

The City of Northfield

**Strategic Management Plan for the
Emerald Ash Borer**



July 2017

Purpose:

Through the implementation of the following strategies, the City of Northfield can limit both the economic and environmental costs associated with the Emerald Ash Borer (EAB).

Assessment of Current Situation:

Based off the tree inventory conducted in August of 2016, the City of Northfield has 1,914 ash trees on its property, which account for about 16% of the city's urban forest and 23% of its biomass¹. Although there are currently no known EAB infestations in Northfield or Rice County, both are at high risk due to infestations in the neighboring counties of Scott, Dakota and Goodhue. There is no way to prevent an infestation from occurring however, with proactive management, Northfield can mitigate the effects and spread out the cost. Currently there is a \$65,000 budget to maintain the urban forest on public land such as boulevards. In 2016 approximately \$45,000² of it was spent on removing/grinding/replacing 110 trees. The remaining money was used for pruning and other maintenance related costs. There is an additional \$5,000 allocated to the maintenance of park trees. In order to successfully combat EAB the city will need to either designate a separate budget for EAB related costs or increase the current urban forest maintenance budget.

Benefits of Trees:

Trees provide numerous economic, health and environmental benefits to the City of Northfield. From an economics perspective, healthy trees lower energy costs, increase property values, and reduce pressure on storm drainage systems³. Health wise, trees decrease the amount of pollutants in the air, improve water quality and have a positive effect on mental health⁴. Finally trees support the ecosystem and help combat the effects of climate change.

¹ Source: Northfield Urban Forest Asset Management Plan developed by Katie Himanga on February 3rd, 2014.

² Estimates based off GIS data and prices stated in current contract with Cannon River Tree Care LLC

³ Source: <https://www.arboday.org/trees/benefits.cfm>

⁴ Ibid

Approximate Value of Northfields Ash Trees

Year	Average Yearly Value per Tree ⁵	Average Diameter at Breast Height of Northfields Ash Trees ⁶	Total Number of Trees	Total Yearly value
1	\$141.00	15	1914	\$269,874.00
2	\$144.00	15.4	1914	\$275,616.00
3	\$148.00	15.8	1914	\$283,272.00
4	\$151.00	16.2	1914	\$289,014.00
5	\$154.00	16.6	1914	\$294,756.00
6	\$157.00	17	1914	\$300,498.00
7	\$160.00	17.4	1914	\$306,240.00
8	\$164.00	17.8	1914	\$313,896.00
9	\$167.00	18.2	1914	\$319,638.00
10	\$170.00	18.6	1914	\$325,380.00
11	\$173.00	19	1914	\$331,122.00
12	\$177.00	19.4	1914	\$338,778.00
13	\$180.00	19.8	1914	\$344,520.00
14	\$183.00	20.2	1914	\$350,262.00
15	\$186.00	20.6	1914	\$356,004.00
16	\$189.00	21	1914	\$361,746.00
17	\$192.00	21.4	1914	\$367,488.00
18	\$195.00	21.8	1914	\$373,230.00
19	\$197.00	22.2	1914	\$377,058.00
20	\$200.00	22.6	1914	\$382,800.00
				\$6,561,192.00

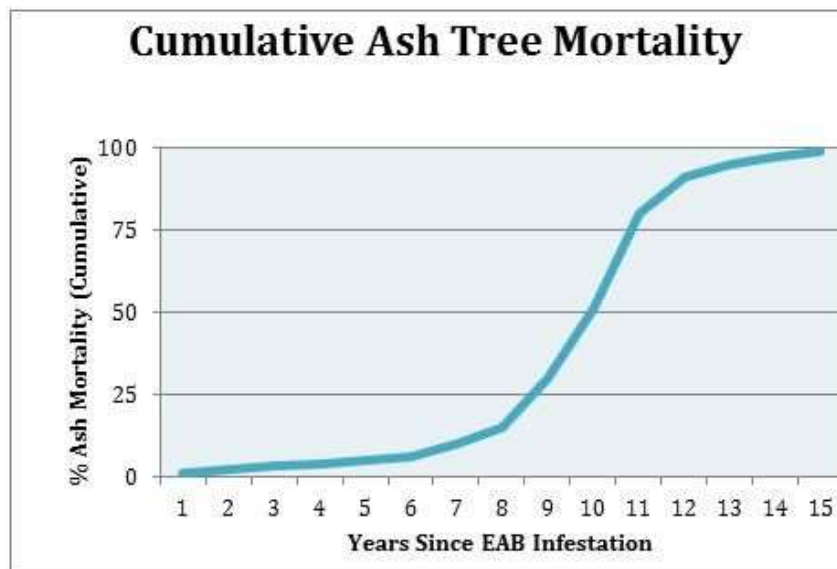
⁵ Source: <http://www.treebenefits.com/calculator/> (Single family residential was used as 'land-use type' in calculation)

⁶ Ash tree diameters grow between .25 and .5 inches per year. For this calculation a .4 growth rate was assumed which is the rounded value of the average of .25 and .5 (.375).

