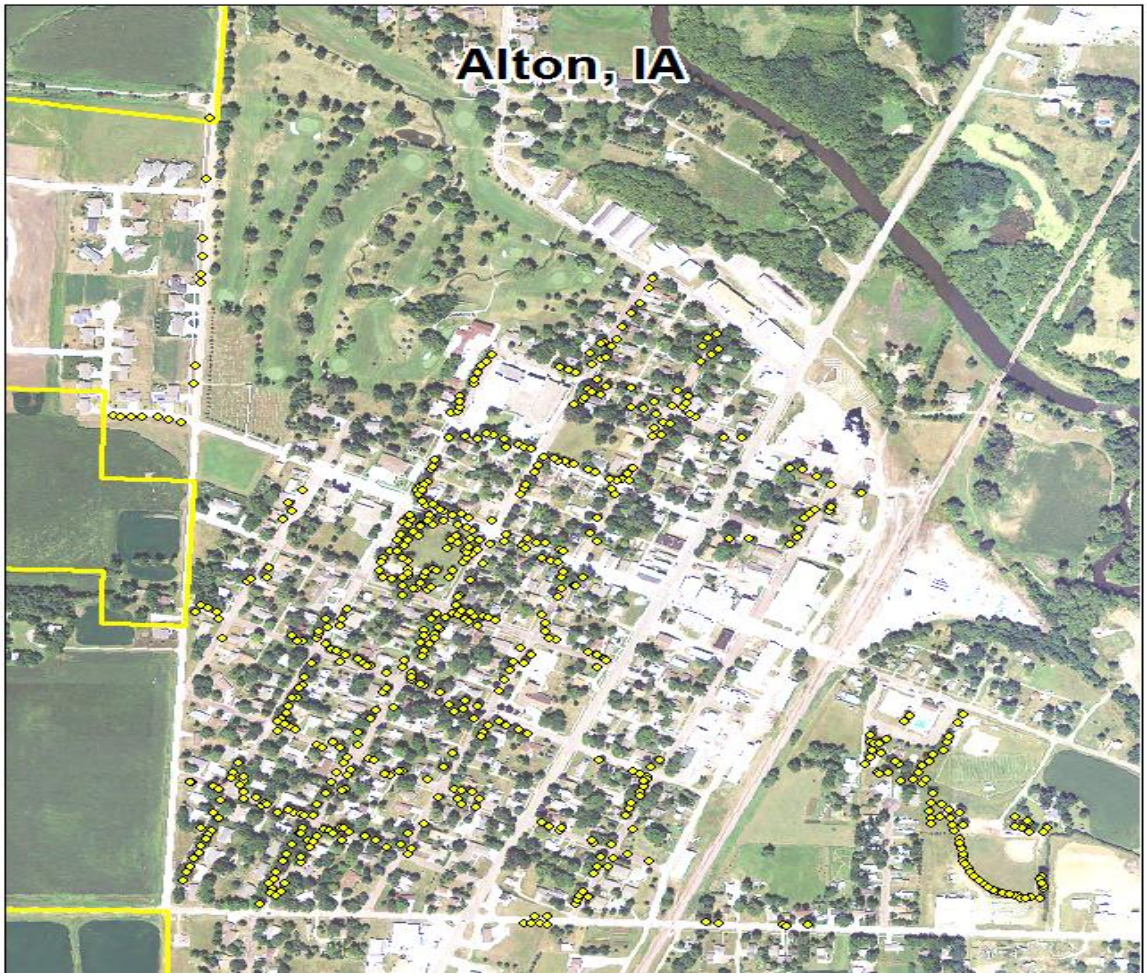
Emerald Ash Borer/Urban Plan
Alton, IA



2014 Urban Forest Management Plan
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Executive Summary

Overview

This plan was developed to assist the City of Alton 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 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 29% of Alton'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 2014, 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 437 trees inventoried.

- Alton's trees provide $105,620 of benefits annually, an average of $241 per tree (Appendix A, Table 7).
- There are over 32 species of trees and one lilac shrub along streets.
- The top three genera are: Maple 37%, Ash 29%, and Apple 5%.
- 11% of the trees are in need of 'immediate' or 'critical' management. 89% of the trees need routine work.
- 15 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 15 trees needing removal, 8 trees are over 24 inches in diameter at 4.5 ft and must be addressed immediately. *City ownership of the trees recommended for removal should be verified prior to any removal*.
- 31 of the 128 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: ash, maple, cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut.
- Check ash trees with a visual survey yearly.
- With the current budget it could take 16 to 21 years at the current removal rate. Suggestion: request a budget increase of $10,000 annually and apply for grants to plant replacement trees.

Introduction

This plan was developed to assist Alton 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 and replacement planting. With proper planning and management of the current canopy in Alton, these costs can be extended over years and public safety issues from dead and dying ash trees mitigated.

Trees are an important component of Alton'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 Alton 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 Alton's urban forestry goals.

Inventory

In 2014, a tree inventory was conducted that included 100% of the city owned trees in parks and along streets. 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 437 city trees was entered into the USDA Forest service program Street Tree Resource Analysis Tool for Urban forestry Management (STRATUM), part of the i-Tree suite. The following are results from the i-Tree STRATUM analysis.

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Alton's trees reduce energy related costs by approximately $27,814 annually (Appendix A, Table 1). These savings are both in Electricity (133.5 MWh) and in Natural Gas (18,042.9 Therms).

Annual Stormwater Benefits

Alton's trees intercept about 1,423,053 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides $38,565 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 mater (ozone). In Alton, it is estimated that trees remove 1,707 lbs. of air pollution (ozone (O_3), particulate matter less than 10 microns (PM10), carbon monoxide (CO), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2)) per year with a net value of $4,827 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Alton, trees sequester about 314,482 lbs. of carbon a year with an associated value of $2,359 (Appendix A, Table 5). In addition, your trees store 5,332,617 lbs. of carbon, with a yearly benefit of $39,995 (Appendix A, Table 4).

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. Alton receives $32,056 in annual social benefits from trees (Appendix A, Table 6).

Financial Summary of all Benefits

According to the USDA Forest Service i-Tree STRATUM analysis, Alton's trees provide $105,620 of benefits annually. Benefits of individual trees vary based on size, species, health and

location, but on average each of the 437 city trees in Alton provide approximately $241 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Alton has over 33 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Maple	163	37%
Ash	128	29%
Apple (Crab)	44	10%
Honeylocust	22	5%
Oak-Pin, Red, Bur	19	4%
Linden/Basswood	17	3%
Cottonwood	10	2%
Northern Hackberry	9	2%
Black walnut	7	<2%
Pear	7	<2%
Buckeye	2	<1%
Birch	2	<1%
Alder	1	<1%
Large deciduous	1	<1%
Large evergreen	1	<1%
Small evergreen	1	<1%
Spruce	1	<1%
Willow	1	<1%
Elm	1	<1%

Age Class

Most of Alton's trees (71%) are between 6 and 30 inches in diameter at 4.5 ft. (Appendix A, Figure 2 & Appendix A, Table 8). With regard to age/size, it is preferred that the highest numbers of trees be in the smaller diameters, so younger and smaller trees will replace natural mortality and to maintain canopy cover. Alton's size curve is in the medium to large range indicating a mature average stand.

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 Alton indicate that 54% of the trees are in good health, with only 12% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 51% of Alton'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 and indicates the number 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 Cleaning	75	17%
Crown Raising	1	<1%
Tree Staking	0	0%
Tree Removal	15	3%
Crown Reduction	11	3%

Definitions:
Crown cleaning-removing dead, diseased, damaged, poorly attached, or crossing branches.
Crown raising-removing lower branches from the trunk to eliminate obstructions or clearance problems.
Tree staking-encourage straight trunks, strong scaffold branching, eliminate multiple leaders, and girdling ties and replacing stakes.
Tree removal-tree is dangerous, dead or dying, and no amount of care will increase longevity or safety.
Crown reduction-pruning to reduce tree height, spread, overcrowding, wind resistance, or an increase of light penetration.

Canopy Cover

The total canopy with both private and public trees is .09%, over 1,160 acres. The canopy cover included in the Alton inventory includes approximately 11 acres (Appendix A, Figure 4).

Land Use and Location

The majority of Alton'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	67%
Park/vacant/other	32%
Industrial/Large commercial	0%
Small commercial	1%
Multifamily residential	0%

Location	
Planting strip	99.5%
Other maintained locations	0%
Cutout (surrounded by pavement)	0%
Front yard	.5%

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 24 inches should be removed. A few have main trunks which are forked between 2 feet and 8 feet above the ground. Any of these forked trees, with open splits exposing interior wood, should be removed. Broken branches and branches that interfere with motorist's vision of pedestrians, vehicles, traffic signs and signals should be removed.

Hazardous trees

Alton has 15 'removal' trees that need removal without regard to the species (Appendix A, Table 8) and 8 'critical concern' trees (Appendix A, Table 9). These 'critical concern' trees can be seen on the Location of Trees with Recommended Maintenance map (Appendix B, Figure 4). See also Appendix B, Figure 5 titled Maintenance Tasks looking for red circles with a black x within the red circle. When comparing Figures 4 & 5, you will notice that some of the 'critical concern' trees on Figure 4 are also 'removal' trees on figure 5. It is recommended to start with the large diameter 'critical concern' trees first. There are 3 trees over 24 inches in diameter at chest height or 4.5 ft. that should be addressed immediately. Then, move on to the smaller 'critical concern' trees and then the remaining 'removal' trees around town. There are a total of 15 trees.

Note: Critical concern trees are labeled this way for public safety, and should be inspected without delay (by the city and the homeowner).

Poor tree species

After the removal of the critical concern trees, ash trees in poor health should be assessed for removal or pruning (Appendix B, Figure 3 & Appendix B, Figure 4). Of the 15 removals, 5 are ash trees. There are a total of 129 ash trees, and 31 of the ash have 3 or more signs and symptoms associated with EAB. In addition, there are 15 ash trees that are in poor health based on the condition of the wood. *City ownership of the trees recommended for removal should be verified prior to any removal*

Other Hazardous Green Ash trees with Decay

Infected ash trees are listed by their addresses, or house color if no address was found, or position on the city block. In some cases, the district forester is recommending removal; or the homeowner may decide to remove it since the main trunk or the main forks are decaying. These ash trees are brought to your attention because decay caused by a fungus dissolves the cellulose portion of the wood fibers, resulting in weakened branches, limbs, or main trunks. Once weakened, the decayed portion simply breaks off without warning, and falls onto anything below.

