

Town of Northfield 2018 Tree Planting and Maintenance Plan

Based on findings from the
2017 Tree Inventory



*Prepared for the Town of Northfield
Board of Selectmen and Highway Department*



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Alnus glutinosa
Common alder

Introduction and Project Area

Let me desire and wish well the life
these trees may live when I
no longer rise in the mornings
to be pleased by the green of them
shining, and their shadows on the ground,
and the sound of the wind in them.

Wendell Berry | *Excerpt from Planting Trees*
from *Collected Poems 1957-1982*, North Point Press

In 2018, the Town of Northfield hired the FRCOG to conduct an inventory of trees in downtown Northfield. The objective of conducting the inventory was to assess the health of trees, create a management plan for trees including needed maintenance or removal and assess the need for additional trees. The inventory was conducted in the spring of 2018 by FRCOG staff.

Planting and removing trees in Northfield has stirred controversy in the past. It is hoped that the inventory conducted by the FRCOG, using objective criteria and standards, will help the Town to make the best decisions possible where tree planting and maintenance is concerned.

Recommendations based upon a thorough inventory form the basis for this report which includes baseline conditions and a tree planting and maintenance plan for the Town of Northfield.

The FRCOG worked with the Board of Selectmen and the Highway Department Superintendent to determine the geographic location and scope of the inventory as well as deliverables that would best serve the Town and those responsible for planting and maintaining Northfield’s public trees.

The Town recognizes the value of having a baseline public tree inventory in Northfield. This inventory will serve many purposes including:

- ⇒ Establishing a baseline with which trends, such as trees removed and trees planted, can be compared.*
- ⇒ Considering street trees as part of the Town’s overall green infrastructure (natural systems that help reduce stormwater runoff and protect the Town’s resources)
- ⇒ Helping the Highway Department/Tree Warden manage maintenance and planting schedules
- ⇒ Understanding the role of MassDOT in planting and maintaining trees along Main Street, which is a state highway
- ⇒ Supporting claims to FEMA in the case of significant losses of public trees due to severe weather and other hazards
- ⇒ Supporting grant applications tree planting and planning projects

The inventory included public street trees located in the downtown area as defined by the Highway Department Director and Board of Selectmen as follows:

- ⇒ Unless otherwise specified, trees within 15 feet of the edge of streets were inventoried. Generally speaking, wooded areas were excluded from this inventory.
- ⇒ Tree belts on Main Street from Route 10 to Moody Street were included. On the east side of Main Street to the intersection of Dickinson, trees between the sidewalk and houses were included.
- ⇒ Additionally, trees along the following streets within 15 feet of the edge of the street but not located in wooded areas were inventoried: Maple Street, Warwick Road, School Street, Dickinson Street (between Main and East Streets), East Street, Parker Avenue, Meadow Street, Glen Road, and East Northfield Road, Holton, Pine and Moody Streets between Main Street and Highland Avenue, Highland Avenue, trees within the Pentecost Cemetery. *Note: Time did not permit for the inventory of trees in many of the wooded areas along roads in the inventory.*

* A tree inventory that was conducted in 2005 for the Town of Northfield is compared to the 2018 inventory to the extent possible in this report. See pages 10 and 11.

Project Area



To see information about the technology used to collect the data and what data was collected, go to Appendix C on pages 29 and 30.

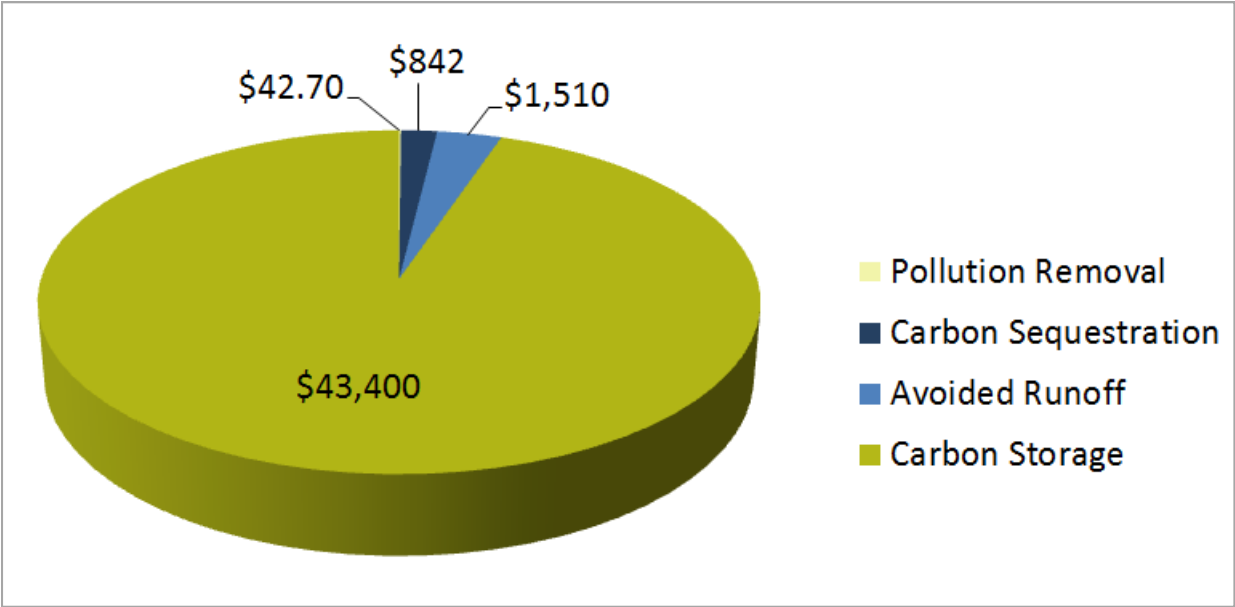
Tree Benefits: Townwide

Public shade trees provide benefits to the Town of Northfield and its residents, such as increased property values and decreased energy costs. iTree Eco, a free U.S. Forest Service application, was used to calculate the annual benefits of the trees inventoried. iTree Eco is an analysis tool for urban forest managers that uses tree inventory data to quantify the dollar value of annual benefits including carbon storage and sequestration, stormwater runoff, and air pollution reduction. iTree Eco also calculates the structural value of the trees inventoried.

Tree benefits are converted into monetary value as follows:

- ⇒ **Carbon Storage and Gross Carbon Sequestration:** Carbon storage and gross carbon sequestration value is calculated based on the price of \$129.73 per ton. Carbon stored is 334.6 tons or \$43,400 annually. Carbon sequestered is 6.494 tons or \$842 annually.
- ⇒ **Avoided Runoff:** The annual reductions in annual stormwater runoff due to rainfall interception by trees. Avoided runoff value is calculated by the price \$0.067/ft³. Total avoided runoff is 22.55 thousand cubic feet or \$1,510 annually.
- ⇒ **Pollution Removal:** Amount of pollution particulates removed from the air. Total per year of pollution removed is 322 pounds or \$43.

Annual Benefits: Trees in the project area provide roughly **\$46,000** in benefits each year.



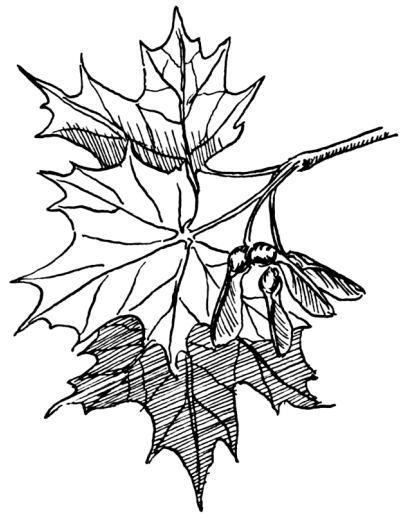
Structural Value: Trees in the project area are worth nearly **\$1.05 million**

The 412 trees inventoried provide roughly \$46,000 in annual benefits. Typically, as trees get larger, their value increases.

Public trees are a significant asset for the Town of Northfield. If one were to try to replace all the trees inventoried, based upon their current size and value, it would cost about \$1.05 million to do so.

Replacement values are determined using methodology developed by the Council of Tree and Landscape Appraisers, which includes a number of factors, such as hardiness, durability (structural integrity), and longevity. Replacement values are estimates of the full cost of replacing trees in their current condition, should they be removed for some reason.

Trees in the Town of Northfield play an important part in providing ecological and other services to the Town, including saving the Town and its residents money. Trees are an integral part of Northfield’s infrastructure (such as streets, sidewalks, stormwater drains, etc.) and help to reduce overall costs to the Town. Investment and maintenance of trees should be given the same importance as other infrastructure in Northfield.



Acer saccharum
Sugar maple

Townwide Findings and Maintenance Needs

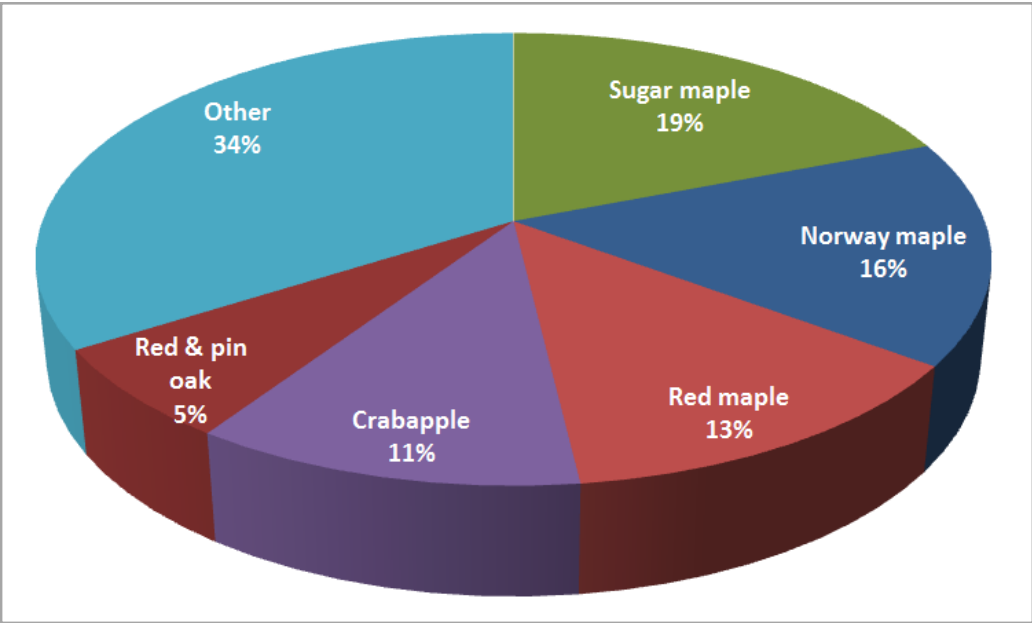
Findings: All trees

TREE SPECIES IN NORTHFIELD: The 412 trees inventoried in Northfield are comprised primarily of a mix of shade trees (large trees with spreading canopies) and crabapple trees. The most prevalent trees are sugar maples, which make up nearly one fifth of trees inventoried in Northfield. Norway maples and red maples are the next most prevalent trees, followed by crabapple and red and pin oaks.

In all, nearly half of trees inventoried are maples of one species or another. Sugar maples - as well as other maples - are particularly vulnerable to the warming temperatures we are experiencing in the Northeast U.S.. This vulnerability, along with other stressors such as road salt and acid rain, will continue to contribute to the decline in sugar maples and other maples. Planting diverse tree species in the future will help Northfield’s tree population be more resilient to pests, pathogens and impacts from climate change.

A suggested tree species list is included as part of this report, with recommendations for diversity, climate resilience and appropriate size for the site. *Recommendations for Streetside Tree Planting* can be found on page 27.

Tree Species Prevalence (all trees inventoried)



TREE SIZE IN NORTHFIELD: About 31% of trees in Northfield are 70' or taller. Many of the taller trees were located on the more rural roads, such as the oak pictured to the right. Taller trees provide more shading benefits, such as reduced cooling costs for homes and businesses, and reduced degradation of asphalt.

Less than one percent of trees inventoried were less than 10' tall. Most of these small trees were ornamental trees, such as paperbark maple. Seven percent of trees inventoried were between 10' and 19' tall. Some of these shorter trees were very young trees, such as London planetree.

