



Title:
TREE RISK MANAGEMENT & REMOVAL POLICY

Subject: GENERAL OPERATIONS	Page: 1 of 15	Policy Number: 04.90.00
Category: DISTRICTWIDE POLICY	Approval Date: 05/26/2015	Last Revised Date: 06/13/2018

POLICY STATEMENT:

The Forest Preserve District of Cook County (*the "District"*) is comprised of approximately 69,000 acres of real property where many millions of trees are located. District trees provide significant benefits to Cook County residents. Non-invasive trees provide food and shelter for native wild life species, promote ecosystem diversity, and add to the quality of life of Cook County residents.

Unfortunately, from time to time and despite the District best efforts, trees and tree parts do fail. The District is limited in its ability to reasonably foresee all of the tree failures that could occur all of the time or to prevent all injuries or damage caused thereby. The ability to predict which of the District millions of trees will fail and in what fashion is improbable. Trees are living and growing organisms that are affected and influenced by many factors which are out of human control. No guarantee on tree safety, health, or longevity of plant life can be given.

The measure by which any institution can gauge whether it has a reasonable tree risk management program is by comparing the historic record of incidences with the current operational program. The District has had very limited frequency of damage/injury events over the past decades from tree part failures. This is a direct result of the District operational practices and staff skill sets.

The District has decided to formalize an official policy that articulates the District current tree risk management and removal program and expands on some concepts related to the topic.

PURPOSE:

The purpose of this policy is: **(1)** to describe the District responsibilities and procedures for tree risk management and removal directly within its jurisdiction; **(2)** to identify the responsibilities of other entities which have trees that are on roadway easements, or right-of-ways, or other property, or that are near or otherwise adjacent to District property; and **(3)** to describe the procedure of identifying and removing District trees that may impact non-roadway property adjacent to District property.

AFFECTED AREAS:

This policy applies to all **(1)** District employees that will interface with and/or participate in the implementation of this policy; **(2)** other entities which own trees adjacent to District property; and **(3)** to Cook County residents who have District trees impacting their property, residential or otherwise.

DEFINITIONS:

District Property: District property is any property that is owned and managed by the Forest Preserve District of Cook County.

Tree: A tree is a long-lived woody perennial plant, greater than 3 meters in height at maturity, with one or multiple stems.

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High-Risk Trees: High-Risk Trees are trees (or tree parts) that have a high potential for failing and a high potential to strike a foreseeable target. The determination of whether a District tree is high risk or not can only be made by District staff or their designated agent.

Tree Removal: Tree removal includes tree trimming, pruning, and complete removal as outlined in this policy.

Loss: Loss is defined as property damage or personal injury and may be expressed in dollars.

Failure: Failure is the mechanical breaking or collapse of a tree or tree part. Failures often result from a variety of factors including weather, insects, animals, decay and death. Failures result in Loss only if a Target is stricken.

Defects: Defects are flaws in a tree that reduce its structural strength. Trees may have single or multiple defects which may or may not be detectable.

Target: A person, vehicle, structure or property within range of the tree in question.

PROCEDURE/PROCESS:

- 1) **Staff Inspection of Tree Criteria:** The Department of Resource Management, including the Department's International Society of Arboriculture (ISA) certified arborists, approved contractors, or other certified or trained employees, may inspect and make a judgement if a tree is high-risk and should be marked for removal. The District, including its certified arborists and trained staff, cannot detect or anticipate every condition or event that could lead to the structural failure of a tree, or guarantee that a tree will be healthy or safe under all circumstance. Trees can be managed but not controlled. The standard for inspection is a visual assessment from the ground.

Inspection of District trees is conducted regularly by Resource Management crews. The standard for inspection is a visual assessment from the ground. It is the Resource Management Departments goal to inspect 25% of District holdings each year. Their focus is on trees that impact patrons of the District recreational facilities like picnic groves, trails and nature centers and public-private interface as well as along roadsides. Resource Management crews' inspections consider a variety of factors like the health and aesthetics of trees, as well as, the potential risks posed by trees.

In addition, to regular inspections by Resource Management crews, District personnel from other Departments, such as Maintenance and Law Enforcement, are regularly in the field and observing tree conditions including trees that pose potential risk. Those personnel regularly report such information to the Resource Management Department for follow-up. Similarly, the Resource Management Department regularly receives information regarding potentially hazardous trees from other sources including municipalities, roadway authorities, utilities, concerned citizens and District patrons.

