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Village of Bannockburn

Urban Forest Management Plan

Prepared By

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The Village of Bannockburn undertook an update of the existing street tree inventory as part of the development of an urban forest management plan and tree ordinance review and update. Currently, Bannockburn manages 2,085 trees throughout its Village parkways and rights of way, as well as on Village-owned properties. This new updated comprehensive inventory update project is now culminating in the development of this Urban Forest Management Plan (UFMP) which will detail how these trees will be managed for the benefit of the Village of Bannockburn over the next 10 years, with a focus which begins in 2025, and projects out to 2035. As will be discussed later in this UFMP, there are many environmental benefits of a vigorous urban forest, and this document will help to guide the Village's actions and investments in the tree population in order to ensure that Bannockburn and its residents continue to take advantage of these benefits.

In terms of the condition of the Urban Forest in Bannockburn, there are both strengths and opportunities for improvement. An enormous strength is the fact that there are 89 species represented in the tree population which is exceptional diversity for a municipal population of Bannockburn size. The Oak "Quercus" genus, however, makes up 15.35% of the tree population which exceeds an optimal biodiversity target of 10% total population by a single genus, and this statistic certainly leaves room for improvement. Another strength is the fact that the stocking density in the Village is very high, which creates an opportunity for the Village to focus on a multi-layered canopy using shade tolerant new plantings in open planting spaces when growing space might be limited due to mature adjacent trees. Additionally, the overall condition of the population as a whole is above average and this presents another strength and a trend that should be commended and strived to be improved upon. Another opportunity for improvement is found in using the tree inventory to locate trees that are identified as being in poor condition or with poor structure, and maintenance for these trees can be prioritized.

That said, the current budget being applied towards forestry management activities should likely be larger. At approximately $90,000 per year, this is enough to fulfill current, necessary needs, but even a modest increase in budget would allow Bannockburn to accomplish much more. This Plan will explore opportunities to fund forestry activities in more unconventional ways than standard governmental & tax funding.

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 2025-2035 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 Village of Bannockburn.

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 Village, 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 Village of Bannockburn, Illinois to increase canopy cover, enhance biodiversity of the canopy in an effort to support and maintain long-term ecological health for the community, maximize the benefits trees provide while minimizing cost, mitigate against climate change, ensure tree equity throughout the community, 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.

GOALS OF THE URBAN FOREST MANAGEMENT PLAN

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 Village of Bannockburn, 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 annually as part of the budget process by the Bannockburn Village Board, Village Forester, Tree Commission 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.

To satisfy the goals and objectives below, the intent, guidelines and specifications which follow, describe the general criteria and specific requirements which, if strictly adhered to and used collectively, will maintain the Village-maintained sites in their optimum condition over the long term.

These guidelines and specifications were meant to be both specific and general. Village staff should follow specific directions where they are given. There are also some general recommendations which allow for staff research, evaluation and discretion, where noted.

This document, however, could never anticipate every problem which may occur or develop over time. Site specific problems should be diagnosed and remedied before they become detrimental to the overall appearance and the long-term health of the Village maintained landscapes and the enjoyment of its users.

The Goals and Objectives of the Urban Forest Management Plan are to:

- Provide for public safety.
- Move from reactive management to a proactive management model.
    - Implement and follow a regular tree pruning cycle.
    - Integrate newly planted trees into a pruning cycle.
    - Identify work priorities.
        - Tree action items to address immediately
        - Tree action items to address in 24-26 months or as budgets allow
        - Work to adhere to current ANSI A300 and Z133 Standards, A60.1 Standards for Nursery Stock, and currently accepted Best Management Practices.
        - Be able to quantify costs, benefits and impacts of management activities
    - Implement work tracking
    - Implement a hazard reduction strategy via regular hazard tree inspections
        - Post-storm event inspections – respond to storm events in an effective and efficient manner
- Insect and disease inspections – prepare for and respond to newly identified insect or disease
- Protect and enhance the asset value of the trees.
- Reduce the amount of buckthorn understory and transition to a more resilient and native plant-based understory
- Assess planting opportunity potential

Timeline: 10-year Urban Forestry Strategy

1 year goal: Remove hazardous trees (trees rated 5 and 6 in tree inventory (unless being kept as habitat tree in low activity area)).

Introduce 5-7 year pruning cycle for all trees on Village owned properties and right-of-ways. Depending upon annual budget, sections of Village can be broken into halves, quads or Village sites/right-of-way and scheduled accordingly.

5 year goal: Remove invasive species from Village owned properties and right-of-way and instill Healthy Hedges and preferred tree species to replace the invasive species.

10 year goal: Meet the 15/10/5 species and 40%/30%/20%/10% age diversity goal on Village owned properties and right-of-way

The Village goal for tree species and age diversity will follow the 15/10/5 species rule where there shall be no more than 5% of any one species of tree, no more than 10% of any one genus of tree and no more than 15% of any one family of tree; and 40% shall be young trees, 30% shall be maturing trees, 20% shall be mature trees and 10% shall be old, or declining trees, on any one site or property.

NEEDS ANALYSIS

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. It is the goal of this Plan to assess the current state of the Village of Bannockburn'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 Bannockburn's tree data has been analyzed: How many trees, what condition they are in and more were all examined to create goals to improve the tree population for the benefit of the organization, its residents and other stakeholders.

Specific goals in terms of planting, removals, pruning, budgets and maintenance are all addressed by acknowledging both strengths and opportunities, and suggesting how they might be used to the Village's advantage. These strengths and opportunities will be the guiding principles for the management strategies and specific goals outlined in each section below. The Plan shall also attempt to leave room for adaptive management, so the plan may be changed when appropriate.

GOAL SETTING

In order to accomplish anything, goals are necessary to help guide organizations through the process. Establishing or enhancing a highly functional forestry program will require a series of attainable goals to in order to be achieved. 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 Village'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 Bannockburn use this UFMP to create an even more sustainable and adaptable forestry program over the time period of the Plan by performing annual reviews and modifications as recommended and needed.

This program will include tree planting, tree maintenance and tree removal for Bannockburn'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.

PROJECTED BUDGET

The budget numbers below, as mentioned several times through this Urban Forestry Management Plan, are conservative projected figures based on current industry rates for the services listed. Based on input from Village 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 generally increases slightly each year, and projects through 2035, at which time, including CPI, the budget will have increased approximately 25% from the current level of approximately $90,000 in 2024 to approximately $112,410 by 2035. This represents a necessary budget increase for such an increase in values of the Urban Forest.

Removals	Fiscal Years	2024-25	2025-26	2026-27	2027-28	2028-29	2029-35
	Trees Removed	60	140	100	50	50	465
	Notes	Condition 5 & Condition 6	Condition 5, Poss Condition 4	Inventory Updates	Inventory Updates	Inventory Updates	Inventory Updates
	Removal Cost	$20,700	$ 49,750	$30,750	$31,750	$32,700	$33,700

Plantings	Fiscal Years	2024-25	2025-26	2026-27	2027-28	2028-29	2029-35
	Trees Planted	100	100	100	50	50	465
	Planting Cost	$45,000	$46,350	$47,750	$24,500	$25,250	$48,360

Pruning	Fiscal Years	2024-25	2025-26	2026-27	2027-28	2028-29	2029-35
	Trees Pruned	350	350	350	350	350	350/year
	Notes	All Dead Limb and Begin Cycle Pruning	350 Cycle Pruning	350 Cycle Pruning	350 Cycle Pruning	350 Cycle Pruning	Approx 350 Cycle Pruning/Year
	Pruning Cost	$22,300	$23,000	$23,700	$24,400	$25,130	$25,750

Forestry Consultant	Fiscal Years	2024-25	2025-26	2026-27	2027-28	2028-29	2029-35
	Notes	Basic Assistance with prep, etc	Appraisals & Risk Management	Inventory Update & Risk Mgmt	Inventory Update & Risk Mgmt	Inventory Update & Risk Mgmt	Inventory Update & Risk Mgmt
	Cost	$2,000	$2,000	$4,000	$4,000	$4,000	$4,600

Totals	Cost	$90,000	$121,100	$106,200	$84,650	$87,080	$112,410

STRATEGIC INITIATIVES

Review and Update Village Ordinances

Periodic review of municipal code in conjunction with the UFMP can help to identify areas in the ordinances governing trees in Bannockburn that may be in need of improvement. These ordinances are 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 species, or defining exactly what trees are the Village's and the homeowner's responsibility, among other things. The goal of these ordinances is to create a tree population and canopy cover which is diverse, healthy, and improving, providing the greatest benefit to the Village and its residents over the long term.

Enhance Overall Diversity by 2035

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 2035 which will see the tree population become far more diverse than it is at present. The current population includes 89 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, a goal will be that they will be planted 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. The Village plans to plant 93 trees in calendar year 2024. The tree planting will bring the Village to near full stock capacity which will allow the Village to replace removed trees at a nearly 1:1 ratio when space permits in the next 10 years.

Maintain, Review and Update an Invasive and Undesirable 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 when possible. Included in this Plan is an undesirable and invasive species lists which details specific trees which may not be planted on boulevards, in parks and on Village-owned properties. Village Staff, the Village Board of Trustees, other stakeholders and the Village Forester will review the list annually at the beginning of the calendar year to ensure that it is being maintained in accordance with the latest information on specific trees. For more information on what species cannot be planted on Bannockburn ROWs, see the Undesirable Species Appendix D and Invasive Species list in Appendix E.

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 Village crews and contractors can perform work on these trees. A stem-by-stem tree inventory update was completed in 2024. This inventory resulted in an unbiased assessment of all the trees on public ROWs and Village-owned properties in the Village and this maintained data will continue to guide the forestry program throughout the next 10 years. The Village Forester and administrative staff will annually update a portion of the inventory data in advance of the cycle pruning schedule.

All inventories are a snapshot in time. With 2,085 trees on Village ROWs and properties, the tree inventory should continue to be maintained at a high level of accuracy so that it doesn't become out of date. It is recommended that the inventory continue to be updated periodically by Village Administrative Staff and Village Forester, to keep the information at its most current on a Village-wide scale. Maintaining this tree data at a high level is vital in the execution of this Management Plan.

MAINTENANCE GOALS

Manage Tree Removals

For public safety, or to prevent the spread of tree pests and pathogens, sometimes tree removal is unavoidable and recommended. The Village staff and Village forester, twice annually, review current tree inventories and remove all dead, dying for diseased trees. At present, there are 25 trees which were called out for removal during the inventory. Of these, 7 are listed as Condition 6 and 18 as Condition 5 and are listed as Priority 1 removal. To keep the residents of Bannockburn safe, a tree removal program has been created in this Plan which budgets for safe removal of all these trees over the next 2 years in order to maintain public safety. Cost projections for tree removals have been made based on the number, age and condition of trees in Bannockburn for the next 10 years, so that long term budgeting projections can be made. Also included are ANSI standards, as well as suggested bid specifications to ensure the

Village is hiring qualified contractors who will be held to the highest industry standards. For more information on Bannockburn's proposed tree removal program, turn to page 60-66.

Sustain and Adjust 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 Bannockburn. The Village is working towards a 5-7 year pruning cycle program. Cost projections and other details will be discussed in the Tree Pruning section of this plan. The Village has begun pruning approximately 300 trees each year.

This program would ensure that all trees on public property are pruned at a minimum every 5-7 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 pages 73-77.

Proper Mulching of All New Plantings

As noted above, the urban environment is a difficult place for a tree to become established and to live a long, healthy life. Proper mulching can significantly increase a tree's ability to do this. Mulch helps to conserve water during the summer by preventing it from evaporating from the soil. It also helps prevent weeds from growing around the tree and competing for water and nutrients, and keeps lawn equipment such as weed whips away from the trunk where they can damage the tree. All new Village plantings will be properly mulched at the time of planting by the planting contractor. Another intended outcome of this initiative will be to educate residents about proper mulching care and notify them when poor mulching techniques are being used. Of particular concern is the practice known as "Volcano Mulching" which has the opposite effect of proper mulching and can severely damage a tree over time. For more information on proper mulching turn to page 78-79.

Tree Preservation During Construction

Sometimes trees can become damaged by construction activities, costing the Village money, and eliminating the benefit the tree had to the community. A basic tree assessment should be conducted prior to the issuance of a permit for construction activities. A tree protection zone must be established and maintained during construction and the Village should monitor construction activities to ensure local ordinances are adhered to. Removal of public trees for construction purposes is generally disallowed and shall be only at the discretion of the Village and will require prior written approval by Bannockburn during site planning. Please refer to Bannockburn's Village Code Chapter 216 Trees and Woodland Protection for details on the protection of significant trees on private property during construction. Additionally, the Village is dedicated to supplying drinking water that exceeds all state and federal standards. With the issue of lead in drinking water becoming a concern for many municipalities, the Village is anticipating that

the quantity of lead service line replacements may increase significantly in the next few years. A direct goal of this Urban Forest Management Plan is to aim to preserve Village and significant private trees during all excavation and construction activities.

POLICY INITIATIVES

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 Village should be compliant with the latest industry Best Management Practices. The ANSI 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 Village employees and contractors performing tree care operations. Public outreach and education shall be performed by the Village of Bannockburn staff, ensuring that residents understand these practices as well. For more information on public outreach see page 11-12. This UFMP will also be placed on the Village's website for all residents to use as a reference.

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 is in place for the Village of Bannockburn and is referenced in this Plan. This policy aids in identifying, documenting and designating for removal or mitigation, trees which may pose a threat to public safety in a timely manner. This reduces 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 the Tree Risk Assessment Policy is discussed in more detail on pages 80-82. This policy should be reviewed and adjusted as any circumstances change.

Increase Urban Tree Canopy Cover From 44% to 48%.

Tree canopy is important to the community 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 Village of Bannockburn map showing canopy cover data for the Chicagoland area can be found at http://chicagorti.org/interactivemap .

Based on data from the Chicago Region Trees Initiatives we believe that an increase to 48% canopy cover is a realistic goal for Bannockburn by 2035. This will be accomplished by increasing the number of trees on publicly owned property, as well as improving tree care allowing trees to live longer, become larger, and create more canopy cover. Being built on a mature Oak woodland, Bannockburn has a unique

ecosystem of its own. Much of the projected canopy cover increase will be achieved through a multilayer approach.

Tree planting on private property can also 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 Bannockburn Residents save money. For more information on Urban Tree Canopy, tree benefits, and other such information, turn to pages 48-52.

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 always include strategies for building a resilient forest and a resilient community. The Village has a Standard Operating Procedure and three separate contractors on call in place which guides storm damage cleanup response with regards to trees. Additionally, United States Forest Service's Community Forest Storm Mitigation – A Guide for Communities which was published in the latter half of 2021 can also be a reference for the Village to enhance its storm response policy.

Mitigate Climate Change Effects

A 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 great habitat for birds, pollinators and other beneficial wildlife that can enhance the urban environment. This will all be examined at several different points throughout this UFMP, 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.

Continue to Support a Stocking Density

Currently, there are very few open planting spaces on Bannockburn's streets that would appropriately support a full-sized shade tree, and the stocking density is very high. This plan seeks to modestly increase the overall number of trees by creating a multilayered canopy, consisting of existing large canopy trees with medium sized trees and smaller ornamentals growing beneath them. By using this approach, and also finding areas where new trees would be welcome in the landscape, the number of trees in Bannockburn can be moderately increased.

PROGRAMS

There are no strategic timelines set forth here for these programs. As the direct goals of the Urban Forestry program in Bannockburn are met or exceeded, these are goals to be discussed by the Village of Bannockburn and other stakeholders as time and budgets become available. 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.

Awareness and Increased Engagement of Stakeholders

The Village recognizes the value of engaging the community concerning Village forestry activities and improving public education opportunities and involvement with regards to the urban forest. One reason for the establishment and enhancement of an Urban Forestry program in Bannockburn is to improve the lives of the residents, business owners and other stakeholders who want to see the Village be a healthier, happier community. In order to make this happen, Bannockburn will explore the possibility of looking for partners in the community to provide support for establishing a more robust public involvement program. Bannockburn staff will plan to reach out to Bannockburn garden club, philanthropic organization, residents and business owners to make the forestry program innovative and community based. In this manner, residents and business owners in Bannockburn 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 Village.

Openlands TreeKeepers / Public Outreach

There is a local chapter of the Openlands Tree Keepers 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 Village 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.

Bannockburn could hold several annual tree education sessions, perhaps to coincide with annual Spring and Fall planting cycles. These sessions may be taught by the Village Forester and/or 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 shall be made available at Village Hall. An 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 Village of Bannockburn is a diversity vision for 2035 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 Village, 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 Village desires each year is to have trees contract grown by local nurseries, and reserved specifically for the Village of Bannockburn. This way, the Village 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, Bannockburn 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.

In the event the trees are not available, the Village should provide an alternative species tree planting goal and adjust plantings for the next year's season accordingly.

As numbers 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 Village would reserve the right to increase orders when budgets allow.

Private Property Tree Planting Programs

Tree planting on private property is actually a direct goal of this Urban Forestry Management Plan, as noted above. Though the Village has no formal jurisdiction to plant trees on private property, the benefits of tree planting on private property are substantial in terms of energy savings, storm water benefits, and other benefits. The Village should consider encouraging residents to plant trees on their property. Partnering with local nurseries to create a program where residents can purchase trees from that nursery at a reduced price may also be a way to encourage tree planting on private property.

STRATEGIC PARTNERSHIPS

Strategic partnerships are a very effective means of getting forestry projects funded when tax funding may present a shortfall. 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.

Lake County Forest Preserve District (LCFPD)

The Lake County Forest Preserves is an organization which manages 31,100 acres protected across 64 unique sites of natural areas, trails, and other projects in Lake County. Several preserves are located in and very close to Bannockburn. They have a great wealth of knowledge and are worth reaching out to for partnership in accomplishing the goals of this plan.

North Shore Metropolitan Water Reclamation District

NSWRD 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, NSWRD is a very logical partner.

Openlands TreeKeepers

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

Illinois Department of Natural Resources

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

The 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 Bannockburn in forestry related endeavors. They also offer educational programs, volunteer education, and a whole host of other services which can make this plan a success.

Chicago Botanic Garden

The Chicago Botanic Garden offers a wide variety of educational horticulture programs including the University of Illinois Extension Master Gardener Program. The Garden also has several Conservation and Community Engagement Programs which residents can take advantage of to become more knowledgeable and involved.

Deerfield High School District #113 and Bannockburn School District #106

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 Deerfield School District #113 and Bannockburn School District #106 could be a reciprocal relationship, where students could engage in study projects based around trees, citizen science, and volunteerism, and Bannockburn 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.

Chicago Region Trees Initiative

CRTI is actually an amalgamation of many groups acting together as a driving force for establishing the importance of urban forestry in the Chicagoland area and abroad. CRTI has several working groups which handle topics such as forest composition, risk management, 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.

Bannockburn Garden Club

A group of Bannockburn resident members that support a mission to stimulate the knowledge and love of gardening; to aid in the conservation of native trees, plants and wildlife; and to encourage civic projects. Members seek to give back to the local community and to share both knowledge and resources.

EXPLORE AND ENHANCE FUNDING STRATEGIES

With unprecedented amount of federal dollars that may potentially become available to urban forestry programs in municipalities, the prospects for alternative funding sources in the Village are significant. The Village should plan to seek an array of grant funding opportunities from both government agencies, as well, as non-profit conservation organizations. To help enhance the Village's grant strategy, the Village can use this UFMP to identify Bannockburn's long- and short-term forestry goals (programmatic and financial), the strengths and weaknesses of the urban forest, and its forestry related resources, since if this historic funding opportunity materializes, the options of where grant dollars can be spent could be extraordinary.

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, Bannockburn's tree population of 2,085 trees is responsible for intercepting or avoiding over 10.4 million 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.

PUBLIC EDUCATION AND OUTREACH

It is suggested that Bannockburn hold several annual tree education sessions, possibly to coincide with annual Spring and Fall planting cycles. These sessions may be taught by the Village Forester, Nurseries, other forestry staff, and/or Forestry Consultant, or other such qualified parties, and cover tree watering, fertilization, pruning and the basics of how to spot insects and diseases. An Arbor Day celebration is an example of one such outreach event where trees could be planted and education sessions run. The Village has been an active organizer of annual Arbor Day observations, but is considering revamping and enhancing the program to incorporate more education programs and hands on experiences with local schools or other entities. In addition, basic tree care pamphlets can be made available at Village Hall offices. An Arbor Day celebration is an example of one such outreach event where trees could be planted and education sessions run.

TREE INVENTORY

Purpose

Urban Forest Management, Inc. (UFM) conducted a tree inventory of areas identified as Village of Bannockburn responsibility with the purpose of gathering data to assess the current health and species composition of the existing trees. The data collected is intended to be used to identify and inform routine plant health care needs and maintenance activities, tree work budgeting and assist design considerations of new landscape planting projects and/or construction projects. The data will also help drive planning for future species and size diversity needs as well.

Methodology and Data Interpretation

Inventory areas include the Village rights-of-way, the Duffy Lane reservoir and the Village Hall campus property.

Trees were tagged with diamond-shaped numbered aluminum 'VOB' tags and inventoried (evaluated for species, condition, form and any associated problems). Some trees display one or more old tags from previous inventory and/or survey work. Where these tag numbers were readable, they are shown in the 'Comments' column with "OT" (old tag), followed by the tag number(s).

Trees were measured for size at DBH[i]. In cases where trees have multiple trunks, the largest diameter trunk is listed in the 'Size' column and the other smaller diameter trunks are listed in the 'Co-leaders (at DBH)' column. A size followed by 'FH' indicates the tree was measured in foot height.

Naturally seeded trees 8" DBH and larger, and landscape plantings 2" DBH and larger were included in the inventory.

The following is a key for interpreting the condition and form data found in the tree inventory listing:

Condition Rating - The condition of the trees shall be based on a six (6) point scale and one (1) being the best and six (6) being the worst.