House number or otherwise:

1. No house, a small commercial lot, corner of 2nd Avenue and 12th Street, 100 feet east of the entry for the masonry storage lot. 18" diameter branch hanging over city street.
2. Empty lot, east of fire hall, corner of 11th Street and 2nd Avenue, 32" diameter, 2 of 3 large leaders cover street.
3. The Schwarz's, no house number, on 7th Street, a large ash next to driveway. Branch at 45 feet over driveway.
4. Tan house, 7th Street and 3rd Avenue corner, north side, Reddish roof, 36" ash by driveway on 7th Street, large limb over grass and street.
5. 403 Tenth Street, 23" diameter ash, extensive dieback, two limbs hang over Tenth Street, corner of 4th Avenue and Tenth Street, NW corner, 2nd tree north.
6. 707 5th Street, dead tree on street, hanging branches over road, 'staghorn' top meaning limbs without any twigs to hold leaves, totally dead.
7. 410 11th Street, corner tree by stop sign, top of the SE fork is infected.
8. 511 7th Street, yellow house facing south, corner tree on 7th, branch over public side walk, poor tree in general, full of epicormic sprouts along the trunk.
9. 610 5th Avenue, tan house, corner tree, branch over front yard.
10. 509 6th Avenue, corner of Jefferson Avenue, tree is south of the driveway edge, whole top has fruiting bodies of this fungus.

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 3 years will replace the trees that are removed. It is recommended to plant 1 or 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 Alton.

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, Alton is heavily planted with maple (37%) and ash (29%) (Appendix A, Figure 1). Maple and ash 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: cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut, as outlined in section 151.02 of the city ordinance (Appendix C). All trees planted must meet the restrictions in city ordinance 151.02 (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.

Proposed Six Year Maintenance Plan**

Year 1

Removal: the 4 largest critical concern trees.
Planting and Replacement: 9 trees to be planted in open locations using grants.
Visual Survey for signs and symptoms of EAB.

Year 2

Removal: the 4 trees remaining critical concern trees and 4 additional 'removal' trees located on the Figure 5, Appendix B. *
Planting and Replacement: 6 trees in open locations from year-one removals.
Routine trimming: Contract to trim 1/6 of the city trees needing work.
Visual Survey for signs and symptoms of EAB.

Year 3

Removal: 3 to 6 ash trees - removal of any new critical concern trees and ash in poor health.*
Planting and Replacement: 9 trees to be planted in open locations and locations from previous removals.
Routine trimming: Contract to trim 1/6 of the city trees needing work.
Visual Survey for signs and symptoms of EAB.

Year 4

Removal or Pruning: 6 ash trees needing 'immediate' care or in poor health. *
Planting and Replacement: 7 trees in open locations from previous removals.
Routine trimming: Contract to trim 1/6 of the city trees needing work.
Visual Survey for signs and symptoms of EAB.

Year 5

Removal or Pruning: 8 ash trees needing work or in poor health.*
Planting and Replacement: 9 trees to be planted in open locations.
Routine trimming: more work on the 'poor' ash trees or other trees needing work.
Visual Survey for signs and symptoms of EAB.

Year 6

Removal: 6 to 8 trees needing work on in poor health.*
Planting and Replacement: 7 trees in open locations from previous removals.
Routine trimming: Contract to trim 1/6 of the city trees needing work.
Visual Survey for signs and symptoms of EAB.

*Reduction of ash over 6 years: Approximately 30 to 38 ash trees removed (approximately 28% of the ash). It will take approximately 16 to 21 years to remove all ash if this removal rate is continued. EAB could potentially kill all ash within 4 years of its arrival.
** To remove all ash trees within 6 years (21 trees per year), the tree budget would need to be increased to $11,700 a year. If the budget were increased to $10,000 a year all ash could be removed in 7 years.

Emerald Ash Borer Plan

Ash Tree Removal if Needed

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, Figures 2 & 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 it is necessary. At present, the entire State of Iowa is under quarantine for all of the items listed above.

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.

Canopy Replacement

As budget permits, all removed trees will be replaced. All trees will meet the restrictions in city ordinance Article 5, Part 5.02, 2c prohibited trees which lists 5 kinds of trees: cottonwood, poplar, Boxelder, Chinese elm, or evergreens. Chapter 151.02 (Appendix C), Part 151.02, Section 3 includes all of these prohibited trees: ash, maple, cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut. You will find the State tree code, Chapter 151 in Appendix c.

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. City Code 151.06 states “If it is determined with reasonable certainty that any such condition exists (trees or shrubs in the City reported or suspected to be infected with or damaged by any disease or insect or disease pests) on private property and that the danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Council shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days of said notification. If such owner, occupant or person in charge of said property fails to comply within 14 days of receipt of notice, the Council may cause the condition to be corrected and the cost assessed against the property.”

Budget

Proposed Budget

FY 2015 Budget

Removal: $2,500*, or, saving 12 ash trees using Tree-Age chemical treatment @$150/tree estimated in order to postpone tree removal. .
Planting: $900
Watering & Maintenance: $500

FY 2016 Budget

Removal: $2,500*, or, saving more ash trees using a systemic fungicide.
Planting: $900
Routine trimming: $1,700 to 4,000
Watering & Maintenance: $600

FY 2017 Budget

Removal: $3,300*; or, saving more ash trees using a systemic fungicide.
*Or saving for ash tree treatment
Planting: $900
Watering & Maintenance: $700

FY 2018 Budget

Removal: $3,500
Planting: $900
Routine trimming: $1,700
Watering & Maintenance: $800

FY 2019 Budget

Removal: $3,700
Planting: $900
Watering & Maintenance: $900

FY 2020 Budget

Removal: $4,200
Planting: $900
Routine trimming: $1,700
Watering & Maintenance: $1000

*Reduction of ash over 6 years: approximately 30 to 38 ash trees removed (approximately 28% of ash). **It will take approximately 16 to 21 years to remove all ash at the proposed 6-year rate with this proposed budget.** We have used a state-wide average tree removal cost of $550 each. Local costs will vary from contractors, and communities may assign costs based city employee costs.

Purposed Budget Increase

EAB could potentially kill all ash trees in Alton within 4 years of its arrival. To remove all ash trees within 6 years the budget would need to be increased by $11,700 a year. If the budget were increased to $10,000 a year all ash could be removed within 7 years. Additionally, it is recommended that Alton 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. Trees Forever also provides grants.

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Appendix A: i-Tree Data

Tables 1 through 9.

Table 1: Annual Energy Benefits

Alton

Annual Energy Benefits of Public Trees

11/16/2014

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	49.6	3,767	6,697.0	6,563	10,330	(N/A)	29.6	37.1	60.41
Silver maple	33.7	2,555	4,363.6	4,276	6,831	(N/A)	19.8	24.6	59.92
Norway maple	12.3	933	1,753.7	1,719	2,651	(N/A)	12.3	9.5	37.34
Apple	3.7	283	598.8	587	870	(N/A)	9.4	3.1	16.10
Honeylocust	6.7	508	887.0	869	1,377	(N/A)	4.2	4.9	57.36
Sugar maple	4.1	310	534.7	524	834	(N/A)	3.3	3.0	43.90
Littleleaf linden	2.8	209	346.3	339	548	(N/A)	3.1	2.0	30.46
Bur oak	1.5	111	205.0	201	311	(N/A)	2.1	1.1	25.95
Northern hackberry	3.3	250	468.0	459	709	(N/A)	2.1	2.5	59.09
Cottonwood	3.6	274	505.0	495	769	(N/A)	1.9	2.8	69.87
Black walnut	2.8	213	391.4	384	597	(N/A)	1.7	2.1	59.67
Northern red oak	1.2	95	155.4	152	247	(N/A)	1.4	0.9	30.90
Callery pear	0.5	36	67.3	66	102	(N/A)	1.4	0.4	12.69
Red maple	1.3	97	163.1	160	257	(N/A)	1.0	0.9	42.78
American basswood	1.0	74	128.9	126	200	(N/A)	1.0	0.7	33.41
Northern pin oak	1.0	75	142.0	139	214	(N/A)	0.9	0.8	42.81
Birch	0.6	49	92.1	90	139	(N/A)	0.7	0.5	34.73
Blue spruce	0.5	35	62.8	62	97	(N/A)	0.7	0.3	24.14
Ohio buckeye	0.3	26	46.3	45	71	(N/A)	0.3	0.3	35.62
American elm	0.6	44	83.5	82	125	(N/A)	0.3	0.5	62.70
Boxelder	0.5	41	75.1	74	115	(N/A)	0.3	0.4	57.27
Conifer Evergreen Small	0.1	4	8.6	8	12	(N/A)	0.3	0.0	6.20
Conifer Evergreen Large	0.3	22	39.4	39	61	(N/A)	0.3	0.2	30.47
Scotch pine	0.0	2	4.0	4	6	(N/A)	0.2	0.0	5.61
Willow	0.3	24	47.4	46	71	(N/A)	0.2	0.3	70.84
Mulberry	0.0	2	3.8	4	5	(N/A)	0.2	0.0	5.40
Alder	0.0	0	0.0	0	0	(N/A)	0.2	0.0	0.00
Broadleaf Deciduous Large	0.4	33	59.0	58	91	(N/A)	0.2	0.3	91.02
Norway spruce	0.2	14	24.6	24	38	(N/A)	0.2	0.1	38.17
Eastern white pine	0.1	10	14.6	14	24	(N/A)	0.2	0.1	24.14
Lilac	0.2	14	24.7	24	38	(N/A)	0.2	0.1	38.13
Conifer Evergreen Medium	0.1	5	10.2	10	15	(N/A)	0.2	0.1	14.80
Black locust	0.3	20	39.6	39	59	(N/A)	0.2	0.2	58.69
Total	133.5	10,132	18,042.9	17,682	27,814	(N/A)	100.0	100.0	48.20

