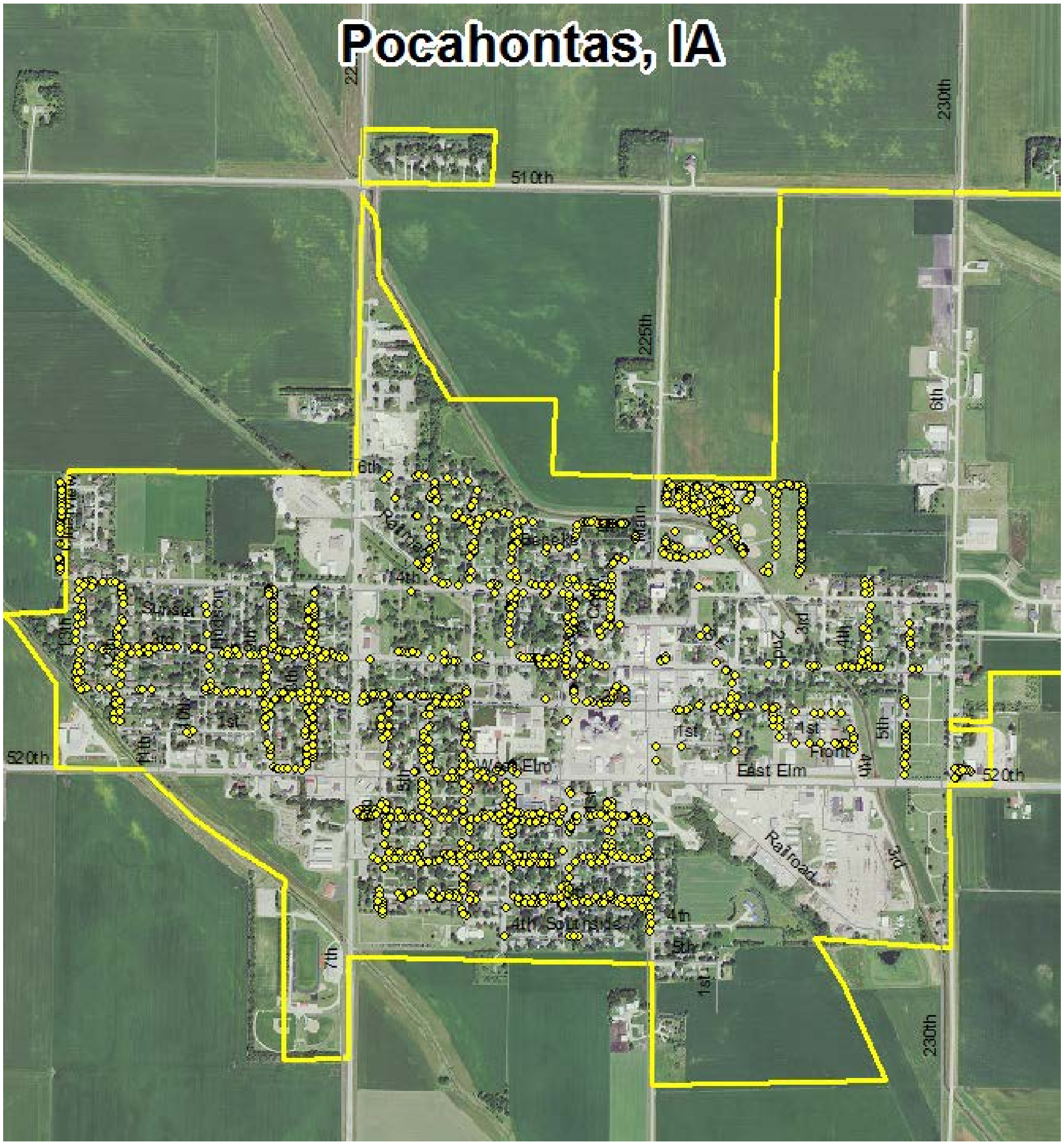
Pocahontas, IA



2017 Urban Forest Management Plan
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Table of Contents

Executive Summary

Overview

This plan was developed to assist the City of Pocahontas 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 17% of Pocahontas'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 1466 trees inventoried.

- Pocahontas's trees provide $303,253 of benefits annually, an average of $206 a tree
- There are over 244 species of trees
- The top three genera are: Maple 41%, Ash 27%, and Linden 6%
- 8% of trees are in need of some type of management
- 29 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 29 trees needing removal, 14 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*
- 139 of 393 the 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 76 years to remove ash – Suggestion: request a budget increase to $25,590 annually and apply for grants to plant replacement trees

Introduction

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

Trees are an important component of Pocahontas'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 Pocahontas 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 Pocahontas'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 1466 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. Pocahontas's trees reduce energy related costs by approximately $78,513 annually (Appendix A, Table 1). These savings are both in Electricity (374.9 MWh) and in Natural Gas (51,077.9 Therms).

Annual Stormwater Benefits

Pocahontas's trees intercept about 4,350,354 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides $117,895 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 Pocahontas, it is estimated that trees remove 4,862.6 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 $13,708 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Pocahontas, trees sequester about 1,456,197lbs of carbon a year with an associated value of $10,921 (Appendix A, Table 4). In addition, the trees store 15,815,555 lbs of carbon, with a yearly benefit of $118,617 (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. Pocahontas receives $82,216 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, Pocahontas's trees provide $303,253 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 1,466 trees in Pocahontas provide approximately $206 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Pocahontas has over 44 different tree species along city streets and parks (Appendix A, Figure 1).
The distribution of trees by genera is as follows:

Maple	603	41%
Ash	393	27%
Linden	82	6%
Hackberry	78	5%
Spruce	60	4%
Honeylocust	58	4%
Walnut	45	3%
Elm	29	2%
Oak	26	2%
Apple (crabapple)	25	2%
Pine	17	1%
Birch	11	1%
Willow	8	1%
Other	7	<1%
Hickory	6	<1%
Ohio Buckeye	4	<1%
Pear	4	<1%
Cottonwood/Aspen	3	<1%
Red bud	2	<1%
White Cedar	2	<1%
Red Cedar	1	<1%
Mulberry	1	<1%
Hophornbeam	1	<1%

Age Class

Most of Pocahontas's trees (41%) are between 24 and 36 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 smallest size

category (a downward slope) to prepare for natural mortality and to maintain canopy cover. Pocahontas's size curve is on the larger side, indicating a older than 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 Pocahontas indicate that 97% of the trees are in good health, with none of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). On the contrary, 24% of Pocahontas'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 6% of the population. This 6% 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 Cleaning	58	4%
Tree Removal	29	2%
Crown Raising	6	<1%
Crown Reduction	5	<1%

Canopy Cover

The total canopy with both private and public trees is 15%, 189 acres. The canopy cover included in the Pocahontas inventory includes approximately 43 acres (Appendix A, Figure 4). The statewide canopy goal is 3%, in 30 years. To achieve this goal it is estimated that 94 trees need to be planted annually on public and private land in addition to replacement trees.

Land Use and Location

The majority of Pocahontas'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	85%
Park/vacant/other	14%
Small commercial	1%

Location	
Front yard	56%
Planting strip	44%

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

Pocahontas has 4 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 trees are addressed, there should be follow up on the trees marked as needing maintenance. There are a total of 98 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 28 removals, 9 are ash trees. There are a total of 393 ash trees, and 156 of those have signs and symptoms that have been associated with EAB. In addition, there are 28 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 Pocahontas.

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 (41%) (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: fruit-bearing tree or cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut, 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.

Six Year Maintenance Plan with <u>No Additional Funding</u>

Year 1

- Removal: 4 concern trees and 1 immediate
- Planting and Replacement: 6 trees to be planted in open locations
- Young Tree Pruning & Maintenance: 10
- Visual Survey for signs and symptoms of EAB

Year 2

- Removal: 5 trees marked for removal
- Planting and Replacement: 6 trees to be planted in open locations
- Young Tree Pruning & Maintenance: 10
- Visual Survey for signs and symptoms of EAB

Year 3

- Removal: 5 trees marked for removal
- Planting and Replacement: 6 trees to be planted in open locations
- Young Tree Pruning & Maintenance: 10
- Visual Survey for signs and symptoms of EAB

Year 4

- Removal: 5 trees marked for removal
- Planting and Replacement: 6 trees to be planted in open locations
- Young Tree Pruning & Maintenance: 10
- Visual Survey for signs and symptoms of EAB

Year 5

- Removal: 5 trees marked for removal
- Planting and Replacement: 6 trees to be planted in open locations
- Young Tree Pruning & Maintenance: 10
- Visual Survey for signs and symptoms of EAB

Year 6

Removal: 5 trees marked for removal and 1new critical concern tree or ash in poor health
*Or saving for ash tree treatment and/or future ash removal
Planting and Replacement: 6 trees to be planted in open locations
Young Tree Pruning & Maintenance: 10
Visual Survey for signs and symptoms of EAB

*Reduction of ash over 6 years: Approximately 10 to 393 ash trees removed (approximately 3% of ash). It will take approximately 76 years to remove all ash with the current budget. EAB could potentially kill all ash within 4 to 15 years of its arrival.
** To remove all ash trees within 6 years, the budget would need to be increased to $63,250 a year. If the budget were increased to $25,590 a year all ash could be removed in 15 years.

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 151.02 (Appendix C). The new plantings will be a diverse mix and will not include any fruit-bearing tree or cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut.

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 treatment is not being used. City Code 151.08 INSPECTION AND REMOVAL. “The Council shall inspect or cause to be inspected any trees or shrubs in the City reported or suspected to be dead, diseased or damaged, and such trees and shrubs shall be subject to the following:… 2. Private Property. If it is determined with reasonable certainty that any such condition exists on private property and that 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 fourteen (14) days of receipt of notice, the Council may cause the condition."

Budget

Current Budget

Total Budget: $5,350

Removal: $4,000
*Or saving for ash tree treatment and/or future ash removal
Planting: $600
Pruning & Maintenance: $750

*Reduction of ash over 6 years: Approximately 10 to 393 ash trees removed (approximately 3% of ash). It will take approximately 76 years to remove all ash with the current budget. EAB could potentially kill all ash within 4 to 15 years of its arrival.
** To remove all ash trees within 6 years, the budget would need to be increased to $63,250 a year. If the budget were increased to $25,590 a year all ash could be removed in 15 years.

