

# *Village of Glencoe*

## *Urban Forestry Management Plan*



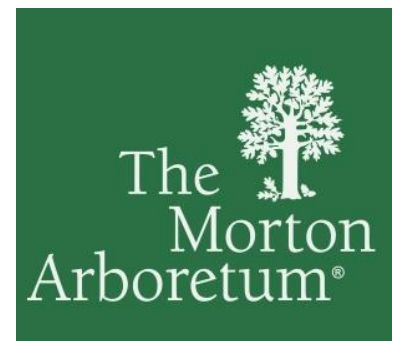
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### Prepared On

June 9th, 2022

**This publication was made possible with a grant from the Illinois Department of Natural Resources and United States Department of Agriculture Forest Service, with assistance from the Morton Arboretum**



## **Table of Contents**

<b>Overview of Goals/Mission Statement</b>	1-2
<b>Glencoe's Urban Forest: At a Glance</b>	3
<b>Direct Goals</b>	4-11
<b>Additional / Long Term Goals</b>	11-13
<b>Strategic Partnerships</b>	14-16
<b>Personnel</b>	16-17
<b>State of the Urban Forest</b>	18-35
<b>The Future of the Urban Forest</b>	36-42
<b>Trees and Climate Change</b>	43-49
<b>Tree Removal Planning</b>	49-54
<b>Tree Planting Planning</b>	54-57
<b>Tree Pruning Planning</b>	58-62
<b>Other General Maintenance</b>	62-64
<b>Tree Preservation and Management During Construction</b>	64-65
<b>Tree Risk Assessment and Sample Policy</b>	66-69
<b>Projected Budget</b>	70
<b>Summary / Conclusion</b>	71
<b>Glossary of Terms</b>	72-77
<b>Appendix A: Acceptable / Unacceptable Species List</b>	78
<b>Appendix B: Additional Species Comments</b>	79
<b>Appendix C: Species Substitutions</b>	80
<b>Appendix D: Balled and Burlapped Planting Detail</b>	81
<b>Appendix E: Containerized Tree Planting Detail</b>	82
<b>Appendix F: Proper Pruning Detail</b>	83
<b>Appendix G: Tree Protection Detail</b>	84
<b>Appendix H: ISA Risk Assessment Form</b>	85-86
<b>Appendix I: ANSI Z133.1 Standards Summary</b>	87-89
<b>Appendix J: Tree Planting Standards Summary</b>	90-92
<b>Appendix K: Tree Pruning Standards Summary</b>	93
<b>Appendix L: Tree Protection Standards Summary</b>	94-96
<b>Appendix M: Urban Timber Harvesting</b>	97

## **OVERVIEW OF GLENCOE'S URBAN FOREST MANAGEMENT PLAN**

Glencoe, Illinois currently manages 8,035 trees throughout its Village parkways and right of ways. The Village's trees were re-inventoried as part of a project in late 2021 and early 2022 culminating in this Urban Forestry Management Plan which will detail how these trees will be managed for the benefit of the Village of Glencoe over the next 10 years, with a focus which begins in 2022, and projects out to 2032.

In terms of the condition of the Urban Forest in Glencoe, there are both strengths and opportunities for improvement. One strength is the fact that there are 137 species represented in the tree population which is excellent diversity for a municipal tree population. The Maple genus, however, makes up over 25% of the population which is far too high and this statistic certainly leaves much room for improvement. Another strength is the fact that Glencoe has a very high stocking density and there are very few open planting spaces that would support a full-sized shade tree. This high stocking density presents an opportunity to create a multi-layered canopy where shade tolerant understory species can be planted among existing mature shade trees. Additionally, the overall condition of the population as a whole is above average and Glencoe is now equipped to use the maintenance recommendations from this re-inventory to attend to issues that have been identified. There is some work to do in terms of near-term maintenance, however once the necessary maintenance is complete, Glencoe will be able to focus on enhancements rather than remedial action.

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 2022-2032 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 Glencoe.

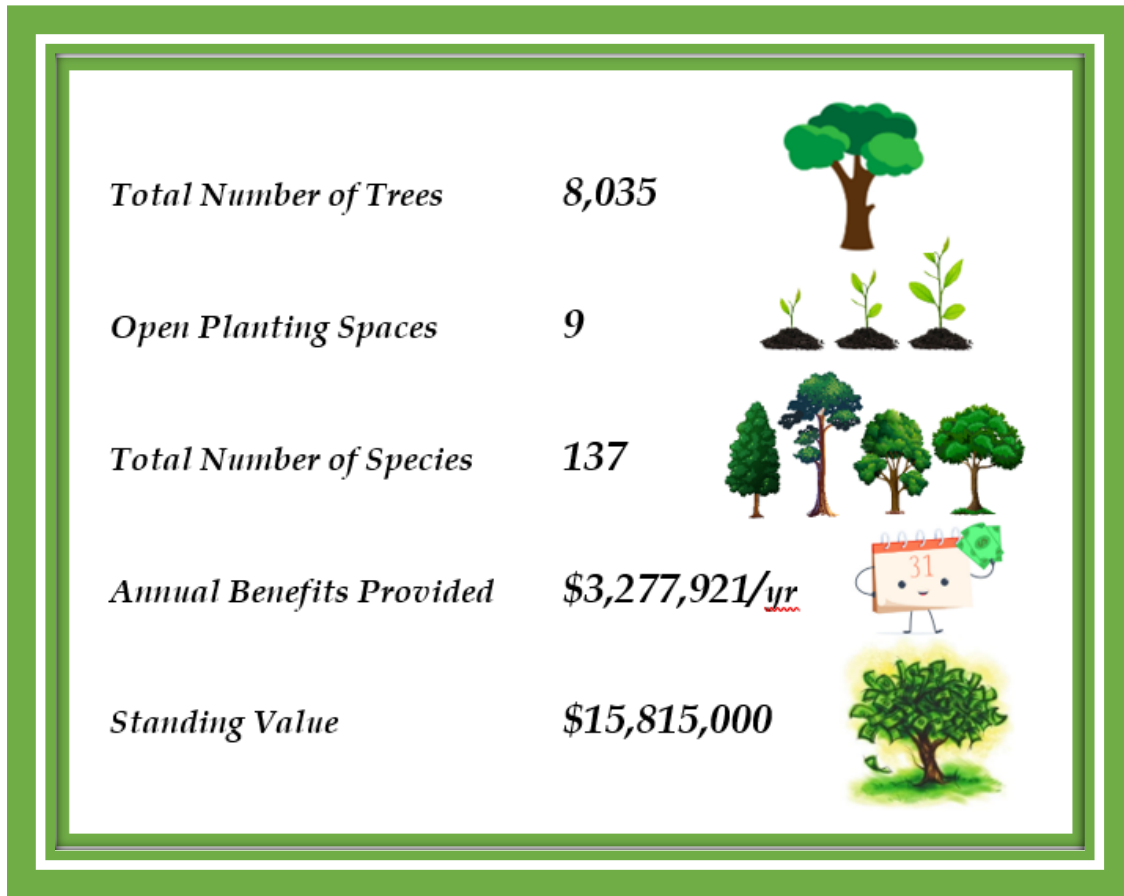
However, all plans are subject to change based on new information, budgets, or other unforeseen circumstances. For this reason, it is asked that readers consider that this plan is to be an evolving document, and goals and strategies will be updated to fit new circumstances as needed.

This Plan should be reviewed periodically, at which point the Village, its residents, 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 intended to be an absolute, but rather serve as guideposts to mark the road to success.

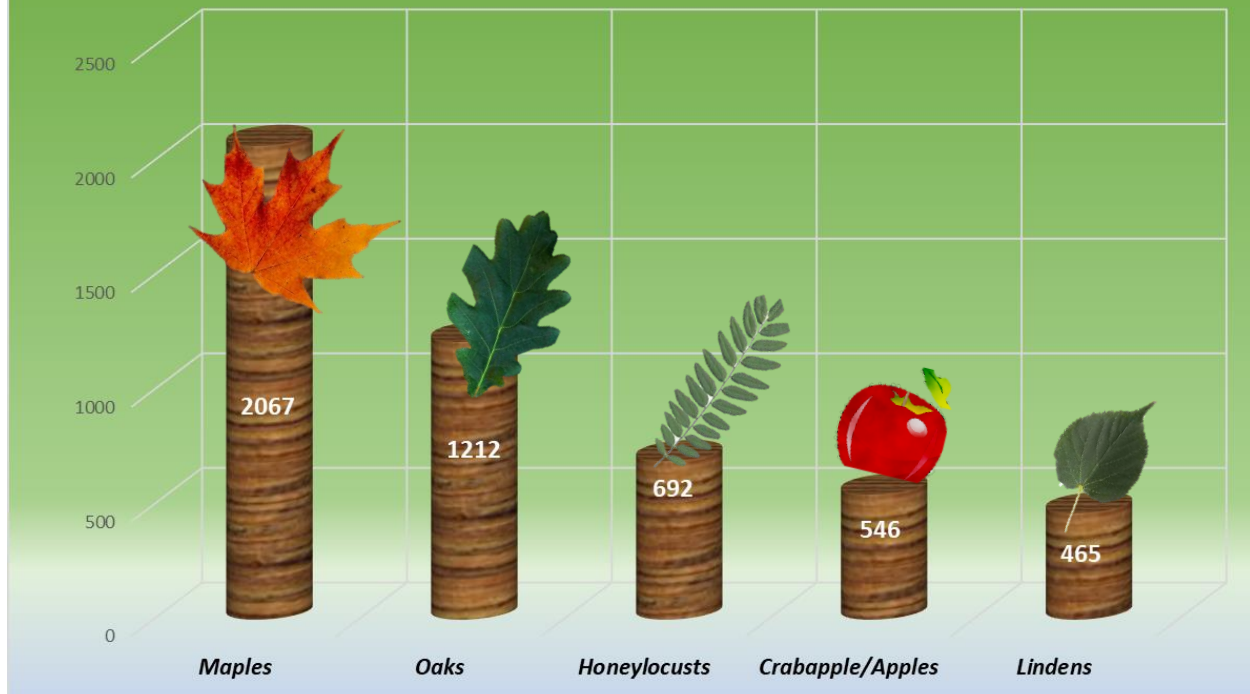
## MISSION STATEMENT

*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 Glencoe, Illinois to increase canopy cover, maximize the benefits trees provide while minimizing cost, mitigate against climate change, and create a program to manage the Urban Forest Resource for the greatest public good in a manner that is both financially and programmatically sustainable, while maintaining flexibility for future adaptive management.*

**GLENCOE'S URBAN FOREST: AT A GLANCE...**



***Top 5 Types of Trees in Glencoe***



## **DIRECT GOALS**

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

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

### **Create a Needs Analysis for the Current Tree Population**

Every tree population today is the result of decades of past management decisions. Over time, we increase our overall level of knowledge, skill, and efficiency in managing trees. Based on that new knowledge, we sometimes discover that decisions made decades ago may appear in retrospect to have been wrong, even though they seemed like a good idea at the time. It is the goal of this Plan to assess the current state of the Village of Glencoe’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 Glencoe’s tree data has been analyzed: How many trees, what condition they are in, how old they are, what needs do they have, and more were all examined to create goals to improve the tree population for the benefit of the organization, its residents, and other stakeholders. Specific goals in terms of planting, removals, pruning, budgets, personnel, and maintenance are all addressed by acknowledging both strengths and opportunities, and suggesting how they might be used to the Village’s advantage.

These strengths and opportunities will be the guiding principles for the management strategies and specific goals outlined in each section below. To avoid repeating past mistakes, the Plan shall also

attempt to leave room for adaptive management, so the plan may be changed when appropriate.



### **Establish Goals in Order to Enhance Strengths and Realize Opportunities**

In order to accomplish anything, goals are necessary to help guide organizations through the process. 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 Glencoe use this UFMP to create a more sustainable and adaptable forestry program within a 5-10 year period.

This program will include tree planting, tree maintenance, and tree removal for Glencoe's Urban Forest, so that the tree population will be healthy, and provide the greatest benefits and least risk to the community while maximizing benefits and minimizing risk. To learn more about the budgets, see the individual goals in each section below, or turn to the budget table on page 71.

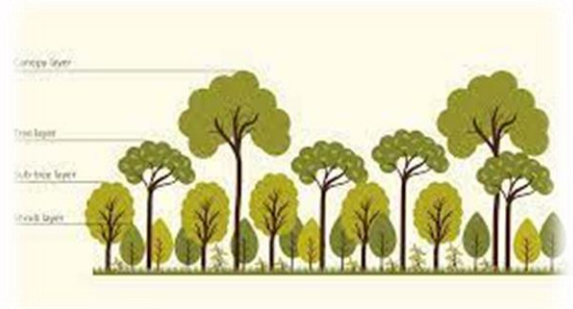
### **Update Village Ordinances for Enforcement of Tree Policies**

As part of the IDNR grant program, work has been performed by Morton Arboretum working in tandem with Glencoe staff and relevant community stakeholders, in order to edit and improve ordinances governing trees in Glencoe. 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 unsafe trees, 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 which is diverse, healthy, and improving, providing the greatest benefit to the Village and its residents over the long term.

### **Increase Overall Diversity by 2032 Through a Multi-Layered Canopy Approach**

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 2032 which will see the tree population become even more diverse than it is at present. The current population includes a commendable 137 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. This plan also takes into consideration the high stocking density in Glencoe and focuses on creating a multilayered canopy by incorporating shade tolerant understory species that can be planted among larger shade trees.



Not only will trees be planted which are underrepresented or not present in the current population, they will also 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. Currently, Glencoe plants approximately 100 trees each year, and this plan seeks to increase that number to 200 trees per year over the course of this plan, to both be able to replace older declining trees, as well as to grow the tree population by about 65 trees overall by 2032. Ideas such as contract growing, creating an in house liner nursery and others will be explored. To learn more about tree planting and reforestation, turn to pages 55-58.

### **Maintain an Acceptable / Unacceptable Species List**

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

### **Manage Tree Removals**

For public safety, and to prevent the spread of tree pests and pathogens, sometimes tree removal is unavoidable and recommended. At present, there are 256 trees which were called out for removal during the inventory. Of these, 5 are listed as a Priority Removal, 126 are listed as Standard Removals, and 125 are listed as Low Priority Removals based on the tree inventory data.

To keep the residents of Glencoe safe, a tree removal program has been created in this Plan which budgets for the 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 Glencoe for the next 10 years, so that long-term budgeting projections can be made. Also included are ANSI and ISA safety standards, as well as suggested bid specifications to ensure the Village is hiring qualified contractors who will be held to the highest industry standards. For more information on Glencoe's proposed tree removal program, turn to pages 50-55.



### **Enhance Current 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 Glencoe. Pruning will be done by Glencoe tree crews and Certified Arborist contractors. During 2022, the 672 trees identified as requiring priority pruning, pruning of dead limbs, or establishment pruning will be budgeted. Details will be discussed in the Tree Pruning section of this plan. Currently, the Village prunes approximately 660 trees each year and this plan seeks to increase that number, over the next 6 years, to 1,350.

As Glencoe begins to increase its budgets and capacity for tree pruning, a goal will be to enhance the current cyclical pruning program. This program will ensure that all trees on public property are pruned at a minimum every 6 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 59-63.

### **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 January 2022. This inventory resulted in an unbiased assessment of the trees on public Right of Ways in the Village, and will serve as the data which will guide the forestry program throughout the next 10 years.

All inventories are a snapshot in time. With 8,035 trees on Village parkways and ROWs, the tree inventory should be maintained at a high level of accuracy so that it doesn't become out of date. Currently, the Village's inventory data is managed through the Village's GIS system. However, it is also recommended that the inventory continue to be updated periodically by a Forestry Consultant, 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.

### **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 65.

### **Incorporation of Best Management Practices in Tree Care Operations**

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

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

Trees create great benefits, but they may also pose various degrees of risk. Tree limb failure can have catastrophic effects on people or property, and trees need to be well-managed and healthy to avoid that risk. A risk assessment policy has been created for the Village of Glencoe as part of this Plan. This policy will aid in identifying, documenting, and designating for removal or mitigation, trees which may pose a threat to public safety in a timely manner. This will reduce the overall level of risk posed by trees, as well as exposure to liability from tree related incidents. Basic risk assessment language is included in this document, and a basic Tree Risk Assessment Policy has been created on pages 69-70, and the ISA Basic Tree Risk Assessment form can be found in Appendix H.



### Increase Urban Tree Canopy Cover from 54.75% to 56%

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 Glencoe. Currently, Glencoe contains 54.75% tree canopy coverage, compared to other land cover types. Increases in tree canopy also come with increases in total benefits provided to the community. This percentage is well above average in comparison to similarly sized municipalities in the region. An interactive 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 56% canopy cover is a realistic goal for Glencoe by 2032. 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, Glencoe 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 Glencoe Residents save money. For more information on Urban Tree Canopy, tree benefits, and other such information, turn to pages 31-36.

### 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. For more information on using trees to mitigate climate change, turn to page \_\_\_\_.



### **Tree Preservation / Invasive Species Management**

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 survey and assessment is currently required prior to the issuance of a permit for construction activities. A tree protection zone must be established with temporary tree protection fencing and maintained during construction. The Village should monitor construction activities to ensure local ordinances are adhered to. The removal of trees of a certain size that are on the approved species list should require prior approval by Glencoe during site planning. The removal of low quality or invasive species is also recommended. This not only increases the amount of planting space, but also increases public safety. A direct goal of this Urban Forestry Management plan is to preserve trees during construction as well as reducing the number and type of undesirable species within the Village of Glencoe. For more information on tree preservation and replacement requirements see Glencoe Ordinance Chapter 34.21-26.

### **Increase Awareness of the Urban Forest in the Village of Glencoe, and Engage Stakeholders**

The reason for the establishment and enhancement of an Urban Forestry program in Glencoe is to improve the lives of the residents, business owners, and other stakeholders who want to enjoy the benefits a well-managed tree inventory can provide. In order to make this happen, Glencoe is looking for partners in the community to provide support for this program. Glencoe staff is reaching out to local garden clubs, philanthropic organization such as the Friends of the Green Bay Trail and the Glencoe Community Garden, as well as residents to make the forestry program innovative and community based. In this manner, residents and business owners in Glencoe 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. For more on these innovative programs, and how you can get involved, turn to pages 14-16.

### **Maintain Exceptional Stocking Density**

Currently, there are very few open planting spaces on Glencoe's streets that would appropriately support a full sized shade tree, and the stocking density is very high at nearly 100%. 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 Glencoe can be moderately increased.

### **Maintain EAB Treatment Program**

Glencoe has had a successful Ash treatment in place for many years. The Village has opted to treat candidate ash trees in the public ROW and plan on continuing this program. This program has ensured the preservation of a number of legacy Ash trees.

### **Additional Goals**

There are no strategic timelines set forth here for these programs. As the direct goals of the Urban Forestry program in Glencoe are met or exceeded, these are goals to be discussed by the Village of Glencoe 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.

### **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.

Glencoe 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 Arborist 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.

