DAVEY Resource Group

October 2022

COMMUNITY FORESTRY MANAGEMENT PLAN

The Village of Depew, New York

Prepared for:

The Village of Depew
City Hall
85 Manitou Street
Depew, New York 14043

Prepared by:

Davey Resource Group, Inc.
10 Mitchell Street
Sinclairville, New York 14782
716-450-0884

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ACKNOWLEDGMENTS

This project supports the Village of Depew's vision to promote and enhance community well-being through public tree conservation and improved forestry management practices. This *Community Forestry Management Plan* offers expertise in preserving and expanding urban canopy so the environmental, economic, and social benefits it provides continue for generations.

The Village of Depew is thankful for the grant funding it received from the NYS Department of Environmental Conservation (DEC) through its 2020 Urban and Community Forestry (U&CF) Grant Program Round 15. The grants are part of DEC's Urban and Community Forestry Program, which works to increase public awareness of the importance of trees and helps communities develop and implement comprehensive tree management plans to create healthy forests while enhancing quality of life for residents.

The Village of Depew also recognizes the support of:

Kevin Peterson—Depew Mayor
Audrey Hamernik—Deputy Mayor
Darrin Ziemba—Village Trustee
Jacqueline Kucewicz—Village Trustee
Andrew Adolf—Village Trustee & Chairman of the Tree Board
Andrea Barsi, Chris Peters, and Joseph Puskar—Depew Core Tree Board Members
Regina L. Grzankowski—Mayor's Secretary & Community Development Director
Terry Wachowiak—Village Administrator
Kenneth Pyc—Superintendent of Public Works
Depew Public Works Department—For all the in-house tree work throughout the Village
Erica Stempniak Hlavaty—Former Deputy Mayor and Former Chairman of the Tree Board

Ten-Year Tree Resource Maintenance Schedule

EXECUTIVE SUMMARY

The Village of Depew *Community Forestry Management Plan*, written by Davey Resource Group, Inc. "DRG", focuses on quantifying the benefits provided by the inventoried tree resource and addressing its maintenance needs. DRG completed a tree inventory for The Village of Depew in November 2021 and analyzed the inventory data to understand the structure of the village's inventoried tree resource. DRG also estimated the economic values of the various environmental benefits provided by this public tree resource by analyzing inventory data with i-Tree Eco and recommended a prioritized management program for future tree care.

The functions of The Village of Depew's inventoried tree population provide benefits with an estimated total value of $251,603 annually. The village 's annual tree maintenance budget is an average of $99,000 yearly over the 10 years. The functions of The Village of Depew's inventoried tree population throughout its trees' lifetimes are worth an estimated $140,874,835. Supporting and funding proactive maintenance of the public tree resource is a sound long-term investment that will reduce tree management costs over time.

High priority tree removal and pruning is costly, accounting for the larger budget in Year 1 of the ten-year schedule, as shown in Figure 1. After high priority work has been completed, budgets are expected to decrease and stabilize as tree management transitions from reactive to proactive maintenance. This also reduces the number of new elevated risk trees over time by preventing deteriorating conditions of trees with initially minor defects.

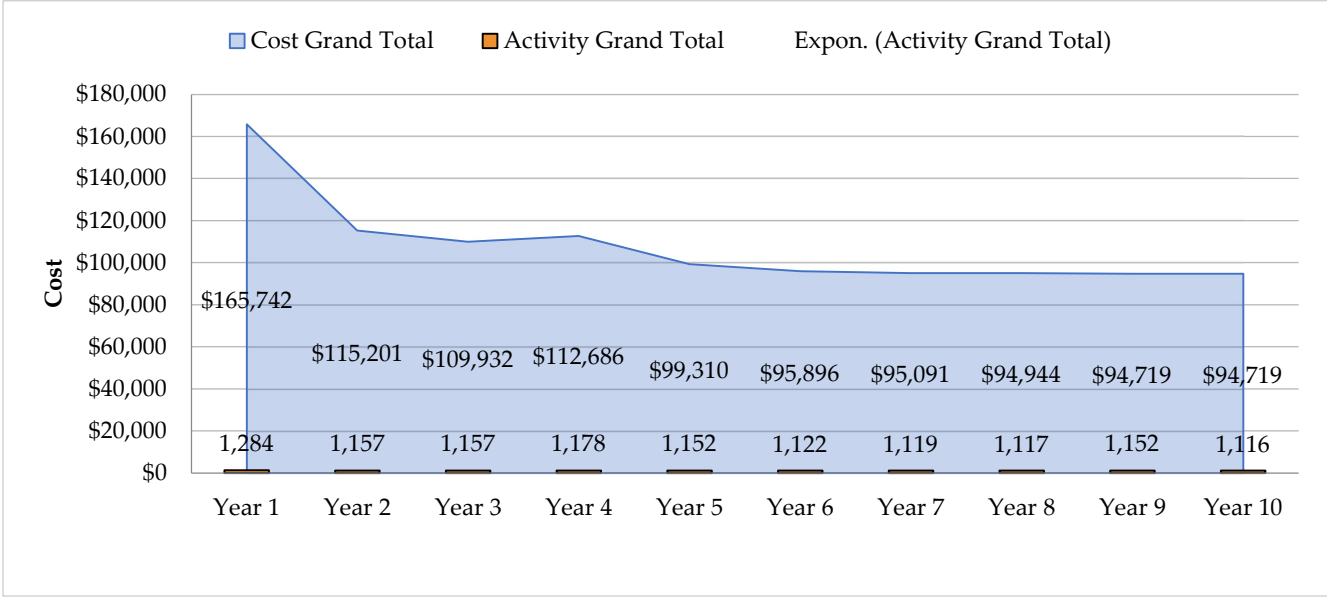


Figure 1. Number of inventoried sites by location and type.

Recommended Maintenance Types

Tree Removal

Trees designated for removal have defects that cannot be cost-effectively or practically corrected. Most of the trees in this category have a large percentage of dead crown.

Total = 272 trees

High Priority = 13 trees

Moderate Priority = 120 trees

Low Priority = 139 trees

Stumps = 45

Priority Pruning

Priority pruning removes defects such as Dead and Dying Parts or Broken and/or Hanging Branches. Pruning the defected branch(es) can lower risk associated with the tree while promoting healthy growth.

Total = 294 trees

High Priority = 17 trees

Moderate Priority = 277 trees

Routine Pruning Cycle

Over time, routine pruning of Low and Moderate Risk trees can minimize reactive maintenance, limit instances of elevated risk, and provide the basis for a robust risk management program.

Total = 3,188 trees

Number in cycle each year = at least 329 trees

Young Tree Training Cycle

Younger trees can have branch structures that lead to potential problems as the tree ages, requiring training to ensure healthy growth. Training is completed from the ground with a pole pruner or pruning shear.

Total = 963 trees

Number in cycle each year = at least 100 trees

Tree Planting

Planting new trees in areas that have poor canopy continuity is important, as is planting trees where there is sparse canopy, to ensure that tree benefits are distributed evenly across the Village.

Total new plantings = 100 trees over the 10 years

Routine Tree Inspection

Routine inspections are essential to uncovering potential problems with trees and should be performed by a qualified arborist who is trained in the art and science of planting, caring for, and maintaining individual trees.

Total = 327 existing trees + 10 new trees

Number in drive-by assessment cycle each year = 337 trees

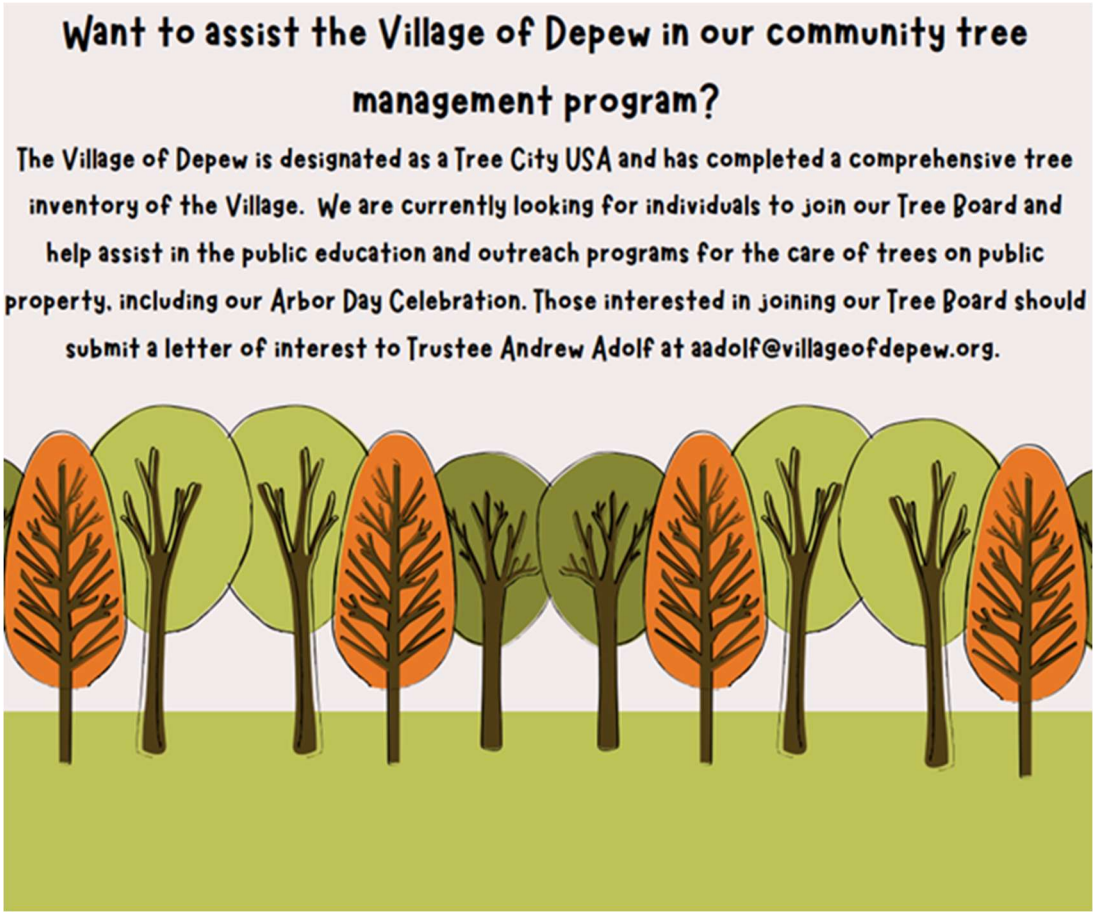
THE VILLAGE OF DEPEW'S COMMITMENT TO URBAN FORESTRY

Mission Statement: The Village of Depew is committed to the care and attention of our urban forest. It is an understanding that the green space we create and preserve will last for future generations to come. This is done by applying best management practices that allows the village to grow the community through education, as well as both planting and conserving the Urban Forest in a safe and professional manner. We believe that trees are an important piece to what makes our village special and should be taken care of to reflect the pride we have in our urban forest.

The Village of Depew, NY is committed to maintaining and growing an urban forest. The village understands the value that not only helps air quality, prevents gallons of water runoff, as well as other practical applications, but also helps to beautify the surrounding village with a variety of trees.

This commitment was put into effect by the establishment and formation of the Village of Depew Tree Board, originally headed by former Deputy Mayor Erica Stempniak and currently headed by Tree Board Chairman and Village Trustee Andrew Adolf. The Tree Board allowed for a means to promote education as well as engagement through the Village of Depew.

Flyers (such as the one below) were posted throughout the village as well on social media outlets like the Village of Depew, NY Facebook to encourage residents to join The Village of Depew's mission:



Tree City USA

This helped the Village of Depew to gain Tree City USA status in early 2021. The Tree City USA is a program sponsored by the National Arbor Day Foundation in cooperation with the USDA Forest Service and the state forestry agencies.

The Village of Depew met the four overarching standards:

- Maintaining a tree board or department
- Having a community tree ordinance
- Spending at least $2 per capita on urban forestry
- Celebrating Arbor Day

The Arbor Day Website lists a few of the following as beneficial reasons to become a Tree City USA (From arborday.org/programs/treecityusa):

- Trees help absorb the sounds of traffic in urban areas by 40%.
- Neighborhoods with trees are seven to nine degrees cooler than those without.
- Trees reduce energy costs up to 25% by shading buildings and protecting them from winter winds.
- Homes with trees have higher property values.
- Green space plays a major role in improving mental and physical health.
- Planting and maintaining trees absorb carbon dioxide in the atmosphere, mitigating the effects of climate change.

These benefits along with many others are reasons why the Village of Depew will continue to work to maintain their status and designation from Tree City USA.

Hopefully this will help lead to further education that can presented as opportunities to residents.

Engagement to local Village of Depew schools has also begun as the village will look to figure out programs to collaborate with area schools at different levels. Involving the local resident children will help to ensure the next generation will be able to grow with the trees in the community to continue the mission of urban forestry.

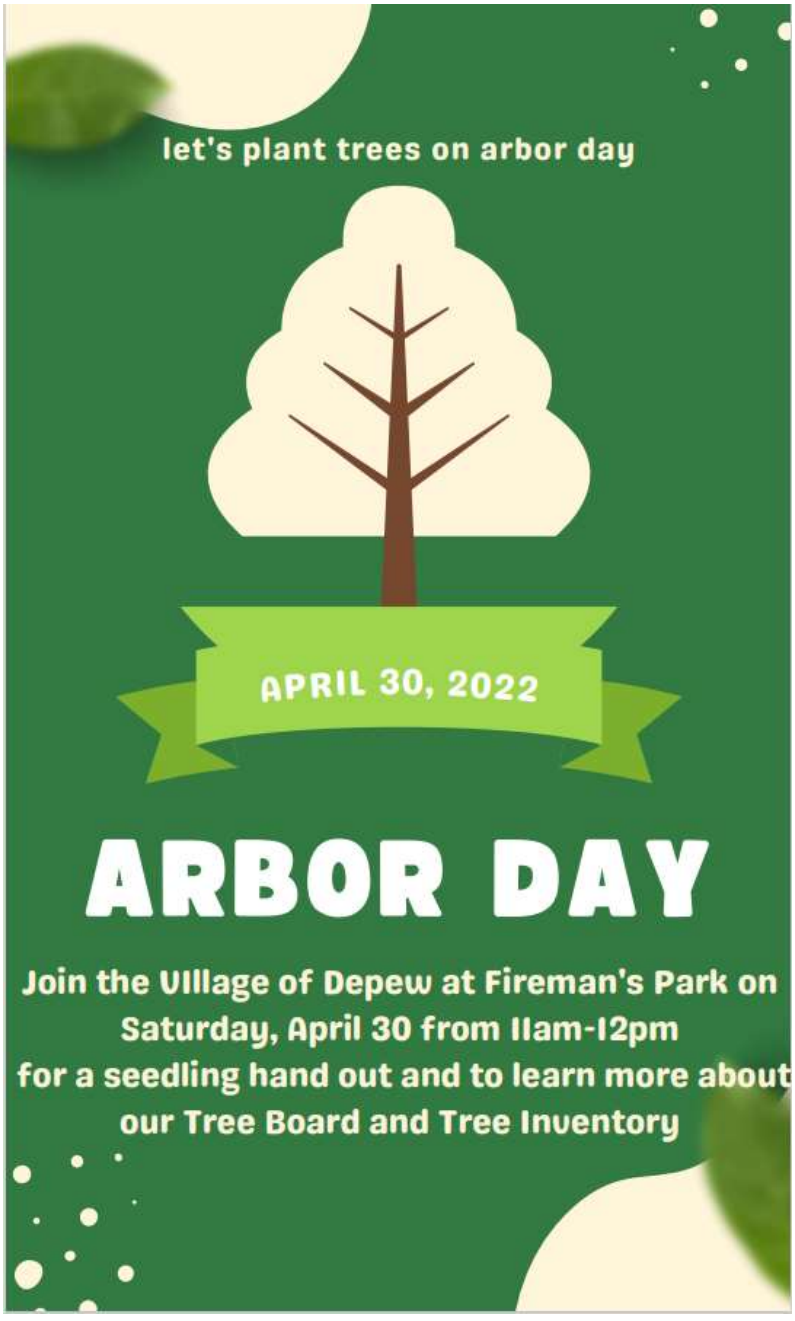
Chairman of the Tree Board and Village of Depew Trustee Andrew Adolf next to newly installed Tree City USA sign in Fireman's Park.

Department Involvement

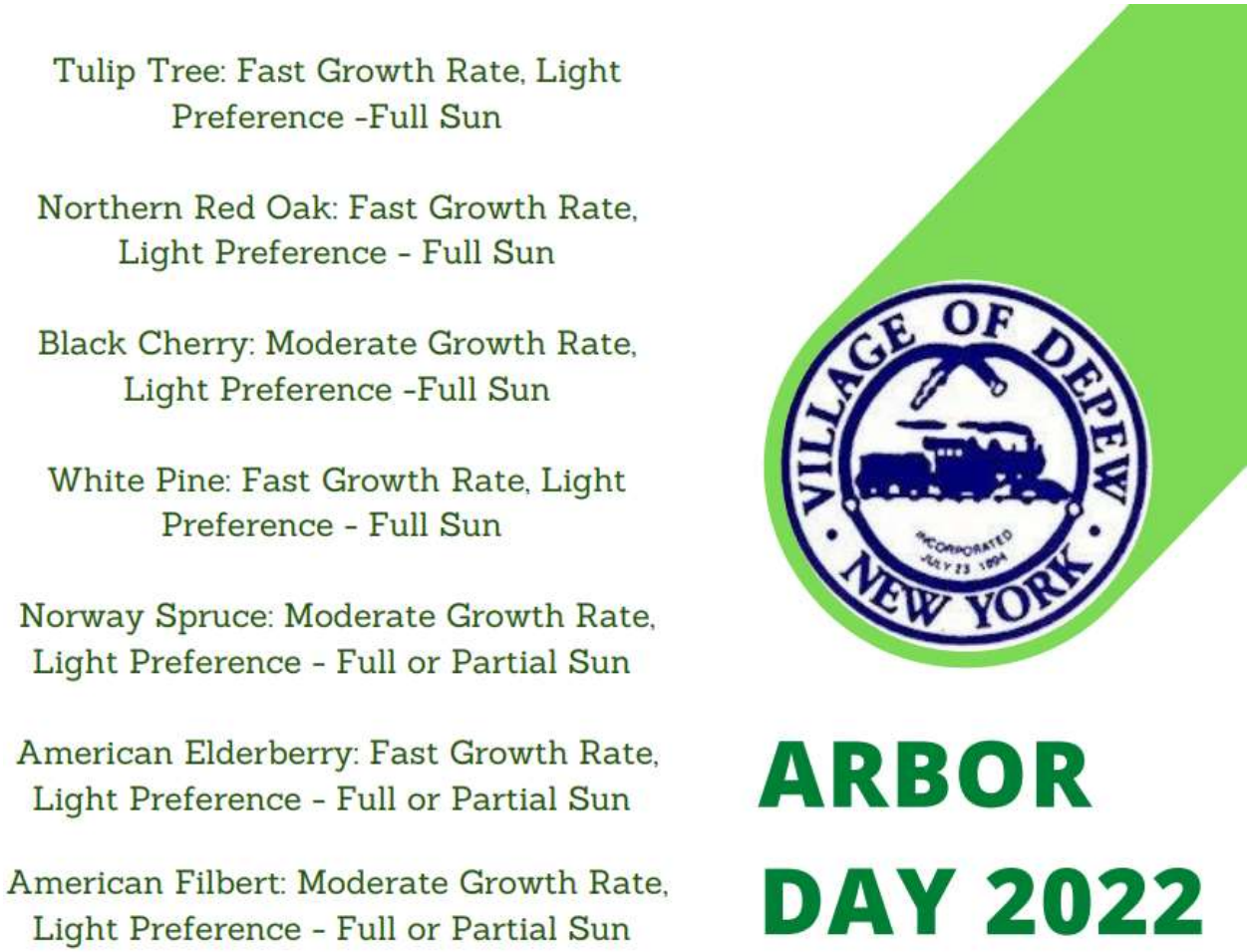
The Department of Public Works, led by their supervisor Ken Pyc, has a great amount of involvement with The Village of Depew's Tree Community Forestry Management Plan. This participation by the DPW helps to defray costs through the village by planting a majority of the new tree plantings throughout the village. They also help to prune and keep the trees in good condition. They will be more active in this process throughout moving forward as timeline procedures throughout the year are put in place so that trees are addressed on a scheduled rotating basis. This inner department cooperation allows for cost-effective budgeting towards the village trees. It allows an increased number of trees to be purchased as the Department of Public Works helps to plant and maintain the trees. This helps the village push forward with a successful increase of trees to be purchased and allows for more diversity of types through the square footage of the village.

