

Urban Forest Asset Management Plan

February 3, 2014

Developed by Katie Himanga, CF
For the City of Northfield and Northfield in Bloom
With funding from the Northfield Area Foundation

Enhancing Northfield's Urban Forest

The urban forest provides services to Northfield citizens such as environmental protection, stormwater management and lower energy consumption as well as social and psychological well being. In addition, trees are essential for community beautification.

The importance of trees and green to residents of Northfield is well documented. The Comprehensive Plan, a recently adopted Land Development Code, a proposed tree policy update and the work of local citizen organizations attest to the interest in enhancing the urban forest. The City established the Environmental Quality Commission in 1986 to advise decision-makers on matters of environmental quality and natural resources.

Northfield has a history of using collaborative effort to achieve community goals such as:

- The Sustainability Commission organizes a combined Arbor Day/Earth Day celebration each year
- City staff coordinate volunteers to plant trees on private and public property each spring
- Northfield Garden Club partnered with the City and the Minnesota Department of Transportation to plant trees along Highway 3
- Citizen leaders organized Northfield Roundtable for community visioning
- Northfield in Bloom secured recognition for urban forestry in the America in Bloom program.

To advance the urban forestry program, Northfield in Bloom initiated an asset management planning project with funding from the Northfield Area Foundation. A professional urban forester worked with city staff to review all aspects of the current urban forestry program and make recommendations for the future. The result is this Urban Forest Asset Management Plan.

The forest pest Emerald Ash Borer (EAB) is likely to be found in Northfield within five years. Over time all ash trees in the community will become infested with EAB and will die unless treated with insecticides. The community must take action now to protect its overall tree cover during the transition from a high percentage of ash to a low percentage of ash in the tree population.

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Asset Management: Introduction

Urban forests are a mosaic of naturally regenerated and planted trees. While natural forests have the ability to renew and maintain themselves, planted trees do not. Urban forests are a living, growing community asset that needs human intervention¹ and merit active management. Trees are an essential element of green infrastructure that increase in value rather than deteriorate throughout their service life if provided routine maintenance.

Trees and urban forests provide services to Northfield citizens such as environmental protection, stormwater management, lower energy consumption, as well as providing social and psychological well being. They are essential for community beautification.

Asset management is an approach to infrastructure management. It recognizes that each element of infrastructure is an asset that requires routine and efficient maintenance for cost effective performance. It also recognizes that management must be done with limited resources and consistent with community priorities.

The City of Northfield currently has an urban forestry program of bare essentials. Some program activities are entirely reactive while other urban forestry activities in the City are proactive. Community planning is visionary. Urban forestry work is being done by several different organizations both within the government structure and in partnership with other organizations.



Community desire to maintain and enhance the urban forest in Northfield is documented in ordinances, the Comprehensive Plan and the *Framework Planning in Northfield* document.

A key finding of this project is that resources currently dedicated to urban forestry are inadequate and for that reason the city is not fully realizing all the benefits of trees. Additionally, while the city relies heavily on the knowledge and skill of persons with expertise in ecology or related subjects, it seldom engages a professional urban forester/arborist.

Program strengths are staff and community support. City Forester T.J. Heinricy is responsible for the program in Public Works and has years of experience. He has Minnesota Tree Inspector and First Detector certifications and attends continuing education classes annually. Additionally, community organizations and citizens often play a role in various aspects of the tree program.

¹ *A Model of Urban Forest Sustainability*, by James R. Clark, Nelda Matheny, Genni Cross and Victoria Wake, *Journal of Arboriculture* 23(1): January 1997.

Asset Management: Program Assessment and Recommendations

To assess the urban forest and make the recommendations that follow, a professional urban forester visited Northfield, interviewed city staff and others, reviewed aerial images and applicable city documents. The management activities and accepted practices listed in the chart that follows are generally recognized as components of a municipal urban forestry program.²

Accepted practices are generally those that are proactive; they anticipate future needs. Identifying vacant tree planting spaces and planting trees now is an example of a proactive practice that addresses the future need for beauty, shade, energy conservation, stormwater mitigation and other tree services. Reactive practices are those triggered by an event such as a citizen complaint or wind storm. Comprehensive urban forest programs are characterized by planning, scheduled tree maintenance, master planning for tree planting, risk management and professional oversight.

The greatest concern identified in a January 2013 assessment of the Northfield urban forest³ was the lack of formative pruning of young trees and maintenance pruning of mature trees. Additional concerns are boulevards where no trees are being planted and boulevards where large stature trees are located directly under primary electric distribution lines.

In Northfield, some key elements of a proactive program are in place. Additional commitment, including funding, would allow the city to do the important work of taking care of the existing tree resource and planting the next generation of trees.

The Overview of Urban Forestry Program and Recommendations that begins on the next page is organized by priority for action. The Urban Forest Management Activities are in three charts with those that need the most immediate attention in the first one titled First Priorities. Within each chart, activities are listed from highest to lowest priorities. Also, in the column of Recommended Next Steps, steps that are highest priority are listed first.

For each Recommended Next Step, initials in brackets indicate the appropriate leader for implementation:

CC	City Council	S	Staff
EQC	Environmental Quality Commission	V	Volunteer/Seasonal Staff
PC	Planning Commission		

²Based on *Urban Forestry: Planning and Managing Urban Greenspaces*, Robert W. Miller, University of Wisconsin, Stevens Point, 1988; *A Technical Guide to Urban and Community Forestry*, U.S. Department of Agriculture, Forest Service, Revised March 1993; and consultant's experience.

³Windshield assessment of community forest by consulting forester and arborist Katie Himanga, CF, Heartwood Forestry, January 10, 2013.

Overview of Urban Forestry Program and Recommendations

First Priorities

Urban Forest Management Activity	Accepted Practice	City of Northfield Current Practice (2013)	Recommended Next Steps
Budget	<ul style="list-style-type: none"> Adequate funding 	<ul style="list-style-type: none"> Funding for urban forestry is inadequate 	<ul style="list-style-type: none"> Increase funding [CC] Provide adequate resources, including adequate staff, to implement an annual plan of work [CC]
Tree Maintenance	<ul style="list-style-type: none"> Scheduled formative pruning of young trees Maintenance pruning of older trees Early care including watering 	<ul style="list-style-type: none"> Reactive program 'Chasing problems' of clearance and storm damage Currently no formative pruning of street trees Some early care provided for trees in parks including Treegator watering bags Staff cannot prune adolescent and mature trees because the City does not have a truck with an aerial lift City uses contract services for pruning 	<ul style="list-style-type: none"> Develop annual plan of scheduled work [S] Conduct regular field staff training for tree pruning [S] Increase budget for contract tree pruning [CC] Consider purchase of an aerial lift truck so that staff can do maintenance pruning of adolescent and mature trees [CC]
Risk Management	<ul style="list-style-type: none"> Program of tree risk management 	<ul style="list-style-type: none"> No program in place City inspects trees informally and on a complaint basis 	<ul style="list-style-type: none"> Develop a program of assessment and mitigation of risk [S]

Urban Forest Management Activity	Accepted Practice	City of Northfield Current Practice (2013)	Recommended Next Steps
Management Planning	<ul style="list-style-type: none"> • Ongoing • Proactive planning based on established goals 	<ul style="list-style-type: none"> • Strong community goals are stated in existing vision and comprehensive plan documents • No companion work plans to guide implementation • Most planning done informally based on goals set by staff 	<ul style="list-style-type: none"> • Put program under the purview of an advisory board such as the Environmental Quality Commission [CC] • Task EQC with setting and monitoring annual goals and addressing gaps between community goals and priorities and current practices [CC] • Task EQC with making budget recommendations for urban forestry to City Council [CC] • Give EQC oversight responsibility for the list of acceptable trees for public property and the Land Development Code (LDC) [CC]
Administration and Management	<ul style="list-style-type: none"> • Organized • Lines of communication • Professional support when needed 	<ul style="list-style-type: none"> • Program is primarily in the public works department but community development handles all aspects of the LDC • Communication among staff and between staff and elected officials is good • City not in the habit of securing professional support 	<ul style="list-style-type: none"> • Update Tree Policy as described on page 1.11 of this document [CC] • Organize internal program leadership team that meets every 1-2 months to provide program coordination [S] • Task team with making operational management of the forest consistent with community goals [S] • Use professional services for program planning and management support, field training, field support [S]

Urban Forest Management Activity	Accepted Practice	City of Northfield Current Practice (2013)	Recommended Next Steps
Inventory	<ul style="list-style-type: none"> • Inventory of street and park trees • Data management 	<ul style="list-style-type: none"> • Proactive: windshield survey of boulevard trees done in 2012 • Data recorded in a spreadsheet 	<ul style="list-style-type: none"> • Integrate data into GIS system [S] • Secure tablet computers for staff [CC] • Train staff in use of software and tablets [S] • Input data for vacant planting spaces and update data for existing trees [S] • Use i-Tree software for cost-benefit analysis [V]

Estimated EAB Costs		
Removal	Minimum	\$1,400,000
	Likely	\$1,800,000
	Maximum	\$2,800,000
Replanting		\$340,000
Treatment		\$340,000 per year

Estimated cost of removing, replanting or treating the ash trees along boulevards and in parks. Estimates based on 2012 inventory data, current costs and assumptions based on author's experience.