### **Establishment of Village of Glencoe Propagation Nursery**

Consideration should be given to the establishment of a small propagation nursery on Glencoe-owned land. The Village of Glencoe can grow a share of its own trees, using much smaller trees obtained from wholesale nurseries at a fraction of the cost of a full-sized tree. Small trees can be purchased wholesale, and then grown to maturity in Glencoe.

Such programs have been successfully instituted in many communities, and represents a quality investment that results in cost savings over the long term. Trees can be purchased when small, or donated from residents, and grown to plantable size on Village-owned land.

We would recommend that the Village work with the Forestry Consultant, local nurserymen, and other strategic partners in order to explore this concept, and begin the planning phase by 2025, with the goal of having a functional nursery by 2030. The amount of time required for the care of young trees is minimal, and at an average cost of \$350 per 2" DBH tree wholesale, the Village could save a significant amount of money in their tree planting program by pursuing this goal.



### **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 Glencoe is a diversity vision for 2032 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 Glencoe. 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, Glencoe 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. The Village has successfully implemented and utilized a contract growing program with a tree planting contractor who owns a local nursery since 2018. The Village might opt to expand this program to include other local nurseries.



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.

Nurseries should be of sufficient production capacity to furnish all trees ordered in advance by the Village, as well as possible increases when necessary. Nurseries should be chosen not only on their capacity to produce stock, but to meet quality, form, and health standards as specified by the Village. The nursery should allow tagging by the Village Arborist or other representative as well.

A long-term tree planting contract may be developed alongside the nursery supply contract. This contract would specify all pick-up, transportation, planting, and spoil disposal procedures, as well as establish costs for planting trees. Trees should be evaluated one year after planting and assessed for health and survival. Responsibility for replacement of trees that have not survived the one year guarantee period is divided equally between the supplier, the planter, and the Village. Trees that are dug or balled improperly will be replaced by the nursery. Trees improperly handled or planted are replaced by the planter. Trees that do not survive because of lack of maintenance are replaced by the Village.

### **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.

### **Wood Utilization Program**

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



Urban timber can be utilized to mill wood into a large variety of products including dimensional lumber, fine furniture, and artisan pieces. In order to successfully upcycle urban timber into usable lumber, several steps must be followed in order to produce logs suitable for milling. Urban timber production will include specifications for tree removal operations that will produce saw logs of the proper dimension and quality. Specifications for the construction of public buildings that require a specified amount of upcycled, local urban timber may qualify for LEED certification points, and raising awareness of the benefits of the urban forest in general, creating a saleable product that can serve as a revenue stream.

## 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.

### Forest Preserve District of Cook County

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



### Metropolitan Water Reclamation District

MWRD strives to protect businesses, homes and neighborhoods from flood damages, clean wastewater entering 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, MWRD is a very logical partner. They also give away Oak and other seedling trees every year as part of their Restore the Canopy efforts, and using this resource as a source of trees would be welcome.



### Openlands TreeKeepers

Openlands is a highly diverse NPO in the Chicagoland area which focuses on many aspects of ecology in the urban and suburban environment such as natural areas, urban forestry, wetland conservation, and other such topics. They have a vast network of connections around the area, and 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 Glencoe 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 Glencoe 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 Glencoe 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.



### **Glencoe Park District**

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



### **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.



### **Glencoe Community Garden**

Glencoe Community Garden is a community-wide service project for community members of all ages and abilities. It aims to be a sustainable, organic-practicing, food-producing mini-farm and garden and serve local food kitchens, pantries and other charitable organizations. Trees are an essential part of gardening, and spreading the word about the importance of trees can be accomplished through local volunteers like those at the Community Garden and may serve as a resource for education and other environmental initiatives.



### **Glencoe Public Library**

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



### Glencoe School District 35

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 Glencoe School District 35 could be a reciprocal relationship, where students could engage in study projects based around trees, citizen science, and volunteerism, and Glencoe 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.



### Personnel

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

#### Village's Public Works Forestry Supervisor

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

#### Tree Care Contractors or Public Works Forestry Division Staff

Tree Care Contractors or Public Works Forestry Division Staff are responsible for performing work identified by the Village's Public Works Forestry Supervisor or Forestry Consultant in a timely, safe, and expeditious manner. The Tree Care Contractor must have at least one International Society of Arboriculture Certified Arborist on site when work is being performed.

The contractors will also guide and participate in the performance of Tree Trimming, Pruning, Removal, and Plant Health Care operations. Other operations, such as Tree Planting, Tree Watering, and Tree Mulching do not have to be performed under the direct supervision of a Certified Arborist.

### **Third Party Forestry Consultant (As Needed)**

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

### **Public Works General Superintendent**

The Public Works General Superintendent along with the Forestry Supervisor will exercise authority related to planning of large scale programs related to the Urban Forest, possibly with the assistance and guidance of the Forestry Consultant. They will also exercise authority related to decision-making concerning pruning or removal of Parkway Trees.

### **Development Services Manager**

The Development Services Manager will exercise authority related to enforcing the existing and proposed changes to the Village Code and Ordinances as referenced by this document.

### **Tree Commission**

With the passing of the Ordinance Amendment a Tree Commission will be created. The Commission serve as an advisory board that includes both Village staff and community members. The role of such a group will be to promote public outreach and welcome public input on tree related issues. In this manner, residents in Glencoe 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.



## State of the Urban Forest

Using the tree inventory data collected for the Village of Glencoe, it was determined that there are a total of 8,035 trees and 19 stumps on Village Owned rights of way. The charts and statistics in this portion of the Management Plan illustrate that the tree population in Glencoe can be characterized as being in overall above average condition and the stocking density is very high, at nearly 100%. The species diversity in Glencoe is impressive with 137 individual species represented. Based on the following data in the Management Plan, the Village of Glencoe will be equipped to use this valuable information to address short term concerns, long term management considerations, and overall planning objectives.

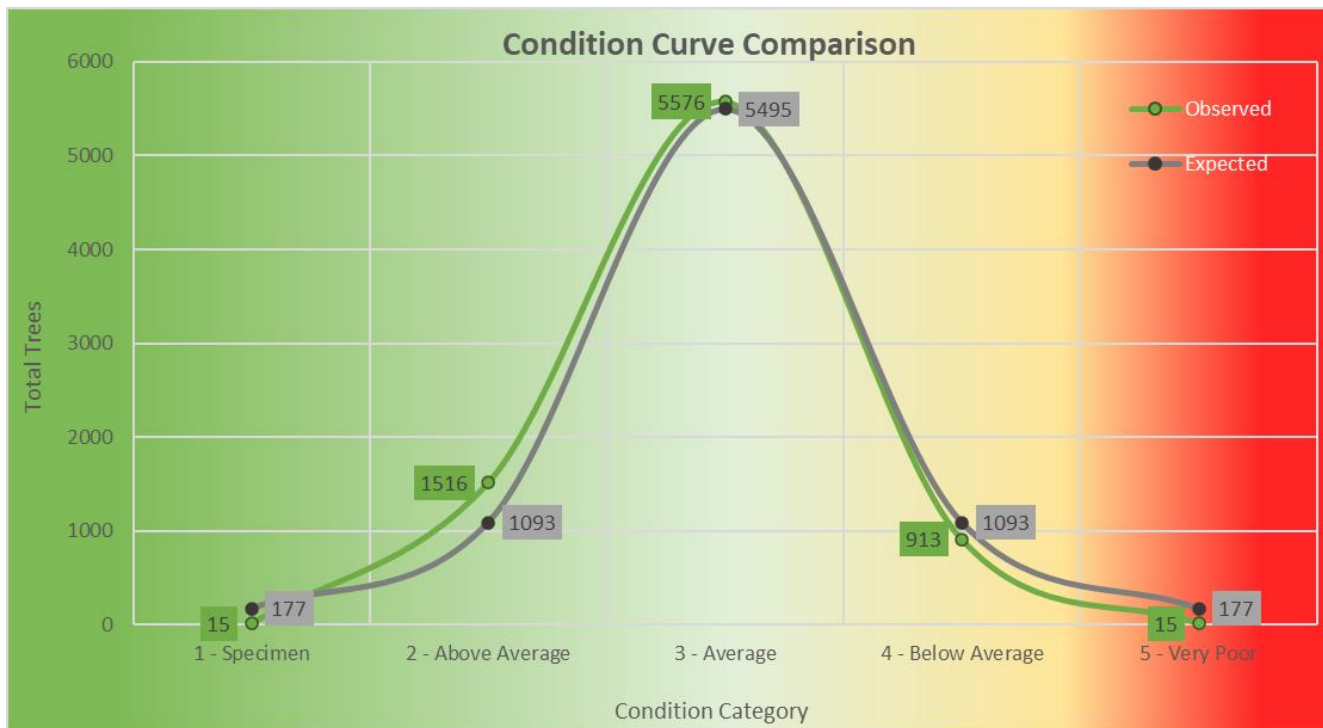
### Basic Statistics – Managed Trees

Number of Trees Inventoried	8,035
Number of Stumps Inventoried	19
Number of Planting Spaces Inventoried	9
Total Number of Species	137
Total Diameter Inches	110,573
Average Tree Diameter - Inches	13.76
Average Tree Condition	2.92 (Above Average)
Average Mature (8" and up) Tree Condition	2.88 (Above Average)

### Condition Statistics

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

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



The chart above represents the distribution of trees in each of the 5 categories. We have included the tree condition ratings we observed in the field, as well as a curve representing an “average” distribution so that comparisons can be made. The green line represents what we observed in the field, and the grey line represents an average or “normal” tree population. The condition curve for the Glencoe inventory indicates a tree population that is in overall above average condition.

The Condition 1, or specimen trees, were significantly lower than would be predicted by the standard distribution alone, but we always expect that the specimen trees (and often Condition 5 trees as well) will come in lower than their statistical norm because of their relative rarity. In Glencoe, only 31% of the tree population currently meets the minimum DBH threshold for this category. A Condition 1 tree, by definition, must be at least 16” DBH (and generally much larger), have textbook perfect architecture for the species, and have no observable defects. As younger trees are planted in sites with adequate growing space, and if they are properly pruned and maintained, they should develop with good structure and may mature to become Condition 2 and eventually Condition 1 trees.

The Condition 5, or very poor trees, came in below the expected norm as would be expected since municipally managed trees are often removed before they reach this rating. The 15 trees in this category should be prioritized and removed.

The Condition 2, or above average trees, came in significantly higher than what statistical analysis would predict. Similar to the Condition 1 category, Condition 2 trees need to have good structure that is consistent with the species in question and also be over 8” DBH. Looking toward the future, Glencoe has an opportunity to further increase the number of trees in the condition 2 category.

In general, if trees are properly mulched and maintained, newly installed trees are done so correctly and cared for well, and site selection for the trees is well matched to the species, trees will often mature with good form and without significant defects. These trees can eventually become Condition 2 trees.

The Condition 4, or below average trees are lower than what would be statistically expected. This category includes a variety of species that have developed excessive deadwood and/or other structural defects. Using the tree inventory data to locate trees in need of removal and maintenance, Glencoe can look to further decrease this number over the next few years as they move forward and attend to issues we have identified. These actions will continue to shift the above Condition Curve even more Above Average.

The trees in the Condition 3, or average, category are slightly higher than the expected norm. The reason for this is simply that this is the “average” category and generally should have the most trees in it. Trees less than 8” DBH are always assigned this category, unless they happen to be in worse condition. In the next few years, these more recently planted trees will begin to show their adaption to their environment, and we would expect these average trees to deviate from the norm.

### Age Class Analysis



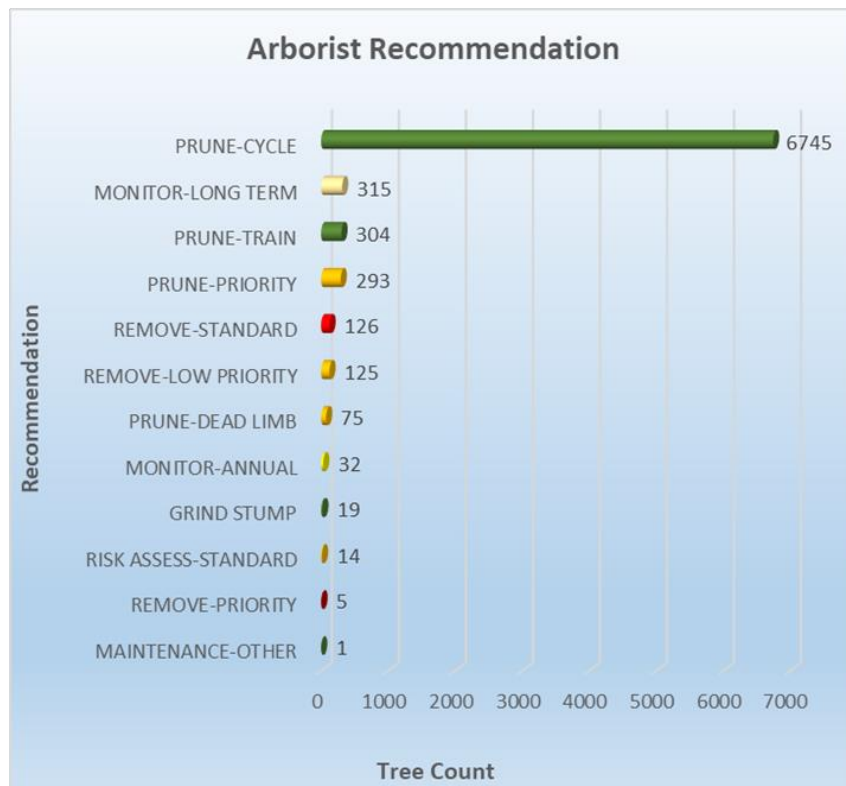
In terms of the ages of trees in Glencoe, we have split the tree population into 8 “classes” of 6” diameter increments. This tells us how many trees are in each “age class”. Because trees are measured by Diameter at Breast Height (DBH) as a standard measure, this breakdown can help show where trees are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

This age class analysis chart illustrates a somewhat typical trend in the overall age spread of a tree population seen in a municipal setting. Often, we see many trees being younger to middle-aged and a relatively lower number of trees in the older age categories. The Glencoe tree population is relatively young to middle-aged with more than 50% of tree population measuring less than 13" DBH, an indication of fairly recent commitment to continual tree planting. As shown above, 18% of the total population has a DBH of 6" or less which we generally consider to be less than about 15 years old. About 1/3 of the tree population have a DBH of 7-12" which are generally considered to be about 15-25 years old. The 13-18" DBH category make up about a quarter of the population and is considered to be approximately 25-35 years old. The 19-24" DBH category makes up 13% of the population and is considered to be approximately 40-50 years old.

The 866 trees measuring over 24" DBH account for 10% of the total tree population and are considered to be about 50+ years old. However less than 20% of these trees are in below average condition or worse indicating a commitment to higher level of care. It should be mentioned that the number of trees in the 30"+ categories are often lower due to the natural senescence and ensuing decline of trees in urban settings. A fairly equal number of trees in each age classification is, within reason, desirable and indicative of a consistent focus on tree planting and tree maintenance. As the younger trees continue to grow, Glencoe will have an opportunity, over time, to bring the tree age classes to a more balanced level.

### Arborist Recommendation / Maintenance

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



In terms of Arborist Recommendations of maintenance needs in the Glencoe tree population, the statistics displayed above show a positive trend overall. The number of trees in the “cyclical prune” category is quite high which is a positive trait in a tree population and indicative of a satisfactory level of maintenance. However, there are 256 trees that are recommended for removal. The 256 trees in the “Remove” sets include a variety of tree species which have declined or developed structural defects and are beyond the point of salvaging. The 5 priority removals should be prioritized over other removals. The 126 trees designated as standard removals should be prioritized and removed in a timely manner. The 125 trees in the low priority category should be removed as time and budget allow. The remaining categories, other than removals discussed above, were used to indicate trees in need of maintenance which should be prioritized over those in the Cyclical Prune category and is reviewed briefly below.

The 293 trees in the “Prune-Priority” group and the 75 trees in the “Prune-Dead Limb” group are trees which are simply overgrown, or have parts which need to be removed promptly, and should have pruning prioritized over the trees in the cyclical prune set. Generally, we consider this to be a “within 1-3 years” level of pruning.

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

The 347 total trees in the two “Monitor” categories can be viewed as being in a transitional phase. For the most part, the tree has an indiscernible defect, or shows signs of developing issues or general decline which must be observed, and often includes the existing Ash trees. These trees should be reassessed periodically, and their maintenance status updated as necessary.

The 2 trees in the “Maintenance-Other” category typically need some other form of maintenance not covered in the rest of the categories, mostly the removal of girdling objects, anchor staking, or no longer needed trunk wrapping. A description of the maintenance needed should be found in the reasons or comments field.

### **Risk Assessments**

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



As illustrated in the chart above, the vast majority of Glencoe trees were found to have no observable risk level. The 11 trees that fell into the Substantial risk level category should receive a Level 2 Risk Assessment and/or the recommended mitigating action. Any tree found to pose an Elevated risk level should be monitored and/or inspected by Glencoe and a threshold of risk tolerance be established.

Some of elevated risk level trees may also be considered for a Level 2 Risk Assessment and/or mitigating action. Great Lakes Urban Forestry Management would be pleased to assist Glencoe in any aspect of developing or managing a Tree Risk Assessment Policy or performing Level 2 Basic Risk Assessments or Level 3 Advanced Risk Assessments.

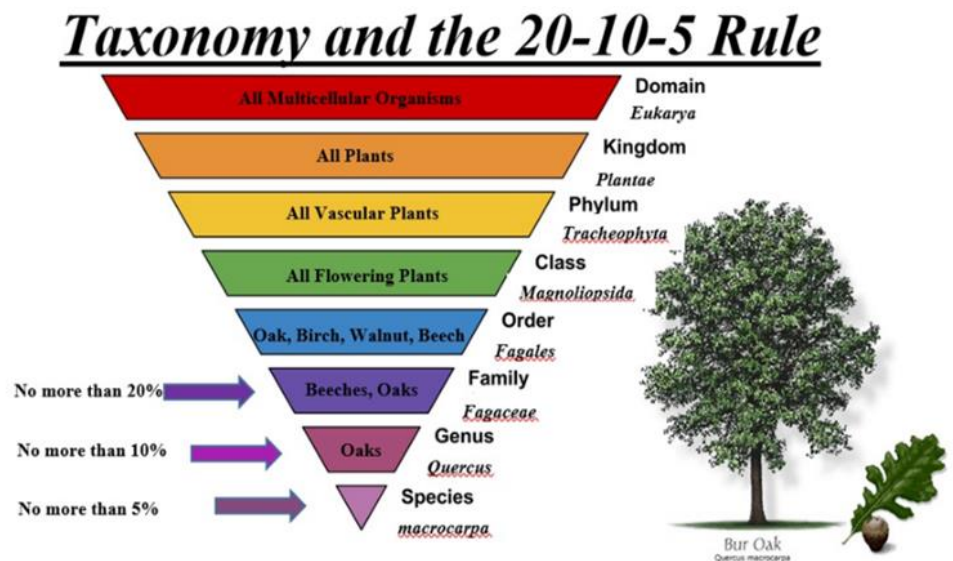
### **Diversity Analysis**

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

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

The “20-10-5” rule for Glencoe’s future tree plantings is recommended, which states that no more than 20% of any one family, 10% of any one genus, and 5% of any one species shall be planted during any one planting cycle. It will also be a long-term direct goal of the forestry program to have the tree population as a whole in compliance with the 20-10-5 Rule, although it may not be possible by the 2032 date used in this document. This level of taxonomic diversity is consistent with today’s arboricultural industry standards (see above graphic).