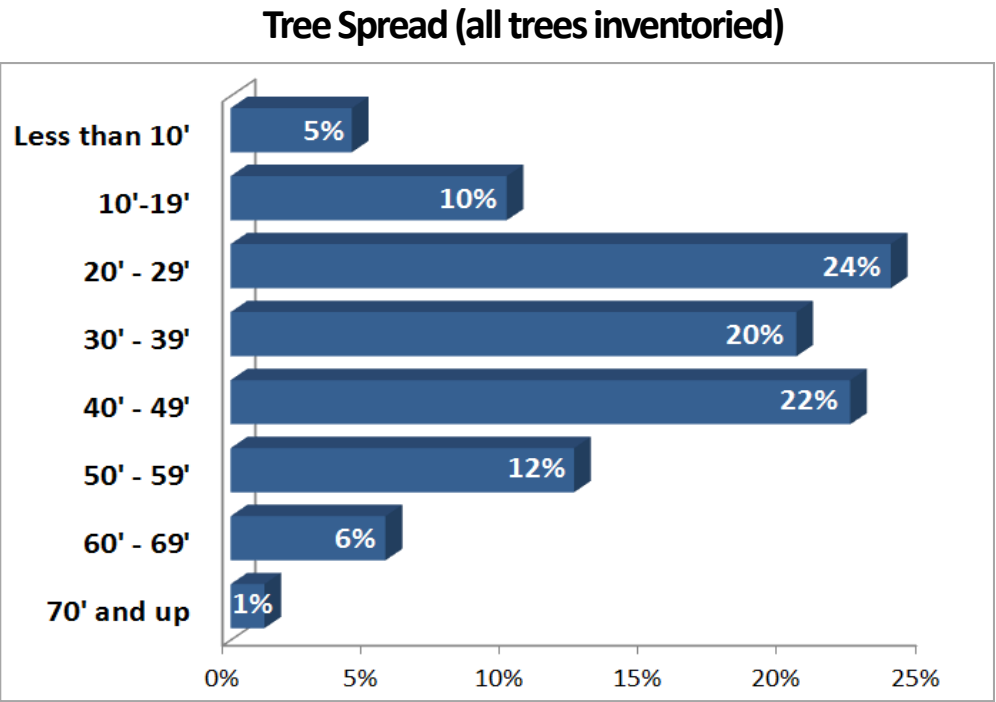
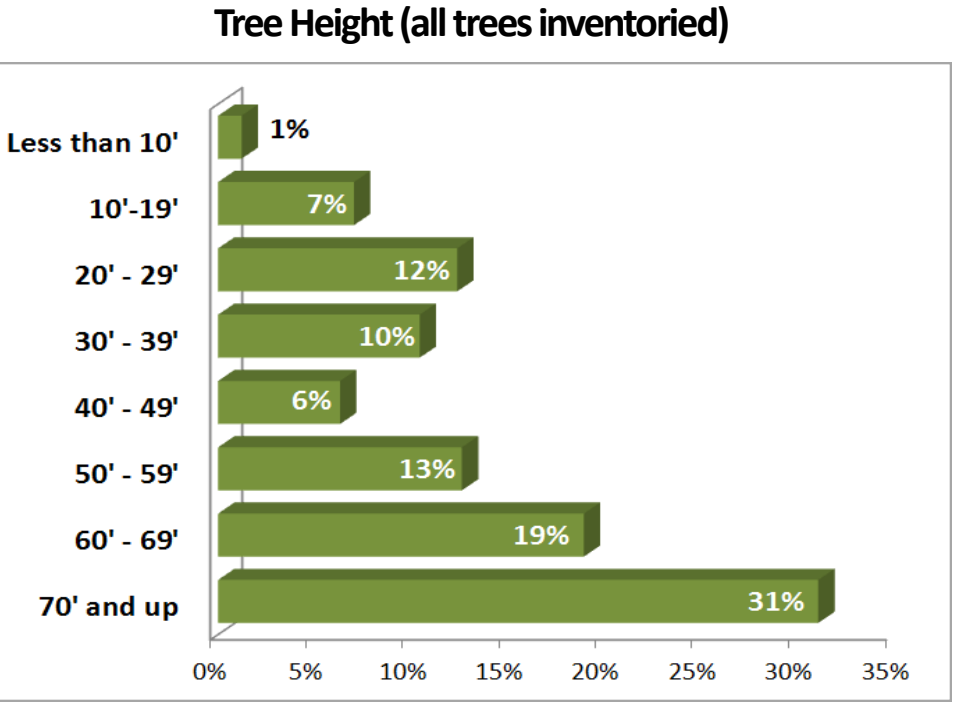
In terms of tree spread, just over 65% of all trees in Northfield are between 20' and 49' feet wide. Only 15% are smaller, with a spread of less than 20'. Twelve percent are between 50' and 59' wide and just seven percent reach a width of 60' or wider. It is the case that sometimes the spread of a tree canopy is constrained by the close proximity in which trees grow with one another.

Trees with wider canopy collect more rainwater, decreasing stormwater runoff. This is particularly important as climate change brings with it more precipitation which is predicted to fall in the form of more frequent, more intense storms.

Trees with wider canopy collect more rainwater, decreasing stormwater runoff and reducing erosion and flooding.



Of the tallest trees, many were growing in stands on the more rural roads, such as on Glen Road. In settings such as these the height and spread of trees had to be estimated because of how closely together the trees were growing.



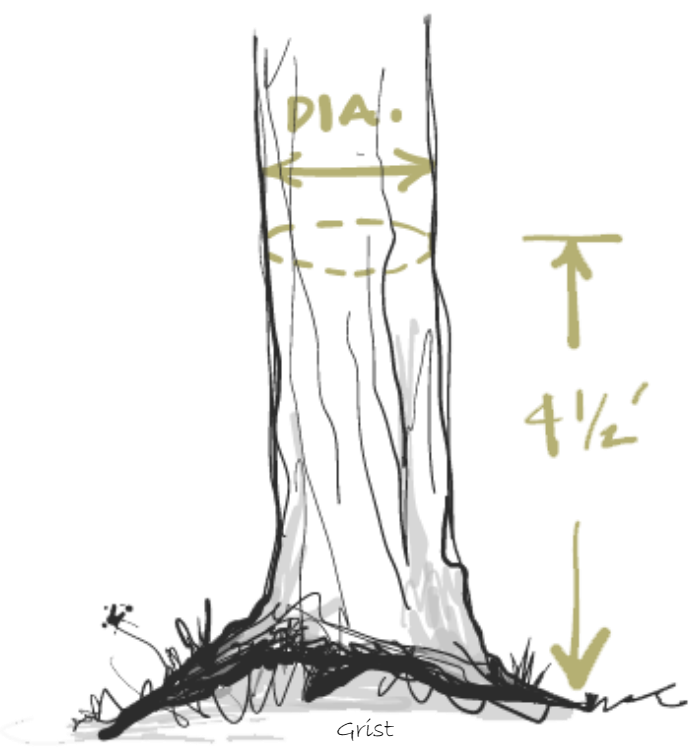
TREE TRUNK DIAMETER IN NORTHFIELD: Most of the trees inventoried – 56% – measure between 10" and 29" in diameter (DBH). In contrast, only 13% of the tree population is made up of young trees (5" DBH or smaller).

Larger DBHs and, presumably, older trees are less prevalent. Only ten percent are between 30" and 39" in diameter. And just 3% are 40" or wider. The largest tree measured, in terms of DBH, is a red maple located on East Street. Its hefty diameter is 54".

In 2005, an inventory of trees was conducted on a few streets in Northfield. Two variables - DBH and condition - can be compared between the 2005 and 2018 inventories.

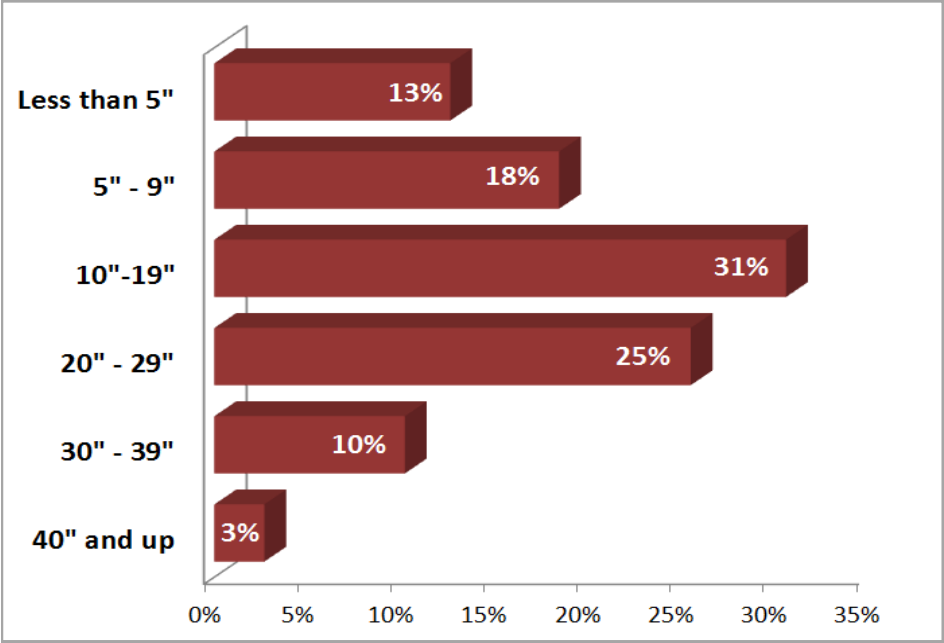
Red maples averaged 15" in diameter in 2005. In 2018, the average DBH has increased 4" to 19". Other tree species saw increased in DBH as well. Oaks increased by 4" DBH, while Norway maples increased an average of 3".

Having a diverse tree population in terms of DBH and age is important. If a large number of older trees were to die off, the tree population would not be able to rebound without a significant population of young trees.



DBH = Diameter at breast height

Tree Trunk Diameter (DBH) (all trees inventoried)



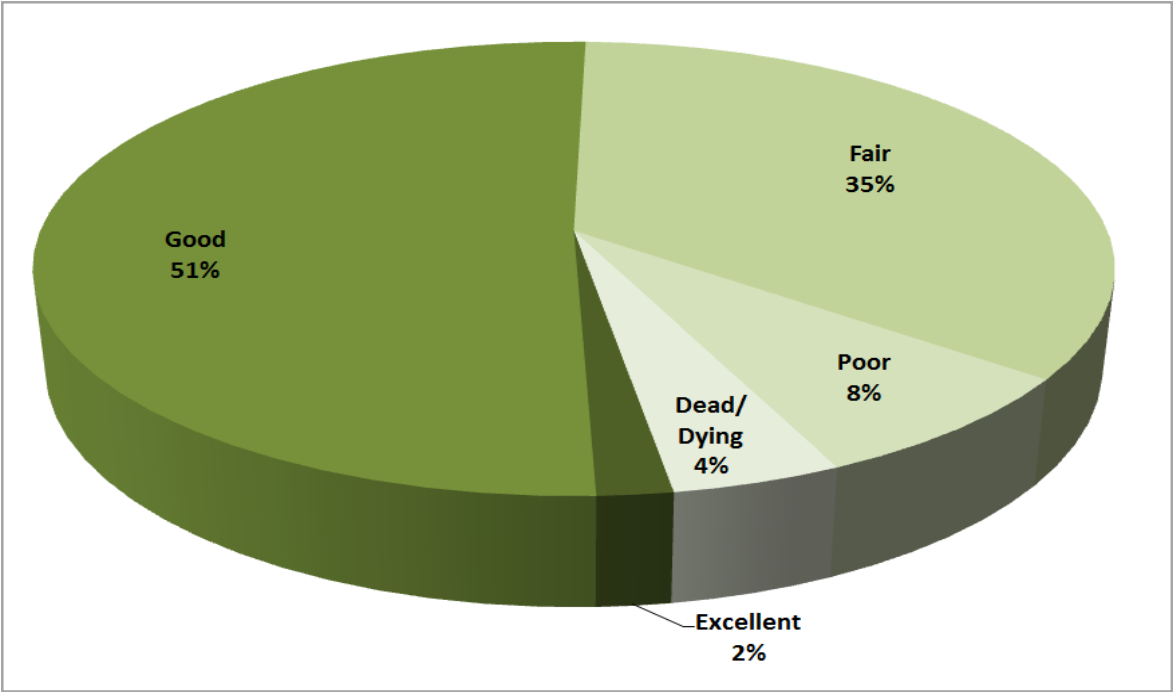
Change in DBH between 2005 and 2018

Species and count	Average DBH 2018	Average DBH 2005	Increase in DBH
Norway maple (15)	23"	20"	3"
Red maple (33)	19"	15"	4"
Sugar maple (14)	30"	28"	2"
Oaks (6)	30"	26"	4"
Other (17)	25"	23"	2"



The largest trunk diameter - or DBH - was measured on a red maple on East Street. This tree trunk measured 54" in diameter.