Infestation Pattern:

Evidence from other states indicate it takes 5-10 years for the EAB to infest and kill the majority of trees in the area. Although the infestation typically starts off small, it grows exponentially as shown in Figure 1. Once an area develops an EAB infestation it typically takes about eight years before all untreated trees succumb to the infestation and die. Tree deaths follow a death curve that grows exponentially, so the majority of the trees will die between years four and eight. Ash trees typically die two years after showing symptoms of EAB⁷ although this depends on both size of the tree and the degree of the infestation.

EAB Death Curve



⁷ <http://www.emeraldashborer.info/faq.php>

Management Options:

Option 1) Remove all ash trees and don't replace them.....\$793,525

This option would have a significant effect on both the environment and the aesthetic feel of the community. Although overall cheaper, it doesn't account for the millions of dollars lost in tree benefits. Also, assuming the infestation follows the traditional eight year death curve, the majority of that cost would fall during a 3-5 year period, which would lead to a significant increase in the annual budget.

Option 2) Remove all ash trees and replace at 1:1 ratio.....\$1,630,000-\$1,820,000

This option would reduce some of the long term environmental and aesthetic effects but is more expensive because the financial impact is again concentrated over a 3-5 year period.

Option 3) Treat 50%, Remove 50%, Replace 50%.....\$1,707,374

This option gives the city more time to manage the infestation and lowers yearly costs. Emamectin Benzoate, the injection recommended for treatment is effective for 2-3 years and has no known effect on pollinators or other organisms. For cost purposes it would be applied every 3 years in this example. About 1/3 (318/957) of the trees designated for treatment would be given an injection each year for an annual rate of approximately \$42,203.7. Over 20 years the cumulative annual benefits provided by preserving 957 trees would be around \$3 million. Meanwhile the costs of removing and replacing the other 957 trees would be approximately \$396,762.5 and \$466,537.5 respectively. Untreated trees will likely die over a 5 year period so the annual cost of removing and replacing 957 trees over those 5 years would be about \$172,660.

Table 1
Projected EAB Infection Rate for Northfields Ash Tree Population

Year	1	2	3	4	5	6	7	8	9	10
% Ash Trees Affected by EAB⁸	<1	1	2	4	8	16	32	64	100	100
Approximate Number of trees affected⁹	<19	19	38	77	153	306	612	1,225	1,914	1,914

Table 2
Breakdown of Costs Associated with Cutting and Grinding all of the City's Ash Trees

Diameter of Tree	Rate¹⁰	Number	Total
Clear Tree (1"-8")	\$95.00	388	\$36,860
Clear Tree (8"-24") ¹¹	\$375.00	1,267	\$475,125
Clear Tree (24"-48") ¹²	\$715.00	259	\$185,185
Stump Grinding (1"-8")	\$35.00	388	\$13,580
Stump Grinding (8"-24") ⁶	\$50.00	1,267	\$63,350
Stump Grinding (24"-48") ⁷	\$75.00	388	\$19,425
GRAND TOTAL			\$793,525*

*This number will likely increase due to tree growth over time or from a change in prices provided by the contractor.

⁸ Source: <http://int.entm.purdue.edu/ext/treecomputer/index.php?page=input/trcAdvanced.php§ion=2>

⁹ Rounded to nearest whole number

¹⁰ Source: Rates based off current contract with Cannon River Tree Care LLC

¹¹ All 8" trees were included in this category

¹² All 24" trees were included in this category

Table 3

Breakdown of Costs Associated with Replacing all the City's Ash Trees

Average cost of a replacement tree (\$75-\$200) ¹³	Average 1 st year cost of maintaining new tree ¹⁴	Total replacement cost per tree	Number of Trees that need to be replaced	Total cost of replacing trees
\$137.5	\$300	\$437.5	1,914	\$837,375
\$137.5	\$350	\$487.5	1,914	\$933,075
\$137.5	\$400	\$537.5	1,914	\$1,028,775

¹³ Cost varies according to size, species and quantity of the tree or trees purchased

¹⁴ Rough estimates for watering, pruning and installing the tree