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



### Taxonomic (Species) Diversity

Why is it important to plant a diverse set of trees at the species, Genus, and Family levels? Simply put, it is to ensure that we will not fall victim to mass tree loss from pests and pathogens in the future. The reason Emerald Ash Borer (EAB) was such a devastating expense for many organizations was because their tree populations were composed of over 20% Ash trees. When these trees died and had to be removed, those organizations lost 20% of their trees. It is important to note that Glencoe had only 10-11% of Ash trees at the onset of the EAB infestation, so the impact in the Village was not as severe as some municipalities in the region.

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 Glencoe is by far dominated by Maple species. In decreasing numbers, the remaining top 5 include Oaks, Honeylocusts, Crabapples, and Lindens.

### **Spatial Diversity**

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

In addition to the functional benefits provided by increasing spatial diversity, organizations which have implemented diverse planting over the past several decades have demonstrated that such diversity yields an arboretum-like landscape that is both functional and aesthetically pleasing. At present, the Spatial Diversity in Glencoe 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

SPECIES	COUNT	% OF TOTAL	AVG DBH	AVG COND
MAPLE-NORWAY	727	9.05%	15.14	3.13
HONEYLOCUST	692	8.61%	16.52	2.78
APPLE-CRAB	535	6.66%	7.29	3.04
PEAR-CALLERY	422	5.25%	10.14	3.18
MAPLE-FREEMAN	418	5.20%	10.48	2.81
OAK-WHITE	399	4.97%	23.03	2.73
OAK-RED	349	4.34%	17.87	2.87
MAPLE-RED	347	4.32%	9.52	3.05
LINDEN-AMERICAN	335	4.17%	14.79	2.83
MAPLE-SUGAR	269	3.35%	13.58	3.04
ASH-WHITE	242	3.01%	14.08	2.91
OAK-SWAMP WHITE	222	2.76%	19.15	2.58
LILAC-JAPANESE TREE	219	2.73%	7.14	3.00
MAPLE-SILVER	204	2.54%	26.07	3.11
GINKGO	200	2.49%	11.40	2.77
OAK-BURR	159	1.98%	26.06	2.46
ELM-AMERICAN	154	1.92%	24.50	2.72
HACKBERRY	146	1.82%	11.85	2.78
ELM-HYBRID	127	1.58%	9.09	2.67
LINDEN-LITTLELEAF	124	1.54%	13.28	2.90
ELM-SPP	98	1.22%	11.73	2.89
HICKORY-SHAGBARK	82	1.02%	17.62	2.48
ASH-GREEN	76	0.95%	17.11	3.11
SPRUCE-COLORADO	71	0.88%	10.18	2.96
HAWTHORN-SPP	68	0.85%	8.28	3.13
KENTUCKY COFFEETREE	57	0.71%	8.61	2.75
REDBUD	53	0.66%	7.66	3.00
PINE-AUSTRIAN	51	0.63%	11.84	3.06
SPRUCE-NORWAY	51	0.63%	13.20	2.67
PINE-WHITE	50	0.62%	8.80	3.02
MAPLE-HEDGE	48	0.60%	5.96	3.13
CATALPA	45	0.56%	19.25	3.38
KATSURATREE	44	0.55%	8.02	2.95

VILLAGE OF GLENCOE URBAN FORESTRY MANAGEMENT PLAN

ELM-SIBERIAN	43	0.54%	25.07	3.16
LILAC-SPP	40	0.50%	7.15	2.93
SERVICEBERRY-APPLE	38	0.47%	4.97	3.05
SYCAMORE	36	0.45%	24.94	2.56
BEECH-EUROPEAN	33	0.41%	3.40	3.00
BEECH-SPP	32	0.40%	7.81	2.81
BLACK LOCUST	32	0.40%	19.46	3.15
HORSECHESTNUT	30	0.37%	5.93	3.07
MAPLE-MIYABEI	29	0.36%	6.68	2.89
BIRCH-RIVER	26	0.32%	11.12	2.92
HORNBEAM-AMERICAN	25	0.31%	4.56	3.12
ARBORVITAE	24	0.30%	7.95	3.00
SERVICEBERRY-SPP	24	0.30%	3.71	3.04
DOUGLAS FIR	23	0.29%	11.61	2.96
OAK-SCHUETTS	23	0.29%	7.22	2.83
WALNUT-BLACK	23	0.29%	18.30	2.83
BUCKTHORN	21	0.26%	12.57	3.52
BUCKEYE-OHIO	20	0.25%	11.70	2.85
CHESTNUT-EUROPEAN	19	0.24%	16.89	3.05
OAK-ENGLISH	19	0.24%	9.89	2.89
TULIPTREE	17	0.21%	8.76	2.71
LONDON PLANETREE	16	0.20%	8.50	2.94
OAK-PIN	16	0.20%	18.56	2.69
HAWTHORN-COCKSPUR	15	0.19%	4.17	3.17
MULBERRY-SPP	15	0.19%	21.33	3.47
COTTONWOOD	14	0.17%	37.92	3.08
SPRUCE-WHITE	14	0.17%	7.86	3.07
MAGNOLIA-SPP	13	0.16%	8.23	2.92
PINE-SCOTS	13	0.16%	12.08	3.08
CHERRY-CHOKE	12	0.15%	9.33	3.25
JUNIPER-COMMON	12	0.15%	7.83	3.00
APPLE-EDIBLE	11	0.14%	6.09	3.18
OAK-SCARLETT	10	0.12%	13.70	3.00
BIRCH-PAPER	9	0.11%	9.44	2.89
HORNBEAM-EUROPEAN	9	0.11%	4.00	3.11
OAK-CHINQUAPIN	9	0.11%	7.44	3.00
ALDER-BLACK	8	0.10%	9.75	3.00
MAPLE-AMUR	8	0.10%	12.63	3.38
MAPLE-JAPANESE	8	0.10%	3.50	3.13
BALDCYPRESS	7	0.09%	12.14	2.43
BIRCH-WHITE	7	0.09%	6.57	3.00
IRONWOOD	7	0.09%	6.50	3.25
BOXELDER	6	0.07%	18.33	3.50
DAWN REDWOOD	6	0.07%	13.17	2.83

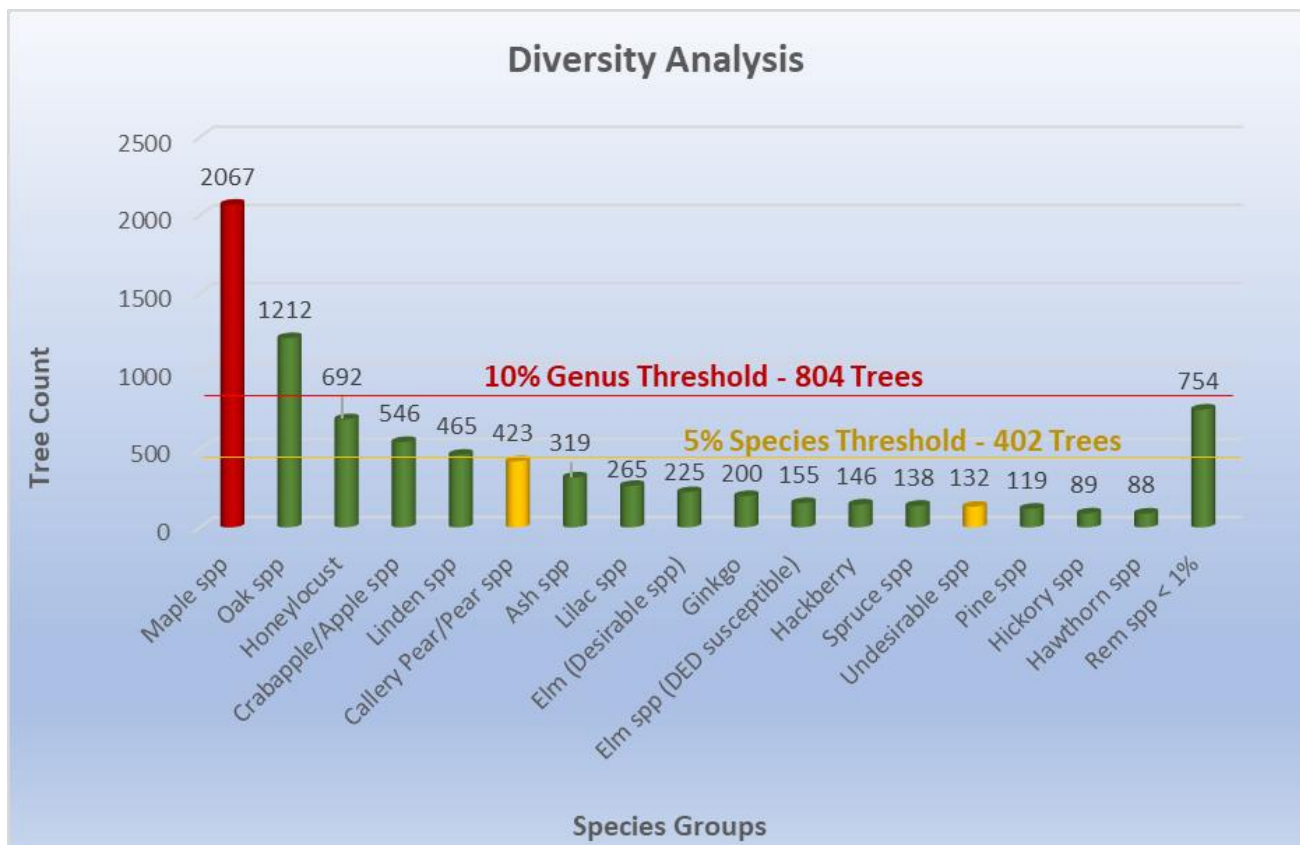
*VILLAGE OF GLENCOE URBAN FORESTRY MANAGEMENT PLAN*

LILAC-PEKING	6	0.07%	5.00	3.00
MAPLE-PAPERBARK	6	0.07%	4.83	3.00
YEW-SPP	6	0.07%	8.40	3.00
HEMLOCK-EASTERN	5	0.06%	8.60	3.00
LINDEN-SILVER	5	0.06%	5.00	3.20
PLUM-SPP	5	0.06%	6.00	3.00
CHERRY-SPP	4	0.05%	6.75	3.25
DOGWOOD-SPP	4	0.05%	7.75	2.75
HICKORY-SPP	4	0.05%	16.25	3.25
OAK-SHINGLE	4	0.05%	6.00	2.75
PINE-RED	4	0.05%	11.50	3.25
UNKNOWN	4	0.05%	4.25	3.00
VIBURNUM-SPP	4	0.05%	8.75	3.00
BEECH-AMERICAN	3	0.04%	5.33	3.00
FIR-CONCOLOR	3	0.04%	11.33	2.67
HAWTHORN-WASHINGTON	3	0.04%	9.33	3.00
HICKORY-BITTERNUT	3	0.04%	7.67	3.00
HONEYSUCKLE	3	0.04%	20.33	2.33
HORSECHESTNUT-RED	3	0.04%	3.67	3.00
BUCKEYE-SPP	2	0.02%	8.50	3.50
CHERRY-BLACK	2	0.02%	14.00	3.50
DOGWOOD-FLOWERING	2	0.02%	5.00	3.00
HAWTHORN-GREEN	2	0.02%	3.25	3.00
HAZELNUT-TURKISH	2	0.02%	5.00	3.00
MAGNOLIA-CUCUMBER	2	0.02%	11.50	3.00
OSAGE ORANGE	2	0.02%	28.50	3.50
REDECEDAR-WESTERN	2	0.02%	9.50	3.00
TAMARACK	2	0.02%	4.00	3.00
YELLOWWOOD	2	0.02%	8.00	2.00
ALDER-SPP	1	0.01%	9.00	3.00
ASH-BLUE	1	0.01%	9.00	4.00
ASPEN-QUAKING	1	0.01%	18.00	3.00
BIRCH-SPP	1	0.01%	5.00	3.00
BLACKGUM	1	0.01%	2.00	3.00
CHERRY-HIGAN	1	0.01%	7.00	4.00
CHERRY-SARGEANT	1	0.01%	5.00	3.00
DOGWOOD-CORNELIAN	1	0.01%	5.00	3.00
DOGWOOD-PAGODA	1	0.01%	2.00	3.00
ELM-RED	1	0.01%	20.00	4.00
FIR-BALSAM	1	0.01%	12.00	2.00
LINDEN-SPP	1	0.01%	5.00	3.00
MAGNOLIA-STAR	1	0.01%	6.00	3.00
MAPLE-SPP	1	0.01%	9.00	3.00
MAPLE-SYCAMORE	1	0.01%	8.00	3.00

## VILLAGE OF GLENCOE URBAN FORESTRY MANAGEMENT PLAN

MAPLE-TARTARTIAN	1	0.01%	3.00	3.00
MOUNTAIN ASH-AMERICAN	1	0.01%	5.00	3.00
MOUNTAIN ASH-EUROPEAN	1	0.01%	5.00	3.00
OAK-BLACK	1	0.01%	7.00	3.00
OAK-SAWTOOTH	1	0.01%	13.00	3.00
PEAR-EDIBLE	1	0.01%	16.00	3.00
PINE-JAPANESE WHITE	1	0.01%	7.00	3.00
SERVICEBERRY-ALLEGHENY	1	0.01%	2.00	3.00
SERVICEBERRY-DOWNY	1	0.01%	2.00	4.00
SMOKETREE	1	0.01%	3.00	3.00
SPRUCE-SERBIAN	1	0.01%	4.00	3.00
SPRUCE-SPP	1	0.01%	4.00	3.00
SWEETGUM	1	0.01%	6.00	3.00
YEW-JAPANESE	1	0.01%	40.00	3.00
ZELKOVA	1	0.01%	1.00	3.00

As shown in the table above, the Village of Glencoe Tree population consists of an impressive 137 distinct tree species, accounting for 8,035 total trees. The above table shows the percent of the total population each species makes up, as well as the average Condition and Trunk Diameter. To see which trees are performing well, we would look for trees with a Condition rating of less than 3 and with a large DBH. This population is shown graphically below:



As can be seen above, the tree population in Glencoe is good overall, but by far is dominated by Maple species. In decreasing numbers, the remaining of the top 5 include Oak, Honeylocust, Crabapple/Apple, and Linden. 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 Maples overall while increasing lesser represented species should be a strategic goal, and our Diversity Vision will help to accomplish this.

Going forward it is recommended that the Village sets a goal to limit widespread planting of Maple species and to opt for improved varieties of Maple species when absolutely necessary.

Additionally, the 132 trees in the “Undesirable spp” category include trees such as Ailanthus, Buckthorn, Cottonwood, Siberian Elm, Mulberry, White Poplar, Osage Orange, Black Locust, and Willow spp. These trees are known for either being invasive or weak-wooded trees that often develop a variety of structural defects as they mature. For safety, aesthetic, and ecological reasons, it is recommended that the Village set a goal of gradually reducing the number of undesirable trees on its parkways and replanting them with a diverse set of tree species to increase overall diversity.

Although Glencoe’s diversity is very good overall (with the exception of the Maples), 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 CO<sub>2</sub> 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 Glencoe. 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.

## iTree Streets Analysis Results

### Glencoe

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

1/23/2022

Benefits	Total (\$) Standard Error	\$/tree Standard Error	\$/capita Standard Error
Energy	80,879 (N/A)	9.94 (N/A)	8.99 (N/A)
CO2	19,106 (N/A)	2.35 (N/A)	2.12 (N/A)
Air Quality	18,476 (N/A)	2.27 (N/A)	2.05 (N/A)
Stormwater	720,876 (N/A)	88.56 (N/A)	80.10 (N/A)
Aesthetic/Other	2,317,896 (N/A)	284.75 (N/A)	257.54 (N/A)
<b>Total Benefits</b>	<b>3,157,233 (N/A)</b>	<b>387.87 (N/A)</b>	<b>350.80 (N/A)</b>

### *Total Standing Value of Glencoe's Tree Population*

**\$11,933,726**

*(Per CTLA's 9<sup>th</sup> Guide to Plant Appraisal)*

## iTree Eco Analysis Results

- Number of trees: 8,140
- Tree Cover: 109 acres
- Most common species of trees: Norway maple, Honeylocust, apple spp
- Percentage of trees less than 6" (15.2 cm) diameter: 19.1%
- Pollution Removal: 2.794 tons/year (\$25.6 thousand/year)
- Carbon Storage: 4.776 thousand tons (\$815 thousand)
- Carbon Sequestration: 91.52 tons (\$15.6 thousand/year)
- Oxygen Production: 244.1 tons/year
- Avoided Runoff: 251.1 thousand cubic feet/year (\$50.7 thousand/year)
- Building energy savings: N/A – data not collected
- Avoided carbon emissions: N/A – data not collected
- Structural values: \$15.1 million

***Total Standing Eco Value of Glencoe's Trees*** **\$3,881,724**

***Total Annual Eco Value of Glencoe's Trees*** **\$120,688/year**

To summarize all of these values together, we have created the following summary table:

<b>Annual Values</b>	
Benefits to Residents	\$3,157,233/year
Benefits to Environment	\$120,688/year
<b>SUBTOTAL (Each Year)</b>	<b>\$3,277,921/year</b>
<b>Standing Values</b>	
As a Commodity	\$11,933,726
As an Ecological Resource	\$3,881,274
<b>SUBTOTAL</b>	<b>\$15,815,000</b>

As can be seen from the above tables, the tree population in the Village of Glencoe currently provides approximately \$3,277,921 in benefits every year, directly related to trees and their effect on homes, businesses, and the environment. It should be noted that the annual budget for all forestry activities recommended in this plan, projected for the calendar year 2032, will total approximately \$266,805 per year, so the benefits from the tree population are worth over 12 times what the cost put into them is. We will examine this further below. In addition, the total standing value as a commodity and an ecological resource of the whole tree population is \$15,815,000.

These benefits can be viewed as “income” to Glencoe’s residents, and so long as the trees are well maintained, they will continue to provide these benefits, and more. As trees grow, they also increase their benefits! For example, a 3” diameter tree provides less than \$50/year in benefits, whereas a 20” tree can provide up to \$500 per year. The goal is to increase benefits even more, where the tree population pays for itself and even yields “profits”!

The replacement value of trees was also calculated. Currently, the standing value of all trees in the Village of Glencoe population is \$11,933,726. This value is calculated using the industry standard reference, the *9<sup>th</sup> Edition Guide to Tree and Landscape Appraisal*, which is published by the Council of Tree and Landscape Appraisers.

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 (CO<sub>2</sub>):** The amount of CO<sub>2</sub> 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 CO<sub>2</sub> from our atmosphere lessens these effects. Trees uptake CO<sub>2</sub> 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 Glencoe 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 Glencoe 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 Glencoe contains 54.75% total tree canopy. The map of the canopy assessment appears on the page after next page.