Second Priorities

Urban Forest Management Activity	Accepted Practice	City of Northfield Current Practice (2013)	Recommended Next Steps
Pest (Insect and Disease) Management	<ul style="list-style-type: none"> • Trained Tree Inspector on staff • Periodic inspections 	<ul style="list-style-type: none"> • City employs a Tree Inspector • Inspections are done informally and in response to complaints 	<ul style="list-style-type: none"> • Conduct inspections on a schedule of 1-3 times each summer and once each winter [S]
Ordinances	<ul style="list-style-type: none"> • Ordinances that establish authority for public trees, pest management and tree protection 	<ul style="list-style-type: none"> • Ordinance Chapter 86-Vegetation, Article II, Divisions 1 and 2 give the city some authority for public trees and pest management but requires adjoining property owners to maintain boulevard trees • There are strong tree protection provisions for selected species in the Land Development Code (LDC) 	<ul style="list-style-type: none"> • Update the Tree Policy as recommended on page 1.11 of this document [CC] • Work with an urban forester to correct technical errors in Chapter 86, Article II [EQC] • Update tree preservation section of the LDC and adjust to provide greater protection to natural landscapes and native trees in riparian forests and to encourage forest restoration [PC] • Change responsibility for list of acceptable trees from the City Council to the EQC and staff [PC] • Update the tree pest ordinance based on model developed by League of Minnesota Cities [EQC]

Urban Forest Management Activity	Accepted Practice	City of Northfield Current Practice (2013)	Recommended Next Steps
Tree Planting	<ul style="list-style-type: none"> • Master street tree plans • Goals for tree stocking level • Diversity of species planted 	<ul style="list-style-type: none"> • Program limited to an annual tree sale and occasional grant funded project • No plan in place for existing boulevards • Adjoining property owners can plant in boulevards at their own cost, some seek City Forester advice but others do not • Developers are required to plant boulevard trees in new subdivisions 	<ul style="list-style-type: none"> • Conduct tree planting on public property each spring and fall [S] • Set diversity goals and implement through a master street tree plan and planning for new subdivisions and redevelopment projects [EQC] • Establish a tree fund for public property with mitigation money paid for tree replacement under the LDC. [CC]
Tree Removal and Replacement	<ul style="list-style-type: none"> • Dead and dying trees and stumps removed promptly • Removals scheduled for replacement 	<ul style="list-style-type: none"> • Reactive program • Removal done at city expense upon request by citizens or staff • Staff and contractor survey for work to be done by contractor • City does not replace trees that are removed 	<ul style="list-style-type: none"> • Limit city-funded removals to trees with health or structural problems or those causing infrastructure damage [EQC] • Plan removal and replacement of ash trees over time [EQC] • Integrate work orders into GIS [S]
Stormwater Management	<ul style="list-style-type: none"> • Trees integrated into stormwater management program 	<ul style="list-style-type: none"> • Staff are interested in integrating trees into the program 	<ul style="list-style-type: none"> • Consider trees for stormwater management when reviewing project permit applications and planning for public projects [S]
Tree Preservation	<ul style="list-style-type: none"> • Construction damage prevention program in place for development in woodlands and for projects in developed areas 	<ul style="list-style-type: none"> • No program of native forest preservation • Comprehensive program of preservation of large diameter trees of certain species as outlined in the Land Development Code (LDC) 	<ul style="list-style-type: none"> • Update LDC to strengthen protection of native forests [PC] • Make additional changes to LDC as recommended elsewhere in this document [PC] • Establish a designated fund for the LDC tree mitigation funds [CC]

Third Priorities

Urban Forest Management Activity	Accepted Practice	City of Northfield Current Practice (2013)	Recommended Next Steps
Management of open space vegetation	<ul style="list-style-type: none"> Sites monitored Interventions such as prescribed burning used as needed to achieve goals 	<ul style="list-style-type: none"> No program in place Inventory of natural resources done in 2005 	<ul style="list-style-type: none"> Tour sites on foot [S] Develop management plans based on tour findings and the inventory of natural resources [EQC] Update management plans every five years [EQC]
Commercial Arboriculture	<ul style="list-style-type: none"> Commercial arborists licensed, insured, trained 	<ul style="list-style-type: none"> No program 	<ul style="list-style-type: none"> Encourage commercial arborists to become International Society of Arboriculture (ISA) Certified Arborists [S] Add a Certified Arborist requirement for contract work beginning in 2016 [S]
Storm response	<ul style="list-style-type: none"> Plan in place and updated periodically 	<ul style="list-style-type: none"> Program is reactive 	<ul style="list-style-type: none"> Write plan basics on paper and keep a copy on the Emergency Operations Center [S]
Communication and Public Relations	<ul style="list-style-type: none"> Professional communication with peers Information education with public 	<ul style="list-style-type: none"> Staff interact regularly with peers in other cities Staff regularly update administration and elected officials of activities Some information education done through social media (Facebook) City does an annual Tree Sale and combined Arbor Day/Earth Day event 	<ul style="list-style-type: none"> Increase use of social media and news releases with emphasis on benefits of trees and tree selection [S] Transition annual Tree Sale to an annual boulevard tree planting project as described elsewhere in this document [S] Initiate a program of identifying, recognizing and celebrating trees of special significance [V]

Urban Forest Management Activity	Accepted Practice	City of Northfield Current Practice (2013)	Recommended Next Steps
Utility Arboriculture	<ul style="list-style-type: none"> • Utilities use accepted pruning practices • City-utility collaboration to replace large trees under primary electric lines 	<ul style="list-style-type: none"> • No tree replacement program in place • Utility pruning practices are generally acceptable 	<ul style="list-style-type: none"> • Initiate program in partnership with Xcel Energy of replacing large stature trees with small stature trees under primary electric distribution lines [S]
Program Recognition	<ul style="list-style-type: none"> • Tree City USA (TCUSA) annual recognition • GreenStep Cities program: Urban Forests Best Practice 	<ul style="list-style-type: none"> • TCUSA • America in Bloom 	<ul style="list-style-type: none"> • Submit information about urban forest program to the GreenStep Cities program for the Urban Forests Best Practice [V]

Detailed Recommendations for the Annual Tree Sale

The City contributes significant resources to an annual tree sale. For this program the City offers a selection of ornamental, shade and evergreen trees to the public. Residents place orders with the city and then the trees are purchased from a local nursery. City staff coordinates volunteers who plant the trees on public and private property. Over 80 trees were planted in 2013. City resources committed to the program include:

- Program coordination
- Selection and ordering of trees
- Order taking
- Promotion through city website and social media
- Marking individual planting sites
- Utility locates
- Recruiting and coordinating volunteers to plant trees.

With about the same contribution of staff resources, the City could plant the same number of trees in vacant spaces on boulevards.

Recommendation: Transform the tree sale program to a boulevard and park planting program over a period of five years and focus on large stature, native shade trees and large stature adapted non-native, non-invasive species. Transition tree purchasing for private property to the private sector. Continue to support tree planting on private property with information and education and by collaborating with a civic organization for planting assistance for persons in need.

Year 1. Create a small budget for boulevard trees and offer on request to residents with vacant boulevard spaces. Discontinue offering small stature trees for planting on private property.

Year 2. Increase budget and increase promotion of boulevard tree availability.

Year 3. Increase budget and target a relatively vacant neighborhood for a boulevard tree planting project.

Year 4. Target another neighborhood for a boulevard tree planting project. Discontinue offering evergreen trees for private property. Partner with a civic organization to offer planting services to property owners in need of assistance.

Year 5. Discontinue offering tree for private property and concentrate on boulevard tree planting. Support tree planting on private property by promoting the availability of tree planting assistance.

Detailed Recommendations for the Tree Policy

City Council direction for the City of Northfield urban forestry program is in ordinance Chapter 86-Vegetation, Article II, Divisions 1 and 2 and in a tree policy. The policy is in the process of being updated and the draft document *Tree Policy/Tree Disease Management* was reviewed and recommendations made for this project.

Recommendation: Review the draft Tree Policy attached as an appendix to this document, make adjustments as desired and forward to the City Council for adoption. Review tree lists separately (see detailed recommendations on next page).

In the recommended draft that is attached as an appendix, these changes from the initial *Tree Policy/Tree Disease Management* draft were incorporated:

- Minor technical corrections
- Tree sizes defined as small or large (eliminated medium size, adjusted heights)
- Added communication of tree regulations to City residents
- Adjusted the distance from underground utilities to give the City Forester more discretion to make decisions about tree planting on sites with nearby utility lines
- Removed background educational information from the tree pest introductions
- Made a distinction between trees in the white oak group, which do not produce oak wilt spore pads, and the red oak group, which do produce them
- Added the oak wilt control method of disrupting common root systems of oak trees
- Added the oak wilt control method of sealing infected, unseasoned red oak firewood under plastic tarps
- Addressed non-emergency pruning or removal of ash trees during the EAB flight season
- Added the EAB control method of chemical treatment of trees in parks and on boulevards
- Replaced the list of Prohibited Trees and Acceptable Trees with a policy statement regarding selection of trees for the list
- Makes the list of Acceptable Trees and Prohibited Trees a separate document.

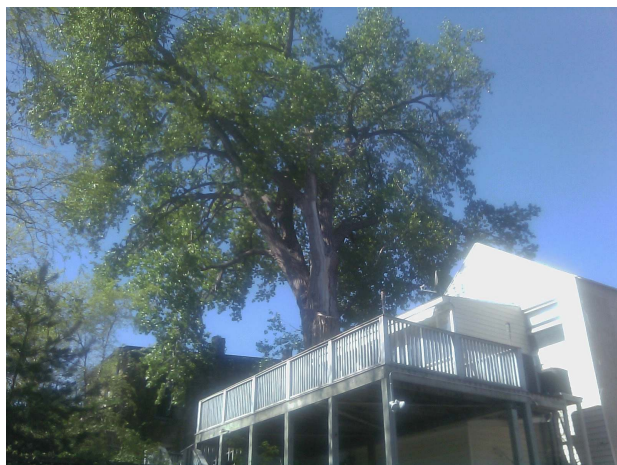
Tree Policy Background

The EQC tree advisory group and City of Northfield staff developed a draft *Tree Policy/Tree Disease Management* document. In combination with the Land Development Code adopted in 2011, it substantially meets strategy ER 9.1 of the 2008 Comprehensive Plan: “The City will develop an urban forest management policy....” The strategy is under Objective 9: Increase the density of the community’s urban forest. To date, the document has not been adopted by the City Council.

Detailed Recommendations for the Acceptable Tree List

The City maintains lists of tree species and horticultural varieties that may be planted along streets and in parks, and by private citizens and developers to meet the tree replacement requirements of the Land Development Code (LDC). Currently the City Council is involved in approving such lists.

For application of the LDC, ordinance Chapter 34⁴ requires City Council involvement in selecting tree species that may be planted and those that are prohibited. It refers to “...the List of Approved Landscape Trees and Plant Materials as approved and amended from time to time by the resolution of the city council...” The City proposes the same level of Council involvement for the list of trees that may be planted along boulevards and in parks.



An iconic cottonwood tree, located in the heart of the downtown district and a few yards from the Cannon River, has no legal protection under the Land Development Code because cottonwood is one of five native trees classed as “Prohibited Trees.” Photo credit: Katie Himanga, CF.