Table 2: Annual Stormwater Benefits

Alton

Annual Stormwater Benefits of Public Trees

11/16/2014

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	545,971	14,796	(N/A)	29.6	38.4	86.53
Silver maple	437,118	11,846	(N/A)	19.8	30.7	103.91
Norway maple	96,730	2,621	(N/A)	12.3	6.8	36.92
Apple	13,626	369	(N/A)	9.4	1.0	6.84
Honeylocust	62,052	1,682	(N/A)	4.2	4.4	70.07
Sugar maple	38,994	1,057	(N/A)	3.3	2.7	55.62
Littleleaf linden	17,885	485	(N/A)	3.1	1.3	26.93
Bur oak	15,639	424	(N/A)	2.1	1.1	35.32
Northern hackberry	27,014	732	(N/A)	2.1	1.9	61.01
Cottonwood	44,946	1,218	(N/A)	1.9	3.2	110.73
Black walnut	32,420	879	(N/A)	1.7	2.3	87.86
Northern red oak	9,035	245	(N/A)	1.4	0.6	30.61
Callery pear	2,520	68	(N/A)	1.4	0.2	8.54
Red maple	8,929	242	(N/A)	1.0	0.6	40.33
American basswood	6,180	167	(N/A)	1.0	0.4	27.91
Northern pin oak	9,536	258	(N/A)	0.9	0.7	51.68
Birch	4,637	126	(N/A)	0.7	0.3	31.42
Blue spruce	7,038	191	(N/A)	0.7	0.5	47.68
Ohio buckeye	1,995	54	(N/A)	0.3	0.1	27.03
American elm	5,558	151	(N/A)	0.3	0.4	75.32
Boxelder	7,277	197	(N/A)	0.3	0.5	98.61
Conifer Evergreen Small	684	19	(N/A)	0.3	0.0	9.26
Conifer Evergreen Large	5,938	161	(N/A)	0.3	0.4	80.46
Scotch pine	213	6	(N/A)	0.2	0.0	5.77
Willow	3,764	102	(N/A)	0.2	0.3	102.01
Mulberry	69	2	(N/A)	0.2	0.0	1.86
Alder	0	0	(N/A)	0.2	0.0	0.00
Broadleaf Deciduous Large	7,239	196	(N/A)	0.2	0.5	196.17
Norway spruce	4,605	125	(N/A)	0.2	0.3	124.79
Eastern white pine	1,539	42	(N/A)	0.2	0.1	41.70
Lilac	667	18	(N/A)	0.2	0.0	18.06
Conifer Evergreen Medium	755	20	(N/A)	0.2	0.1	20.47
Black locust	2,479	67	(N/A)	0.2	0.2	67.19
Citywide total	1,423,053	38,565	(N/A)	100.0	100.0	66.84

Table 3: Annual Air Quality Benefits

Alton

Annual Air Quality Benefits of Public Trees

11/16/2014

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	69.0	11.0	32.9	3.1	367	236.1	34.4	32.9	224.9	1,473	0.0	0	644.3	1,840	(N/A)	29.6	10.76
Silver maple	71.4	12.1	35.6	3.2	386	158.2	23.2	22.2	152.3	991	-39.0	-146	439.1	1,231	(N/A)	19.8	10.80
Norway maple	17.6	3.0	8.9	0.8	96	59.4	8.6	8.2	55.8	369	-4.3	-16	158.0	448	(N/A)	12.3	6.31
Apple	3.0	0.5	1.6	0.1	16	18.6	2.6	2.5	16.9	114	0.0	0	45.8	130	(N/A)	9.4	2.41
Honeylocust	11.7	1.9	5.4	0.5	62	31.6	4.6	4.4	30.3	198	-8.4	-32	82.1	228	(N/A)	4.2	9.50
Sugar maple	4.8	0.8	2.5	0.2	26	19.3	2.8	2.7	18.5	121	-3.9	-14	47.8	132	(N/A)	3.3	6.97
Littleleaf linden	2.3	0.4	1.2	0.1	13	12.9	1.9	1.8	12.5	81	-1.2	-5	31.9	89	(N/A)	3.1	4.94
Bur oak	1.8	0.3	0.9	0.1	9	7.0	1.0	1.0	6.6	43	0.0	0	18.6	53	(N/A)	2.1	4.41
Northern hackberry	3.7	0.6	2.0	0.2	21	15.9	2.3	2.2	15.0	99	0.0	0	41.9	119	(N/A)	2.1	9.95
Cottonwood	6.4	1.0	3.0	0.3	34	17.3	2.5	2.4	16.3	108	0.0	0	49.3	142	(N/A)	1.9	12.87
Black walnut	4.0	0.6	1.9	0.2	22	13.5	2.0	1.9	12.7	84	0.0	0	36.8	105	(N/A)	1.7	10.53
Northern red oak	1.7	0.3	0.9	0.1	9	5.8	0.9	0.8	5.7	37	-2.4	-9	13.7	37	(N/A)	1.4	4.62
Callery pear	0.3	0.1	0.2	0.0	2	2.3	0.3	0.3	2.1	14	-0.1	0	5.5	15	(N/A)	1.4	1.93
Red maple	1.9	0.3	0.9	0.1	10	6.0	0.9	0.8	5.8	38	-0.7	-3	16.0	45	(N/A)	1.0	7.51
American basswood	0.5	0.1	0.3	0.0	3	4.6	0.7	0.6	4.4	29	-0.6	-2	10.8	30	(N/A)	1.0	4.99
Northern pin oak	2.0	0.3	1.0	0.1	11	4.8	0.7	0.7	4.5	30	-0.5	-2	13.6	39	(N/A)	0.9	7.74
Birch	0.8	0.1	0.4	0.0	4	3.1	0.4	0.4	2.9	19	-0.2	-1	8.0	23	(N/A)	0.7	5.69
Blue spruce	1.1	0.2	0.9	0.1	7	2.2	0.3	0.3	2.1	14	-2.6	-10	4.6	11	(N/A)	0.7	2.73
Ohio buckeye	0.3	0.0	0.2	0.0	2	1.6	0.2	0.2	1.5	10	-0.1	0	4.0	11	(N/A)	0.3	5.69
American elm	0.5	0.1	0.3	0.0	3	2.8	0.4	0.4	2.6	17	0.0	0	7.0	20	(N/A)	0.3	9.99
Boxelder	1.1	0.2	0.5	0.0	6	2.6	0.4	0.4	2.4	16	-0.3	-1	7.2	21	(N/A)	0.3	10.29
Conifer Evergreen Small	0.1	0.0	0.1	0.0	0	0.3	0.0	0.0	0.2	2	-0.4	-1	0.4	1	(N/A)	0.3	0.35
Conifer Evergreen Large	0.7	0.1	0.6	0.1	5	1.4	0.2	0.2	1.3	9	-2.8	-10	1.8	3	(N/A)	0.3	1.45
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)	0.2	0.56
Willow	0.9	0.1	0.4	0.0	5	1.6	0.2	0.2	1.5	10	-0.2	-1	4.7	14	(N/A)	0.2	13.58
Mulberry	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)	0.2	0.71
Alder	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)	0.2	0.00
Broadleaf Deciduous Large	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)	0.2	19.04
Norway spruce	0.6	0.1	0.4	0.1	4	0.9	0.1	0.1	0.8	5	-2.9	-11	0.3	-2	(N/A)	0.2	-1.58
Eastern white pine	0.2	0.0	0.1	0.0	1	0.6	0.1	0.1	0.6	4	-0.5	-2	1.2	3	(N/A)	0.2	2.82
Lilac	0.2	0.0	0.1	0.0	1	0.9	0.1	0.1	0.8	5	0.0	0	2.3	7	(N/A)	0.2	6.56
Conifer Evergreen Medium	0.1	0.0	0.1	0.0	0	0.3	0.0	0.0	0.3	2	-0.2	-1	0.6	2	(N/A)	0.2	1.53
Black locust	0.5	0.1	0.2	0.0	3	1.3	0.2	0.2	1.2	8	-0.1	0	3.6	10	(N/A)	0.2	10.16
Citywide total	210.0	34.9	104.0	9.6	1,133	635.0	92.6	88.3	604.9	3,961	-71.4	-268	1,707.9	4,827	(N/A)	100.0	8.37

Table 4: Annual Carbon Stored

Alton

Stored CO2 Benefits of Public Trees

11/16/2014

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	2,263,917	16,979	(N/A)	29.6	42.5	99.29
Silver maple	1,656,156	12,421	(N/A)	19.8	31.1	108.96
Norway maple	292,408	2,193	(N/A)	12.3	5.5	30.89
Apple	52,871	397	(N/A)	9.4	1.0	7.34
Honeylocust	146,013	1,095	(N/A)	4.2	2.7	45.63
Sugar maple	138,628	1,040	(N/A)	3.3	2.6	54.72
Littleleaf linden	51,397	385	(N/A)	3.1	1.0	21.42
Bur oak	57,086	428	(N/A)	2.1	1.1	35.68
Northern hackberry	53,803	404	(N/A)	2.1	1.0	33.63
Cottonwood	213,646	1,602	(N/A)	1.9	4.0	145.67
Black walnut	131,580	987	(N/A)	1.7	2.5	98.68
Northern red oak	33,239	249	(N/A)	1.4	0.6	31.16
Callery pear	5,431	41	(N/A)	1.4	0.1	5.09
Red maple	21,019	158	(N/A)	1.0	0.4	26.27
American basswood	20,040	150	(N/A)	1.0	0.4	25.05
Northern pin oak	33,302	250	(N/A)	0.9	0.6	49.95
Birch	12,889	97	(N/A)	0.7	0.2	24.17
Blue spruce	8,716	65	(N/A)	0.7	0.2	16.34
Ohio buckeye	4,725	35	(N/A)	0.3	0.1	17.72
American elm	13,485	101	(N/A)	0.3	0.3	50.57
Boxelder	41,620	312	(N/A)	0.3	0.8	156.07
Conifer Evergreen Su	280	2	(N/A)	0.3	0.0	1.05
Conifer Evergreen La	6,685	50	(N/A)	0.3	0.1	25.07
Scotch pine	38	0	(N/A)	0.2	0.0	0.29
Willow	14,280	107	(N/A)	0.2	0.3	107.10
Mulberry	178	1	(N/A)	0.2	0.0	1.33
Alder	0	0	(N/A)	0.2	0.0	0.00
Broadleaf Deciduous	39,259	294	(N/A)	0.2	0.7	294.44
Norway spruce	7,490	56	(N/A)	0.2	0.1	56.18
Eastern white pine	1,170	9	(N/A)	0.2	0.0	8.78
Lilac	3,037	23	(N/A)	0.2	0.1	22.78
Conifer Evergreen M	284	2	(N/A)	0.2	0.0	2.13
Black locust	7,945	60	(N/A)	0.2	0.1	59.59
Citywide total	5,332,617	39,995	(N/A)	100.0	100.0	69.31