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.

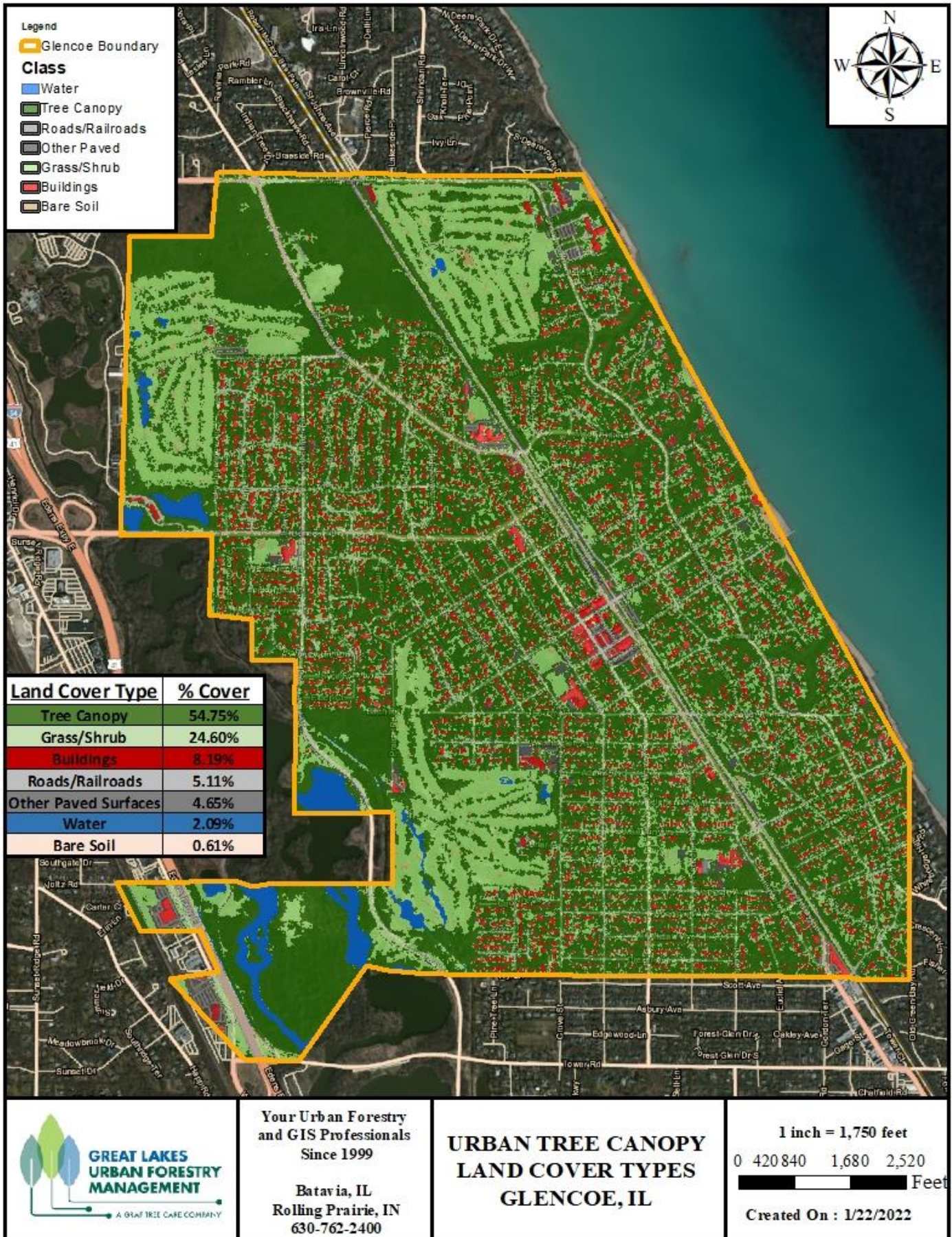
The goal is to increase the total tree canopy in Glencoe to 56% by 2032. This goal has been estimated by analyzing data from many different urban tree populations in the Chicago region, and is based on data from the Chicago Region Trees Initiative's (CRTI) Forest Composition Workgroup.

We believe this is an attainable goal over this time period. Glencoe 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 Glencoe. 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 Glencoe.

<b>Land Cover Type</b>	<b>% Cover</b>
<b>Tree Canopy</b>	<b>54.75%</b>
<b>Grass/Shrub</b>	<b>24.60%</b>
<b>Buildings</b>	<b>8.19%</b>
<b>Roads/Railroads</b>	<b>5.11%</b>
<b>Other Paved Surfaces</b>	<b>4.65%</b>
<b>Water</b>	<b>2.09%</b>
<b>Bare Soil</b>	<b>0.61%</b>

# VILLAGE OF GLENCOE URBAN FORESTRY MANAGEMENT PLAN



## The Future of the Urban Forest

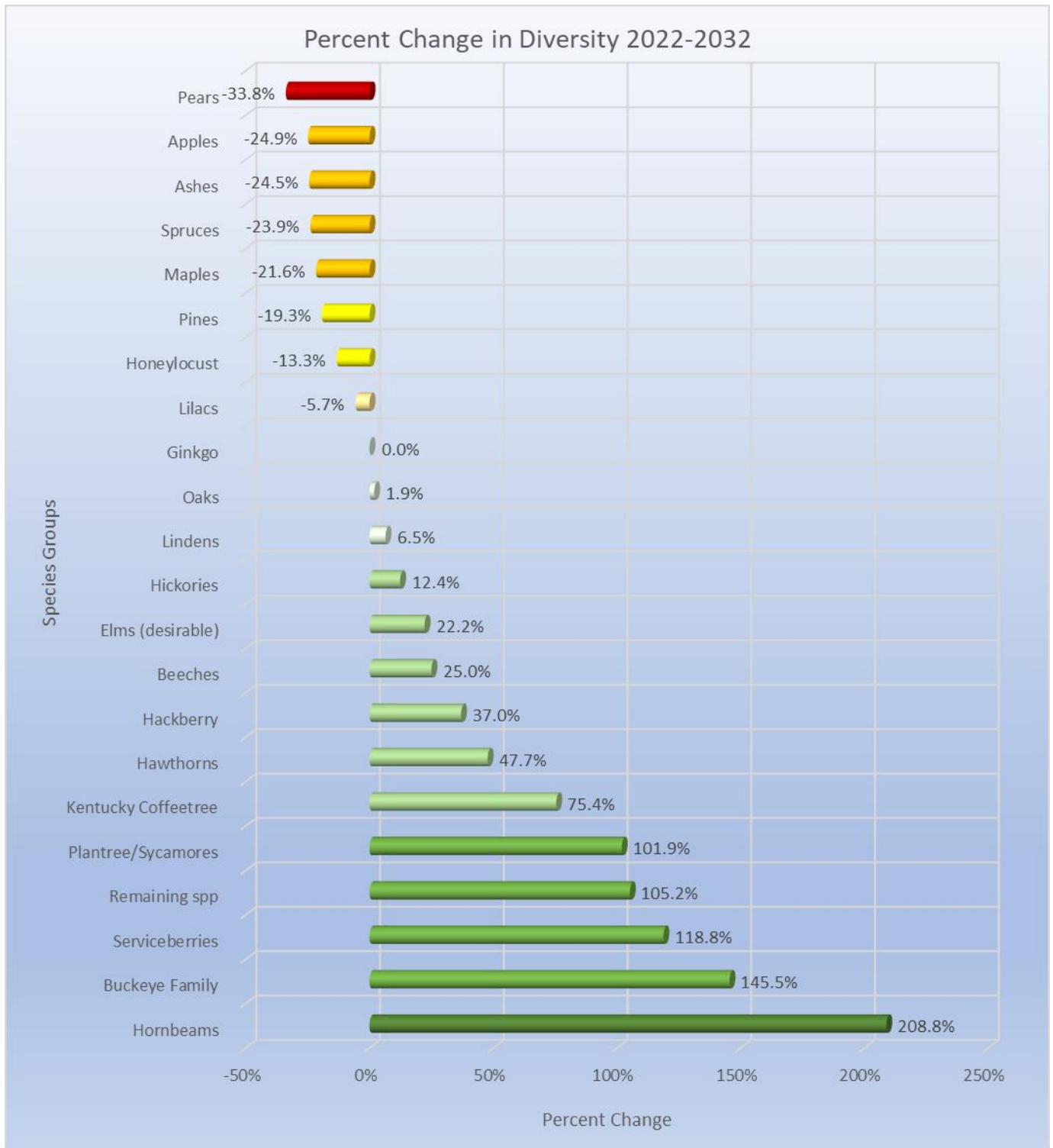
In this section, a vision of what the tree population of Glencoe could become by 2032 was created, and compared with the current population. Using the existing data, and the diversity vision, we will then define exactly how Glencoe can move from where it is now to where it could be.

### Change in Species Composition 2022 – 2032

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

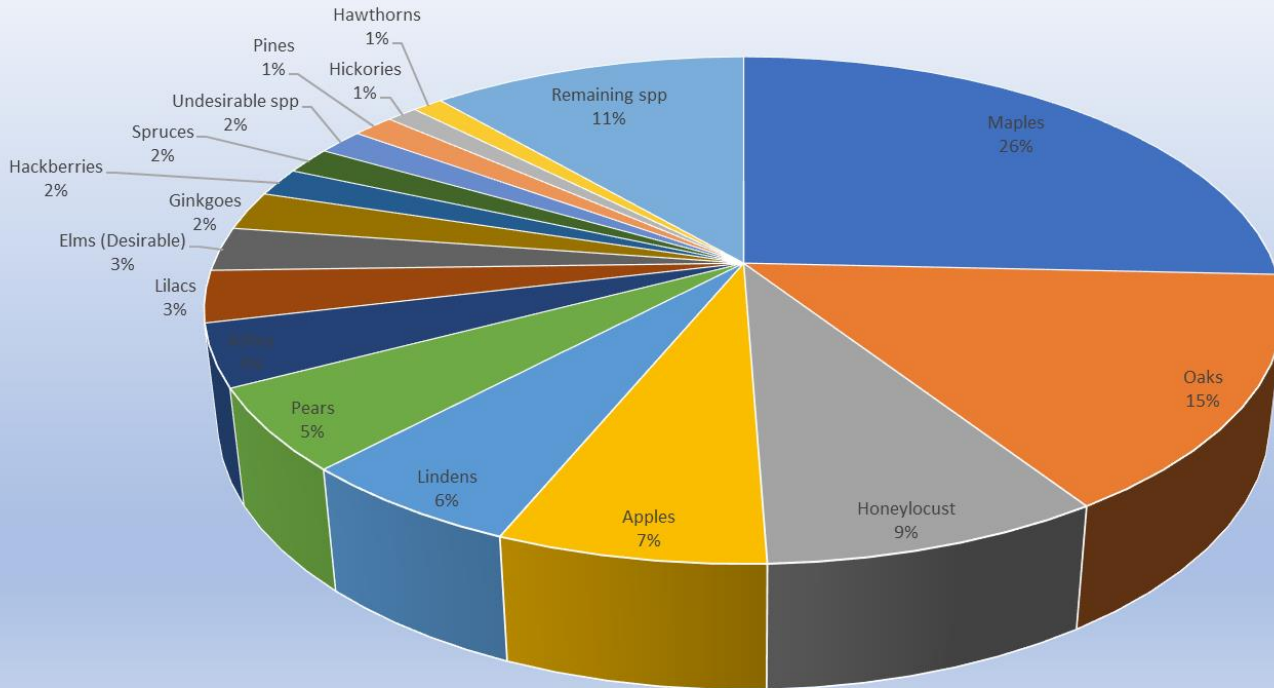
SPECIES	COUNT 2022	COUNT 2032	SPECIES	COUNT 2022	COUNT 2032	SPECIES	COUNT 2022	COUNT 2032
MAPLE-NORWAY	727	475	BUCKEYE-OHIO	20	30	HAZELNUT-TURKISH	2	10
HONEYLOCUST	692	600	CHESTNUT-EUROPEAN	19	25	MAGNOLIA-CUCUMBER	2	10
APPLE-CRAB	535	400	OAK-ENGLISH	19	60	OSAGE ORANGE	2	10
PEAR-CALLERY	422	275	TULIPTREE	17	45	REDECEDAR-WESTERN	2	1
MAPLE-FREEMAN	418	375	LONDON PLANETREE	16	80	TAMARACK	2	5
OAK-WHITE	399	325	OAK-PIN	16	25	YELLOWWOOD	2	20
OAK-RED	349	300	HAWTHORN-COCKSPUR	15	35	ALDER-SPP	1	30
MAPLE-RED	347	300	MULBERRY-SPP	15	0	ASH-BLUE	1	1
LINDEN-AMERICAN	335	275	COTTONWOOD	14	5	ASPEN-QUAKING	1	5
MAPLE-SUGAR	269	200	SPRUCE-WHITE	14	15	BIRCH-SPP	1	10
ASH-WHITE	242	200	MAGNOLIA-SPP	13	25	BLACKGUM	1	30
OAK-SWAMP WHITE	222	200	PINE-SCOTS	13	20	CHERRY-HIGAN	1	5
LILAC-JAPANESE TREE	219	180	CHERRY-CHOKE	12	10	CHERRY-SARGEANT	1	5
MAPLE-SILVER	204	100	JUNIPER-COMMON	12	20	DOGWOOD-CORNELIAN	1	30
GINKGO	200	200	APPLE-EDIBLE	11	10	DOGWOOD-PAGODA	1	10
OAK-BURR	159	150	OAK-SCARLETT	10	30	ELM-RED	1	0
ELM-AMERICAN	154	100	BIRCH-PAPER	9	10	FIR-BALSAM	1	20
HACKBERRY	146	200	HORNBEAM-EUROPEAN	9	30	LINDEN-SPP	1	20
ELM-HYBRID	127	175	OAK-CHINQUAPIN	9	30	MAGNOLIA-STAR	1	20
LINDEN-LITTLELEAF	124	150	ALDER-BLACK	8	5	MAPLE-SPP	1	20
ELM-SPP	98	50	MAPLE-AMUR	8	5	MAPLE-SYCAMORE	1	10
HICKORY-SHAGBARK	82	70	MAPLE-JAPANESE	8	15	MAPLE-TARTARTIAN	1	5
ASH-GREEN	76	40	BALDCEYPRESS	7	50	MOUNTAIN ASH-AMERICAN	1	5
SPRUCE-COLORADO	71	50	BIRCH-WHITE	7	10	MOUNTAIN ASH-EUROPEAN	1	5
HAWTHORN-SPP	68	60	IRONWOOD	7	50	OAK-BLACK	1	30
KENTUCKY COFFEETREE	57	100	BOXELDER	6	0	OAK-SAWTOOTH	1	10
REDBUD	53	70	DAWN REDWOOD	6	10	PEAR-EDIBLE	1	5
PINE-AUSTRIAN	51	30	LILAC-PEKING	6	40	PINE-JAPANESE WHITE	1	1
SPRUCE-NORWAY	51	30	MAPLE-PAPERBARK	6	15	SERVICEBERRY-ALLEGHENY	1	30
PINE-WHITE	50	30	YEW-SPP	6	10	SERVICEBERRY-DOWNY	1	20
MAPLE-HEDGE	48	50	HEMLOCK-EASTERN	5	15	SMOKETREE	1	10
CATALPA	45	65	LINDEN-SILVER	5	50	SPRUCE-SERBIAN	1	10
KATSURATREE	44	55	PLUM-SPP	5	15	SPRUCE-SPP	1	0
ELM-SIBERIAN	43	0	CHERRY-SPP	4	5	SWEETGUM	1	40
LILAC-SPP	40	30	DOGWOOD-SPP	4	15	YEW-JAPANESE	1	0
SERVICEBERRY-APPLE	38	60	HICKORY-SPP	4	15	ZELKOVA	1	30
SYCAMORE	36	25	OAK-SHINGLE	4	40	AMUR MAACKIA	0	10
BEECH-EUROPEAN	33	50	PINE-RED	4	15	BUCKEYE-RED	0	20
BEECH-SPP	32	20	UNKNOWN	4	0	BUCKEYE-YELLOW	0	10
BLACK LOCUST	32	40	VIBURNUM-SPP	4	2	CAROLINA SILVERBELL	0	10
HORSEHESTNUT	30	50	BEECH-AMERICAN	3	15	GOLDEN RAIN TREE	0	5
MAPLE-MIYABEI	29	50	FIR-CONCOLOR	3	20	HARDY RUBBERTREE	0	10
BIRCH-RIVER	26	45	HAWTHORN-WASHINGTON	3	15	HICKORY-PECAN	0	5
HORNBEAM-AMERICAN	25	75	HICKORY-BITTERNUT	3	10	HYDRANGEA-TREE FORM	0	10
ARBORVITAE	24	25	HONEYSUCKLE	3	0	LARCH	0	5
SERVICEBERRY-SPP	24	30	HORSEHESTNUT-RED	3	20	PAGODATREE	0	20
DOUGLAS FIR	23	30	BUCKEYE-SPP	2	5	PAWPAW	0	20
OAK-SCHUETTS	23	35	CHERRY-BLACK	2	0	PERSIAN IRONWOOD	0	10
WALNUT-BLACK	23	15	DOGWOOD-FLOWERING	2	10	PERSIMMON	0	10
BUCKTHORN	21	0	HAWTHORN-GREEN	2	20	WITCH HAZEL	0	20

