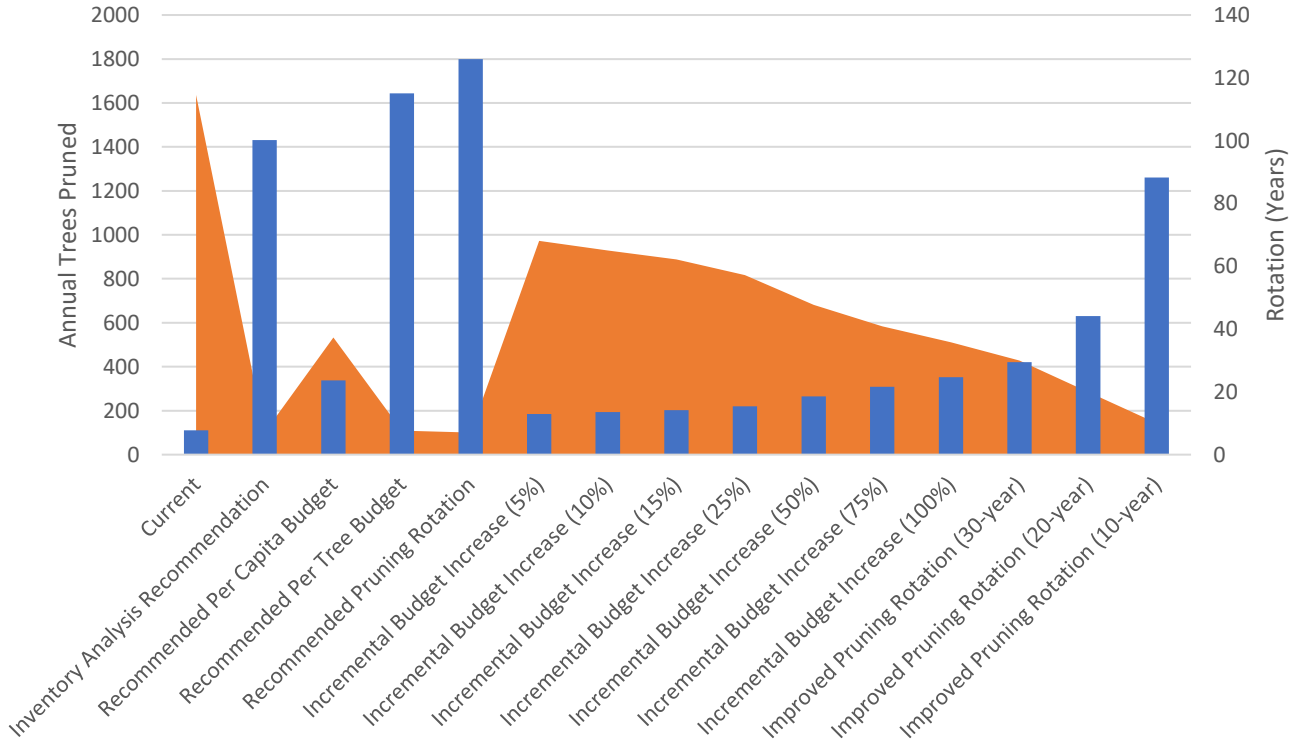
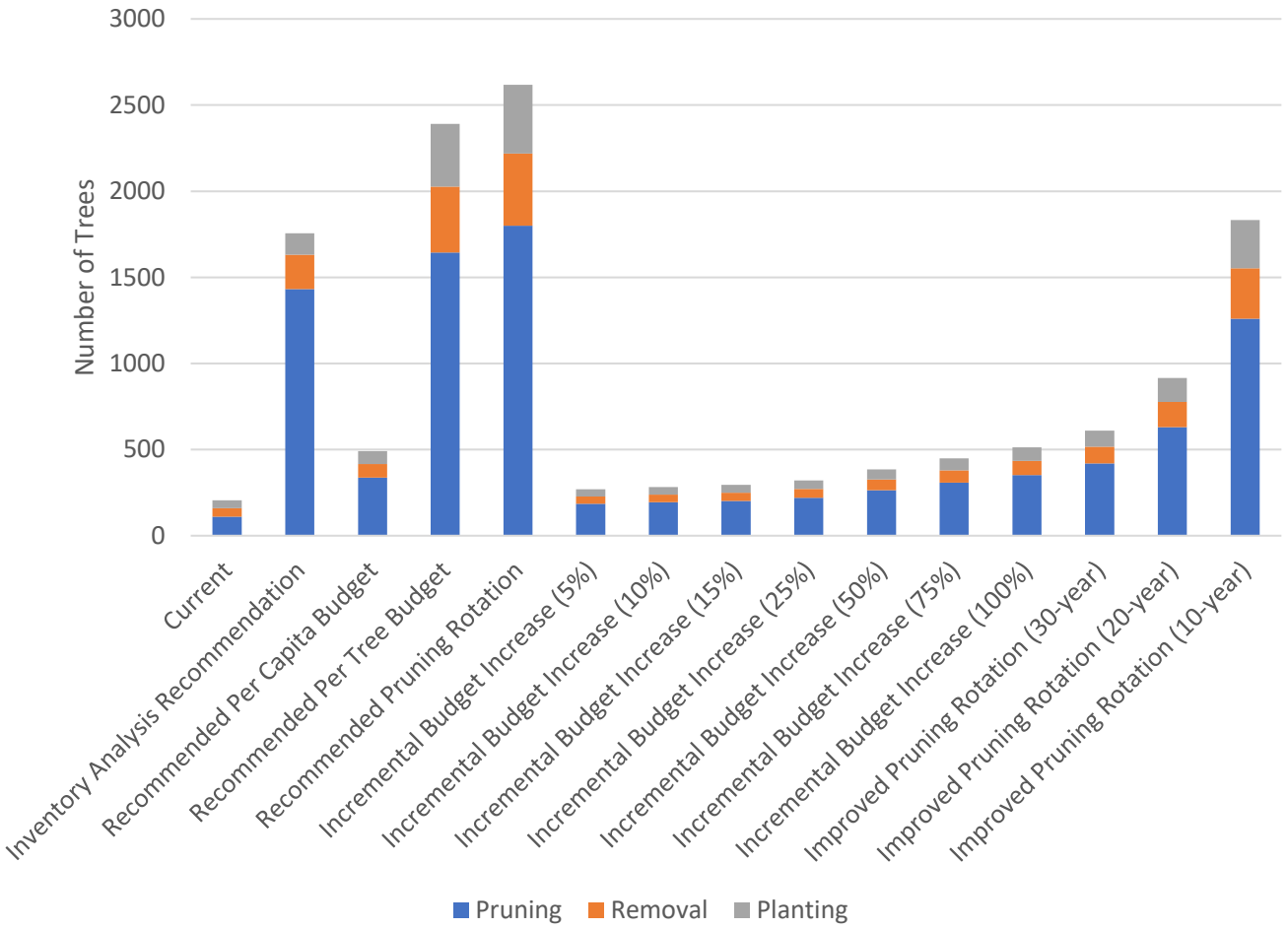


Figure 5. Number of trees by activity and budget scenario



Appendix E. Estimating the Total Public Tree Population

Street Trees

- 68.3 linear miles of streets (PlanIT Geo estimate in TreePlotter)
- **Total Street Trees: 10,245 street trees** (75 trees per 0.5 miles)

Park Trees

- Laurel Dog Park – 1,000 trees (estimated)
- Seventh Avenue Park – 200 trees (estimated)
- Daphne Park – 50 trees (estimated)
- Pinehurst Park – 25 trees (estimated)
- Lee Barnett Memorial Pocket Park – 2 trees (estimated)
- Trustmark Park – 25 trees (estimated)
- Laurel Recreation Department (610 Munson St, Laurel, MS 39440) – 10 trees (estimated)
- Mason Memorial Park – 804 trees (2021 inventory)
- Gardiner Park – 130 trees (2021 inventory)
- Boston Park – 110 trees (2021 inventory)
- **Total Park Trees: 2,356 park trees**

Total Estimated Public Trees in Streets and Maintained Areas of Parks

- **12,601 trees** (estimated)
- **31% loblolly pine, 14% water oak, 7% sweetgum, 6% southern red oak, 6% live oak** (estimated)

Table 41. Summary of 2021 tree inventory data (species) and estimated public tree population

Common Name	Count in Inventory	% of Inventory	Species Count for Total Population (estimate)
Loblolly pine	327	31%	3,947
Water oak	144	14%	1,738
Sweetgum	73	7%	881
Southern red oak	64	6%	772
Live oak	63	6%	760
Southern magnolia	53	5%	640
Post oak	51	5%	616
Common crapemyrtle	34	3%	410
Flowering dogwood	26	2%	314
White oak	24	2%	290
Top 10 Total	**859**	**82%**	**10,367**
Other Species	**185**	**18%**	**2,233**
TOTAL	**1,044**	**100%**	**12,600**

Table 42. Summary of 2021 tree inventory data (diameter) and estimated public tree population

Diameter Class	Count in Inventory	% of Inventory	Total Population (estimate)
0-6in	90	9%	1,086
6-12in	95	9%	1,147
12-18in	122	12%	1,472
18-24in	195	19%	2,353
24-30in	308	30%	3,717
>30in	234	22%	2,824
Total	**1,044**	**100%**	**12,600**

Appendix F. Comprehensive Benchmarking Results

Table 43. Comparison of urban forestry statistics for various study groups and the City of Laurel