Purposed Budget Increase

EAB could potentially kill all ash trees in Pocahontas within 4 years of its arrival. To remove all ash trees within 6 years the budget would need to be increased to $63,250 a year. If the budget were increased to $$25,590 a year all ash could be removed within 15 years. Additionally, it is recommended that Pocahontas 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.

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 4 trees could be treated per year (every other year treatment). This would be 8 trees selected for treatment, and Pocahontas would still need to find $308,000 for removal. Alternatively, if there are 200 treatable trees, it would cost approximately $30,000 a year for treatment and leave $154,400 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 Pocahontas. It is suggested to consider increasing the budget to plan for this.

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Pocahontas

Annual Energy Benefits of Public Trees

2/9/2017

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	108.1	8,204	14,670.9	14,377	22,582	(N/A)	26.7	28.8	57.75
Silver maple	82.5	6,259	10,681.6	10,468	16,727	(N/A)	17.0	21.3	67.18
Norway maple	58.0	4,403	8,284.1	8,118	12,521	(N/A)	16.5	15.9	51.74
Northern hackberry	27.3	2,074	3,847.8	3,771	5,845	(N/A)	5.3	7.4	74.94
American basswood	16.3	1,240	2,378.0	2,330	3,570	(N/A)	4.2	4.5	58.53
Sugar maple	13.9	1,052	1,837.3	1,801	2,853	(N/A)	4.2	3.6	46.77
Honeylocust	17.4	1,320	2,274.4	2,229	3,549	(N/A)	4.0	4.5	61.19
Black walnut	14.8	1,125	2,042.5	2,002	3,126	(N/A)	3.1	4.0	69.47
Apple	1.3	100	218.1	214	314	(N/A)	1.7	0.4	12.55
Spruce	2.6	197	351.4	344	541	(N/A)	1.6	0.7	22.55
Littleleaf linden	3.8	285	514.0	504	789	(N/A)	1.4	1.0	37.56
Elm	3.1	235	406.1	398	633	(N/A)	1.2	0.8	35.18
Blue spruce	1.1	80	153.5	155	236	(N/A)	1.2	0.3	13.10
Norway spruce	1.9	144	267.4	262	406	(N/A)	1.2	0.5	23.87
Maple	0.6	48	95.1	93	141	(N/A)	1.1	0.2	8.81
Boxelder	3.4	259	447.9	439	697	(N/A)	1.0	0.9	46.50
Red maple	2.4	185	321.0	315	500	(N/A)	1.0	0.6	33.31
Austrian pine	2.2	166	302.6	297	462	(N/A)	1.0	0.6	33.02
Northern red oak	1.6	119	215.6	211	331	(N/A)	0.7	0.4	33.06
Bur oak	0.9	68	127.0	124	192	(N/A)	0.7	0.2	19.22
Willow	2.4	179	348.8	342	520	(N/A)	0.5	0.7	65.04
Swamp white oak	0.1	10	20.8	20	30	(N/A)	0.4	0.0	5.00
Siberian elm	2.1	162	282.7	277	439	(N/A)	0.4	0.6	73.17
River birch	0.0	2	4.8	5	7	(N/A)	0.4	0.0	1.10
Catalpa	0.4	34	55.5	54	88	(N/A)	0.4	0.1	14.69
Conifer Evergreen Large	0.9	70	123.0	121	191	(N/A)	0.3	0.2	38.17
Paper birch	1.3	97	168.2	165	262	(N/A)	0.3	0.3	52.40
Pear	0.2	12	26.9	26	38	(N/A)	0.3	0.0	9.53
American elm	0.7	55	94.0	92	147	(N/A)	0.3	0.2	36.80
Ohio buckeye	0.2	14	30.0	29	44	(N/A)	0.3	0.1	10.89
Amur maple	0.4	31	63.2	62	93	(N/A)	0.3	0.1	23.18
Eastern white pine	0.6	42	73.8	72	115	(N/A)	0.2	0.1	38.17
Northern white cedar	0.3	25	44.3	43	69	(N/A)	0.1	0.1	34.32
Eastern redbud	0.0	3	7.6	7	11	(N/A)	0.1	0.0	5.40
Broadleaf Deciduous Small	0.1	6	13.5	13	19	(N/A)	0.1	0.0	9.53
White ash	0.2	14	26.7	26	40	(N/A)	0.1	0.1	20.10
Quaking aspen	0.4	32	57.4	56	88	(N/A)	0.1	0.1	43.92
Eastern cottonwood	0.4	29	53.7	53	82	(N/A)	0.1	0.1	82.02
Eastern hophornbeam	0.1	6	12.8	13	18	(N/A)	0.1	0.0	18.19
Eastern red cedar	0.1	8	16.4	16	25	(N/A)	0.1	0.0	24.57
Chinese elm	0.4	29	53.7	53	82	(N/A)	0.1	0.1	82.02
Black maple	0.3	22	39.9	39	61	(N/A)	0.1	0.1	60.68
Mulberry	0.0	2	3.8	4	5	(N/A)	0.1	0.0	5.40
Black spruce	0.1	10	15.2	15	25	(N/A)	0.1	0.0	24.51
Total	374.9	28,457	51,077.9	50,056	78,513	(N/A)	100.0	100.0	53.56

Table 2: Annual Stormwater Benefits

Pocahontas

Annual Stormwater Benefits of Public Trees

2/9/2017

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	1,214,262	32,906	(N/A)	26.7	27.9	84.16
Silver maple	1,166,031	31,599	(N/A)	17.0	26.8	126.91
Norway maple	545,273	14,777	(N/A)	16.5	12.5	61.06
Northern hackberry	281,501	7,629	(N/A)	5.3	6.5	97.80
American basswood	192,131	5,207	(N/A)	4.2	4.4	85.36
Sugar maple	141,031	3,822	(N/A)	4.2	3.2	62.65
Honeylocust	198,088	5,368	(N/A)	4.0	4.6	92.55
Black walnut	184,292	4,994	(N/A)	3.1	4.2	110.98
Apple	5,072	137	(N/A)	1.7	0.1	5.50
Spruce	44,731	1,212	(N/A)	1.6	1.0	50.51
Littleleaf linden	33,009	895	(N/A)	1.4	0.8	42.60
Elm	33,991	921	(N/A)	1.2	0.8	51.17
Blue spruce	12,854	348	(N/A)	1.2	0.3	19.35
Norway spruce	37,495	1,016	(N/A)	1.2	0.9	59.77
Maple	3,381	92	(N/A)	1.1	0.1	5.73
Boxelder	34,372	931	(N/A)	1.0	0.8	62.10
Red maple	19,318	524	(N/A)	1.0	0.4	34.90
Austrian pine	37,115	1,006	(N/A)	1.0	0.9	71.84
Northern red oak	13,769	373	(N/A)	0.7	0.3	37.31
Bur oak	7,515	204	(N/A)	0.7	0.2	20.37
Willow	26,936	730	(N/A)	0.5	0.6	91.25
Swamp white oak	647	18	(N/A)	0.4	0.0	2.92
Siberian elm	23,267	631	(N/A)	0.4	0.5	105.09
River birch	73	2	(N/A)	0.4	0.0	0.33
Catalpa	2,760	75	(N/A)	0.4	0.1	12.47
Conifer Evergreen Large	23,023	624	(N/A)	0.3	0.5	124.79
Paper birch	12,972	352	(N/A)	0.3	0.3	70.31
Pear	544	15	(N/A)	0.3	0.0	3.68
American elm	6,472	175	(N/A)	0.3	0.1	43.85
Ohio buckeye	924	25	(N/A)	0.3	0.0	6.26
Amur maple	1,460	40	(N/A)	0.3	0.0	9.89
Eastern white pine	13,814	374	(N/A)	0.2	0.3	124.79
Northern white cedar	7,574	205	(N/A)	0.1	0.2	102.63
Eastern redbud	137	4	(N/A)	0.1	0.0	1.86
Broadleaf Deciduous Small	272	7	(N/A)	0.1	0.0	3.68
White ash	1,227	33	(N/A)	0.1	0.0	16.63
Quaking aspen	5,662	153	(N/A)	0.1	0.1	76.72
Eastern cottonwood	5,491	149	(N/A)	0.1	0.1	148.79
Eastern hophornbeam	264	7	(N/A)	0.1	0.0	7.17
Eastern red cedar	1,635	44	(N/A)	0.1	0.0	44.30
Chinese elm	5,491	149	(N/A)	0.1	0.1	148.79
Black maple	2,867	78	(N/A)	0.1	0.1	77.70
Mulberry	69	2	(N/A)	0.1	0.0	1.86
Black spruce	1,544	42	(N/A)	0.1	0.0	41.85
Citywide total	4,350,354	117,895	(N/A)	100.0	100.0	80.42

