City of Belvidere

Urban Forestry Management Plan

City of BELVIDERE Illinois

GREAT LAKES URBAN FORESTRY

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ILLINOIS DEPARTMENT OF NATURAL RESOURCES

FOREST SERVICE U S DEPARTMENT OF AGRICULTURE

The Morton Arboretum®

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OVERVIEW OF BELVIDERE'S URBAN FOREST MANAGEMENT PLAN

Belvidere, Illinois currently manages 4,223 trees throughout its City terraces, rights of way, and City-owned properties. There are also approximately 7,465 open planting spaces that have been recorded which represents significant potential for growth of the Urban Forest resource. The City's trees were inventoried as part of a project this past year culminating in this Urban Forestry Management Plan which will detail how these trees will be managed for the benefit of the City of Belvidere over the next 20 years, with a focus which begins in 2025, and projects out to 2045.

In terms of the condition of the Urban Forest in Belvidere, there are both strengths and opportunities for improvement. One strength is that there are 105 species represented which is quite good diversity for a municipal tree population of this size. The Maple genus, however, makes up over 50% of the urban forest which is a significant portion of the population, and this statistic certainly leaves much room for improvement. Another opportunity for improvement lies in the City's low stocking density. As it stands, the stocking density in Belvidere is 36%, however with nearly 7,500 open planting spaces, there is certainly opportunity to gradually increase density over time. Also, the current budget being applied towards forestry management should likely be larger. At $91,000 per year, this is enough to fulfill basic needs, even a modest increase in budget would allow Belvidere to accomplish much more.

In order to enhance the Urban Forestry program so it will create long term benefits to the community while reducing costs, the following Urban Forest Management Plan will address each one of these strengths and challenges and create goals and milestones for each. Below is a broad view of the direct goals to come in the 2025-2045 period. Further detail is given in the body of the Plan, with separate sections detailing specific Urban Forestry activities, and how we propose they are achieved, along with standards and Best Management Practices for each.

An urban forestry program has been created in this Plan which attempts to achieve the greatest benefit for the community, based on the available data we have from the inventory, as well as input from stakeholders and residents of the City of Belvidere.

However, all plans are subject to change based on new information, budgets, or other unforeseen circumstances. For this reason, it is asked that readers consider that this plan is to be an evolving document, and goals and strategies will be updated to fit new circumstances as needed.

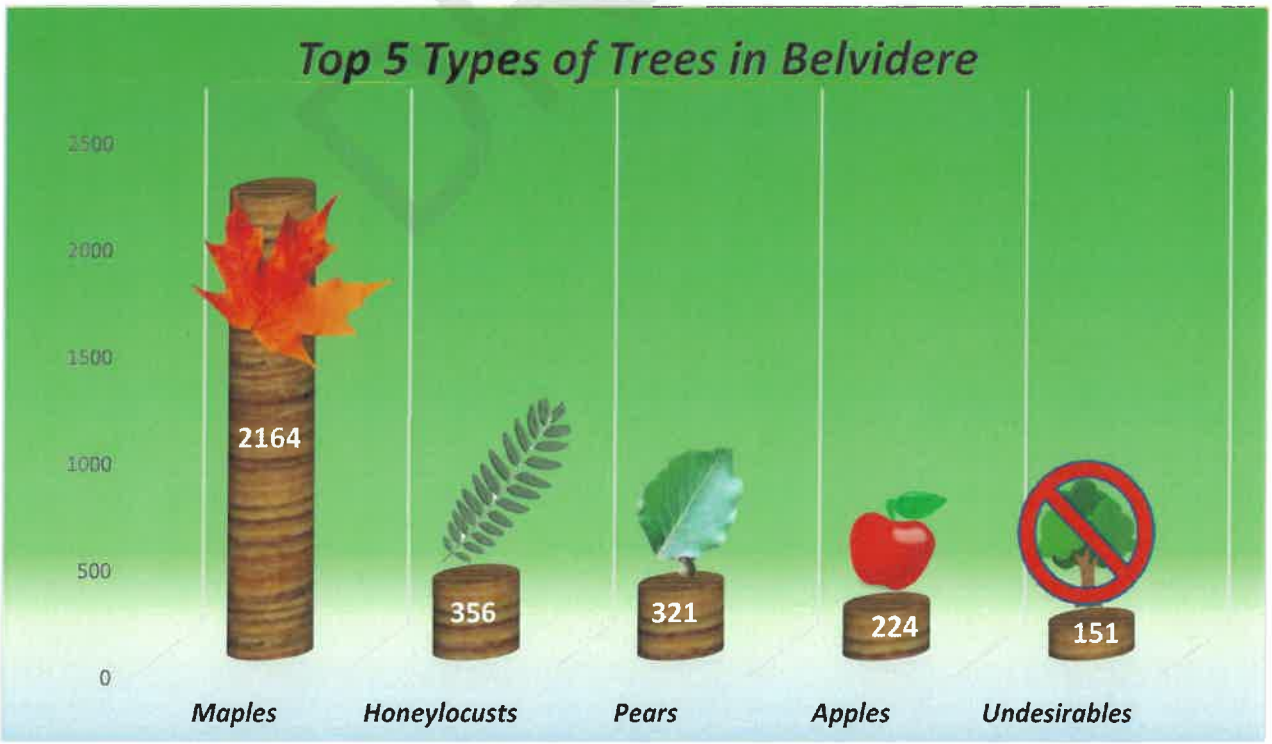
This Plan should be reviewed periodically, at which point the City, and its residents, business owners, and other stakeholders will have an opportunity to provide input and help improve the Plan during those annual reviews. These strategies and goals are not absolute, but rather serve as guideposts to mark the road to success.

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 City of Belvidere, 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.

BELVIDERE'S URBAN FOREST: AT A GLANCE...

Total Number of Trees	*4,223*
Open Planting Spaces	*7,465*
Total Number of Species	*105*
Annual Benefits Provided	*$101,640/year*
Standing Value	*$10,290,000*



DIRECT GOALS

Listed below are the direct goals of this Urban Forest Management Plan (herein referred to as "UFMP", or "the Plan"), as well as a brief discussion of how they shall be met. Direct goals are those which this plan addresses very explicitly in describing pruning, removal, planting, and other activities. Every attempt was made to make these goals realistic and achievable, so they do not place an undue burden on the City of Belvidere, its residents, or its resources. Instead, the direct goals of this UFMP are to save money and provide greater benefits over time through proactive, as opposed to reactive, management. The Plan is also meant to be adaptive: New concepts, the introduction of new pests or pathogens, or changing climate (both social and meteorological) may all change the way the Urban Forest is viewed.

The Plan is intended to be reviewed periodically by the City staff and any other stakeholders. The review process should include evaluation of progress made towards these goals. Goals may be altered after the review, as conditions warrant. This UFMP is written with the understanding that organizations, stakeholders, and residents change over time, and therefore its goals require a degree of flexibility. Since trees represent a long term (50-80 year) commitment, this UFMP is intended to provide guidance and continuity through those changes, while also adapting to them as the need arises.

Create a Needs Analysis for the Current Tree Population

Every tree population today is the result of decades of past management decisions. Over time, we increase our overall level of knowledge, skill, and efficiency in managing trees. Based on that new knowledge, we sometimes discover that decisions made decades ago may appear in retrospect to have been inappropriate, even though they seemed like a good idea at the time. It is the goal of this Plan to assess the current state of the City of Belvidere's Urban Forest and examine its overall strengths and benefits, as well as look for opportunities for improvement to inform future decisions.

Each aspect of Belvidere's tree data has been analyzed: How many trees, what condition they are in, how old they are, what needs do they have, and more were all examined to create goals to improve the tree population for the benefit of the City of Belvidere, its residents, and other stakeholders. Specific goals in terms of planting, removals, pruning, budgets, personnel, and maintenance are all addressed by acknowledging both strengths and opportunities and suggesting how they might be used to the City's advantage. These strengths and opportunities will be the guiding principles for the management strategies and specific goals outlined in each section below. To avoid repeating past mistakes, the Plan shall also attempt to leave room for adaptive management, so the plan may be changed when appropriate.

Establish Goals in Order to Enhance Strengths and Realize Opportunities

In order to accomplish anything, goals are necessary to help guide organizations through the process. Enhancing a well-functioning forestry program will require a series of attainable goals to achieve this. This UFMP seeks to accomplish those goals within a realistic budget and attainable timespan. As stated previously, goals are intended to change over time as the City's capacity to manage the resource may increase or be reduced.

In each section of the Plan related to direct goals, language has been included which incorporate both a budget and a time frame in which those goals can be accomplished. The overarching goal will be to have Belvidere use this UFMP to create a more sustainable and adaptable forestry program within a 5-10 year period.

This program will include tree planting, tree maintenance, and tree removal for Belvidere's Urban Forest, so that the tree population will be healthy, and provide the greatest benefits and least risk to the community while maximizing benefits and minimizing risk. To learn more about the budgets, see the individual goals in each section below, or turn to the budget table on page __.

Update City Ordinances for Enforcement of Tree Policies

As part of the IDNR grant program, work will be performed by Morton Arboretum working in tandem with Belvidere staff and relevant community stakeholders to review the current City ordinance and look for opportunities to improve policies governing trees in Belvidere. These ordinances should be meant to reinforce proper practices while discouraging improper practices and care, and are not meant to be overly punitive, but rather to encourage the community to engage in proper tree care practices for the benefit of all parties. These ordinances are common industry regulations, such as enforcing rules about what trees cannot be planted because they are low quality or invasive trees or defining exactly what trees are the City's and the homeowner's responsibility, among other things. The goal of these ordinances is to create a tree population which is diverse, healthy, and improving, providing the greatest benefit to the City and its residents over the long term.

Increase Overall Diversity by 2045 Through Tree Planting

Tree species diversity is one of the most important concepts in Urban Forestry today. The reason pests and diseases like Emerald Ash Borer (EAB) and Dutch Elm Disease were so devastating is that there were too many Ash and Elm trees. When EAB arrived, many communities' Ash population was 20% or more, resulting in mass tree loss. This can be avoided by planting a greater diversity of tree species, so that when new pests or pathogens are introduced, we only lose small amounts of specific tree species. Diversity leads to stability, and stability leads to reduced costs and increased benefits over time.

An achievable "Diversity Vision" has been created for 2045 which will see the tree population become far more diverse than it is at present. The current population includes a respectable 105 individual species, and the diversity vision included in the Plan aims to reduce the number of trees that are over-represented and/or lower quality species while also seeking to increase the number of species that are under-represented or not present in the tree population.

Not only will trees be planted which are underrepresented or not present in the current population, an objective should be to plant in such a manner that selects the right tree for the right site. A direct goal will be to create a tree planting program where trees are matched to existing sites for the next 10 + years. Currently, Belvidere plants approximately 20 trees each year, and this plan seeks to increase that number to an average of 100 trees per year over the course of this plan, to both be able to replace underperforming or declining trees, as well as to grow the tree population overall by 2045. To learn more about tree planting, turn to page __.

Maintain an Acceptable / Unacceptable Species List

The urban environment is a difficult place for a tree to live. Between road salts, urban pollutants, limited soil, and other challenges, not all trees will thrive in the urban environment. Trees which have very weak wood, which are known invasive species, which produce messy or foul-smelling fruits, or which create a public nuisance, should also be avoided. Acceptable species are those which are adapted to our Midwest climate, are not invasive, and do not pose high risk. Included in this Plan is an "acceptable and unacceptable" species list which will detail specific trees which may be planted on City ROWs and other City-owned properties. The City will review the list periodically to ensure that it is being maintained in accordance with the latest information on specific trees. For more information on what species can and cannot be planted in Belvidere, see the Acceptable Species list in Appendix A.

Manage Tree Removals

For public safety, or to prevent the spread of tree pests and pathogens, sometimes tree removal is unavoidable. At present, according to the inventory data, there are 309 trees which have been called for removal. Of these, 34 are listed as Priority Removals, 161 are listed as Standard Removals, and another 114 are listed as Low Priority Removals based on the inventory data.

A tree removal program has been created in this Plan which budgets for the safe removal of all these trees over the next several years in order to maintain public safety and the City's aesthetics. Cost projections for tree removals have been made based on the number, age, and condition of trees in Belvidere for the next 20 years, so that long-term budgeting projections can be made.

Also included are ANSI and ISA safety standards, as well as suggested bid specifications to ensure the City is hiring qualified contractors who will be held to the highest industry standards. For more information on Belvidere's proposed tree removal program, turn to page _.

Implement & Enhance Cycle Pruning Program

Properly pruned trees establish faster, grow quicker, and live longer lives than trees which are not pruned, or improperly pruned. Since large trees provide the greatest benefits to the community, pruning is a critical part of the Urban Forestry program in Belvidere. Pruning will be done by Belvidere staff or Certified Arborist contractors. Over the next year, the trees identified as requiring priority pruning, pruning of dead limbs, or establishment pruning will be budgeted. The first goal will be to prune the trees which are in the greatest need of pruning.

Currently, the City prunes approximately 220 trees each year as part of an annual pruning program and a goal of this plan will be to gradually increase that number. The cyclical pruning program proposed in this Plan will ensure that all trees on public property are pruned at a minimum every 5 years, increasing tree health and vigor while reducing costs associated with storm damage and tree failure. For more information on tree pruning and maintenance, turn to ___.

Maintain an Accurate Tree Inventory on an Annual Basis

Managing an urban forest requires a clear understanding of the trees, their ages, conditions, and locations, so that City crews and contractors can perform work on these trees. A stem-by-stem tree inventory was completed in 2024. This inventory resulted in an unbiased assessment of all of the trees on public rights of way in the City and will serve as the data which will guide the forestry program throughout the next 20 years.

All inventories are a snapshot in time. With 4,223 trees on City terraces and ROWs, the tree inventory should be maintained at a high level of accuracy so that it doesn't become out of date. Currently, the Belvidere's inventory is housed on the City's GIS platform and can be edited and updated by City staff. It is also recommended that the inventory be updated periodically by a Forestry Consultant, to keep the information at its most current on a City-wide scale. Maintaining this tree data at a high level is vital in the execution of this Management Plan.

Implement Proper Planting, Mulching, and Establishment Practices for All New Trees

As noted above, the urban environment is a difficult place for a tree to become established and to live a long, healthy life. Proper planting and establishment practices can significantly increase a tree's ability to do this. The City will begin with choosing the right tree for the right place, followed by utilizing detailed plant material and planting specifications for contractors to follow, ideally coupled with inspections for adherence to specifications by City representatives before, during, and after planting. Post installation establishment care should be formalized for all trees for the first five years after planting. This could include watering during dry periods, staking, sunscald protection, re-mulching every 2-3 years, and training pruning to ensure good branching structure. Implementation of this initiative can help ensure the City protects its investment in green infrastructure.

In addition, this initiative can be used to help educate residents about proper mulching, watering, and pruning of new trees to help avoid tree stress due to over- or under-watering, improper pruning, "volcano mulching", or homeowner-caused damage to trees from mowers and trimmers. For more information on proper mulching, turn to page __.

Incorporation of Best Management Practices in Tree Care Operations

"Best Management Practices" is a term which means being on the cutting edge of your industry. All contractors working for the City should be compliant with the latest industry Best Management Practices, based on the appendices in this report. The ANSI and ISA Best Management Practices shall be integral parts of any Request for Proposal (RFP) or bid documents when seeking qualified contractors. Full text of all referenced standards shall be made available to all City employees and contractors performing tree care operations. Public outreach and education may be performed by the City of Belvidere staff, ensuring that residents understand these practices as well. This UFMP will be placed in the public domain for all residents to use as a reference.

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

Trees create great benefits, but they may also pose various degrees of risk. Tree limb failure can have catastrophic effects on people or property, and trees need to be well-managed and healthy to avoid that risk. A risk assessment policy has been created for the City of Belvidere as part of this Plan. This policy will aid in identifying, documenting, and designating for removal or mitigation, trees which may pose a threat to public safety in a timely manner. This will reduce the overall level of risk posed by trees, as well as exposure to liability from tree-related incidents. Basic risk assessment language is included in this document, and a basic Tree Risk Assessment Policy has been created in page __, and the ISA Basic Tree Risk Assessment Form can be found in Appendix H.

Increase Urban Tree Canopy from 26.77% to 29%

Tree canopy is important to the community as a whole because more and larger trees provide greater benefits such as decreased heating and cooling costs, pollution reduction, and increased storm water uptake. Tree lined streets are more attractive to homebuyers and potential new businesses, which increases home values, home ownership, and tax revenue. All of these factors benefit the community, so a direct goal will be to increase tree canopy in the City of Belvidere. Currently, Belvidere contains 26.77% tree canopy coverage, compared to other land cover types. Increases in tree canopy also come with increases in total benefits provided to the community.

Based on data from the Chicago Region Trees Initiatives, we believe that an increase to 29% canopy cover is a realistic goal for Belvidere by 2045. This will be accomplished by increasing the number of trees on publicly owned and private property, as well as improving tree care allowing trees to live longer, become larger, and create more canopy cover. This increase in canopy cover might be a cooperative goal with Boone County Conservation District or Belvidere Park District.

Tree planting on private property will be encouraged through public-private partnerships with local organizations and businesses. As we will show in the detailed portions of this Plan, these are real benefits that will help Belvidere residents save money. For more information on Urban Tree Canopy, tree benefits, and other such information, turn to pages ___.

Mitigate Climate Change Effects

An proactive and effective strategy to mitigate a changing climate is to plant more trees, and 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 have 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 excellent 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, in terms of examining the hard dollar benefits trees provide, looking at where trees can be planted to maximize

their effect on heat islands and flooding, and looking at what species could be planted in the future as we are subject to higher average temperatures. For more information on using trees to mitigate climate change, turn to page __.

Define Trees as Critical Stormwater Infrastructure

Green infrastructure is rapidly becoming recognized as being just as important as grey infrastructure in many ways. Chief among these green infrastructure components are trees, and specifically the stormwater mitigation effects they provide. A mature tree can intercept or otherwise mitigate over 5,000 gallons of avoided runoff every year. On a population scale, Belvidere's tree population of 4,223 trees is responsible for intercepting or avoiding over 677,400 gallons of stormwater runoff each year. The loss of this resource due to storm damage, insect or pathogen invasion, or other such damage would have a critical impact on the local stormwater infrastructure. For this reason, a direct goal of this Management Plan will be to define trees as critical stormwater infrastructure, and that these assets should be compensated for when lost to unforeseeable events.

Creation, Utilization, and Maintenance of a Storm Response Policy

Since storms are inevitable, they must be a consideration in any municipal management regime and a decision making variable in managing municipal tree populations. Urban Forest Management should always include strategies for building a resilient forest and a resilient community. United States Forest Service's *Community Forest Storm Mitigation – A Guide for Communities* which was published in the latter half of 2021 can be an excellent framework for Belvidere to build a comprehensive storm response policy tailored to the City's exact needs.

Tree Preservation / Invasive Species Management

Sometimes trees can become damaged by construction activities, costing the City money, and eliminating the benefit the tree had to the community. A basic tree survey and assessment should be conducted prior to the issuance of a permit for construction activities. A tree protection zone should be established and maintained during construction and the City should monitor construction activities to ensure local ordinances are adhered to. Tree removal, for trees of a certain size on the approved species list, should require prior approval by Belvidere during site planning. The removal of low quality or invasive species is also recommended. This not only increases the amount of planting space, but also increases public safety. A direct goal of this Urban Forestry Management plan is to preserve trees during construction and reduce the number of undesirable species within the City of Belvidere.

Increase Awareness of the Urban Forest in the City of Belvidere, and Engage Stakeholders

The reason for the establishment and enhancement of an Urban Forestry program in Belvidere is to improve the lives of the residents, business owners, and other stakeholders who want to see the City be a healthier, happier community. In order to make this happen, Belvidere is looking for partners in the community to provide support for this program. Belvidere staff may explore reaching out to local garden clubs, philanthropic organizations, residents, and business owners to make the forestry program innovative and community based. In this manner, residents and business owners in Belvidere can take ownership of this important and beneficial resource, and allow it to work for them, their families, businesses, and the good of the whole City. For more on these innovative programs, and how you can get involved, turn to pages ___.

Private Property Tree Planting 50/50 Program

Tree planting on private property is a goal of this Urban Forestry Management Plan and although the City 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 benefits, and other benefits. The City is currently planning to implement a 50/50 program where the City and residents will share the cost of trees and these trees will be planted out of the ROW in the front yard of residential homes. Residents will then be responsible for the care of these trees.

Maintain Wood Utilization Program – Get more details on what the city currently does and how that may be enhanced

The City of Belvidere already has a Wood Utilization program in place. As the UFMP recommendations take effect, a considerable amount of removed tree material will be generated that may be suitable for use as urban timber. Urban timber is defined as saw logs generated from urban tree removal operations. Larger and longer logs are suitable for dimensional lumber production, and smaller material may be used to produce many other products. Forming strategic partnerships with local sawmills, woodworkers, and carpenters would be an important early goal of this program, while creating a market for the finished goods will be an ongoing goal.

Urban timber will be utilized to mill wood into a large variety of products including dimensional lumber, fine furniture, and artisan pieces. In order to successfully upcycle urban timber into usable lumber, several steps must be followed in order to produce logs suitable for milling. Urban timber production will include specifications for tree removal operations 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 and raising awareness of the benefits of the urban forest in general, creating a saleable product that can serve as a revenue stream. A sample Urban Timber Harvesting specification in Appendix M.

Additional Goals

There are not necessarily strategic timelines set forth here for these programs. As the direct goals of the Urban Forestry program in Belvidere are met or exceeded, these are goals to be discussed by the City of Belvidere if time and budgets become available and the ideas are feasible for the City. We believe that many of these programs represent some of the most progressive Urban Forestry policies in the current climate, and that they should all be seriously considered for implementation.

Continuing Citizen Education (TreeKeepers/Local Organizations)

There is a local chapter of the Openlands TreeKeepers program active in the Chicago area. This organization is a non-profit which assist in educating people about trees, how to prune, plant, and manage them, and their benefits to society. The City might opt to reach out to Openlands or a similar local organization in order to establish a relationship, and assist in the creation of this educational program, which may help to engage the community.