Rating	Description	General Criteria
1	Excellent	The tree is typical of the species, has less than 10% deadwood in the crown that is attributable to normal causes, has no other observed problems and required no remedial action.
2	Good to Fair	The tree is typical of the species and/or has less than 20% deadwood in the crown, only one or two minor problems that are easily corrected with normal care.
3	Fair (average)	The tree is typical of the species and/or has less than 30% deadwood in the crown, one or two minor problems that are not eminently lethal to the tree, and no significant decay or structural problems, but the tree must have remedial care above normal care in order to minimize the impact of future stress and to insure continued health.
4	Fair to Poor	The tree is not typical of the species and/or has significant problems such as 30-50% deadwood in the crown, serious decay or structural defect, insects, disease or other problems that can be eminently lethal to the tree or create a hazardous tree if not corrected in a short period of time of if the tree is subjected to additional stress.
5	Poor	The tree is not typical of the species and/or has over 50% deadwood in the crown, major decay or structural problems, is hazardous or is severely involved with insects, disease, or other problems that even if aggressively corrected would not result in the long term survival of the tree.
6	Dead	Less than 10% of the tree shows signs of life.

[1] Diameter at Breast Height - a standard forestry measurement of diameter taken at 4.5’ above the soil line.

Form Rating – Subjective evaluation comparing tree with specimen tree of the same species. Form classes are the same as those listed above under condition, with the exception of number 6, which translates to ‘very poor form’. Typical form defects might include multiple leaders, no leader, lean, one sided crown, trunk crook, etc.

SPECIES SUMMARY

A total of two thousand eighty-five (2,085) trees were inventoried during the 2023 tree inventory update. The most common species inventoried was American elm which comprised 10.46% of the trees inventoried, followed by black walnut (6.43%), crabapple (6.04%), callery pear (5.61%), bur oak (5.32%), basswood (5.28%), swamp white oak (4.99%), common honeylocust (4.36%), Norway maple (3.12%) and other species in smaller quantities.

One thousand six hundred-twenty (1,620) trees, or 77.7% of the trees inventoried, were rated condition 2 or 3.

Four hundred sixty-five (465) trees, or 22.3% of the trees inventoried, were rated condition 4, 5 or 6.

Please refer to the following Species Summary chart and the enclosed Tree Inventory Listing for more detailed information.

SUMMARY OF ALL TREES INVENTORIED BY SPECIES

Botanical Name	Common Name	Cond 1	Cond 2	Cond 3	Cond 4	Cond 5	Cond 6	Number of Trees Inventoried	Percentage of Trees Inventoried
Abies concolor	Concolor Fir			1	1	1		3	0.14%
Acer campestre	Hedge Maple (Field Maple)		1	1				2	0.10%
Acer negundo	Boxelder Maple			1	5	2		8	0.38%
Acer nigrum	Black Maple			1	1			2	0.10%
Acer platanoides	Norway Maple		3	50	12			65	3.12%
Acer platanoides 'Schwedleri'	Schwedler Norway Maple			1				1	0.05%
Acer rubrum	Red Maple		1	14	3			18	0.86%
Acer saccharinum	Silver Maple		3	34	16	1		54	2.59%
Acer saccharum	Sugar Maple		2	25	6	1	1	35	1.68%
Acer x freemanii	Freeman Maple		7	29	1		1	38	1.82%
Aesculus glabra	Ohio Buckeye			1				1	0.05%
Aesculus hippocastanum	Horsechestnut			1				1	0.05%
Alnus glutinosa	Black Alder		1	1				2	0.10%
Amelanchier arborea	Downy Serviceberry (Juneberry, Shadbush)		1	5	3			9	0.43%
Amelanchier spp.	Serviceberry			7	3			10	0.48%
Betula nigra	River Birch		1	22	3			26	1.25%
Betula nigra 'Heritage'	Heritage® River Birch			1				1	0.05%

SUMMARY OF ALL TREES INVENTORIED BY SPECIES

Botanical Name	Common Name	Cond 1	Cond 2	Cond 3	Cond 4	Cond 5	Cond 6	Number of Trees Inventoried	Percentage of Trees Inventoried
Carpinus caroliniana	Blue Beech (Musclewood, American Hornbeam)		2	3	1	1		7	0.34%
Carya cordiformis	Bitternut Hickory		1	3	2			6	0.29%
Carya ovata	Shagbark Hickory		2	17		1		20	0.96%
Castanea sativa	European Chestnut				1			1	0.05%
Catalpa speciosa	Northern Catalpa		3	1				4	0.19%
Celtis occidentalis	Common Hackberry		4	16	1	1		22	1.06%
Cercis canadensis	Redbud		1	5	4	1		11	0.53%
Cornus alternifolia	Pagoda Dogwood			6				6	0.29%
Cornus florida	Flowering Dogwood			8				8	0.38%
Crataegus crus-galli	Cockspur Hawthorn		1	5	2			8	0.38%
Crataegus crus-galli var. inermis	Thornless Cockspur Hawthorn		3	4	2		1	10	0.48%
Crataegus phaenopyrum	Washington Hawthorn			6	51	2	2	61	2.93%
Crataegus spp.	Hawthorn			8	4	1		13	0.62%
Fagus sylvatica	European Beech			1				1	0.05%
Fagus sylvatica 'Roseo-Marginata'	Tricolor Beech			3				3	0.14%
Fraxinus americana	White Ash			1				1	0.05%
Fraxinus pennsylvanica	Green Ash			1	3	1	6	11	0.53%
Ginkgo biloba	Ginkgo (Maidenhair Tree)		5	5	1			11	0.53%
Gleditsia triacanthos	Common Honeylocust		17	66	8			91	4.36%
Gymnocladus dioicus	Kentucky Coffeetree		19	15	2			36	1.73%
Juglans nigra	Black Walnut		5	98	24	5	2	134	6.43%
Juniperus virginiana	Eastern Red-cedar			16	2			18	0.86%
Larix larcinia	American Larch			2				2	0.10%
Liriodendron tulipifera	Tuliptree		1					1	0.05%
Magnolia spp.	Magnolia			1				1	0.05%
Malus spp.	Crabapple		9	77	30	7	3	126	6.04%
Morus alba	White Mulberry			6	2			8	0.38%
Ostrya virginiana	Ironwood			2	1			3	0.14%
Picea abies	Norway Spruce		3	26	5			34	1.63%
Picea glauca	White Spruce		3	7			1	11	0.53%

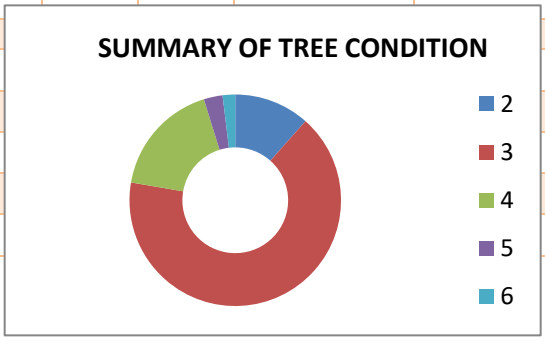
SUMMARY OF ALL TREES INVENTORIED BY SPECIES

Botanical Name	Common Name	Cond 1	Cond 2	Cond 3	Cond 4	Cond 5	Cond 6	Number of Trees Inventoried	Percentage of Trees Inventoried
Picea pungens	Colorado Blue Spruce		2	18	19	5	3	47	2.25%
Pinus nigra	Austrian Pine			17	7		1	25	1.20%
Pinus strobus	Eastern White Pine		1	7	2			10	0.48%
Pinus sylvestris	Scots Pine			8	2			10	0.48%
Platanus occidentalis	Sycamore		1					1	0.05%
Populus alba	White Poplar			3				3	0.14%
Populus deltoides	Cottonwood		4	33	5			42	2.01%
Populus tremuloides	Quaking Aspen			2	1			3	0.14%
Prunus serotina	Black Cherry			2		1		3	0.14%
Prunus spp.	Cherry				1			1	0.05%
Prunus subhirtella var. pendula	Weeping Cherry				2			2	0.10%
Prunus x cistena	Purpleleaf Sand Cherry			1				1	0.05%
Pseudotsuga menziesii	Douglas-fir			5				5	0.24%
Pyrus calleryana	Callery Pear		52	63	2			117	5.61%
Pyrus spp.	Pear			13				13	0.62%
Quercus alba	White Oak		2	15	3	1		21	1.01%
Quercus bicolor	Swamp White Oak		30	68	6			104	4.99%
Quercus ellipsoidalis	Hill's Oak			21	3	2		26	1.25%
Quercus imbricaria	Shingle Oak (Laurel Oak)			1				1	0.05%
Quercus macrocarpa	Bur Oak		12	78	19	1	1	111	5.32%
Quercus muehlenbergii	Chinquapin Oak		1	2	2			5	0.24%
Quercus palustris	Pin Oak		1	2				3	0.14%
Quercus rubra	Northern Red Oak		3	37	7	1	1	49	2.35%
Rhamnus cathartica	Common (European) Buckthorn				3	1		4	0.19%
Robinia pseudoacacia	Black Locust			7	3	1	2	13	0.62%
Salix alba	Weeping Willow			1				1	0.05%
Salix matsudana 'tortuosa'	Corkscrew Weeping Willow			3				3	0.14%
Salix nigra	Black Willow		1	4		1		6	0.29%
Syringa reticulata	Japanese Tree Lilac		4	14	3	1		22	1.06%
Taxodium distichum	Baldcypress		3	4				7	0.34%
Thuja occidentalis	Eastern Arborvitae		13	30	8			51	2.45%

SUMMARY OF ALL TREES INVENTORIED BY SPECIES

Botanical Name	Common Name	Cond 1	Cond 2	Cond 3	Cond 4	Cond 5	Cond 6	Number of Trees Inventoried	Percentage of Trees Inventoried
Tilia americana	Basswood (American Linden)		7	58	27	11	7	110	5.28%
Tilia americana 'Redmond'	Redmond Linden		1	38	3	2		44	2.11%
Tilia cordata	Littleleaf Linden		2	15	1			18	0.86%
Ulmus americana	American Elm		1	180	25	5	7	218	10.46%
Ulmus americana 'Princeton'	Princeton Elm		1	1				2	0.10%
Ulmus minor 'Morton'	Accolade® Elm			3				3	0.14%
Ulmus minor 'Morton Glossy'	Triumph™ Elm			1				1	0.05%
Ulmus pumila	Siberian Elm			10	10	2		22	1.06%
Ulmus rubra	Slippery Elm						1	1	0.05%
Ulmus spp.	Elm			1				1	0.05%
Ulmus x spp.	Hybrid elm			9	1			10	0.48%
	Total	**0**	**241**	**1379**	**365**	**60**	**40**	**2085**	**100.00%**

	Condition 1-3:	1620		77.7%	
	Condition 4-6:	465		22.3%	
	Average Size DBH:	10.1"			
	Median Size DBH:	9"			



SUMMARY OF ALL TREES INVENTORIED BY GENUS

Collectively the genus Quercus (oaks) comprised 15.34% of the trees inventoried, followed by Ulmus (elms) (12.37%), Acer (maples) (10.70%), Tilia (basswood) (8.25%), Juglans (walnut) (6.43%), Pyrus (pear) 6.24%), Malus (apple) (6.04%), and other genus in smaller quantities.

SUMMARY OF ALL TREES INVENTORIED BY GENUS		
Genus	**Number of Trees Inventoried**	**Percentage of Trees Inventoried**
Quercus	320	15.35%
Ulmus	258	12.37%
Acer	223	10.70%
Tilia	172	8.25%
Juglans	134	6.43%
Pyrus	130	6.24%
Malus	126	6.04%
Crataegus	92	4.41%
Picea	92	4.41%
Gleditsia	91	4.36%
Thuja	51	2.45%
Populus	48	2.30%
Pinus	45	2.16%
Gymnocladus	36	1.73%
Betula	27	1.29%
Carya	26	1.25%
Celtis	22	1.06%
Syringa	22	1.06%
Amelanchier	19	0.91%
Juniperus	18	0.86%
Cornus	14	0.67%
Robinia	13	0.62%
Fraxinus	12	0.58%
Cercis	11	0.53%
Ginkgo	11	0.53%
Salix	10	0.48%
Morus	8	0.38%
Carpinus	7	0.34%
Prunus	7	0.34%
Taxodium	7	0.34%
Pseudotsuga	5	0.24%
Catalpa	4	0.19%
Fagus	4	0.19%
Rhamnus	4	0.19%

SUMMARY OF ALL TREES INVENTORIED BY GENUS		
Genus	**Number of Trees Inventoried**	**Percentage of Trees Inventoried**
Abies	3	0.14%
Ostrya	3	0.14%
Aesculus	2	0.10%
Alnus	2	0.10%
Larix	2	0.10%
Castanea	1	0.05%
Liriodendron	1	0.05%
Magnolia	1	0.05%
Platanus	1	0.05%
Total	**2085**	**100.00%**

VILLAGE RIGHTS-OF-WAY

The Village of Bannockburn maintains 18.6 miles of public right-of way.

One thousand five hundred fifty-two (1,552) trees were inventoried in the Village rights-of-way which constitutes 74% of the total number of trees inventoried in the 2023 inventory update.

The most common species inventoried in the Village rights-of-way was American elm which comprised 10.46% of the trees inventoried, followed by black walnut (6.43%), crabapple (6.04%), callery pear (5.61%), bur oak (5.32%), basswood (5.28%), swamp white oak (4.99%), common honeylocust (4.36%), Norway maple (3.12%), and other species in smaller quantities.

One thousand six hundred-twenty (1,620) trees, or 77.7% of the trees inventoried, were rated condition 2 or 3.

Four hundred sixty-five (465) trees, or 22.3% of the trees inventoried, were rated condition 4, 5 or 6.

SUMMARY OF RIGHT-OF-WAY TREES BY SPECIES									
Botanical Name	**Common Name**	**Cond 1**	**Cond 2**	**Cond 3**	**Cond 4**	**Cond 5**	**Cond 6**	**Number of Trees Inventoried**	**Percentage of Trees Inventoried**
Abies concolor	Concolor Fir			1	1	1		3	0.2%
Acer campestre	Hedge Maple (Field Maple)		1	1				2	0.1%
Acer negundo	Boxelder Maple			1	5	2		8	0.5%
Acer nigrum	Black Maple			1	1			2	0.1%
Acer platanoides	Norway Maple		2	40	11			53	3.4%
Acer platanoides 'Schwedleri'	Schwedler Norway Maple			1				1	0.1%
Acer rubrum	Red Maple		1	14	3			18	1.2%
Acer saccharinum	Silver Maple			10	6			16	1.0%
Acer saccharum	Sugar Maple		1	20	6	1	1	29	1.9%
Acer x freemanii	Freeman Maple		6	29	1		1	37	2.4%
Aesculus glabra	Ohio Buckeye			1				1	0.1%
Aesculus hippocastanum	Horsechestnut			1				1	0.1%
Alnus glutinosa	Black Alder		1	1				2	0.1%
Amelanchier arborea	Downy Serviceberry (Juneberry, Shadbush)		1	1	2			4	0.3%
Amelanchier spp.	Serviceberry			6	3			9	0.6%
Betula nigra	River Birch			7	2			9	0.6%
Carpinus caroliniana	Blue Beech Musclewood, American Hornbeam)		1	1	1	1		4	0.3%
Carya cordiformis	Bitternut Hickory			1	2			3	0.2%
Carya ovata	Shagbark Hickory		1	17		1		19	1.2%
Castanea sativa	European Chestnut				1			1	0.1%
Celtis occidentalis	Common Hackberry		4	13	1			18	1.2%
Cercis canadensis	Redbud			4	4	1		9	0.6%
Cornus alternifolia	Pagoda Dogwood			6				6	0.4%
Cornus florida	Flowering Dogwood			8				8	0.5%
Crataegus crus-galli	Cockspur Hawthorn			4	1			5	0.3%
Crataegus crus-galli var. inermis	Thornless Cockspur Hawthorn			2	2		1	5	0.3%
Crataegus phaenopyrum	Washington Hawthorn			6	51	2	2	61	3.9%
Crataegus spp.	Hawthorn			8	2			10	0.6%

SUMMARY OF RIGHT-OF-WAY TREES BY SPECIES									
Botanical Name	**Common Name**	**Cond 1**	**Cond 2**	**Cond 3**	**Cond 4**	**Cond 5**	**Cond 6**	**Number of Trees Inventoried**	**Percentage of Trees Inventoried**
Fagus sylvatica	European Beech			1				1	0.1%
Fraxinus americana	White Ash			1				1	0.1%
Fraxinus pennsylvanica	Green Ash				3	1	2	6	0.4%
Ginkgo biloba	Ginkgo (Maidenhair Tree)		5	4				9	0.6%
Gleditsia triacanthos	Common Honeylocust		17	66	7			90	5.8%
Gymnocladus dioicus	Kentucky Coffeetree		18	13	2			33	2.1%
Juglans nigra	Black Walnut		3	69	15	2	2	91	5.9%
Juniperus virginiana	Eastern Red-cedar			13	2			15	1.0%
Larix larcinia	American Larch			2				2	0.1%
Magnolia spp.	Magnolia			1				1	0.1%
Malus spp.	Crabapple		5	66	26	6	3	106	6.8%
Morus alba	White Mulberry			6	2			8	0.5%
Ostrya virginiana	Ironwood			2	1			3	0.2%
Picea abies	Norway Spruce		3	14	4			21	1.4%
Picea glauca	White Spruce		3	7				10	0.6%
Picea pungens	Colorado Blue Spruce		1	16	10	1	3	31	2.0%
Pinus nigra	Austrian Pine			12	6		1	19	1.2%
Pinus strobus	Eastern White Pine			6	1			7	0.5%
Pinus sylvestris	Scots Pine			3	1			4	0.3%
Populus alba	White Poplar			2				2	0.1%
Populus deltoides	Cottonwood		1	12	4			17	1.1%
Prunus serotina	Black Cherry			2		1		3	0.2%
Prunus subhirtella var. pendula	Weeping Cherry				2			2	0.1%
Prunus x cistena	Purpleleaf Sand Cherry			1				1	0.1%
Pseudotsuga menziesii	Douglas-fir			3				3	0.2%
Pyrus calleryana	Callery Pear		51	62	1			114	7.3%
Pyrus spp.	Pear			13				13	0.8%
Quercus alba	White Oak		2	14	3	1		20	1.3%
Quercus bicolor	Swamp White Oak		8	33	4			45	2.9%
Quercus ellipsoidalis	Hill's Oak			12	2	2		16	1.0%
Quercus imbricaria	Shingle Oak (Laurel Oak)			1				1	0.1%
Quercus macrocarpa	Bur Oak		10	64	19	1	1	95	6.1%
Quercus muehlenbergii	Chinquapin Oak		1	2	2			5	0.3%

SUMMARY OF RIGHT-OF-WAY TREES BY SPECIES									
Botanical Name	**Common Name**	**Cond 1**	**Cond 2**	**Cond 3**	**Cond 4**	**Cond 5**	**Cond 6**	**Number of Trees Inventoried**	**Percentage of Trees Inventoried**
Quercus palustris	Pin Oak			1				1	0.1%
Quercus rubra	Northern Red Oak		1	25	5		1	32	2.1%
Rhamnus cathartica	Common (European) Buckthorn				3	1		4	0.3%
Robinia pseudoacacia	Black Locust			7	3	1	2	13	0.8%
Salix alba	Weeping Willow			1				1	0.1%
Salix matsudana 'tortuosa'	Corkscrew Weeping Willow			2				2	0.1%
Salix nigra	Black Willow			3		1		4	0.3%
Syringa reticulata	Japanese Tree Lilac		3	12	3	1		19	1.2%
Taxodium distichum	Baldcypress			3				3	0.2%
Thuja occidentalis	Eastern Arborvitae		13	29	8			50	3.2%
Tilia americana	Basswood (American Linden)		6	29	12	4	2	53	3.4%
Tilia americana 'Redmond'	Redmond Linden		1	38	3	2		44	2.8%
Tilia cordata	Littleleaf Linden		2	14	1			17	1.1%
Ulmus americana	American Elm		1	115	17	4	4	141	9.1%
Ulmus minor 'Morton'	Accolade® Elm			1				1	0.1%
Ulmus pumila	Siberian Elm			9	8	2		19	1.2%
Ulmus rubra	Slippery Elm						1	1	0.1%
Ulmus x spp.	Hybrid elm			7	1			8	0.5%
	Total	**0**	**174**	**1024**	**287**	**40**	**27**	**1552**	**100.0%**
RIGHT-OF-WAY Trees	**Condition 1-3:**	**1198**	**77.2%**						
RIGHT-OF-WAY Trees	**Condition 4-6:**	**354**	**22.8%**						
RIGHT-OF-WAY Trees	**Average Size DBH of**	**9.8"**							
RIGHT-OF-WAY Trees	**Median Size DBH of**	**9.0"**							

SUMMARY OF RIGHT-OF-WAY TREES BY GENUS

Collectively the genus Quercus (oaks) comprised 13.9% of the right-of-way trees inventoried, followed by Ulmus (elms) (11.0%), Acer (maples) (10.70%), Pyrus (pear) (8.2%), Tilia (basswood) (7.3%), Malus (apple) (6.8%), and other genus in smaller quantities.