Table 3: Annual Air Quality Benefits

Pocahontas

Annual Air Quality Benefits of Public Trees

2/9/2017

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	152.1	24.3	72.3	6.8	809	515.0	75.1	71.6	489.9	3,211	0.0	0	1,407.1	4,019 (N/A)	26.7	10.28
Silver maple	197.2	33.4	97.1	8.7	1,064	387.1	56.8	54.2	373.0	2,426	-100.5	-377	1,107.2	3,113 (N/A)	17.0	12.50
Norway maple	112.7	19.4	55.3	5.0	609	280.5	40.6	38.7	263.2	1,739	-26.3	-99	789.1	2,249 (N/A)	16.5	9.29
Northern hackberry	46.0	8.0	23.1	2.1	250	131.6	19.1	18.2	123.9	817	0.0	0	371.9	1,067 (N/A)	5.3	13.68
American basswood	26.8	4.6	13.0	1.2	144	79.4	11.5	10.9	74.1	491	-22.6	-85	198.9	551 (N/A)	4.2	9.03
Sugar maple	18.0	3.1	9.2	0.8	98	65.6	9.6	9.2	62.8	410	-14.3	-54	163.8	454 (N/A)	4.2	7.45
Honeylocust	38.8	6.4	17.6	1.8	205	81.9	12.0	11.5	78.7	513	-30.6	-115	218.0	602 (N/A)	4.0	10.39
Black walnut	24.6	3.9	11.4	1.1	130	70.9	10.3	9.8	67.2	441	0.0	0	199.3	571 (N/A)	3.1	12.70
Apple	1.1	0.2	0.6	0.1	6	6.6	0.9	0.9	6.0	40	0.0	0	16.4	47 (N/A)	1.7	1.86
Spruce	5.1	1.0	4.2	0.6	34	12.3	1.8	1.7	11.7	77	-21.1	-79	17.4	31 (N/A)	1.6	1.31
Littleleaf linden	5.2	0.9	2.6	0.2	28	18.0	2.6	2.5	17.0	112	-2.6	-10	46.5	131 (N/A)	1.4	6.21
Elm	4.3	0.7	2.0	0.2	23	14.6	2.1	2.0	14.1	92	0.0	0	40.1	114 (N/A)	1.2	6.35
Blue spruce	1.5	0.3	1.3	0.2	10	5.2	0.7	0.7	4.8	32	-4.3	-16	10.4	26 (N/A)	1.2	1.44
Norway spruce	4.4	0.9	3.6	0.5	29	9.1	1.3	1.3	8.6	57	-20.6	-77	9.0	8 (N/A)	1.2	0.48
Maple	0.4	0.1	0.2	0.0	2	3.1	0.4	0.4	2.9	19	-0.2	-1	7.3	21 (N/A)	1.1	1.29
Boxelder	4.4	0.7	2.1	0.2	23	16.1	2.4	2.2	15.4	101	-1.7	-6	41.8	118 (N/A)	1.0	7.84
Red maple	4.4	0.8	2.1	0.2	24	11.5	1.7	1.6	11.0	72	-1.5	-6	31.8	90 (N/A)	1.0	6.01
Austrian pine	6.4	1.3	5.1	0.8	42	10.4	1.5	1.4	9.9	65	-14.4	-54	22.4	53 (N/A)	1.0	3.77
Northern red oak	2.7	0.5	1.4	0.1	15	7.5	1.1	1.0	7.1	47	-3.9	-15	17.6	47 (N/A)	0.7	4.70
Bur oak	0.6	0.1	0.4	0.0	3	4.3	0.6	0.6	4.0	27	0.0	0	10.7	30 (N/A)	0.7	3.01
Willow	6.1	1.1	2.9	0.3	33	11.5	1.7	1.6	10.7	71	-1.4	-5	34.4	99 (N/A)	0.5	12.32
Swamp white oak	0.1	0.0	0.0	0.0	0	0.6	0.1	0.1	0.6	4	0.0	0	1.5	4 (N/A)	0.4	0.69
Siberian elm	4.1	0.7	2.0	0.2	22	10.1	1.5	1.4	9.7	63	0.0	0	29.5	85 (N/A)	0.4	14.16
River birch	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)	0.4	0.14
Catalpa	0.1	0.0	0.1	0.0	1	2.1	0.3	0.3	2.0	13	0.0	0	5.0	14 (N/A)	0.4	2.32
Conifer Evergreen Large	2.8	0.6	2.2	0.3	18	4.4	0.6	0.6	4.2	27	-14.3	-54	1.5	-8 (N/A)	0.3	-1.58
Paper birch	1.5	0.2	0.7	0.1	8	6.0	0.9	0.8	5.8	38	0.0	0	16.2	46 (N/A)	0.3	9.20
Pear	0.1	0.0	0.1	0.0	1	0.8	0.1	0.1	0.7	5	0.0	0	1.9	5 (N/A)	0.3	1.33
American elm	0.6	0.1	0.3	0.0	3	3.4	0.5	0.5	3.3	21	0.0	0	8.8	25 (N/A)	0.3	6.22
Ohio buckeye	0.1	0.0	0.1	0.0	0	0.9	0.1	0.1	0.8	6	0.0	0	2.1	6 (N/A)	0.3	1.51
Amur maple	0.3	0.1	0.2	0.0	2	2.0	0.3	0.3	1.8	12	0.0	0	5.0	14 (N/A)	0.3	3.55
Eastern white pine	1.7	0.3	1.3	0.2	11	2.6	0.4	0.4	2.5	16	-8.6	-32	0.9	-5 (N/A)	0.2	-1.58
Northern white cedar	0.9	0.2	0.7	0.1	6	1.6	0.2	0.2	1.5	10	-4.2	-16	1.2	0 (N/A)	0.1	-0.06
Eastern redbud	0.0	0.0	0.0	0.0	0	0.2	0.0	0.0	0.2	1	0.0	0	0.5	1 (N/A)	0.1	0.71
Broadleaf Deciduous Small	0.0	0.0	0.0	0.0	0	0.4	0.1	0.1	0.4	2	0.0	0	0.9	3 (N/A)	0.1	1.33
White ash	0.0	0.0	0.0	0.0	0	0.9	0.1	0.1	0.8	6	0.0	0	2.1	6 (N/A)	0.1	2.91
Quaking aspen	0.8	0.1	0.4	0.0	4	2.0	0.3	0.3	1.9	12	0.0	0	5.8	17 (N/A)	0.1	8.29
Eastern cottonwood	0.8	0.1	0.4	0.0	4	1.9	0.3	0.3	1.8	12	0.0	0	5.5	16 (N/A)	0.1	15.71
Eastern hophornbeam	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)	0.1	2.55
Eastern red cedar	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)	0.1	2.19
Chinese elm	0.8	0.1	0.4	0.0	4	1.9	0.3	0.3	1.8	12	0.0	0	5.5	16 (N/A)	0.1	15.71
Black maple	0.7	0.1	0.3	0.0	4	1.4	0.2	0.2	1.3	8	-0.2	-1	4.0	12 (N/A)	0.1	11.54
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)	0.1	0.71
Black spruce	0.2	0.0	0.2	0.0	1	0.6	0.1	0.1	0.6	4	-0.6	-2	1.2	3 (N/A)	0.1	2.89
Citywide total	679.0	114.4	337.4	32.1	3,674	1,787.2	260.4	248.3	1,698.8	11,139	-294.9	-1,106	4,862.6	13,708 (N/A)	100.0	9.35

Table 4: Annual Carbon Stored

Pocahontas

Stored CO2 Benefits of Public Trees

2/9/2017

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	4,970,463	37,278	(N/A)	26.7	31.4	95.34
Silver maple	4,286,565	32,149	(N/A)	17.0	27.1	129.11
Norway maple	1,865,684	13,993	(N/A)	16.5	11.8	57.82
Northern hackberry	708,702	5,315	(N/A)	5.3	4.5	68.14
American basswood	991,540	7,437	(N/A)	4.2	6.3	121.91
Sugar maple	520,645	3,905	(N/A)	4.2	3.3	64.01
Honeylocust	502,063	3,765	(N/A)	4.0	3.2	64.92
Black walnut	806,347	6,048	(N/A)	3.1	5.1	134.39
Apple	20,350	153	(N/A)	1.7	0.1	6.11
Spruce	50,691	380	(N/A)	1.6	0.3	15.84
Littleleaf linden	113,324	850	(N/A)	1.4	0.7	40.47
Elm	142,578	1,069	(N/A)	1.2	0.9	59.41
Blue spruce	9,221	69	(N/A)	1.2	0.1	3.84
Norway spruce	51,765	388	(N/A)	1.2	0.3	22.84
Maple	5,890	44	(N/A)	1.1	0.0	2.76
Boxelder	142,191	1,066	(N/A)	1.0	0.9	71.10
Red maple	48,765	366	(N/A)	1.0	0.3	24.38
Austrian pine	55,804	419	(N/A)	1.0	0.4	29.90
Northern red oak	56,352	423	(N/A)	0.7	0.4	42.26
Bur oak	21,514	161	(N/A)	0.7	0.1	16.14
Willow	101,062	758	(N/A)	0.5	0.6	94.75
Swamp white oak	1,185	9	(N/A)	0.4	0.0	1.48
Siberian elm	98,317	737	(N/A)	0.4	0.6	122.90
River birch	101	1	(N/A)	0.4	0.0	0.13
Catalpa	5,448	41	(N/A)	0.4	0.0	6.81
Conifer Evergreen La	37,451	281	(N/A)	0.3	0.2	56.18
Paper birch	50,094	376	(N/A)	0.3	0.3	75.14
Pear	1,843	14	(N/A)	0.3	0.0	3.46
American elm	16,368	123	(N/A)	0.3	0.1	30.69
Ohio buckeye	1,554	12	(N/A)	0.3	0.0	2.91
Amur maple	5,761	43	(N/A)	0.3	0.0	10.80
Eastern white pine	22,471	169	(N/A)	0.2	0.1	56.18
Northern white cedar	10,833	81	(N/A)	0.1	0.1	40.62
Eastern redbud	356	3	(N/A)	0.1	0.0	1.33
Broadleaf Deciduous	922	7	(N/A)	0.1	0.0	3.46
White ash	2,069	16	(N/A)	0.1	0.0	7.76
Quaking aspen	26,129	196	(N/A)	0.1	0.2	97.98
Eastern cottonwood	25,943	195	(N/A)	0.1	0.2	194.57
Eastern hophornbeam	908	7	(N/A)	0.1	0.0	6.81
Eastern red cedar	1,102	8	(N/A)	0.1	0.0	8.27
Chinese elm	25,943	195	(N/A)	0.1	0.2	194.57
Black maple	7,945	60	(N/A)	0.1	0.1	59.59
Mulberry	178	1	(N/A)	0.1	0.0	1.33
Black spruce	1,118	8	(N/A)	0.1	0.0	8.39
Citywide total	15,815,555	118,617	(N/A)	100.0	100.0	80.91