Tree Condition (all trees inventoried)



TREE CONDITION IN NORTFIELD: The tree inventory found a population of trees in varying conditions. Just two percent of trees were found to be in excellent condition, while just over half the trees inventoried are in good condition. One third of trees inventoried are in fair condition. Trees in poor condition or dead or dying make up twelve percent of the overall tree population.

Compared with conditions in 2005, overall condition has declined. While this inventory does not assess the increase or decline of each tree, in general trees in good condition have decreased by about 38%. There was a ten percent increase in trees in fair condition, while there was a 38% increase in trees in poor condition.

Change in Condition between 2005 and 2018

Condition	Tree Quantity 2018	Tree Quantity 2005	% change
Good	47	65	-38%
Fair	29	26	10%
Poor	16	10	38%





Dieback of branches was observed in a number of trees, including in sugar maples throughout the project area.

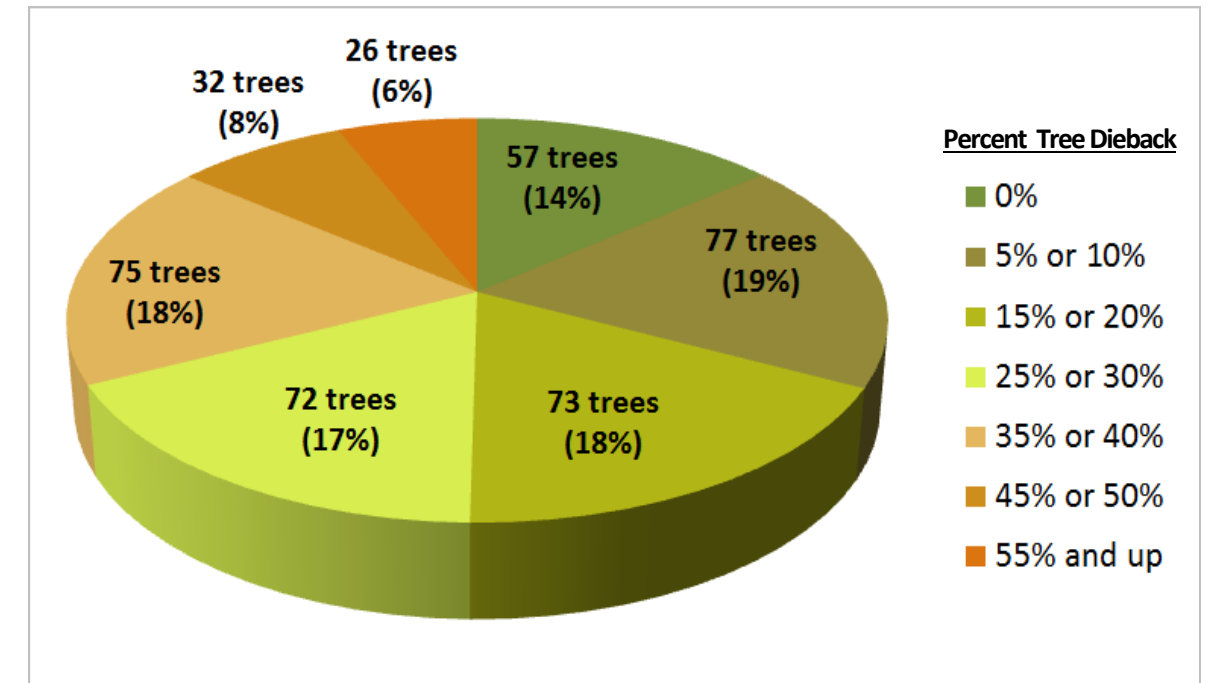
One of the variables used to assess tree condition is the percent of the tree canopy that has died back. About 14% of trees had no visible dieback, or dead branches or leaves. Nineteen percent of trees were found to have up to ten percent dead branches or leaves in their canopy. The pie chart to the right illustrates the remaining findings and shows that just six percent of all trees inventoried had canopies with 55% or more dieback in their canopy.

Along with the condition, the maintenance needs of each tree was determined. Of the 412 trees inventoried, over half - or 244 - had no discernable needs for maintenance, and only 6 trees were deemed to be a critical concern. The highway department should prioritize tending to the critical concern trees as soon as possible, since injury to the public is possible due to the trees' condition. There are an additional 34 large trees that need immediate (or as soon as is possible) maintenance due to dead limbs and other issues. There are twelve small trees that need immediate maintenance, but these trees should be looked after only after the critical concern trees and large trees with immediate maintenance needs are resolved.

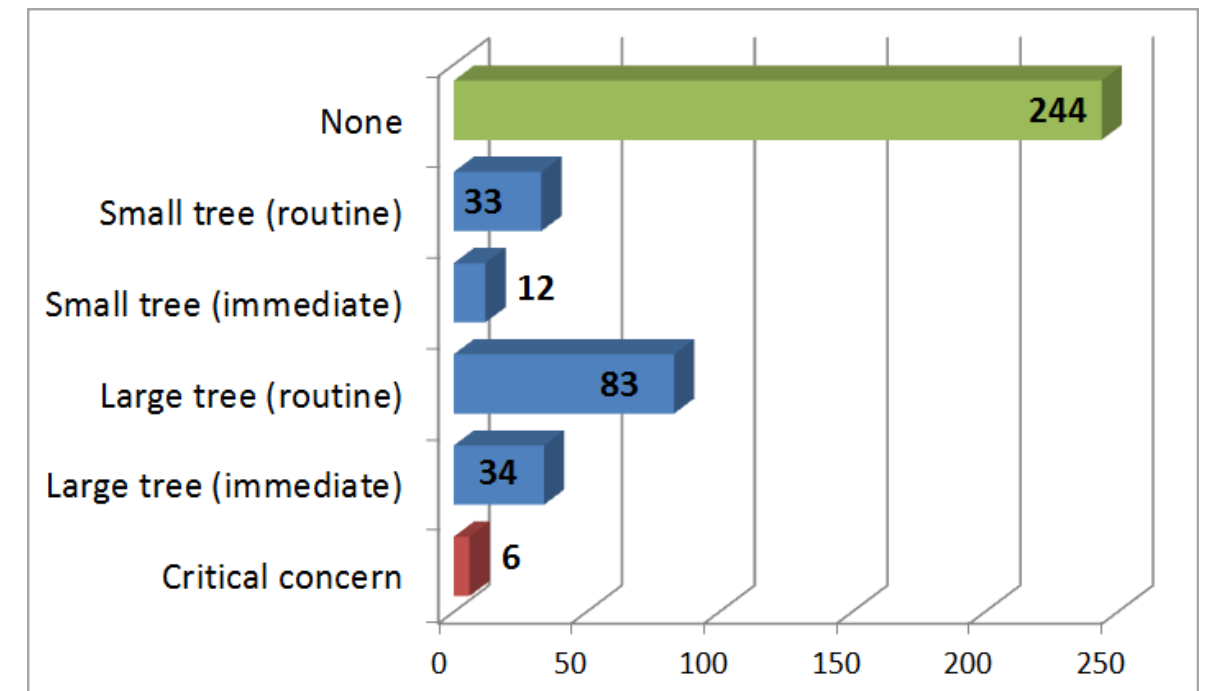
Note: See page 18 for tree maintenance recommendations that fall within the jurisdiction of MassDOT's right-of-way.

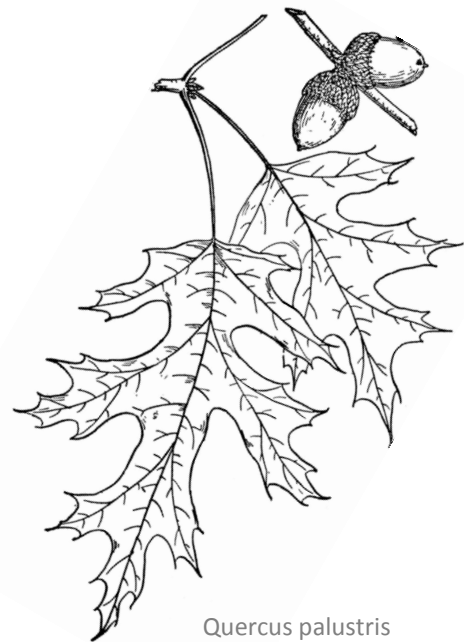
Continued, regular maintenance is vital to keeping the public tree population healthy. Maintenance can be prioritized by using the data collected in this inventory, sorting the trees by condition and scheduling maintenance for the trees in the poorest condition.

Tree Canopy Percent Dieback



Tree Maintenance Needs





Quercus palustris

Pin oak

Main Street Findings and Maintenance Needs

THE 5-10-20 RULE

Planners can ensure resilience by planting many different kinds of trees. This makes the population less vulnerable to pests and diseases. To maintain a good balance of trees, follow this formula:

- No more than 5 percent of one species
- No more than 10 percent of one genus
- No more than 20 percent of one family

— Slaff | Freedman | Grist *Ecological Resilience in Deerfield: Trees as Green Infrastructure*, 2018

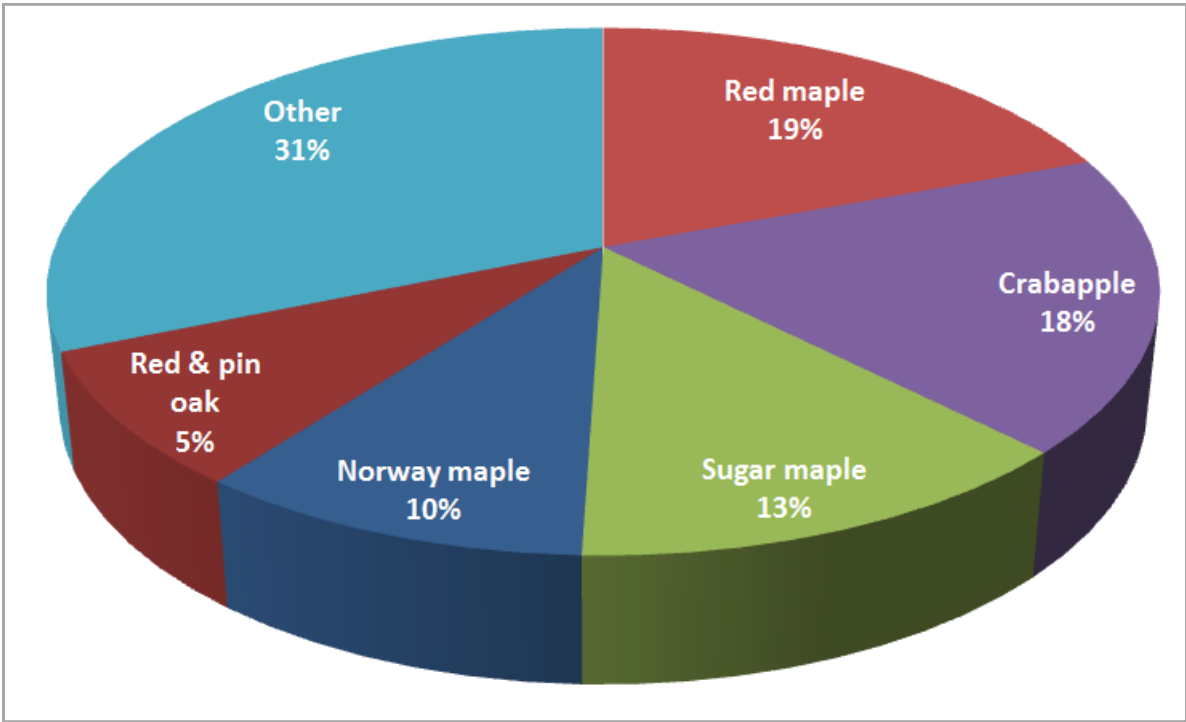
Findings: Main Street Only

TREE SPECIES ON MAIN STREET: Of the 412 trees inventoried in Northfield, 192 are located on Main Street, primarily within the state highway right-of-way. The trees on Main Street are mostly a mix of shade trees (large trees with spreading canopies) and crabapples (smaller stature trees).

The most prevalent tree on Main Street are red maples, which make up nearly one fifth - or 19% - of trees inventoried in Northfield. The next most prevalent are crabapple, which make up 18%. Sugar maples make up 13% of trees inventoried on Main; this in contrast to 20% of trees overall. Norway maples are less prevalent on Main Street - only 10% - as compared with overall trees inventoried, where Norway maples made up 16% of the tree population. Red and pin oaks round out the list of the most prevalent tree species at 5%. All other trees make up 31% of the tree population on Main Street.

In all, about 50% of trees inventoried on Main Street are maples of one species or another. Sugar maples - as well as other maples - are particularly vulnerable to the warming temperatures we are experiencing in the Northeast U.S.. This vulnerability, along with other stressors such as road salt and acid rain, will continue to contribute to the decline in sugar maples and other maples. Planting diverse tree species in the future will help Northfield’s tree population be more resilient to pests, pathogens and impacts from climate change. A suggested tree species list is included as part of this report, with recommendations for diversity, climate resilience and appropriate size for the site. See page 27.