SUMMARY OF RIGHT-OF-WAY TREES BY GENUS		
Genus	**Number of Trees Inventoried**	**Percentage of Trees Inventoried**
Abies	3	0.2%
Acer	166	10.7%
Aesculus	2	0.1%
Alnus	2	0.1%
Amelanchier	13	0.8%
Betula	9	0.6%
Carpinus	4	0.3%
Carya	22	1.4%
Castanea	1	0.1%
Celtis	18	1.2%
Cercis	9	0.6%
Cornus	14	0.9%
Crataegus	81	5.2%
Fagus	1	0.1%
Fraxinus	7	0.5%
Ginkgo	9	0.6%
Gleditsia	90	5.8%
Gymnocladus	33	2.1%
Juglans	91	5.9%
Juniperus	15	1.0%
Larix	2	0.1%
Magnolia	1	0.1%
Malus	106	6.8%
Morus	8	0.5%
Ostrya	3	0.2%
Picea	62	4.0%
Pinus	30	1.9%
Populus	19	1.2%
Prunus	6	0.4%
Pseudotsuga	3	0.2%
Pyrus	127	8.2%

SUMMARY OF RIGHT-OF-WAY TREES BY GENUS		
Genus	**Number of Trees Inventoried**	**Percentage of Trees Inventoried**
Quercus	215	13.9%
Rhamnus	4	0.3%
Robinia	13	0.8%
Salix	7	0.5%
Syringa	19	1.2%
Taxodium	3	0.2%
Thuja	50	3.2%
Tilia	114	7.3%
Ulmus	170	11.0%
Total	**1552**	**100.0%**

DUFFY RESERVOIR

The parcel on the north side of Duffy Lane knowns as the Duffy Reservoir is primarily an open drainage area with trees around the perimeter which is bound by Duffy Lane on the south, I-94 on the east, private entities located on Lakeside Drive to the north, and a private residence to the east.

One hundred twenty-four (124) trees were inventoried in the Duffy Lane reservoir which comprises 6% of the total number of trees inventoried in the 2023 inventory update. The most common species inventoried in the Duffy Lane reservoir was swamp white oak which comprised 21% of the trees inventoried, followed by black walnut (18.5%), American elm (15.3%), cottonwood (13.7%), basswood (9.7%), and other species in smaller quantities. One hundred (100) trees, or 80.6% of the trees inventoried, were rated condition 2 or 3. Twenty-four (24) trees, or 19.4% of the trees inventoried, were rated condition 4, 5 or 6.

DUFFY RESERVOIR SUMMARY BY SPECIES

Botanical Name	Common Name	Cond 1	Cond 2	Cond 3	Cond 4	Cond 5	Cond 6	Number of Trees Inventoried	Percentage of Trees Inventoried
Carya cordiformis	Bitternut Hickory		1					1	0.8%
Carya ovata	Shagbark Hickory		1					1	0.8%
Crataegus spp.	Hawthorn				2			2	1.6%
Fraxinus pennsylvanica	Green Ash						4	4	3.2%
Juglans nigra	Black Walnut			16	6	1		23	18.5%
Pinus nigra	Austrian Pine			5	1			6	4.8%
Pinus strobus	Eastern White Pine		1	1				2	1.6%
Populus deltoides	Cottonwood		1	15	1			17	13.7%
Populus tremuloides	Quaking Aspen			1	1			2	1.6%
Quercus bicolor	Swamp White Oak		8	16	2			26	21.0%
Quercus ellipsoidalis	Hill's Oak			3				3	2.4%
Quercus macrocarpa	Bur Oak			2				2	1.6%
Quercus rubra	Northern Red Oak			3				3	2.4%
Salix nigra	Black Willow			1				1	0.8%
Tilia americana	Basswood (American Linden)			10	1	1		12	9.7%
Ulmus americana	American Elm			15	2		2	19	15.3%
	Total	**0**	**12**	**88**	**16**	**2**	**6**	**124**	**100.0%**
Duffy Lane Reservoir Trees Cond. 1-3:		**100**	**80.6%**						
Duffy Lane Reservoir Trees Cond. 4-6:		**24**	**19.4%**						
Average Size DBH of RIGHT-OF-WAY Trees:		**12.5"**		**Median Size DBH of RIGHT-OF-WAY Trees:**					**11.0"**

SUMMARY OF DUFFY LANE RESERVOIR TREES BY GENUS

Collectively the genus Quercus (oaks) comprised 27.4% of the Duffy Lane Reservoir trees inventoried, followed by Juglans (walnut) (18.5%), Populus (cottonwood) (15.3%), Ulmus (elm) (15.3%), Tilia (basswood) (9.7%), and other genus in smaller quantities.

DUFFY RESERVOIR TREE SUMMARY BY GENUS		
Genus	**Number of Trees Inventoried**	**Percentage of Trees Inventoried**
Carya	2	1.6%
Crataegus	2	1.6%
Fraxinus	4	3.2%
Juglans	23	18.5%
Pinus	8	6.5%
Populus	19	15.3%
Quercus	34	27.4%
Salix	1	0.8%
Tilia	12	9.7%
Ulmus	19	15.3%
Total	124	100.0%

SUMMARY OF VILLAGE HALL CAMPUS TREES

The Village Hall campus is an 11-acre site which contains a mix of maintained turf, rain gardens, natural areas and a system of walking paths.

Four hundred-nine (409) trees were inventoried in the Village Hall campus which comprises 20% of the total number of trees inventoried in the 2023 inventory update.

The most common species inventoried in the Village Hall campus was American elm which comprised 14.2% of the trees inventoried, followed by basswood (11%), silver maple (9.3%), swamp white oak (8.1%), black walnut (4.9%), crabapple (4.9), and other species in smaller quantities.

Three hundred twenty-two (322) trees, or 78.7% of the trees inventoried, were rated condition 2 or 3.

Eighty-seven (87) trees, or 21.3% of the trees inventoried, were rated condition 4, 5 or 6.

SUMMARY OF TREES ON VILLAGE HALL CAMPUS

Botanical Name	Common Name	Cond 1	Cond 2	Cond 3	Cond 4	Cond 5	Cond 6	Number of Trees Inventoried	Percentage of Trees Inventoried
Acer platanoides	Norway Maple		1	10	1			12	2.9%
Acer saccharinum	Silver Maple		3	24	10	1		38	9.3%
Acer saccharum	Sugar Maple		1	5				6	1.5%
Acer x freemanii	Freeman Maple		1					1	0.2%
Amelanchier arborea	Downy Serviceberry (Juneberry, Shadbush)			4	1			5	1.2%
Amelanchier spp.	Serviceberry			1				1	0.2%
Betula nigra	River Birch		1	15	1			17	4.2%
Betula nigra 'Heritage'	Heritage® River Birch			1				1	0.2%
Carpinus caroliniana	Blue Beech (Musclewood, American Hornbeam)		1	2				3	0.7%
Carya cordiformis	Bitternut Hickory			2				2	0.5%
Catalpa speciosa	Northern Catalpa		3	1				4	1.0%
Celtis occidentalis	Common Hackberry			3		1		4	1.0%
Cercis canadensis	Redbud		1	1				2	0.5%
Crataegus crus-galli	Cockspur Hawthorn		1	1	1			3	0.7%
Crataegus crus-galli var. inermis	Thornless Cockspur Hawthorn		3	2				5	1.2%
crataegus spp.	Hawthorn					1		1	0.2%

SUMMARY OF TREES ON VILLAGE HALL CAMPUS									
Botanical Name	**Common Name**	**Cond 1**	**Cond 2**	**Cond 3**	**Cond 4**	**Cond 5**	**Cond 6**	**Number of Trees Inventoried**	**Percentage of Trees Inventoried**
Fagus sylvatica 'Roseo-Marginata'	Tricolor Beech			3				3	0.7%
Fraxinus pennsylvanica	Green Ash			1				1	0.2%
Ginkgo biloba	Ginkgo (Maidenhair Tree)			1	1			2	0.5%
Gleditsia triacanthos	Common Honeylocust				1			1	0.2%
Gymnocladus dioicus	Kentucky Coffeetree		1	2				3	0.7%
Juglans nigra	Black Walnut		2	13	3	2		20	4.9%
Juniperus virginiana	Eastern Red-cedar			3				3	0.7%
Liriodendron tulipifera	Tuliptree		1					1	0.2%
Malus spp.	Crabapple		4	11	4	1		20	4.9%
Picea abies	Norway Spruce			12	1			13	3.2%
Picea glauca	White Spruce						1	1	0.2%
Picea pungens	Colorado Blue Spruce		1	2	9	4		16	3.9%
Pinus strobus	Eastern White Pine				1			1	0.2%
Pinus sylvestris	Scots Pine			5	1			6	1.5%
Platanus occidentalis	Sycamore		1					1	0.2%
Populus alba	White Poplar			1				1	0.2%
Populus deltoides	Cottonwood		2	6				8	2.0%
Populus tremuloides	Quaking Aspen			1				1	0.2%
Prunus spp.	Cherry				1			1	0.2%
Pseudotsuga menziesii	Douglas-fir			2				2	0.5%
Pyrus calleryana	Callery Pear		1	1	1			3	0.7%
Quercus alba	White Oak			1				1	0.2%
Quercus bicolor	Swamp White Oak		14	19				33	8.1%
Quercus ellipsoidalis	Hill's Oak			6	1			7	1.7%
Quercus macrocarpa	Bur Oak		2	12				14	3.4%
Quercus palustris	Pin Oak		1	1				2	0.5%
Quercus rubra	Northern Red Oak		2	9	2	1		14	3.4%
Salix matsudana 'Tortuosa'	Corkscrew Weeping Willow			1				1	0.2%
Salix nigra	Black Willow		1					1	0.2%
Syringa reticulata	Japanese Tree Lilac		1	2				3	0.7%
Taxodium distichum	Baldcypress		3	1				4	1.0%
Thuja occidentalis	Eastern Arborvitae			1				1	0.2%

SUMMARY OF TREES ON VILLAGE HALL CAMPUS									
Botanical Name	**Common Name**	**Cond 1**	**Cond 2**	**Cond 3**	**Cond 4**	**Cond 5**	**Cond 6**	**Number of Trees Inventoried**	**Percentage of Trees Inventoried**
Tilia americana	Basswood (American Linden)		1	19	14	6	5	45	11.0%
Tilia cordata	Littleleaf Linden			1				1	0.2%
Ulmus americana	American Elm			50	6	1	1	58	14.2%
Ulmus americana 'Princeton'	Princeton Elm		1	1				2	0.5%
Ulmus minor 'Morton'	Accolade® Elm			2				2	0.5%
Ulmus minor 'Morton Glossy'	Triumph™ Elm			1				1	0.2%
Ulmus pumila	Siberian Elm			1	2			3	0.7%
Ulmus spp.	Elm			1				1	0.2%
Ulmus x spp.	Hybrid elm			2				2	0.5%
	Total	**0**	**55**	**267**	**62**	**18**	**7**	**409**	**100.0%**
RIGHT-OF-WAY	**Trees Condition 1-3:**				**322**	**78.7%**			
RIGHT-OF-WAY	**Trees Condition 4-6:**				**87**	**21.3%**			
Average Size DBH	**Village Hall Campus Trees:**				**10.7"**				
Median Size DBH	**Village Hall Campus Trees:**				**10"**				

SUMMARY OF VILLAGE HALL CAMPUS TREES BY GENUS

Collectively the genus Quercus (oaks) comprised 17.4% of the Village Hall campus trees inventoried, followed by Ulmus (elm) (16.9%), Acer (maple) (13.9%), Tilia (basswood) (11.2%), Picea (spruce) (7.3%), Juglans (walnut)(4.9%), Malus (apple) 4.9%), and other genus in smaller quantities.

VILLAGE HALL CAMPUS TREES BY GENUS		
Genus	Number of Trees Inventoried	Percentage of Trees Inventoried
Quercus	71	17.4%
Ulmus	69	16.9%
Acer	57	13.9%
Tilia	46	11.2%
Picea	30	7.3%
Juglans	20	4.9%
Malus	20	4.9%
Betula	18	4.4%
Populus	10	2.4%
Crataegus	9	2.2%
Pinus	7	1.7%
Amelanchier	6	1.5%
Catalpa	4	1.0%
Celtis	4	1.0%
Taxodium	4	1.0%
Carpinus	3	0.7%
Fagus sylvatica	3	0.7%
Gymnocladus	3	0.7%
Juniperus	3	0.7%
Pyrus	3	0.7%
Syringa	3	0.7%
Carya	2	0.5%
Cercis	2	0.5%
Ginkgo	2	0.5%
Pseudotsuga	2	0.5%
Salix	2	0.5%
Fraxinus	1	0.2%
Gleditsia	1	0.2%
Liriodendron	1	0.2%
Platanus	1	0.2%
Prunus	1	0.2%
Thuja	1	0.2%
Total	409	100.0%

CHANGES FROM PREVIOUS TREE INVENTORIES

Street tree inventories were conducted 2011, 2013 and 2014, prior to the widespread loss of ash trees caused by Emerald ash borer. Prior to emerald ash borer, 54% of the trees inventoried were dominated by two (2) species: Green ash (46% of trees inventoried) and American elm (8%) of trees inventoried, although the overall condition of the trees inventoried has remained the same in terms of distribution across condition classes.

2011 VILLAGE STREET TREE INVENTORY

BOTANICAL NAME	COMMON NAME	COND 1-3	COND 4-6	Number of Trees Inventoried	Percentage of Trees Inventoried
Abies concolor	Concolor Fir	2	1	3	0.1%
Acer campestre	Hedge Maple	1	0	1	0.03%
Acer negundo	Boxelder Maple	4	8	12	0.4%
Acer nigrum	Black Maple	2	0	2	0.1%
Acer platanoides	Norway Maple	55	6	61	2%
Acer platanoides 'Schwedleri'	Schwedler Norway Maple	2	0	2	0.1%
Acer rubrum	Red Maple	17	4	21	1%
Acer saccharinum	Silver Maple	45	11	56	2%
Acer saccharum	Sugar Maple	22	8	30	1%
Acer *x* freemanii	Freeman Maple	25	5	30	1%
Alnus glutinosa	Black Alder	3	2	5	0.2%
Amelanchier arborea	Serviceberry	7	1	8	0.2%
Betula nigra	River Birch	35	0	35	1%
Carya cordiformis	Bitternut Hickory	4	4	8	0.2%
Carya ovata	Shagbark Hickory	16	3	19	1%
Celtis occidentalis	Hackberry	15	1	16	0.5%
Cercis canadensis	Redbud	5	4	9	0.3%
Cornus alternifolia	Pagoda Dogwood	8	1	9	0.3%
Cornus florida	Flowering Dogwood	3	0	3	0.1%
Crataegus crus-galli	Cockspur Hawthorn	9	2	11	0.3%
Crataegus crus-galli var. inermis	Thornless Cockspur Hawthorn	9	2	11	0.3%
Crataegus phaenopyrum	Washington Hawthorn	5	1	6	0.2%
Crataegus spp.	Hawthorn	15	9	24	1%
Fraxinus americana	White Ash	51	20	71	2%
Fraxinus excelsior	European Ash	10	15	25	1%
Fraxinus pennsylvanica	Green Ash	925	562	1487	46%
Gleditsia triacanthos	Honeylocust	20	6	26	1%
Gymnocladus dioicus	Kentucky Coffeetree	5	0	5	0.2%
Hamamelis virginiana	Witch-hazel	2	0	2	0.1%
Juglans nigra	Black Walnut	101	25	126	4%

2011 VILLAGE STREET TREE INVENTORY					
BOTANICAL NAME	**COMMON NAME**	**COND 1-3**	**COND 4-6**	**Number of Trees Inventoried**	**Percentage of Trees Inventoried**
Juniperus virginiana	Eastern Red-cedar	19	0	19	1%
Larix larcinia	American Larch	2	0	2	0.1%
Magnolia spp.	Magnoila	0	1	1	0.03%
Malus spp.	Crabapple	41	7	48	1%
Morus alba	Mulberry	7	3	10	0.3%
Ostrya virginiana	Ironwood	3	2	5	0.2%
Picea abies	Norway Spruce	35	5	40	1%
Picea glauca	White Spruce	19	1	20	1%
Picea pungens	Colorado Blue Spruce	63	14	77	2%
Pinus nigra	Austrian Pine	32	8	40	1%
Pinus strobus	Eastern White Pine	16	1	17	1%
Pinus sylvestris	Scots Pine	12	4	16	0.5%
Populus alba	White Poplar	2	0	2	0.1%
Populus deltoides	Cottonwood	19	4	23	1%
Populus tremuloides	Quaking aspen	5	0	5	0.2%
Prunus ceracifera	Purple Leaf Plum	1	0	1	0.03%
Prunus serotina	Black Cherry	4	6	10	0.3%
Prunus spp.	Cherry	0	3	3	0.1%
Prunus spp.	Weeping Cherry	1	1	2	0.1%
Prunus *x* cistena	Purpleleaf Sand Cherry	1	0	1	0.03%
Pseudotsuga menziesii	Douglas-fir	6	0	6	0.2%
Pyrus calleryana	Callery Pear	4	0	4	0.1%
Pyrus spp.	Pear	29	0	29	1%
Quercus alba	White Oak	11	10	21	1%
Quercus bicolor	Swamp White Oak	57	5	62	2%
Quercus ellipsoidalis	Hill's Oak	16	14	30	1%
Quercus macrocarpa	Bur Oak	70	25	95	3%
Quercus palustris	Pin Oak	4	0	4	0.1%
Quercus robur	English Oak	0	1	1	0.03%
Quercus rubra	Red Oak	32	11	43	1%
Robinia pseudoacacia	Black Locust	5	5	10	0.3%
Salix alba	Weeping Willow	2	0	2	0.1%
Salix matsudana 'tortuosa'	Corkscrew Willow	2	1	3	0.1%
Salix nigra	Black Willow	5	5	10	0.3%
Syringa reticulata	Japanese Tree Lilac	11	1	12	0.4%
Taxodium distichum	Baldcypress	2	0	2	0.1%
Thuja occidentalis	Eastern Arborvitae	26	1	27	1%

2011 VILLAGE STREET TREE INVENTORY					
BOTANICAL NAME	**COMMON NAME**	**COND 1-3**	**COND 4-6**	**Number of Trees Inventoried**	**Percentage of Trees Inventoried**
Tilia americana	Basswood	62	29	91	3%
Tilia cordata	Littleleaf Linden	12	3	15	0.5%
Tsuga canadensis	Eastern Hemlock	1	1	2	0.1%
Ulmus americana	American Elm	220	36	256	8%
Ulmus pumila	Siberian Elm	15	15	30	1%
Ulmus spp.	Elm	0	1	1	0.03%
Ulmus *x* spp.	Hybrid elm	1	0	1	0.03%
	Total	**2298**	**925**	**3223**	
Condition 1-3:	**71.3%**				
Condition 4-6:	**28.7%**				

GENERAL TREE HEALTH COMMENTS

Environmental Stress

Environmental stress is a catch-all term which refers to the diminished vigor of a tree, with symptoms resulting from any or a combination of factors including, but not limited to soil compaction/poor soil aeration, pollution, nutrient deficiencies, scorching from reflected heat (pavement) and winter injury.

Stressed oak trees become vulnerable to two-lined chestnut borer, which is a secondary problem that can hasten the decline of oak trees, and should be treated accordingly. However, it is important to identify and address the primary cause(s) of stress to the oaks.

Lawnmower Damage

Lawnmower damage or other mechanically caused damage - some trees have wounds to their trunks or exposed surface roots, basal decay and/or basal swelling from ongoing lawnmower and/or weed whip damage. Repeated damage causes the tree to devote resources to continually forming callus growth, and the open cuts can provide an easy way for pathogens to enter the tree and/or decay pockets to form.

Landscape contractors conducting mowing activities should be instructed to avoid mowing over exposed tree roots, and be cautious with the use of weed whips. Weed whips can also cause serious damage to bark, particularly on young trees and trees with characteristically thinner bark and should not be used in

proximity to tree trunks or buttress roots. Applying mulch rings to trees will serve as a visual reminder to keep equipment away from tree trunks.

Mulching

Keep mulch no higher than 3" around trees, and away from trunks to prevent adventitious roots from forming above the natural root flare of the trees. Mulch height should be reduced so the natural root flare is exposed. Additionally, mulch should be kept 6" – 12" from the base of the tree. See page 78-78 for more details.

Girdling

Address girdling root issues where possible. Girdling roots are a structural defect that are either inherent to some species (red maple), or often can be traced back to nursery production practices, planting practices (twisting a tree to fit into a planting space, not cutting down wire planting baskets), or the tree's reaction to obstacles such as curbs. These are roots that encircle the base of the tree and gradually cut off the vascular system of the tree as it grows. This is evidenced by a gradually increasing degree of top dieback over time, and stunted leaves. Sometimes girdling roots are well below the soil surface and other times they can be seen above it. The more accessible girdling roots can sometimes be remedied by carefully severing the problem root(s). The severed portion of the root can remain in place if it cannot be safely removed without causing additional damage to the tree.

Some trees with girdling roots which are rated condition '3' will most likely decline to condition '4' and begin exhibiting symptoms as girdling roots worsen such as top dieback and weak appearance/sparse foliage. In some cases, careful soil excavation around the base of the trunk will expose girdling roots that can be severed.

Wire Nursery Baskets

Wire nursery baskets present – some planted trees exhibit portions of wire nursery baskets sticking up out of the ground. Underground girdling roots may be a problem with these trees as the baskets inhibit natural root extension/growth. This may impact the potential longevity of many of these trees. Current best management practices should be followed for planting projects. This includes cutting down any wire baskets present at the time of planting, and removing all wires, ropes, ribbons or nursery ties affixed to the tree at the time of planting (this excludes any trunk wraps or staking and ties necessary to secure the tree).

Construction and Infrastructure Improvements

Construction and infrastructure improvement activities are often a significant cause of tree impacts ranging from compacted soils, root loss, trunk wounds, broken limbs, etc. As a standard practice, trees

should be evaluated for potential construction impacts during all project planning processes, and a tree protection plan should be coordinated and consistently implemented for the duration of any projects. Post-construction, preserved trees within and adjacent to construction should be monitored for signs of impact such as dieback or decline and remedied accordingly. Depending on the species and type of damage, impacts may not become evident for 3 – 5 years or more post-activity.