Comparison Attribute	U.S. Average	Southern Average	10-25k Population	Laurel (2019)
Community and Staff Profile				
Land Area (sq mi)	45.7	79.4	15.4	16.5
Park Land (ac)	1,010	1,504	290	Unknown
Streets with Trees Average	82%	80%	75%	NA
Average Forestry Employees	7.2	8.2	4.7	
Funding				
Forestry Budget	$801,595	$829,105	$102,683	$60,050
Budget per Total Public Trees	$37.50	$60.52	$44.45	$4.77
Budget per Total Street Trees	$42.59	$81.97	$45.78	$5.86
Forest Budget Percent of Total City Budget	0.52%	NA	0.42%	Unknown
Forestry Budget Per Capita	$8.76	NA	$6.22	$3.24
Annual Utility Tree Budget	$775,303	$1,342,783	$67,737	NA
Annual Contracted Tree Care Budget	$313,750	$182,928	$35,410	Unknown
Volunteers and Partnerships				
Use of Volunteers	65%	NA	61%	Yes
Annual Volunteers (count)	205	149	38	Unknown
Annual Volunteer Hours	852	1,053	158	400
Contracting Tree Care Activities				
Cities using Tree Care Contractors	88%	NA	88%	NA
Cities using Tree Contractors for Pruning	68%	NA	67%	NA
Cities using Tree Contractors for Removals	88%	NA	87%	NA
Community Tree Populations				
Public Tree Total	55,332	70,122	4,894	~12,600
Street Tree Total	26,234	32,529	4,115	~10,245
Park Tree Total	25,720	13,515	1,431	~2,356
Public Trees Per Capita	0.55	1.11	0.28	0.68
Street Trees Per Capita	0.27	0.22	0.23	0.55
Park Trees Per Capita	0.11	0.10	0.09	0.13
Potential Street Tree Planting Sites	5,089	8,760	369	NA
Potential Park Tree Planting Sites	1,027	983	131	NA
Public Trees per Forestry Employee	9,552	7,229	1,899	~4,200
Street Trees per Forestry Employee	4,821	3,352	1,784	~3,400
Total Value of Public Trees	$68,665,110	$122,451,086	$34,426,439	$31,198,079 (i-Tree)
Tree Operations and Management Profile				
Public Service Requests	998	957	97	Unknown
Annual Trees Planted	629	393	65	45
Annual Trees Pruned	2,108	1,564	270	110
Annual Trees Removed	467	279	89	50
Annual Trees Treated	265	215	45	NA
Desired Pruning Cycle (years)	NA	NA	3.4	7-20 years
Systematic Tree Pruning	55%	NA	61%	No
Conduct Risk Assessments	57%	NA	57%	Yes
Emergency Response System for Trees	55%	NA	30%	No

Appendix G. Website Content

It is recommended the City create new page to provide the public with tree-related information. The page URL should be easy to remember, i.e., www.laurelms.com/trees. Alternatively, the City may add the information to the established "Tree Tips" page (http://www.laurelms.com/government/boards-and-commissions/tree-board/tree-tips/) supporting the Laurel Tree Board. The webpage or content should include the following information:

Community Awareness and Education

- Tree Topping Information: https://www.treesaregood.org/portals/0/docs/treecare/WhyToppingHurts.pdf
- Emerald Ash Borer (EAB) Information: https://www.mfc.ms.gov/forest-health/forest-pests/emerald-ash-borer/
- Mississippi Urban and Community Forestry Management Manual: https://www.fwrc.msstate.edu/pubs/urbanmanual_second.pdf
- Tree Planting and Establishment: https://wwv.isa-arbor.com/education/onlineresources/cad/drawings/Planting/L_tree%20planting_24inch%20to%2036inch%20box_single%20berm_unmodified_N.pdf
- Tree Pruning: https://www.mfc.ms.gov/wp-content/uploads/2020/03/64-07-Pruning-Trees_2.pdf
- Invasive Species
  - Popcorn Tree Control Program: https://www.mfc.ms.gov/programs/urban-community-forestry/popcorn-tree-control-program/
  - Help Stop the Pop: https://helpstopthepop.com/tallowtree
  - Southern Pine Beetle Prevention Program: https://www.mfc.ms.gov/programs/invasive-species-programs/southern-pine-beetle-prevention-program/
  - Tree of Heaven: https://www.mfc.ms.gov/forest-health/invasive-plants/tree-of-heaven-2/

Project Related Content

- Mississippi Statewide TreePlotter application: https://pg-cloud.com/Mississippi/
- Laurel, MS Tree Management Program Evaluation Report (TMPER)
  - TMPER Goals and Recommendations
  - TMPER Tree Inventory Findings
  - TMPER Tree Canopy Findings
  - TMPER Tree Benefits and Services
  - TMPER Tree Maintenance Best Practices (Appendix J)
  - TMPER Urban Forestry Resources (Appendix K)
- Laurel, MS i-Tree Canopy Assessment (Appendix B)

Policy

- Laurel, MS Code of Ordinances – Chapter 24 – Trees – Incorporate the City's tree ordinance on the website in a different format than PDF. Add each section in a nested accordion-style web element to condense the content to fit on one page while still allowing easy access to the information.
- Recommended Tree Species List (TMPER Appendix A)

Appendix H. 2021 Sample Park Tree Inventory Summary

Summary of Sample Park Tree Inventory Composition

Figure 6: Top 10 Genera of Sample Park Tree Inventory

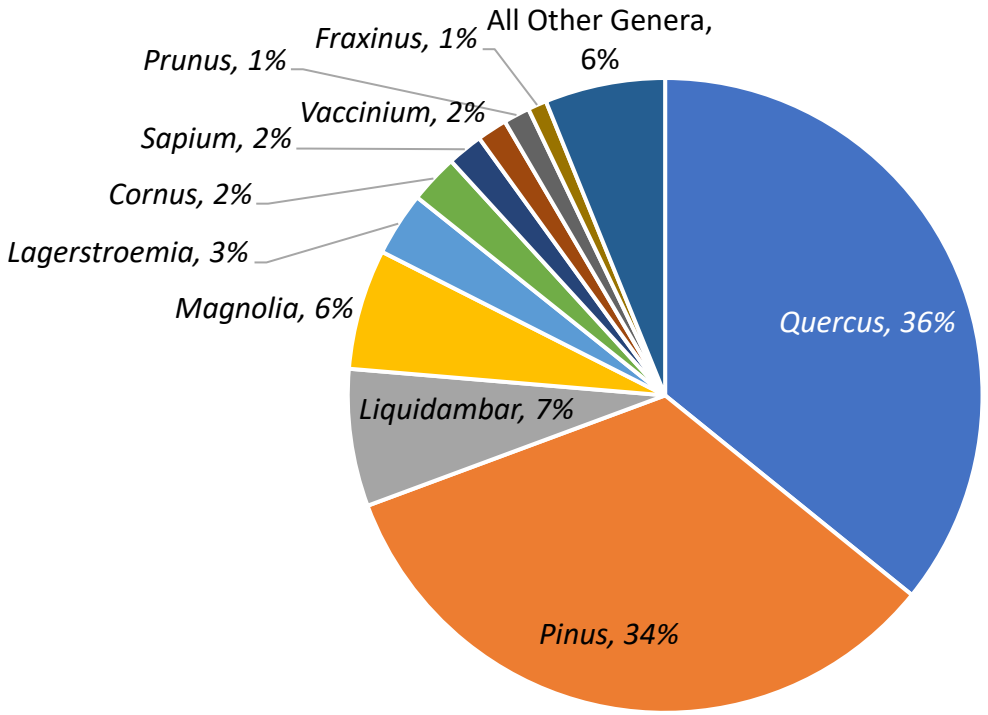
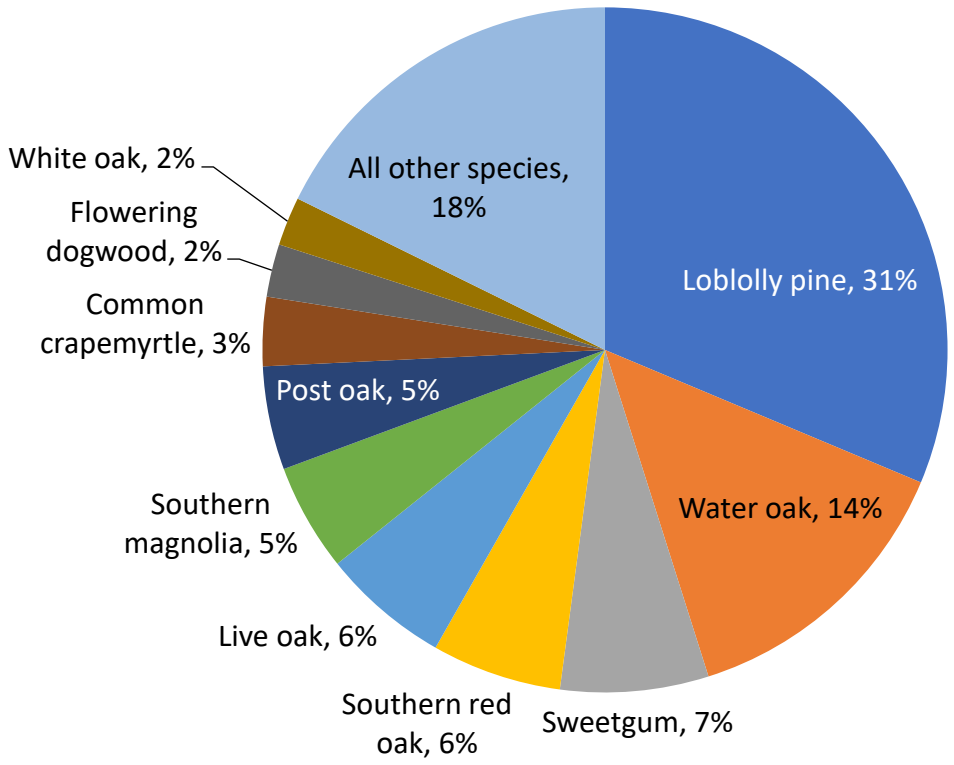