Prohibited Species have no protection in the LDC. Many species, including important native species, are deemed Prohibited. As such, there is no requirement for replacement or other mitigation if they are removed. Current Prohibited Species include these that grow naturally along the Cannon River: eastern cottonwood, silver maple and willow.

For the health and diversity of the Northfield urban forest, the current practice of maintaining tree lists that require City Council action must change. Current and proposed lists unnecessarily limit the kinds of trees that may be planted in various parts of the community.

The City is encouraged to maintain tree lists as separate, operational documents rather than incorporating them into the adopted tree policy. This eliminates the need for City Council

approval each time there is a proposed change. Lists should be under the purview of trained staff and a citizen advisory board such as the EQC. The City should seek professional input for anything other than minor changes.

For the draft recommended tree list attached as an appendix to this document, Minnesota native oaks, hickory, black walnut, cottonwood, silver maple, box elder and willow were added to a list previously proposed to the City Council. All are valuable when planted in the right place and some are essential along creeks and rivers. Evergreens are appropriate for many sites including

⁴City ordinance Chapter 34, 3.6.4(A)(1)(a).

some boulevards. They were added to the list along with some additional useful non-native species.

Except in certain situations where specific horticultural varieties (cultivars) are highly preferable to others or to the species itself, they should not be included in the list. New cultivars are being developed and released to the market each year. An over-reliance on cultivars can limit genetic diversity in a tree population. For urban forest health the city should promote diversity of tree species and genetic diversity within each species while at the same time taking insect and disease epidemics and other factors into consideration.

For reference, lists of locally native tree species and many non-natives that are adapted to local conditions and not invasive are included in the reference section of this document.



Red pine makes an effective boulevard tree along this Northfield street. It helps screen the railroad from view and provides winter color in the neighborhood. Red pine is a salt-tolerant, Minnesota native species. Photo credit: Katie Himanga, CF.

Recommendation: Review the draft Acceptable Tree List attached as an appendix to this document, make adjustments as desired and begin using it as a guidance document.

In the recommended draft that is attached as an appendix, these changes from the list in the initial *Tree Policy/Tree Disease Management* draft and the list used for the LDC were incorporated:

- Removed the requirement of City Council approval
- Eliminated personal bias from the list by requiring that removal of all large diameter, healthy, structurally sound, native species be mitigated
- Identifies trees by both common and scientific names
- Avoids listing horticultural varieties (cultivars)
- Eliminates information about tree characteristics.⁵

⁵Up to date information about tree characteristics is available to citizens online and in print in a variety of formats.

Detailed Recommendations for the Land Development Code

The Land Development Code (LDC) includes a landscape section with strong protection for large diameter individual trees of certain species growing in developed areas of the city. Although it may have been intended to protect natural woodlands as well, it probably does not. Most tree species that are native to the riparian areas along the Cannon River and its tributaries are exempted from protection. Additionally, these species may not be planted to meet the tree replacement requirements of the code. Most upland woodlands in the area were de-vegetated and converted to agricultural fields long ago and are thus unaffected by the LDC.

To manage the landscape provisions of an ordinance of the caliber and complexity of the Northfield LDC requires the administrative support of a qualified tree expert. With training staff could handle small straight-forward projects, but for large complex projects that require professional judgement a tree expert should be involved. This is especially true at the plan review stage and for compliance checks.

As currently written, provisions of the tree protection section may not protect woodlands, especially along creeks and rivers, because important native tree species have been deemed ‘prohibited’ and can be removed without replacement. One can for example remove dozens of 20-30" diameter eastern cottonwood, black walnut and silver maple trees and not be required to replant trees. On the other hand if one removes a 50" diameter basswood tree on a lot, one must replant 12 trees regardless of the space available.



The Land Development Code offers no protection for native cottonwood trees such as this one in downtown Northfield. Photo: Katie Himanga, CF.

Every species of tree can cause damage to other infrastructure and some Minnesota favorites are the worst offenders: elm, maple and honeylocust. The LDC prohibits planting species known to cause infrastructure damage within 15' of a road or public improvement. That presents a problem for tree planting in boulevards, medians and pits. Since infrastructure damage by trees has more to do with the condition or design of other infrastructure than it does with the species of tree, this section should be eliminated. Tree experts and staff should make decisions about tree placement.

The LDC includes strong parking lot landscaping requirements for vegetation density and vertical blocking of view. They are so strong that they will likely result in people having an unsafe feeling when they are walking within the parking lots and on nearby sidewalks and streets. To enhance the feeling of safety, amend the regulation to lessen the blocking of the view,

especially between three and six feet above ground level. A person close-by may feel a sense that something sinister could be ‘lurking in the bushes’ when the bushes are tall or the trees are dense evergreens as compared to short bushes or trees that are free of lower branches.

The City will receive mitigation payments from those who cannot meet tree replacement requirements and choose the Tree Bank Alternative for their project. Currently this income is not designated for any particular fund. It should be reserved for tree planting on boulevards.

The City is encouraged to have an urban forester to review the landscape and tree preservation provisions of the LDC and make recommendations related to:

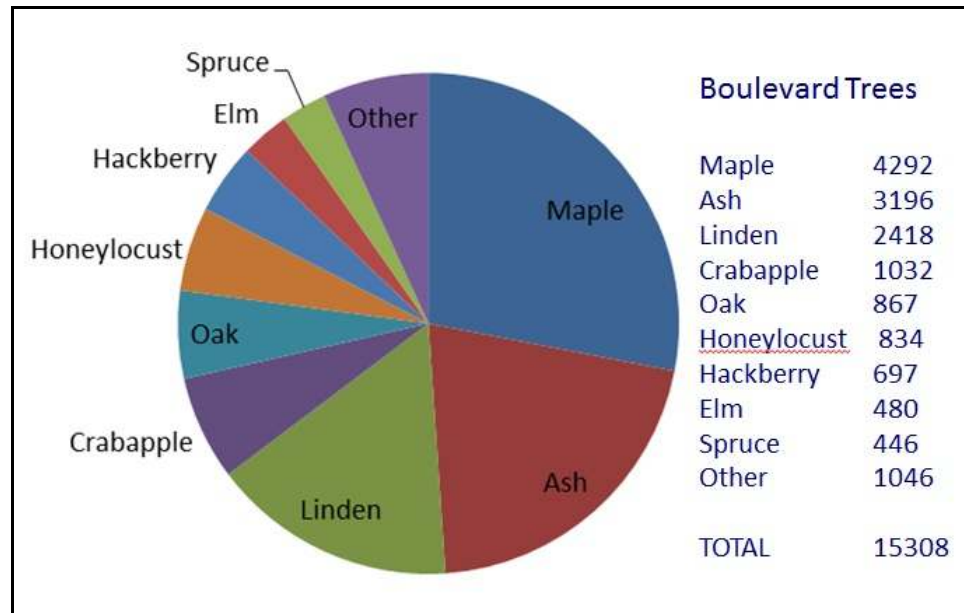
- **Correcting terms and technical details that are in error**
- **The contents of a companion guidance document for subjects that should be specified but not enshrined in law**
- **The definition of Critical Root Zone**
- **Removing the tree list from City Council authority**
- **Preserving healthy, structurally sound trees of all locally native species**
- **Distinguishing between species that grow slow in diameter (such as bur oak), and those that have rapid growth (such as soft maples) when making tree replacement calculations**
- **Increasing species diversity for large tree replacement projects**
- **Increasing the incentive (consider quadrupling the credit) for the preservation of young, desirable, locally native trees such as bur and red oak, sugar and black maple, American linden, and hickory that are retained on a site**
- **Eliminating outdated or poor planting methods**
- **Allowing tree planting in boulevards, medians, pits and other locations within 15' of a road or public improvement**
- **Extent of screening and blocking required for landscaping parking lots**
- **Language that would allow more creativity within parking lots so that permit applicants can use cutting edge strategies that incorporate stormwater management with landscaping for projects.**

Asset Management: Analysis of Current Tree Inventory Data

In the spring of 2012 the Streets and Parks Department began an inventory of all city maintained trees. Trees on boulevards as well as trees in formal and mowed areas of parks were included. The inventory was done with City staff traveling by vehicle and counting the trees.⁶

Tree species and diameter⁷ were recorded along with location in the City based on the United States National Grid. Diameter was estimated. The result is data useful for planning purposes but not for day to day management of trees.

Although the inventory did not include a count of vacant spaces in boulevards or in parks, the number of smaller diameter trees relative to the number of large diameter trees points to the need to plant more trees in the community.



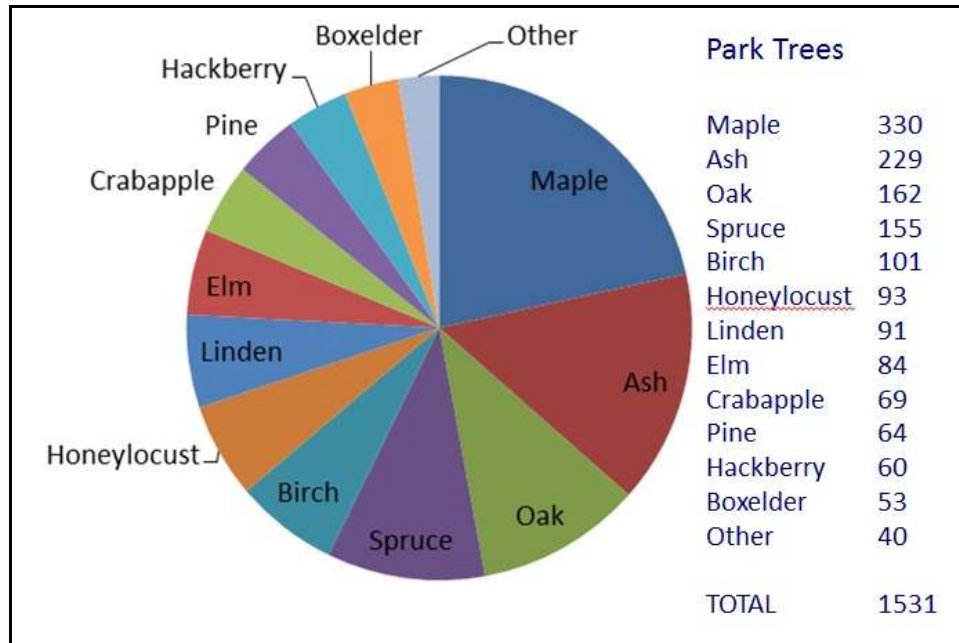
The boulevard tree population includes a diversity of species but is heavily weighted to species of maple and ash. All ash are susceptible to emerald ash borer (EAB) and are likely to become infested in the coming decade.



