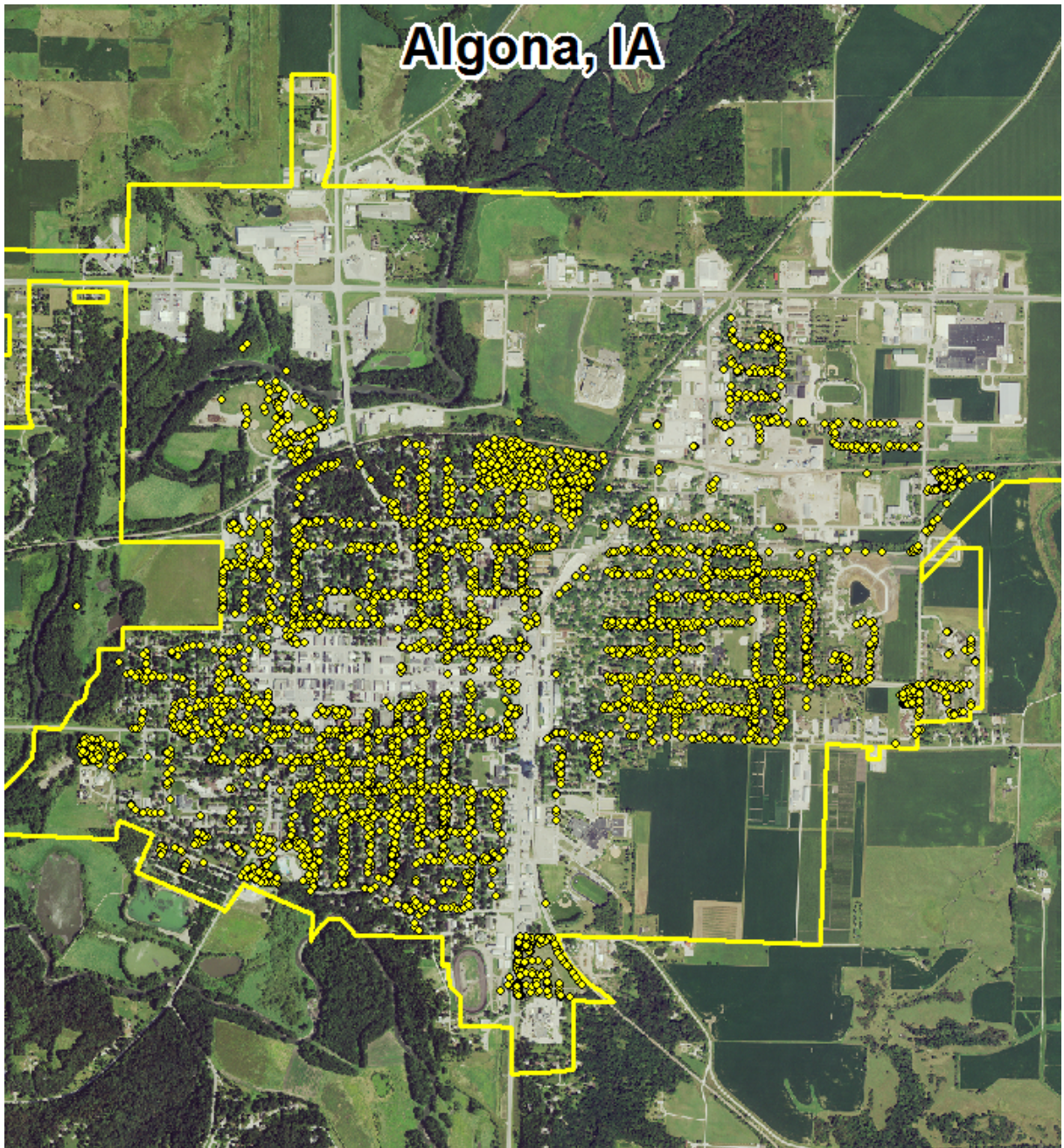


Algona, IA



2017 Urban Forest Management Plan
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Executive Summary

Overview

This plan was developed to assist the City of Algona with managing its urban forest, including budgeting and future planning. Trees can provide a multitude of benefits to the community, and sound management allows a community to best take advantage of these benefits. Management is especially important considering the serious threats posed by forest pests such as the emerald ash borer (EAB). EAB is an invasive insect imported from Eastern Asia on wood shipping crates that kills all species of ash trees (this does not include mountain ash). There is a strong possibility that 23% of Algona's city owned trees (ash) will die once EAB becomes established in the community, unless preventative treatment is used. With proper planning and management, the costs of removing dead and dying trees can be extended over years, mitigating public safety issues.

Inventory and Results

In 2016, a tree inventory was conducted using Global Positioning System (GPS) data collectors. The inventory was a complete inventory of street and park trees. Below are some key findings of the 4,435 trees inventoried.

- Algona's trees provide \$796,500 of benefits annually, an average of \$180 a tree
- There are over 77 species of trees
- The top three genera are: Maple 46%, Ash 23%, and Spruce 5%
- 57% of trees are in need of some type of management
- 217 trees are recommended for removal

Recommendations

The core recommendations are detailed in the Recommendations Section. The Emerald Ash Borer Plan includes management recommendations as well. Below are some key recommendations.

- Of the 217 trees needing removal [*City ownership of the trees recommended for removal should be verified prior to any removal*](#)
- 253 of the 1002 ash trees should be carefully examined, as they have one or more symptoms that could be related to an EAB infestation
- All trees should be pruned on a routine schedule- one third of the city every other year
- Plant a diverse mix of trees that do not include: American Elm, Black Locust, Bolleana Poplar, Boxelder, Catalpa, Cottonless Cottonwoods, Cottonwood, Evergreen, Green Ash, Mountain Ash, Mulberry, Norway Maple, Siberian (Chinese) Elm, Russian Olive, Silver Maple, Tombarady Poplar, Tree of Heaven, Weeping Brch, Willow or White Poplar
- Check ash trees with a visual survey yearly
- The current budget is not enough to address all items marked in the the removal or to address ash treatment of removal – Suggestion: request a budget increase and apply for grants to plant replacement trees

Introduction

This plan was developed to assist Algona with the management, budgeting and future planning of their urban forest. Across the state, forestry budgets continue to decrease with more and more of that money spent on tree removal. With the anticipated arrival of Emerald Ash Borer (EAB), an invasive pest that kills native ash trees, it is time to prepare for the increased costs of tree removal or treatment and replacement planting. With proper planning and management of the current canopy in Algona, these costs can be extended over years and public safety issues from dead and dying ash trees mitigated.

Trees are an important component of Algona's infrastructure and one of the greatest assets to the community. The benefits of trees are immense. Trees provide the community with improved air quality, stormwater runoff interception, energy conservation, lower traffic speeds, increased property values, reduced crime, improved mental health and create a desirable place to live, to name just a few benefits. It is essential that these benefits be maintained for the people of Algona and future generations through good urban forestry management.

Good urban forestry management involves setting goals and developing management strategies to achieve these goals. An essential part of developing management strategies is a comprehensive public tree inventory. The inventory supplies information that will be used for maintenance, removal schedules, tree planting and budgeting. Basing actions on this information will help meet Algona's urban forestry goals.

Inventory

In 2016, a tree inventory was conducted that included 100% of the city owned trees on both streets and parks. The tree data was collected using a handheld Global Positioning System (GPS) receiver. The data collector gives Geographic Information Systems (GIS) coordinates with an accuracy of 3 meters, which can be used in Arc GIS as an active GIS data layer. Because the inventory is a digital document the data can be updated with new information and become a working document.

The programming used to collect tree information on the data collectors was written to be compatible with a state-of-the-art software suite called i-Tree. i-Tree was developed by the USDA Forest Service to quantify the structure of community trees and the environmental services that trees provide. The i-Tree suite is a public domain which can be accessed for free.

To quantify the urban forest structure and benefits, specific data is collected for each tree. This data includes: location, land use, species, diameter at 4.5 ft, recommended maintenance, priority of that maintenance, leaf health, and wood condition. Additionally, signs and symptoms associated with EAB were noted for all ash trees. The signs and symptoms noted were canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

Inventory Results

The data collected for the 4,435 city trees was entered into the USDA Forest service program Street Tree Resource Analysis Tool for Urban forestry Management as part of the i-Tree suite. The following are results from the i-Tree STREETS analysis.

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Algona's trees reduce energy related costs by approximately \$217,206 annually (Appendix A, Table 1). These savings are both in Electricity (1,033.4 MWh) and in Natural Gas (141,606.0 Therms).

Annual Stormwater Benefits

Algona's trees intercept about 11,268,893 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides \$305,387 of benefits to the city.

Annual Air Quality Benefits

Air quality is a persistent public health issue in Iowa. The urban forest improves air quality by removing pollutants, lowering air temperature, and reducing energy consumption, which in turn reduces emissions from power plants, and emitting volatile organic matter (ozone). In Algona, it is estimated that trees remove 3,444.3 lbs of air pollution (ozone (O₃), particulate matter less than 10 microns (PM₁₀), carbon monoxide (CO), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂)) per year with a net value of \$37,913 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Algona, trees sequester about 3,718,736 lbs of carbon a year with an associated value of \$27,891 (Appendix A, Table 4). In addition, the trees store 40,342,844 lbs of carbon, with a yearly benefit of \$302,571 (Appendix A, Table 5).

Annual Aesthetics Benefits

Social benefits of trees are hard to capture. The analysis does have a calculation for this area that includes: aesthetic value, property values, lowered rates of mental illness and crime, city livability and much more. Algona receives \$208,104 in annual social benefits from trees (Appendix A, Table 6).

Financial Summary of all Benefits

According to the USDA Forest Service i-Tree STREETS analysis, Algona's trees provide \$796,500 of benefits annually. Benefits of individual trees vary based on size, species, health and

location, but on average each of the 4,435 trees in Algona provide approximately \$180 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Algona has over 77 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Maple	2045	46%
Ash	1002	23%
Spruce	217	5%
Apple (crabapple)	197	4%
Oak	194	4%
Black Walnut	163	4%
Other	150	3%
Linden	131	3%
Honey locust	89	2%
Hackberry	56	1%
White Cedar	41	1%
Elm	41	1%
Cottonwood/Poplar	15	<1%
Cherry	13	<1%
Birch	11	<1%
Dogwood	11	<1%
Lilac	11	<1%
Pine	9	<1%
Alder	8	<1%
Mountain Ash	7	<1%
Hickory	6	<1%
Pear	4	<1%
Cedar/Juniper	3	<1%
Ohio Buckeye	2	<1%
Catalpa	2	<1%
Sumac	2	<1%
Red bud	1	<1%
Kentucky coffeetree	1	<1%
Mulberry	1	<1%
Hophornbeam	1	<1%
Hemlock	1	<1%

Age Class

Most of Algona's trees (57.5%) are between 12 and 30 inches in diameter at 4.5 ft (Appendix A, Figure 2). For age, it is preferred that the highest amounts of trees are in the middle category, to prepare for natural mortality and to maintain canopy cover. Algona's size curve is lower in young trees, showing low planting in the past 10 years.

Condition: Wood and Foliage

Both wood condition and leaf condition are good indicators of the overall health of the urban forest. The foliage condition results for Algona indicate that 83% of the trees are in good health, with only 3% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Also, 54% of Algona's trees are in good health for wood condition (appendix A, Figure 4 & Appendix B, Figure 3). Wood condition that is in poor health, dead or dying is about 16% of the population. This 16% is an estimate of trees that need management follow up.

Management Needs

The following outlines the specific management needs of the street and park trees by number of trees and percent of canopy (Appendix B, Figure 3).

Crown Raising	1,484	33%
Crown Cleaning	798	18%
Tree Removal	217	5%
Crown Reduction	13	<1%
Tree Staking	4	<1%

Canopy Cover

The total canopy with both private and public trees is 20%, 568 acres. The canopy cover included in the Algona inventory includes approximately 116 acres (Appendix A, Figure 4). The City's Canopy goal is to increase 3%, in 30 years. To achieve this goal it is estimated that 140 trees need to be planted annually on public and private property beyond replacement trees.

Land Use and Location

The majority of Algona's city and park trees are in planting strips in single family residential neighborhoods (Appendix A, Figure 6 & Appendix A, Figure7). The following describes the land use and locations for the street and park trees.

Land Use

Single family residential	74%
Park/vacant/other	23%
Small commercial	1%
Multifamily residential	<1%
Industrial/Large commercial	<1%

Location

Planting strip	61%
Front yard	38%
Median	1%
Cutout (surrounded by pavement)	<1%

Recommendations

Risk Management

Hazardous trees can be a significant threat to both people and property. Trees that are dead or dying, or that have large issues such as trunk cracks longer than 18 inches should be removed. Broken branches and branches that interfere with motorist's vision of pedestrians, vehicles, traffic signs and signals, etc should be removed.

Hazardous trees

Algona has 59 critical concern trees that need immediate removal. These trees can be seen on the Location of Trees with Recommended Maintenance map (Appendix B, Figure 4). It is recommended to start with the large diameter critical concern trees first. Please refer to the six year maintenance plan at the end of this section. After all of the critical concern both removal and pruning is addressed, there should be follow-up on the trees marked as needing maintenance. There are a total of 2,444 trees with these needs.

Poor tree species

After the removal of the critical concern trees, ash trees in poor health should be assessed for removal (Appendix B, Figure 3 & Appendix B, Figure 4). Of the 217 removals, 35 are ash trees. There are a total of 1002 ash trees, and 253 of those have signs and symptoms that have been associated with EAB. In addition, there are 95 ash trees that are in poor health. ***City ownership of the trees recommended for removal should be verified prior to any removal***

Pruning Cycle

Proper pruning can extend the life and good health of trees, as well as reduce public safety issues. In the Management Needs section of the Findings there are four main maintenance issues to be addressed: routine pruning, crown cleaning, crown raising, and crown reduction. Crown cleaning removes dead, diseased, and damaged limbs. Crown raising is the removal of lower branches that are 2 inches in diameter or larger in the case of providing clearance for pedestrians or vehicles. Crown reduction is removing individual limbs from structures or utility wires. It is recommended that all trees be pruned on a routine schedule every five to seven years. Please refer to the six year maintenance plan for further information.