Figure 7: Top 10 Species of Sample Park Tree Inventory



Summary of Sample Park Tree Inventory Condition

Figure 8: Condition rating of inventoried trees

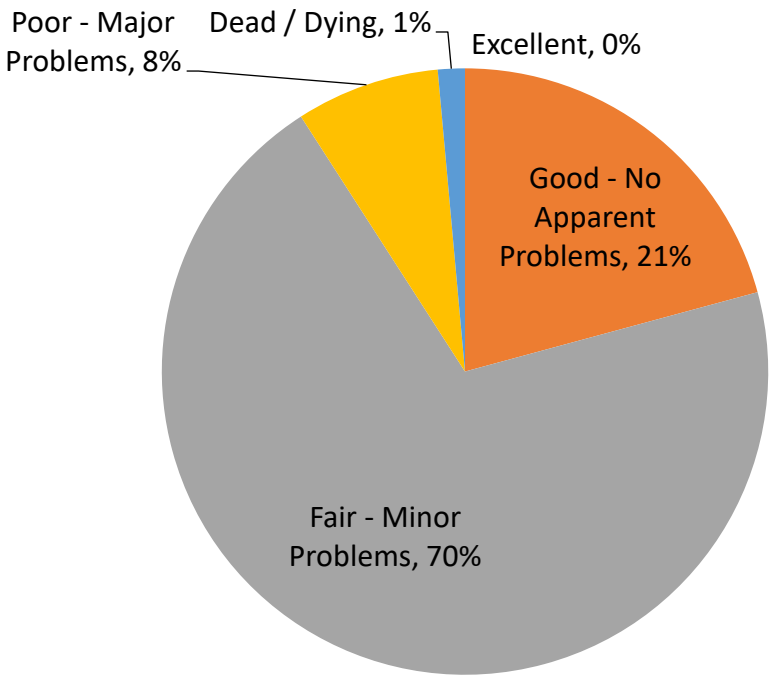
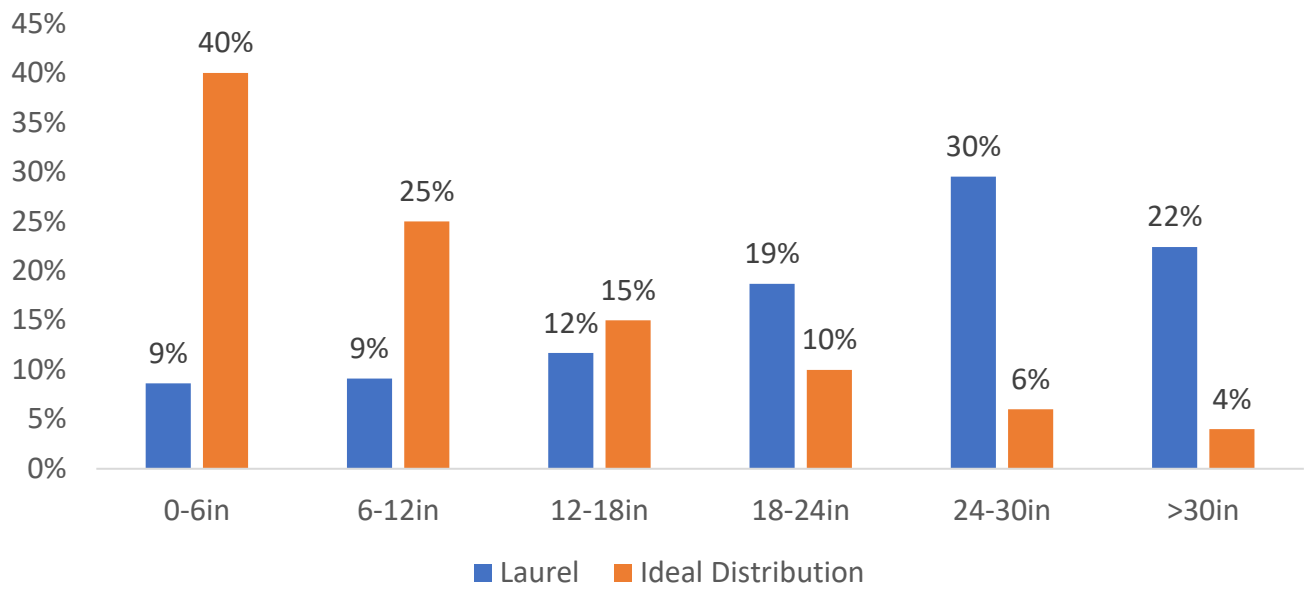


Figure 9: Count and percentage of condition rating of inventoried trees

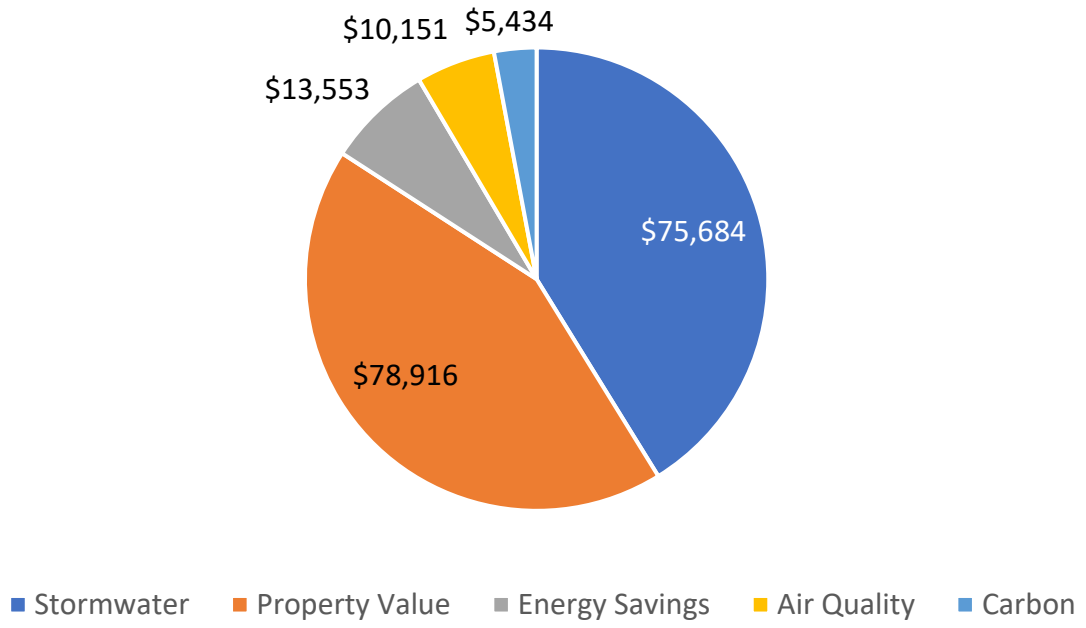
Condition	Count	%
Excellent	0	0%
Good – No Apparent Problems	217	21%
Fair – Minor Problems	732	70%
Poor – Major Problems	80	8%
Dead/Dying	15	1%
Total	**1,044**	**100%**

