Village of Park Forest

Urban Forestry Management Plan

Prepared By

Stephen D. Lane: Urban Ecologist, Urban Forestry Consultant - ISA Certified Arborist #IL-4565A
Leslie Delles: Project Manager – ISA Certified Arborist #IL-9199AM

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OVERVIEW OF PARK FOREST'S URBAN FOREST MANAGEMENT PLAN

The Village of Park Forest was one of the recipients of the 2020 Urban & Community Forestry Grant, funded by the Illinois Department of Natural Resources and administered by The Morton Arboretum. This grant funded a comprehensive tree inventory and this Urban Forestry Management Plan (UFMP or the Plan). Great Lakes Urban Forestry Management (GLUFM) completed both the comprehensive inventory and the UFMP.

The inventory identified that Park Forest currently manages 4,284 trees throughout its Parks, parkways and rights-of-way. Additionally, the inventory identified 2,082 open planting spaces, representing significant potential to expand this Urban Forest resource. Completed in 2022, the inventory serves as the basis for this Urban Forestry Management Plan, detailing how these trees will be managed for the benefit of the Village of Park Forest, and its residents over the next 10 years; 2022, through 2032.

The Urban Forest is one of the Village's greatest assets and offers both strengths and improvement opportunities. The principal strength is the fact that there are 103 species represented in the tree population, providing good diversity for a smaller municipal population. The Maple genus, however, makes up over 44% of the population. This is far too high. The primary opportunity is the 2,082 plating spaces identified by the inventory. Because the existing tree population is predominantly middle aged to mature, the potential for the Village to focus on new plantings is considerable. Additionally, the overall condition of the population, as a whole is well below average, providing another opportunity for improvement. This tree inventory may change over time but will remain the primary management tool, guiding management decisions and classifying trees in need of maintenance or removal.

The UFMP sets the first priority as near-term maintenance. Once this necessary maintenance is complete, Park Forest can focus on enhancements rather than remedial action. In addition, the UFMP recommends the current annual budget allocation for urban forestry management increase by $77,000, to $154,000. This increase will allow Park Forest to accomplish the goals outlined in this Plan more readily.

To advance the Urban Forestry program and the long-term benefits to the Village of Park Forest, the Urban Forest Management Plan will address each of the strengths and opportunities, defining goals and milestones for each. Following is a broad view of the goals for the next 10 years. The Plan further outlines details, with separate sections outlining specific Urban Forestry activities, and how best to achieve these. Additionally, the UFMP outlines standards and Best Management Practices (BMP) for each activity. The ultimate goal being to develop an urban forestry program, able to realize the greatest benefit for the Village, based on data from the inventory, as well as input from stakeholders and residents of the Village of Park Forest.

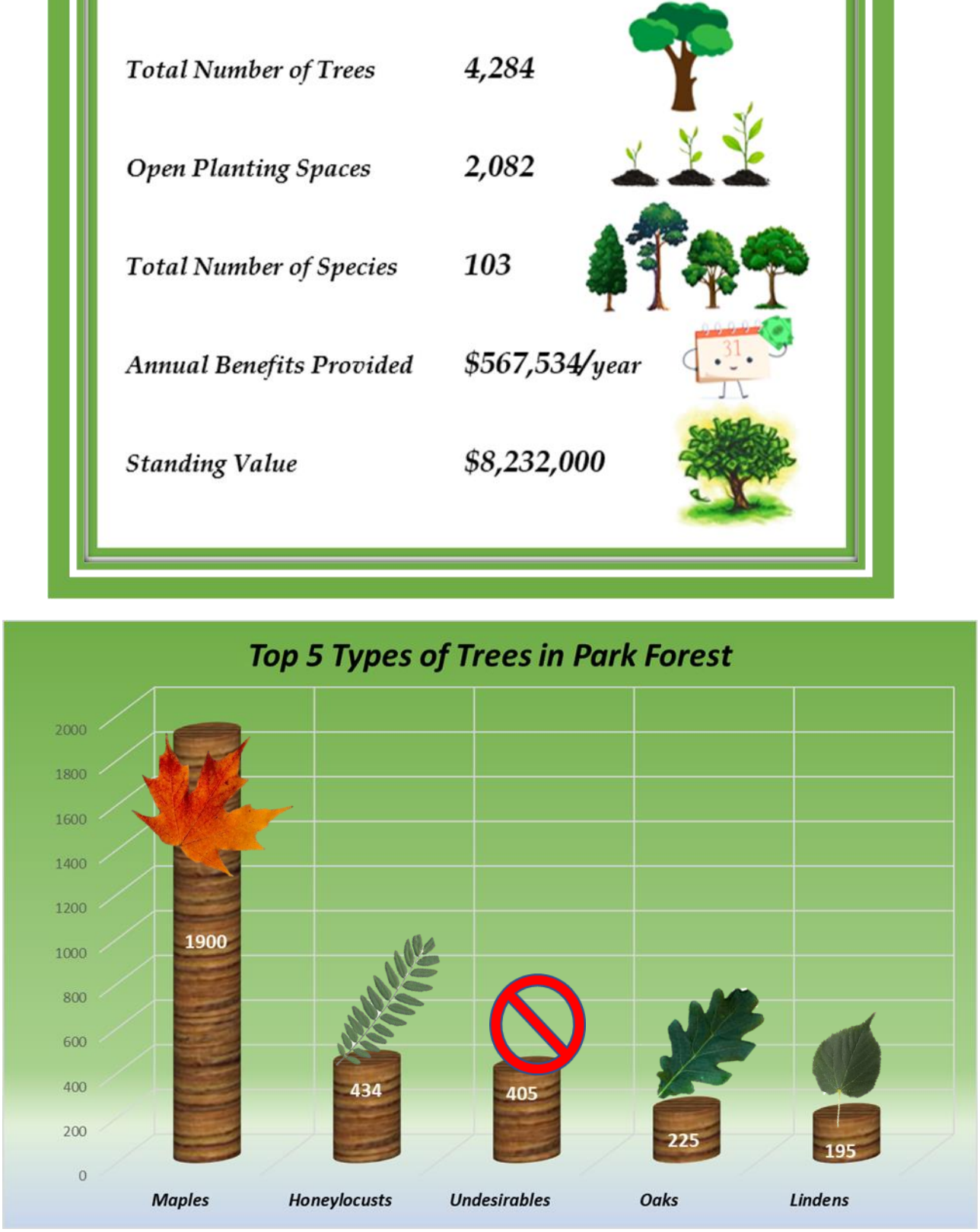
Annual review of the plan will allow the Village, its residents, business owners, and other stakeholders opportunity to provide input to improve the Plan and update its goals and objectives.

MISSION STATEMENT

It shall be the mission of this Urban Forest Management Plan to outline goals, budgets, and Arboricultural Best Management Practices for the management of the Urban Forest in the Village of Park Forest, Illinois, to increase canopy cover, maximize the benefits trees provide while minimizing cost, mitigate against climate change, and create a program to manage the Urban Forest Resource for the greatest public good in a manner that is both financially and programmatically sustainable, while maintaining flexibility for future adaptive management.

PARK FOREST'S URBAN FOREST: AT A GLANCE…

Total Number of Trees	*4,284*
Open Planting Spaces	*2,082*
Total Number of Species	*103*
Annual Benefits Provided	*$567,534/year*
Standing Value	*$8,232,000*



Direct Goals

Following is a brief discussion of the short and long-term goals of this Urban Forest Management Plan ("UFMP", or "the Plan"), as well as a framework of how these goals can be met. Short-Term goals address management, pruning, removal, planting, and other related activities. Long-Term goals address the sustainability of the urban forest. Lastly, there are "Additional Goals" to increase public involvement in, and awareness of, this valuable resource. Every attempt has been made to assure goals are realistic and achievable and do not place an undue burden on the Village of Park Forest, its residents, or its resources. The intent of these UFMP goals is to save money and over time, enhance the benefits of the urban forest through proactive, as opposed to reactive, management. The Plan is also adaptive, to accommodate potential change such as new concepts in urban forestry management, the introduction of new pests or pathogens and a changing climate, both social and meteorological. Since trees represent a long term (50-80 year) commitment, this UFMP will provide guidance and continuity through these changes, while being adaptive, as the need arises.

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Goal: Private Property Tree Planting Incentive Programs

Goal: Establishment of Village of Park Forest Propagation Nursery

SHORT-TERM GOALS: 1 – 3 YEARS

Ultimately, the Village's desire is to manage this resource to enhance its strengths and realize the opportunities identified by the comprehensive inventory. In order to accomplish this, objectives are necessary to help guide decision makers. Establishing or enhancing a high functioning forestry program requires a series of achievable goals. This UFMP outlines how best to accomplish these goals within a realistic budget and attainable timeline.

Each section of the Plan related to these goals, includes language to incorporate both a budget and a timeline in which to accomplish these goals. The overarching goal, to have Park Forest use this UFMP to create a more sustainable and adaptable forestry program within a 5-10 year period.

This UFMP outlines tree planting, tree maintenance, and tree removal operations for Park Forest's Urban Forest, to assure a healthy tree population, providing the greatest benefits and lowest risk to the community. To learn more about the budgets, see the individual goals in each section below, or turn to the budget table on page 68.

Village staff and the Environment Commission will review the Plan on a regular basis and provide reports to the Village Board of Trustees through its annual budget process. The review will include an evaluation of progress made towards the goals outlined in the UFMP. These goals may be adjusted in the review process, as conditions warrant. This UFMP understands that organizations, stakeholders, and residents change over time, and therefore its goals require a degree of flexibility.

Many of the Short-Term Goals outlined in the UFMP are already in place. They are included to assure that these practices continue and enhanced where feasible.

Goal: Create a Needs Analysis of the Current Tree Population

Every tree population today is the result of decades of past management decisions. Over time, as the overall level of knowledge, skill, and efficiency in managing trees increases, it becomes apparent that decisions made decades ago may not have been the best. It is the goal of this Plan to assess the current state of the Village of Park Forest's Urban Forest, examine its overall strengths and benefits and identify opportunities for improvement, resulting in more informed management decisions.

To assess the overall health and diversity of the urban forest, the Comprehensive Inventory collected and analyzed data for each park and parkway tree in Park Forest. Data includes the number of trees, the condition of each tree, the age of each tree and maintenance needs for each tree. Based on this analysis, the UFMP outlines specific goals for planting, removals, pruning, budgets, personnel, and maintenance in light of identified

strengths and opportunities, as well as suggesting how these could be used to the Village's advantage. Maximizing strengths and opportunities will be the guiding principles for the management strategies and goals outlined in each section below. The Plan also leaves room for adaptive management to accommodate change, as discussed above.

Goal: Update Village Tree Preservation Ordinances

One of the requirements of the IDNR grant program is an approved Tree Preservation Ordinance. Village Staff, with guidance from The Morton Arboretum, edited and compiled the various Village ordinances relating to trees and organized them into *Chapter 110, ARTICLE IV. – TREE PRESERVATION, Section 110-90 through 110-101*; adopted August 16, 2021. The purpose of this Ordinance is to recognize the services and function that trees provide as a collective asset to the entire community and to state the goals of the Village of Park Forest with respect to the protection, preservation, care and planting of trees on public lands. Refer to the Village Code of Ordinances for the complete ordinance. This Urban Forestry Management Plan supports the Tree Preservation Ordinance by outlining standards and practices for urban forestry management activities, defining responsibilities, and laying the framework for future funding and maintenance decisions.

Goal: Maintain an Acceptable / Unacceptable Species List

The urban environment is a difficult place for a tree to live. Assailed by road salts, urban pollutants, limited soil, and other challenges, not all trees thrive in the urban environment. The Village should avoid planting trees that are weak wooded, known invasive species, produce messy or foul-smelling fruits or create a public nuisance. Acceptable species are those adapted to the Midwest climate, are not invasive, and do not pose high risk. Included in this Plan is an "acceptable and unacceptable" list, detailing specific trees that may be planted on boulevards, parkways, parks, and other public lands. Village staff and the Environment Commission will review the list periodically to ensure compliance with the latest information on specific trees. For more information on acceptable and unacceptable trees for Park Forest, see Acceptable Species list in Appendix A.

Goal: Tree Preservation / Undesirable Species Management

A prime goal of this UFMP is the preservation of trees during construction and reducing the total of undesirable species within the Village of Park Forest. Damage to public trees during construction operations costs the Village money and reduces any benefits the trees provided the community. Per Village Ordinance Chapter 110 Article IV, any public or private new development or existing site improvement that may affect public property trees is subject to a landscape plan consistent with Appendix A (Unified Development Ordinance), Article VI-D (Landscape Plan) of the Code of Ordinances. A tree protection zone should be established and maintained during construction. The Village should monitor construction activities to ensure adherence to the Ordinance. Any removal of public trees on the approved species list requires prior approval from the Village Arborist during project planning. To improve public safety and increase the number of planting spaces, the Village may permit the additional removal of low quality or invasive species during a construction project.

Goal: Incorporate Best Management Practices for Mulching of All New Plantings

Proper mulching significantly increases a tree's establishment and promotes tree health and longevity. Primarily, mulch helps conserve water by reducing evaporation from the soil and reduces weeds, which compete for water and nutrients. Additionally, mulch helps keep lawn maintenance equipment away, protecting tree trunks from mechanical damage. When planted, all Village trees will be mulched appropriately. This practice will also serve as an example to residents on proper mulching techniques and discourage the practice known as "Volcano Mulching", which has the opposite effect of proper mulching, severely damaging a tree over time. For more information on proper mulching, turn to page 62.

Goal: Incorporate Best Management Practices in Tree Care Operations

The use of "Best Management Practices" (BMP) puts one on the cutting edge of their industry. All staff and contractors working for the Village must be familiar with, and practice industry BMP for tree care. The BMP published by ANSI and ISA are included in the appendices of this UFMP and shall be integral parts of any Request for Proposal (RFP), or bid documents when seeking qualified contractors for urban forestry operations. The full text of all referenced standards will be available to all Village staff and contractors performing tree care operations. Additionally, Village staff and the Environment Commission should sponsor public outreach programs to educate the public on these practices. Lastly, this UFMP will be available in the public domain for all residents to reference.

Goal: Cost-Sharing Program for Tree Purchase

Currently, the Village maintains a "Cost Sharing" program available to residents desiring to have a particular species of tree planted in their parkway. The resident and Village Arborist agree on the species to be planted, the resident pays their share and the Village purchases and plants the tree. The Village monitors the tree through its establishment, but the resident assumes the care needed during this time. To maintain diversity goals, and proper site selection, the Village Arborist has final approval of all species planted. Although residents may not plant trees in a parkway at their own discretion, educating residents on the different species of trees available in the nursery trade would be a good community outreach, helping residents understand appropriate parkway tree selection. The UFMP recommends maintaining and promoting this program.

Goal: Manage Tree Removals

Public safety concerns and the prevention and control of tree pests and pathogens often makes tree removal unavoidable. At present, the inventory identifies 259 trees for removal. Of these, 22 are a Priority Removal, 212 are Standard Removals, and 25 are Low Priority Removals. To ensure public safety, the Plan outlines a tree removal program that budgets for the safe removal of all these trees over the next five years. To assist budget projections over the next 10 years, cost projections for tree removals are also included. Condition, age and quantity are the criteria used to make these projections.

Additionally, to ensure the Village is hiring qualified contractors, held to the highest industry standards, ANSI and ISA safety standards, as well as suggested bid specifications are included. For more information on Park Forest's proposed tree removal program, turn to page 49.

Goal: Maintain or Enhance Cyclic Pruning Program

Properly pruned trees establish more quickly, grow more quickly, live longer and pose fewer risks than improperly pruned trees. Since mature, healthy trees provide the greatest benefits to the community, pruning is a critical part of the Urban Forestry program in Park Forest.

Park Forest staff or Certified Arborist contractors will conduct all pruning operations. For some newly planted trees, however, well-trained volunteers may assist Village staff with pruning tasks. Beginning 2022, and over the next 3 years, the 1,147 trees identified as requiring priority pruning, pruning of dead limbs, or establishment pruning will be budgeted. Details are in the Tree Pruning section of this plan.

Currently, the Village endeavors to maintain a 7-Year pruning cycle for all public trees. The UFMP suggests the Village concentrate on keeping this 7-Year pruning cycle. This will ensure that all trees on public property are regularly pruned, increasing tree health and vigor while reducing costs associated with storm damage and tree failure. If budget allows for an enhancement to the cyclic pruning program, a 6-Year cycle could be implemented. The UFMP also proposes that staff train a volunteer group in the proper pruning and maintenance practices of young trees. In this way, the community can assist in caring for this important resource. Volunteers may also assist in other tasks, such as watering and monitoring for new insects and diseases. For more information on tree pruning and maintenance, turn to pages 56-60.

Goal: Wood Utilization Program

The Village has an established program to utilize wood from trees felled within the Village. As the UFMP recommendations progress, substantially more tree material will be generated that may be suitable for use as urban timber, which is defined as saw logs generated from urban tree removal operations. Larger and longer logs are suitable for dimensional lumber production, and smaller material is suitable for artisan use. The Village currently mills this urban timber to use in its landscape projects and for park benches.

To successfully upcycle urban timber into usable lumber, several steps are required to produce logs suitable for milling. Urban timber production includes specifications for tree removals that will produce saw logs of the proper dimension and quality. Specifications for the construction of public buildings that require a specified amount of upcycled, local urban timber may qualify for LEED certification points as well as raise awareness of the benefits of the urban forest in general, creating a saleable product. Forming strategic partnerships with local sawmills, woodworkers, and carpenters is an important early goal of this program, while creating a market for the finished goods will be an ongoing goal. A sample Urban Timber Harvesting specification is included in Appendix N.

Goal: Creation, Utilization, and Maintenance of a Tree Risk Assessment Policy

Trees afford a great assortment of benefits, environmentally, economically, and socially. They can also pose varying degrees of risk, as something like a tree limb failure could have catastrophic effects on people and property. To mitigate these risks, trees need to be well managed, maintained and healthy. A Village Risk Assessment Policy is part of this UFMP. This policy will aid in identifying, designating and documenting for removal or mitigation, in a timely manner, trees that pose a threat to public safety. This will reduce the overall level of risk and liability associated with tree related incidents. See page 9 for basic risk assessment language and the Tree Risk Assessment Policy.

Goal: Increase Awareness of the Urban Forest in the Village of Park Forest and Engage Stakeholders

Enhancement of the Park Forest Urban Forestry Program will improve the quality of life for residents, business owners, and stakeholders wanting to see the Village a healthier, happier community. Park Forest is looking for partners in the community to champion and support this program and staff will reach out to local garden clubs, philanthropic organization, residents, and businesses for this support. The goal, to have an innovative and community-based program. One that residents and business proprietors can take ownership of, and have pride in, this important, beneficial resource. For more on these innovative programs, and how to get involved, turn to pages 14-16.

LONG-TERM GOALS: 3 – 10 YEARS

Long Term Goals serve to maintain a high functioning forestry program. Although many of these goals are already in place they are included to better manage this resource.

Goal: Maintain an Accurate Tree Inventory

Managing an urban forest requires a clear understanding of the trees, their ages, conditions, and locations, so that Village crews and contractors can properly maintain the trees. The stem-by-stem tree inventory, completed in June 2022, provides an unbiased assessment of all trees on public Rights-of-Way and parks within the Village, providing the baseline data for the Village's urban forestry program over the next 10 years.

All inventories are a snapshot in time and with 4,284 trees on Village parkways, parks and ROWs, an annual update of the inventory is essential. Updates should include all newly planted trees and notations on maintenance and removals. Additionally, a Forestry Consultant should update the inventory periodically, on a Village-wide scale, to keep all data current. Maintaining the data at a high level is vital to the execution of this Plan.

Goal: Mitigate Climate Change Effects

A proactive and effective strategy to mitigate a changing climate is to plant more trees, in fact the United States Environmental Protection Agency lists tree planting as one of the more effective solutions to mitigate climate change through absorption of carbon dioxide (https://www.epa.gov/heatislands/using-trees-and-vegetation-reduce-heat-islands).

Outside of their aesthetic value, trees offer a great variety of environmental benefits, specifically offsetting climate change by producing a cooling effect in urban heat islands, and flood abatement by absorbing stormwater that otherwise would run off. Trees also act as long-term sinks for carbon dioxide, where carbon from the atmosphere becomes "sequestered" in the tree's woody parts like the trunk and limbs as a result of photosynthesis, which is how trees create energy to grow.

Increasing tree canopy creates greater sinks for carbon dioxide, reduces localized heating from the urban heat island effect, and reduces environmental issues stemming from flooding. It also provides great habitat for birds, pollinators, and other beneficial wildlife that can enhance the urban environment. This will all be examined at several different points throughout this UFMP, including the hard dollar benefits trees provide, looking at where trees can be planted to maximize their effect on heat islands and flooding, and suggestions of what species could be planted in the future as the Earth is subjected to higher average temperatures. For more information on using trees to mitigate climate change, turn to page 43-49.

Goal: Increase Overall Diversity by 2032

Tree species diversity is one of the most important concepts in Urban Forestry management today. Devastating infestations and diseases such as Emerald Ash Borer (EAB) and Dutch Elm Disease (DED) are a direct result of the over population of both Ash and American Elm trees. When EAB arrived, the Ash population of many communities was 20% or more, resulting in devastating losses to the overall tree populations. Proper planning to encourage a greater diversity of tree species lessens the overall impact of a single pathogen or pest to any given communities urban forest. Diversity leads to stability, and stability leads to reduced costs and increased benefits over time.

The current population includes a respectable 103 individual species. This information is advantageous to the Village in that the nature of the urban forest, in terms of species diversity, is a known quantity. An achievable "Diversity Vision" for 2032 increases the overall diversity of the urban forest to 110 species. The diversity vision aims to reduce the number of over-represented and/or lower quality species while increasing the number of species that are under-represented or absent in the tree population. Additionally, the tree-planting program will intentionally match tree selection to the planting site, assuring the proper site for each newly planted tree. Both an approved species list and an undesirable species list is

included to guide plantings on public property and meet the diversity goal. Develop all planting plans with these lists in mind.

Goal: Increase Urban Tree Canopy from 42.88% to 44%

An extensive tree canopy is important to the Village in many ways as more and larger trees offer proportionally greater benefits. Environmentally, more and larger trees decrease heating and cooling costs, sequester more carbon, mitigate the effects of pollution and increase storm water uptake. Economically, tree lined streets are more attractive to homebuyers and new businesses, increasing home values, home ownership, retail activity and tax revenue. Socially, the presence of trees has been demonstrated to reduce stress, improve mental health, encourage outside activity and reduce crime. Since all these factors are a direct benefit to the community, the goal to increase tree canopy in the Village of Park Forest has significant ramifications. Currently, tree canopy coverage in Park Forest is 42.88%, compared to other land cover types (see p 35 for land cover map). This includes all land, both public and private. This is different from the diversity and planting projections elsewhere in this document that only deal with trees on properties that the Village has direct jurisdiction over. The goal is to increase this percentage to 44% by 2032 by encouraging tree planting on private property by homeowners and businesses. This increase in tree canopy provides corresponding increases in total benefits to the community.

Based on data from the Chicago Region Trees Initiatives (see http://chicagorti.org/interactivemap), an increase to 44%canopy cover, by 2032 is a realistic goal for Park Forest. In addition to increased plantings, improving tree care will encourage trees to live longer, grow larger and create a larger canopy cover. The Village may also consider incentivizing tree planting on private property through public-private partnerships with local organizations and businesses.

As this UFMP demonstrates, trees benefit a community in tangible ways, saving residents money and benefiting the environment. For more information on Urban Tree Canopy benefits, turn to pages 30-35.

Currently, Park Forest plants approximately 45 trees each year. Given the inventory identifies 259 trees for removal, and 2,082 potential planting sites, it would take more than 50 years to replace these lost trees and plant in the identified locations. The Plan recommends that the number of trees planted annually increase to 175 trees over the next 10 years, to both replace older declining trees, as well as to increase the tree population by over 1,375 trees by 2032. To help meet these goals of diversity, density and canopy, the UFMP proposes such ideas as contract growing, creating an in-house "liner" nursery and an incentive program. To learn more about tree planting and reforestation, turn to page 53, and Appendices E, F, and K.

Goal: Increase Parkway Stocking Density from 60% to 73%

Currently, there are 2,082 open planting spaces and 3,260 trees on Park Forest's streets totaling approximately 5,342 spaces that are suitable to support a tree on the Village's parkways. The ROW stocking density is currently moderate at approximately 60%. Stocking density differs from total canopy coverage in that stocking density is a statistical percentage calculation of the total number of suitable planting spaces on Village ROWs versus the number of trees growing in these planting spaces. While 100% stocking density would be very difficult to achieve over the 10-year scope of this plan, and is not always desirable, a 73%

stocking density is attainable and will reap tangible benefits. Increased tree plantings in the coming years, and use of innovative strategies to fund this increase, will help accomplish this goal. Please note that open planting spaces on park properties were not evaluated as part of this project and are not reflected in the stocking density percentage.

Goal: Contract Growing Program

One of the keys to a successful Reforestation Plan or Tree Planting Program, and to meeting the above goals, is the availability of locally sourced, high-quality nursery stock. However, there is no guarantee of commercially available nursery stock to realize any given planting plan. One way to assure availability is to contract with local nurseries to custom grow the desired stock and reserve it specifically for the Village of Park Forest. Ordering trees in annual increments lessens the Village's competition with the landscape industry, other local organizations responsible for tree planting and local retailers for nursery stock. Each year, Park Forest will purchase the trees previously ordered for that year, and place an order for the following year. This gives the supplying nursery time to procure, plant, and bring the agreed upon trees to the size and branching habit specified.

As numbers of trees required for planting may vary from year to year, based on removal rates, budgets and staffing, tree order projections must be coordinated with the nursery. To ensure exposure and climate zone compatibility as well as reduce transportation costs, qualifying nurseries should be located within the South Suburban region, preferably within 25 miles of Park Forest. Qualifying nurseries must demonstrate an ability to provide stock that meets standards as published in *American Standards for Nursery Stock* for quality, form and health. Nurseries should also be of sufficient production capacity to furnish, on an ongoing basis, all trees ordered in advance by the Village. Lastly, the nursery should allow tagging by the Village Arborist.

The Village might also consider a long-term tree-planting contract in conjunction with the nursery supply contract. This contract would establish costs for tree planting to include all pick-up, transportation, planting, guarantee and spoil disposal procedures. The Village Arborist and representatives from the contractor will evaluate each tree one year after planting to assess for health and survival. Responsibility for replacement of trees that have not survived the guarantee period is divided equally between the supplier, the contractor and the Village. Trees dug or balled improperly are the responsibility of the nursery. The contractor is responsible for improperly handled or planted trees. The Village is responsible for trees that did not survive due to lack of maintenance.

Additional Goals

There are no strategic timelines proposed for these additional goals. Great Lakes Urban Forestry Management believes these programs represent some of the most progressive Urban Forestry policies, and recommends that, as advised by Village staff and the Environment Commission, they be seriously considered by the Board of Trustees.

Goal: Volunteer Labor (TreeKeepers/Local Organizations)

The ability to use well-trained residents as volunteer labor for pruning of young trees and planting of smaller sized nursery stock during spring and fall planting cycles may benefit the Villages' bottom-line. In order to

accomplish this though, ongoing training sessions will be required to train these volunteers to be confident enough to perform these activities with minimal supervision. A training program developed by the Village Arborist, in cooperation with a Forestry Consultant and local organizations would educate residents on the proper way to prune young trees, as well as how to plant container-grown trees, water and mulch trees, identify trees, and other basic tree knowledge.

There is a local chapter of the Open Lands Tree Keepers program active in the Chicago area. This organization is a non-profit, available to assist in educating people about trees; how to prune, plant, and manage them, as well as their benefits to society. There are other local organizations with which the Village could collaborate as well, please see page 14 for more details. Upon acceptance of this Plan, Great Lakes Urban Forestry Management recommends the Village coordinate with Open Lands, or a similar local organization to establish a relationship, and assist in the creation of this volunteer program. This will engage the community as well as save the Village money in its overall maintenance program.

For residents that may not be interested in joining the volunteer program, but may still want to know more about how to take care of their trees, it is recommended that Park Forest hold several annual tree education sessions, to coincide with annual planting cycles. Taught by the Village Arborist or Forestry Consultant and other qualified parties, these sessions would cover watering, fertilization, pruning, the basics of how to spot insects and diseases and the best practices to manage and control these pests. Basic tree care pamphlets would also be available. Great Lakes Urban Forestry Management recommends that the Village continue to use Arbor Day celebrations as an outreach and education event.

Goal: Private Property Tree Planting Incentive Programs

Great Lakes Urban Forestry Management recommends the Village consider an incentive program, encouraging tree planting on private property. Though the Village has no formal jurisdiction to plant trees on private property, the benefits of tree planting on private property are substantial in terms of energy savings, storm water management and other benefits. Incentive programs for residents and business owners could include a slight reduction in water and sewer bills for each tree planted. Another program would be to collaborate with local nurseries to create a discount purchase program for Village residents and businesses. Other communities, such as Minooka and Hickory Hills have successfully utilized similar programs.

A similarly successful program has been the direct, wholesale purchase of trees from a nursery and then hosting an annual tree sale to residents. The Village resells the trees at a slight markup from the wholesale cost, but still less than retail, and uses the proceeds to fund its forestry initiatives. Such programs could encourage tree planting on private property by reducing tree costs to the residents.

Goal: Establishment of Village of Park Forest Propagation Nursery

Great Lakes Urban Forestry Management also recommends the Village consider establishing a small propagation nursery on Park Forest land. The Village of Park Forest would grow a share of its own trees, using much smaller stock obtained from wholesale nurseries at a fraction of the cost of a full-sized tree. Grown to transplant size, these trees would be relocated into available spaces. Other communities, such as Algonquin, have successfully instituted similar programs, representing a quality investment, resulting in cost savings over the long term. The cost to water and prune small nursery trees is relatively low, however the Village may choose to perform a cost-benefit analysis to determine the amount of staffing resources that would need to be devoted to such an undertaking.

GLUFM recommends that the Village works with the Forestry Consultant, local nurserymen, and other strategic partners to explore this concept, and perhaps begin the planning phase in 2025 with the goal of having a functioning nursery by 2030. The amount of time required for the care of young trees is minimal, and at an average cost of $250-$350 per 2" DBH tree wholesale, the Village could save a significant amount of money in their tree-planting program. In addition, not unlike a community garden, local residents could assist with the care of these nursery trees.

Strategic Partnerships

Strategic partnerships are a very effective means of funding forestry projects. Partnerships can supplement tax funding for projects, or provide a pool of volunteer labor. These typically involve either public-private partnerships or collaboration with other public entities. Typically, organizations that participate in these programs include local garden clubs, scout groups, rotary clubs, businesses, state departments of natural resources, and other such groups. This will be an ongoing goal, with both continuing and new partnerships.

Forest Preserve District of Cook County

The Forest Preserve District of Cook County manages 70,000 acres of natural areas, trails, and other projects in Cook County. Several preserves are located very close to Park Forest. FPDCC would be a valuable partner in sourcing nursery stock. They have a great wealth of knowledge and are worth reaching out to for partnership in accomplishing the goals of this plan.

Metropolitan Water Reclamation District

MWRD strives to protect businesses, homes and neighborhoods from flood damages, clean wastewater entering treatment plants and manage water as a vital resource for the area. As one of the primary goals of this UFMP is to define trees as critical stormwater infrastructure, MWRD is a very logical partner. They also give away Oak and other seedling trees every year as part of their Restore the Canopy efforts, and using this resource as a source of trees would be welcome.

Openlands TreeKeepers

Openlands is a highly diverse NPO in the Chicagoland area which focuses on many aspects of ecology in the urban and suburban environment such as natural areas, urban forestry, wetland conservation, and other such topics. They have a vast network of connections around the area, and offer various instructive programs, such as the TreeKeepers program, which educates residents on the tree biology and the care of trees.