Belvidere could possibly hold several annual tree education sessions, perhaps to coincide with annual Spring and Fall planting cycles. These sessions may be taught by the City staff, the Forestry Consultant, or other such qualified parties, and cover tree watering, fertilization, pruning, and the basics of how to spot insects and diseases. In addition, basic tree care pamphlets might be made available at City Hall in addition to website-based forestry information. The City's Arbor Day celebration is an example of one such outreach event where trees could be planted, and education sessions run.

Contract Growing Program

One of the keys to a successful Reforestation Plan or Tree Planting Program is the availability of high-quality nursery stock from local sources. Incorporated with the UFMP for the City of Belvidere is a diversity vision for 2045 that includes a great variety and diversity of different trees. A new approved species list has also been developed, as well as the tree species that are prohibited on public property. Having this information is an advantage for the City, in that the nature of the urban forest in terms of species composition is already known. It is believed that a comprehensive tree planting plan will be an important part of this process as well.

This knowledge, however, does not guarantee the availability of those specific trees when the time arrives to fill a particular site. One way to assure the availability of nursery stock the City desires each year is to have trees contract grown by local nurseries and reserved specifically for the City of Belvidere. This way, the City will not have to compete with the landscape industry, other local organizations responsible for tree planting, or local retailers. Trees are ordered in annual increments. Each year, Belvidere 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 the number of trees required for planting vary from year to year based on removal rates, budgets, and other factors, tree order projections should be made conservatively to avoid the possibility of cancellation of orders. In agreement with the supplying nursery, the City would reserve the right to increase orders when budgets allow. Supplying nurseries should be located within a specified distance from the City of Belvidere, to ensure climatic zone compatibility and reduced transportation costs and planting stock exposure to the elements. Nurseries should be of sufficient production capacity to furnish all trees ordered in advance by the City, as well as possible increases when necessary. Nurseries should be chosen not only by their capacity to produce stock, but to meet quality, form, and health standards as specified by the City. The nursery should allow tagging by City staff or other representative as well.

A long-term tree planting contract may be developed alongside the nursery supply contract. This contract would specify all pick-up, transportation, planting, and spoil disposal procedures, as well as establish costs for planting trees. Trees should be evaluated one year after planting and assessed for health and survival.

Strategic Partnerships

Strategic partnerships are a very effective means of getting forestry projects funded when tax funding may present a shortfall, or when additional volunteer labor is needed. These typically involve either public-private partnerships or partnering with other public entities. Typically, the organizations seen participating 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, and continuing partnerships with new organizations shall always be sought.

Boone County Conservation District

The mission of the Boone County Conservation District (BCCD) is to preserve and manage natural areas and open spaces for ecological, educational and recreational benefits of present and future generations. BCCD manages 4400 acres which are set aside for preservation, education, and passive recreation. Most of this land serves as natural areas, providing many benefits for the citizens, water quality, and biodiversity of Boone County. As an important land stewardship entity, BCCD could be a valuable partner for the City.

Morton Arboretum

The Morton Arboretum, aside from being a wonderful place to visit to learn about trees, also has significant educational and operational resources available. As the overall administrator on the grant which funded this project, they have a vested interest in seeing it succeed and have already assisted Belvidere in forestry related endeavors.

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 elsewhere. CRTI has several working groups which handle topics such as forest composition, risk management, communications, etc. They are always looking to partner with local communities to get tasks accomplished and publicized, so they will be a first-rate resource for accomplishing the goals laid out in this plan.

Openlands TreeKeepers

Openlands is a highly diverse NPO in northeastern Illinois 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 also offer various instructive programs, such as the TreeKeepers program, which educates residents on the care of young trees, tree biology, and the like.

Illinois Department of Natural Resources

The IDNR's Urban and Community Forestry program is how Belvidere was funded 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 which can help Belvidere accomplish the goals laid out in this plan, including additional funding for such things as tree planting or local education and outreach.

Illinois Arborist Association

The mission of the Illinois Arborist Association is to "Foster interest, establish standards, exchange professional ideas and pursue scientific research in Arboriculture." IAA is a professional organization made up of certified arborists from throughout the state of Illinois. The association strives to further the education of certified arborists and can serve as a valuable resource to reach the goals of this plan.

Living Lands & Waters

The mission of Living Lands & Waters is to aid in the protection, preservation and restoration of the natural environment of the nations' major rivers and their watersheds. Over the last 15 years, they have managed a successful program called the MillionTrees Project where Oak seedlings can be obtained at a minimal cost. Belvidere might consider using this program to procure seedlings to plant on its ROW and City-owned properties.

Illinois Environmental Protection Agency

The mission of the Illinois EPA is to safeguard environmental quality, consistent with the social and economic needs of the State of Illinois, so as to protect health, welfare, property, and the quality of life. The Illinois EPA works to safeguard natural resources from pollution to provide a healthy environment. By partnering with businesses, local governments, and the public, the Illinois EPA is dedicated to continued protection of the air we breathe, the water we drink, and the land we live on.

Four Rivers Sanitation Authority

Four Rivers Sanitation Authority strives to protect businesses, homes and neighborhoods from flood damages, clean wastewater entering our 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, FRSA is a very logical partner.

Natural Land Institute

NLI's mission is to create an enduring legacy of natural land in Northern Illinois for people, plants, and animals. They are active in encouraging the community to help create and sustain this legacy for generations to come. They offer a wealth of opportunities for people to get involved.

Four Rivers Environmental Coalition

Four Rivers Environmental Coalition is an alliance of over 30 environmental organizations and businesses in the watersheds of the Rock, Kishwaukee, Pecatonica, and Sugar Rivers. They sponsor a wide variety of volunteer opportunities and educational events and would be a valuable partner to help achieve the goals of the plan.

Belvidere Park District

Belvidere Park District may be able to coordinate environmental projects going forward including the creation of educational and outreach programs for residents to learn how to properly care for their own trees. This type of program might focus on trees, tree care, education, and other environmental initiatives.

Ida Public Library

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

Rotary Club of Belvidere

The Rotary Club is a volunteer service-oriented organization with a wide array of interests, volunteers, and projects they are willing to get involved with. Some of those areas of interest are community service, conservation, and beautification, which fit the goals of this urban forestry management plan. In seeking to create a local group of volunteers to assist with young tree care and planting of new trees, the Rotary Club would be a phenomenal organization to reach out to for accomplishing some of the goals of this plan.

Belvidere Lions Club

The mission of Lions Club International is to empower Lions clubs, volunteers, and partners to improve health and well-being, strengthen communities, and support those in need through humanitarian services and grants that impact lives globally, and encourage peace and international understanding. Belvidere Lions Club could be an important resource for community volunteer events.

Local Boy and Girl Scout Troops

The mission of the Boy Scouts of America is to prepare young people to make ethical and moral choices over their lifetimes by instilling in them the values of the Scout Oath and Law and the mission of the Girl Scouts of the USA is to build girls of courage, confidence, and character, who make the world a better place. Both organizations foster a dedication to education, community service, and volunteerism and a partnership with the City could be a beneficial relationship for all entities involved.

Belvidere Community Unified School District 100

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 local school districts could be a reciprocal relationship, where students could engage in study projects based around trees, citizen science, and volunteerism, and Belvidere staff or urban forestry consultants could provide guest lectures to the students in any of these areas and develop interest in or even promote careers in the green industry.

Personnel NEEDS CITY INPUT & APPROVAL

In order to streamline Urban Forestry Operations, tasks will be assigned to various staff and contractors/consultants. Below is a representation of personnel/groups involved in forestry related tasks.

Director of Public Works

The Director of Public Works is responsible for implementing forestry programs with the approval and cooperation of governmental jurisdictions in Belvidere. This position will seek bids from qualified Tree Care Contractors to complete the work approved by the various agencies, as well as maintain the tree inventory when possible, and act as a representative for public concerns. At the request and/or approval of the City Council, the forestry related duties of the Director of Public Works may be performed by the Forestry Consultant, however, the City Council will be tasked with ensuring that no conflict of interest exists in doing so.

Tree Care Contractors

Tree Care Contractors are responsible for performing work identified by City staff or the 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 when work is being performed. The contractors will also guide and participate in the performance of Tree Trimming, Pruning, Removal, and Plant Health Care operations. Other operations, such as Tree Planting, Tree Watering, and Tree Mulching do not have to be performed under the direct supervision of a Certified Arborist.

Forestry Consultant

The Forestry Consultant is responsible for impartially assessing the tree population on a periodic basis, at the discretion of the Director of Public Works. The Forestry Consultant communicates the needs of the trees to the Director of Public Works so that individual needs in terms of tree planting, removal, and maintenance can be performed. The Forestry Consultant may also function as the City Arborist at the request of the City.

Planning Staff

Planning staff will exercise authority related to planning of large scale programs related to the Urban Forest, with the assistance and guidance of the Public Works Director and City Council.

State of the Urban Forest

Using the tree inventory data collected for the City of Belvidere in 2024, it was determined that there are a total of 4,223 trees on City Owned rights of way, along with approximately 7,465 open planting spaces that were recorded. The charts and statistics in this portion of the Management Plan illustrate that the tree population in Belvidere can be characterized as overall in average condition and with low stocking density, at 36%. The species diversity in Belvidere is good with 105 individual species represented. Based on the following data in the Management Plan, the City of Belvidere will be equipped to use this valuable information to address short-term concerns, long term management considerations, and overall planning objectives.

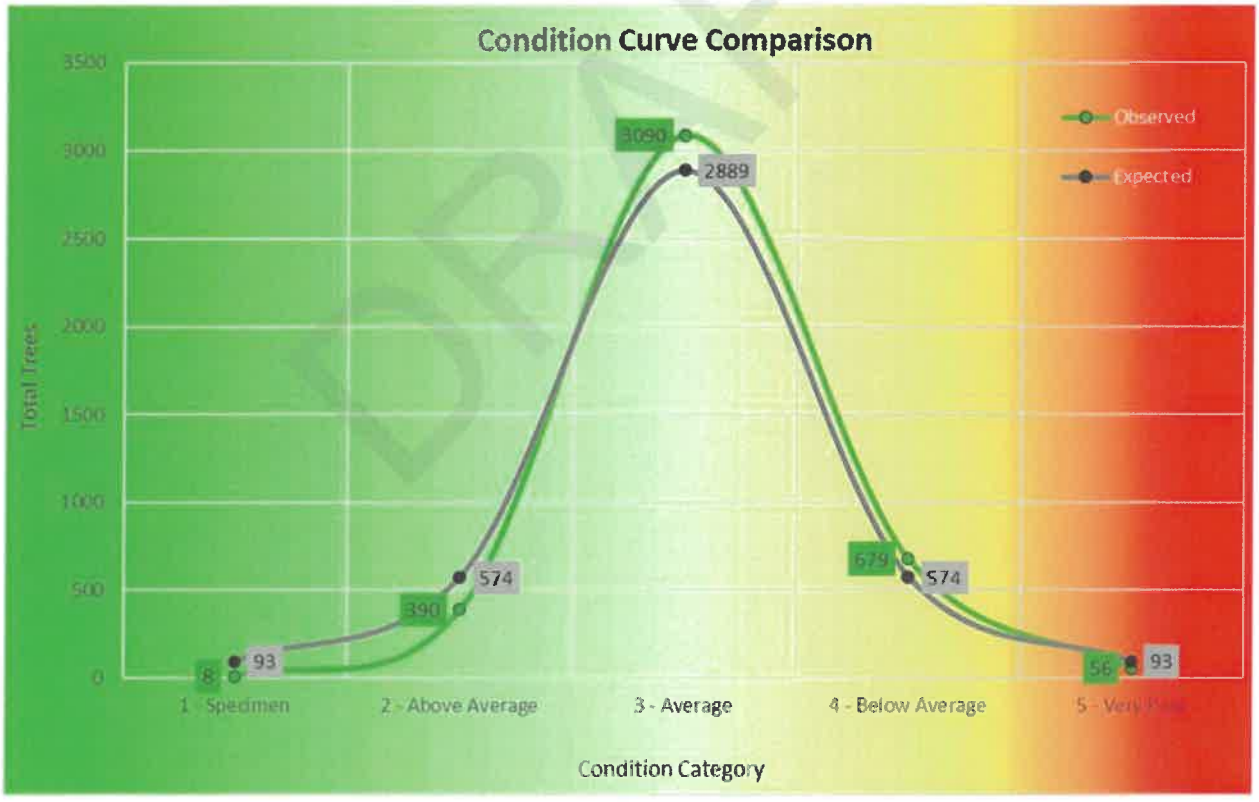
Basic Statistics – Managed Trees

BELVIDERE TREE INVENTORY STATISTICS	
Number of Trees Inventoried	4,223
Number of Stumps Inventoried	103
Number of Planting Spaces Inventoried	7,465
Total Number of Species	105
Total Diameter Inches	74,519"
Average Tree Diameter	17.65"
Average Tree Condition	3.09 (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 Forestry Consultant's definition be a minimum of 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 a minimum of 8" DBH.
Condition 3	**Average** – Tree has moderate amounts of deadwood, wounds, or other defects, but is generally healthy. A wide variety of forms is acceptable for this group, which is meant to define the middle ground around which better or worse trees can be defined.
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 farther 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. We have included the tree condition ratings we observed in the field, as well as a curve representing an "average" distribution so that comparisons can be made. The green line represents what we observed in the

field, and the grey line represents an average or "normal" tree population. The average tree condition for all City-managed trees in Belvidere is 3.09 which is below average.

The Condition 1, or specimen, trees were much lower than would be predicted by the standard distribution alone, but we always expect that the specimen trees will come in lower than their statistical norm because of their 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. About half of Belvidere's tree population meet the DBH threshold to qualify for this condition, however their structure, vigor, and/or defects prevent them from receiving this condition rating. As younger trees are planted in sites with adequate growing space, and if they are properly pruned and maintained, they should develop with good structure and may mature to become Condition 2 and eventually Condition 1 trees.

The Condition 5, or very poor trees, are lower than the expected norm which is common in municipal settings as trees are often removed before reaching this state. It is recommended that Condition 5 trees be prioritized and removed in a timely manner.

The Condition 2, or above average trees, are significantly lower than what statistical analysis would predict. Similar to the Condition 1 category, Condition 2 trees need to have good structure that is consistent with the species in question and also be a minimum of 8" DBH. Approximately 83% of the inventoried trees are 8" DBH or larger and qualify for the Condition 2 status, however only 9% of those trees were rated as Condition 2 due to the trees' structure, vigor, and/or defects. Looking toward the future, Belvidere has an opportunity to increase the number of trees in the Condition 2 category. In general, if trees are properly planted, mulched, watered, and established, and site selection for the trees is well matched to the species, followed with cyclical pruning and maintenance, trees will often mature with good form and without significant defects. These trees can eventually become Condition 2 trees.

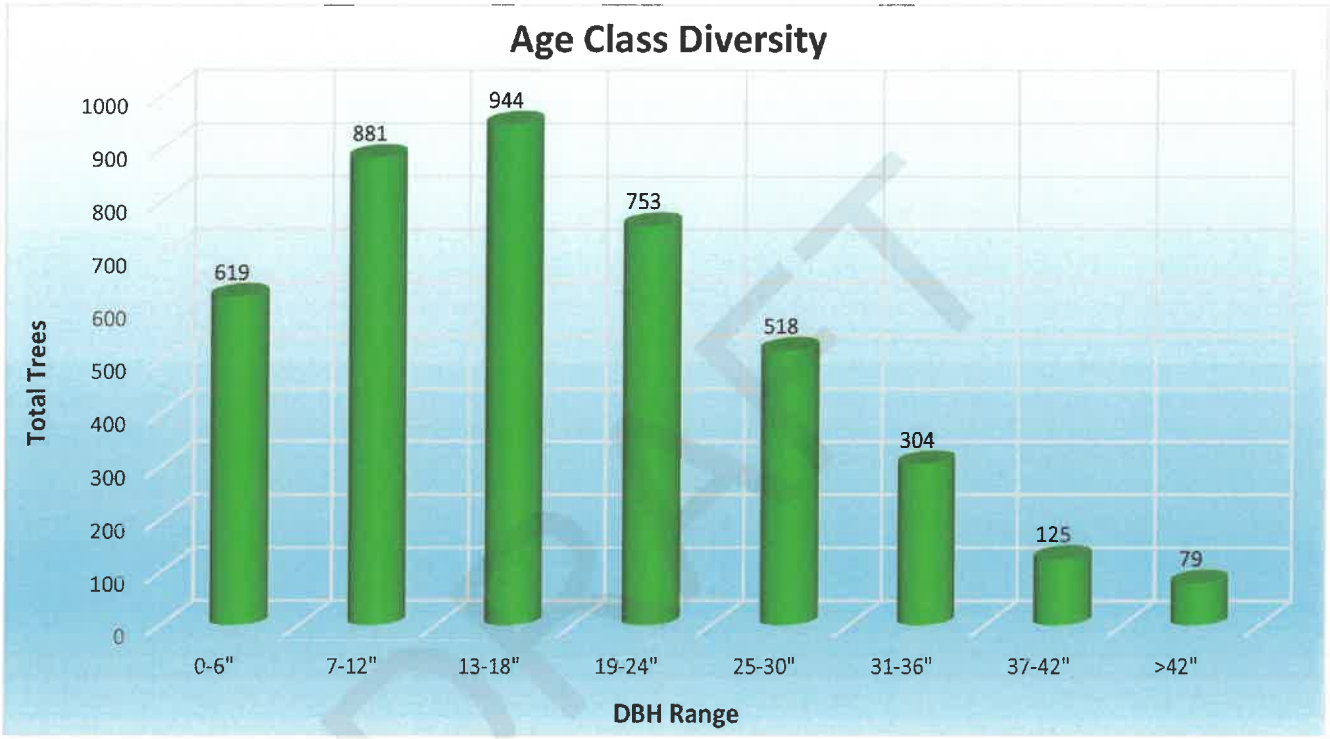
The Condition 4, or below average, trees were moderately higher than what would be statistically expected. This data represents a large number of over-mature or declining trees that have developed structural defects, decay, and deadwood. Belvidere can use the data from this inventory to locate Condition 4 trees and prioritize them for maintenance or removal. Belvidere can look to further decrease this number over the next few years as they move forward and attend to issues that have been identified.

The trees in the Condition 3, or average, category were lower than the expected norm, and this is due to the higher number of below average trees. In the next few years, when the below average trees receive maintenance or pruning, we would expect these trees to move into the average or above average category.

Ideally, tree populations should have an average tree condition somewhere in the 2.5 range with a greater population of specimen trees and a steep drop off in trees lower than Condition 3. The City can use this tree inventory and the recommendations that accompany it to further improve the

overall health of its tree population. With some younger trees which are about to enter a phase where they may become Condition 2 trees from Condition 3, or Condition 1 from Condition 2, and with mitigating actions to further reduce trees in the Condition 4 and 5 categories, we anticipate that Belvidere will continue to maintain a vigorous and resilient tree population.

Age Class Analysis



In terms of the ages of trees in Belvidere, we have split the tree population into 8 "classes" of 6" diameter increments. This tells us how many trees are in each "age class". Because trees are measured by Diameter at Breast Height (DBH) as a standard measure, this breakdown can help show where trees are in their life cycles. Some trees like Cottonwood and Silver Maple grow in diameter very quickly, up to 1" per year or possibly more. Other slower growing trees such as Oak and Hickory may only add ¼" or less every year. As a broad generalization, it can be said that most trees on average grow at around ½" per year.

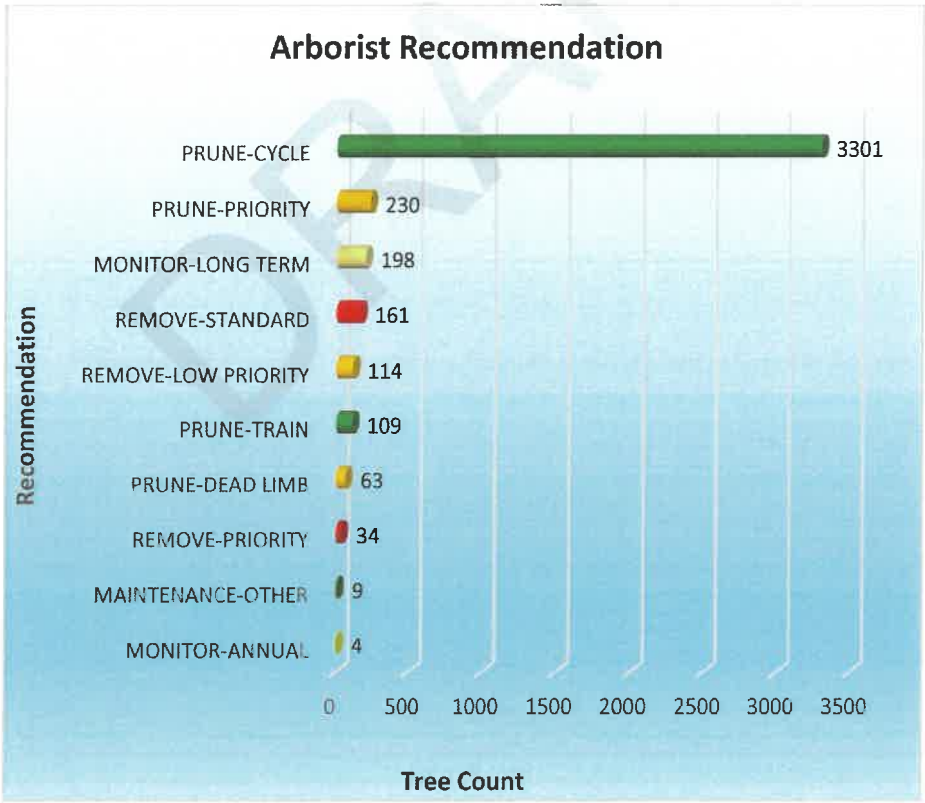
This age class analysis chart illustrates a somewhat atypical trend in the overall age spread of a tree population seen in a municipal setting. Often, we see many trees being younger to middle aged and a relatively lower number of trees in the older age categories, however in Belvidere the 7-24" DBH categories dominate the urban forest. As shown above, about 15% of the total population has a DBH of 6" or less, which is an indication of relatively moderate commitment to tree planting in recent years. About 21% of Belvidere's trees have a DBH of 7-12" which are generally considered to be about 15-25 years old. The 13-18" DBH category is the largest and makes up approximately 22% of the

population and are considered to be approximately 25-35 years old. The 19-24" DBH category which are generally mature trees over 35-45 years old represent another 18% of the total tree population.