Summary of Sample Park Tree Inventory Size Classes

Figure 10: Distribution of trees by diameter (size) class

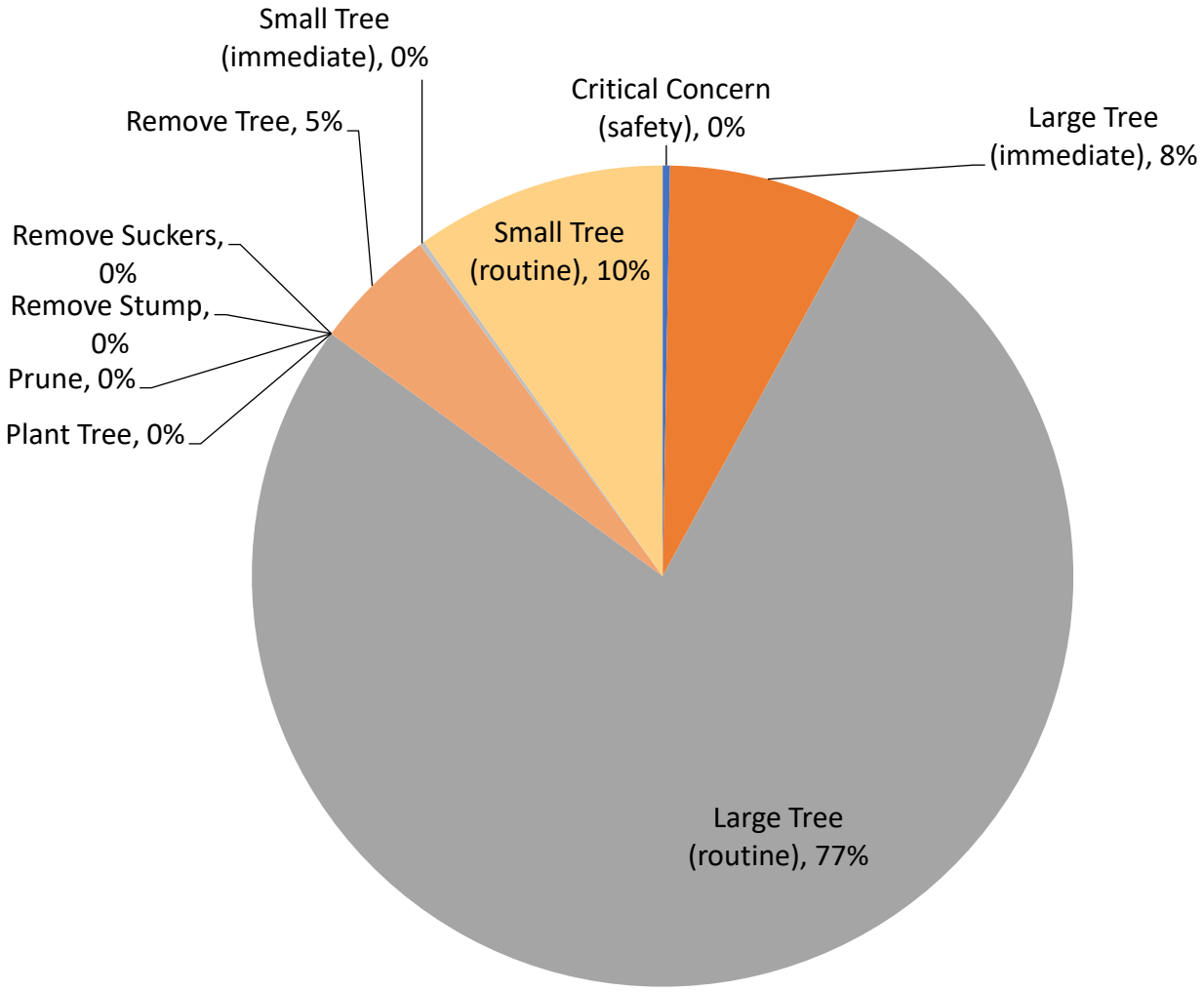


Ecosystem Services and Benefits of the Urban Forest



Summary of Maintenance Needs of Sample Park Tree Inventory

Figure 11: Primary maintenance needs of inventoried trees



Appendix I. Alignment of the Report with the Comprehensive Plan

Laurel Comprehensive Plan Summary and Recommendations

i. Chapter 4, Community Character:
   a. (4.3) Develop an Agri-Tourism marketing plan for the region to celebrate the lumber heritage and to promote regional attractions, including Landrums, Mitchell Farms, Fulmers, and the DeSoto National Forest.
   b. (4.6) Develop a "Plant Laurel" initiative to plant throughout the city to promote the namesake of the city.
   c. (4.7) Work with the Historic Preservation Committee to develop design standards that promote development and facilitate infrastructure improvements while still preserving the historic character of the city.

ii. Chapter 6, Natural Resources
   a. (6.2) Develop overlay districts, where appropriate, that require design and landscaping standards that will enhance major corridors or employment centers within the city.

iii. Chapter 7, Community Facilities
   a. (7.5) Facilitate the funding and construction of the Rails-to-Trails Program along the abandoned street car rail line to provide a multi-use path for all citizens.
   b. (7.16) Establish greenways to protect natural areas of the community.
   c. (7.24) Continue mapping current infrastructure in GIS to maintain an accurate database of existing infrastructure.

iv. Chapter 8, Housing
   a. (8.3) Require new multi-family housing developments, within the city, to include adequate amounts of green space and sidewalks.
   b. (8.8) Continue to preserve areas of historical or cultural significance through ordinances.
   c. (8.9) Require new developments to include Traditional Neighborhood Design elements such as street trees, lighting and landscaped entrances.

v. Chapter 9, Land Use
   a. (9.2) Establish zoning, landscaping, and architectural standards that protect and enhance existing neighborhoods and allow for infill development.
   b. (9.5) Continue to preserve trees through existing ordinances.
   c. (9.8) Promote transitional open spaces to buffer intense land uses from other uses.

vi. Chapter 10, Transportation
   a. (10.6) Implement traffic calming devices, such as roundabouts, divided boulevards, and landscaping where appropriate, to maintain safety.
   b. (10.7) Promote an integrated transportation system that connects neighborhoods through sidewalks, pedestrian trails and bike paths.
   c. (10.8) Develop an ordinance that requires sidewalks in new development where connectivity is needed or feasible.
   d. (10.11) Implement bike lanes and sidewalks near schools to promote healthy transportation options for students.

Comprehensive Plan Aligned with Urban Forestry Recommendations

The following provides a summary of the recommendations in the City's Comprehensive Plan that align with the goals and recommended actions of this Tree Management Program Evaluation Report. The table below lists the Comprehensive Plan recommendation and the short- and long-term recommended actions using the following abbreviations:

PS: Program Staffing Recommended Actions
PB: Program Budget Recommended Actions
PT: Program Structure Recommended Actions
PU: Program Urban Forest Management Recommended Actions
PC: Program City Code Recommended Actions
TM: Tree Maintenance Recommended Actions
TP: Tree Planting Recommended Actions
CE: Community Engagement Recommended Actions

S: Short-Term Recommendations
L: Long-Term Recommendations

Table 44. Comprehensive Plan recommendations aligned with Urban Forestry recommendations

Comprehensive Plan Recommendation #	Short-Term (S) Recommended Actions	Long-Term (L) Recommended Actions
4.3	CE.02, CE.06	CE.01
4.6	TP.04, TP.05, TP.07	TP.01, TP.03, TP.04, TP.05, TP.06, TP.07
4.7	PC.01, PC.02, PC.03	PC.01, PC.02, PC.03
6.2	PC.01, PC.02	PC.02, PC.03
7.5	PC.01, PC.02, TP.03	PC.02, PC.03, TP.03
7.16	PU.03, PC.01, PC.02, TP.02, TP.05, TP.06, TP.07	PS.01, PU.06, PS.03, PC.04, TP.01, TP.03, TP.04, TP.06
7.24	PU.02, TM.01, TM.02, TP.04	PB.05, PU.02, PU.03, PU.04, PU.05, PU.09, TM.02, TM.03, TM.04, TP.02, TP.05, TP.06
8.3	PU.03, PC.01, PC.02, PC.03, TP.02, TP.03, TP.05, TP.06, TP.07	PC.01, PC.02, PC.03, PC.04, TP.01, TP.03, TP.04, TP.06, TP.07
8.8	PC.01, PC.02, PC.03	PC.01, PC.02, PC.03, PC.04
8.9	PC.01, PC.02, PC.03	PC.01, PC.02, PC.03, PC.04
9.2	PC.01, PC.02, PC.03	PC.01, PC.02, PC.03, PC.04
9.5	PC.01, PC.02, PC.03	PC.01, PC.02, PC.03, PC.04
9.8	PC.01, PC.02, PC.03	PC.01, PC.02, PC.03, PC.04
10.6	PC.01, PC.02, PC.03, TP.05, TP.06, TP.07	PS.03, PC.01, PC.02, PC.03, PC.04, TP.03, TP.06
10.7	PC.01, PC.02, PC.03	PC.01, PC.02, PC.03, PC.04
10.8	PC.01, PC.02, PC.03	PC.01, PC.02, PC.03, PC.04
10.11	PC.01, PC.02, PC.03	PC.01, PC.02, PC.03, PC.04

Appendix J. 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).

<u>Reasons for Tree Pruning</u>

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 12. Types of tree pruning

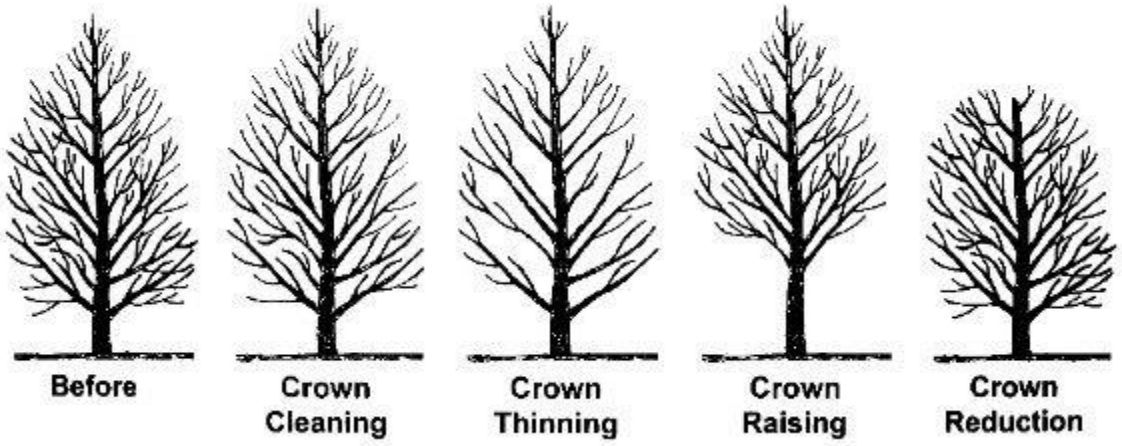


Image source: Arbor Day Foundation

Tree Pruning Cuts

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

Figure 13. Types of pruning cuts and the proper branch cutting technique

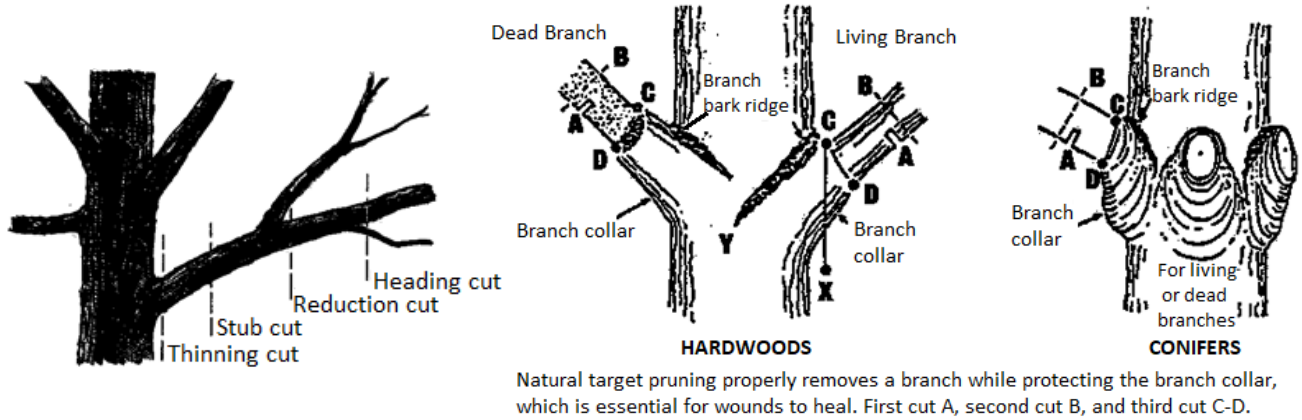


Photo source: Pennsylvania State University Urban Forestry Extension

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 eastern redbud (*Cercis canadensis*), flowering dogwood (*Cornus florida*), crape myrtle (*Lagerstromea indica*), and flowering crabapple (*Malus spp*). Additional species should be considered as listed in the recommended species list (Appendix A).