Illinois Department of Natural Resources

The IDNR's Urban and Community Forestry program is a funding source for this UFMP. The IDNR's mission is to protect, perpetuate, restore, conserve, and manage the forest and related resources of Illinois, both public and private. To that end, they have an abundance of resources, staff, and a network of partners available to help Park Forest accomplish the goals laid out in this plan, including additional funding for such things as tree planting, and local education and outreach.

The Morton Arboretum

The Morton Arboretum, aside from being a wonderful place to visit and learn about trees, also has significant educational and operational resources available. As the overall administrator of the grant which funded this project, they have a vested interest in seeing it succeed and have already assisted Park Forest in many forestry related endeavors. They also offer educational programs and a host of services which can make this plan a success.

Garden Club of Park Forest

Since 1954 the Garden Club of Park Forest has been a contributing factor to the Village of Park Forest, promoting gardening, tree planting, conservation, and other philanthropies. Trees are an essential part of gardening, and spreading the word about the importance of trees can be accomplished through local volunteers like those at the Garden Club and may serve as a resource for education and other environmental initiatives.

SSSRA

The Village of Park Forest is a founding member of South Suburban Special Recreation Association which provides recreation programming to children and adults with a variety of needs. Park Forest could explore additional programs with SSSRA staff and participants to assist with mulching and watering of newly planted trees.

Local High Schools and Colleges

Urban Forestry is by and large a fairly unknown profession, but there are many aspects of STEM concepts that go into it: GIS Mapping, chemistry, physics, biology, and math are all essential facets of Arboriculture. A relationship with Park Forest-Chicago Heights School District 163 and perhaps local institutions of higher learning could be a reciprocal relationship, engaging students in study projects based around trees, citizen science, and volunteerism. Park Forest staff or urban forestry consultants could provide guest lectures to the students in any of these areas encouraging interest in or even promote careers in the green industry.

Park Forest Public Library

The local public library is a place where people congregate and learn. As such this would be a first-rate location to advertise opportunities for education about urban forestry, as well as stocking and showcasing books related to urban forestry and its related disciplines.

Chicago Region Trees Initiative

CRTI is actually an amalgamation of many groups acting together as a driving force for establishing the importance of urban forestry in the Chicagoland area and abroad. CRTI has several working groups which handle topics such as forest composition, risk management, and communications and is always looking to partner with local communities. CRTI would be a valuable partner in accomplishing the goals laid out in this plan.

Personnel

In order to streamline Urban Forestry Operations, responsibilities have been assigned to various staff, governing bodies and contractors/consultants. Below is a representation of tasks and responsibilities

Trustee Board

The Village of Park Forest Board of Trustees authorizes spending through the Annual Budget Process to support all Urban Forestry Operations.

Environment Commission

The Environment Commission, as appointed by the Board of Trustees, is a recommending body providing assistance, direction and advice to the Village regarding the preservation, planting, management and protection of trees. The Environment Commission shall provide advice on the application of the Urban Forest Management Plan.

Village Arborist

The Village Arborist is responsible for the management of the entire Urban Forestry Program. This includes trees in all parkways, parks and public lands within the Village. The Village Arborist will also manage all contracts with qualified Forestry Consultants and Tree Care Contractors to complete urban forestry operations. Additional responsibilities include maintaining the tree inventory and acting as the Villages representative for public concerns as well as consulting with Planning and Code Compliance staff during the plan review process. With the approval of the Trustee Board, a Forestry Consultant may perform the duties of the Village Arborist. The Village Arborist, along with the Director of Recreation, Parks & Community Health shall be responsible for the enforcement of and compliance with the Tree Preservation Ordinance and the UFMP.

Forestry Consultant

As assigned by Village staff, the Forestry Consultant is responsible for periodically, and impartially assessing the tree population. The Forestry Consultant communicates these findings to the Village Arborist who is

responsible to see that individual needs in terms of tree planting, removal, and maintenance are completed. At the request of the Village, the Forestry Consultant may also function as the Village Arborist.

Tree Care Contractors

Tree Care Contractors are responsible for performing work identified by the Village Arborist or Forestry Consultant in a timely, safe, and expeditious manner. The Tree Care Contractor must have at least one International Society of Arboriculture, Certified Arborist on site during all urban forestry operations that include tree trimming, pruning, removal, and plant health care. Operations such as tree planting, irrigation and mulching need not be performed under the direct supervision of a Certified Arborist.

Department of Economic Development & Planning

Consults with the Village Arborist on the Urban Forest aspects of PUD, UDO, zoning and planning projects.

Department of Community Development

Consults with the Village Arborist in the Plan Review Process to assure compliance with all applicable Village Ordinances relating to tree preservation and landscape development.

State of the Urban Forest

Using the tree inventory data collected for the Village of Park Forest, it was determined that there are a total of 4,284 trees and 76 stumps on Village owned parkways and park properties along with 2,082 open planting spaces. The charts and statistics in this portion of the Management Plan illustrate that the tree population in Park Forest is in below average condition overall and the stocking density is moderate, at 60%. The species diversity in Park Forest is good, with 103 individual species represented. Based on the following data in the Management Plan, the Village of Park Forest will be equipped to use this valuable information to address short term concerns, long term management considerations, and overall planning objectives.

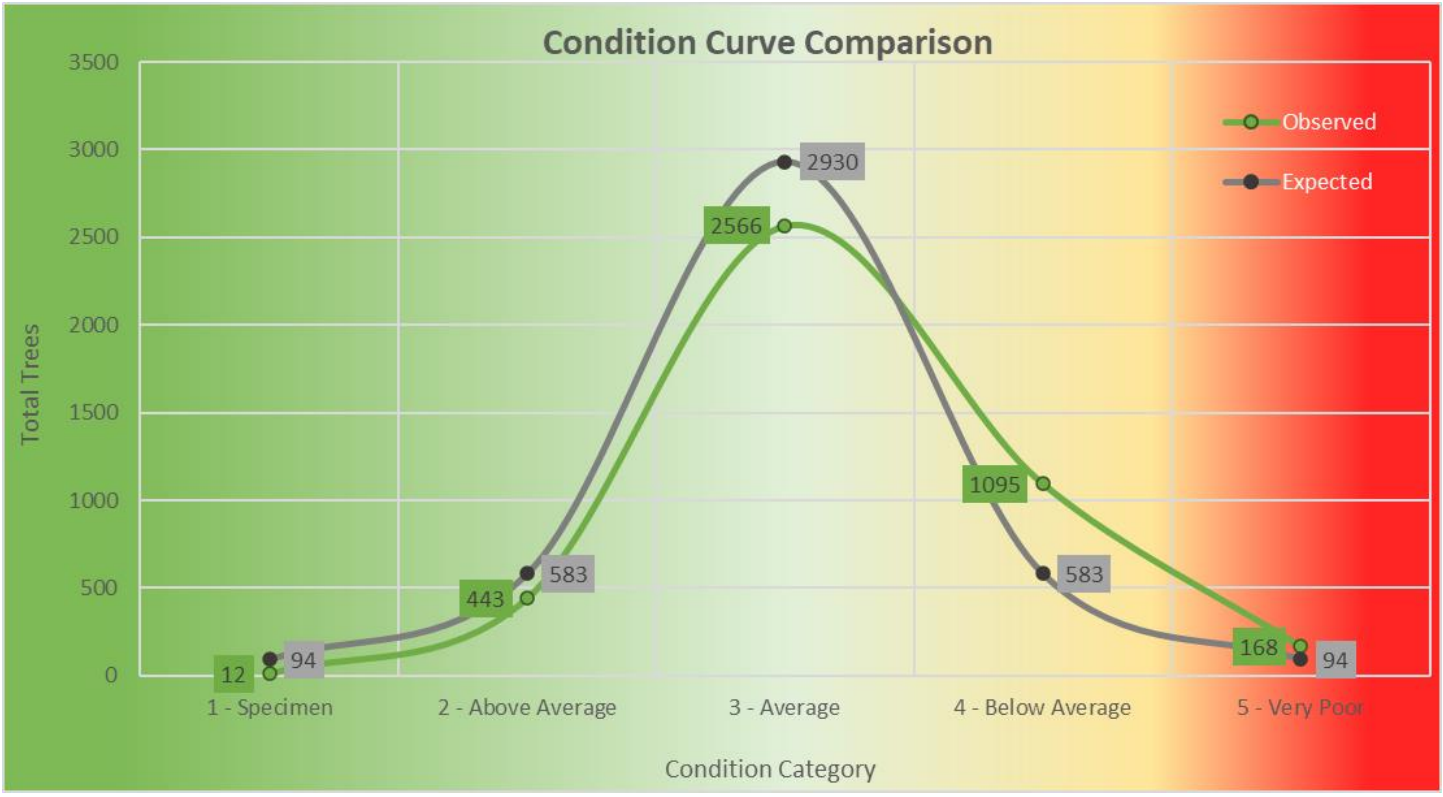
Basic Statistics – Managed Trees

Total Number of Trees Inventoried	**4,284**
Number of Street Trees Inventoried	3,260
Number of Park Trees Inventoried	1,024
Total Number of Stumps Inventoried	76
Number of Planting Spaces Inventoried	2,082
Total Number of Species	103
Total Diameter Inches	68,280"
Average Tree Diameter	15.94"
Average Tree Condition	3.23 (Well Below Average)

Condition Statistics

During the tree inventory, the condition of each tree was rated using a 1-5 rating system. The rating criteria is as follows:

Condition 1	**Specimen –** Tree has no observable defects, wounds, diseases, and has perfect form for the species. Since younger trees are generally trouble free, a condition 1 tree must, by the UFMP definition, be greater than 16" DBH. These are legacy trees, and as such are rare.
Condition 2	**Above Average –** Tree may have a small amount of deadwood, or a very limited number of minor defects. The overall form of the tree must be good, and consistent for the species. These trees, by the Forestry Consultant's definition, must be larger than 8" DBH.
Condition 3	**Average –** Meant to define the middle ground around which superior or inferior trees are defined. These trees have moderate amounts of deadwood, wounds, or other defects, but are generally healthy. A wide variety of forms are acceptable in this group,
Condition 4	**Below Average –** Tree has defects, deadwood, wounds, disease, etc., which are likely to cause a need for removal. Very poor form or architecture can put an otherwise healthy tree in this category as well.
Condition 5	**Very Poor –** Tree must be removed. Defects are too far advanced for the tree to be reasonably saved. Like condition 1 trees, these are rare, as generally trees approaching this level are removed before they deteriorate to this level.



The chart above represents the distribution of trees in each of the 5 categories. GLUFM has included the tree condition ratings observed in the field (green line), as well as a curve representing an "average" distribution (grey line) so that comparisons can be made. The condition curve for the Park Forest inventory indicates a tree population that is in overall well below average condition.

Condition 1, or specimen trees, are fewer than would be predicted by the standard distribution alone. It is often expected that specimen trees (and often Condition 5 trees) will come in less than their statistical norm, because of their relative rarity. A Condition 1 tree, by definition, must be at least 16" DBH (and generally much larger), have textbook perfect architecture for the species, and have no observable defects. Although a considerable percentage of the Park Forest population exceeds the 16" DBH threshold, many mature trees have developed considerable deadwood, decay, or other structural defects that places them into a lower category.

Condition 2, or above average trees, are also significantly less than what statistical analysis would predict. Similar to the Condition 1 category, Condition 2 trees need to have a sound structure, consistent with the species, be free of major defects, and over 8" DBH. Many of the trees in Park Forest that would be eligible for a Condition 2 rating did not meet these standards due to the presence of deadwood, decay, and/or structural defects. Park Forest has the opportunity to increase the number of trees in the Condition 2 category by planting appropriately selected trees in identified sites. This, along with adequate growing space, proper mulching and maintenance will ensure that the number of Condition 2, and even Condition 1 trees will increase over time.

Condition 3, or average category, has fewer tress than the expected norm. Primarily because many trees that would typically be in this category, fall into the Condition 4 & 5 categories. Typically, all trees under 8" DBH are automatically assigned this category, unless they happen to be in poor condition. As Park Forest uses

this inventory data to prioritize and attend to identified issues, the Village's condition curve will begin to trend more toward Condition 3.

Condition 4, or below average trees, are significantly greater than statistically expected; largely because of the significant number of over-grown trees with structural defects, decay, and deadwood. Park Forest can use this inventory to locate Condition 4 trees and prioritize them for maintenance or removal, reducing the overall count of trees in this category.

Condition 5, or very poor trees, are also greater than expected. Great Lakes Urban Forestry Management recommends that the Village prioritize Condition 5 trees for removed in a timely manner.

Age Class Analysis

To determine the number of trees in each "age class", the tree population is divided into eight, 6" diameter increments. As a standard measure, trees are grouped by their Diameter at Breast Height (DBH). This breakdown helps determine where each tree is in its life cycle. Some trees like Cottonwood and Silver Maple grow in diameter very quickly, up to 1" per year, possibly more. Others, such as Oak and Hickory may add only ¼", or less every year. As a broad generalization, most trees average about ½" of growth per year.

The Age Class Diversity chart, illustrates a somewhat atypical trend in the overall age spread of a tree population in a municipal setting. Typically, there is a greater number of younger to middle aged trees and fewer trees in the older age categories. The Park Forest tree population is largely middle aged to mature with over 65% of the tree population measuring more than 13" DBH. With 2,082 planting spaces identified in the inventory, Park Forest has an enormous opportunity to focus on tree planting going forward. As demonstrated above, just 14% of the total population has a DBH of 6" or less. These trees are generally

considered to be younger than about 15 years old. Approximately 20% of Park Forest's trees have a DBH of 7-12", considered to be about 15-25 years old. The 13-18" DBH category is the largest, making up almost 27% of the population. These trees are approximately 25-35 years old. The 19-24" DBH category makes up over 24% of the population. These trees are generally mature trees, 35-45 years old.

There are 449 trees measuring over 24" DBH, accounting for about 14% of the total tree population and are 45+years old. Many of these may be nearing the end of their natural life and a significant number are in Below Average, or worse condition. Notably, the number of trees in the 30"+ categories is often lower due to natural senescence and ensuing decline of trees in urban settings.

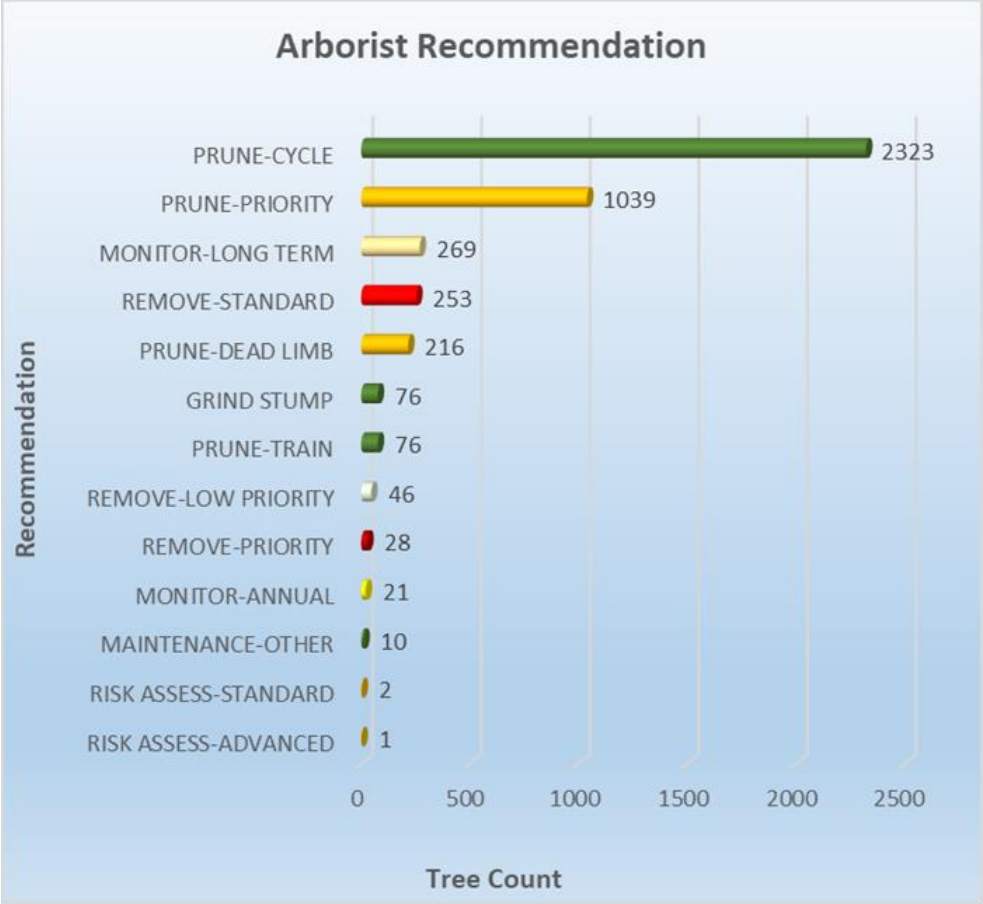
The, somewhat, equal number of trees in each age classification is, within reason, desirable and indicates a consistent focus on tree planting and tree maintenance in Park Forest. In addition, showing proper tree selection for any given location. As younger trees continue to grow, Park Forest has the opportunity to bring the tree age classes to a more balanced level. Going forward, Park Forest should continue to take a targeted approach when it comes to choosing new species to plant in its parkways and parks focusing on planting a wider variety of tree species and genera.

1950	8,138
1960	29,993
1970	30,638
1980	26,222
1990	24,656
2000	23,462
2010	21,975

The table of Park Forest's population growth since 1950 is shown at the right, and it is apparent that the growth in the number of trees on the Village ROWs increases around the same time as the population of the Village was increasing dramatically. For the Village, population growth spiked between 1950 and 1960. This corresponds directly with the increase in tree planting between 25-30" diameter inches, which equates to 60 years ago, in tree terms!

Arborist Recommendation / Maintenance

During the inventory, the Forestry Consultant's staff recorded an Arborist Recommendation for each tree, outlining what maintenance work needs to be performed in the coming years.



In terms of Arborist Recommendations of maintenance needs in the Park Forest tree population, the statistics displayed above show an overall average trend. The majority of trees (54%) require only Cyclical Pruning on a regular basis, which is an overall desirable trait in a tree population. However, there are a significant number of trees recommended for removal. The 28 trees in the Priority Removal category should be prioritized over other removals. The 253 trees designated as standard removals should be prioritized and removed in a timely manner. The 46 trees in the low priority removal category should be removed as time and budget allow. The remaining categories, other than removals discussed above, were used to indicate trees in need of maintenance which should be prioritized over those in the Cyclical Prune category and will be discussed briefly below.

The 1,039 trees in the "Prune-Priority" group and the 216 trees in the "Prune-Dead Limb" group are trees which are simply overgrown, or have parts which need to be removed promptly, and should have pruning prioritized over the trees in the cyclical prune set. Generally, these are considered this to be a "within 1-3 years" level of pruning.

The 290 total trees in the "Monitor" categories can be viewed as being in a transitional phase. For the most part, the tree has an indiscernible defect, or shows signs of developing issues or general decline which must be observed. These trees should be reassessed periodically, and their maintenance status updated as necessary.

Trees categorized as "Prune-Train" are typically trees smaller than 8" DBH and have structural issues or are overgrown and require selective pruning to establish better architecture in the future. Establishment pruning, or the pruning of young trees to establish proper branching habit and structure, is one of the least expensive yet most effective maintenance items that can be performed on a young tree.

The 3 trees which received a "Risk Assessment" status are in a location that poses an elevated risk to Park Forest residents. These are trees which have developed defects and require a more in-depth inspection and analysis to determine Park Forest's risk tolerance threshold and the need for mitigation efforts. It is recommended that a Level 2 Basic Risk Assessment be performed on these trees (per TRAQ or ANSI A300 Pt 9 Standards), or equivalent (ISA Tree Risk BMP methodology, Matheny and Clark, etc).

The 10 trees in the "Maintenance-Other" category typically need some other form of maintenance not covered in the rest of the categories. A description of the maintenance needed should be found in the comments field.

Risk Assessments

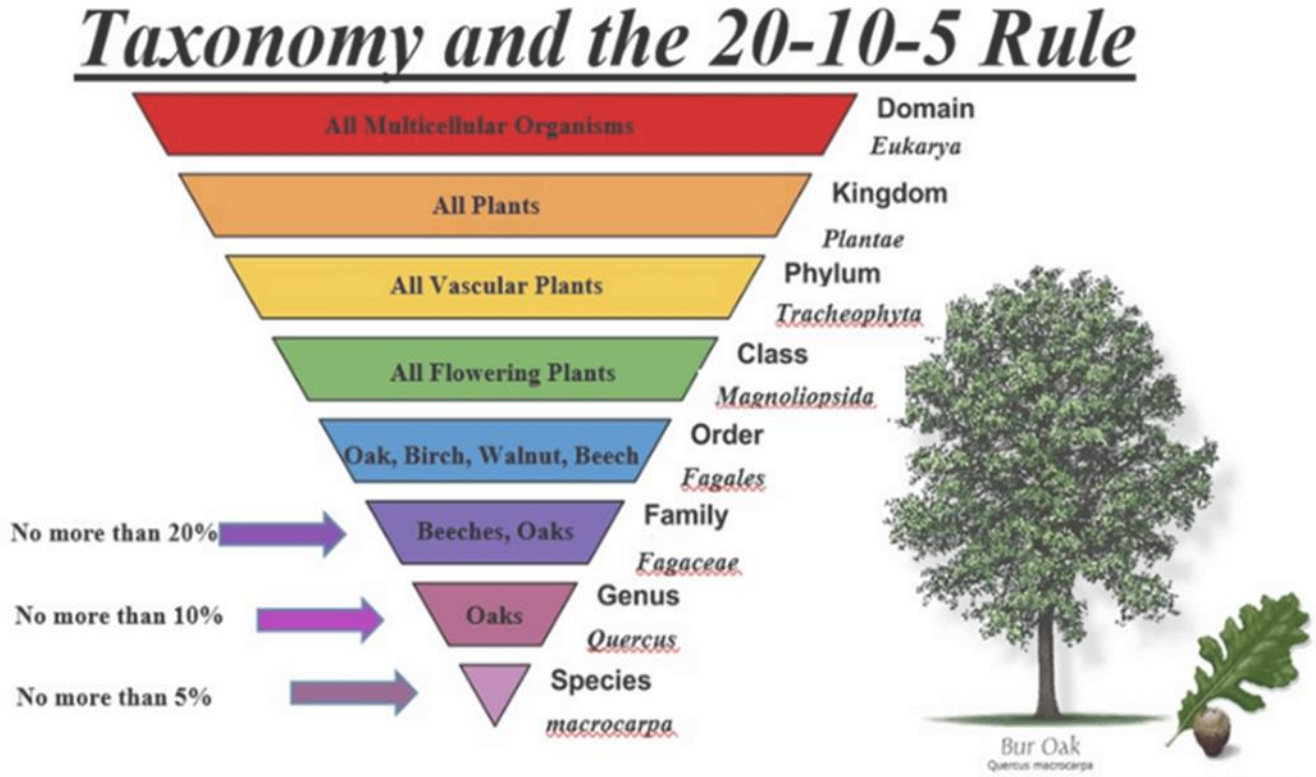
Each tree inventoried was subject to a rapid tree risk assessment. The International Society of Arboriculture has a professional qualification program called "TRAQ" (Tree Risk Assessment Qualification) which uses specific information for assessing how much risk a tree poses. The Forestry Consultant's staff used a rapid tree risk assessment based on this protocol. Such rapid assessments are used in applications such as disaster relief assessments after extreme weather events where tree risk must be documented, but time frames are very short. For this reason, it must be unequivocally stated that these assessments are NOT meant to be legally binding, and do not represent a full TRAQ evaluation of the level of risk individual trees may pose.

As illustrated in the chart above, the vast majority of Park Forest trees were found to have no observable risk level. The 2 trees assigned to the critical risk level category should receive immediate mitigating actions. The 138 trees that fell into the substantial risk level category should receive a Level 2 Risk Assessment and/or

mitigating action. Any tree found to pose an elevated risk level should be monitored and/or inspected by Park Forest and a threshold of risk tolerance be established. Some of elevated risk level trees may also be considered for a Level 2 Risk Assessment and/or mitigating action. Great Lakes Urban Forestry Management would be pleased to assist Park Forest in any aspect of developing or managing a Tree Risk Assessment Policy or performing Level 2 Basic Risk Assessments or Level 3 Advanced Risk Assessments.

Diversity Analysis

Taxonomy is the method by which scientists classify plants, animals, and other life forms into distinct categories. A species is unique, with only one type in that category. The designation, or name, Burr Oak (*Quercus macrocarpa*), refers to only one specific type of tree. A genus, however, is a group that may contain multiple species. All Oak trees, for instance, are in the genus *Quercus*. The further down the taxonomic ladder, the more similar things become.



The more similar tree species are to each other, the higher the likelihood that an insect or pathogen can exploit every species of that genus. Emerald Ash Borer is a classic example of this, as it affected every tree species in the Fraxinus (ash) genus. The most effective measure to manage tree loss is to limit the number of similar trees planted, that a new pest or pathogen can affect. While diversity at the species level is important, it is also important to achieve diversity on the genus and family levels, so that a diverse selection of trees are planted.

Great Lakes Urban Forestry Management recommends that Park Forest continue to plant according to the "20-10-5" rule. This rule states that no more than 20% of any given family, 10% of any given genus, and 5% of any given species is planted during any one planting cycle. It is also a long-term goal of this Plan to have the tree population, as a whole in compliance with the 20-10-5 Rule. Although it may not be possible by the 2032 date,

this level of taxonomic diversity is consistent with today's arboricultural industry standards (see above graphic).

The old paradigm of urban forestry was to create tree lined streets and parks in which every tree was the same type, shape, age, and height, to produce a uniform, "aesthetically pleasing" appearance. Urban foresters have now learned that once a pest or pathogen is introduced into a monoculture such as this, an epicenter of infestation is created that may cause serious damage, both ecologically and financially. Diversity in the urban forest helps prevent and reduce the impacts of pests and pathogens. There are three aspects of diversity in the urban forest, examined in detail, below.

Taxonomic (Species) Diversity

Why is it so important to plant a diverse assortment of trees at the Species, Genus, and Family levels? Simply put, to ensure that there will not be another massive tree loss, from a pest, such as the Emerald Ash Borer, or pathogen in the future. The reason losses from the Emerald Ash Borer (EAB) were so devastating and expensive, for many communities was because tree populations were often composed of over 20% Ash trees. When these trees died, those communities lost 20% of their trees.

This loss comes with the obvious expense of removal and replacement, but devastating tree loss comes with hidden costs as well. Namely the loss of the environmental services that those trees provided; homes cost more to heat and cool, storm water infrastructure fails under heavier pressure, and levels of pollutants and greenhouse gases are increased. For all of these reasons, a diverse population of trees is needed so that communities are never at risk of losing more than 5-10% of their trees at any given time due to pests or pathogens.

As will be discussed in further detail, Maple is the dominate Genus in Park Forest, overwhelming the overall population by well over 50%. In decreasing numbers, the remaining top 5 include Honeylocusts, Undesirable species, Oaks, and Lindens.

Spatial Diversity

Spatial diversity is the practice of mixing tree species across a given geographic area. The easiest way to slow the spread of any new pest or pathogen is to increase the distance between potential hosts. Every pest or disease, such as EAB or Dutch Elm Disease (DED), has a limited area in which it can spread within a given time. The more difficult it is to get to the next host tree, the less potential for spread, and the easier quarantine becomes.

In addition to the functional benefits provided by increasing spatial diversity, communities that have implemented diverse planting over several decades have demonstrated that such diversity yields an arboretum-like landscape, both functional and aesthetically pleasing. At present, the Spatial Diversity in Park Forest is relatively low. During tree selection, extra care should be given to ensure that new plantings yield a spatially diverse tree population.

Age-Class Diversity

Age-class diversity is also an important consideration. A healthy, natural forest has trees of many ages. Young, intermediate, and mature trees allow for regeneration, replacement and vigor in the overall forest community. A mixture of species, locations, and ages yields the greatest diversity that insulates a natural forest from pest and pathogen outbreaks. The Urban Forest is no different. The outdated urban forestry paradigm promoted an

urban forest of trees, all approximately the same size and age, and species. Once these trees begin to decline, most will require removal and replanting simultaneously, leaving an entire street or neighborhood without shade and aesthetically barren. Add to this the expense of wholesale removal and replacement and the benefits of age-class diversity become readily apparent.

The current approach of the urban forestry community is to strategically plant trees on streets or in neighborhoods over a longer timeframe. This strategy allows trees to mature and decline in different stages, and at different times. As declining trees are removed, there will always be a variety of age classes, sizes and species on a block or in a neighborhood. This reduces the pressure to plant trees in an area immediately after tree removal, helping to manage costs. A mixed age-class planting ensures that mature trees are always present in a neighborhood. It also allows for strategic planting of smaller or medium sized trees.

An additional benefit of mixed-age plantings is the ability to plant shade-loving trees as well as sun-loving trees together. A newly planted street or neighborhood with trees of the same age puts all the trees essentially in full sun. This reduces the ability to plant shade loving trees, as they have a tendency to dry out in the summer sun. With mixed-age stands, shade-tolerant, trees can be planted underneath the canopy of larger, mature trees. This approach allows for future tree removal and replacement, ensuring an Urban Forest that has mature trees, middle-aged trees, and young trees in similar quantities.