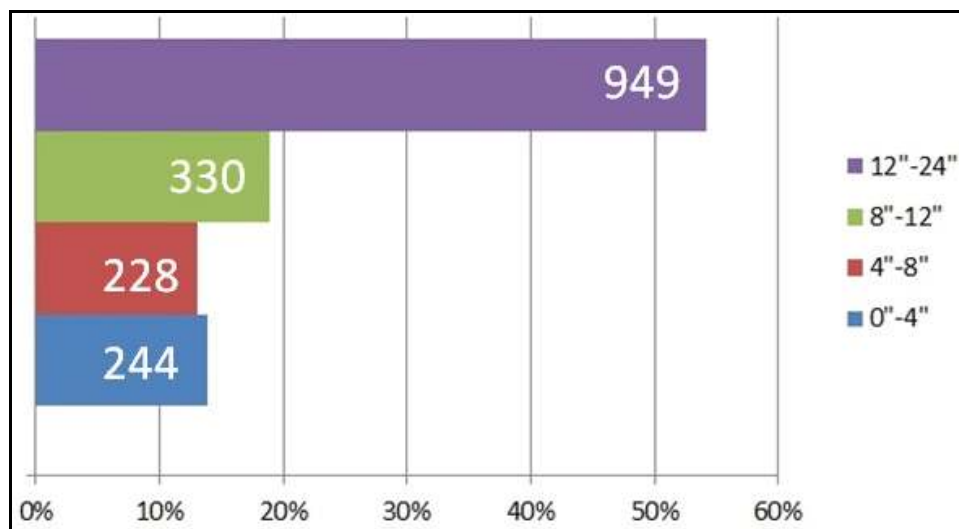
Size distribution of 15,308 trees on boulevards.

⁶City of Northfield 2012 Boulevard and Park Tree Inventory Report. For the purpose of the report, the definition of boulevard is the area between the curb-line and the sidewalk, or 10-12 feet behind the curb if no sidewalk is present.

⁷The diameter of trees is measured at 4.5' above ground level.



The park tree population includes a diversity of species. Species of oak, some of which are native to all parts of the city, make up a higher percentage of the park tree population than they do of the boulevard tree population.



Size distribution of 1,751 trees in parks.

Asset Management: Program Guidance Documents

Ordinances⁸

Section	Title	Adopted on or before:	Comments
Chapter 22-Environment, Article I.	In General, Sec. 22-1.- Declaration of city environmental policy.	1986	<ul style="list-style-type: none"> • Clear statement of position on environmental quality and the role of city government
Chapter 22-Environment, Article II.	Environmental Quality Commission (EQC), Sec. 22-26 to 22-30	1986	<ul style="list-style-type: none"> • Establishes EQC for "the purpose of advising the city on matters concerning environmental quality and natural resources" and for implementing 22-1 • "City administrator shall cooperate with the EQC on environmental matters." • This is the appropriate policy/advisory 'home' for the tree program
Chapter 34-Land Development Code (LDC), Article 3	Development Standards, 3.6 Landscape, Screening, and Buffering Standards.	2011	<ul style="list-style-type: none"> • See Detail Recommendations for the Land Development Code in separate section of this document
Chapter 34-LDC, Article 4	Administration	2011	<ul style="list-style-type: none"> • 4.3.1(H) Allows Council to waive park dedication requirements but not landscape requirements • 4.7.3 (A) allows, but does not require, planner to consult experts for development review committee • Does not mention vegetation expertise
Chapter 34-LDC, Article 6	Definitions	2011	<ul style="list-style-type: none"> • Add definitions for some terms • Review and correct terms: clearcutting, damaged or diseased trees, deciduous tree, evergreen tree, ornamental shrub, ornamental tree, wetland
Chapter 46-Nuisances			<ul style="list-style-type: none"> • Does not mention trees, but prohibits "obstruction of any kind" for streets and sidewalks which covers overhanging branches
Chapter 54-Parks and Recreation, Article II	Park and Recreation Advisory Board	1986	<ul style="list-style-type: none"> • Gives Park and Recreation Board advisory role in the park system, recreational facilities and programs • Could be some overlap with EQC on landscapes, especially natural areas

⁸League of Minnesota Cities has a model Shade Tree Pest Control Ordinance that can be used as a template for updating the current pest ordinance: www.lmc.org/media/document/1/shade_tree_pest_control.doc.

Section	Title	Adopted on or before:	Comments
Chapter 86-Vegetation, Article II, Division 1	Generally	1986	<ul style="list-style-type: none"> Gives City Forester authority but does not say who appoints the forester City Forester in charge of boulevard trees including determining setbacks
Chapter 86-Vegetation, Article II, Division 2	Disease Control		<ul style="list-style-type: none"> Work with an urban forester to correct some technical errors in the chapter Addresses Dutch elm disease, elm bark beetles, oak wilt disease, emerald ash borer (EAB)

Planning Documents

Title	Adopted on or before:	Comments
Comprehensive Plan	2008	<ul style="list-style-type: none"> Sustainability highlighted in Key Directions Preserving "environmental character" mentioned in vision statement.
Natural Resources Inventory	2005	<ul style="list-style-type: none"> Excellent resource document.
Framework Plan	[2013]	<ul style="list-style-type: none"> April 2013 document of the Northfield Roundtable Not an adopted city document "Greening" mentioned throughout Emphasis on river corridor and "the Commons" Encourages "Groves" of trees The services of a professional landscape architect will be needed to bring the vision to fruition
Gateway Corridor Improvement Plan	May 2012	<ul style="list-style-type: none"> Purpose is to illustrate the intent of the design principles, project goals and objectives and to offer recommendations to guide the evolution of the public realm and connectivity within the City, specifically along gateway corridors Purview of Streetscape Taskforce Encourages additional street trees, landscaping Recommends enhancing the urban forest with trees and understory planting areas As projects are implemented, technical details such as planting strategies, spacing and species selection should be reviewed by an urban forester or landscape architect and adjusted to meet specific site requirements
MNDOT Community Roadside Landscape Partnership Program, Phase I and Phase II project plans	2011 and 2013	<ul style="list-style-type: none"> Phase I Hwy. 3 Southern Gateway, \$10,000 funding in 2011-2013 Phase II Hwy. 3 Northern Gateway, anticipated \$10,000 funding in 2013-2015 for 60-80 trees, spring 2014 planting Program implemented by Northfield Garden Club

Policies

Title	Adopted on or before:	Comments
Tree Policy/Tree Disease Management, Sections 1 & 2	proposed for 2013	<ul style="list-style-type: none"> • Recommended policy attached as appendix to this document
Tree Policy/Tree Disease Management, Section 3 (Prohibited Tree List and Acceptable Tree List)	proposed for 2013	<ul style="list-style-type: none"> • Recommended Acceptable Tree List attached as appendix to this document
Tree species allowed for meeting the landscaping requirements of the 2010 Northfield Land Development Code (LDC)	2011	<ul style="list-style-type: none"> • Required by LDC 3.6 • Can only be modified by City Council • Change responsibility for list from the City Council to the EQC and staff

Operational Protocols

Title	Adopted on or before:	Comments
Contracted Tree Trimming Services for 2012-2013: Specification and Bidder's Proposal Quote	2011	<ul style="list-style-type: none"> • Minor technical errors • No reference to ANSI, OSHA or ISA Certification • Update to include OSHA & ANSI references and require ISA Certification
Tree Inspection Report	2013	<ul style="list-style-type: none"> • Good form except that it does not have room for ANSI description of pruning needed • Add a line to describe pruning work to be done
Complaints and Work Orders		<ul style="list-style-type: none"> • All recorded on paper • Integrate into GIS with asset management software
2012 Boulevard and Park Tree Inventory Report	2012	<ul style="list-style-type: none"> • Existing tree inventory is a "snapshot in time" • Planning is underway for integration of tree data into the city GIS • Recommend putting tree inventory data into a tree benefit calculator
Maintenance Work Plan		<ul style="list-style-type: none"> • None in writing
Shade Tree Program		<ul style="list-style-type: none"> • City "sells" trees to citizens and arranges for planting • Species used in 2013: 53% were shade trees versus ornamentals or evergreens, 32% of species were native species and 68% were non-native • In the future transition the tree sale to a program of planting street trees as described in Detailed Recommendations for the Annual Tree Sale elsewhere in this document

Asset Management: Program Recognition

Northfield has achieved state and national recognition:

- Tree City USA – meets all the program requirements
- GreenStep Cities – meets the Urban Forests Best Practice requirements
- America in Bloom – meets requirements
- Minnesota State Horticultural Society – Northfield was 2012 Garden Club of the Year

Tree City USA

Tree City USA is a program of the National Arbor Day Foundation that provides the framework for community forestry management for cities and towns across America. Communities achieve Tree City USA status by meeting four core standards of sound urban forestry management:

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

Participating communities have demonstrated a commitment to caring for and managing their public trees. Together the more than 3,400 Tree City USA communities serve as home to more than 135 million Americans. The City of Northfield has been recognized as a Tree City USA for 15 years⁹ and occasionally earns an additional Growth Award.

In Northfield criteria are met by assigning legal responsibility for the care and management of the community's trees to a City Forester, a tree ordinance,¹⁰ a budget of at least \$2 per capita and a combined Arbor Day–Earth Day event. The Environmental Quality Commission, in collaboration with other community organizations carries out the Arbor Day–Earth Day event. Although not a professional forester, the Northfield City Forester T. J. Heinrich participates in education classes each year and maintains Tree Inspector Certification with the Minnesota Department of Natural Resources and First Detector status with the Minnesota Department of Agriculture.

The program would be strengthened by specifically directing a citizen advisory board such as the Environmental Quality Commission (EQC) to write and monitor an annual urban forestry work plan.

⁹www.arborday.org/programs/treeCityUSA

¹⁰Chapter 86-Vegetation, Article II, Division 1 and Division 2.