Figure 14. Example of trees directionally pruned for clearance from power lines

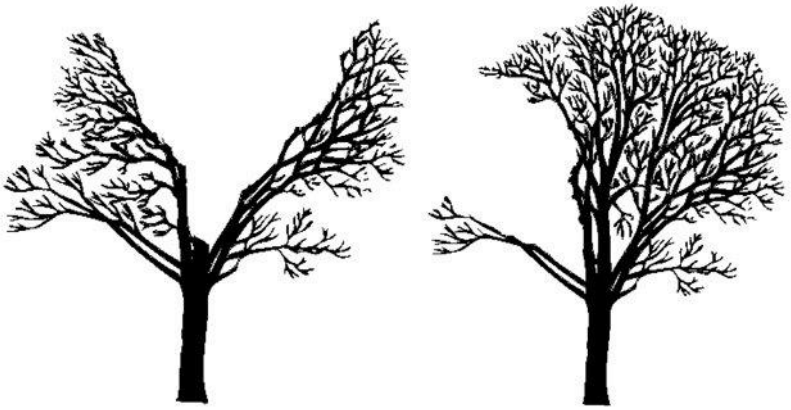


Photo source: Pennsylvania State University Urban Forestry Extension

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.

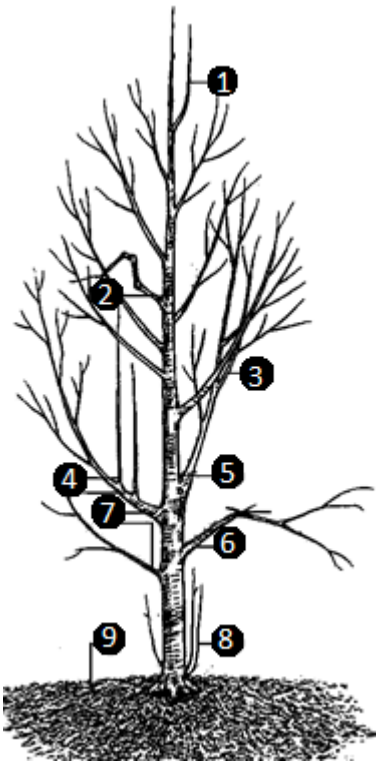
Young Tree Maintenance Techniques

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 15. 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 Zones 8a-9a 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 K. Urban Forestry Resources

Local Resources

- TreePlotter app - https://pg-cloud.com/Mississippi/
- Mississippi Urban Forestry Council - http://www.msurbanforest.com/
    - Urban and Community Forestry Program - https://www.mfc.ms.gov/programs/urban-community-forestry/
    - Community Forest Program - https://www.mfc.ms.gov/programs/urban-community-forestry/community-forest-program/
    - Trees for Mississippi Homes - https://www.mfc.ms.gov/wp-content/uploads/2020/03/trees-for-ms-homes_0.pdf
    - EAB Information - https://www.mfc.ms.gov/forest-health/forest-pests/emerald-ash-borer/
    - Popcorn Tree Control Program - https://www.mfc.ms.gov/programs/urban-community-forestry/popcorn-tree-control-program/
    - Tips For Selecting A Tree Care Company - https://www.mfc.ms.gov/wp-content/uploads/2020/03/tips-for-selecting-07_1.pdf
    - Sick Tree FAQ - https://www.mfc.ms.gov/programs/urban-community-forestry/sick-tree-faq/
- MS Department of Agriculture – Landscape Horticulturist and Tree Surgery Licensing - http://www.mdac.ms.gov/bureaus-departments/plant-industry/regulation-professional-services/landscape-horticulturist-tree-surgery-licensing/
- Southern Group of State Foresters: https://www.southernforests.org/
- MS State University Cooperative Extension: http://extension.msstate.edu/
    - "Native Trees for Mississippi Landscapes": http://extension.msstate.edu/sites/default/files/publications/publications/p2330.pdf

Community Outreach and Education

- The Nature Conservancy "Healthy Trees, Healthy Cities": https://www.conservationgateway.org/ConservationPractices/cities/hthc/Pages/default.aspx/training-resources
- U.S. 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 (EAB) and Other Pests

- EAB - https://www.mfc.ms.gov/forest-health/forest-pests/emerald-ash-borer/
- Southern Pine Beetle - https://www.mfc.ms.gov/forest-health/forest-pests/southern-pine-beetle/
- Ips Engraver Beetle - https://www.mfc.ms.gov/forest-health/forest-pests/ips-engraver-beetle/
- Redbay Ambrosia Beetle - https://www.mfc.ms.gov/forest-health/forest-pests/redbay-ambrosia-beetle/
- Crape Myrtle Bark Scale - https://www.mfc.ms.gov/forest-health/forest-pests/crape-myrtle-bark-scale/
- Gypsy Moth - https://www.mfc.ms.gov/forest-health/forest-pests/gypsy-moth/
- Sirex Woodwasp - https://www.mfc.ms.gov/forest-health/forest-pests/sirex-woodwasp/
- Popcorn Tree Control Program - https://www.mfc.ms.gov/programs/urban-community-forestry/popcorn-tree-control-program/

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
- 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: https://www.a2gov.org/departments/forestry/Pages/Trees-and-Development.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

- MS Emergency Management Agency Disaster Assistance Plans: https://www.msema.org/preparedness-2/emergency-plans/disaster-assistance-plans/
- Urban Forest Strike Teams: https://www.southernforests.org/urban/ufst
- 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: https://www.epa.gov/green-infrastructure
- Mississippi Watershed Management Organization: https://www.mwmo.org/learn/watershed-and-stormwater-basics/

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://www.tcia.org/TCIA/Build_Your_Business/A300_Standards/A300_Standards.aspx
- 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 FAQ: https://www.gotouaa.org/project/faq/
- 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": https://trees-energy-conservation.extension.org/
- Arbor Day Foundation "Energy-Saving Trees": http://energysavingtrees.arborday.org/#About

Urban Wood Utilization

- Urban Wood Network: https://urbanwoodnetwork.org/
- North Carolina Urban Forest Council – Urban Wood Group: https://www.ncufc.org/NC-Urban-Wood-Group.php
- Urban Tree Alliance – Urban Wood Utilization Program: http://www.urbantreealliance.org/wood-utilization/

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: https://dnr.wisconsin.gov/sites/default/files/topic/UrbanForests/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 Board Handbook: https://file.dnr.wa.gov/publications/rp_urban_arbor_day_tree_board_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
- Vibrant Cities Lab Funding Toolkit: https://www.vibrantcitieslab.com/toolkit/funding/
- 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 Piedmont Community Tree Guide: https://www.fs.fed.us/psw/publications/documents/psw_gtr200/psw_gtr200.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/
- PlanIT Geo Urban Tree Canopy Assessments: https://planitgeo.com/urban-tree-canopy-assessment/
- i-Tree Canopy Assessments: https://canopy.itreetools.org/
- PlanIT Geo Tree Inventory Software: https://planitgeo.com/treeplotter/

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://www.isa-arbor.com/education/onlineresources/dictionary
- PlanIT Geo Reports and Plans: https://issuu.com/planitgeoissuu

Appendix L. Tree Ordinance Review and Recommendations

The following provides the recommended additions, revisions, and other technical guidance relating to urban forestry, informed by urban forestry consultants and industry standards, for sections of Chapter 24, Tree Ordinance and Appendix I, Zoning Ordinance in Laurel City Code.

Chapter 24 Tree Ordinance

(addition) Purpose: This Chapter is enacted in recognition of the following facts:

A. Among the features that contribute to the attractiveness and livability of the City of Laurel are its trees, both indigenous and introduced, growing as single specimens, in clusters, or in woodland situations. These trees have significant psychological and tangible benefits for both residents and visitors to the City.

B. Trees contribute to the visual framework of the City by providing scale, color, silhouette and mass. Trees contribute beneficially to the climate of the City by reducing heat buildup and providing shade, moisture, and wind control. Trees contribute to the protection of other natural resources by providing erosion control for the soil, oxygen for the air and habitat for wildlife. Trees contribute to the economy of the City by increasing and sustaining property values. Trees reduce the cost of stormwater systems by increasing the water retention capacity of soils. Trees provide screens and buffers to separate land uses, are often landmarks of the City's history, and are a critical element of nature in the midst of an urban setting.

C. The City's trees collectively constitute an urban forest, and removals or additions of even a single tree can negatively or positively affect the urban forest and the City as a whole. The loss or removal of a tree from one location in the City's urban forest can often be at least partially mitigated by planting a replacement tree or replacement trees in the same or a different location. However, the negative effect of the loss or removal of a mature tree may in some cases take generations to fully mitigate by the planting of immature replacement trees.

D. For all these reasons, it is the purpose of this Chapter, and in the interest of the public health, safety and welfare of the people of the City of Laurel, while recognizing private rights to develop and use property in a manner not prejudicial to the public interest, to protect and preserve trees by regulating their removal and damage to them; to prevent unnecessary tree loss and damage; to minimize environmental damage from improper tree removal or pruning; to encourage or, when appropriate, to require tree replacement plantings; to effectively enforce tree preservation regulations; and to promote the appreciation and understanding of trees.

EXAMPLE

(addition) Heritage Trees

A. Purpose: In the passage of the ordinance codified in this chapter, the city recognizes that trees contribute in many important ways to the health, safety, and welfare of all of Laurel's citizens. Besides their aesthetic benefits, trees offer windbreaks, provide erosion control, act as filters for airborne pollutants, release oxygen, and provide a habitat for birds and other wildlife. All trees perform these functions for the lands on which they occur. The city recognizes, however, that trees of significant size and maturity often perform these functions for all people living in their vicinity. They are key elements in a living system whose boundaries do not conform to the legal boundaries of private property. They are part of the natural heritage of all of Sonoma's citizens upon which the continued health and welfare of the community depends. Also part of such valued natural heritage are other trees, not necessarily as large, which form an important element of the community's history.