Planting

Most of the planting over the next 5 years will replace the trees that are removed. It is recommended to plant 1.2 trees for every tree removed, since survival rates will not be 100%. Please refer to the six year maintenance plan at the end of this section. It is not essential that the new trees be planted in the same location of the trees being removed. However, maintaining the same number of trees helps ensure continuation of the benefits of the existing forest in Algona.

It is important to plant a diverse mix of species in the urban forest to maintain canopy health, since most insects and diseases target a genus (ash) or species (green ash) of trees. Current diversity recommendations advise that a genus (i.e. maple, oak) not make up more than 20% of the urban forest and a single species (i.e. silver maple, sugar maple, white oak, bur oak) not make up more than 10% of the total urban forest. Presently, the forest is heavily planted with maple (46%) (Appendix A, Figure 1). Maples should not be planted until this percentage can be lowered. Also, ash trees have not been recommended since 2002, due to the threat of EAB. Other species to avoid because they are public nuisances include: American Elm, Black Locust, Bolleana Poplar, Boxelder, Catalpa, Cottonless Cottonwoods, Cottonwood, Evergreen, Green Ash, Mountain Ash, Mulberry, Norway Maple, Siberian (Chinese) Elm, Russian Olive, Silver Maple, Tombardy Poplar, Tree of Heaven, Weeping Brch, Willow or White Poplar, as outlined in section 12.24.40 C of the city ordinance (Appendix C). All trees planted must meet the restrictions in city ordinance 12.24.40 (Appendix C).

Continual Monitoring

Due to the threat of EAB, it is important to continuously check the health of ash trees. It is recommended that ash trees be checked with a visual survey every year for tree decline and for the following signs and symptoms: canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

Six Year Maintenance Plan

Year 1

Removal: 59 critical concern trees

Planting and Replacement: 211 trees to be planted in open locations (with grants and seedlings)

Pruning & Maintenance: 13 critical trees

Visual Survey for signs and symptoms of EAB

Year 2

Removal: 32 trees

Planting and Replacement: 186 trees to be planted in open locations (with grants and seedlings)

Pruning & Maintenance: 458 trees

Visual Survey for signs and symptoms of EAB

Year 3

Removal: 32 trees

Planting and Replacement: 186 trees to be planted in open locations (with grants and seedlings)

Pruning & Maintenance: 458 trees

Visual Survey for signs and symptoms of EAB

Year 4

Removal: 32 trees

Planting and Replacement: 186 trees to be planted in open locations (with grants and seedlings)

Pruning & Maintenance: 458 trees

Visual Survey for signs and symptoms of EAB

Year 5

Removal: 32 trees

Planting and Replacement: 186 trees to be planted in open locations (with grants and seedlings)

Pruning & Maintenance: 458 trees

Visual Survey for signs and symptoms of EAB

Year 6

Removal: 32 trees

Planting and Replacement: 186 trees to be planted in open locations (with grants and seedlings)

Pruning & Maintenance: 458 trees

Visual Survey for signs and symptoms of EAB

To address all issues marked in the inventory the budget would need to be \$62,130 annually- \$21,000 for removal and stump grinding and \$41,130 for pruning. This does not include ash removal or treatment

Does not include ash tree treatment and/or future ash removal which is estimated at least \$580,200

Emerald Ash Borer Plan

Ash Tree Removal

Tree removal will be prioritized with dead, dying, hazardous trees to be removed first (Appendix B, Figure 4). Next will be all ash in poor condition and displaying signs and symptoms of EAB (Appendix B, Figure 2 & Appendix B, Figure 3). ***City ownership of the tree recommended for removal should be verified prior to any removal***

Treatment of Ash Trees

Chemical treatment can be effective tool for communities to spread removal costs out over several years while allowing trees to continue to provide benefits. However, treatment is not recommended if EAB is more than 15 miles away from the community. For more information on the cost of treatment strategies visit <http://extension.entm.purdue.edu/treecomputer/>

EAB Quarantines

EAB is an extremely destructive plant pest and it is responsible for the death and decline of millions of ash trees. Ash in both forested and urban settings constitute a significant portion of the canopy cover in the United States. Current tools to detect, control, suppress and eradicate this pest are not as robust as the USDA would desire. In order to stay ahead of this hard to detect beetle, the USDA is attempting to contain the beetle before it spreads beyond its known positions by regulating articles.

A regulated article under the USDA's quarantine includes any of the following items:

- emerald ash borer
- firewood of all hardwood species (for example ash, oak, maple and hickory)
- nursery stock and green lumber of ash
- any other ash material, whether living, dead, cut or fallen, including logs, stumps, roots, branches, as well as composted and not composted chips of the genus ash (Mountain ash is not included)

In addition, any other article, product or means of conveyance not listed above may be designated as a regulated article if a USDA inspector determines that it presents a risk of spreading EAB once a quarantine is in effect for your county.

Wood Disposal

A very important aspect of planning is determining how wood infested with EAB will be handled, keeping in mind that quarantines will restrict its movement. Consider who will cut and haul the dead and dying trees? Is there an accessible, secured site big enough to store and sort the hundreds of trees and the associated brush and chips? How will wood be disposed of or utilized? Do you have equipment capable of handling the amount and size of ash trees your tree inventory has identified? Once your county is under quarantine for EAB, contact USDA-APHIS-PPQ at 515-251-4083 or visit the website http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/regulatory.shtml. Wood waste can be disposed of as you normally would if your county is not part of a quarantine.

Canopy Replacement

As budget permits, all removed trees will be replaced. All trees will meet the restrictions in city ordinance 12.24.40 (Appendix C). The new plantings will be a diverse mix and will not include American Elm, Black Locust, Bolleana Poplar, Boxelder, Catalpa, Cottonless Cottonwoods, Cottonwood, Evergreen, Green Ash, Mountain Ash, Mulberry, Norway Maple, Siberian (Chinese) Elm, Russian Olive, Silver Maple, Tombardy Poplar, Tree of Heaven, Weeping Brch, Willow or White Poplar.

Postponed Work

While finances, staffing and equipment are focused on the management of ash, usual services may be delayed. Tree removal requests on genera other than ash will be prioritized by hazardous or emergency situations only.

Monitoring

It is recommended that ash trees be checked with a visual survey every year for tree death and for the following signs and symptoms: canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

Private Ash Trees

It is strongly recommended that private property owners start removing ash trees on their property upon arrival of EAB if preventative treatments are not being used.

Budget

Current Budget

Removal, Stump Grinding and Pruning: \$32,000

*Does not include ash tree treatment and/or future ash removal

Planting: grants

Purposed Budget Increase

In the first year all critical concern trees need to be addressed for public safety this cost estimated is \$36,570. To address all issues marked in the inventory in 6 years it is estimated the budget would need to be \$62,130 annually- \$21,000 for removal and stump grinding and \$41,130 for pruning. This does not include ash removal or treatment. EAB could potentially kill all ash trees in Algona within 4 years of its arrival. To remove all ash the total cost would be about \$580,200.

Another option being considered by many communities is treating a number of selected trees, either to maintain those trees in the landscape or to delay their removal – to spread out the costs and number of trees needing removed all at once. Trunk injection is administered every two years for the life of the tree. If treatment is discontinued, the tree dies. For instance, in this treatment scenario, the average ash diameter is 20 inches and at \$15 per inch, about 40 trees could be treated per year (every other year treatment). This would be 80 trees selected for treatment for \$12,000 a year, and Algona would still need to find \$553,200 for removal. Alternatively, if there are 200 treatable trees, it would cost approximately \$30,000 a year for treatment and leave \$481,200 for removal. These are alternatives to straight removal of ash trees. However, whether or not the treatment option is selected, there will be an increased cost of dealing with ash trees if EAB is found in Algona. It is suggested to consider increasing the budget to plan for this.

Additionally, it is recommended that Algona apply for grants to fund replacement trees. Utility Company grants are usually between \$500 and \$10,000 for community-based, tree-planting projects that include parks, gateways, cemeteries, nature trails, libraries, nursing homes, and schools.

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Algona

Annual Energy Benefits of Public Trees

3/6/2017

Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	231.4	17,562	31,626.5	30,994	48,556	(N/A)	19.5	22.4	56.20
Norway maple	150.6	11,430	21,494.2	21,064	32,494	(N/A)	14.9	15.0	49.01
Black maple	153.9	11,677	21,263.5	20,838	32,515	(N/A)	12.8	15.0	57.35
Silver maple	150.4	11,418	19,887.4	19,490	30,907	(N/A)	12.0	14.2	58.32
Apple	11.7	887	1,820.4	1,784	2,671	(N/A)	4.4	1.2	13.56
Spruce	20.1	1,523	2,587.6	2,536	4,059	(N/A)	3.8	1.9	24.16
Black walnut	50.1	3,800	6,872.4	6,735	10,535	(N/A)	3.7	4.9	64.63
Sugar maple	31.9	2,419	4,290.7	4,205	6,624	(N/A)	3.2	3.0	46.98
Bur oak	44.7	3,395	6,137.5	6,015	9,410	(N/A)	2.9	4.3	72.38
Honeylocust	25.9	1,968	3,391.4	3,324	5,292	(N/A)	2.0	2.4	59.46
White ash	22.6	1,714	2,851.0	2,794	4,508	(N/A)	1.9	2.1	54.32
Littleleaf linden	14.7	1,119	2,016.4	1,976	3,095	(N/A)	1.9	1.4	37.29
Red maple	8.5	647	1,159.5	1,136	1,784	(N/A)	1.5	0.8	27.03
Northern hackberry	17.6	1,340	2,531.1	2,481	3,820	(N/A)	1.3	1.8	68.22
Broadleaf Deciduous Medium	7.7	583	1,120.7	1,098	1,681	(N/A)	1.1	0.8	35.77
Conifer Evergreen Large	6.2	467	768.9	754	1,221	(N/A)	1.0	0.6	27.13
American basswood	8.3	629	1,181.5	1,158	1,787	(N/A)	0.9	0.8	43.58
Northern white cedar	5.8	442	762.3	747	1,189	(N/A)	0.9	0.5	28.99
Black ash	9.3	704	1,275.2	1,250	1,954	(N/A)	0.9	0.9	48.84
Blue spruce	3.5	267	475.9	466	733	(N/A)	0.8	0.3	20.94
Conifer Evergreen Medium	2.9	216	401.6	394	610	(N/A)	0.8	0.3	17.94
Amur maple	2.7	203	413.5	405	608	(N/A)	0.7	0.3	19.00
American elm	10.0	759	1,319.7	1,293	2,053	(N/A)	0.7	0.9	68.42
Maple	4.9	372	677.5	664	1,036	(N/A)	0.6	0.5	39.83
Boxelder	5.6	424	757.5	742	1,167	(N/A)	0.5	0.5	55.55
Northern red oak	3.2	243	441.1	432	676	(N/A)	0.5	0.3	32.18
Oak	1.7	132	225.6	221	353	(N/A)	0.5	0.2	17.64
Ash	3.5	264	503.5	493	757	(N/A)	0.3	0.3	50.48
Norway spruce	1.3	100	176.3	173	273	(N/A)	0.3	0.1	19.47
White oak	0.9	71	131.5	129	200	(N/A)	0.3	0.1	15.38
Broadleaf Deciduous Small	0.6	47	96.5	95	141	(N/A)	0.3	0.1	11.77
Lilac	0.3	26	58.7	58	83	(N/A)	0.2	0.0	8.33
Elm	2.1	161	286.6	281	442	(N/A)	0.2	0.2	55.20
Plum	0.3	20	45.3	44	64	(N/A)	0.2	0.0	8.03
Dogwood	0.4	28	56.6	55	83	(N/A)	0.2	0.0	10.42
Alder	0.2	17	36.0	35	52	(N/A)	0.2	0.0	6.53
Cottonwood	2.7	205	355.6	349	553	(N/A)	0.2	0.3	79.06
Mountain ash	1.0	76	158.0	155	231	(N/A)	0.2	0.1	33.02
Basswood	1.7	130	233.5	229	359	(N/A)	0.2	0.2	51.32
Broadleaf Evergreen Medium	0.9	67	111.9	110	177	(N/A)	0.2	0.1	25.24
Eastern white pine	0.2	15	34.5	34	49	(N/A)	0.2	0.0	7.02
Hickory	1.3	96	148.7	146	242	(N/A)	0.1	0.1	40.30
Paper birch	1.2	88	153.1	150	238	(N/A)	0.1	0.1	39.66
Eastern cottonwood	1.7	129	241.1	236	366	(N/A)	0.1	0.2	73.13
Swamp white oak	0.4	29	53.3	52	81	(N/A)	0.1	0.0	20.33
Pear	0.2	15	33.3	33	47	(N/A)	0.1	0.0	11.80
River birch	0.1	9	19.4	19	28	(N/A)	0.1	0.0	7.01
Flowering dogwood	0.0	4	8.2	8	12	(N/A)	0.1	0.0	3.89
Pin oak	1.0	76	136.2	134	209	(N/A)	0.1	0.1	69.71
Black cherry	0.6	43	81.0	79	122	(N/A)	0.1	0.1	40.80
Eastern red cedar	0.0	2	4.9	5	7	(N/A)	0.0	0.0	3.62
Siberian elm	0.4	30	53.7	53	83	(N/A)	0.0	0.0	41.36
Black locust	0.5	38	69.1	68	105	(N/A)	0.0	0.0	52.73
Ohio buckeye	0.1	8	17.6	17	26	(N/A)	0.0	0.0	12.79
Broadleaf Deciduous Large	0.7	51	86.0	84	135	(N/A)	0.0	0.1	67.63
Quaking aspen	0.5	38	65.1	64	102	(N/A)	0.0	0.0	50.77