Arbor Day Celebration 2022

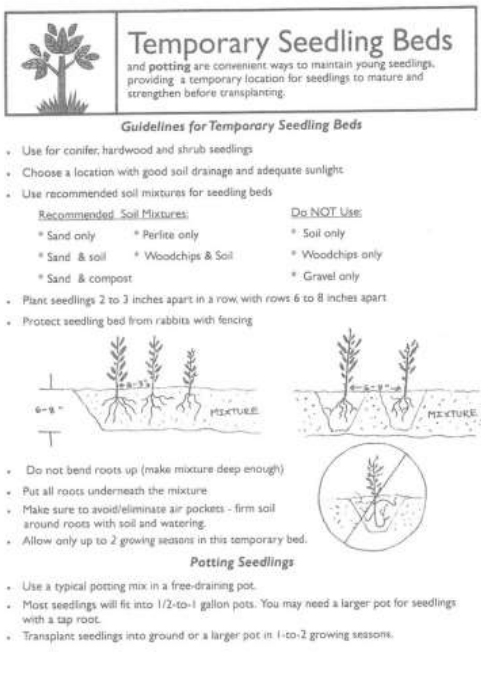
The Village of Depew geared up for its first major Arbor Day Celebration in person returning from the Covid-19 pandemic with Tree City USA designation. Advertising was done throughout the area as well on social media sites to promote the event with such flyers as this:



At The Village of Depew's Arbor Day Celebration held on Saturday April 30, 2022, the Village of Depew's Tree Board was able to hand out a variety of seven different seedlings and saplings to the public. It was important to the tree board to help begin spreading diversity amongst the trees throughout the village. By handing out a wide variety of trees, the Tree Board began the process to prevent future effects of both invasive pests and diseases. The variety included tulip tree, northern red oak, black cherry, white pine, Norway spruce, American elderberry, and American Filbert. The education portion was important to help the local public make them most of their trees and increase chance for survival:



Educational materials were able to be handed out at the Arbor Day Celebration. Flyers such as the following were distributed along with the variety of seven different seedlings and saplings to the public so residents were able to learn how to properly plant their seedlings and saplings:



Temporary Seedling Beds

and **potting** are convenient ways to maintain young seedlings, providing a temporary location for seedlings to mature and strengthen before transplanting.

Guidelines for Temporary Seedling Beds

- Use for conifer, hardwood and shrub seedlings
- Choose a location with good soil drainage and adequate sunlight
- Use recommended soil mixtures for seedling beds

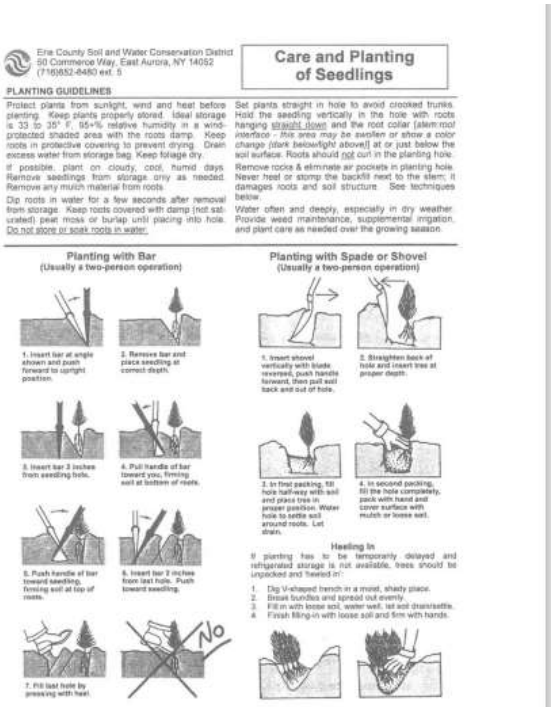
Recommended Soil Mixtures:		Do NOT Use:
* Sand only	* Perlite only	* Soil only
* Sand & soil	* Woodchips & Soil	* Woodchips only
* Sand & compost		* Gravel only

- Plant seedlings 2 to 3 inches apart in a row, with rows 6 to 8 inches apart
- Protect seedling bed from rabbits with fencing

- Do not bend roots up (make mixture deep enough)
- Put all roots underneath the mixture
- Make sure to avoid/eliminate air pockets - firm soil around roots with soil and watering.
- Allow only up to 2 growing seasons in this temporary bed.

Potting Seedlings

- Use a typical potting mix in a free-draining pot.
- Most seedlings will fit into 1/2-to-1 gallon pots. You may need a larger pot for seedlings with a tap root.
- Transplant seedlings into ground or a larger pot in 1-to-2 growing seasons.



Erie County Soil and Water Conservation District
50 Commerce Way, East Aurora, NY 14052
(716)652-8480 ext. 5

Care and Planting of Seedlings

PLANTING GUIDELINES

Protect plants from sunlight, wind and heat before planting. Keep plants properly stored. Ideal storage is 33 to 35° F, 85+% relative humidity in a wind-protected shaded area with the roots damp. Keep roots in protective covering to prevent drying. Drain excess water from storage bag. Keep foliage dry.

If possible, plant on cloudy, cool, humid days. Remove seedlings from storage only as needed. Remove any mulch material from roots.

Dip roots in water for a few seconds after removal from storage. Keep roots covered with damp (not saturated) peat moss or burlap until placing into hole. Do not store or soak roots in water.

Set plants straight in hole to avoid crooked trunks. Hold the seedling vertically in the hole with roots hanging straight down and the root collar (stem root interface - this area may be swollen or show a color change (dark below/light above)) at or just below the soil surface. Roots should not curl in the planting hole.

Remove rocks & eliminate air pockets in planting hole. Never heel or stomp the backfill next to the stem; it damages roots and soil structure. See techniques below.

Water often and deeply, especially in dry weather. Provide weed maintenance, supplemental irrigation, and plant care as needed over the growing season.

Planting with Bar
(Usually a two-person operation)

1. Insert bar at angle shown and push forward to upright position.
2. Remove bar and place seedling at correct depth.
3. Insert bar 3 inches from seedling hole.
4. Pull handle of bar toward you, firming soil at bottom of roots.
5. Push handle of bar toward seedling, firming soil at top of roots.
6. Insert bar 2 inches from last hole. Push toward seedling.
7. Fill last hole by pressing with heel.

Planting with Spade or Shovel
(Usually a two-person operation)

1. Insert shovel vertically with blade reversed, push handle forward, then pull soil back and out of hole.
2. Straighten back of hole and insert tree at proper depth.
3. In first packing, fill hole half-way with soil and place tree in proper position. Water hole to settle soil around roots. Let drain.
4. In second packing, fill the hole completely, pack with hand and cover surface with mulch or loose soil.

Heeling In

If planting has to be temporarily delayed and refrigerated storage is not available, trees should be unpacked and "heeled in":

1. Dig V-shaped trench in a moist, shady place.
2. Break bundles and spread out evenly.
3. Fill in with loose soil, water well, let soil drain/settle.
4. Finish filling-in with loose soil and firm with hands.

Interested in joining the Village of Depew Tree Board? Contact Trustee Andrew Adolf at aadolf@villageofdepew.org for more information.

Arbor Day Celebration 2022 Photos:

Left to Right: Chairman of the Tree Board and Village of Depew Trustee Andrew Adolf, Assemblymember Monica Wallace, Regional Forester for NYS Department of Environmental Conservation Patrick Marren

From Left to Right: Deputy Mayor Audrey Hamernik, Depew Mayor Kevin Peterson, Depew Tree Board Members Chris Peters and Andrea Barsi, Depew Trustee and Tree Board Chairman Andrew Adolf, Assemblymember Monica Wallace, DEC Forester Patrick Marren, Depew Trustee Jackie Kucewicz, Depew Tree Board Member Joseph Puskar.

Right: Depew Main Core Tree Board Members holding the plaque that distinguishes the Village of Depew as a Tree City USA. From Left to Right: Depew Tree Board Member Andrea Barsi, Depew Trustee and Tree Board Chairman Andrew Adolf, Depew Tree Board Members Joseph Puskar and Chris Peters.

Arbor Day Celebration in the Local Paper *The Lancaster and Depew Bee*:

Lancaster/Depew Bee
Local News

Submit a news tip

If you have news about upcoming events or new businesses in Lancaster or Depew, or know of community leaders who could be profiled, feel free to email jsinner@beenews.com or contact James Sinner by mail at 5564 Main St., Buffalo, NY 14221-5410.

News Brief

The Town of Lancaster has contracted with Davey Resource Group, Inc. to conduct an Urban Tree Inventory and Management Plan study. This work aims to improve the town's understanding of its public landscape and the health of its trees.

The work began in early April. Davey Resource Group, Inc. employees are walking along streets, town right-of-ways and other public areas collecting data on trees. They are wearing high visuality vests and clothing with identifying logos attached.

This project is funded by the New York State Department of Environmental Conservation - Urban and Community Forestry Grants Program.

For more information, call the Town of Lancaster Forestry Department at 716-683-3426. You can also reach out through email by contacting jpilato@lancaster.gov.

The Lancaster Bee & Depew Bee are social

The Lancaster Bee and Depew Bee are on social media. Don't forget to follow the papers on Facebook® @LancasterBee and on Twitter® @Lanc_Depew_Bee for more news and photos. These accounts post breaking news and will feature links to sports, news, business and lifestyle stories.

Depew distributes seedlings on Arbor Day

Local legislators and community members gathered for a celebration of Arbor Day at Fireman's Park in Depew on Saturday morning. During the event, seedlings were handed out to attendees and village legislators celebrated their Tree City USA status.

From left: Deputy Mayor Audrey Hamernik, Depew Mayor Kevin Peterson, Depew tree board members Christopher Peters and Andrea Barsi, Depew Trustee and tree board chairman Andrew Adolf, Assemblymember Monica Wallace, Patrick Marron of the DEC, Depew Trustee Jackie Kucewicz, Depew tree board member Joseph Puskar and Community Development Director Regina Granzkowski.

Photo by James Sinner

Funding secured to replace trees

After calls from the Cheektowaga and Lancaster Town Boards, state funding in the amount of $200,000 has been secured as a part of the state budget to help local governments re-tree areas which were damaged by invasive species, according to Assemblymember Monica Wallace.

In recent years, many local governments have struggled to replace trees which were killed by the invasive species the emerald ash borer.

According to Wallace, the damage has been particularly notable in Western New York, as the area has a "larger distribution of ash trees relative to the rest of the state."

In March, the Lancaster and Cheektowaga town boards adopted resolutions calling on the Legislature to approve funding for such a retree program in the final budget to ensure the health of local parks and forests.

"Trees are an integral part of our environment, parks, and sense of community, as we recognize with plantings and celebrations every Arbor Day," said Assemblymember Wallace. "Unfortunately, over the past two decades, countless local trees have been destroyed by the emerald ash borer. That's why I fought for and secured funding in this budget to help local governments replace the trees lost to this invasive species and ensure that future generations can continue to reap the benefits of healthy forests and beautiful parks."

Cherry tree takes root at Veterans Park

Village officials and Matt Urban Post 7275 members gather around a freshly planted cherry tree, placed during Arbor Day in honor of the late John C. Miller, a former veteran and post member. Dolly Miller, his wife, was in attendance for the ceremony. From left are Trustee Cyndi Maciejowski, Mayor Lynne Ruda, Trustee Paul Rudd, Dolly Miller, Commander James Wier, Marie Schu, Pat Ardino, Evelyn Wier, Henry Mazurek, Mike Zalikowski, Jake Schu and Walter Buechi.

Photos by James Sinner

From left: Matt Urban Post 7275 Commander James Wier, Walter Buechi, Mike Zalikowski, Lance Becker, Jake Schu, Henry Mazurek, Kitty Lorenz and her dog Ruka line up for a photo at Veterans Park in Lancaster on Arbor Day.

INTRODUCTION

The Village of Depew is home to 15,178 residents (U.S. Census Bureau 2020, retrieved from: https://www.census.gov/quickfacts/fact/table/depewvillagenewyork#) benefitting from public trees in their community. The village's urban forestry program manages all trees, stumps, and planting sites along the street rights-of-way (ROW) and throughout public parks. For 112 years, The Village of Depew's staff in the Public Service Department's Division of Parks and Forestry have shown continued commitment to developing a thriving public tree resource.

Urban forestry program budgets are funded by the village's General Fund. The Village of Depew has a tree committee, has a tree ordinance, spends more than $2 per capita on tree maintenance, celebrates Arbor Day, and has been a Tree City USA community for 1 year.

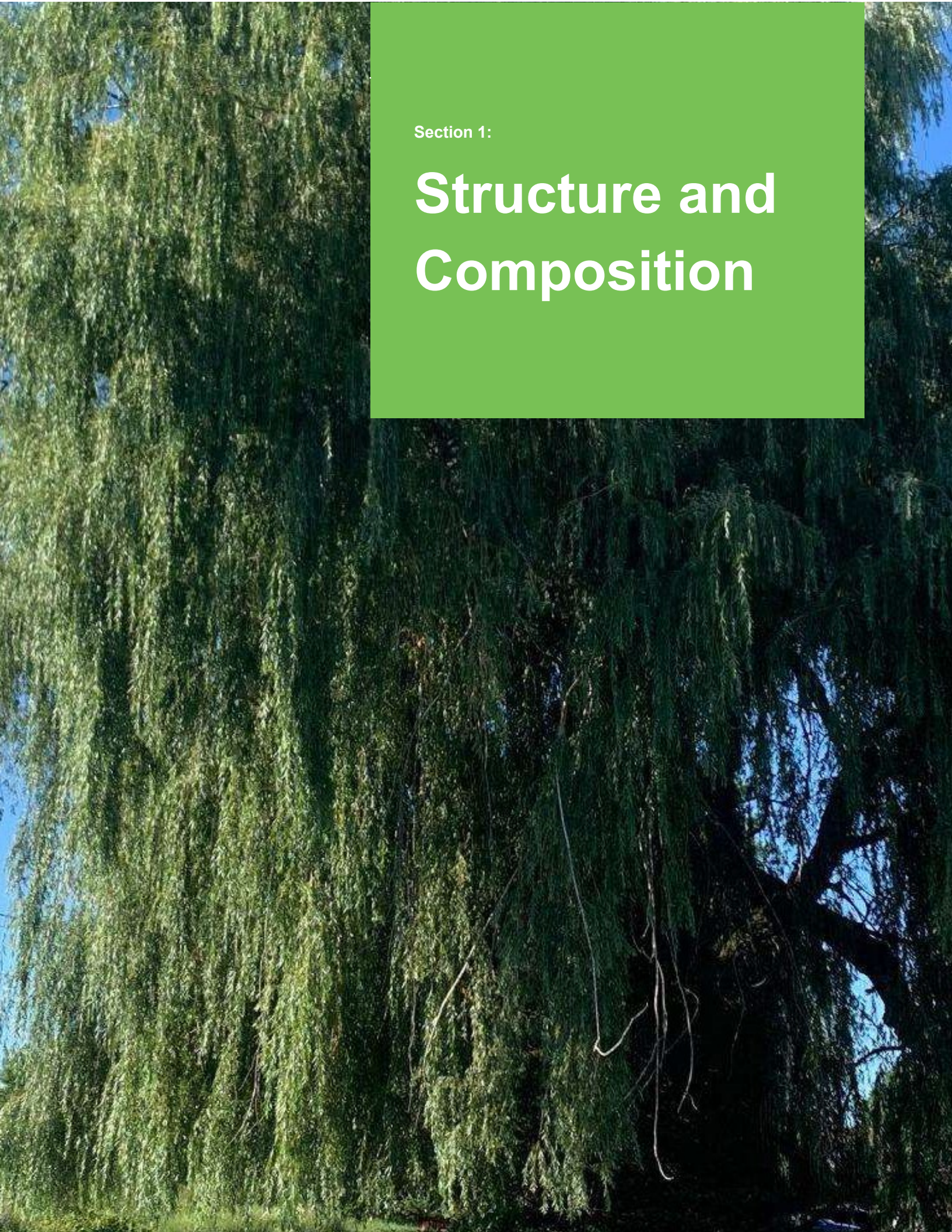
The Village of Depew's urban forestry program is well on its way to creating a sustainable and resilient public tree resource, and it is important to stay on track by consistently renewing program funding and routinely updating the tree inventory.

Recommended Approach to Tree Management

An effective approach to tree resource management follows a proactive and systematic program that sets clear and realistic goals, prescribes future action, and periodically measures progress. A robust urban forestry program establishes tree maintenance priorities and utilizes modern tools, such as a tree inventory accompanied by TreeKeeper® or other asset management software.

In November 2021, The Village of Depew worked with DRG to inventory its public trees and develop this management plan. Consisting of three sections, this plan considers the diversity, distribution, and condition of the inventoried tree population and provides a prioritized system for managing the village's public tree resource.

- *Section 1: Structure and Composition of the Public Tree Resource* summarizes the inventory data with trends representing the current state of the tree resource.
- *Section 2: Functions and Benefits of the Public Tree Resource* summarizes the estimated value of benefits provided to the community by public trees' various functions.
- *Section 3: Recommended Management of the Public Tree Resource* details a prioritized management program and provides an estimated budget for recommended maintenance activities over a ten-year period.



Section 1:

Structure and Composition

SECTION 1: STRUCTURE AND COMPOSITION OF THE PUBLIC TREE RESOURCE

In November 2021, DRG arborists collected site data on trees, stumps, and planting sites along the street ROW and on trees in public parks for a tree inventory contracted by the Village of Depew. 5,322 total sites inventoried were collected along the street ROW and in parks. Inventoried parks include Fireman's Park and Veterans Park. Figure 2 breaks down the total sites inventoried by type. See Appendix A for details about DRG's methodology for collecting site data.

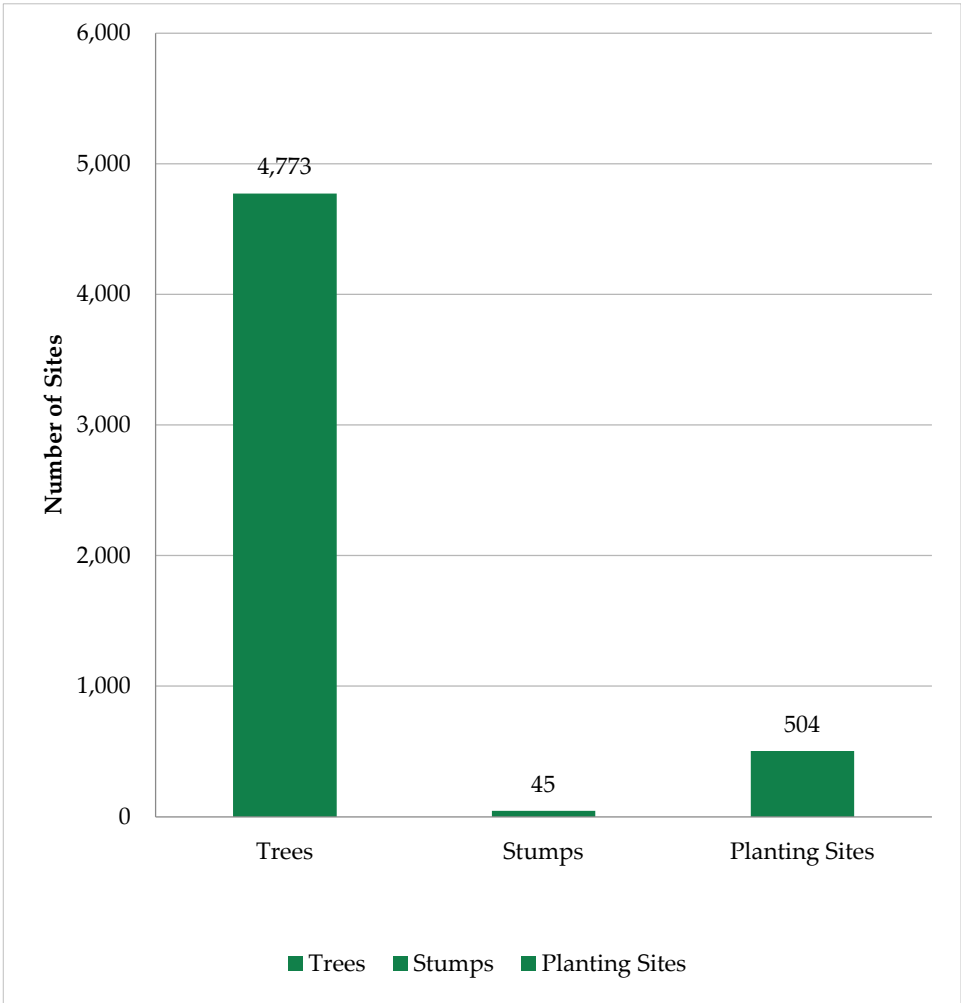


Figure 2. Number of inventoried sites by location and type.

Species, Genus, and Family Distribution

The 10-20-30 rule is a common standard for tree population distribution, in which a single species should compose no more than 10% of the tree population, a single genus no more than 20%, and a single family no more than 30% (Santamour 1990).

Figure 3 shows The Village of Depew's distribution of the most abundant tree species inventoried compared to the 10% threshold. Norway maple (*Acer platanoides*) is the most abundant species, at 40% of the population, is well above the 10% threshold, and is immediately concerning from this data alone.