Table 5: Annual Carbon Sequestered

Pocahontas

Annual CO Benefits of Public Trees

2/9/2017

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
Green ash	255,287	1,915	-23,858	-1,129	-187	181,316	1,360	411,615	3,087 (N/A)	26.7	28.3	7.90
Silver maple	329,732	2,473	-20,576	-889	-161	138,316	1,037	446,584	3,349 (N/A)	17.0	30.7	13.45
Norway maple	70,421	528	-8,966	-619	-72	97,305	730	158,141	1,186 (N/A)	16.5	10.9	4.90
Northern hackberry	35,564	267	-3,402	-262	-27	45,838	344	77,739	583 (N/A)	5.3	5.3	7.47
American basswood	56,564	424	-4,759	-196	-37	27,404	206	79,012	593 (N/A)	4.2	5.4	9.71
Sugar maple	28,934	217	-2,502	-147	-20	23,259	174	49,544	372 (N/A)	4.2	3.4	6.09
Honeylocust	28,581	214	-2,413	-134	-19	29,175	219	55,209	414 (N/A)	4.0	3.8	7.14
Black walnut	35,533	266	-3,870	-158	-30	24,857	186	56,361	423 (N/A)	3.1	3.9	9.39
Apple	1,753	13	-98	-23	-1	2,210	17	3,843	29 (N/A)	1.7	0.3	1.15
Spruce	2,435	18	-243	-49	-2	4,349	33	6,492	49 (N/A)	1.6	0.4	2.03
Littleleaf linden	10,610	80	-544	-44	-4	6,301	47	16,323	122 (N/A)	1.4	1.1	5.83
Elm	6,963	52	-684	-34	-5	5,201	39	11,445	86 (N/A)	1.2	0.8	4.77
Blue spruce	710	5	-44	-20	0	1,778	13	2,424	18 (N/A)	1.2	0.2	1.01
Norway spruce	1,801	14	-248	-38	-2	3,178	24	4,693	35 (N/A)	1.2	0.3	2.07
Maple	893	7	-29	-8	0	1,056	8	1,912	14 (N/A)	1.1	0.1	0.90
Boxelder	11,109	83	-683	-41	-5	5,714	43	16,099	121 (N/A)	1.0	1.1	8.05
Red maple	5,083	38	-234	-22	-2	4,090	31	8,917	67 (N/A)	1.0	0.6	4.46
Austrian pine	2,376	18	-268	-44	-2	3,662	27	5,726	43 (N/A)	1.0	0.4	3.07
Northern red oak	2,051	15	-271	-20	-2	2,637	20	4,398	33 (N/A)	0.7	0.3	3.30
Bur oak	2,126	16	-103	-11	-1	1,496	11	3,508	26 (N/A)	0.7	0.2	2.63
Willow	1,704	13	-485	-28	-4	3,946	30	5,137	39 (N/A)	0.5	0.4	4.82
Swamp white oak	251	2	-6	-2	0	212	2	455	3 (N/A)	0.4	0.0	0.57
Siberian elm	4,100	31	-472	-23	-4	3,580	27	7,185	54 (N/A)	0.4	0.5	8.98
River birch	33	0	-1	-1	0	43	0	74	1 (N/A)	0.4	0.0	0.09
Catalpa	951	7	-26	-5	0	746	6	1,665	12 (N/A)	0.4	0.1	2.08
Conifer Evergreen Large	1,280	10	-180	-18	-1	1,555	12	2,638	20 (N/A)	0.3	0.2	3.96
Paper birch	2,916	22	-240	-13	-2	2,147	16	4,809	36 (N/A)	0.3	0.3	7.21
Pear	245	2	-9	-3	0	260	2	493	4 (N/A)	0.3	0.0	0.92
American elm	831	6	-79	-7	-1	1,217	9	1,962	15 (N/A)	0.3	0.1	3.68
Ohio buckeye	421	3	-9	-3	0	312	2	721	5 (N/A)	0.3	0.0	1.35
Amur maple	609	5	-28	-5	0	681	5	1,257	9 (N/A)	0.3	0.1	2.36
Eastern white pine	256	2	-108	-13	-1	933	7	1,068	8 (N/A)	0.2	0.1	2.67
Northern white cedar	443	3	-52	-6	0	557	4	943	7 (N/A)	0.1	0.1	3.53
Eastern redbud	76	1	-2	-1	0	74	1	147	1 (N/A)	0.1	0.0	0.55
Broadleaf Deciduous Smal	123	1	-4	-1	0	130	1	246	2 (N/A)	0.1	0.0	0.92
White ash	364	3	-10	-2	0	311	2	663	5 (N/A)	0.1	0.0	2.49
Quaking aspen	1,034	8	-125	-5	-1	699	5	1,602	12 (N/A)	0.1	0.1	6.01
Eastern cottonwood	960	7	-125	-4	-1	650	5	1,481	11 (N/A)	0.1	0.1	11.11
Eastern hophornbeam	114	1	-4	-1	0	124	1	232	2 (N/A)	0.1	0.0	1.74
Eastern red cedar	43	0	-5	-2	0	187	1	222	2 (N/A)	0.1	0.0	1.67
Chinese elm	960	7	-125	-4	-1	650	5	1,481	11 (N/A)	0.1	0.1	11.11
Black maple	923	7	-38	-3	0	477	4	1,359	10 (N/A)	0.1	0.1	10.20
Mulberry	38	0	-1	-1	0	37	0	74	1 (N/A)	0.1	0.0	0.55
Black spruce	91	1	-5	-2	0	213	2	296	2 (N/A)	0.1	0.0	2.22
Citywide total	907,290	6,805	-75,936	-4,041	-600	628,884	4,717	1,456,197	10,921 (N/A)	100.0	100.0	7.45

Table 6: Annual Social and Aesthetic Benefits

Pocahontas

Annual Aesthetic/Other Benefits of Public Trees

2/9/2017

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	21,004	(N/A)	26.7	25.5	53.72
Silver maple	25,905	(N/A)	17.0	31.5	104.04
Norway maple	6,820	(N/A)	16.5	8.3	28.18
Northern hackberry	4,576	(N/A)	5.3	5.6	58.67
American basswood	4,008	(N/A)	4.2	4.9	65.70
Sugar maple	3,102	(N/A)	4.2	3.8	50.85
Honeylocust	6,940	(N/A)	4.0	8.4	119.66
Black walnut	2,723	(N/A)	3.1	3.3	60.51
Apple	96	(N/A)	1.7	0.1	3.85
Spruce	615	(N/A)	1.6	0.7	25.62
Littleleaf linden	1,140	(N/A)	1.4	1.4	54.29
Elm	636	(N/A)	1.2	0.8	35.34
Blue spruce	301	(N/A)	1.2	0.4	16.70
Norway spruce	323	(N/A)	1.2	0.4	19.01
Maple	157	(N/A)	1.1	0.2	9.80
Boxelder	787	(N/A)	1.0	1.0	52.45
Red maple	658	(N/A)	1.0	0.8	43.86
Austrian pine	220	(N/A)	1.0	0.3	15.74
Northern red oak	168	(N/A)	0.7	0.2	16.82
Bur oak	258	(N/A)	0.7	0.3	25.78
Willow	152	(N/A)	0.5	0.2	19.01
Swamp white oak	40	(N/A)	0.4	0.0	6.65
Siberian elm	277	(N/A)	0.4	0.3	46.25
River birch	16	(N/A)	0.4	0.0	2.74
Catalpa	133	(N/A)	0.4	0.2	22.22
Conifer Evergreen Large	131	(N/A)	0.3	0.2	26.25
Paper birch	252	(N/A)	0.3	0.3	50.49
Pear	13	(N/A)	0.3	0.0	3.22
American elm	126	(N/A)	0.3	0.2	31.60
Ohio buckeye	55	(N/A)	0.3	0.1	13.68
Amur maple	35	(N/A)	0.3	0.0	8.67
Eastern white pine	26	(N/A)	0.2	0.0	8.75
Northern white cedar	73	(N/A)	0.1	0.1	36.67
Eastern redbud	4	(N/A)	0.1	0.0	2.06
Broadleaf Deciduous Small	6	(N/A)	0.1	0.0	3.22
White ash	67	(N/A)	0.1	0.1	33.42
Quaking aspen	81	(N/A)	0.1	0.1	40.67
Eastern cottonwood	67	(N/A)	0.1	0.1	66.60
Eastern hophornbeam	6	(N/A)	0.1	0.0	6.40
Eastern red cedar	14	(N/A)	0.1	0.0	13.68
Chinese elm	67	(N/A)	0.1	0.1	66.60
Black maple	109	(N/A)	0.1	0.1	109.08
Mulberry	2	(N/A)	0.1	0.0	2.06
Black spruce	25	(N/A)	0.1	0.0	25.23
Citywide total	82,216	(N/A)	100.0	100.0	56.08

Table 7: Summary of Benefits in Dollars

Pocahontas

Total Annual Benefits of Public Trees by Species ($)