B. Heritage Trees Defined: As used in this chapter, "heritage tree" means a tree or group of trees specifically designated by official act of the Tree Board that:

(1) The tree or group of trees has historical significance or has taken on the aura of historical appeal; or

(2) The tree or group of trees is mutually dependent upon each other for survival; or

(3) The tree or group of trees is considered an outstanding specimen of its species; or

(4) The tree or group of trees is the size of 50 inches or more in diameter measured at 24 inches above natural grade; and

(5) The tree or group of trees has been recommended as such by the Tree Board and dedicated and accepted by the city council of Laurel.

(6) For the purpose of subsection C of this section, an outstanding specimen is a tree which has been determined by the Tree Board heritage tree committee to be healthy, has attained maturity and is well formed. Any tree designated as a heritage tree may by identified with a marker or by any other means as determined by the Tree Board.

B. Heritage Tree Dedication.

(1) Tree Board's heritage tree committee shall make a recommendation to the commission whether a tree, which meets the definitions under (Heritage Trees Defined), has a significant historical or horticultural value to the city to warrant its dedication as a heritage tree. Not all trees which meet the definition under (Heritage Trees Defined) will be significant, and the Tree Board shall weigh the cost of maintenance against the value of the tree(s) as a Laurel landmark in determining whether a tree should be dedicated as a heritage tree. The Tree Board shall not recommend acceptance of dedication of a proposed heritage tree until at least six months (182 calendar days) has elapsed from the time the proposed dedication is taken under consideration by the Tree Board.

(2) Upon the recommendation of the Tree Board that a tree(s) meets the criteria of a heritage tree and should be dedicated as such, the owner of the tree(s) may dedicate the tree(s) to the city, if he or she also dedicates right of access for maintenance and protection, and the dedication is accepted by resolution of the city council. Dedication shall be subject to such conditions as the council considers proper in the case.

C. Removal and Damaging of Heritage Trees Prohibited.

(1) It is unlawful for any person to break, injure, deface, mutilate, kill or destroy any heritage tree or set fire or permit any fire to burn where such fire or the heat thereof will injure any portion of a heritage tree, or to cause or permit any wire charged with electricity to come into contact therewith, or to allow any gas, liquid, or solid substance which is harmful to such trees to come in contact with their leaves.

(2) It is unlawful and it is prohibited for any person other than the duly authorized representative to place, apply, attach or keep attached to any such heritage tree any wire, rope, sign, paint, or any other substance, structure, thing or device of any kind or nature whatsoever until a written permit to do so has first been obtained from the Tree Board.

D. Designated Historical Trees.

(1) In those cases in which the city and property owner cannot reach an agreement for the dedication of a proposed heritage tree, or where the city finds that a tree's historical importance is outweighed by its dedication and maintenance costs, the city's Tree Board may declare such a tree a designated historical tree.

(2) The purpose of such identification is to recognize and locate trees of historical significance in the city. Such identification as a designated historical tree is not intended nor shall it restrict the owner of such property where the tree shall occur from any normal exercise of his property rights that are recognized under law.

(3) Such identification shall include the marking of designated historical trees on maps of the historic preservation combining district and on a master heritage and historical tree map to be prepared and maintained by the city (Planning Department). Identification shall also include written notification to the property owner of such designation and, if so ordered by the Tree Board and accepted by the property owner, a physical marker may be placed on or near a designated historical tree.

E. Penalties.

(1) Any person violating any of the provisions of this chapter or failing to comply with them shall upon conviction thereof be punished by a fine not to exceed $500.00, or by imprisonment not to exceed six months, or both such fine and imprisonment.

EXAMPLE

City Code Appendix I, Zoning 606.04. Landscaping Standards

606.04.01: Trees shall be a species recognized by the State of Mississippi Division of Forestry or by the City's Recommended Tree Species List, as being acceptable for this area

606.04.01: Tree species shall have a minimum of one and one half to two (1½ to 2) to two (2) inch caliper measured at the diameter at breast height and shall be a minimum of six to eight (6-8) feet in overall height at the time of planting and shall adhere to ANSI Z60.1 American Standard for Nursery Stock (trees).

606.04.06: Tree Protection During Construction: Existing trees within the construction area shall be protected as defined in this section. It shall be unlawful for any person in the construction of any structures or other improvements to place solvents, material, construction machinery, or temporary soil deposits within ten (10) feet of any protected tree trunk ~~having twenty-four inch (24") or greater DBH (Diameter at Breast Height)~~.

606.04.06: (addition)

Purpose and Intent:

A. The purpose of this article is to regulate, control and promote the planting of trees, to encourage the protection of existing trees in the streets and public grounds within the city, to regulate the preservation, replacement and indiscriminate removal of trees on private property, both on unimproved lands and on land which has heretofore been improved to any extent whatsoever, and to establish procedures and practices for fulfilling these purposes, thereby promoting the public health, safety and general welfare of the citizens of the City of Gulfport and contributing to the quality of life by encouraging the preservation of the urban forest canopy and its various resources to ensure sustainable development practices within the city.
B. The intent of this article is to encourage the protection of existing trees and to promote the planting of additional trees in order to facilitate the control of soil conservation, air pollution and noise, to assist in the management of on-site stormwater flows and water quality enhancement, minimize the destruction of wooded wetlands, and to enhance the beauty, health and safety of the environment for the city.
C. These regulations are enacted by the city to protect the health safety and welfare of its citizens in the following ways:
   (2) Maintaining and protecting property values;
   (3) Providing an acceptable degree of transition between abutting uses;
   (4) Providing appropriate barriers and visual screens and relief from traffic, noise, heat, glare and the spread of dust and debris;
   (5) Enhancing the visual and aesthetic appearance of the community;
   (6) Preserving terrain native habitat and vegetation where possible;
   (7) Protect and preserve native trees of certain species and size and mitigate the removal of other native trees;
   (8) Facilitate the control of soil conservation, air pollution and noise and to enhance the beauty, health and safety of the environment for the city;
   (9) Provide protection to structures in and during high-wind events by contributing to the reduction of wind speeds;
   (10) Reduce topsoil erosion, prevent harmful land pollutants contained in the soil from getting into our waterways, slow down water run-off, and ensure that our groundwater supplies are continually being replenished;
   (11) Minimize energy use with properly located canopy trees.

Tree Protection Advisor: The position of tree protection advisor is hereby created, who shall direct, regulate and control the care and necessary removal of all trees existing now and hereafter in the city.

A. The tree protection advisor shall be a certified arborist or a horticulturist or shall hold a minimum of a bachelors degree in landscape architecture or horticulture. The arborist/horticulturist shall take active steps to process and render decisions granting or denying applications for permits under this article. Any

EXAMPLE

decisions of the tree protection advisor, as authorized herein, shall be final unless an appeal is submitted to the city planning commission.

Tree Protection Criteria: Developers shall exercise care to protect trees which are to be retained from damage during construction. The following procedures shall be observed in order to protect remaining trees:

A. Protection from mechanical injury.
   (1) All trees to be retained within 25 feet of a building site and lining ingress or egress roads, parking areas and utility easements shall be protected from equipment damage by placing sections of acceptable fencing around the dripline of any tree which is to be preserved during construction operations, inside of which no grading, storing, dumping of any material or any disturbance whatsoever may occur. Groups of trees may be protected by fencing the entire area where they are located.
   (2) Heavy-equipment operators shall be careful not to damage existing tree trunks and roots. Feeder roots shall not be cut closer than 25 feet to tree trunks.
   (3) Tree limbs damaged during construction shall be pruned in accordance with the standards outlined in ANSI A300, Tree, Shrub and Other Woody Plant Maintenance.
   (4) The operation of heavy equipment within driplines shall be minimized in order to prevent soil compaction.
   (5) Deciduous trees shall be given an application of a slow-release, low nitrogen, all-purpose fertilizer to aid in their recovery from possible damage caused by construction operations. Such application shall be made on the basis of two pounds of fertilizer for every inch of tree diameter.
   (6) Trees shall not be used for roping, cables, signs or fencing. Nails and spikes shall not be driven into trees.
   (7) The area around the base of existing trees shall be left open to provide access for water and nutrients. Therefore, no impervious cover nor storage of equipment, materials, debris or fill shall be allowed within the dripline of any existing tree, except as may be necessary for a maximum of three months if no other storage space is available.

F. Protection from grade change.
   (1) Raising the grade. If an increase in the grade of the land is proposed, the developer shall install either of the following:
      a) A system of gravel and drain tiles at the old soil level opening into a dry well built around the trunk and designed for each tree, individually fitting the contour of the land so that it drains water away from the tree trunk.
      b) A retaining wall between the existing grade and the higher grade.
   (2) Lowering the grade. If a lowering of the grade is proposed, the developer shall initiate one of the following methods to protect the trees:
      a) Terracing the grade.
      b) A retaining wall between the existing grade and the lower grade.
   (3) If the proposed grade change, in the opinion of the Tree Board, is too excessive to allow retention of existing trees, the developer shall be required to replace the trees he removes on a 1:4 basis, which means one inch of new tree diameter for every four inches of tree diameter removed.

G. Protection from excavations. When digging trenches for utility lines and other similar uses, the developer shall adhere to the following, listed in the order of their preference:
   (1) If possible, trenches should bypass the root area.
   (2) If this is not feasible, trenches should be tunneled under the tree's tree root area.
   (3) If trenches must be dug in the tree root area, the following precautions shall be observed:
      a) Trenches shall be no closer to the trunk than half the distance from the dripline to protect the Critical Root Zone (CRZ).
      b) Cut as few roots as possible.
      c) If roots have to be cut, cut them as cleanly as possible.
      d) Exposed roots must not be allowed to dry out before permanent backfill is placed; provide temporary earth cover or pack with peat moss and wrap with burlap.
      e) Backfill the trench as soon as possible avoiding soil compaction.