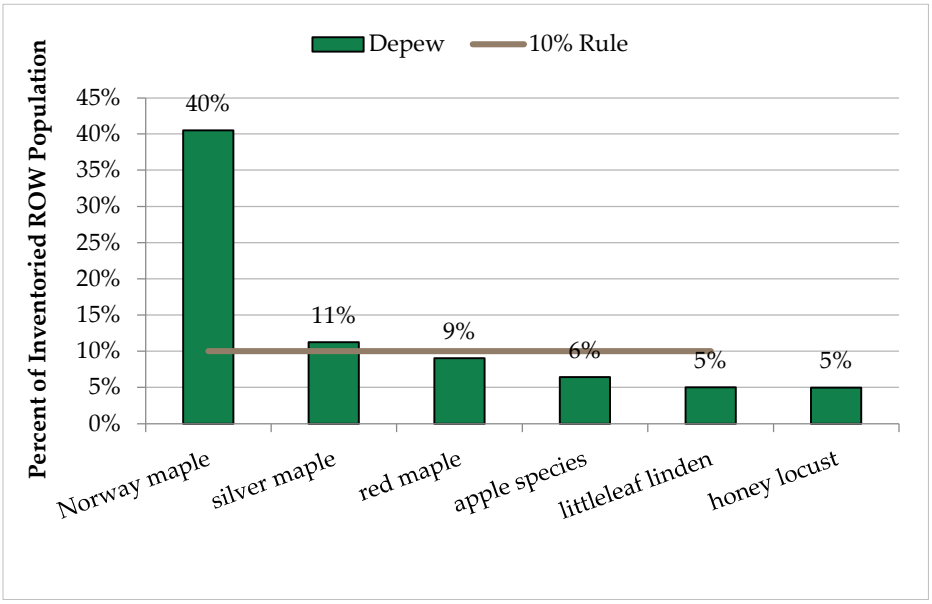


Figure 3. Species distribution of inventoried trees.

However, Figure 5 shows the village's distribution of the most abundant tree genera inventoried, and maple (*Acer*) is significantly higher than the 20% threshold at 63% of the inventoried population. For this reason, the Village of Depew should not plant Norway maple or any other maple species until this distribution becomes more ideal.

RESILIENCE THROUGH DIVERSITY

The Dutch elm disease epidemic of the 1930s provides a key historical lesson on the importance of diversity (Karnosky 1979). The disease killed millions of American elm trees, leaving behind enormous gaps in the urban canopy of many Midwestern and Northeastern communities. In the aftermath, ash trees became popular replacements and were heavily planted along city streets. History repeated itself in 2002 with the introduction of the emerald ash borer into America. This invasive beetle devastated ash tree populations across the Midwest. Other invasive pests spreading across the country threaten urban forests, so it's vital that we learn from history and plant a wider variety of tree genera to develop a resilient public tree resource.

Ash trees in an urban forest killed by emerald ash borer. USDA Forest Service (2017)

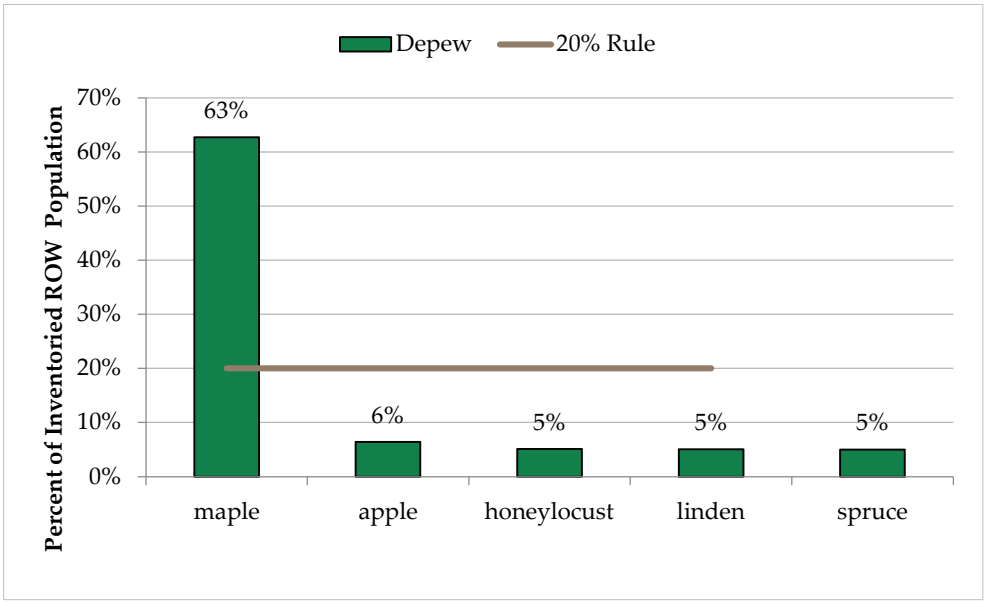


Figure 4. Genus distribution of inventoried trees.

Genus distribution is an important consideration because some pests, such as emerald ash borer (EAB, *Agrilus planipennis*), target a single genus as its host. Some pests also target a single family as its host, such as the bacterium *Erwinia amylovora*, commonly known as fireblight. Fireblight only affects plants in the rose family (*Rosaceae*), such as serviceberry, hawthorn, apple/crabapple, hawthorn, cherry/plum, and pear.

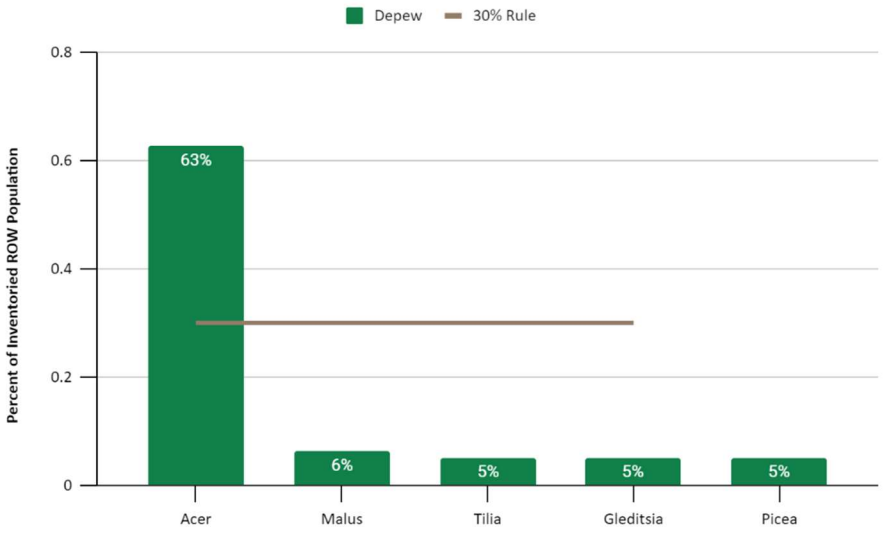


Figure 5. Family distribution of inventoried trees.

Figure 5 shows the village's distribution of the most abundant tree families inventoried compared to the 30% threshold. While Rosaceae (11%) is fairly far from the threshold, Sapindaceae (*Acer*) (64%) is the only family composing a greater proportion of the inventoried population, which is exceeding the threshold.

Pest Susceptibility

Early diagnosis of disease and infestation is essential to ensuring the health and continuity of The Village of Depew's public tree resource. See Appendix B for some information about the pests listed below and websites where additional information can be found.

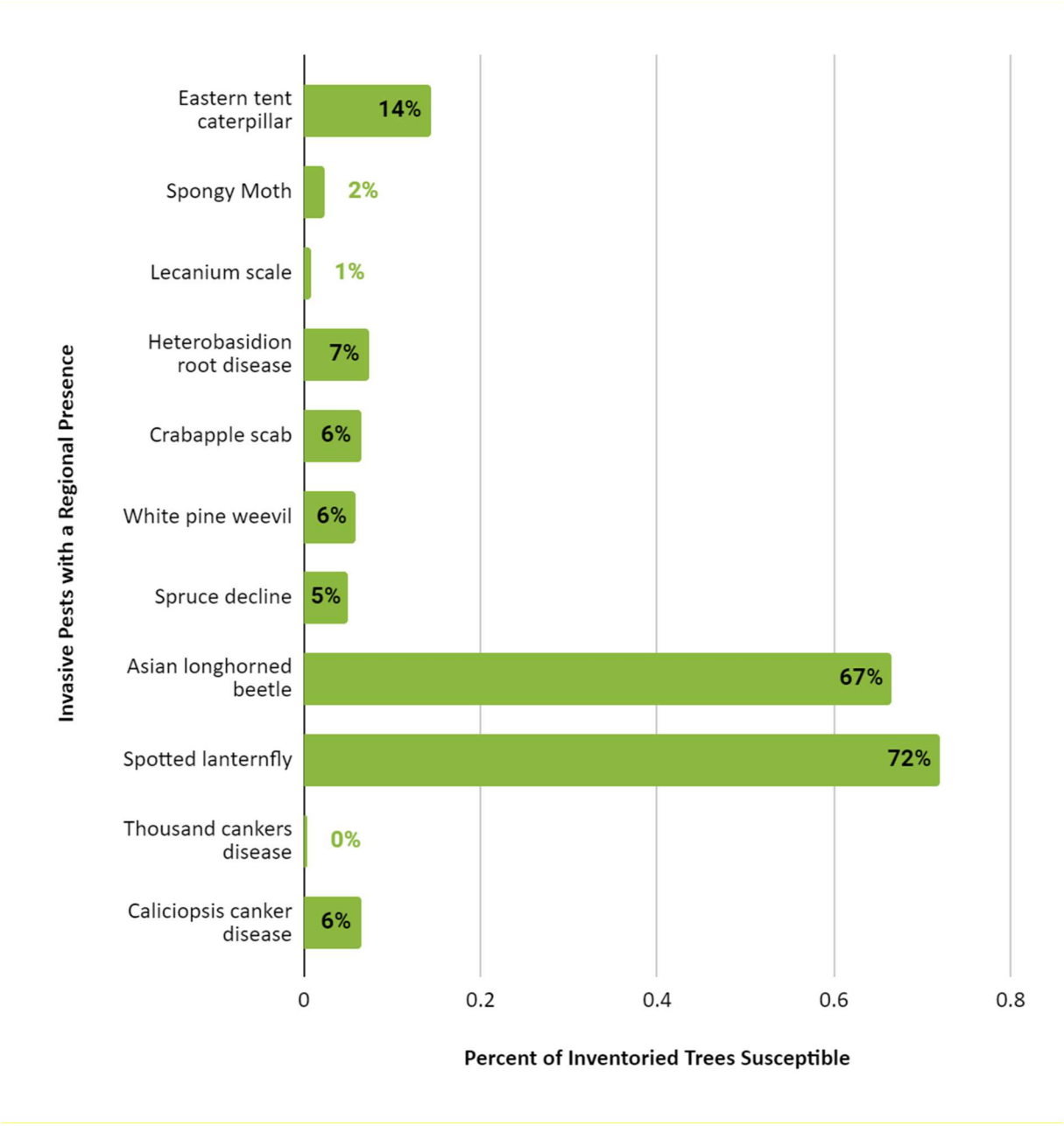


Figure 6. Tree resource susceptibility to invasive pests that have a regional presence.

Figure 6 shows the percent of inventoried trees susceptible to some of the known pests in and around New York. It is important to remember that this figure only represents data collected during the inventory. Many more trees throughout The Village of Depew, especially those on private property, may be susceptible to hosting these invasive pests. Spotted lantern fly (SLF, *Lycorma delicatula*) and Asian longhorned beetle (ALB, *Anoplophora glabripennis*) are known threats to a large percentage of the inventoried tree resource, 72% and 67%, respectively.

Pest Susceptibility Recommendations

The overabundance of maple in The Village of Depew's tree resource is a management concern because it creates unnecessary risk in the event of an invasive pest outbreak. This abundance is not only more tree resource to lose but is also more habitat for the pests it is susceptible to, such as SLF or ALB, making it easier for them to spread. Increasing species diversity is a critical goal that will help The Village of Depew's tree resource be resilient in the event of future pest invasions.

While it might be prudent for the village to limit planting species in the *Rosacea* family to prevent it from approaching the 30% threshold, efforts to improve diversity at the genus and species level are a better use of short-term resources until more research is done on family diversity as a mechanism for promoting system resilience. For this reason, The Village of Depew should use its resources to inspect trees in the *Acer* genus for signs of infestation on a routine basis, so affected trees can be quarantined to contain the pest before an outbreak starts.

Condition

Several factors affecting condition were considered for each tree, including root characteristics, branch structure, trunk, canopy, foliage condition, and the presence of pests. The condition of each inventoried tree was rated by an arborist as Good, Fair, Poor, or Dead. The general health of the inventoried tree population was characterized by the most prevalent condition assigned during the inventory.

Figure 7 shows most of the inventoried trees were recorded in Good or Fair condition, 21% and 68%, respectively. Based on these data, the general health of the inventoried tree population is rated as Fair. The Village of Depew has a low percentage of Dead trees and trees in Poor condition, so the general health of the village's tree resource is approaching Fair.

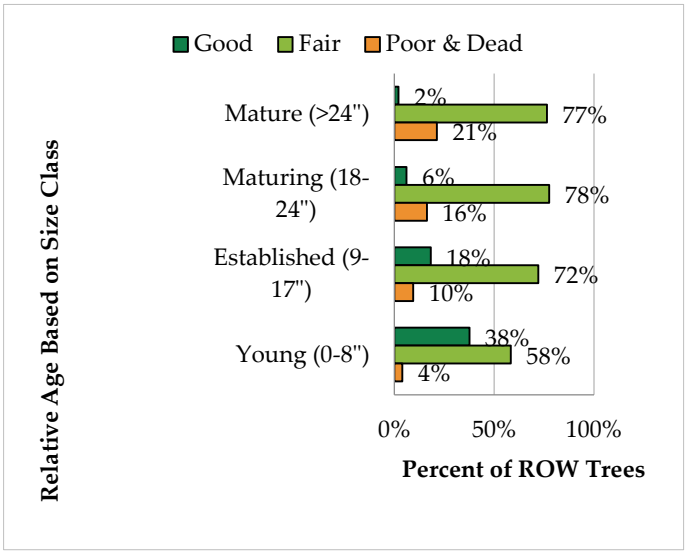


Figure 7. Condition of inventoried trees.

Condition Recommendations

Dead trees and trees in Poor condition should be removed as soon as possible, because the health of these trees is unlikely to recover even with increased care and present a risk.

Younger trees rated in Fair or Poor condition may benefit from structural pruning to improve their health over time. Pruning should follow *ANSI A300 (Part 1)* guidelines.

Poor condition ratings among mature trees were generally due to visible signs of decline and stress, including decay, dead limbs, sparse branching, or poor structure. These trees will likely require corrective pruning and intensive plant health care to improve their vigor and should be monitored for worsening conditions.

RELATIVE AGE DISTRIBUTION

Analysis of a tree population's relative age distribution is performed by assigning age classes to the size classes of inventoried trees, offering insight into the maintenance needs of Village of Depew's tree resource. The inventoried trees are grouped into the following relative age classes:

- Young trees (0–8 inches diameter at breast height (DBH))
- Established trees (9–17 inches DBH)
- Maturing trees (18–24 inches DBH)
- Mature trees (greater than 24 inches DBH)

These size classes were chosen so that the inventoried tree resource can be compared to the ideal relative age distribution, which holds that the largest proportion of the inventoried tree population (approximately 40%) should be young trees, while a smallest proportion (approximately 10%) should be mature trees (Richards 1983). Since tree species have different lifespans and mature at different diameters, actual tree age cannot be determined from diameter size class alone, yet size classifications can be extrapolated into relative age classes.

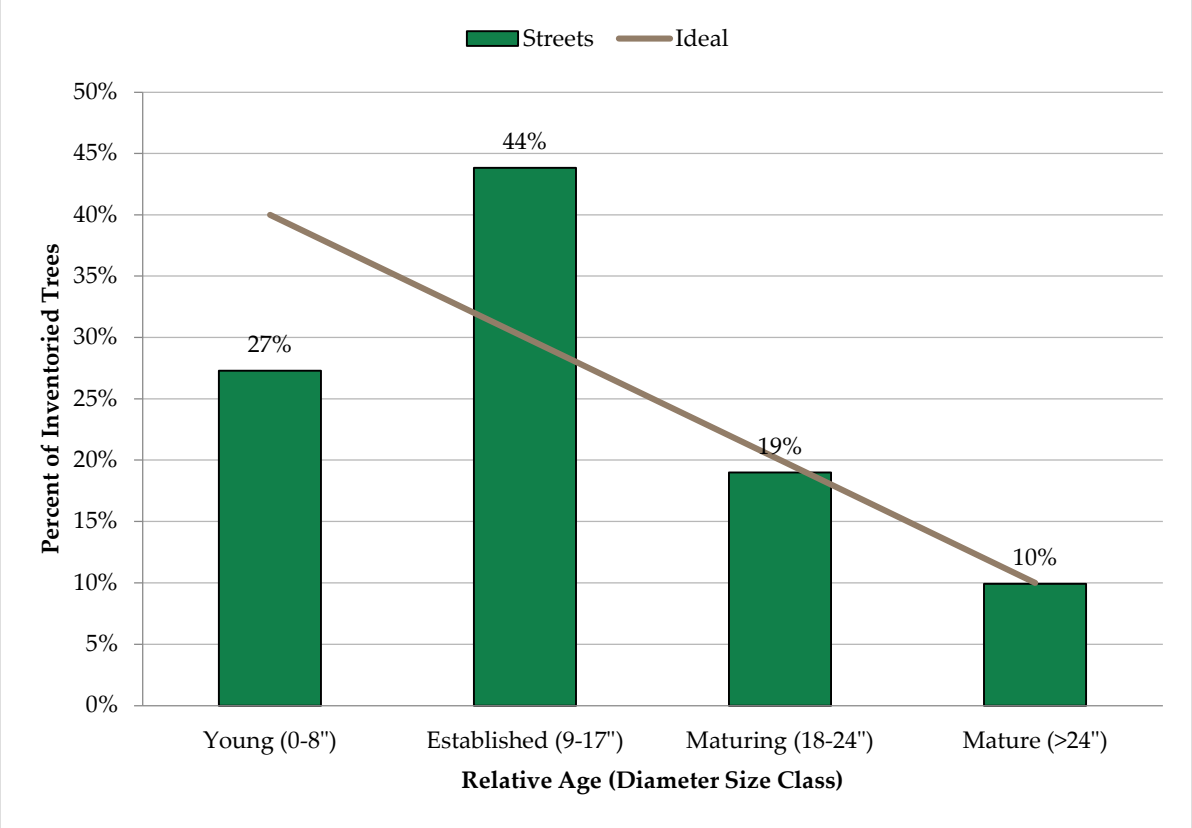


Figure 8. Relative age distribution of inventoried trees.

Figure 8 compares The Village of Depew's relative age distribution of the inventoried tree population to the ideal. The village's inventoried tree resource is starting to trend towards the ideal for some categories; however, established trees exceed the ideal by 14%, while young trees fall short by 13%.

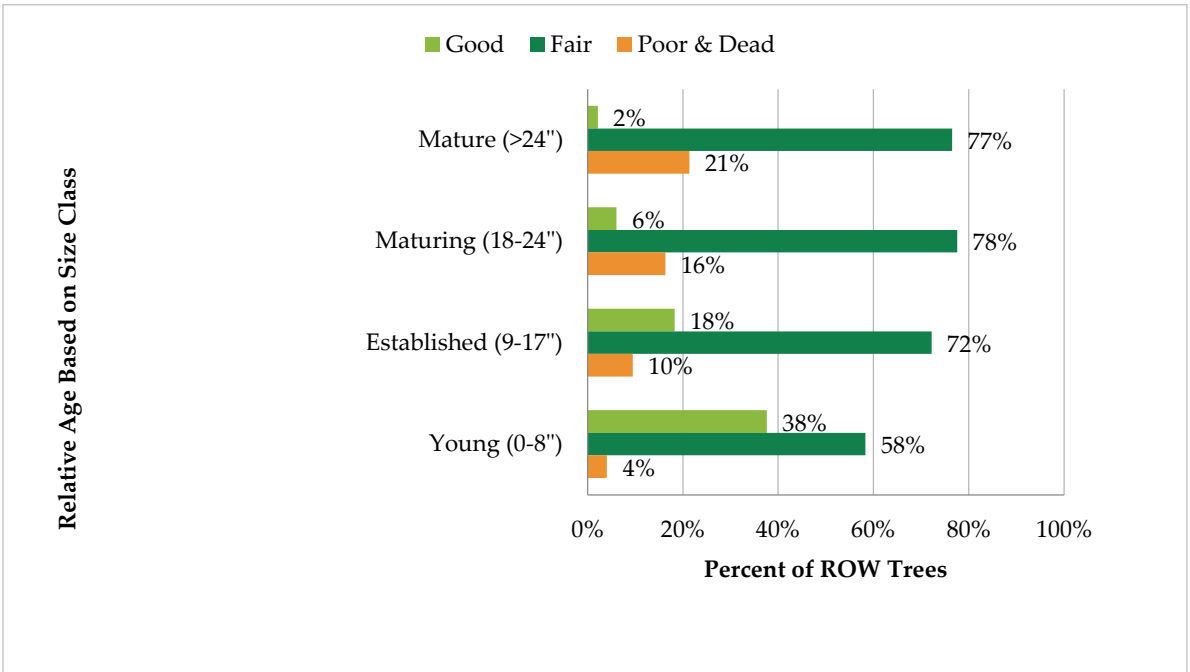


Figure 9. Condition of inventoried trees by relative age class.