GreenStep Cities

Minnesota GreenStep Cities is a voluntary challenge, assistance and recognition program to help cities achieve their sustainability and quality-of-life goals. This free continuous improvement program, managed by a public-private partnership, is based upon 28 Best Practices. Each Best Practice can be implemented by completing one or more actions at a 1, 2 or 3-star level, from a list of four to eight actions. These actions are tailored to all Minnesota cities, focus on cost savings and energy use reduction, and encourage civic innovation.¹¹ The City of Northfield became part of the GreenStep Cities program on November 8, 2010.

Urban Forests is one of 28 Best Practices. The Best Practice requires that cities add tree and plant cover that increases community health, wealth and quality of life. The City of Northfield meets the criteria for the Urban Forests Best Practice but it is not currently reported for GreenStep Cities recognition. For the Urban Forests Best Practice (number 16), a Category A City is required take at least two of the following actions:

- Action 1. Certify as a Tree City USA
- Action 2. Adopt as policy Minnesota Tree Trusts' Best Practices and use the guidelines in at least one development project to achieve an excellent or exemplary rating
- Action 3. Budget for and achieve urban canopy/tree planting goals
- Action 4. Maximize tree planting along your main downtown street or throughout the city
- Action 5. Adopt a tree preservation or native landscaping ordinance
- Action 6. Build community capacity to protect existing trees/plant resilient species by certifying at least one or more local staff/volunteers.

Recommendation: Report actions 1, 5 and 6, which the City of Northfield meet, to achieve additional GreenStep Cities recognition.

America In Bloom/Northfield in Bloom

America in Bloom (AIB) promotes nationwide beautification through education and community involvement by encouraging the use of flowers, plants, trees, and other environmental and lifestyle enhancements.¹² America in Bloom is an independent, non-profit 501(c)(3) organization. Northfield was a 2008 participant.

Northfield in Bloom (NIB) is a local organization of volunteers formed in 2008. It works in cooperation with the City to promote beautification in Northfield and is funded by the Northfield

¹¹greenstep.pca.state.mn.us

¹²www.americainbloom.org

Area Foundation.

To achieve recognition, America in Bloom judges visited Northfield to review and evaluate the community. Efforts are evaluated in four sectors: municipal, commercial, residential, and community involvement. They are evaluated in six categories:

- Floral Displays
- Landscaped Areas
- Urban Forestry
- Environmental Efforts
- Heritage Preservation
- Overall Impression.

Northfield is specifically mentioned by AIB in its Best Practices publication *America in Bloom, Best Ideas From America's Towns and Cities*, September 2010, 6th edition. Northfield is cited for the City's program of planting trees in residential areas and garden club volunteer efforts to eradicate buckthorn from the city.

Minnesota State Horticultural Society (MSHS) Awards Program/Northfield Garden Club

The Minnesota State Horticultural Society (MSHS)¹³ statewide awards program recognizes individuals and organizations that have made outstanding contributions to horticulture and greening efforts in public gardens, community projects and through exemplary community achievements. Northfield Garden Club received the 2012 Garden Club of the Year Award.

Long known for its work beautifying public green spaces in Northfield, the Northfield Garden Club took on a project with the Cooperative Landscape Partnership Project. The club spearheaded the planting of 64 trees along the boulevards of Minnesota Highway 3, an area that had been identified as a significant gateway to the city.

Garden club volunteers conceived of the tree-planting idea, applied through the Minnesota Department of Transportation program for funding, and worked tirelessly with MnDOT to develop the planting plan. The club arranged to purchase the trees from a local landscaper, who contributed to the planting effort. The club also raised \$7,000 to pay for the watering of the trees. The ability of this group to work cooperatively with several other entities to the betterment of the community is a tremendous example of civic activism at work.

The club recently expanded the Highway 3 project and will plant trees along the segment of the road to the north of downtown Northfield.

¹³ northerngardener.org

Asset Management: Trees and Stormwater Management

Trees are important stormwater tools. They reduce the volume of both runoff and pollutants carried in the runoff by catching, cleaning and infiltrating rainwater. Strategies for Northfield are:

- Increase overall tree canopy cover to improve rainwater interception, evapotranspiration and infiltration
- Emphasize large stature trees that overhang streets and other paved surfaces
- Incorporate trees into bioretention systems
- Use tree trenches and other new technologies to collect and infiltrate stormwater in paved parking lots
- Restore shoreland along the Cannon River and its tributaries
- Incorporate tree education for citizens into the Low Impact Development (LID) program for implementation of the city's Comprehensive Surface Water Management Plan.¹⁴

Tree Benefits

Trees are the main component of riparian forests that protect the Cannon River and its tributaries from erosion and absorb pollutants. Trees and other natural vegetation can be flood resistant and help protect adjoining properties from damage during flood events. Priority views can be enhanced rather than blocked with careful planning.

Natural areas are degraded when they are infested with European buckthorn or other invasive exotic species. They are less able to catch, clean and infiltrate rainwater than uninfested natural areas.

Besides its direct benefit for stormwater management, natural vegetation helps indirectly by reducing the concentration of geese along the river and around ponds. Often considered a nuisance, they can be a source of pollution too. Geese prefer habitats where open water is right next to mowed grass. They like large open areas where they have a 360° view so they can watch for potential predators. Geese are grazers and during the summer molting season they do not fly but produce copious amounts of excrement which makes them a nuisance in the areas intended for human use. By planting a buffer of unmowed grasses and flowers, shrubs or trees along the edges of the river or around ponds, geese are discouraged from setting up housekeeping.

Resources

A key potential partner for any stormwater effort is the Cannon River Watershed Partnership

¹⁴Minnesota Stormwater Manual stormwater.pca.state.mn.us/index.php/Trees.

(CRWP).¹⁵ The mission of CRWP is to engage people in protecting and improving the water quality and natural systems of the Cannon River watershed. The CRWP office is located in the James Farm Building on the edge of St. Olaf College's Natural Lands. For this report the author sought input from the executive director of CRWP.

The Minnesota Cities Stormwater Coalition (MCSC) provides help to cities in implementing various federal and state stormwater requirements.

The Minnesota Pollution Control Agency incorporates information about trees into the Minnesota Stormwater Manual. The manual is currently being expanded to include detailed information on canopy interception and evapotranspiration loss from trees. The Minimal Impact Design Standards (MIDS) calculator is being designed to incorporate volume reductions for certain new technologies.



Islands in cul-de-sacs can be redesigned to become mini-forests and bioretention basins that are the first step in the treatment train for cleaning and infiltrating runoff from streets. Photo credit: Katie Himanga, CF.

¹⁵www.crowp.net.

Tree Assessment: Introduction

To guide management of the urban forest, quantify the ecosystem services trees provide and plan for the future, managers and decision-makers need information about the extent, composition and health of the urban forest. There are different ways to collect and assess information.

Tree inventories provide the most detailed information needed for urban forest management including physical structure, species composition and number of trees. They are used to assess the ecosystem services and values associated with the urban forest.¹⁶ They can be used for monitoring changes in forest composition over time. Data is collected in the field and used to determine the location and the exact or estimated measurements of quantity, quality and health of the urban forest, as well as a description of other urban forest attributes, such as potential planting sites and risks.^{17,18} Inventories are the basis for:

- Strategic resource management
- Determining a sufficient budget for the program
- Grant applications
- Short and long term planning
- Justifying public works actions.

Another kind of inventory that would provide useful data is a crown cover assessment. This is especially useful for ecological planning. Such an assessment would be a good project for a college student with some technical skills and an interest in the environment. This assessment involves analysis of aerial photography or satellite imagery and typically produces an assessment of urban tree canopy cover rather than data about individual trees. They can be used to find where planting spaces may be available and to identify site limitations. The latter can be done by staff with modest training.

Two types of assessment are recommended for Northfield:

- **Public tree inventory (update existing and move to Geographic Information System)**
- **Canopy cover assessment.**

The City GIS is the best repository of records of unique and historically significant trees, often called heritage trees, regardless of their location in the community.

¹⁶i-Tree software was developed to aid in sampling or inventorying urban trees and forests, and for calculating their ecosystem services and values, www.itreetools.org.

¹⁷Urban Forestry Best Management Practices for Public Works Managers, No. 4 Urban Forest Management Plan, APWA Press.

¹⁸www.itreetools.org/resources/content/guide_to_assessing_urban_forests_nrs_inf_24_13.pdf

Tree Assessment: Public Tree Inventory

Management of any resource begins with an inventory of that resource. The City of Northfield Public Services Department conducted a street tree inventory in 2012. It was a windshield survey in which staff drove along city streets and collected limited data about species and diameter class. This simple method of evaluating trees was a good first step for a developing urban forestry program. The next step is to move the data, currently in a spreadsheet, to a Geographic Information System (GIS).

Plans are in the works for moving data from the existing inventory spreadsheet to the GIS. Professional staff manage the GIS which means public works staff have access to technical support needed to integrate the inventory into operations and produce periodic reports for management planning. Once staff have experience with the GIS and data recording equipment, they can expect increased efficiency in operations, scheduling and reporting work, tracking costs and responding to citizen requests. **Steps recommended:**

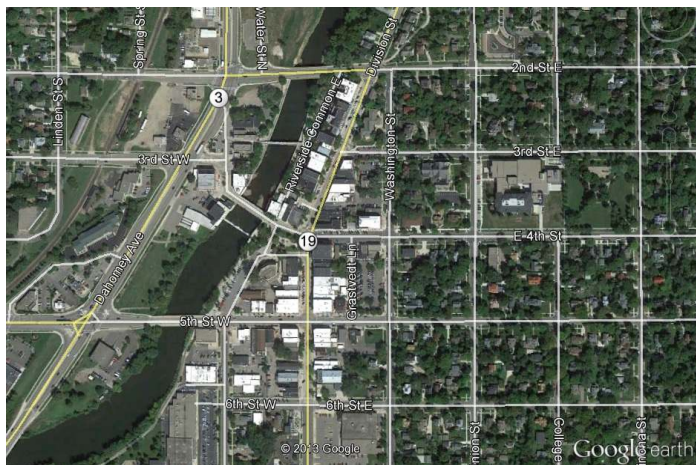
1. **Move existing inventory data to the GIS. A seasonal worker could be hired or the GIS technician could complete the task with an estimated 30 hours of labor.**
2. **Public Works staff begin to update the GIS data in real time. A plan for this is in progress. Public Works staff need field equipment (tablets), training and some technical support from the GIS office.** Data collection about individual trees should include:
 - Location by GPS points
 - Type of tree by genus, species and cultivar (if known)
 - Diameter measured to the nearest inch at a height of 4.5'
 - Health condition as excellent, good, fair, poor, dying/dead
 - Structural condition as excellent, good, fair, poor, failing
 - Maintenance need such as prune or remove
 - Maintenance priority such as immediate, short range, long range
 - Sidewalk and other hardscape damage description
 - Insect and disease problems description
 - Vacant planting sites that are available or unavailable.