Table 5: Annual Carbon Sequestered

Alton

Annual CO Benefits of Public Trees

11/16/2014

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
Green ash	114,119	856	-10,867	-511	-4	0	0	102,742	771 (N/A)	29.6	32.7	4.51
Silver maple	129,302	970	-7,951	-356	-3	0	0	120,995	907 (N/A)	19.8	38.5	7.96
Norway maple	18,564	139	-1,412	-128	-1	0	0	17,024	128 (N/A)	12.3	5.4	1.80
Apple	5,888	44	-254	-57	0	0	0	5,577	42 (N/A)	9.4	1.8	0.77
Honeylocust	19,774	148	-701	-55	0	0	0	19,018	143 (N/A)	4.2	6.0	5.94
Sugar maple	8,149	61	-666	-42	0	0	0	7,442	56 (N/A)	3.3	2.4	2.94
Littleleaf linden	7,295	55	-248	-29	0	0	0	7,017	53 (N/A)	3.1	2.2	2.92
Bur oak	3,752	28	-274	-18	0	0	0	3,461	26 (N/A)	2.1	1.1	2.16
Northern hackberry	3,629	27	-258	-30	0	0	0	3,341	25 (N/A)	2.1	1.1	2.09
Cottonwood	8,125	61	-1,025	-39	0	0	0	7,060	53 (N/A)	1.9	2.2	4.81
Black walnut	6,838	51	-632	-30	0	0	0	6,177	46 (N/A)	1.7	2.0	4.63
Northern red oak	1,416	11	-160	-14	0	0	0	1,243	9 (N/A)	1.4	0.4	1.17
Callery pear	913	7	-28	-5	0	0	0	879	7 (N/A)	1.4	0.3	0.82
Red maple	2,703	20	-101	-11	0	0	0	2,592	19 (N/A)	1.0	0.8	3.24
American basswood	1,669	13	-96	-10	0	0	0	1,563	12 (N/A)	1.0	0.5	1.95
Northern pin oak	985	7	-160	-11	0	0	0	814	6 (N/A)	0.9	0.3	1.22
Birch	1,175	9	-63	-6	0	0	0	1,106	8 (N/A)	0.7	0.4	2.07
Blue spruce	438	3	-42	-9	0	0	0	388	3 (N/A)	0.7	0.1	0.73
Ohio buckeye	610	5	-23	-3	0	0	0	584	4 (N/A)	0.3	0.2	2.19
American elm	684	5	-65	-5	0	0	0	614	5 (N/A)	0.3	0.2	2.30
Boxelder	2,567	19	-200	-8	0	0	0	2,359	18 (N/A)	0.3	0.8	8.85
Conifer Evergreen Small	40	0	-1	-1	0	0	0	38	0 (N/A)	0.3	0.0	0.14
Conifer Evergreen Large	375	3	-32	-5	0	0	0	337	3 (N/A)	0.3	0.1	1.26
Scotch pine	18	0	0	-1	0	0	0	17	0 (N/A)	0.2	0.0	0.13
Willow	370	3	-69	-4	0	0	0	298	2 (N/A)	0.2	0.1	2.23
Mulberry	38	0	-1	-1	0	0	0	37	0 (N/A)	0.2	0.0	0.27
Alder	0	0	0	0	0	0	0	0	0 (N/A)	0.2	0.0	0.00
Broadleaf Deciduous Larg	912	7	-188	-5	0	0	0	719	5 (N/A)	0.2	0.2	5.39
Norway spruce	256	2	-36	-4	0	0	0	217	2 (N/A)	0.2	0.1	1.62
Eastern white pine	116	1	-6	-2	0	0	0	108	1 (N/A)	0.2	0.0	0.81
Lilac	268	2	-15	-2	0	0	0	251	2 (N/A)	0.2	0.1	1.88
Conifer Evergreen Mediun	39	0	-1	-1	0	0	0	36	0 (N/A)	0.2	0.0	0.27

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
Black locust	470	4	-38	-3	0	0	0	429	3 (N/A)	0.2	0.1	3.22
Citywide total	341,499	2,561	-25,612	-1,406	-11	0	0	314,482	2,359 (N/A)	100.0	100.0	4.09

Table 6: Annual Social and Aesthetic Benefits

Alton

Annual Aesthetic/Other Benefits of Public Trees

11/16/2014

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	9,407	(N/A)	29.6	29.3	55.01
Silver maple	10,448	(N/A)	19.8	32.6	91.65
Norway maple	1,920	(N/A)	12.3	6.0	27.05
Apple	334	(N/A)	9.4	1.0	6.18
Honeylocust	4,437	(N/A)	4.2	13.8	184.86
Sugar maple	879	(N/A)	3.3	2.7	46.27
Littleleaf linden	813	(N/A)	3.1	2.5	45.15
Bur oak	363	(N/A)	2.1	1.1	30.24
Northern hackberry	557	(N/A)	2.1	1.7	46.43
Cottonwood	632	(N/A)	1.9	2.0	57.44
Black walnut	554	(N/A)	1.7	1.7	55.44
Northern red oak	123	(N/A)	1.4	0.4	15.44
Callery pear	112	(N/A)	1.4	0.4	14.03
Red maple	366	(N/A)	1.0	1.1	61.07
American basswood	148	(N/A)	1.0	0.5	24.75
Northern pin oak	100	(N/A)	0.9	0.3	19.92
Birch	121	(N/A)	0.7	0.4	30.33
Blue spruce	70	(N/A)	0.7	0.2	17.58
Ohio buckeye	65	(N/A)	0.3	0.2	32.69
American elm	102	(N/A)	0.3	0.3	51.00
Boxelder	147	(N/A)	0.3	0.5	73.49
Conifer Evergreen Small	26	(N/A)	0.3	0.1	12.81
Conifer Evergreen Large	94	(N/A)	0.3	0.3	47.08
Scotch pine	7	(N/A)	0.2	0.0	6.83
Willow	31	(N/A)	0.2	0.1	31.46
Mulberry	2	(N/A)	0.2	0.0	2.06
Alder	0	(N/A)	0.2	0.0	0.00
Broadleaf Deciduous Large	58	(N/A)	0.2	0.2	58.34
Norway spruce	26	(N/A)	0.2	0.1	26.25
Eastern white pine	32	(N/A)	0.2	0.1	32.32
Lilac	15	(N/A)	0.2	0.0	15.48
Conifer Evergreen Medium	21	(N/A)	0.2	0.1	21.08
Black locust	43	(N/A)	0.2	0.1	43.05
Citywide total	32,056	(N/A)	100.0	100.0	55.56

Table 7: Summary of Benefits in Dollars

Alton

Total Annual Benefits of Public Trees by Species ($)

11/16/201

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Green ash	10,330	771	1,840	14,796	9,407	37,143	(N/A)	35.2
Silver maple	6,831	907	1,231	11,846	10,448	31,264	(N/A)	29.6
Norway maple	2,651	128	448	2,621	1,920	7,769	(N/A)	7.4
Apple	870	42	130	369	334	1,744	(N/A)	1.7
Honeylocust	1,377	143	228	1,682	4,437	7,866	(N/A)	7.4
Sugar maple	834	56	132	1,057	879	2,958	(N/A)	2.8
Littleleaf linden	548	53	89	485	813	1,987	(N/A)	1.9
Bur oak	311	26	53	424	363	1,177	(N/A)	1.1
Northern hackberry	709	25	119	732	557	2,143	(N/A)	2.0
Cottonwood	769	53	142	1,218	632	2,813	(N/A)	2.7
Black walnut	597	46	105	879	554	2,181	(N/A)	2.1
Northern red oak	247	9	37	245	123	662	(N/A)	0.6
Callery pear	102	7	15	68	112	304	(N/A)	0.3
Red maple	257	19	45	242	366	930	(N/A)	0.9
American basswood	200	12	30	167	148	558	(N/A)	0.5
Northern pin oak	214	6	39	258	100	617	(N/A)	0.6
Birch	139	8	23	126	121	417	(N/A)	0.4
Blue spruce	97	3	11	191	70	371	(N/A)	0.4
Ohio buckeye	71	4	11	54	65	206	(N/A)	0.2
American elm	125	5	20	151	102	403	(N/A)	0.4
Boxelder	115	18	21	197	147	497	(N/A)	0.5
Conifer Evergreen Smal	12	0	1	19	26	58	(N/A)	0.1
Conifer Evergreen Large	61	3	3	161	94	321	(N/A)	0.3
Scotch pine	6	0	1	6	7	19	(N/A)	0.0
Willow	71	2	14	102	31	220	(N/A)	0.2
Mulberry	5	0	1	2	2	10	(N/A)	0.0
Alder	0	0	0	0	0	0	(N/A)	0.0
Broadleaf Deciduous La	91	5	19	196	58	370	(N/A)	0.4
Norway spruce	38	2	-2	125	26	189	(N/A)	0.2
Eastern white pine	24	1	3	42	32	102	(N/A)	0.1
Lilac	38	2	7	18	15	80	(N/A)	0.1
Conifer Evergreen Medi	15	0	2	20	21	58	(N/A)	0.1
Black locust	59	3	10	67	43	182	(N/A)	0.2
Citywide Total	27,814	2,359	4,827	38,565	32,056	105,620	(N/A)	100.0

Table 8.

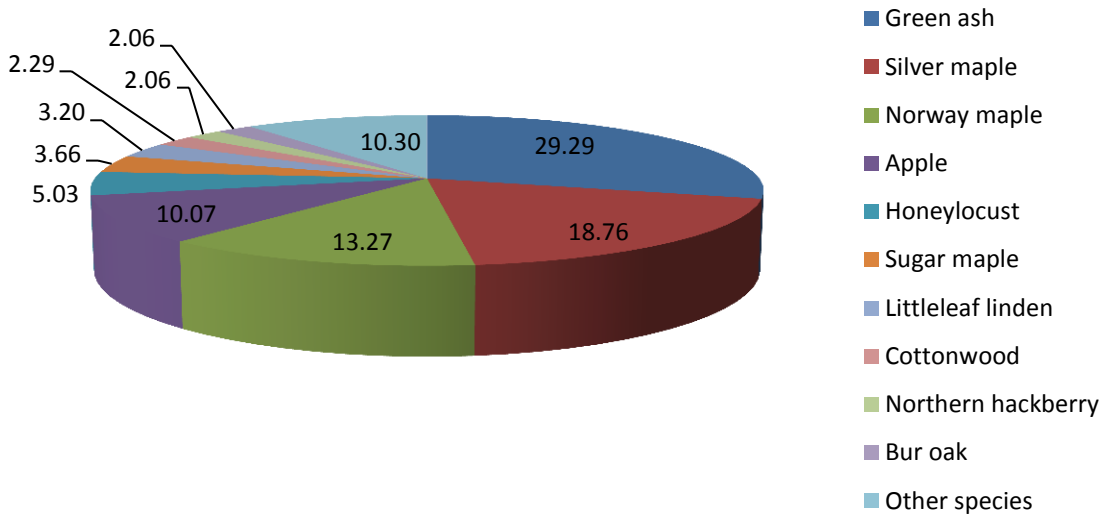
Priority Task Summary for All Trees											
437 Public Trees along streets and city park.											
	DBH Classes in inches (DBH-Diameter at Breast Height)										
Maintenance Type	0 to 3 inches	3 to 6 inches	6 to 12 inches	12 to 18 inches	18 to 24 inches	24 to 30 inches	30 to 36 inches	36 to 42 inches	>42 inches	Total trees	% of Total
None/No work	21	40	45	107	49	43	12	13	5	335	76.66
Stake or Train	0	0	0	0	0	0	0	0	0	0	0
Clean Crown	0	4	8	16	18	13	8	5	3	75	17.16
Raise Crown	0	0	0	0	0	1	0	0	0	1	0.23
Reduce Crown	1	0	0	0	0	3	5	0	2	11	2.52
Remove Tree	0	2	0	0	5	3	1	4	0	15	3.43
Treat Pests	0	0	0	0	0	0	0	0	0	0	0
City Wide Total	22	46	53	123	72	63	26	22	10	437	100