Northern pin oak	0.1	8	17.6	17	26 (N/A)	0.0	0.0	12.79
Birch	0.1	8	16.9	17	24 (N/A)	0.0	0.0	24.47
Juniper	0.0	4	7.9	8	11 (N/A)	0.0	0.0	11.47
Scotch pine	0.0	2	4.0	4	6 (N/A)	0.0	0.0	5.61
Red pine	0.0	2	4.0	4	6 (N/A)	0.0	0.0	5.61
Conifer Evergreen Small	0.1	8	16.4	16	25 (N/A)	0.0	0.0	24.57
Broadleaf Evergreen Small	0.1	4	9.2	9	13 (N/A)	0.0	0.0	13.40
Black poplar	0.5	37	63.1	62	99 (N/A)	0.0	0.0	98.63
Eastern hophornbeam	0.2	15	31.6	31	46 (N/A)	0.0	0.0	46.14
Japanese tree lilac	0.1	6	12.8	13	18 (N/A)	0.0	0.0	18.19
Kentucky coffeetree	0.0	0	0.5	0	1 (N/A)	0.0	0.0	0.66
Scarlet oak	0.1	7	13.7	13	21 (N/A)	0.0	0.0	20.64
Eastern redbud	0.0	0	0.6	1	1 (N/A)	0.0	0.0	0.87
Catalpa	0.3	25	46.9	46	71 (N/A)	0.0	0.0	70.91
Common chokecherry	0.0	2	3.8	4	5 (N/A)	0.0	0.0	5.40
Eastern hemlock	0.0	0	0.7	1	1 (N/A)	0.0	0.0	0.93
Chinese elm	0.3	25	46.9	46	71 (N/A)	0.0	0.0	70.91
Mulberry	0.2	15	31.6	31	46 (N/A)	0.0	0.0	46.14
Northern catalpa	0.4	33	59.0	58	91 (N/A)	0.0	0.0	91.02
Cherry plum	0.1	6	12.8	13	18 (N/A)	0.0	0.0	18.19
Total	1,033.4	78,432	141,606.0	138,774	217,206 (N/A)	100.0	100.0	48.98

Table 2: Annual Stormwater Benefits

Algona

Annual Stormwater Benefits of Public Trees

3/6/2017

Species	Total rainfall interception (Gal)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	2,462,912	66,745	(N/A)	19.5	21.9	77.25
Norway maple	1,323,668	35,871	(N/A)	14.9	11.7	54.10
Black maple	1,486,319	40,279	(N/A)	12.8	13.2	71.04
Silver maple	2,100,019	56,911	(N/A)	12.0	18.6	107.38
Apple	46,190	1,252	(N/A)	4.4	0.4	63.35
Spruce	331,466	8,983	(N/A)	3.8	2.9	53.47
Black walnut	609,511	16,518	(N/A)	3.7	5.4	101.34
Sugar maple	338,632	9,177	(N/A)	3.2	3.0	65.08
Bur oak	628,726	17,038	(N/A)	2.9	5.6	131.07
Honeylocust	260,893	7,070	(N/A)	2.0	2.3	79.44
White ash	241,228	6,537	(N/A)	1.9	2.1	78.76
Littleleaf linden	133,343	3,614	(N/A)	1.9	1.2	43.54
Red maple	58,728	1,592	(N/A)	1.5	0.5	24.11
Northern hackberry	165,361	4,481	(N/A)	1.3	1.5	80.02
Broadleaf Deciduous Medium	72,793	1,973	(N/A)	1.1	0.6	41.97
Conifer Evergreen Large	103,402	2,802	(N/A)	1.0	0.9	62.27
American basswood	80,653	2,186	(N/A)	0.9	0.7	53.31
Northern white cedar	120,536	3,267	(N/A)	0.9	1.1	79.67
Black ash	76,333	2,069	(N/A)	0.9	0.7	51.72
Blue spruce	48,886	1,325	(N/A)	0.8	0.4	37.85
Conifer Evergreen Medium	34,362	931	(N/A)	0.8	0.3	27.39
Amur maple	10,418	282	(N/A)	0.7	0.1	8.82
American elm	94,343	2,557	(N/A)	0.7	0.8	85.22
Maple	41,774	1,132	(N/A)	0.6	0.4	43.54
Boxelder	76,148	2,064	(N/A)	0.5	0.7	98.27
Northern red oak	27,918	757	(N/A)	0.5	0.2	36.03
Oak	14,849	402	(N/A)	0.5	0.1	20.12
Ash	33,542	909	(N/A)	0.3	0.3	60.60
Norway spruce	23,654	641	(N/A)	0.3	0.2	45.79
White oak	9,595	260	(N/A)	0.3	0.1	20.00
Broadleaf Deciduous Small	2,613	71	(N/A)	0.3	0.0	5.90
Lilac	1,152	31	(N/A)	0.2	0.0	3.12
Elm	26,409	716	(N/A)	0.2	0.2	89.46
Plum	880	24	(N/A)	0.2	0.0	2.98
Dogwood	1,294	35	(N/A)	0.2	0.0	4.38
Alder	1,226	33	(N/A)	0.2	0.0	4.15
Cottonwood	35,603	965	(N/A)	0.2	0.3	137.83
Mountain ash	4,982	135	(N/A)	0.2	0.0	19.29
Basswood	20,871	566	(N/A)	0.2	0.2	80.80
Broadleaf Evergreen Medium	6,935	188	(N/A)	0.2	0.1	26.85
Eastern white pine	2,146	58	(N/A)	0.2	0.0	8.31
Hickory	7,936	215	(N/A)	0.1	0.1	35.84
Paper birch	10,090	273	(N/A)	0.1	0.1	45.58
Eastern cottonwood	21,262	576	(N/A)	0.1	0.2	115.24
Swamp white oak	2,170	59	(N/A)	0.1	0.0	14.70
Pear	666	18	(N/A)	0.1	0.0	4.51
River birch	500	14	(N/A)	0.1	0.0	3.39
Flowering dogwood	145	4	(N/A)	0.1	0.0	1.31
Pin oak	10,930	296	(N/A)	0.1	0.1	98.74

Black cherry	2,507	68 (N/A)	0.1	0.0	22.65
Eastern red cedar	367	10 (N/A)	0.0	0.0	4.97
Siberian elm	4,575	124 (N/A)	0.0	0.0	62.00
Black locust	3,888	105 (N/A)	0.0	0.0	52.69
Ohio buckeye	598	16 (N/A)	0.0	0.0	8.11
Broadleaf Deciduous Large	8,704	236 (N/A)	0.0	0.1	117.95
Quaking aspen	4,056	110 (N/A)	0.0	0.0	54.96
Northern pin oak	598	16 (N/A)	0.0	0.0	8.11
Birch	586	16 (N/A)	0.0	0.0	15.88
Juniper	659	18 (N/A)	0.0	0.0	17.86
Scotch pine	213	6 (N/A)	0.0	0.0	5.77
Red pine	213	6 (N/A)	0.0	0.0	5.77
Conifer Evergreen Small	1,635	44 (N/A)	0.0	0.0	44.30
Broadleaf Evergreen Small	289	8 (N/A)	0.0	0.0	7.83
Black poplar	7,239	196 (N/A)	0.0	0.1	196.17
Eastern hophornbeam	1,174	32 (N/A)	0.0	0.0	31.82
Japanese tree lilac	264	7 (N/A)	0.0	0.0	7.17
Kentucky coffeetree	18	0 (N/A)	0.0	0.0	0.48
Scarlet oak	608	16 (N/A)	0.0	0.0	16.47
Eastern redbud	7	0 (N/A)	0.0	0.0	0.20
Catalpa	3,943	107 (N/A)	0.0	0.0	106.85
Common chokecherry	69	2 (N/A)	0.0	0.0	1.86
Eastern hemlock	49	1 (N/A)	0.0	0.0	1.32
Chinese elm	3,943	107 (N/A)	0.0	0.0	106.85
Mulberry	1,174	32 (N/A)	0.0	0.0	31.82
Northern catalpa	7,239	196 (N/A)	0.0	0.1	196.17
Cherry plum	264	7 (N/A)	0.0	0.0	7.17
Citywide total	11,268,893	305,387 (N/A)	100.0	100.0	68.86

Table 3: Annual Air Quality Benefits

Algona

Annual Air Quality Benefits of Public Trees

3/6/2017

Species	Deposition (lb)				Total Depos. (\$)	Avoided (lb)				Total Avoided (\$)	BVOC Emissions (lb)	BVOC Emissions (\$)	Total (lb)	Total Standard (\$ Error)	% of Total Trees	Avg. \$/tree
	O ₃	NO ₂	PM ₁₀	SO ₂		NO ₂	PM ₁₀	VOC	SO ₂							
Green ash	298.1	47.7	144.3	13.4	1,592	1,104.4	160.8	153.3	1,048.7	6,881	0.0	0	2,970.6	8,473 (N/A)	19.5	9.81
Norway maple	261.2	45.1	129.7	11.6	1,415	728.2	105.4	100.4	683.3	4,515	-62.1	-233	2,002.6	5,698 (N/A)	14.9	8.59
Black maple	381.4	65.0	175.2	16.9	2,023	735.3	107.0	102.0	696.8	4,578	-124.5	-467	2,155.0	6,134 (N/A)	12.8	10.82
Silver maple	359.5	60.9	177.3	15.9	1,941	710.0	103.9	99.2	680.6	4,440	-192.0	-720	2,015.3	5,661 (N/A)	12.0	10.68
Apple	12.2	2.0	6.0	0.6	66	57.7	8.3	7.8	53.0	355	-0.1	0	147.5	420 (N/A)	4.4	2.13
Spruce	37.8	7.5	31.5	4.6	250	94.2	13.8	13.2	90.9	590	-153.6	-576	139.8	265 (N/A)	3.8	1.57
Black walnut	85.6	13.7	39.6	3.8	452	239.2	34.8	33.2	226.9	1,490	0.0	0	676.9	1,942 (N/A)	3.7	11.91
Sugar maple	45.4	7.7	22.8	2.0	246	151.3	22.1	21.1	144.4	945	-35.9	-135	380.9	1,056 (N/A)	3.2	7.49
Bur oak	97.4	15.6	43.8	4.4	511	213.7	31.1	29.7	202.7	1,331	0.0	0	638.3	1,842 (N/A)	2.9	14.17
Honeylocust	49.9	8.2	22.9	2.3	264	122.1	17.9	17.1	117.4	765	-38.0	-142	319.8	886 (N/A)	2.0	9.96
White ash	37.9	6.1	17.8	1.7	201	105.5	15.5	14.8	102.3	663	0.0	0	301.6	864 (N/A)	1.9	10.40
Littleleaf linden	21.5	3.7	10.8	1.0	117	70.5	10.3	9.8	66.9	439	-10.6	-40	183.9	516 (N/A)	1.9	6.22
Red maple	11.6	2.0	5.8	0.5	63	40.6	5.9	5.6	38.6	253	-4.2	-16	106.5	300 (N/A)	1.5	4.55
Northern hackberry	25.0	4.3	12.9	1.1	137	85.4	12.4	11.8	80.1	529	0.0	0	233.0	666 (N/A)	1.3	11.90
Broadleaf Deciduous Medium	15.0	2.6	7.4	0.7	81	37.4	5.4	5.1	34.8	231	-3.5	-13	104.8	299 (N/A)	1.1	6.36
Conifer Evergreen Large	11.9	2.4	9.8	1.5	79	28.7	4.2	4.0	27.9	180	-48.1	-181	42.3	79 (N/A)	1.0	1.75
American basswood	10.2	1.7	5.2	0.4	55	40.1	5.8	5.5	37.6	248	-8.9	-34	97.6	270 (N/A)	0.9	6.59
Northern white cedar	14.4	2.9	11.6	1.8	94	27.4	4.0	3.8	26.4	172	-66.9	-251	25.3	15 (N/A)	0.9	0.36
Black ash	14.8	2.5	7.4	0.7	80	44.4	6.5	6.2	42.1	277	-3.5	-13	120.9	343 (N/A)	0.9	8.59
Blue spruce	6.7	1.3	5.6	0.8	44	16.7	2.4	2.3	15.9	104	-17.8	-67	34.0	82 (N/A)	0.8	2.34
Conifer Evergreen Medium	3.7	0.7	3.4	0.5	25	13.7	2.0	1.9	12.9	85	-11.5	-43	27.2	67 (N/A)	0.8	1.97
Amur maple	2.7	0.5	1.4	0.1	15	13.2	1.9	1.8	12.1	81	0.0	0	33.6	96 (N/A)	0.7	2.99
American elm	19.8	3.4	9.7	0.9	107	47.3	6.9	6.6	45.3	296	0.0	0	140.0	403 (N/A)	0.7	13.43
Maple	9.9	1.7	4.6	0.4	53	23.4	3.4	3.2	22.2	146	-3.3	-12	65.5	186 (N/A)	0.6	7.15
Boxelder	11.3	1.8	5.1	0.5	59	26.6	3.9	3.7	25.3	166	-3.0	-11	75.2	214 (N/A)	0.5	10.19
Northern red oak	5.6	1.0	2.8	0.2	30	15.3	2.2	2.1	14.5	95	-7.9	-29	35.8	96 (N/A)	0.5	4.57
Oak	1.4	0.2	0.8	0.1	8	8.2	1.2	1.1	7.9	51	0.0	0	20.9	59 (N/A)	0.5	2.96
Ash	7.0	1.2	3.4	0.3	38	16.9	2.4	2.3	15.8	104	-1.6	-6	47.7	136 (N/A)	0.3	9.07
Norway spruce	2.7	0.5	2.2	0.3	18	6.2	0.9	0.9	6.0	39	-12.2	-46	7.5	11 (N/A)	0.3	0.78
White oak	1.0	0.2	0.5	0.0	6	4.5	0.7	0.6	4.2	28	0.0	0	11.8	33 (N/A)	0.3	2.58
Broadleaf Deciduous Small	0.7	0.1	0.4	0.0	4	3.0	0.4	0.4	2.8	19	0.0	0	7.9	23 (N/A)	0.3	1.89
Lilac	0.2	0.0	0.1	0.0	1	1.7	0.2	0.2	1.5	10	0.0	0	4.0	11 (N/A)	0.2	1.14
Elm	4.0	0.6	1.8	0.2	21	10.1	1.5	1.4	9.6	63	0.0	0	29.3	84 (N/A)	0.2	10.52
Plum	0.1	0.0	0.1	0.0	1	1.3	0.2	0.2	1.2	8	0.0	0	3.1	9 (N/A)	0.2	1.09
Dogwood	0.3	0.0	0.2	0.0	2	1.8	0.3	0.2	1.7	11	0.0	0	4.5	13 (N/A)	0.2	1.60
Alder	0.4	0.1	0.2	0.0	2	1.1	0.2	0.2	1.0	7	0.0	0	3.2	9 (N/A)	0.2	1.14
Cottonwood	7.0	1.1	3.1	0.3	36	12.8	1.9	1.8	12.2	80	0.0	0	40.2	116 (N/A)	0.2	16.61
Mountain ash	1.6	0.3	0.8	0.1	9	5.0	0.7	0.7	4.6	31	0.0	0	13.7	39 (N/A)	0.2	5.60
Basswood	2.8	0.4	1.3	0.1	15	8.2	1.2	1.1	7.8	51	0.0	0	22.9	66 (N/A)	0.2	9.38
Broadleaf Evergreen Medium	0.3	0.1	0.5	0.0	3	4.1	0.6	0.6	4.0	26	-1.9	-7	8.3	21 (N/A)	0.2	3.07
Eastern white pine	0.2	0.0	0.2	0.0	1	1.0	0.1	0.1	0.9	6	-0.6	-2	2.0	5 (N/A)	0.2	0.73
Hickory	0.6	0.1	0.4	0.0	3	5.8	0.9	0.8	5.7	37	0.0	0	14.3	40 (N/A)	0.1	6.68
Paper birch	1.0	0.2	0.5	0.0	5	5.5	0.8	0.8	5.2	34	0.0	0	14.0	40 (N/A)	0.1	6.62
Eastern cottonwood	2.8	0.4	1.3	0.1	15	8.2	1.2	1.1	7.7	51	0.0	0	22.9	66 (N/A)	0.1	13.12
Swamp white oak	0.3	0.0	0.2	0.0	2	1.8	0.3	0.3	1.7	11	-0.1	0	4.5	13 (N/A)	0.1	3.18
Pear	0.1	0.0	0.1	0.0	1	1.0	0.1	0.1	0.9	6	0.0	0	2.3	7 (N/A)	0.1	1.63
River birch	0.0	0.0	0.0	0.0	0	0.6	0.1	0.1	0.5	4	0.0	0	1.3	4 (N/A)	0.1	0.94
Flowering dogwood	0.0	0.0	0.0	0.0	0	0.2	0.0	0.0	0.2	1	0.0	0	0.5	2 (N/A)	0.1	0.51
Pin oak	1.9	0.3	1.0	0.1	10	4.8	0.7	0.7	4.5	30	-3.5	-13	10.4	27 (N/A)	0.1	8.93
Black cherry	0.8	0.1	0.4	0.0	4	2.7	0.4	0.4	2.6	17	0.0	0	7.5	21 (N/A)	0.1	7.15
Eastern red cedar	0.0	0.0	0.0	0.0	0	0.2	0.0	0.0	0.1	1	-0.2	-1	0.2	0 (N/A)	0.0	0.20
Siberian elm	0.8	0.1	0.4	0.0	4	1.9	0.3	0.3	1.8	12	0.0	0	5.6	16 (N/A)	0.0	8.10
Black locust	0.7	0.1	0.4	0.0	4	2.4	0.3	0.3	2.3	15	-0.2	-1	6.4	18 (N/A)	0.0	9.04
Ohio buckeye	0.1	0.0	0.0	0.0	0	0.5	0.1	0.1	0.5	3	0.0	0	1.3	4 (N/A)	0.0	1.80
Broadleaf Deciduous Large	1.3	0.2	0.6	0.1	7	3.2	0.5	0.4	3.0	20	0.0	0	9.2	26 (N/A)	0.0	13.23
Quaking aspen	0.4	0.1	0.2	0.0	2	2.3	0.3	0.3	2.3	15	0.0	0	5.9	17 (N/A)	0.0	8.38
Northern pin oak	0.1	0.0	0.0	0.0	0	0.5	0.1	0.1	0.5	3	0.0	0	1.3	4 (N/A)	0.0	1.80
Birch	0.1	0.0	0.0	0.0	0	0.5	0.1	0.1	0.5	3	0.0	0	1.2	3 (N/A)	0.0	3.47
Jumper	0.1	0.0	0.1	0.0	0	0.2	0.0	0.0	0.2	1	-0.3	-1	0.3	1 (N/A)	0.0	0.62
Scotch pine	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	-0.1	0	0.2	1 (N/A)	0.0	0.56
Red pine	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	-0.1	0	0.2	1 (N/A)	0.0	0.56
Conifer Evergreen Small	0.3	0.1	0.3	0.0	2	0.5	0.1	0.1	0.5	3	-0.9	-3	1.0	2 (N/A)	0.0	2.19
Broadleaf Evergreen Small	0.0	0.0	0.0	0.0	0	0.3	0.0	0.0	0.3	2	0.0	0	0.7	2 (N/A)	0.0	2.06
Black poplar	1.6	0.3	0.7	0.1	8	2.3	0.3	0.3	2.2	14	0.0	0	7.7	23 (N/A)	0.0	22.55
Eastern hophornbeam	0.4	0.1	0.2	0.0	2	1.0	0.1	0.1	0.9	6	0.0	0	2.9	8 (N/A)	0.0	8.35
Japanese tree lilac	0.0	0.0	0.0	0.0	0	0.4	0.1	0.1	0.3	2	0.0	0	0.9	3 (N/A)	0.0	2.55
Kentucky coffeetree	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0 (N/A)	0.0	0.08
Scarlet oak	0.0	0.0	0.0	0.0	0	0.5	0.1	0.1	0.4	3	0.0	0	1.1	3 (N/A)	0.0	2.99
Eastern redbud	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0 (N/A)	0.0	0.11
Catalpa	0.5	0.1	0.2	0.0	3	1.6	0.2	0.2	1.5	10	0.0	0	4.4	12 (N/A)	0.0	12.48