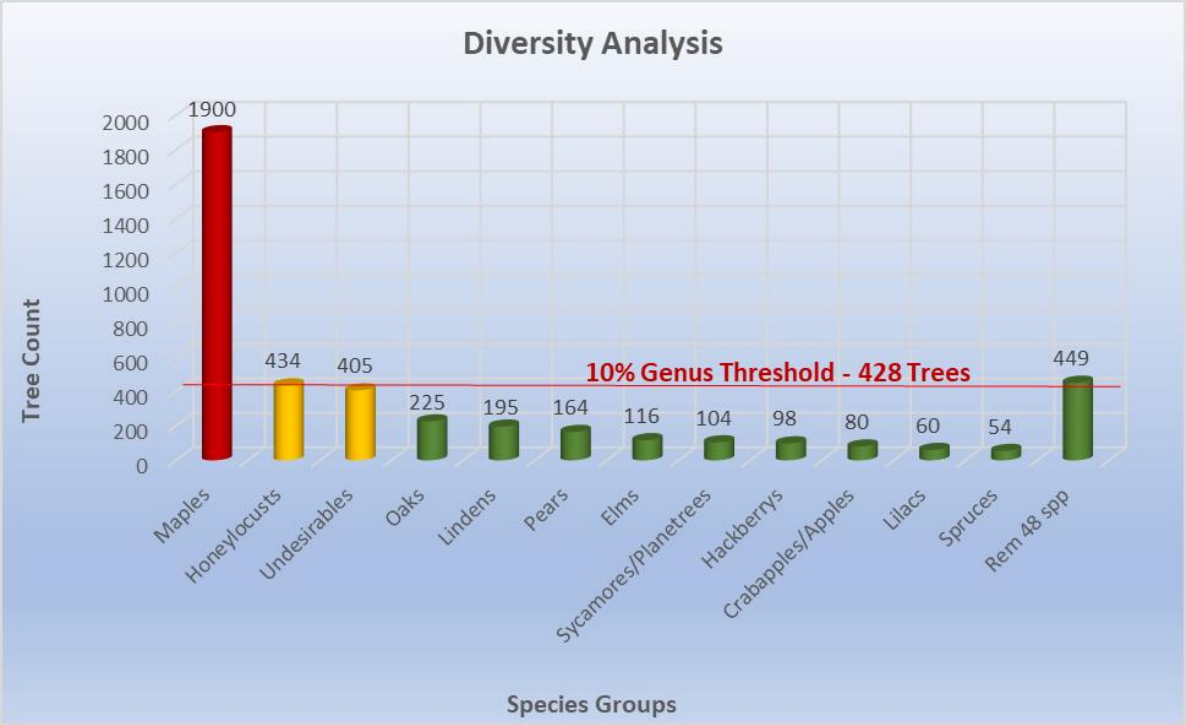
Current Tree Population

SPECIES	COUNT	% OF TOTAL	AVG DBH	AVG COND
MAPLE-SILVER	1207	28.17%	19.76	3.40
HONEYLOCUST	434	10.13%	19.48	3.14
MAPLE-RED	285	6.65%	14.72	3.24
MAPLE-NORWAY	260	6.07%	15.95	3.32
ELM-SIBERIAN	212	4.95%	21.75	3.48
PEAR-CALLERY	163	3.80%	10.66	3.21
LINDEN-LITTLELEAF	147	3.43%	14.67	3.05
HACKBERRY	98	2.29%	12.08	2.77
SYCAMORE	96	2.24%	21.02	2.59
MAPLE-AUTUMN BLAZE	83	1.94%	7.45	2.98
APPLE-CRAB SPP	75	1.75%	9.93	3.36
COTTONWOOD	58	1.35%	34.21	3.17
LILAC-TREE	58	1.35%	6.29	3.17
ELM-HYBRID	57	1.33%	5.60	3.09
LINDEN-AMERICAN	46	1.07%	17.07	3.02
MULBERRY-SPP	46	1.07%	12.24	3.28
OAK-SWAMP WHITE	46	1.07%	3.24	3.00
OAK-PIN	42	0.98%	19.86	3.14
MAPLE-SUGAR	40	0.93%	10.98	3.08
OAK-BURR	38	0.89%	10.50	2.92
ELM-AMERICAN	37	0.86%	18.57	2.97
GINKGO	37	0.86%	9.95	2.92
SWEETGUM	32	0.75%	6.00	2.94
KENTUCKY COFFEETREE	31	0.72%	3.94	3.03

OAK-RED	31	0.72%	16.45	3.26
ASH-GREEN	30	0.70%	14.60	3.37
BUCKTHORN	29	0.68%	7.93	3.03
SPRUCE-BLUE	28	0.65%	11.50	3.14
PINE-WHITE	27	0.63%	12.85	2.89
BALDCYPRESS	24	0.56%	4.25	2.92
OAK-WHITE	24	0.56%	13.63	2.83
AMERICAN REDBUD	23	0.54%	9.30	3.17
BIRCH-RIVER	23	0.54%	14.17	3.04
CHERRY-BLACK	22	0.51%	12.95	3.18
HAWTHORN-SPP	21	0.49%	12.05	3.19
ELM-RED	20	0.47%	12.65	3.10
MAPLE-MIYABEI	16	0.37%	7.94	3.06
TULIPTREE	16	0.37%	8.75	3.13
AMERICAN HORNBEAM	15	0.35%	6.13	3.20
BIRCH-WHITE	15	0.35%	6.67	3.47
OAK-ENGLISH	15	0.35%	3.20	3.27
SPRUCE-NORWAY	15	0.35%	17.40	2.67
ARBOR VITAE	13	0.30%	6.92	3.08
ALDER-SPP	11	0.26%	11.09	3.45
OAK-SHINGLE	11	0.26%	5.09	3.18
CATALPA	10	0.23%	15.70	2.90
OAK-CHINQUAPIN	10	0.23%	3.70	3.20
SPRUCE-WHITE	10	0.23%	10.60	4.10
WILLOW-SPP	10	0.23%	42.70	4.20
EASTERN REDCEDAR	9	0.21%	9.11	2.78
HAWTHORN-COCKSPUR	9	0.21%	13.11	3.33
HICKORY-BITTERNUT	8	0.19%	1.50	3.00
LONDON PLANETREE	8	0.19%	14.00	2.50
MAGNOLIA-SPP	8	0.19%	6.00	3.00
POPLAR-WHITE	8	0.19%	28.88	3.75
WALNUT-BLACK	8	0.19%	9.50	3.13
SERVICEBERRY-SPP	7	0.16%	3.29	3.14
BLACKGUM	6	0.14%	4.83	3.33
HORSECHESTNUT	6	0.14%	12.67	3.83
AILANTHUS	5	0.12%	3.60	3.40
APPLE-EDIBLE	5	0.12%	4.20	3.00
ASH-WHITE	5	0.12%	24.80	4.20
BUCKEYE-OHIO	5	0.12%	10.60	2.60
PINE-AUSTRIAN	5	0.12%	16.00	3.40
PLUM-SPP	5	0.12%	5.60	3.20
BOXELDER	4	0.09%	14.25	4.25
CHERRY-SPP	4	0.09%	8.75	3.75
HICKORY-SHAGBARK	4	0.09%	11.00	2.75

MAPLE-AMUR	4	0.09%	11.75	3.00
MAPLE-BLACK	4	0.09%	10.50	3.25
SUMAC	4	0.09%	2.00	3.00
AMUR CORKTREE	3	0.07%	12.67	2.67
HAWTHORN-GREEN	3	0.07%	9.00	2.67
HAWTHORN-WASHINGTON	3	0.07%	12.67	4.00
IRONWOOD	3	0.07%	5.00	3.00
OAK-CHESTNUT	3	0.07%	2.33	3.00
OAK-SCARLET	3	0.07%	19.33	4.00
WILLOW-WEEPING	3	0.07%	22.67	4.00
WILLOW-WHITE	3	0.07%	9.33	3.33
BLACK LOCUST	2	0.05%	25.00	2.00
ELM-SPP	2	0.05%	13.00	3.50
LILAC-SHRUB	2	0.05%	9.00	3.00
LINDEN-SILVER	2	0.05%	17.50	1.50
OAK-HERITAGE	2	0.05%	3.00	3.50
OSAGE ORANGE	2	0.05%	12.00	3.50
SMOKETREE	2	0.05%	9.50	3.00
UNKNOWN	2	0.05%	3.00	4.00
BEECH-SPP	1	0.02%	18.00	4.00
BIRCH-GRAY	1	0.02%	5.00	4.00
BUCKEYE-RED	1	0.02%	7.00	3.00
DOGWOOD-SPP	1	0.02%	4.00	5.00
DOUGLAS FIR	1	0.02%	14.00	3.00
KATSURA	1	0.02%	12.00	3.00
MAPLE-HEDGE	1	0.02%	11.00	5.00
PEAR-EDIBLE	1	0.02%	10.00	4.00
PINE-SCOTCH	1	0.02%	17.00	3.00
PINE-SPP	1	0.02%	11.00	4.00
SPRUCE-SPP	1	0.02%	2.00	3.00
WALNUT-WHITE	1	0.02%	14.00	4.00
WILLOW-PUSSY	1	0.02%	13.00	3.00
YELLOWWOOD	1	0.02%	2.00	3.00
YEW	1	0.02%	5.00	3.00
ZELKOVA	1	0.02%	8.00	3.00

As shown in the table above, the Village of Park Forest tree population consists of 103 distinct tree species, accounting for 4,284 total trees. The above table shows the percent of each species, as well as the average Condition and Trunk Diameter. Trees with a Condition Rating of less than 3 and with a large DBH indicates trees that are doing well. This population is represented graphically below:



As seen above, tree diversity in Park Forest is good overall but by far, Maple is the dominate species. In decreasing numbers, the remaining top five include Honeylocust, Undesirable Spp., Oak, and Linden. From there, the number of tree species representing more than 1% of the total tree population drops off steadily. The primary goal of the Diversity Vision is to reduce the number of Maples while increasing the lesser represented species. A positive characteristic that should be acknowledged is the presence of native Oaks in the top 5 species.

Great Lakes Urban Forestry Management recommends the Village continues to develop a long-term tree-planting plan. This invaluable tool would not only further improve overall diversity, but also maximize the lifespan of public trees by carefully matching tree species requirements and tolerances to each individual planting site. Trees that are well adapted to their growing conditions will establish more quickly, require less maintenance, be healthier overall and more resistant to disease and insect infestations. By matching the right trees with the right planting spaces, using a tree-planting plan, the Village of Park Forest will maximize its investment in each new tree. Great Lakes Urban Forestry Management also recommends the Village limit widespread planting of Maple species and select improved varieties of Maple species when necessary.

The 274 trees in the "Undesirable spp." category include trees such as Ailanthus, Buckthorn, Cottonwood, Siberian Elm, Mulberry, White Poplar, unimproved Osage Orange, unimproved Black Locust, and Willow spp. These trees are known for either being invasive or weak-wooded trees that often develop a variety of structural defects as they mature. For safety, aesthetic, and ecological reasons, it is recommended that the Village set a goal of gradually reducing the number of undesirable trees on its parkways and replanting them with a diverse set of tree species to increase overall diversity and improve population stability. The plan also recommends that the species Ailanthus, White Poplar and Buckthorn be assigned to priority removals.

Although Park Forest's diversity is decent overall (with the exception of the Maples), the Village has a number of species to choose from which are commercially available and underrepresented in this population. As

mentioned above, the Urban Forest Management Plan will lay out strategies to increase diversity. Specific species recommendations are in the "Future of the Urban Forest" Section below.

i-Tree Report / Urban Tree Canopy Assessment

i-Tree is a state-of-the-art, peer-reviewed software suite from the USDA Forest Service that provides Urban Forestry analysis and benefits assessment tools. Communities of all sizes have strengthened their forest management and advocacy efforts by using i-Tree tools to help quantifying the structure of trees and forests, and the environmental services that trees provide.

The i-Tree suite calculates the hard dollar "ecological service" values trees provide to communities that save homeowners money. Savings such as heating and cooling costs from summer shade and winter windbreaks, CO2 uptake, reducing the effects of climate change and air quality improvements from the absorption of urban pollutants. Trees also absorb stormwater, reducing strain on stormwater infrastructure, saving money in replacement costs. Finally, trees can contribute up to 15% of the total value of a property.

Using the data from the tree inventory, several i-Tree reports have been prepared for the Village of Park Forest. Below are reports on the Net Annual Benefits of the tree population, replacement values, and breakdown of benefits per species. GLUFM performed both the i-Tree Streets analysis that looks primarily at energy savings, and an i-Tree Eco analysis that focuses more on ecological benefits such as Carbon Storage and Sequestration. The results of these analyses are below, and full tables and i-Tree Reports are available.

i-Tree Streets Analysis Results

Park Forest

Total Annual Benefits, Net Benefits, and Costs for Public Trees

6/9/2022

Benefits	Total ($)	Standard Error	$/tree	Standard Error	$/capita	Standard Error
Energy	45,899	(N/A)	10.71	(N/A)	2.09	(N/A)
CO2	11,929	(N/A)	2.78	(N/A)	0.54	(N/A)
Air Quality	10,784	(N/A)	2.52	(N/A)	0.49	(N/A)
Stormwater	293,590	(N/A)	68.53	(N/A)	13.34	(N/A)
Aesthetic/Other	139,083	(N/A)	32.47	(N/A)	6.32	(N/A)
Total Benefits	501,284	(N/A)	117.01	(N/A)	22.79	(N/A)

Total Standing Value of Park Forest's Tree Population

$5,256,496

(Per Council of Tree and Landscape Appraisers 9th Guide to Plant Appraisal)

i-Tree Eco Analysis Results

- Number of trees: 4,284
- Tree Cover: 47.66 acres
- Most common species of trees: Silver maple, Honeylocust, Red maple
- Percentage of trees less than 6" (15.2 cm) diameter: 16.0%
- Pollution Removal: 1.576 tons/year ($25.3 thousand/year)
- Carbon Storage: 3.178 thousand tons ($542 thousand)
- Carbon Sequestration: 50.82 tons ($8.67 thousand/year)
- Oxygen Production: 135.5 tons/year
- Avoided Runoff: 109.1 thousand cubic feet/year ($16.3 thousand/year)
- Building energy savings: N/A – data not collected
- Avoided carbon emissions: N/A – data not collected
- Replacement values: $7.69 million

Total Standing Eco Value of Park Forest's Trees $2,975,504

Total Annual Eco Value of Park Forest's Trees $66,250/year

To summarize all of these values together, the following table has been created:

Annual Values	
Benefits to Residents	$501,284/year
Benefits to Environment	$66,250/year
SUBTOTAL (Each Year)	**$567,534/year**
Standing Values	
As a Commodity	$5,256,496
As an Ecological Resource	$2,975,504
SUBTOTAL	**$8,232,000**

As can be seen from the above tables, the tree population in the Village of Park Forest currently provides $567,534 in benefits every year. This value is directly related to trees and their effect on homes, businesses, and the environment. By comparison, the proposed annual budget for all forestry activities recommended in this plan, projected through the calendar year 2032, total approximately $154,000 per year. With benefits from the tree population valued at over 3 ½ times the costs to maintain and grow the urban forest these monies are an investment. This will be examined further in the Plan. In addition, the total standing value, as a commodity and an ecological resource for the entire tree population is $8,232,000.

These benefits are essentially "income" to Park Forest's residents, and as trees mature, this "income" will grow. For instance, a 3" diameter tree provides less than $50/year in benefits, whereas a 20" tree can provide up to $500 per year. The goal is to increase benefits so that the tree population pays for itself and even yields "profits".

The replacement value of trees was also calculated. Currently, the standing value of all trees in the Village of Park Forest is $5,256,496. This value is calculated using the industry standard reference, *9th Edition Guide to Tree and Landscape Appraisal*, published by the Council of Tree and Landscape Appraisers (CLTA).

The i-Tree Eco data looks at the value of trees in the absence of their effect on homes and businesses, and looks at trees from an ecological perspective to determine a tree's value in sequestering and storing Carbon. These numbers derive from peer-reviewed science in Arboriculture, Climatology and other disciplines.

The goal of this Urban Forestry Management Plan is to create a tree population that maximizes all of these ecological services for Park Forest residents by increasing the number of trees in Village, and their longevity, all while minimizing costs, in order to create a healthy, well maintained, and vibrant tree population.

Below are several examples of Ecological Services provided by trees:

Energy Savings: During the warm summer months, trees temper high temperatures with their shade. Cooler temperatures lessen the workload of air conditioners, reducing overall energy consumption. During the colder winter months, trees can moderate winter winds, easing heat loss, again reducing energy consumption.

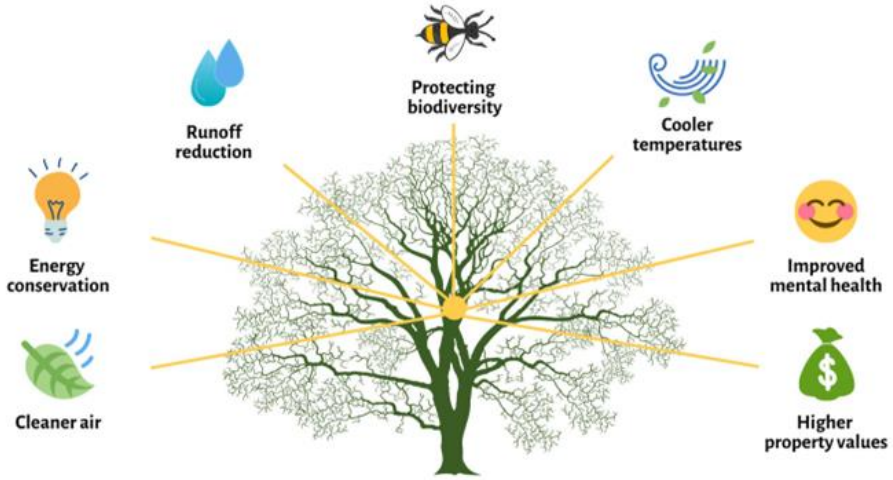
Carbon Dioxide (CO2): The amount of CO2 emitted into the atmosphere has a direct correlation to global climate change. Among other things, this change contributes to more severe storms and more extreme drought conditions. Reducing CO2 emissions and pulling carbon from the atmosphere lessens these effects. Trees

uptake CO2 and act as a carbon sink, sequestering carbon in its woody tissues, removing it from the atmosphere, creating a net benefit to society, and saving money. According to the Arbor Day Foundation , in one year a mature tree will absorb an average of 48 pounds of carbon dioxide from the atmosphere and release 260 pounds of oxygen in exchange.

Air Quality: Industrial processes and vehicle emissions add pollutants into the air that can lead to, or worsen health conditions such as heart and lung disease, and asthma. In addition, these pollutants can mix with moisture in the atmosphere creating nitric and sulfuric acids. This "acid rain" can destroy fisheries and contaminate water supplies. Trees absorb these compounds through their leaves and other tissues, preventing them from remaining in the atmosphere. Reductions in these pollutants results in overall improved community health, reducing the cost of healthcare to society.

Storm water: The cost to manage stormwater is considerable, and when the system is overrun, or fails, damage to homes, vehicles and lost business can become catastrophic. Add to this the cost of repairing or replacing damaged infrastructure and the need for effective and efficient ways to manage stormwater is readily apparent. One of the most efficient and reliable methods of managing stormwater comes from trees. Foremost, the tree canopy intercepts the rain and holds it in its leaves, branches and bark. The Center for Urban Forest Research estimates a single tree can reduce stormwater runoff by more than 4,000 gallons annually. In Park Forest, counting only trees 19" and larger, this translates to over 5,000,000 gallons of stormwater detained annually. Trees then slowly release stormwater into the soil. This slow and controlled release of water helps keep soils from becoming over saturated and able to absorb the water. Secondary to trees physically detaining rain is transpiration, the process of trees drawing moisture form the soil and "exhaling" back into the atmosphere. These cumulative, natural processes ease demand on stormwater infrastructure, allowing it to do its job more effectively with the result of reduced flooding and the subsequent damage it can cause.

Aesthetic/Economic: Up to 15% of the value of a property may be attributed to its trees and other landscaping. Tree lined streets are often found to be more appealing to homebuyers than streets devoid of trees, which may result in increased property values (https://www.arborday.org/trees/benefits.cfm).



Urban Tree Canopy Assessment

Based on data available from the US Forest Service and The Morton Arboretum, the total Urban Tree Canopy of Park Forest was assessed, and is expressed as a percentage of tree canopy coverage from an aerial perspective. This assessment covers seven land cover types that include trees, grass and shrub, bare soil, water, buildings, roads/railroads, and other paved surfaces. The result of this tree canopy assessment is that Park Forest contains 42.88% total tree canopy. The map of the canopy assessment appears on the next page.

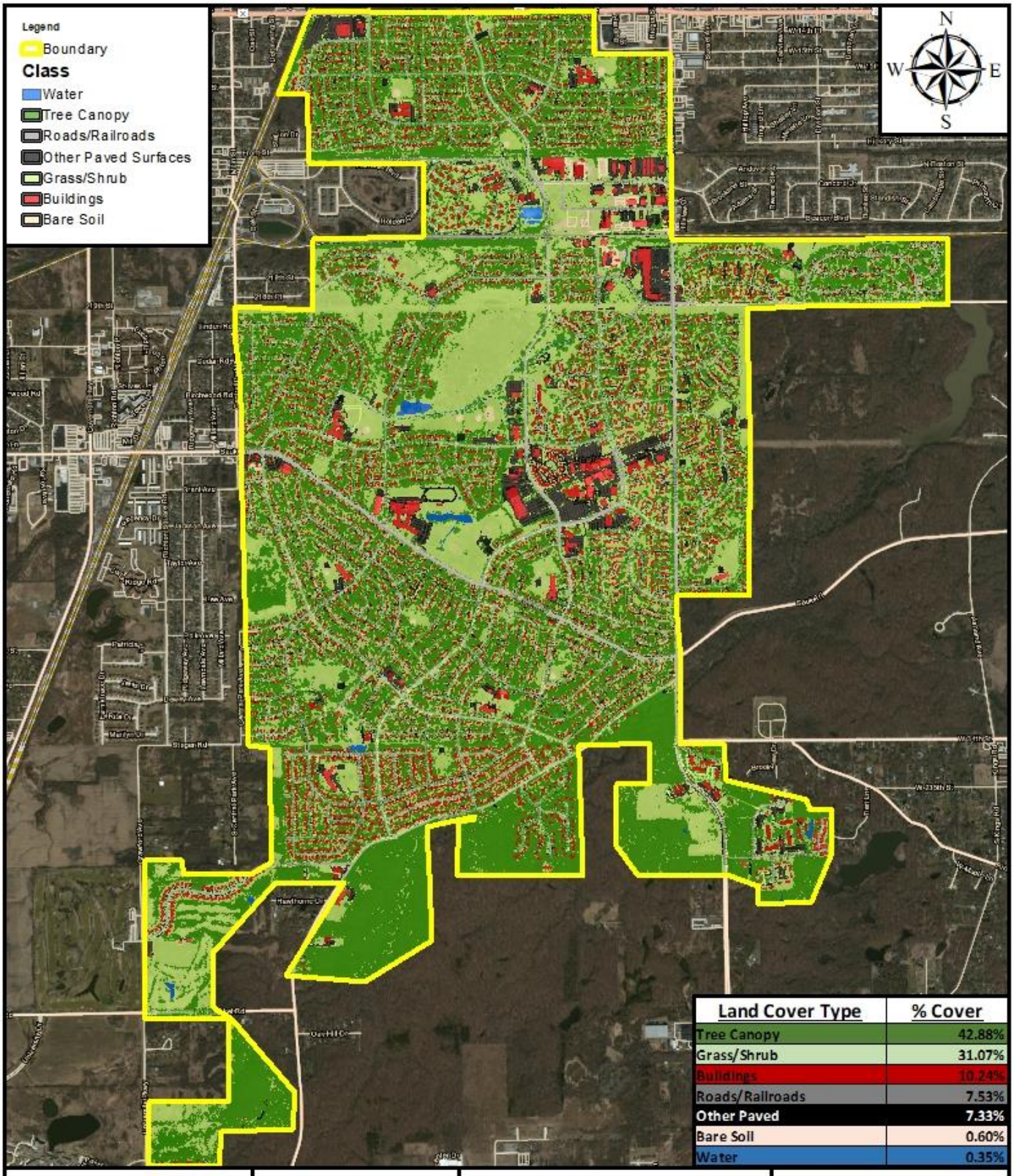
Land Cover Type	% Cover
Tree Canopy	42.88%
Grass/Shrub	31.07%
Buildings	10.24%
Roads/Railroads	7.53%
Other Paved	7.33%
Bare Soil	0.60%
Water	0.35%

The tree canopy assessment itself was conducted on publicly owned land such as parkways and boulevards, by using software similar to Google Earth, to analyze aerial images and estimate tree and other land cover types within the Village. Detailed information on each tree is not included in this assessment, only total coverage.

The Plan recommends the goal of increasing the total tree canopy in Park Forest to 44% by 2032. This goal is based on preliminary data (https://chicagorti.org/master-plan/) from the Chicago Region Trees Initiative's (CRTI) Forest Composition Workgroup.

Great Lakes Urban Forestry Management believes this is a modest but attainable goal as Park Forest, as a whole, already has a considerable tree canopy and is above average when compared to other, similar suburban communities in the greater Chicagoland area.

This goal is best accomplished with a three-pronged approach. One, by increasing the number of trees in parks, municipal campuses and parkways. Two, by maintaining the existing tree population in a proactive fashion, as outlined in this Plan. Three, by encouraging tree planting on private, business and commercial properties. Great Lakes Urban Forestry Management encourages the Village to consider incentive programs as well as public/private partnerships to encourage this. An important part of the incentive program includes outreach and education to residents through events such as Arbor Day and Earth Day celebrations. Progress towards this goal will be monitored using aerial imagery analysis as shown below. Every 10 years, new imagery will be assessed and the increase in Park Forest canopy cover calculated.



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PARK FOREST
LAND COVER TYPES
COOK/WILL COUNTY, IL

1 inch = 2,250 feet

0 0.275 0.55 Miles

Created On : 8/21/2021

The Future of the Urban Forest

This section discusses the vision for the Park Forest Urban Forest in 2032 and compares this to current conditions. Using existing data, and the diversity vision, Great Lakes Urban Forestry Management outlines how Park Forest can move from the present into the future.

Reaching Diversity in Species Composition 2022 – 2032

Projections and recommendations for this change in diversity are based on local knowledge of the tree population, existing conditions and what species are doing well and which are not. These result in a change list customized to the Village of Park Forest. These recommendations are general guideposts, and not absolutes. This Plan, and the species composition goals, are to be managed and adapted over time as new data becomes available.

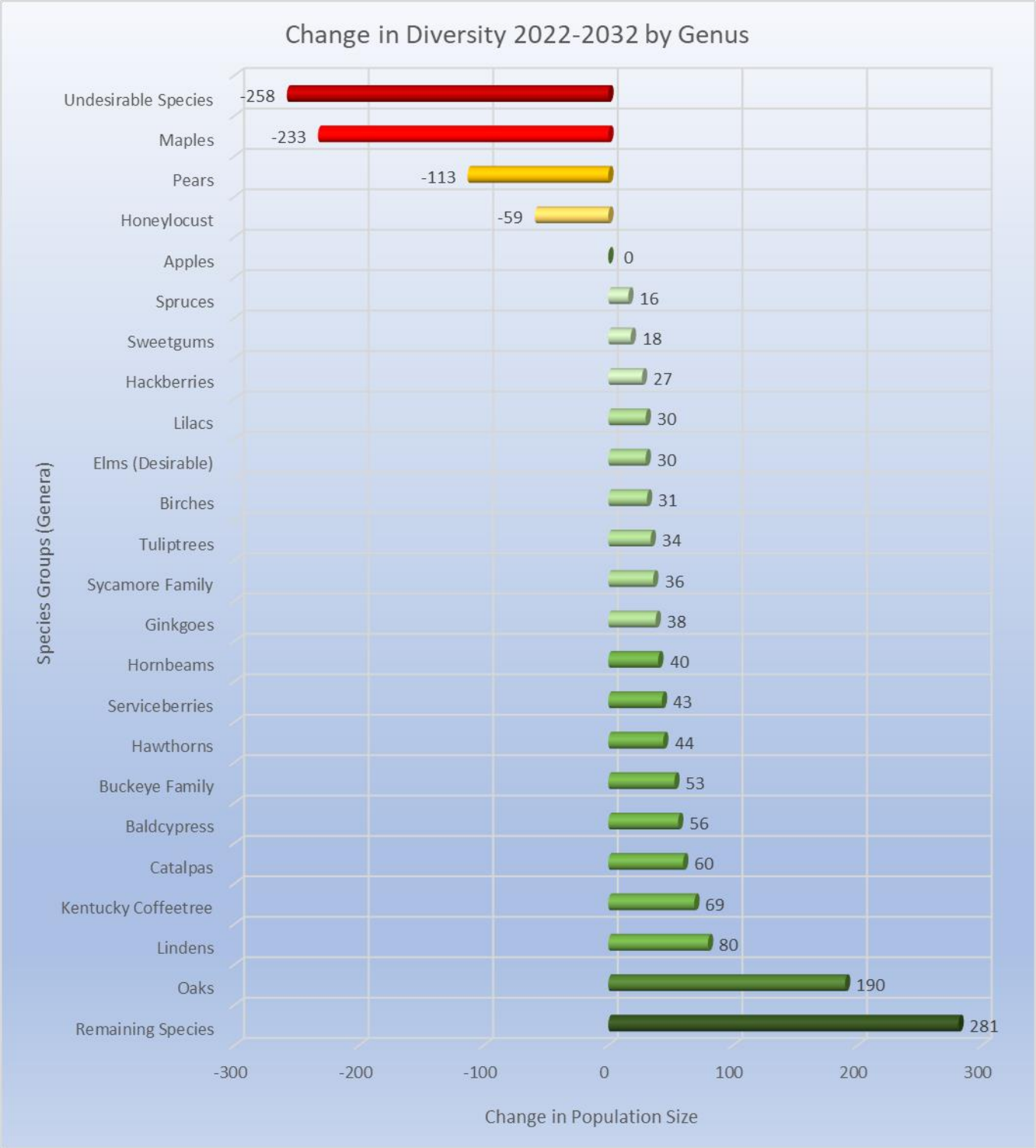
2022 Diversity vs 2032 Diversity Projections

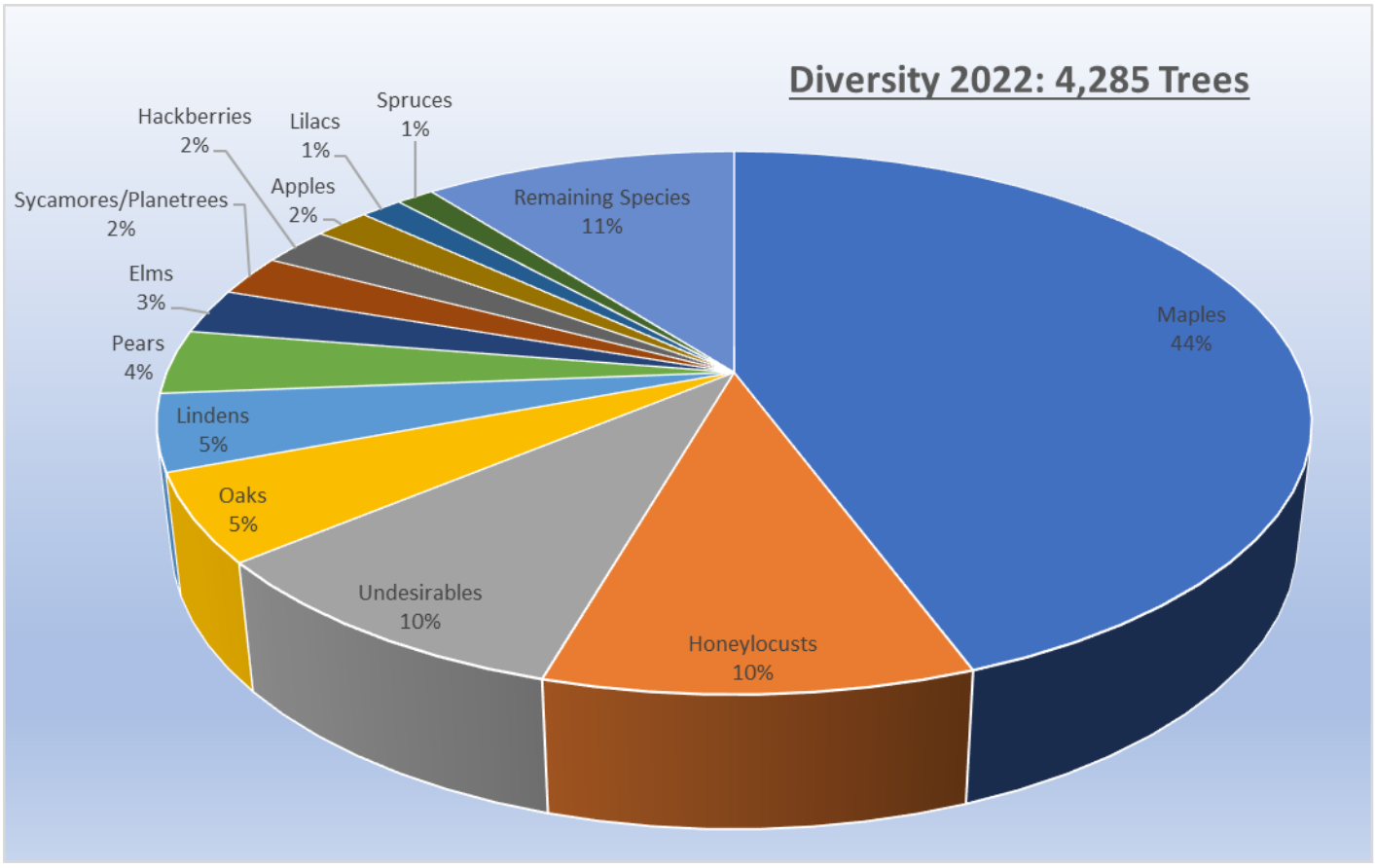
SPECIES	COUNT 2022	COUNT 2032	SPECIES	COUNT 2022	COUNT 2032	SPECIES	COUNT 2022	COUNT 2032
MAPLE-SILVER	1207	1050	HORNBEAM-AMERICAN	15	45	WILLOW-WHITE	3	1
HONEYLOCUST	434	375	OAK-ENGLISH	15	45	BLACK LOCUST	2	20
MAPLE-RED	285	250	SPRUCE-NORWAY	15	25	ELM-SPP	2	10
MAPLE-NORWAY	260	150	ARBOR VITAE	13	25	LILAC-SHRUB	2	10
ELM-SIBERIAN	212	100	ALDER-SPP	11	20	LINDEN-SILVER	2	50
PEAR-CALLERY	163	50	OAK-SHINGLE	11	30	OAK-HERITAGE	2	20
LINDEN-LITTLELEAF	147	125	CATALPA	10	70	OSAGE ORANGE	2	10
HACKBERRY	98	125	OAK-CHINQUAPIN	10	30	SMOKETREE	2	10
SYCAMORE	96	70	SPRUCE-WHITE	10	20	UNKNOWN	2	0
MAPLE-AUTUMN BLAZE	83	100	WILLOW-SPP	10	0	BEECH-SPP	1	5
APPLE-CRAB SPP	75	75	EASTERN REDCEDAR	9	20	BIRCH-GRAY	1	5
COTTONWOOD	58	20	HAWTHORN-COCKSPUR	9	20	BUCKEYE-RED	1	10
LILAC-TREE	58	80	HICKORY-BITTERNUT	8	15	BUCKEYE-YELLOW	1	5
ELM-HYBRID	57	100	LONDON PLANETREE	8	70	DOGWOOD-SPP	1	10
LINDEN-AMERICAN	46	100	MAGNOLIA-SPP	8	10	DOUGLAS FIR	1	20
MULBERRY-SPP	46	15	POPLAR-WHITE	8	0	KATSURA	1	10
OAK-SWAMP WHITE	46	80	WALNUT-BLACK	8	5	MAPLE-HEDGE	1	10
OAK-PIN	42	30	SERVICEBERRY-SPP	7	50	PEAR-EDIBLE	1	1
MAPLE-SUGAR	40	60	BLACKGUM	6	25	PINE-SCOTCH	1	10
OAK-BURR	38	60	HORSECHESTNUT	6	25	PINE-SPP	1	1
ELM-AMERICAN	37	25	AILANTHUS	5	0	SPRUCE-SPP	1	5
GINKGO	37	75	APPLE-EDIBLE	5	5	WALNUT-WHITE	1	1
SWEETGUM	32	50	ASH-WHITE	5	5	WILLOW-PUSSY	1	1
KENTUCKY COFFEETREE	31	100	BUCKEYE-OHIO	5	25	YELLOWWOOD	1	30
OAK-RED	31	50	PINE-AUSTRIAN	5	5	YEW	1	1
ASH-GREEN	30	10	PLUM-SPP	5	5	ZELKOVA	1	10
BUCKTHORN	29	0	BOXELDER	4	0	AMUR MAACKIA	0	10
SPRUCE-BLUE	28	20	CHERRY-SPP	4	15	BEECH-EUROPEAN	0	10
PINE-WHITE	27	15	HICKORY-SHAGBARK	4	15	DAWN REDWOOD	0	5
BALDCYPRESS	24	75	MAPLE-AMUR	4	2	DOGWOOD-CORNELIAN	0	10
OAK-WHITE	24	35	MAPLE-BLACK	4	15	DOGWOOD-PAGODA	0	5
AMERICAN REDBUD	23	40	SUMAC	4	5	FIR-CONCOLOR	0	10
BIRCH-RIVER	23	40	AMUR CORKTREE	3	3	HICKORY-PECAN	0	5
CHERRY-BLACK	22	10	HAWTHORN-GREEN	3	15	HORNBEAM-EUROPEAN	0	10
HAWTHORN-SPP	21	30	HAWTHORN-WASHINGTON	3	15	LARCH	0	5
ELM-RED	20	10	IRONWOOD	3	20	MAGNOLIA-CUCUMBER	0	5
MAPLE-MIYABEI	16	25	OAK-CHESTNUT	3	10	MAGNOLIA-SAUCER	0	5
TULIPTREE	16	50	OAK-SCARLET	3	25	MAPLE-PAPERBARK	0	5
BIRCH-WHITE	15	25	WILLOW-WEEPING	3	1	PAGODATREE	0	10