Table 9. Recommended Maintenance for All Trees

Recommended Maintenance for All Trees											
437 public trees											
	DBH Classes in inches (DBH-Diameter at Breast Height)										
Maintenance Type	0 to 3 inches	3 to 6 inches	6 to 12 inches	12 to 18 inches	18 to 24 inches	24 to 30 inches	30 to 36 inches	36 to 42 inches	>42 inches	Total # of Trees	% of Total
Young tree (routine)	22	42	51	62	3	0	0	0	0	180	41.19
Young tree (immediate)	0	3	0	1	0	0	0	0	0	4	0.92
Mature tree (routine)	0	0	2	57	57	51	18	15	8	208	47.6
Mature tree (immediate)	0	0	0	3	9	9	8	6	2	37	8.47
Critical Concern (Public safety)	0	1	0	0	3	3	0	1	0	8	1.83
City wide total	22	46	53	123	72	63	26	22	10	437	100

Appendix A. Graphs.

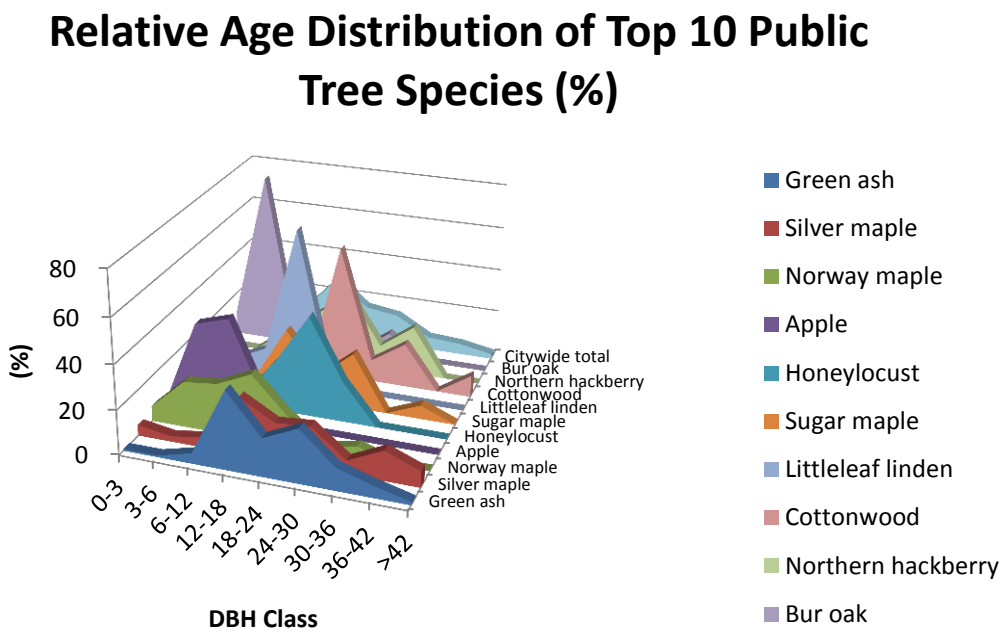
Figure 1: Species Distribution



Species Distribution of Public Trees (%)
11/16/2014

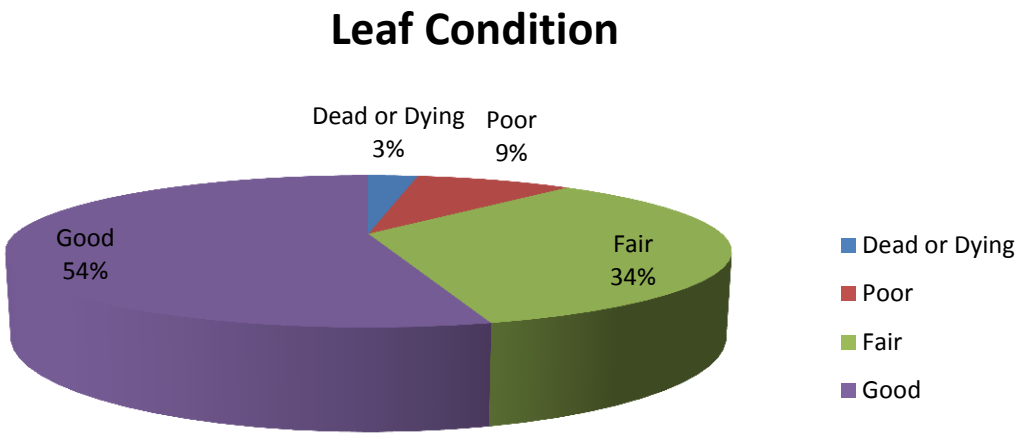
Species	Percent
Green ash	29.29
Silver maple	18.76
Norway maple	13.27
Apple	10.07
Honeylocust	5.03
Sugar maple	3.66
Littleleaf linden	3.20
Cottonwood	2.29
Northern hackberry	2.06
Bur oak	2.06
Other species	10.30
Total	100.00

Figure 2: Relative Age Class



Relative Age Distribution of Top 10 Public Tree Species (%)									
11/16/2014									
	DBH class (in)								
Species	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42
Green ash	0.78	0.78	4.69	35.16	17.19	24.22	10.16	5.47	1.56
Silver maple	4.88	2.44	4.88	25.61	17.07	18.29	6.10	13.41	7.32
Norway maple	6.90	20.69	22.41	29.31	13.79	1.72	5.17	0.00	0.00
Apple	2.27	40.91	45.45	11.36	0.00	0.00	0.00	0.00	0.00
Honeylocust	9.09	0.00	4.55	22.73	45.45	18.18	0.00	0.00	0.00
Sugar maple	18.75	0.00	6.25	31.25	12.50	25.00	0.00	6.25	0.00
Littleleaf linden	0.00	7.14	14.29	71.43	7.14	0.00	0.00	0.00	0.00
Cottonwood	0.00	0.00	0.00	0.00	60.00	10.00	20.00	0.00	10.00
Northern hackberry	0.00	0.00	11.11	22.22	33.33	11.11	22.22	0.00	0.00
Bur oak	11.11	77.78	0.00	0.00	0.00	11.11	0.00	0.00	0.00
Citywide total	5.03	10.53	12.13	28.15	16.48	14.42	5.95	5.03	2.29

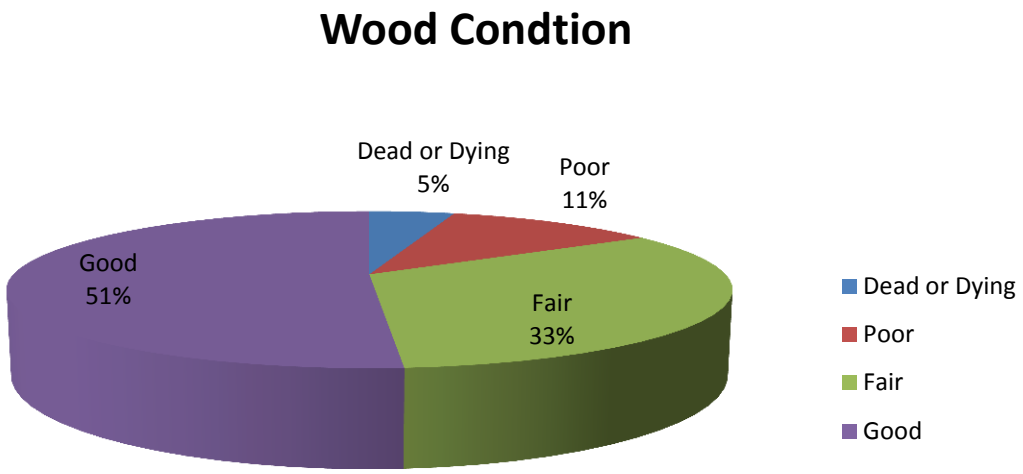
Figure 3: Foliage Condition



Condition (Foliage) of Public Trees by Species (%)
11/16/2014

Species Name	Dead or Dying	Poor	Fair	Good
Green ash	3.91	14.06	40.63	41.41
Silver maple	2.44	7.32	40.24	50.00
Norway maple	0.00	3.45	18.97	77.59
Apple	4.55	9.09	20.45	65.91
Honeylocust	0.00	0.00	54.55	45.45
Sugar maple	0.00	12.50	25.00	62.50
Littleleaf linden	0.00	7.14	14.29	78.57
Cottonwood	20.00	10.00	50.00	20.00
Northern hackberry	0.00	0.00	44.44	55.56
Bur oak	0.00	0.00	11.11	88.89
Black walnut	14.29	0.00	85.71	0.00
Callery pear	0.00	28.57	0.00	71.43
Northern red oak	0.00	0.00	14.29	85.71
Red maple	0.00	0.00	60.00	40.00
Citywide total	2.75	8.72	34.17	54.36