Tree Species Prevalence (Main Street Only)



- Maple, Norway
- Maple, red
- Maple, sugar
- Oak, northern or pin
- Crabapple
- Other

TREE SIZE IN ON MAIN STREET: Nearly one third of trees on Main Street are less than 30 feet. These shorter trees will not provide as much shading, which reduces cooling costs for residents, businesses and Town buildings on Main Street. On the other end of the height spectrum, about one quarter of trees on Main Street are 60' or over.

As the Town plants more trees, generally they should select the biggest stature trees for most locations on the tree belt on Main Street since the tree belt is so wide and is mostly unobstructed by overhead utility lines. Taller trees provide more shading benefits, such as reduced cooling costs for homes and businesses, and reduced degradation of asphalt.

In terms of tree spread, less than ten percent of the trees inventoried on Main Street were less than 10 feet wide. Some of these were ornamental trees, such as paperbark maple and others were very young trees. The most prevalent size spreads are between 20 and 29' and between 40' and 49'. Only eight percent of trees inventoried on Main Street are 60' or wider.

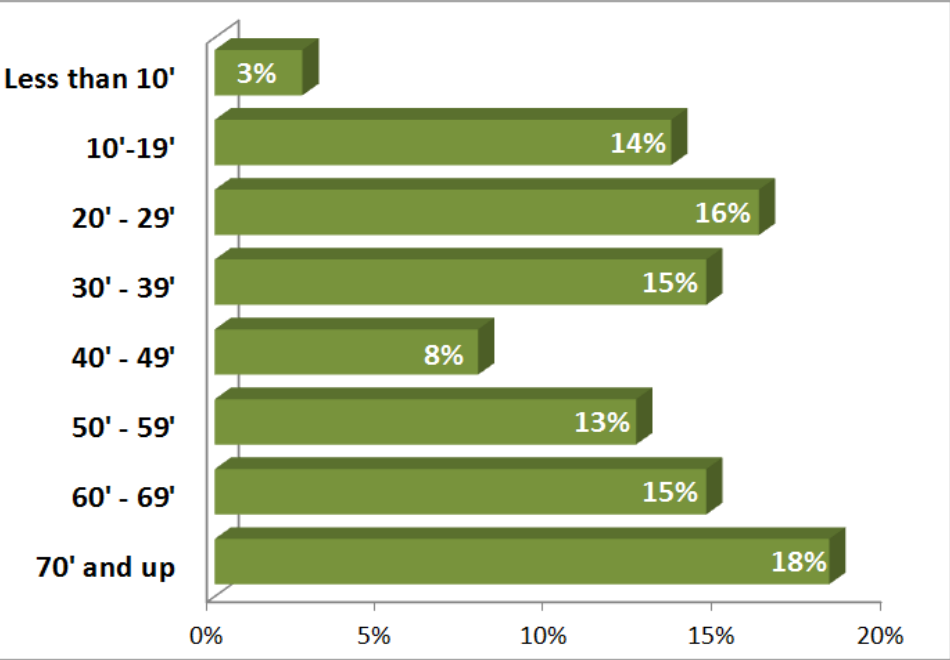
Trees with wider canopy collect more rainwater, decreasing stormwater runoff. This is particularly important as climate change brings with it more precipitation which is predicted to fall in the form of more frequent, more intense storms.

On Main Street, there were substantially more trees with small trunk diameters, or DBHs. One reason for more trees with small DBHs is that the percentage of crabapples, which have smaller DBHs, is higher on Main Street than overall. Only twelve percent of trees on Main Street have a DBH of 40" or more. Generally speaking, trees with larger DBHs are older trees.

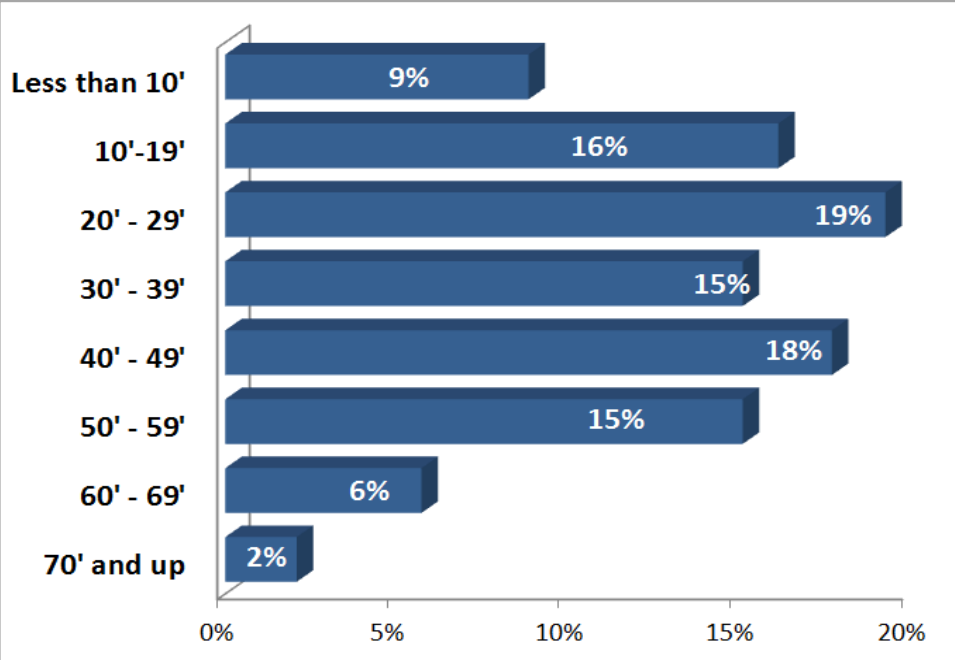


Planting shorter stature trees, such as the crabapples pictured here, may not be the best use of the ample tree belts on Main Street, which can accommodate much larger trees which would provide much substantially more benefits.

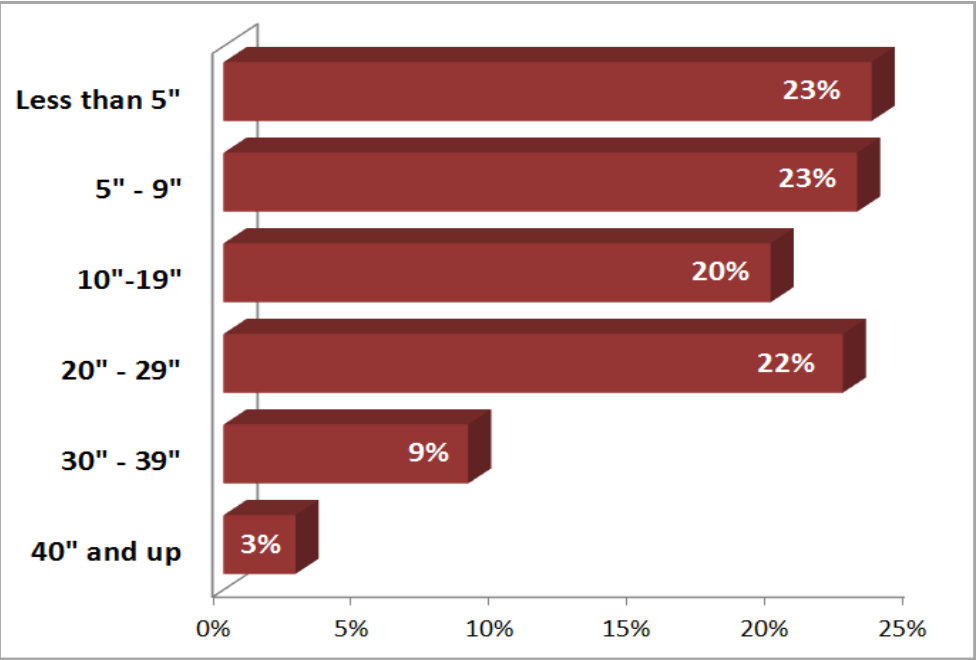
Tree Height (Main Street Only)



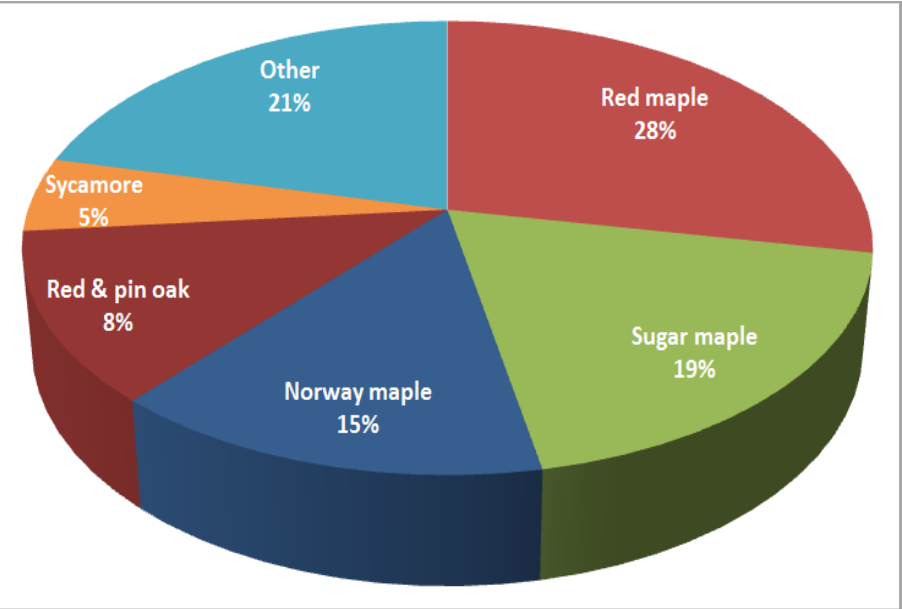
Tree Spread (Main Street Only)



Tree DBH (Main Street Only)



Tree Species Prevalence (Main Street Only):
No Ornamental Trees Included



TREE SIZE IN ON MAIN STREET, NOT INCLUDING CRABAPPLES AND OTHER

ORNAMENTAL TREES: Although crabapples are not categorized as shade trees, which are typically large trees with spreading canopies, crabapples (and other ornamental trees) were included in the tree inventory given their prevalence on Main Street. The data on this page looks at the distribution of shade trees only.

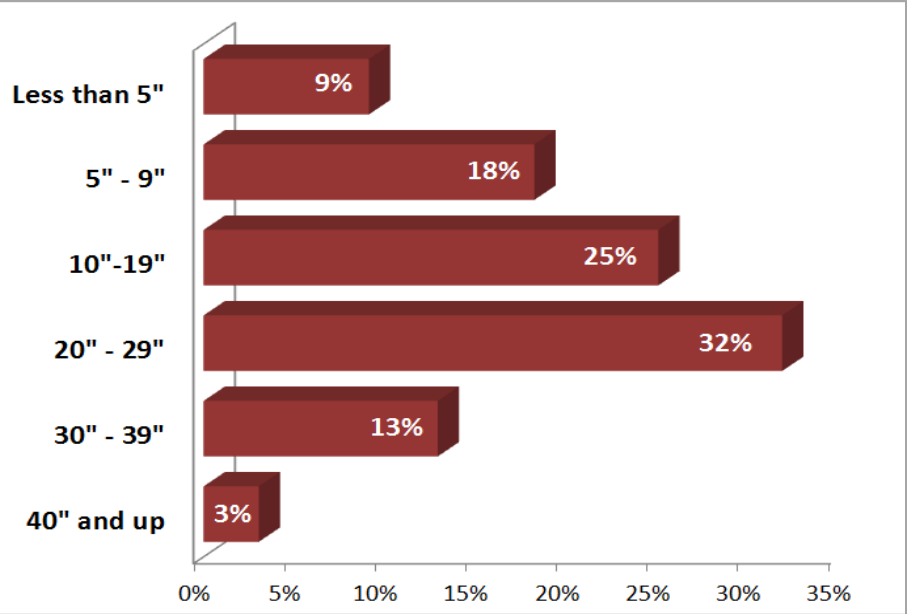
When ornamental trees are subtracted from the 192 trees inventoried on Main Street, 132 shade trees remain. In this case, red maples make up 28% of the shade trees and sugar maples make up 19%. In all, maple tree species make up 62% of all shade trees on Main Street.

Red oaks and sycamore also make up some of the most prevalent species, at eight percent and five percent respectively. Moving forward, the Town of Northfield should aim to increase these two tree species - along with other trees listed on page 27 - since these trees are identified as being especially resilient to climate change and other stressors.