The combination of information received from the foregoing sources, both internal and external to the District, has proved to be a reliable and cost effective means of managing the inspection of District trees.

- 2) **Criteria for Tree Removal:** The District may remove trees for a variety of reasons consistent with its mission. These reasons include general management of the natural ecosystem, as well as addressing risks related to potentially high-risk trees.

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To this end, the District may remove trees when:

- The tree is on District Property;
- The tree is removed by or with the approval of the Department of Resource Management; and
- Removal of the tree is consistent with the interests of the District, and will not detrimentally affect the District natural forests, as determined by the Department of Resource Management.

Trees may also be removed by the District for any of the following reasons:

- The tree is deemed high-risk by District staff, and the contributing factors cannot be corrected through other reasonable arboricultural practices.
- The furtherance of District restoration related activities.
- When trees are not deemed dead, dying or high-risk, the following factors will be considered:
 1. Life expectancy of the tree.
 2. Desirability of the tree species.
 3. Amount of space allowable for tree growth.
 4. Overall quality, growth form and structural integrity of the tree.
 5. Persistent and uncontrollable insect, disease, or decay causing fungal problems.
 6. Frequency and extensiveness of the tree’s maintenance requirements.
 7. Feasibility and timeliness in which a replacement tree will be planted.
 8. Proximity and quality of trees and species near the one considered for removal.
 9. Extent and frequency of damage the tree is causing to surrounding infrastructure such as sidewalks, streets, sewers, etc.
 10. Trees that impact construction projects and/or utility line installation related activities, pursuant to a written agreement.

3) Conditions That May Not Warrant Tree Removal: Generally, the District does not remove trees in the following situations:

- Trees that may be considered a nuisance due to dropping flowers, fruit, nuts, seeds, branches, and leaves;
- Trees that are dead and/or are dying that serve as a habitat within the forest and pose no apparent risk to the preserve users and general public;
- Trees that are perceived as too tall/large or obstructs view;
- Trees that are perceived as making too much shade;
- Trees that are in the middle of the Forest are not subject to removal.

Prioritized District Tree Removal: The District focuses its work to identify trees with removal issues in the following District properties:

- Areas where patrons/users of District property are present such as trails, picnic groves, and parking areas;
- Areas where patrons and District personnel are present such as nature centers, construction areas, and other employment facilities; and
- Areas where adjacent property users/owners may be impacted by District trees, including roadways, and residences.

As a priority, the District considers the factors related to removal as to potentially hazardous, dead, decaying, and/or defective trees that have been reported to the District by a constituent and/or government entity.

4) General District Tree Removal Requests: Constituents and or governmental entities may notify the District, at any time, of any District tree that may be high-risk, failing, and/or decaying. Once the District receives such notification, the Department of Resource Management shall:

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- Conduct an investigation of the tree to determine if the tree is on District property; and
- If the tree is on District property, Resource Management will determine whether removal is appropriate and in alignment with the District mission.

5) **Residential Property Tree Removal Requests:** Residents that (1) believe they have an issue with a District tree impacting their property, and/or (2) would like to trim, prune, or remove a District tree that may be impacting their property, should contact the Resource Management Department with such issues.

The Resource Management Department shall:

- Conduct an assessment of the tree to determine if the tree is on District property;
- If the tree is on District property, the Resource Management team will determine a remedial course of action in alignment with the District mission, and/or in support of best practices in being a good neighbor; and
- Provide opportunities for the general public to notify the District should they see a potential hazardous tree, and/or want to make a request that a District tree be removed should they believe that a tree, or trees, may pose a hazard to their property.

6) **Non-District Tree Removal:** It is not the responsibility of the District to trim, prune, and/or remove trees that are on property that is not owned or is not managed by the District. Examples of such trees would be those trees in a roadway right-of-way or a utility easement. It is the duty of other entities, such as the roadway authority, utility or private landowner, that is responsible for the subject property that includes trees to trim, prune, and/or remove said trees(s). It is not the responsibility and/or duty of the District to do so.

Trees that are co-owned by the District and an adjacent property owner, including but not limited to, governmental entities, utilities and roadway authorities, are the responsibility of the adjacent property owner. The exceptions are where co-owned trees could affect the user of District property or trees co-owned with residential properties.