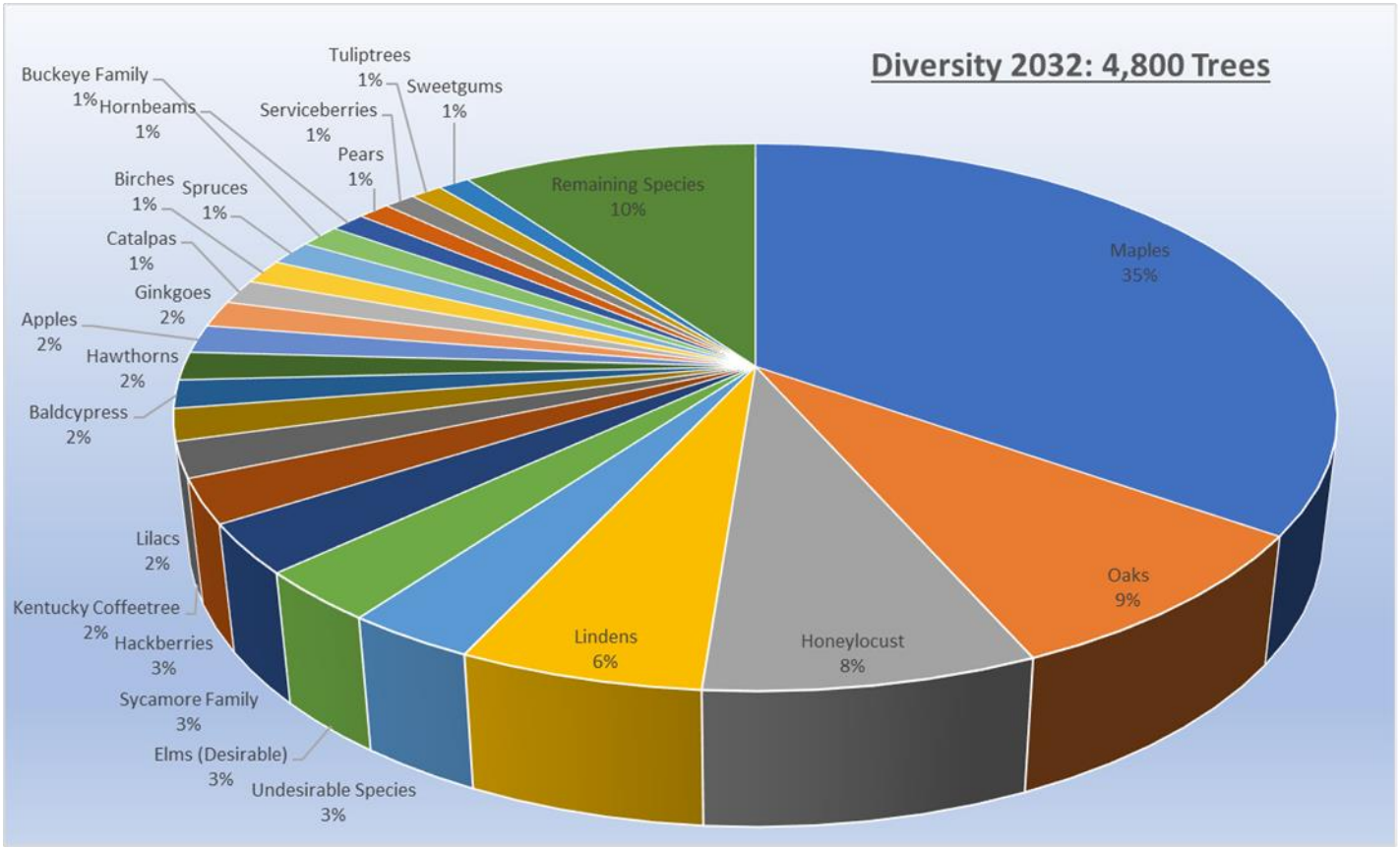
	Plant in Abundance
	Plant in Limited Quantities
	Maintain Existing Population
	Reduce Population Size

Change in Species Composition 2022 – 2032

The bar chart below is a graphical illustration of the projected change in species composition of the Park Forest tree population over the next 10 years.




Diversity 2022: 4,285 Trees
Maples 44%
Honeylocusts 10%
Undesirables 10%
Oaks 5%
Lindens 5%
Pears 4%
Elms 3%
Sycamores/Planetrees 2%
Apples 2%
Hackberries 2%
Lilacs 1%
Spruces 1%
Remaining Species 11%


Diversity 2032: 4,800 Trees
Maples 35%
Oaks 9%
Honeylocust 8%
Lindens 6%
Undesirable Species 3%
Elms (Desirable) 3%
Sycamore Family 3%
Hackberries 3%
Kentucky Coffeetree 2%
Lilacs 2%
Baldcypress 2%
Hawthorns 2%
Apples 2%
Ginkgoes 2%
Catalpas 1%
Birches 1%
Spruces 1%
Pears 1%
Serviceberries 1%
Hornbeams 1%
Buckeye Family 1%
Tuliptrees 1%
Sweetgums 1%
Remaining Species 10%

As seen in the above several pages of charts, species diversity will broadly move away from the over-represented and low quality species, to a variety of different species, including those that are under-represented or not present in the tree population. This includes an overall increase of over 500 trees, from 4,284 to 4,800 trees. Additionally, the current 103 species will increase to 110 species. The result will be a more robust Urban Forest, resistant to pest and pathogen outbreaks. Increasing diversity will also position Park Forest to consider certification as an Arboretum through The Morton Arboretum's ArbNet Certification program, which requires a minimum of 100 species.

The Benefits of Older, Larger, Healthier Trees

Larger, older trees provide the greatest benefits to a community. As discussed earlier, larger trees create more shade, offsetting cooling costs, reduce the strain on storm water infrastructure by absorbing more stormwater, create larger buffers against cool winter winds, reducing heating costs and absorb and sequester more carbon than smaller trees. A variety of factors will combine to improve the age diversity for the 2032 vision of the urban forest. Beginning with the current age structure, and anticipating high rates of survival for newly planted trees, as well as increased survivorship of existing trees due to improved management and care practices, a more reasonable age distribution pattern is expected. This, coupled with predicted growth, survivorship, and expected tree losses, based on current species composition and predicted removals allows for the reasonable forecast of a more diverse tree population in species, age and size by 2032.

As demonstrated in the above chart, the current tree population (grey bars) shows a predominantly middle aged to mature tree composition, with gradual increases in numbers of trees through the 13-18" category that

declines in the larger age class categories. The projected age class chart above shows an increase in the smallest age class category over the course of this Plan, and projects more trees surviving into the older age classes, providing the greatest benefits in terms of ecological services to the Village. The table to the right shows the same age class projection data in a tabular format.

	2022	2027	2032
0-6"	686	750	800
7-12"	889	800	775
13-18"	1074	900	875
19-24"	977	975	950
25-30"	459	700	800
31-36"	130	250	400
37-42"	42	90	150
>42"	27	35	50

This projected age diversity centers on increased levels of care for existing trees resulting in longer-lived trees. The graph and table show a general expectation of how the changes in tree diameters might change over the next 10 years based on the methods outlined in this Urban Forestry Management Plan. Predictions are based on prior experience and methods detailed below. If these projections hold, Park Forest could see a $193,162 or 34% increase in annual benefits up from $567,534 to $760,696. Standing values of the tree population could increase $2,455,431 or 30% from the current level of $8,232,000 to approximately $10,687,431.

Age class projections assume a ½" per year growth rate, meaning a tree would take about 10 years to move from one age/size class to the next. In addition, projections include the number of trees planted and removed annually as outlined in the Tree Planting and Tree Removal sections of the Plan. Lastly, the professional opinion of the Forestry Consultant is included. These are rough estimates for the purposes of this Plan.

The overall increase in size of the tree population will yield a much greater dollar figure relative to the ecological services provided and residents will have a greater sense of being in an arboretum-like setting.

Return on Investment

Return on Investment (ROI) for individual trees compares the dollar value of ecological and social benefits to the costs of planting, care, and removal over the lifetime of the tree.

Following is an ROI calculation sheet that separates a tree's lifetime into three phases with the anticipated maintenance costs. These phases are young (3-12" DBH), mature (13-24" DBH), and full grown (25-36"). Note, these phases represent two age categories in the Age Diversity discussion

Data was taken from the i-Tree algorithm, and applied towards the average benefits provided by a tree at each of these life stages, and multiplies it out over the 20 year period each phase accounts for. This example also looks at projected costs for planting, watering, routine maintenance, emergency maintenance, and eventual removal of that tree over 60 years. The results are illustrated in the summary table below, with the calculations on the following page. Please note that these calculations are for example purposes only and not based on actual budget numbers.

Summary of Return on Investment over 60 Year Period

Total Investment	$3,610.00
Total Return	$10,819.60
Total ROI Over 60 Years	199.71%

Return on Investment: Years 1-20 (3-12″ Diameter)

Costs

Initial Purchase and Installation	$300.00
Watering for 2 Years	$100.00
Pruning - 4x @ $40/prune	$160.00
TOTAL INVESTMENT	**$560.00**

Benefits	Avg/Year	Over 20 Years
Electricty	$6.08	$121.60
Natural Gas	$11.27	$225.40
Property Value	$27.55	$551.00
Stormwater	$13.85	$277.00
Air Quality	$2.52	$50.40
CO2 Reduction	$2.31	$46.20
TOTAL RETURN		**$1,271.60**

ROI Years 1-20: 127.07%

Return on Investment: Years 21-40 (13-24″ Diameter)

Costs

Pruning - 4x @ $75/prune	$300.00
Emergency Maintenance (2x)	$500.00
TOTAL INVESTMENT	**$800.00**

Benefits	Avg/Year	Over 20 Years
Electricty	$18.87	$377.40
Natural Gas	$31.90	$638.00
Property Value	$55.97	$1,119.40
Stormwater	$54.96	$1,099.20
Air Quality	$8.36	$167.20
CO2 Reduction	$7.02	$140.40
TOTAL RETURN		**$3,541.60**

ROI Years 21-40: 342.70%

Return on Investment: Years 41-60 (25-36″ Diameter)

Costs

Pruning - 4x @ $150/prune	$600.00
Emergency Maintenance (2x)	$650.00
Eventual Cost of Removal	$1,000.00
TOTAL INVESTMENT	**$2,250.00**

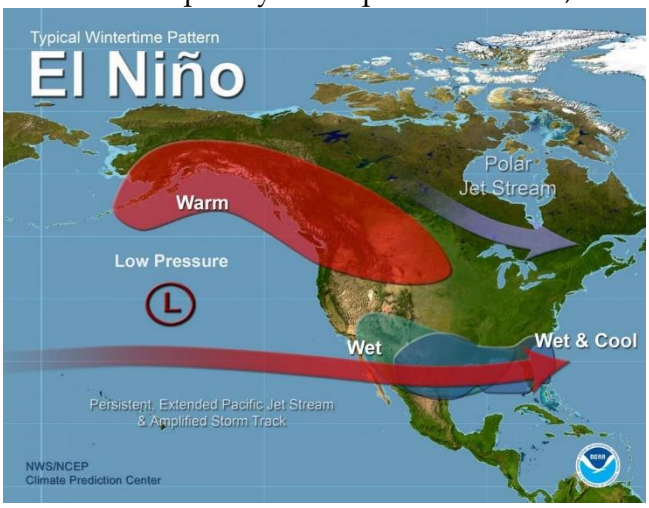
Benefits	Avg/Year	Over 20 Years
Electricty	$27.20	$544.00
Natural Gas	$49.26	$985.20
Property Value	$71.46	$1,429.20
Stormwater	$127.82	$2,556.40
Air Quality	$14.06	$281.20
CO2 Reduction	$10.52	$210.40
TOTAL RETURN		**$6,006.40**

ROI Years 41-60: 166.95%

Trees and Climate Change

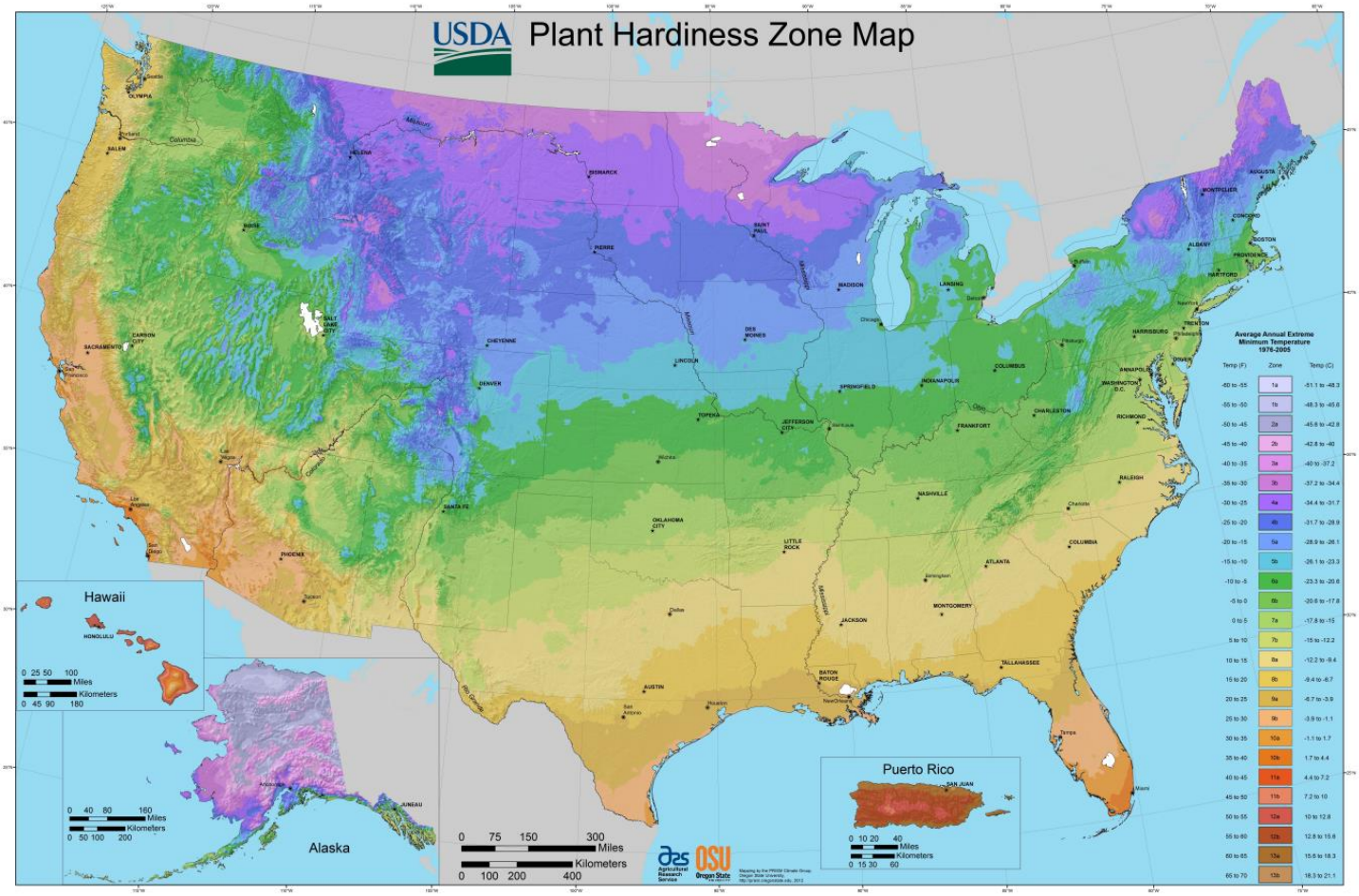
According to the United States Environmental Protection Agency, National Oceanic and Atmospheric Administration, Metropolitan Mayors Caucus, and a variety of other national and international reputable scientific and humanities-oriented sources, climate change will cause significant suffering over the coming hundreds to thousands of years. Increases in carbon dioxide, methane, and other greenhouse gasses in the atmosphere trap heat from the sun and will create a generally warming climate. Though it should be said that "climate change" means more than just warming trends.

Though the general trend will be towards a warmer climate, the transition process will be very chaotic, with more "extremes": hotter summers, colder winters and more severe storm seasons will be the trend until the full effects of a warming trend are realized. This is due to the immense complexity of the planet's climate, and all of the "teleconnections" which exist. Teleconnections are effects on one part of the planet from a corresponding change in another part. The most "famous" of these is the "El Nino" phenomenon, where changing ocean temperatures near the Galapagos islands strongly influences the amount of rainfall or drought in North America. In addition to "El Nino" there are other known teleconnections across the globe, including examples such as "La Nina" and "southern oscillation", and changing climate impacts all of them.



All of the organizations involved with changing climate and the carbon dioxide inputs that drive it have the same message: planting more trees, particularly in areas predisposed to changes in climate, will aid in pulling CO2 from the atmosphere, reducing the impact of climate change. So the number of trees planted is important, both on public as well as private land. The types of trees being planted matters as well. The US Forest Service has initiated a program of planting climate sensitive tree species outside of their historic natural ranges in anticipation of an overall warmer climate (https://www.fs.usda.gov/ccrc/story/helping-forests-keep-pace-climate-change).

When it comes to tree planting in anticipation of climate change for urban environments in the Chicago area care needs to be exercised. While the general trend is towards warming, the "extremes" side of this makes for a difficult decision. While summers may be warmer, supporting trees adapted to warmer conditions overall, winters may still reach -30° F, or colder for extended periods. This is critical, as cold temperatures are the limiting factor, determining what can be planted in any given area. See the USDA Hardiness Zone map on the following page for a more detailed explanation. It shows the **coldest** temperatures which can be expected in an area, not the **warmest**. So before planting trees in northern Illinois that are more native to southern Illinois, one must plan for the coldest temperature, not the warmest.



All of that said, trees could be planted now, on a somewhat experimental basis, that are more tolerant of a warmer climate. Below are some suggestions of trees the Village could plant which are just outside of its hardiness zone that may be successful over the coming 30 years, depending on how effective other climate change mitigation methods are.

Southern Catalpa	**Southern Hackberry**	**Swamp Chestnut Oak**	**Cherrybark Oak**
(*Catalpa bignoniodes*)	(*Celtis laevigata*)	(*Quercus michauxii*)	(*Quercus pagoda*)
Water Hickory	**Pecan Hickory**	**Sourwood**	**Mimosa Tree**
(*Carya aquaticca*)	(*Carya illinoiensis*)	(*Oxydendrum arborea*)	(*Albizia julibrissin*)
Carolina Silverbell	**Crapemyrtle spp**	**Flowering Dogwood**	**Sweetbay Magnolia**
(*Halesia Carolina*)	(*Lagerstroemia spp*)	(*Cornus florida*)	(*Magnolia virginiana*)
Southern Magnolia	**American Holly**	**Oklahoma Redbud**	**Ornamental Cherries**
(*Magnolia grandiflora*)	(*Ilex opaca*)	(*Cercis reniformis*)	(*Prunus spp*)

All of these species grow in Illinois but are marginally hardy in some of the northern counties. Some are certainly more risky than others. Crape Myrtle for instance is barely tolerant of the climate in southern Illinois, while Southern Hackberry has already been planted here with reliable success. Nonetheless, GLUFM recommends these as species worthy of experimental planting.

Positive Tree Benefits for the Environment

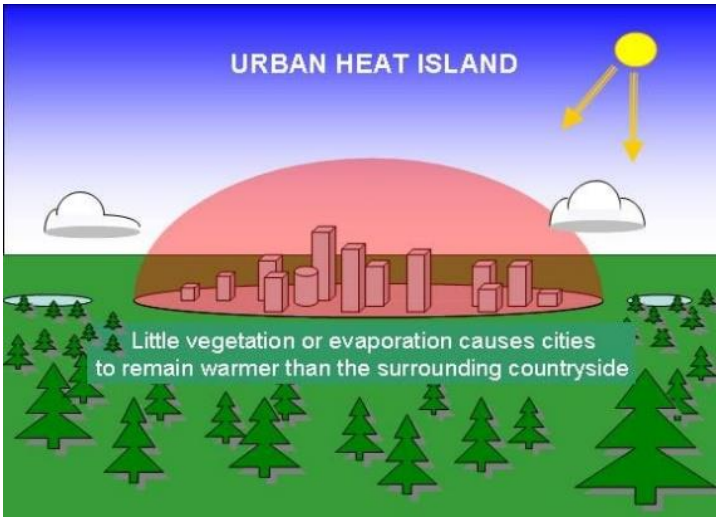
When it comes to trees and climate change, let's move on to some of the immensely positive benefits that trees provide. Here, the focus is on 2 topics, those being the climate change and the urban heat island effect, as well as flooding prevention and stormwater benefits, since this was one of the primary focuses of this grant, and also some of the more important benefits trees provide.

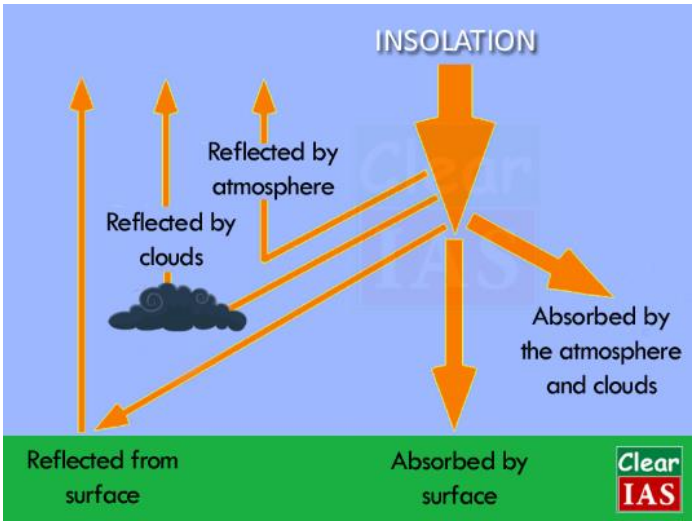
Climate Change / Urban Heat Island Mitigation

First, let's define a few terms: **Climate Change** is change in the climate, both human-induced as well as naturally occurring, that disrupts what is perceived to be the normal operation of climate. It should be noted that climate is different than weather. Weather is the day-to-day meteorology such as rain on Tuesday and sunny on Wednesday. Climate is what the long-term averages are for an area, such as average June temperatures in the mid 70's with 2-3 inches of rain. The term **Global Warming** has been misapplied many times when speaking about climate change. Yes, increases in carbon dioxide emissions lead in general to a warmer climate, which comes with very specific problems. But the climate change currently seen is one of extremes: higher highs, lower lows, more severe storms, etc. The important part is that during this process of change, year to year weather becomes more unpredictable as the climate changes to a generally warmer one.

The **Urban Heat Island Effect** is a separate but related issue. Trees and other green plants contain chlorophyll, a naturally occurring compound, custom built by nature to absorb the sun's energy and convert it to sugars by photosynthesis. And what energy the sun has. The amount of energy from the sun hitting the Earth at any given time is approximately 1,350 Watts per square meter, which is a LOT of energy to absorb. When an area has fewer plants, and a lot of asphalt or other dark surfaces, this energy is not absorbed but reflected as heat.

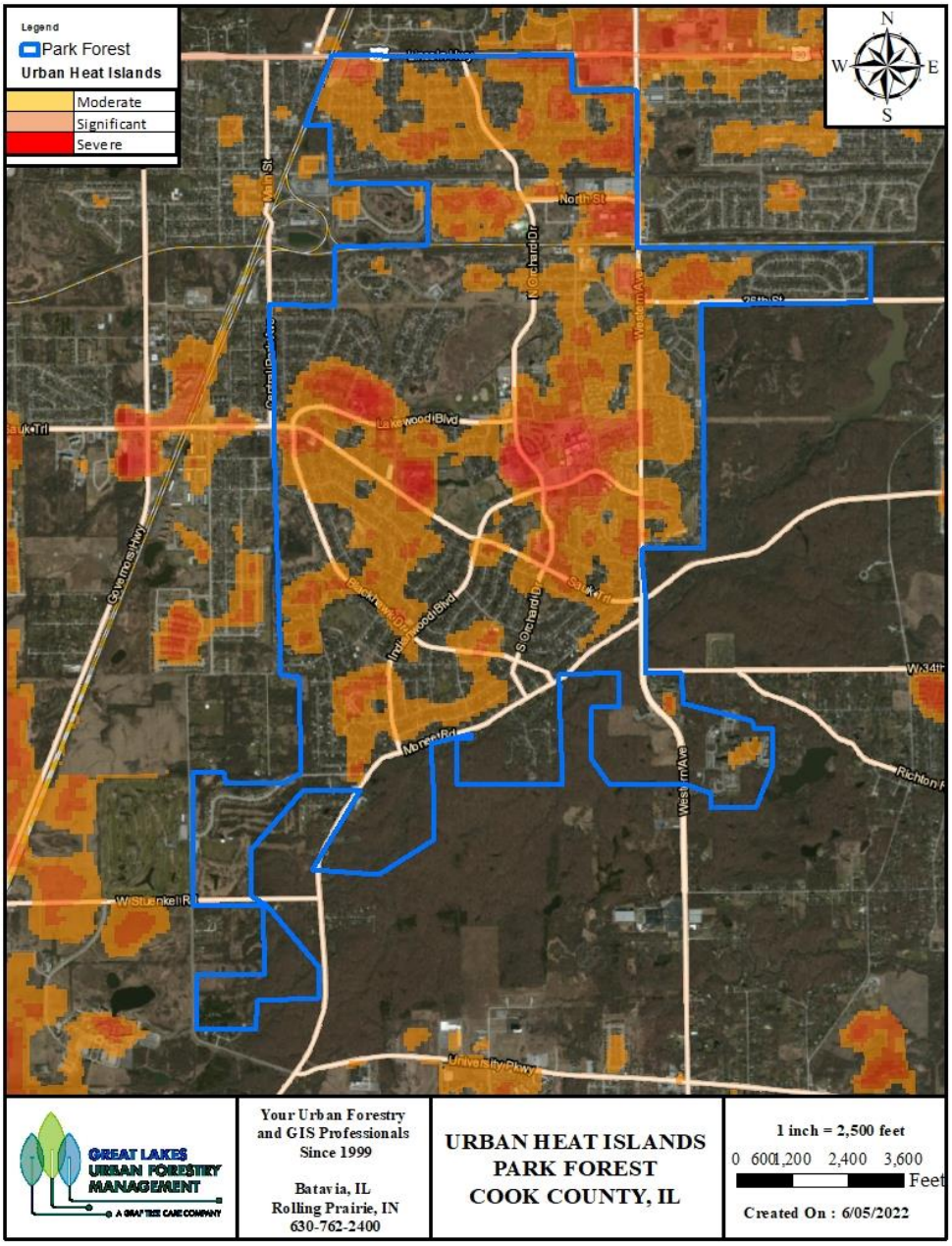
Think about it, if a person wears a dark shirt when the sun is shining, that person would feel hotter than if they are wearing a white shirt. That is because different colors absorb energy differently, and light colors reflect light while dark colors absorb it, and absorbing more light leads to more heat. So asphalt and other urban surfaces create local heating above normal atmospheric heating.





All of this is of course just scratching the surface of a set of very complex issues. But essentially, when there is a generally warming climate, combined with this urban heat island effect, it dramatically raises temperatures in urban areas, leading to a variety of issues. This is where trees become a major factor in mitigating this heat gain. Not only do they absorb carbon dioxide from the atmosphere, reducing the effects of climate change, but especially in urban areas, trees planted in areas of asphalt and dark surfaces will keep the sun from heating those surfaces, instead directing the sun's energy to photosynthesis. The combination of these things provides an overall cooling effect.

Below is a map of the Village's urban heat island areas. The darker red or orange areas represent greater heat island effects, but do not represent specific "degree based" deviations, and areas of no shading mean no deviation from long term averages:



As seen from this map, the greatest heat island effects tend to be along transportation corridors, commercial and light industry areas, where greenspace is lower overall. These are the areas where tree planting will create the greatest cooling effects.

Planting trees on Village owned property as well as encouraging residents and business owners to plant trees on their own properties is a long-term goal of this management plan, with one of the biggest reasons being to offset the effects of climate change and the urban heat island effect. It should also be remembered that climate is global, with no walls separating cities, states, countries, etc. When one area warms, it affects the whole climate system. Conversely, when an area has more trees and vegetation, those benefits are not confined to that area but benefit the whole planet. Trees are truly an example of acting locally and impacting globally.