H. Protection during cleanup.

EXAMPLE

(1) All construction debris shall be hauled away and shall not be burned or buried on site.
(2) Fences and barriers around trees shall be the last thing to be removed from the site.

Specifications for Planting and Replacement of Trees:

A. Replacement of trees lost during construction.
   (1) Where the developer finds it impossible to retain existing trees in the tree protection zone due to cutting, filling or other construction activity, he or she shall replant one inch of new tree diameter for every four inches of existing tree diameter removed.
   (2) A permit shall be required for the removal of any tree with an eighteen-inch caliper (or diameter at breast height, measured at 4.5 feet above grade) or greater. The City Tree Board shall recommend to the Code Enforcement Officer whether the permit should be approved or denied, and the Board shall have the authority to require that such tree be replaced caliper for caliper. The Tree Board shall provide a written basis for its findings.
   (3) New trees shall have a one and one half to two (1½ to 2) to two (2) inch caliper measured at the diameter at breast height and shall be a minimum of six to eight (6-8) feet in overall height at the time of planting. Replanting shall be done according to the specifications of the Tree Board and the standards specified by the ANSI Z60.1 American Standard for Nursery Stock. The Code Enforcement Officer and the Tree Board shall be consulted before any replacement trees are planted.

B. Criteria for selection of new trees. When a developer is required to replace trees that he or she has removed, he or she shall adhere to the City's Recommended Tree List and shall be guided by the following criteria in selecting replacement trees. These guidelines shall also be followed when it is necessary for a developer to choose certain trees for retention and others for clearing:
   (1) Species longevity.
   (2) Hardiness, including wind firmness, climate requirements and characteristics of soil to hold tree.
   (3) Susceptibility to insect and disease attack and to pollution.
   (4) Aesthetic values, including autumn coloration, type of flowers or fruit and form characteristics.
   (5) Maintenance and care, such as pruning, etc.
   (6) Wildlife values.
   (7) Comfort to surroundings, such as summer shade.
   (8) Existence of disease, rot or other damage to tree.
   (9) Protection of buildings, vehicles and pedestrians.
   (10) Size at maturity.
   (11) Effect on soil retention and erosion control.
   (12) Value as a noise buffer.
   (13) Undesirable characteristics.

EXAMPLE

Appendix M. Recommended Actions Tables

Short-Term Recommended Actions

Table 45. Short-term recommended actions

Goal	Objective	#	Short-Term Recommended Actions	ID
Urban Forestry Program	Staffing	01	Maintain current staffing levels and associated industry certifications and qualifications. (PS.01S)	PS.01S
Urban Forestry Program	Staffing	02	Strengthen Standard Operating Procedures (SOPs), protocols, and communications as they relate to tree management activities among departments, partners, and contractors. (PS.02S)	PS.02S
Urban Forestry Program	Staffing	03	Continue to provide, at minimum, annual in-house or consultant-led training on tree care safety and first aid. (PS.03S)	PS.03S
Urban Forestry Program	Staffing	04	Ensure tree-related operations are represented by staff with credentials such as International Society of Arboriculture (ISA) Certified Arborists and Tree Risk Assessment Qualification (TRAQ) either directly through the department or supporting department. (PS.04S)	PS.04S
Urban Forestry Program	Staffing	05	Stay current with industry research, science, and technology through various platforms. An example includes management of current and potential exotic tree pest and disease threats. (PS.05S)	PS.05S
Urban Forestry Program	Budget	01	Utilize the 2021 inventory of trees in public parks to prioritize the use of tree maintenance and removal funding. (PB.01S)	PB.01S
Urban Forestry Program	Budget	02	Share the results of the 2021 inventory and the 2021 Tree Canopy Assessment ecosystem benefits and services data to build support for increased funding and community stewardship. (PB.02S)	PB.02S
Urban Forestry Program	Budget	03	Continue to budget for the management of the public tree population. (PB.03S)	PB.03S
Urban Forestry Program	Budget	04	Continue to allocate budget towards staff training, certifications, and professional development. (PB.04S)	PB.04S
Urban Forestry Program	Budget	05	Establish funding for a comprehensive inventory of all public trees. (PB.05S)	PB.05S
Urban Forestry Program	Budget	06	Continue to apply for grants from federal, state, and regional organizations and agencies to achieve recommendations in this Report. (PB.06S)	PB.06S
Urban Forestry Program	Structure	01	Provide information to the public via City website regarding the current programs and departments responsible for urban forest management and public tree care. (PT.01S)	PT.01S
Urban Forestry Program	Structure	02	Strengthen communications, protocols, manuals, and Standard Operating Procedures relating to the management of the urban forest. (PT.02S)	PT.02S
Urban Forestry Program	Management	01	Continue to appropriately address and manage public tree maintenance, removals, plantings, treatments, and inspections as funding allows. Use the guidance provided in this Report. (PU.01S)	PU.01S
Urban Forestry Program	Management	02	Update the tree inventory as activities are completed (pruning, removal, planting, other). (PU.02S)	PU.02S
Urban Forestry Program	Management	03	Align tree maintenance and planting with other City planning and construction efforts. (PU.03S)	PU.03S
Urban Forestry Program	Management	04	Annually revisit contract specifications and in-house policies and directives to ensure that tree care operations adhere to current industry standards, including ANSI A300 Standards for Tree Care Operations, ANSI Z133.1-2012 for Arboricultural Operations Safety Requirements, and ISA Series Best Management Practices (BMPs). (PU.04S)	PU.04S
Urban Forestry Program	Management	05	Continue to retain Arbor Day Foundation's Tree City USA status and pursue Growth Awards to again receive Sterling Tree City status (received in 2005). (PU.05S)	PU.05S
Urban Forestry Program	Management	06	Coordinate the outreach strategy as a Citywide initiative rather than a departmental effort. (PU.06S)	PU.06S

Goal	Objective	#	Short-Term Recommended Actions	ID
Urban Forestry Program	Management	07	Update the City's website with content recommended in this Report. (PU.07S)	PU.07S
Urban Forestry Program	Management	08	Continue to utilize volunteers and support volunteer training opportunities as feasible. (PU.08S)	PU.08S
Urban Forestry Program	Management	09	Continue to utilize partnerships to achieve common goals. (PU.09S)	PU.09S
Urban Forestry Program	Code	01	Align resources and planning efforts across City departments and partners to meet common goals and improve efficiencies, beginning with the 2035 Comprehensive Plan (see Appendix I for a list of common goals and recommendations). (PC.01S)	PC.01S
Urban Forestry Program	Code	02	Tree managing staff should engage in City department planning such as updates to the City's comprehensive plan. (PC.02S)	PC.02S
Urban Forestry Program	Code	03	Continue to provide guidance on tree planting and preservation for City and development projects. (PC.03S)	PC.03S
Tree Maintenance	Maintenance	01	Prioritize trees recommended for removal and remediate based on available budget preferably within the first 1-3 years. Utilize recommendations in the Planting Guidance section to replace removed trees. (TM.01S)	TM.01S
Tree Maintenance	Maintenance	02	Prioritize trees requiring immediate pruning and trees noted as critical concern in the inventory. Remediate concerns based on available budget preferably within the first 1-3 years. (TM.02S)	TM.02S
Tree Maintenance	Maintenance	03	Develop a seven-year rotational pruning regimen for the inventoried trees greater than six inches DBH by City park, quadrant, tree species, or other variable that prunes approximately 118 trees per year (830 trees in seven years). (TM.03S)	TM.03S
Tree Maintenance	Maintenance	04	Develop a three-year rotational pruning regimen for the inventoried trees less than six inches DBH by City park, quadrant, tree species, or other variable that provides training pruning to approximately 28 young trees per year (83 trees in three years). (TM.04S)	TM.04S
Tree Planting	Planting	01	Conduct additional analyses of the i-Tree Canopy assessment to refine possible planting areas— moving from "possible" to "feasible" and "preferable". (TP.01S)	TP.01S
Tree Planting	Planting	02	Reduce the planting of water oaks (Quercus nigra) and loblolly pines (Pinus taeda). (TP.02S)	TP.02S
Tree Planting	Planting	03	For each public tree removed, replace with a new tree if the site is suitable for a "no-net-loss" approach. (TP.03S)	TP.03S
Tree Planting	Planting	04	As feasible, inventory potential public planting sites using the City's TreePlotter software and prescribe a recommended tree species for the given site. (TP.04S)	TP.04S
Tree Planting	Planting	05	For every public tree planted, ensure the tree meets the American National Standards Institute's (ANSI) Z60.1 nursery stock standards. (TP.05S)	TP.05S
Tree Planting	Planting	06	Ensure every public tree planted has a post-planting care plan consisting of young tree training, watering, mulching, staking, and monitoring as needed. (TP.06S)	TP.06S
Tree Planting	Planting	07	Implement planting recommendations utilizing the Recommended Tree Species List provided in this Report (Appendix A). (TP.07S)	TP.07S

Goal	Objective	#	Short-Term Recommended Actions	ID
Community Engagement	Community	01	Update the City's website and materials based on information from the Report. (CE.01S)	CE.01S
Community Engagement	Community	02	Formalize clear and consistent design and language for urban forestry outreach materials. (CE.02S)	CE.02S
Community Engagement	Community	03	Share quarterly informative urban forestry and tree-related content to a social media, City website, and other communication platforms. (CE.03S)	CE.03S
Community Engagement	Community	04	Continue to work closely with the City's Tree Board and align the roles and responsibilities of the Board with recommendations in this Report. (CE.04S)	CE.04S
Community Engagement	Community	05	Support the Tree Board in providing information in this Report to the public and reporting on its implementation. (CE.05S)	CE.05S
Community Engagement	Community	06	Support volunteer training opportunities as feasible. (CE.06S)	CE.06S
Community Engagement	Community	07	Prioritize citizen service requests and update the City website with frequently asked questions and resources. (CE.07S)	CE.07S
Community Engagement	Community	08	Gather feedback from the public regarding viewpoints, perceptions, and opportunities relating to the urban forest. (CE.08S)	CE.08S
Community Engagement	Community	09	Continue to track and annually report urban forestry activities of all partners to maintain Arbor Day Tree City USA designation. (CE.09S)	CE.09S
Community Engagement	Community	10	Continue to strengthen partnerships with civic groups, Homeowners' Associations, volunteers, and neighborhoods. (CE.10S)	CE.10S
Community Engagement	Community	11	Conduct biannual community surveys to gauge public viewpoints and receive feedback on implementation of the UFMP, and program success. Survey responses should inform future urban forest decision making. (CE.11S)	CE.11S