Trees measuring over 24" DBH make up approximately a quarter of the total tree population. The 1,026 trees in the 25"+ DBH categories are considered to be about 45-50+ years old. It should be mentioned that the number of trees in the 30"+ categories are often lower due to the natural senescence and ensuing decline of trees in urban settings. A somewhat equal number of trees in each age classification is, within reason, desirable and indicative of a consistent focus on tree planting and tree maintenance in Belvidere over the years and shows that the right trees are being planted in the correct locations. Belvidere will continue to have an opportunity over time to bring the tree age classes to a more balanced level. The goal of a well-written Urban Forestry Management Plan should be to increase this number and overall long-term survivorship.

Arborist Recommendation / Maintenance

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



In terms of Arborist Recommendations of maintenance needs in the Belvidere tree population, the statistics displayed above show an encouraging trend overall. The majority of trees (78%) require only Cyclical Pruning on a regular basis, which is an overall desirable trait in a tree population.

However, 309 or 7% of the trees are recommended for removal. The 34 trees in the Priority Removal category should be prioritized over other removals. The 161 trees designated as standard removals should be prioritized and removed in a timely manner. The 114 trees in the low priority 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 230 trees in the "Prune-Priority" group and the 63 trees in the "Prune-Dead Limb" group are trees which are simply overgrown or have parts which need to be removed more promptly and should have pruning prioritized over the trees in the cyclical prune set. Generally, we consider this to be a "within 1-3 years" level of pruning.

The 202 total trees in the two "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.

The 109 trees categorized as "Prune-Train" are typically trees smaller than 8" DBH that 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 9 trees in the "Maintenance-Other" category typically need some other form of maintenance not covered in the rest of the categories, mostly the removal of volcano mulch or girdling objects. A description of the maintenance needed should be found in the recommendation reasons or comments fields.

As will be discussed in more detail later in this Plan, a cyclical pruning program will ensure that each City tree in Belvidere will be pruned on a regular basis. Proper pruning will help to further improve the overall condition of the tree population.

Risk Ratings

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, we must state unequivocally 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.

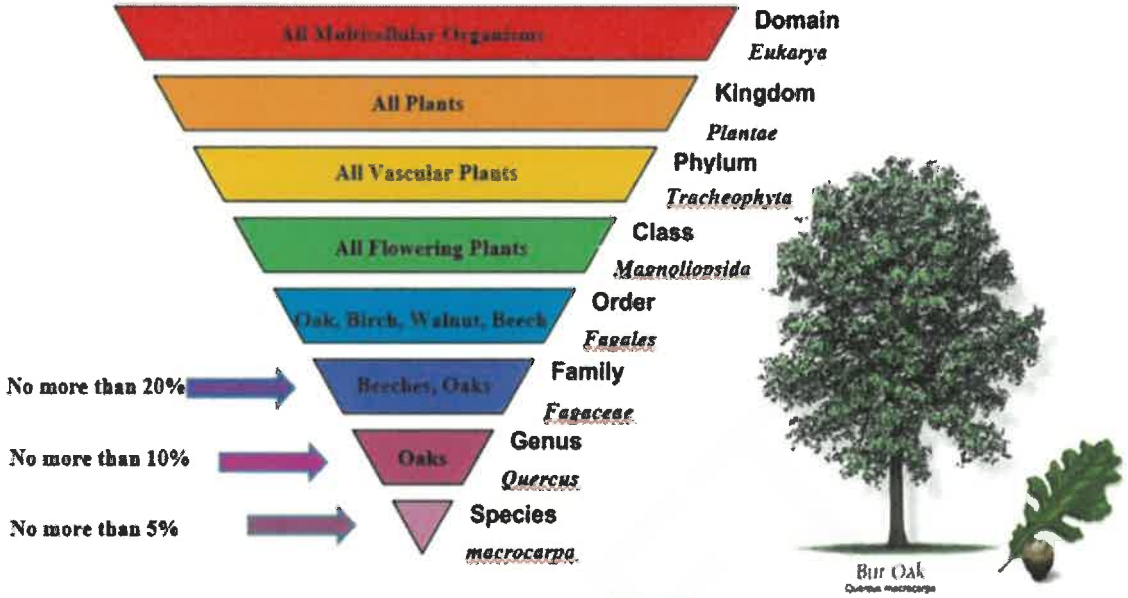
As illustrated in the chart above, the vast majority of Belvidere trees were found to have no observable risk level. However, 193 trees were found to have some degree of risk. Going forward, any tree that falls into the critical risk level category should receive immediate mitigating actions. Any trees that fall 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 Belvidere and a threshold of risk tolerance be established.

It is important to mention that the trees in the elevated risk category do not necessarily pose an immediate threat, however they have defects that have an elevated potential to worsen. Great Lakes Urban Forestry would be pleased to assist Belvidere in performing Level 2 Basic Risk Assessments or Level 3 Advanced Risk Assessments. A Tree Risk Assessment Policy will be discussed in more detail later in this Plan.

Diversity Analysis

Taxonomy is the method by which scientists classify plants, animals, and other life forms into distinct categories. A species is unique. There is only one type in that category, such as Bur Oak (*Quercus macrocarpa*), which 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 you go, the more similar things become.

Taxonomy and the 20-10-5 Rule



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 ash genus. The most effective prevention of tree loss we have is to limit the number of 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 large selection of trees are planted.

The "20-10-5" rule for Belvidere's future tree plantings is recommended, which states that no more than 20% of any one family, 10% of any one genus, and 5% of any one species shall be planted during any single planting cycle. It will also be a long-term direct goal of the forestry program to have the tree population as a whole in compliance with the 20-10-5 Rule, although it may not be possible by the 2044 date used in this document. 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. This was thought to produce a uniform appearance. Urban foresters have now learned that once a pest or pathogen is introduced into a monoculture planting such as this, an epicenter of infestation is created that may cause serious damage, both ecologically and financially. Diversity in the urban forest helps to prevent and reduce the impacts of pests and pathogens. There are three aspects of diversity in the urban forest. We will examine these in detail, below.

Taxonomic (Species) Diversity

Why is it important to plant a diverse set of trees at the species, Genus, and Family levels? Simply put, it is to ensure that we will not fall victim to mass tree loss from pests and pathogens in the future. The reason Emerald Ash Borer (EAB) was such a devastating expense for many organizations was because their tree populations were composed of over 20% Ash trees. When these trees died and had to be removed, those organizations lost 20% of their trees.

This comes with the obvious expense of having to remove these trees and replace them. But it also comes with hidden expenses as well, namely the loss of the ecological services that those trees provided: Homes cost more to heat and cool, storm water infrastructure falls under heavier pressure, and increases in pollutants and greenhouse gases may be observed. For all of these reasons, a more diverse group of trees needs to be planted, such that we are never at risk of losing more than 5-10% of our trees at any given time due to a pest or pathogen.

As will be discussed in further detail below, the tree population in Belvidere is by far dominated by Maple species. In decreasing numbers, the remaining of the top 5 include Honeylocusts, Pears, Apples, and Spruces trees.

Spatial Diversity

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

In addition to the functional benefits provided by increasing spatial diversity, organizations which have implemented diverse planting over the past several decades have demonstrated that such diversity yields an arboretum-like landscape that is both functional and aesthetically pleasing. At present, the Spatial Diversity in Belvidere is rather low due to the presence of a large percentage of Maples in the tree population. During the tree planting planning phase, extra care should be taken to ensure that new plantings are done in a manner that yields a highly spatially diverse tree population, and creation of areas of low spatial diversity (monocultures) will be avoided.

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 tree species, locations, and ages will lead to great diversity, which insulates a natural forest against pest and pathogen outbreaks. The Urban Forest is no different. The outdated urban forestry paradigm promoted even-aged tree plantings, so that all trees were approximately the same size and age. However, once these trees begin to decline, most will

require removal and replanting simultaneously. This can leave an entire street segment or neighborhood without shade and aesthetics for a long time.

The current approach of the urban forestry community is to strategically plant trees on streets or in neighborhoods over a longer timeframe. With this strategy, trees will grow to maturity in different stages and decline at different times. When declining trees are eventually removed, there will always be a variety of age classes and tree sizes 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 will allow 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. When a street or neighborhood is newly planted with trees of the same age, all the trees are 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 may be planted underneath the canopy of larger, mature trees. This approach will be used for future tree removal and replacement and help to create an Urban Forest that has mature trees, middle aged trees, and young trees in similar quantities.

Current Tree Population

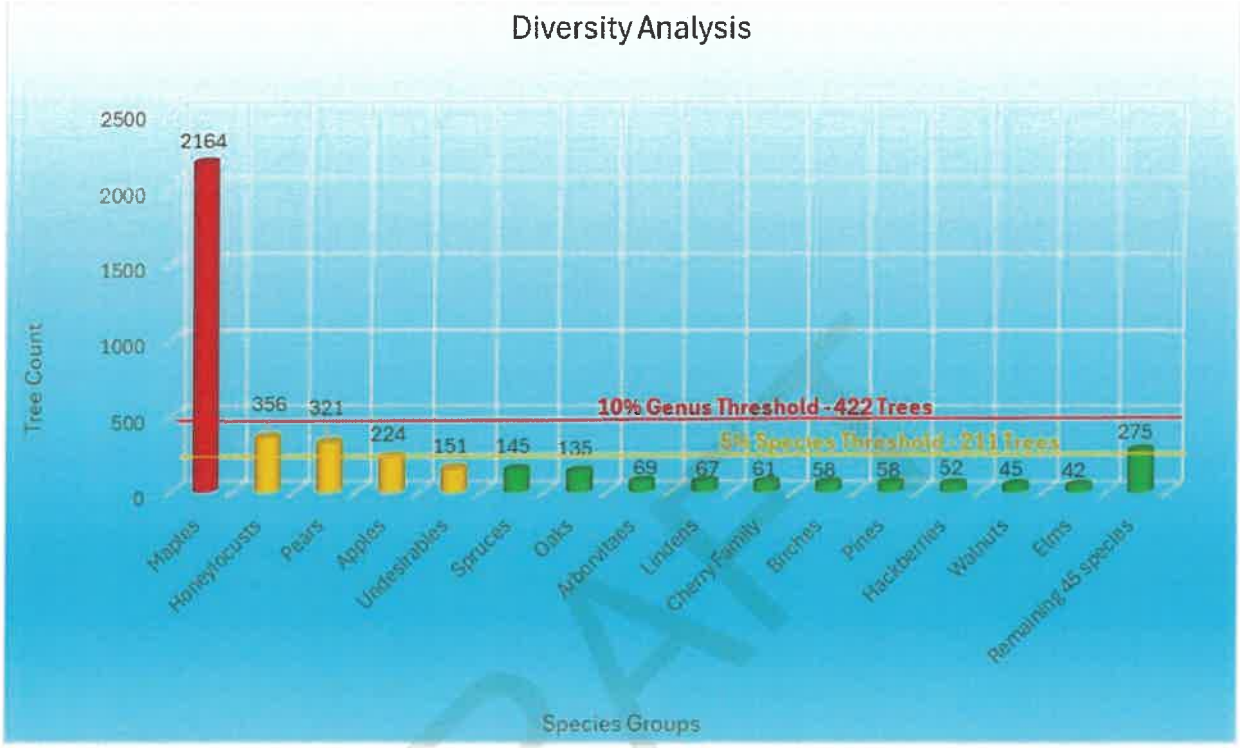
SPECIES	COUNT	% OF TOTAL	AVG DBH	AVG COND
MAPLE-NORWAY	810	19.18%	20.55	3.16
MAPLE-SILVER	533	12.62%	25.99	3.13
HONEYLOCUST	356	8.43%	21.63	3.13
MAPLE-RED	334	7.91%	11.02	3.02
PEAR-CALLERY	319	7.55%	10.68	3.07
MAPLE-SUGAR	271	6.42%	22.01	3.18
APPLE-CRAB SPP	211	5.00%	8.87	3.13
MAPLE-AUTUMN BLAZE	198	4.69%	11.05	3.03
ELM-SIBERIAN	71	1.68%	22.77	3.35
ARBOR VITAE	69	1.63%	7.64	3.04
SPRUCE-BLUE	69	1.63%	14.46	3.16
HACKBERRY	52	1.23%	25.46	2.88
BIRCH-RIVER	46	1.09%	15.24	2.83
OAK-PIN	46	1.09%	27.54	2.74
SPRUCE-NORWAY	44	1.04%	14.82	2.91
WALNUT-BLACK	44	1.04%	27.75	2.86
LINDEN-LITTLELEAF	39	0.92%	15.54	2.97
PINE-WHITE	36	0.85%	14.50	2.81
SYCAMORE	36	0.85%	29.81	2.36
CHERRY-SPP	35	0.83%	6.37	3.11
OAK-RED	33	0.78%	20.45	2.30
MULBERRY-SPP	30	0.71%	18.47	3.43

LINDEN-AMERICAN	28	0.66%	20.57	3.14
OAK-BURR	28	0.66%	17.61	2.75
AMERICAN REDBUD	25	0.59%	7.60	3.04
ELM-AMERICAN	25	0.59%	27.68	3.40
SPRUCE-WHITE	24	0.57%	9.75	3.04
EASTERN REDCEDAR	21	0.50%	9.57	3.00
PINE-AUSTRIAN	19	0.45%	16.58	3.26
PLUM-SPP	19	0.45%	6.58	3.63
GINKGO	16	0.38%	9.06	2.88
JUNIPER-COMMON	15	0.36%	8.13	3.53
SERVICEBERRY-SPP	15	0.36%	4.47	3.00
BOXELDER	14	0.33%	16.29	3.43
OAK-SWAMP WHITE	14	0.33%	9.79	2.79
APPLE-EDIBLE	13	0.31%	10.69	2.85
LILAC-TREE	13	0.31%	5.23	3.08
ASH-WHITE	12	0.28%	12.75	4.08
BIRCH-WHITE	12	0.28%	10.75	3.00
ELM-HYBRID	12	0.28%	14.00	2.75
COTTONWOOD	11	0.26%	27.27	3.00
HAWTHORN-SPP	10	0.24%	10.50	2.80
CATALPA	9	0.21%	24.33	3.33
SPRUCE-SPP	8	0.19%	6.38	3.25
ASH-GREEN	7	0.17%	10.43	3.57
DOUGLAS FIR	7	0.17%	10.86	3.29
MAGNOLIA-SPP	7	0.17%	13.43	3.14
MAPLE-AMUR	7	0.17%	18.29	3.14
BLACK LOCUST	6	0.14%	26.50	3.33
BUCKEYE-OHIO	6	0.14%	15.83	3.00
FIR-SPP	6	0.14%	7.50	3.00
HORSECHESTNUT	6	0.14%	24.83	2.83
TULIPTREE	6	0.14%	11.33	3.17
ASPEN-QUAKING	5	0.12%	4.60	2.80
MAPLE-MIYABEI	5	0.12%	9.40	2.80
OAK-ENGLISH	5	0.12%	6.20	3.00
BLACKGUM	4	0.09%	4.50	3.00
CHERRY-BLACK	4	0.09%	18.25	2.75
DOGWOOD-SPP	4	0.09%	7.50	3.00
ELM-RED	4	0.09%	16.50	3.00
KATSURA	4	0.09%	4.50	3.00
MAGNOLIA-SAUCER	4	0.09%	3.50	3.00
MAPLE-JAPANESE	4	0.09%	3.75	3.00
OAK-WHITE	4	0.09%	36.00	2.50
PEACH	4	0.09%	8.25	3.25

POPLAR-WHITE	4	0.09%	23.00	3.00
APRICOT	3	0.07%	4.67	3.33
MAGNOLIA-CUCUMBER	3	0.07%	17.33	3.33
OAK-BLACK	3	0.07%	46.67	4.00
POPLAR-SPP	3	0.07%	19.67	3.33
SUMAC	3	0.07%	7.00	3.00
WILLOW-SPP	3	0.07%	28.67	3.33
BALDCYPRESS	2	0.05%	11.00	3.00
BEECH-EUROPEAN	2	0.05%	11.00	2.50
BUCKEYE-YELLOW	2	0.05%	25.00	3.00
BUCKTHORN	2	0.05%	13.00	3.50
DOGWOOD-CORNELIANCHERRY	2	0.05%	4.50	3.00
HAWTHORN-WASHINGTON	2	0.05%	9.00	3.00
HICKORY-SHAGBARK	2	0.05%	18.50	3.00
IRONWOOD	2	0.05%	2.00	3.00
KENTUCKY COFFEETREE	2	0.05%	13.00	2.50
LONDON PLANETREE	2	0.05%	5.00	3.00
MAPLE-BLACK	2	0.05%	23.50	3.00
PEAR-EDIBLE	2	0.05%	9.50	3.00
PINE-MUGO	2	0.05%	8.00	3.50
SWEETGUM	2	0.05%	16.00	2.50
AILANTHUS	1	0.02%	8.00	3.00
ALDER-SPP	1	0.02%	12.00	3.00
AMUR MAACKIA	1	0.02%	7.00	3.00
ELM-SPP	1	0.02%	10.00	4.00
HAWTHORN-COCKSPUR	1	0.02%	5.00	3.00
HAZELNUT-TREE	1	0.02%	9.00	4.00
HICKORY-BITTERNUT	1	0.02%	29.00	4.00
HONEYSUCKLE	1	0.02%	1.00	3.00
HORNBEAM-AMERICAN	1	0.02%	6.00	3.00
LILAC-SHRUB	1	0.02%	24.00	3.00
MAGNOLIA-STAR	1	0.02%	13.00	4.00
OAK-SCARLET	1	0.02%	2.00	3.00
OAK-SPP	1	0.02%	21.00	3.00
OTHER	1	0.02%	9.00	3.00
PERSIAN IRONWOOD	1	0.02%	1.00	3.00
PINE-RED	1	0.02%	12.00	3.00
SEVENTH SON FLOWER	1	0.02%	4.00	3.00
WALNUT-WHITE	1	0.02%	20.00	3.00
WILLOW-WEEPING	1	0.02%	2.00	3.00

As shown in the table above, the City of Belvidere Tree population consists of 105 distinct tree species, accounting for 4,223 total trees. The above table shows the percent of the total population

each species makes up, as well as the average Condition and Trunk Diameter. To see which trees are performing well, we would look for trees with a Condition rating of less than 3 and with a larger DBH. This population is shown graphically below:



Maple species account for over 51% of Belvidere's tree population. It is quite common for Maple species to be the highest represented species in municipalities and in other urban settings because they are typically an adaptable and hardy shade tree. However, if a pest or pathogen that attacks only the Maple genus were introduced into our region, Belvidere could potentially lose half of its tree population. The Norway Maple species alone make up nearly 19% of Belvidere's entire population, and over 22% of these trees are in Below Average condition or worse. Norway, Silver, Sugar, and Red Maples all exceed the recommended 5% species threshold. Going forward and with the help of the Urban Forestry Management Plan, Belvidere will need to focus on reducing the number of poor condition and over-mature Maples. Honeylocusts, Callery Pears, and Crabapples also either exceed or meet the 5% species threshold.

Additionally, the 151 trees that were classified in the "Undesirables" include Ailanthus, Black Locust, Boxelder, Buckthorn, Cottonwood, Honeysuckle, Mulberry, Siberian Elm, Black Cherry, Poplar and Willow. These trees are known for either being invasive and/or weak-wooded trees that often develop a variety of structural defects as they mature. Callery Pear trees are also relatively recently considered a concern due to their invasive reproductive characteristics. For safety, aesthetic, and ecological reasons, it is recommended that the City set a goal of gradually reducing the number of undesirable trees on its ROWs and replanting them with a diverse set of tree species to increase overall diversity and improve tree population stability.

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. The i-Tree tools help communities of all sizes to strengthen their forest management and advocacy efforts by quantifying the structure of trees and forests, and the environmental services that trees provide.

The i-Tree suite calculates hard dollar values that trees provide to communities. Trees provide "ecological services" that save homeowners money, such as in heating and cooling costs, where large trees help shade houses in the summer, saving on air conditioning and electricity bills, and provide windbreaks during the winter, saving on heating and natural gas costs. They also provide CO2 uptake, reducing the effects of climate change, as well as air quality improvements by the absorption of urban pollutants. Trees also absorb stormwater, which reduces strain on stormwater infrastructure, and saves money in replacement costs. Finally, trees contribute up to 15% of the total value of a property, so they have monetary aesthetic benefits as well.

Using the data from the tree inventory, an i-Tree report has been prepared for the City of Belvidere. Below you will find reports on the Net annual benefits of the tree population, replacement values, and breakdown of benefits per species. We performed an i-Tree Eco analysis which focuses primarily on ecological benefits. The results of these analyses are below, and full tables and the i-Tree Report are available upon request.

i-Tree Eco Analysis Results

A summary of the i-Tree Eco report for the Belvidere tree population is provided below in several formats, as summary tables, and with a bullet point list somewhat longer:

Pollution Removal	$8,870
Carbon Sequestration	$29,100
Avoided Runoff	$6,050
Building Energy Savings	$18,100
Carbon Avoided	$18,400
Oxygen Production	$21,120
TOTAL ANNUAL BENEFITS	**$101,640**

Carbon Storage	$1,620,000
Replacement Value	$8,670,000
TOTAL STANDING BENEFITS	**$10,290,000**

Annual Values	
Benefits to Residents	$62,120/year
Benefits to Environment	$39,520/year
SUBTOTAL (Each Year)	**$101,640/year**
Standing Values	
As a Commodity	$8,670,000
As an Ecological Resource	$1,620,000
SUBTOTAL	**$10,290,000**

- Number of trees: 4,223
- Tree Cover: 67.67 acres
- Most common species of trees: Norway maple, Silver maple, Honeylocust
- Percentage of trees less than 6" (15.2 cm) diameter: 14.7%
- Pollution Removal: 1.595 tons/year ($8.87 thousand/year)
- Carbon Storage: 3.745 thousand tons ($1.62 million)
- Carbon Sequestration: 67.15 tons ($29.1 thousand/year)
- Oxygen Production: 179.1 tons/year
- Avoided Runoff: 677.4 thousand gallon/year ($6.05 thousand/year)
- Building energy savings: $18,100/year
- Carbon Avoided: 42.62 tons/year ($18400/year)
- Replacement values: $8.67 million

As can be seen from the above tables, the tree population in the City of Belvidere currently provides approximately $101,640 in benefits every year, directly related to trees and their effect on homes, businesses, and the environment. It should be noted that the annual budget for all forestry activities recommended in this plan, projected for the calendar year 2025, will total approximately $145,450 per year, so the benefits from the tree population are worth nearly 70% of the cost put into them will be.