2/9/2017

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Green ash	22,582	3,087	4,019	32,906	21,004	83,599	(N/A)	27.6
Silver maple	16,727	3,349	3,113	31,599	25,905	80,694	(N/A)	26.6
Norway maple	12,521	1,186	2,249	14,777	6,820	37,553	(N/A)	12.4
Northern hackberry	5,845	583	1,067	7,629	4,576	19,700	(N/A)	6.5
American basswood	3,570	593	551	5,207	4,008	13,929	(N/A)	4.6
Sugar maple	2,853	372	454	3,822	3,102	10,603	(N/A)	3.5
Honeylocust	3,549	414	602	5,368	6,940	16,874	(N/A)	5.6
Black walnut	3,126	423	571	4,994	2,723	11,838	(N/A)	3.9
Apple	314	29	47	137	96	623	(N/A)	0.2
Spruce	541	49	31	1,212	615	2,448	(N/A)	0.8
Littleleaf linden	789	122	131	895	1,140	3,076	(N/A)	1.0
Elm	633	86	114	921	636	2,391	(N/A)	0.8
Blue spruce	236	18	26	348	301	929	(N/A)	0.3
Norway spruce	406	35	8	1,016	323	1,789	(N/A)	0.6
Maple	141	14	21	92	157	424	(N/A)	0.1
Boxelder	697	121	118	931	787	2,654	(N/A)	0.9
Red maple	500	67	90	524	658	1,838	(N/A)	0.6
Austrian pine	462	43	53	1,006	220	1,784	(N/A)	0.6
Northern red oak	331	33	47	373	168	952	(N/A)	0.3
Bur oak	192	26	30	204	258	710	(N/A)	0.2
Willow	520	39	99	730	152	1,539	(N/A)	0.5
Swamp white oak	30	3	4	18	40	95	(N/A)	0.0
Siberian elm	439	54	85	631	277	1,486	(N/A)	0.5
River birch	7	1	1	2	16	26	(N/A)	0.0
Catalpa	88	12	14	75	133	323	(N/A)	0.1
Conifer Evergreen Large	191	20	-8	624	131	958	(N/A)	0.3
Paper birch	262	36	46	352	252	948	(N/A)	0.3
Pear	38	4	5	15	13	75	(N/A)	0.0
American elm	147	15	25	175	126	489	(N/A)	0.2
Ohio buckeye	44	5	6	25	55	135	(N/A)	0.0
Amur maple	93	9	14	40	35	191	(N/A)	0.1
Eastern white pine	115	8	-5	374	26	518	(N/A)	0.2
Northern white cedar	69	7	0	205	73	354	(N/A)	0.1
Eastern redbud	11	1	1	4	4	21	(N/A)	0.0
Broadleaf Deciduous Sm	19	2	3	7	6	37	(N/A)	0.0
White ash	40	5	6	33	67	151	(N/A)	0.0
Quaking aspen	88	12	17	153	81	351	(N/A)	0.1
Eastern cottonwood	82	11	16	149	67	324	(N/A)	0.1
Eastern hophornbeam	18	2	3	7	6	36	(N/A)	0.0
Eastern red cedar	25	2	2	44	14	86	(N/A)	0.0
Chinese elm	82	11	16	149	67	324	(N/A)	0.1
Black maple	61	10	12	78	109	269	(N/A)	0.1
Mulberry	5	1	1	2	2	11	(N/A)	0.0
Black spruce	25	2	3	42	25	97	(N/A)	0.0
Citywide Total	78,513	10,921	13,708	117,895	82,216	303,253	(N/A)	100.0