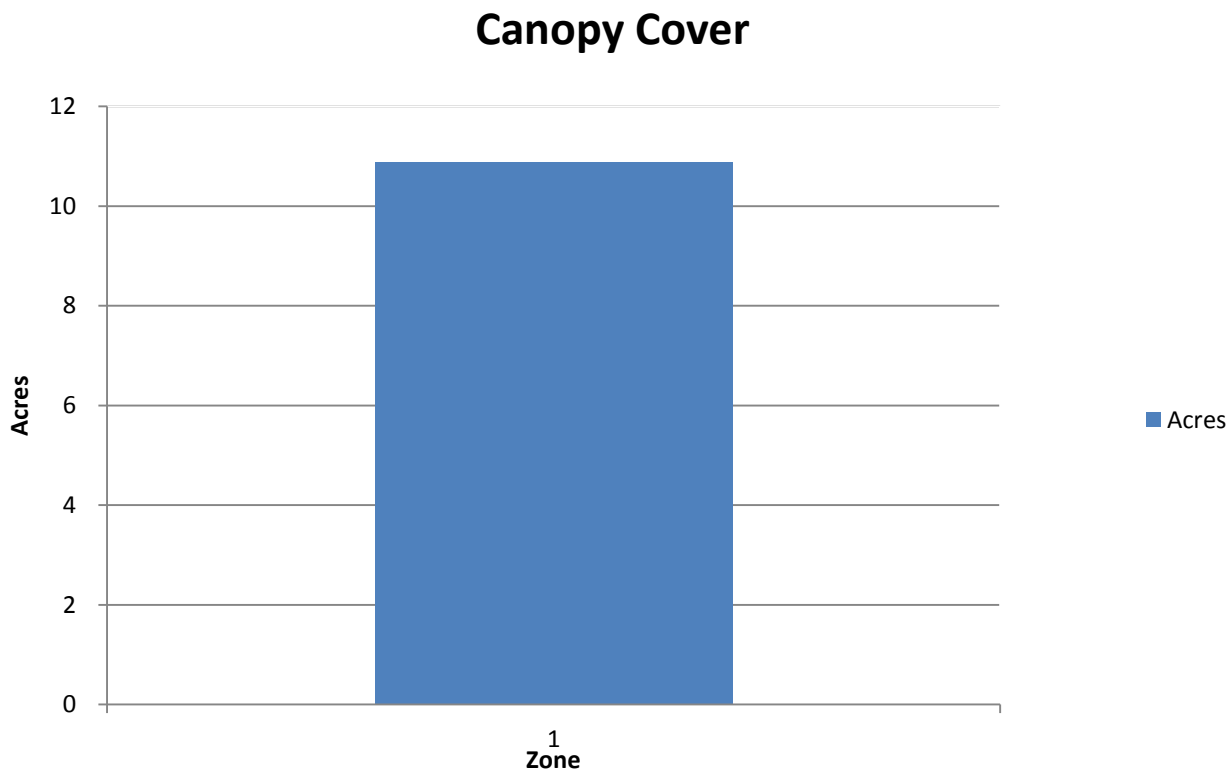
Figure 4: Wood Condition



Condition (Woody) of Public Trees by Species (%)
11/16/2014

Species Name	Dead or Dying	Poor	Fair	Good
Green ash	5.47	12.50	35.94	46.09
Silver maple	6.10	15.85	31.71	46.34
Norway maple	1.72	13.79	27.59	56.90
Apple	4.55	6.82	34.09	54.55
Honeylocust	0.00	0.00	31.82	68.18
Sugar maple	0.00	18.75	50.00	31.25
Littleleaf linden	0.00	14.29	21.43	64.29
Cottonwood	20.00	10.00	50.00	20.00
Northern hackberry	0.00	11.11	11.11	77.78
Bur oak	0.00	0.00	11.11	88.89
Black walnut	14.29	0.00	57.14	28.57
Callery pear	0.00	28.57	42.86	28.57
Northern red oak	0.00	0.00	0.00	100.00
Red maple	0.00	20.00	80.00	0.00
Citywide total	4.58	11.44	32.72	51.26

Figure 5: Canopy Cover in Acres

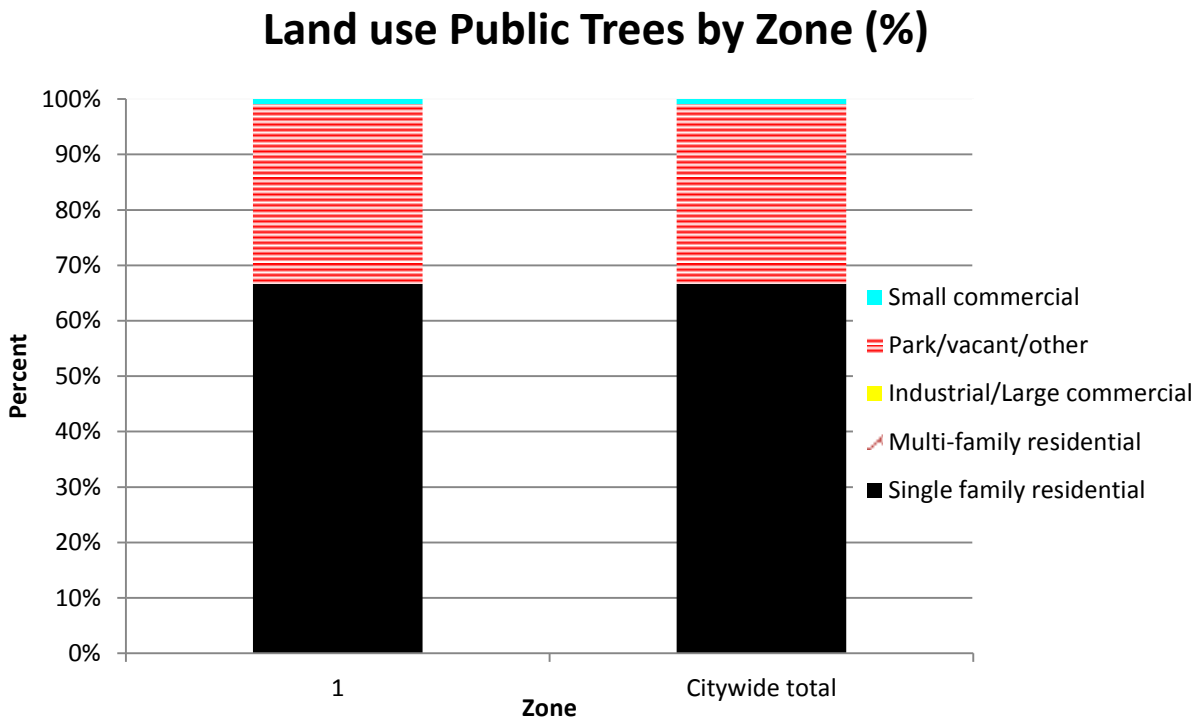


Canopy Cover of Public Trees (Acres)

11/16/2014

	Total Land Area	Total Street and Sidewalk Area	Total Canopy Cover	Canopy Cover as % of Total Land Area
Citywide total	1,160.00		10.89	0.09

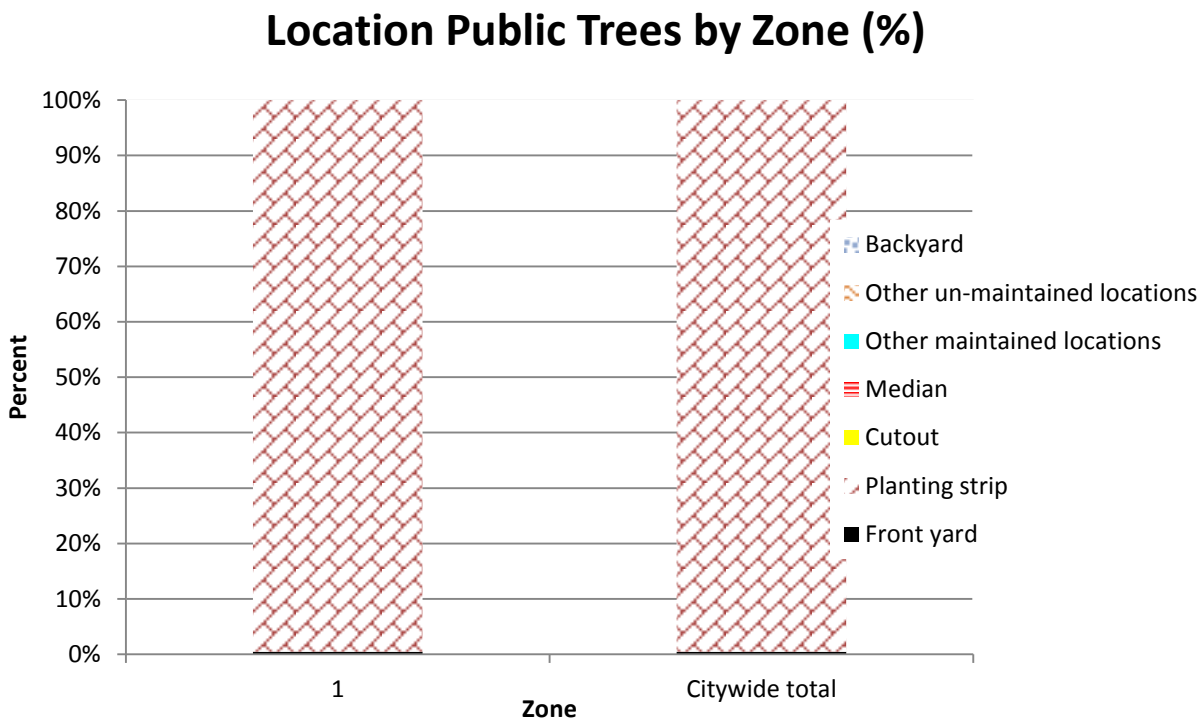
Figure 6: Land Use of city/park trees



Land use Public Trees by Zone (%)
11/16/2014

Zone	Single family residential	Multi-family residential	Industrial/Large commercial	Park/vacant/other	Small commercial
1	66.67	0.00	0.00	32.42	0.91
Citywide total	66.67	0.00	0.00	32.42	0.91

Figure 7: Location of Public Trees by Zone



Location Public Trees by Zone (%)
11/16/2014

Zone	Front yard	Planting strip	Cutout	Median	Other maintained locations	Other un-maintained locations	Backyard
1	0.46	99.54	0.00	0.00	0.00	0.00	0.00
Citywide total	0.46	99.54	0.00	0.00	0.00	0.00	0.00