We will examine this further below. In addition, the total standing value as a commodity and an ecological resource of the whole tree population is $10,290,000.

These benefits can be viewed as "income" to Belvidere's residents, and so long as the trees are well maintained, they will continue to provide these benefits, and more. As trees grow, they also increase their benefits! For example, 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 even more, where 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 City of Belvidere population is $8,670,000. This value is calculated using the industry standard reference, the *9th Edition Guide to Tree and Landscape Appraisal*, which is published by the Council of Tree and Landscape Appraisers.

The i-Tree Eco data looks at the value of the trees in the absence of the effect of homes or businesses, and looks at trees more from an ecological perspective, mostly what the tree's value is in sequestering and storing Carbon. These numbers are based on peer reviewed science in both Arboriculture as well as Climatology and other disciplines.

The goal of this Urban Forestry Management Plan is to create a tree population which maximizes all of these ecological services to Belvidere residents by increasing the number of trees in City, and how long they live, 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 summer when temperatures are warm, trees create shade, and temperatures are cooler in the shade. Cooler temperatures cause air conditioners to have to work less, which reduces the amount of energy a household uses. During the winter when temperatures are cold, winter winds cool your home quickly. Trees act as windbreaks, causing heating systems to use less natural gas, saving energy and money.

Carbon Dioxide (CO2): The amount of CO2 which is put into the atmosphere each year has a direct correlation with global climate change. That change causes more severe storms, greater drought conditions, and many other costly outcomes. Reducing CO2 from our atmosphere lessens these effects. Trees uptake CO2 and act as a carbon sink, putting carbon into long term storage in its woody tissues, removing it from our atmosphere, creating a net benefit to society, and saving money.

Air Quality: Industrial processes and vehicle emissions put pollutants into our air. These pollutants can cause or worsen health conditions such as heart disease, asthma, and lung disease. In addition, these pollutants can mix with water in the atmosphere and create nitric and sulfuric acid, causing acid rain, which can destroy fisheries and contaminate water supplies. Trees absorb these compounds with their leaves and other tissues and prevent them from remaining in the atmosphere. Reductions in these pollutants results in overall better health, reducing the cost of healthcare to society, and saving communities money.

Storm water: The cost of delivering fresh water to homes, as well as removing and treating wastewater and storm water is considerable. One of the greatest costs comes when these systems are overwhelmed, such as during flooding, which can cause millions of dollars of damage to homes and vehicles, or when these systems need to be replaced. Fortunately, trees take water from the soil and put it back into the atmosphere through the process of transpiration. Therefore, the more trees an organization has, the less flooding is an issue, and the less strain is put on storm water infrastructure, resulting in fewer repairs and replacements. In addition, tree canopy slows rainfall's effects on flooding by "intercepting" it with leaves and branches, delaying how quickly rainfall can become floodwater. All of this adds up to savings for an organization.

Aesthetic/Economic: Up to 15% of the value of a property can be attributed to its trees and other landscaping. Tree lined streets are much more appealing to homebuyers than streets devoid of trees, resulting in increased home sales, and therefore increased tax revenue, or increased tax revenue with which to fund initiatives relating to trees, attract new businesses, etc.

Urban Tree Canopy Assessment

Based on data available from the US Forest Service and Morton Arboretum, the total Urban Tree Canopy of Belvidere can be determined. This is expressed as the percent of the City covered by tree canopy from an aerial view. This assessment included 7 total land cover types, including trees, grass and shrub, bare soil, water, buildings, roads/railroads, agriculture, and other paved surfaces. The result of this tree canopy assessment was that Belvidere contains 26.77% total tree canopy. The map of the canopy assessment appears on the next page.

The tree inventory itself was only conducted on publicly owned land such as ROWs and boulevards, etc. Detailed information on each tree is not included in this assessment, only total coverage. Aerial images were used to estimate how much tree and other land cover types were in the City using a software which is similar to Google Earth or other aerial imagery viewers.

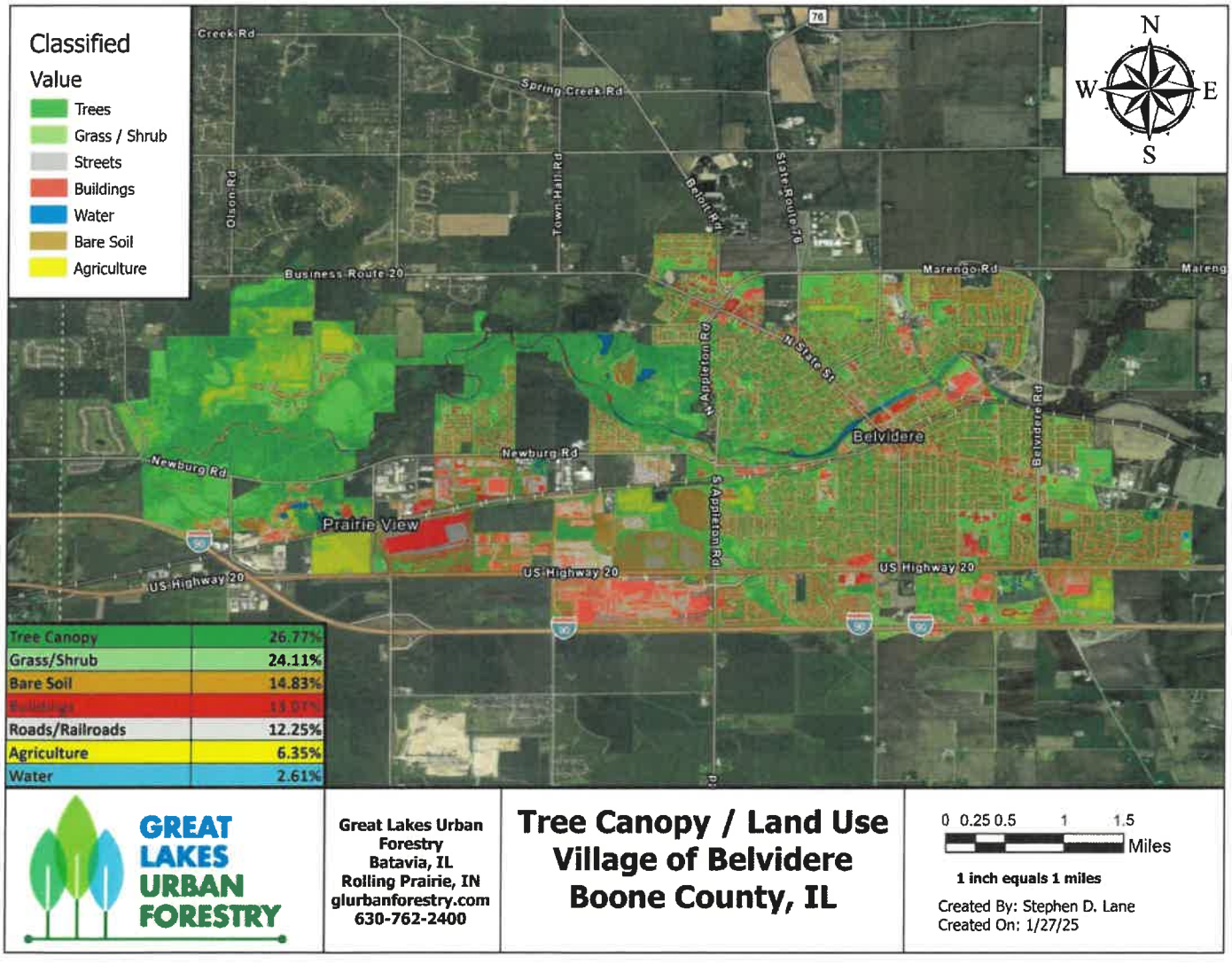
Tree Canopy	26.77%
Grass/Shrub	24.11%
Bare Soil	14.83%
Buildings	13.07%
Roads/Railroads	12.25%
Agriculture	6.35%
Water	2.61%

The goal is to increase the total tree canopy in Belvidere to 29% by 2045. This goal has been estimated by analyzing data from many different urban tree populations in the Chicago and Northwest Indiana regions and is based on preliminary data from the Chicago Region Trees Initiative's (CRTI) Forest Composition Workgroup.

We believe this is an attainable goal over this time period. Belvidere, as a whole, has an overall respectable amount of tree canopy, and it is above average compared to other neighboring and similarly sized suburban communities. The goal set is a modest, but reasonable, increase, which will still yield beneficial results.

This will be accomplished through increasing the number of trees on the City's terraces as well as other City-owned properties. It will also be accomplished by maintaining the existing tree population in a proactive fashion, by enhancing the Urban Forestry program in Belvidere. This will ensure that existing trees will live longer as they are given appropriate care.

Tree planting and maintenance will also be encouraged on private property, by incentivizing residents and business owners to plant trees through public-private partnerships. Outreach and education will also be provided to residents through events such as Arbor Day and Earth Day celebrations. This goal will be monitored by using aerial imagery analysis like the analysis presented below. Every 10 years, the imagery should be assessed, and a new canopy cover percentage will be calculated for Belvidere.



The Future of the Urban Forest

In this section, a vision of what the tree population of Belvidere could become by 2045 was created and compared with the current population. Using the existing data, and the diversity vision, we will then define exactly how Belvidere can move from where it is now to where it could be.

Change in Species Composition 2025 – 2045

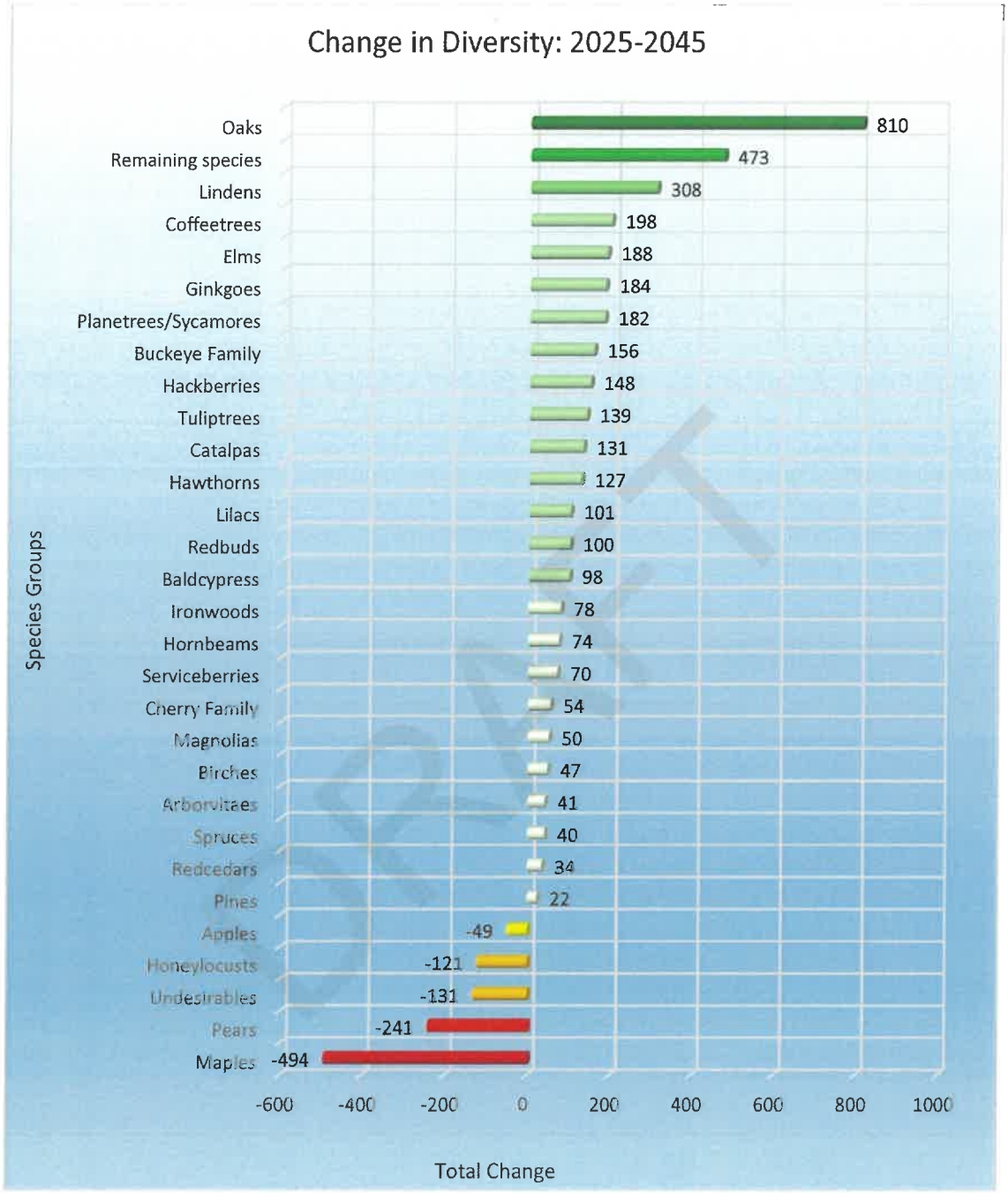
The full calculations for this change in diversity were performed by hand, not using automated software. Local knowledge of the trees, their conditions, what is growing well and what isn't were all used and yielded this very customized forest composition change list. These goals are meant as general guideposts, and not absolutes. Be aware that this Plan, and the species composition goals, are meant to be adaptively managed over time, and as new information becomes available.

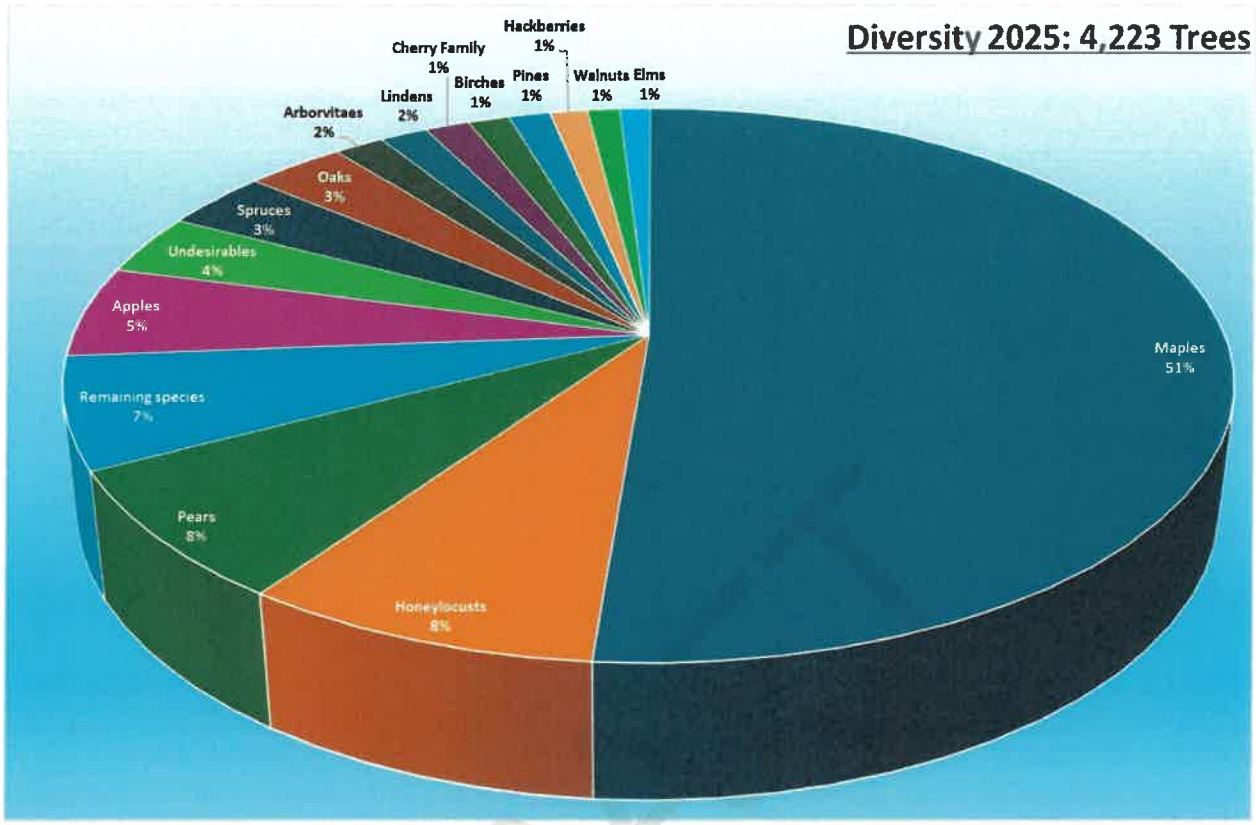
Plant in Abundance
Plant in Limited Quantities
Maintain Existing Population
Reduce Population Size

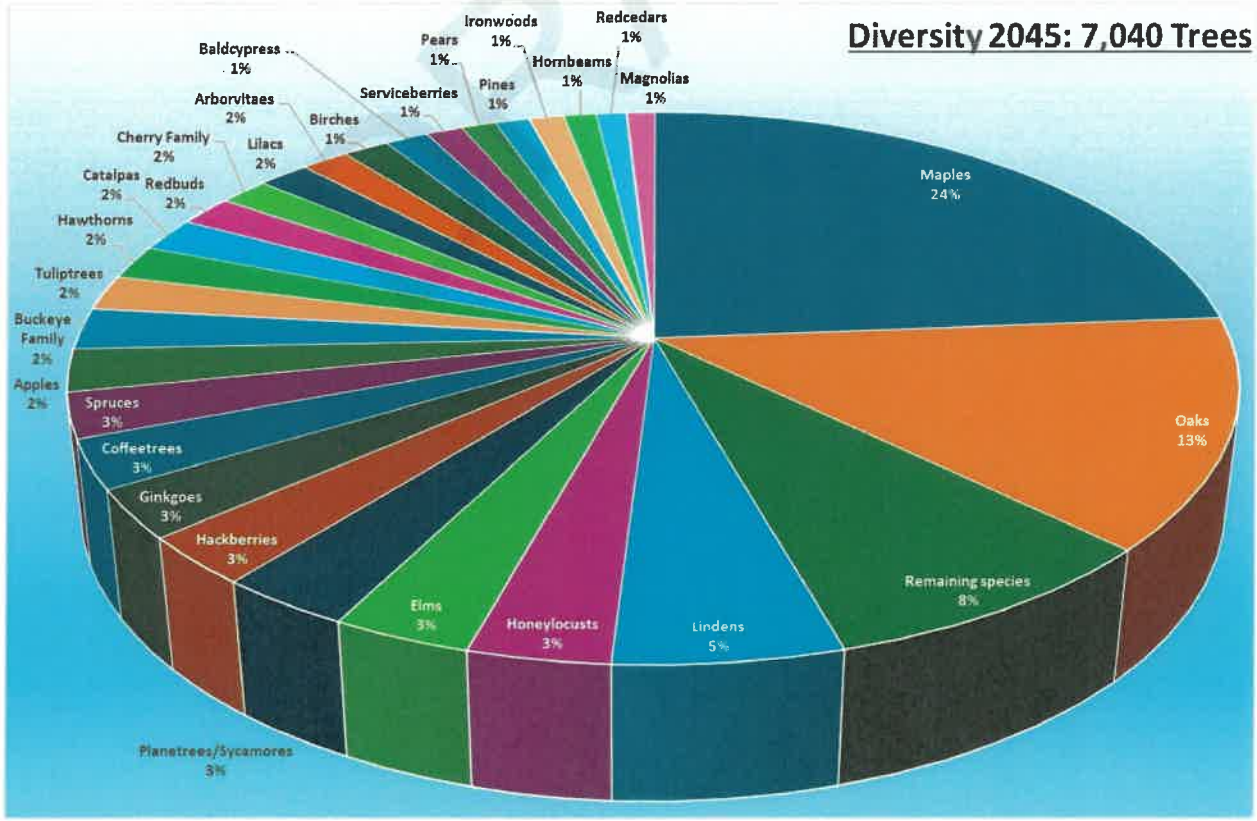
SPECIES	COUNT 2025	COUNT 2045
MAPLE-NORWAY	810	570
MAPLE-SILVER	533	290
HONEYLOCUST	356	235
MAPLE-RED	334	215
PEAR-CALLERY	319	80
MAPLE-SUGAR	271	310
APPLE-CRAB SPP	211	170
MAPLE-AUTUMN BLAZE	198	180
ELM-SIBERIAN	71	10
ARBOR VITAE	69	110
SPRUCE-BLUE	69	30
HACKBERRY	52	200
BIRCH-RIVER	46	65
OAK-PIN	46	95
SPRUCE-NORWAY	44	85
WALNUT-BLACK	44	35
LINDEN-LITTLELEAF	38	180
PINE-WHITE	36	75
SYCAMORE	36	20
CHERRY-SPP	35	65
OAK-RED	33	135
MULBERRY-SPP	30	10
LINDEN-AMERICAN	28	175
OAK-BURR	28	175
AMERICAN REDBUD	26	125
ELM-AMERICAN	25	5
SPRUCE-WHITE	24	65
EASTERN REDCEDAR	21	60
PINE-AUSTRIAN	19	5
PLUM-SPP	19	50
GINKGO	18	200
JUNIPER-COMMON	15	10
SERVICEBERRY-SPP	15	85
BOXELDER	14	0
OAK-SWAMP WHITE	14	215
APPLE-EDIBLE	13	5
LILAC-TREE	13	115
ASH-WHITE	12	0
BIRCH-WHITE	12	30
ELM-HYBRID	12	215
COTTONWOOD	11	0
HAWTHORN-SPP	10	110
CATALPA	9	140
SPRUCE-SPP	8	5
ASH-GREEN	7	0
DOUGLAS FIR	7	45
MAGNOLIA-SPP	7	15
MAPLE-AMUR	7	0