7) **Public Notice of Tree Removal:** The District uses various methods to notify the public of tree removal operations, including but not limited to, posting signs in the removal area prior to project commencement, contacting residents by phone, posting projects on the District website, and emailing local elected officials and municipal offices.

RESPONSIBILITY:

Department of Resource Management: The Department of Resource Management shall: (1) manage the implementation of this policy; (2) have the authority to remove any trees as stated in this policy; (3) authorize all tree removals on District property as described in this policy; (4) assist in providing public notice of the District trees that have been marked for removal; (5) serve as the District liaison to external constituents and/or entities seeking to remove a District tree as described in this policy; and (6) assist with the delivery of emergency and safety related services related to high-risk trees.

Office of the General Superintendent: The Office of the General Superintendent shall: (1) establish and communicate District policies; (2) establish a hotline and/or web portal for constituents and/or entities to make inquiries about or requests for tree removals; (3) inform other Forest Preserve Districts, and Conservation Districts, in the state of Illinois of this policy; and (4) ensure that District Resident Watchman assist with the delivery of emergency and safety related services after normal-business hours upon request.

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Law Enforcement Department: The Law Enforcement Department shall: **(1)** assist in the implementation of this policy; **(2)** assist with the delivery of emergency and safety related services; and **(3)** make timely notifications to Resource Management staff, and other appropriate District managers, of any reported tree related incidents.

TRAINING REQUIREMENTS:

- 1) All Resource Management and Law Enforcement employees should be trained on this policy.
- 2) All other relevant/necessary District staff should be trained on this policy.

COMMUNICATION PLAN:

- 1) This policy should be distributed to all relevant/necessary staff.
- 2) This policy should be added to the District shared drive, intranet, and website.

REFERENCES:

Illinois General Assembly
Cook County Forest Preserve District Act (70 ILCS 810)

Forest Preserve District of Cook County
Protection of Native Landscape (FPDCC Code Section [2-2-1](#))

POLICY LEAD: [Anthony D. Tindall](#)
Policy & Special Projects Manager

APPROVAL: [Arnold Randall](#)
General Superintendent

POLICY HISTORY:

Approved: 05/26/2015
Revised: 04/15/2016 **Revised:** 06/13/2018

If you have questions, comments, or suggestions concerning District policies, please contact:

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APPENDIX A:

The Forest Preserves commissioned Mark Duntemann of Natural Path Urban Forestry Consultants to perform a study of Forest Preserves property and its tree risk management methods. The following are excerpts from said study.

Author:

Mark Duntemann
 Natural Path Urban Forestry Consultants
<http://naturalpathforestry.com/>

Date:

May 22, 2012

Background on Natural Path Urban Forestry Consultants:

Natural Path Urban Forestry Consultants focuses on nurturing creative thought and implementing progressive urban forestry programs for a wide range of community sizes. NPFC provides a variety of services that encourage the proactive management of urban vegetation. Services include tree risk appraisal and assessments, management services, expert witness, urban forestry management, training, research, tree preservation, and community outreach.

Background on Author:

Mark Duntemann created Natural Path in 1988 as an urban forestry consulting business. Since then, he has overseen projects across North and South America and Europe. Mark is an ISA Board-Certified Master Arborist (RM 131B) and instructor for the Tree Risk Assessment Qualification. He presents internationally on topics of tree risk and urban forestry policy development. Mark serves as an expert witness in numerous tree-related litigation cases and uses this experience to inform his perspective on tree risk management.

2.0 DATA GATHERING AND ASSESSMENT

Two separate assessments were conducted. The first was to isolate information pertinent to the distances and areas within the Forest Preserves system. The second assessment was a sampling of woodland sites to establish tree density. For the former, an assortment of Geographic Information System (GIS) layers was evaluated. The layers were provided by the Forest Preserves Additional layers from this information to isolate the required information were created. The study randomly marked 1/10 acre plots throughout the Forest Preserves system and conducted tree counts.

GIS Analysis

A number of GIS layers from the Forest Preserves were provided. They included site boundaries, roads, trails, structures and natural area communities. Table 1 delineates information retrieved from these layers.

Table 1- FPDCC Demographics	
Item	Area/Length/Quantity
Forest Preserves Area	68,000 acres
Trails	347 miles
Picnic Groves	271 each
Parking Areas	1,265 each
Structures	616 each
Perimeter	813 miles

The Forest Preserves further delineates management areas within their property by natural communities. **Table 2** identifies the community types known to date, the quantity of these within the system, and the areas covered by each natural community type.