Common chokecherry	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	0.0	0	0.3	1 (N/A)	0.0	0.71
Eastern hemlock	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0 (N/A)	0.0	0.05
Chinese elm	0.5	0.1	0.2	0.0	3	1.6	0.2	0.2	1.5	10	0.0	0	4.4	12 (N/A)	0.0	12.48
Mulberry	0.4	0.1	0.2	0.0	2	1.0	0.1	0.1	0.9	6	0.0	0	2.9	8 (N/A)	0.0	8.35
Northern catalpa	1.2	0.2	0.5	0.1	6	2.1	0.3	0.3	2.0	13	0.0	0	6.6	19 (N/A)	0.0	19.04
Cherry plum	0.0	0.0	0.0	0.0	0	0.4	0.1	0.1	0.3	2	0.0	0	0.9	3 (N/A)	0.0	2.55
Citywide total	1,896.1	319.5	937.6	90.5	10,249	4,932.7	718.2	684.7	4,682.2	30,728	-\$17.3	-\$3,065	13,444.3	37,913 (N/A)	100.0	8.55

Table 4: Annual Carbon Stored

Algona

Stored CO2 Benefits of Public Trees

3/6/2017

Species	Total Stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	9,743,858	73,079	(N/A)	19.5	24.2	84.58
Norway maple	4,316,967	32,377	(N/A)	14.9	10.7	48.83
Black maple	4,061,871	30,464	(N/A)	12.8	10.1	53.73
Silver maple	8,358,534	62,689	(N/A)	12.0	20.7	118.28
Apple	202,217	1,517	(N/A)	4.4	0.5	7.70
Spruce	367,942	2,760	(N/A)	3.8	0.9	16.43
Black walnut	2,837,141	21,279	(N/A)	3.7	7.0	130.54
Sugar maple	1,324,190	9,931	(N/A)	3.2	3.3	70.44
Bur oak	3,270,334	24,528	(N/A)	2.9	8.1	188.67
Honeylocust	637,166	4,779	(N/A)	2.0	1.6	53.69
White ash	678,126	5,086	(N/A)	1.9	1.7	61.28
Littleleaf linden	466,225	3,497	(N/A)	1.9	1.2	42.13
Red maple	134,945	1,012	(N/A)	1.5	0.3	15.33
Northern hackberry	371,774	2,788	(N/A)	1.3	0.9	49.79
Broadleaf Deciduous	249,049	1,868	(N/A)	1.1	0.6	39.74
Conifer Evergreen La	116,083	871	(N/A)	1.0	0.3	19.35
American basswood	376,304	2,822	(N/A)	0.9	0.9	68.84
Northern white cedar	169,898	1,274	(N/A)	0.9	0.4	31.08
Black ash	245,433	1,841	(N/A)	0.9	0.6	46.02
Blue spruce	46,917	352	(N/A)	0.8	0.1	10.05
Conifer Evergreen M	18,837	141	(N/A)	0.8	0.0	4.16
Amur maple	45,139	339	(N/A)	0.7	0.1	10.58
American elm	416,946	3,127	(N/A)	0.7	1.0	104.24
Maple	107,748	808	(N/A)	0.6	0.3	31.08
Boxelder	457,277	3,430	(N/A)	0.5	1.1	163.31
Northern red oak	113,555	852	(N/A)	0.5	0.3	40.56
Oak	48,683	365	(N/A)	0.5	0.1	18.26
Ash	115,763	868	(N/A)	0.3	0.3	57.88
Norway spruce	30,029	225	(N/A)	0.3	0.1	16.09
White oak	33,741	253	(N/A)	0.3	0.1	19.47
Broadleaf Deciduous	12,198	91	(N/A)	0.3	0.0	7.62
Lilac	3,640	27	(N/A)	0.2	0.0	2.73
Elm	135,968	1,020	(N/A)	0.2	0.3	127.47
Plum	2,719	20	(N/A)	0.2	0.0	2.55
Dogwood	5,086	38	(N/A)	0.2	0.0	4.77
Alder	6,839	51	(N/A)	0.2	0.0	6.41
Cottonwood	244,515	1,834	(N/A)	0.2	0.6	261.98
Mountain ash	25,989	195	(N/A)	0.2	0.1	27.85
Basswood	90,330	677	(N/A)	0.2	0.2	96.78
Broadleaf Evergreen l	6,120	46	(N/A)	0.2	0.0	6.56
Eastern white pine	816	6	(N/A)	0.2	0.0	0.87
Hickory	19,394	145	(N/A)	0.1	0.0	24.24
Paper birch	32,621	245	(N/A)	0.1	0.1	40.78
Eastern cottonwood	89,034	668	(N/A)	0.1	0.2	133.55
Swamp white oak	4,960	37	(N/A)	0.1	0.0	9.30
Pear	2,171	16	(N/A)	0.1	0.0	4.07
River birch	672	5	(N/A)	0.1	0.0	1.26
Flowering dogwood	369	3	(N/A)	0.1	0.0	0.92
Pin oak	48,409	363	(N/A)	0.1	0.1	121.02
Black cherry	12,817	96	(N/A)	0.1	0.0	32.04
Eastern red cedar	86	1	(N/A)	0.0	0.0	0.32
Siberian elm	19,742	148	(N/A)	0.0	0.0	74.03
Black locust	11,569	87	(N/A)	0.0	0.0	43.39
Ohio buckeye	1,118	8	(N/A)	0.0	0.0	4.19
Broadleaf Deciduous	42,930	322	(N/A)	0.0	0.1	160.99

Quaking aspen	12,130	91 (N/A)	0.0	0.0	45.49
Northern pin oak	1,118	8 (N/A)	0.0	0.0	4.19
Birch	1,101	8 (N/A)	0.0	0.0	8.26
Juniper	277	2 (N/A)	0.0	0.0	2.08
Scotch pine	38	0 (N/A)	0.0	0.0	0.29
Red pine	38	0 (N/A)	0.0	0.0	0.29
Conifer Evergreen Sp	1,102	8 (N/A)	0.0	0.0	8.27
Broadleaf Evergreen !	908	7 (N/A)	0.0	0.0	6.81
Black poplar	55,982	420 (N/A)	0.0	0.1	419.86
Eastern hophornbeam	6,743	51 (N/A)	0.0	0.0	50.57
Japanese tree lilac	908	7 (N/A)	0.0	0.0	6.81
Kentucky coffeetree	12	0 (N/A)	0.0	0.0	0.09
Scarlet oak	1,035	8 (N/A)	0.0	0.0	7.76
Eastern redbud	14	0 (N/A)	0.0	0.0	0.10
Catalpa	15,773	118 (N/A)	0.0	0.0	118.30
Common chokecherry	178	1 (N/A)	0.0	0.0	1.33
Eastern hemlock	2	0 (N/A)	0.0	0.0	0.02
Chinese elm	15,773	118 (N/A)	0.0	0.0	118.30
Mulberry	6,743	51 (N/A)	0.0	0.0	50.57
Northern catalpa	39,259	294 (N/A)	0.0	0.1	294.44
Cherry plum	908	7 (N/A)	0.0	0.0	6.81
Citywide total	40,342,844	302,571 (N/A)	100.0	100.0	68.22