SPECIES	COUNT 2025	COUNT 2045
BLACK LOCUST	6	0
BUCKEYE-OHIO	6	55
FIR-SPP	6	5
HORSECHESTNUT	6	55
TULIPTREE	6	145
ASPEN-QUAKING	5	15
MAPLE-MIYABEI	5	25
OAK-ENGLISH	5	55
BLACKGUM	4	65
CHERRY-BLACK	4	0
DOGWOOD-SPP	4	25
ELM-RED	4	5
KATSURA	4	15
MAGNOLIA-SAUCER	4	15
MAPLE-JAPANESE	4	10
OAK-WHITE	4	35
PEACH	4	0
POPLAR-WHITE	4	0
APRICOT	3	0
MAGNOLIA-CUCUMBER	3	15
OAK-BLACK	3	45
POPLAR-SPP	3	0
SUMAC	3	0
WILLOW-SPP	3	0
BALDCYPRESS	2	100
BEECH-EUROPEAN	2	20
BUCKEYE-YELLOW	2	50
BUCKTHORN	2	0
DOGWOOD-CORNELIAN	2	10
HAWTHORN-WASHINGTON	2	20
HICKORY-SHAGBARK	2	30
IRONWOOD	2	80
KENTUCKY-COFFEETREE	2	100
LONDON-PLANETREE	2	200
MAPLE-BLACK	2	40
PEAR-EDIBLE	2	0
PINE-MUGO	2	0
SWEETGUM	2	60
AILANTHUS	1	0
ALDER-SPP	1	20
HORNBEAM-AMERICAN	1	80
AMUR MAACKIA	1	10
ELM-SPP	1	0
HAWTHORN-COCKSPUR	1	10
HAZELNUT-TREE	1	20
HICKORY-BITTERNUT	1	30
HONEYSUCKLE	1	0

SPECIES	COUNT 2025	COUNT 2045
LILAC-SHRUB	1	0
MAGNOLIA-STAR	1	20
OAK-SCARLET	1	30
OAK-SPP	1	10
OTHER	1	0
PERSIAN IRONWOOD	1	10
PINE-RED	1	0
SEVENTH SON FLOWER	1	5
WALNUT-WHITE	1	0
WILLOW-WEEPING	1	0
AMUR CORKTREE	0	5
BEECH-AMERICAN	0	10
BIRCH-GRAY	0	5
BIRCH-YELLOW	0	5
BUCKEYE-RED	0	10
CHESTNUT-CHINESE	0	5
DAWN REDWOOD	0	25
DOGWOOD-PAGODA	0	15
ELM-CHINESE	0	5
FRINGETREE	0	5
GOLDEN RAINTREE	0	5
HARDY RUBBERTREE	0	5
HICKORY-PECAN	0	5
HORNBEAM-EUROPEAN	0	15
HYDRANGEA-TREE FORM	0	5
LARCH	0	10
LINDEN-SILVER	0	20
MAPLE-HEDGE	0	10
MAPLE-PAPERBARK	0	10
MAPLE-TATARIAN	0	10
OAK-CHESTNUT	0	10
OAK-CHINQUAPIN	0	40
OAK-CRIMSON SPIRE	0	30
OAK-HERITAGE	0	20
OAK-HILLS	0	10
OAK-SAWTOOTH	0	10
OAK-SHINGLE	0	30
OSAGE ORANGE	0	5
PAGODA TREE	0	5
PAWPAW	0	5
PERSIMMON	0	5
ROSE OF SHARON	0	5
SMOKETREE	0	5
SUGARBERRY	0	10
VIBURNUM	0	5
WITCH HAZEL	0	5
YELLOWWOOD	0	10
ZELKOVA	0	10


Change in Diversity: 2025-2045
Species Groups
Oaks 810
Remaining species 473
Lindens 308
Coffeetrees 198
Elms 188
Ginkgoes 184
Planetrees/Sycamores 182
Buckeye Family 156
Hackberries 148
Tuliptrees 139
Catalpas 131
Hawthorns 127
Lilacs 101
Redbuds 100
Baldcypress 98
Ironwoods 78
Hornbeams 74
Serviceberries 70
Cherry Family 54
Magnolias 50
Birches 47
Arborvitaes 41
Spruces 40
Redcedars 34
Pines 22
Apples -49
Honeylocusts -121
Undesirables -131
Pears -241
Maples -494
-600 -400 -200 0 200 400 600 800 1000
Total Change

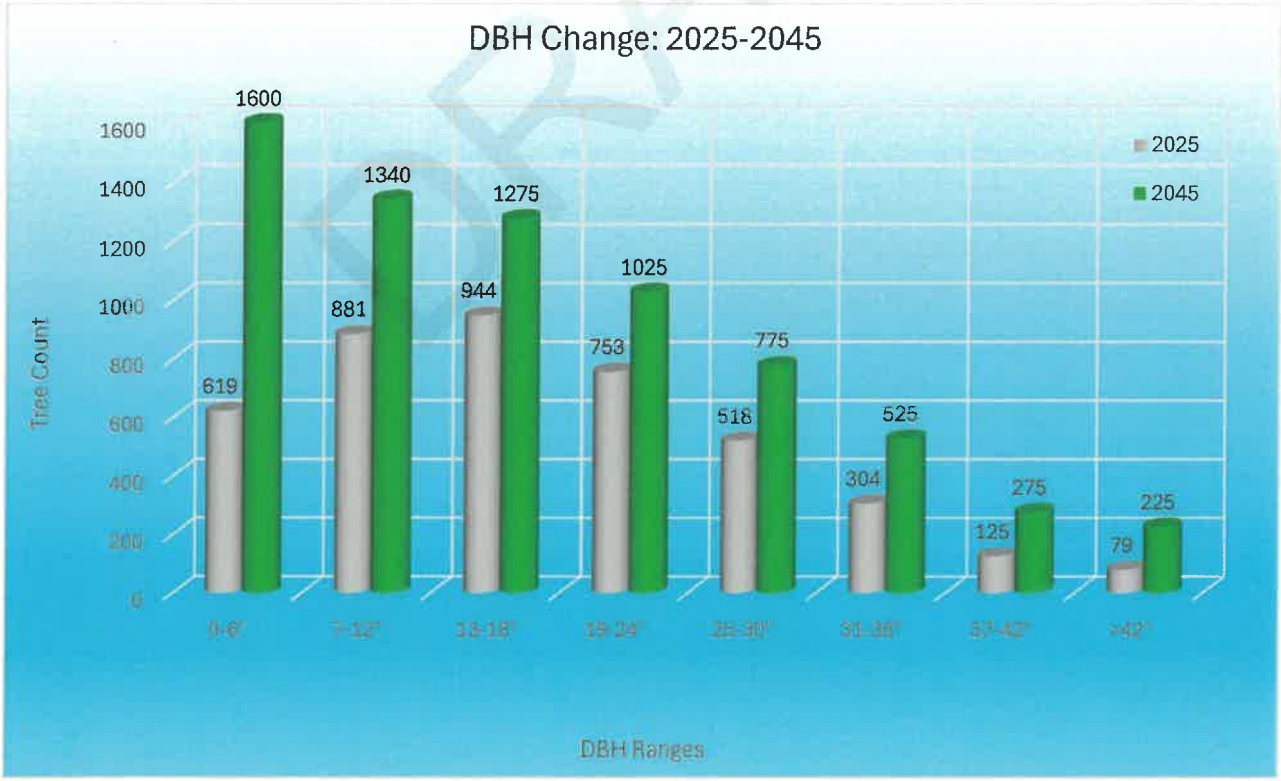

Diversity 2025: 4,223 Trees
Maples 51%
Honeylocusts 8%
Pears 8%
Remaining species 7%
Apples 5%
Undesirables 4%
Spruces 3%
Oaks 3%
Arborvitaes 2%
Lindens 2%
Birches 1%
Cherry Family 1%
Hackberries 1%
Pines 1%
Walnuts 1%
Elms 1%


Diversity 2045: 7,040 Trees
Maples 24%
Oaks 13%
Remaining species 8%
Lindens 5%
Honeylocusts 3%
Elms 3%
Planetrees/Sycamores 3%
Hackberries 3%
Ginkgoes 3%
Coffeetrees 3%
Spruces 3%
Apples 2%
Buckeye Family 2%
Tuliptrees 2%
Hawthorns 2%
Catalpas 2%
Redbuds 2%
Cherry Family 2%
Lilacs 2%
Arborvitaes 2%
Baldcypress 1%
Birches 1%
Serviceberries 1%
Pears 1%
Ironwoods 1%
Pines 1%
Hornbeams 1%
Redcedars 1%
Magnolias 1%

As can be seen from the above several pages of charts showing the change in species composition over the next 20 years, there will broadly be a move away from the overrepresented or low quality species discussed above, and a variety of different species, those which are underrepresented or not present in the tree population, will be planted. This will lead to an overall increase from 4,223 to 7,040 trees total on the City's ROWs, as well as a change from the current total of 105 species to a total of 120 species. This will result in a more robust and resilient Urban Forest which is resistant to pest and pathogen outbreaks.

The Benefits of Larger, Healthier Trees

Larger trees provide greater benefits to the community: They create more shade to offset cooling costs, absorb more storm water, create greater buffers against cool winter winds for heating costs, and absorb and sequester more carbon than smaller trees do. For the 2045 vision of the tree population, a variety of methods were used to arrive at a reasonable age-class distribution. We used the current population structure and anticipated high rates of survival based on new planting practices which would involve a "right tree/right site" approach, as well as increased survivorship of existing trees due to enhanced management and care practices. Predicted growth, survivorship, and eventual tree losses are based on current species composition and future plantings and removals. This allowed the creation of a vision of what the tree population, including species and size, will look like 20 years from now.



It can be seen from the above chart that the existing tree population (grey bars) shows a predominantly younger tree population with the majority of trees classified in the 1-6″ and 7-12″ DBH categories and a gradual decline moving into the 13-18″ and larger age class categories. The projected age class chart shows increases in all the age class categories over the course of this Plan, as younger trees are continually planted and more trees survive into the older age classes, where they will provide the greatest benefits in terms of ecological services to the community. The table to the right shows this data in tabular format.

	2025	2035	2045
0-6"	619	1100	1600
7-12"	881	1150	1340
13-18"	944	1125	1275
19-24"	753	875	1025
25-30"	518	650	775
31-36"	304	400	525
37-42"	125	190	275
>42"	79	130	225

This was based on the fact that increased levels of care for existing trees would enable them to survive longer. The graph and table show a general expectation of how the changes in tree diameters might change over the next 20 years based on the methods to be applied in this Urban Forestry Management Plan. The numbers themselves were projected by hand, based on our prior experience, and the methods are detailed below. If these projections hold, Belvidere could see a $19,915 or 18% increase in annual benefits up from $101,640 to $130,555. Standing values of the tree population could increase $2,058,000 or 20% from their current level of $10,290,000 to approximately $12,348,000.

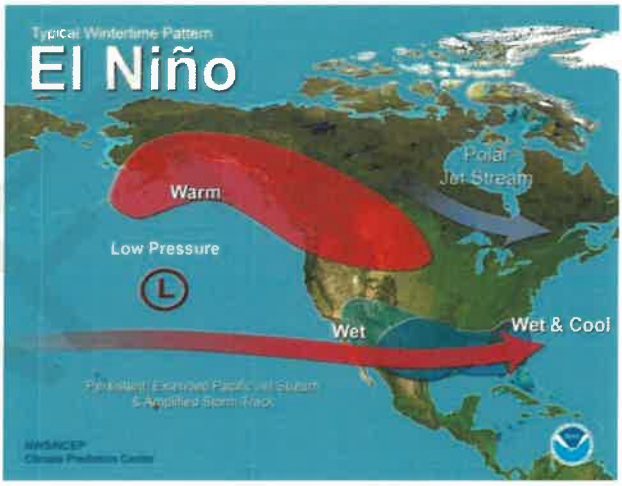
For projections of future age classes of trees, a ½″ per year growth rate was roughly estimated by assuming that it would take an average tree 10 years to go from one age class to the next (6″ = appx 10 years growth). The number of trees to be planted and removed annually were also used in the calculations below in the Tree Planting and Tree Removal sections. These numbers were based on all the above, as well as the best professional opinion of the Forestry Consultant. As time goes by, these projections will likely change. These are rough estimates for the purposes of this Plan.

The overall increase in size of the tree population and diameters of the individual trees will yield a much greater dollar figure when it comes to the ecological services provided and provide residents with a greater sense of being in an arboretum-like setting when they are enjoying the urban forest.

Trees and Climate Change

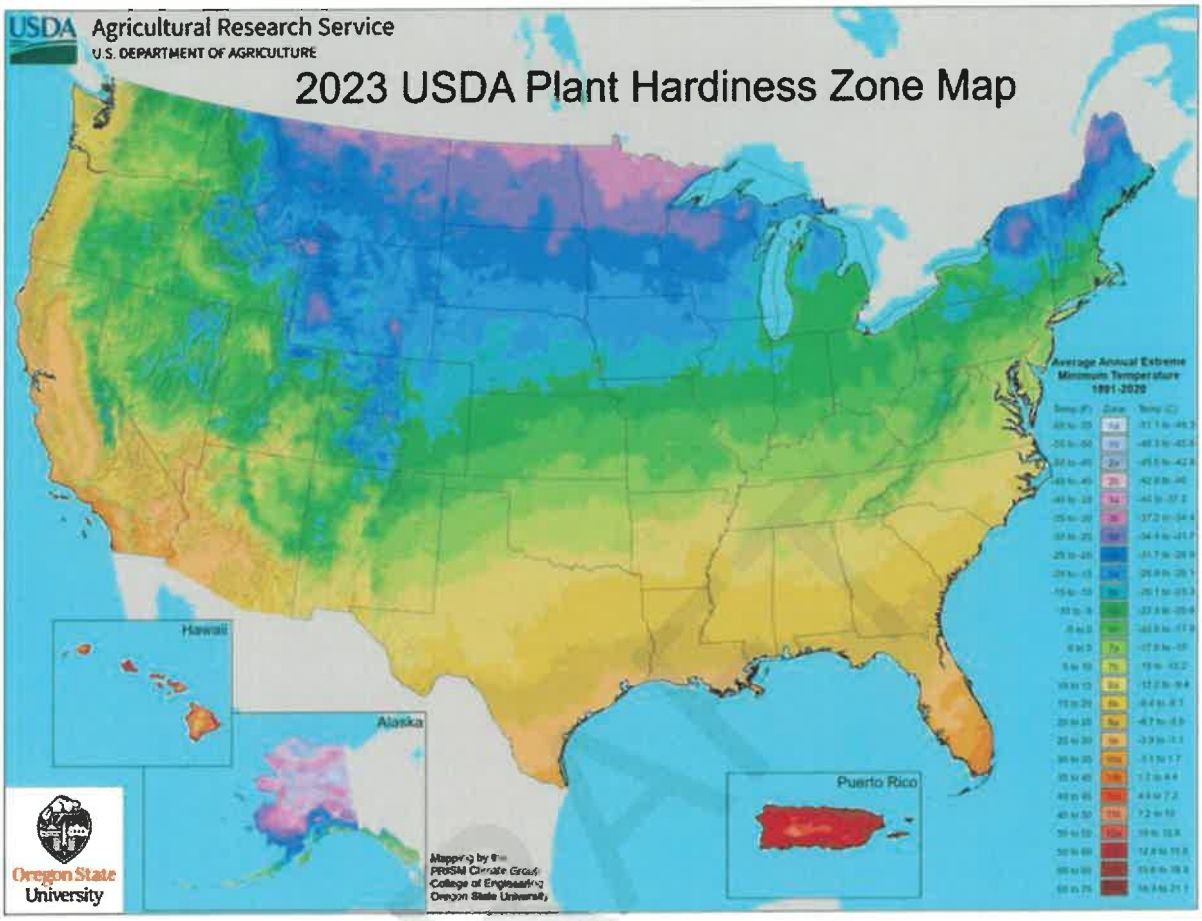
According to the United States Environmental Protection Agency, National Oceanic and Atmospheric Administration, Metropolitan Mayors Caucus, and a variety of other national and international reputable scientific and humanities-oriented sources, climate change will cause significant suffering over the 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 at times be chaotic with one of more "extremes": hotter summers, colder winters, worse storm seasons, and this will likely be the trend for quite some time before 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 all North America. But there are literally dozens of these known teleconnections across the globe 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 and reducing the impact of climate change. The number of trees we are planting is important, both on public as well as private land. But the types of trees we are planting matters as well. The US Forest Service is already starting programs 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 our area, we need to be careful, however. While the general trend is towards warming, the "extremes" side of this makes for a difficult decision. While summers may be warmer and support trees which are adapted to warmer conditions overall, our winters will still reach down into the -30° F and even colder range for extended periods. Cold weather is the limiting factor for what can be planted in an 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** ones. Before we start planting trees in northern Illinois that are more native to southern Illinois, we must understand that we need to plan for the coldest temperature, not the warmest per se.



All of that said, we should start planting trees now at least on a somewhat experimental basis that will be more tolerant of a warmer climate. Below are some suggestions of species which the City could plant that are just outside of our climate region, and may be successful over the coming 30 years or so, depending how effective we are at combatting climate change using other methods:

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, however not all will grow in Northern Illinois. Some are more native than others. Crape Myrtle for instance is barely tolerant of the climate in southern Illinois,

while Southern Hackberry can already be planted here with reliable success. However, they are good species to keep on our radar for experimental plantings.

Positive Tree Benefits for the Environment

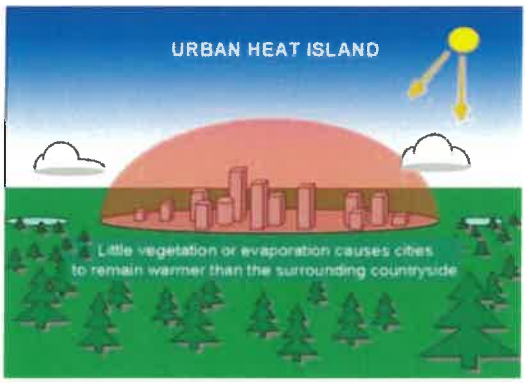
When it comes to trees and climate change, let's move on to some of the immensely positive benefits that trees provide. Here, we are focusing on 2 topics, those being the climate change and the urban heat island effect, as well as flooding prevention and stormwater benefits, since this was one of the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

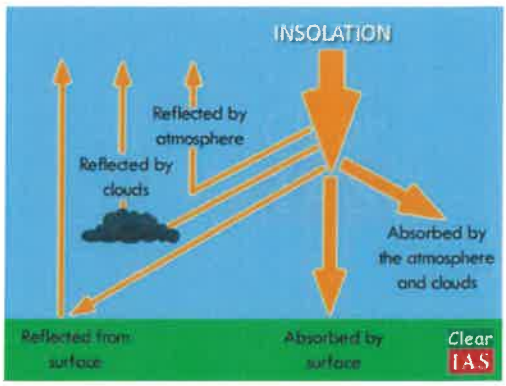
Climate Change / Urban Heat Island Mitigation

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 we perceive to be the normal operation of climate. It should be noted here 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. Increases in carbon dioxide emissions lead in general to a warmer climate, which comes with very specific problems. The climate change we are seeing currently 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 generally a warmer one.

The **Urban Heat Island Effect** is a separate but related issue. Trees and other green plants contain chlorophyll, a naturally occurring compound which is custom built by nature for absorbing the sun's energy and converting it to sugars by photosynthesis. 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 more asphalt and other dark surfaces, this produces a lot of heat.

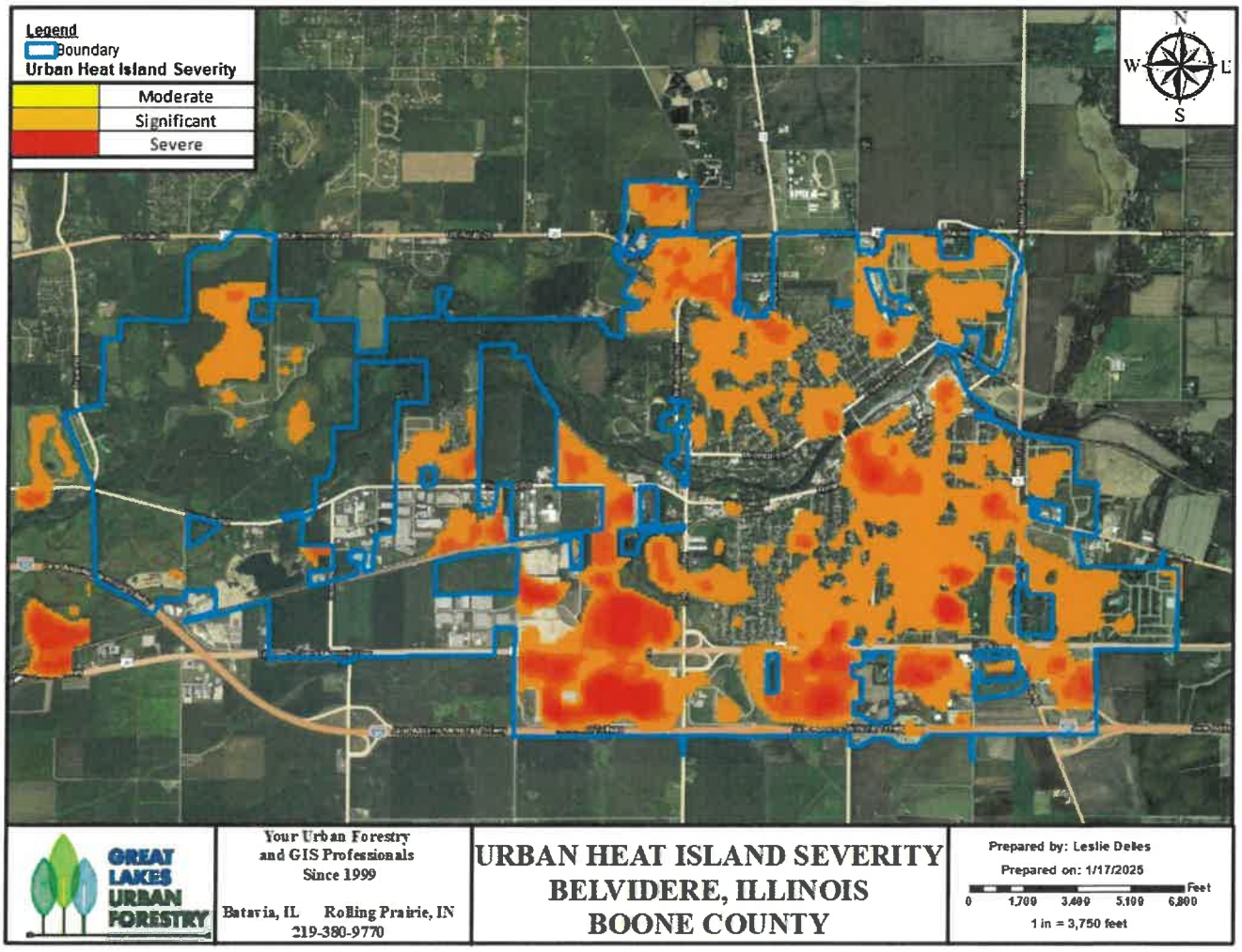
If you were to wear a dark shirt when the sun is shining, you will feel hotter than if you were wearing a white shirt. That is because different colors absorb things differently; light colors reflect light while dark colors absorb it, and the absorption of more light leads to more heat. Asphalt and other 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. When we have a general warming climate, combined with this urban heat island effect, it can dramatically raise temperatures in urban areas, leading to a variety of issues. This is where trees become a major factor in improving the environment. Not only do they absorb carbon dioxide from the atmosphere, which helps to reduce the effects of climate change, they are also reducing the amount of sunlight being absorbed by asphalt and dark areas. Especially in urban areas, if we can plant trees over areas of asphalt and dark surfaces, this will keep the sun from hitting those surfaces and instead direct the sun's energy to photosynthesis in the tree's leaves. The combined effects of these things will lead to reductions in warming.