Data logically should be collected as areas are surveyed for risk or for maintenance needs. Information about new trees planted should be entered after each planting season and trees removed should be noted periodically.

3. **Begin tracking service requests and work orders in the GIS. This step requires additional asset management software and training for Public Works field and clerical staff.**

Tree Assessment: Canopy Cover Assessment

For canopy cover assessments aerial or satellite images are interpreted to determine amount and distribution of tree and other kinds of cover.¹⁹ They can be used to estimate the number of planting spaces available. Some kinds of image interpretation projects can be carried out by a short term worker such as a college student with technical skills and an interest environmental science.



Free aerial imagery is available from the City and from Google Earth. Images have trees in leaf or during winter. Historical images dating to the 1930s are available.

Digital aerial images already in existence and available from the City and Google Earth lend themselves to photo interpretation. This involves using the images and a series of points that are interpreted to determine the cover type at each point center. Done well, it produces statistical estimates of cover with a known error of estimation. A free software tool²⁰ can be used to photo-interpret cover using Google Maps.

Regardless of tools used, it is important to know the goal of the assessment. Is it to determine the percentage of tree cover and to track changes over time? Such an

assessment is useful for comparing one area to another area of the City, to a different city or to a national standard. It can be used to track tree canopy loss or improvements over time.

The advantages of this kind of assessment include low cost and that they can be done quickly and by anyone with technical skills, either in the office or in a remote location. Assessment can be done by neighborhood, zone or community. The assessment can be repeated in the future with paired imagery to assess change over time.

Recommendation:

- Hire a college student with some technical skills and an interest in the environment to do a crown cover assessment based on current existing aerial and satellite imagery
- Provide staff with enough training to be able to use existing aerial and satellite imagery to count planting spaces available and to identify site limitations for planting projects.

¹⁹For more information about Urban Tree Canopy Assessment visit www.nrs.fs.fed.us/urban/utc/.

²⁰i-Tree Canopy is available from www.itreetools.org.

Public Education: Introduction

Although arborists, urban foresters and educators know the benefits of trees, citizens and political decision-makers may not. Informed citizens make better decisions, are inspired to plant trees, and are more likely to support the community urban forestry program. This is of particular importance when program changes are being planned.

Public education happens by means that may or may not be under the control of urban forestry program leaders. News of catastrophe, such as massive tree loss during storms or the arrival of a devastating disease, are sure to be reported in local media. News of city maintenance and management efforts that reduce the impact of storms or disease epidemics rarely get the same coverage. A more direct approach is needed.

Public Relations Methods	
Indirect	Direct
Online blogs Newspapers Radio Television Social media	Face-to-face meetings Presentations Handouts Website Newsletter Billing inserts Social media and email blasts

Press releases, invitations to staged events such as Arbor Day ceremonies, and news tips are ways to encourage positive stories about the urban forestry program.

In addition to public relations strategies already in use in Northfield, this additional strategy merits consideration:

- **Post tree related information on social media 1-2 times each month.**

Additionally, Northfield In Bloom is exploring these:

- A tree recognition program
- Arboretum status for an area of the city such as the downtown segment of the Cannon River Corridor.

Public Relations and Education: Tree Topics

Reliable information and an assortment of topic ideas for direct public relations are available from several trustworthy organizations. Given the academic scrutiny that topics may get in the Northfield community, it is important that information posted online be linked to research-based factual information. These are good sources of interesting information about trees and urban forest management:

- Alliance for Community Trees²¹
- College of the Environment, University of Washington²²
- International Society of Arboriculture²³
- USDA Forest Service
- University of Minnesota Extension Service
- Minnesota Department of Agriculture
- Minnesota Department of Natural Resources.

Here are topic ideas that can be used throughout the year. Some topics should be repeated annually to remind citizens of the tree care needs of their trees.

Topic Ideas

Tree Benefits	Tree Care
Improved sales in downtown districts Pavement life extended Reduced home energy use Improved market value of homes Food and cover for wildlife Reduced crime Neighborhood social interaction Reduced stress Improved scholastic performance	Urban forests are systems that need care How to prune young trees How to recognize hazardous trees How to recognize invasive species Using mulch to improve tree health What to plant near power lines Watering

²¹www.actrees.org

²²www.naturewithin.info

²³www.treesaregood.org

Public Relations and Education: Tree Recognition Program

A tree recognition program is a public relations tool for citizen engagement with the urban forest. Such a program seeks to locate and give recognition to significant trees within a community. Northfield in Bloom (NIB) is considering such a program.

Steps in setting up a program:

1. Establish criteria and categories. These may be large size,²⁴ historical or cultural significance, notable character or another relevant characteristic.
2. Decide if recognition will be informal or if there will be an official process. Either way, outline the process and engage participants.
3. Determine a nomination process.
4. Decide who will receive and verify nominations and who will keep records.
5. Prepare a nomination form and solicit nominations.
6. Recognize and publicize winners.

The Minneapolis Park and Recreation Board has a Heritage Tree Program that can be used as a model for Northfield.²⁵

²⁴The method for determining tree size is described in the American Forests Measuring Guidelines: www.americanforests.org.

²⁵Information about the Heritage Tree Program is at www.minneapolisparcs.org.

Public Relations and Education: Arboretum

Designating an area as an arboretum is another public relations tool for encouraging citizen interaction with the urban forest. The Arboretum Accreditation Program of Morton Arboretum guides such designation.²⁶ Northfield in Bloom (NIB) is exploring the idea of seeking arboretum designation for a portion of the city. The downtown segment of the Cannon River corridor is a candidate location.

An accredited arboretum is one that has met certain professional standards. Four levels of accreditation have been established to recognize arboretums and public gardens at various degrees of development, capacity, and professionalism. All levels require an arboretum plan, an organizational/governance group, and a collection of at least 25 kinds of trees or woody plants. Plants in the collection must be labeled in some way as to their identity and records must be kept as to their origin and date of planting. The arboretum must have staff or volunteer support. It must be accessible to the public and have at least one public event or educational program each year.

The criteria for arboretum designation were reviewed for this report.

Level	Feasibility
I	Easily reached with existing park land and volunteer resources
II	Could be reached with existing park land and volunteer resources
III & IV	Likely beyond the capacity of volunteers but could be accomplished in partnership with a college or other established institution.

²⁶Information about arboretum accreditation is at arbnet.org/arboretum-accreditation.html.

Public Education: Trees for Energy Conservation

Trees shade our homes in summer and shelter us from harsh winter winds. Estimates indicate that in Minnesota, strategically placed shade trees could reduce an air conditioning bill by up to 25% and a windbreak could reduce annual fuel bills by up to 20%. A tree-canopied neighborhood is cooler in the summer, and winter winds are cut in half. When summer temperatures are cooler, fewer air pollutants form. Thus, trees create more comfortable and cleaner places for people to live.²⁷

Winter Heating Considerations

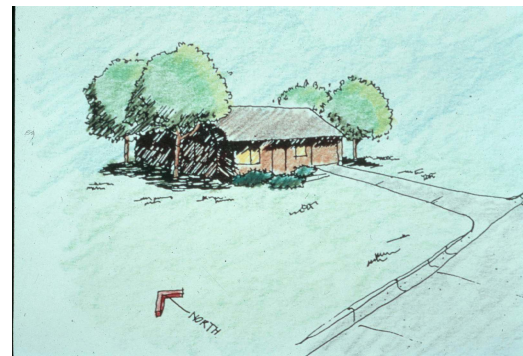
Both the sun and wind affect the temperature of homes in winter. A significant amount of solar energy can be gained from the sun shining through south windows in the winter when the sun is low in the sky. East and west windows can also provide solar energy gain in winter. The solar energy may make up as much as 5-20% of the total energy needed to heat the home. Escaping warm air, along with cold wind entering a home, increases heating costs and accounts for 25-40% of the heating requirements. The stronger the wind, and the colder the temperature, the greater the effect.²⁸

Summer Cooling Considerations

Very little solar energy enters our homes through the roof and walls because of insulation. Approximately half of unwanted heat in a house in the summer comes from the sun shining through the windows. Because the summer sun is so high in the sky, almost twice as much solar energy enters through the east and west windows as the south windows, especially if there is a roof overhang on the south side of the house.

West is best: Shade west and east windows to most effectively reduce air conditioning use:

- Give highest priority to planting shade trees next to west windows.
- Plant trees next to east windows as a second priority
- Select a tree that can be planted within twenty feet of a window and will grow at least ten feet taller than the window



West is best. Shade west and east windows to reduce air conditioning use.

²⁷ *Energy Savings Landscapes: The Minnesota Homeowner's Guide* based on research done at the University of Minnesota and www.dnr.state.mn.us/treecare/energy/strategies.

²⁸ Information for this section is from the Sustainable Urban Landscape Information Series, University of Minnesota, www.sustland.umn.edu/design/energysaving.

- Select trees that are strong, resistant to disease, pests and damage from storms; and that will grow vigorously under local site conditions
- Select a tree with dense foliage and as broad in form as space permits.

Let the sun shine in: Avoid shading south windows.

If trees already exist south of windows:

- Remove their lower branches to allow more winter sun under the limbs.

If you do want a tree southeast or southwest of a window:

- Use a "solar friendly" tree that has moderately dense foliage during the hottest times of the year, loses its leaves early in the fall as the heating season begins, and has sparse winter branches
- Select cultivars from northern seed sources which will lose their leaves earlier in the fall.



Let the sun shine in. Avoid shading south windows.



Even without leaves, a tree casts shade on south windows in winter.

Take advantage of the free solar energy coming in through the south windows in the winter. The worst place to have a tree is in the yard south of a home, since the sun's angles cause the shadow of the tree to miss the home during the summer months and always fall on the home during the winter months.