Figure 9 cross analyzes the condition of the inventoried tree resource with its relative age distribution, providing insight into the inventoried population's stability. 79% of mature trees and 84% of maturing trees are rated in Fair condition or better, which matters because these larger trees would have a more damaging impact in the event of failure. 90% of established trees and 96% of young trees are rated in Fair condition or better, so it is important to provide the maintenance they need to remain healthy as they age and grow, to reduce the proportion of mature and maturing trees in Poor condition or worse.

Relative Age Recommendations

While The Village of Depew has a deficit of young trees, the village has a low percentage of trees in Poor condition, indicating that young trees have the potential of reaching maturity if they are well maintained. DRG recommends that Depew implement a robust maintenance program, to conserve the condition of young trees as they age so they replace removed trees and fill canopy gaps in maturity. The village should also focus on tree preservation and proactive care, to protect mature and maturing trees from unnecessary removal and to prevent them from succumbing to treatable defects. Prioritizing proactive maintenance above tree planting will shift the relative age distribution towards the ideal over time.

DEFECT OBSERVATIONS

For each tree inventoried, DRG assessed conditions indicating the presence of structural defects and recorded the most significant condition. Defects were limited to the following categories:

- Dead and dying parts
- Broken and/or hanging branches
- Cracks
- Weakly attached branches and codominant stems
- Missing or decayed wood
- Tree architecture
- Root problems
- Other

Table 1. Tree defect categories recorded during the inventory.

Defect	Street Trees	Percent of Street Trees
Dead and Dying Parts	1,929	40%
Weakly Attached Branches and Codominant Stems	1,363	29%
Missing or Decayed Wood	1,158	24%
None	157	3%
Broken and/or Hanging Branches	51	1%
Tree Architecture	47	1%
Cracks	38	1%
Root Problems	27	1%
Other	3	0%
Total	4,773	100.00%

The two most frequently recorded defect categories were Dead & Dying Parts and Weakly Attached Branches/Codominant Stems at 41% and 29% of inventoried trees, respectively (Table 1). Of the 1,929 trees with Dead & Dying Parts, 138 were recommended for removal.

Defect Observation Recommendations

When considering the defect recorded for each tree, there are two important qualifiers to keep in mind. First, the categories are broadly inclusive. For example, the "Dead and Dying Parts" category can include trees with just one or two smaller diameter dead limbs as well as trees found with large-diameter dead limbs or entire sections of dead canopy. Therefore, inferences on overall tree condition or risk rating cannot be derived solely from the presence or absence of a defect recorded during the inventory. Second, an inventoried tree may have multiple defects; the 2021 Depew inventory recorded only the most significant defect observed for each tree. These two qualifiers are important to keep in mind when considering urban forest management planning and the prioritization of maintenance or monitoring activities.

INFRASTRUCTURE CONFLICTS

In an urban setting, space is limited both above and below ground. Trees in this environment may conflict with infrastructure, such as buildings, sidewalks, utility wires, and pipes, which could pose risks to public safety. Existing or possible conflicts between trees and infrastructure recorded during the inventory include:

- *Overhead Utilities*—The presence of overhead utility lines above a tree or planting site was noted; it is important to consider these data when planning pruning activities and selecting tree species for planting.

Table 2. Tree conflicts with overhead infrastructure recorded during the inventory.

Overhead Utilities	Trees	Percent of Trees
Present	1,616	34%
Not Present	3,157	66%
Total	4,773	100%

Table 2 shows that there were 1,616 street trees with utilities directly above, or passing through, the tree canopy.

Infrastructure Recommendations

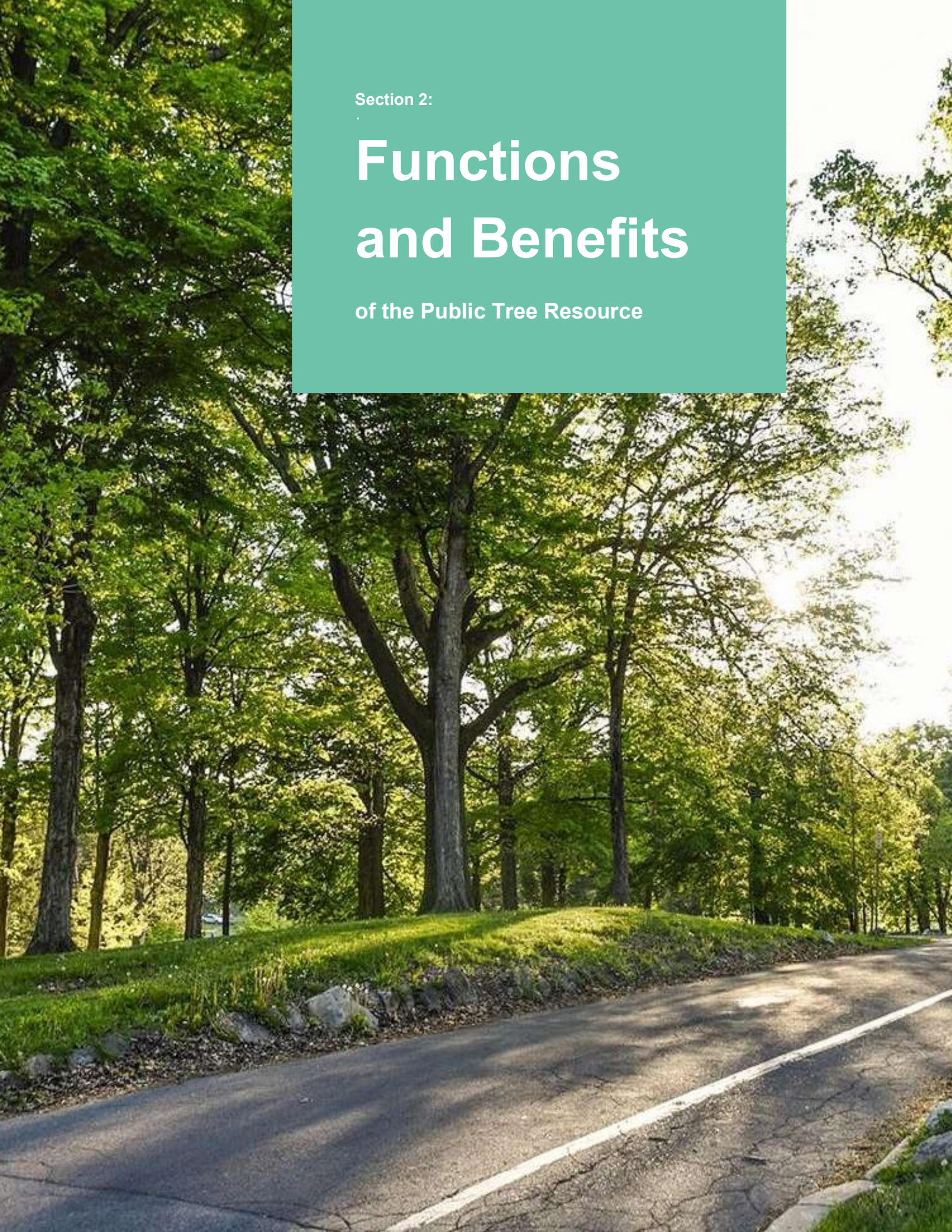
Planting only small-growing trees within 20 feet of overhead utilities, medium-size trees within 20–40 feet, and large-growing trees outside 40 feet will help improve future tree conditions, minimize future utility line conflicts, and reduce the costs of maintaining trees under utility lines.

When planting around hardscape, it is important to give the tree enough growing room above ground. Guidelines for planting trees among hardscape features are as follows: give small-growing trees 4–5 feet, medium-growing trees 6–7 feet, and large-growing trees 8 feet or more between hardscape features. In most cases, this will allow for the spread of a tree's trunk taper, root collar, and immediate larger-diameter structural roots.

Section 2:

Functions and Benefits

of the Public Tree Resource



SECTION 2: FUNCTIONS AND BENEFITS OF THE PUBLIC TREE RESOURCE

Trees occupy a vital role in the urban environment by providing of a wide array of economic, environmental, and social benefits far exceeding the investments in planting, maintaining, and removing them. Trees reduce air pollution, improve public health outcomes, reduce stormwater runoff, sequester and store carbon, reduce energy use, and increase property value. Using advanced analytics, such as i-Tree Eco and other models in the i-Tree software suite, understanding the importance of trees to a community continues to expand by providing tools to estimate monetary values of the various benefits provided by a public tree resource.

Environmental Benefits

- Trees decrease energy consumption and moderate local climates by providing shade and acting as windbreaks.
- Trees act as mini reservoirs, helping to slow and reduce the amount of stormwater runoff that reaches storm drains, rivers, and lakes. One hundred mature tree crowns intercept roughly 100,000 gallons of rainfall per year (U.S. Forest Service 2003a).
- Trees help reduce noise levels, cleanse atmospheric pollutants, produce oxygen, and absorb carbon dioxide.
- Trees can reduce street-level air pollution by up to 60% (Coder 1996). Lovasi (2008) suggested that children who live on tree-lined streets have lower rates of asthma.
- Trees stabilize soil and provide a habitat for wildlife.

Economic Benefits

- Trees in a yard or neighborhood increase residential property values by an average of 7%.
- Commercial property rental rates are 7% higher when trees are on the property (Wolf 2007).
- Trees moderate temperatures in the summer and winter, saving on heating and cooling expenses (North Carolina State University 2012, Heisler 1986).
- On average, consumers will pay about 11% more for goods in landscaped areas, with this figure being as high as 50% for convenience goods (Wolf 1998b, Wolf 1999, and Wolf 2003).
- Consumers also feel that the quality of products is better in business districts surrounded by trees than those considered barren (Wolf 1998b).
- The quality of landscaping along the routes leading to business districts had a positive influence on consumers' perceptions of the area (Wolf 2000).

Social Benefits

- Tree-lined streets are safer; traffic speeds and the amount of stress drivers feel are reduced, which likely reduces road rage/aggressive driving (Wolf 1998a, Kuo and Sullivan 2001a).
- Chicago apartment buildings with medium amounts of greenery had 42% fewer crimes than those without any trees (Kuo and Sullivan 2001b).
- Chicago apartment buildings with high levels of greenery had 52% fewer crimes than those without any trees (Kuo and Sullivan 2001a).
- Employees who see trees from their desks experience 23% less sick time and report greater job satisfaction than those who do not (Wolf 1998a).
- Hospital patients recovering from surgery who had a view of a grove of trees through their windows required fewer pain relievers, experienced fewer complications, and left the hospital sooner than similar patients who had a view of a brick wall (Ulrich 1984, 1986).
- When surrounded by trees, physical signs of personal stress, such as muscle tension and pulse rate, were measurably reduced within three to four minutes (Ulrich 1991).

i-TREE ECO ANALYSIS

i-Tree Eco utilizes tree inventory data along with local air pollution and meteorological data to quantify the functional benefits of a community's tree resource. By framing trees and their benefits in a way that everyone can understand, dollars saved per year, i-Tree Eco helps a community to understand trees as both a natural resource and an economic investment. Knowledge of the composition, functions, and monetary value of trees helps to inform planning and management decisions, assists in understanding the impact of those decisions on human health and environmental quality, and aids communities in advocating for the necessary funding to manage their vested interest in the public tree resource appropriately.

ANNUAL RETURN ON INVESTMENT FROM THE PUBLIC TREE RESOURCE

The i-Tree Eco analysis of the Village of Depew's inventoried trees quantified the functional benefits of three critical ecosystem services that they provide: air pollution removal, carbon sequestration, and avoided surface runoff. The village's annual tree maintenance budget is approximately $45,000, making The Village of Depew's return on investment almost 10% annually.

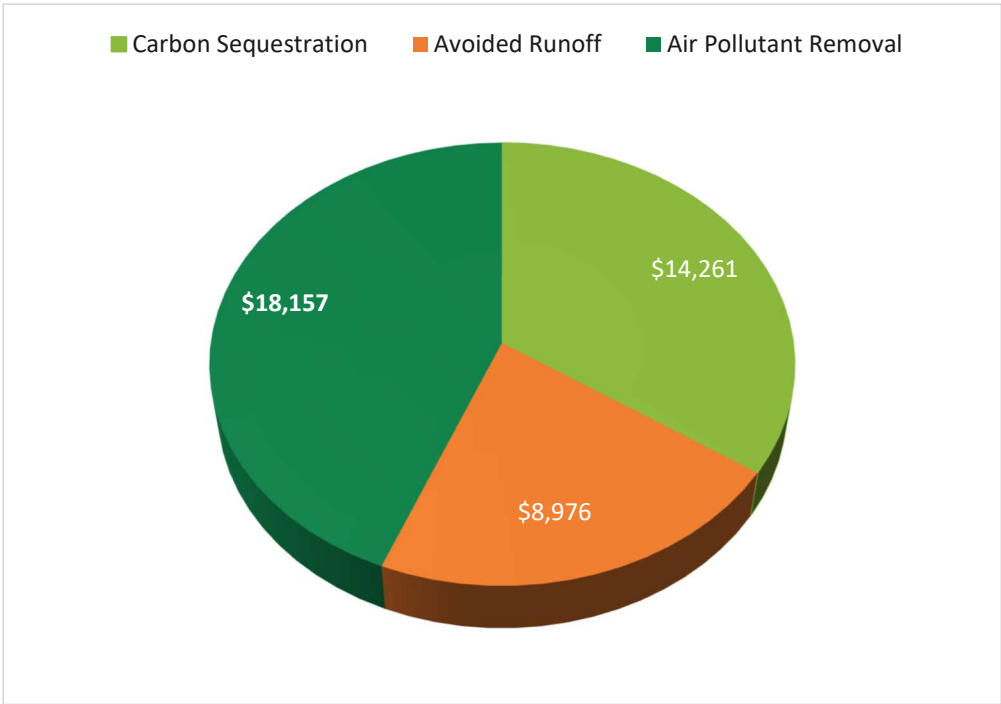


Figure 10. Estimated value of the benefits provided by inventoried trees.

Urban environments have unique challenges that make the estimated $41,395 of functional benefits provided by The Village of Depew's inventoried tree population an essential asset to the village (Figure 10). Compared to rural landscapes, urban landscapes are characterized by high emissions in a relatively small area, valuing the 1,491 lbs. of airborne pollutants removed by The Village of Depew's tree resource at an estimated $ $18,157. Avoiding stormwater runoff reduces the risk of flooding and combined sewer overflow, both of which impact people, property, and the environment, valuing the 502,237 gals. of runoff avoided with The Village of Depew's tree resource at an estimated $8,976. Carbon dioxide ($CO_2$) also impacts people, property, and the environment as the primary greenhouse gas driving climate change, valuing the 84,000 lbs. sequestered by The Village of Depew's tree resource at an estimated $14,261.

The replacement value of the village's inventoried tree population is estimated to be $13,771,806. In The Village of Depew, only ten species account for almost half of the public tree resource and half of the functional benefits it provides. If any of these species were lost to invasive pests, disease, or other threats, its loss would have significant costs. It is critical to promote species diversity with future plantings to minimize susceptibility to potential threats, and to plant large-statured broadleaf tree species wherever possible to maximize potential environmental and economic benefits. See Appendix C for a tree species list recommended by DRG.

SEQUESTERING AND STORING CARBON

Trees are carbon sinks, which are the opposite of carbon sources. While carbon is emitted from cars and smokestacks, carbon is absorbed into trees during photosynthesis and stored in their tissue as they grow. The i-Tree Eco model estimates both the carbon sequestered each year and total carbon stored. The Village of Depew's inventoried trees have stored 5,696 lbs. of carbon, which is all the carbon each tree has amassed throughout their lifetimes and is valued at $971,069. Norway maple (*Acer platanoides*) and silver maple (*A. saccharinum*) store the most carbon: 943 tons and 878 lbs. per tree, respectively. Both species also sequester the most carbon: 19 lbs. per tree per year and 29 lbs. per tree per year, respectively.

Table 3. Summary of benefits provided by inventoried trees ranked by species importance value.

Most Common Trees Inventoried		Count	Percent of Total	Benefits Provided by Street Trees				
				CO_2 Stored	CO_2 Sequestered	Avoided Runoff	Air Pollution Removed	Replacement Value
Common Name	Botanical Name		%	tons	tons/year	gal/year	lbs/year	Dollars
Norway maple	*Acer platanoides*	1,933	40.5%	942.6	18.2	141,618	420	$2,405,858
silver maple	*Acer saccharinum*	536	11.2%	878.4	7.9	134,902	400	$1,260,580
red maple	*Acer rubrum*	430	9.0%	277.8	4.7	50,118	140	$731,784
apple spp	*Malus*	306	6.4%	74.2	1.4	8,372	20	$234,243
littleleaf linden	*Tilia cordata*	239	5.0%	143.6	1.9	36,075	100	$574,304
thornless honeylocust	*Gleditsia triacanthos v. inermis*	237	5.0%	96.1	1.9	22,839	60	$333,745
blue spruce	*Picea pungens*	174	3.6%	49.9	0.6	21,787	60	$240,291
Callery pear	*Pyrus calleryana*	155	3.2%	47.7	1.0	9,526	20	$141,246
Japanese tree lilac	*Syringa reticulata*	118	2.5%	12.8	0.4	1,790	0	$49,852
green ash	*Fraxinus pennsylvanica*	88	1.8%	17.9	0.1	2,441	0	$38,573
Norway spruce	*Picea abies*	49	1.0%	26.3	0.3	12,928	40	$130,093
plum spp	*Prunus*	44	0.9%	8.4	0.2	1,596	0	$21,919
Freeman maple	*Acer × freemanii*	43	0.9%	3.4	0.2	1,186	0	$12,684
horse chestnut	*Aesculus hippocastanum*	42	0.9%	38.3	0.5	8,089	20	$65,074
sugar maple	*Acer saccharum*	38	0.8%	32.7	0.3	5,028	20	$89,571
All Other Trees Inventoried		341	7.1%	197	2.2	43,941	60	$556,086
Total		**4,773**	**100%**	**2,847**	**41.8**	**502,237**	**1,500**	**$6,885,903**

CONTROLLING STORMWATER

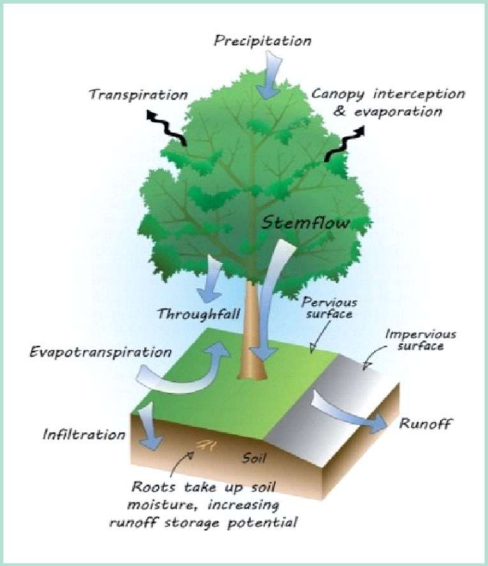
Trees intercept rainfall with their leaves and branches, helping lower stormwater management costs by avoiding runoff. The inventoried trees in the Village of Depew avoid 1,004,403 gals. of runoff annually. Avoided runoff accounts for 22% of the annual functional benefits provided by The Village of Depew's public tree resource.

Of all species inventoried, Norway maple (*Acer platanoides*) contributed the most annual stormwater benefits. The Norway maple population (40% of inventoried trees) avoided 502,202 gals. of runoff. On a per-tree basis, large trees with leafy canopies provided the most functional benefits. Silver maple was the second most abundant tree inventoried in the village and it contributes to avoiding 141,608 gals. of runoff yearly.

IMPROVING AIR QUALITY

The inventoried tree population annually removes 2,860 lbs. of air pollutants, including sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and particulate matter ($PM_{2.5}$). The i-Tree Eco model estimated the value of this benefit at $9,080. As shown in Figure 11, a small reduction of $PM_{2.5}$ is the more valuable than any of the other pollutants removed. The trees that provided the highest annual air quality benefits were Norway maple and silver maple, which removed 0.22 lb. of pollutants per tree per year and 0.75 lb. of pollutants per tree per year, respectively.