## Change in Species Composition 2022 - 2032

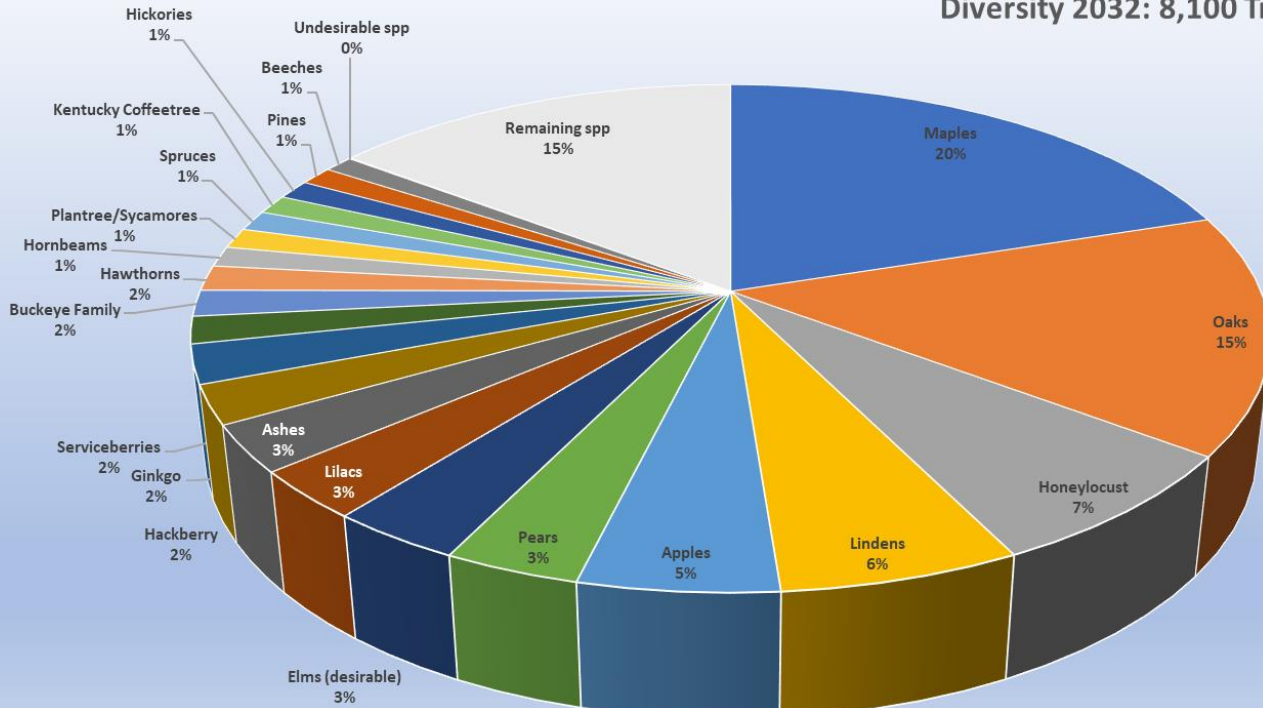


## VILLAGE OF GLENCOE URBAN FORESTRY MANAGEMENT PLAN

Diversity 2022: 8,035 Trees



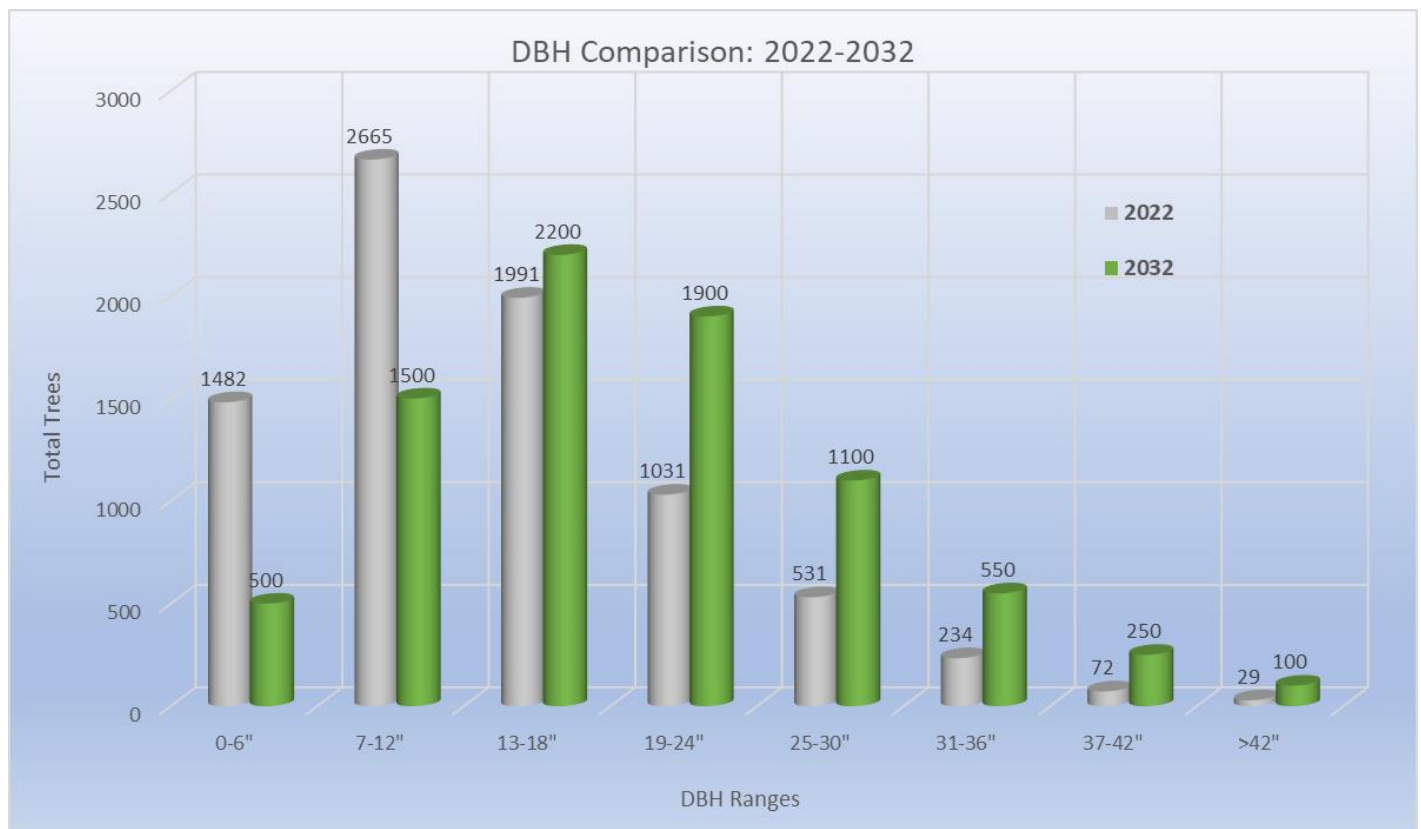
Diversity 2032: 8,100 Trees



As can be seen from the above several pages of charts showing the change in species composition over the next 10 years, there will broadly be a move away from the overrepresented or low quality species discussed above, and a variety of different species, those which are underrepresented or not present in the tree population, will be planted. This will lead to an overall increase from 8,035 to 8,100 trees total on the Village's ROWs, as well as a change from the current total of 137 species to a total of 144 species. This will result in an even more robust and resilient Urban Forest which is resistant to pest and pathogen outbreaks. It will also give Glencoe an opportunity to certify the Village as an Arboretum through the Morton Arboretum's ArbNet Certification program, which requires a minimum of 100 species.

### **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 2032 vision of the tree population, a variety of methods were used to arrive a reasonable age-class distribution. We used the current population structure, and anticipated high rates of survival based on new planting practices which would involve a "right tree/right site" approach, as well as increased survivorship of existing trees due to better management and care practices. Predicted growth, survivorship, and eventual tree losses are based on current species composition and future plantings and removals. This allowed the creation of a vision of what the tree population, including species and size, will look like 10 years from now.



It can be seen from the above chart that the existing tree population (grey bars) shows a predominantly younger to middle aged tree population with the 1-18" DBH ranges making up the vast majority and a decline in numbers in the larger age class categories. The projected age class chart shows some significant decreases in the smaller age class category over the course of this Plan, and also projects more trees surviving into the older age classes, where they will provide the greatest benefits in terms of ecological services to the community. The table to the right shows this data in a tabular format.

	<u>2022</u>	<u>2027</u>	<u>2032</u>
0-6"	1482	850	500
7-12"	2665	2100	1500
13-18"	1991	2300	2200
19-24"	1031	1500	1900
25-30"	531	760	1100
31-36"	234	350	550
37-42"	72	150	250
>42"	29	50	100

This was based on the fact that increased levels of care for existing trees would enable them to survive longer. The graph and table show a general expectation of how the changes in tree diameters might change over the next 10 years based on the methods to be applied in this Urban Forestry Management Plan. The numbers themselves were projected by hand, based on our prior experience, and the methods detailed below. If these projections hold, Glencoe could see a 13% increase in annual benefits of \$470,396 up from \$3,277,921 to \$3,748,317. Standing values of the tree population could increase \$4,750,075, or 23%, from their current level of \$15,815,000 to approximately \$20,565,075.

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

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

### **Return on Investment**

Return On Investment (ROI) for an individual tree is strongly favorable over the life of a tree in terms of investment in planting, care, and removal versus the ecological benefits the tree provides. As we strive to justify the expenditures on trees and tree care, it is important that organizations and their staff are aware of this.

On the following page, we have provided an ROI calculation sheet. This sheet breaks the tree's lifetime down into three phases, based on the anticipated costs of pruning in the budgets sections below. These phases are the young (3-12" DBH), mature (13-24" DBH), and full grown (25-36") ranges shown below.

Data was taken from the iTree algorithm, and applied towards the average benefits provided by a tree at each of these life stages, and multiplies it out over the 20 year period each phase accounts for. We also looked at costs for planting, watering, routine maintenance, emergency maintenance, and eventual removal of that tree over 60 years. The results are pictured below, with the calculations on the following page.

<b>Total Investment</b>	<b>\$3,610.00</b>
<b>Total Return</b>	<b>\$10,819.60</b>
<b>Total ROI Over 60 Years</b>	<b>199.71%</b>

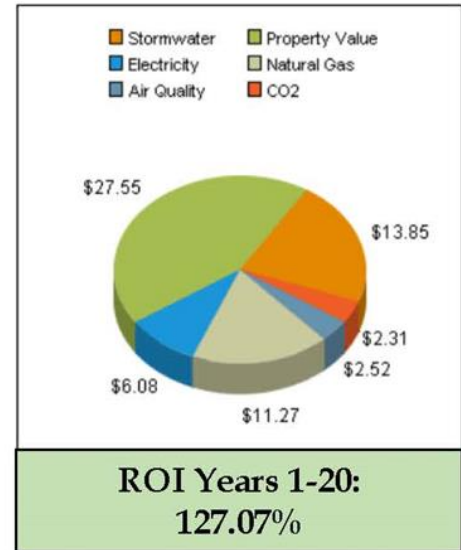
## VILLAGE OF GLENCOE URBAN FORESTRY MANAGEMENT PLAN

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

#### Costs

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

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

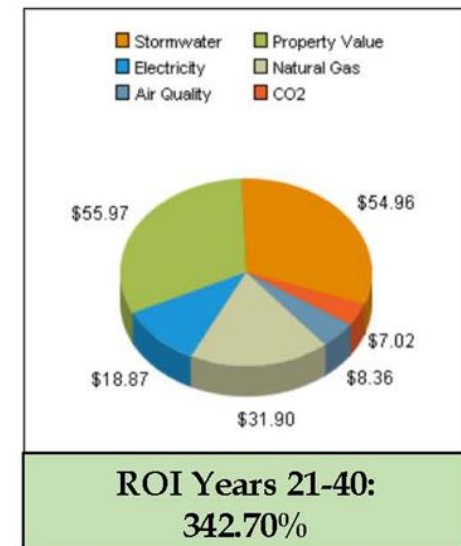


### Return on Investment: Years 21-40 (13-24" Diameter)

#### Costs

Pruning - 4x @ \$75/prune	\$300.00
Emergency Maintenance (2x)	\$500.00
<b>TOTAL INVESTMENT</b>	<b>\$800.00</b>

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

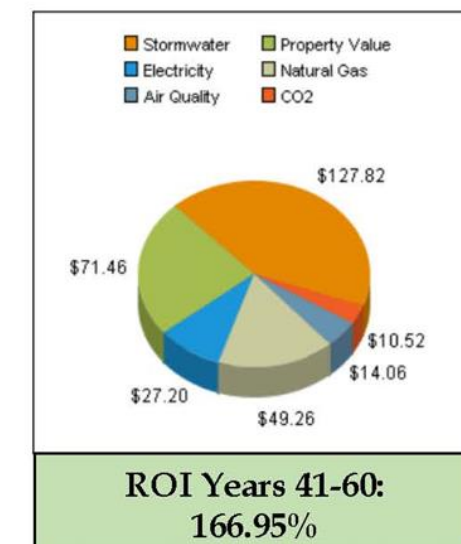


### Return on Investment: Years 41-60 (25-36" Diameter)

#### Costs

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

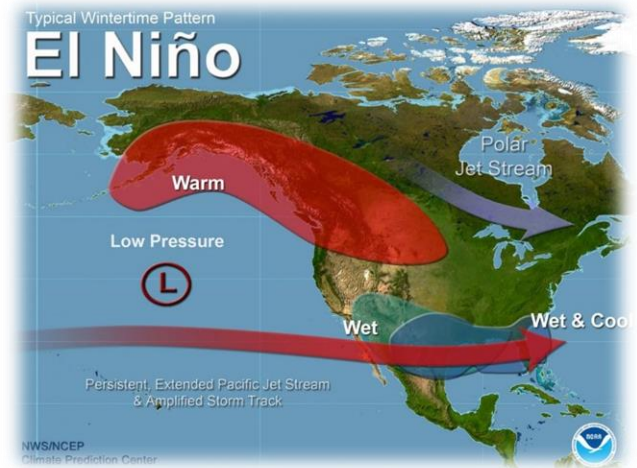
Benefits	Avg/Year	Over 20 Years
Electricity	\$27.20	\$544.00
Natural Gas	\$49.26	\$985.20
Property Value	\$71.46	\$1,429.20
Stormwater	\$127.82	\$2,556.40
Air Quality	\$14.06	\$281.20
CO2 Reduction	\$10.52	\$210.40
<b>TOTAL RETURN</b>		<b>\$6,006.40</b>



## 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.

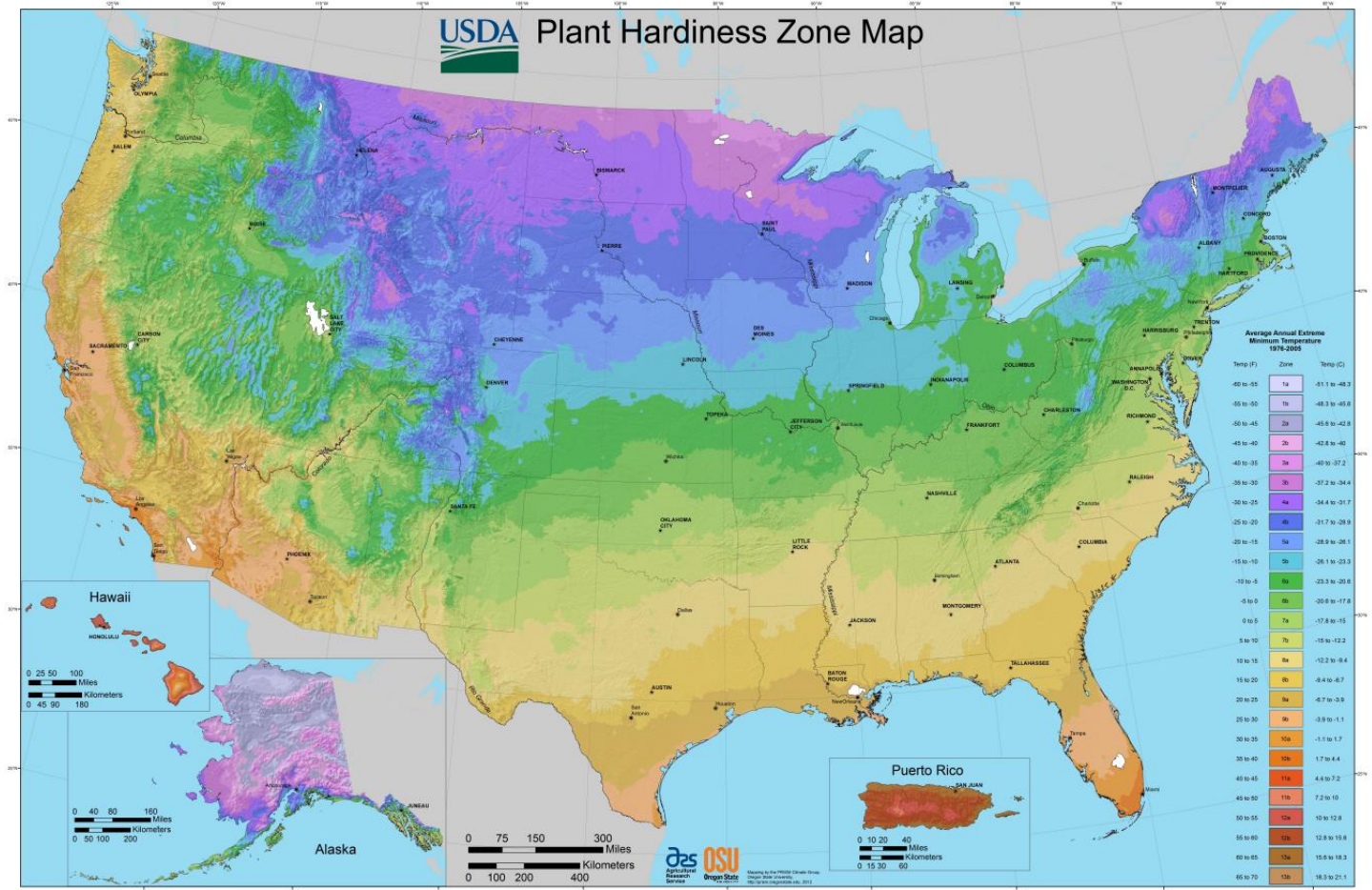
Though the general trend will be towards a warmer climate, the transition process will be very chaotic, and will be one of more “extremes”: hotter summers, colder winters, worse storm seasons, and the like will be the trend for quite some time before the full effects of a warming trend are realized. 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 CO<sub>2</sub> 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 -30° 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.