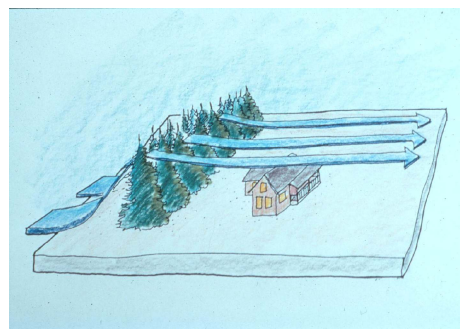
The more the merrier. Maximize tree canopy cover throughout neighborhoods.

The more the merrier: Maximize tree canopy cover throughout the neighborhood to maximize environmental benefits.

- Achieve at least 50% tree canopy cover by planting trees throughout the neighborhood
- Preserve and care for existing trees and forests near neighborhoods
- Locate air conditioners away from south windows and shade them with trees allowing good air circulation around the air conditioner
- Shade car parking areas with trees which have enough rooting space to thrive.

Up and over: Where winters are long and windy, the most valuable way to reduce annual energy use is to create windbreaks. Tall trees will guide wind up and over an area to a point downwind at least ten times the height of the windbreak.

- Select windbreak trees which are evergreen and which will have branches from ground level to a height at least twice as tall as the building being sheltered
- Select trees that are best adapted to the site's growing conditions so they will be tall, yet dense
- Plant rows or continuous clusters of trees upwind and perpendicular to the primary wind direction usually running along the west and north sides of the property.



Up and over. Create windbreaks.

For lots that are large:

- Make the windbreak longer than the area being sheltered
- Space evergreens about 20 feet apart and deciduous trees at greater spaces to allow the sun to reach the lower branches; where space is limited, plant fewer trees - don't crowd the trees
- Locate the inside of the shelterbelt on a very open site at least 50 feet from buildings and driveways to avoid snow drifting problems, even if the windbreak is on the other side of the road.

If your lot is smaller:

Plant evergreen trees to the west and north in sunny locations in rows or groupings with trees spaced about ten feet apart.

Reference: Trees of Northfield

Trees Native to Northfield²⁹

About native trees: The tree species listed here are ones that likely grew in the Northfield area before the 1850's. Trees sold in the nursery trade probably do not originate in the Northfield area, but are appropriate to use in most places. Nurseries sell either common or horticultural varieties. Common trees are grown from seed. Horticultural varieties are usually reproduced by cuttings (cloning). For natural areas, select common trees grown from seeds.

Tree pests that were introduced to the area since the 1850's have devastated certain species of trees. When this is the case, horticultural varieties that have been bred for pest resistance should be used for most planting projects. Dutch elm disease and emerald ash borer are such pests. Others, such as oak wilt disease, can be managed by how trees are arranged in the landscape.

Tall Stature Deciduous Species

Acer negundo, boxelder
Acer nigrum, black maple
Acer rubrum, red maple
Acer saccharum, sugar maple
Acer saccharinum, silver maple
Acer x freemanii, Freeman maple hybrids³⁰
Betula papyrifera, paper birch (white birch)
Carya cordiformis, bitternut hickory
Celtis occidentalis, hackberry
Fraxinus americana, white ash
Fraxinus nigra, black ash
Fraxinus pennsylvanica, green ash
Gymnocladus dioica, Kentucky coffeetree
Juglans cinerea, butternut
Juglans nigra, black walnut
Ostrya virginiana, ironwood (American hop-hornbeam)
Populus balsamifera, balsam poplar
Populus deltoides, cottonwood
Populus grandidentata, large-toothed aspen
Populus tremuloides, quaking aspen

²⁹This is an incomplete list. Some uncommon species are not included. Information sources are the Minnesota Biological Survey, *Vascular Plants of Minnesota: A Checklist and Atlas*, by Gerald B. Ownbey and Thomas Morley, University of Minnesota, 1991; and, *Trees and Shrubs of Minnesota*, by Welby R. Smith, Minnesota Department of Natural Resources, University of Minnesota Press, 2008.

³⁰Freeman maple is a naturally occurring hybrid of silver maple and red maple. It may occur wherever the range of silver maple overlaps with the range of red maple.

Prunus serotina, black cherry
Quercus alba, white oak
Quercus bicolor, bicolor (swamp white) oak
Quercus ellipsoides, northern pin oak
Quercus macrocarpa, bur oak
Quercus rubra, red oak
Quercus velutina, black oak
Salix nigra, black willow
Tilia americana, American linden (basswood)
Ulmus americana, American elm
Ulmus rubra, red elm (slippery elm)
Ulmus thomasii, cork elm (rock elm)

Short Stature Deciduous Species

Amelanchier sp., serviceberry (tree form)
Carpinus caroliniana, American hornbeam (blue beech)
Cornus alternifolia, pagoda dogwood (tree form)
Prunus nigra, Canada plum
Prunus pensylvanica, pin-cherry
Prunus virginiana, chokecherry
Viburnum lentago, nannyberry viburnum

Conifers

Juniperus virginiana, Eastern red cedar (juniper)
Larix laricina, American larch (tamarack)³¹

³¹Larch is a deciduous conifer.

Reference: Trees of Northfield

Trees Adapted to Northfield – Non-Native³²

Tall Stature Deciduous Species

Acer platanoides, Norway maple³³

Aesculus glabra, Ohio buckeye

Betula nigra, river birch

Betula alleghaniensis, yellow birch

Carya ovata, shagbark hickory

Fraxinus mandschurica, Manchurian ash

Ginkgo biloba, ginkgo (maidenhair tree)

Gleditsia triacanthos var. *inermis*, honeylocust³⁴

Magnolia acuminata, cucumbertree magnolia

Pyrus ussuriensis, Ussurian pear

Tilia cordata, littleleaf linden

Ulmus, elm hybrids or disease resistant cultivars

Ulmus japonica, Jacan Japanese elm

Short Stature Deciduous Species

Cercis canadensis, eastern redbud

Crataegus crusgalli var. *inermis*, cockspur hawthorn

Malus sp., crabapple

Magnolia stellata, star magnolia

Sorbus alnifolia, Korean mountain-ash

Sorbus aucuparia, European mountain-ash

Syringa reticulata, Japanese tree lilac

Trees listed here may or may not do well on a particular site in Northfield. For information about trees that grow well in Northfield, consult a reputable resource such as a University of Minnesota volunteer Tree Care Advisor, a Minnesota Nursery & Landscape Association Certified Professional, a Certified Arborist, or a University of Minnesota Extension Service publication.

Conifers

Abies balsamea, balsam fir

Larix decidua, European larch³⁵

Larix sibirica, Siberian larch

Picea glauca, white spruce

Picea glauca var. *densata*, Black Hills white spruce

Picea mariana, black spruce

³²This is an incomplete list of trees that can grow in the Northfield area. Most are not invasive when planted in urbanized areas, but some should be avoided near natural areas. The list includes these species native to parts of Minnesota other than Northfield: shagbark hickory, river birch, balsam fir, white spruce, black spruce and jack pine.

³³Plant cultivars of Norway maple with caution, especially near natural areas. It reproduces by seed that is spread by wind and has a tendency to become invasive.

³⁴Honeylocust is native to Houston County in the southeast corner of Minnesota. It can reproduce and spread by seed. Under certain conditions it has the potential to become invasive.

³⁵Larch are deciduous conifers.

Pinus banksiana, jack pine

Pinus resinosa, red pine

Pinus strobus, white pine

Thuja occidentalis, white cedar (arborvitae)

Reference: Framework Planning in Northfield

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Appendix: Recommended Tree Policy

City of Northfield

Tree Policy Tree Pest Management

1. TREE MANAGEMENT ON CITY-OWNED PROPERTY, CITY RIGHTS-OF-WAY, AND CITY EASEMENTS

- 1.1 Purpose and Definitions
- 1.2 City Forester Duties
- 1.3 Placement and Care of Trees on City Property

2. CITY OF NORTHFIELD PEST MANAGEMENT PLANS

- 2.1 Purpose
- 2.2 Administration
- 2.3 Communication
- 2.4 Oak Wilt Disease
- 2.5 Dutch Elm Disease (DED)
- 2.6 Emerald Ash Borer (EAB)
- 2.7 Ash Wood Utilization and Disposal

3. PROHIBITED AND ACCEPTABLE TREES

- 3.1 Purpose
- 3.2 Acceptable Tree List

1. TREE MANAGEMENT ON CITY-OWNED PROPERTY, CITY RIGHTS-OF-WAY, AND CITY EASEMENTS

1.1 Purpose and Definitions

It is the policy of the City of Northfield to recognize and preserve existing natural resources and to encourage the greening of the City. The City finds that the preservation of healthy trees and other vegetation, where it is able to be done, is in the best interest of City residents' health and welfare. To that end, the City established an ordinance (Chapter 86, Article II. Shade Trees) and this policy to assist the City staff in preserving healthy trees throughout the City. This policy shall apply to all City Property.

City Property. For the purposes of this policy City Property includes City Parks and other City-owned property, rights-of-way including boulevards, and City easements.

City Tree. A tree growing on City Property. For the purposes of this policy, a tree's location is determined by the location where the tree trunk emerges from the ground.

Boulevard Tree. A City Tree growing on a street right-of-way.

Small Stature Tree. Tree that has a mature height of no more than 30 feet.

Large Stature Tree. Tree that has a mature height of more than 30 feet.

Tree Pest. Any vertebrate or invertebrate animal, plant pathogen, or plant in the community threatening to cause significant damage to a shade tree or community forest, as defined by Minn. Stat. § 89.001, to be a shade tree pest.

1.2 City Forester Duties

A. The duties of the City Forester are defined in City Code Section 86-32: "It is the duty of the city forester to coordinate, under the direction and the control of the city council, all activities of the city relating to the control and prevention of shade tree diseases. The forester shall recommend to the council the details of a program for the control of shade tree diseases and shall perform the duties incident to such a program adopted by the council and shall also be in charge of boulevard trees." The City Forester shall be appointed by the Public Works Director. The City Forester shall:

1. Identify diseased, infested and hazardous trees that threaten the health and safety of the public
2. Coordinate all activities of the City relating to the control and prevention of oak wilt disease, Dutch elm disease and emerald ash borer (EAB).
3. Make known and enforce regulations and specifications concerning the planting, care and removal of all trees and other woody plants on City Property.