Table 5: Annual Carbon Sequestered

Annual CO Benefits of Public Trees

3/6/2017

Species	Sequestered (lb)	Sequestered (\$)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released (\$)	Avoided (lb)	Avoided (\$)	Net Total (lb)	Total Standard (\$ Error)	% of Total Trees	% of Total \$	Avg. \$/tree
Elm	4,437	33	-653	-23	-5	3,553	27	7,313	55 (N/A)	0.2	0.2	6.86
Plum	426	3	-13	-5	0	440	3	847	6 (N/A)	0.2	0.0	0.79
Dogwood	568	4	-25	-6	0	616	5	1,154	9 (N/A)	0.2	0.0	1.08
Alder	539	4	-33	-4	0	374	3	876	7 (N/A)	0.2	0.0	0.82
Cottonwood	3,680	28	-1,174	-31	-9	4,527	34	7,003	53 (N/A)	0.2	0.2	7.50
Mountain ash	1,088	8	-125	-15	-1	1,685	13	2,633	20 (N/A)	0.2	0.1	2.82
Basswood	4,132	31	-434	-19	-3	2,882	22	6,561	49 (N/A)	0.2	0.2	7.03
Broadleaf Evergreen Medi	567	4	-29	-10	0	1,480	11	2,008	15 (N/A)	0.2	0.1	2.15
Eastern white pine	186	1	-4	-5	0	339	3	517	4 (N/A)	0.2	0.0	0.55
Hickory	2,435	18	-93	-11	-1	2,123	16	4,455	33 (N/A)	0.1	0.1	5.57
Paper birch	2,619	20	-157	-12	-1	1,943	15	4,393	33 (N/A)	0.1	0.1	5.49
Eastern cottonwood	4,387	33	-427	-18	-3	2,859	21	6,800	51 (N/A)	0.1	0.2	10.20
Swamp white oak	711	5	-25	-4	0	643	5	1,325	10 (N/A)	0.1	0.0	2.48
Pear	304	2	-10	-4	0	323	2	612	5 (N/A)	0.1	0.0	1.15
River birch	292	2	-5	-2	0	201	2	486	4 (N/A)	0.1	0.0	0.91
Flowering dogwood	85	1	-2	-1	0	80	1	161	1 (N/A)	0.1	0.0	0.40
Pin oak	4,567	34	-232	-11	-2	1,671	13	5,996	45 (N/A)	0.1	0.2	14.99
Black cherry	1,014	8	-62	-7	-1	952	7	1,897	14 (N/A)	0.1	0.1	4.74
Eastern red cedar	27	0	0	-1	0	53	0	78	1 (N/A)	0.0	0.0	0.29
Siberian elm	811	6	-95	-4	-1	666	5	1,378	10 (N/A)	0.0	0.0	5.17
Black locust	856	6	-56	-5	0	835	6	1,631	12 (N/A)	0.0	0.0	6.12
Ohio buckeye	229	2	-5	-1	0	183	1	406	3 (N/A)	0.0	0.0	1.52
Broadleaf Deciduous Larg	1,357	10	-206	-7	-2	1,127	8	2,272	17 (N/A)	0.0	0.1	8.52
Quaking aspen	1,105	8	-58	-5	0	834	6	1,876	14 (N/A)	0.0	0.1	7.04
Northern pin oak	229	2	-5	-1	0	183	1	406	3 (N/A)	0.0	0.0	1.52
Birch	224	2	-5	-1	0	176	1	393	3 (N/A)	0.0	0.0	2.95
Juniper	40	0	-1	-1	0	82	1	119	1 (N/A)	0.0	0.0	0.89
Scotch pine	18	0	0	-1	0	38	0	55	0 (N/A)	0.0	0.0	0.41
Red pine	18	0	0	-1	0	38	0	55	0 (N/A)	0.0	0.0	0.41
Conifer Evergreen Small	43	0	-5	-2	0	187	1	222	2 (N/A)	0.0	0.0	1.67
Broadleaf Evergreen Small	81	1	-4	-1	0	98	1	174	1 (N/A)	0.0	0.0	1.30
Black poplar	479	4	-269	-6	-2	813	6	1,017	8 (N/A)	0.0	0.0	7.63
Eastern hophornbeam	0	0	-32	-4	0	335	3	299	2 (N/A)	0.0	0.0	2.24
Japanese tree lilac	114	1	-4	-1	0	124	1	232	2 (N/A)	0.0	0.0	1.74
Kentucky coffeetree	3	0	0	0	0	4	0	7	0 (N/A)	0.0	0.0	0.05
Scarlet oak	209	2	-5	-1	0	159	1	361	3 (N/A)	0.0	0.0	2.71
Eastern redbud	9	0	0	0	0	6	0	14	0 (N/A)	0.0	0.0	0.10
Catalpa	857	6	-76	-4	-1	552	4	1,330	10 (N/A)	0.0	0.0	9.97
Common chokecherry	38	0	-1	-1	0	37	0	74	1 (N/A)	0.0	0.0	0.55
Eastern hemlock	4	0	0	0	0	6	0	9	0 (N/A)	0.0	0.0	0.07
Chinese elm	857	6	-76	-4	-1	552	4	1,330	10 (N/A)	0.0	0.0	9.97
Mulberry	0	0	-32	-4	0	335	3	299	2 (N/A)	0.0	0.0	2.24
Northern catalpa	912	7	-188	-5	-1	734	6	1,453	11 (N/A)	0.0	0.0	10.90
Cherry plum	114	1	-4	-1	0	124	1	232	2 (N/A)	0.0	0.0	1.74
Citywide total	2,190,232	16,427	-193,714	-11,102	-1,536	1,733,319	13,000	3,718,736	27,891 (N/A)	100.0	100.0	6.29

Table 6: Annual Social and Aesthetic Benefits

Algona

Annual Aesthetic/Other Benefits of Public Trees

3/6/2017

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	45,870	(N/A)	19.5	22.0	53.09
Norway maple	20,948	(N/A)	14.9	10.1	31.60
Black maple	16,566	(N/A)	12.8	8.0	29.22
Silver maple	49,369	(N/A)	12.0	23.7	93.15
Apple	1,037	(N/A)	4.4	0.5	5.26
Spruce	4,912	(N/A)	3.8	2.4	29.24
Black walnut	8,909	(N/A)	3.7	4.3	54.66
Sugar maple	7,380	(N/A)	3.2	3.5	52.34
Bur oak	6,978	(N/A)	2.9	3.4	53.68
Honeylocust	12,630	(N/A)	2.0	6.1	141.91
White ash	6,576	(N/A)	1.9	3.2	79.23
Littleleaf linden	4,266	(N/A)	1.9	2.1	51.40
Red maple	2,147	(N/A)	1.5	1.0	32.53
Northern hackberry	2,994	(N/A)	1.3	1.4	53.47
Broadleaf Deciduous Medium	890	(N/A)	1.1	0.4	18.94
Conifer Evergreen Large	1,559	(N/A)	1.0	0.7	34.65
American basswood	1,755	(N/A)	0.9	0.8	42.81
Northern white cedar	939	(N/A)	0.9	0.5	22.90
Black ash	1,149	(N/A)	0.9	0.6	28.71
Blue spruce	692	(N/A)	0.8	0.3	19.77
Conifer Evergreen Medium	762	(N/A)	0.8	0.4	22.42
Amur maple	224	(N/A)	0.7	0.1	6.98
American elm	1,657	(N/A)	0.7	0.8	55.23
Maple	1,113	(N/A)	0.6	0.5	42.80
Boxelder	1,527	(N/A)	0.5	0.7	72.73
Northern red oak	323	(N/A)	0.5	0.2	15.38
Oak	444	(N/A)	0.5	0.2	22.21
Ash	379	(N/A)	0.3	0.2	25.29
Norway spruce	235	(N/A)	0.3	0.1	16.81
White oak	269	(N/A)	0.3	0.1	20.71
Broadleaf Deciduous Small	35	(N/A)	0.3	0.0	2.89
Lilac	30	(N/A)	0.2	0.0	2.96
Elm	351	(N/A)	0.2	0.2	43.86
Plum	23	(N/A)	0.2	0.0	2.89
Dogwood	30	(N/A)	0.2	0.0	3.81
Alder	29	(N/A)	0.2	0.0	3.63
Cottonwood	276	(N/A)	0.2	0.1	39.36
Mountain ash	63	(N/A)	0.2	0.0	9.07
Basswood	333	(N/A)	0.2	0.2	47.54
Broadleaf Evergreen Medium	180	(N/A)	0.2	0.1	25.66
Eastern white pine	70	(N/A)	0.2	0.0	10.05
Hickory	258	(N/A)	0.1	0.1	42.97
Paper birch	249	(N/A)	0.1	0.1	41.47
Eastern cottonwood	329	(N/A)	0.1	0.2	65.79
Swamp white oak	81	(N/A)	0.1	0.0	20.25
Pear	17	(N/A)	0.1	0.0	4.23
River birch	41	(N/A)	0.1	0.0	10.35
Flowering dogwood	4	(N/A)	0.1	0.0	1.38

Pin oak	357 (N/A)	0.1	0.2	118.83
Black cherry	60 (N/A)	0.1	0.0	19.92
Eastern red cedar	27 (N/A)	0.0	0.0	13.37
Siberian elm	62 (N/A)	0.0	0.0	31.05
Black locust	82 (N/A)	0.0	0.0	41.11
Ohio buckeye	29 (N/A)	0.0	0.0	14.48
Broadleaf Deciduous Large	104 (N/A)	0.0	0.1	52.10
Quaking aspen	104 (N/A)	0.0	0.0	51.77
Northern pin oak	29 (N/A)	0.0	0.0	14.48
Birch	26 (N/A)	0.0	0.0	26.22
Juniper	21 (N/A)	0.0	0.0	21.34
Scotch pine	7 (N/A)	0.0	0.0	6.83
Red pine	7 (N/A)	0.0	0.0	6.83
Conifer Evergreen Small	14 (N/A)	0.0	0.0	13.68
Broadleaf Evergreen Small	4 (N/A)	0.0	0.0	4.38
Black poplar	29 (N/A)	0.0	0.0	28.57
Eastern hophornbeam	0 (N/A)	0.0	0.0	0.00
Japanese tree lilac	6 (N/A)	0.0	0.0	6.40
Kentucky coffeetree	5 (N/A)	0.0	0.0	5.26
Scarlet oak	29 (N/A)	0.0	0.0	28.56
Eastern redbud	0 (N/A)	0.0	0.0	0.03
Catalpa	66 (N/A)	0.0	0.0	65.59
Common chokecherry	2 (N/A)	0.0	0.0	2.06
Eastern hemlock	6 (N/A)	0.0	0.0	5.76
Chinese elm	66 (N/A)	0.0	0.0	65.59
Mulberry	0 (N/A)	0.0	0.0	0.00
Northern catalpa	58 (N/A)	0.0	0.0	58.34
Cherry plum	6 (N/A)	0.0	0.0	6.40
Citywide total	208,104 (N/A)	100.0	100.0	46.92

Table 7: Summary of Benefits in Dollars

Algona

Total Annual Benefits of Public Trees by Species (\$)

3/6/2017

Species	Energy	CO ₂	Air Quality	Stormwater	Aesthetic/Other	Total (\$)	Standard Error	% of Total \$
Green ash	48,556	6,602	8,473	66,745	45,870	176,247	(N/A)	22.1
Norway maple	32,494	3,335	5,698	35,871	20,948	98,345	(N/A)	12.3
Black maple	32,515	2,788	6,134	40,279	16,566	98,283	(N/A)	12.3
Silver maple	30,907	6,249	5,661	56,911	49,369	149,096	(N/A)	18.7
Apple	2,671	277	420	1,252	1,037	5,657	(N/A)	0.7
Spruce	4,059	392	265	8,983	4,912	18,611	(N/A)	2.3
Black walnut	10,535	1,374	1,942	16,518	8,909	39,278	(N/A)	4.9
Sugar maple	6,624	876	1,056	9,177	7,380	25,113	(N/A)	3.2
Bur oak	9,410	1,166	1,842	17,038	6,978	36,434	(N/A)	4.6
Honeylocust	5,292	710	886	7,070	12,630	26,588	(N/A)	3.3
White ash	4,508	697	864	6,537	6,576	19,183	(N/A)	2.4
Littleleaf linden	3,095	467	516	3,614	4,266	11,959	(N/A)	1.5
Red maple	1,784	213	300	1,592	2,147	6,036	(N/A)	0.8
Northern hackberry	3,820	372	666	4,481	2,994	12,334	(N/A)	1.5
Broadleaf Deciduous M	1,681	152	299	1,973	890	4,995	(N/A)	0.6
Conifer Evergreen Large	1,221	123	79	2,802	1,559	5,784	(N/A)	0.7
American basswood	1,787	265	270	2,186	1,755	6,263	(N/A)	0.8
Northern white cedar	1,189	103	15	3,267	939	5,512	(N/A)	0.7
Black ash	1,954	192	343	2,069	1,149	5,706	(N/A)	0.7
Blue spruce	733	64	82	1,325	692	2,896	(N/A)	0.4
Conifer Evergreen Medi	610	49	67	931	762	2,420	(N/A)	0.3
Amur maple	608	61	96	282	224	1,271	(N/A)	0.2
American elm	2,053	201	403	2,557	1,657	6,870	(N/A)	0.9
Maple	1,036	121	186	1,132	1,113	3,587	(N/A)	0.5
Boxelder	1,167	259	214	2,064	1,527	5,230	(N/A)	0.7
Northern red oak	676	65	96	757	323	1,916	(N/A)	0.2
Oak	353	49	59	402	444	1,307	(N/A)	0.2
Ash	757	68	136	909	379	2,250	(N/A)	0.3
Norway spruce	273	23	11	641	235	1,182	(N/A)	0.1
White oak	200	28	33	260	269	791	(N/A)	0.1
Broadleaf Deciduous Sm	141	12	23	71	35	281	(N/A)	0.0
Lilac	83	8	11	31	30	164	(N/A)	0.0
Elm	442	55	84	716	351	1,647	(N/A)	0.2
Plum	64	6	9	24	23	126	(N/A)	0.0
Dogwood	83	9	13	35	30	170	(N/A)	0.0
Alder	52	7	9	33	29	130	(N/A)	0.0
Cottonwood	553	53	116	965	276	1,963	(N/A)	0.2
Mountain ash	231	20	39	135	63	489	(N/A)	0.1
Basswood	359	49	66	566	333	1,373	(N/A)	0.2
Broadleaf Evergreen Me	177	15	21	188	180	581	(N/A)	0.1
Eastern white pine	49	4	5	58	70	187	(N/A)	0.0
Hickory	242	33	40	215	258	788	(N/A)	0.1
Paper birch	238	33	40	273	249	833	(N/A)	0.1
Eastern cottonwood	366	51	66	576	329	1,387	(N/A)	0.2
Swamp white oak	81	10	13	59	81	244	(N/A)	0.0
Pear	47	5	7	18	17	93	(N/A)	0.0
River birch	28	4	4	14	41	90	(N/A)	0.0
Flowering dogwood	12	1	2	4	4	22	(N/A)	0.0

Pin oak	209	45	27	296	357	934 (N/A)	0.1
Black cherry	122	14	21	68	60	286 (N/A)	0.0
Eastern red cedar	7	1	0	10	27	45 (N/A)	0.0
Siberian elm	83	10	16	124	62	295 (N/A)	0.0
Black locust	105	12	18	105	82	323 (N/A)	0.0
Ohio buckeye	26	3	4	16	29	77 (N/A)	0.0
Broadleaf Deciduous La	135	17	26	236	104	519 (N/A)	0.1
Quaking aspen	102	14	17	110	104	346 (N/A)	0.0
Northern pin oak	26	3	4	16	29	77 (N/A)	0.0
Birch	24	3	3	16	26	73 (N/A)	0.0
Juniper	11	1	1	18	21	52 (N/A)	0.0
Scotch pine	6	0	1	6	7	19 (N/A)	0.0
Red pine	6	0	1	6	7	19 (N/A)	0.0
Conifer Evergreen Smal	25	2	2	44	14	86 (N/A)	0.0
Broadleaf Evergreen Sm	13	1	2	8	4	29 (N/A)	0.0
Black poplar	99	8	23	196	29	354 (N/A)	0.0
Eastern hophornbeam	46	2	8	32	0	89 (N/A)	0.0
Japanese tree lilac	18	2	3	7	6	36 (N/A)	0.0
Kentucky coffeetree	1	0	0	0	5	7 (N/A)	0.0
Scarlet oak	21	3	3	16	29	71 (N/A)	0.0
Eastern redbud	1	0	0	0	0	1 (N/A)	0.0
Catalpa	71	10	12	107	66	266 (N/A)	0.0
Common chokecherry	5	1	1	2	2	11 (N/A)	0.0
Eastern hemlock	1	0	0	1	6	8 (N/A)	0.0
Chinese elm	71	10	12	107	66	266 (N/A)	0.0
Mulberry	46	2	8	32	0	89 (N/A)	0.0
Northern catalpa	91	11	19	196	58	375 (N/A)	0.0
Cherry plum	18	2	3	7	6	36 (N/A)	0.0
Citywide Total	217,206	27,891	37,913	305,387	208,104	796,500 (N/A)	100.0