## VILLAGE OF GLENCOE URBAN FORESTRY MANAGEMENT PLAN



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

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

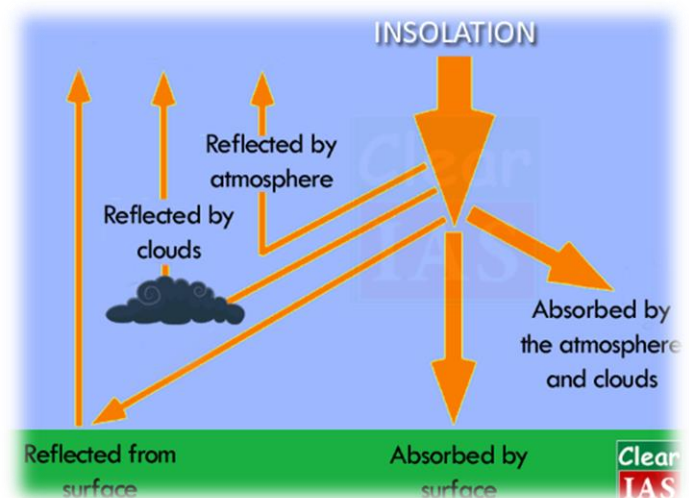
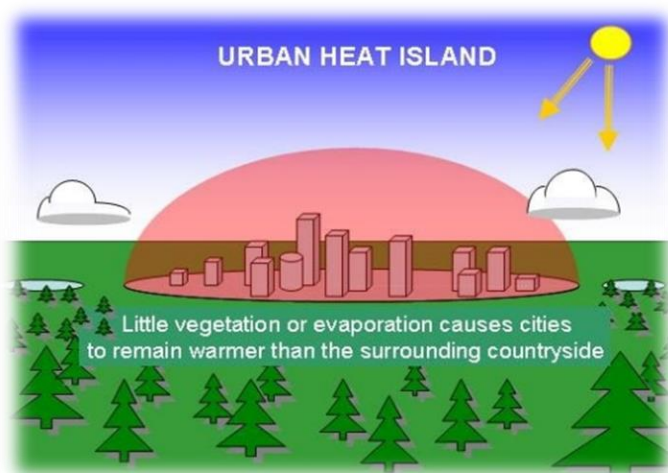
When it comes to trees and climate change, let's move on to some of the immensely positive benefits that trees provide. Here, we are focusing on 2 topics, those being the climate change and the urban heat island effect, as well as flooding prevention and stormwater benefits, since this was one of the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

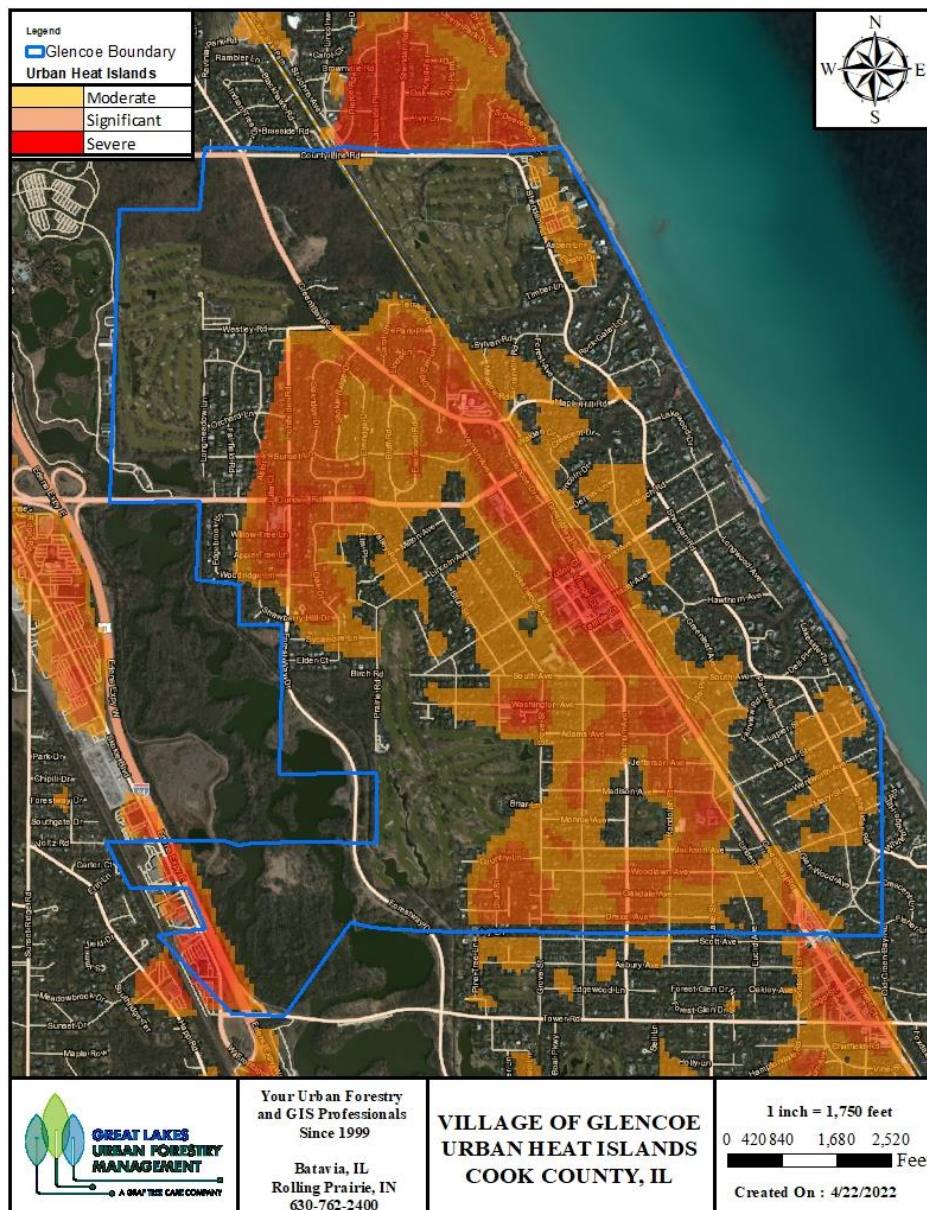
Think about it, if you wear a dark shirt when the sun is shining, you feel hotter than if you were wearing a white shirt. That is because different colors absorb things differently, and light colors reflect light while dark colors absorb it, and absorbing more light leads to more heat. So asphalt and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



## VILLAGE OF GLENCOE URBAN FORESTRY MANAGEMENT PLAN

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.

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



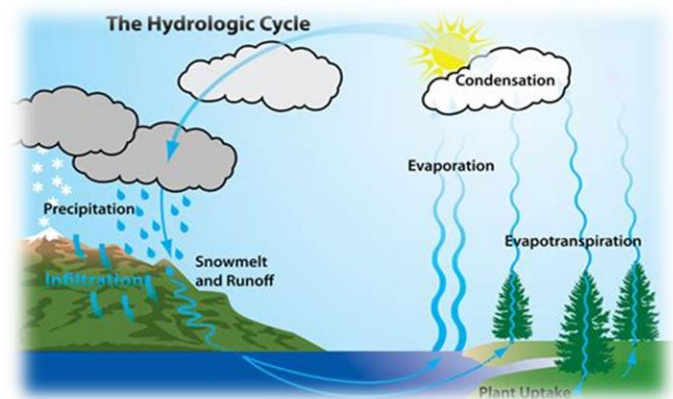
As can be seen from this map, the greatest heat island effects are along the transportation corridors, as well as the industrial areas where greenspace is lower overall. These are the areas where tree planting will create the greatest cooling effects.

Planting trees not just on 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.

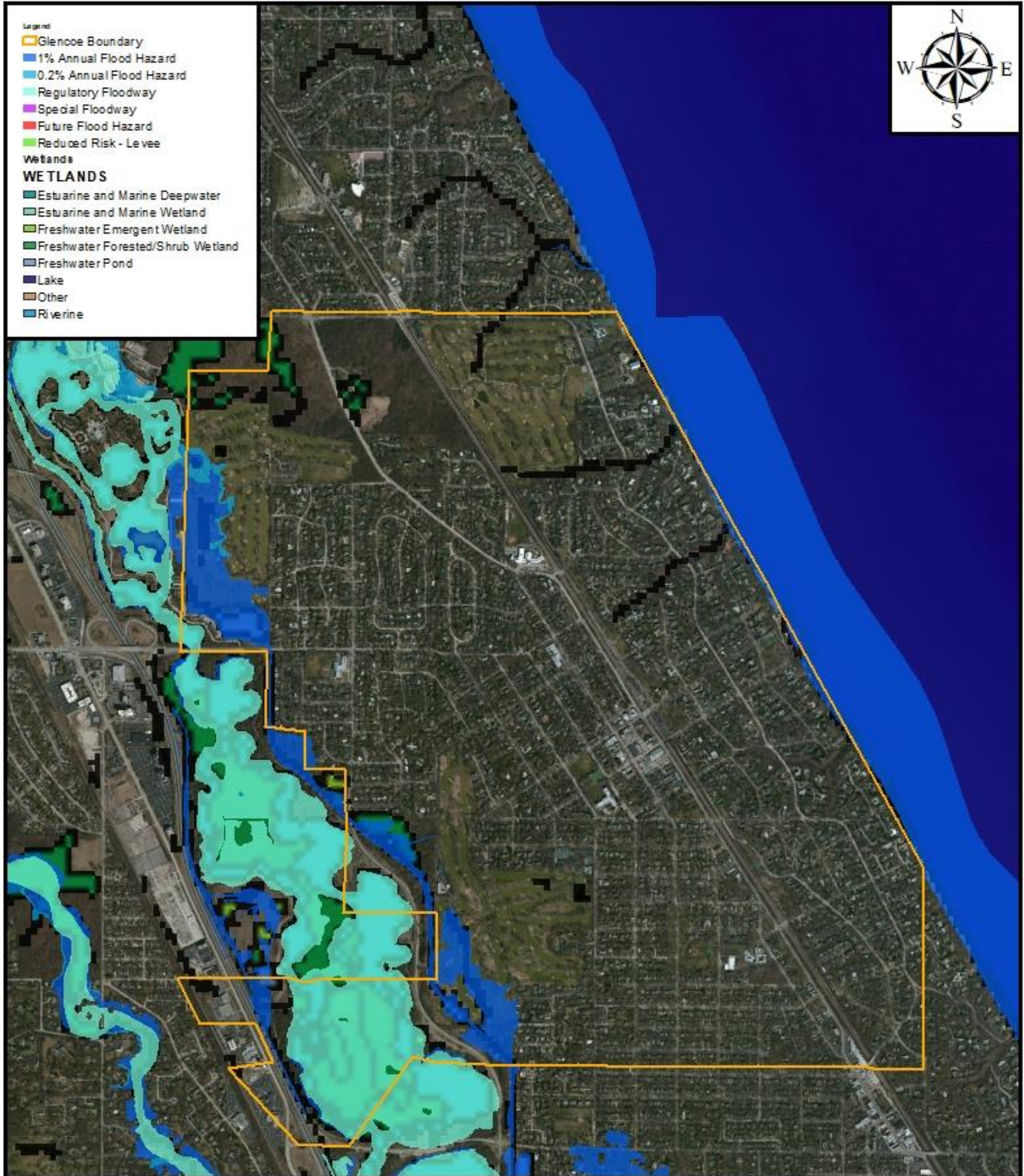
If the rain falls onto the soil surface, some of that water **percolates** into the soil where it moves as groundwater (water under the soil surface). However, when there is so much rain that the soil becomes saturated like a wet sponge that cannot hold any more water, then any additional rainfall becomes **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 Glencoe:

# VILLAGE OF GLENCOE URBAN FORESTRY MANAGEMENT PLAN



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**VILLAGE OF GLENCOE  
FLOOD PRONE AREAS  
COOK COUNTY, IL**

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

(<https://www.epa.gov/sites/default/files/2015-11/documents/stormwater2streettrees.pdf>)

Tree planting efforts should take these flood prone areas into account, as well as the areas which appear to be drier and more drought prone where there is no shading on the map. And just like climate change is not confined to a single area, neither is stormwater and flooding. Whatever floodwater is not absorbed in one area moves downstream to another area. So by reducing runoff in Glencoe, it will help all downstream communities. And again, the more communities we can get to take action on this, the more flooding and runoff will be reduced.

## Tree Removals

The first step towards attaining Glencoe's forestry goals will be to remove trees which are diseased, dying, or present a hazard. At present, there are 256 trees which have been called for removal during the inventory. Of these, 5 are listed as a Priority Removal, 126 are listed as Standard Removals, and 125 are listed as Low Priority Removals based on the tree inventory data. A direct goal of this Urban Forestry Management Plan is to have all identified trees marked as removals during the inventory to be removed within 2 calendar years of this plan's adoptions. Beginning this year, all the trees designated as priority or standard removals can be budgeted. In 2023, all the low priority removals can be budgeted. In subsequent years, this plan projects a budget of the removal of 200 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 200 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 200 trees be removed each year, this is simply a projection based on the existing inventory data.

For purposes of projection, costs have been estimated using a rate of \$25/diameter inch for tree removal and stump grinding, which is a conservative estimate based on current market pricing. Rates could be found lower than this in a competitive bid process or using in-house labor. No cost increase is assumed for the first 5 years, and a 3% annual cost increase is assumed thereafter. This is also a conservative estimate based on the Consumer Price Index. In addition, for trees in year 6 and beyond, these are anticipated averages of trees to be removed. Exact numbers of trees may differ.

REMOVALS	Milestones	2022	2023	2024	2025	2026	2027-2032
	Trees Removed	131	125	150	200	200	200/year avg
	Diameter Inches	1,783"	1,662"	1,225"	1,500"	1,500"	1,500"
	Notes	All Priority and Standard Removals	All Low Priority Removals	Removals From Inventory Updates	Removals From Inventory Updates	Removals From Inventory Updates	Removals From Inventory Updates
	Removal Cost (2022)	\$44,575	\$41,550	\$30,625	\$37,500	\$37,500	\$37,500
	Removal Cost (CPI)	\$44,575	\$41,550	\$30,625	\$37,500	\$37,500	\$43,125

As the table above illustrates, there will be a gradual increase in the number of annual removals over the initial 3 year period. These cost estimates were prepared for the long-term removals, based on the tree inventory data. As this is a program to be adaptively managed, these budget tables can be revisited periodically to reflect actual costs being paid.

## Tree Removal Activities

### **Safe Removal of a Tree to an Appropriate Flush Cut**

Tree removal can be dangerous, but when performed by professionals is very safe. Therefore, all tree removal activities on Glencoe's public property shall be performed under the guidance of a Certified Arborist or Arborist Trainee. This may be the supervision of the Village Arborist, or a staff Certified Arborist alongside a contractor. The safe removal of a tree involves the safe removal and lowering of all portions of the tree according to all relevant ANSI standards and Best Management Practices. The stump must be flush cut such that the highest portion of the cut is no greater than two inches from the highest part of the ground surface to prevent a tripping hazard on public property.

### **Stump Grinding**

Within a reasonable amount of time following the removal, stumps and surface roots should be removed using an approved stump grinding machine, such that the stump is ground to a minimum depth of 6 inches, and no surface roots are visible. If the site is to be planted with a new tree, that depth should be increased to 12 inches below the soil surface. This will ensure that a new tree may be successfully planted, and that no re-sprouting will occur from the old stump. The depths to which the stump must be ground may be altered by the Village of Glencoe depending on needs for specific circumstances or contracts. Until such time as the planting space is fully restored, the stump hole should be filled and compacted to ground level using the debris resulting from the stump removal or otherwise properly barricaded.

## **Planting Site Restoration**

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

## **Reasons for Tree Removal**

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

Removal of trees on Village of Glencoe public property shall always be at the discretion of the Village Arborist and/or 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 Arborist or Forestry Consultant. Removal requests may be granted and paid for under the annual forestry budget. However, trees with a greater need for removal based on public safety will always hold a higher priority. Under no circumstances will the Village of Glencoe be responsible for trees which are not in the right of way.

## **Dead or Dying**

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

## **Diseased or Infested**

Diseases are caused by viral, fungal, or bacterial pathogens. Infestations are caused by insects or other small animals. Dutch Elm Disease and Oak Wilt, for example, are fungal diseases that kill Elm and Oak trees when they are infected. Emerald Ash Borer is an insect which kills Ash trees by infesting them. The prompt removal of diseased or infested trees limits the exposure of other nearby trees. The removal of 1 tree may save dozens of others. Trees deemed to be diseased or infested by the Village Arborist or Forestry Consultant shall be removed as expediently as possible in order to slow the spread of such insects and diseases.

## High or Extreme Risk

“Tree Risk” is the potential of a tree or tree part to impact a nearby person or piece of property and cause property damage or personal injury. This topic is of great interest in Arboriculture today, and insurance companies are becoming increasingly involved in the process of assessing and managing the risk posed by trees. Litigation involving trees is a perennial concern for public entities. All trees in Glencoe 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 Arborist, 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 Arborist or 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 Arborist or 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 Forestry Consultant or Village Forester.

### **Reasonable Resident Request**

If a tree has non-terminal pest or pathogen issues, moderately poor structure or is in somewhat poor condition, a resident may request the removal of the tree. 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, Glencoe 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 Arborist and/or Forestry Consultant. This will be used as a preventative measure so that these trees do not continue to decline to a point where they become hazardous, and not used as a reason to remove an otherwise healthy tree.

### **Basic 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:

#### **Village of Glencoe**

1. All personnel directly involved with process of chainsaw operation, climbing, bucket truck operation, and rigging limbs shall be provided with sufficient training and experience to perform such duties while employed by the Village of Glencoe, as either Public Works and Forestry staff, or performing work as a contractor employed by the Village.
2. Only qualified utility arborists may perform tree removal operations within ten feet of an electric utility line. Village of Glencoe employees or contractors may complete the process of trunk removal and stump grinding only if the remaining portion of the tree is greater than ten feet from a transmission line.
3. The Village will not remove healthy trees in order to meet diversity goals, unless the tree poses a risk to persons or property.

4. The Village of Glencoe shall not perform or assist, programmatically or financially, with the removal of trees on private property. Public/Private tree ownership is defined by Ordinance as having 51% or greater of its trunk diameter within the public right of way.

## Tree Planting

Whereas tree removal is necessary to promote public safety, planting of new trees must happen in order to increase diversity and maintain canopy cover. At present, the Village of Glencoe 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 1,850 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. After the first year, a gradual 10 trees planted per year increase is called for until a plateau of 200 trees per year is reached in 2027.

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



	Milestones	2022	2023	2024	2025	2026	2027-2032
PLANTINGS	Trees Planted	150	160	170	180	190	200/year avg
	Planting Cost (2022)	\$60,000	\$64,000	\$68,000	\$72,000	\$76,000	\$80,000
	Planting Cost (CPI)	\$60,000	\$64,000	\$68,000	\$72,000	\$76,000	\$92,000

## The Importance of Planning Your Tree Planting

### Right Tree in the Right Site

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

This process should involve assessing each site to be planted in much the same way we would assess a tree, except that in this case, we look for factors such as available above and below ground growing space, how much light the tree receives, amount of soil moisture present, and possibly other factors such as soil pH and texture. Once this information is collected, planting sites can be matched with trees which are well suited to those sites.

Matching the right tree to the right site like this will result in trees which establish faster, grow more vigorously, live longer, and provide far greater benefits. Even a simpler version of this process is better than nothing. When you have your species list for each site assembled, it makes bidding nurseries and plantsmen much easier since you already have a plan in hand.

Playing an active role in your tree planting planning also allows for meeting diversity standards such as the taxonomic, spatial, and age class diversity principles outlined above and attempts to get the tree population into compliance with the “20-10-5 Rule”. 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 Arborist or Urban Forestry Consultant should assess planting sites before trees are purchased and installed each year, to ensure the correct tree is being planted for the correct site. Each tree planted represents a 25-75+ year commitment, and this planning helps to increase the benefits the community can reap from this commitment. A list of acceptable species to be planted for all land use types appears in Appendix A.

### **Nursery Stock Procurement**

Nursery stock quality is yet another aspect of planning which can help a tree establish, survive, and thrive to provide great benefits to the community. The Village Forester or an Urban 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. Specifications should be for material no smaller than 1.75” caliper, with good form for the species, planted as either balled and burlapped or minimum 5-gallon containerized stock.

Currently, the industry is recovering from a nursery stock shortage due to high demand to replace Ash trees lost to Emerald Ash Borer, which impacted the availability of some species. We strongly recommend 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 Acceptable Species list in Appendix A. 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 Glencoe**

1. Planting sites shall be determined and monitored using the Village's tree inventory, in conjunction with staff and 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 taxonomic, spatial, and age-class diversity goals. A diverse and resilient urban forest minimizes exposure to financial, environmental, and health risks while maximizing aesthetics, environmental benefits, and ecosystem services to its residents.
4. All planting stock shall be grown within 150 miles of the Village/planting site.
5. Acceptable nursery stock shall conform to the following standards:
  - A. Minimum of 2-inch caliper, measured at six inches from the trunk flare
  - B. Root ball conforms to ANSI Z60.1 Standards for Nursery Stock
  - C. Less than 10% deadwood in the crown
  - D. Architecture consistent for the species, cultivar, or variety in question
  - E. No included bark or other such narrow branch attachments, unless consistent with species or variety
  - F. Free of pests or pathogens
  - G. Approved species list for the Village of Glencoe
6. 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 Glencoe and its approved contractors.
7. 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 Glencoe.
8. JULIE, or another similar utility locating service shall be contacted, and all utilities located a minimum of three days before planting is scheduled to begin.
9. A minimum of a one-year replacement guarantee shall be extended from approved nurseries and plantsmen for all new plantings rated to hardiness zone five or lower.