Oak Wilt

Oak wilt - Oak wilt WAS NOT identified in the Village during the course of the inventory however, because it can mimic symptoms of other issues affecting oaks, it is important to include some background information about the disease:
Oak wilt is a serious fungal disease that is transmitted aerially by beetles, and below ground via root grafts, with symptoms that look very similar to several other issues also impacting oaks including drought stress, excessive water(ing), construction damage and root rot, all of which can compromise a tree's fine roots. The only way to confirm the presence of oak wilt is through sampling and testing.

Most of the problems we are seeing in oaks are the result of a combination of the above issues which are resulting in root systems that do not have sufficient fine roots to transport water and nutrients up to the tree canopy, which is why we see the trees exhibiting top dieback.

We always encourage having trees and soil tested before embarking on any type of treatment plan (including fertilization). Assuming oak wilt is the cause of an oak's decline without testing can cause one to potentially go down the wrong path in terms of possible treatment options and waste time and money.

Depending on individual tree and accessibility issues, an arborist may recommend various treatment and containment options ranging from fungicide treatments to severing roots via root pruning to break root grafts.

As always, oaks should not be pruned from May-November to avoid creating wounds which will attract the beetle that transmits oak wilt, as well as providing entry points for pathogens. If pruning or cutting cannot be avoided due to storm damage, breakage, etc., wounds and breakage should be cleaned up and addressed as necessary, and a pruning sealant should be applied to fresh cuts immediately.

Ongoing research by Dr. Stephanie Adams at the Morton Arboretum is indicating that in addition to the stresses listed above, there are some strains of phytophthora causing root rot in oaks, particularly in clay soils with very flat topography and shallow water tables. Phytophthora is a type of water mold called an oomycete which is frequently found in soils and various strains can infect a wide range of plants. It is important to conduct sampling to verify if phytophthora is a contributing factor in oak decline. If it is, trees should be treated with the appropriate systemic fungicide. The treatment is most effective when fine branch dieback is observed in the tree crown. By the time the tree begins to develop larger limb dieback,

and a 'staghorn' appearance, it's too late for the tree to rebound with treatment, and death usually occurs in 2-5 years.

Additional study into the possible links to extreme cold weather events, drought, heavier than normal years of precipitation, and the occasional proliferation of the presence of phytophthora in the soil is also being conducted, as there have been occasional areas of oak decline observed in the broader region, most recently after similar events in the 1970s and 1980s.

Another issue to watch out for is the introduction of phytophthora to a site via landscaping materials (trees and shrubs). Landscaping materials should be tested for pathogens prior to planting among oaks. Be aware that the probing for sampling involves disturbing root balls, and this can void a plant warranty, but it is better to be proactive and identify a potential problem rather than inadvertently introduce a pathogen to your site.

There are also other causes of root rot (such as bacterial diseases), and treatments that work on phytophthora (a fungal disease) will not work on bacterial causes, so it is very important to try to correctly identify the problem before starting any treatment.

Two-Lined Chestnut Borer

Two-lined chestnut borer - Two-lined chestnut borer is an insect that only attacks stressed trees. The oak decline and death observed is likely from a combination of causes that are all contributing to the problem, including the age of the trees, wet soils/fluctuations in soil moisture, wounds and/or breakage from storm damage creating entry points for bacterial and fungal pathogens and diseases such as bur oak blight, construction impact, recreational site usage, foot traffic and general environmental stress. The trees are spreading their resources thin to combat these various issues, and it takes a toll over time. As a result, the trees release stress pheromones and other compounds which are picked up on by various insects and other trees.

When oaks are stressed, they attract the two-lined chestnut borer, which is an opportunistic native insect that damages the plumbing system of oaks in much the same way ash trees are damaged by the emerald ash borer. (Both insect species have similar life cycles, the larvae feed under the bark destroying the structures that conduct sugars and water up and down the trunk, and two-lined chestnut borers leave D-shaped exit holes in the bark of oaks, just like EAB does with ash trees.) While the two-lined chestnut borer causes internal damage to oaks which results in limb and crown dieback, and ultimately finishes off a stressed tree, it is really a symptom of other underlying issues.

General supportive care is recommended if trees are stressed. Fertilizing every few years is an option if there are deficiencies in soil nutrients, coupled with insecticide treatment to control the 2-lined chestnut borer. Fertilizers should be used sparingly so they are not causing oaks to put on additional foliage/growth

that they cannot maintain. Soil testing is always recommended prior to applying any fertilizers to determine what (if any) deficiencies exist.

Trees can be treated for two-lined chestnut borer with various insecticides. Licensed Applicators have access to products with higher imidacloprid concentrations as well as several other products with different active ingredients which have a range of application types and re-application times (i.e. annual, every 3 years, etc).

Licensed applicators have an array of application options, and may apply the chemicals by soil drench, soil injection, trunk injection, bark spray or foliar spray. Trunk injections keep the product contained within the tree and reduce the likelihood of the product migrating or translocating to unwanted areas. If the potential for drift or translocation or impacting beneficial insects is a concern, it is important to discuss the product, type of application, timing of application and how the product targets the insects with the applicator to have a clear understanding of the process and, make sure the treatment methods align with property management objectives.

Trunk injections should only be conducted by a Certified Arborist or under the direct supervision of a Certified Arborist to avoid unnecessary damage to trees during the injection process.

When assessing oaks for the possibility of insecticidal treatment for two-lined chestnut borer, trees that are exhibiting less than 20% or so crown dieback will likely have enough viable plumbing to distribute the product throughout the tree. If the insect infestation is localized in some branches, those branches can be pruned out and property disposed of as well. If there is more than 25% dieback in the crown, there is likely too much internal damage to the tree's plumbing system for the product to be effectively distributed, but you may want to try treatment to see if it is helpful if you have some trees that you really want to try and save.

For any oak tree existing in close proximity to open water or drainages, and percolation or runoff from soil-based treatments may be a concern, treatments with trunk injections is recommended as the preferred method of application to keep products contained.

OBJECTIVES OF THE URBAN FOREST MANAGEMENT PLAN

Trees, both public and private, help define the character of a community. They provide many benefits and in the long term, and they add both tangible and intangible benefits to the Village.

The asset value of healthy and well-maintained trees is significant. In addition to aesthetic and ecological benefits, additional values include monetary benefits such as increased property values, and, significantly, a benefit to the community is the idea that healthy, well-maintained, and properly pruned trees are less susceptible to storm damage. If a tree is less susceptible to storm damage, then the frequency and extent

of property damage and power outages will be reduced, and the amount of time and money spent on responding to tree emergencies is lessened.

Trees planted in the public way can become either an asset or a liability. Some of the many factors that contribute to the status of a tree as being viewed as an asset or liability include: selecting the right tree for the right place, providing for species diversity, and properly planting the tree conducting scheduled maintenance activities include mulching and watering for establishment. In order to sustain the asset value of the trees for the long-term insect and disease management and tree pruning programs must also be implemented as problems occur.

PUBLIC HEALTH AND SAFETY

The number one priority of the Urban Forest Management Plan is to provide enhanced public safety via proactive management of the trees located in the Village rights-of-way and other Village-maintained properties (the Duffy Lane Reservoir and the Village Hall campus). When trees are growing within the public way, they must be managed somewhat differently than trees growing well outside of the public way. Dead and dangerous trees and limbs need be identified and removed in a timely manner. Overhead clearance standards for roadways and sidewalks need to be maintained. Any obstructions of traffic control devices, roadway signage and street lights need to be eliminated. Trees should not be planted too closely to fire hydrants, b-boxes, man holes, or street lights. Sight lines at street intersections and driveways must not be blocked. Trees planted in public ways should not be in conflict with Gas lines, electric lines, sewer lines and other utilities.

- 332 Trees inventoried (16% of all trees inventoried) have a DBH of 15” or larger
    - 23 of the trees on Duffy Lane are located at the Reservoir
    - 69 of the Telegraph Road trees are located around the Village Hall campus

Trees 15" DBH and larger by Street		
Street	**Number of Trees Inventoried**	**Percentage of Trees Inventoried**
Aberdeen Court	4	1.2%
Aitken Drive	14	4.2%
Broadley's Court	4	1.2%
Cedarcrest	3	0.9%
Duffy Lane	37	11.1%
Dunsinane Road	4	1.2%
Dunsinane Road East	2	0.6%
Half Day Road	5	1.5%
High Terrace	5	1.5%
Hilltop Lane	3	0.9%
Lakeside Drive	1	0.3%
Lakeside Drive - island	2	0.6%
Lakewood Drive	1	0.3%
Meadow Lane	38	11.4%
North Avenue	14	4.2%
Orchard	1	0.3%
Robin Road	4	1.2%
Stirling Road	31	9.3%
Sunset Lane	6	1.8%
Telegraph Road	112	33.7%
Valley & Telegraph	1	0.3%
Valley Road	22	6.6%
Wilmot Road	18	5.4%
Total	**332**	**100.0%**

The vast majority of the trees inventoried are less than 15” D.B.H. Very few of these trees (less than 15” DBH) present potential hazards now or in the near future from total failure or from large, dead branches. The safety concerns for these trees are or will be overhead clearance for roadways and sidewalks, the obstruction of traffic control devices, roadway signage, street and the sight lines at street intersections and driveways.

DIVERSITY

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 15% Ash trees. When these trees died and had to be removed, those organizations lost 15% of their trees. It is important to note that Bannockburn had 49% of Ash trees at the onset of the EAB infestation, so the impact in the Village was severe.

This comes with the obvious expenses 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 Bannockburn is by far dominated by Oak species. In decreasing numbers, the remaining top 5 include Elms, Maple, Lindens, Walnut and Pear.

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. Atpresent, the Spatial Diversity in Bannockburn is relatively low. During the tree planting planning phase, 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

Common Name	Count	% of Total	Average DBH	AVG Cond 1-6
American Elm	218	10.46%	11.68	3.25
Black Walnut	134	6.43%	12.40	3.26
Crabapple	126	6.04%	3.90	3.35
Callery Pear	117	5.61%	6.36	2.57
Bur Oak	111	5.32%	13.89	3.11
Basswood (American Linden)	110	5.28%	10.96	3.57
Swamp White Oak	104	4.99%	10.32	2.77
Common Honeylocust	91	4.36%	8.35	2.90
Norway Maple	65	3.12%	10.87	3.14
Washington Hawthorn	61	2.93%	2.80	4.00
Silver Maple	54	2.59%	16.00	3.28
Eastern Arborvitae	51	2.45%	4.89	2.90
Northern Red Oak	49	2.35%	14.10	3.18
Colorado Blue Spruce	47	2.25%	8.34	3.77
Redmond Linden	44	2.11%	5.91	3.14

Common Name	Count	% of Total	Average DBH	AVG Cond 1-6
Cottonwood	42	2.01%	16.28	3.02
Freeman Maple	38	1.82%	6.98	2.92
Kentucky Coffeetree	36	1.73%	4.05	2.53
Sugar Maple	35	1.68%	10.21	3.26
Norway Spruce	34	1.63%	10.14	3.06
Hill's Oak	26	1.25%	13.35	3.27
River Birch	26	1.25%	6.40	3.08
Austrian Pine	25	1.20%	9.97	3.40
Common Hackberry	22	1.06%	8.65	2.95
Japanese Tree Lilac	22	1.06%	4.33	3.05
Siberian Elm	22	1.06%	22.73	3.64
White Oak	21	1.01%	18.37	3.14
Shagbark Hickory	20	0.96%	10.10	3.00
Eastern Red-cedar	18	0.86%	10.04	3.11
Littleleaf Linden	18	0.86%	5.99	2.94
Red Maple	18	0.86%	13.08	3.11
Black Locust	13	0.62%	13.62	3.85
Hawthorn	13	0.62%	7.13	3.46
Pear	13	0.62%	7.71	3.00
Ginkgo (Maidenhair Tree)	11	0.53%	2.43	2.64
Green Ash	11	0.53%	7.82	5.09
Redbud	11	0.53%	7.11	3.45
White Spruce	11	0.53%	6.75	3.00
Eastern White Pine	10	0.48%	9.65	3.10
Hybrid elm	10	0.48%	4.70	3.10
Scots Pine	10	0.48%	9.88	3.20
Serviceberry	10	0.48%	3.53	3.30
Thornless Cockspur Hawthorn	10	0.48%	3.85	3.20
Downy Serviceberry (Juneberry, Shadbush)	9	0.43%	3.69	3.22
Boxelder Maple	8	0.38%	13.13	4.13
Cockspur Hawthorn	8	0.38%	3.88	3.13
Flowering Dogwood	8	0.38%	3.59	3.00
White Mulberry	8	0.38%	15.38	3.25
Baldcypress	7	0.34%	5.04	2.57
Blue Beech (Musclewood, American Hornbeam)	7	0.34%	2.86	3.14
Bitternut Hickory	6	0.29%	9.17	3.17
Black Willow	6	0.29%	16.67	3.17
Pagoda Dogwood	6	0.29%	3.83	3.00

Common Name	Count	% of Total	Average DBH	AVG Cond 1-6
Chinquapin Oak	5	0.24%	3.05	3.20
Douglas-fir	5	0.24%	11.60	3.00
Common (European) Buckthorn	4	0.19%	10.00	4.25
Northern Catalpa	4	0.19%	5.19	2.25
Accolade® Elm	3	0.14%	5.17	3.00
Black Cherry	3	0.14%	10.67	3.67
Concolor Fir	3	0.14%	8.58	4.00
Corkscrew Weeping Willow	3	0.14%	14.17	3.00
Ironwood	3	0.14%	8.00	3.33
Pin Oak	3	0.14%	19.58	2.67
Quaking Aspen	3	0.14%	11.67	3.33
Tricolor Beech	3	0.14%	2.58	3.00
White Poplar	3	0.14%	10.67	3.00
American Larch	2	0.10%	6.00	3.00
Black Alder	2	0.10%	8.00	2.50
Black Maple	2	0.10%	14.00	3.50
Hedge Maple (Field Maple)	2	0.10%	4.50	2.50
Princeton Elm	2	0.10%	1.38	2.50
Weeping Cherry	2	0.10%	4.50	4.00
Cherry	1	0.05%	3.00	4.00
Elm	1	0.05%	7.75	3.00
European Beech	1	0.05%	3.00	3.00
European Chestnut	1	0.05%	4.25	4.00
Heritage® River Birch	1	0.05%	3.25	3.00
Horsechestnut	1	0.05%	17.00	3.00
Magnolia	1	0.05%	7.00	3.00
Ohio Buckeye	1	0.05%	10.00	3.00
Purpleleaf Sand Cherry	1	0.05%	8.00	3.00
Schwedler Norway Maple	1	0.05%	24.00	3.00
Shingle Oak (Laurel Oak)	1	0.05%	4.00	3.00
Slippery Elm	1	0.05%	17.00	6.00
Sycamore	1	0.05%	1.75	2.00
Triumph™ Elm	1	0.05%	1.75	3.00
Tuliptree	1	0.05%	3.50	2.00
Weeping Willow	1	0.05%	23.00	3.00
White Ash	1	0.05%	8.00	3.00

As shown in the table above, the Village of Bannockburn Tree population consists of an impressive 89 distinct tree species, accounting for 2,085 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 4 and with a large DBH.

As can be seen above, the tree population in Bannockburn is good overall, but by far is dominated by Oak species. In decreasing numbers, the remaining of the top 5 include Elms, Maple, Lindens, Walnut and Pear. From there, the number of tree species representing more than 1% of the total tree population drops off steadily. It should generally be said that reducing the number of Oaks overall while increasing lesser represented species should be a strategic goal, and our Diversity Vision will help to accomplish this.

Additionally, the 257 trees in the "Undesirable spp" category include trees such as Austrian Pine, Callery Pear, Colorado Blue Spruce, Cottonwood, Green Ash, Scots Pine, Weeping Willow, White Ash and White Poplar. Also, the Village has 96 trees in the "Invasive Species" category such as Black Alder, Buckthorn, Hedge Maple, Norway Maple and Siberian Elm. These trees are known for either being invasive or weak-wooded trees that often develop a variety of structural defects as they mature. For safety, aesthetic, and ecological reasons, it is recommended that the Village set a goal of gradually reducing the number of undesirable trees on its parkways and replanting them with a diverse set of tree species to increase overall diversity. Undesirables may be acceptable in other locations such as the Duffy Lane Reservoir where cottonwoods work well in area of poor drainage. As long as the condition of the tree is in far condition and not hazardous, these species may remain in low use areas.

Although Bannockburn's diversity is very good overall, the Village has a number of species to choose from which are commercially available and underrepresented in their population. As mentioned above, the Urban Forest Management Plan will lay out strategies to even further improve diversity, and we will examine the specific species recommended in the "Future of the Urban Forest" Section below.

ITREE REPORT / URBAN TREE CANOPY ASSESSMENT

iTree is a peer-reviewed software suite that provides Urban Forestry analysis and benefits assessment tools. The iTree tools help communities to strengthen their forest management and advocacy efforts by quantifying the structure of trees and forests, and the environmental services that trees provide.

The iTree 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, several iTree reports have been prepared for the Village of Bannockburn. Below you will find reports on the Net annual benefits of the tree population, replacement values, and breakdown of benefits per species. We performed both the iTree Streets analysis which looks primarily at energy savings, and an iTree Eco analysis which focuses more on ecological benefits such as Carbon Storage and Sequestration. The results of these analyses are below, and full tables and iTree Reports are appended.

OurTrees Benefits – Village of Bannockburn

Trees in Bannockburn, IL

Serving Size:
45.68% tree canopy on 590 acres
18.67% impervious surfaces over 241 acres

	Annual Values
Total benefits for this year:	**$219,070**
Carbon Dioxide Uptake	**$75,932**
Carbon Sequestered	445 tn
CO_2 Equivalent[1]	1,632 tn
Storm Water Mitigation	**$67,540**
Runoff Avoided	8 MG/yr
Rainfall Intercepted	38 MG/yr
Air Pollution Removal	**$75,598**
Carbon Monoxide	428 lb/yr
Ozone	23,885 lb/yr
Nitrogen Dioxide	3,608 lb/yr
Sulfur Dioxide	953 lb/yr
$PM_{2.5}$	1,124 lb/y

Values are Totals to Date:

Carbon Dioxide Uptake	**$2,598,034**
Carbon Storage	15,233 tn
CO_2 Equivalent[1p]	55,855 tn

Benefit estimates are based on USDA Forest Service research and are meant for guidance only.

Based upon the i-Tree Score Card, "A 10% increase in canopy area, 590 acres to 649 acres, would add $14,312 in tree benefits to your community. This increase would include the storage of an additional 1,523 tons of carbon, 755,823 more gallons of avoided storm water runoff, and the removal of an extra 3,471 pounds of air pollution."

As can be seen from the above tables, the tree population in the Village of Bannockburn currently provides approximately $219,070 in benefits every year, directly related to trees and their effect on homes, businesses, and the environment.

The iTree 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. Several examples of Ecological Services provided by trees are:

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.

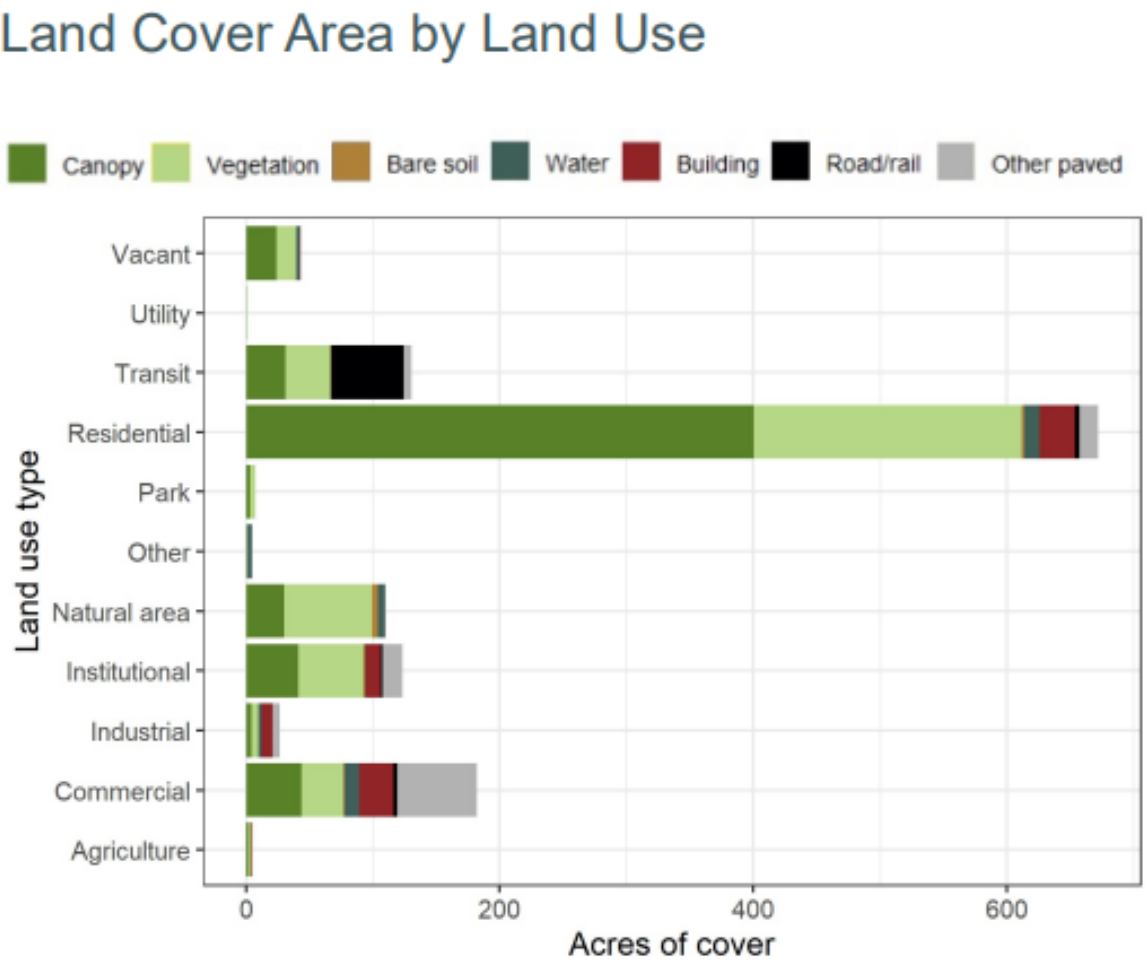
Storm water: The cost of delivering fresh water to homes, as well as removing and treating wastewater and storm water is considerable. One of the greatest costs comes when these systems are overwhelmed, such as during flooding, which can cause millions of dollars of damage to homes and vehicles, or when 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/Other: 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.