Table 2- FPDCC Natural Communities		
Community	Quantity	Area (Acres)
Eurasian Meadow	181	2,279
Fen	19	94
Forest	382	5,369
Reforestation	436	7,764
Prairie	439	9,942
Marsh	807	6,154
Savannah	342	4,579
Sedge Meadow	118	499
Shrubland	90	1,242
Unassociated Woody Growth	420	4,386

GIS Analysis

Based on average tree height measurements, which were taken in the sample plots throughout the system, the maximum height of trees that could potentially affect areas of public use was determined to be eighty feet. Tree risk assessment experts consider a risk zone as 1.5 times the height of a given tree, this is the area in which concern for tree or branch failures that could impact a target should be considered. This also establishes a hazard zone distance of 120 feet for any public use area that exists within or is adjacent to a woodland area. Using this information, a GIS layer was created that identified those areas of the Forest Preserves that are identified as woodland and are adjacent to areas that are designated for public use or adjacent to Forest Preserves property.

Table 3 denotes the acreage and woodland type that are within 120 feet of an area of public use. The Interior numbers correspond to all Forest Preserves facilities adjacent to woodlands. The Exterior numbers identify the woodland acreage of Forest Preserves land that was included within 120 feet of non- Forest Preserves owned property.

Table 3- Acreage of Forest Preserves Woodland Adjacent to Areas of Public Use					
Areas	Woodland	Forest	Woody Growth	All	% of FPD
Trails	2,298	686	504	3,489	5.2%
Parking Lots	383	121	85	590	0.9%
Buildings	91	30	17	138	0.2%
Total Interior	2,679	814	593	4,086	6/1%
Exterior	1,852	1,249	1,054	4,155	6.2%
Total	4,171	1,838	1,484	7,492	11.2%

Seven thousand, four hundred and ninety two acres of woodland land is within 120 feet of areas of public use. The total number of trees within this acreage is 2,997,000 trees. Of these, approximately 600,000 trees were twelve inches or greater in diameter.

3.0 DISCUSSION OF ARBORICULTURAL ASSESSMENT AND MANAGEMENT AS THOSE CONCEPTS ARE APPLIED TO THE FOREST PRESERVES

Tree risk within the arboricultural profession is defined within two broad categories:

- 1) Tree Risk Assessment and 2) Tree Risk Management.

Tree Risk Assessment is the process of evaluating an individual tree with a focus on identifying a tree part that poses the greatest likelihood of failure within a predetermined time frame, which may also have negative consequences if it failed. The tree risk assessment process focuses on the individual tree. The International Society of Arboriculture (ISA) has established three levels of inspection that can occur. The choice of inspection method is a function of the resources being assessed, the objective of the inspection, program goals, and the available resources of the inspecting entity. Each assessment level requires record keeping, follow up, a method for easily discerning trees, mitigation and monitoring. The three assessment types are:

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1 assessment is sometimes not considered a risk assessment. The focus is on identifying benign trees, trees that require more detailed assessments, and trees with an imminent likelihood of failure.

The process of a limited visual assessment should include (ISA, 2011):

1. Identifying the location and/ or selection criteria of trees to be assessed
2. Determining the most efficient route and document the route taken.
3. Assessing the trees of concern from the defined perspective.
4. Recording the location of trees that meet the defined criteria.
5. Evaluating the risk, and
6. Identifying trees needing a higher level of assessment or prompt action.

Example: A level 1 assessment in the Chicago area is typically conducted as a tree inventory, where all trees of a specified size (two inches and greater) are assessed and mapped. This is a visual assessment from the ground taking approximately one to two minutes per tree.

Cost: In 2012 tree inventory costs in the Chicago area are approximately \$2.65 a tree. The cost to inventory a community with 10,000 street or park trees would therefore be \$26,500 (10,000 trees x \$2.65 per tree).

Level 2 - Basic Assessment

As defined by the ISA, "the Level 2 assessment is a detailed visual inspection of a tree and surrounding site and a synthesis of the information collected. It requires the assessor to walk completely around the tree- looking at the site, buttress roots, trunk and branches". The Basic Assessment form is completed for each tree that is evaluated.