## Tree Pruning

When maintaining a tree population for its greatest benefits and lowest risk, tree pruning is one of the most cost-effective maintenance activities which can be performed. Pruning provides several important services for a tree: It reduces the risk of failure, provides clearance for utilities or other structures, reduces wind resistance and wind damage, maintains overall tree health, and improves overall aesthetics.

For the Goals and Milestones, the most critical needs of the Village of Glencoe were prioritized. This priority list begins with trees identified as dead limb prunes, priority prunes, or young trees in need of establishment or training pruning. During the inventory, 672 such trees were identified, and can be pruned over the next year under the Village's existing annual forestry budget. Over the next 5 years, it is recommended that Glencoe set a goal to implement a 6 year cycle pruning schedule. Once in the full 6 year pruning cycle for the estimated tree population of 8,100 total trees by 2032, it is anticipated that approximately 1,350 trees per year will require pruning to maintain this cycle. For cost estimates associated with these activities, several assumptions were made:

First, because young trees (12" and less in diameter) are easy to prune, it is assumed that Village staff can prune all trees less than 12", and \$50 per tree was used as an estimate for this group, based on average cost in the industry at this time. For medium (12"-24") and large (24"+) trees, average figures of \$100 and \$150 per tree (respectively) were used, once again based on average cost in the industry (see tables below). Consistent with other budget tables, a 3% annual CPI increase was added for every year thereafter.

Currently, Glencoe prunes approximately 660 trees per year using a combination of in-house labor and contracted services. The goal of a 6 year cycle pruning program will increase that number to 1,350/year. The Village may opt to employ in-house forestry staff for smaller trees and procure contracted services for trees larger than a specific DBH threshold.

	<b>Milestones</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027-2032</b>
	<b>Trees Pruned</b>	1150	1200	1250	1300	1340	1350/year avg
<b>PRUNING</b>	<b>Notes</b>	All Dead Limb, Priority, and Training Pruning, Begin Cycle Prune	1200 Cycle Prunes	1250 Cycle Prunes	1300 Cycle Prunes	1350 Cycle Prunes	Approximately 1350 Cycle Prunes / year in perpetuity
	<b>Cost (2022)</b>	\$73,215	\$79,090	\$84,960	\$90,830	\$96,710	\$110,505
	<b>Cost (CPI)</b>	\$73,215	\$79,090	\$84,960	\$90,830	\$96,710	\$127,080

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

## 2022 Cost Breakdown – Pruning 1,150 Trees/Year by 2022

	<u>Total Trees</u>	<u>Avg %</u>	<u>Cost/Tree</u>	<u>Pruned/year</u>	<u>Cost/year</u>
Evergreen	349	4.34%	\$20	51	\$ 1,020.00
Large (>24")	863	10.74%	\$150	124	\$ 18,600.00
Medium (13-24")	2917	36.30%	\$75	417	\$ 31,275.00
Small (1-12")	3906	48.61%	\$40	558	\$ 22,320.00
					<b>\$ 73,215.00</b>

## 2026 Cost Breakdown – Pruning 1,340 Trees/Year by 2026

	<u>Total Trees</u>	<u>Avg %</u>	<u>Cost/Tree</u>	<u>Pruned/year</u>	<u>Cost/year</u>
Evergreen	325	4.01%	\$20	54	\$ 1,080.00
Large (>24")	1275	15.74%	\$150	207	\$ 31,050.00
Medium (13-24")	3700	45.68%	\$75	612	\$ 45,900.00
Small (1-12")	2800	34.57%	\$40	467	\$ 18,680.00
					<b>\$ 96,710.00</b>

## 2032 Cost Breakdown – Pruning 1,350 Trees/Year by 2032

	<u>Total Trees</u>	<u>Avg %</u>	<u>Cost/Tree</u>	<u>Pruned/year</u>	<u>Cost/year</u>
Evergreen	300	3.70%	\$20	50	\$ 1,000.00
Large (>24")	1850	22.84%	\$150	308	\$ 46,200.00
Medium (13-24")	4050	50.00%	\$75	675	\$ 50,625.00
Small (1-12")	1900	23.46%	\$40	317	\$ 12,680.00
					<b>\$ 110,505.00</b>

## Pruning Activities

### Creation of a Pruning Cycle

Initially, the Village should prioritize the trees identified in the inventory as requiring either Priority, Dead Limb, or Training pruning, regardless of where they are located. This is primarily to prioritize public safety and proactive actions before routine maintenance.

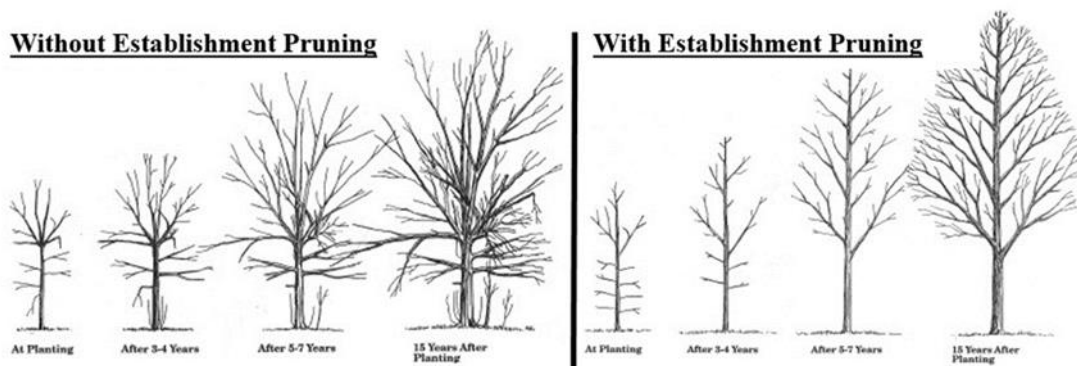
After these trees are pruned, Glencoe should aim to create a 6 year pruning cycle based on the size of its tree population both now and in 2032. With approximately 8,100 parkway trees total by 2032, this would mean that over a 6 year period, approximately 1,350 trees would require pruning each year. As noted above, the number of trees as well as their overall sizes will be changing over that time period, hence above tables showing adaptive management of the tree pruning program. We believe this is a realistic goal based on communications with Village staff.



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 Glencoe begin to budget for this essential expense.

### 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 Glencoe 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 Glencoe**

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 Glencoe 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 Glencoe, 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 Glencoe.
5. The need for pruning and maintenance of individual trees and parkways shall be at the discretion of the Village of Glencoe 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**

### **Maintenance Activities**

#### **Retaining a Consultant**

The task of establishing or enhancing a robust Urban Forestry program can be difficult! There may be many new challenges and learning curves, contracts to renegotiate, bid documents to create, resident concerns to manage, and other responsibilities which may require the assistance of a professional. 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, training Village staff on tree health and risk assessments, assisting in explaining policies to homeowners, preparing contract and bid specifications, and teaching residents how to help the Village in caring for their trees. The importance of this early relationship cannot be overstated, no matter how large or small the organization.

### **Chemical Applications**

Trees, 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.

At present, the Village has a selective program regarding PHC treatments where some high quality or high location value Elm and Ash trees are chemically treated to help prevent damage or decline due to Dutch Elm Disease infection or Emerald Ash Borer infestation and the Village plans to continue this program.



Historically, the Village of Glencoe 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 1,850 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

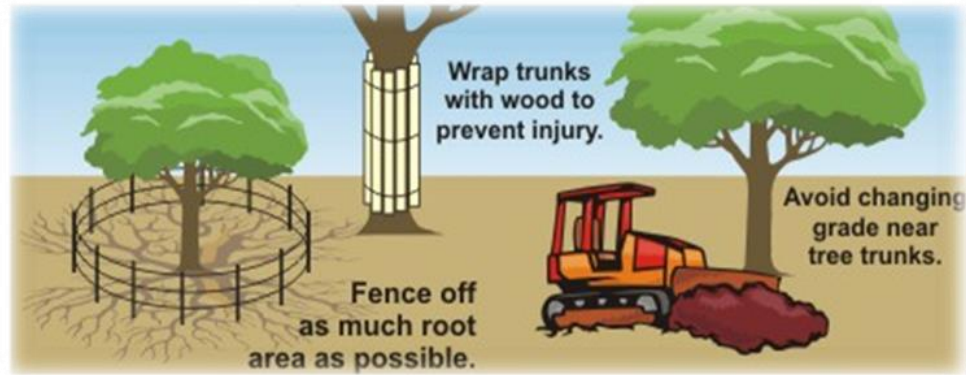
Proper application of mulch is a necessary and cost-effective maintenance activity. Mulch has many benefits, including reducing weed growth in the root zone, protecting the tree trunk and root flare from lawn maintenance equipment, allowing water to move into the soil, reducing evaporation and drought 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 Glencoe 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 Glencoe**

1. A tree survey shall be performed by a qualified individual prior to the beginning of any development activities. The survey shall identify all priority trees on the lot, parcel or tract, including their location, size (in DBH), species and condition. For more information on priority tree classification, see Glencoe Municipal Code Chapter 34-22.
2. The Tree Survey and a Tree Protection Plan should be required be submitted to the Village of Glencoe and all relevant architects, engineers, and workers, detailing the following:
  - A. Trees to be removed
  - B. Trees to be preserved
  - C. Location and size of the Tree Protection Zone (TPZ) for each tree
3. The Tree Protection Zones for each tree shall be visibly delineated by the site engineer, using orange snow fencing or other high visibility exclusion material. When such a delineation is not possible, all workers on site shall be made aware of the TPZ verbally.
4. For more information on tree preservation and replacement requirements see Glencoe Ordinance Chapter 34.21-26

## Tree Risk Assessment Policy

Trees provide ecosystem and aesthetic benefits, but all trees also pose some degree of risk. Determining the acceptable level of risk, along with effectively managing that risk, is a key priority for urban forestry operations. As a tree manager, the Village of Glencoe always must always assume some degree of risk. It is up to the Village to track that risk to ultimately decide how to take steps to mitigate trees which pose such risk in a manner which is responsible both economically as well as in the interest of public safety.

### Levels of Risk Assessment – An Overview

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



#### Level 1 Assessment

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

#### Level 2 Assessment

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



### Level 3 Assessment

A Level 3 Assessment, also called an “advanced assessment”, provides detailed information about specific tree parts, targets, and risk associated with each potential interaction. By definition, it requires specialized equipment known as “advanced tools”, such as bucket trucks, resistance drills, sonic tomographs, and other such equipment. This is the most detailed and time-intensive type of assessment, and is typically only performed when a decision to retain or remove a tree is very difficult, as would be the case for a high quality tree near a potential target that has significant defects, the extent of which are not known, but must become known before making a decision.

### Considerations in Assessing Risk

The following are meant for the reader to gain additional insight into the TRAQ process. Once again, TRAQ inspections were not performed on Village trees during the inventory data collection, but this information will help the reader understand the terminology better, and help inform staff and residents as to how and why these inspections are performed.

### Likelihood of Tree Part Failure

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

### Likelihood of Tree Failure Impacting a Target

Determining the likelihood of impacting a target is figuring out the occupancy rate, or the amount of time that targets (particularly people or high value property) are within the fall zone. A large tree in the middle of a field could fail with little impact, but that same tree in a playground might have serious consequences. In many roadways, motor traffic is present day and night. All of the Village’s inventoried 8,035 trees are in rights-of-way adjacent to roads, where failure of a tree not only impacts motorists, but it also has a potential effect on pedestrian traffic and utilities within right-of-way also.



### Consequences of a Tree Failure Impacting a Target

The potential consequences of the tree failure impacting a target are a cumulative function of both the “value” of the target and the consequences to that target if the tree fails. Whereas previous steps are concerned with occupancy rates, this step looks at the consequences of the impact, and assumes that a target is always present. From the above example, it is assumed that if a parkway tree were to fail, that a car, utility line, and person are all underneath it at the time of failure, and the consequences to those targets is evaluated. Consequences are generally considered to be “minor” for targets that can be easily replaced or repaired, and step up through 4 levels with the highest level being “severe”, which would constitute severe injury to a person, or even a fatality (see the table below).

## Weather

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

## **DRAFT Village of Glencoe Tree Risk Assessment Policy**

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

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

5. A minimum branch diameter of three (3) inches, by ocular estimate, shall be the standard to which this risk assessment policy applies. Assessing all branches smaller than three inches represents an undue burden to the Village.

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

### TRAQ Tree Risk Assessment Matrices

#### **Likelihood of Tree Failure Impacting Target**

<u>Likelihood of Tree Failure</u>	<u>Likelihood of Impacting Target</u>			
	Very Low	Low	Medium	High
<b>Imminent</b>	Unlikely	Somewhat Likely	Likely	Very Likely
<b>Probable</b>	Unlikely	Unlikely	Somewhat Likely	Likely
<b>Possible</b>	Unlikely	Unlikely	Unlikely	Somewhat Likely
<b>Improbable</b>	Unlikely	Unlikely	Unlikely	Unlikely

#### **Risk Rating Matrix**

<u>Likelihood of Failure and Impact</u>	<u>Consequences</u>			
	Negligible	Minor	Significant	Severe
<b>Very Likely</b>	Low	Moderate	High	Extreme
<b>Likely</b>	Low	Moderate	High	High
<b>Somewhat Likely</b>	Low	Low	Moderate	Moderate
<b>Unlikely</b>	Low	Low	Low	Low

## 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 2032, at which time, including CPI, the budget will have increased approximately 48% from the current level of approximately \$179,790 in 2022 to approximately \$266,805 by 2032. This represents a necessary budget increase for such an increase in values of the Urban Forest.

REMOVALS	Milestones	2022	2023	2024	2025	2026	2027-2032
	Trees Removed	131	125	150	200	200	200/year avg
	Diameter Inches	1,783"	1,662"	1,225"	1,500"	1,500"	1,500"
	Notes	All Priority and Standard Removals	All Low Priority Removals	Removals From Inventory Updates	Removals From Inventory Updates	Removals From Inventory Updates	Removals From Inventory Updates
	Removal Cost (2022)	\$44,575	\$41,550	\$30,625	\$37,500	\$37,500	\$37,500
	Removal Cost (CPI)	\$44,575	\$41,550	\$30,625	\$37,500	\$37,500	\$43,125

PLANTINGS	Milestones	2022	2023	2024	2025	2026	2027-2032
	Trees Planted	150	160	170	180	190	200/year avg
	Planting Cost (2022)	\$60,000	\$64,000	\$68,000	\$72,000	\$76,000	\$80,000
	Planting Cost (CPI)	\$60,000	\$64,000	\$68,000	\$72,000	\$76,000	\$92,000

PRUNING	Milestones	2022	2023	2024	2025	2026	2027-2032
	Trees Pruned	1150	1200	1250	1300	1340	1350/year avg
	Notes	All Dead Limb, Priority, and Training Pruning, Begin Cycle Prune	1200 Cycle Prunes	1250 Cycle Prunes	1300 Cycle Prunes	1350 Cycle Prunes	Approximately 1350 Cycle Prunes / year in perpetuity
	Cost (2022)	\$73,215	\$79,090	\$84,960	\$90,830	\$96,710	\$110,505
	Cost (CPI)	\$73,215	\$79,090	\$84,960	\$90,830	\$96,710	\$127,080

FORESTRY CONSULTANT	Milestones	2022	2023	2024	2025	2026	2027-2032
	Notes	Basic Assistance with contract prep, etc	Appraisals and Risk Management	Inventory Updates / Risk Management	Inventory Updates / Risk Management	Inventory Updates / Risk Management	Inventory Updates / Risk Management
	Cost (2019)	\$2,000	\$2,000	\$4,000	\$4,000	\$4,000	\$4,000
	Cost (CPI)	\$2,000	\$2,000	\$4,000	\$4,000	\$4,000	\$4,600

TOTALS	TOTALS - 2021 \$	\$179,790	\$186,640	\$187,585	\$204,330	\$214,210	\$232,005
	TOTALS - CPI 3%	\$179,790	\$186,640	\$187,585	\$204,330	\$214,210	\$266,805

## Summary / Conclusion

The Village of Glencoe has a long history of maintaining a top-tier urban forest. The current status of the urban forest resource in Glencoe is that it is extraordinarily well cared for, and a highly diverse tree population overall, which provides its residents with nearly \$1.2 million in benefits each year, or approximately 7 times the money invested in it on an annual basis.

That said, there are always areas where enhancements can be made, and this Urban Forest Management Plan has attempted to do so. Such goals as reducing the number of Maples and other overplanted species, 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 Glencoe 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. The Village of Glencoe 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.

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

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

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

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

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

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

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

**Contracted Staff:** People working for the 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 Glencoe, 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 Glencoe 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 Glencoe 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 Glencoe.

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

**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 Glencoe.

**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 Glencoe 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 Glencoe Staff.

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

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

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

## Appendix A: Acceptable and Unacceptable Species

Species not appearing on this list can be approved or disallowed under the supervision of the Village staff and/or Forestry Consultant along with the Tree Commission.