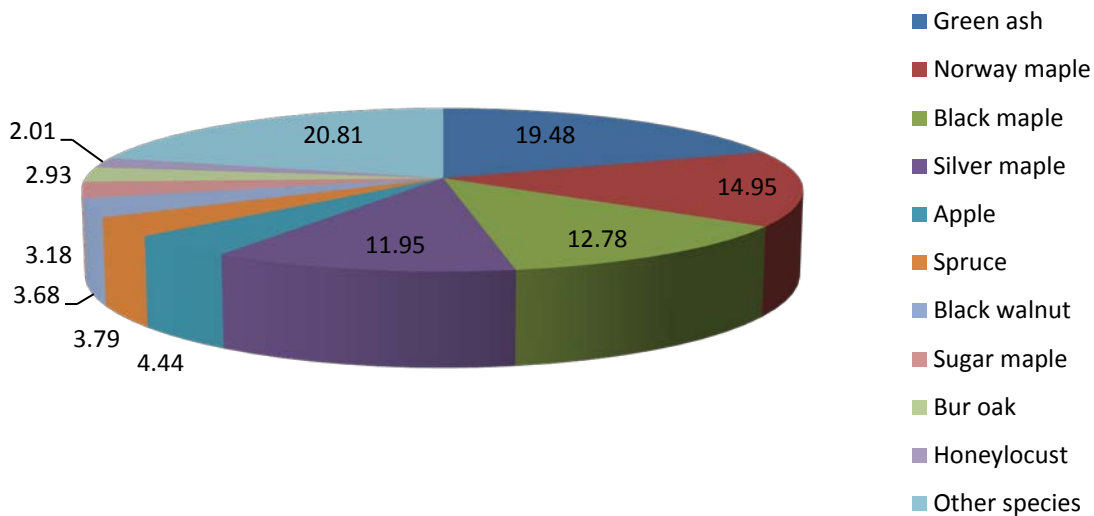


Figure 1: Species Distribution

Relative Age Distribution of Top 10 Public Tree Species (%)

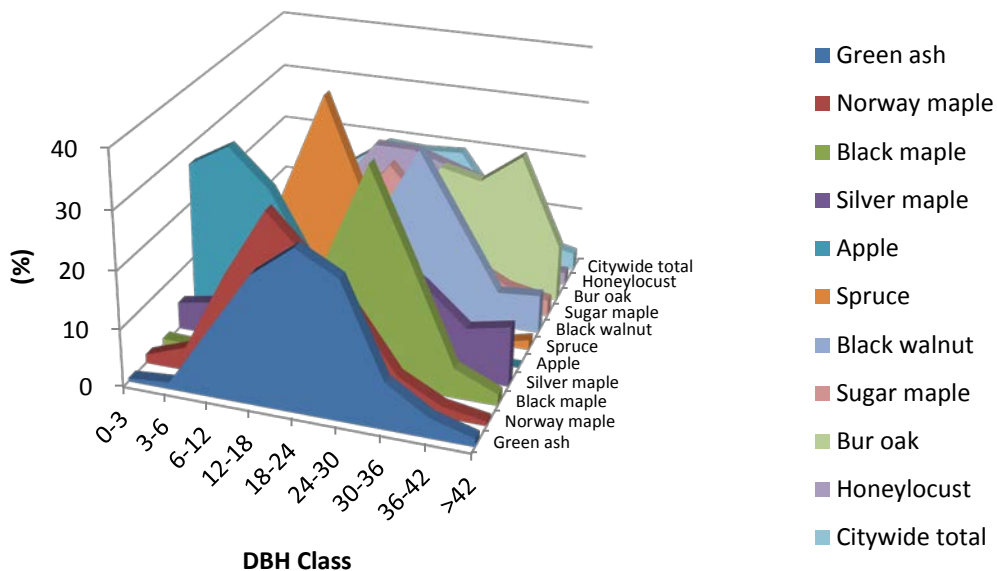


Figure 2: Relative Age Class

Leaf Condition

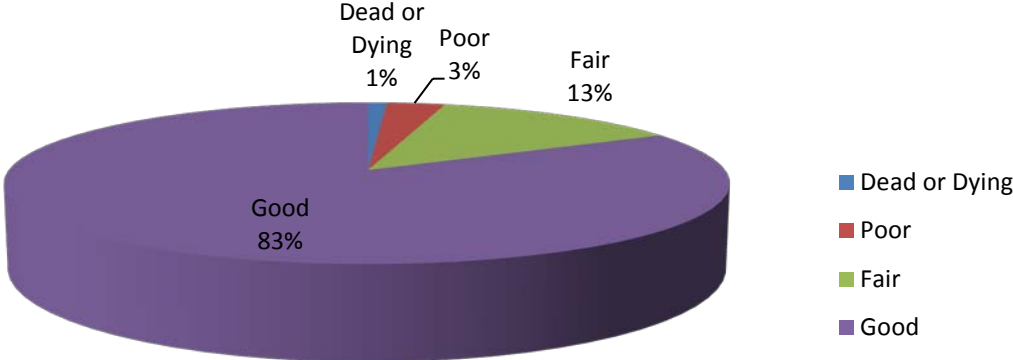


Figure 3: Foliage Condition

Wood Condition

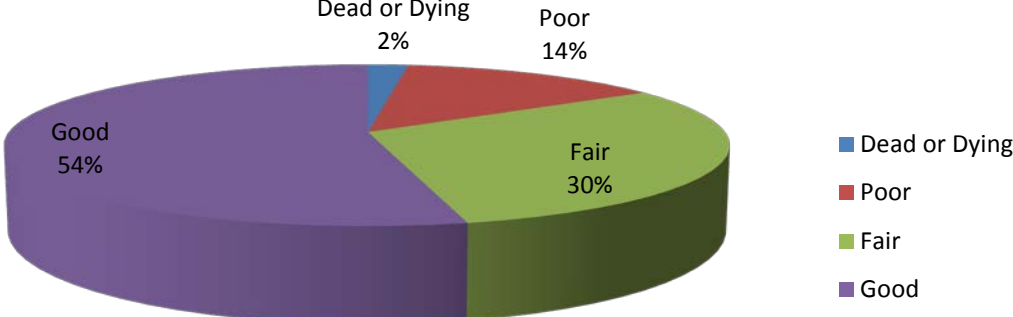


Figure 4: Wood Condition

Canopy Cover

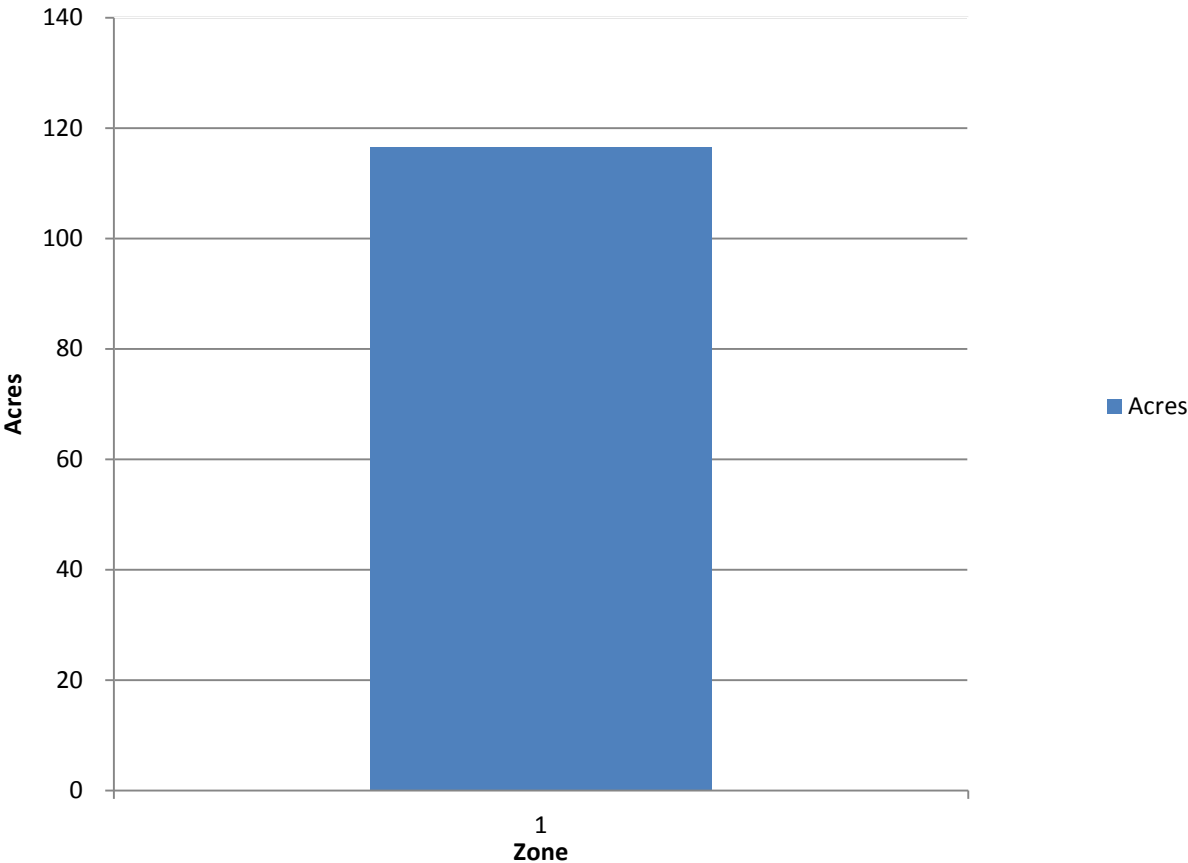


Figure 5: Canopy Cover in Acres

Land use Public Trees by Zone (%)

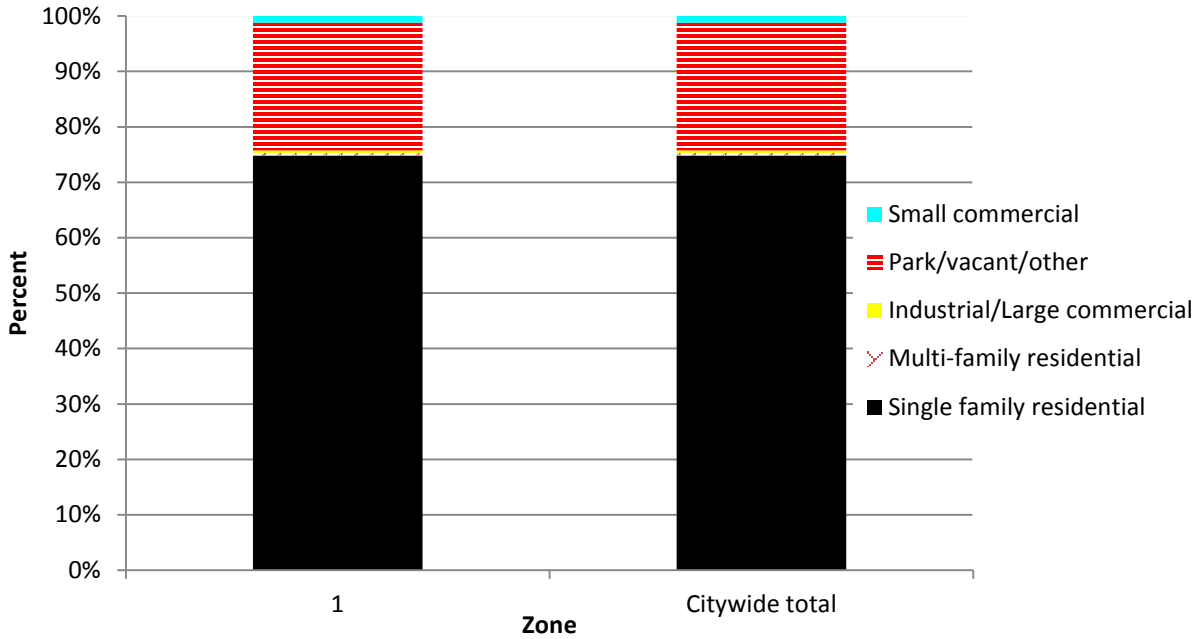


Figure 6: Land Use of city/park trees

Location Public Trees by Zone (%)