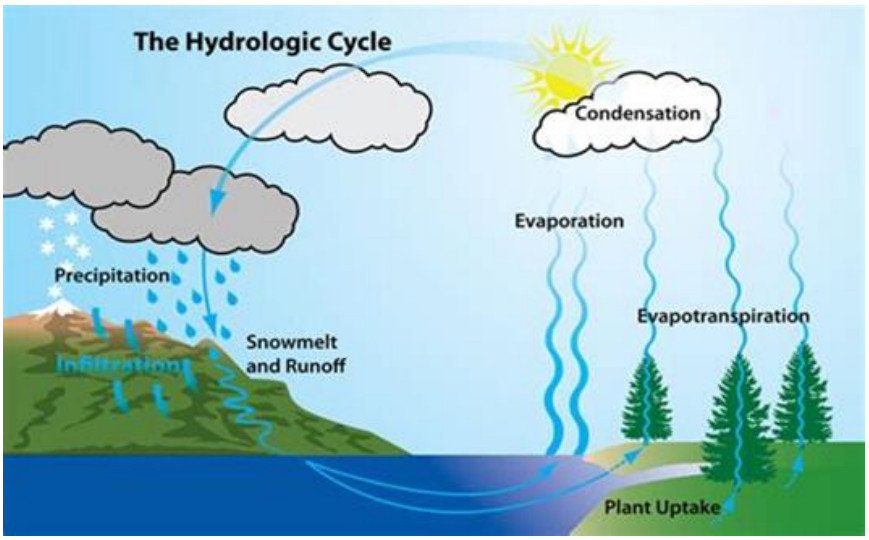
Reduction in Flooding / Storm Effects

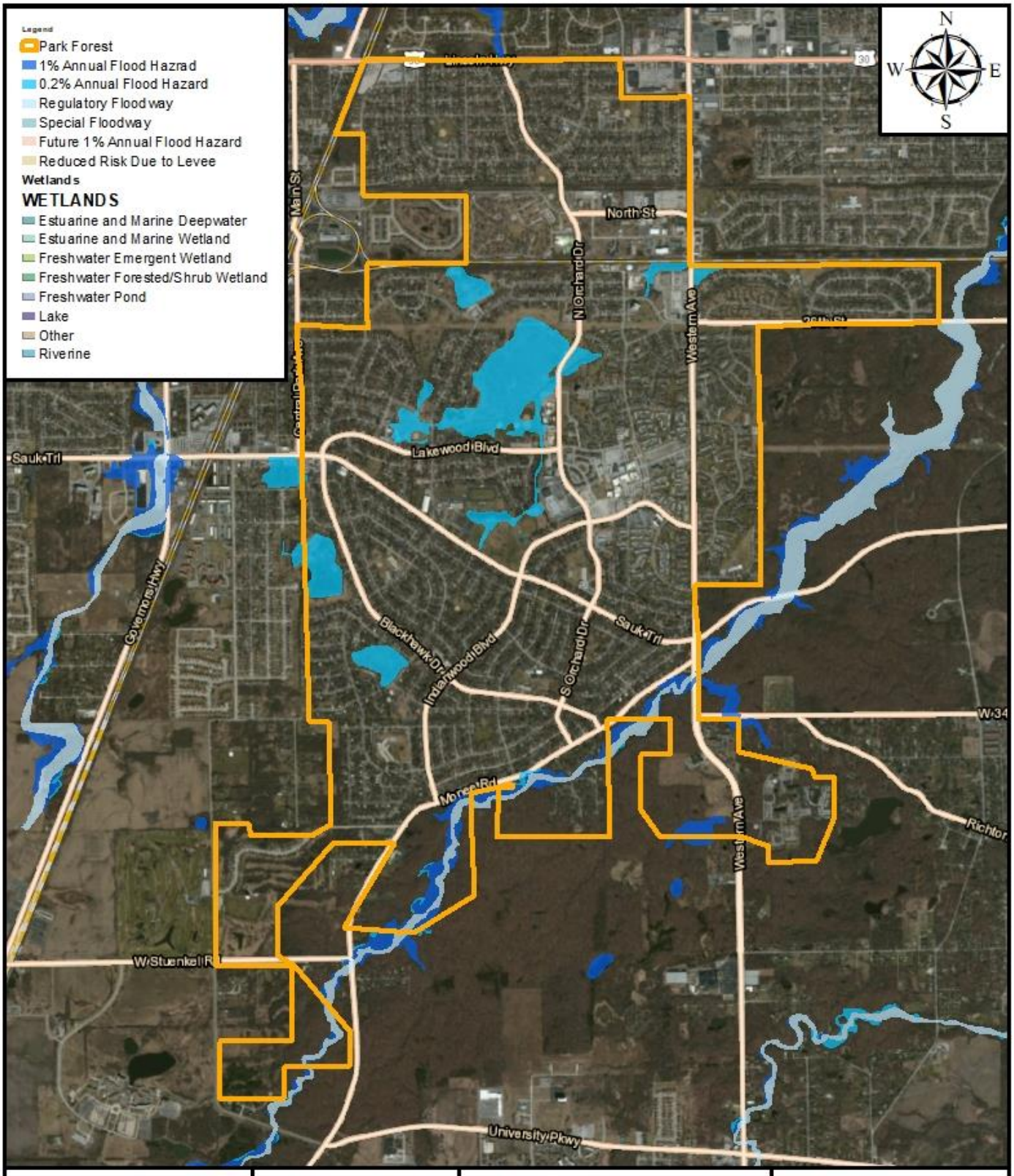
Once again, a few definitions are in order. First, the **Hydrologic Cycle** is pictured in simple form below. All of the water that has ever existed on Earth was here when the Earth first formed around 5 billion years ago and has been recycled ever since. Water stored in the oceans and lakes evaporates into the atmosphere, forms clouds, and then rains, either into the ocean to start again, or over land. When rain falls over land, several different things can happen to it that determine what happens next in the cycle.

If the rain falls onto the soil surface, some of that water **percolates** into the soil where it moves as groundwater (water under the soil surface). However, when there is so much rain that the soil becomes saturated like a wet sponge that cannot hold any more water, then any additional rainfall becomes **runoff**, which "runs off" over the top of the land surface. This is what is traditionally call **floodwater**.

When an area floods, the consequences can be enormous in terms of economic impact and the impact to humans and wildlife. There is another side to this story as well. Most communities have **stormwater infrastructure** such as storm drains to handle runoff. These systems are expensive to maintain, and the more water they handle, the more often they need repair or replacing. What can be done to reduce this floodwater? Plant more trees.

Trees help mitigate excess runoff through **transpiration**, the process of tress up taking excess water through their roots and "transpiring" moisture back into the atmosphere through its leaves. Trees will also hold rainfall in their canopies, slowing the amount of water reaching the ground in a given block of time. So the more trees, the greater the reduction in flooding, reducing demands on stormwater infrastructure as well as reduced economic losses and social sufferings. On the following page is a map showing flood prone areas in Park Forest:





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FLOOD PRONE AREAS
PARK FOREST
COOK COUNTY, IL

1 inch = 2,500 feet
0 600 1,200 2,400 3,600
Feet

Created On : 6/05/2022

The map above shows that there are few significantly flood prone areas near residential and industrial areas in the Village's boundaries. What is important to note on the above map is not what the exact colors mean, but that these colors show either known wetlands, water bodies, or flood prone areas near Park Forest. Tree planting in proximity to any of these locations will help to transpire extra water out of the soil and prevent occasional excess stormwater runoff from occurring. In particular, there are trees which are naturally adapted to growing in wetter soils, which can move a significant amount of ground water, especially as they age. An average mature tree will move as much as 6,500 gallons of water per year. This is given as an average since some tree species that are more tolerant of hydric soil conditions will absorb more water, however species that prefer dry soil condition will absorb less. Multiply that average by thousands of trees, and this becomes very significant. (https://www.epa.gov/sites/default/files/2015-11/documents/stormwater2streettrees.pdf)

The important thing to note is that tree planting efforts should take the proximity to these flood prone areas into account, as well as the areas which appear to be drier and more drought prone where there is no shading on the map. Just as climate change is not confined to a single area, neither is stormwater and flooding. Floodwater not absorbed in one area moves downstream to another. Reducing runoff in Park Forest will benefit all downstream communities. GLUFM sees this as an opportunity for Park Forest to set an example for other communities, encouraging them to take similar action.

Tree Removals

The first step in achieving the Village's forestry goals is the removal of trees that are diseased, dying, or present a hazard. There were 327 trees marked for removal during the inventory. Of these, 28 are Priority Removals, 253 are Standard Removals, and 46 are Low Priority Removals. A primary goal of the UFMP is that all identified trees, marked as Removals, during the inventory are removed within five calendar years of adoption. For budgeting purposes, the 28 trees designated as Priority Removals can be budgeted the first year. The second year, budget the Standard Removals measuring 24" DBH or larger and the Standard Removals measuring between 20" and 23" the third. Standard Removals measuring 14" to 19" DBH removed the fourth year and all remaining trees budgeted for removal year five. In subsequent years, the Plan projects a budget for the removal of an average 120 trees per year. This represents only 1% of the total population compared to a typical municipality that removes 3-5% of its tree inventory annually.

The goal to remove 120 trees annually, after the initial 5-year period, is necessary to meet the overall Diversity Standards goals. From 2027 forward, reassessment of the tree population on an annual or semiannual basis by the Village Arborist or Forestry Consultant will specify which trees require removal. The numbers, detailed below, are placeholders for budget calculations and diversity standards. Removing 120 trees is not a requirement but a projection based on inventory data.

The below cost projections assume a rate of $25/diameter inch for tree removal and stump grinding. This is a conservative estimate, based on current market pricing. The competitive bid process will likely yield better pricing. As is the case with all Plan cost projections, there are no assumed cost increases for the first five years, and a 3% annual cost increase projected thereafter. This is also a conservative estimate based on the Consumer Price Index, and actual costs are likely to be lower than projected. In addition, for years six and beyond, these are anticipated removal averages. Exact numbers of trees removed may be more or less.

	Milestones	2022	2023	2024	2025	2026	2027-2032
REMOVALS	Trees Removed	22	28	57	74	140	120/year avg
	Diameter Inches	645"	835"	1,185"	1,107	1,212"	1,000"
	Notes	All Priority Removals	Standard Removals 24" and Larger	Standard Removals 19-23"	Standard Removals From 12-18"	Standard Removals Under 12" and Low Priority Removals	Annual Removals From Inventory Updates
	Removal Cost (2022)	$16,125	$20,875	$29,625	$27,675	$30,300	$25,000
	Removal Cost (CPI)	$16,125	$20,875	$29,625	$27,675	$30,300	$26,875

As the table above illustrates, there will be a gradual increase in the number of annual removals over the initial 5-year period. These cost estimates were prepared for the long-term removals, based on the tree inventory data. As this is a program to be adaptively managed, these budget tables can be revisited periodically to reflect actual costs being paid.

Tree Removal Activities

Safe Removal of a Tree to an Appropriate Flush Cut

Tree removal, when performed by professionals is very safe. Therefore, a Certified Arborist or Arborist Trainee will oversee or perform all tree removal activities on Park Forest's public property. The Village Arborist, or a staff Certified Arborist may supervise an approved contractor. The safe removal of a tree involves the safe removal and lowering of all portions of the tree according to all relevant ANSI standards and Best Management Practices. The stump must be flush cut such that the highest portion of the cut is no greater than two inches from the highest part of the ground surface to prevent a tripping hazard on public property.

Stump Grinding

Per the timeline outlined in a Village Board approved contract, stumps and surface roots are to be removed using an approved stump-grinding machine, such that the stump is ground to a minimum depth of nine (9) inches, and no surface roots are visible. If the site is to be planted with a new tree, that depth will be fifteen (15) inches below the soil surface. This will ensure the successful planting of the new tree, and limit re-sprouting. The Village Arborist may alter the grinding depth depending on specific, needs, circumstances or contracts. Until such time as the planting space is fully restored, the stump hole should be filled and compacted to ground level using the debris resulting from the stump removal.

Planting Site Restoration

If no trees are to be planted in, or adjacent to the location of a removed tree, the space must be fully restored. Site restoration consists of removing the stump chips from the hole, filling it with a quality loam topsoil, lightly tamping the soil while allowing for settling of the soil and seeding the site with a seed mix approved by, or supplied by, the Village.

Reasons for Tree Removal

Removal of trees on public spaces is the unavoidable reality of managing large tree populations. When the trunk, branches or roots fail, a standing tree becomes a serious threat with potential to cause personal injury or property damage, and even a small dead tree can be an eyesore, reducing property values. Although old trees

may hold great sentimental value, and people become attached, there are times when their presence creates such a hazard that action must be taken to ensure public safety. It is also important to remember that the removal of a tree today is the promise of a new tree for tomorrow!

Removal of trees on Village of Park Forest property is at the discretion of the Village Arborist and/or Forestry Consultant. As outlined below, trees will not be removed without sound reason as determined by the Village Arborist or Forestry Consultant. Residents may request a public tree be removed for reasons NOT covered below. The Village Arborist or Forestry Consultant will review these requests. If granted, these removals will be funded from the annual forestry budget. However, trees with a greater need for removal based on public safety will always be the higher priority. Under no circumstances will the Village of Park Forest be responsible for trees that are not in the right-of-way or other public property.

Dead or Dying

If a tree is biologically dead or nearly dead, it will require removal. Trees which are standing dead, have approximately 50% dead crown or greater, or have less than approximately 40% structurally sound wood in the cross-section of the trunk shall be removed as expediently as practical. These determinations shall be at the discretion of the Village Arborist or Forestry Consultant.

Diseased or Infested

Diseases are caused by viral, fungal, or bacterial pathogens. Infestations by insects or other small animals. Dutch Elm Disease and Oak Wilt, for example, are fungal diseases that kill Elm and Oak trees when they are infected. Emerald Ash Borer is an insect that kills Ash trees by infesting them. The prompt removal of diseased or infested trees limits the exposure of other nearby trees. The removal of one tree may save dozens of others. Trees deemed to be diseased or infested by the Village Arborist or Forestry Consultant shall be removed as expediently as possible to slow the spread of such insects and diseases.

High or Extreme Risk

"Tree Risk" is the potential of a tree or tree part to "impact" a nearby person or property, causing damage or personal injury. This topic is of great interest in Arboriculture today, and insurance companies are becoming increasingly involved in the process of assessing and managing risks posed by trees. Litigation involving trees is a perennial concern for public entities and a basic level of risk was assigned to all trees during the initial inventory. A number of trees were found to be at elevated or substantial risk levels. If this risk can only be safely mitigated by tree removal, as opposed to pruning or other measures, then their timely removal is critical because of potential exposure of the public or property to harm.

The Village Arborist, Forestry Consultant or any other TRAQ Qualified Risk Assessor must assess the tree and prepare a Tree Risk Assessment Report that will document the details of the situation, prior to removal. Often, risk can be mitigated by removing a portion of the tree, or other corrective measures. If the entire tree is deemed to be at high

or extreme risk of failure, however, the entire tree shall be removed as a means of reducing its residual risk to zero.

Emergency / Storm Damage Removals

A tree shall be removed if it has been severely damaged and/or compromised by lightning, wind, or other such weather event. "Storm-damaged" shall be generally defined as a tree which has lost 33% or more of its crown, has a large crack or other wound in the trunk, has a lean of greater than ten degrees from vertical, has sustained a lightning strike, or other such issues directly related to storm events. The Village Arborist or Forestry Consultant shall determine the need for removal in these cases. In an emergency situation such as a tree impacting a person, vehicle, home, power lines, or other such emergency, the Village may perform any actions necessary to abate public hazards so long as they are in compliance with all relevant Arboricultural standards and practices.

Damage from Construction or Vehicle Strike

The Village Arborist or Forestry Consultant shall assess trees impacted by a vehicle strike or piece of construction equipment. Trees that have suffered physical damage or extreme root compaction are likely to decline becoming high risk. Such trees will be scheduled for removal in order to maintain public safety. That decision will be based on the best professional judgement of the Forestry Consultant or Village Forester.

Reasonable Resident Request

If a tree has non-terminal pest or pathogen issues, moderately poor structure or is in somewhat poor condition, a resident may request the removal of the tree. The Village Arborist or Forestry Consultant will review and evaluate each request on a case-by-case basis. If the tree shows significant potential to decline or pose a threat in the near term, the Village may agree to the removal within the next five years. Note that generally, young and or healthy trees are not eligible for this program. Priority will be given to trees that threaten public safety.

Interference with Utility or Signage

A tree shall be removed if it is interfering with the function or visibility of official traffic control devices or has affected above or belowground utilities in a manner that cannot be mitigated by pruning or other measures. In these cases, it is likely that no new tree will be planted in these sites.

Overplanted and Underperforming

No healthy tree shall be removed for the sole reason of having been overplanted. As outlined in this UFMP, Park Forest will be enhancing their use of industry BMP, with the goal of building a diverse urban forest. Overplanted species listed as being in poor condition will be reviewed to assess potential for further decline or recovery. Trees in noticeable decline shall be removed at the discretion of the Village Arborist and/or Forestry Consultant. This is a preemptive measure to keep trees from declining to the point to they become hazardous, but not used as a reason to remove an otherwise healthy tree.

Village Tree Removal Requirements and Standards

All of the following requirements and standards shall be met during tree removal activities as a matter of local policy. For a more detailed view of the specific ANSI and ISA standards, please see Appendix J:

Village of Park Forest

1. All personnel directly involved with chainsaw operations, climbing, bucket truck operation, and rigging limbs shall be provided with sufficient training and experience to perform such duties while employed by the Village of Park Forest, as either Parks, Public Works, or Forestry staff, or performing work as a contractor employed by the Village.
2. Only qualified utility arborists may perform tree removal operations within ten feet of an electric utility line. Village of Park Forest employees or contractors may complete the process of trunk removal and stump grinding only if the remaining portion of the tree is greater than ten feet from a transmission line.
3. The Village will not remove healthy trees in order to meet diversity goals, unless the tree poses a risk to persons or property.
4. The Village of Park Forest shall not perform or assist, programmatically or financially, with the removal of trees on private property. Public/Private tree ownership is defined by Ordinance as having 51% or greater of its trunk diameter within the public right of way.

Tree Planting

Whereas tree removal is necessary to promote public safety, planting of new trees must happen in order to increase diversity and canopy cover. At present, the Village of Park Forest has 2,082 open planting spaces on its parkways. As a means of attaining the goals of increasing canopy cover to 44% and significantly increasing overall diversity, this plan calls for the planting of 1,375 trees over the next 10 years. Village staff, contractors, and possibly properly trained volunteers will be involved in this project. This plan outlines species selections based on identifying appropriate trees for each planting site, assuring trees the best chance to establish and thrive based on specific species requirements.

Achievement of the goals and milestones outlined below, assumes replacement of all trees called out for removal in the Plan *and* planting in identified open spaces on the Village's parkways. After the first year, a gradual increase of 25 trees per year is suggested until a plateau of 175 trees per year is reached in 2027. This plan anticipates plantings to outpace removals.

Budget forecasts assume a cost of $300 per tree (installed). This is a conservative estimate based on retail costs. It is likely the Village will be able to plant at a more favorable rate. Using volunteer labor and planting smaller trees planted could reduce these costs significantly. Money saving proposals are discussed further in the Strategic Partnerships section.

	Milestones	2022	2023	2024	2025	2026	2027-2032
PLANTINGS	Trees Planted	50	75	100	125	150	175/year avg
	Planting Cost (2021)	$15,000	$22,500	$30,000	$37,500	$45,000	$52,500
	Planting Cost (CPI)	$15,000	$22,500	$30,000	$37,500	$45,000	$60,375

The Importance of a Tree Planting Plan

Right Tree in the Right Site

Urban Forestry has the unfortunate history of poor planning when it comes to tree planting. Whatever was readily available, inexpensive, urban tolerant, and grew fast was seen as desirable; and often planning was left to developers or nurseries and plantsmen. With the history of invasive insects and diseases in the Midwest region, and anticipating this will only get worse, it is more crucial than ever that a robust, well-conceived tree-planting plan be in place.

Successful establishment and continued growth depend on not only how, but where a tree is planted. The Village Arborist or Urban Forestry Consultant should assess planting sites prior to each seasons order and planting. Each tree planted represents a 25-75+ year commitment, and proper assessment and planning will increase the overall benefits to the Village and its residents. A list of acceptable species for all land use types appears in Appendix A.

This assessment process should involve evaluating each planting site in much the same, deliberate way one would assess a tree. Factors to consider include available above and below ground growing space, exposure, sun and shade, soil moisture, soil pH and texture. Once this information is collected, planting sites can be matched to trees that are well suited to those sites. Matching tree to site in this way will result in trees that establish more quickly, grow more vigorously, live longer, and provide far greater benefits. Assembling a site-specific species list also makes soliciting bids from nurseries and plantsmen a clearer, simpler process.

Actively engaging in a Tree Planting Plan also allows for meeting diversity standards such as the taxonomic, spatial, and age-class diversity principles discussed earlier, as well as maintaining the "20-10-5" planting rule. With 2,082 planting sites to assess and plant, a phased approach is recommended as the planting budget develops and diversity is evaluated. Targeted species selection also accommodates use of species that are slightly more difficult to site. As a bonus, species that are considered "less urban tolerant", but desirable, can still be planted as appropriate sites are identified. GLUFM anticipates that over the course of this plan, many of these spaces can be planted.

Nursery Stock Procurement

Nursery stock quality is a second aspect of planning that will help a tree establish and thrive, providing maximum benefits to the Village. The Village Forester or an Urban Forestry consultant should inspect and select every tree planted on Village property, minimizing the possibility of having lower quality nursery stock. Standards should specify material no smaller than 1.75" caliper, with good form for the species and either balled-and-burlapped or minimum 5-gallon containerized stock.

Currently, nurseries are recovering from a shortage of some species due to the high demand to replace Ash trees lost to Emerald Ash Borer. As many nurseries are attempting to substitute overplanted trees for some of the higher diversity species, which may still difficult to obtain, GLUFM strongly recommends the Village not accept substitutions in the requested species lists,. GLUFM does recommend an approved Substitution List for each requested tree species. A list of species and acceptable substitutes has been included in Appendix C.

Tree Transport and Planting

Proper transport and planting procedures are crucial to a tree's success after planting. Even healthy trees from the nursery field, can sustain desiccation or structural damage to root balls and if improperly transported, may not survive. Trees planted without properly dug holes may be stunted and trees planted without properly removing packaging materials may develop girdling roots. Trees planted too deeply will suffer from root compaction and trunk decay and trees planted too high may have surface root desiccation. Trees improperly staked or improperly protected may suffer from trunk wounds or girdling of the entire trunk. The standards and BMP for tree transport and planting are detailed later in this section, as well as Appendix K. If a local volunteer work force is used, the Village Forester, Forestry Consultant or other local qualified organization, must adequately train them prior to planting. GLUFM suggests any volunteer work force plant only smaller size trees and containerized stock.

Tree Spacing and Visibility Requirements

Minimum tree spacing between large, medium, and small sized deciduous shade trees should be appropriate for the species and conform to local and BMP standards. GLUFM recommends there be no less than 40 feet between plantings, with some exceptions for open spaces or smaller trees. This will allow trees to grow to their full potential, allow for maximum crown growth and limit competition for water and nutrients between trees. In addition, no tree may be planted within 15 feet of a driveway, intersection, traffic control device, or known below ground utility. Trees may be planted below aboveground power lines, but must be from the "Small" selections listed in the Acceptable Species list in Appendix A. No evergreen species is acceptable as a street trees, as they can obscure views of the road that may lead to accidents. Evergreens are acceptable for parks, schools, municipal campuses, and waterways.

Watering

Watering of newly planted trees is another essential to establishment, growth, and survival; particularly during the first 2 years of establishment. Since watering is not included in the proposed budget figures, this responsibility may be accomplished by willing property owners. It is recommended that when a planting site is chosen, an informative pamphlet or letter be provided to adjacent property owners, detailing the value of trees, describing how much water to give a tree and when it should be watered. Such simple information can be the difference between a tree dying from drought stress, dying form overwatering or a happy, healthy tree.

Challenges of Urban Plantings

Urban planting sites are a difficult environment in which trees can thrive. Long-term data suggests that 5-10% of new plantings will fail each planting cycle. Stresses are a result of many factors such as limited soil volume, salt runoff, airborne pollutants, drought, excess heat, and temperature extremes. The Village must expect new planting mortality despite its best efforts. The planning measures outlined above will help to mitigate new planting mortality and any Village contracts for tree planting should include a one to two-year replacement warranty for any new trees that fail to thrive in their new environment.

Village of Park Forest Tree Planting Requirements and Standards

1. As identified in the Village's tree inventory, planting sites shall be determined and monitored by the Village Arborist and in conjunction with staff and Forestry Consultant input.
2. New planting sites should be 15 feet away from signage, driveways, intersections, and utility structures. If this distance cannot be maintained, the site should not be planted, even if a tree was removed from the same site.
3. Species choices will be made in accordance with the Village's taxonomic, spatial, and age-class diversity goals. A diverse and resilient urban forest minimizes exposure to financial, environmental, and health risks while maximizing aesthetics, environmental benefits, and ecosystem services to its residents.
4. All planting stock shall be grown within 150 miles of the Village/planting site.
5. Acceptable nursery stock shall conform to the following standards:
   - **A.** Minimum of 1.75"-inch caliper, measured at six inches from the trunk flare
   - **B.** Root ball conforms to ANSI Z60.1 Standards for Nursery Stock
   - **C.** Less than 10% deadwood in the crown
   - **D.** Architecture consistent for the species, cultivar, or variety in question
   - **E.** No included bark or other such narrow branch attachments, unless consistent with species or variety
   - **F.** Free of pests or pathogens
   - **G.** From the approved species list for the Village of Park Forest
6. Planting and digging of certain species shall only occur at certain times of year, in accordance with nursery industry BMP and professional judgement. These times are subject to the professional opinions of both the Village of Park Forest and its approved contractors.
7. Residents may participate in the Village's Cost-Share Planting Program to plant trees on Village-owned rights-of-way, after consultation with the Village Arborist
8. JULIE, or another similar utility locating service shall be contacted, and all utilities located a minimum of three days before planting is scheduled to begin.
9. It is recommended that a minimum of a one-year replacement guarantee be extended from approved nurseries and plantsmen for all new plantings rated to hardiness zone five or lower.

Tree Pruning

When maintaining a tree population to reach its greatest benefits and lowest risk, tree pruning is the most cost-effective maintenance activity. Pruning yields several important benefits to a tree. It reduces the risk of failure, provides clearance for utilities and other structures. It also reduces wind resistance, lessens wind and storm damage, maintains overall tree health and improves overall aesthetics.

For the projections discussed in this section, the most critical needs of the Village of Park Forest were prioritized. This priority list begins with those trees identified as *dead limb prunes*, *priority prunes,* or young trees in need of *establishment* or *training pruning*. The Village established a 7-year Cyclical Pruning program in 1995. Unfortunately, the Emerald Ash Borer Crisis interrupted this program. Between 2014 and 2018, the Village pruned an average of 550 trees per year, with a high of 916 trees in 2016. There have been fewer trees pruned since 2020, as staff has concentrated on removing declining and hazardous trees. The inventory identified 1,331 such trees to prune over the next three (3) years, within the Village's existing annual forestry budget, while allowing for required removals also identified by the inventory. The following five (5) years, GLUFM recommends Park Forest slowly increase the number of trees pruned each year through 2027, until it is again able to manage the 7-year pruning cycle. Once back into the full 7-year pruning cycle for the estimated tree population of 4,800 by 2032, approximately 700 trees per year will require pruning to maintain this cycle.

Several assumptions were used to calculate costs associated with cyclical pruning. First, Village staff will prune all young trees (12" and less in diameter); $50 per tree was used as an estimate for this group. This is based on average cost in the industry at this time. Second, for medium (12"-24") and large (24"+)trees, average figures of $100 and $150 per tree (respectively) were used, once again based on average cost in the industry (see tables below). Third, and consistent with other budget tables, there is a 3% annual CPI added for every year thereafter. GLUFM believes that using well-trained volunteer labor to prune young, newly planted trees and smaller trees that can safely be pruned from the ground, these budget figures could become even more favorable. This makes the budget estimates below fairly conservative, as is the case with all budget projections in this Plan.

	Milestones	2022	2023	2024	2025	2026	2027-2032
PRUNING	Trees Pruned	600	600	625	650	675	700/year avg
	Notes	All Dead Limb Prunes + Priority Prunes 22" and Greater	Remaining Priority Prunes + All Training Prunes	625 Cycle Prunes	650 Cycle Prunes	675 Cycle Prunes	Approximately 700 Cycle Prunes / year in perpetuity
	Cost (2022)	$43,500	$43,500	$46,900	$50,300	$53,700	$57,100
	Cost (CPI)	$43,500	$43,500	$46,900	$50,300	$53,700	$61,383

Provided below are a series of estimates, based on the changes in composition of the Urban Forest over time. As larger underperforming trees are removed and smaller trees planted in their place, the size breakdown of the Urban Forest will change. Given this predictable change in the average size of trees, several breakdowns have been included below estimating costs as the composition of the Urban Forest changes. Please note these are estimates, and should be reviewed periodically to ensure accuracy.

2022 Cost Breakdown – Pruning 600 Trees/Year by 2022

	Total Trees	Avg %	Cost/Tree	Pruned/year	Cost/year
Evergreen	136	3.17%	$20	19	$ 380.95
Large (>24")	652	15.22%	$150	91	$ 13,697.48
Medium (13-24")	2009	46.90%	$75	281	$ 21,102.94
Small (1-12")	1487	34.71%	$40	208	$ 8,330.53
					$ 43,511.90

2025 Cost Breakdown – Pruning 650 Trees/Year by 2025

	Total Trees	Avg %	Cost/Tree	Pruned/year	Cost/year
Evergreen	150	3.33%	$20	22	$ 433.33
Large (>24")	950	21.11%	$150	137	$ 20,583.33
Medium (13-24")	1900	42.22%	$75	274	$ 20,583.33
Small (1-12")	1500	33.33%	$40	217	$ 8,666.67
					$ 50,266.67

2032 Cost Breakdown – Pruning 700 Trees/Year by 2032

	Total Trees	Avg %	Cost/Tree	Pruned/year	Cost/year
Evergreen	175	3.65%	$20	26	$ 510.42
Large (>24")	1250	26.04%	$150	182	$ 27,343.75
Medium (13-24")	1875	39.06%	$75	273	$ 20,507.81
Small (1-12")	1500	31.25%	$40	219	$ 8,750.00
					$ 57,111.98

Pruning Activities

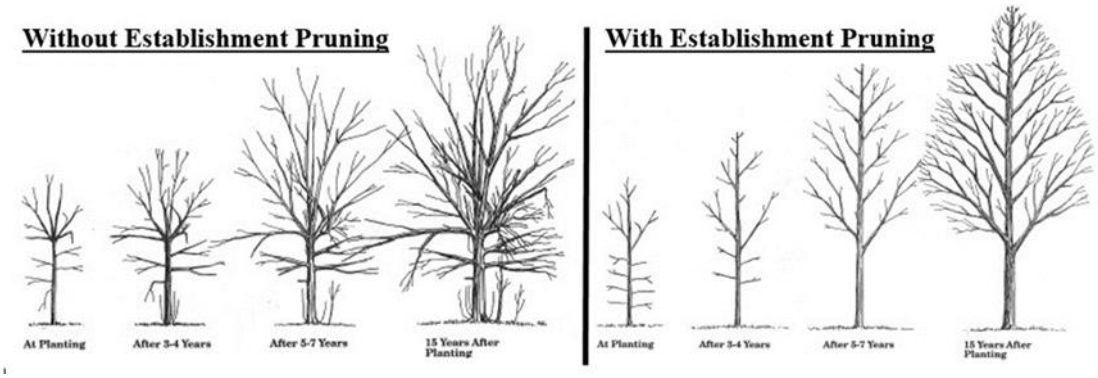
Creation of a Pruning Cycle

Initially, the Village should prioritize public safety over routine maintenance and prune the trees identified in the inventory as requiring either Priority, Dead Limb, or Training pruning. After this, Park Forest should target its 7-year pruning cycle based on the size of its tree population now, and in 2032. With an expected 4,800 Village trees by 2032, this would mean that over a 7-year period, approximately 700 trees would require pruning each year. As noted above, the number of trees, as well as their overall sizes will be changing over that time, hence above tables showing adaptive management of the tree-pruning program.