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

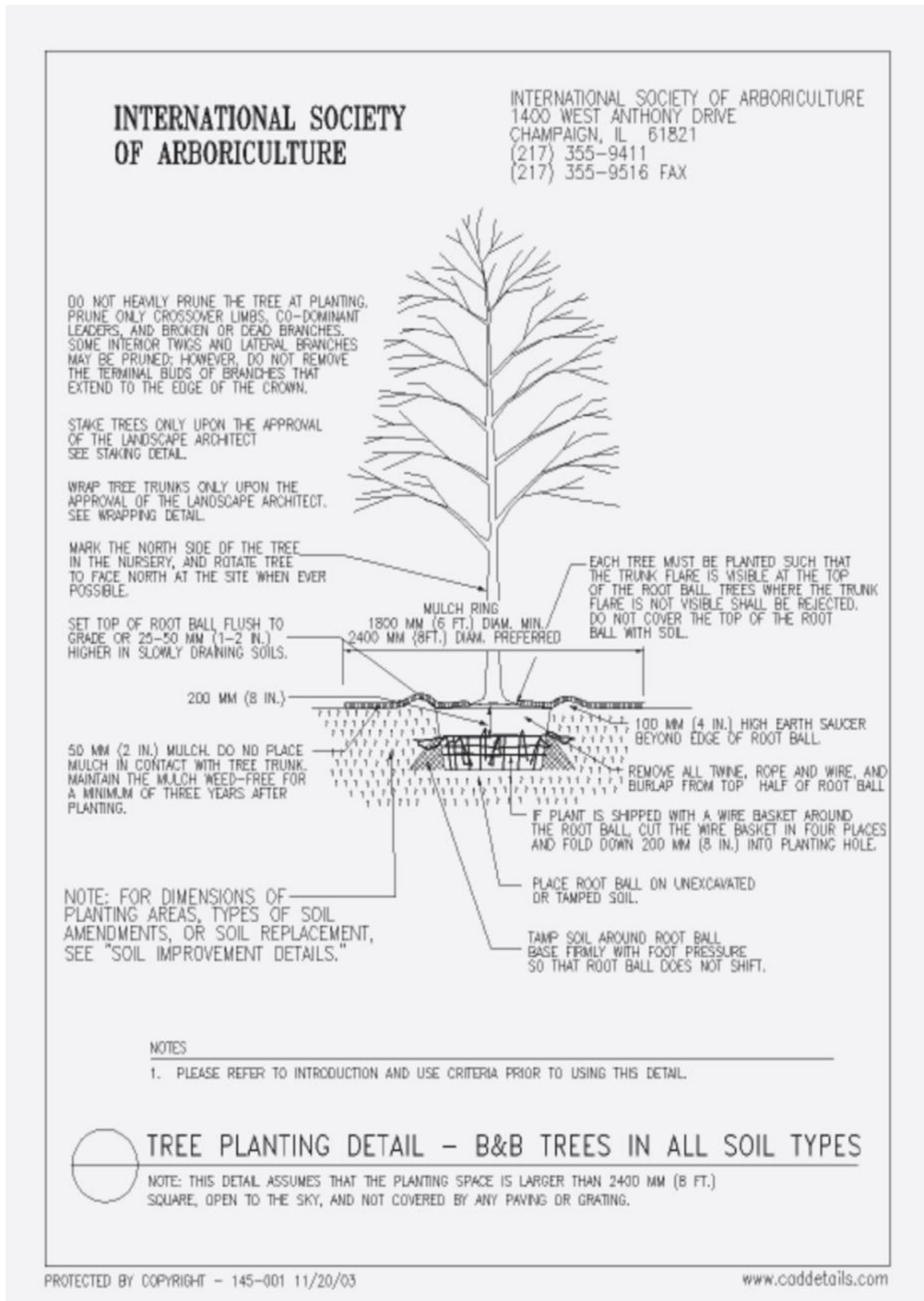
## Appendix B: Additional Comments on Species

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

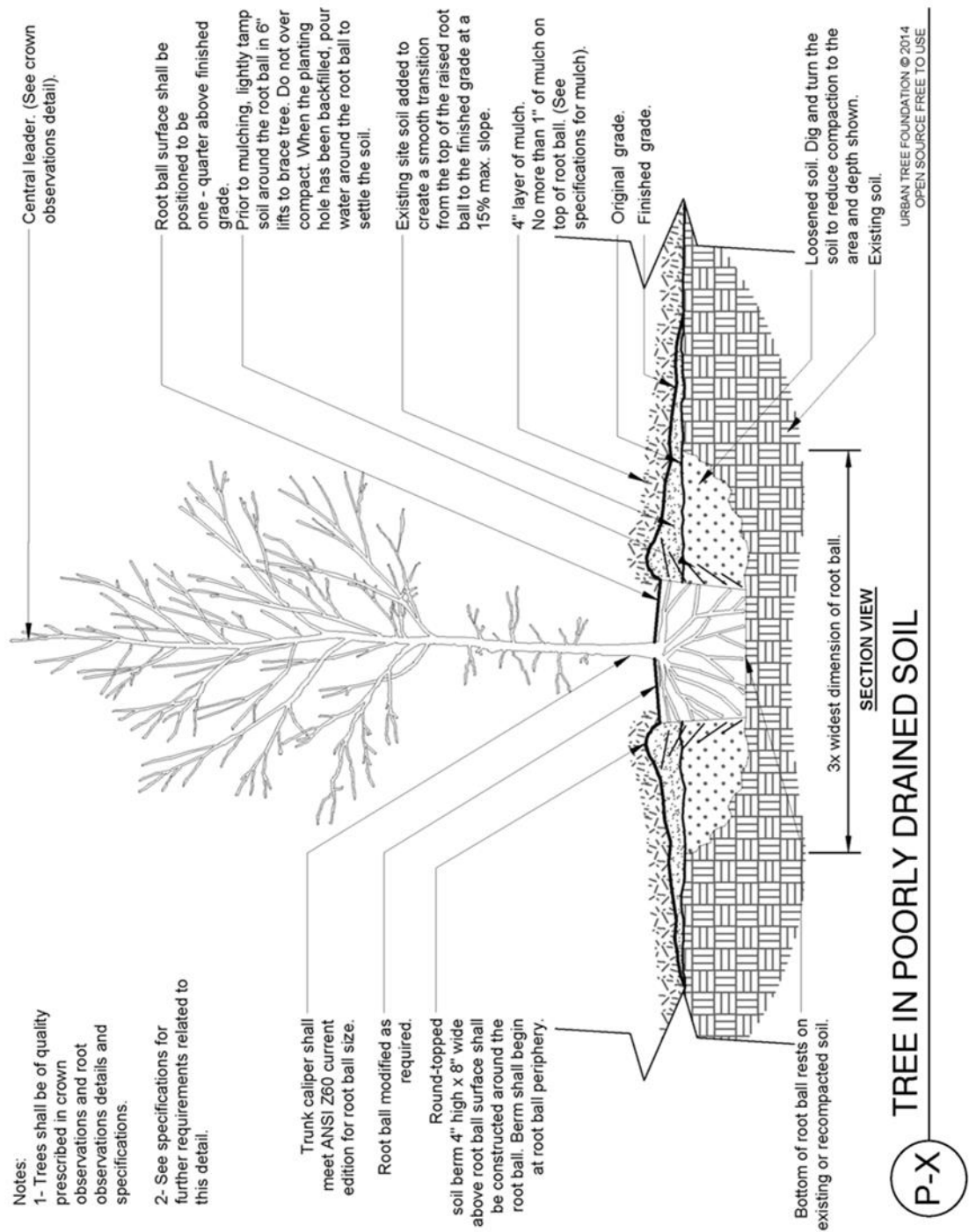
## Appendix C: Species Substitutions

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

## Appendix D: Balled and Burlapped Planting Detail

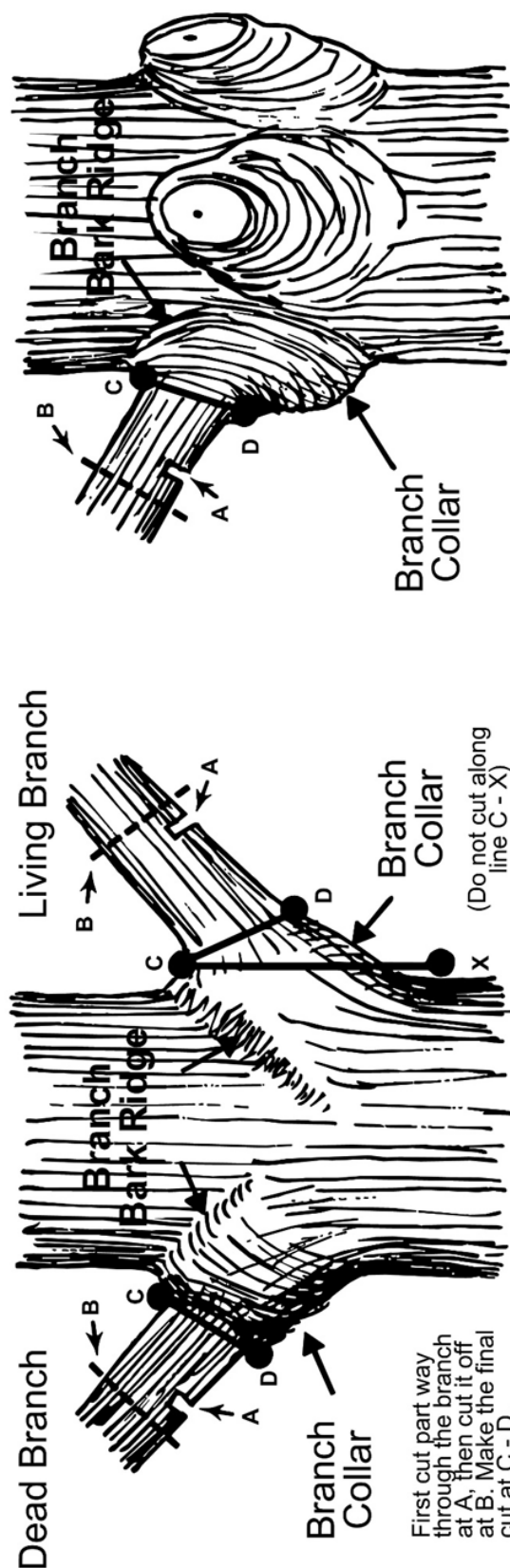


Appendix E: Containerized Planting Detail



## Appendix F: Tree Pruning Detail

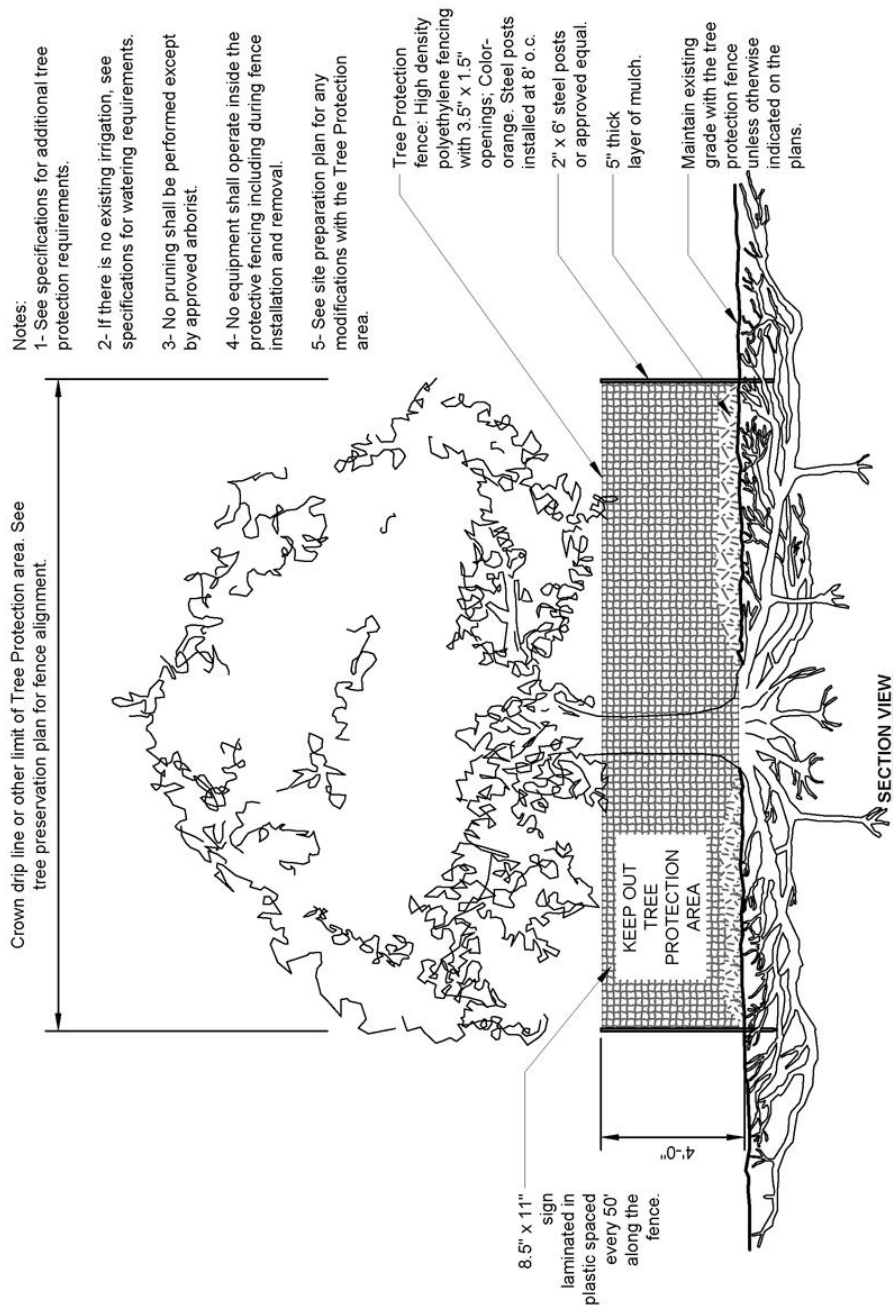
# Proper Pruning Principles



Conifers

Hardwoods

Appendix G: Tree Protection Detail



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S-X  
TREE PROTECTION

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

# ISA Basic Tree Risk Assessment Form

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

Target Assessment						
Target number	Target description	Target zone			Occupancy rate 1 – rare 2 – occasional 3 – frequent 4 – constant	Practical to move target?
		Target within drip line	Target within 1 x Ht.	Target within 1.5 x Ht.		
1						
2						
3						
4						

## Site Factors

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

## Tree Health and Species Profile

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

## Load Factors

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

## Tree Defects and Conditions Affecting the Likelihood of Failure

### — Crown and Branches —

Unbalanced crown ☐ LCR \_\_\_\_\_ %  
 Dead twigs/branches ☐ \_\_\_\_\_ % overall Max. dia. \_\_\_\_\_  
 Broken/Hangers Number \_\_\_\_\_ Max. dia. \_\_\_\_\_  
 Over-extended branches ☐

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

Pruning history  
 Crown cleaned ☐ Thinned ☐ Raised ☐  
 Reduced ☐ Topped ☐ Lion-tailed ☐  
 Flush cuts ☐ Other \_\_\_\_\_

Main concern(s) \_\_\_\_\_

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

### — Trunk —

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

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

### — Roots and Root Collar —

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

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

# VILLAGE OF GLENCOE URBAN FORESTRY MANAGEMENT PLAN

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

Matrix 1. Likelihood matrix.

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

Matrix 2. Risk rating matrix.

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

Notes, explanations, descriptions \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Mitigation options \_\_\_\_\_ Residual risk \_\_\_\_\_  
 \_\_\_\_\_ Residual risk \_\_\_\_\_  
 \_\_\_\_\_ Residual risk \_\_\_\_\_  
 \_\_\_\_\_ Residual risk \_\_\_\_\_

Overall tree risk rating Low ☐ Moderate ☐ High ☐ Extreme ☐ Work priority 1 ☐ 2 ☐ 3 ☐ 4 ☐  
 Overall residual risk Low ☐ Moderate ☐ High ☐ Extreme ☐ Recommended inspection interval \_\_\_\_\_  
 Data ☐ Final ☐ Preliminary Advanced assessment needed ☐ No ☐ Yes-Type/Reason \_\_\_\_\_  
 Inspection limitations ☐ None ☐ Visibility ☐ Access ☐ Vines ☐ Root collar buried Describe \_\_\_\_\_

This datasheet was produced by the International Society of Arboriculture (ISA) and is intended for use by Tree Risk Assessment Qualified (TRAQ) arborists – 2013

## 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 Glencoe 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 ANSI Z133.1 Standard.
16. All brush chippers shall be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements, and shall be equipped with all standard safety devices, decals, and instructions.
17. Sprayers and related plant health care equipment shall be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements, and shall be equipped with all standard safety devices, decals, and instructions.
18. Sprayer tanks or other similar enclosed spaces shall not be entered unless performed through a confined-space entry plan in accordance with OSHA 1910.46 Requirements, including air-quality testing, training, and PPE.
19. Chain saws and other similar portable power tools shall not be operated unless the manufacturer's safety devices are in proper working order. Such safety devices shall not be removed or modified.
20. Forestry staff shall have a minimum of two points of attachment to the tree or aerial device while operating a chainsaw at all times, unless the hazard posed by the second point of attachment poses a greater hazard than utilizing one point of attachment.
21. A visual hazard assessment, including a root collar inspection, shall be performed by a certified arborist or arborist trainee prior to climbing, entering, or performing work in or on any tree, and a second crew member shall be within visual or voice communication at all times during arboricultural operations that are in excess of 12 feet from the ground surface.
22. All ropes, saddles, carabiners, and other similar climbing equipment shall be: a) approved for use in the tree care industry by the manufacturer, b) have a minimum breaking strength or load capacity of 5,000 lbs., c) be inspected before each use, d) Equipment shall be removed from service when it shows signs of excessive wear or deterioration.

23. All pruning, removal, and rigging operations shall have a designated drop zone where limbs, trunks, and tools can be dropped from aloft without impacting pedestrians or passersby. A visual or verbal communication system between the employee aloft and the employee(s) on the ground shall be established to determine when the employee aloft will safely drop tree parts or tools.
24. Any tree parts which cannot be safely dropped or controlled from aloft shall have a separate rigging line tied to them to help control their fall. The tree shall be inspected for structural stability prior to the establishment of a rigging system in the tree. When trees appear to have defects that could jeopardize the ability to safely use a rigging system to drop or control a limb, an alternate plan shall be implemented.
25. All equipment utilized in rigging shall meet the load ratings for the limb being rigged, and a qualified employee, trained in proper rigging procedure shall determine the rigging procedure and equipment to be utilized. Any equipment which has been damaged or overloaded shall be removed from service.
26. When felling (removing) a tree, a crew leader shall make the determination of what equipment is necessary, and how many crew members are to be directly involved in drop zone operations. A well-established escape route shall be planned for involved workers prior to the beginning of felling operations. Any non-involved workers shall be beyond twice the height of the trunk or tree being removed during felling operations.
27. Notches shall be used on all trees and trunks greater than five inches in diameter during felling operations, and should conform to the standards set forth in the ANSI Z133.1 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 Glencoe.
2. All employees and contractors employed by or working for the Village of Glencoe shall be familiar with the following types of planting types, and when it is appropriate to use each:
  - A. **Bare-Root:** Field-grown, and dug without soil during the dormant season
  - B. **Ball and Burlap:** Field grown and packaged with a soil ball, using burlap, twine, and a retaining basket of some kind
  - C. **Tree Spade:** Transplanted using a mechanical tree spade to hold the soil ball during transport
  - D. **In-Ground Fabric Bag:** Field grown with the root mass contained in a semi-permeable fabric bag
  - E. **Container Grown:** Grown above ground in containers of various shapes, sizes, and materials
3. Trees packaged with root balls must have their first structural root within two inches of the soil surface. Trees with deeper structural roots will not perform well when transplanted, and should be avoided when selecting nursery stock.

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

## Appendix K: Tree Pruning Standards (ANSI/ISA BMP)

### ANSI A300 - Part 1

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

### ISA BMP Manual

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

## Appendix M: Urban Timber Harvesting

### Log Removal Specification for Urban Timber Harvesting

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

- Logs shall be felled to obtain minimum 8', 10', or 12' lengths with an additional 6" of trim on each log to a minimum diameter of 11" inside the bark. Maximum log length shall be 20'6".
- If a tree must be removed in sections, every effort should be made to retain the lowest log, at the longest possible length that can be safely felled.
- Branches should be trimmed flush with the bole/trunk, root flares should be trimmed flush with the bole/trunk, and the ends of the log should be square.
- Logs shall be flush cut with no crotches or splits. All obvious defects such as decay, large holes, and rot shall be removed.
- Logs with significant sweep shall be cut in order to eliminate as much sweep as possible while yielding the longest possible straight logs to ensure logs are flush for proper milling.