The goal of this Urban Forestry Management Plan is to create a tree population which maximizes all of these ecological services to Bannockburn residents by increasing the number of trees in Village, and how long they live, while minimizing costs in order to create a healthy, well maintained, and vibrant tree population.

URBAN TREE CANOPY ASSESSMENT

Based on data available from the US Forest Service and Morton Arboretum, the total Urban Tree Canopy of Bannockburn can be determined. This is expressed as the percent of the Village 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, and other paved surfaces. The result of this tree canopy assessment was that Bannockburn contains 44%% total tree canopy.



The tree inventory itself was only conducted on publicly owned land such as parkways 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 Village using a software which is similar to Google Earth or other aerial imagery viewers.

The goal is to increase the total tree canopy in Bannockburn to 48% by 2035. This goal has been estimated by analyzing data from many different urban tree populations in the Chicago region, and is based on data from the Chicago Region Trees Initiative's (CRTI) Forest Composition Workgroup.

We believe this is an attainable goal over this time period. Bannockburn as a whole has an overall considerable amount of tree canopy, and it is well above average compared to other similar suburban communities of Chicagoland. The goal set is a modest, but reasonable, increase, which will still yield beneficial results. As previously mentioned in this Plan, the goal will be to create a multilayered canopy by incorporating shade tolerant understory species that can be planted among existing trees.

This will be accomplished through increasing the number of trees in the parks, municipal campuses, schools, and on the parkways. It will also be accomplished by maintaining the existing tree population in a proactive fashion, by enhancing the Urban Forestry program in Bannockburn. 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 will be assessed, and a new canopy cover percentage will be calculated for Bannockburn.

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 2035 vision of the tree population, a variety of methods were used to arrive a reasonable age-class distribution.

TREES AND CLIMATE CHANGE

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

Though the general trend will be towards a warmer climate, the transition process will be very chaotic, and will be one of more "extremes": hotter summers, colder winters, worse storm seasons, and the like

will 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.

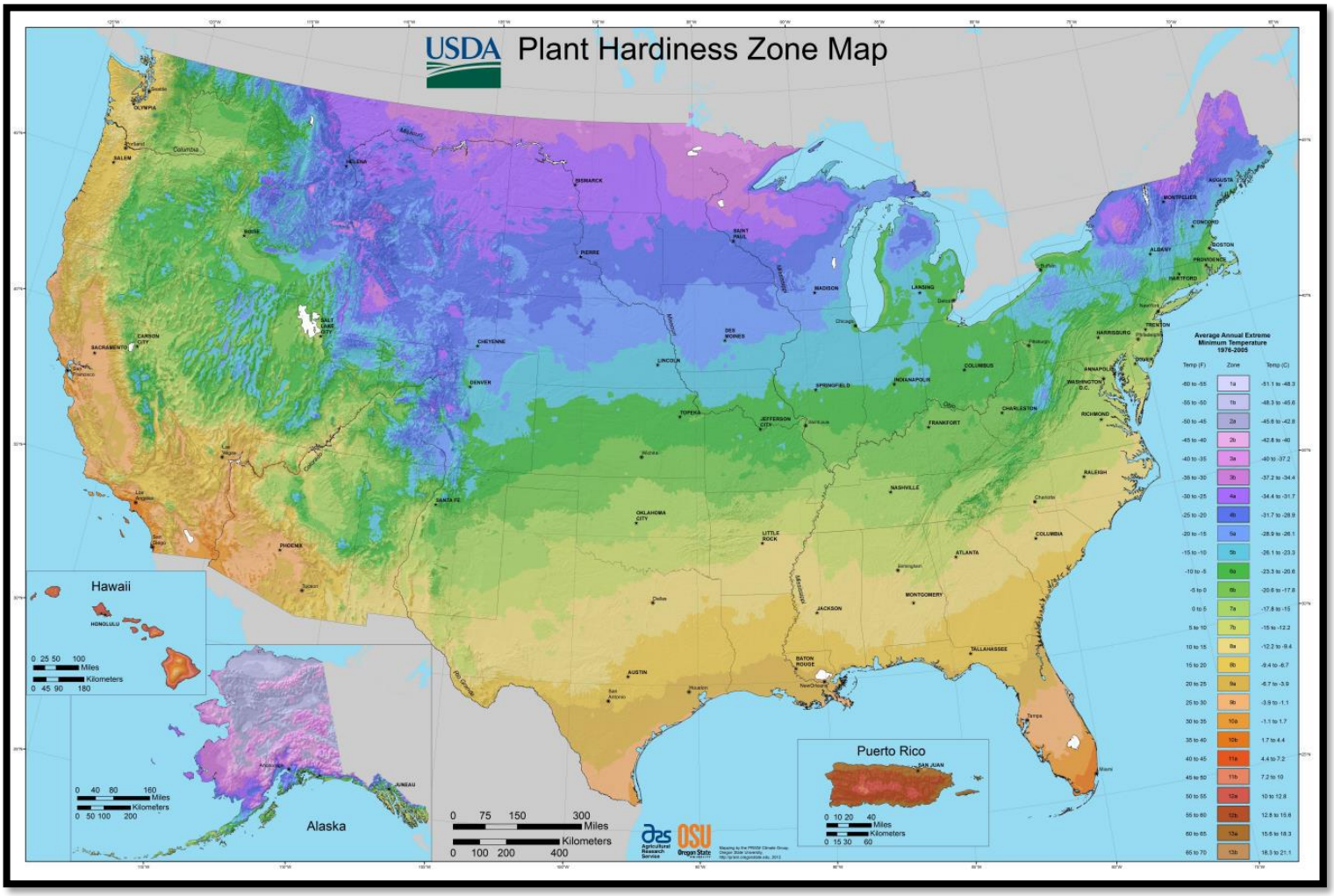
All of the organizations involved with changing climate and the carbon dioxide inputs that drive it have the same message: planting more trees, particularly in areas predisposed to changes in climate, will aid in pulling CO2 from the atmosphere and reducing the impact of climate change. So the number 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 -30º F and even colder range for extended periods. And 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. So 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 trees which the Village could plant which 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 Cherry**
(Magnolia grandiflora)	(Ilex opaca)	(Cercis reniformis)	(Prunus spp)

All of these species grow in Illinois, just not in our part of the state, per se. And some are certainly more risky 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. But nonetheless they are good species to keep on our radar for experimental plantings.



POSITIVE TREE BENEFITS FOR THE ENVIRONMENT

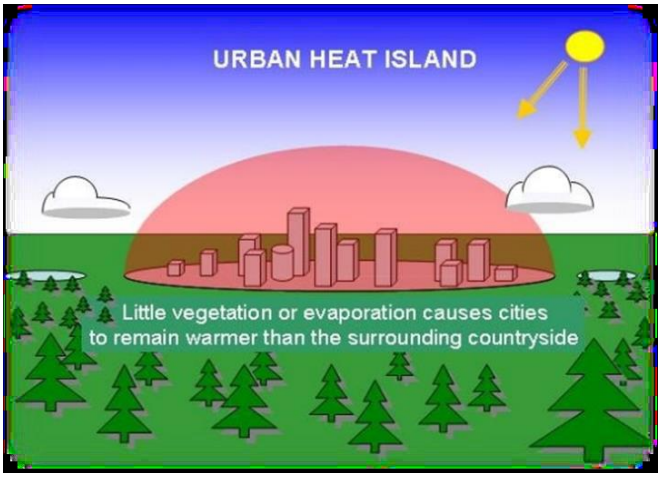
When it comes to trees and climate change, let's move on to some of the immensely positive benefits that trees provide. Here, we are focusing on 2 topics, those being the climate change and the urban heat island effect, as well as flooding prevention and stormwater benefits, since this was one of the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

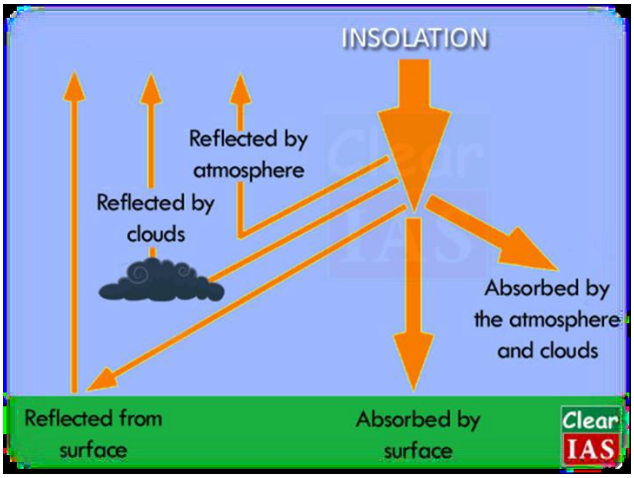
CLIMATE CHANGE / URBAN HEAT ISLAND MITIGATION

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. Yes, increases in carbon dioxide emissions lead in general to a warmer climate, which comes with very specific problems. But 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. And what an energy the sun has. The amount of energy from the sun hitting the Earth at any given time is approximately 1,350 Watts per square meter, which is a LOT of energy to absorb. When an area has fewer plants, and a lot of asphalt and other dark surfaces, this produces a lot of heat.

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





All of this is of course just scratching the surface of a set of very complex issues. But essentially, when we have a generally 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 making things better. Not only do they absorb carbon dioxide from the atmosphere, which helps to reduce the effects of climate change, but 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.

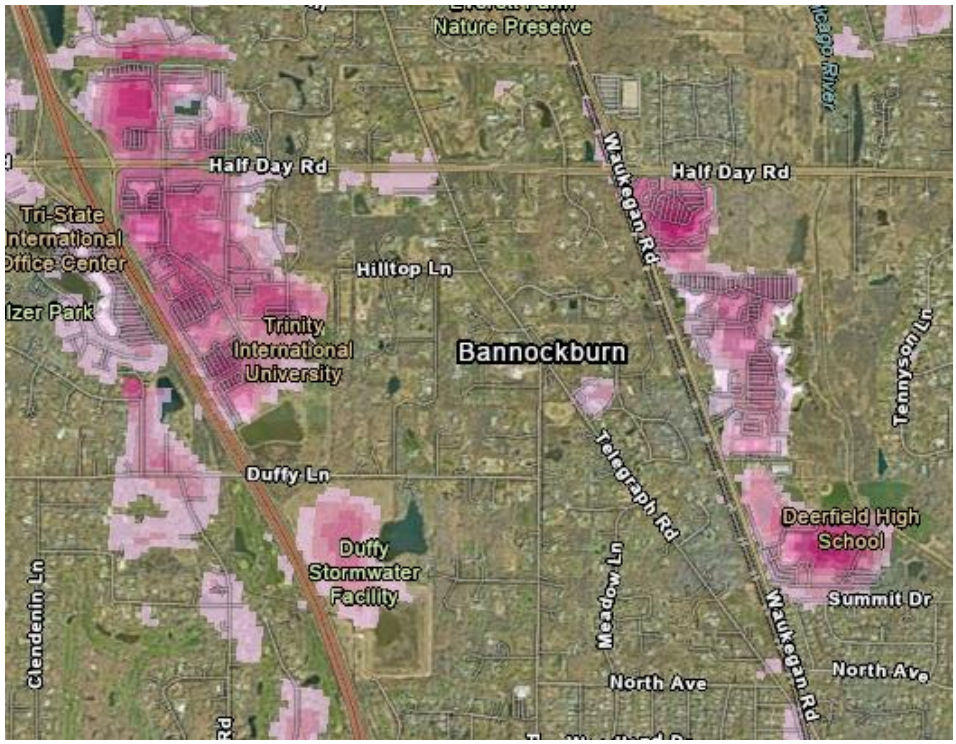
Village of Bannockburn Urban heat island severity (for U.S. cities, 2020)

Contiguous United States Cities Heat Severity 2020

Value

- Mild
- Mild to Moderate
- Moderate
- Moderate to High
- Severe

2



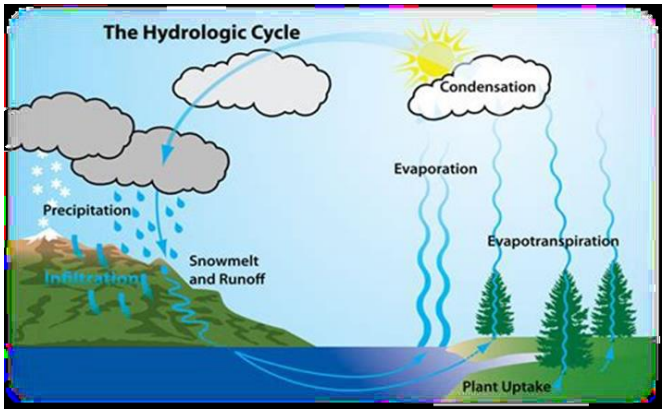
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.
www.argis.com/home/webmap

Planting trees not just on Village 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. So, 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

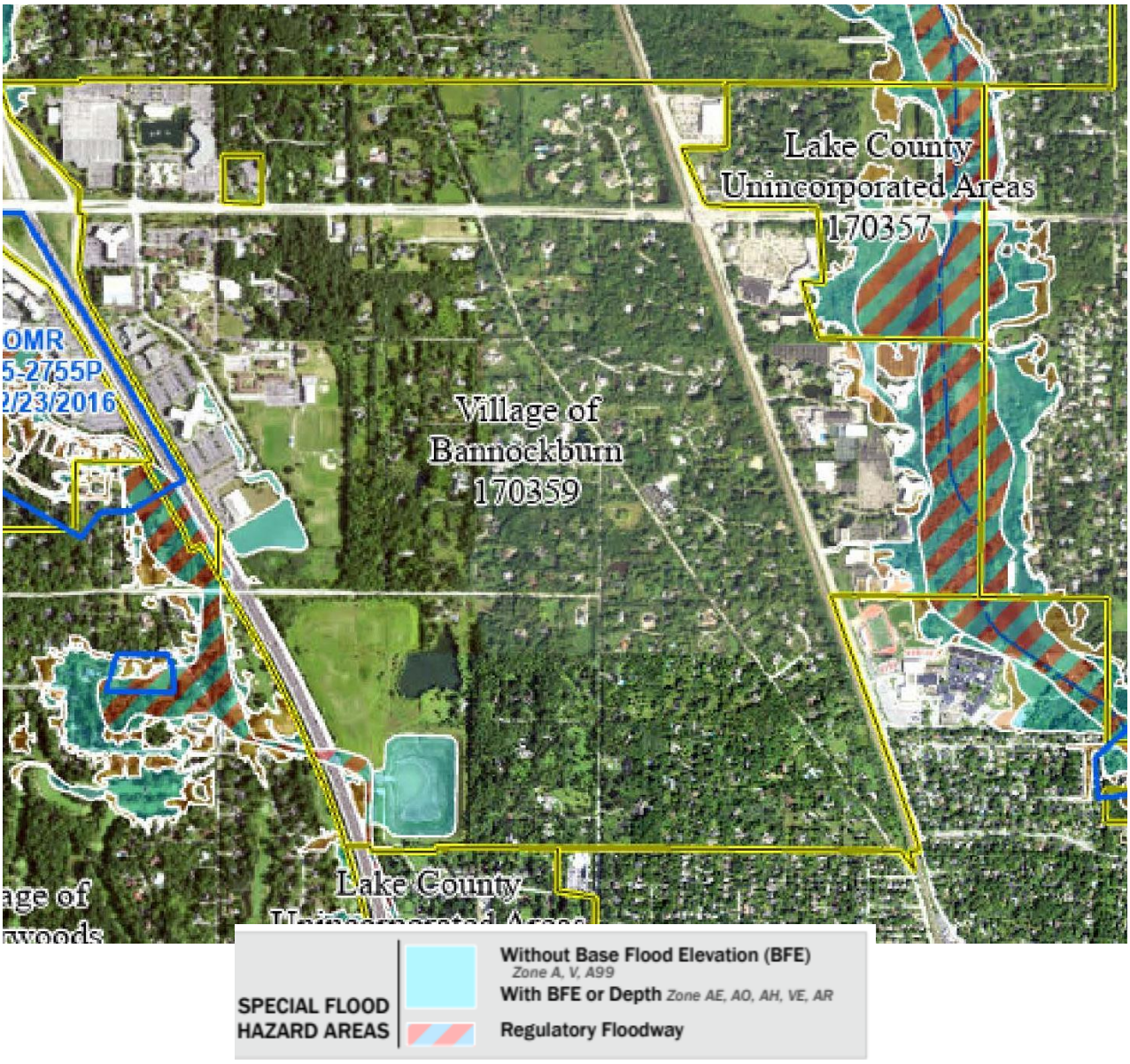
Once again, let's define a few terms here. First, the Earth has what is called a Hydrologic Cycle, which is pictured in a simple form to the right. All of the water that has ever existed on Earth was here when the Earth first formed around 5 billion years ago and has simply been recycled ever since then. 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. And there is another side of this story as well. 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. So what can we do 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. So 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 Bannockburn, three Zone AE areas, from the FEMA Flood Map Service Center:



Tree planting along any Zone AE 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. So by reducing runoff in Bannockburn, 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.

WORK PRIORITIES

The first work priority towards attaining Bannockburn's forestry goals will be to remove trees which are diseased, dying, or present a hazard. At present, there are 100 trees which have been called for removal during the inventory. Of these, 40 are listed as a Priority Removal, Dead and condition 6, 60 are listed as Standard Removals, Poor and condition 5, and 365 are listed as Low Priority Removals, Fair to Poor and Condition 4 based on the tree inventory data. A direct goal of this Urban Forestry Management Plan is to have all identified condition 5 and 6 trees marked as removals during the inventory to be removed within 2 calendar years of this plan's adoptions. Beginning this coming fiscal year, all the trees designated as priority or standard removals can be budgeted. In 2026, all the low priority removals, condition 4 trees can be monitored and removed as necessary and can be budgeted. In subsequent years, this plan projects a budget of the removal of 40 trees per year as an average.

By percentage, this is a below average number of removals in terms of comparably sized municipalities, with removals representing about 2% of the total population. Typically, municipal inventories reveal between 3-5% of the tree population requiring some form of removal.

After this initial 2 to 3 year period, in order to attain the goals set forth in the Diversity Standards, the background rate of tree removal is projected to be approximately 40 trees per year. From 2024 forward, reevaluation of the tree population on an annual or semiannual basis by the Village Forester or 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 40 trees be removed each year, this is simply a projection based on the existing inventory data.

Costs have been estimated using real time rates of contracted services for tree removal and stump grinding, based on current market pricing. No cost increase is assumed for the first 5 years, and a 3% annual cost increase is assumed thereafter. This is an estimate based loosely on the Consumer Price Index, but actual costs may likely be lower than projected. These numbers were calculated for budget forecasting only and may vary significantly, especially in the later years of this plan as variables change.

TREE REMOVAL ACTIVITY DESCRIPTIONS:

Safe Removal of a Tree to an Appropriate Flush Cut

Tree removal can be a very dangerous activity putting people, property, and workers in harm's way. Thus, all tree removal activities on Village of Bannockburn public property shall be performed under the guidance of a Certified Arborist or Arborist Trainee whether in house or contracted. The safe removal of a tree involves the removal and safe lowering of all portions of the secondary branches, scaffold branches, and finally the trunk of a tree by either a tree climber or a bucket truck operator. The stump must be flush cut so 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 roots shall be removed using an approved stump grinding machine, so that the stump is ground to a minimum depth of 6 inches, and no surface roots are visible to the naked eye. If the site is to be planted with a new tree, that depth shall be increased to 12 inches below the soil surface. This will ensure that a new tree may be successfully planted near the site of the removed tree, 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 Village depending on individual management needs for specific circumstances or contracts. If the area of removal is not to be immediately restored with new landscaping the stump hole must be filled and compacted to ground level using the debris resulting from the stump removal.

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 Village of Bannockburn public property shall always be at the discretion of the Village Forestry Consultant. Trees will never be removed without a sound reason from the Village or Forestry Consultant. Residents may request a tree to be removed for reasons NOT covered below, and these requests will be reviewed by the Village 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 the Village of Bannockburn be responsible for trees which are not in the right of way or on Village owned property.

Dead or Dying

If a tree is biologically dead or nearly dead, it will require removal. Trees which are standing dead, have approximately 50% dead crown or greater, or have less than approximately 40% structurally sound wood in the cross-section of the trunk shall be removed as expediently as practical. These determinations shall be at the discretion of the Village 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 the Village Arborist or Forestry Consultant shall be removed as expediently as possible in order to slow the spread of such insects and diseases. It is important to note that not all dead or declining trees need to be removed. If they do not present a hazard to functional uses of a Village maintained property and are not within falling distance of a road, structures, or areas where residents are congregating for recreation, etc., they can remain as habitat. In some cases, it may make sense to just have dead trees topped to a height where they will not be within striking distance of a road, for example.

Condition 4 Trees

A condition 4 tree is not usually in rapid decline, and can survive for many years. These trees should be monitored regularly for evidence of further decline, and be removed, pruned, cabled or receive other corrective measures to address any potential hazards as they present themselves over time. Trees cabled to provide structural stability should be reviewed regularly for soundness and to ensure that the cables are still functioning as intended, have not snapped, pulled through, etc.