Though tree pruning may seem expensive, these costs are significantly less than those associated with property damage or injury. The benefits healthy, well-maintained trees provide increase exponentially over time. A cyclical pruning program is the hallmark of an effective forestry program, and it is highly recommended that Park Forest continue budgeting for this essential program.

Pruning of Young Trees

For the purposes for this Plan, 12" DBH and under is considered a young tree. Young trees are still acclimating to their sites and the pruning of young trees has different goals and outcomes than pruning of larger, mature trees. Standard nursery stock has been meticulously pruned for four to ten years to have a single trunk, and the specific branching patterns associated with its species. Without proper establishment pruning, these trees might have multiple trunks, poor branch structure, and overall poor form and architecture. Pruning of young trees, to establish proper form is one of the most cost-effective maintenance activities. A comparatively inexpensive task that does not require a great time commitment, and saves thousands of dollars in future pruning and maintenance costs. As mentioned above, not having to climb trees or use dangerous equipment, allows young trees to be pruned by Village staff, or well-trained residents.



Pruning of Mature Trees

A mature tree, for the purposes of this Plan, is anything greater than 12" DBH. Mature trees are well acclimated to their sites and the pressure these trees face comes generally from above-ground factors such as pests, pathogens, man-made structures, other trees, windstorms or lightning strikes. Additionally, there are some below ground factors such as girdling roots, limited soil volume or poor soil quality. Pruning mitigates the aboveground issues, as well as helping to balance below ground issues. Natural aging and limb dieback are additional reasons to prune mature trees.

Pruning of mature trees may be done to mitigate a short-term risk, such from a storm, or to maintain long-term health and structure. In the wild, trees loose limbs frequently by "self-pruning". Allowing trees to self-prune is not advisable in an urban setting as there would be multiple safety concerns as well as aesthetic considerations. Mature, public trees should be pruned by professional Certified Arborists, in accordance with industry BMP and accepted ISA and ANSI standards.

Private Property Trees

The Village of Park Forest will not be responsible for the pruning of trees located on private property. The Village reserves the right to prune portions of trees overhanging public property, but is under no legal obligation to do so, and will perform such pruning at the discretion of the Village Arborist or Forestry Consultant.

Types of Pruning

Establishment Pruning

Establishment pruning of newly planted trees is the single most cost-saving measure in tree care, as it establishes proper form and branch structure for the life of the tree. Establishment pruning should be performed a minimum of one time prior to the tree reaching 6" DBH. Once established, periodic cycle pruning should suffice to maintain appropriate form and keep the tree free of dead limbs. As mentioned above, because establishment pruning can be done without the use of heavy, dangerous equipment, well-trained volunteers can be an effective, cost saving means of pruning young trees.

Cycle Pruning

A BMP in Urban Forestry is cyclical pruning as a means of preventive maintenance. No tree should go more than seven years without proper pruning. Cycle pruning ensures that dead branches, storm damaged limbs, or unsightly growth is removed before becoming hazardous or detrimental to the health of a tree. Cyclical pruning also ensures a proper leaf to stem ratio, providing structural support for the tree. Lastly, cyclical

pruning helps to manage overall maintenance costs, as severe issues do not have time to develop. Cycle pruning, if performed regularly, actually leads to less frequent maintenance.

Emergency / Storm Damage Pruning

Emergency pruning is often necessary after a severe storm to mitigate risk posed by broken, hanging or fallen limbs, blocked roadways and debris that has fallen onto a structure or public utility. Emergency and pruning decisions resulting from storm damage will be at the discretion of the Village with public safety concerns paramount. This is one of the few occasions on which the recommendations of this Plan may be temporarily suspended. When life or property are in imminent danger due to conditions associated with a downed tree or tree part, the Village will take whatever remedial action is necessary and reasonable to remove hazards and mitigate risk.

Sanitation Pruning

Typically, sanitation pruning is considered for trees diagnosed with a disease or infestation, to maintain the tree and remove the diseased or infested portions. This technique is only effective when the host tree is infected/infested with certain pests or pathogens in a localized area of the tree. With widespread cases of disease or insect infestation, removal is the most cost-effective and safest option. This is to avoid endangering other nearby trees, as pests and diseases tend to spread, particularly when there is more of the same species nearby.

Removal of High Risk Limbs

At times, a tree as a whole, may not pose a high risk but a single limb may have defects making it hazardous. Removal of such limbs or parts will remove the hazard, re-classifying the tree to “low risk”, without causing permanent damage to the tree.

Tree Pruning Requirements and Standards

Village of Park Forest

1. All activities directly related to the operation of a chainsaw, bucket truck, limb rigging, or tree climbing shall be performed by the Village Arborist, a qualified employee, or under the supervision of a certified arborist or arborist trainee. At no time will "climbing spikes' be used during pruning operations.
2. A Village of Park Forest employee shall perform no pruning or maintenance activity, which takes place within ten feet of a power transmission line, unless certified as a qualified Utility Arborist.
3. No cabling, bracing, or other such support systems shall be installed in Village-owned trees, either by the Village of Park Forest, its residents, or any contractors without prior written approval of the Village Arborist.
4. The need for pruning and maintenance of individual trees and parkways shall be at the discretion of the Village of Park Forest or its duly authorized, designated contractors.
5. No more than 25% of a tree’s crown shall be removed during any single pruning operation. If more than 25% of the crown needs removed, complete removal of the tree should be considered.

Other General Maintenance

Maintenance Activities

Retaining a Consultant

As outlined in the Village of Park Forest Tree Preservation Ordinance;

> (a) The Village shall staff at least one certified arborist, designated as the Village Arborist, who shall oversee any urban forestry work completed by a contractor on Village property within the Village. The Village Arborist along with the Director of Recreation, Parks & Community Health shall be responsible for the enforcement of, and compliance with the Urban Forest Management Plan.

The task of maintaining and enhancing a robust Urban Forestry Program can be difficult. There may be new challenges and BMP, contracts to negotiate, bid documents to create, resident concerns to manage as well as unforeseen responsibilities. To assist with this, an Urban Forestry Consultant may be engaged to supplement the Village's professional staff.

The Forestry Consultant may be involved in sourcing and interviewing contractors and vendors for tree pruning, removal, and planting operations, assisting in maintaining the tree inventory, training Village staff on tree health and risk assessments, assisting in explaining policies to homeowners, preparing contract and bid specifications, and teaching residents how to help the Village in caring for their trees. The importance of this early relationship cannot be overstated, no matter how large or small the organization.

Chemical Applications

Trees are subject to a variety of pests and pathogens. Although it is the Village's policy to practice Integrated Pest Management (IPM) and limit its use of chemical pesticides where possible, there may be times when the best or only course of action is a simple chemical application. This may be done as a preventative or curative procedure at the discretion of the Village Arborist, after considering all options and benefits to the Urban Forest

Water Management

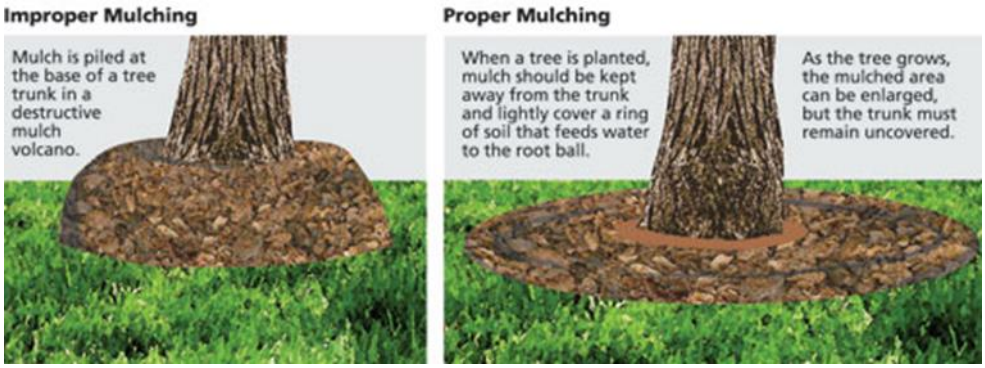
The importance of water in the establishment, growth, and survival of trees cannot be overstated. Most trees adapted to our climate zone (USDA Zone 5) are also adapted to the amount of typical moisture in an average year. However, younger trees with less expansive root systems are susceptible to prolonged drought and will need supplemental irrigation. This is an essential maintenance activity to prevent or limit newly planted tree mortality.

With an anticipated 1,375 trees planted over the next 10 years, the need for supplemental irrigation becomes significant. A general rule would be a cost of $50 per tree, per year to irrigate each tree during its two-year establishment period. Given the goal of planting 175 trees per year, there would be 350 trees requiring water at any given time, with a total cost of $17,500 each year. Although these numbers can be highly variable, an irrigation program, using contracted labor, is likely beyond the scope of current budgets. GLUFM proposes the

Village solicit well-informed residents to assist. Upon receiving a newly planted tree on the parkway in front of their homes, residents should be supplied with an informational pamphlet that explains how often to water their new tree during the first 2-3 years. GLUFM also suggests the Village, acting in conjunction with the Forestry Consultant, hold basic tree maintenance classes open to all residents.

Mulch

Use of, and proper application, of organic mulch is also a necessary and cost-effective maintenance BMP. Organic mulch has many benefits, including reducing weed growth in the root zone, protecting the tree trunk and root flare from lawn maintenance equipment, allowing water to move into the soil, reducing evaporation and drought stress, and creating a naturally fertile soil environment. Turf grass, typical of parkways, competes for water and nutrients, and mulch reduces this competition.



Not all mulching is beneficial however. The practice known as "Volcano Mulching", piling mulch against the trunk in excess of three inches causes moisture build up against the trunk, leading to decay of trunk tissue and necrosis. Materials such as crushed limestone, red volcanic rock, or rubber pellets alters soil chemistry in undesirable ways, leading to decline, dieback and early death. Given that wood chip mulch is a byproduct of urban forestry operations within the Village, GLUFM recommends Park Forest continue its practice of mulching all newly planted trees. GLUFM further recommends the Village mulch all trees 12" DBH and smaller. Mulch is stockpiled at the Municipal Garage and available to residents. It can be picked up free of charge, or delivered for a nominal charge.

BMP for Tree Preservation and Management During Construction

The Village of Park Forest has adopted both a Tree Preservation Ordinance and a Uniform Development Ordinance outlining the care, management, and preservation of trees during both public and private construction projects. The purpose of these ordinances is to recognize the services and function that trees provide as a collective asset to the entire community and to state the goals of the Village of Park Forest with respect to the protection, preservation, care and planting of trees. Refer to the Village Code of Ordinances for the complete texts of each.

Tree and shrub protection and preservation during construction represents an investment in the community and ensuring the protection and preservation of these trees while minimizing burdens to businesses, developers, and residents is essential to a healthy urban forest.

Tree protection and preservation during periods of construction involves protecting trees from damage caused by construction activities. Equipment such as backhoes and skid-steers, or other appendage-type equipment have potential to cause significant damage to trees. This damage includes physical and chemical damage to the trunk, branches, and roots. Damage to the visible, above ground portions of the tree are obvious, as when branches are broken. However, hidden affects such as root compaction or improper grading may not become evident for years, when the tree begins to decline. The standards set forth below and in Appendix M are industry accepted BMP.

Tree Preservation Standards

Village of Park Forest

1. A tree survey shall be performed by a qualified individual prior to the beginning of any development activities. The survey should detail the size, species, and condition of each tree six inches DBH and greater OR managed landscape tree (intentionally planted, non-volunteer tree) of any size.
2. The Tree Survey and a Tree Protection Plan shall be submitted to the Village of Park Forest and all relevant architects, engineers, and workers, detailing the following:
   - **A.** Trees to be removed
   - **B.** Trees to be preserved
   - **C.** Location and size of the Tree Protection Zone (TPZ) for each tree
3. Tree Protection Zones, for each tree, shall be visibly delineated by the site engineer using orange snow fencing or other high visibility exclusion material. When such a delineation is not possible, all workers on site shall be made aware of the TPZ verbally.

Tree Risk Assessment Policy

Trees provide ecosystem and aesthetic benefits, but all trees can pose some degree of risk. Determining the acceptable level of risk, along with effectively managing that risk, is a key priority for all urban forestry operations. As a tree manager, the Village of Park Forest must assume some degree of risk. It is the Village's responsibility to track the risk and ultimately, to determine appropriate steps to mitigate this risk in a manner that is both economically responsible and provides for public safety.

Levels of Risk Assessment – An Overview

These Risk Assessment Levels are based on the International Society of Arboriculture's (ISA) Tree Risk Assessment Qualification (TRAQ) protocols, as well as the ANSI A300 Part 9 (Tree Risk Assessment) Standards. The TRAQ forms can be found in Appendix I at the end of this report. All trees in Park Forest were assessed for a basic level of risk during the inventory. These assessments were equivalent to a Level 1 limited visual assessment as defined below, however these assessments do not represent any formal level of TRAQ risk assessment, and are not legally binding. They are solely to provide Park Forest with data showing the need for a more detailed assessment of individual trees as listed below.

Level 1 Assessment

Also called a "limited visual assessment", whereby there is a visual analysis for obvious physical defects and overall condition. The assessor walks or drives by the tree, assesses it quickly for defects, evaluates the risk posed by the subject tree, and reports the results of the assessment to the tree owner. Often, prior to a recommendation, a more detailed (Level 2 or Level 3) assessment will be required to gather additional data.

Level 2 Assessment

A Level 2 Assessment, also called a "basic assessment", is a written report detailing the information collected during a detailed visual inspection of the tree and surrounding site. Such an inspection requires a 360 degree walk around, and may include the use of simple tools, such as binoculars, magnifying lenses, mallets, probes, and trowels or shovels. The goal is to get a more complete picture of the tree in its environment, as well as previous histories of failures, and a root to branch evaluation of not only the tree but also potential "targets" which falling tree limbs may impact. Targets are things such as structures, people, vehicles, or other property that may be damaged or injured a full or partial failure.

Level 3 Assessment

A Level 3 Assessment, also called an "advanced assessment", provides complete and detailed information about specific tree parts, targets, and risk associated with each potential interaction. By definition, it requires specialized equipment known as "advanced tools", such as bucket trucks, resistance drills, sonic tomography, and other such equipment. This is the most detailed and time-intensive type of assessment, and is typically only performed when a decision to retain or remove a tree is very difficult, as would be the case for a high

quality tree near a potential target that has significant defects, the extent of which are not known, but must become known before making a decision.

Considerations in Assessing Risk

The following are to provide additional insight into the TRAQ process and help the reader better understand the terminology and to inform staff and residents as to how and why these inspections are performed. Once again, no TRAQ inspections were performed on Village trees during the inventory data collection.

Likelihood of Tree Part Failure

This is the process of determining how likely a tree part is to fail, and then how likely that failure is to affect a target. Likelihood of failure is an assessment of a tree's defects, and the potential load on those defects, such as weight, gravity, ice, or wind. Parts impacted are generally the roots, root plate, trunk, branches, or potential of whole tree failure at multiple points.

Likelihood of Tree Failure Impacting a Target

Assessing the likelihood of impact to a target involves determining the occupancy rate, or the amount of time that targets (particularly people or high value property) are within the fall zone. A large tree in the middle of a field could fail with little impact, that same tree in a playground might have serious consequences. In many roadways, motor traffic is present day and night. Of the Village's inventoried trees, many are in rights-of-way, adjacent to roads. Tree failure would not only impact motorists, but also has significant potential to effect pedestrian traffic and utilities within these rights-of-way.

Consequences of a Tree Failure Impacting a Target

The potential consequences of a tree failure impacting a target are a cumulative function of both the "value" of the target (person vs car) and the consequences to that target of that failure. Whereas the previous assessment is concerned with occupancy rates, this assessment considers the consequences of the impact, and assumes that the target is always present. To follow with the above example, the assumption is that if a parkway tree were to fail, a car, utility line, and person are all underneath it at the time of failure, and the consequences to those targets is evaluated. Consequences are generally considered as "minor" for targets that can be easily replaced or repaired, and step up through four levels. The highest level being "severe", which would constitute severe injury or fatality to a person (see the table below).

Weather

Every tree, no matter how healthy, can fail from wind, lightning strikes, ice loading or soil saturation. "Normal" weather can cause tree or tree part failures in trees that have existing defects such as deadwood, cavities, or weak architecture. Extreme weather events, by contrast, can cause the failure of perfectly healthy trees. For all Tree Risk Assessments, risk are assessed assuming "normal" weather conditions. It should be noted that "normal" weather conditions for northeastern Illinois do include gusty winds, thunderstorms, snow, and even an occasional ice storm. It is the extremes of these events that is considered abnormal.

DRAFT Village of Park Forest Tree Risk Assessment Policy

The Village of Park Forest has created this policy to maintain an acceptable level of risk in its tree population(s). In order to maintain a high level of public safety, while mitigating undue burden, the Village adopts the following risk assessment protocols:

1. The Village of Park Forest maintains a tree inventory detailing the species, size, and condition of all trees on Village Parkways and parks, as well as the basic level of risk posed by each tree. This UFMP recommends that the trees listed as being in elevated risk categories during the initial inventory be audited on an ad hoc basis. During these audits, the Village Arborist and/or Forestry Consultant should inspect these trees and identify those posing an unacceptable level of risk. Trees identified as posing an unacceptable risk shall either be scheduled for a more detailed risk assessment (Level 2 or 3), or be mitigated, either by pruning, bracing, or removal, as soon as practical following the assessment.
2. During subsequent years, staff shall perform limited visual assessments on an ad hoc basis by driving by trees during the normal course of daily operations. Trees which may appear to present an elevated risk level shall be scheduled for a more detailed risk assessment (Level 2 or 3), or shall be mitigated, either by pruning, bracing, or removal, as soon as practical following the assessment.
3. Upon notification from a resident of a concern about a potentially high-risk tree, the Village Arborist and/or Urban Forestry Consultant perform a Level 1 limited visual inspection within (14) business days of the notification by the resident. If a Level 2 or Level 3 Risk Assessment is required based on that inspection, it shall be performed within an additional (14) business days. The Village Arborist and/or Forestry Consultant will determine what mitigation measures to take, if any.
4. All trees determined to be in need of mitigating actions (removal, pruning, etc.) should be documented in writing by the Village Arborist and/or Urban Forestry Consultant. The documentation shall include the date of the assessment, the species, size, and condition of the tree. Additionally, the assessment will include a brief narrative detailing which parts of the tree are likely to fail, the likelihood of failure, the likelihood of impacting a target, the consequences of tree or tree part failure, and the overall tree risk rating, per the ISA's TRAQ system of risk assessment.
5. A minimum branch diameter of three (3) inches, by visual estimate, shall be the standard to which this risk assessment policy applies. Assessing all branches smaller than three inches represents an undue burden to the Village.

TRAQ Forms can be found in Appendix I at the end of this report.

TRAQ Tree Risk Assessment Matrices

Likelihood of Tree Failure Impacting Target

Likelihood of Tree Failure	Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat Likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat Likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat Likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Risk Rating Matrix

Likelihood of Failure and Impact	Consequences			
	Negligible	**Minor**	**Significant**	**Severe**
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat Likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Projected Budget

The budget numbers below, as mentioned several times through this Urban Forestry Management Plan, are conservative figures, based on current industry rates for the services listed. Based on input from Village staff, the budget begins fiscal year 22/23 with a dollar amount that is within the Village's current annual budget for tree related expenses. Generally, the budget increases slightly each year, and projects through 2032, at which time, including CPI, the budget will have increased over 100% from the current level of approximately $77,000 in 2022 to approximately $154,000 by 2032. This budget increase is offset by the increased value of the Urban Forest.

REMOVALS	**Milestones**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027-2032**
	Trees Removed	22	28	57	74	140	120/year avg
	Diameter Inches	645"	835"	1,185"	1,107	1,212"	1,000"
	Notes	All Priority Removals	Standard Removals 24" and Larger	Standard Removals 19-23"	Standard Removals From 12-18"	Standard Removals Under 12" and Low Priority Removals	Annual Removals From Inventory Updates
	Removal Cost (2022)	$16,125	$20,875	$29,625	$27,675	$30,300	$25,000
	Removal Cost (CPI)	$16,125	$20,875	$29,625	$27,675	$30,300	$26,875

PLANTINGS	**Milestones**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027-2032**
	Trees Planted	50	75	100	125	150	175/year avg
	Planting Cost (2022)	$15,000	$22,500	$30,000	$37,500	$45,000	$52,500
	Planting Cost (CPI)	$15,000	$22,500	$30,000	$37,500	$45,000	$60,375

PRUNING	**Milestones**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027-2032**
	Trees Pruned	600	600	625	650	675	700/year avg
	Notes	All Dead Limb Prunes + Priority Prunes 22" and Greater	Remaining Priority Prunes + All Training Prunes	625 Cycle Prunes	650 Cycle Prunes	675 Cycle Prunes	Approximately 700 Cycle Prunes / year in perpetuity
	Cost (2022)	$43,500	$43,500	$46,900	$50,300	$53,700	$57,100
	Cost (CPI)	$43,500	$43,500	$46,900	$50,300	$53,700	$61,383

FORESTRY CONSULTANT	**Milestones**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027-2032**
	Notes	Basic Assistance with contract prep, etc	Appraisals and Risk Management	Inventory Updates / Risk Management	Inventory Updates / Risk Management	Inventory Updates / Risk Management	Inventory Updates / Risk Management
	Cost (2022)	$2,500	$2,500	$5,000	$5,000	$5,000	$5,000
	Cost (CPI)	$2,500	$2,500	$5,000	$5,000	$5,000	$5,750

TOTALS	**TOTALS - 2022 $**	**$77,125**	**$89,375**	**$111,525**	**$120,475**	**$134,000**	**$139,600**
	TOTALS - CPI 3%	**$77,125**	**$89,375**	**$111,525**	**$120,475**	**$134,000**	**$154,383**

Conclusion

By adopting this Urban Forestry Management Plan, the Village of Park Forest has taken an important step in investing in its urban forest's future by creating both shorter and longer term goals that will serve as milestones. These are all goals which, as they are undertaken, will help strengthen the urban forestry program in Park Forest, maximizing the benefits that trees provide to the community and minimizing cost and risk. Many local partners have been suggested, as well as many yet to be discovered, each of whom could become a promoter and champion of the urban forestry program in Park Forest. The more public support and engagement this program receives, the better it will be equipped to tackle difficult situations in the future.

Certainly, none of this can be done without funding streams and innovative thinking along the way. As the basic budget and i-Tree reporting demonstrates, the return on investment for the forestry program in Park Forest is remarkable, at over 3 ½ times the projected budget costs invested. As GLUFM brings information like this to light, that the forestry program yields dividends and doesn't just cost money, the more people will become interested and engaged in promoting these efforts.

Great Lakes Urban Forestry Management thanks the Village of Park Forest, its residents, stakeholders, and the grant funding organizations which have made this endeavor possible. It has been a pleasure to work with the Village on this inventory project and Urban Forestry Management Plan. GLUFM looks forward to having an opportunity to assist the Village in their future Urban Forestry endeavors.

Park Forest
Live Grow Discover

GREAT LAKES URBAN FORESTRY MANAGEMENT
A GRAF TREE CARE COMPANY

Glossary of Terms

Aerial Device: Any piece of equipment expressly intended to elevate a human worker above the level at which they typically stand with their feet on the ground surface. Can include but is not limited to bucket trucks, scissor lifts, etc.

Aggressive: A floral or faunal organism that is native (endemic) to the United States or northern Illinois, but is known to outcompete other more desirable organisms

Arborist: An individual engaged in the profession of arboriculture who is educated, trained and licensed to provide for, or supervise the management of trees and other woody plants

Arborist Trainee: Any person working under the direct supervision of an Arborist or Certified Arborist

Balled and Burlapped: A tree, shrub, or other plant prepared for transplanting, by allowing the roots to remain covered by a ball of soil around which canvas or burlap is tied and secured with a basket.

Bare Root: Harvested plants from which the soil or growing medium has been removed

Best Management Practices (BMP): Methods or techniques found to be the most effective and practical means in achieving an objective while making the optimum use of resources.

Caliper: Standard nurseryman's measure of tree diameter (size). Caliper measurement of the trunk shall be taken six inches above the ground up to and including four-inch caliper size. If the caliper at six inches above the ground exceeds four inches, the caliper shall be measured at 12 inches above the ground.

Certified Arborist: An individual who has sufficient experience in the field of Arboriculture, and has been certified by the International Society of Arboriculture as being a Certified Arborist

Border Trees: Trees whose trunks, when measured at DBH, are situated on both Public and private property

Branch Collar: The branch collar is the point where a branch joins the trunk or another branch. The area in which the arborist chooses to make a proper cut.

Climbing Line: Any rope or other such material explicitly intended for bearing the weight of a human being

Collected Plants: Trees or shrubs which have been sourced from private property for the intent of transplanting elsewhere

Compacted Soil: A high-density soil lacking structure and porosity, characterized by restricted water infiltration and percolation (drainage), and limited root penetration

Consumer Price Index: an index of the variation in prices paid by typical consumers for retail goods and other items

Containerized: A tree, shrub, or other plant prepared for transplanting, or grown in, a solid-walled container such as a plastic pots or wooden boxes

Contracted Staff: People working for the Village as part of an independently owned and operated private company which performs work for the Village, but are not directly employed by the Village

Controlling Authority: An agency, organization, or corporate entity with the legal authority and/or obligation to manage individual trees or tree populations

Crew Leader: Any personal who by direction or implication, been chosen to lead a team of In-House or Contracted Staff

Crown: The upper part of a tree, measured from the lowest branch, including all branches and foliage

Critical Root Zone (CRZ): The minimum volume of roots necessary for a tree to have health and stability

Cycle Pruning: The process of routine maintenance pruning of trees, not related to storm damage or other hazard or emergency related-pruning, that occurs on a set and predictable time scale set forth by the Village

Deadwood: Wood on a tree or shrub that is no longer biologically living and has become brittle or prone to failure

Decline/Declining: Trees or shrubs that are experiencing symptoms of a general decline in health due to age, pest, or pathogen related issues

Desirable: A Tree or other plant whose characteristics are sought after due to ecology, aesthetics, or public safety

Diameter or DBH: Diameter at Breast Height. A standard forestry measure of tree diameter (size), measured at 4.5' above ground level on the uphill side of a tree using a Diameter Tape or Biltmore Stick

Digging Machine(s): Any piece of mechanical equipment whose express purpose is to remove soil and plants from their current locations

Diseased: The status of a tree negatively affected by a pathogen, bacterial, fungal, viral, or similar lower life forms

Drip Line: The soil surface delineated by the branch spread of a single plant or group of plants

Drought: A period of two weeks or greater, during which there is less than one inch of rainfall, when the average daytime temperature during that same period exceeds 75 degrees Fahrenheit.

Dutch Elm Disease: A fungal pathogen which causes the decline and death of specific species of Elm trees.

Dying: A tree which is in the process of biological death due to senescence, disease, infestation, or other such malady from which there is very little to no hope of long-term survival

EAB: Emerald Ash Borer. An invasive beetle pest that affects all Ash trees.

Establishment Pruning: The pruning of a young tree in order to establish proper form and branching habit.

Established Trees: Those trees permanently planted for a period of no less than 6 months, and which have permanent roots established in the soil

Failure (tree failure): Breakage of stem or branches, or loss of mechanical support in the root system

Feeder Root: Any portion of the below ground portions of the tree whose purpose is to absorb water and nutrients

Floodplain: Land determined to be periodically inundated with water from a nearby moving or static water body, such as a lake or river. Determined by the Federal Emergency Management Agency

Flush Cut: Either a pruning cut or final cut to remove a stump, for which the maximum acceptable distance from the ground or the branch bark ridge shall be no greater than 2 inches.

Full-Time: An employee who has regular employment through the Village and whose work hours exceed 36 hours in a week, and employed year-round.

Fungal: Any of a group of spore-producing organisms feeding on organic matter, including molds, yeast, mushrooms, and toadstools.

Grade: The level or pitch of a certain piece of land, as defined by the trees or shrubs that inhabit it

Hardscape: The nonliving or man-made fixtures of a planned outdoor area, such as sidewalks, retaining walls, street lamps, etc.

Hazard: A known and documented state of imperiling public safety

Healthy Tree: Any tree which is successfully adapting to it's environment, and shows no signs of disease, pests, pathogens, or other such maladies, as determined by the Village or Forestry Consultant(s)

Host: An organism that is susceptible to a known pest or pathogen

Infested: The status of a tree which has been negatively impacted by pests

In-House Staff: Staff directly employed by the Village of Park Forest, on either a full-time or Part-Time Basis

Invasive: A floral or faunal organism which is not native (endemic) to the United States or northern Indiana

Job Site: Any geographic location where a person or persons will be performing activities related to the care and maintenance of Village of Park Forest property

J.U.L.I.E. (811): The Illinois underground utility locating service

Liner Nursery: A privately owned plant propagation facility specializing in the growth of small trees intended to be planted elsewhere and to grow into a full form

Managed: A tree or shrub that is in an area of the Village routinely mowed and managed. Not a wild forest grown tree or shrub, or area containing such trees and shrubs

Manufacturer's Recommendations: Any expressly written instruction manual for a given piece of equipment that details how said equipment is to be managed or maintained

Mineral Soil: Any substrate that is composed of a variety of rocks and minerals in various states of decomposition, leading to the development of a substance on which living plants may live

Mitigation: The process of diminishing risk

Monoculture: A population of trees in close proximity to one another which is comprised of 3 species or less of trees and shrubs which is prone to pest or pathogen outbreak

Natural Resources: Flora, fauna, and other such living and non-living parts of the environment that the Village of Park Forest maintains

Nursery Stock: Woody Perennials that are of a "Tree Form" growth habit and supplied by a nursery contractor for planting. Not established trees.

Parkway Tree: Any woody plant within a Publicly-Owned right-of-way, or any other property owned or managed by the Village of Park Forest

Part-Time: An employee who has regular employment through the Village and whose work hours are less than 36 hours in a week, and employed year-round.

Pathogen: A fungus, virus, or other such microscopic organism that causes decline or death of trees

Pest: An insect or other macro-faunal organism that causes decline or death of trees

Private Property: Land that, by deed or title, does not belong to the Village of Park Forest

Public Safety: The welfare and protection of the public

Reforestation: The process of planting trees to replace trees that have been removed

Rigging Line: Any rope or other such material explicitly intended for bearing the weight of a tree limb. Not to be used for supporting a human being.

Right-of-Way (ROW): The publicly owned land on which a road, drainage ditch, trail, or other public access is built

Risk: A situation involving potential exposure to danger or endangering public safety

Root Protection Zone (RPZ): The area on the ground surrounding a tree in which excavation, compaction, and other construction-related activities should be avoided or mitigated

Saddle: A piece of equipment expressly intended to hold a human being above ground level with the assistance of a rope or other such device

Sanitation Pruning: The removal of tree limbs that have become diseased or infested, in order to prevent the spread of disease or infestation from spreading throughout the rest of the tree e.g., Dutch Elm Disease, Black Knot Fungus, etc.

Seasonal Employees: Those employees retained by the Village for less than 6 months out of the calendar or budget year

Shrub: Any woody perennial that has a multi-stemmed growth habit not consistent with typical tree form. Can be subject to interpretation by Park Forest Staff.

Sound Wood: Structurally sound, non-decayed, non-compromised wood in the trunk or Scaffold Branches

Staff: Those employees retained by the Village on a full-time basis with benefits provided

Structural Root: Any portion of the below ground portions of the tree whose purpose is to stabilize the plant against the forces of wind and gravity

TRAQ: Tree Risk Assessment Qualification. The International Society of Arboriculture's formal status of an individual who is qualified to assess the risk that trees may bring to the public

Tree Protection Zone (TPZ): The area surrounding a tree in which excavation and other construction-related activities should be avoided.