The process of a basic assessment should include (ISA, 2011):

1. Locating or identifying the tree or trees to be assessed.
2. Determining the targets and target zone for the tree or branches of concern.
3. Reviewing the site history and conditions, and species failure profile.
4. Assessing potential load on the tree and its parts.
5. Assessing general tree health.
6. Inspecting the tree visually and using binoculars, mallet, probes, or shovels as specified in the Scope of Work.
7. Recording observations of site condition, defects, and outward signs of possible internal defects, and response growth.
8. Recommending an advanced assessment, if necessary.
9. Analyzing data to determine the likelihood and consequences of failure in order to evaluate the degree of risk.
10. Developing mitigation options and estimate residual risk for each option.
11. Developing and submit the report/documentation, including, when appropriate, advising on re-inspection intervals.

Example: A level 2 assessment in the Chicago area is considered a risk tree assessment that involves the assessment of a specific set of trees and completing a risk assessment form for each tree. Invasive analysis of the tree is a component of this assessment.

Cost: In 2012 a level 2 type assessment of a large number of trees cost \$53 per tree. The cost to assess 100 trees would therefore be \$5,300 (100 trees x \$53 per tree).

Level 3 - Advanced Assessment

As defined by the ISA, "the Level 3 assessments are performed to provide detailed information about specific tree parts, defects, targets, or site conditions. Specialized equipment, aerial inspections, data collection and analysis, and/or expertise are usually required for advanced assessments."

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The process of an advanced assessment should consider the following (ISA, 2011):

1. Aerial inspection and evaluation of structural defects in branches (visual inspection, decay testing and load testing).
2. Detailed target analysis (e.g., property value, use and occupancy statistics, and potential disruption of activities).
3. Detailed site evaluation (i.e., history evaluation, soil profile inspection to determine root depth, and soil mineral and structural testing).
4. Decay testing (increment boring, drilling with a small diameter bit, resistance recording drilling, single path sonic wave, sonic tomography and electrical impedance tomography).
5. Health evaluation (e.g., tree ring analysis, shoot length increment, detailed health/vigor analysis, and starch analysis).
6. Root inspection and evaluation (root and root collar excavation, root decay evaluation, and ground-penetrating radar).
7. Storm/ wind load analysis (e.g., detailed assessment of tree exposure and protection, computer-based estimations according to engineering standards, wind reaction monitoring over a defined interval).
8. Measuring and assessing the change in trunk lean.
9. Load testing (e.g., hand pull, measured static pull and measured tree dynamics).

Example: A level 3 assessment in the Chicago area is conducted on a tree or trees identified by a client or manager. The range of diagnostic requirements for each assessment is varied. Aerial inspection requiring a bucket truck is common. Laboratory analysis is also common. An assessment may take anywhere from one to four hours to conduct and is usually billed at an hourly rate.

Cost: In 2012 a level 3 type assessment of an individual tree would cost approximately \$85 per hour plus expenses. The cost to assess 1 tree would therefore range from \$85 to \$340 plus expenses (1tree x \$85 per hour x 1 hour to 4 hours).

Tree Risk Management is a system-wide approach that establishes the process of identifying and mitigating those elements of the tree population that pose the highest potential for causing harm to a property and users of a site. Tree risk management policy is developed with an eye toward the mission of the agency, an understanding of the resource being managed, the available resources (financial, man-power, equipment etc.), and definitions of acceptable risk levels. Acceptable risk levels are determined by the frequency of negative events against the cost of reducing one of those events. The risk management process includes: Defining Context, Risk Identification, Risk Analysis, Risk Evaluation and Treatment.

Urban Forestry Management is also a system-wide approach that defines the short and long-term operational strategies for managing a tree resource. The primary operational strategies include tree planting, pruning, and removals. Additional elements include community education, contract oversight and problem anticipation. Tree risk management is a component of urban forest management.

The typical representation of urban forestry management in Illinois is the care of public street trees in a well-defined area of a municipality. Contemporary understanding of what is meant by the term "managed urban forestry program" has an inventory of all public trees in that well-defined area, with each tree uniquely identified, and each tree maintained on a pruning cycle. Furthermore, the municipality maintains an easily defined finite number of trees and each tree is guaranteed some form of regular inspection and care. **Table 4** denotes the number of trees, number of street miles, and staffing for four municipal forestry programs in the Chicago area. The average number of trees managed per staff person is 2,120.