Oaks rated condition 4 that were noted to have two-lined chestnut borer are candidates for treatment to prolong their lives; however when allocating budgets for treatment, as previously discussed, any tree that exhibits significant staghorning in the crown (the appearance of stubby, coarse dead branches without many fine dead branches), or more than 25% dieback in the crown may be in too far of a state of decline to respond to treatment due to the disruption of its ‘plumbing system’ by the insect, and expectations of the tree to overcome the infestation should be moderated, should a course of treatment be pursued.

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 Bannockburn 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.

The Village 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. The Village 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 Village may perform any actions necessary to abate public hazards so long as they are in compliance with all relevant Arboricultural standards and practices.

Damage from Construction or Vehicle Strike

The Village Forestry Consultant shall 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 Village Forestry Consultant.

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 Village Arborist and/or Forestry Consultant, 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 Village may agree to the removal within the next five years. Note that young and/or healthy trees will generally not be considered eligible for this program. 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, Bannockburn 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 the Village 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 Village 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 detailed view of the specific ANSI and ISA standards, please see Appendix I:

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 performing work as a contractor employed by the Village.
2. Only qualified utility arborists may perform tree removal operations within ten feet of an electric utility line. Village of Bannockburn contractors may complete the process of trunk removal and stump grinding only if the remaining portion of the tree is greater than ten feet from a transmission line.
3. The Village will not remove healthy trees in order to meet diversity goals, unless the tree poses a risk to persons or property.

4. The Village of Banockburn 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.

INVASIVE SPECIES REMOVAL

The Village has historically encouraged the preservation of buckthorn as a means to provide desired screening and meet bufferyard opacity requirements. Similar to many surrounding areas,there an understory dominated by invasive species including buckthorn, honeysuckle, Callery pear and white mulberry are common in the Village. Because these trees have voluntarily established, and many are less than 8" DBH, they were not included in the inventory, but they are playing a part in influencing the population dynamics of the woodlands in the Village none the less. Without intervention and active maintenance, the species composition of the wooded areas will become increasingly buckthorn-dominated with other species unable to establish seedlings that can compete for light and nutrients in the dense, closed-canopy buckthorn dominant understory, and will be unable to recruit the next generation of desirable native canopy trees and sub-layers that should comprise a healthy woodland structure. Over time, the population will continue to degrade until a dense one-dimensional 20'-30' tall buckthorn thicket remains. By comparison, a native oak, such as a swamp white oak will easily reach 50'-80' in height and provide a much more effective visual screen between adjoining lots or road frontages when combined with other suitable understory and shrub-layer species.

The management goal for the Village-maintained areas, and by extension, the broader woodland population extending across privately owned property, should be to achieve the desired screening effect through active management and enhancement, employing good forestry practices[1] to conduct the removal of invasive species, and create a multi-dimensional woodland structure consisting of native canopy, understory, shrub layer and ground-plane plants. This would include trees of varying ages as well. (Note: in the absence of invasive species, there will likely be the resurgence of native ground-plane species via what seeds still exist in the soil seed bank.)

In addition to invasive species removal, selective thinning of existing trees may be required as part of the enhancement process on some parcels. The concurrent goals being to create optimal stand density to promote woodland health and resilience, to create openings to accommodate any required planting activities to help create the desired multi-dimensional forest structure, and also create the necessary sunlight patterns/allow sufficient sunlight into a stand for the establishment of any plantings.

[1] Good Forestry Practices – the appropriate and proper implementation of any harvest, renewal and maintenance activities know to be appropriate for the forest and environmental conditions under which they are being applied, and that minimize detriments to forest values including significant ecosystems, important fish and wildlife habitat, soil and water quality and quantity, forest productivity and health and aesthetics.

The use of native species provides many benefits. Native species are well adapted to our area and have evolved together to form symbiotic relationships that support many different types of fauna including pollinators. Native species develop deep root systems which aid in their survival of the typical extended dry conditions in summer months, and also work to improve soil texture. Buckthorn, by comparison, is considered a stressor to a woodland ecosystem; it is known to alter soil pH, greatly increase soil nitrogen, and create higher moisture content in soils, all of which can create conditions that hasten the decline of some existing native species that inhabit an area that buckthorn is invading, further degrading a woodland and moving it toward a one-dimensional buckthorn thicket.

Enhancing understory species composition and transitioning it from one dominated by invasive species to one dominated by native species will require ongoing maintenance efforts, in accordance with current best management practices, to keep species such as buckthorn and honeysuckle from becoming re-established.

Attachment A is a PDF of the Lake County Forest Preserves 'Healthy Hedges' poster and illustrates how using native species, which have evolved with, and are suited to conditions here, can be used in combinations that will provide support to native species and help create effective screening. There are many planting options for creating the desired bufferyard and frontage screening desired by the Village, including options for wetter areas and shadier areas.

Enhancement with clearly defined long-term and short-term management goals and objectives combined with a well thought out planting plan and strategic plant placement will create an environment that meets the desired screening effect, and one that will also become an asset to the Village.

Species To Avoid:

At the time this document was written, there is not currently a definitive, unified list of recognized prohibited trees and shrubs, or trees and shrubs to avoid planting in Illinois or the region; different agencies and organizations maintain lists of invasive or potentially invasive plants, and knowledge about commercially cultivated species is evolving in terms of how plants interact with their environment, and ways they can become invasive over time. See Appendix E for the Village invasive species list.

There are various ways trees and shrubs can disrupt a woodland: primarily some trees and shrubs are known to "escape cultivation" and naturalize, or they can be aggressive seed producers and out-compete native species. Prior to embarking on planting projects, proposed plant species should be reviewed to see if there are currently any concerns for the potential to become invasive, and cause unwanted disturbance to the woodland or conflict with the Village's desired management objectives.

Trees from the genus Pyrus (pear trees) for example have cultivars (Bradford, Aristocrat, Cleveland Select) that are considered to be sterile; however, when the various cultivars are planted in proximity to one another, they cross-pollinate and produce viable seed which then escapes into the surrounding

environment, and these escaped trees can rapidly populate a wooded area once they establish a toehold along openings or perimeters. Escaped pears can easily blend in with their surroundings, but are quite apparent in spring when they flower.

Norway maples are an example of a species that is a prolific seed producer which gives them an edge in terms of quantity. In addition, they produce dense shade which minimizes the chance that other species will become established in the understory.

Examples of additional species that are currently not recommended for planting include and considered undesirable are located in Appendix D.

PLANTING STRATEGY OPTIONS for NATURALIZED AREAS

Whereas tree removal is necessary to promote public safety, planting of new trees must happen in order to increase diversity and maintain canopy cover. At present, the Village of Bannockburn has a very high stocking density at nearly 100%. As a means of attaining the goals of maintaining canopy cover and increasing overall diversity, this plan calls for the planting of about 865 trees over the coming 10 years, keeping plantings at nearly the same pace as removals. These trees will be planted by Village staff or planting 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 goals and milestones shown below, the program intends to keep plantings nearly at pace with removals and a multilayer planting approach will be implemented. This means that a variety of native understory species will be planted among existing mature shade trees.

For the costs of planting, an average of $400 per tree (installed) has been used based on Bannockburn's current costs ranging from $340-$450. We examine money saving ideas in further detail in the Additional Goals section.

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.

Site considerations:

1. There is species variation around the woodland which is influenced by soil type, terrain and hydrology (wet vs. drier).
2. Existing plant types should be used to guide supplemental planting by area.

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 within six weeks. Site restoration consists of removing a portion of the stump chips from the hole, mixing with a quality mineral topsoil, tamping down to match the surrounding grade, spreading grass seed over the t of the topsoil, and securing green turf blanket over the topsoil. This will ensure that grass grows back to restore the aesthetics and function of the park, and prevent tripping hazards from the removal scar. It should be noted here that given the nature of parks, it is not always recommended nor feasible to put a tree back where one was removed, and often a better site can be selected for a new plant than one which was removed. That said, restoration of the removal site to either turfgrass or native vegetation cover is of great importance.

Planting considerations:

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 “15-10-5 Rule”. Being targeted about 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 nearly all of these spaces will be planted.

The success of a tree depends on where and how it is planted. The Village 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.

1. There are two general supplemental planting categories:
   a. Plant fewer small-diameter (1" – 2" DBH) trees, or:
   b. Plant many seedlings/saplings and allow the trees to naturally find a stocking and recruitment equilibrium.

2. Planting stock options would be:
   a. Seedlings (small, bare-root stock trees, usually around 1 year old, approximately 1' tall, depending on species growth rate)
   b. Saplings (small bare-root stock trees 3'-4' tall, less than 1" caliper, more than 1 year old)
   c. Balled and burlapped trees (B+B) stock that is between 1" – 2.5" trunk caliper, root ball contained in burlap
   d. Balled and burlapped trees in larger diameter 3" - 6"+ caliper, for example (or larger as necessary to achieve objective) – Care to minimize disturbance of the root zones of existing trees should be taken with any larger-diameter tree planting in the woodland.

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 C.

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. The Village Forestry consultant should inspect and select every tree which is to be planted on Village property to minimize the possibility of installing lower quality nursery 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 to not to accept 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 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 industry Best Management Practices. It is generally recommended this be no less than 40 feet between plantings, with some exceptions for open spaces or smaller or shade tolerant 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, intersection, traffic control device, or known below ground utility. Trees may be planted under aboveground powerlines, but must be from the "Small" selections listed in the Preferred Species list in Appendix C. No evergreen species shall 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 Village-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. The Village has a robust watering program for new trees. For the first 2 years after planting, Village staff places a watering bag on new trees in spring and regularly fills those bags during times when rain does not provide adequate moisture to the soil. Watering bags are then removed from the young trees before winter to prevent potential damage to the bark.

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 Village'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 – Village of Bannockburn

1. Planting sites shall be determined and monitored using the Village's tree inventory, in conjunction with staff and Village Forestry Consultant input.
2. New planting sites should be 10 feet away from signage, driveways, intersections, and utility structures. If this distance cannot be maintained, the site should not be planted, even if a tree was removed from the same site.

3. Choice of species for planting should be done so according to the Village's species, spatial, and age-class diversity goals. A diverse and resilient urban forest minimizes exposure to financial, environmental, and health risks while maximizing aesthetics, environmental benefits, and ecosystem services to its residents.
4. Acceptable nursery stock shall conform to the following standards:
    a. All trees shall be between one (1) and two (2) inch minimum caliper measured at 6" above the root flare.
    b. Trees must be planted according to the ANSI A300 Standards.
    c. Less than 10% deadwood in the crown
    d. Root ball conforms to ANSI American Standard for Nursery Stock (ANSI Z60.1)
    e. Architecture consistent for the species, cultivar, or variety in question
    f. No included bark or other such narrow branch attachments, unless consistent with species or variety
    g. Free of pests or pathogens
    h. Approved species list for the Village of Bannockburn
5. Trees must be planted so that the root flare is at grade with the land. Some trees are planted with several inches of topsoil added to top of root ball. Root flare must be visible.
6. All trees must have the burlap, rope and wire basket removed at time of planting. (Ideally all, but the top 1/3 of the burlap is acceptable).
7. Any tape or ties in the crown need to be removed.
8. All trees must be purchased from U.S. Department of Agriculture Certified Nurseries.
9. All the new trees should be outfitted with deer protection, whether it be 5' wire fence or 4" diameter corrugated drainpipe slipped around the trunk. Fence diameter should be a minimum of 3' and shall be reviewed periodically and adjusted accordingly to accommodate tree branch growth. Once the trees reach 5" in diameter, the deer protection can be removed unless it is a thin-skinned species such as basswood or red maple and these should be protected in October and November during deer rutting season.
10. All trees shall have a cedar mulch ring around each tree, between two (2) and three (3) feet in diameter and two (2) to (3) inches thick of mulch shall cover the root ball. The mulch shall not touch the truck and shall not be deeper than 3 inches. All excess excavated material will be removed before placement of the cedar mulch ring.
11. Submit certification of trees to Village Manager for material acceptance for every delivery of Village trees.
12. Trees to be warrantied to be alive, healthy, and disease and insect free at time of installation and delivery.
13. Trees to be nursery grown stock pruned to produce vigorous and predominantly vertical growth.

14. Excavated tree pits must be backfilled with a planting soil mix to ensure proper growth and root development.
15. 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 Village of Bannockburn and its approved contractors.
16. All trees will be guaranteed, in writing, for one year from date of installation. Any trees that are dead or in an unhealthy condition, based on inspection by a Village representative will be replaced by the contractor at no expense to the Village of Bannockburn.
17. After initial installation watering, the trees should be watered weekly for the first growing season and as needed in subsequent growing seasons. If gator bags are used, ensure the tape has been removed which covers all of the drain holes on the bottom of the bag to allow for proper water flow.
18. The Village will provide the contractor with a list and location of trees to be planted.
19. The Contractor will notify the Village Manager at least 2 weeks prior to installation.
20. The Village will stake location of tree planting at least one week prior to installation.
21. The contractor will make all arrangements with the JULIE to identify utility locations where trees are to be planted a minimum of three days before planting.
22. The Village reserves the right to reject any and all bids, to waive any irregularities in the bids and to accept the bid which the Village believes to be in its best interest, all factors considered.
23. Trees must be staked on a minimum of two sides to ensure proper growth.
24. Residents shall be permitted to plant trees on the Village-owned right-of-way, if purchased independently and conform to all species, spacing, and proper planting requirements as specified by the Village of Bannockburn.

PLANTING OPTIONS:

1. Monitor the site to wait and see how the gaps fill in over time, while managing for invasive species, to allow development of oak seedlings from annual crop of acorns. Larger existing trees either approaching or currently within the canopy layer with crowns that were either co-dominant-to or suppressed-by the formerly existing canopy tree will be recruited over time to the upper canopy level and gradually fill in the gap created as well.

   Benefits: The trees will recruit from the local genetic type which have successfully survived on the site for centuries. Trees from a local gene type contain traits that can make them adaptable and genetically unique to a local area. I.E. white oaks exhibit commonly accepted traits that classify them as white oaks, and are very similar to one another in appearance; however, there are slight genetic differences in white oaks indigenous to Lake County, IL, as opposed to Southeast Minnesota or eastern Tennessee, for example, that make them particularly adapted and genetically unique to Lake County. Generally, specifying planting stock grown in southeast

Wisconsin or northern Illinois is sufficient, and it is not to say that a white oak planted from stock originating from outside the area won't be successful when planted in Lake County, but there can be certain intangible benefits from selecting planting stock originating from a local geographic area.

Disadvantages: Depending on the duration of a wait-and-see plan, time can be lost getting the next generation of trees established if there is diminished regeneration from the acorn crop on the site. Oaks generally do not produce acorns until they are around 25 years old.

2. Plant a few – to –several small caliper (1" – 2.5" caliper) trees in the gaps.

   Benefits: Immediate observable results to fill in any gaps.

   Disadvantages: Taking into consideration purchase, transportation, and planting requirements, fewer trees could be planted at a greater expense.

   Excavating for the root ball can impact the roots of existing trees. Care should be taken to minimize disruption of the root zones of existing trees where root excavation takes place to plant small caliper trees. Minimize soil compaction while transporting planting stock to planting location.

3. Plant many seedlings or saplings in the gaps.

   Benefits: Hundreds of seedlings or saplings can be purchased for the same cost of a few small caliper trees. As mentioned above, planting large quantities of seedlings or saplings will allow the trees to find their own recruitment and stocking equilibrium.

   Disadvantages: Managing expectations is perhaps the largest obstacle with planting a large quantity of seedlings or saplings. For example, if 1,000 seedlings or saplings are planted in a particular amrea, a reasonable expectation might be that 70-90 of these trees have established themselves in 20 years' time. There should be ongoing loss expectations, whether this is due to natural events (insect, disease, too wet conditions, too dry conditions, storm damage, larger neighboring trees shedding limbs, etc.), or seemingly unexplainable causes; trees can die at various ages for unknown reasons. However, the trees that do survive are the ones best suited to the site conditions.

4. Hybrid/blend option: Establish sample plots to simultaneously undertake a blend of options 1-3 above, and evaluate the results over time:

   Plot 1 type: Control plot to monitor native species recruitment and establishment progress over time, while controlling for invasive species.

   Plot 2 type: B+B type planting plot

   Plot 3 type: Seedling/sapling planting plot

Sample plots can be marked in the field with flags for easy identification and trees can be individually fenced or protected with tree tubes, or fenced around the perimeter to exclude browsing wildlife.

5. Regardless of if one type of planting is pursued over the other, or if a blend is used, consistent periodic monitoring should be conducted to determine what plan of action to take based on field conditions, and to determine effectiveness of actions taken over time, so any future supplemental planting plans can be adjusted accordingly.

LONG-TERM MAINTENANCE

Establish Proactive Work Scheduling/Establishing a Pruning Cycle

Proactive tree health care is a more consistently applied approach to management, as opposed to reactive tree health care which only addresses issues as they come up. Proactive care allows resources to used more efficiently and allows goals and desired management objectives to be set and pursued methodically. The focus should be on managing the landscape well in order by incorporating regularly scheduled work such as pruning and hazard reduction in order to promote healthy trees, and reducing (or minimizing to the extent possible) unscheduled work hazards and storm damage.

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 Bannockburn begin to budget for this essential expense.

Pruning Cycle

Tree pruning is critical to the health and wellbeing of a tree and it is the one constant need in a tree's life time when a tree exists in a location where regular interactions with people and property intersect. Tree pruning helps to provide for public safety, and it significantly reduces the potential for storm damage as the tree reaches maturity.

Pruning objectives should include, but are not limited to one or more of the following: risk reduction, management of tree health, clearance (maintain road access and walkway clearances, lighting clearances and sight lines), structural improvement/correction, view improvement/creation, aesthetic improvement and restoration.

A comprehensive tree pruning program should address the needs of newly planted trees, trees that are in mid-life and trees that are past mid-life, and may be starting to decline but still provide value and benefits to the landscape. Depending on the needs of the tree population and budget constraints, this

cycle would ideally be a 5 – 7 year interval. Not every tree will need to receive corrective action during every cycle, however they should at least be reviewed to identify any needs that should be addressed.

Trees should be assigned to a size-class to target pruning work:

Size class 1 – trees that can be pruned by ground crews (DBH is less than 5")

Size class 2 – trees that require climber crews (DBH is between 5 and 15")

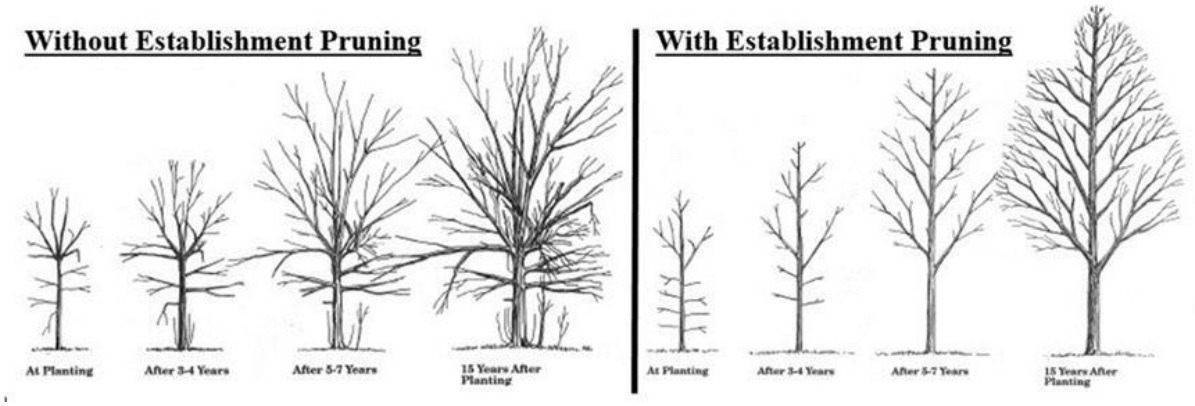
Size class 3 – trees that require tower crews (DBH is greater than 15")

Integrating Newly Planted Trees into Maintenance Cycle

Formative pruning, conducted on young trees, has the greatest long-term impact on tree health and survival, and fosters good tree form. Newly planted trees should be pruned once every three (3) years for the first 15 years it is in the ground to encourage good branching structure. After the 15 year establishment period, the tree should be incorporated in to the regular (5-7 year) pruning cycle.

Pruning of Young Trees

For the purposes for 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 great 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 loose 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 Village of Bannockburn shall not be responsible for the pruning of trees located on private property. The Village reserves the right to prune portions of trees overhanging public property, but is under no legal obligation to do so, and will perform such pruning at the discretion of the Village Arborist and/or 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 Village, 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 Village 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 – Village of Bannockburn

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 Village of Bannockburn employee unless certified as a qualified Utility Arborist.
3. No cabling, bracing, or other such support systems shall be installed in Village-owned trees, either by the Village of Bannockburn, its residents, or any contractors. Exception may be made by obtaining prior written approval of the Village.

4. No heading, pollarding or espalier pruning shall be conducted on Village-owned trees, and no wound dressings shall be used under any circumstances, without a permit and prior written approval of the Village of Bannockburn.
5. The need for pruning and maintenance of individual trees and parkways shall be at the discretion of the Village of Bannockburn 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 put the tree in danger of severe dieback, and removal should be considered at that point.

OTHER GENERAL MAINTENANCE

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. Currently, the Village does not have a Certified Arborist on staff.

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

Chemical Applications

Trees, 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.

Historically, the Village of Bannockburn has generally not had a policy that officially allows residents to treat Village trees for Emerald Ash Borer, Dutch Elm Disease, Apple Scab, or other common disorders. However, in the future, consideration may be given to implementing a free permitting process to allow residents to perform chemical applications on Village trees for common pests or pathogens. The Village will not bear any financial responsibility, nor liability, associated with the costs of such treatments, and treatments must be performed by a Certified Arborist who holds a valid Pesticide Applicators license. Such work may be denied or revoked for utilizing unqualified contractors, potentially hazardous chemicals, or

any other reason at the discretion of the Village. Additionally, trees being treated by residents may still be removed at the discretion of the Village for any reason.