CANOPY FUNCTIONS



Trees provide many functions and benefits all at once simply by existing, such as:

- Catching rainfall in their crown so it drips to the ground with less of an impact or flows down their trunk.
- Helping stormwater soak into the ground by slowing down runoff.
- Creating more pore space in the soil with their roots, helping stormwater to move through the ground.
- Cooling the surrounding landscape by casting shade with their canopy and releasing water from their leaves.
- Catching airborne pollutants on their leaves and absorbing them with their roots when they wash off in the rain.
- Transforming some pollutants into less harmful substances and preventing other pollutants from forming.

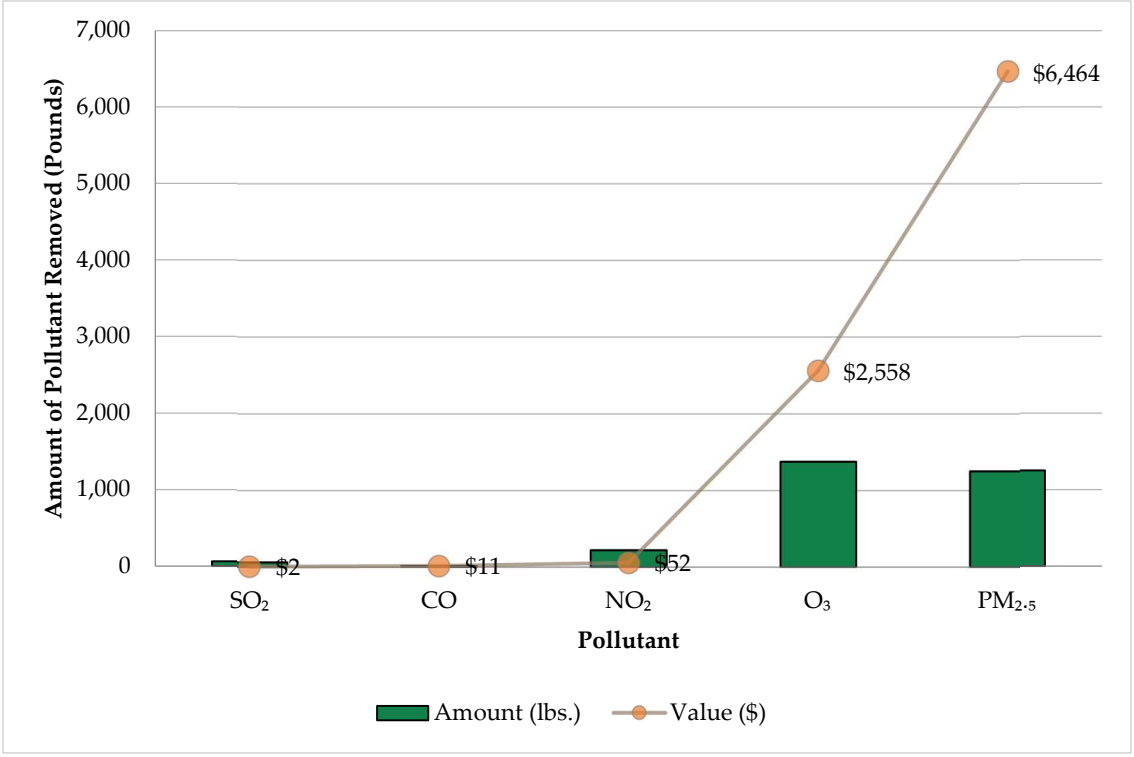


Figure 11. Estimated value of removing airborne pollution by weight and type.

Section 3:

Recommended Management

of the Public Tree Resource

SECTION 3: RECOMMENDED MANAGEMENT OF THE PUBLIC TREE RESOURCE

During the inventory, both a risk rating and a recommended maintenance activity were assigned to each tree. DRG recommends prioritizing and completing each tree's recommended maintenance activity based on the assigned risk rating. This ten-year tree management program takes a multi-faceted and proactive approach to tree resource management.

RISK MANAGEMENT AND RECOMMENDED MAINTENANCE

Although tree removal is usually considered a last resort, and may sometimes create a reaction from the community, there are circumstances in which removal is necessary. Trees fail from natural causes such as diseases, insects, and weather conditions, and from physical injury due to vehicles, vandalism, age, and root disturbances. DRG recommends that trees be removed when corrective pruning will not adequately mitigate risk or when correcting problems would be cost-prohibitive. DRG recommends that tree maintenance activities are prioritized and completed based on the risk rating that was assigned to each tree during the inventory. The following section describes recommended maintenance for each risk rating category.

Trees that cause obstructions or interfere with power lines or other infrastructure should be removed when their defects cannot be corrected through pruning or other maintenance practices. Diseased and nuisance trees also warrant removal. Even though large short-term expenditures may be required, it is important to secure the funding needed to complete priority tree removals. Expedient removal reduces risk and promotes public safety. Figures 12 and 13 present tree pruning and tree removals by risk rating and diameter size class. The following sections briefly summarize the recommended removals identified during the inventory.

EXTREME AND HIGH PRIORITY RECOMMENDED MAINTENANCE

Pruning or removing Extreme and High Risk trees is strongly recommended to be prioritized and completed as soon as possible. In general, maintenance activities should be completed first for the largest diameter trees (>25”) that pose the greatest risk. Once addressed, recommended tree maintenance activities should be completed for smaller diameter trees (<25”) that pose the greatest risk. Addressing Extreme and High Risk trees in a timely and proactive manner often requires significant resources to be secured and allocated. However, performing this work expediently will mitigate risk, improve public safety, and reduce long-term costs.

High Priority Pruning Recommendations

Extreme and High Risk trees should be pruned immediately based on assigned risk rating, which generally requires removing defects such as dead and dying parts, broken and/or hanging branches, and missing or decayed wood that may be present in tree crowns, even when most of the tree is sound. In these cases, when pruning the defected branch(es) can correct the problem, risk associated with the tree is reduced while promoting healthy growth.

The inventory identified trees 17 High Risk trees. The diameter size classes for trees with recommended High Priority pruning ranged between 7–12",13–18",19–24", 25–30", and 31–-36" inches DBH. This maintenance should be performed immediately based on assigned risk rating and may be performed concurrently with other High Risk removals.

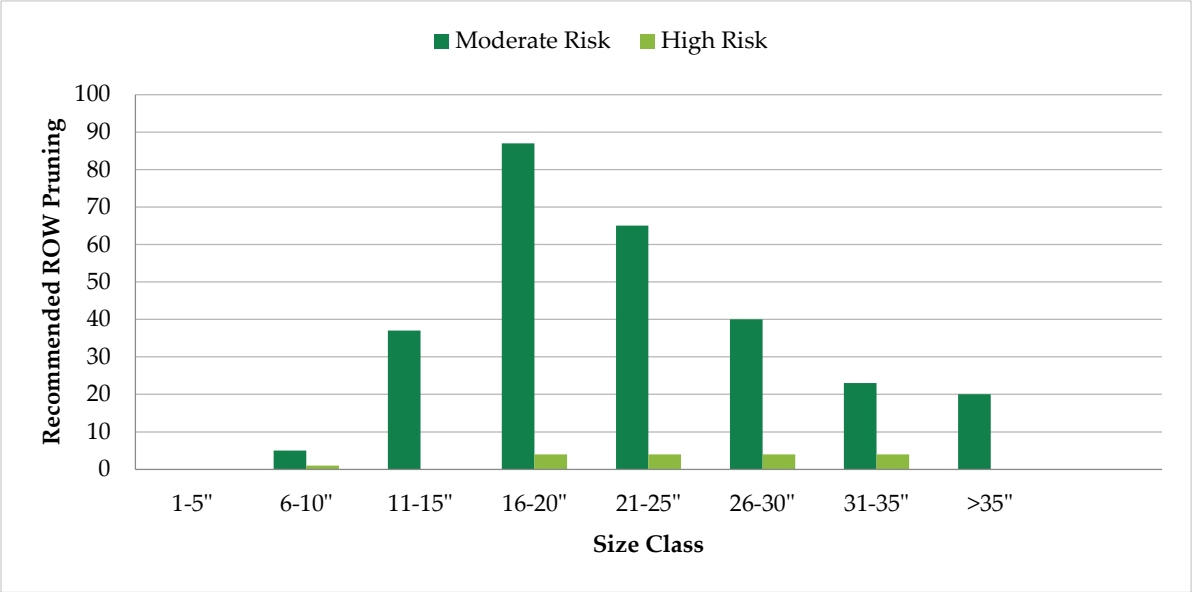


Figure 12. Recommended pruning by size class and risk rating.

High Priority Removal Recommendations

DRG identified 13 High Risk trees recommended for removal. The diameter size classes for High Risk trees ranged between 7–12", 13–18", 19–24", and 25–30" inches DBH.

DRG recommends that trees be removed when pruning will not correct their defects, eliminate the risks that their defects cause, or when corrective pruning would be cost-prohibitive. These trees should be removed immediately based on their risk rating and size class.

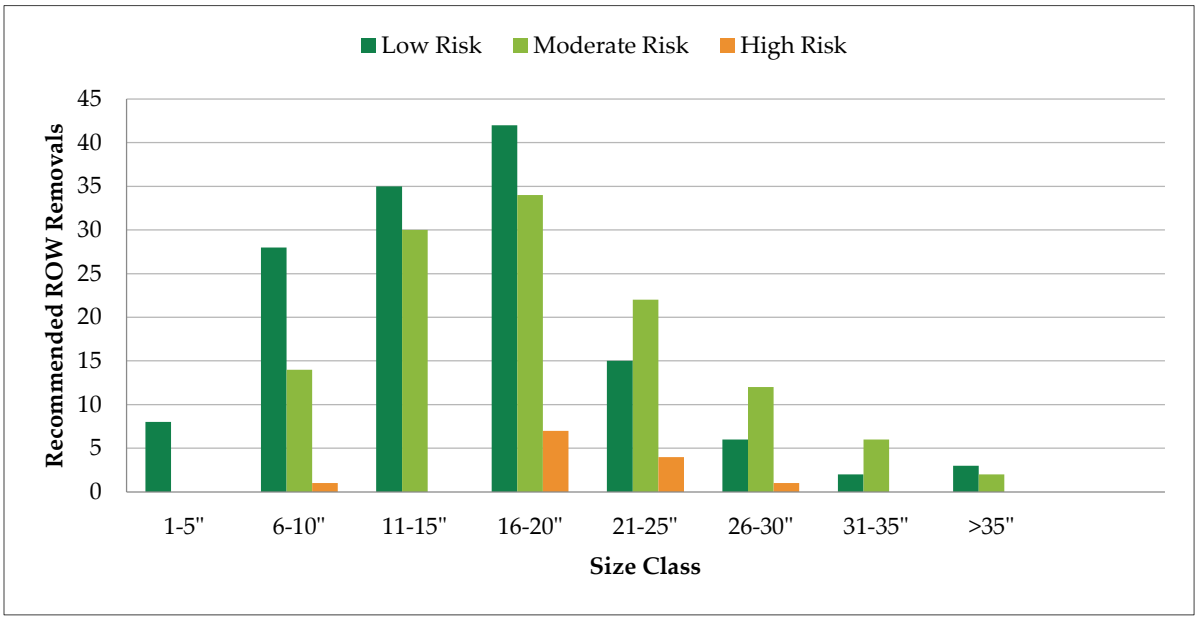


Figure 13. Recommended removals by size class and risk rating.

FURTHER INSPECTION

In the ANSI A300 system, there are three levels of risk assessment. Each level is built on the one before it. The lowest level is designed to be a cost-effective approach to quickly identifying tree risk concerns; whereas, the highest level is intended to provide in-depth information to decide about a tree. These levels are:

- **Level 1** inspection is defined as a Limited Visual assessment, which is often conducted as a walk through or windshield survey designed to identify obvious defects or specified conditions.
- **Level 2** inspection is defined as a Basic assessment and is a detailed, 360-degree visual inspection of a tree and its surrounding site, and a synthesis of the information collected.
- **Level 3** inspection is an Advanced assessment and is performed to provide detailed information about specific tree parts, defects, targets, or site conditions. A Level 3 inspection may use specialized tools or require the input of an expert.

The Further Inspection data field indicates whether a tree requires additional and/or future inspections to assess and/or monitor conditions that may cause it to become a risk to people, property, or other trees. The inventory identified 64 requiring one of three inspection types. Further Inspections are beyond the scope of a standard tree inventory, and can be one of the following:

- Recent Damage OR Multi-year Annual Inspection (e.g., a healthy tree that has been impacted by recent construction, weather, or other damage).
- Level 3 Risk Assessment (e.g., a tree with a defect requiring additional or specialized equipment for investigation).
- Insect/Disease Monitoring (e.g., a tree that appears to have an emerging insect or disease problem).
- No further inspection required.

A Level 3 inspection was recommended for trees in which a defect was observed during the inventory and it warranted a closer inspection by a TRAQ qualified arborist. These trees were inspected utilizing an aerial bucket to provide the inspector access to the canopy of the tree in which most of the defects are located. Trees with a Further Inspection requirement should be assessed by an ISA certified arborist as soon as possible, because the longer serious defects are left unaddressed, the greater a risk that a tree becomes. For the same reason, the management that the arborist recommends should be performed as soon as possible to minimize risk.

Further Inspection Recommendations

The inventory found 47 trees recommended for an advanced Level 3 Risk Assessment, 11 trees recommended for Annual/Multi-year Inspections, and 6 trees noted for insect and disease monitoring. Unless already designated for removal, the 1,158 trees noted as having “Missing or Decayed Wood” should be inspected on a regular basis. Corrective action should be taken as soon as possible unless it will not adequately eliminate the defect, in which case tree removal is likely to be the safest and most cost-effective management.

MODERATE AND LOW PRIORITY RECOMMENDED MAINTENANCE

Pruning or removing Moderate and Low Risk trees are generally the next priorities for maintenance activities. For efficiency, Moderate and Low Risk removals may also be addressed when removing adjacent higher risk trees. Most trees recommended for pruning with these risk levels can be maintained during proactive, routine pruning cycles. DRG recommends implementing proactive maintenance programs incrementally over time as the backlog of risk is reduced.

Moderate Risk Pruning Recommendations

Moderate Risk pruning should be performed after all Extreme and High Risk recommended maintenance is complete and may be performed concurrently with other Moderate Risk removals. The inventory identified 277 Moderate Risk trees recommended for pruning. The diameter size classes for Moderate Risk trees ranged between 6–10 inches DBH and >35 inches DBH.

Moderate Risk Removal Recommendations

DRG identified 120 Moderate Risk trees recommended for removal. Most Moderate Risk trees recommended for removal were smaller than 31 inches DBH. If corrective pruning cannot correct a tree's defects and/or adequately mitigate risk, then the tree should be removed. A total of 8 Moderate Risk trees larger than 31 inches DBH were recommended for removal. These trees should be removed as soon as possible after all High Risk removals and pruning have been completed.

Low Priority Pruning Recommendations

There were 2,022 Low Risk trees recommended for pruning. Low Risk trees with the assigned maintenance of either Routine Prune or None should be included in a proactive Routine Pruning cycle after all the higher risk trees are addressed.

Low Priority Removal Recommendations

DRG identified 139 Low Risk trees recommended for removal. Low Risk removals pose little threat; these trees are generally small, dead, invasive, or poorly formed trees that need to be removed. Eliminating these trees will reduce breeding site locations for insects and diseases and will increase the aesthetic value of the area. Healthy trees growing in poor locations or undesirable species are also included in this category. If pruning cannot correct a tree's defects and/or adequately mitigate risk, then the tree should be removed. All Low Risk trees should be removed when convenient after all higher risk pruning and removals have been completed and may be performed concurrently with routine pruning.

ROUTINE INSPECTIONS

Inspections are essential to uncovering potential problems with trees. They should be performed by a qualified arborist who is trained in the art and science of planting, caring for, and maintaining individual trees. Arborists are knowledgeable about the needs of trees and are trained and equipped to provide proper care. Ideally, the arborist will be ISA Certified and also hold the ISA Tree Risk Assessment Qualification credential.

Routine Inspection Recommendations

All trees along the street ROW should be regularly inspected and attended to as needed. When trees require additional or new work, they should be added to the maintenance schedule. The budget should also be updated to reflect the additional work. Utilize computer management software such as TreeKeeper® to make updates, edits, and keep a log of work records. In addition to locating trees with unidentified defects, inspections also present an opportunity to look for signs and symptoms of pests and diseases. The Village of Depew has a large population of trees that are susceptible to pests and diseases, including maple, apple, and locust.

DRG recommends that The Village of Depew perform routine inspections of inventoried trees by windshield survey (inspections performed from a vehicle) in line with *ANSI A300 (Part 9)* annually and after all severe weather events, to identify defects with heightened risk, signs of pest activity, and symptoms of disease. When trees need additional maintenance, they should be added to the work schedule immediately. Use asset management software such as TreeKeeper® to update inventory data and schedule work records.

ROUTINE PRUNING CYCLE

The Routine Pruning cycle includes all Low Risk trees that received a “Prune”, “Discretionary Prune”, or “None” maintenance recommendation. These trees pose some risk but have a smaller defect size and/or a lower probability of impacting a target. Over time, routine pruning can minimize reactive maintenance, limit instances of elevated risk, and provide the basis for a robust risk management program.

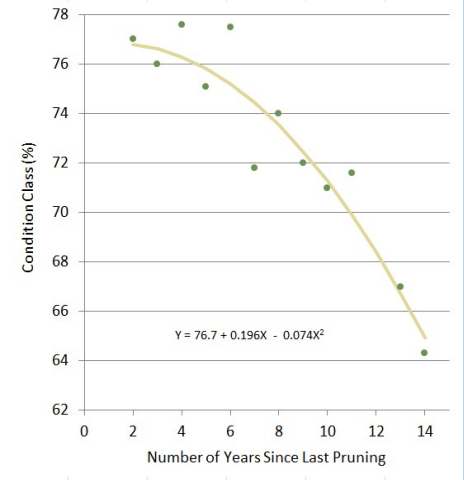
Based on Miller and Sylvester’s research, DRG recommends five-year Routine Pruning cycles to maintain the condition of the inventoried tree resource. However, not all municipalities are able to remain proactive with a five-year cycle based on budgetary constraints, the size of the public tree resource, or both. In these cases, extending the length of the Routine Pruning cycle is an option; however, it is in the municipality’s best interest to not approach or exceed a 10-year pruning cycle. The reason is that this is around when tree condition deteriorates significantly without regular pruning, because their once-minor defects have worsened, reducing tree health and potentially increasing risk (Miller and Sylvester 1981).

Routine Pruning Cycle Recommendations

The Village of Depew’s inventory has 4,502 trees that should be routinely pruned, and DRG recommends that the village establish a ten-year Routine Pruning cycle with approximately 325 trees pruned each year. DRG recommends that the Routine Pruning cycle begins in Year One of the proposed ten-year program, after all Extreme and High Risk Recommended Maintenance is complete.

Approximately 27% of the inventoried tree population would benefit from routine pruning. Figure 14 shows that a variety of size classes is recommended for pruning; however, most of the trees were smaller than 11–15” or smaller DBH.

PROACTIVE PRUNING



RELATIONSHIP BETWEEN TREE CONDITION AND YEARS SINCE PREVIOUS PRUNING.

(ADAPTED FROM MILLER AND SYLVESTER 1981)

Miller and Sylvester studied the pruning frequency of 40,000 street trees in Milwaukee, Wisconsin. Trees that had not been pruned for more than 10 years had an average condition rating 10% lower than trees that had been pruned in the previous several years. Their research suggests that a five-year pruning cycle is optimal for urban trees. Routine pruning cycles help detect and correct most defects before they reach higher risk levels. DRG recommends that pruning cycles begin after all Extreme and High Risk tree maintenance has been completed. DRG recommends two pruning cycles: a Young Tree Training cycle and a Routine Pruning cycle. Newly planted trees will enter the Young Tree Training cycle once they become established and will move into the Routine Pruning cycle when they reach maturity. A tree should be removed and eliminated from the Routine Pruning cycle when it outlives its usefulness.

Figure 14. Routine Pruning.

YOUNG TREE TRAINING CYCLE

Trees included in the Young Tree Training cycle are generally less than 8 inches DBH. These younger trees sometimes have branch structures that can lead to potential problems as the tree ages. Potential structural problems include codominant leaders, multiple limbs attaching at the same point on the trunk, or crossing/interfering limbs. If these problems are not corrected, they may worsen as the tree grows, increasing its risk rating and creating potential liability.

The recommended length of a Young Tree Training cycle is three years because young trees tend to grow at faster rates than mature trees. The Young Tree Training cycle differs from the Routine Pruning cycle in that the Young Tree Training cycle generally only includes trees that can be pruned from the ground with a pole pruner or pruning shear.