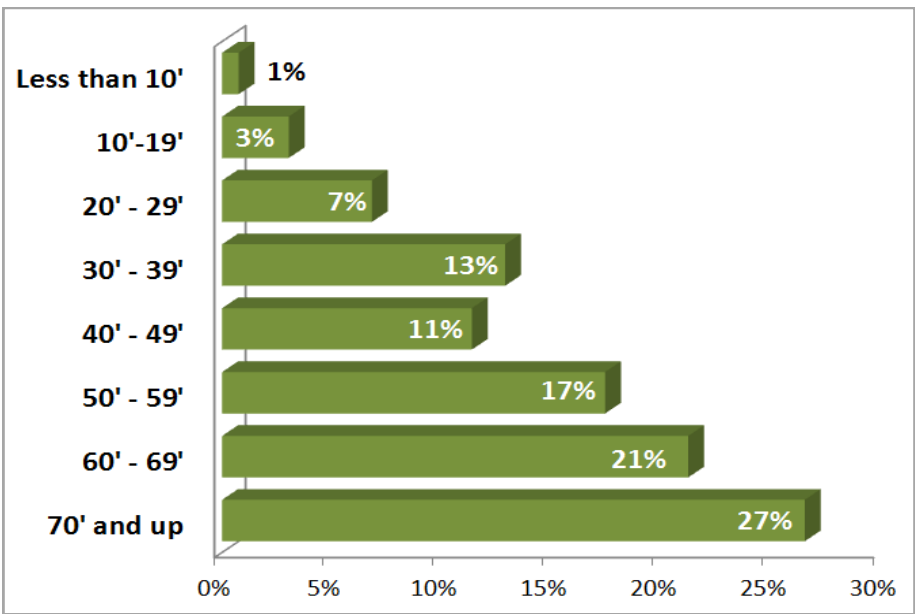
When subtracting out the ornamental trees on Main Street, findings show few young trees (trees with trunks less than 5" in diameter and/or less than 10' high and/or wide. The most common trunk diameter is between 20" and 29" - and nearly half of shade trees on Main Street are 20" or wider, indicating trees that are mature or reaching maturity. Tree height also reveals a tree population that is mature or maturing, with two thirds of all trees reaching a height of 50' or taller. And most shade trees on Main - 44% - have a spread between 40' and 59'.

With findings showing a rather mature shade tree population on Main Street, Northfield should prioritize planting more trees each year to increase the age diversity of its trees and to prepare for the die out of some of its oldest and/or most vulnerable trees.

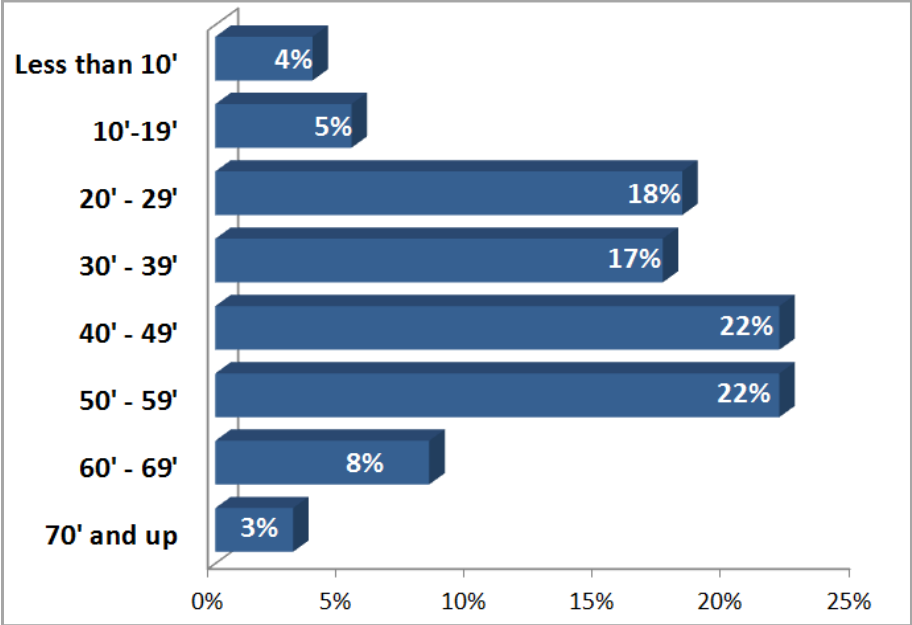
Tree DBH (Main Street Only):
No Ornamental Trees Included



Tree Height (Main Street Only):
No Ornamental Trees Included



Tree Spread (Main Street Only):
No Ornamental Trees Included



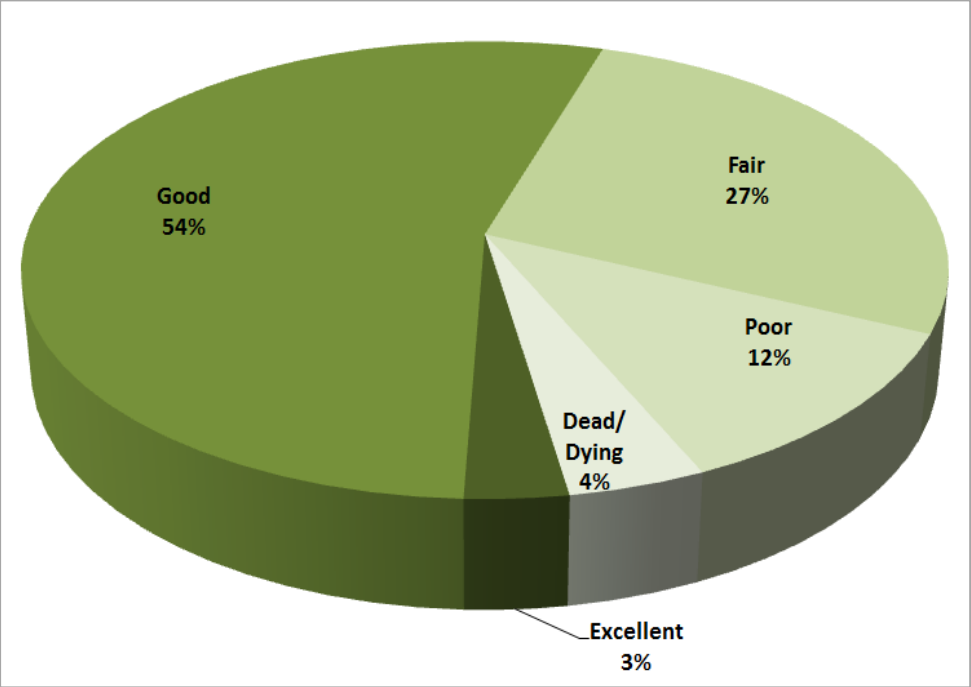
TREE CONDITION ON MAIN STREET: The tree inventory found a population of trees in varying conditions on Main Street. Just three percent of trees were found to be in excellent condition, while just over half the trees inventoried are in good condition. Just over one quarter of trees inventoried on Main Street are in fair condition. Trees in poor condition or dead or dying make up 16% of the tree population on Main Street, as compared with twelve percent overall.

One of the variables used to assess tree condition is the percent of the tree canopy that has died back. About 20% of trees had no visible dieback, or dead branches or leaves, as compared with 14% overall. Thirty percent of trees were found to have up to 10% dead branches or leaves in their canopy. The pie chart to the right illustrates the remaining findings and shows that just 5% of all trees inventoried had canopies with 55% or more dieback in their canopy. In general, dieback findings are more favorable on Main Street compared with Northfield overall. This may be because trees on Main Street receive more scrutiny since the road is more heavily settled and traveled.

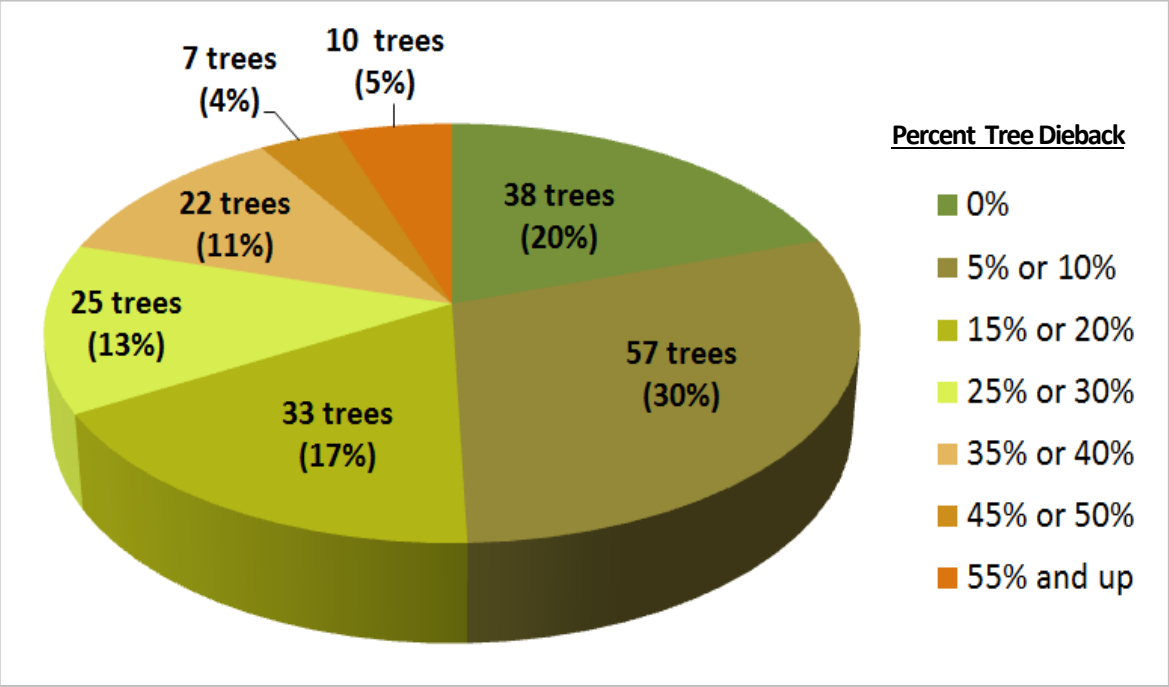
Along with the condition, the maintenance needs of each tree was determined. Of the 192 trees inventoried on Main Street, over half - or 107 - had no discernable needs for maintenance, and only four trees were deemed to be a critical concern. The Town should contact MassDOT to request that they tend to the critical concern trees as soon as possible, since injury to the public is possible due to the trees' condition. There are an additional 34 large trees that need immediate (or as soon as is possible) maintenance due to dead limbs and other issues. There are also 12 small trees that need immediate maintenance. These trees should also be maintained by MassDOT as soon as possible. See the next page for more information on MassDOT and trees.

Continued, regular maintenance is vital to keeping the public tree population healthy. Maintenance can be prioritized by using the data collected in this inventory, sorting the trees by condition and scheduling maintenance for the trees in the poorest condition.

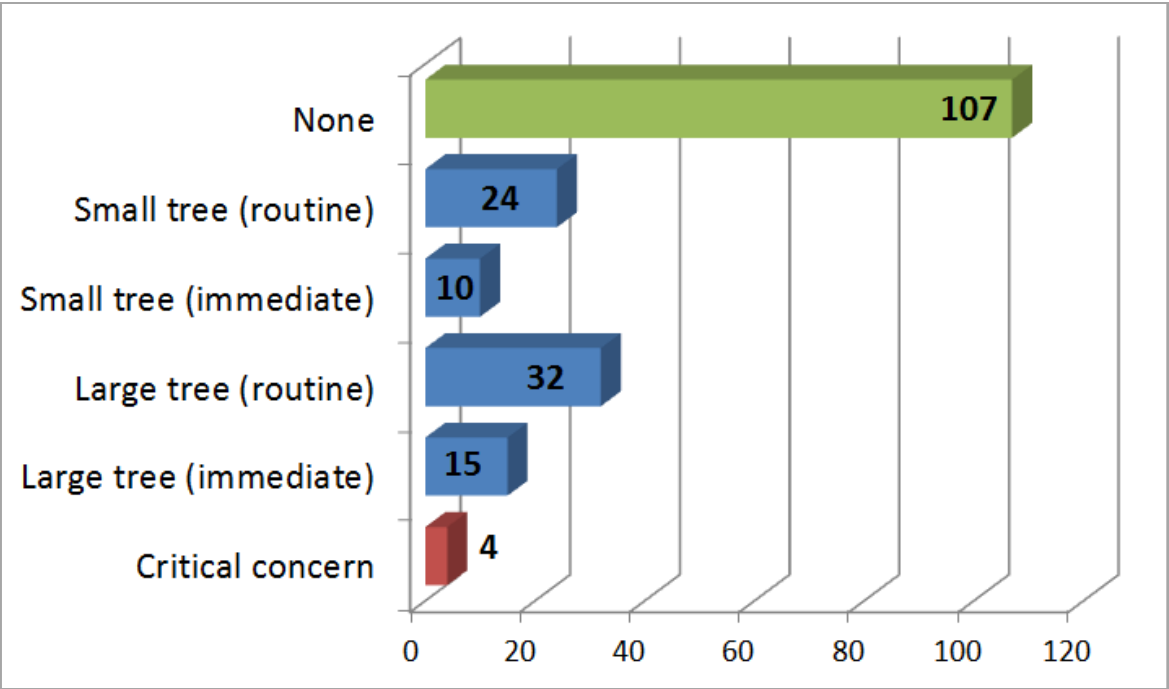
Condition (Main Street Only)



Percent Dieback (Main Street Only)



Maintenance Needed (Main Street Only)





Main Street Tree Maintenance and MassDOT

Main Street is also State Highway 63. As such, trees along Main Street should be planted and maintained by MassDOT. On the west side of Main Street, trees in the tree belt are within MassDOT’s right-of-way. On the east side of Main Street, generally trees in tree belts and in front yards are within MassDOT’s right-of-way.