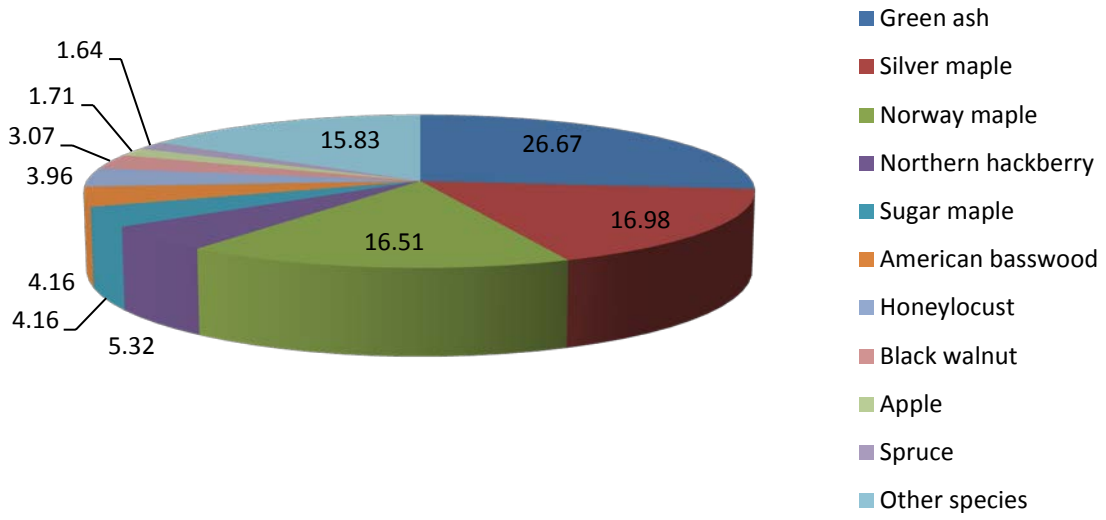

Figure 1: Species Distribution

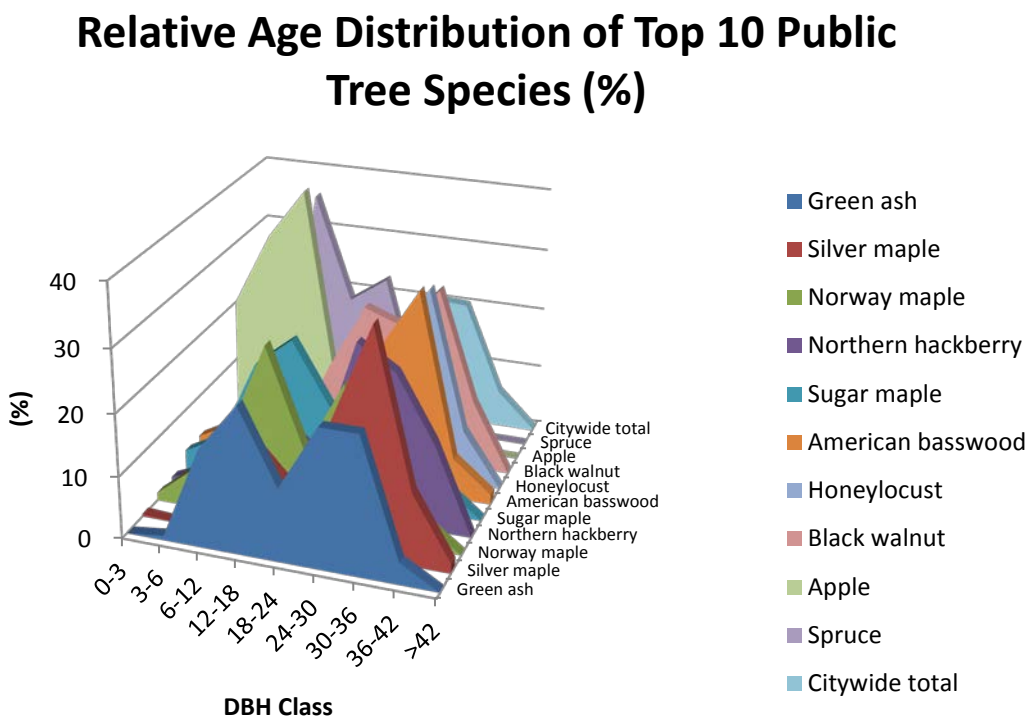

Figure 2: Relative Age Class

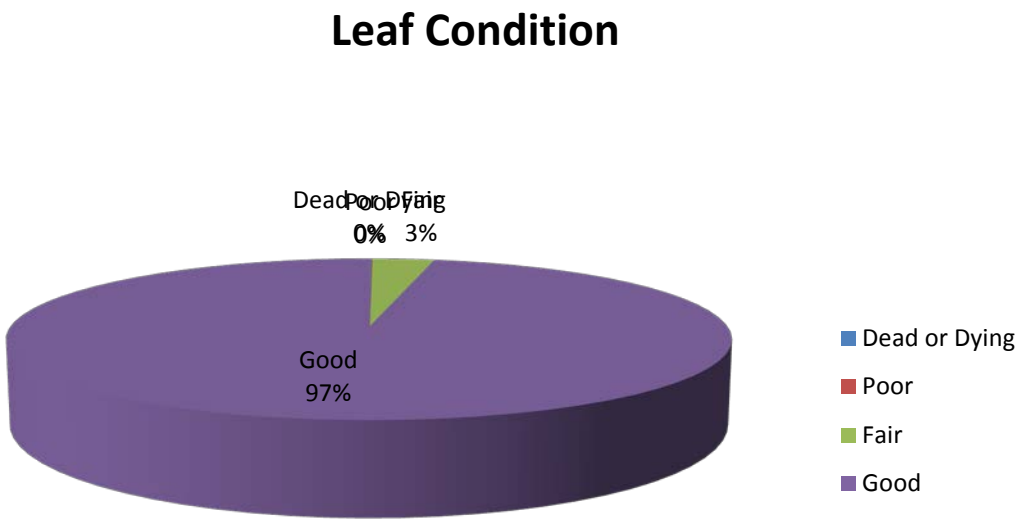

Figure 3: Foliage Condition

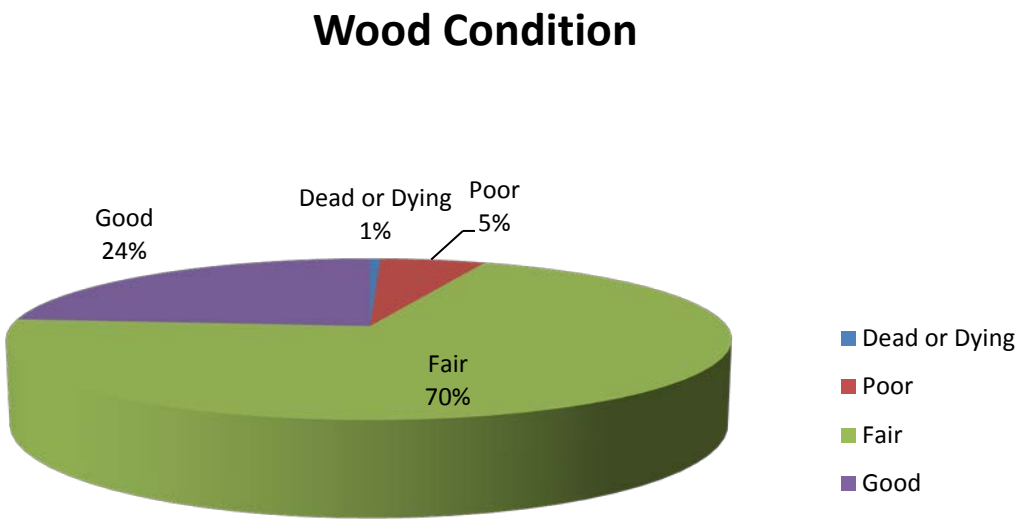

Figure 4: Wood Condition

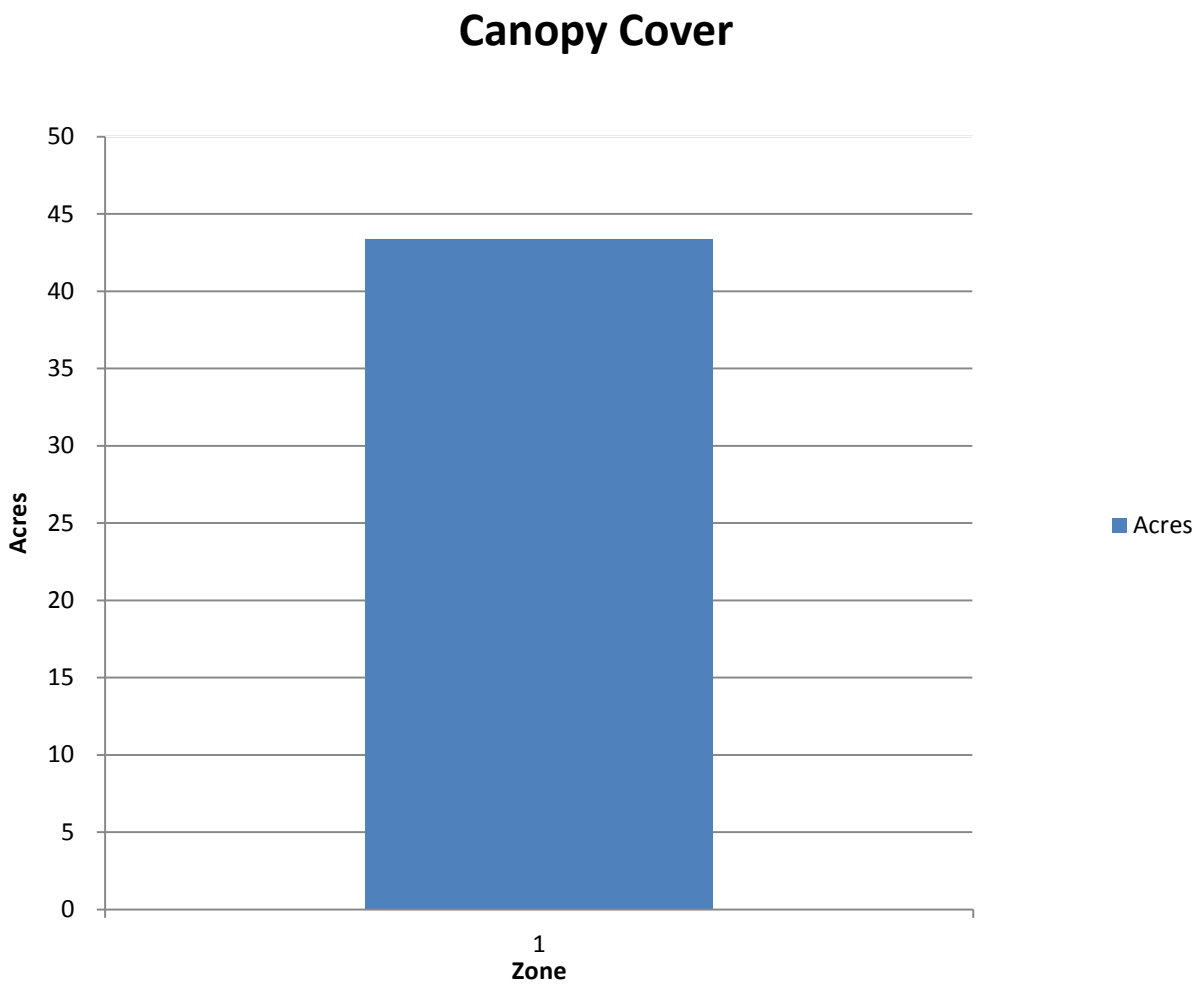

Figure 5: Canopy Cover in Acres

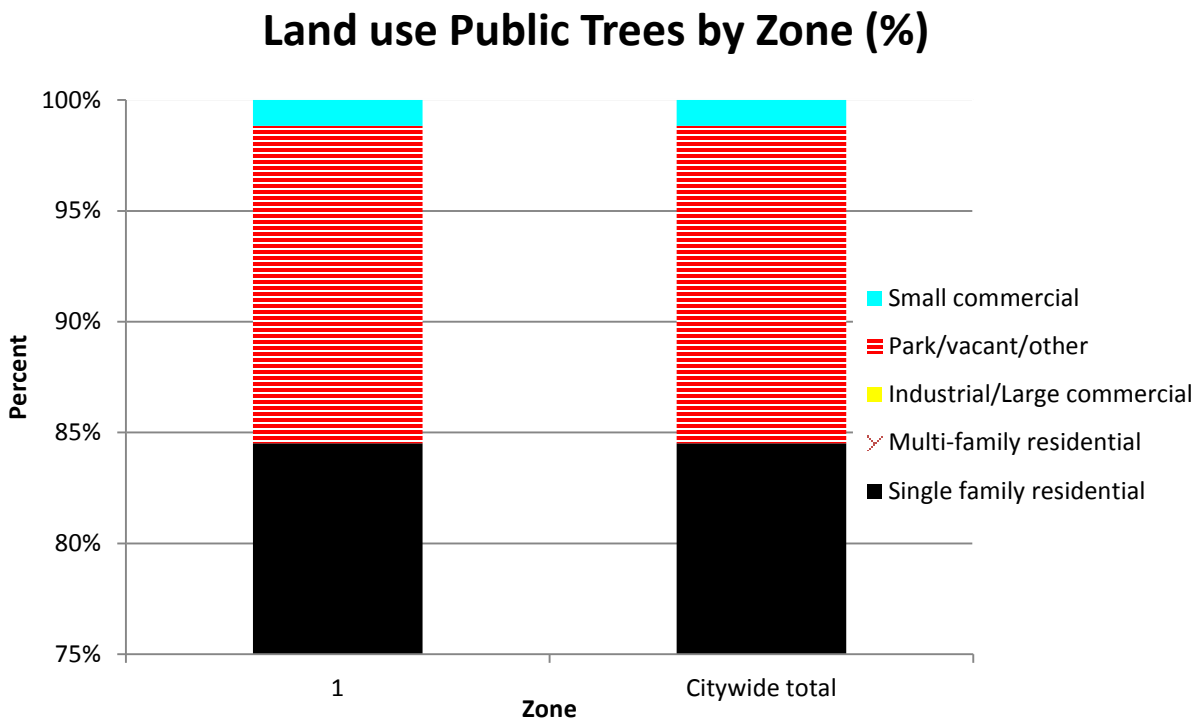

Figure 6: Land Use of city/park trees

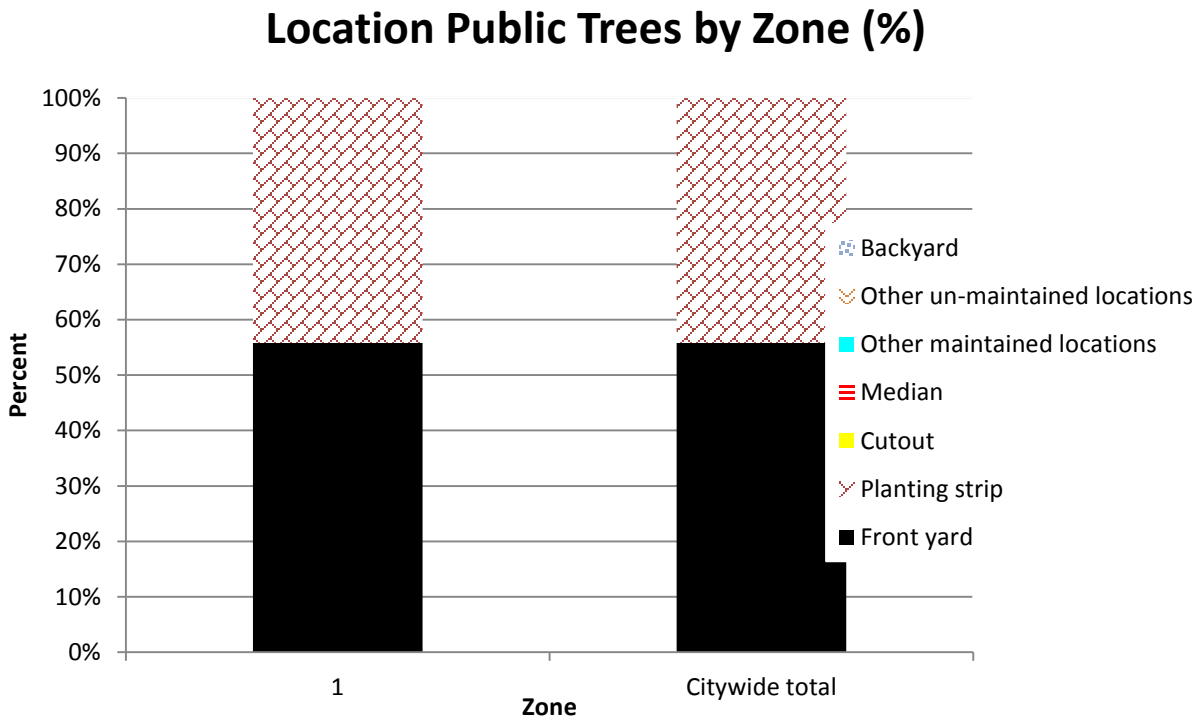

Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping

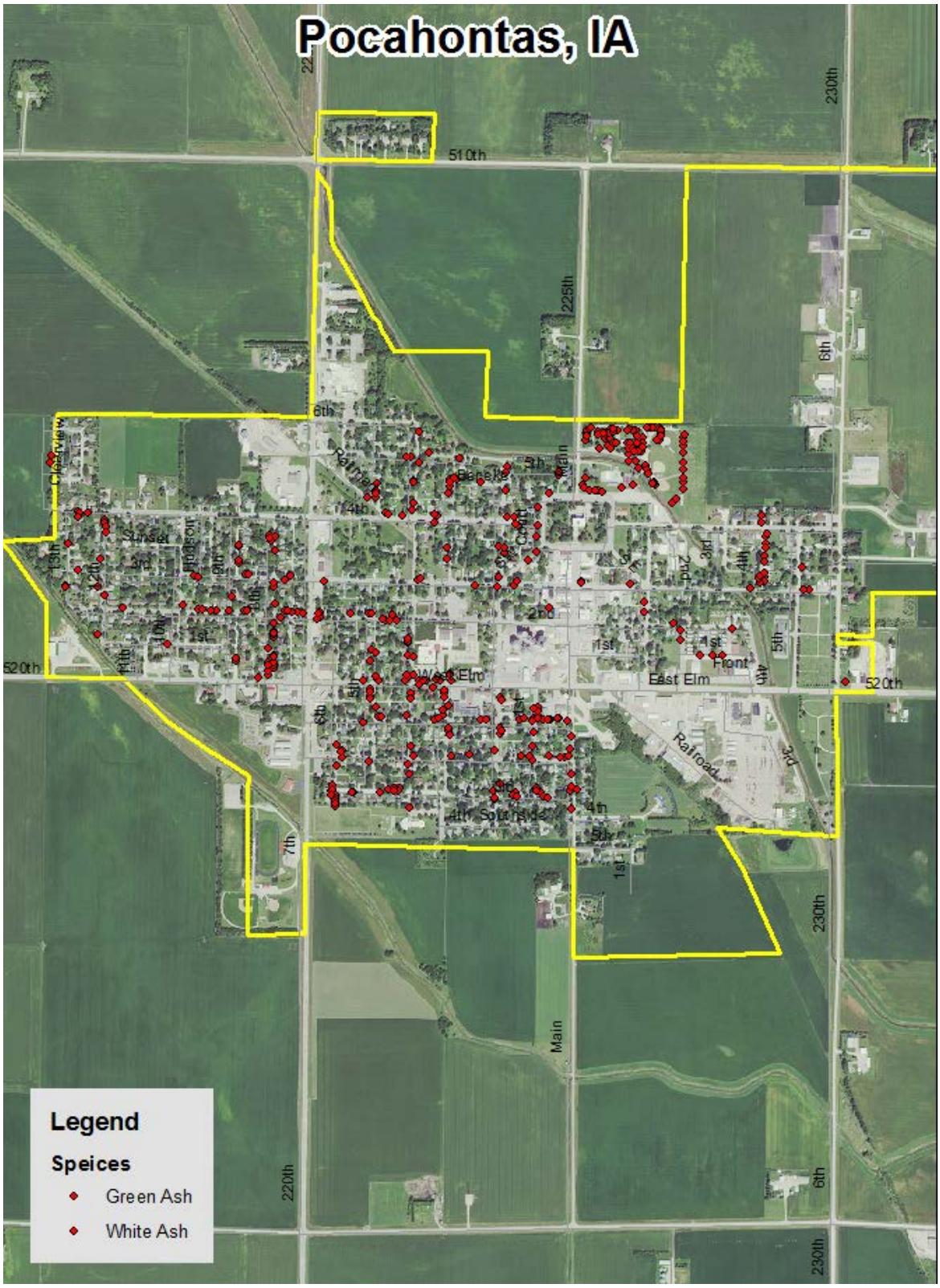

Figure 1: Location of Ash Trees

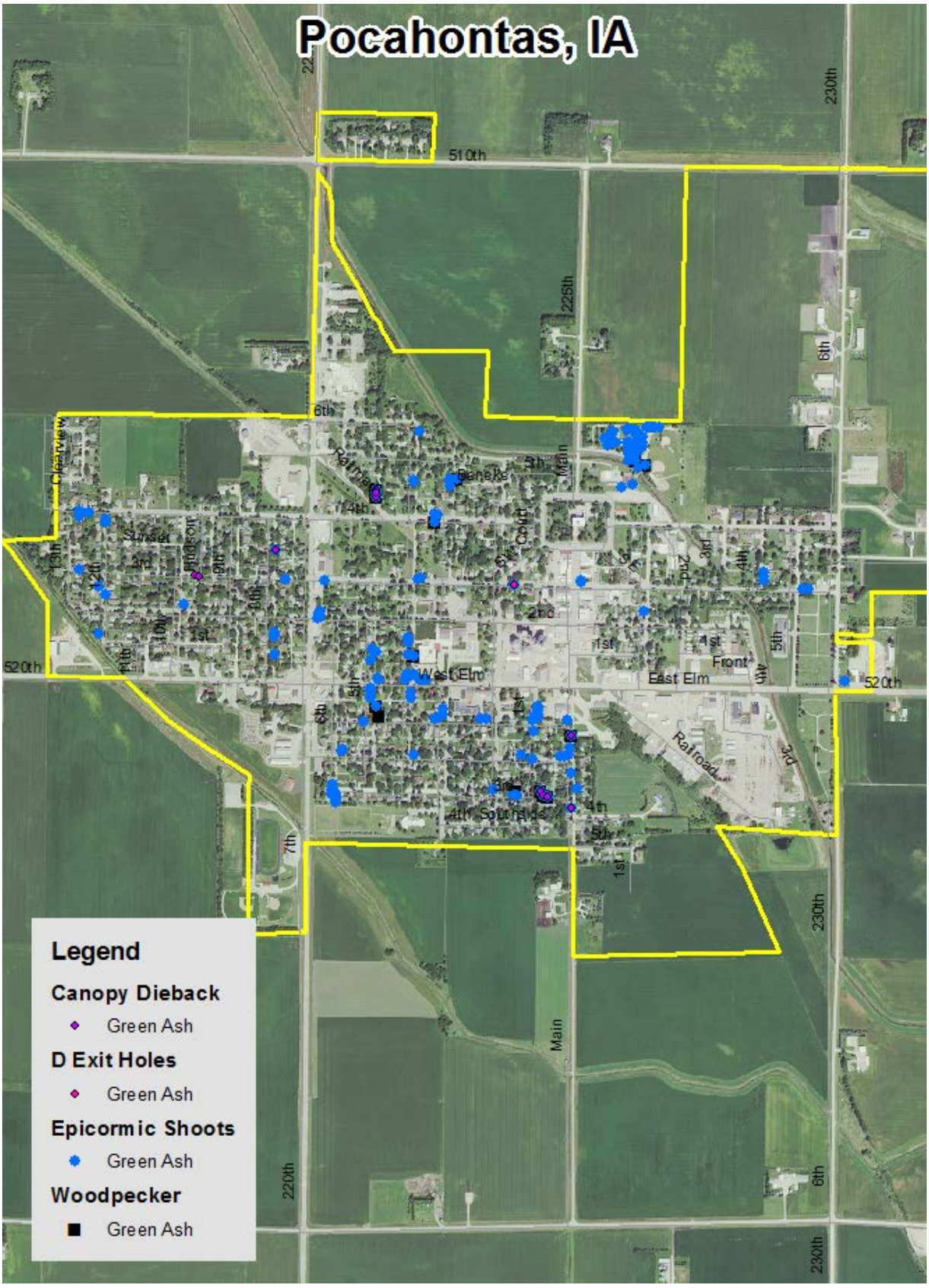

Figure 2: Location of EAB symptoms

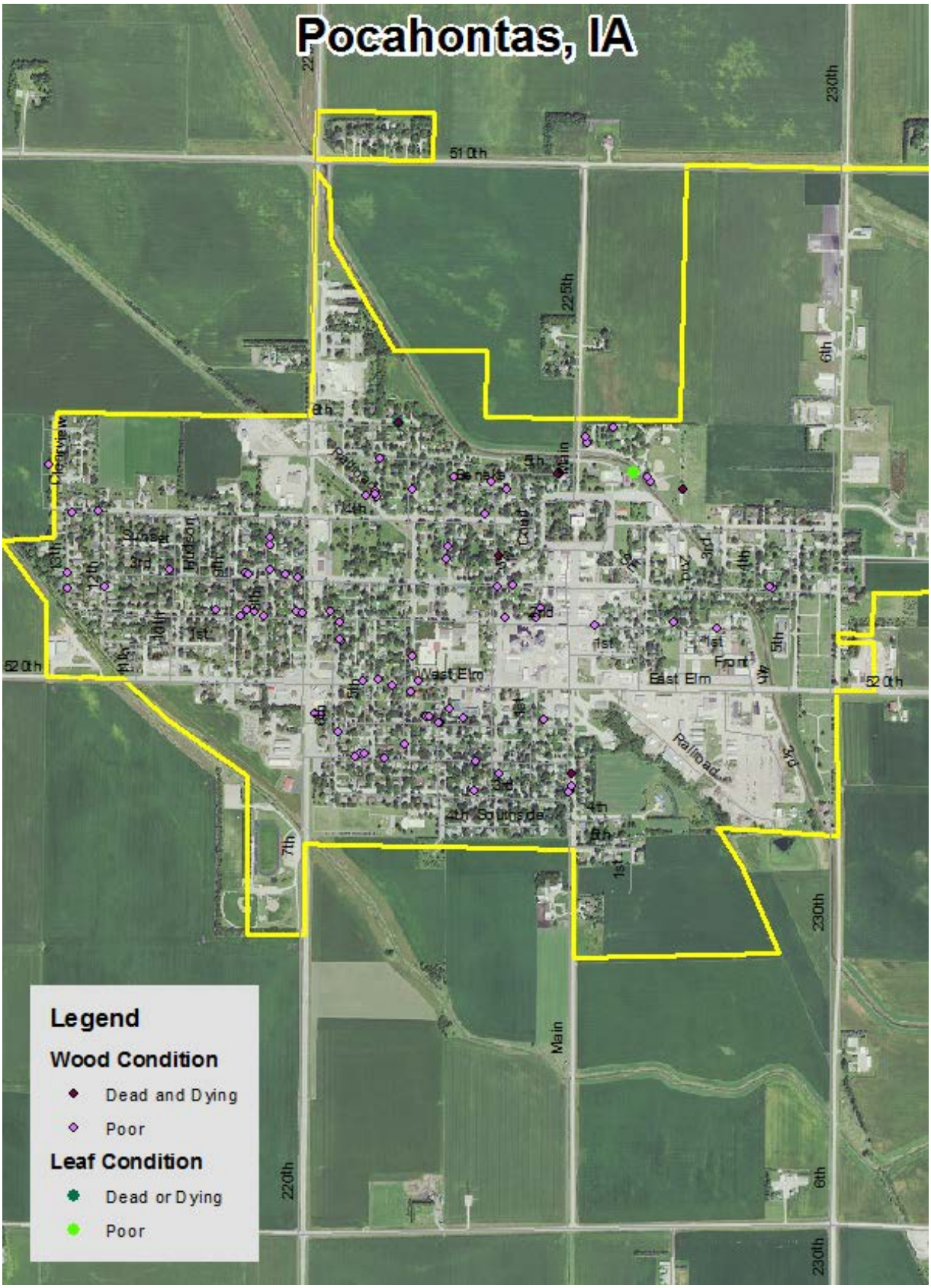

Figure 3: Location of Poor Condition Trees

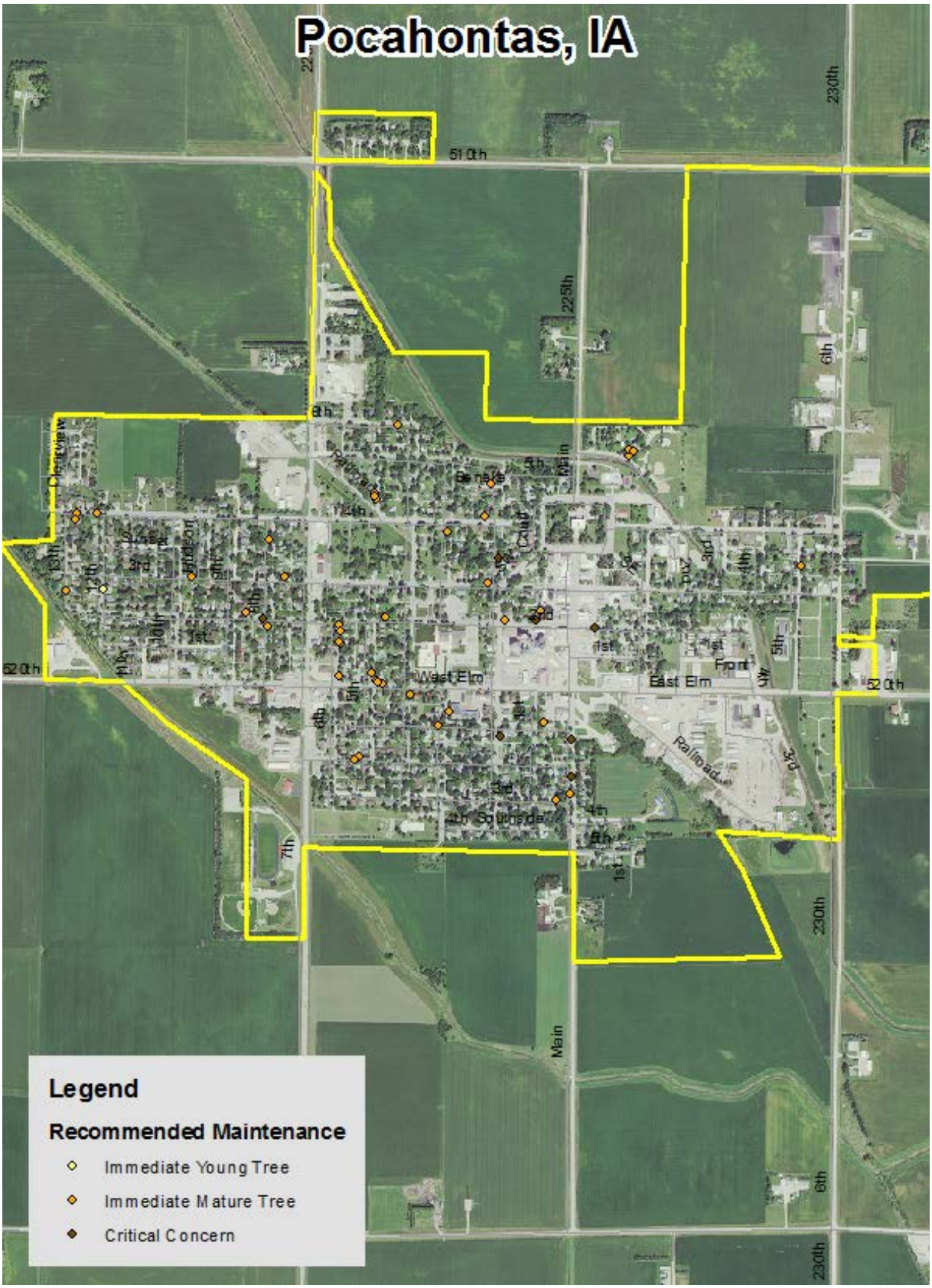

Figure 4: Location of Trees with Recommended Maintenance

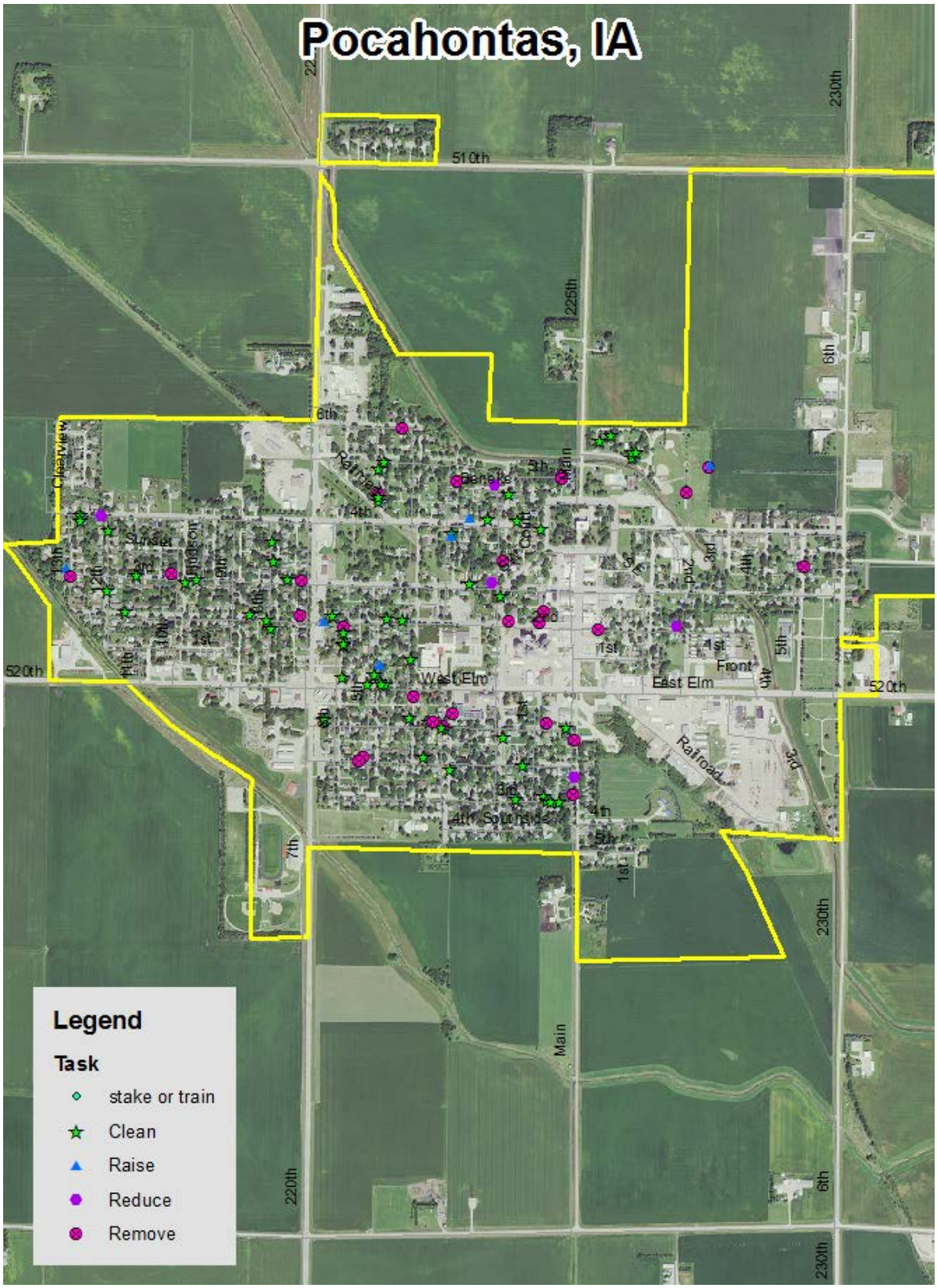

Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*