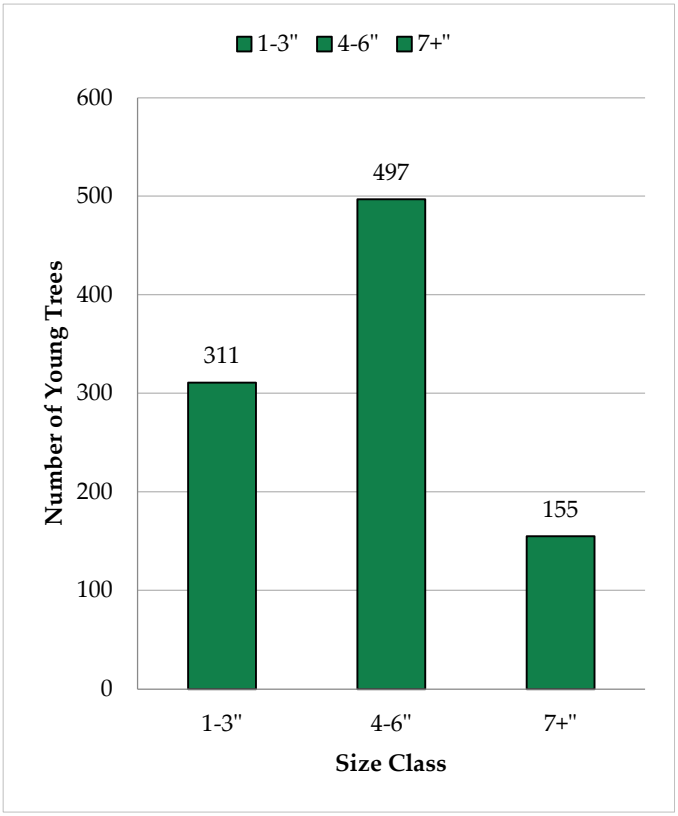


Figure 15. Three-year Young Tree Training cycle by size. class.

Young Tree Training Cycle Recommendations

DRG recommends that The Village of Depew implement a three-year Young Tree Training cycle beginning after the completion of all Extreme and High Risk Recommended Maintenance activities. During the inventory, 963 trees less than or equal to 8 inches DBH were inventoried and recommended for young tree training. Since The Village of Depew has so many young trees, the Young Tree Training cycle is vital for the future condition of the inventoried tree population. DRG recommends that an average of 294 trees be trained with structural pruning each year over three years, beginning in Year One of the management program.

When new trees are planted, they should enter the Young Tree Training cycle after establishment, typically within 2–3 years after planting. In future years, the number of trees in the Young Tree Training cycle will be based on tree planting efforts and growth rates of young trees. The village should strive to training prune approximately one-third of its young trees each year.

TREE PLANTING AND STUMP REMOVAL

Planting new trees in areas where there is sparse canopy already is the most important. It is also important to plant more trees in areas with poor canopy continuity or gaps in existing canopy that may be formed by the removal of trees. While The Village of Depew receives value from the ecosystem services provided by the public tree resource, those benefits usually are not distributed evenly across the village.

The Right Tree in the Right Place is a mantra for tree planting used by the Arbor Day Foundation and many utility companies nationwide. Trees come in many different shapes and sizes, and often change dramatically over their lifetimes. Before selecting a tree for planting, make sure it is the right tree—know how tall, wide, and deep it will be at maturity. Equally important to selecting the right tree is choosing the right spot to plant it. Blocking an unsightly view or creating some shade may be a priority, but it is important to consider how a tree may impact existing utility lines and hardscape as it grows taller, wider, and deeper. If the tree at maturity will reach overhead lines, or conflict with sidewalks and curbs, it is best to choose another tree or a different location.

Tree Planting and Stump Removal Recommendations

Creating larger growing sites for trees in the municipal ROW can be the single most beneficial management practice to improve the survival rate of planted and developing trees. Increasing planting space can also reduce the amount of tree-related infrastructure conflicts, as the trees will be planted further from curbs and sidewalks. Depending on the site, there are several methods available to create and/or increase the growing space for newly planted trees:

- Install or enlarge tree wells/pits in existing sidewalks of sufficient width. Ideally, the minimum growing space of a small-sized tree is 32 square feet. Where The Village of Depew has sidewalks of a sufficient width and length, the city could install tree pits with enough space remaining for the sidewalk to still comply with American Disability Act (ADA) standards.
- Planting trees 4 feet behind a curb without a sidewalk, or 4 feet behind an existing sidewalk, can be a low-cost alternative to more construction intensive methods. This can result in less damage to the sidewalk and give tree roots room to grow into the open soil.

- Re-routing the sidewalk around an area to create designated large tree sites is a relatively cost-effective method to increase growing spaces. This method can also be applied to existing large tree sites, where tree roots have already come in conflict with the sidewalk.
- A landscape bump-out/curb extension is a vegetative area that protrudes into the parking lane of a street, to provide a growing space for plants or trees. These spaces can be used quite effectively by municipalities to beautify a streetscape, provide greater storm water retention, along with the added benefit of slowing car speeds at the bump-out location.

The inventory identified 45 stumps recommended for removal, with a wide range of sizes from 5" to 48" in diameter. Stump removals should occur when convenient and be included in regular planting plans if the site would be feasible for planting after the stump is removed. For this reason, it is most convenient to remove all stumps in areas with scheduled tree planting work, so all feasible sites in an area are stocked at once.

A list of suggested tree species is provided in Appendix C. These tree species are specifically selected for the climate of The Village of Depew. This list is not exhaustive but can be used as a guideline for species that meet community objectives and to enhance any existing list of approved species.

MAINTENANCE SCHEDULE AND BUDGET

Utilizing 2021 Village of Depew tree inventory data, an annual maintenance schedule was developed detailing the recommended tasks to complete each year. DRG made budget projections using industry knowledge and public bid tabulations in the industry. A complete table of estimated costs for The Village of Depew's ten-year tree management program follows.

This schedule provides a framework for completing the recommended inventoried tree maintenance over the next ten years. Following this schedule can shift tree maintenance activities from being reactive to a more proactive tree care program.

To implement the maintenance schedule, The Village of Depew's tree maintenance budget should be:

- No less than $165,742 for the first year of implementation.
- No less than $115,201 each for the second and third years.
- No less than $112,686 each for the fourth and fifth years
- No less than $99,310 each for the sixth and seventh years
- No less than $94,944 each during the last three years

Annual budget funds are needed to ensure that Extreme and High Risk trees are expediently managed and that the vital Young Tree Training and Routine Pruning cycles can begin as soon as possible. If routing efficiencies and/or contract specifications allow more tree work to be completed in a given year, or if this maintenance schedule requires adjustment to meet budgetary or other needs, then it should be modified accordingly. Unforeseen situations such as severe weather events may arise and change the maintenance needs of trees. If maintenance needs change, then budgets, staffing, and equipment should be adjusted to meet the new demand.

The planting budget is conservative for the village based on conversations during the planning of this plan. It does take into account replacing 1% of the population and increasing the population by 10 trees each year. There is room in the parks and within the ROW for several more trees than the amount in the budget table. When feasible, the village should strive to increase this amount to increase the benefits the trees provide to the community.

Table 4. Estimated budget for recommended ten-year tree resource management program

Activity Cost			Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7		Year 8		Year 9		Year 10		Total	
Activity	Diameter	Cost/Tree	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost
High Priority Removals	1-3"	$28		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	$0
	4-6"	$58		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	$0
	7-12"	$138	1	$138		$0		$0		$0		$0		$0		$0		$0		$0		$0	1	$138
	13-18"	$314	3	$942		$0		$0		$0		$0		$0		$0		$0		$0		$0	3	$942
	19-24"	$605	8	$4,840		$0		$0		$0		$0		$0		$0		$0		$0		$0	8	$4,840
	25-30"	$825	1	$825		$0		$0		$0		$0		$0		$0		$0		$0		$0	1	$825
	31-36"	$1,045		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	$0
	37-42"	$1,485		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	$0
	>43"	$2,035		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	$0
Activity Total(s)			**13**	**$6,745**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**13**	**$6,745**
Moderate Priority Removals	1-3"	$28		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	$0
	4-6"	$58		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	$0
	7-12"	$138	23	$3,174		$0		$0		$0		$0		$0		$0		$0		$0		$0	23	$3,174
	13-18"	$314	42	$13,188		$0		$0		$0		$0		$0		$0		$0		$0		$0	42	$13,188
	19-24"	$605	29	$17,545		$0		$0		$0		$0		$0		$0		$0		$0		$0	29	$17,545
	25-30"	$825	18	$14,850		$0		$0		$0		$0		$0		$0		$0		$0		$0	18	$14,850
	31-36"	$1,045	6	$6,270		$0		$0		$0		$0		$0		$0		$0		$0		$0	6	$6,270
	37-42"	$1,485	2	$2,970		$0		$0		$0		$0		$0		$0		$0		$0		$0	2	$2,970
	>43"	$2,035		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	$0
Activity Total(s)			**120**	**$57,997**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**120**	**$57,997**
Low Priority Removals	1-3"	$28		$0		$0		$0		$0	3	$84		$0		$0		$0		$0		$0	3	$84
	4-6"	$58		$0		$0		$0	4	$232	5	$290		$0		$0		$0		$0		$0	9	$522
	7-12"	$138		$0		$0		$0	17	$2,346	20	$2,760		$0		$0		$0		$0		$0	37	$5,106
	13-18"	$314		$0	16	$5,024	16	$5,024	17	$5,338		$0		$0		$0		$0		$0		$0	49	$15,386
	19-24"	$605		$0		$0	14	$8,470	14	$8,470		$0		$0		$0		$0		$0		$0	28	$16,940
	25-30"	$825		$0	8	$6,600		$0		$0		$0		$0		$0		$0		$0		$0	8	$6,600
	31-36"	$1,045		$0	2	$2,090		$0		$0		$0		$0		$0		$0		$0		$0	2	$2,090
	37-42"	$1,485		$0	2	$2,970		$0		$0		$0		$0		$0		$0		$0		$0	2	$2,970
	>43"	$2,035		$0	1	$2,035		$0		$0		$0		$0		$0		$0		$0		$0	1	$2,035
Activity Total(s)			**0**	**$0**	**29**	**$18,719**	**30**	**$13,494**	**52**	**$16,386**	**28**	**$3,134**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**139**	**$51,733**
Stump Removals	1-3"	$18		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	$0
	4-6"	$28	2	$56		$0		$0		$0		$0		$0		$0		$0		$0		$0	2	$56
	7-12"	$44	2	$88	2	$88	1	$44	1	$44	1	$44	1	$44	1	$44	1	$44	1	$44	1	$44	12	$528
	13-18"	$72	2	$144	2	$144	2	$144	2	$144	2	$144	2	$144	2	$144	1	$72	1	$72	1	$72	17	$1,224
	19-24"	$94	1	$94	1	$94	1	$94	1	$94		$0		$0		$0		$0		$0		$0	4	$376
	25-30"	$110	1	$110	1	$110	1	$110	1	$110	1	$110		$0		$0		$0		$0		$0	5	$550
	31-36"	$138	1	$138	1	$138	1	$138		$0		$0		$0		$0		$0		$0		$0	3	$414
	37-42"	$160	1	$160		$0		$0		$0		$0		$0		$0		$0		$0		$0	1	$160
	>43"	$182	1	$182		$0		$0		$0		$0		$0		$0		$0		$0		$0	1	$182
Activity Total(s)			**11**	**$972**	**7**	**$574**	**6**	**$530**	**5**	**$392**	**4**	**$298**	**3**	**$188**	**3**	**$188**	**2**	**$116**	**2**	**$116**	**2**	**$116**	**45**	**$3,490**
High Priority Pruning	1-3"	$20		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	$0
	4-6"	$30		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	$0
	7-12"	$75	1	$75		$0		$0		$0		$0		$0		$0		$0		$0		$0	1	$75
	13-18"	$120	2	$240		$0		$0		$0		$0		$0		$0		$0		$0		$0	2	$240
	19-24"	$170	5	$850		$0		$0		$0		$0		$0		$0		$0		$0		$0	5	$850
	25-30"	$225	5	$1,125		$0		$0		$0		$0		$0		$0		$0		$0		$0	5	$1,125
	31-36"	$305	4	$1,220		$0		$0		$0		$0		$0		$0		$0		$0		$0	4	$1,220
	37-42"	$380		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	$0
	>43"	$590		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	$0
Activity Total(s)			**17**	**$3,510**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**17**	**$3,510**

Activity Cost			Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7		Year 8		Year 9		Year 10		Total	
Activity	Diameter	Cost/Tree	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost
Moderate Priority Pruning	1-3"	$20		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	
	4-6"	$30		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0	0	$0
	7-12"	$75	18	$1,350		$0		$0		$0		$0		$0		$0		$0		$0		$0	18	$1,350
	13-18"	$120	72	$8,640		$0		$0		$0		$0		$0		$0		$0		$0		$0	72	$8,640
	19-24"	$170	94	$15,980		$0		$0		$0		$0		$0		$0		$0		$0		$0	94	$15,980
	25-30"	$225	50	$11,250		$0		$0		$0		$0		$0		$0		$0		$0		$0	50	$11,250
	31-36"	$305	25	$7,625		$0		$0		$0		$0		$0		$0		$0		$0		$0	25	$7,625
	37-42"	$380	14	$5,320		$0		$0		$0		$0		$0		$0		$0		$0		$0	14	$5,320
	>43"	$590	4	$2,360		$0		$0		$0		$0		$0		$0		$0		$0		$0	4	$2,360
Activity Total(s)			**277**	**$52,525**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**277**	**$52,525**
Routine Inspection	Drive-by Assessment	$1	327	$327	327	$327	327	$327	327	$327	327	$327	327	$327	327	$327	327	$327	327	$327	327	$327	3,270	$3,270
	Walk-by Assessment	$5	0	$0		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0
Activity Total(s)			**327**	**327**	**327**	**327**	**327**	**327**	**327**	**327**	**327**	**327**	**327**	**327**	**327**	**327**	**327**	**327**	**327**	**327**	**327**	**327**	**3,270**	**$3,270**
Young Tree Training (3-year Cycle)	1-3"	$20	96	$1,920	96	$1,920	96	$1,920	96	$1,920	96	$1,920	96	$1,920	96	$1,920	96	$1,920	96	$1,920	96	$1,920	960	$19,200
	4-6"	$30	150	$4,500	150	$4,500	150	$4,500	150	$4,500	150	$4,500	150	$4,500	150	$4,500	150	$4,500	150	$4,500	150	$4,500	1,500	$45,000
	6"<	$40	48	$1,920	48	$1,920	48	$1,920	48	$1,920	48	$1,920	48	$1,920	48	$1,920	48	$1,920	48	$1,920	48	$1,920	480	$19,200
Activity Total(s)			**294**	**$8,340**	**294**	**$8,340**	**294**	**$8,340**	**294**	**$8,340**	**294**	**$8,340**	**294**	**$8,340**	**294**	**$8,340**	**294**	**$8,340**	**294**	**$8,340**	**294**	**$8,340**	**2,940**	**$83,400**
Routine Pruning (10-year Cycle)	1-3"	$20	4	$80	3	$60	3	$60	3	$60	3	$60	3	$60	3	$60	3	$60	3	$60	3	$60	31	$620
	4-6"	$30	4	$120	4	$120	4	$120	4	$120	3	$90	3	$90	3	$90	3	$90	3	$90	3	$90	34	$1,020
	7-12"	$75	115	$8,625	115	$8,625	115	$8,625	115	$8,625	115	$8,625	115	$8,625	115	$8,625	114	$8,550	114	$8,550	114	$8,550	1,147	$86,025
	13-18"	$120	112	$13,440	112	$13,440	112	$13,440	112	$13,440	112	$13,440	112	$13,440	111	$13,320	111	$13,320	111	$13,320	111	$13,320	1,116	$133,920
	19-24"	$170	59	$10,030	59	$10,030	59	$10,030	59	$10,030	59	$10,030	58	$9,860	58	$9,860	58	$9,860	58	$9,860	58	$9,860	585	$99,450
	25-30"	$225	22	$4,950	22	$4,950	22	$4,950	22	$4,950	22	$4,950	22	$4,950	22	$4,950	22	$4,950	21	$4,725	21	$4,725	218	$49,050
	31-36"	$305	8	$2,440	8	$2,440	8	$2,440	8	$2,440	8	$2,440	8	$2,440	7	$2,135	7	$2,135	7	$2,135	7	$2,135	76	$23,180
	37-42"	$380	3	$1,140	3	$1,140	3	$1,140	3	$1,140	3	$1,140	3	$1,140	2	$760	2	$760	2	$760	2	$760	26	$9,880
	>43"	$590	2	$1,180	1	$590	1	$590	1	$590	1	$590	1	$590	1	$590	1	$590	1	$590	1	$590	11	$6,490
Activity Total(s)			**329**	**$42,005**	**327**	**$41,395**	**327**	**$41,395**	**327**	**$41,395**	**326**	**$41,365**	**325**	**$41,195**	**322**	**$40,390**	**321**	**$40,315**	**320**	**$40,090**	**320**	**$40,090**	**3,244**	**$409,635**
New Tree Planting and Maintenance	Purchasing	$250	10	$2,500	10	$2,500	10	$2,500	10	$2,500	10	$2,500	10	$2,500	10	$2,500	10	$2,500	10	$2,500	10	$2,500	100	$25,000
	Planting & Watering	$200	10	$2,000	10	$2,000	10	$2,000	10	$2,000	10	$2,000	10	$2,000	10	$2,000	10	$2,000	10	$2,000	10	$2,000	100	$20,000
	Mulching	$25	10	$250	10	$250	10	$250	10	$250	10	$250	10	$250	10	$250	10	$250	10	$250	10	$250	100	$2,500
Activity Total(s)			**30**	**$4,750**	**30**	**$4,750**	**30**	**$4,750**	**30**	**$4,750**	**30**	**$4,750**	**30**	**$4,750**	**30**	**$4,750**	**30**	**$4,750**	**30**	**$4,750**	**30**	**$4,750**	**300**	**$47,500**
Natural Mortality (1%)	Tree Removal	$314	48	$14,987	48	$14,987	48	$14,987	48	$14,987	48	$14,987	48	$14,987	48	$14,987	48	$14,987	48	$14,987	48	$14,987	477	$149,872
	Stump Removal	$72	48	$3,437	48	$3,437	48	$3,437	48	$3,437	48	$3,437	48	$3,437	48	$3,437	48	$3,437	48	$3,437	48	$3,437	477	$34,366
	Replacement Tree	$475	48	$22,672	48	$22,672	48	$22,672	48	$22,672	48	$22,672	48	$22,672	48	$22,672	48	$22,672	48	$22,672	48	$22,672	477	$226,718
Activity Total(s)			**143**	**$41,096**	**143**	**$41,096**	**143**	**$41,096**	**143**	**$41,096**	**143**	**$41,096**	**143**	**$41,096**	**143**	**$41,096**	**143**	**$41,096**	**143**	**$41,096**	**143**	**$41,096**	**1,432**	**$410,955**
Activity Grand Total			**1,284**		**1,157**		**1,157**		**1,178**		**1,152**		**1,122**		**1,119**		**1,117**		**1,116**		**1,116**		**11,520**	
Cost Grand Total				**$165,742**		**$115,201**		**$109,932**		**$112,686**		**$99,310**		**$95,896**		**$95,091**		**$94,944**		**$94,719**		**$94,719**		**$1,078,235**

Veterans Park

Veterans Park is bordered by Park Place, Terrace Boulevard, Marengo Street, and Meridian Street.

The park is comprised 22% of Norway maple and 33% in the maple family. As previously discussed in the plan, species diversity is very important to reduce the risk of losing a majority of the trees at one time due to an invasive insect or disease. The village is encouraged to replace trees that need to be removed in the future due to poor health. Due to the use of the park at the moment, there are limited vacant sites available. If the use should change or the village desires to increase the canopy in the park, it is recommended no trees from the maple family are considered for planting.