Appendix B: ArcGIS Mapping

Figure 1: Location of Ash Trees

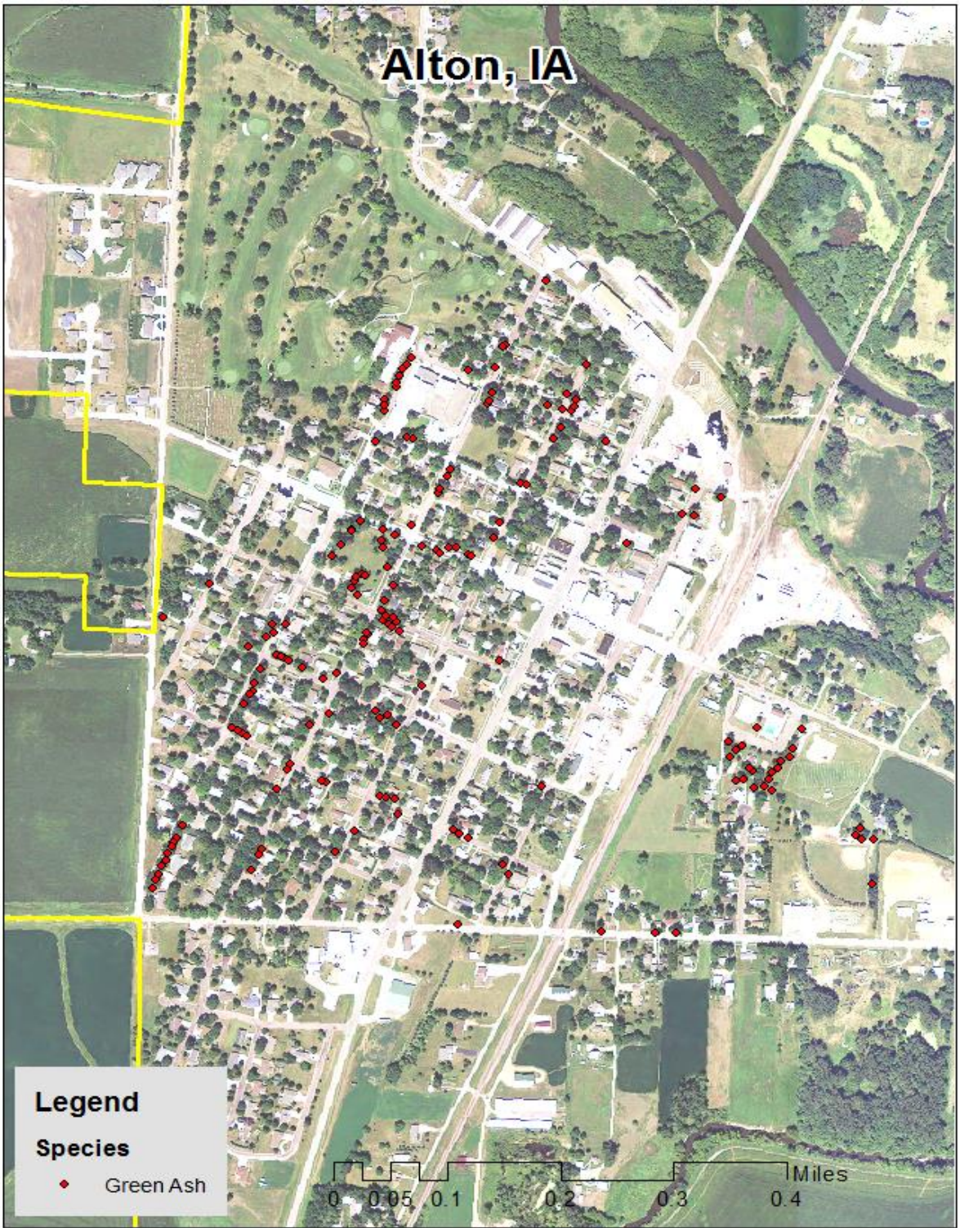


Figure 2: Location of EAB symptoms

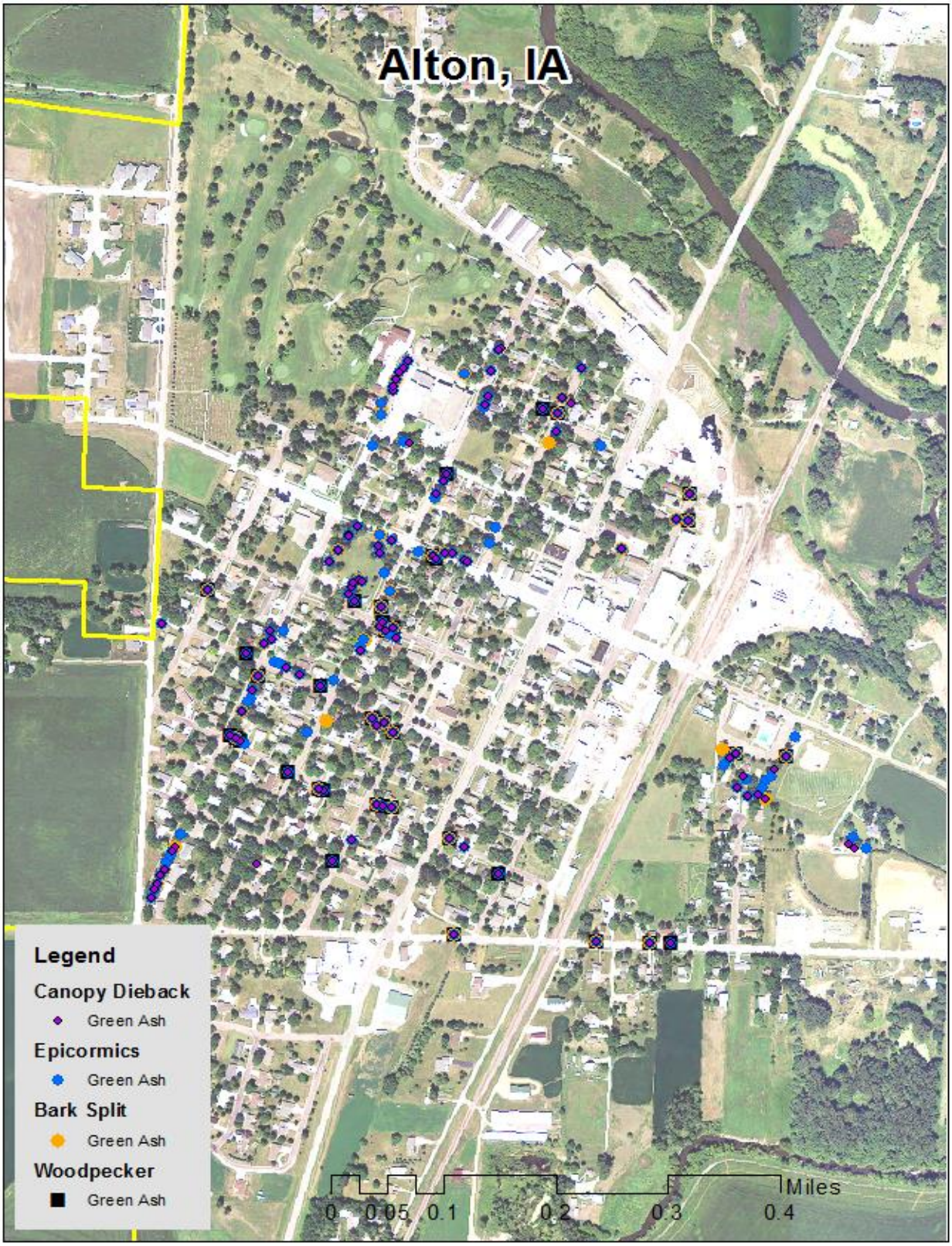


Figure 3. Location of Poor Condition Trees

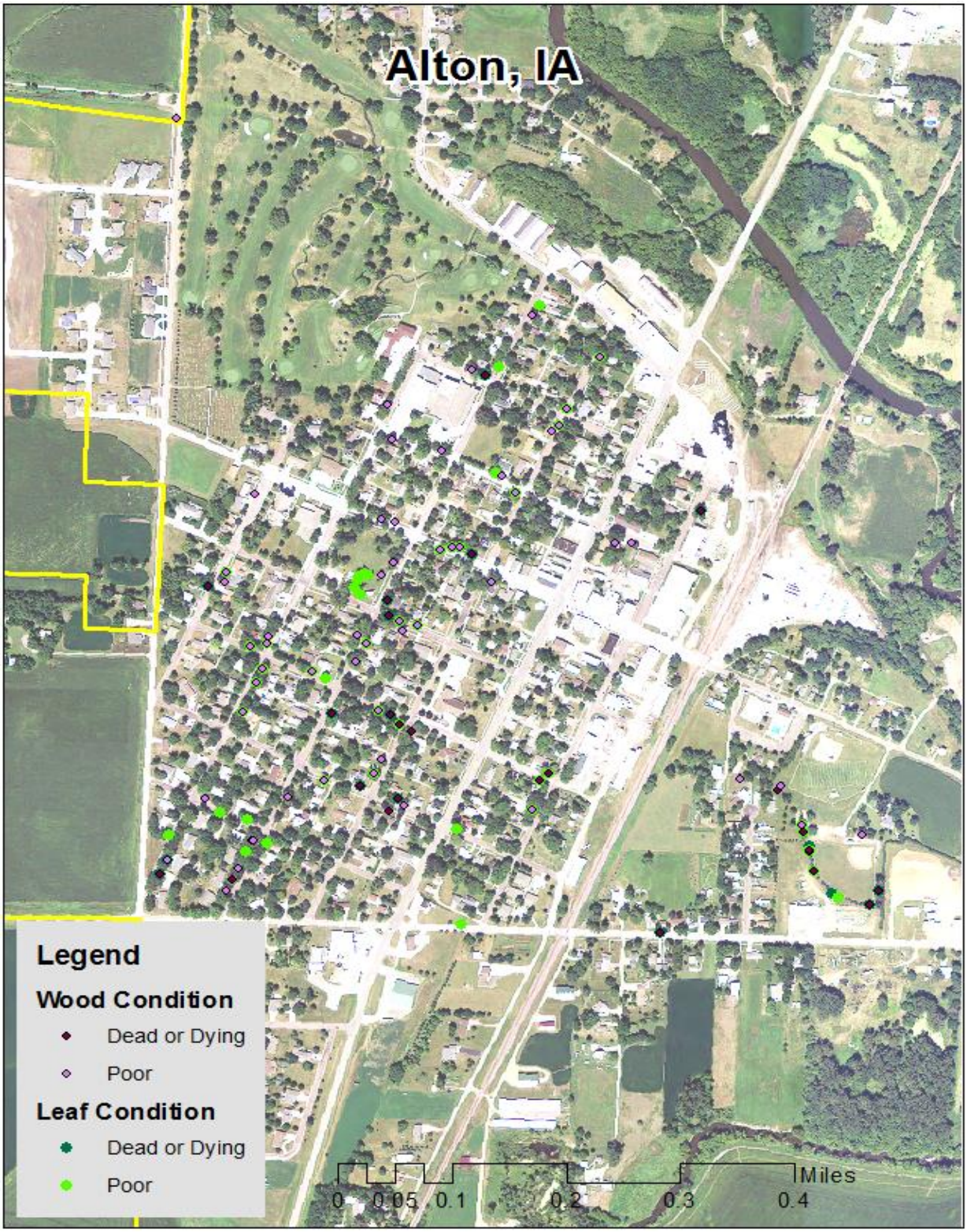


Figure 4: Location of Trees with Recommended Maintenance

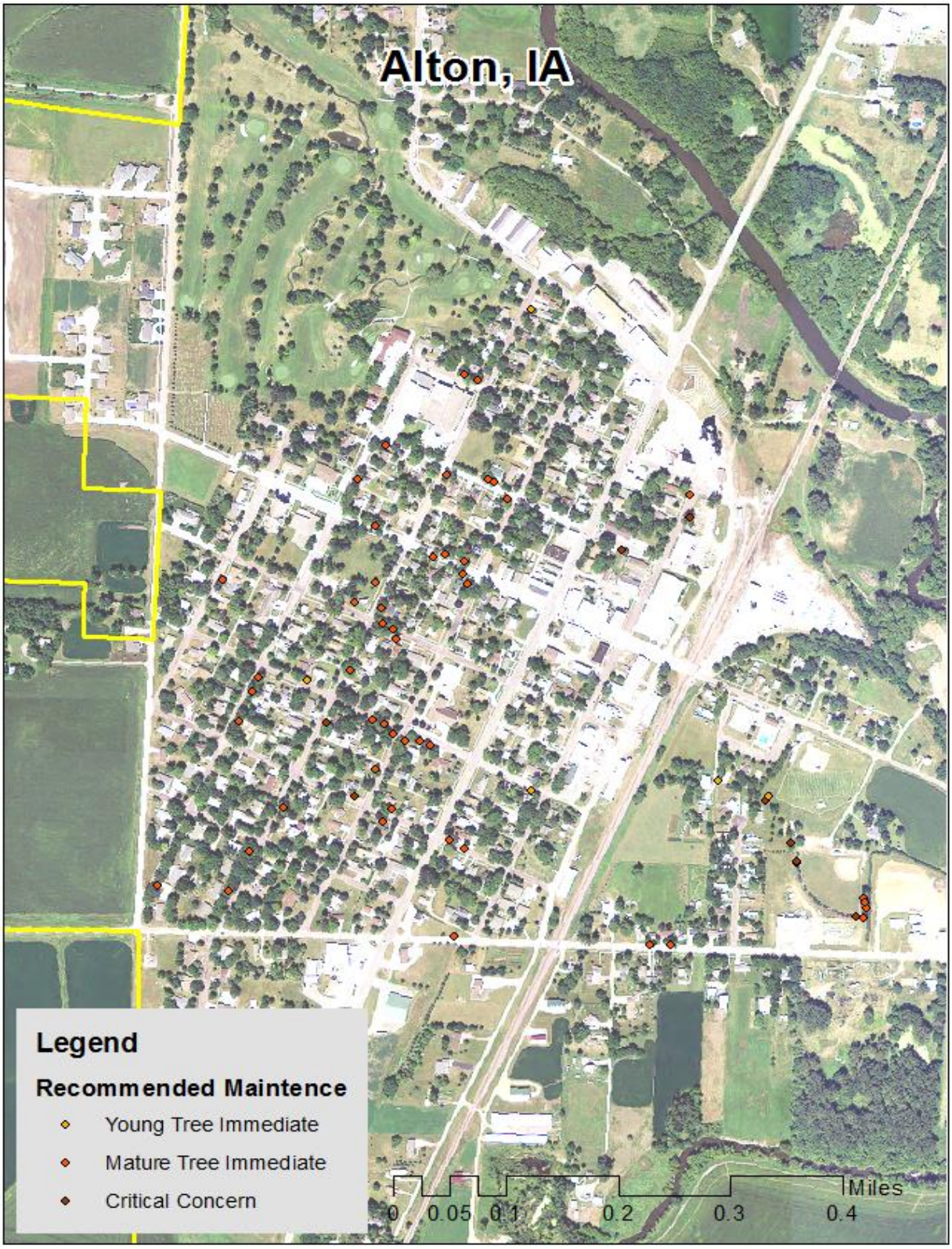
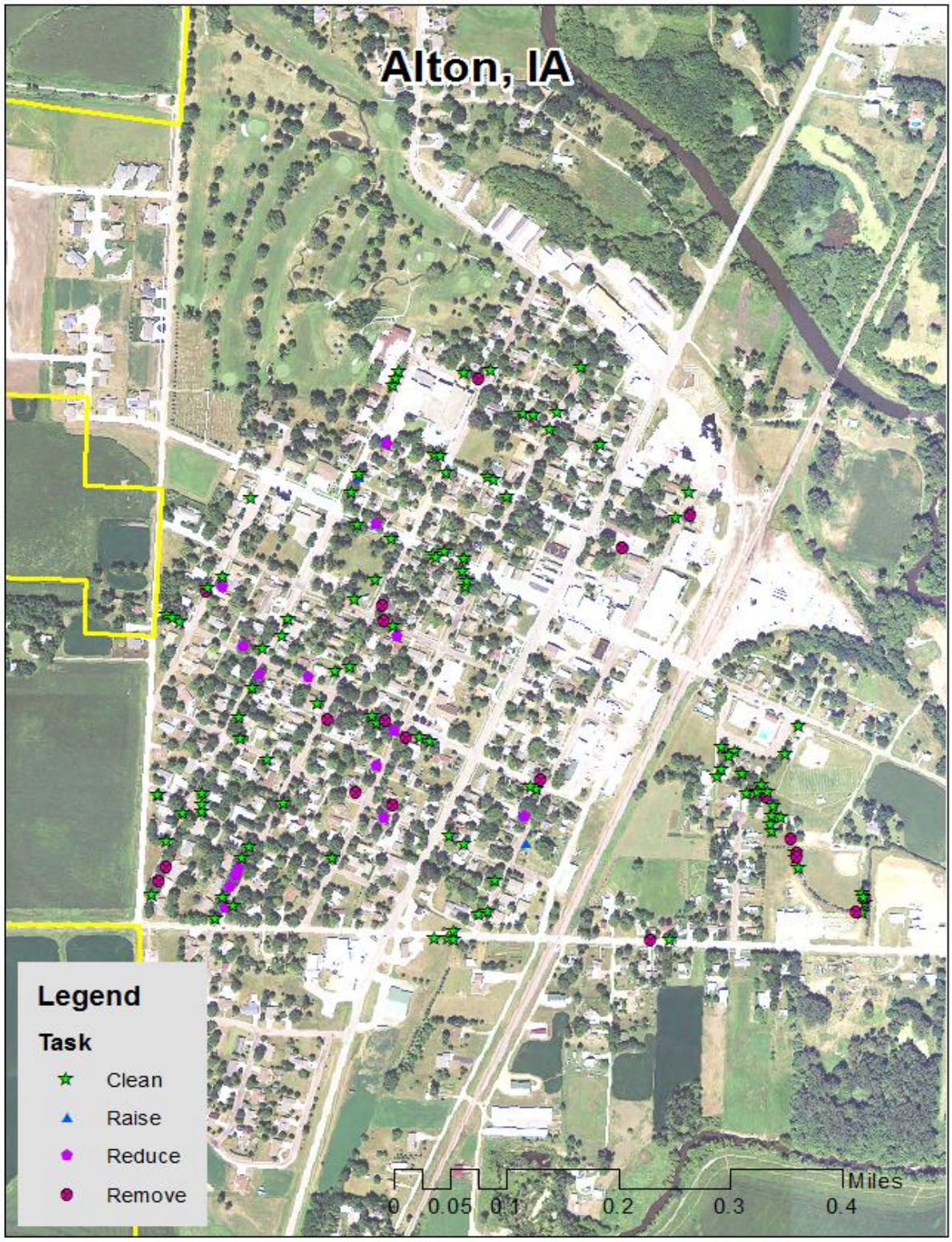


Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*



Appendix C: Alton Tree Ordinances

CHAPTER 151
TREES AND GRASS

151.01 DEFINITION. For use in this chapter, "boulevard" means that part of the street, avenue or highway in the City not covered by sidewalk and lying between the lot line and the curb line; 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.

151.02 PLANTING RESTRICTIONS. No tree shall be planted in any boulevard or street except in accordance with the following:
1. Alignment. All tress planted in any street shall be planted in the boulevard midway between the outer line of the sidewalk and the curb. In the event a curb line is not established, trees shall be planted on a line ten (10) feet from the property line.
2. Spacing. Trees shall not be planted on any boulevard which is less than nine (9) feet in width, or contains less than eighty-one (81) square feet of exposed soil surface per tree. Trees shall not be planted closer than twenty (20) feet from street intersections (property lines extended) and ten (10) feet from driveways. If it is at all possible trees should be planted inside the property lines and not between the sidewalk and the curb.
3. Prohibited Trees. No person shall plant in any street any fruit-bearing tree or any tree of the kinds commonly known as cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut.

151.03 DUTY TO TRIM TREES. The owner or agent of the abutting property shall keep the trees on, or overhanging the street, trimmed so that all branches will be at least eighteen (18) feet above the surface of a street, twenty (20) feet above the surface of a primary highway, and eight (8) feet above the sidewalks. If the abutting property owner fails to trim the trees, the City may serve notice on the abutting property owner requiring that such action be taken within five (5) days. If such action is not taken within that time, the