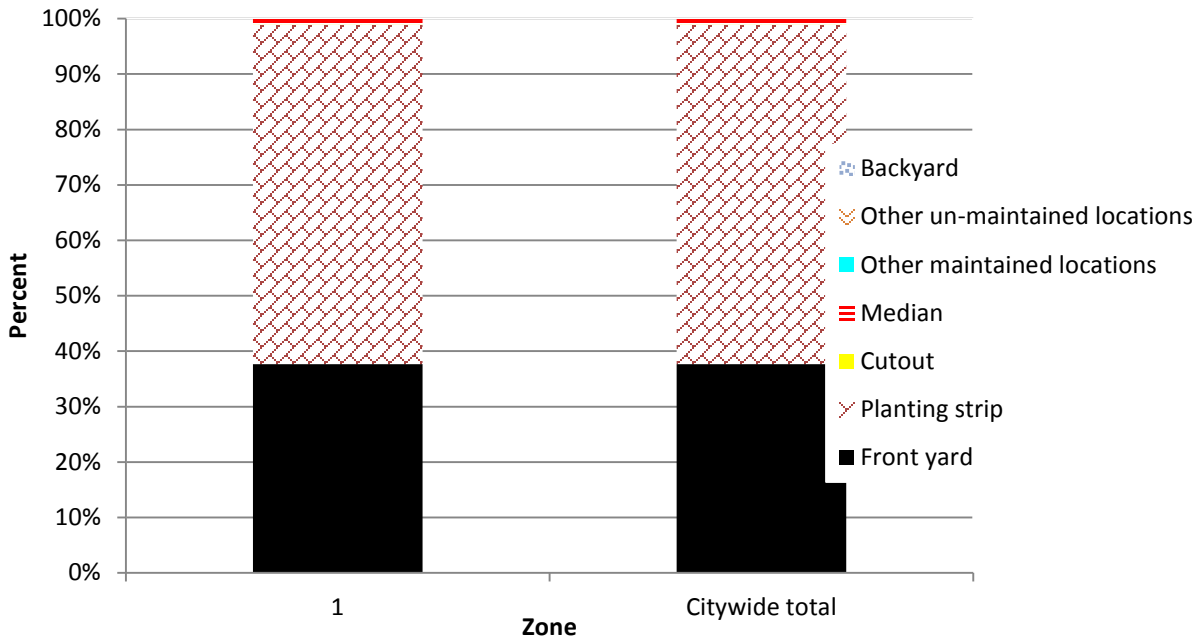


Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping

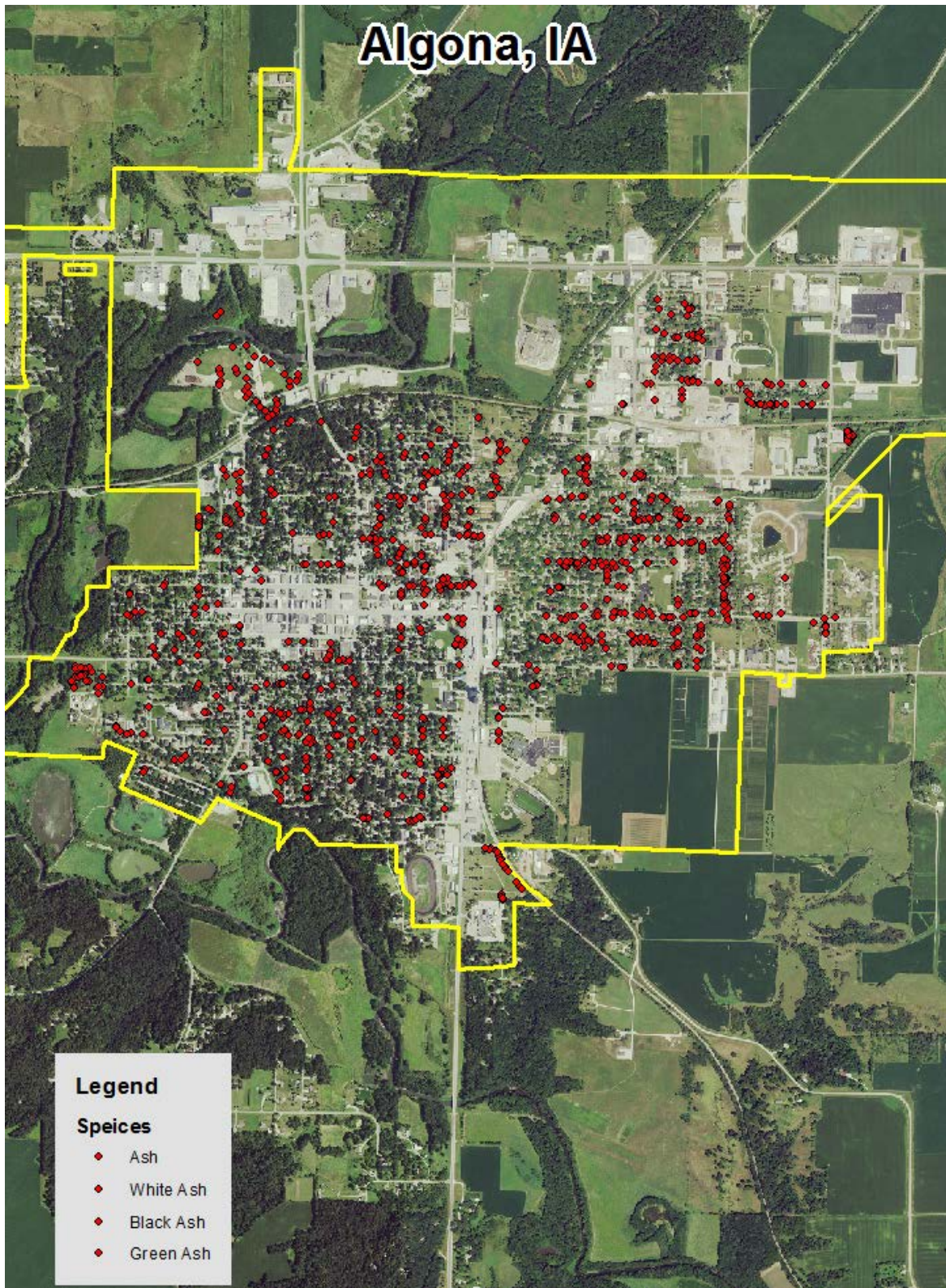


Figure 1: Location of Ash Trees

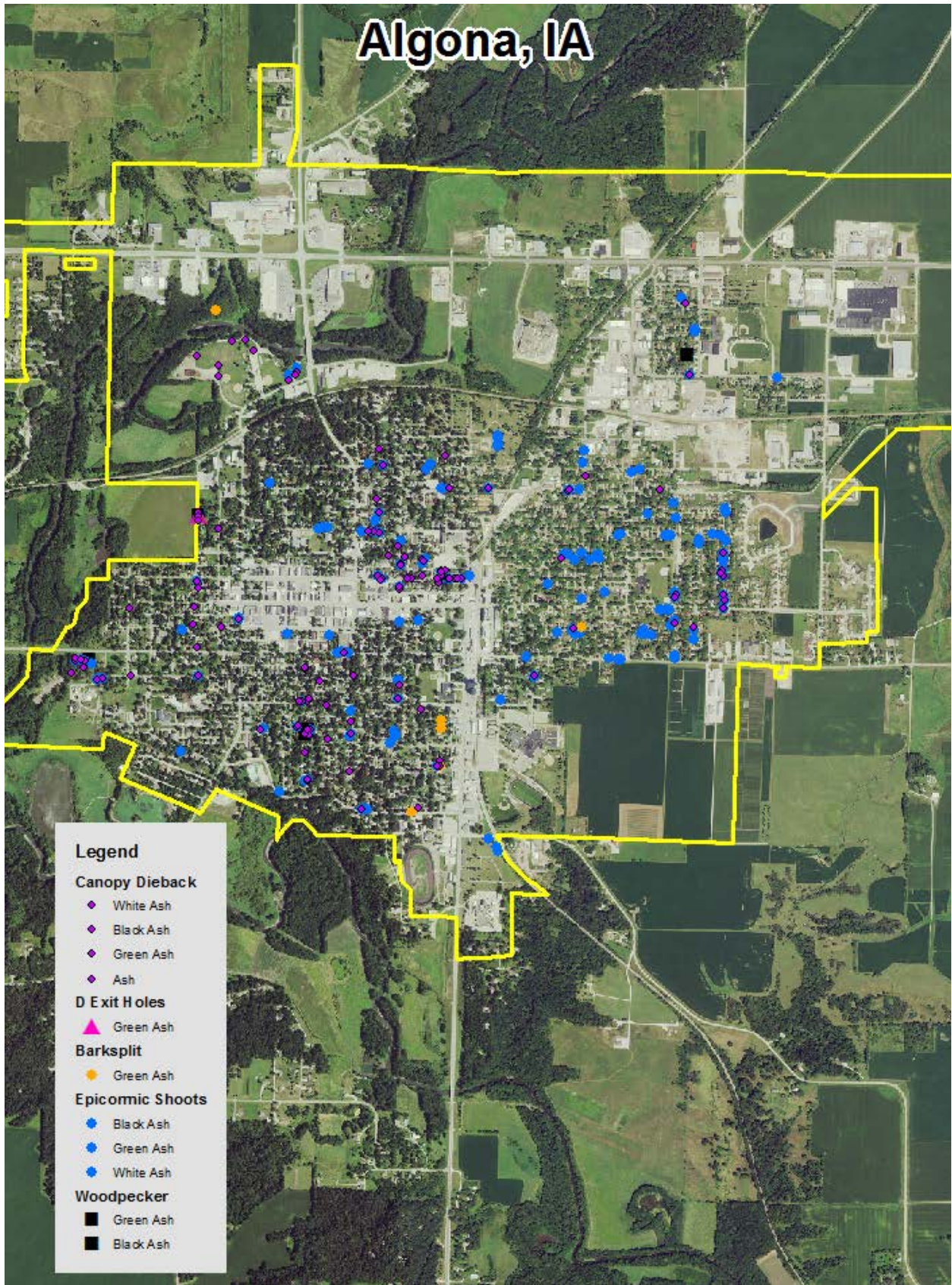


Figure 2: Location of EAB symptoms

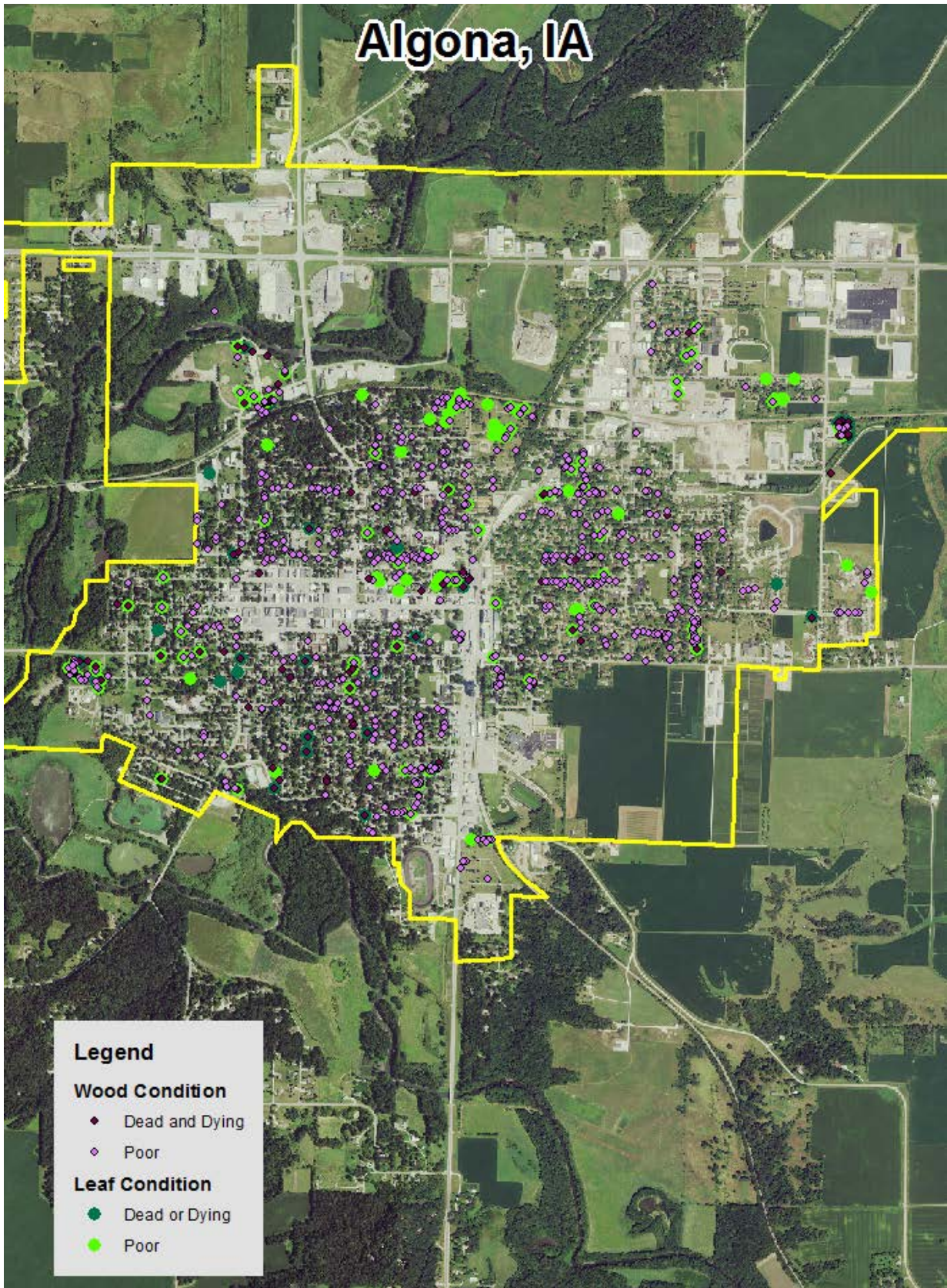


Figure 3: Location of Poor Condition Trees

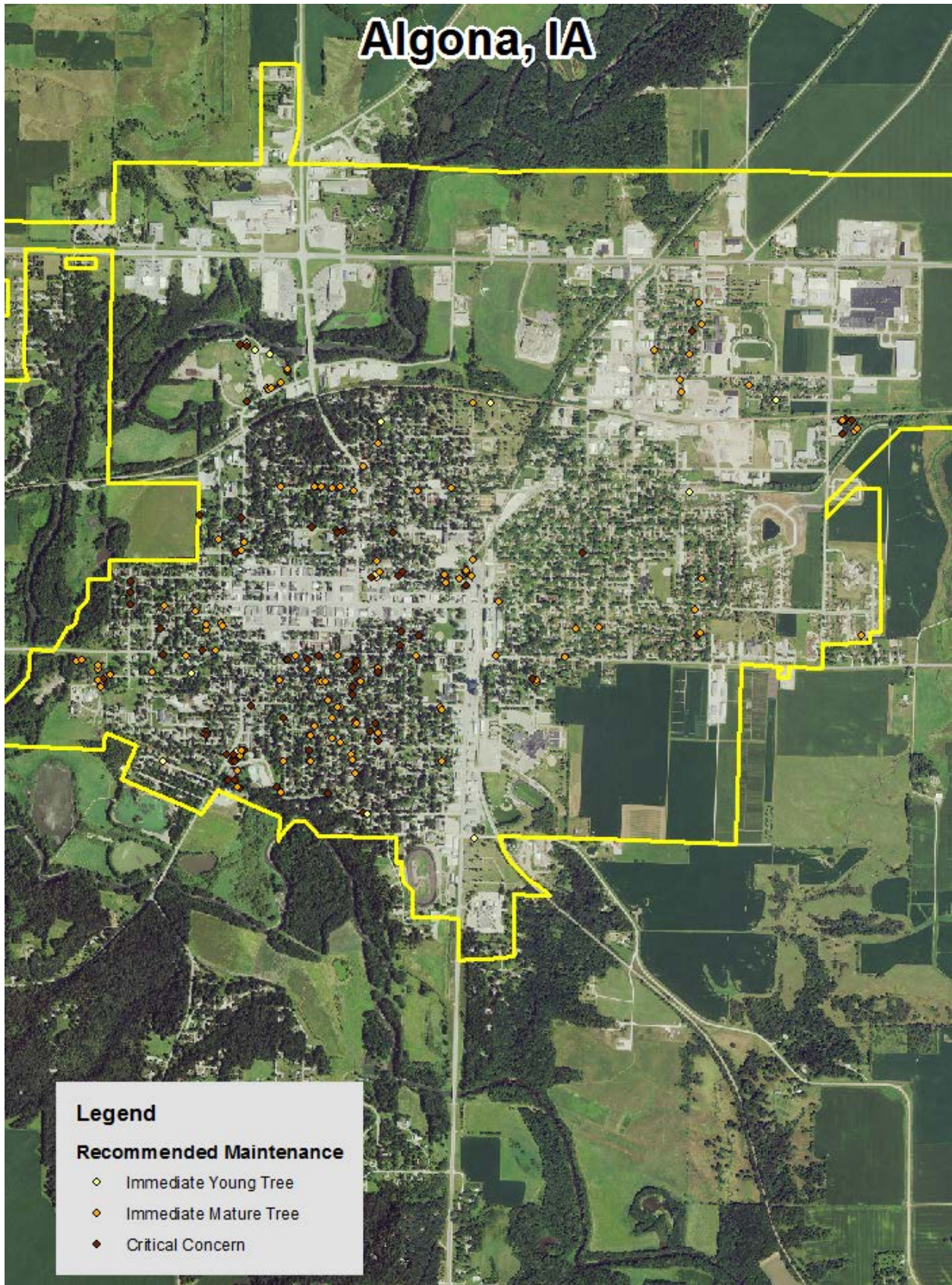


Figure 4: Location of Trees with Recommended Maintenance

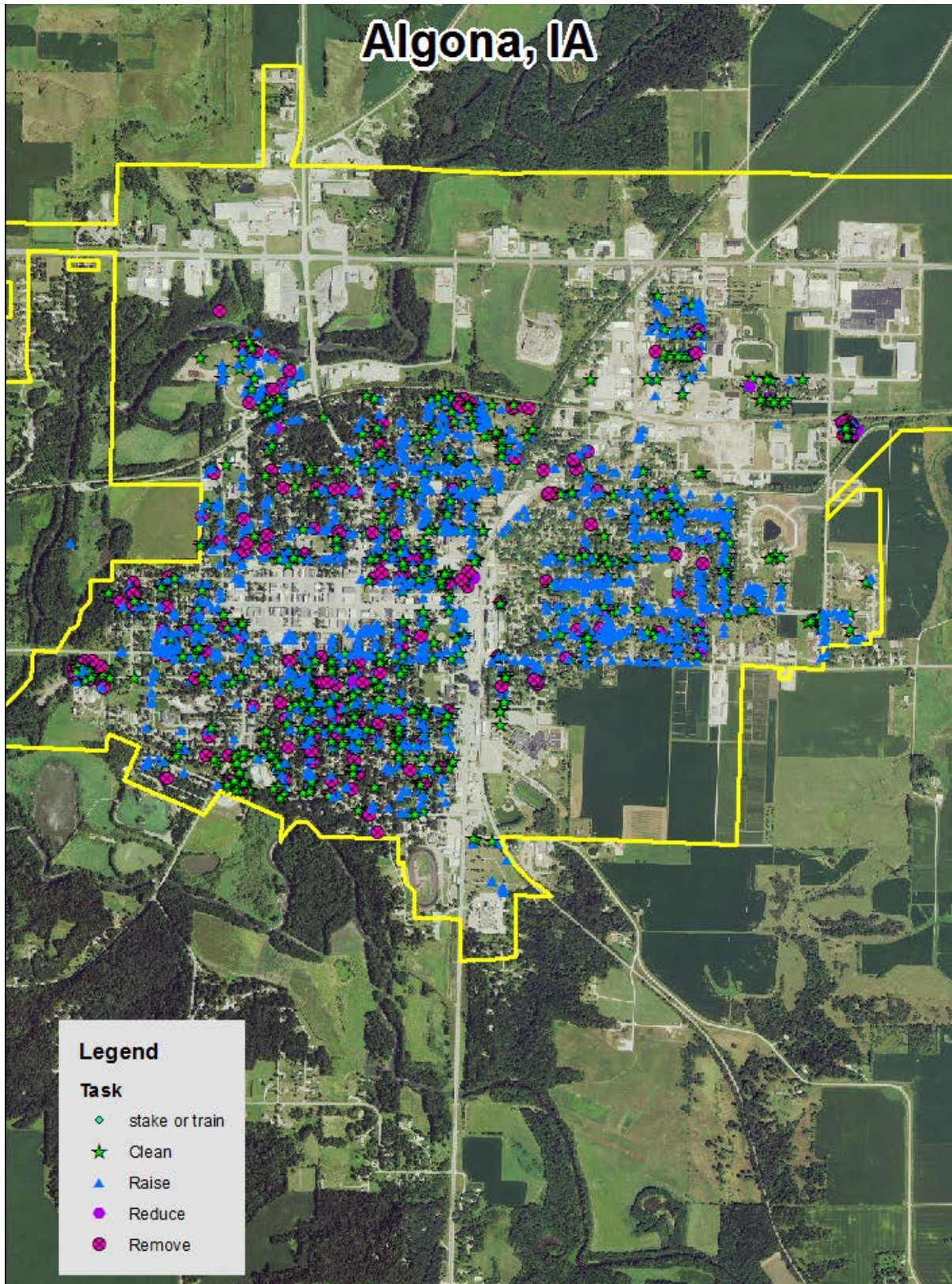


Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*

Appendix C: Algona Tree Ordinances

12.24.010

Chapter 12.24

TREES

Sections:

Article I. General Provisions

- 12.24.010 Purpose.
- 12.24.020 Definitions.
- 12.24.030 Permits.
- 12.24.040 Planting restrictions.
- 12.24.050 Maintenance.
- 12.24.060 Removal of trees.

Article II. Dutch Elm Disease Control

- 12.24.080 Trees subject to removal.
- 12.24.090 Duty to remove.
- 12.24.100 Inspection.
- 12.24.110 Removal from city property.
- 12.24.120 Removal from private property.

Article I. General Provisions

12.24.010 Purpose.

The purpose of this chapter is to promote and protect the public health, safety and general welfare by providing for the regulation of the planting, maintenance and removal of trees, shrubs and other plants within the city. (Ord. 821 § 1 (part), 1995)

12.24.020 Definitions.

For use in this chapter, the following terms are defined:

“Large tree” means a tree that may attain a height of forty-five feet or more.

“Low growing tree” means a tree that will maintain a maximum height of thirty feet or less.

“Park” means all public parks having individual names.

“Parking” means that part of the right-of-way in the city not covered by sidewalk and lying between the lot line and the curbline; or, on unpaved streets, that part of the street, avenue, or highway lying between the lot line and that portion of the street usually traveled by vehicular traffic.

“Public works director” means the public works director of the city or his or her designee. The public works director shall have the following general powers and duties:

1. To direct, manage, supervise and control all planting, removal, maintenance and protection of all trees and shrubs on public areas;

If the abutting property owner fails to trim the trees as required in the preceding sentence, the public works director may within a reasonable time initiate abatement procedures as outlined in Sections 8.12.030 through 8.12.110 of the Algona Municipal Code. (Ord. 821 § 1 (part), 1995)

12.24.060 Removal of trees.

The public works director shall remove, on the order of the council, any tree on the streets of the city which interferes with the making of improvements or with travel thereon. He shall additionally remove any trees on the parking or street, not on private property, which have become diseased, or which constitute a danger to the public, or which may otherwise be declared a nuisance. (Ord. 821 § 1 (part), 1995)

Article II. Dutch Elm Disease Control

12.24.080 Trees subject to removal.

The council having determined that the health of the elm trees within the city is threatened by a fatal disease known as the Dutch elm disease declares the following shall be removed:

A. Living or Standing Trees. Any living or standing elm tree or part thereof infected with the Dutch elm disease fungus or which harbors any of the elm bark beetles, that is *scolytus multistriatus* (eichb.) or *hylurgopinus rufipes* (marsh);

2. To guard all trees and shrubs within the city to prevent the spread of disease or pests and to eliminate dangerous conditions that may affect the life, health or safety of persons or property;

3. Such other powers and duties as are provided by state law and/or city ordinance.

“Tree topping” means the practice of cutting the main trunk of a tree to limit the height of the tree. (Ord. 821 § 1 (part), 1995)

12.24.030 Permits.

No person shall plant, prune, remove, cut above or below ground, or otherwise disturb any tree on any street, parking or municipal-owned property without first filing an application and procuring a permit from the public works director, who shall determine whether a permit will be issued. The person receiving the permit shall follow the regulations set forth in this chapter. (Ord. 821 § 1 (part), 1995)

12.24.040 Planting restrictions.

No tree shall be planted on any street or parking except in accordance with the following:

A. **Alignment.** All trees hereafter planted in any street shall be planted in the parking at a point halfway between the sidewalk and curblin. In the event no tree line has been established, or the existing tree line is not halfway between the sidewalk and curblin, the public works director shall determine the tree line or the place where the tree line shall be planted.

B. **Location.** No tree shall be planted closer than four feet from the curblin or outer line of the sidewalk. Parkings must be at least ten feet in width for large tree plantings and at least eight feet wide for low growing trees. All trees should have a spacing of at least thirty feet from other trees or a greater distance depending on the species. No street tree shall be planted within thirty feet of the point where property lines intersect at the corner of street intersections. No street tree shall be planted within ten feet of an alley or ten feet of a driveway. No tree shall be planted under or within ten lateral feet of any overhead utility wire unless it is a low growing tree approved by the public works director. No tree shall be planted within five lateral feet of any underground utility wire.