Table 4- Chicago Area Municipal Urban Forestry Programs					
Community	Trees	Street Miles	Trees/Street Mile	Forestry Staff	Trees/Staff Person
Elmhurst	23,000	150	153	11	2,091
Evanston	27,000	137	197	18	1,500
Mount Prospect	24,000	166	145	9.5	2,526
Oak Park	18,200	110	165	5	3,640

Risk

Research commissioned by the UK National Tree Safety Group found that the overall risk to the public from falling trees or branches is extremely low. Estimates place this risk at one in 10 million in any given year. A common decision threshold for risk managers to recommend mitigation is one in 1 million. That is, the level of risk in which people face and engage with voluntarily in the course of everyday life. A reasonable program is one that balances the benefits of the system being managed and actual risk of an event occurring.

4.0 CONCLUSIONS

The following conclusions are based upon a reasonable degree of urban forestry and tree risk management certainty:

Conclusion 1 - The Forest Preserves of Cook County has a mission that is far different than traditional arboricultural and urban forestry practices. Assigning to the Forest Preserves a level of individual tree management that is commonly associated with urban forestry programs is inappropriate.

The Mission of the Forest Preserves of Cook County, as stated in the 1914 enabling legislation is to

"to acquire, restore and manage lands for the purpose of protecting and preserving public open space with its natural wonders, significant prairies, forests, wetlands, rivers, streams, and other landscapes with all of its associated wild life, in a natural state for the education, pleasure and recreation of the public now and in the future. "

The Forest Preserves of Cook County is responsible for managing over 68,000 acres. It contains a broad range of large and unique ecosystems, which include marsh and prairies to savannahs and woodlands. Conservative estimates of the number of trees in the Forest Preserves system is 7 million trees.

Any level of an inspection program, as defined by the urban forestry profession (e.g., municipal), if similarly defined for the Forest Preserves would place an undue and disproportionate burden on the Forest Preserves. The initiation and maintenance of such an inspection program would be untenable for the Forest Preserves to implement and maintain at current and foreseeable funding and staffing levels.

A review of tree-related work orders found that the Forest Preserves Resource Management Department relies on adjoining property owners to inform the Forest Preserves of any tree issues that may affect the

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Conclusion 2 - Unlike the individual tree management required of urban forestry programs, the Forest Preserves manages its extensive holdings as a series of systems. The primary focus of management is on maintaining these systems. Because of the Forest Preserves size, attention to individual trees is programmatically restrictive and inappropriate.

The operational day-to-day agenda of municipal forestry programs focus on the assessment and care of individual trees. Work on individual trees is assigned based on a previous assessment of that particular tree, adherence to a scheduled maintenance program or service requests from the resident who resides on the property that is adjacent to the street tree at issue. In proactive urban forestry programs, every single tree is uniquely identified, monitored, evaluated and maintained. A number of important factors allow this level of individual and intensive management. The relatively small number of trees, the easy identification of each tree and staffing levels define the ability of communities to manage at this intensive level. As was noted in the narrative of this report, the average number of trees per forestry staff in a sample of Chicago area communities is 2,120 trees. When placed on the typical five-year inspection and pruning schedule found in most managed municipal programs, the average number of trees managed per year per staff person is 424. Additionally, the focus of municipal forestry staff is almost exclusively on managing this finite number of trees.

In contrast, the Forest Preserves of Cook County manages over 68,000 acres of land that encompasses an estimated seven million trees. The Forest Preserves has numerous large areas of natural ecosystems that are managed with attention to the unique qualities of those individual systems. The Resource Management Department of the Forest Preserves manages these large holdings through a number of management sections. These include wildlife, fisheries, ecology and nature centers/ education. The Resource Management Crews Section provides most of the field staffing for maintenance and management activities. Their responsibilities not only include traditional arboricultural work, but also prescribed burning, invasive species eradication and herbicide treatment. To draw a simple comparison between the Forest Preserves and municipal programs in the Chicago area, and given the conservative estimate of 7 million trees, the tree to staff ratio was approximately 368,000 trees per staff person. A management program with the Forest Preserves that focuses on individual trees is untenable and inappropriate for the Forest Preserves mission.

Conclusion 3 - The cost of implementing a municipal-standard urban forestry level assessment program would be prohibitive.