City may perform the required action and assess the costs against the abutting property for collection in the same manner as a property tax.
(Code of Iowa, Sec. 364.12[2c, d, & e])

151.04 TRIMMING TREES TO BE SUPERVISED. Except as allowed in Section 151.03, it is unlawful for any person to trim or cut any tree in a street or public place unless the work is done under the supervision of the City.

151.05 DISEASE CONTROL. Any dead, diseased or damaged tree or shrub which may harbor serious insect or disease pests or disease injurious to other trees is hereby declared to be a nuisance.

151.06 INSPECTION AND REMOVAL. The Council shall inspect or cause to be inspected any trees or shrubs in the City reported or suspected to be infected with or damaged by any disease or insect or disease pests, and such trees and shrubs shall be subject to removal as follows:
1. City Property. If it is determined that any such condition exists on any public property, including the strip between the curb and the lot line of private property, the Council may cause such condition to be corrected by treatment or removal. The Council may also order the removal of any trees on the streets of the City which interfere with the making of improvements or with travel thereon.
2. Private Property. If it is determined with reasonable certainty that any such condition exists on private property and that the danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Council shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days of said notification. If such owner, occupant or person in charge of said property fails to comply within 14 days of receipt of notice, the Council may cause the condition to be corrected and the cost assessed against the property.
(Code of Iowa, Sec. 364.12[3b & h])

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