Firemans Park

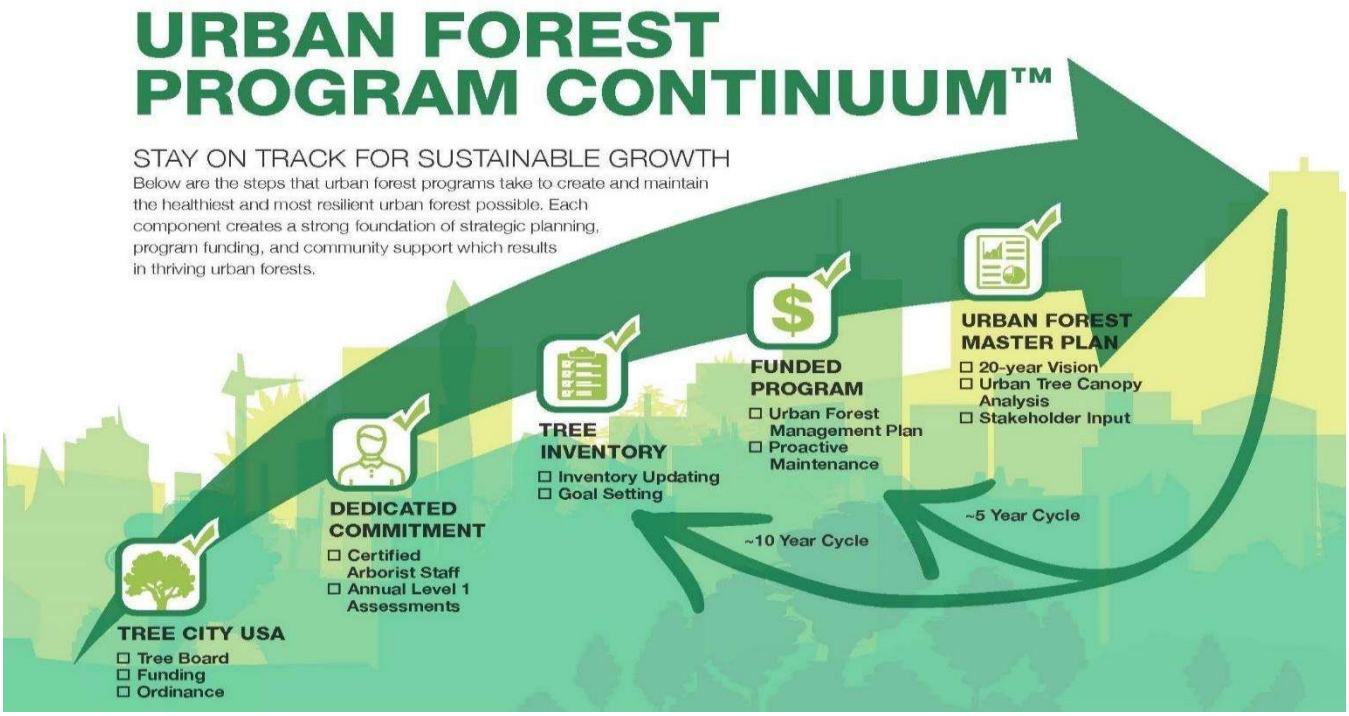
Firemans Park is bordered by Erie Street and Terrace Boulevard. It is comprised of 31 trees and 33% are London plane trees. As mentioned previously in the plan, species diversity is important to reduce the risk of losing the urban canopy at one time. As can be seen in the photo below there is ample opportunities for planting sites within the park. Areas around the playing fields are now void of trees. Providing shade for spectators and players alike would enhance these areas. In addition, the area around the playground provides ample growing space. This park is recommended for consideration for future Arbor Day plantings in which children could be involved in enhancing their play space with trees.

CONCLUSION

When properly maintained, the valuable benefits trees provide over their lifetime far exceed the time and money invested in planting, pruning, and inevitably removing them. The 4,773 public trees inventoried provide $41,395 in estimated annual economic value, which is almost 33% of the village's annual tree maintenance budget of $124,319. Successfully implementing the ten-year program may increase The Village of Depew's ROI over time, or at least maintain it over the years.

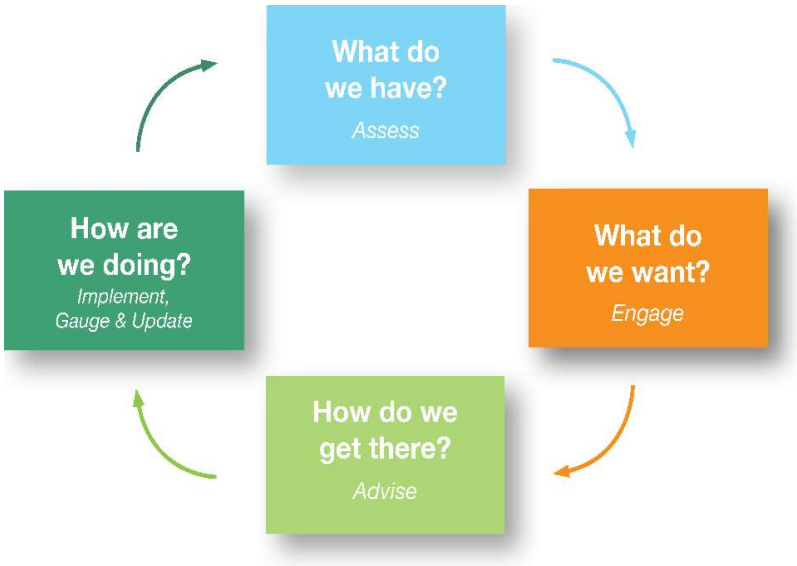
The program is ambitious and is a challenge to complete in ten years but becomes easier after all high priority tree maintenance is completed. This *Community Forestry Management Plan* could potentially help the village advocate for an increased urban forestry budget to fund the recommended maintenance activities. Getting started is the most difficult part because of the expensive maintenance in the first year, which represents the transition from reactive maintenance to proactive maintenance. Significant investment early on can reduce tree maintenance costs over time.

As the urban forest grows, the benefits enjoyed by the Village of Depew and its residents will increase as well. Inventoried trees are only a fraction of the total trees in The Village of Depew when including private property, which is why it is important to also incentivize private landowners to care for their trees and to plant new ones. The village's urban forestry program is well on its way to creating a sustainable and resilient public tree resource, and can stay on track by setting goals, updating inventory data to check progress, and setting more ambitious goals once they are reached.



Evaluating and Updating This Plan

This *Community Forestry Management Plan* provides management priorities for the next ten years, and it is important to update the tree inventory using TreeKeeper® as work is completed, so the software can provide updated species distribution and benefit estimates. This empowers The Village of Depew to self-assess the village's progress over time and set goals to strive toward by following the adaptive management cycle. Below are some ways of implementing the steps of this cycle:



- Prepare planting plans well enough in advance to schedule and complete stump removal in the designated area, and to select species best suited to the available sites.
- Annually comparing the number of trees planted to the number of trees removed and the number of vacant planting sites remaining, then adjusting future planting plans accordingly.
- Annually comparing the species distribution of the inventoried tree resource with the previous year after completing planting plans to monitor recommended changes in abundance.
- Schedule and assign high-priority tree work so it can be completed as soon as possible instead of reactively addressing new lower priority work requests as they are received.
- Include data collection such as measuring DBH and assessing condition into standard procedure for tree work and routine inspections, so changes over time can be monitored.

URBAN FOREST MANAGEMENT GOALS AND TIMELINES

Introduction

This section identifies the specific goals and objectives to enhance the village's municipal tree program in the coming years. The goals are identified as ongoing, short term (1–3 years for action), medium term (3–5 years), and long term (5+ years). Specific action steps needed to reach each goal are also identified.

The goals for the Village of Depew were developed based on the current status of the urban forestry program in the village and the needs of the village as identified by the Tree Committee members interviewed.

Goals and Action Steps

Goal	Timeframe	Action Steps
Complete all priority tree maintenance work	1–3 years	Remove elevated risk trees recommended for removal. Prune elevated risk trees recommended for pruning.
Maintain young tree training pruning program as three-year cycle	1–3 years	Secure or set aside necessary funding. Organize volunteer teams that have been successful in prior planting efforts. Hire contractors or train staff on structural pruning techniques. Divide village into thirds and prune young trees in 1/3 of village each year.
Develop a mature tree pruning program in a routine pruning cycle	5–8 years	Identify all trees recommended for routine pruning. Update list to include trees after high priority maintenance has been performed.
Maintain planting program	Ongoing	Apply for planting grants. Secure or set aside necessary funding. Consult with towns for additional assistance. Identify high priority planting locations. Identify suitable planting sites in high priority locations. Hire contractors or train staff on tree planting. Coordinate with volunteer groups to provide watering services during tree establishment. Set goals for annual planting (i.e., replace removed trees, x trees annually, x trees by set date, etc.).
Increase tree species and genus diversity	Ongoing	Routinely analyze species and genus composition of the urban forest. Identify species and genera which are overabundant. Update approved planting list and do-not-plant list to correspond to species and genus data. Plant a greater variety of tree species and genera.

Goal	Timeframe	Action Steps
Select "Right Tree for the Right Place"	Ongoing	Analyze site conditions before planting and select trees well suited to the site. Select trees which will not outgrow available space at maturity. Create and maintain approved planting lists and do-not-plant lists based on species and genera prevalence and presence of invasive threats.
Create an approved tree species planting list	1–3 years	Modify DRG-provided potential planting list using village information. Distribute list on village websites. Use list to guide tree planting decisions.
Create and enforce a do-not-plant list	1–3 years	Identify tree species and genera which are overabundant in village. Identify tree species which are susceptible to current or future invasive species threats. Identify tree species which are known to be invasive in the area. Create a list of these undesirable species. Distribute list on village websites. Use list to guide tree planting decisions. Update list as needed when species and genus distribution shift or as new information on invasive species becomes available.
Improve tree cover in public right-of-way (ROW)	Ongoing	Identify parks and public properties with greatest occupancy rates and greatest need for trees. Identify suitable planting sites in these high priority areas. Include requests from property owners for trees to be planted in ROW adjacent to their properties. Select tree species well suited to site conditions. Install trees using best practices. Maintain young trees on a regular basis.
Compensate for ash decline due to emerald ash borer (EAB).	3–5 years	Remove dead and dying ash trees on public property which pose a hazard. Replant with non-host species. Educate homeowners of treatment options.
Update tree inventory	Ongoing	Edit inventoried trees as work is completed. Add new trees as they are planted. Remove or edit trees to stumps or vacant sites as they are removed. Remove or edit stumps to vacant sites as they are removed. Plan to conduct a full re-inventory within the next 8–10 years.

Goal	Timeframe	Action Steps
Maintain and update tree-related regulations in village's zoning ordinances	1–3 years	Review and revise existing ordinances. Determine essential inclusions. Present to village council. Advocate for a vote on revisions to the ordinances.
Reduce risk associated with village trees	Ongoing	Routinely inspect village trees for defects which may elevate risk. Monitor trees identified in the inventory recommended for multi-year annual inspection or insect/disease monitoring. Inspect trees after any major storms, or every spring/fall.
Reduce future conflicts with utilities and infrastructure with proper planting strategies	Ongoing	Plant only small stature trees (15–30 feet tall at maturity) below utility lines. Plant medium stature trees (30–40 feet tall at maturity) at least 20 feet from utility lines. Plant large stature trees (40+ feet tall at maturity) at least 40 feet from utility lines. Locate trees to avoid blocking important road signage. Plant trees at least: • 5 feet from underground utilities • 10 feet from driveways • 15 feet from utility poles • 15 feet from buildings • 20 feet from stop signs • 20 feet from fire hydrants • 30 feet from intersections Routinely prune village trees to minimize conflicts with utilities, signs, and buildings.
Prepare for future invasive species threats	1–3 years	Draft an invasive species management plan using guidance from this *Community Forestry Management Plan*. Identify likely areas for invasive species establishment. Routinely monitor high-priority areas to identify new invasions early. Manage new invasive species in ways which are cost-efficient, environmentally sound, and socially acceptable. Routinely check with organizations such as the United States Department of Agriculture (USDA) and the Western New York Partnership for Regional Invasive Species Management (PRISM) for updates on invasive species in your area. Increase opportunity for tree committee members to attend local and regional tree care and pest management workshops to stay abreast of changes that might affect the village's public tree resource.

Goal	Timeframe	Action Steps
Continue Arbor Day celebrations	Ongoing	Coordinate between village departments. Provide public education (e.g., demonstrations, handouts, tabling, etc.) on tree planting, care, and benefits. Source seedlings to hand out to residents. Plant trees on village properties.
Educate citizens about trees	Ongoing	Provide free presentations or classes during Arbor Day celebrations. Post urban forestry updates to village websites. Provide approved tree planting lists and do-not-plant lists. Table or provide educational flyers at public gathering places. Evaluate the use of social media to increase public awareness of the Tree Committee's activities.
Continue to maintain Tree City USA status	Ongoing	Continue to meet the specific requirements and apply for the recognition annually.

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APPENDIX A
DATA COLLECTION AND SITE LOCATION METHODS

DATA COLLECTION METHODS

DRG collects tree inventory data using their proprietary GIS software, called Rover, loaded onto pen-based field computers. At each site, the following data fields were collected:

- Address
- Comments
- Condition
- Date of Inventory
- Maintenance Recommendation
- Multi-stem Tree
- Notes
- Relative Location
- Size*
- Species and Identification Confidence Level
- Utility Interference
- X and Y Coordinates

* measured in inches in diameter at 4.5 feet above ground or diameter at breast height (DBH]).

The knowledge, experience, and professional judgment of DRG's arborists ensure the high quality of inventory data.

SITE LOCATION METHODS

Equipment and Base Maps

Inventory arborists use FZ-G1 Panasonic Toughpad® units with internal GPS receivers. Geographic information system (GIS) map layers are loaded onto these units to help locate sites during the inventory. This table lists these base map layers, along with each layer's source and format information.

Data Source	Data Year	Projection
Shapefile Big Rapids, MI Information Technology Department	2019-2020	NAD 1983 State Plane Michigan South, FT
Aerial Imagery Big Rapids, MI Information Technology Department	2014	NAD 1983 State Plane Michigan South, FT

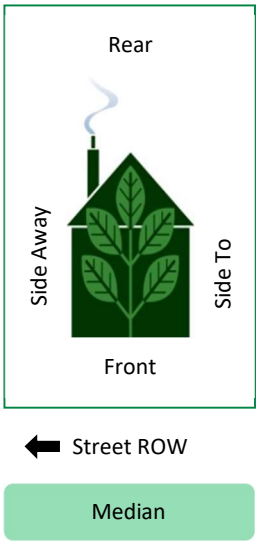
STREET ROW SITE LOCATION

Individual street ROW sites were located using a methodology that identifies sites by *address number*, *street name, side*, and *on street*. This methodology was used to help ensure consistent assignment of location.

Address Number and Street Name

Where there was no GIS parcel addressing data available for sites located adjacent to a vacant lot, or adjacent to an occupied lot without a posted address number, the arborist used their best judgment to assign an address number based on nearby addresses. An "X" was then added to the number in the database to indicate that it was assigned, for example, "37X Choice Avenue."

Sites in medians were assigned an address number by the arborist in Rover using parcel and streets geographical data. Each segment was numbered with an assigned address that was interpolated from addresses facing that median and addressed on that same street as the median. If there were multiple medians between cross streets, each segment was assigned its own address. The *street name* assigned to a site was determined by street centerline information.



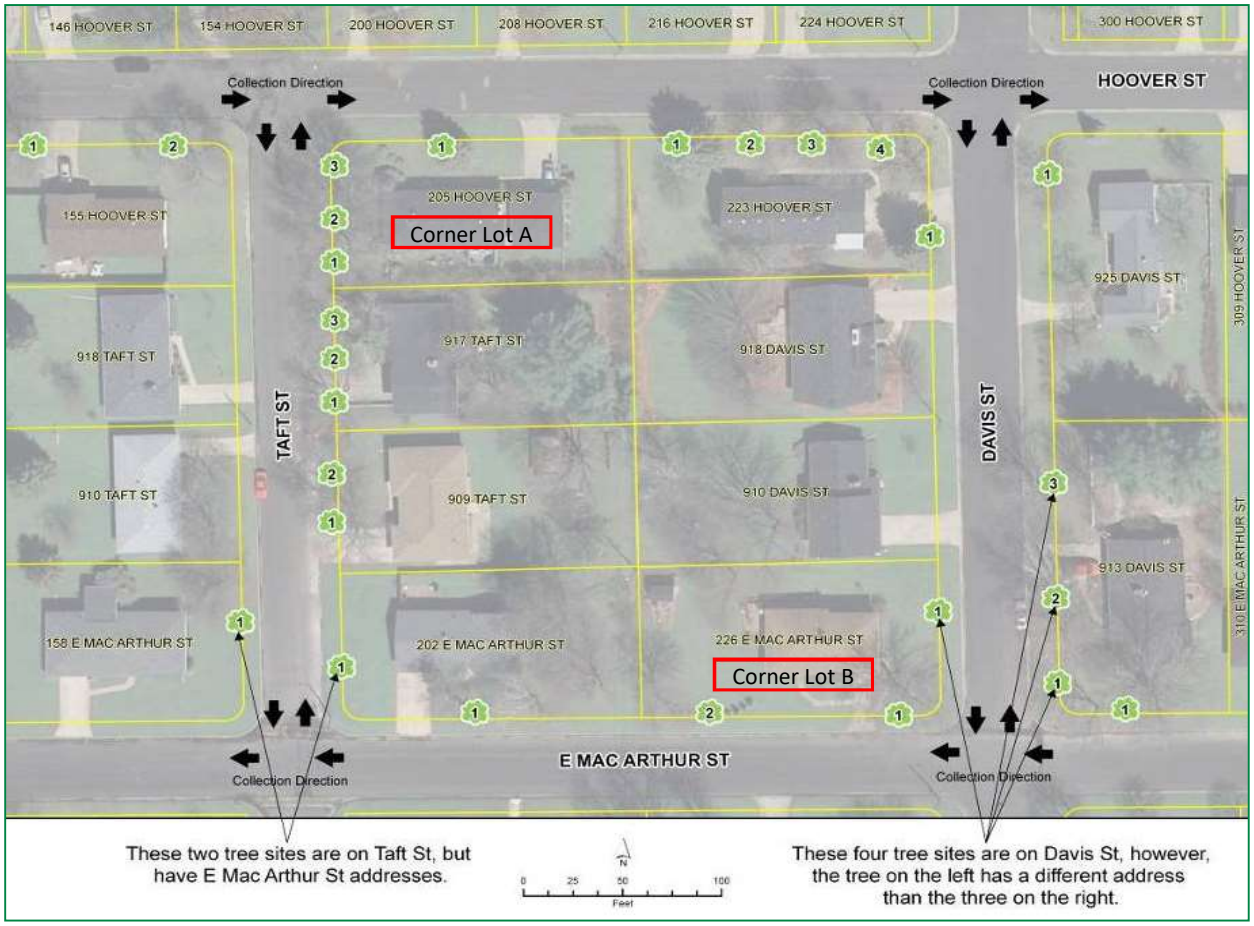
Side Value

Each site was assigned a *side value*, including *front*, *side*, *median*, or *rear* based on the site's location in relation to the lot's street frontage. The *front* is the side facing the address street. *Side* is either side of the lot that is between the front and rear. *Median* indicates a median or island surrounded by pavement. The *rear* is the side of the lot opposite of the address street.

PARK AND PUBLIC SPACE SITE LOCATION

Park and/or public space site locations were collected using the same methodology as street ROW sites, however nearly all of them have the "Assigned Address" field set to 'X' and have the "Park Name" data field filled.

Site Location Example



Corner Lot A		**Corner Lot B**	
Address/Street Name:	205 Hoover St.	Address/Street Name:	226 E Mac Arthur St.
Side:	Side	Side:	Side
On Street:	Taft St.	On Street:	Davis St.
Address/Street Name:	205 Hoover St.	Address/Street Name:	226 E Mac Arthur St.
Side:	Side	Side:	Front
On Street:	Taft St.	On Street:	E Mac Arthur St.
Address/Street Name:	205 Hoover St.	Address/Street Name:	226 E Mac Arthur St.
Side:	Side	Side:	Front
On Street:	Taft St.	On Street:	E Mac Arthur St.
Address/Street Name:	205 Hoover St.		
Side:	Front		
On Street:	Hoover St.		

APPENDIX B
INVASIVE PESTS AND DISEASES

In today's worldwide marketplace, the volume of international trade brings increased potential for pests and diseases to invade our country. Many of these pests and diseases have seriously harmed rural and urban landscapes and have caused billions of dollars in lost revenue and millions of dollars in cleanup costs. Keeping these pests and diseases out of the country is the number one priority of the USDA's Animal and Plant Inspection Service (APHIS).

Updated pest range maps can be found at: https://www.nrs.fs.fed.us/tools/afpe/maps/ and updated pest information can be found at: https://www.aphis.usda.gov/aphis/resources/pests-diseases/hungry-pests/Pest-Tracker.

Although some invasive species naturally enter the United States via wind, ocean currents, and other means, most invasive species enter the country with some help from human activities. Their introduction to the U.S. is a byproduct of cultivation, commerce, tourism, and travel. Many species enter the United States each year in baggage, cargo, contaminants of commodities, or mail.

Once they arrive, invasive pests grow and spread rapidly because controls, such as native predators, are lacking. Invasive pests disrupt the landscape by pushing out native species, reducing biological diversity, killing trees, altering wildfire intensity and frequency, and damaging crops. Some pests may even push species to extinction. The following sections include key pests and diseases that adversely affect trees in America at the time of this plan's development. This list is not comprehensive and may not include all threats.

It is critical to the management of community trees to routinely check APHIS, USDA Forest Service, and other websites for updates about invasive species and diseases in your area and in our country so that you can be prepared to combat their attack.