Tree Risk: The likelihood and consequences of failure of a tree or tree parts

Tree Risk Assessment: A systematic process used to identify, analyze, and evaluate tree risk

Underperforming: Trees which have systematic health and vigor issues resulting in poor health, architecture, or other such maladies as determined by Village staff

Undesirable Tree: A tree not desired in the landscape due to ecological, aesthetic, or public safety reasons, as determined by Park Forest Staff.

Unmanaged: A tree or shrub that is in an area of the Village of Park Forest that is not routinely mowed and managed. A wild forest grown tree or shrub, or area containing such trees and shrubs.

Urban Wood: Any tree or other woody perennial material harvested for the sole purpose of long-term storage in the form of furniture, recreational material, etc. Differentiated from "Reclaimed Wood"

Utility Arborist: A person explicitly trained in the management of trees and other plants in relation to energized power lines. Someone licensed to work with conflicts between trees and such energized power lines.

Village Property: Land that, by deed or title, belongs to the Village of Park Forest

Appendix A: Acceptable and Unacceptable Species

Species not appearing on this list may be approved or disallowed by consensus of the Environment Commission, acting under the supervision of the Village Arborist and/or Forestry Consultant

NOT APPROVED	APPROVED SPECIES (ANYWHERE)			PARKS ONLY
	Large Trees	**Medium Trees**	**Small Trees**	**Large Trees**
AILANTHUS	BALDCYPRESS	ALDER	AMERICAN REDBUD	CATALPA
AMUR CORKTREE	BEECH-AMERICAN	AMUR MAACKIA	BUCKEYE-RED	CHESTNUT-CHINESE
ASH-EUROPEAN	BEECH-EUROPEAN	BIRCH-RIVER	DOGWOOD-SPP	MAGNOLIA-CUCUMBER
ASH-GREEN	IMPROVED BLACK LOCUST	BIRCH-WHITE	THORNLESS HAWTHORN-SPP	TULIPTREE
ASH-WHITE	BUCKEYE-OHIO	BLACKGUM	LILAC-TREE	IMPROVED WILLOW-SPP
BOXELDER	BUCKEYE-YELLOW	ELM-CHINESE	ROSE OF SHARON	**Medium Trees**
BUCKTHORN	CATALPA	HARDY RUBBER TREE	SERVICEBERRY-SPP	GOLDEN RAINTREE
BURNING BUSH	DAWN REDWOOD	HAZELNUT-TURKISH	SMOKETREE	MOUNTAIN ASH
CHERRY-BLACK/PIN	ELM-HYBRID	HORNBEAM-AMERICAN	APPLE-CRAB	PEAR-EDIBLE
COTTONWOOD	GINKGO*	HORNBEAM-EUROPEAN		SASSAFRASS
ELM-AMERICAN	HACKBERRY	IRONWOOD		SEVENTH SON FLOWER
ELM-SIBERIAN	HICKORY-SPP	KATSURA		**Small Trees**
HONEYSUCKLE	HONEYLOCUST	MAPLE-HEDGE		APPLE-EDIBLE
MAPLE-NORWAY	HORSECHESTNUT	MAPLE-MIYABEI		CHERRY-ORNAMENTAL
MAPLE-SILVER	KENTUCKY COFFEETREE*	MAPLE-PAPERBARK		LILAC-SHRUB
MULBERRY-SPP	LARCH	MAPLE-SHANTUNG		MAGNOLIA-SAUCER
PEAR-CALLERY	LINDEN-AMERICAN	MAPLE-TRIFLORUM		MAPLE-AMUR
POPLAR-SPP	LINDEN-LITTLELEAF	OAK-CHINKQUAPIN		MAPLE-JAPANESE
POPLAR-WHITE	LONDON PLANETREE	OAK-ENGLISH		PEACH/NECTARINE
PRINCESS TREE	MAPLE-SUGAR	OAK-SHINGLE		PLUM-SPP
RUSSIAN OLIVE	OAK-BURR	PERSIAN IRONWOOD		WITCH HAZEL
WALNUT-ANY	OAK-PIN	YELLOWWOOD		**Evergreens**
WILLOW-SPP	OAK-RED			ARBOR VITAE
	OAK-SWAMP WHITE			DOUGLAS FIR
	OAK-WHITE			EASTERN REDCEDAR
	PAGODATREE		Do Not Plant	FIR-CONCOLOR
	PERSIMMON			HEMLOCK-SPP
	SWEETGUM		Plant limited quantities	JUNIPER-COMMON
	SYCAMORE			PINE-AUSTRIAN
	ZELKOVA		Plant in abundance	PINE-MUGO
				PINE-WHITE
		* - Male Only		SPRUCE-BLUE
				SPRUCE-NORWAY
				SPRUCE-SPP
				YEW

Appendix B: Additional Comments on Species

SPECIES	COMMENTS		SPECIES	COMMENTS
AILANTHUS	NOT APPROVED		LILAC-SHRUB	Parks Only
ALDER-SPP			LILAC-TREE	Improved varieities, tree form only
AMERICAN HORNBEAM			LINDEN-AMERICAN	
AMERICAN REDBUD			LINDEN-LITTLELEAF	
AMUR MAACKIA			LINDEN-SILVER	
APPLE-CRAB SPP	Apple Scab resistant varieties only		LINDEN-SPP	
APPLE-EDIBLE	Parks Only		LONDON PLANETREE	Prefer 'Exclamation!', 'Bloodgood' not allowed
APRICOT	NOT APPROVED		MAGNOLIA-CUCUMBER	
ARBOR VITAE	Parks only		MAGNOLIA-SAUCER	Scale resistant varieties only
ASH-BLUE	NOT APPROVED		MAGNOLIA-SHRUB	tar Magnolia or similar Magnolia pruned to tree form
ASH-GREEN	NOT APPROVED		MAPLE-AMUR	Parks only unless pruned to tree form
ASH-WHITE	NOT APPROVED		MAPLE-AUTUMN BLAZE	Or other similar Acer x freemannii
ASPEN	Improved varieties only		MAPLE-BLACK	
BALDCYPRESS	Prefer 'Shawnee Brave'		MAPLE-HEDGE	
BEECH-AMERICAN			MAPLE-JAPANESE	Small growing space only
BEECH-SPP	Prefer 'Tricolor' or 'Riversii'		MAPLE-MIYABEI	Prefer 'State Street'
BIRCH-RIVER	Prefer Single stem only		MAPLE-NORWAY	NOT APPROVED
BIRCH-SPP	Sweet Birch, Yellow Birch, or other newintroductions		MAPLE-PAPERBARK	
BIRCH-WHITE	Bronze Birch Borer resistant only, prefer 'Whitespire'		MAPLE-RED	Improved varieties only
BLACK LOCUST	Improved varieties only, prefer 'Purple Robe'		MAPLE-SILVER	NOT APPROVED
BLACKGUM			MAPLE-SUGAR	Prefer 'Green Mountain'
BOXELDER	NOT APPROVED		MOUNTAIN ASH	Improved varieties only
BUCKEYE-OHIO			MOUNTAIN ASH-EUROPEAN	Improved varieties only
BUCKEYE-RED	Prefer 'Ft. McNair' or Bottlebush		MULBERRY-SPP	NOT APPROVED
BUCKEYE-YELLOW			OAK-BURR	
BUCKTHORN	NOT APPROVED		OAK-CHESTNUT	
BURNING BUSH	NOT APPROVED		OAK-CHINKQUAPIN	
CAROLINA SILVERBELL	Protected sites only		OAK-ENGLISH	
CATALPA	Parks Only		OAK-PIN	
CHERRY-BLACK	NOT APPROVED		OAK-RED	
CHERRY-PURPLE LEAF			OAK-SWAMP WHITE	
CHERRY-SPP	Ornamental, Black Knot resistant varieties only		OAK-WHITE	
COTTONWOOD	NOT APPROVED		OTHER	Open for new introductions
DAWN REDWOOD			PAGODATREE	
DOGWOOD-SPP	Hardy varieties only		PEACH	Parks only
DOUGLAS FIR	Parks only		PEAR-CALLERY	NOT APPROVED
EASTERN REDCEDAR	Parks only		PEAR-EDIBLE	Parks Only
ELM-AMERICAN	NOT APPROVED		PERSIAN IRONWOOD	Medium growing space only
ELM-HYBRID	Hardy varieties only		PERSIMMON	American variety preferred (Diospyros virginiana)
ELM-RED	NOT APPROVED		PINE-AUSTRIAN	Parks Only
ELM-SIBERIAN	NOT APPROVED		PINE-SCOTCH	Parks only
ELM-SPP	New cultivar introductions		PINE-WHITE	Parks only
EUONYMUS	Eastern Wahoo ONLY no non-native varieties		PLUM-SPP	Parks Only
FIR-SPP	Parks only		PUSSYWILLOW	Parks only
FRINGETREE			ROSE OF SHARON	
GINKGO	Male only		SASSAFRAS	
GOLDEN RAINTREE			SERVICEBERRY-SPP	Prefer 'Autumn Brilliance'
HACKBERRY			SEVENTH SON FLOWER	
HARDY RUBBER TREE			SHRUB-SPP	Parks only, open for new introductions
HAWTHORN-SPP	Thornless varieties only		SMOKETREE	American variety preferred, small growing space only
HICKORY-BITTERNUT			SPRUCE-BLUE	Parks only
HICKORY-SHAGBARK			SPRUCE-NORWAY	Parks only
HONEYLOCUST	Prefer 'shademaster' or 'inermis'		SPRUCE-SPP	Parks only
HONEYSUCKLE	NOT APPROVED		SUMAC	Parks only
HORNBEAM-EUROPEAN			SWEETGUM	Prefer 'Happidaze'
HORSECHESTNUT			SYCAMORE	In natural areas only, London Planetree preferred
HYDRANGEA-PEEGEE			TULIPTREE	Parks Only
IRONWOOD			VIBURNUM	Tree form only
JUNIPER-COMMON	Parks Only		WALNUT-BLACK	NOT APPROVED
KATSURA			IMPROVED WILLOW-SPP	Parks Only
KENTUCKY COFFEETREE	Fruitless varieties only		YELLOWWOOD	
LARCH			YEW	Parks Only
			ZELKOVA	Prefer 'Green Vase'

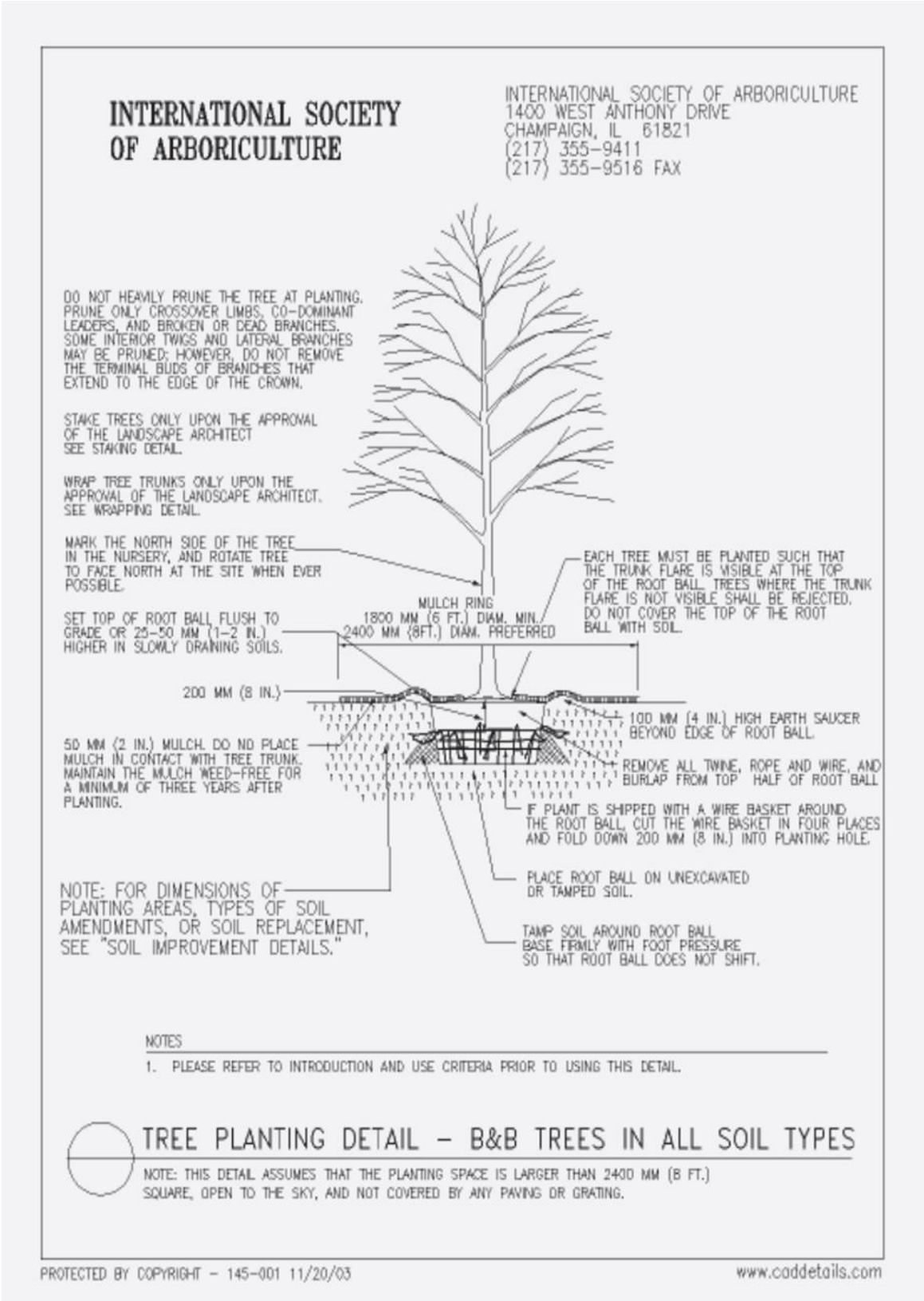
Appendix C: Species Substitutions

Species	Planting Time	Acceptable Substitutes
Alder, Black/Speckled	Spring	River Birch, Planetree
Amur Maackia	Spring	Yellowwood, Shingle Oak
Baldcypress	Spring	Larch, Dawn Redwood
Beech, European	Spring	Red Oak, Buckeye
Birch, River (Multi Stem)	Spring	Alder, Swamp White Oak
Birch, White	Spring	River Birch, Alder
Black Locust (Purple Robe)	Any	Honeylocust, Kentucky Coffeetree
Blackgum	Spring	Sweetgum, Dogwood
Buckeye, Ohio (Autumn Splendor)	Any	Horsechestnut, Catalpa
Buckeye, Red	Spring	Dogwood, Hawthorn
Buckeye, Yellow	Spring	Planetree, Sweetgum
Catalpa	Any	Kentucky Coffeetree, Tuliptree
Cherry, Sargent	Spring	Red Buckeye, Tree Lilac
Chestnut, Chinese	Spring	Turkish Hazelnut, Persimmon
Crabapple (Larger)	Any	Tree Lilac, Hawthorn
Dawn Redwood	Spring	Baldcypress, Larch
Dogwood, Cornelian	Spring	Tree Lilac, Hawthorn
Dogwood, Pagoda	Spring	Sargent Cherry, Smoketree
Douglas Fir	Spring	Concolor Fir, Spruce
Elm, Hybrid (Larger)	Any	Hackberry, Hardy Rubbertree
Fir, Concolor	Spring	Douglas Fir, Spruce
Ginkgo (Standard)	Any	Tuliptree, Catalpa
Golden Raintree	Spring	Katsura, Magnolia
Hackberry, Common	Any	Hybrid Elm, Hardy Rubbertree
Hardy Rubber Tree	Any	Tuliptree, Zelkova
Hawthorn, 'Inermis'	Any	Crab Apple, Dogwood
Hawthorn, Winterking	Any	Tree Lilac, Smoketree
Hazelnut, Turkish	Spring	Persimmon, Catalpa
Hickory, Bitternut	Spring	Oak spp, Beech spp
Hickory, Shagbark	Spring	Oak spp, Beech spp
Hornbeam, American	Spring	Ironwood, Hawthorn
Hornbeam, European (Columnar)	Spring	English Oak (columnar)
Horsechestnut (Baumanii)	Any	Buckeye, Catalpa
Ironwood	Spring	American Hornbeam,Hawthorn
Katsura	Spring	Magnolia, Seventh Son Flower
Kentucky Coffeetree	Any	Honeylocust, Black Locust
Larch	Spring	Baldcypress, Dawn Redwood
Lilac, Japanese Ivory Silk	Any	Hawthorn, Sargent Cherry
Linden, Greenspire	Any	Kentucky Coffeetree, Hybrid Elm
Linden, Redmond	Any	Catalpa, Hackberry
Locust, Skyline	Any	Kentucky Coffeetree,Black locust
London Planetree	Spring	Sweetgum, Blackgum
Magnolia, Cucumber	Spring	Yellow Buckeye, Catalpa
Magnolia, Saucer	Spring	Persian Ironwood, Katsura
Magnolia, Star	Spring	Sargent Cherry, Smoketree
Maple, Autumn Blaze	Any	Black Maple, Shantung Maple
Maple, Black	Any	Shantung Maple, Autumn Blaze
Maple, Paperbark	Spring	Triflorum Maple, Tree Lilac
Maple, Shantung	Any	Sugar Maple, Miyabei Maple
Maple, Sugar	Any	Autumn Blaze, Shanting Maple
Maple, Triflorum	Spring	Paperbark Maple, Tree Lilac
Mountain Ash	Spring	Black Locust, Hawthorn
Oak, Burr	Spring	Shingle Oak, Swamp White Oak
Oak, English (Columnar)	Any	European Hombeam
Oak, English (Standard)	Any	White Oak, Burr Oak
Oak, Red	Spring	Black Oak, Chinquapin Oak
Oak, Shingle	Spring	Chinquapin Oak, English Oak
Oak, Swamp White	Spring	London Planetree, Burr Oak
Oak, White	Spring	Burr Oak, English Oak
Oak,Chinquapin	Spring	Shingle Oak, Red Oak
Persian Ironwood	Spring	Seventh Son Flower, Katsura
Persimmon	Spring	Turkish Hazelnut, Zelkova
Pine, Limber	Spring	Spruce, Concolor Fir
Pine, Red	Spring	Douglas Fir, Eastern Redcedar
Poplar, Hybrid	Any	London Planetree, Baldcypress
Redbud	Any	Serviceberry, Hawthorn
Redcedar, Eastern	Spring	Spruce, Douglas Fir
Serviceberry	Any	Redbud, Tree Lilac
Seventh Son Flower	Spring	Persian Ironwood, Katsura
Smoketree	Spring	Magnolia, Seventh Son Flower
Sourwood	Spring	Blackgum,Sweetgum
Spruce, Black Hills	Spring	Eastern Redcedar, Concolor Fir
Spruce, Blue	Spring	Eastern Redcedar, Douglas Fir
Spruce, Norway	Spring	Eastern Redcedar, Concolor Fir
Spruce, Serbian	Spring	Eastern Redcedar, Douglas Fir
Sweetgum	Spring	Yellow Buckeye, Larch
Tuliptree	Any	Zelkova, Ginkgo
Yellowwood	Spring	Amur Maackia, Shingle Oak
Zelkova	Spring	Tuliptree, Ginkgo

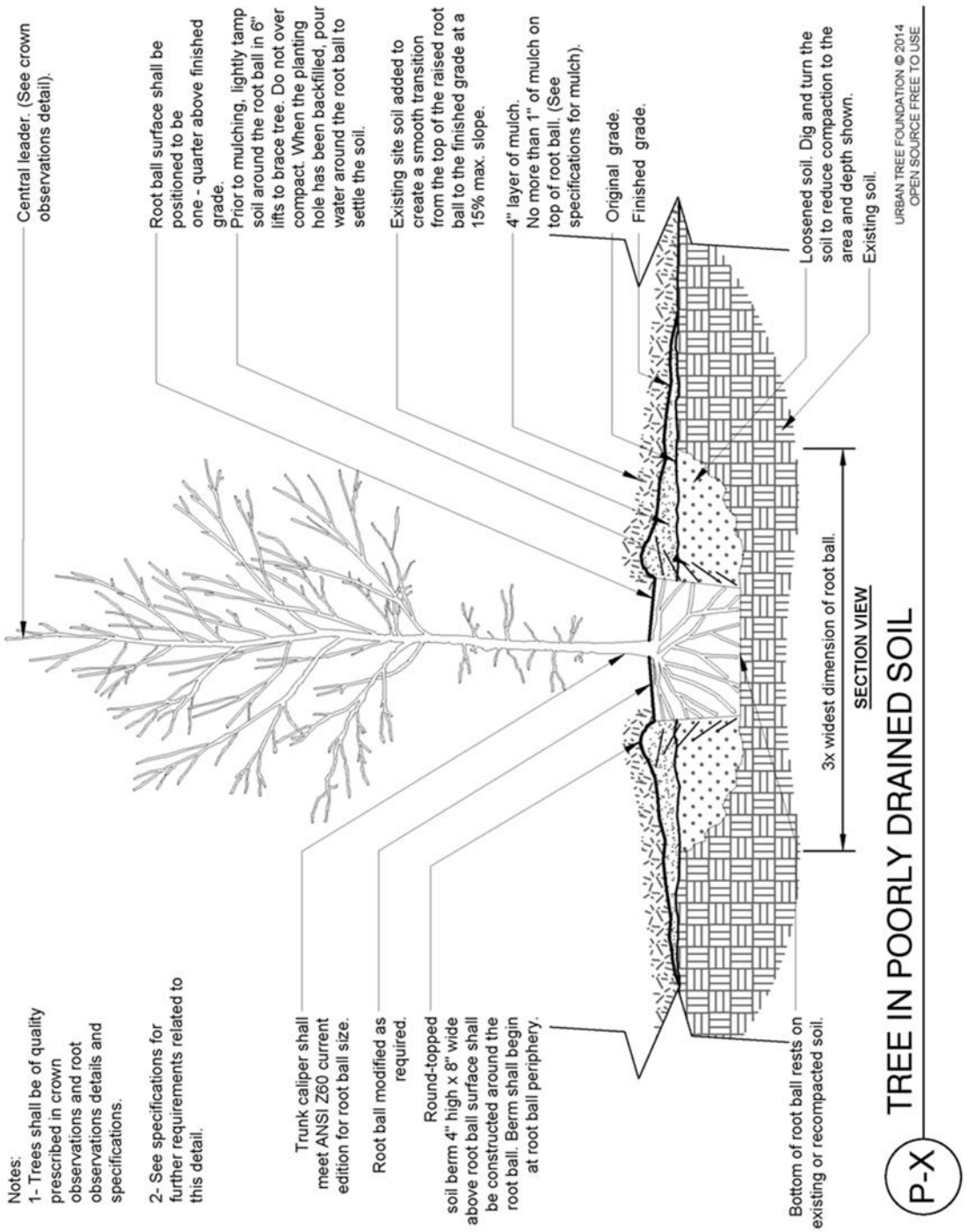
Appendix D: Latin Nomenclature Reference Chart

COMMMON_NAME	LATIN	COMMMON_NAME	LATIN
AILANTHUS	Ailanthus altissima	LONDON PLANETREE	Platanus x acerifolia
ALDER-SPP	Alnus spp	MAGNOLIA-CUCUMBER	Magnolia acuminata
AMERICAN HORNBEAM	Carpinus caroliniana	MAGNOLIA-SAUCER	Magnolia x soulangea
AMERICAN REDBUD	Cercis canadensis	MAGNOLIA-SPP	Magnolia spp
AMUR CORKTREE	Phellodendron amurense	MAGNOLIA-STAR	Magnolia stellata
AMUR MAACKIA	Maackia amurensis	MAPLE-AMUR	Acer ginnala
APPLE-CRAB SPP	Malus spp	MAPLE-AUTUMN BLAZE	Acer x freemanii
APPLE-EDIBLE	Malus domestica	MAPLE-BLACK	Acer nigrum
APRICOT	Prunus spp	MAPLE-HEDGE	Acer campestre
ARBOR VITAE	Thuja occidentalis	MAPLE-JAPANESE	Acer japonicum
ASH-BLACK	Fraxinus nigra	MAPLE-MIYABEI	Acer miyabei 'Morton'
ASH-BLUE	Fraxinus quadrangulata	MAPLE-NORWAY	Acer platanoides
ASH-EUROPEAN	Fraxinus excelsior	MAPLE-PAPERBARK	Acer griseum
ASH-GREEN	Fraxinus pennsylvanica	MAPLE-RED	Acer rubrum
ASH-WHITE	Fraxinus americana	MAPLE-SHANTUNG	Acer truncatum
ASPEN-QUAKING	Populus tremuloides	MAPLE-SILVER	Acer saccharinum
ASPEN-SPP	Populus tremuloides	MAPLE-SPP	Acer spp
BALDCYPRESS	Taxodium distichum	MAPLE-SUGAR	Acer saccharum
BARBERRY-SPP	Berberis spp	MAPLE-TATARIAN	Acer tataricum
BEECH-AMERICAN	Fagus grandifolia	MAPLE-TRIFLORUM	Acer triflorum
BEECH-EUROPEAN	Fagus sylvatica	MOUNTAIN ASH-AMERICAN	Sorbus americana
BEECH-SPP	Fagus spp	MOUNTAIN ASH-EUROPEAN	Sorbus aucuparia
BIRCH-GRAY	Betula populifolia	MULBERRY-SPP	Morus spp
BIRCH-RIVER	Betula nigra	OAK-BEBB	Quercus bebbiana
BIRCH-SPP	Betula spp	OAK-BLACK	Quercus velutina
BIRCH-WHITE	Betula papyrifera	OAK-BURR	Quercus macrocarpa
BIRCH-YELLOW	Betula alleghaniensis	OAK-CHESTNUT	Quercus prinus
BLACK LOCUST	Robinia pseudoacacia	OAK-CHINKQUAPIN	Quercus muehlenbergii
BLACKGUM	Nyssa sylvatica	OAK-CHINQUAPIN	Quercus muehlenbergii
BOXELDER	Acer negundo	OAK-ENGLISH	Quercus robur
BUCKEYE-BOTTLEBRUSH	Aesculus parviflora	OAK-HERITAGE	Quercus x macdanielii
BUCKEYE-OHIO	Aesculus glabra	OAK-HILLS	Quercus ellipsoidalis
BUCKEYE-RED	Aesculus x carnea	OAK-PIN	Quercus palustris
BUCKEYE-YELLOW	Aesculus flava	OAK-RED	Quercus rubra
BUCKTHORN	Rhamnus cathartica	OAK-SAWTOOTH	Quercus acutissima
BURNING BUSH	Euonymus spp	OAK-SCARLET	Quercus coccinea
CATALPA	Catalpa speciosa	OAK-SHINGLE	Quercus imbricaria
CHERRY-BLACK	Prunus serotina	OAK-SHUMARD	Quercus shumardii
CHERRY-PURPLE LEAF	Prunus x cistena	OAK-SPP	Quercus spp
CHERRY-SPP	Prunus spp	OAK-SWAMP WHITE	Quercus bicolor
CHESTNUT-CHINESE	Castanea mollissima	OAK-WHITE	Quercus alba
COTTONWOOD	Populus deltoides	OSAGE ORANGE	Maclura pomifera
DAWN REDWOOD	Metasequoia glyptostroboides	OTHER	OTHER
DOGWOOD-CORNELIANCHERRY	Cornus mas	PAGODA TREE	Sophora japonica
DOGWOOD-FLOWERING	Cornus florida	PAWPAW	Asimina triloba
DOGWOOD-PAGODA	Cornus alternifolia	PEACH	Prunus persica
DOGWOOD-SPP	Cornus spp	PEAR-CALLERY	Pyrus calleryana
DOUGLAS FIR	Pseudotsuga menziesii	PEAR-EDIBLE	Pyrus communis
EASTERN REDCEDAR	Juniperus virginiana	PERSIAN IRONWOOD	Parrotia persica
ELDERBERRY	Sambucus canadensis	PERSIMMON	Diospyros virginiana
ELM-AMERICAN	Ulmus americana	PINE-AUSTRIAN	Pinus nigra
ELM-CHINESE	Ulmus parvifolia	PINE-LIMBER	Pinus flexilis
ELM-ENGLISH	Ulmus procera	PINE-MUGO	Pinus mugo
ELM-HYBRID	Ulmus x spp	PINE-PONDEROSA	Pinus ponderosa
ELM-RED	Ulmus rubra	PINE-RED	Pinus resinosa
ELM-SIBERIAN	Ulmus pumila	PINE-SCOTCH	Pinus sylvestris
ELM-SPP	Ulmus spp	PINE-SPP	Pinus spp
EUONYMUS	Euonymus spp	PINE-WHITE	Pinus strobus
EUROPEAN HORNBEAM	Carpinus betulus	PLANTING SPACE	PLANTING SPACE
FIR-CONCOLOR	Abies concolor	PLUM-AMERICAN	Prunus americana
FIR-SPP	Abies spp	PLUM-SPP	Prunus spp
FRINGETREE	Chionanthus spp	POPLAR-LOMBARDY	Populus nigra
GINKGO	Ginkgo biloba	POPLAR-SPP	Populus spp
GOLDEN RAINTREE	Koelreuteria paniculata	POPLAR-WHITE	Populus alba
HACKBERRY	Celtis occidentalis	PRINCESS TREE	Paulownia tomentosa
HACKBERRY-COMMON	Celtis occidentalis	ROSE OF SHARON	Hibiscus syriacus
HARDY RUBBERTREE	Eucommia ulmoides	RUSSIAN OLIVE	Elaeagnus angustifolia
HAWTHORN-COCKSPUR	Crataegus crusgalli	SASSAFRAS	Sassafras¬áalbidum
HAWTHORN-GREEN	Crataegus viridis	SERVICEBERRY-SPP	Amelanchier spp
HAWTHORN-SPP	Crataegus spp	SEVENTH SON FLOWER	Heptacodium miconioides
HAWTHORN-WASHINGTON	Crataegus phaenopyrum	SIBERIAN PEASHRUB	Caragana arborescens
HAZELNUT-AMERICAN	Corylus americana	SMOKETREE	Cotinus coggygria
HAZELNUT-TREE	Corylus colurna	SOURWOOD	Oxydendrum arboreum
HEMLOCK-EASTERN	Tsuga canadensis	SPRUCE-BLUE	Picea pungens
HICKORY-BITTERNUT	Carya cordiformis	SPRUCE-NORWAY	Picea abies
HICKORY-MOCKERNUT	Carya tomentosa	SPRUCE-SPP	Picea spp
HICKORY-PECAN	Carya illinoinensis	SPRUCE-WHITE	Picea glauca
HICKORY-PIGNUT	Carya glabra	STUMP	STUMP
HICKORY-SHAGBARK	Carya ovata	SUGARBERRY	Celtis laevigata
HICKORY-SPP	Carya spp	SUMAC	Rhus spp
HONEYLOCUST	Gleditsia triacanthos	SWEETGUM	Liquidambar styraciflua
HONEYSUCKLE	Lonicera spp	SYCAMORE	Platanus occidentalis
HORSECHESTNUT	Aesculus hippocastanum	TAMARACK	Larix laricina
HYDRANGEA-TREE	Hydrangea paniculata	TULIPTREE	Liriodendron tulipifera
IRONWOOD	Ostrya virginiana	UNKNOWN	UNKNOWN
JUNIPER-COMMON	Juniperus communis	VIBURNUM	Viburnum spp
JUNIPER-SPP	Juniperus communis	WAHOO TREE	Euonymus atropurpureus
KATSURA	Circidiphyllum japonicum	WALNUT-BLACK	Juglans nigra
KENTUCKY COFFEETREE	Gymnocladus dioicus	WALNUT-WHITE	Juglans cinerea
LARCH	Larix decidua	WILLOW-PUSSY	Salix discolor
LILAC-JAPANESE	Syringa reticulata	WILLOW-SPP	Salix spp
LILAC-PEKING	Syringa pekinensis	WILLOW-WEEPING	Salix babylonica
LILAC-SHRUB	Syringia spp	WILLOW-WHITE	Salix alba
LILAC-TREE	Syringia spp	WITCH HAZEL	Hamamelis virginiana
LINDEN-AMERICAN	Tilia americana	YELLOWWOOD	Cladrastis kentuckea
LINDEN-LITTLELEAF	Tilia cordata	YEW	Taxus spp
LINDEN-SILVER	Tilia tomentosa	ZELKOVA	Zelkova serrata
LINDEN-SPP	Tilia spp		