The implementation of a large scale, urban forestry level, risk assessment program is complex and costly. A thorough program requires an understanding of all the trees being managed. The task is to identify the trees that have the highest probability for failing and then to multiply the probability of a negative consequence occurring for each tree.

The implementation of an urban forestry level risk assessment program for the Forest Preserves of Cook County would require a formidable level of staffing and funding. The following factors influence this conclusion:

Area - Based on the GIS shape files that were provided, a total of 4,086 acres of woodland that are within 120 feet of any public use site within Forest Preserves property was identified. This includes trails, roads, buildings, parking lots, and picnic groves. The number is considered conservative because it does not account for trees that may reside in natural communities that were not identified as woodland (e.g., marshes, savannahs, etc.). In addition to the woodland acreage adjacent to Forest Preserves facilities, I also identified 4,155 acres of woodland that were within 120 feet of the external perimeter of the individual Forest Preserves sites. The properties adjacent to the Forest Preserves perimeters included: State Highway; County, Township, and Municipal roads; Railroad right-of-way; utility corridors; residential properties; and, business properties.

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Number of Trees - The number of trees within the Forest Preserves system is substantial. Conservative estimates assigned trees to the areas identified as woodland. District-wide, the interior woodland areas that are within 120 feet of Forest Preserves use sites contain approximately 1,634,000 trees. The woodland areas within 120 feet of Forest Preserves site perimeters contained an additional 1,363,000 trees for a total of 2,997,000 trees potentially impacting areas of public use.

Identifying Boundary Lines - The legal property line between Forest Preserves sites and adjacent properties is ambiguous throughout the County. A clear delineation of property lines would be required to identify and assign appropriate inspection and maintenance responsibilities to the Forest Preserves and all adjoining property owners. Prior to any level of assessment occurring, the 813 mile perimeter of the whole Forest Preserves would need to be surveyed by a licensed Survey/ Engineering firm. Additionally, property lines would need to be visibility established for every fifty feet along the perimeter. Gewalt, Hamilton and Associates provided me with a cost estimate to implement such a survey. Based on a similar project that occurred recently for the Canadian National and the Elgin, Joliet and Eastern Railway, the cost to survey the property perimeter and install semi-permanent stakes every fifty feet would be approximately \$6,000 per mile. The total cost to implement such a survey would be \$4,878,000.

The definition of co-ownership varies greatly amongst and between government agencies. One entity may offer a defined inspection responsibility for a particular tree, but another entity may have maintenance responsibility assigned based on the circumstance. A definition of each responsibility would need to be agreed on between the Forest Preserves and all adjacent property owners. These owners include sixty- eight individual municipalities, twenty-five townships, five counties, a number of railroads, Commonwealth Edison and numerous residential properties.

Limited Visual Assessment - A limited visual assessment on the ground is considered an initial requirement for establishing a thorough risk assessment program once property lines have been identified. This would entail a visual assessment of all 2,977,000 trees on the 7,492 acres within 120 feet of any public use areas. Given this expectation, the cost of a limited visual inspection would be approximately \$7,889,050 (2,977,000 trees x \$2.65 per tree). The work would take 14,984 technician days. This would include field time, data review, and mitigation recommendations. Cost estimates are based on current competitive tree inventory bid prices in the Chicago area, \$2.65 per tree and completing approximately 1/2 acre per day per technician. Additional costs would include database management, increased inspection intervals, mitigation and inspection administration, and the actual mitigation of issues that were identified.

Basic Assessment - A Basic Assessment would be required of all significant trees. Approximately 600,000 trees twelve inches or greater in diameter were within 120 feet of a public use area. Each tree would require GPS mapping and the completion of a Basic Assessment form. The cost to conduct a Basic Assessment on all significant trees within 120 feet of a public use area would be \$31,800,000 and require 15,000 technician days. Costs were based on current competitive tree risk assessment bid prices in the Chicago area (\$53 per tree). Additional costs would include database management, increased inspection intervals, mitigation and inspection administration, and actual mitigation of issues identified. These trees would minimally require a five-year inspection interval.

Advanced Assessment - An advanced assessment would be required on approximately five percent of the trees receiving a Basic Assessment, or 30,000 trees. Each assessment would take approximately two hours at \$85 an hour for a total of \$5,100,000. Additional costs would include database management, increased inspection intervals, mitigation and inspection administration, and actual mitigation of issues identified. These trees would minimally require a one-year inspection interval.