According to Acting District Maintenance Engineer for MassDOT’s Highway Division, District 2, MassDOT does not currently have a budget for regular planting and maintenance of trees. They will only plant trees if there is a significant road construction project. In terms of maintenance, they will only maintain trees that are “clear hazards”, which include risk of falling limbs or entire tree or obstruction of signs, signals and sight lines.


Tree deemed “clear hazards” on Main Street as part of this project are shown in the table below, along with large trees requiring immediate maintenance. The Town of Northfield should contact MassDOT with this list of trees and request maintenance as soon as possible.

Address	Tree	Maintenance required	Notes
4 Main Street	American elm	Removal	Dead
4 Main Street	Sugar maple	Crown cleaning; remove dead branches; treat for insects	
56 Main Street	Norway maple	Crown cleaning; remove dead branches	
61 Main Street	Red maple	Crown cleaning; remove dead branches	
65 Main Street	Sugar maple	Crown cleaning; remove dead branches	
66 Main Street	Red maple	Crown cleaning; remove dead branches	
68 Main Street	Red maple	Crown cleaning; remove dead branches	
69 Main Street	Red maple	Crown cleaning; remove dead branches	
87 Main Street	Sugar maple	Crown cleaning; remove dead branches	Evaluate wound from missing branch
88 Main Street	Sugar maple	Crown cleaning; remove dead branches	Dead branches hanging over bench and sidewalk
89 Main Street	Sugar maple	Crown cleaning; remove dead branches; treat for insects	See hole in trunk on east side
90 Main Street	Red maple	Crown cleaning; remove dead branches	
92 Main Street	Red maple	Crown cleaning; remove dead branches	
92 Main Street	Red maple	Crown cleaning; remove dead branches	
113 Main Street	Norway maple	Crown cleaning; remove dead branches	In front of Library; pedestrian risk
113 Main Street	Paper birch	Crown cleaning; remove dead branches	In front of Library; pedestrian risk; dead branch over bench
155 Main Street	Sugar maple	Removal	Tree is nearly dead and is at risk for falling
157 Main Street	Sugar maple	Crown cleaning; remove dead branches	
186 Main Street	Red maple	Crown cleaning; remove dead branches	Stunted



Trees located within MassDOT’s right-of-way on Main Street and that are “clear hazards”, such as this dead elm on the south end of Main Street, must be maintained or removed by MassDOT.

Planting Recommendations: Main Street



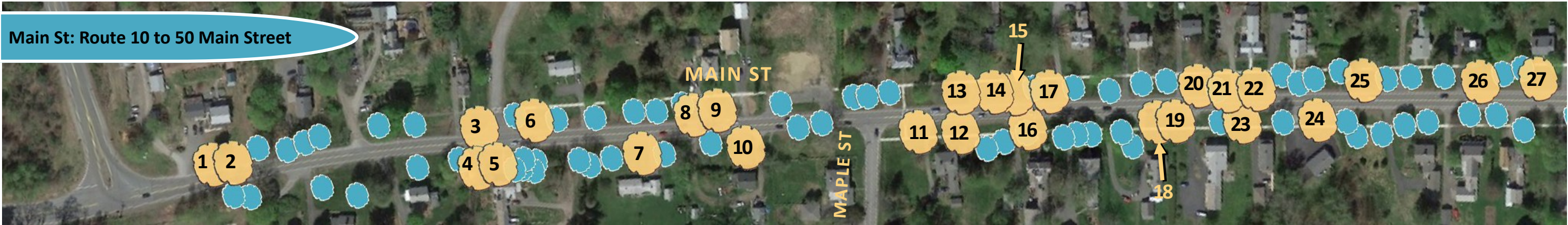
Main Street Tree Planting and MassDOT

As stated on the previous page, trees in the tree belts along Main Street are within MassDOT’s right-of-way. However, MassDOT does not currently have a budget for regular trees planting. They will only plant trees if there is a significant road construction project.

Given this situation, the Town of Northfield should set goals and allocate funding toward tree planting along Main Street. To plant along Main Street, the Town of Northfield has to follow these steps:

1. Determine the proposed locations for planting trees, using recommendations on this and the following page .
2. Contact MassDOT for a Highway Access Permit. Once granted, permits are good for five years. It is recommended that the Town seek a permit for as many trees as they think they will plant in five years, rather than seeking permits piecemeal.
3. Once ready to plant a tree or trees, the Town of Northfield is responsible for calling DigSafe prior to planting.

Available Spaces for Trees	Recommended Tree	Notes
1,2	Tulip poplar; London planetree or other upright species	Choose upright species that could be limbed up to avoid blocking the view of passersby to the business
3	Hackberry; Freeman maple	If this lower-lying site is moist, choose a wet-soil tolerant species
4, 5, 6, 7, 8, 9	Any shade tree listed on page 27	Site can accommodate shade tree; do not plant ornamental tree here
10	Any shade tree listed on page 27	Do not plant under the utility line from the street to the house
11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23	Any shade tree listed on page 27	Site can accommodate shade tree; do not plant ornamental tree here
24	Black tupelo, littleleaf linden, or yellowwood	Medium stature tree such as those listed in this site would be best
25,26, 27	Any shade tree listed on page 27	Site can accommodate shade tree; do not plant ornamental tree here
28, 29	Any shade tree listed on page 27	Site can accommodate shade tree; do not plant ornamental tree here
30, 31	Elm ‘Prospector’ or ‘Triumph’; ginkgo	Two matching, narrower trees would frame the entrance to Town Hall nicely
32	Any shade tree listed on page 27	Recommended tree would replace failing red maple which should be removed



Planting Recommendations: Main Street (cont.)

Available Spaces for Trees	Recommended Tree	Notes
33	Any shade tree listed on page 27	Site can accommodate shade tree; do not plant ornamental tree here
34	Black tupelo, littleleaf linden, or yellowwood	Medium stature tree such as those listed in this site would be best
35, 36	Any shade tree listed on page 27	Site can accommodate shade tree; do not plant ornamental tree here
37	Ginkgo	Ginkgo has open branching form which would not block retail signs
38, 39	Any shade tree listed on page 27	Two matching trees would frame the entrance to the building nicely
40, 41	Any shade tree listed on page 27	Recommended tree would replace sugar maple which should be removed
42, 43, 44, 45	Any shade tree listed on page 27	Site can accommodate shade tree; do not plant ornamental tree here
46, 47	Crabapple	See species listed on page 27
48, 49	Ginkgo	Ginkgo has open branching form which would not block retail signs
50	Any shade tree listed on page 27	Site can accommodate shade tree; do not plant ornamental tree here
51, 52, 53	Elm ‘Prospector’ or ‘Triumph’; ginkgo	Narrower tree to avoid utility lines



See the Recommended Trees for Streetside Planting list on page 27 for climate resilient and site-specific trees.



Planting Recommendations: Other Streets



Trees on Highland Avenue and East Street

Of the streets in the tree inventory project area in Northfield, three streets - Main Street, Highland Avenue and East Street - have a somewhat formal layout, with houses located regularly along the streets and streets lined with shade trees. Other streets radiating from Main Street have a more rural character, with wooded areas and irregularly placed houses. In terms of planting more trees, the Town should prioritize planting on Main Street, Highland Avenue and East Street.

When considering planting trees on Highland Avenue and East Street, maintaining more formal rows of shade trees along streets is suggested. Doing so will help the Town maintain the character and look of these more densely settled residential streets.

As shown in the charts below, Highland Avenue and East Street are populated with street trees that are primarily maple species. Page 8 discusses reasons for diversifying street trees including increasing resilience to climate change with higher tree species diversity and avoiding mass die-off of tree species due to a pest or pathogen that targets trees such as maples.

The *Recommended Trees for Streetside Planting* document on page 27 provides a robust list of trees for a variety of locations the Tree Warden should consider when planting on these streets.

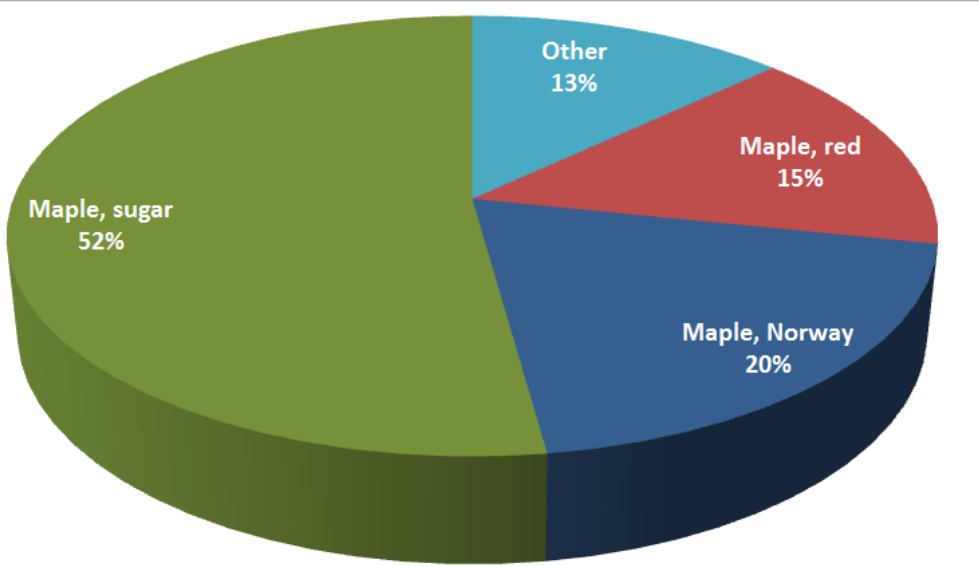


Of the 46 trees inventoried on Highland Avenue, 85% are maples of various species and over 50% are sugar maples.

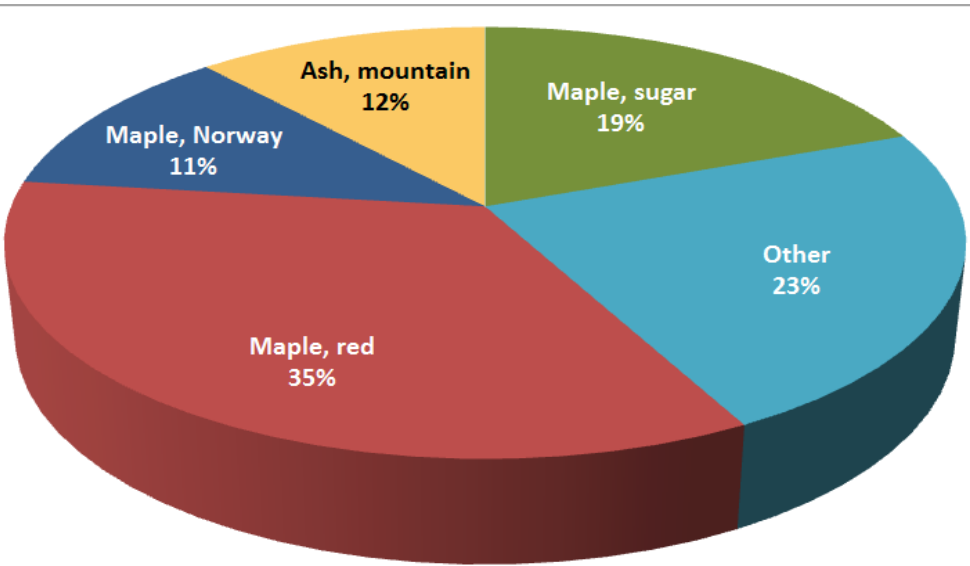


Twenty six trees were inventoried on East Street. Sixty five percent are maples of various species and 35% are trees of other species such as mountain ash.