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 particularly susceptible to stress due to prolonged drought. Young trees need supplemental watering, which is an essential maintenance activity and can prevent newly planted tree mortality.

As we anticipate approximately 865 additional trees being planted over the course of the next 10 years, this concept becomes very important. The Village has a robust watering program for newly planted trees. For the first 2 years after planting, Village staff places watering bags on new trees in spring and regularly fills those bags during times when rain does not provide adequate moisture to the soil. Watering bags are then removed from the young trees before winter to prevent potential damage to the bark.

Mulch

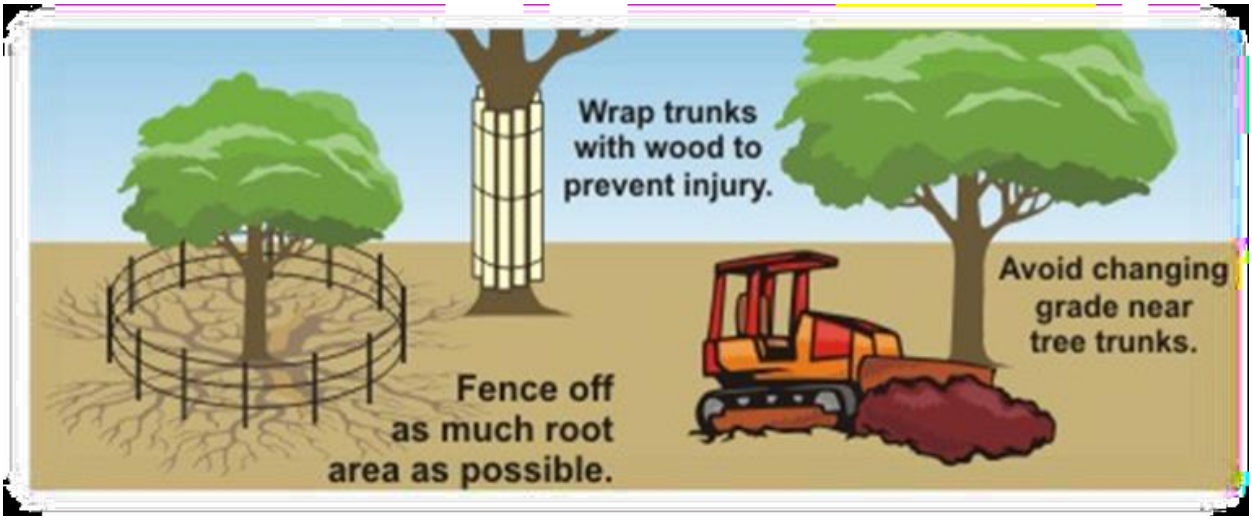
Proper application of mulch is a necessary and cost-effective maintenance activity. Mulch has many benefits, including reducing weed growth in the root zone, protecting the tree trunk and root flare from lawn maintenance equipment, allowing water to move into the soil, reducing evaporation and drought stress, and creating a naturally fertile soil environment. Turf grass typical of parkways 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. All

newly planted trees should have mulch applied appropriately. A goal for Bannockburn 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 tree 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. 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 – Village of Bannockburn

1. A tree survey shall be performed by a qualified individual prior to the beginning of any development activities.
2. The Tree Survey and a Tree Protection Plan should be required be submitted to the Village of Bannockburn and all relevant architects, engineers, and workers, detailing the following:
    a. Location of the subject property, including street address or legal description.
    b. Size of the subject property.
    c. Any recorded plat, deed, or covenant that indicates that all or part of the subject property is located within a conservancy area.
    d. Number, size, species, class, and condition of trees which will be removed or destroyed.
    e. Trees to be preserved.
    f. Number, size, species, class, and condition of trees which might be damaged or destroyed by the proposed use change or any activity taken in connection therewith, and a tree preservation plan setting forth the steps to be taken to prevent such damage or destruction and any necessary remedial action.
    g. A tree preservation plan provided in connection with construction activity shall incorporate at least the techniques and safeguards detailed in the Village Code 216.6 Section E.
3. For more information on tree preservation and replacement requirements see Bannockburn Ordinance Chapter 216-6 Trees and Woodland Protection.

INTEGRATING INVENTORY AND TREE HEALTH CARE

A tree inventory should be considered as a 'living document'. It should be updated and maintained as trees are added to and subtracted from the landscape.

A properly maintained tree inventory listing can aid with planning, budget management, work reporting, insect and disease control, and warranty tracking of newly planted trees to protect (maintain and enhance) both the asset value of trees and public safety.

As a supplement to conducting a 'hard update' of the tree inventory every 10-15 years, a consistent tree risk assessment program for early identification, monitoring and appropriate corrective actions of potential hazards should be incorporated.

TREE RISK ASSESSMENT

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 and the corresponding ANSI A300 Part 9 Tree Risk Assessment Standards which are general guidelines that can be modified to suit the needs and requirements of a tree risk manager based on their acceptable risk threshold. 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.

There are three levels of risk assessment:

Level 1: Limited Visual Assessment

This is the basic assessment of individual trees or tree populations using one, two or three factors of assessment (likelihood of failure, likelihood of impact, consequences of failure) as a constant, to identify trees with imminent and/or probable likelihood of failure while looking for obvious defects. This is a rapid assessment (i.e. a drive by review, aerial review, or walk-by review). This is usually a precursor to a more detailed assessment of specific trees.

Level 2: Basic Assessment

This is a more detailed and thorough inspection of a tree from a 360° perspective, and often employs the use of tools to complete the assessment such as binoculars, probes, or mallets to identify conditions that are visible from ground-based visual inspections, taking into account the site, buttress roots, trunk and branches. A tree inventory is considered to be a Level 2 risk assessment.

Level 3: Advanced Assessment

This is the most detailed level of assessment which provides detailed information about specific tree parts, defects, targets and /or site conditions. Specialized equipment is often required to complete the assessment such as aerial access equipment, and resistographs or sonic tomography equipment to detect decay.

Trees should be evaluated after storm or high wind events. Pruning or removing trees damaged by storms removes hazards and mitigates conditions that will impact tree health. In high-activity areas, trees should be evaluated for hazards on an annual basis. In low-activity areas, trees could be evaluated once every two or three years.

Trees of concern in the Village that are identified in between inventory updates or after storm event reviews as directed by Village staff are usually identified via self-reporting by residents or as observed/noted during police patrols or Village staff observations, and followed-up on by the Village

Arborist who provides recommendations to the Village Manager or their designee on any corrective actions as necessary.

The Village of Bannockburn trees were found to have no observable risk level. Any tree found to pose an Elevated risk level are monitored and / or inspected by the Village Forester and a threshold of risk tolerance will be established.

ADMINISTRATION AND IMPLEMENTATION OF VOLUNTEER PROGRAM

Although the Village currently does not use volunteers for tree care activities, well trained citizens are often valuable assets to the existing labor force. Residents interested in becoming forestry volunteers would be required to participate in training exercises. A graduated series of classes would provide training to qualify residents in a variety of activities, from simple plantings to more advanced pruning. TreeKeepers is a program that has been instituted successfully in several Illinois communities to train and utilize volunteers for tree care activities. Openlands' TreeKeepers offers certification program and is an ever-growing community of tree ambassadors that care for the Urban Forest in Chicagoland. As the interest in Urban Forestry spread in northern Illinois, TreeKeepers is a successful model for the development of citizen stewardship programs. For residents not interested in joining a formal program like TreeKeepers, it is recommended the Village hold spring and fall education sessions for the public. These sessions could be taught by a Forestry Consultant, and would cover tree planting, watering, fertilization, pruning, and the basics of insects and diseases. Additionally, basic tree care pamphlets can be made available at the Village office. The Village can utilize its printed newsletter, online platforms, and social media to provide educational tools to residents.

QUALIFICATIONS, TRAINING, SUPPORT AND NEEDS

Personnel

In order to streamline Urban Forestry Operations, tasks will be assigned to various staff and contractors/consultants.

Village Manager

The Village Manager is responsible for implementing forestry programs with the approval and cooperation of Bannockburn Village Board. 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. The duties of the Village Manager may be delegated to the Assistant Village Manager or Police Chief/Public Works Director, however, with regards to the consultant, the Village will ensure that no conflict of interest exists in doing so.

Forestry Consultant

The Forestry Consultant is responsible for impartially assessing the tree population on a periodic basis, at the discretion of the Village Manager or their designee. The Forestry Consultant communicates the needs of the trees to the Village Manager or their designee so that individual needs in terms of tree planting, removal, and maintenance can be performed. The Forestry Consultant may also function as the Forestry Superintendent at the request of the Village.

Tree Care Contractors

Tree Care Contractors are responsible for performing work identified by the Village Manager or their designee, in a timely, safe, and expeditious manner. 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.

Police Chief/Public Works Director

The Police Chief/Public Works Director or their designee can exercise authority related to decision-making concerning the pruning.

Assistant Village Manager

The Assistant Village Manager or their designee can exercise authority related to decision-making concerning the removal of parkway, open space and village owned trees.

Tree Commission

The Village Architectural Review Commission serves as the Bannockburn Tree Commission. The Commission serves as recommending body. The role of the Commission is to provide assistance, direction and expertise to the Village of Bannockburn regarding the preservation, planting, management and protection of trees. The Tree Commission shall utilize the urban forest management plan for guidance on urban forestry issues.

SUMMARY / CONCLUSION

The Village of Bannockburn has a long history of maintaining a top-tier urban forest. The current status of the urban forest resource in Bannockburn is that it is extraordinarily well cared for, and a highly diverse tree population overall.

That said, there are always areas where enhancements can be made, and this Urban Forest Management Plan has attempted to do so. Such goals increasing the species diversity, consideration of growing some nursery stock on Village-owned land, and increasing overall tree canopy using a multi-layered approach, among many others, are areas where the Village could make a great program even better.

And it is worth mentioning as we conclude this plan that urban forestry and care and maintenance of trees is a journey, and not a destination. It is of the utmost importance that this plan and its goals be reviewed every year or every other year so that evaluation of goals can be made, and the urban forestry program can be adaptively managed. Trees are long-lived organisms, and must fight through many circumstances, both known and unforeseen. Therefore, this document is meant to be a starting point, and not an ending point. Now with goals established, those goals can continually be reevaluated for success or failure and altered as necessary.

We hope that the value of trees to the community has been shown here, both in terms of hard dollars as well as some of the intangible services such as pollution reduction and carbon sequestration. These are things that many people do not consider in their daily lives, and we hope that reading this document has helped to establish a sense of wonder about trees and the benefits they provide society.

We also hope that this document helps to advance the field and science of Arboriculture, and the culture of safety that it thrives on. All too often, we see people looking at the urban forest as “just a bunch of trees”, when in reality, and as hopefully this document has shown, the situation is far more complex than that. There are excellent careers to be had in the green industry and specifically in Arboriculture, and it is hoped that maybe this document has inspired or will at some point inspire people to consider this as a career option.

We thank the Village of Bannockburn and its staff and local stakeholders for their partnership in writing this plan, as well as the funding streams from the US Forest Service and Illinois Department of Natural Resources through the Morton Arboretum. The Village of Bannockburn has a bright future ahead if it in terms of Urban Forestry, and it has been a pleasure being part of that process.

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.

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 Village as part of an independently owned and operated private company which performs work for the Village, but who are not directly employed by the Village.

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

Crew Leader: Any personal who 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 Village.

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 Village 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 Village 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 Village of Bannockburn, on either a full-time or Part-Time Basis.

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

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

Park District Property: Land which, by deed or title, belongs to the Village of Bannockburn.

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

Part-Time: An employee who has regular employment through the Village 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 Village of Bannockburn.

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 Village 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 Bannockburn Staff.

Sound Wood: Structurally sound, non-decayed, non-compromised wood in the trunk or scaffold branches.

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

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

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

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

Unmanaged: A tree or shrub which is in an area of the Village of Bannockburn 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.

Resources

Resource Title	Organization	Web Address
ANSI Standards	American National Standards Institute	American National Standards Institute - ANSI Home
Climate Change Resource Center	Forest Preserve U.S. Department of Agriculture	Climate Change Resource Center | US Forest Service Research and Development (usda.gov)
CRTI Muncipal Canopy Summaries	Chicago Region Trees Initiative	Municipal Canopy Summaries of Chicago Region | Chicago Region Trees Initiative (chicagorti.org)
Healthy Hedges	Lake County Forest Preserves	Native Plants - Conservation | Lake County Forest Preserves (lcfpd.org)
Management of Invasive Plants and Pests of Illinois	Morton Arboretum	Management-of-Invasive-Plants-and-Pests-of-Illinois.pdf (mortonarb.org)
Northern Illinois Tree Species List	Morton Arboretum	Northern-Illinois-Tree-Species-List_092022-1.pdf (mortonarb.org)
Selecting and Planting Trees	Morton Arboretum	14CT_Tree Selection Planting_BRCH.indd (mortonarb.org)
Stormwater to Street Trees	US Environmental Protection Agency	Stormwater to Street Trees: Engineering Urban Forests for Stormwater Management (EPA 841 B 13 001)
Urban Forest Best Management Practices for Public Works Managers	ICMA	306726_UrbanForestryManagementPlan.pdf (icma.org)
Urban Forest Management Plan	Village of Glencoe	Glencoe Urban Forestry Management Plan 06.10.2022.pdf (revize.com)
Urban Forest Management Plan	Village of Oak Park	oak_park_urban_forest_management_plan_-_1.30.2024.pdf (oak-park.us)
Urban Forest Management Plan	Crystal Lake Park District	CrystalLakeParkDistrict_UrbanForestryManagementPlan_6_18_201.pdf (crystallakeparks.org)
Using Trees & Vegetation to Reduce Heat Islands	US Environmental Protection Agency	Using Trees and Vegetation to Reduce Heat Islands | US EPA
Healthy Habitats Brochure	Lake County Forest Preserves	Healthy Habitats Brochure.indd (lcfpd.org)
Management Plans and UCF Management Tools	Illinois Department of Natural Resources	https://dnr.illinois.gov/conservation/forestry/urbanforestry/trmanagementplans.html

APPENDIX A

Street Tree Inventory – Recommended Removals Priority 1 Trees (Condition 5 and 6)

Botanical Name	Common Name	Cond 5	Cond 6
Abies concolor	Concolor Fir	1	
Acer negundo	Boxelder Maple	2	
Acer saccharinum	Silver Maple	1	
Acer saccharum	Sugar Maple	1	1
Acer x freemanii	Freeman Maple		1
Carpinus caroliniana	Blue Beech (Musclewood, American Hornbeam)	1	
Carya ovata	Shagbark Hickory	1	
Celtis occidentalis	Common Hackberry	1	
Cercis canadensis	Redbud	1	
Crataegus crus-galli var. inermis	Thornless Cockspur Hawthorn		1
Crataegus phaenopyrum	Washington Hawthorn	2	2
Crataegus spp.	Hawthorn	1	
Fraxinus pennsylvanica	Green Ash	1	6
Juglans nigra	Black Walnut	5	2
Malus spp.	Crabapple	7	3
Picea glauca	White Spruce		1
Picea pungens	Colorado Blue Spruce	5	3
Pinus nigra	Austrian Pine		1
Prunus serotina	Black Cherry	1	
Quercus alba	White Oak	1	
Quercus ellipsoidalis	Hill's Oak	2	
Quercus macrocarpa	Bur Oak	1	1
Quercus rubra	Northern Red Oak	1	1
Rhamnus cathartica	Common (European) Buckthorn	1	
Robinia pseudoacacia	Black Locust	1	2
Salix nigra	Black Willow	1	
Syringa reticulata	Japanese Tree Lilac	1	
Tilia americana	Basswood (American Linden)	11	7
Tilia americana 'Redmond'	Redmond Linden	2	
Ulmus americana	American Elm	5	7
Ulmus pumila	Siberian Elm	2	
Ulmus rubra	Slippery Elm		1
	Total Condition 5 and 6 Trees	**60**	**40**

Priority 2 Trees (Condition 4 trees)

Botanical Name	Common Name	Cond 4
Abies concolor	Concolor Fir	1
Acer negundo	Boxelder Maple	5
Acer nigrum	Black Maple	1
Acer platanoides	Norway Maple	12
Acer rubrum	Red Maple	3
Acer saccharinum	Silver Maple	16
Acer saccharum	Sugar Maple	6
Acer x freemanii	Freeman Maple	1
Amelanchier arborea	Downy Serviceberry (Juneberry, Shadbush)	3
Amelanchier spp.	Serviceberry	3
Betula nigra	River Birch	3
Carpinus caroliniana	Blue Beech (Musclewood, American Hornbeam)	1
Carya cordiformis	Bitternut Hickory	2
Castanea sativa	European Chestnut	1
Celtis occidentalis	Common Hackberry	1
Cercis canadensis	Redbud	4
Crataegus crus-galli	Cockspur Hawthorn	2
Crataegus crus-galli var. inermis	Thornless Cockspur Hawthorn	2
Crataegus phaenopyrum	Washington Hawthorn	51
Crataegus spp.	Hawthorn	4
Fraxinus pennsylvanica	Green Ash	3
Ginkgo biloba	Ginkgo (Maidenhair Tree)	1
Gleditsia triacanthos	Common Honeylocust	8
Gymnocladus dioicus	Kentucky Coffeetree	2
Juglans nigra	Black Walnut	24
Juniperus virginiana	Eastern Red-cedar	2
Malus spp.	Crabapple	30
Morus alba	White Mulberry	2
Ostrya virginiana	Ironwood	1
Picea abies	Norway Spruce	5
Picea pungens	Colorado Blue Spruce	19
Pinus nigra	Austrian Pine	7
Pinus strobus	Eastern White Pine	2
Pinus sylvestris	Scots Pine	2
Populus deltoides	Cottonwood	5
Populus tremuloides	Quaking Aspen	1

Botanical Name	Common Name	Cond 4
Prunus spp.	Cherry	1
Prunus subhirtella var. pendula	Weeping Cherry	2
Pyrus calleryana	Callery Pear	2
Quercus alba	White Oak	3
Quercus bicolor	Swamp White Oak	6
Quercus ellipsoidalis	Hill's Oak	3
Quercus macrocarpa	Bur Oak	19
Quercus muehlenbergii	Chinquapin Oak	2
Quercus rubra	Northern Red Oak	7
Rhamnus cathartica	Common (European) Buckthorn	3
Robinia pseudoacacia	Black Locust	3
Syringa reticulata	Japanese Tree Lilac	3
Thuja occidentalis	Eastern Arborvitae	8
Tilia americana	Basswood (American Linden)	27
Tilia americana 'Redmond'	Redmond Linden	3
Tilia cordata	Littleleaf Linden	1
Ulmus americana	American Elm	25
Ulmus pumila	Siberian Elm	10
Ulmus x spp.	Hybrid elm	1
	Total Condition 4 Trees	**365**

APPENDIX B

Invasive Species Removal Locations – Village Rights-of-Way

Potential Locations of Invasive Species Removal / Restoration in Village RIGHT-OF-WAY

Address	Notes
1815 Telegraph	Remove buckthorn, honeysuckle
10 Bannockburn Ct.	Remove large diameter (4”-6”) multi-stem buckthorn
3 Bannockburn Ct.	Remove 2”-4” multi-stem buckthorn, honeysuckle
1955 Telegraph	Remove 2”-4” buckthorn, honeysuckle - narrower right-of-way, hydrant
1380 Valley	Remove dense honeysuckle, some 2”-3” buckthorn - wet area
2805 Telegraph	Remove dense buckthorn, honeysuckle
2360 Telegraph	Remove honeysuckle, small ash, small black walnut
2250 Telegraph	Remove honeysuckle, buckthorn, multi-flora rose - partially cleared
1560 Robin Road	Remove dense honeysuckle, buckthorn
1963 Wilmot Road	Remove large diameter buckthorn length of right-of-way
2125 Wilmot Road	Remove dense buckthorn
2250 Telegraph Road	Remove buckthorn, honeysuckle length of Wilmot Road
1875 Duffy Lane	Remove thin line of buckthorn
1675 Duffy Lane	Remove thin line of buckthorn
2030 Wilmot Road	Remove buckthorn north of path
1900 Wilmot Road	Remove dense small diameter buckthorn on Sunset
2000 Meadow	Remove mostly dense honeysuckle, some buckthorn
1915 Meadow	Remove line of honeysuckle
1944 Meadow	Remove line of honeysuckle, buckthorn
2125 Telegraph	Remove buckthorn along Stirling
2000 Half Day	Remove buckthorn, teasel, phragmites along Lakewood
2250 Wilmot	Has hickory regeneration

APPENDIX C

Preferred Species List

Preferred Tree List			
Common Name	**Genus**	**Species**	**Type**
Bald-Cypress (1)	Taxodium	distichum	Native
Basswood, American	Tilia	americana	Native
Beech, American (1)	Fagus	grandifolia	Native
Beech, European (1)	Fagus	sylvatica	Non-Native
Birch, River	Betula	nigra	Native
Blackhaw Viburnum	Viburnum	prunifolium	Native
Buckeye, Ohio	Aesculus	glabra	Native
Buckeye, Yellow	Aesculus	flava	Native
Carolina Silverbell	Halesia	carolina	Native
Catalpa, Northern	Catalpa	speciosa	Native
Catalpa, Purple	Catalpa	erubescens	Native
Coffeetree, Kentucky	Gymnocladus	dioicus	Native
Crabapple	Malus	cultivars & spp.	Native
Crabapple, Prairie	Malus	ioensis	Native
Dogwood, Cornelian-Cherry	Cornus	mas	Non-Native
Dogwood, Flowering	Cornus	florida	Native
Dogwood, Kousa	Cornus	kousa	Non-Native
Eastern Red Cedar	Juniperus	virginiana	Native
Elm (Hybrids & Cultivars)	Ulmus	spp.	Non-Native
Fir, Concolor	Abies	concolor	Non-Native
Ginkgo (male selections)	Ginkgo	biloba	Non-Native
Hackberry	Celtis	occidentalis	Native
Hackberry, Sugar / Sugarberry	Celtis	laevigata	Native
Hazelnut, American	Corylus	americana	Native
Hazelnut, Turkish	Corylus	colurna	Non-Native
Hickory, Bitternut	Carya	cordiformis	Native
Hickory, Mockernut	Carya	tomentosa	Native
Hickory, Pignut	Carya	glabra	Native
Hickory, Shagbark	Carya	ovata	Native
Honey Locust	Gleditsia	triacanthos	Native
Hophornbeam, American	Ostrya	virginiana	Native