Long-Term Recommended Actions

Table 46. Long-term recommended actions

Goal	Objective	#	Long-Term Recommended Actions	ID
Urban Forestry Program	Staffing	01	Utilize the case study in this Report to propose additional staffing to appropriately manage the public tree population. (PS.01L)	PS.01L
Urban Forestry Program	Staffing	02	Evaluate the roles and responsibilities of the Boards and Commissions influencing urban forestry such as the Laurel Tree Board. (PS.02L)	PS.02L
Urban Forestry Program	Staffing	03	Secure the recommended staffing levels to effectively manage the public park and street tree population on a rotation described in the Report's case studies. (PS.03L)	PS.03L
Urban Forestry Program	Staffing	04	Explore opportunities to strengthen or establish a local non-profit organization devoted to the stewardship of Laurel's urban forest. (PS.04L)	PS.04L
Urban Forestry Program	Budget	01	Use the guidance provided in this Report to request a budget necessary to manage the estimated 12,600 public trees in maintained areas and the new trees planted. (PB.01L)	PB.01L
Urban Forestry Program	Budget	02	Establish a dedicated, sustained funding source beyond the current departmental budget for urban forestry operations to increase the level of service to meet the community's high standards. (PB.02L)	PB.02L
Urban Forestry Program	Budget	03	Secure funding to inventory the public tree population every 5-10 years in-house or with certified consultants. (PB.03L)	PB.03L
Urban Forestry Program	Budget	04	Secure mechanisms for emergency funding in response to storms and disasters. (PB.04L)	PB.04L
Urban Forestry Program	Budget	05	Secure a budget that more appropriately meets the recommended levels of $44.45 per public tree. Adjust as the urban forest and resources grow and change. (PB.05L)	PB.05L
Urban Forestry Program	Structure	01	Secure the necessary funding and resources to effectively manage the public park and street tree population. (PT.01L)	PT.01L
Urban Forestry Program	Structure	02	Establish an Urban Forestry Program with a City division devoted to the management and planning of the urban forest. Consider migrating tree maintenance operations under this new program. (PT.02L)	PT.02L
Urban Forestry Program	Structure	03	Enhance the Urban Forestry Program or programs that manage the urban forest with the staffing levels recommended in this Report. (PT.03L)	PT.03L
Urban Forestry Program	Management	01	Adjust the management budget and activities to more closely align with recommendations in this Report (32% of budget for pruning, 30% for removals, 16% for planting, 10% for management, and 12% for "other" activities). (PU.01L)	PU.01L
Urban Forestry Program	Management	02	Inventory the public tree population on an industry-recommended rotation of every 5-10 years. (PU.02L)	PU.02L
Urban Forestry Program	Management	03	With a comprehensive public tree inventory, conduct a cost-benefit analysis to build the case for additional funding and resources. (PU.03L)	PU.03L
Urban Forestry Program	Management	04	Routinely sample the public tree population to assess tree risk in high priority areas. (PU.04L)	PU.04L
Urban Forestry Program	Management	05	Use Citywide tree inventory data and best available science for long-term planning and management of existing and future tree pests and diseases impacting the City's urban forest. (PU.05L)	PU.05L
Urban Forestry Program	Management	06	Develop a strategic planting plan with goals of urban forest diversity, sustainability, resiliency, and equity. (PU.06L)	PU.06L
Urban Forestry Program	Management	07	Establish or strengthen a local non-profit organization as stewards and advocates of the urban forest. (PU.07L)	PU.07L
Urban Forestry Program	Management	08	Diversify the types of volunteers using outreach and education about the benefits and importance of trees. Utilize partnerships with neighborhood organizations. (PU.08L)	PU.08L
Urban Forestry Program	Management	09	Complete an urban forest audit using similar criteria as the 2021 audit completed for this Report. (PU.09L)	PU.09L

Goal	Objective	#	Long-Term Recommended Actions	ID
Urban Forestry Program	Management	10	Conduct a Citywide tree canopy assessment that analyzes canopy gains and losses over a ~10-year period. (PU.10L)	PU.10L
Urban Forestry Program	Management	11	Establish a strategic Urban Forest Management Plan based on a comprehensive inventory and changes to the urban forestry program as a result of this Report and other efforts. (PU.11L)	PU.11L
Urban Forestry Program	Code	01	Update City Code, ordinances, policies, and manuals as changes to the program and the City occur. Use Appendix L as guidance. (PC.01L)	PC.01L
Urban Forestry Program	Code	02	Effectively preserve existing trees while meeting the needs of development and construction. (PC.02L)	PC.02L
Urban Forestry Program	Code	03	Effectively monitor tree-related requirements for development and construction activities. (PC.03L)	PC.03L
Urban Forestry Program	Code	04	Establish tree canopy goals and planting targets aligned with goals of tree species and age diversity and urban forest resiliency. (PC.04L)	PC.04L
Tree Maintenance	Maintenance	01	Secure the appropriate staffing and resources by implementing the Program Guidance Recommendations (Long-Term Budget Recommendations) to maintain the entire estimated public tree population (~12,600 trees) on a seven-year pruning rotation. (TM.01L)	TM.01L
Tree Maintenance	Maintenance	02	Complete the recommendations in the Program Guidance section (Long-Term Urban Forest Management Recommendations) by conducting a comprehensive public tree inventory to inform maintenance and removals. (TM.02L)	TM.02L
Tree Maintenance	Maintenance	03	Based on the Citywide inventory, prioritize trees recommended for removal and remediate based on available budget preferably within the first 1-3 years. Utilize recommendations in the Planting Guidance section to replace removed trees. (TM.03L)	TM.03L
Tree Maintenance	Maintenance	04	Prioritize trees requiring immediate pruning and trees noted as critical concern in the inventory. Remediate concerns based on available budget preferably within the first 1-3 years. (TM.04L)	TM.04L
Tree Maintenance	Maintenance	05	Develop a seven-year rotational pruning regimen for the public tree population greater than six inches DBH by City park, quadrant, tree species, or other variable that prunes approximately 1,431 trees per year (10,016 trees in seven years). (TM.05L)	TM.05L
Tree Maintenance	Maintenance	06	Develop a three-year rotational pruning regimen for the public tree population less than six inches DBH by City park, quadrant, tree species, or other variable that provides training pruning to approximately 334 young trees per year (1,002 trees in three years). (TM.06L)	TM.06L
Tree Planting	Planting	01	Set planting goals as a Citywide effort including departments, partners, and the community. (TP.01L)	TP.01L
Tree Planting	Planting	02	Based on a Citywide public tree inventory, update the Recommended Tree Species List. (TP.02L)	TP.02L
Tree Planting	Planting	03	Develop a Strategic Tree Planting Plan that broadly identifies location, tree species, timing, annual care, and other criteria aligned with the tree planting and canopy goals. Implementing the planting plan should achieve goals of urban forest diversity, sustainability, resiliency, and equitable distribution of associated benefits and services. (TP.03L)	TP.03L
Tree Planting	Planting	04	Insert planting goals into an urban forest management plan and convey those goals to project partners. (TP.04L)	TP.04L
Tree Planting	Planting	05	For public tree plantings, assess available planting sites in the inventory and agree on which partner will be focused on planting in the coming years, and how that fits into the annual care plan. (TP.05L)	TP.05L
Tree Planting	Planting	06	Ensure all public trees planted are captured in the tree inventory management software such as the City's TreePlotter application. (TP.06L)	TP.06L
Tree Planting	Planting	07	For private tree plantings, convey the goals and data to large landholders, neighborhood groups, and other players to encourage planting on private lands. (TP.07L)	TP.07L

Goal	Objective	#	Long-Term Recommended Actions	ID
Community Engagement	Community	01	Coordinate the outreach strategy as a Citywide initiative rather than a departmental effort. (CE.01L)	CE.01L
Community Engagement	Community	02	Develop strategies to remove barriers to participation for all community members. Barriers to address include ADA communications compliance, internet availability, language, cultures, location, transportation, etc. (CE.02L)	CE.02L
Community Engagement	Community	03	Engage neighborhoods with volunteer tree planting events. Prioritize areas with lower urban tree canopy and other considerations such as underserved communities. (CE.03L)	CE.03L
Community Engagement	Community	04	Explore options to facilitate and/or subsidize tree planting for private property owners through tree-giveaways and cost-shares. Support local, regional (e.g., watersheds), and national programs (e.g., Arbor Day Foundation) that provide such giveaways. (CE.04L)	CE.04L
Community Engagement	Community	05	Strive to achieve the Arbor Day Foundation's Growth Award for higher levels of tree care and community engagement and pursue another Sterling Tree City award. (CE.05L)	CE.05L
Community Engagement	Community	06	Recognize exemplary urban forest stewards and volunteers representing youth, residents, organizations, and business owners. Consider a tree donation or tree fund framework for costs associated with this program. (CE.06L)	CE.06L
Community Engagement	Community	07	Collaborate with nurseries to propagate a more diverse palette of trees that meets the City's tree diversity requirements and updated planting recommendations. (CE.07L)	CE.07L

2021 TREE MANAGEMENT PROGRAM EVALUATION REPORT

LAUREL, MS

The City of Laurel
Mississippi

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