C. **Prohibited Trees.** No person shall hereinafter plant in any street or parking any fruit bearing trees, coniferous trees or any tree of the kinds commonly known as American Elm, Black Locust, Bolleana Poplar, Boxelder, Catalpa, Cottonless Cottonwoods, Cottonwood, Evergreen, Green Ash, Mountain Ash, Mulberry, Norway Maple, Siberian (Chinese) Elm, Russian Olive, Silver Maple, Tombarody Poplar, Tree of Heaven, Weeping Birch, Willow or White Poplar.

D. **Minimum Tree Size.** All trees planted on any street or parking shall be at least six feet tall when planted. (Ord. 821 § 1 (part), 1995)

12.24.050 Maintenance.

In the event a tree planted in the street or parking is not being properly cared for, the city may perform work on the trees. The owner or agent of the abutting property shall maintain trees on the abutting property that are overhanging the street or parking in such a manner so that all branches will be at least fifteen feet above the surface of the street and eight feet above the sidewalks.

B. Dead Trees. Any dead elm tree or part thereof including logs, branches, stumps, firewood or other elm material from which the bark has not been removed and burned or sprayed with an effective elm bark beetle destroying insecticide. (Prior code § 6-2.0201)

12.24.090 Duty to remove.

No person, firm or corporation shall permit any tree or material as defined in Section 12.24.080 of this article to remain on the premises owned, controlled or occupied by him within the city. (Prior code § 6-2.0202)

12.24.100 Inspection.

The superintendent shall inspect or cause to be inspected all premises and places within the city to determine whether any condition as defined in Section 12.24.080 of this article exists thereon, and shall also inspect or cause to be inspected any elm trees reported or suspected to be infected with the Dutch elm disease or any elm bark bearing material reported or suspected to be infected with the elm bark beetles. (Prior code § 6-2.0203)

12.24.110 Removal from city property.

If the superintendent upon inspection or examination, in person or by some qualified person acting for him, shall determine that any condition as herein defined exists in or upon any public street, alley, park or any public place, including the strip between the curb and the lot line of private property, within the city and that the danger of other elm trees within the city is imminent, he shall immediately cause it to be removed and burned or otherwise correct the same in such manner as to destroy or prevent as fully as possible the spread of Dutch elm disease or the insect pests or vectors known to carry such disease fungus. (Prior code § 6-2.0204)

12.24.120 Removal from private property.

A. If the superintendent upon inspection or examination, in person or by some qualified person acting for him, shall determine with reasonable certainty that any condition as herein defined exists in or upon private premises and that the danger to other elm trees within the city is imminent, he shall immediately notify by certified mail the owner, occupant or person in charge of such property, to correct such condition within fourteen days of such notification. If such owner, occupant or person in charge of such property fails to comply within fourteen days of receipt thereof, the council may cause the nuisance to be removed and the cost assessed against the property as provided in Chapter 8.12 of this code.

B. If the superintendent is unable to determine with reasonable certainty whether or not a tree in or upon private premises is infected with Dutch elm disease, he is authorized to remove or cut specimens from such tree, and obtain a diagnosis of such specimens. (Prior code § 6-2.0205)

The State of Iowa is an Equal Opportunity Employer and provider of ADA services.

Federal law prohibits employment discrimination on the basis of race, color, age, religion, national origin, sex or disability. State law prohibits employment discrimination on the basis of race, color, creed, age, sex, sexual orientation, gender identity, national origin, religion, pregnancy, or disability. State law also prohibits public accommodation (such as access to services or physical facilities) discrimination on the basis of race, color, creed, religion, sex, sexual orientation, gender identity, religion, national origin, or disability. If you believe you have been discriminated against in any program, activity or facility as described above, or if you desire further information, please contact the Iowa Civil Rights Commission, 1-800-457-4416, or write to the Iowa Department of Natural Resources, Wallace State Office Bldg., 502 E. 9th St., Des Moines, IA 50319.

If you need accommodations because of disability to access the services of this Agency, please contact the Director at 515-725-8200.