Preferred Tree List			
Hornbeam, American (Ironwood)	Carpinus	caroliniana	Native
Hornbeam, European	Carpinus	betulus	Non-Native
Horse-chestnut	Aesculus	hippocastanum	Non-Native
Horse-chestnut, Red	Aesculus	x carnea	Non-Native
Katsura Tree	Cercidiphyllum	japonicum	Non-Native
Linden, American	Tilia	americana	Native
Linden, Little-leaf	Tilia	cordata	Non-Native
Linden, Silver	Tilia	tomentosa	Non-Native
Locust, Black	Robinia	pseudoacacia	Native
Magnolia, Cucumber	Magnolia	acuminata	Native
Magnolia, Sweetbay	Magnolia	virginiana	Non-Native
Maple, Black	Acer	nigrum	Native
Maple, Paperbark	Acer	griseum	Non-Native
Maple, Red	Acer	rubrum	Native
Maple, Sugar	Acer	saccharum	Native
Oak, Black	Quercus	velutina	Native
Oak, Bur	Quercus	macrocarpa	Native
Oak, Chestnut	Quercus	montana	Native
Oak, Chinkapin	Quercus	muehlenbergii	Native
Oak, English	Quercus	robur	Non-Native
Oak, Hill's	Quercus	ellipsoidalis	Native
Oak, Northern Red	Quercus	rubra	Native
Oak, Scarlet	Quercus	coccinea	Native
Oak, Shingle	Quercus	imbricaria	Native
Oak, Shumard	Quercus	shumardii	Native
Oak, Swamp White	Quercus	bicolor	Native
Oak, Ware's	Quercus	x warei 'Nadler'	Non-Native
Oak, White	Quercus	alba	Native
Pagoda Tree, Japanese	Styphnolobium	japonicum	Non-Native
Parrotia	Parrotia	persica	Non-Native
Pawpaw, American	Asimina	triloba	Native
Pecan	Carya	illinoinensis	Native
Persimmon	Dispyros	virginiana	Native
Pine, White	Pinus	strobus	Native
Planetree, London	Platanus	x acerifolia	Non-Native
Redbud, Eastern	Cercis	canadensis	Native

Preferred Tree List			
Redwood, Dawn	Metasequoia	glyptostroboides	Non-Native
Sassafras	Sassafras	albidum	Native
Serviceberry, Allegheny	Amelanchier	laevis	Native
Serviceberry, Common	Amelanchier	arborea	Native
Smoketree, American	Cotinus	obovatus	Native
Smoketree, Eurasian	Cotinus	coggygria	Non-Native
Sweet-gum, American	Liquidambar	styraciflua	Native
Sycamore, American	Platanus	occidentalis	Native
Tamarack (1)	Larix	laricina	Native
Tuliptree (1)	Liriodendron	tulipifera	Native
Tupelo, Black	Nyssa	slyvatica	Native
Walnut, Black	Juglans	nigra	Native
White Fringe Tree	Chionanthus	virginicus	Non-Native
Willow, Weeping (Niobe)	Salix	alba 'Niobe'	Non-Native
Yellowwood	Cladrastis	kentukea	Non-Native
Zelkova, Japanese	Zelkova	serrata	Non-Native

APPENDIX D

Undesirable Species List

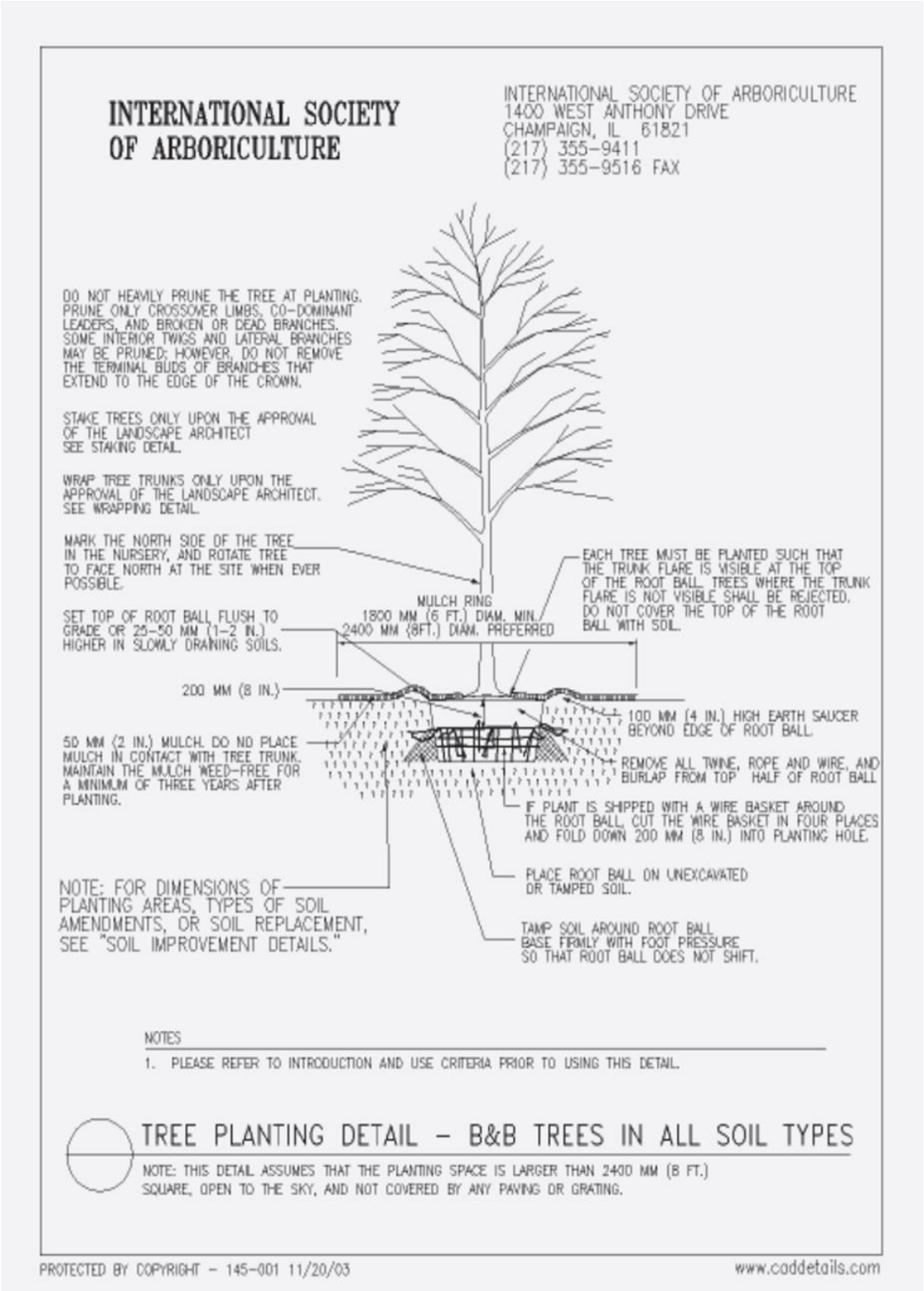
Undesirable Species List		
Common Name	**Genus**	**Species**
Alder, Speckled	Alnus	incana ssp. Rugosa
Amur, Corktree	Phellodendron	amurense
Ash	Fraxinus	spp.
Austrian pine	Pinus	nigra
Birch, Gray	Betula	populifolia
Birch, Paper	Betula	papyrifera
Blue Spruce	Picea	pungens
Burning Bush	Euonymus	alatus
Butternut/White Walnut	Julgans	cinerea
Cottonwood**	Populous	deltoides
European Cranberry Bush	Viburnum	opulus
Maple, Silver	Acer	saccharinum
Oleaster	Elaeagnus	pungens
Osage Orange	Maclura	pomifera
Pine, Red	Pinus	resinosa
Poplar, Black	Populus	nigra
Poplar, White	Populus	alba
Scots Pine	Pinus	sylvestris
Siberian Elm	Ulmus	pumila
Willow*	Salix	alba
*** except for cultivar 'Niobe' due to hardiness**		
**** except for seedless / cottonless cultivars**		

APPENDIX E

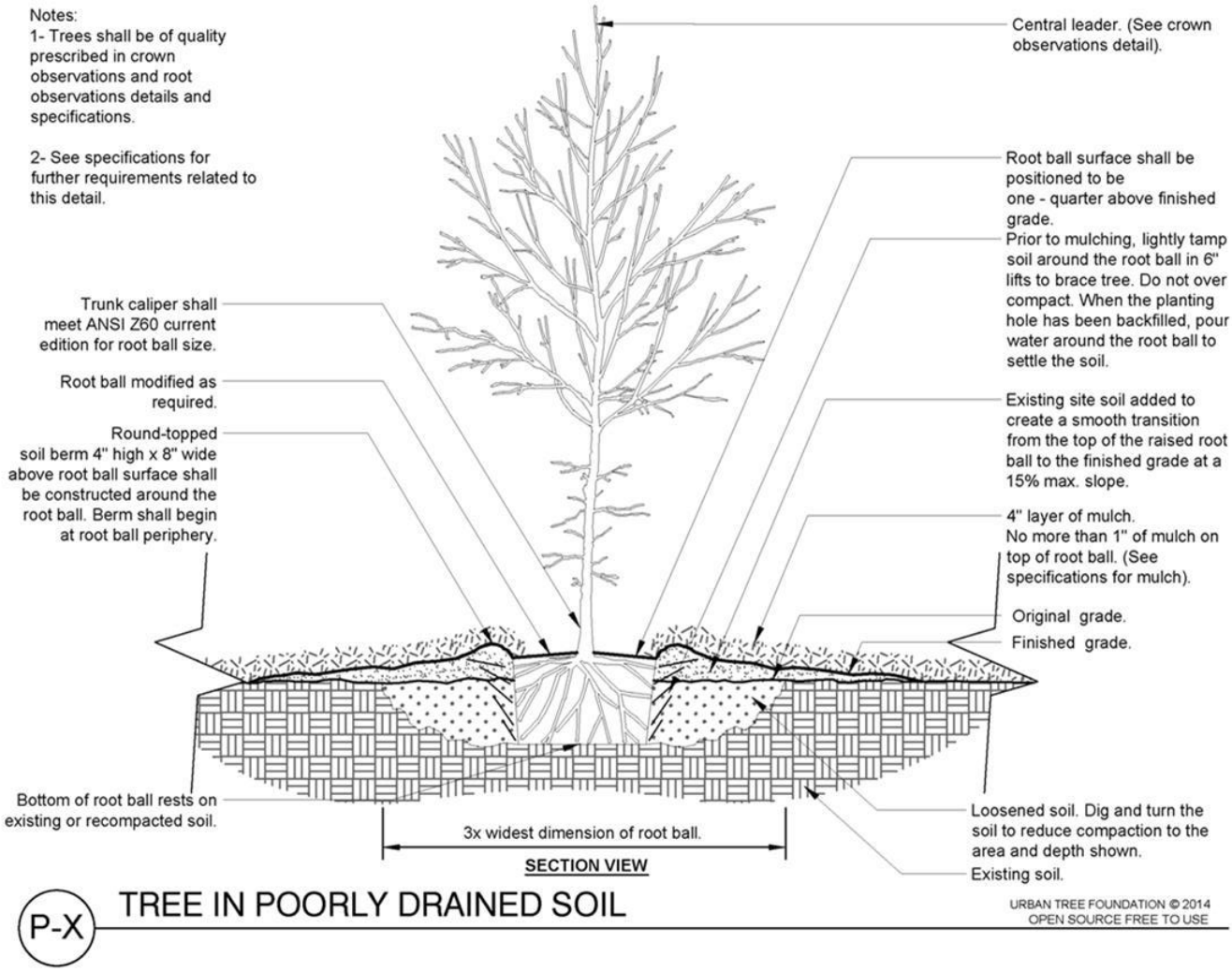
Invasive Species List

Invasive Species List		
Common Name	**Genus**	**Species**
Alder, Black	Alnus	glutinosa
Buckthorn, Common	Rhamnus	cathartica
Buckthorn, Glossy	Frangula	alnus
Callery Pear	Pyrus	calleryana
Elm, Siberian	Ulmus	pumila
Honeysuckle, Exotic Bush	Lonicera	tatarica
Honeysuckle, Japanese	Lonicera	japonica
Honeysuckle, Non-native	Lonicera	periclymenum
Honeysuckle, Winter	Lonicera	fragrantissima
Maple, Amur	Acer	ginnala
Maple, Hedge	Acer	campestre
Maple, Norway	Acer	platanoides
Mulberry, White	Morus	alba
Olive, Autumn	Elaeagnus	umbellata
Olive, Russian	Elaeagnus	angustifolia
Oak, Sawtooth	Quercus	acutissima
Tree of Heaven	Ailanthus	altissima

APPENDIX F - Balled and Burlapped Planting Detail

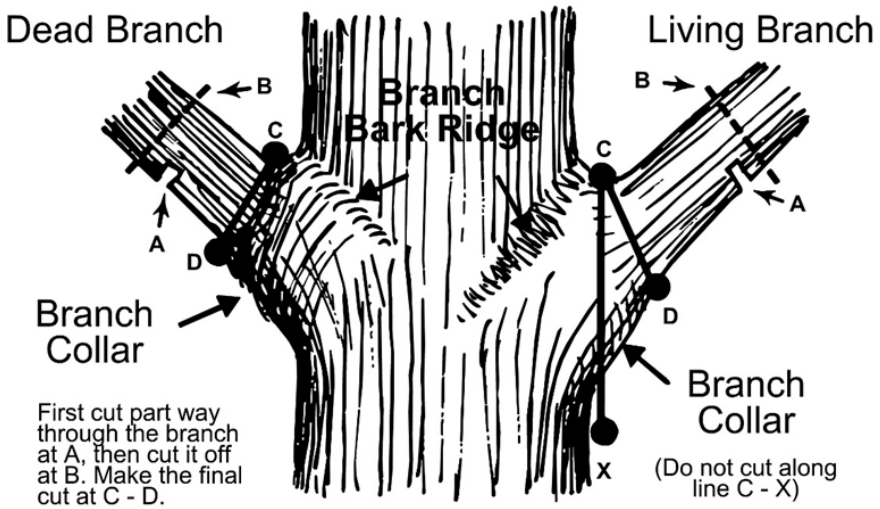


APPENDIX G - Containerized Planting Detail

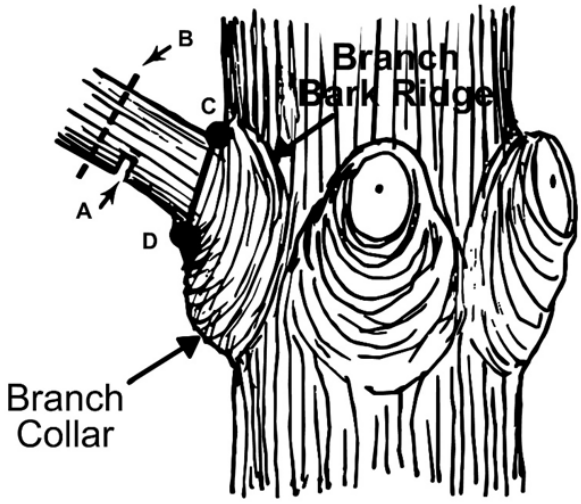


APPENDIX H - Proper Pruning Detail

Proper Pruning Principles



Hardwoods



Conifers

Arbor Day Foundation®

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 Village of Bannockburn employees and contractors involved with tree care operations.

1. All tools and equipment utilized during tree care operations, including those not specifically mentioned below, shall be inspected and maintained by qualified personnel in accordance with the manufacturer's care instructions.
2. All staff shall be trained in the proper use, inspection, and maintenance of said equipment.
3. Certified arborists or arborist trainees shall conduct job briefings daily prior to tree care operations of any kind and the information shall be communicated to all workers.
4. All activities performed on any job site for any activity outlined in this Urban Forestry Management Plan shall comply with all applicable OSHA guidelines and standards.
5. Traffic and pedestrian control shall be established around the job site prior to the beginning of tree care operations.
6. Emergency contact information and a safety kit conforming to the ANSI Z308.1 standards shall be made available to all workers. All employees shall have basic instruction on the use of CPR and First Aid.
7. Personal Protective Equipment (PPE) shall be required when there is a reasonable probability of injury or illness on the job site. Such a determination will be made by the Certified Arborist or Arborist Trainee prior to the beginning of tree care operations each day, and PPE shall be made available. PPE shall be well-maintained in accordance with the manufacturer's requirements.
8. Head protection shall conform to ANSI Z89.1, face and eye protection shall conform to ANSI Z87.1, respiratory protection shall comply with ANSI Z88.2, and leg protection shall always be worn when using a chainsaw.
9. Flammable liquids shall be kept a minimum of ten feet from open sources of flame or high heat and shall be stored in approved containers.
10. All Village staff and contractors working near electrical hazards shall be qualified to do so and shall be educated in the full ANSI standards for Electrical Hazards and Line Clearance.
11. Vehicles and mobile equipment shall be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements and shall be equipped with all standard safety devices, decals, and instructions, and shall be operated within all federal, state, and local motor vehicle codes and ordinances.
12. Aerial devices shall be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements, and shall be equipped with all standard safety devices, decals, and instructions.
13. Aerial devices shall be stabilized by wheel chocks, outriggers, or stabilizers as necessary for the device, and shall never be used to lift, hoist, or lower logs or equipment unless specifically designed to do so.
14. Aerial devices shall be equipped with fall protection devices and permanent load ratings, both in accordance with ANSI/SIA 92.2 or 92.5, as applicable to the specific aerial device.
15. No aerial device shall be allowed to make contact with electrical conductors, and minimum safe distances shall be maintained in accordance with the ANSIZ133.1 Standard.

16. All brush chippers shall be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements, and shall be equipped with all standard safety devices, decals, and instructions.
17. Sprayers and related plant health care equipment shall be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements, and shall be equipped with all standard safety devices, decals, and instructions
18. Sprayer tanks or other similar enclosed spaces shall not be entered unless performed through a confined-space entry plan in accordance with OSHA 1910.46 Requirements, including air-quality testing, training, and PPE.
19. Chain saws and other similar portable power tools shall not be operated unless the manufacturer's safety devices are in proper working order. Such safety devices shall not be removed or modified.
20. Forestry staff shall have a minimum of two points of attachment to the tree or aerial device while operating a chainsaw at all times, unless the hazard posed by the second point of attachment poses a greater hazard than utilizing one point of attachment.
21. A visual hazard assessment, including a root collar inspection, shall be performed by a certified arborist or arborist trainee prior to climbing, entering, or performing work in or on any tree, and a second crew member shall be within visual or voice communication at all times during arboricultural operations that are in excess of 12 feet from the ground surface.
22. All ropes, saddles, 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. **A**ll 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 Village, and shall be healthy, vigorous, well-rooted and established in the container in which it is growing. The root system shall reach the sides of the container, but shall not have excessive growth encircling the inside of the container.
4. All collected plants (those grown on unmanaged land) shall be so designated, and shall be considered to be nursery-grown stock when they have been successfully reestablished in a nursery row and grown under regular nursery cultural practices for a minimum of two growing seasons.
5. The trunk or stem of the plant shall be in the center of the ball or container, with a 10% overall variance in location.
6. The use of digging machines in both the packaging and installation of trees is considered an acceptable nursery practice.

ANSI A300 – Part 6

1. Planting sites and work sites shall be inspected for hazards by the Village prior to the beginning of work each day. If portions of the work site are outside of the original scope of work, the controlling authority shall be notified immediately.
2. Location of utilities, obstructions, and other such hazards above and below ground shall be taken into account prior to planting and transplanting operations. These include, but are not limited to, gas, electric, sewer, communication, drainage, and signage.
3. The following shall be taken into consideration prior to transport and planting: Requirements of individual trees, compass orientation of field-grown trees, site feasibility assessments, soil assessment, and drainage assessment.
4. Tools for planting and transplanting shall be properly labelled or purchased for their intended use, and be maintained in accordance with the manufacturer's recommendations
5. The system used to move and store the plant shall minimize desiccation and other damage to the crown, trunk or 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 Village of Bannockburn.
2. All employees and contractors employed by or working for the Village of Bannockburn 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:
    a. **Pruning to Clean**: Selective removal of dead, diseased, detached, cracked, and broken branches
    b. **Pruning to Thin:** Selective removal of small live branches to reduce crown density
    c. **Pruning to Raise:** Selective removal of branches to provide vertical clearance
    d. **Pruning to Reduce:** Selective removal of branches and stems to decrease the height or spread of a tree or shrub
    e. **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
    f. **Pruning to Restore:** Selective removal of branches, sprouts, and stubs from trees and shrubs which have been topped, severely headed, vandalized, lion-tailed, storm damaged, or otherwise damaged

2. Every effort shall be made to time pruning of individual tree species to be done in accordance with best management practices for the tree species in question. All pruning work shall be done so at the discretion of the Village of Glencoe 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.