Highland Avenue Tree Species



East Street Tree Species



Summary Action Plan

This table is a compilation of recommendations listed throughout this report and can be used as a stand-alone document.

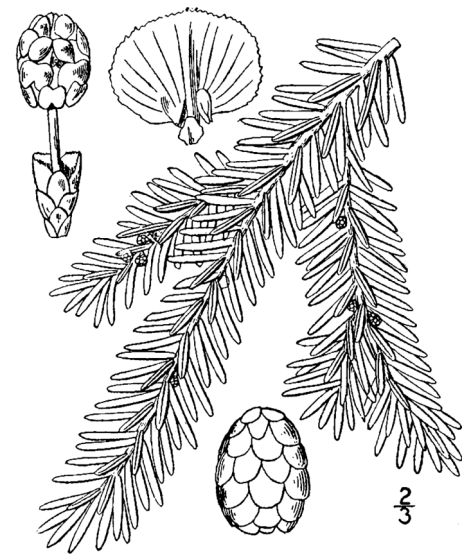
Goals	Strategies	Timeline	Potential Funding Source	Responsible Group
Use the baseline inventory for planning.				
	Use the baseline tree inventory results, especially the condition of trees, to help plan priority tree maintenance and planting needs.	2018-2019	Town	Northfield Highway Department; Tree Warden
	Use the baseline tree inventory to track tree condition, maintenance and planting over time, updating the data periodically as budget and staffing allows.	Ongoing	Town; District Local Technical Assistance (DLTA); Department of Conservation and Recreation Urban and Community Forestry Challenge Grant (DCR Challenge Grant)	Northfield Highway Department; Tree Warden; FRCOG
	Incorporate street trees into overall strategies and planning initiatives to improve or add new green infrastructure, improve walkability and reduce stormwater runoff.	Ongoing	Existing Highway Department budget for trees; DLTA; DCR Challenge Grant	Northfield Highway Department; Planning Board; FRCOG
	Seek funding to conduct annual updates to the inventory.	Ongoing	DLTA; DCR Challenge Grant	Northfield Tree Warden; Northfield Highway Department; FRCOG
Continue to maintain and plant more public trees.				
	Be proactive in preparing for the decline of maples by planting diverse tree species around Town, using the following to help prioritize tree placement and species: ⇒ Plant trees that are resilient native species as well as trees deemed as having climate change adaptability and disease tolerance. Be aware of tree rooting space needed. See the 5-10-20 Rule (page 12) and the appendix for <i>Recommended Trees for Streetside Planting</i> (page 27). ⇒ Interplant young trees between mature shade trees and near trees in decline where possible. ⇒ Prioritize planting where trees will shade streets and other large expanses of hardscape. ⇒ Avoid planting small stature trees along uniform lines of shade trees; seek to maintain the uniformity of large shade tree species to maintain the character of neighborhoods and to maximize the benefits provided by trees planted along streets. ⇒ Be sensitive to shading the roofs of those homeowners who have solar or PV panels.	Ongoing	Town; DCR Challenge Grant	Northfield Tree Warden; Northfield Highway Department
	Pursue targeted funding for planting trees and providing public education on the importance of trees to the Town, including additional grants from DCR.	Ongoing	DCR Challenge Grant; Community Foundation of Western Mass	Northfield Tree Warden; Northfield Highway Department; FRCOG
	⇒ Use the planting recommendations on pages xx to prioritize tree planting over the next five to ten years. Concentrate efforts on Main Street, Highland Avenue and East Street initially.	2019-2029	DCR Challenge Grant; Town; Private foundation funding	Northfield Tree Warden; Northfield Highway Department
	⇒ In order to allow the public to plant trees on tree belts, develop and distribute guidelines and / or policy for planting trees, using the <i>Recommended Trees for Streetside Planting</i> . Consider requiring a tree planting permit so that the Tree Warden can ensure the public are planting the right tree in the right place.	2019 (policy development); ongoing (planting)	Town; private	Northfield Board of Selectmen; Tree Warden; Northfield Highway Department
	⇒ Work with MassDOT to ensure they are maintaining trees on Main Street. Make specific maintenance requests as detailed on page 18.	2018 for immediate needs; ongoing as needed	MassDOT	Northfield Board of Selectmen; Tree Warden; Northfield Highway Department
	⇒ Work with MassDOT to find out if any tree planting funds become available for Main Street.	Ongoing	MassDOT	Northfield Board of Selectmen; Tree Warden; Northfield Highway Department

Goals	Strategies	Timeline	Potential Funding Source	Responsible Group
Continue to maintain and plant more public trees. (continued)				
	Continue routine maintenance of all trees, using Excel inventory data sorted by condition and/or the tree condition maps to prioritize maintenance.	Ongoing	Existing Highway Department budget for trees	Northfield Tree Warden; Northfield Highway Department
Educate and involve the public.				
	Use the infographics poster and other materials from this project to educate the public by displaying the materials at public meetings, the library and town offices, as well as at other gathering places in Town such as the Senior Center.	2018-2019	None needed	Northfield Town Administrator; Northfield Library Director; Northfield Select Board and Planning Board
	Use the infographics poster to make the case for maintaining or increasing the Highway Department's budget for maintaining and planting trees in Northfield.	2018-2019	None needed	Northfield Highway Department; Select Board; the public; the public
	Work with volunteers to establish a tree committee as a means for supporting the Northfield Highway Department's tree planting and maintenance, and to help increase public awareness and education about the benefits of trees the Town and its residents and natural resources.	2018-2020	DCR Challenge Grant	Northfield Tree Warden; Northfield Select Board, Volunteers
	Pursue a Tree City USA status, if not already in place, which could improve Northfield's chances of receiving funding for tree related projects.	2020	None needed	Northfield Tree Warden; Northfield Highway Department; Northfield Town Administrator
	Consider partnering with schools and youth-focused groups to develop tree-focused curricula and programs that will help develop young tree stewards.	2018-2022	DCR Challenge Grant; DLTA; NOAA Environmental Literacy Grants	Volunteers; FRCOG
	Use educational materials to encourage home owners to plant more trees on their lawns to reduce stormwater runoff.	2018-2019 and ongoing	DLTA; DCR Challenge Grant	FRCOG; Northfield Tree Warden
	Use educational materials provided to alert residents about Asian longhorn beetles, maple decline and other pests and issues impacting street trees.	Ongoing	None needed	Northfield Tree Warden; Library
	Historic District of Northfield: ⇒ Showcase historic trees with interpretive signs that are similar to existing signs on structures and monuments. Consider nominating choice trees to the DCR Legacy Tree program. ⇒ Develop a walking map of trees that incorporates information from earlier and recent tree inventories.	2019-2022	Private foundation grants; ; DCR Challenge Grant	FRCOG; Northfield Tree Warden; Historic Northfield staff



PLANTING SPECIFICATIONS

This report provides specific recommendations on what trees to plant for climate change resilience. See page 27 **Appendix A: Recommended Trees for Streetside Planting**. Also included are planting guidelines. See page 28 for **Appendix B: Considerations and Techniques for Streetside Tree Planting**.



Tsuga Canadensis
Eastern hemlock

Appendices

In addition to planting trees that will tolerate climate change, it is important to continue our efforts to diversify the urban forest.
— Dr. Andrew Bell, Chicago Botanic Garden

Appendix A: Recommended Trees for Streetside Planting

The following trees are deemed to be adaptable and climate change resilient based on U.S. Forest Service recommendations as well as a Chicago Botanic Garden study that evaluated the effects of a warming climate on urban trees. “Trees for 2050” are selected from a list of trees studied by Chicago Botanic Garden for their suitability to survive and thrive under three climate change scenarios. When selecting trees for streetside planting and climate change resilience, diversity of tree species is key.

SHADE TREES																	
Common name	Botanical name	Height (in feet)	Spread (in feet)	North America native?	USDA grow zone**	Light	Water	Root Area***									
Black tupelo or black gum	Nyssa sylvatica	30-50	20-30	y	3-9	full sun to part shade	medium to wet	medium	x	x		x		x			x
Elm 'Prospector'	Ulmus davidiana var. japonica 'Prospector	50	25	n	4-9	sun	medium	small				x					x
Elm 'Triumph'	Ulmus 'Morton Glossy	50-60	35-40	n	4-9	sun	medium	small				x					x
Ginkgo 'Autumn Gold'	Gingko biloba 'Autumn Gold'	50-80	30-40	n	3-8	full sun	medium	small		x	x	x		x			x
Hackberry	Celtis occidentalis	40-60	40-60	y	2-9	full sun to part shade	medium to wet	medium	x			x	x				x
Honeylocust 'Skyline®'	Gleditsia triacanthos f. inermis 'Skycole'	60-80	60-80	y	3-8	sun	medium	medium	x	x	x	x			x		x
Katsura	Cercidiphyllum japonicum	40-60	25-60	n	4-8	sun to part shade	medium	medium				x		x			
Kentucky coffee	Gymnocladus dioica	60-80	40-55	y	3-8	full sun	medium	large	x	x	x				x		x
Linden, American 'Redmond'	Tilia americana 'Redmond'	50-70	30-45	y	2-8	full sun to part shade	medium	medium	x						x		x
Linden, Littleleaf	Tilia cordata 'Greenspire®' or 'Norlin'	30-50	25-30	n	3-7	full to part sun	medium	medium			x				x		
London Planetree 'Bloodgood'	Platanus × acerifolia 'Bloodgood'	75-100	60-70	hybrid	4-8	full sun	medium to wet	large			x		x				x
Maple, Freeman 'Autumn Blaze®'	Acer × freemanii 'Jeffersred'	40-50	30-40	y	3-7	full sun	medium to wet	medium	x					x			x
Oak, chestnut	Quercus prinus	50-70	50-70	y	4-8	full sun	Dry to medium	medium	x								
Oak, pin	Quercus palustris	50-70	40-60	y	4-8	sun	medium to wet	medium				x		x			
Oak, red	Quercus rubra	50-75	50-75	y	4-8	sun	dry to medium	large	x	x	x			x			x
Oak, swamp white	Quercus bicolor	50-60	50-60	y	3-8	sun	medium to wet	medium		x			x	x			
Oak, white	Quercus alba	50-80	50-80	y	3-9	sun	dry to medium	large	x								x
Sweetgum	Liquidambar styraciflua	60-80	40-60	y	5-9	full sun	medium	medium					x	x			x
Sycamore, American	Platanus occidentalis	75-100	75-100	y	4-9	sun to light shade	medium to wet	large		x	x	x					x
Tulip poplar	Liriodendron tulipifera	60-90	30-50	y	4-9	full	medium	large					x	x			
Yellowwood	Cladrastis lutea	30+	30+	y	4-9	full sun	dry to medium	medium						x	x		x
ORNAMENTAL TREES																	
Cornelian cherry (dogwood)	Cornus mas	20-30	15-20	n	4-8	full sun to part shade	medium	small					x		x	x	x
Crabapple 'Royal Raindrops'	Malus 'Royal Raindrops'	20	12-15	hybrid	4-8	full sun	medium	small			x		x	x	x	x	
Crabapple, 'Adirondack'	Malus 'Adirondack'	15-20	6-8'	hybrid	4-8	full sun	dry to medium	small						x	x	x	x
Crabapple, 'Red Jewel'	Malus 'Red Jewel'	15-20	12-15'	hybrid	4-8	full sun	dry to medium	small						x	x	x	
Hornbeam, American	Carpinus caroliniana	20-35	20-35	y	3-9	part shade to full shade	medium	small				x		x		x	x
Serviceberry 'Autumn Brilliance'	Amelanchier × grandiflora 'Autumn Brilliance'	15-25	15-20	y	4-9	sun to part shade	medium	small						x	x	x	x
*Chicago Botanic Garden: https://www.chicagobotanic.org/plantinfo/tree_alternatives																	
Other sources: U.S. Forest Service; Missouri Botanical Garden; Cornell University Woody Plants Database (http://woodyplants.cals.cornell.edu/home)																	
** http://planthardiness.ars.usda.gov/phzmweb/interactivemap.aspx																	
*** Derived from Vermont Tree Selection Guide (https://vtcommunityforestry.org/resources/vermont-tree-selection-guide) see page 25 in this report for root area specifications																	

Appendix B: Considerations and Techniques for Streetside Tree Planting*

Why plant trees at all?