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The staffing levels needed to conduct a risk assessment program that provides the required baseline information, as outlined above, within one year would require 120 ISA-certified arborists who were exclusively assigned to the project. The initial cost would be \$44,789,050 for the assessments alone. Property line delineation would cost an additional \$4,878,000 for a total initial cost of \$49,667,050. The expenses for subsequent years would cost \$5.1 million per year to conduct the anticipated Level 3 inspections. Every fifth year from the initial survey and assessment year, would require an additional \$31.8 million to conduct the Level 2 inspections. As trees mature over time additional trees would need to be added to the Level 2 inspections. Expenses related to administration, data maintenance, and tree-issue mitigation costs related to the inspections would also be required and exceed the scope of this report.

Conclusion 4 - A common understanding and practice within arboriculture and urban forestry is that tree branches that cross the vertical plane of two adjacent properties are the responsibility of the property owner in which the branch resides.

It is commonly known that the standard of care within arboriculture specific to trees that cross property lines is that the maintenance responsibility of a tree part is assigned to an entity in whose property the branch aerially resides.

Under this principle, trees or tree limbs that are in the airspace above a roadway right-of-way are the responsibility of the roadway authority. Consistent with this principle is the fact that the IDOT has an active tree risk inspection program along Illinois State routes in IDOT Region 1, which includes Cook County.

Conclusion 5 - The tree risk management program of the Forest Preserves focuses on managing the trees that clearly reside on Forest Preserves property, which also affect the invited users of their sites.

The Forest Preserves has a small yet highly-skilled Resource Management staff. All of their resource crews are ISA-certified arborists. This limited-sized crew has vegetation management responsibility for all trees that reside on the 68,000 acre Forest Preserves. This area is conservatively estimated to contain 7 million trees.

Risk tolerance and action thresholds are defined by the owner of a property. Tolerance is a function of the cumulative understanding of past events and their resulting consequences. Inherent in the concept of risk management is the ability to demonstrate the quantifiable reduction of the number of negative events occurring with the increase in resource assignment.

The number of known events involving a tree in which an injury has occurred on or adjacent to Forest Preserves property is less than five in more than ten years. The investment of \$49,667,050 by the Forest Preserves for the initiation of this survey and assessment and the additional substantial costs thereafter, which would be required to inspect every tree on the Forest Preserves property within 120 feet of an area of public use, is disproportionate to the number of incidents that have occurred previously. Furthermore, such an inspection could not guarantee a reduction in the number of few tree-related injuries currently experienced by the Forest Preserves. Given the budget and staffing levels, the expenditure of 10 years' worth of budget allocation presents a scenario of diminishing returns for the given public investment. In sum, the number of past events is low and the range of myriad variables that could influence the failure of an otherwise healthy tree or branch is sufficient to suggest that the implementation of the inspection program, as outlined above, would not necessarily reduce the number of tree-related injury events from occurring. Moreover, the necessity of assessing significantly increased taxes to the Cook County taxpayers to pay for the three levels of the inspection program detailed above is unreasonable.

Conclusion 6 - Use of a windshield survey to assess the perimeter of the Forest Preserves holdings would be inappropriate and ineffective.

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Windshield inspections within the arboricultural profession are a limited and inadequate tool for conducting even rudimentary tree risk assessments. The limitations associated with this method are numerous, but the primary concern is that a windshield inspection only provides a momentary glimpse of one side of a tree. Additionally, this glimpse rarely allows a full length view of the side being observed.

The context for conducting a windshield survey requires the assessor to easily isolate the subject tree. This scenario may exist in a traditional urban streetscape setting, but it certainly does not exist in a woodland setting where trees are dense, ownership is ambiguous, and the area that trees cover may be extensive.

Multiple variables confound the visual discrimination tasks associated with a windshield inspection. These variables can be categorized generally as site conditions, vegetation, and assessor abilities. The variables that can confound a woodland windshield inspection can include:

- Speed of traffic
- Speed of vehicle
- Weather
- Seasonal variation of vegetation
- Variation in forms
- Multitude of objects
- Depth perception
- Orientation of objects
- Cognitive processing speed
- Peripheral vision
- Variation between people and abilities
- Vertical complexity
- Inspection Requirements
- Documentation Process
- Capacity of Vehicle
- Distinguishing Ownership
- Distinguishing Target trees
- The ability to simultaneously hold and manipulate a large number of variables within short term memory

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