For the City of Belvidere, below is a map of the 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:

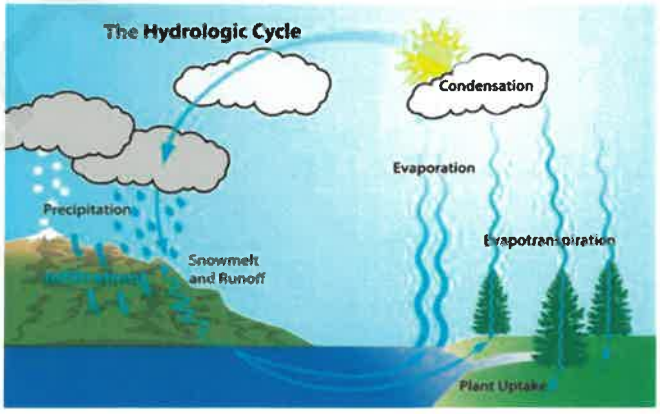


As can be seen from this map, the greatest heat island effects tend to be along the transportation corridors, as well as the industrial areas where greenspace is lower overall. These are the areas where tree planting will create the greatest cooling effects.

Planting trees not just on City owned property, but also encouraging residents and business owners to plant trees on their own property is a long-term goal of this management plan, and one of the big reasons is to offset the effects of climate change and the urban heat island effect. It should also be remembered that the climate is global, and there are no walls that separate cities, states, countries, etc. When one area warms, it has effects on the whole climate system. Conversely, when an area has more trees and vegetation planted, those benefits do not just stay 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

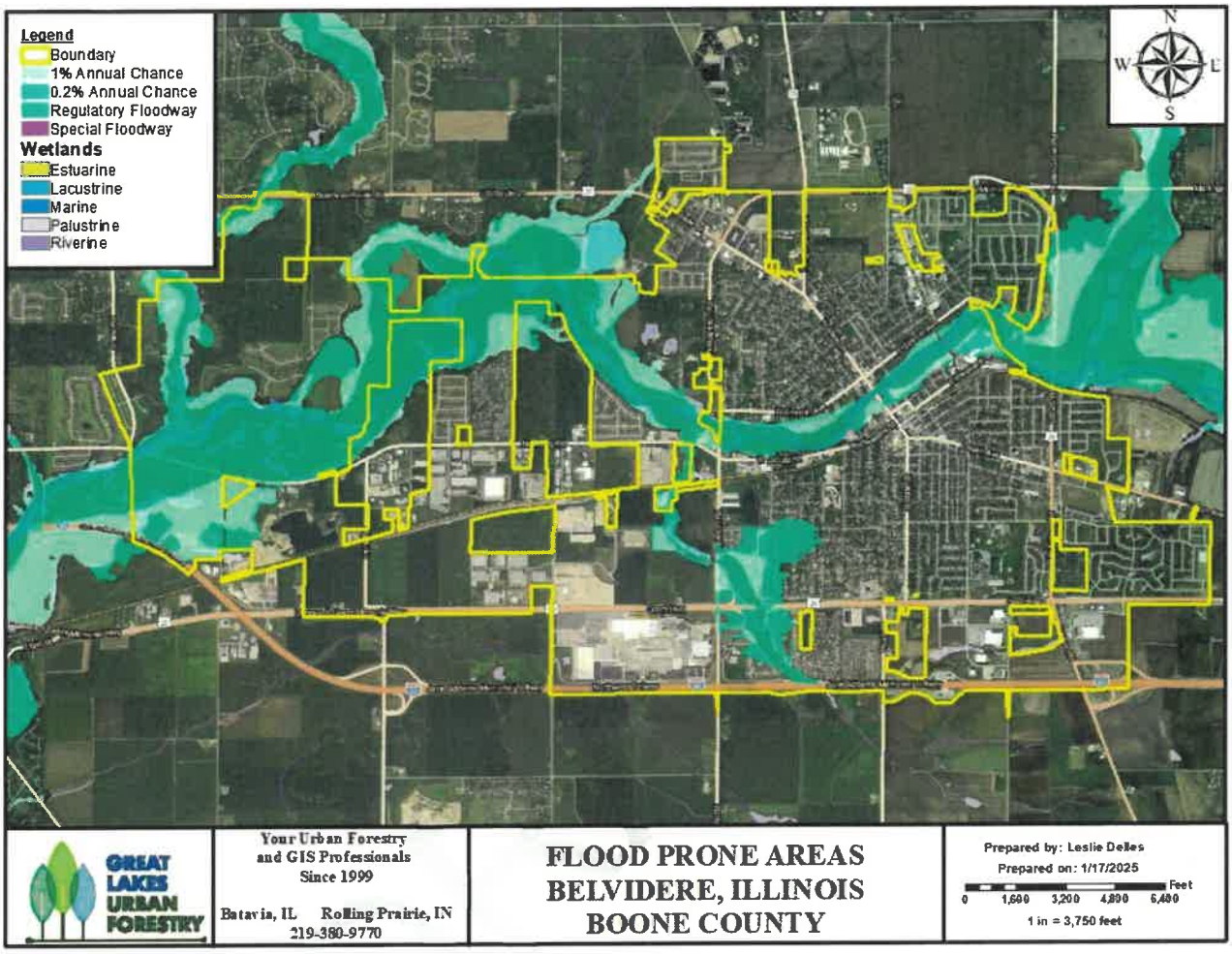
The Earth has what is called a **Hydrologic Cycle**, which is pictured in a simple form to the right. All of the water that has ever existed on Earth was here when the Earth first formed around 5 billion years ago and has simply been recycled ever since then. Water stored in the oceans and lakes evaporates into the atmosphere where it forms clouds, and then rains down, either into the ocean to start again, or over land, where things get more complicated. 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 we traditionally call **floodwater**.

When an area floods, the consequences can be enormous in terms of economic impact and the impact to humans and wildlife. Most communities have what is called **stormwater infrastructure** to handle this water. Storm drains are things we all see regularly which are meant to handle this water. But those 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 do something called **transpiration**, which effectively means that their roots soak up excess water in the soil, and they release it through their leaves back to the atmosphere. The more trees we plant, the greater the reduction in flooding, and the less our stormwater infrastructure is taxed, and the less economic and social suffering there has to be as a result of flooding. On the following page is a map showing flood prone areas in Belvidere:



What is important to note from the above map is not what the exact colors mean, just know that these colors all show either known wetlands, water bodies, or flood prone areas in Belvidere. Tree planting along any of these locations will help to transpire extra water out of the soil and prevent flooding from occurring. In particular, there are trees which are naturally adapted to growing in wetter soils, and these trees can really move a lot of water out of the ground, especially as they age. A mature tree can move as much as 6,500 gallons of water per year out of the system. Multiply that by thousands of trees, and you can see how quickly this adds up to a big difference. (https://www.epa.gov/sites/default/files/2015-11/documents/stormwater2streettrees.pdf)

Tree planting efforts should take 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. And just like climate change is not confined to a single area, neither is stormwater and flooding. Whatever floodwater is not absorbed in one area moves downstream to another area. By reducing runoff in Belvidere, it will help all downstream communities. And again, the more communities we can get to take action on this, the more flooding and runoff will be reduced.

Tree Removals

The first step towards attaining Belvidere's forestry goals will be to remove trees which are diseased, dying, or present a hazard. At present, there are 309 trees which have been called for removal during the inventory. Of these, 34 are listed as a Priority Removal, 161 are listed as Standard Removals, and 114 are listed as Low Priority Removals based on the tree inventory data. A direct goal of this Urban Forestry Management Plan is to have all identified trees marked as Removals during the inventory to be removed within 4 calendar years of this plan's adoption.

By percentage, the 309 trees identified for removal during the inventory are a slightly above average number of removals in terms of comparably sized municipalities, with removals representing just over 7% of the total population. Typically, municipal inventories reveal between 3-5% of the tree population requiring some form of removal.

After this initial 5-year period, in order to attain the goals set forth in the diversity projections, the background rate of tree removal will be approximately 100 trees per year. Going forward, reevaluation of the tree population on an annual or semiannual basis by the City staff or the Forestry Consultant will specify which trees require removal. These numbers, detailed below, are meant to be placeholders for budget calculations and diversity standards. This does not require that 100 trees be removed each year, this is simply a projection based on the existing inventory data.

For purposes of projection, costs have been estimated using a rate of $25/diameter inch for tree removal and stump grinding, which is a conservative estimate based on current market pricing. Rates could certainly be found lower than this in a competitive bid process or using in-house labor. As is the case with all cost projections for this Plan, no cost increase is assumed for the first 5 years, and a 3% annual cost increase is assumed 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 trees in year 6 and beyond, these are anticipated averages of trees to be removed. Exact numbers of trees to be removed may be more or less.

Milestones	2025	2026	2027	2028	2029	2035-2045
Trees Removed	48	55	100	106	100	100
Diameter Inches	1,566"	1,647"	1,780"	1,780"	1,600"	1,600"
Notes	All Priority Removals & Standard Removals 38" or Greater	Standard Removals Between 25" and 37"	Remaining Standard Removals & Low Prioirity Removals 36" or Greater	Remaining Low Prioirty Removals	Annual Removals From Inventory Updates	Annual Removals From Inventory Updates
Removal Cost (2025)	$39,150	$41,175	$44,500	$44,500	$40,000	$40,000
Removal Cost (CPI)	$39,150	$41,175	$44,500	$44,500	$40,000	$46,000

As the table above illustrates, there will be a generally 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 can be dangerous, but when performed by professionals is very safe. Therefore, all tree removal activities on Belvidere's public property should be performed under the guidance of a Certified Arborist or Arborist Trainee. The safe removal of a tree involves the cautious 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

Within a reasonable amount of time following the removal, stumps and surface roots should be removed using an approved stump grinding machine, such that the stump is ground to a minimum depth of 6 inches, and no surface roots are visible. If the site is to be planted with a new tree, that depth should be increased to 12 inches below the soil surface. This will ensure that a new tree may be successfully planted, and that no re-sprouting will occur from the old stump. The depths to which the stump must be ground may be altered by the City of Belvidere depending on needs for specific 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

Once the tree has been safely removed and the stump has been ground out, the open planting space must be fully restored if a tree is not scheduled to be planted in or adjacent to the old hole. Site restoration consists of removing the stump chips from the hole, filling it with a quality mineral topsoil, tamping down to match the surrounding grade, spreading grass seed over the top of the topsoil, and securing a straw mat over the top soil. This will ensure that grass grows back to restore the aesthetics and function of the terrace and prevent tripping hazards from the removal scar.

Reasons for Tree Removal

Removal of trees on public spaces is an unavoidable reality of managing large tree populations. When the trunk, branches or roots fail, a standing tree can cause personal injury or property damage, and even small dead trees can be an eyesore and reduce property values. Old trees can hold great sentimental value, and many people become attached to them. However, there are times when their presence creates a public hazard, and it is at those times that action must be taken to ensure public safety. It's also important to remember that the removal of a tree today is the promise of a new tree for tomorrow!

Removal of trees on City of Belvidere public property shall always be at the discretion of the City staff and/or Forestry Consultant. Trees will never be removed without a sound reason from the City or Forestry Consultant. Residents may request a tree to be removed for reasons NOT covered below, and these requests will be reviewed by City staff or Forestry Consultant. Removal requests may be

granted and paid for under the annual forestry budget. However, trees with a greater need for removal based on public safety will always hold a higher priority. Under no circumstances will Belvidere be responsible for trees which are not in the right of way.

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 City staff or Forestry Consultant.

Diseased or Infested

Diseases are caused by viral, fungal, or bacterial pathogens. Infestations are caused 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 which kills Ash trees by infesting them. The prompt removal of diseased or infested trees limits the exposure of other nearby trees. The removal of 1 tree may save dozens of others. Trees deemed to be diseased or infested by City staff or Forestry Consultant shall be removed as expediently as possible in order 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 piece of property and cause property 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 the risk posed by trees. Litigation involving trees is a perennial concern for public entities. All trees in Belvidere were assessed for a basic level of risk during the initial inventory, and a number of trees were found to be at elevated or substantial risk levels. If such 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 potential harm.

City staff, the Forestry Consultant or any other TRAQ Qualified Risk Assessor must assess the tree and prepare a Tree Risk Assessment Report which 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. City staff or the Forestry Consultant shall determine the need for removal of a tree in these cases, although in an emergency situation such as a tree impacting a person, vehicle, home, power lines, or other such emergency, the City 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

City staff or the Forestry Consultant will assess trees that have been impacted by a vehicle strike or piece of construction equipment. If the tree has suffered physical damage or extreme root compaction and is likely to decline and become high risk, it 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 City staff.

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. Such requests will be reviewed by the Public Works Superintendent and/or Public Works Director and evaluated on a case-by-case basis. If the tree shows significant potential to decline or pose a threat in the near term, the City may agree to the removal within an appropriate amount of time. Priority will always be given to trees in danger of threatening 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 impacted 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 a result of this UFMP, Belvidere will be enhancing their use of industry best management practices for diversity in the urban forest, with the goal of building a diverse urban forest. Overplanted species listed as being in poor condition will be reviewed to assess further decline or recovery. Those trees in noticeable decline shall be removed at the discretion of City staff and/or Forestry Consultant. This will be used as a preventative measure so that these trees do not continue to decline to a point where they become hazardous, and not used as a reason to remove an otherwise healthy tree.

Basic City Tree Removal Requirements and Standards

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

City of Belvidere

1. All personnel directly involved with process of chainsaw operation, climbing, bucket truck operation, and rigging limbs shall be provided with sufficient training and experience to perform such duties while employed by the City of Belvidere, as either Public Works and Forestry staff, or performing work as a contractor employed by the City.
2. Only qualified utility arborists may perform tree removal operations within ten feet of an electric utility line. City of Belvidere 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 City will not remove healthy trees in order to meet diversity goals, unless the tree poses a risk to persons or property.
4. The City of Belvidere 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 our diversity and canopy cover. As a means of increasing canopy cover to 29% and increasing overall diversity, this plan calls for the planting of approximately 2,000 trees over the coming 20 years. These trees will be planted by City staff and/or qualified contractors. This plan has a direct goal of planting trees where they have the best chances to establish and thrive based on their specific sites and species requirements.

For the projections shown below, the program began with being able to replace trees called out for removal above and also to begin planting in open spaces on the City ROW and private property. After the first year, a gradual 10 trees planted per year increase is called for until a plateau of 100 trees per year is reached in 2035-2045.

For the costs of planting, $400 per tree (installed) has been used. This is a conservative estimate based on retail costs, and the City may be able to perform planting at a more favorable rate. We examine money saving proposals in further detail in the Additional Goals and Strategic Partnerships sections.

Milestones	2025	2026	2027	2028	2029	2035-2045
Trees Planted	40	50	60	70	80	100
Planting Cost (2025)	$16,000	$19,000	$22,000	$25,000	$28,000	$35,000
Planting Cost (CPI)	$16,000	$19,000	$22,000	$25,000	$28,000	$40,250

The Importance of Planning Your Tree Planting

Right Tree in the Right Site

Urban Forestry has an unfortunate history of not planning carefully for tree planting. Whatever was readily available, inexpensive, urban tolerant, and grew fast was seen as desirable, and often planning of tree plantings was left to developers or nurseries and plantsmen. With our history of invasive insects and diseases in the Midwest region and knowing these will only get worse in the future, it is more crucial than ever that we have a process to plan our tree plantings.

This process should involve assessing each site to be planted in much the same way we would assess a tree, except that in this case, we look for factors such as available above and below ground growing space, how much light the tree receives, amount of soil moisture present, and possibly other factors such as soil pH and texture. Once this information is collected, planting sites can be matched with trees which are well suited to those sites. Matching the right tree to the right site like this will result in trees which establish faster, grow more vigorously, live longer, and provide far greater benefits. Even a simpler version of this process is better than nothing. When you have your species list for each site assembled, it makes bidding nurseries and plantsmen much easier since you already have a plan in hand.

Playing an active role in your tree planting planning also allows for meeting diversity standards such as the taxonomic, spatial, and age class diversity principles outlined above and attempts to get the tree population into compliance with the "20-10-5 Rule". With approximately 7,465 planting sites to be assessed, tree planting planning can be phased off each year as the planting budget takes shape and diversity is evaluated. Being targeted with species selection also allows the use of species which are slightly more difficult to find appropriate sites for. These species that are considered "less urban tolerant" can still be planted when the appropriate site is found! We anticipate that over the timeline of this plan that early all of these spaces will be planted.

The success of a tree depends on where and how it is planted. City staff or the Urban Forestry Consultant should assess planting sites before trees are purchased and installed each year, to ensure the correct tree is being planted for the correct site. Each tree planted represents a 25-75+ year commitment, and this planning helps to increase the benefits the community can reap from this commitment. A list of acceptable species to be planted for all land use types appears in Appendix A.

Nursery Stock Procurement

Nursery stock quality is yet another aspect of planning which can help a tree establish, survive, and thrive to provide great benefits to the community. City staff or an Urban Forestry consultant should inspect and select every tree which is to be planted on City property to minimize the possibility of installing lower quality nursery stock. Specifications should be for material no smaller than 1.5" caliper, with good form for the species, planted as either balled and burlapped or minimum 5-gallon containerized stock.

Currently, the industry is recovering from a nursery stock shortage due to high demand to replace Ash trees lost to Emerald Ash Borer, which impacted the availability of some species. We strongly recommend not accepting substitutions in the requested species lists, as many nurseries are still attempting to substitute overplanted trees for some of the higher diversity species which may still be difficult to obtain. It is recommended to have an approved substitution prepared 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 determine a tree's success after planting. Even healthy trees from the field, if improperly transported, may dry out during transport, or have structural damage to root balls incurred. When it comes time to plant, trees planted too deeply will suffer from root compaction and trunk decay.

Trees planted without properly dug holes may suffer from stunting. Trees planted without proper removal of packaging materials may develop girdling roots. Trees planted too high may have surface root desiccation. Trees improperly staked or with improper trunk protection may suffer from trunk wounds or girdling of the entire trunk. The standards and Best Management Practices for tree transport and planting are detailed later in this section, as well as Appendix J.

Tree Spacing and Visibility Requirements

Minimum tree spacing between large, medium, or small sized deciduous shade trees should be appropriate for the species and conform to City standards and written in section 118-34 of City Code. It is generally recommended this 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 without heavy competition for water and nutrients with neighboring trees, and without limited space for crown growth. In addition, no tree should be planted within 10 feet of a driveway or known below ground utility and 35 feet from an intersection or traffic control device. Trees may be planted under aboveground powerlines but must be from the "Small" selections listed in the Acceptable Species list in Appendix A. No evergreen species should be considered acceptable for street trees, as they can obscure views of the road and may lead to accidents. Evergreens are acceptable for municipal campuses, and other City-owned properties.

Watering

Watering of newly planted trees is essential to their establishment, growth, and survival, particularly during the first 2 years of their lives. Since watering is not included in our budget figures, this responsibility may have to fall on the property owners. It is recommended that when a tree site is selected for planting, a basic letter be mailed to property owners describing how much water to give

a tree, and when it should be given. Such simple information can make the difference between a tree dying from drought stress, a tree dying from overwatering, and a happy, healthy tree.

Challenges of Urban Plantings

Urban planting sites are a difficult environment for a tree to thrive in, and based on long term data, it is expected that 5-10% of new plantings fail each planting cycle. The City's 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. Urban tree plantings can pose an uphill battle in many ways, due to limited soil volume, salt runoff, airborne pollutants, and other factors. New planting mortality is to be expected, despite best efforts to prevent such an outcome, but the planning measures outlined above will help to mitigate annual new planting mortality.

Tree Planting Requirements and Standards

City of Belvidere

1. Newly installed trees should not be planted within 10 feet of a driveway or known below ground utility and 35 feet from an intersection or traffic control device. If this distance cannot be maintained, the site should not be planted, even if a tree was removed from the same site.
2. Choice of species for planting should be done so according to the City'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.
3. All planting stock shall be grown within 150 miles of the City.
4. Acceptable nursery stock shall conform to the following standards:
   - **A.** Minimum of 1.5-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.** Approved species list for the City of Belvidere
5. Planting and digging of certain species shall only occur at certain times of year, in accordance with nursery industry best management practices and professional judgement. These times are subject to the professional opinions of both the City of Belvidere and its approved contractors.

6. Residents can obtain a permit to plant trees on the City-owned right-of-way, if purchased independently and conform to all species, spacing, and proper planting requirements as specified by the City of Belvidere.
7. 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.
8. A minimum of a one-year replacement guarantee shall 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 for its greatest benefits and lowest risk, tree pruning is one of the most cost-effective maintenance activities which can be performed. Pruning provides several important services for a tree: It reduces the risk of failure, provides clearance for utilities or other structures, reduces wind resistance and wind damage, maintains overall tree health, and improves overall aesthetics.