- ⇒ **Trees help our neighborhoods.** They provide beauty and structure and reduce noise. Trees help us feel good about our surrounding and provide a peaceful oasis. Tree lined streets help slow down traffic.
- ⇒ **Trees help our environment.** They reduce soil erosion and stormwater runoff, improve air and water quality, sequester carbon, provide wildlife habitat and other ecological benefits.
- ⇒ **Trees help our economy.** They increase property values, encourage patronage to downtown businesses and reduce energy costs. They reduce crime.
- ⇒ **Trees help us to be healthy.** Trees improve mental well-being and healing, and increase our attention span. Trees encourage more walking and biking. Trees improve the quality of air we breathe and lower incidences of asthma.

Plant the right tree in the right place.

Trees we plant within developed communities are often located in sites that are much less suitable than native forests and are often exposed to a number of human caused stresses such as air pollution, elevated temperatures, compacted soils, and confined spaces, as well as salt from roads and damage from plows, lawn mowers and weed whips.

Because of these potential stresses, proper selection of tree species and planting site is crucial. Careful planning can help ensure that the “right tree” is established in the “right place”.

In Northfield, some factors are quite favorable for streetside trees. Many streets in South and Old Northfield have no sidewalks, so trees are planted in front yards, providing abundant root areas. And in Old Northfield, Old Main Street has extra-wide tree belts, where trees also have abundant root areas. Places in Northfield in which siting trees becomes a challenge include in Northfield Center, North and South Main Streets, along Sugarloaf Street and any streets with sidewalks and narrow tree belts.

Consider below ground conditions.

ROOTING SPACE is the volume of soil available for root growth. Inadequate rooting space can limit water, nutrient uptake, and oxygen exchange necessary for successful plant growth. Common barriers to rooting space include sidewalks, roads, and soil compaction.

The **Recommended Trees for Streetside Planting** table on page 31 includes the suggested root areas as follows:

SMALL: Indicates planting sites with limited soil volume, such as narrow greenbelts and pits less than 6 feet wide. Depths should be 3 feet. Planting should not occur in less than 4’ by 4’ spaces.

MEDIUM: Indicates planting sites with an intermediate amount of soil volume. Green belts greater than 6 feet wide, but still limited in the amount of below ground growing space.

LARGE: Indicates planting sites that are large soil volume such as front yards, wide tree belts, commons and parks.

These recommendations are under ideal circumstances, and in many cases you will be forced to plant in much tighter areas. Planting in longer, narrow strips is generally acceptable. Where soil volumes are restricted select smaller species, those known to have limited root systems, or those that are especially heat and drought tolerant. The use of structured soils or other techniques can be incorporated to increase soil volume available for tree roots.

Consider above ground conditions.

OVERHEAD SPACE is the available growing space above the ground to accommodate tree growth. Planting plans should recognize the size and shape of the tree throughout its life, and allow enough overhead space for the mature crown size. Major problems and costs caused by trees planted too close to buildings, power lines, streetlights, and traffic signs can be avoided by selecting species that will not require repetitive pruning, grow roots that will disrupt underground utilities or building foundations, or develop limbs that will grow into utility lines or reduce traffic safety. To avoid overhead utility conflicts select small trees with a maximum mature height of 25 ft. for locations under overhead power lines.

GIVE ROOTS MORE ROOM.

The major impediment to establishing trees in paved urban areas is the lack of an adequate volume of soil for tree root growth. Soils under roads, sidewalks and other hardscapes can be highly compacted to meet load-bearing requirements and engineering standards. This compaction often stops roots from growing, causing them to be contained within a very small useable volume of soil without adequate water, nutrients or oxygen. Soil compaction can lead to tree failure and/or to the disruption of hardscape as tree heave pavement up in their effort to grow.

STRUCTURAL SOIL is comprised of a rigid stone “lattice” that meets engineering requirements for a load-bearing paving base, and a quantity of uncompacted soil that supports tree root growth. The primary component is a uniformly sized, highly angular crushed stone. When this narrowly graded stone is compacted, the stones form an open “lattice” structure, while the soil fills in this structure, allowing for root growth and aeration of the root zone.

Structural soil can be used under sidewalks and other hardscapes to provide a better environment for tree roots and to prevent the heaving of hardscapes by tree roots. **LEARN MORE:** www.hort.cornell.edu/uhi/outreach/csc/article.html (Urban Horticulture Institute, Cornell University)

Appendix C: Data Collection and Methodology

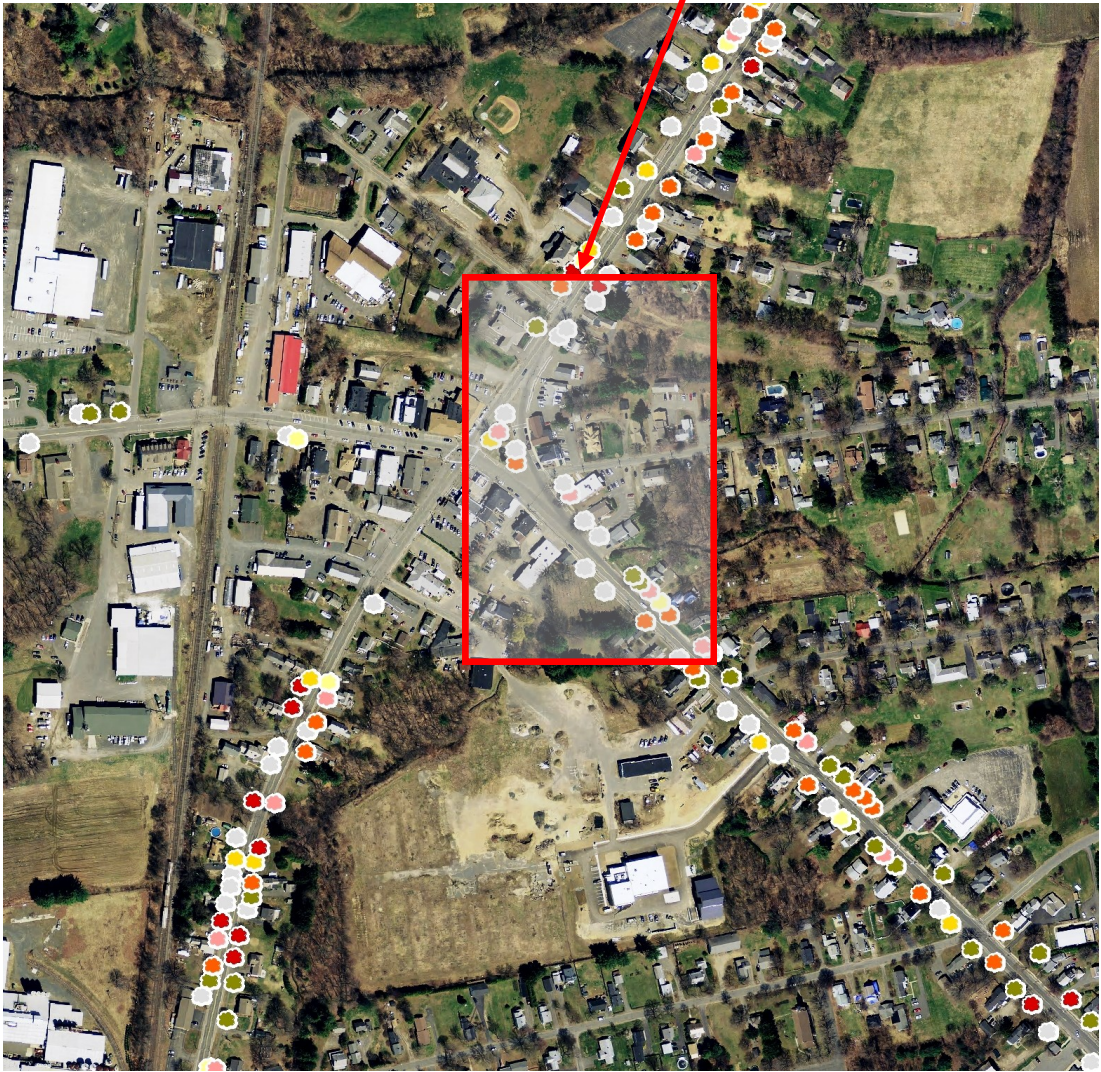
Technology used: Data was collected using Collector for ArcGIS on an Android phone. A geographic information system or GIS-based map was created and shared as part of this inventory. Each tree was inventoried and saved as a data point on the map.

i-Tree was used to analyze the ecological benefits and values of the trees inventoried. i-Tree is a free software suite from the USDA Forest Service that provides urban and rural forestry analysis and benefits assessment tools.

The Town of Northfield was provided with the final digital baseline data and shapefile, which can be used in ArcMap, along with other datalayers. Ideally, the Highway Department could use the datalayer and make updates to it using a smartphone or tablet in the field. The Town was also provided with printed maps, a summary infographic poster that highlights inventory findings, and this final report.



Photos of trees were also taken, such as these trees located along Old Main Street.



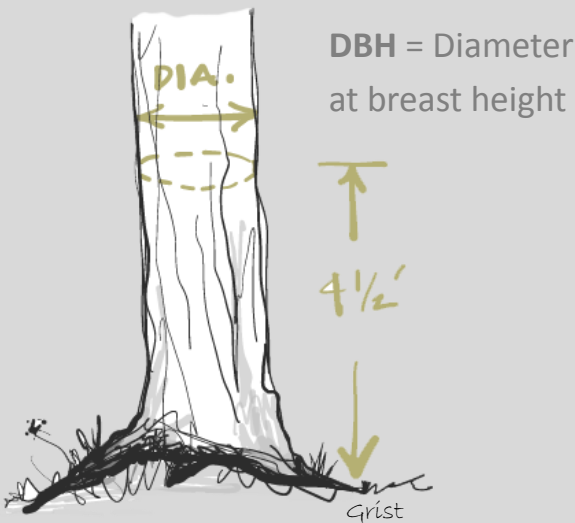
Data fields:

- ID:** Unique identification number
- Lat/Long:** Latitude and longitude point data
- Inventory Date:** Date of data collection
- Street:** Street name
- Street Number:** Nearest street number, if visible
- Genus:** Scientific genus name
- Species:** Scientific species name
- Common:** Common name, cultivar
- DBH:** Diameter to nearest inch at 4-½ feet above the ground
- Tree Height:** Estimated height rounded to the nearest 5’ foot increment
- Tree Crown Spread (Canopy):** Estimated width at broadest part of the tree, rounded to the nearest 5’ foot increment
- Height to Crown Base:** Height from the ground to the base of the live crown.
- Height to Crown Top:** Height from the ground to the top of the live crown.
- Land Use:** The type of land use that most closely matches the site, such as agricultural, residential, commercial and institutional
- Percent Canopy Missing:** Percent of the crown volume that is not occupied by branches and leaves.
- Percent Crown Dieback:** Amount of dead branches in crown
- Crown Light Exposure:** Number of sides of the tree receiving

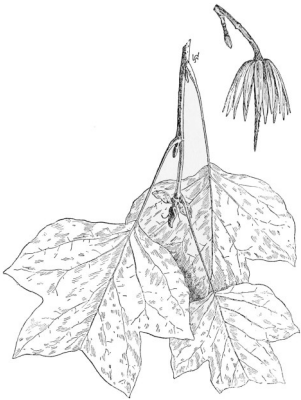
- sunlight from above (maximum of five)
- Condition:** Ratings based upon visual inspection of the physical appearance of trees, including presence of crown die back, dead and/or dangerous limbs, rotting or missing bark and the presence of insects. Actual condition to be confirmed by tree warden or arborist.
- G = Good to excellent
 - F = fair to good
 - P = Tree warden inspection recommended
 - D = Dead/dying
- Sidewalk Conflict:** Extent of damage to sidewalks from trees
- Utility Conflict:** Potential or existing conflicts between tree branches and overhead utility lines.
- Notes:** Any distinctive characteristics or immediate needs
- Maintenance Recommendations:**
- ⇒ None
 - ⇒ Small tree (routine)
 - ⇒ Small tree (immediate)
 - ⇒ Large tree (routine)
 - ⇒ Large tree (immediate)
 - ⇒ Critical concern (public safety)
- Maintenance Task:**
- ⇒ None
 - ⇒ Stake/train
 - ⇒ Crown clearing
 - ⇒ Crown raising
 - ⇒ Crown reduction/thinning
 - ⇒ Remove
 - ⇒ Treat pests/disease
- Attachment:** Photo of trees inventoried in 2017, including any significant issues

Measures

Tree trunk diameters were measured using a tape measure that converts circumference to diameter.



The height and spread (canopy) of trees were typically estimated to the nearest 5 foot increment.



Liriodendron tulipifera
Tulip tree

Line drawings of leaves throughout the report obtained on Wikimedia Commons
All other photos - FRCOG

Town of Northfield 2018 Tree Planting and Maintenance Plan

*Prepared for the Town of Northfield
Board of Selectmen and Highway Department*