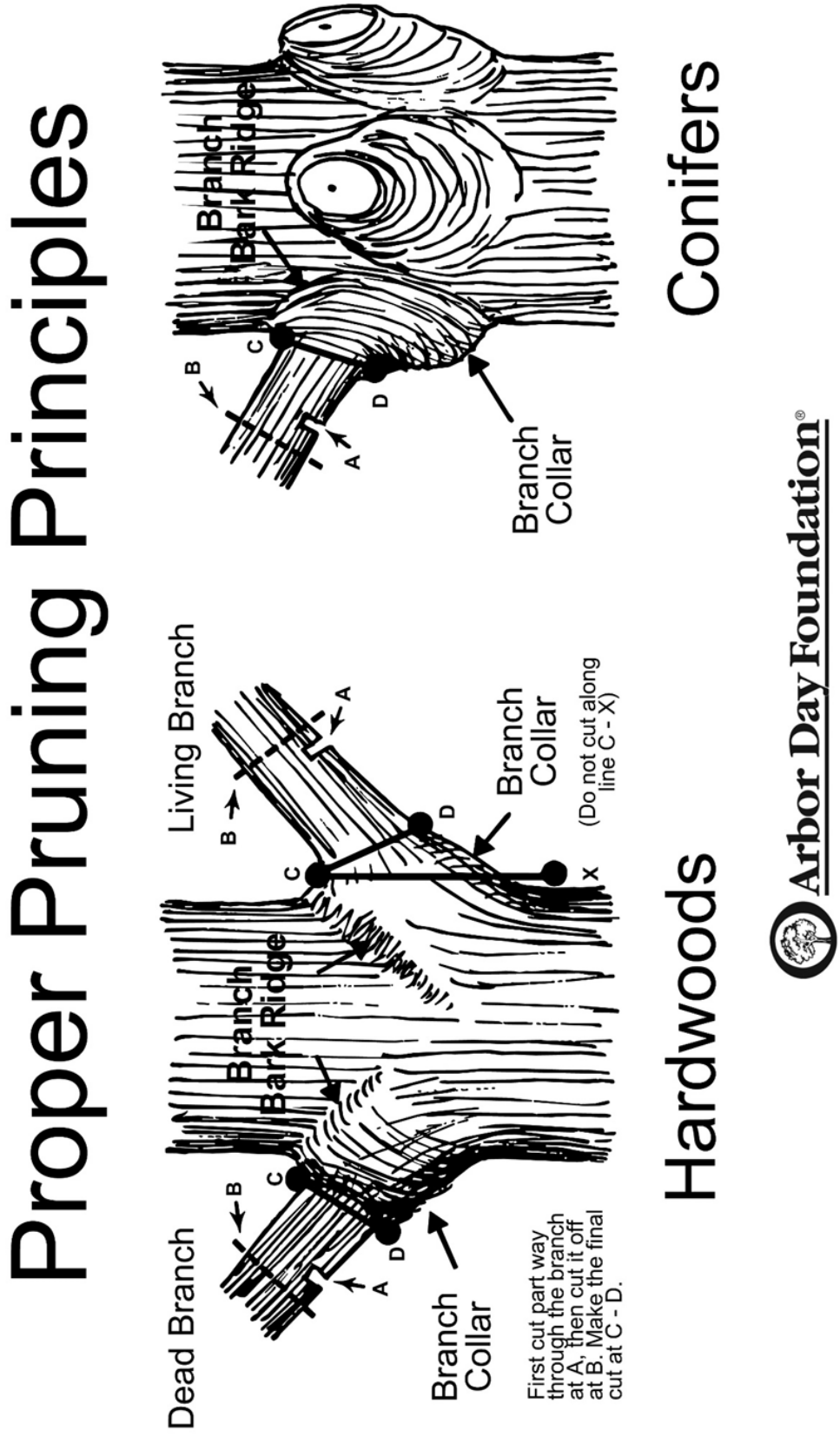
Appendix E: Balled and Burlapped Planting Detail



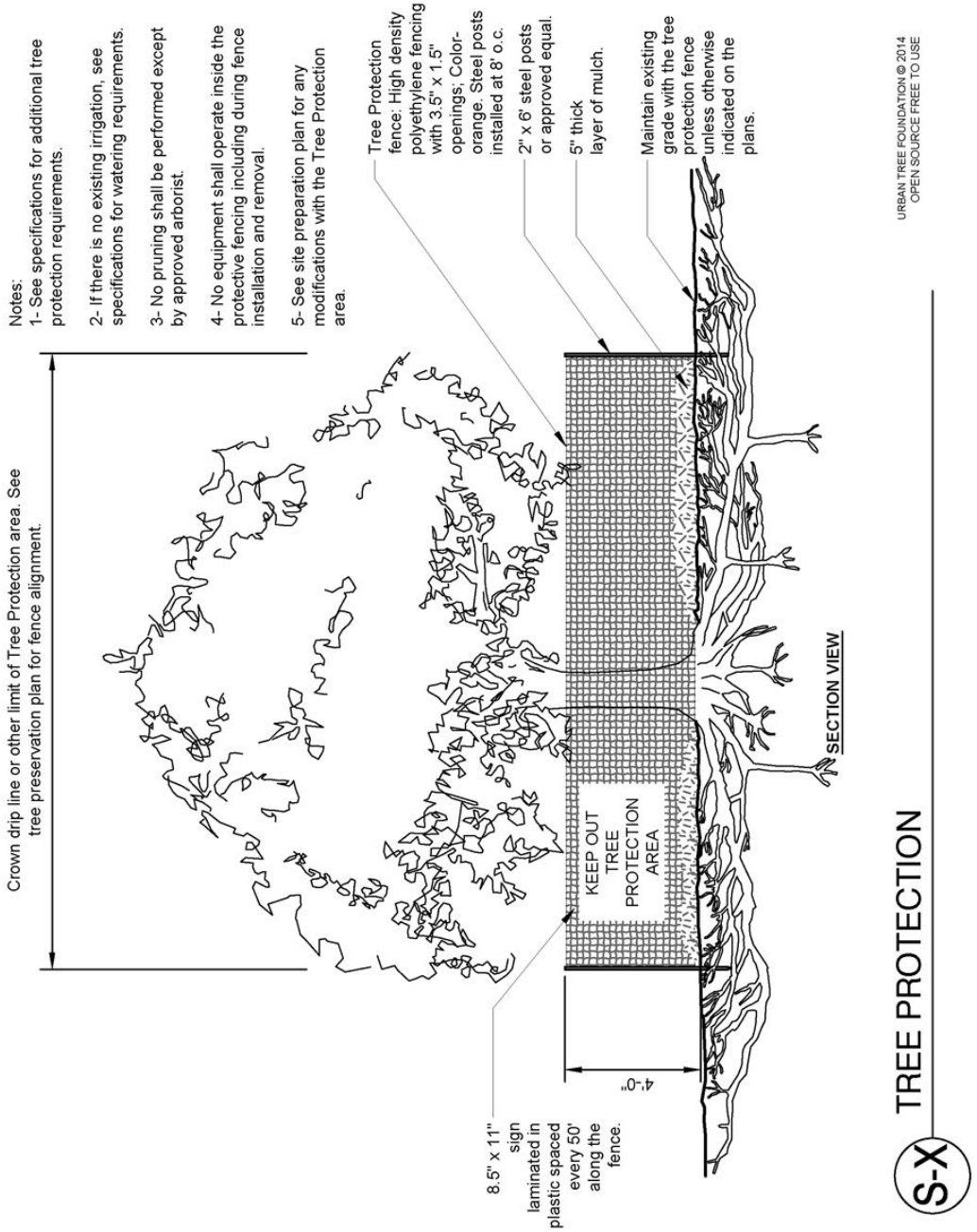
Appendix F: Containerized Planting Detail



Appendix G: Tree Pruning Detail



Appendix H: Tree Protection Detail



Appendix I: ISA Tree Risk Assessment Form (TRAQ Level 2-Basic)

ISA Basic Tree Risk Assessment Form

Client _____ Date _____ Time _____
Address/Tree location _____ Tree no. _____ Sheet _____ of _____
Tree species _____ dbh _____ Height _____ Crown spread dia. _____
Assessor(s) _____ Time frame _____ Tools used _____

Target Assessment

Target number	Target description	Target zone: Target within drip line	Target zone: Target within 1 x Ht.	Target zone: Target within 1.5 x Ht.	Occupancy rate (1 – rare, 2 – occasional, 3 – frequent, 4 – constant)	Practical to move target?	Restriction practical?
1							
2							
3							
4							

Site Factors

History of failures _____ **Topography** Flat ☐ Slope ☐ _____% **Aspect** _____
Site changes None ☐ Grade change ☐ Site clearing ☐ Changed soil hydrology ☐ Root cuts ☐ Describe _____
Soil conditions Limited volume ☐ Saturated ☐ Shallow ☐ Compacted ☐ Pavement over roots ☐ _____% Describe _____
Prevailing wind direction _____ **Common weather** Strong winds ☐ Ice ☐ Snow ☐ Heavy rain ☐ Describe _____

Tree Health and Species Profile

Vigor Low ☐ Normal ☐ High ☐ **Foliage** None (seasonal) ☐ None (dead) ☐ Normal _____% Chlorotic _____% Necrotic _____%
Pests _____ **Abiotic** _____
Species failure profile Branches ☐ Trunk ☐ Roots ☐ Describe _____

Load Factors

Wind exposure Protected ☐ Partial ☐ Full ☐ Wind funneling ☐ _____ **Relative crown size** Small ☐ Medium ☐ Large ☐
Crown density Sparse ☐ Normal ☐ Dense ☐ **Interior branches** Few ☐ Normal ☐ Dense ☐ **Vines/Mistletoe/Moss** ☐ _____
Recent or planned change in load factors _____

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ☐ LCR _____%
Dead twigs/branches ☐ ____% overall Max. dia. _____
Broken/Hangers Number _____ Max. dia. _____
Over-extended branches ☐
Pruning history
Crown cleaned ☐ Thinned ☐ Raised ☐
Reduced ☐ Topped ☐ Lion-tailed ☐
Flush cuts ☐ Other _____

Cracks ☐ _____ Lightning damage ☐
Codominant ☐ _____ Included bark ☐
Weak attachments ☐ _____ Cavity/Nest hole ____% circ.
Previous branch failures ☐ _____ Similar branches present ☐
Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ☐
Conks ☐ Heartwood decay ☐ _____
Response growth _____

Main concern(s) _____

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐ _____
Likelihood of failure Improbable ☐ Possible ☐ Probable ☐ Imminent ☐ _____

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐
Codominant stems ☐ Included bark ☐ Cracks ☐
Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ☐
Lightning damage ☐ Heartwood decay ☐ Conks/Mushrooms ☐
Cavity/Nest hole _____% circ. Depth _____ Poor taper ☐
Lean _____° Corrected? _____
Response growth _____
Main concern(s) _____

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure
Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth _____ Stem girdling ☐
Dead ☐ Decay ☐ Conks/Mushrooms ☐
Ooze ☐ Cavity ☐ _____% circ.
Cracks ☐ Cut/Damaged roots ☐ Distance from trunk _____
Root plate lifting ☐ Soil weakness ☐
Response growth _____
Main concern(s) _____

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure
Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

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Risk Categorization

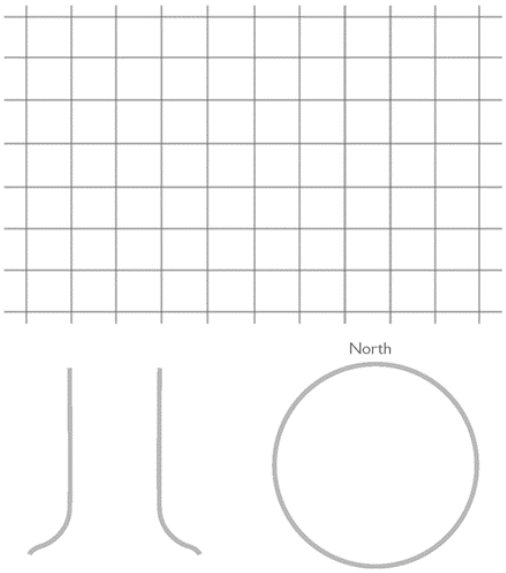
Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood: Failure: Improbable	Failure: Possible	Failure: Probable	Failure: Imminent	Impact: Very low	Impact: Low	Impact: Medium	Impact: High	Failure & Impact (from Matrix 1): Unlikely	Somewhat	Likely	Very likely	Consequences: Negligible	Minor	Significant	Severe	Risk rating of part (from Matrix 2)
1																							
2																							
3																							
4																							

Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impacting Target			
	Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low



Notes, explanations, descriptions _____

Mitigation options _____ **Residual risk** _____

Residual risk _____

Residual risk _____

Residual risk _____

Overall tree risk rating Low ☐ Moderate ☐ High ☐ Extreme ☐ **Work priority** 1 ☐ 2 ☐ 3 ☐ 4 ☐

Overall residual risk Low ☐ Moderate ☐ High ☐ Extreme ☐ **Recommended inspection interval** _____

Data ☐Final ☐Preliminary **Advanced assessment needed** ☐No ☐Yes-Type/Reason _____

Inspection limitations ☐None ☐Visibility ☐Access ☐Vines ☐Root collar buried Describe _____

Appendix J: ANSI Z133.1 Standards – Applies to All Sections

All of the ANSI Z133.1 safety standards shall apply to all tree care operations outlined in the Urban Forestry Management Plan. Listed below is a basic overview of the standard, it is not verbatim. A full text of this manual will be made available to all Village of Park Forest employees and contractors involved with tree care operations.

1. All tools and equipment utilized during tree care operations, including those not specifically mentioned below, shall be inspected and maintained by qualified personnel in accordance with the manufacturer's care instructions.
2. All staff shall be trained in the proper use, inspection, and maintenance of said equipment.
3. Certified arborists or arborist trainees shall conduct job briefings daily prior to tree care operations of any kind and the information shall be communicated to all workers.
4. All activities performed on any job site for any activity outlined in this Urban Forestry Management Plan shall comply with all applicable OSHA guidelines and standards.
5. Traffic and pedestrian control shall be established around the job site prior to the beginning of tree care operations.
6. Emergency contact information and a safety kit conforming to the ANSI Z308.1 standards shall be made available to all workers. All employees shall have basic instruction on the use of CPR and First Aid.
7. Personal Protective Equipment (PPE) shall be required when there is a reasonable probability of injury or illness on the job site. Such a determination will be made by the Certified Arborist or Arborist Trainee prior to the beginning of tree care operations each day, and PPE shall be made available. PPE shall be well-maintained in accordance with the manufacturer's requirements.
8. Head protection shall conform to ANSI Z89.1, face and eye protection shall conform to ANSI Z87.1, respiratory protection shall comply with ANSI Z88.2, and leg protection shall always be worn when using a chainsaw.
9. Flammable liquids shall be kept a minimum of ten feet from open sources of flame or high heat and shall be stored in approved containers.
10. All Village staff and contractors working near electrical hazards shall be qualified to do so and shall be educated in the full ANSI standards for Electrical Hazards and Line Clearance.
11. Vehicles and mobile equipment shall be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements and shall be equipped with all standard safety devices, decals, and instructions, and shall be operated within all federal, state, and local motor vehicle codes and ordinances.

12. Aerial devices shall be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements, and shall be equipped with all standard safety devices, decals, and instructions.

13. Aerial devices shall be stabilized by wheel chocks, outriggers, or stabilizers as necessary for the device, and shall never be used to lift, hoist, or lower logs or equipment unless specifically designed to do so.

14. Aerial devices shall be equipped with fall protection devices and permanent load ratings, both in accordance with ANSI/SIA 92.2 or 92.5, as applicable to the specific aerial device.

15. No aerial device shall be allowed to make contact with electrical conductors, and minimum safe distances shall be maintained in accordance with the ANSIZ133.1 Standard.

16. All brush chippers shall be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements, and shall be equipped with all standard safety devices, decals, and instructions.

17. Sprayers and related plant health care equipment shall be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements, and shall be equipped with all standard safety devices, decals, and instructions

18. Sprayer tanks or other similar enclosed spaces shall not be entered unless performed through a confined-space entry plan in accordance with OSHA 1910.46 Requirements, including air-quality testing, training, and PPE.

19. Chain saws and other similar portable power tools shall not be operated unless the manufacturer's safety devices are in proper working order. Such safety devices shall not be removed or modified.

20. Forestry staff shall have a minimum of two points of attachment to the tree or aerial device while operating a chainsaw at all times, unless the hazard posed by the second point of attachment poses a greater hazard than utilizing one point of attachment.

21. A visual hazard assessment, including a root collar inspection, shall be performed by a certified arborist or arborist trainee prior to climbing, entering, or performing work in or on any tree, and a second crew member shall be within visual or voice communication at all times during arboricultural operations that are in excess of 12 feet from the ground surface.

22. All ropes, saddles, carabineers, and other similar climbing equipment shall be: a) approved for use in the tree care industry by the manufacturer, b) have a minimum breaking strength or load capacity of 5,000 lbs., c) be inspected before each use, d) Equipment shall be removed from service when it shows signs of excessive wear or deterioration.

23. All pruning, removal, and rigging operations shall have a designated drop zone where limbs, trunks, and tools can be dropped from aloft without impacting pedestrians or passersby. A visual or verbal communication system between the employee aloft and the employee(s) on the ground shall be established to determine when the employee aloft will safely drop tree parts or tools.

24. Any tree parts which cannot be safely dropped or controlled from aloft shall have a separate rigging line tied to them to help control their fall. The tree shall be inspected for structural stability prior to the establishment of a rigging system in the tree. When trees appear to have defects that could jeopardize the ability to safely use a rigging system to drop or control a limb, an alternate plan shall be implemented.

25. All equipment utilized in rigging shall meet the load ratings for the limb being rigged, and a qualified employee, trained in proper rigging procedure shall determine the rigging procedure and equipment to be utilized. Any equipment which has been damaged or overloaded shall be removed from service.

26. When felling (removing) a tree, a crew leader shall make the determination of what equipment is necessary, and how many crew members are to be directly involved in drop zone operations. A well-established escape route shall be planned for involved workers prior to the beginning of felling operations. Any non-involved workers shall be beyond twice the height of the trunk or tree being removed during felling operations.

27. Notches shall be used on all trees and trunks greater than five inches in diameter during felling operations, and should conform to the standards set forth in the ANSIZ133.1 Standard.

28. Loose clothing, ropes, lanyards, and saddles shall not be worn during any tree care activity where the risk of entanglement with tools or machinery is possible, particularly with brush chippers.

Appendix K: Tree Planting Standards (ANSI/ISA BMP)

ANSI Z60.1

1. All root ball and container sizes for all balled and burlapped stock shall conform to the Z60.1 standards for width and depth, such that they encompass enough of the fibrous root system as necessary for the full recovery of the plant upon installation.
2. All bare root stock shall conform to ANSI Z60.1 standards for minimum root spread.
3. All containerized stock shall conform to ANSI Z60.1 standards for plant and container size, as specified by the Village, and shall be healthy, vigorous, well-rooted and established in the container in which it is growing. The root system shall reach the sides of the container, but shall not have excessive growth encircling the inside of the container.
4. All collected plants (those grown on unmanaged land) shall be so designated, and shall be considered to be nursery-grown stock when they have been successfully reestablished in a nursery row and grown under regular nursery cultural practices for a minimum of two growing seasons.
5. The trunk or stem of the plant shall be in the center of the ball or container, with a 10% overall variance in location.
6. The use of digging machines in both the packaging and installation of trees is considered an acceptable nursery practice.

ANSI A300 – Part 6

1. Planting sites and work sites shall be inspected for hazards by the Village prior to the beginning of work each day. If portions of the work site are outside of the original scope of work, the controlling authority shall be notified immediately.
2. Location of utilities, obstructions, and other such hazards above and below ground shall be taken into account prior to planting and transplanting operations. These include, but are not limited to, gas, electric, sewer, communication, drainage, and signage.
3. The following shall be taken into consideration prior to transport and planting: Requirements of individual trees, compass orientation of field-grown trees, site feasibility assessments, soil assessment, and drainage assessment.
4. Tools for planting and transplanting shall be properly labelled or purchased for their intended use, and be maintained in accordance with the manufacturer's recommendations
5. The system used to move and store the plant shall minimize desiccation and other damage to the crown, trunk or root-ball, and the health and vigor of the plant shall be maintained during these periods.

6. The hole to be dug for all new plantings shall be a minimum of 150% larger than the rootball or container diameter, as deep as the root flare of the tree to be planted, and shall have sides from which soil has been loosened in order to aid in root penetration.
7. For balled and burlapped trees, all root-ball supporting materials shall be removed from the upper third of the root-ball, and removed from the planting hole prior to final backfilling.
8. Prior to planting, container root balls shall be managed by approved methods such as, shaving the root ball, slicing the root ball, and redirecting or removing encircling roots.
9. Backfill shall comprise of either the same soil created when the hole was excavated, or a similarly amended mixture to meet a specific objective, and shall be applied in a layered fashion to reduce future settling and prevent air pockets.
10. Mulch shall be applied at a depth of two to four inches, near - but not touching - the trunk of the tree, and extending to the perimeter of the planting.
11. Support systems such as guy-wires or stakes shall not be installed except where needed.

ISA BMP Manual – Tree Planting

1. Timing of planting shall be determined based on the species, and the best professional opinion of the employees of or contractors working for the Village of Park Forest.
2. All employees and contractors employed by or working for the Village of Park Forest shall be familiar with the following types of planting types, and when it is appropriate to use each:
   A. **Bare-Root:** Field-grown, and dug without soil during the dormant season
   B. **Ball and Burlap:** Field grown and packaged with a soil ball, using burlap, twine, and a retaining basket of some kind
   C. **Tree Spade:** Transplanted using a mechanical tree spade to hold the soil ball during transport
   D. **In-Ground Fabric Bag:** Field grown with the root mass contained in a semi-permeable fabric bag
   E. **Container Grown:** Grown above ground in containers of various shapes, sizes, and materials
3. Trees packaged with root balls must have their first structural root within two inches of the soil surface. Trees with deeper structural roots will not perform well when transplanted, and should be avoided when selecting nursery stock.

4. Trees with root balls shall be handled by the ball, not the stem, to ensure no damage occurs to the root-soil interface or to the stem itself**.**
5. Trees with leaves shall be transported with a fabric tarp to minimize desiccation, and have had their root balls wetted prior to transport.
6. Sites shall be tested for drainage, nutrient levels, and pH prior to planting (or prior to species selection, if possible).
7. Container stock shall be removed from its container. For balled and burlapped trees, wrappings shall be left on until the tree is in the hole; wrapping shall then be removed from the third to fourth of the wire basket and burlap from the top of the ball. For all types, ensure any encircling (girdling) roots are removed, and root ball is shaved as necessary.
8. As soil is added, wet and tamp each layer down to ensure good moisture and reduction of air bubbles.
9. Do not prune trees at time of planting, unless to remove dead, dying, diseased, or cracked branches, as it may take away from root development to have the tree attempt to heal these above-ground wounds.
10. The use of trunk wrap may be considered in areas with harsh winters, specifically on trees with thin bark, such as London Planetree and certain Maple species.

Appendix L: Tree Pruning Standards (ANSI/ISA BMP)

ANSI A300 - Part 1

1. A designated Arborist or Arborist Trainee shall visually inspect each tree before beginning work. If any condition is observed above and beyond the original scope of work, said condition shall be reported to the controlling authority before any work begins.
2. Pruning cuts which remove a branch at its point of origin shall be made close to the trunk or parent branch without cutting into the branch-bark collar or leaving a stub.
3. Pruning cuts made to reduce the length of a limb or parent stem shall be made at a slight angle relative to the remaining stem, and not damage the remaining stem. If pruning to a lateral branch, the lateral should be large enough to assume the terminal role.
4. Final cuts shall be made such that the result is a flat surface, with the adjacent bark firmly attached.
5. Not more than 25% of the foliage shall be removed during an annual growing season, depending on the tree species, size, age, and condition. If more frequent pruning due to utilities, vistas, or health considerations is necessary, removal of the tree should be considered as an alternative to pruning.

ISA BMP Manual

1. All employees or contractors directly involved with the pruning of trees shall be familiar with the following pruning types and how they are to be used in conjunction with one another:
    1. **Pruning to Clean**: Selective removal of dead, diseased, detached, cracked, and broken branches
    2. **Pruning to Thin:** Selective removal of small live branches to reduce crown density
    3. **Pruning to Raise:** Selective removal of branches to provide vertical clearance
    4. **Pruning to Reduce:** Selective removal of branches and stems to decrease the height or spread of a tree or shrub
    5. **Structural Pruning:** Selective removal of live branches and stems to influence the orientation, spacing, growth rate, strength of attachment, and ultimate size of branches and stems
    6. **Pruning to Restore:** Selective removal of branches, sprouts, and stubs from trees and shrubs which have been topped, severely headed, vandalized, lion-tailed, storm damaged, or otherwise damaged
2. Every effort shall be made to time pruning of individual tree species to be done in accordance with best management practices for the tree species in question. All pruning work shall be done so at the discretion of the Village of Park Forest and its approved contractors.

Appendix M: Tree Protection (ANSI/ISA BMP)

ANSI A300 – Part 5

1. Tree management plans and specifications for tree management shall be written and administered by a certified arborist qualified in the management of trees and shrubs during site planning, development, and construction. Such activities may include, but are not limited to demolition, grading, building construction, walkway or roadway construction, excavation, trenching and boring, or other such activity which has the potential to negatively impact trees.
2. The management of trees and shrubs shall be incorporated into the following phases of the site development process:
   A. Planning
   B. Design
   C. Pre-Construction
   D. Construction
   E. Landscape
   F. Post-Construction
3. During the Planning phase, an assessment of tree and shrub resources on the site shall be performed by a certified arborist. The assessment shall identify the species, condition, and size of each tree and shall be incorporated into the site design. Trees to be retained or protected shall appear on site design maps. Trees on neighboring property which could also be impacted should also be considered.
4. During the design phase, a tree management report shall be developed for trees to be conserved on the site, and shall be included in the construction plans and specifications, which may include, but are not limited to:
   A. Trees to be retained
   B. Tree and Root Protection Zones
   C. Tree Protection Zone barriers
   D. Tree Protection plans
   E. Soil erosion control
   F. Soil compaction controls
   G. Staging and storage areas
   H. Other relevant on-site activities

5. Grading and demolition plans shall include all trees to be retained and removed, as well as the tree protection plans for working around trees to be retained. Plans shall also include equipment routes for avoiding the TPZ. Consequences for non-compliance shall be specified.
6. During the pre-construction phase, all tree protection plans shall be effectively communicated to all parties involved with the site development, and tree protection zone barriers shall be in place prior to the beginning of any construction activities.
7. The TPZ shall be delineated around all trees to be protected during construction, and shall be based on the size, species, and condition of the tree and its root system. Six to 18 times the diameter of the tree is generally considered to be acceptable. Deviations from this diameter may be made at the discretion of a certified arborist. Activities which could damage tree roots or compact soil should be avoided in the TPZ
8. Fencing or other visible barriers to the TPZ shall be installed prior to site clearing, grading, and demolition, and maintained throughout the construction and landscaping phase. When this is not feasible, alternate methods may be considered.
9. During the construction phase, compliance with tree protection plans shall be monitored by a certified arborist, and any damage to tree barriers or trees, or non-compliance shall be reported to the project manager or owner, or other controlling authority.
10. When removing vegetation or pavement during demolition, equipment used adjacent to the TPZ shall be specified to avoid damage to the tree and the surrounding soil, and soil protection measures shall be in place prior to vehicle or heavy traffic in or near the TPZ.
11. Storage or disposal of construction materials or hazardous materials shall not occur in the TPZ.
12. Fill within the TPZ shall not be permitted without mitigation to allow for proper air and water availability to existing roots. If fill cannot be avoided in the TPZ, compaction of fill shall be avoided, and consideration shall be given to a permanent well installation to protect the tree and its roots.
13. During the landscape, irrigation, and lighting phase, levels of compliance shall be documented and reported by a certified arborist. Non-compliance shall be reported to the project manager.
14. During the post-construction phase, a remedial and long-term maintenance plan shall be specified for existing and new landscaping, to ensure success of preservation efforts and newly planted landscaping.
15. Pruning shall be considered to reduce wind sail when necessary. It should not be considered to compensate for root loss.
16. Mulch shall be applied to as much of the tree protection zone as possible, in order to create a favorable soil environment for root recovery after construction activities.

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1. A cost-benefit analysis shall be conducted during the planning phase. In some cases, money may be better invested in tree planting post-construction.
2. The species and age of tree shall be evaluated by a certified arborist, so that trees in good condition with desirable characteristics are preserved, but those in poor condition or with undesirable characteristics are not.
3. A tree inventory and tree management report shall be conducted during the planning phase, and a certified arborist shall work closely with developers to ensure best management practices are being met for both parties.
4. Effort shall be made to retain groups of trees, such that there is a wind and solar buffer around the highest quality trees if possible.
5. The Critical Root Zone (CRZ) is the area around the tree trunk where roots essential for tree health and stability are located. A Tree Protection Zone (TPZ) is an arborist-defined area around the tree which should include the CRZ, as well as additional area to ensure future stability and growth. The TPZ is subject to the professional opinion of the certified arborist.
6. An attempt shall also be made to preserve native soil for landscape planting as native soil with horizons and development is preferred over fill or black dirt.
7. If a sufficient TPZ cannot be established, a 6-12" layer of hardwood mulch, 3/4-inch plywood mat over a four-inch layer of hardwood mulch, or other such measures shall be temporarily installed over the CRZ in order to prevent root and soil compaction.
8. Trunk protection shall be installed on trees very close to construction activities, and should consist of 2x4 or 2x6 planks, strapped snugly to the tree trunk with wire or other strapping, preferably with a closed-cell foam between the trunk and the planks.
9. When roots over one inch cannot be avoided, they shall be pruned, not left torn or crushed. Acceptable methods of pruning are:
   A. Excavation using supersonic air tools, pressurized water, or hand tools, followed by selective root cutting
   B. Cutting through the soil along a predetermined line with a tool designed to cut roots
   C. Mechanically excavating the soil and selectively pruning remaining roots.
10. Wells, tree islands, retaining walls, and other such structures or strategies shall be considered as alternatives to any cut/fill work in the CRZ or TPZ.
11. Monitoring shall take place during construction and post-construction phases, and any non-compliance should be reported to the proper controlling authority right away, so that timely remediation or mitigation efforts may be undertaken.

Appendix N: Urban Timber Harvesting

Log Removal Specification for Urban Timber Harvesting

This tree removal standard shall not take precedence over applicable industry safe work practices and shall be implemented by a qualified arborist, urban forest manager, and /or practitioner who, through related training or on-the-job experience, or both, are familiar with the standards, practices and hazards of recovering urban forest products and the equipment used in such operations. Additionally:

- Logs shall be felled to obtain minimum 8', 10', or 12' lengths with an additional 6" of trim on each log to a minimum diameter of 11" inside the bark. Maximum log length shall be 20'6".

- If a tree must be removed in sections, every effort should be made to retain the lowest log, at the longest possible length that can be safely felled.

- Branches should be trimmed flush with the bole/trunk, root flares should be trimmed flush with the bole/trunk, and the ends of the log should be square.

- Logs shall be flush cut with no crotches or splits. All obvious defects such as decay, large holes, and rot shall be removed.

- Logs with significant sweep shall be cut in order to eliminate as much sweep as possible while yielding the longest possible straight logs to ensure logs are flush for proper milling.