For the projections below, the most critical needs of the City of Belvidere were prioritized. This priority list begins with trees identified as dead limb prunes, priority prunes, or young trees in need of establishment or training pruning. Based on the inventory data, 397 such trees were identified, and can be pruned over the next year under the City's existing annual forestry budget. For the next 10 years, it is recommended that Belvidere slowly increase the number of trees pruned each year through 2035 until they are at full capacity to handle the 5-year pruning cycle which has been proposed for the City. Currently, Belvidere prunes approximately 220 trees per year using primarily in-house labor and once the full 5-year pruning cycle is implemented, it is anticipated that approximately 1,100 trees per year will require pruning to maintain this cycle.

For cost estimates associated with these activities, several assumptions were made:

First, because young trees (12" and less in diameter) are easy to prune, it is assumed that City staff can prune all trees less than 12", and $50 per tree was used as an estimate for this group, based on average cost in the industry at this time. 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). Consistent with other budget tables, a 3% annual CPI increase was added for every year thereafter.

The budget estimates below are fairly conservative, as is the case with all budget projections in this Plan.

Milestones	2025	2026	2027	2028	2029	2035-2045
Trees Pruned	845	900	950	1000	1050	1,100/year avg
Notes	All Dead Limb, Priority & Training Prunes and Begin Annual Cycle Prunes	900 Cycle Prunes	950 Cycle Prunes	1,000 Cycle Prunes	1,050 Cycle Prunes	Approximately 1,100 Cycle Prunes / year in perpetuity
Cost (2025)	$19,700	$22,130	$24,560	$26,990	$29,420	$31,850
Cost (CPI)	$19,700	$22,130	$24,560	$26,990	$29,420	$36,600

Pruning Activities

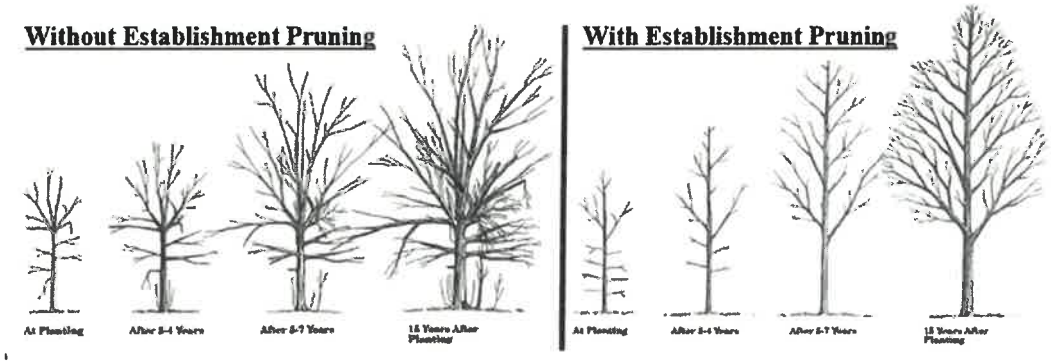
Implement/Maintain/Enhance Pruning Cycle Program

Initially, the City should prioritize the trees identified in the inventory as requiring either Priority, Dead Limb, or Training pruning, regardless of where they are located. This is primarily to prioritize public safety before routine maintenance. After these trees are pruned, Belvidere should aim to maintain a 5 year pruning cycle based on the size of its tree population both now and in 2045. This would mean that over a 5 year period, approximately 1,100 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 period, hence the above tables showing adaptive management of the tree pruning program.

Though tree pruning may seem expensive, the cost of maintaining trees is significantly less than the costs associated with trees damaging property or injuring residents. The benefits trees provide when healthy and well maintained can be prolonged and significantly increased, as shown in the projections above. A cycle pruning program is the hallmark of an effective forestry program, and it is highly recommended that Belvidere begin to budget for this essential expense.

Pruning of Young Trees

For the purposes of this Plan, a young tree is considered to be under 12" DBH. Young trees are still trying to acclimate to their sites. The pruning of young trees has different goals and outcomes than the 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 which are considered common to the various tree 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 which can be performed. It is an inexpensive task that does not require a large time commitment and saves thousands of dollars in pruning and maintenance costs later in the tree's life.



Pruning of Mature Trees

A mature tree, for the purposes of this Plan, is considered to be greater than 12" in diameter. Mature trees are established in and acclimated to their sites. The pressure these trees face from their environment generally comes from above-ground factors such as pests, pathogens, man-made structures, other trees, windstorms or lightning strikes, as well as some below ground factors like girdling roots, limited soil volume, or poor soil quality. Pruning is performed to mitigate the above-ground issues, as well as balance out any below ground issues when possible. Natural aging and limb dieback are additional reasons these trees are pruned.

Pruning of mature trees may mitigate a short-term risk, such as after a storm, or pruning may be done to maintain a tree's long-term health and structure. In the wild, trees lose limbs frequently. This is called self-pruning. Allowing trees to self-prune over time is not advisable in an urban setting. Safety factors may arise, and the process of self-pruning may bring up aesthetic issues in an urban environment. Mature public trees should only be pruned by professional Certified Arborists and done in accordance with industry Best Management Practices and accepted ISA and ANSI standards.

Private Property Trees

The City of Belvidere will not be responsible for the pruning of trees located on private property. The City 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 City staff and/or the Forestry Consultant.

Reasons for Pruning

Establishment Pruning

Establishment pruning of newly planted trees is the single most cost-saving measure in tree care, as it establishes good 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 six inches in diameter. Once established, the tree will only require periodic cycle pruning to maintain an appropriate form for the urban forest and to maintain health and keep the tree free of dead limbs.

Cycle Pruning

A Best Management Practice in Urban Forestry is that trees should be pruned on a cyclical basis as preventative maintenance. No tree should go more than seven years without proper pruning. Cycle pruning ensures that dead branches, storm damaged limbs, or unsightly growth are removed before becoming hazardous or bad for the health of the tree. Cyclical pruning also ensures the proper leaf to stem ratio, which provides structural support for the tree. It also ensures that pruning stays relatively inexpensive, as severe issues do not have time to develop. Cycle pruning is a maintenance activity which if performed regularly, actually needs to be performed less often!

Emergency / Storm Damage Pruning

Emergency pruning is nearly always necessary to mitigate severe risk after storm events, such as limbs which have fallen and are blocking traffic, have impacted a structure, are interfering with a utility, or are hanging and in imminent danger of doing any of the above. Emergency and Storm Damage Pruning should be conducted at the discretion of the City, with the best interests of the public in mind. 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 City may take whatever remedial action is practical and reasonable to mitigate such imminent risk.

Sanitation Pruning

When a tree has been diagnosed as having been diseased or infested with a pest or disease, sanitation pruning may be employed to maintain the tree while removing the diseased or infested portions. This technique is only effective when the host tree is infected/infested with certain pests and pathogens, and only in a localized area of the tree. With more widespread cases of disease or insect infestation, removal will be the most cost-effective and safest option to avoid endangering other nearby trees, as these 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 that make it hazardous. At these times, the removal of such limbs or parts may render the tree to be low risk again, without causing permanent damage to the tree.

Tree Pruning Requirements and Standards

City of Belvidere

1. All activities directly related to the operation of a chainsaw, bucket truck, limb rigging, or tree climbing shall be performed by a qualified employee, or under the supervision of a certified arborist or arborist trainee.

2. No pruning or maintenance activity that takes place within ten feet of a power transmission line shall be accomplished by a City of Belvidere employee unless certified as a qualified Utility Arborist.
3. No cabling, bracing, or other such support systems shall be installed in City-owned trees, either by the City of Belvidere, its residents, or any contractors. An exception may be made by obtaining prior written approval of the City.
4. No heading, pollarding or espalier pruning shall be conducted on City-owned trees, and no wound dressings shall be used under any circumstances, without a permit and prior written approval of the City of Belvidere.
5. The need for pruning and maintenance of City individual trees shall be at the discretion of the City of Belvidere and its designated contractors.
6. No more than 25% of a tree's crown shall be removed during pruning operations to preserve the health of the tree. Any more than 25% of the crown being removed can put the tree in danger of severe dieback, and removal should be considered at that point.
7.

Other General Maintenance

Maintenance Activities

Retaining a Consultant

The task of establishing or enhancing a robust Urban Forestry program can be difficult! There may be many new challenges and learning curves, contracts to renegotiate, bid documents to create, resident concerns to manage, and other responsibilities which may require the assistance of a professional.

A Forestry Consultant may assist in maintaining the tree inventory, training city staff, and review and update of the urban forestry management plan.

Chemical Applications

Trees, like people, sometimes contract pests and pathogens. Often these pests and pathogens can be controlled with a simple chemical application just as illnesses in humans can be controlled with medication. This practice is called Plant Health Care. When financially practical, chemical control for common pests or pathogens may be utilized as a preventative or curative method and increase the aesthetics and benefits of the tree population.

Chemical applications on terrace trees, such as treatment for Emerald Ash Borer, Dutch Elm Disease, Apple Scab, or other common disorders will be performed by the City as needed.

Residents of Belvidere may perform chemical applications on the terrace trees, such as treatment for Emerald Ash Borer, Dutch Elm Disease, Apple Scab, or other common disorders with prior permission from the City. The City will not bear any financial responsibility associated with the costs of such treatments, and treatments must be performed by a Certified Arborist who holds a valid Pesticide Applicators license.

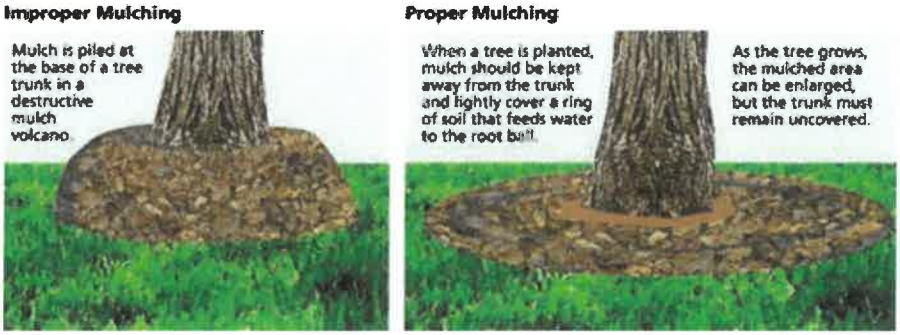
Such an allowance would be strictly informational, to allow the City to be aware of chemical treatments occurring on trees that it owns. Such work may be denied or revoked for utilizing unqualified contractors, potentially hazardous chemicals, or any other reason at the discretion of the City. Additionally, trees being treated by residents may still be removed at the discretion of the City for any of the reasons listed above.

Water Management

The importance of water in the establishment, growth, and survivorship of trees cannot be overstated. Most trees adapted to our climate zone (USDA Zone 5b) are also adapted to the amount of moisture we have in an average year. However, younger trees with less expansive root systems are susceptible to prolonged drought. Young trees need supplemental watering, which is an essential maintenance activity and can prevent newly planted tree mortality. Upon receiving a newly planted tree, residents should be supplied with an informational letter/pamphlet which explains how often to water their new tree during the first 2-3 years.

Mulch

Proper application of mulch is a necessary and cost-effective maintenance activity. 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 terraces competes for water and nutrients, and mulch reduces this competition.



But not all mulching is beneficial. The practice known as "Volcano Mulching" is the practice of piling mulch against the trunk in excess of 3" deep. This causes moisture build up against the trunk, and can cause decay of the trunk tissue, and possibly death. Material such as crushed limestone, red volcanic rock, or rubber pellets can alter the soil chemistry in an undesirable way, and cause dieback or tree death. Fortunately, mulch is a commodity most communities can get for free so long as they are pruning and removing trees each year. Mulch is available at the City of Belvidere Street Department, located at 515 W Locust St. All newly planted trees should have mulch applied appropriately. A goal for Belvidere should be to mulch all trees 12" DBH and smaller, but for now, mulch for all newly planted trees, and preventing volcano mulching should be a primary concern.

Tree Preservation and Management During Construction

In many municipalities, ordinances exist to protect trees and shrubs from construction activities. The intent of these ordinances is to protect the benefits those trees and shrubs provide to the community. Trees and shrubs may be privately owned but are also community resources that provide benefits such as aesthetics, storm water benefits, energy savings, carbon sequestration and increased property values. Therefore, tree and shrub protection and preservation during construction represents an investment in the community! 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. This damage includes physical and chemical damage to the trunk, branches, and roots. Damage may be caused by equipment such as backhoes, skid steers, or other appendage-type equipment. The effects of damage to the visible above ground portions of the tree can be obvious, as when branches are broken. But hidden effects such as root compaction or improper grading may not become evident for years until the tree begins to die back. The standards set forth below and in Appendix L are industry standards with a proven record of success.

Tree Preservation Requirements and Standards

City of Belvidere

Please Reference Sec 118-33 & Sec 151-49 of City Code

DRAFT Tree Risk Assessment Policy

Trees provide ecosystem and aesthetic benefits, but all trees also pose some degree of risk. Determining the acceptable level of risk, along with effectively managing that risk, is a key priority for urban forestry operations. As a tree manager, the City of Belvidere must always assume some degree of risk. It is up to the City to track that risk to ultimately decide how to take steps to mitigate trees which pose such risk in a manner which is responsible both economically as well as in the interest of 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 H at the end of this report. All trees in Belvidere were assessed for a basic level of risk during the inventory. These assessments were rapid assessments, and do not represent any formal level of TRAQ risk assessment and are not legally binding. They are solely intended to provide Belvidere with data showing a need for a more detailed assessment of individual trees such as those listed below.

Level 1 Assessment

Also called a "limited visual assessment", whereby a tree has a basic analysis of obvious physical defects and 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 report detailing the information collected during a detailed visual inspection of the tree and the 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 things which may be damaged or injured by trees.

Level 3 Assessment

A Level 3 Assessment, also called an "advanced assessment", provides 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 tomographs, 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 meant for the reader to gain additional insight into the TRAQ process. Once again, TRAQ inspections were not performed on City trees during the inventory data collection, but this information will help the reader understand the terminology better and help inform staff and residents as to how and why these inspections are performed.

Likelihood of Tree Part Failure

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

Likelihood of Tree Failure Impacting a Target

Determining the likelihood of impacting a target is figuring out 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, but that same tree in a playground might have serious consequences. In many roadways, motor traffic is present day and night. Where failure of a tree not only impacts motorists, but it also has a potential effect on pedestrian traffic and utilities within right-of-way also.

Consequences of a Tree Failure Impacting a Target

The potential consequences of the 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 if the tree fails. Whereas the previous step was concerned with occupancy rates, this step looks at the consequences of the impact and assumes that the target is always present. To follow with the above example, it is assumed that if a terrace tree were to fail, that 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 to be "minor" for targets that can be easily replaced or repaired and step up through 4 levels with the

highest level being "severe", which would constitute severe injury to a person, or even a fatality (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 for trees which have existing defects, like deadwood, cavities, or poor architecture. Extreme weather events, by contrast, can cause the failure of perfectly healthy trees. For all Tree Risk Assessments, Risk should be assessed assuming "normal" weather conditions. Though 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 should be considered abnormal.

DRAFT City of Belvidere Tree Risk Assessment Policy

The City of Belvidere has created this policy to maintain an acceptable level of risk from its tree population(s). In order to maintain a high level of public safety, while mitigating undue burden, the City should adopt the following risk assessment protocols:

1. The City of Belvidere maintains a tree inventory detailing the species, size, and condition of trees on City properties, as well as a 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, City staff and/or Forestry Consultant should inspect these trees and identify trees potentially posing an unacceptable level of risk. Subject to budgetary approved constraints, such trees identified shall either be scheduled for a more detailed risk assessment (Level 2 or 3), or shall be mitigated, either by pruning or removal, as soon as practical following the assessment.
2. During subsequent years, when feasible staff may perform limited visual assessments on an ad hoc basis by driving by trees during the normal course of daily operations. Subject to budgetary approved constraints, 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 or removal, as soon as practical following the assessment.
3. Upon notification from a resident of a concern about a potentially high-risk tree, City staff and/or Urban Forestry Consultant will 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 will be performed within an additional (14) business days. a decision will be made by City staff and/or Forestry Consultant as to what the appropriate mitigation measures are, if any.
4. All trees determined to be in need of mitigating actions (removal, pruning, etc.) should be documented in writing by City staff and/or Urban Forestry Consultant. The documentation shall include the date the assessment was performed, the species, size, and condition of the

tree, and 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 ocular 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 City.

TRAQ Forms can be found in Appendix H 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 City staff, the budget begins this year with a dollar amount that is within their current annual budget for tree related expenses. From there, generally the budget increases slightly each year, and projects through 2045, at which time, including CPI, the budget will have increased approximately 60% from the current level of approximately $77,350 in 2025 to approximately $132,050 by 2045. This represents a necessary budget increase for such an increase in values of the Urban Forest.

REMOVALS	**Milestones**	**2025**	**2026**	**2027**	**2028**	**2029**	**2035-2045**
	Trees Removed	48	55	100	106	100	100
	Diameter Inches	1,566"	1,647"	1,780"	1,780"	1,600"	1,600"
	Notes	All Priority Removals & Standard Removals 38" or Greater	Standard Removals Between 25" and 37"	Remaining Standard Removals & Low Prioirity Removals 36" or Greater	Remaining Low Prioirty Removals	Annual Removals From Inventory Updates	Annual Removals From Inventory Updates
	Removal Cost (2025)	$39,150	$41,175	$44,500	$44,500	$40,000	$40,000
	Removal Cost (CPI)	$39,150	$41,175	$44,500	$44,500	$40,000	$46,000
PLANTINGS	**Milestones**	**2025**	**2026**	**2027**	**2028**	**2029**	**2035-2045**
	Trees Planted	40	50	60	70	80	100
	Planting Cost (2025)	$16,000	$19,000	$22,000	$25,000	$28,000	$35,000
	Planting Cost (CPI)	$16,000	$19,000	$22,000	$25,000	$28,000	$40,250
PRUNING	**Milestones**	**2025**	**2026**	**2027**	**2028**	**2029**	**2035-2045**
	Trees Pruned	845	900	950	1000	1050	1,100/year avg
	Notes	All Dead Limb, Priority & Training Prunes and Begin Annual Cycle Prunes	900 Cycle Prunes	950 Cycle Prunes	1,000 Cycle Prunes	1,050 Cycle Prunes	Approximately 1,100 Cycle Prunes / year in perpetuity
	Cost (2025)	$19,700	$22,130	$24,560	$26,990	$29,420	$31,850
	Cost (CPI)	$19,700	$22,130	$24,560	$26,990	$29,420	$36,600
FORESTRY CONSULTANT (AS NEEDED)	**Milestones**	**2025**	**2026**	**2027**	**2028**	**2029**	**2035-2045**
	Notes	Appraisals and Risk Management	Appraisals and Risk Management	Inventory Updates / Appraisals/ Risk Management	Inventory Updates / Appraisals/ Risk Management	Inventory Updates / Appraisals/ Risk Management	Inventory Updates / Appraisals/ Risk Management
	Cost (2025)	$2,500	$2,500	$5,000	$6,000	$7,000	$8,000
	Cost (CPI)	$2,500	$2,500	$5,000	$6,000	$7,000	$9,200
TOTALS	**TOTALS - 2025 $**	**$77,350**	**$84,805**	**$96,060**	**$102,490**	**$104,420**	**$114,850**
	TOTALS - CPI 3%	**$77,350**	**$84,805**	**$96,060**	**$102,490**	**$104,420**	**$132,050**

Summary / Conclusion

By creating this Urban Forestry Management Plan, the City of Belvidere has taken an important step in investing in their 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 Brookfield, maximizing the benefits that trees provide to the community and minimizing cost and risk. There are many local partners we have suggested, as well as many yet to be discovered, who can help along the way and actually can become promoters of the urban forestry program in Brookfield. 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 i-Tree reporting demonstrates, the return on investment for the forestry program in Brookfield is significant considering the value that the tree population provides, both environmentally and economically. As we bring 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 thanks the City of Belvidere, its residents, stakeholders, and the grant funding organizations which have made this effort possible. It has been a pleasure to work with the City on this inventory, and to create the Urban Forestry Management Plan. We look forward to continuing to assist the City with their Urban Forestry endeavors.

City of BELVIDERE Illinois

GREAT LAKES URBAN FORESTRY

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 which is native (endemic) to the United States or northern Indiana, but which 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 should 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. This is the area 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 City as part of an independently owned and operated private company which performs work for the City, but who are not directly employed by the City

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 has 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 City

Deadwood: Wood on a tree or shrub which is no longer biologically living and becomes brittle or prone to failure

Decline/Declining: Trees or shrubs which are experiencing symptoms of a general decline on 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 which has been negatively impacted 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 which 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 which have been 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 which has been 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 City and whose work hours exceed 36 hours in a week, and who is 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 which 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 City or Forestry Consultant(s)

Host: An organism which 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 City of Belvidere, 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 City of Belvidere property

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

Liner Nursery: A privately owned plant propagation facility which specializes in the growth of small trees which are intended to be planted for growth into a full form

Managed: A tree or shrub which is in an area of the City which is 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 supposed to be managed or maintained

Mineral Soil: Any substrate which 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 which the City of Belvidere maintains

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

Parks and Recreation Property: Land which, by deed or title, belongs to the City of Belvidere

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

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

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

Pest: An insect or other macrofaunal organism which causes decline or death of trees

Private Property: Land which, by deed or title, does not belong to the City of Belvidere

Public Safety: The welfare and protection of the general public

Reforestation: The process by which trees are planted to replace trees which 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 City for less than 6 months out of the calendar or budget year

Shrub: Any woody perennial which has a multi-stemmed growth habit not consistent with being considered a tree. Can be subject to interpretation by Belvidere Staff.

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

Staff: Those employees retained by the City 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 general 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 City staff

Undesirable: A tree which is not desired in the landscape due to ecological, aesthetic, or public safety reasons, as determined by Belvidere Staff

Unmanaged: A tree or shrub which is in an area of the City of Belvidere which 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 which has been 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 who is licensed to work with conflicts between trees and such energized power lines.