APHIS, Plant Health, Plant Pest Program Information
www.aphis.usda.gov/plant_health/plant_pest_info

The University of Georgia, Center for Invasive Species and Ecosystem Health
www.bugwood.org

USDA National Agricultural Library
www.invasivespeciesinfo.gov/microbes

USDA Northeastern Areas Forest Service, Forest Health Protection
www.na.fs.fed.us/fhp

SPOTTED LANTERNFLY

The spotted lanternfly (SLF, *Lycorma delicatula*) is native to China and was first detected in Pennsylvania in September 2014. SLF feeds on a wide range of fruit, ornamental, and woody trees, with tree-of-heaven being one of its preferred hosts. SLF is a hitchhiker and can be spread long distances by people who move infested material or items containing egg masses.

If allowed to spread in the United States, this pest could seriously impact the country's grape, orchard, and logging industries. Be sure to inspect for the pest. Egg masses, juveniles, and adults can be on trees and plants, as well as on bricks, stone, metal, and other smooth surfaces. Also thoroughly check vehicles, trailers, and even the clothes you are wearing to prevent accidently moving SLF.

Symptoms of SLF are plants oozing or weeping with a fermented odor, buildup of a sticky fluid called honeydew on the plant or on the ground underneath them, and sooty mold growing on plants. The following trees are susceptible to SLF: almond, apple, apricot, cherry, maple, nectarine, oak, peach, pine, plum, poplar, sycamore, walnut, and willow, as well as grape vines and hop plants.

Pinned spotted lanternfly.

Photograph courtesy of PA Dept of Agriculture

Pinned spotted lanternfly nymph with wingspan open.

Photograph courtesy of USDA APHIS

EASTERN TENT CATERPILLAR

Eastern tent caterpillar (*Malacosoma americanum*) was first observed in the United States in 1646. In spring, caterpillars make nests in the forks and crotches of tree branches. Caterpillars do not feed within the nest; they leave the nest to feed up to 3 feet from nest and return to rest and take shelter in wet weather. Large infestations may occur at 8- to 10-year intervals. Egg masses overwinter on twigs. Trees are rarely killed by eastern tent caterpillar, but health is compromised that year and aesthetic value is decreased.

Easter tent caterpillar have a wide range of hosts, including *Malus* (apple) and *Prunus* (cherry).

Eastern tent caterpillar nest.

Photograph courtesy of Prairie Haven

ASIAN LONGHORNED BEETLE

The Asian longhorned beetle (ALB, *Anoplophora glabripennis*) is an exotic pest that threatens a wide variety of hardwood trees in North America. The beetle was introduced in Chicago, New Jersey, and New York City, and is believed to have been introduced in the United States from wood pallets and other wood-packing material accompanying cargo shipments from Asia. ALB is a serious threat to America's hardwood tree species.

Adult Asian longhorned beetle.

Photograph courtesy of New Bedford Guide (2011)

Adults are large (3/4- to 1/2-inch long) with very long, black and white banded antennae. The body is glossy black with irregular white spots. Adults can be seen from late spring to fall depending on the climate. ALB has a long list of host species; however, the beetle prefers hardwoods, including several maple species. Examples include: box elder (*Acer negundo*); Norway maple *(A. platanoides*); red maple *(A. rubrum*); silver maple (*A. saccharinum*); sugar maple (*A. saccharum*); buckeye (*Aesculus glabra*); horsechestnut (*A. hippocastanum*); birch (*Betula*); London planetree (*Platanus* × *acerifolia*); willow (*Salix)*; and elm (*Ulmus*).

SPONGY MOTH

The spongy moth (SM, *Lymantria dispar*) is native to Europe and first arrived in the United States in Massachusetts in 1869. This moth is a significant pest because its caterpillars have an appetite for more than 300 species of trees and shrubs. SM caterpillars defoliate trees, which makes the species vulnerable to diseases and other pests that can eventually kill the tree.

Close-up of male (darker brown) and female (whitish color) European gypsy moths.

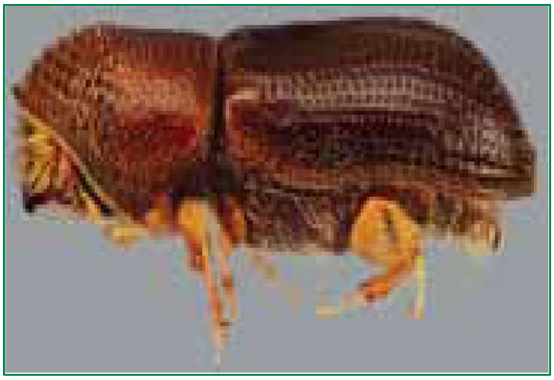
Photograph courtesy of USDA APHIS (2019)

Male SMs are brown with a darker brown pattern on their wings and have a 1/2-inch wingspan. Females are slightly larger with a 2-inch wingspan and are nearly white with dark, saw-toothed patterns on their wings. Although they have wings, the female SM cannot fly.

The SMs prefer approximately 150 primary hosts but feed on more than 300 species of trees and shrubs. Some trees are found in these common genera: birch (*Betula*); cedar (*Juniperus*); larch (*Larix*); aspen, cottonwood, poplar (*Populus*); oak (*Quercus)*; and willow (*Salix)*.

THOUSAND CANKERS DISEASE

A complex disease referred to as Thousand cankers disease (TCD) was first observed in Colorado in 2008 and is now thought to have existed in Colorado as early as 2003. TCD is considered to be native to the United States and is attributed to numerous cankers developing in association with insect galleries.



Walnut twig beetle, side view.

Photograph courtesy of USDA Forest Service (2011)

TCD results from the combined activity of the *Geosmithia morbida* fungus and the walnut twig beetle (WTB, *Pityophthorus juglandis*). The WTB has expanded both its geographical and host range over the past two decades, and coupled with the *Geosmithia morbida* fungus, walnut (*Juglans*) mortality has manifested in Arizona, California, Colorado, Idaho, New Mexico, Oregon, Utah, and Washington. In July 2010, TCD was reported in Knoxville, Tennessee. The infestation is believed to be at least 10 years old and was previously attributed to drought stress. This is the first report east of the 100th meridian, raising concerns that large native populations of black walnut (*J. nigra*) in the eastern United States may suffer severe decline and mortality.

The tree species preferred as hosts for TCD are walnut.

OAK WILT

Oak wilt was first identified in 1944 and is caused by the fungus *Ceratocystis fagacearum*. While considered an invasive and aggressive disease, its status as an exotic pest is debated since the fungus has not been reported in any other part of the world. This disease affects the oak genus and is most devastating to those in the red oak subgenus, such as scarlet oak (*Quercus coccinea*), shingle oak (*Q. imbricaria*), pin oak (*Q. palustris)*, willow oak (*Q. phellos*), and red oak (*Q. rubra*). It also attacks trees in the white oak subgenus, although it is not as prevalent and spreads at a much slower pace in these trees.

Oak wilt symptoms on red and white oak leaves.

Photograph courtesy of USDA Forest Service (2011a)

Just as with DED, oak wilt disease is caused by a fungus that clogs the vascular system of oak and results in decline and death of the tree. The fungus is carried from tree to tree by several borers common to oak, but the disease is more commonly spread through root grafts. Oak species within the same subgenus (red or white) will form root colonies with grafted roots that allow the disease to move readily from one tree to another.

HEMLOCK WOOLY ADELGID

The hemlock woolly adelgid (HWA, *Adelges tsugae*) was first described in western North America in 1924 and first reported in the eastern United States in 1951 near Richmond, Virginia.

In their native range, populations of HWA cause little damage to the hemlock trees, as they feed on natural enemies and possible tree resistance has evolved with this insect. In eastern North America and in the absence of natural control elements, HWA attacks both eastern or Canadian hemlock (*Tsuga canadensis*) and Carolina hemlock (*T. caroliniana*), often damaging and killing them within a few years of becoming infested.

The HWA is now established from northeastern Georgia to southeastern Maine and as far west as eastern Kentucky and Tennessee.

Hemlock woolly adelgids on a branch.

Photograph courtesy of Connecticut Agricultural Experiment Station, Bugwood.org (2011)

EMERALD ASH BORER

Emerald ash borer *(EAB) (Agrilus planipennis*) is responsible for the death or decline of tens of millions of ash trees in 14 states in the American Midwest and Northeast. Native to Asia, EAB has been found in China, Japan, Korea, Mongolia, eastern Russia, and Taiwan. It likely arrived in the United States hidden in wood-packing materials commonly used to ship consumer goods, auto parts, and other products. The first official United States identification of EAB was in southeastern Michigan in 2002.

Adult beetles are slender and 1/2-inch long. Males are smaller than females. Color varies but adults are usually bronze or golden green overall with metallic, emerald-green wing covers. The top of the abdomen under the wings is metallic, purplish-red and can be seen when the wings are spread.

The EAB-preferred host tree species are in the genus *Fraxinus* (ash).

Close-up of an emerald ash borer.

Photograph courtesy of USDA APHIS (2020)

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APPENDIX C
i-TREE ECO METHOLOGY

i-Tree ECO regionalizes the calculations of its output by incorporating detailed reference city project information for 16 climate zones across the United States. Big Rapids falls within the Midwest Climate Zone. Sample inventory data from Minneapolis represent the basis for the Midwest Reference City Project for the Midwest Community Tree Guidelines. The basis for the benefit modeling in this study compares the inventory data from Big Rapids to the results of Midwest Reference City Project to obtain an estimation of the annual benefits provided by Big Rapids' tree resource.

Growth rate modeling information was used to perform computer-simulated growth of the existing tree population for one year and account for the associated annual benefits. This "snapshot" analysis assumed that no trees were added to or removed from the existing population. Calculations of carbon dioxide (CO_2) released due to decompositions of wood from removed trees did consider average annual mortality. This approach directly connects benefits with tree-size variables such as diameter at breast height (DBH) and leaf-surface area. Many benefits of trees are related to processes that involve interactions between leaves and the atmosphere (e.g., interception, transpiration, photosynthesis); therefore, benefits increase as tree canopy cover and leaf surface area increase.

For each of the modeled benefits, an annual resource unit was determined on a per-tree basis. Resource units are measured as megawatt-hours of electricity saved per tree; therms of natural gas conserved per tree, pounds of atmospheric CO_2 reduced per tree; pounds of nitrogen dioxide (NO_2), particulate matter (PM_{10}), and volatile organic compounds (VOCs) reduced per tree; cubic feet of stormwater runoff reduced per tree; and square feet of leaf area added per tree to increase property values.

Prices were assigned to each resource unit using economic indicators of society's willingness to pay for the environmental benefits trees provide. Estimates of benefits are initial approximations as some benefits are difficult to quantify (e.g., impacts on psychological health, crime, and violence). In addition, limited knowledge about the physical processes at work and their interactions make estimates imprecise (e.g., fate of air pollutants trapped by trees and then washed to the ground by rainfall). Therefore, this method of quantification provides first-order approximations. It is meant to be a general accounting of the benefits produced by urban trees—an accounting with an accepted degree of uncertainty that can, nonetheless, provide science-based platform for decision-making.

A detailed description of how the default benefit prices are derived, refer to the *City of Minneapolis, Minnesota Municipal Tree Resource Analysis* (McPherson *et al.* 2005) and the *Midwest Community Tree Guide: Benefits, Costs, and Strategic Planning* (McPherson *et al.* 2009). i-Tree Streets' default values from the Midwest Climate Zone were used for air quality and stormwater benefit prices and local values were used for energy usage, aesthetics, and other benefits.

Benefit Prices Used by i-Tree Streets in the Analysis of Big Rapids' Tree Inventory

Benefits	Price	Unit	Source
Electricity	$0.00759	$/Kwh	Xcelenergy 2004
Natural Gas	$0.0098	$/Therm	Centerpoint Energy 2004
CO_2	$0.0075	$/lb	US EPA 2003
PM_{10}	$2.84	$/lb	US EPA 2003
NO_2	$3.34	$/lb	US EPA 2003
O_3	$3.34	$/lb	US EPA 2003
SO_2	$2.06	$/lb	US EPA 2003
VOCs	$3.75	$/lb	Ottinger and others 1990
Stormwater Interception	$0.0046	$/gallon	McPherson & Xiao 2004
Aesthetic Value	$218,000	Average Midwest Housing Price	TreeKeeper®

Using these prices, the magnitude of the benefits provided by the public tree resource was calculated based on the science of i-Tree Streets using DRG's TreeKeeper® inventory management software. For a detailed description of how the magnitudes of benefit prices are calculated, refer to the *Midwest Community Tree Guide: Benefits, Costs, and Strategic Planning* (McPherson *et al.* 2009).

APPENDIX D
SUGGESTED TREE SPECIES FOR USDA HARDINESS ZONE 6

Proper landscaping and tree planting are critical components of the atmosphere, livability, and ecological quality of a community's urban forest. The tree species listed below have been evaluated for factors such as size, disease and pest resistance, seed or fruit set, and availability. The following list is offered to assist all relevant community personnel in selecting appropriate tree species. These trees have been selected because of their aesthetic and functional characteristics and their ability to thrive in the soil and climate conditions throughout Zone 6 on the USDA Plant Hardiness Zone Map.

Deciduous Trees

Large Trees: Greater than 45 Feet in Height at Maturity

Scientific Name	Common Name	Cultivar
Acer rubrum	red maple	Red Sunset®
Acer saccharum	sugar maple	'Legacy'
*Aesculus flava**	yellow buckeye	
*Betula alleghaniensis**	yellow birch	
*Betula lenta**	sweet birch	
Betula nigra	river birch	Heritage®
*Carya illinoensis**	pecan	
*Carya laciniata**	shellbark hickory	
*Carya ovata**	shagbark hickory	
*Castanea mollissima**	Chinese chestnut	
Celtis laevigata	sugar hackberry	
Celtis occidentalis	common hackberry	'Prairie Pride'
Cercidiphyllum japonicum	katsuratree	'Aureum'
*Diospyros virginiana**	common persimmon	
*Fagus grandifolia**	American beech	
*Fagus sylvatica**	European beech	(Numerous exist)
Ginkgo biloba	ginkgo	(Choose male trees only)
Gleditsia triacanthos inermis	thornless honeylocust	'Shademaster'
Gymnocladus dioica	Kentucky coffeetree	Prairie Titan®
*Juglans nigra**	black walnut	
*Larix decidua**	European larch	
Liquidambar styraciflua	American sweetgum	'Rotundiloba'
*Liriodendron tulipifera**	tuliptree	'Fastigiatum'
*Magnolia acuminata**	cucumbertree magnolia	(Numerous exist)
*Magnolia macrophylla**	bigleaf magnolia	
Metasequoia glyptostroboides	dawn redwood	'Emerald Feathers'
Nyssa sylvatica	black tupelo	
*Platanus occidentalis**	American sycamore	
Platanus × acerifolia	London planetree	'Yarwood'
Quercus alba	white oak	

Large Trees: Greater than 45 Feet in Height at Maturity (Continued)

Scientific Name	Common Name	Cultivar
Quercus bicolor	swamp white oak	
Quercus coccinea	scarlet oak	
Quercus lyrata	overcup oak	
Quercus macrocarpa	bur oak	
Quercus montana	chestnut oak	
Quercus muehlenbergii	chinkapin oak	
Quercus palustris	pin oak	
Quercus imbricaria	shingle oak	
Quercus phellos	willow oak	
Quercus robur	English oak	Heritage®
Quercus rubra	northern red oak	'Splendens'
Quercus shumardii	Shumard oak	
Styphnolobium japonicum	Japanese pagodatree	'Regent'
Taxodium distichum	common baldcypress	'Shawnee Brave'
Tilia americana	American linden	'Redmond'
Tilia cordata	littleleaf linden	'Greenspire'
Tilia × euchlora	Crimean linden	
Tilia tomentosa	silver linden	'Sterling'
Ulmus parvifolia	Chinese elm	Allée®
Zelkova serrata	Japanese zelkova	'Green Vase'

Medium Trees: 31 to 45 Feet in Height at Maturity

Scientific Name	Common Name	Cultivar
Aesculus × carnea	red horsechestnut	
Alnus cordata	Italian alder	
*Asimina triloba**	pawpaw	
Carpinus betulus	European hornbeam	'Franz Fontaine'
Cladrastis kentukea	American yellowwood	'Rosea'
Corylus colurna	Turkish filbert	
Eucommia ulmoides	hardy rubber tree	
Koelreuteria paniculata	goldenraintree	
Ostrya virginiana	American hophornbeam	
Parrotia persica	Persian parrotia	'Vanessa'
Pistacia chinensis	Chinese pistache	
Prunus maackii	amur chokecherry	'Amber Beauty'
Prunus sargentii	Sargent cherry	
*Pterocarya fraxinifolia**	Caucasian wingnut	
Quercus acutissima	sawtooth oak	
Quercus cerris	European turkey oak	
*Sassafras albidum**	sassafras	

Small Trees: 15 to 30 Feet in Height at Maturity

Scientific Name	Common Name	Cultivar
Acer buergerianum	trident maple	Streetwise®
Acer campestre	hedge maple	Queen Elizabeth™
Acer cappadocicum	coliseum maple	'Aureum'
Acer ginnala	amur maple	Red Rhapsody™
Acer griseum	paperbark maple	
Acer nigrum	black maple	
*Acer pensylvanicum**	striped maple	
Acer triflorum	three-flower maple	
*Aesculus pavia**	red buckeye	
Amelanchier arborea	downy serviceberry	(Numerous exist)
Amelanchier laevis	Allegheny serviceberry	
*Carpinus caroliniana**	American hornbeam	
Cercis canadensis	eastern redbud	'Forest Pansy'
Chionanthus virginicus	white fringetree	
Cornus alternifolia	pagoda dogwood	
Cornus kousa	Kousa dogwood	(Numerous exist)
Cornus mas	corneliancherry dogwood	'Spring Sun'
Corylus avellana	European filbert	'Contorta'
*Cotinus coggygria**	common smoketree	'Flame'
*Cotinus obovata**	American smoketree	
*Crataegus phaenopyrum**	Washington hawthorn	Princeton Sentry™
Crataegus viridis	green hawthorn	'Winter King'
*Franklinia alatamaha**	Franklinia	
*Halesia tetraptera**	Carolina silverbell	'Arnold Pink'
Laburnum × watereri	goldenchain tree	
Maackia amurensis	amur maackia	
*Magnolia × soulangiana**	saucer magnolia	'Alexandrina'
*Magnolia stellata**	star magnolia	'Centennial'
*Magnolia tripetala**	umbrella magnolia	
*Magnolia virginiana**	sweetbay magnolia	Moonglow®
Malus spp.	flowering crabapple	(Disease resistant only)
Oxydendrum arboreum	sourwood	'Mt. Charm'
Prunus subhirtella	Higan cherry	'Pendula'
Prunus virginiana	common chokecherry	'Schubert'
*Staphylea trifolia**	American bladdernut	
Stewartia ovata	mountain stewartia	
*Styrax japonicus**	Japanese snowbell	'Emerald Pagoda'
Syringa reticulata	Japanese tree lilac	'Ivory Silk'

Note: * denotes species that are **not** recommended for use as street trees.

Coniferous and Evergreen Trees

Large Trees: Greater than 45 Feet in Height at Maturity

Scientific Name	Common Name	Cultivar
Abies balsamea	*balsam fir*	
Abies concolor	white fir	'Violacea'
Cedrus libani	cedar-of-Lebanon	
Chamaecyparis nootkatensis	Nootka falsecypress	'Pendula'
Cryptomeria japonica	Japanese cryptomeria	'Sekkan-sugi'
× *Cupressocyparis leylandii*	Leyland cypress	
Ilex opaca	American holly	
Picea omorika	Serbian spruce	
Picea orientalis	Oriental spruce	
Pinus densiflora	Japanese red pine	
Pinus strobus	eastern white pine	
Pinus sylvestris	Scotch pine	
Pinus taeda	loblolly pine	
Pinus virginiana	Virginia pine	
Psedotsuga menziesii	Douglas-fir	
Thuja plicata	western arborvitae	(Numerous exist)
Tsuga canadensis	eastern hemlock	

Medium Trees: 31 to 45 Feet in Height at Maturity

Scientific Name	Common Name	Cultivar
Chamaecyparis thyoides	atlantic whitecedar	(Numerous exist)
Juniperus virginiana	eastern redcedar	
Pinus bungeana	lacebark pine	
Pinus flexilis	limber pine	
Pinus parviflora	Japanese white pine	
Thuja occidentalis	eastern arborvitae	(Numerous exist)

Small Trees: 15 to 30 Feet in Height at Maturity

Scientific Name	Common Name	Cultivar
Ilex × *attenuata*	Foster's holly	
Pinus aristata	bristlecone pine	
Pinus mugo	mugo pine	

Dirr's Hardy Trees and Shrubs (Dirr 2013) and *Manual of Woody Landscape Plants* (5th Edition) (Dirr 1988) were consulted to compile this suggested species list. Cultivar selections are recommendations only and are based on DRG's experience. Tree availability will vary based on availability in the nursery trade.