1.3 Placement and Care of Trees on City Property

A. The City Forester has authority to determine the location and species of all trees and other woody plants to be planted on City Property. These are determined in accordance with City Code Section 86-33 and 34-672 and based on good urban forestry practices.

B. Generally all tree planting on City Boulevards is permitted if it meets the criteria listed below. The City Forester considers all other planting on a case-by-case basis:

- Spacing of Boulevard Trees. Small Stature Trees planted no less than 30 feet apart and Large Stature Trees planted no less than 40 feet apart.
- Distance from Street Corners. Trees are at least 40 feet from the point of intersecting curb lines.
- Distance from overhead utility lines. Only Small Stature Trees shall be planted on City

- Property under or within 10 lateral feet of any overhead primary electric distribution line.
- Distance from underground utility lines. Planting directly over underground utility lines shall be avoided.
- Species. Any tree on the Approved Boulevard Tree list may be planted if it meets the above criteria. Other species will be considered by the City Forester on a case by case basis.

D. Care of Trees on City Property. By ordinance “The property owner shall be responsible for maintaining and watering trees on the boulevard adjacent to his/her property.” Any work done by the Public Works Department or its designee shall be at the direction of the City Forester. All other trees on City Property shall be maintained by the Public Works Department or its designee. Other plantings on City Rights-of-Way or City Easements shall be maintained by the owner of the property in conformance with City Code.

E. Tree Removal on Public Land. All trees and other woody plants on City Property shall be removed as determined by the City Forester. Boulevard Trees will be removed at the expense of the city only when one or more of the following criteria are met:

- The tree is in a state of decline due to disease or insect pest for which there is no likelihood of a cure
- The tree is an ash and the property owner agrees to replace it with a tree of another species within one year
- The tree poses a safety risk that cannot be corrected
- An unreasonable safety risk would be created by pruning or roots or branches associated with a nearby construction or infrastructure improvement project
- The Environmental Quality Commission determines that tree preservation is not cost effective compared to the value of the tree
- The Environmental Quality Commission determines that a tree poses an extreme public nuisance because of fruit or seed drop, tendency to drop branches or other objectionable condition
- The Environmental Quality Commission determines that the aesthetic value of the tree is extremely low or the tree interferes with the growth and development of a more desirable tree.

F. Stump Removal. The stumps of all Boulevard Trees and trees in manicured areas of other City Property shall be ground out or removed. Generally, stumps will be removed to several inches below the level of the surrounding ground, covered with top soil and planted with grass seed. Homeowners are asked to water the newly seeded areas.

G. Pruning Boulevard Trees. City crews or a City contractor trim boulevard trees, mostly during the winter months, as time and resources allow. Trees are pruned primarily for safety and health and for clearance over the street and sidewalk. After storms, the City will prune broken branches as time and resources allow.

H. Preferred Trees. The city maintains a list of Approved Boulevard Trees that may be planted on boulevards. Other species of trees and all other woody plants proposed for City Property shall first be reviewed and approved by the City Forester.

2 CITY OF NORTHFIELD PEST MANAGEMENT PLANS

2.1 Purpose

The goal of this plan is to buffer the impact of disease and pest infestations described in City Code Section 86-62:

- Dutch elm disease
- Oak wilt disease
- Emerald ash borer (insect infestation)

2.2 Administration

See “Duties of City Forester” above and these described in City Code Section 86-63 through 86-64:

- Inspection and investigation
- Diagnosis
- Abatement
- Record keeping.

2.3 Communication

The City Forester shall give the City Administrator, City Council, Environmental Quality Commission and the Parks and Recreation Board periodic updates through normal channels. All media relations will follow established City protocol.

2.4 Oak Wilt Disease

Introduction. Oak Wilt is a fungal disease that affects all species of oaks (*Quercus* spp.). The fungus is transmitted overland from one tree to another by picnic beetles primarily in April, May and June, or underground through grafted root systems.

Control: As per City Code (Sec 86-67), the City Forester shall cause the infected tree or wood to be chipped, removed, burned or buried or otherwise effectively treated so as to destroy and prevent as fully as possible the spread of oak wilt disease. Firewood may be kept if it meets the requirements of City Code (Sec 86-66). Additionally:

- Since trees in the white oak family (white, bur and bicolor oak) do not produce fungal spore pads, infected trees may remain in the landscape unless they are at risk of being hazardous to people or property
- The disruption of common root systems, when done according to University of Minnesota Extension Service guidelines, is the preferred method of nuisance abatement for infected oak trees where they are near other oaks of the same species
- Disruption of common root systems must be done before infected oak trees are removed to limit the underground spread of the disease.

2.5 Dutch Elm Disease (DED)

Introduction: Dutch Elm Disease (DED) affects all species of elm (*Ulmus* spp.). The fungus is transmitted overland from one tree to another by elm bark beetles or underground through grafted root systems.

Control: As per City Code (Sec 86-67), the City Forester shall cause the infected tree or wood to be chipped, removed, burned or buried or otherwise effectively treated so as to destroy and prevent as fully as possible the spread of Dutch elm disease. Firewood may be kept if it meets the requirements of City Code (Sec 86-66).

2.6 Emerald Ash Borer (EAB)

Introduction: Emerald Ash Borer (EAB) is an insect that kills all Minnesota native species of ash (*Fraxinus* spp.): green ash, white ash, black ash.

Control: As per City Code (Sec 86-67), the City Forester shall cause the infected tree or wood to be chipped, removed, burned or buried or otherwise effectively treated so as to destroy and prevent as fully as possible the spread of EAB. Additionally:

- Native ash trees shall not be planted on City Property
- Native ash trees may not be planted to meet the requirements of the Land Development Code (LDC)
- Citizens and businesses are encouraged to discontinue planting native ash trees
- Ash firewood may be kept if done in a manner consistent with Minnesota Department of Agriculture and the University of Minnesota Extension Service recommendations.

Control for Boulevard Trees:

- During infrastructure work, the City will remove any boulevard ash trees
- The City will remove any other ash tree on that is in a state of decline due to disease or insect pest for which there is no likelihood of a cure
- When an adjoining property owner has a qualified tree service or a qualified person treat an infested boulevard tree with insecticide at their own expense and in accordance with University of Minnesota Extension suggestions, and has provided evidence to the Tree

Inspector, it may remain in the landscape for as long as the treatment is effective and the tree remains healthy

- Trees that are removed will be replaced at the owner's expense
- The City encourages planting a diversity of tree species to better protect the urban forest in the future

Control for Park Trees:

- The City shall remove any ash tree in poor condition or with major defects in manicured/mowed areas of City parks
- Trees that are removed shall be replaced.
- The City may treat a healthy or infested park ash tree with insecticide in accordance with University of Minnesota Extension suggestions, in which case it may remain in the landscape for as long as the treatment is effective and the tree remains healthy
- Ash trees in wooded areas of parks will be left alone unless they present a risk to a fixed target or trail if City resources are available for tree removal
- In wooded areas the city relies on natural regeneration for reestablishment of tree cover which can be supplemented with planting when resources are available.

Control for Trees on Private Property:

- Property owners are urged to monitor for the EAB or contact the City Forester with concerns about infestation
- The City will make periodic inspection of ash trees on private property to the extent they are visible from public street, trails and parks, and will respond to reports of suspected EAB infestations
- The City encourages citizens and tree firms to wait and not treat ash trees until emerald ash borer (EAB) is confirmed with 15 miles of the City as recommended by the Minnesota Department of Agriculture
- Residents with a ash tree are encouraged to establish a relationship with the City Forester, a Certified Arborist or a Minnesota Department of Agriculture trained First Detector in anticipation of needing advice about diagnosing, treating and removing an ash tree.

2.7 Ash Wood Utilization and Disposal

1. Infested ash wood must not be moved when doing so would spread EAB to areas not known to be infested:

January-April	May-August	September-December
Infested wood may be moved as long as it will be processed at its destination prior to April 30	Infested trees must be left standing, or the wood processed before it is moved from the site	Infested wood may be moved as long as it will be processed at its destination prior to April 30

Note that in the event of a State or Federal quarantine, there may be additional restrictions on the movement of ash wood within Rice County or from one county to another.

2. The City Forester shall identify one or more sites as potential marshaling yards where EAB infested wood can be collected, stored and processed in the event that the City is subject to a state or federal quarantine. The site shall be gated and locked when staff are not present.
3. When practical, ash trees of merchantable size shall be cut into logs and sawn into lumber which renders the wood free of EAB. The Minnesota DNR-Forestry maintains a Sawmill & Dry Kiln Listing for the Metro and Surrounding Areas on its website.
4. Woody ash debris may be processed according to the criteria in state and federal quarantine guidelines to render it free of EAB so that it can be transported into and out of the City (example: wood may be chipped or ground into pieces that are no more than 1 inch in size in two directions).
5. When ash wood cannot be practically converted to lumber, chips or mulch, it may be burned at a waste-to-energy facility.
6. The City will work with tree services that do business in Northfield to:
 - Provide current information about the EAB program in Northfield
 - Encourage services to advise the City of ash tree pruning and removal projects and allow wood to be inspected for EAB
 - Require compliance with the Tree Care Registry law
 - Encourage voluntary arborist certification.

3. PROHIBITED AND ACCEPTABLE TREES

3.1 Purpose

The City finds it necessary to maintain a list of trees which may be planted to meet the requirements of the Land Development Code (LDC). Additionally, the City finds it desirable to maintain a list of trees that may be planted on boulevards.

The City Forester has authority to approve the species of tree and the location where it will be planted on any City boulevard or other City property or easement. The City Forester may approve species that are not specifically listed. They are considered on a case by case basis.

The City strives for genetic diversity in its tree population and to that end, encourages the planting of common trees, which are grown from seed, where possible. Cultivars may be planted, and in some situations are preferred, but should not be overused. The City values all of its native tree species but recognizes that some are better suited to natural areas than to boulevards and manicured areas of parks. The planting of invasive exotic species is generally prohibited.

3.2 Acceptable Tree List

The City Forester maintains all lists of acceptable trees with input from the Environmental Quality Commission and tree professionals. The list, which is separate of this policy, includes:

- Trees known to be native to Northfield prior to the 1850s
- Trees that are generally approved for planting on City Boulevards
- Approved Landscape Trees and Plant Materials for implementation of the Land Development Code
- Prohibited trees.

Appendix: Recommended Acceptable Tree List

[Insert City of Northfield Acceptable Tree List here.]