Appendix A: Acceptable and Unacceptable Species

Species not appearing on this list can be approved or disallowed by City staff and/or Forestry Consultant

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

* - Male Only

Appendix B: Additional Comments on Species

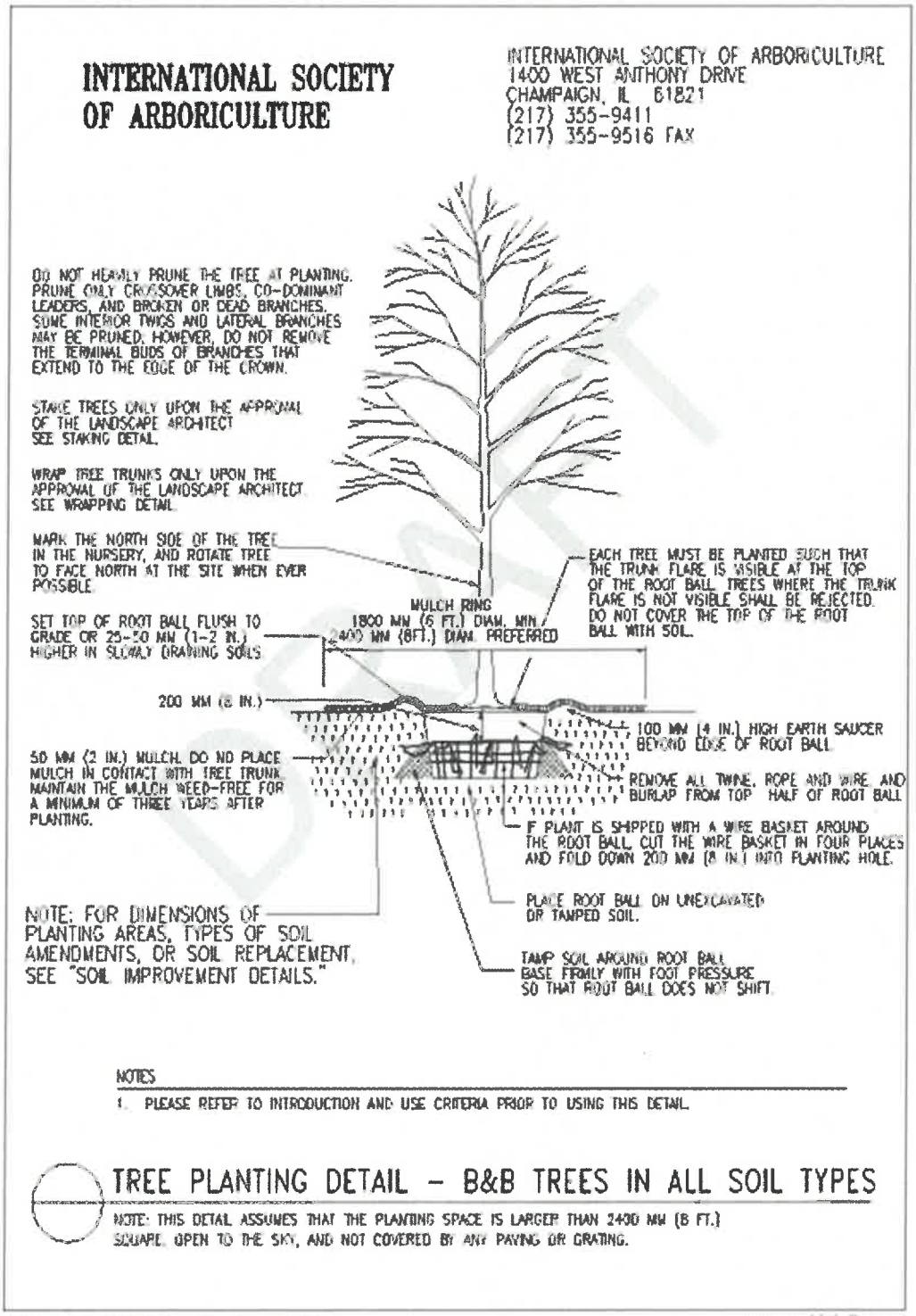
SPECIES	COMMENTS
AILANTHUS	NOT APPROVED
ALDER-SPP	
AMERICAN HORNBEAM	
AMERICAN REDBUD	
AMUR MAACKIA	
APPLE-CRAB SPP	Apple Scab resistant varieties only
APPLE-EDIBLE	Parks Only
APRICOT	NOT APPROVED
ARBOR VITAE	Parks only
ASH-BLUE	NOT APPROVED
ASH-GREEN	NOT APPROVED
ASH-WHITE	NOT APPROVED
ASPEN	Improved varieties only
BALDCYPRESS	Prefer 'Shawnee Brave'
BEECH-AMERICAN	
BEECH-SPP	Prefer 'Tricolor' or 'Riversii'
BIRCH-RIVER	Prefer Single stem only
BIRCH-SPP	Sweet Birch, Yellow Birch, or other newintroductions
BIRCH-WHITE	Bronze Birch Borer resistant only, prefer 'Whitespire'
BLACK LOCUST	Improved varieties only, prefer 'Purple Robe'
BLACKGUM	
BOXELDER	NOT APPROVED
BUCKEYE-OHIO	
BUCKEYE-RED	Prefer 'Ft. McNair' or Bottlebush
BUCKEYE-YELLOW	
BUCKTHORN	NOT APPROVED
BURNING BUSH	NOT APPROVED
CAROLINA SILVERBELL	Protected sites only
CATALPA	
CHERRY-BLACK	NOT APPROVED
CHERRY-PURPLE LEAF	
CHERRY-SPP	Ornamental, Black Knot resistant varieties only
COTTONWOOD	NOT APPROVED
DAWN REDWOOD	
DOGWOOD-SPP	Hardy varieties only
DOUGLAS FIR	Parks only
EASTERN REDCEDAR	Parks only
ELM-AMERICAN	NOT APPROVED
ELM-HYBRID	Hardy varieties only
ELM-RED	NOT APPROVED
ELM-SIBERIAN	NOT APPROVED
ELM-SPP	New cultivar introductions
EUONYMUS	Eastern Wahoo ONLY no non-native varieties
FIR-SPP	Parks only
FRINGETREE	
GINKGO	Male only
GOLDEN RAINTREE	
HACKBERRY	
HARDY RUBBER TREE	
HAWTHORN-SPP	Thornless varieties only
HICKORY-BITTERNUT	
HICKORY-SHAGBARK	
HONEYLOCUST	Prefer 'shademaster' or 'inermis'
HONEYSUCKLE	NOT APPROVED
HORNBEAM-EUROPEAN	
HORSECHESTNUT	
HYDRANGEA-PEEGEE	
IRONWOOD	
JUNIPER-COMMON	Parks Only
KATSURA	
KENTUCKY COFFEETREE	Fruitless varieties only
LARCH	

SPECIES	COMMENTS
LILAC-SHRUB	Parks Only
LILAC-TREE	Improved varieities, tree form only
LINDEN-AMERICAN	
LINDEN-LITTLELEAF	
LINDEN-SILVER	
LINDEN-SPP	
LONDON PLANETREE	Prefer 'Exclamation!', 'Bloodgood' not allowed
MAGNOLIA-CUCUMBER	
MAGNOLIA-SAUCER	Scale resistant varieties only
MAGNOLIA-SHRUB	Star Magnolia or similar Magnolia pruned to tree form
MAPLE-AMUR	Parks only unless pruned to tree form
MAPLE-AUTUMN BLAZE	Or other similar Acer x freemannii
MAPLE-BLACK	
MAPLE-HEDGE	
MAPLE-JAPANESE	Small growing space only
MAPLE-MIYABEI	Prefer 'State Street'
MAPLE-NORWAY	NOT APPROVED
MAPLE-PAPERBARK	
MAPLE-RED	Improved varieties only
MAPLE-SILVER	NOT APPROVED
MAPLE-SUGAR	Prefer 'Green Mountain'
MOUNTAIN ASH	Improved varieties only
MOUNTAIN ASH-EUROPEAN	Improved varieties only
MULBERRY-SPP	NOT APPROVED
OAK-BURR	
OAK-CHESTNUT	
OAK-CHINKQUAPIN	
OAK-ENGLISH	
OAK-PIN	
OAK-RED	
OAK-SWAMP WHITE	
OAK-WHITE	
OTHER	Open for new introductions
PAGODATREE	
PEACH	Parks only
PEAR-CALLERY	NOT APPROVED
PEAR-EDIBLE	Parks Only
PERSIAN IRONWOOD	Medium growing space only
PERSIMMON	American variety preferred (Diospyros virginiana)
PINE-AUSTRIAN	Parks Only
PINE-SCOTCH	Parks only
PINE-WHITE	Parks only
PLUM-SPP	Parks Only
PUSSYWILLOW	Parks only
ROSE OF SHARON	
SASSAFRAS	
SERVICEBERRY-SPP	Prefer 'Autumn Brilliance'
SEVENTH SON FLOWER	
SHRUB-SPP	Parks only, open for new introductions
SMOKETREE	American variety preferred, small growing space only
SPRUCE-BLUE	Parks only
SPRUCE-NORWAY	Parks only
SPRUCE-SPP	Parks only
SUMAC	Parks only
SWEETGUM	Prefer 'Happidaze'
SYCAMORE	In natural areas only, London Planetree preferred
TULIPTREE	
VIBURNUM	Tree form only
WALNUT-BLACK	NOT APPROVED
WILLOW-SPP	NOT APPROVED
YELLOWWOOD	
YEW	Parks Only
ZELKOVA	Prefer 'Green Vase'

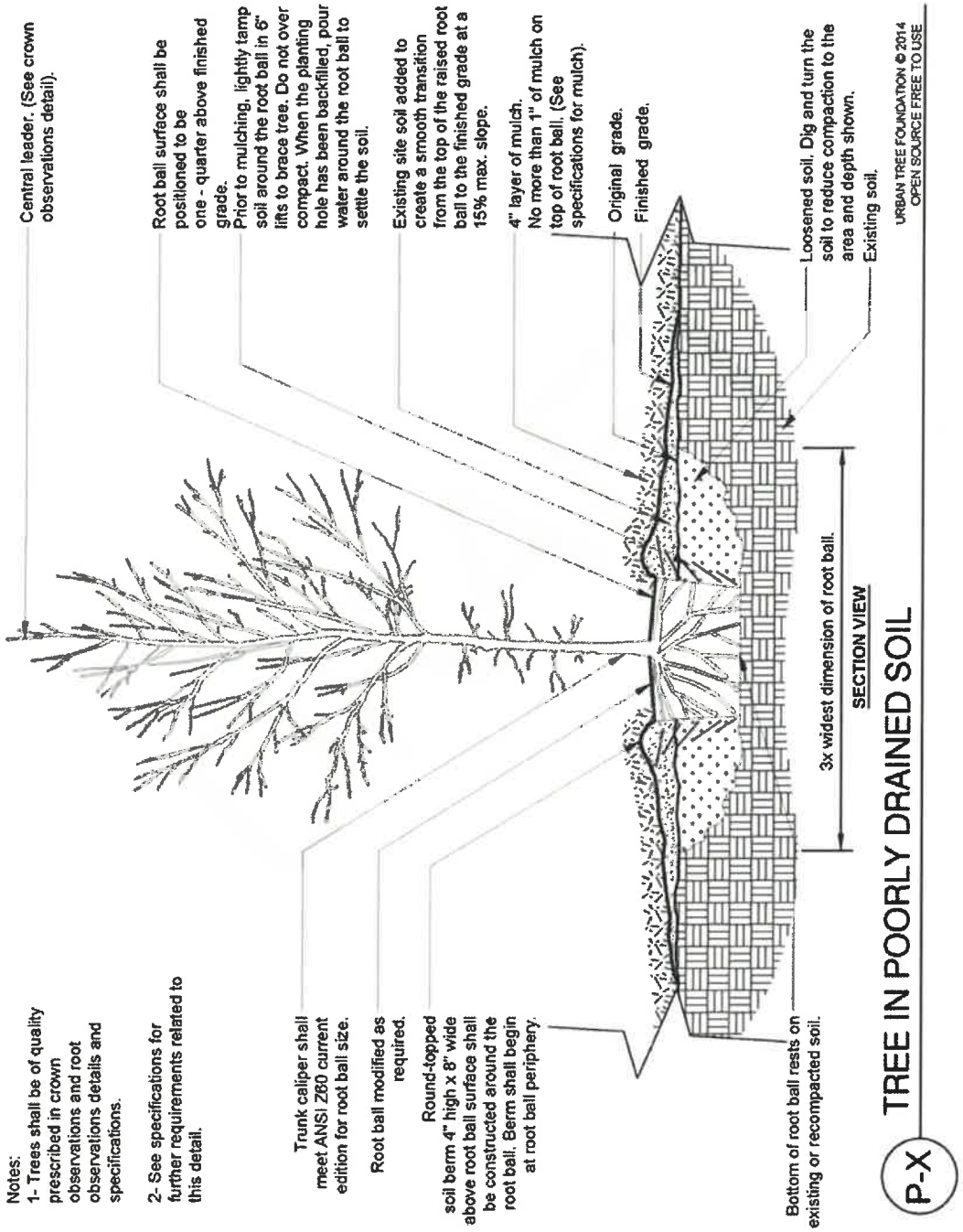
Appendix C: Species Substitutions

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 Hornbeam
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

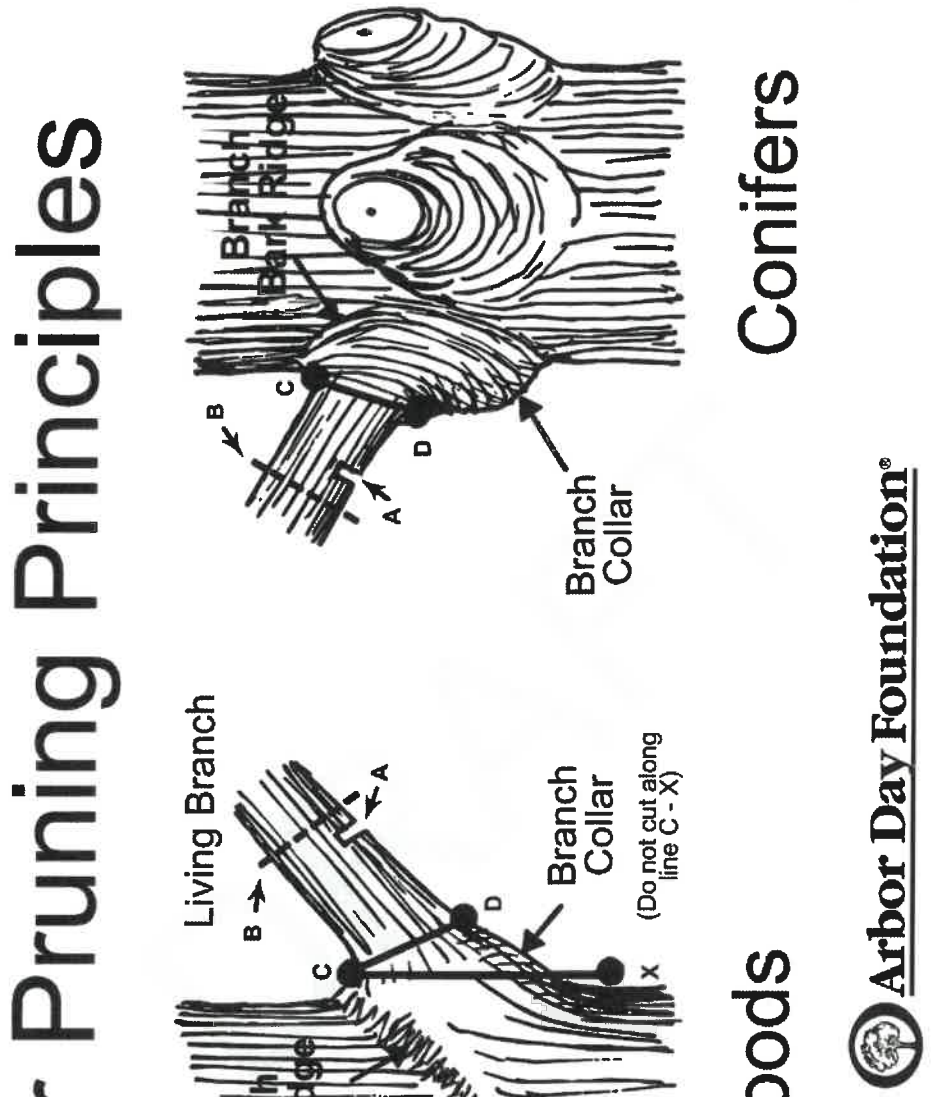
Appendix D: Balled and Burlapped Planting Detail



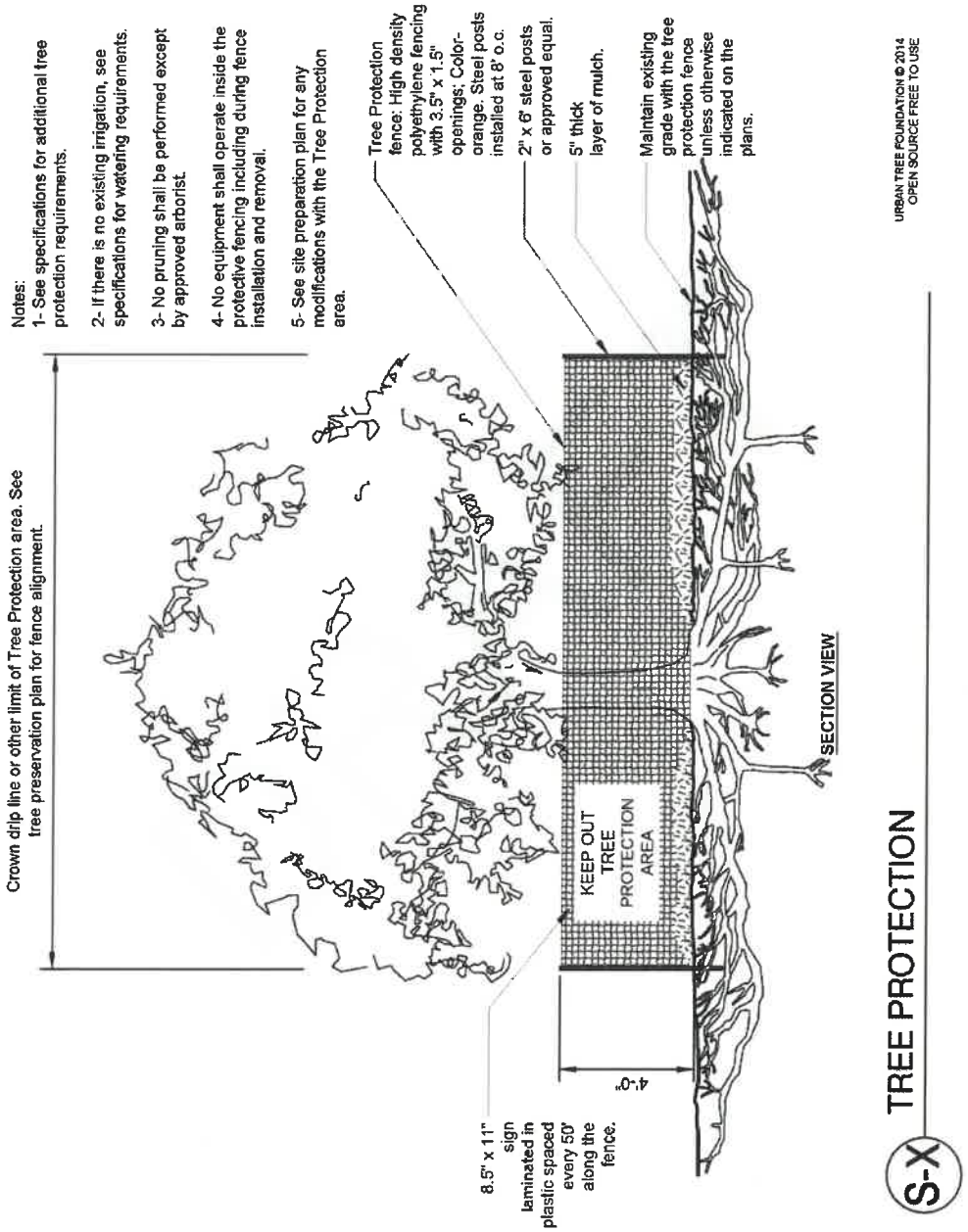
Appendix E: Containerized Planting Detail



Appendix F: Tree Pruning Detail



Appendix G: Tree Protection Detail



Appendix H: 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 1x Ht.	Target zone: Target within 1.5x 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 ☐

Risk Categorization

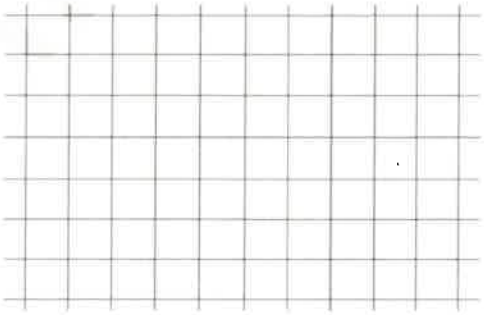
Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood: Failure: Improbable	Failure: Possible	Failure: Probable	Failure: Imminent	Impact: Very low	Impact: Low	Impact: Medium	Impact: High	Failure & Impact (from Matrix 1): Unlikely	Somewhat	Likely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

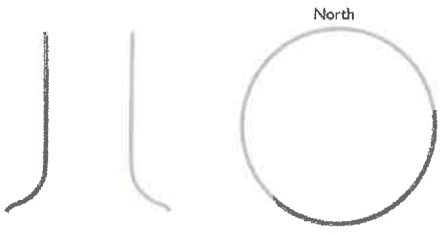
Matrix 1. Likelihood matrix.

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 I: 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, and it is not verbatim. A full text of this manual will be made available to all City of Belvidere 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 City 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, carabiners, 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 J: 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 City, 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 City 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 rootball, 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 rootball supporting materials shall be removed from the upper third of the rootball 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 City of Belvidere.
2. All employees and contractors employed by or working for the City of Belvidere 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 K: 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 City of Belvidere and its approved contractors.

Appendix L: 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.

ISA BMP Manual

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 M: 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.