Appendix C: Pocahontas Tree Ordinances

CHAPTER 151

TREES AND OFFENSIVE VEGETATION

151.01 DEFINITIONS. For use in this chapter, the following words are defined:

1. "Offensive vegetation" includes all noxious weeds as defined in Chapter 317 of the Code of Iowa and all other weeds which are not otherwise included in the definition contained in Chapter 317 but which are commonly held to be offensive to sight or smell. The term includes all grasses not otherwise offensive which have reached a height of twelve (12) inches or more unless otherwise excluded by the following provisions: Offensive vegetation does not include shrubbery, trees, flowers and other vegetation designed for aesthetic landscaping purposes, nor does the term include garden vegetables customarily grown for home use in a garden, provided the garden is regularly maintained and otherwise free from the type of offensive vegetation that this chapter seeks to eliminate.

2. "Parking" 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 parking or street except in accordance with the following:

1. Alignment. All trees planted in any street shall be planted in the parking 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 parking 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 fifteen (15) feet above the surface of the street 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 GROWTH OF OFFENSIVE VEGETATION PROHIBITED. The dense growth of offensive vegetation within the City is prohibited. This section does not apply to any lot or parcel of ground where cultivated, agricultural commodities are planted and harvested within the City, provided the lot or parcel is regularly maintained and otherwise free from the type of offensive vegetation that this chapter seeks to eliminate.

151.06 DUTY TO REMOVE OFFENSIVE VEGETATION. The owners, agents or occupants of all lots and parcels of ground within the City shall cut or cause to have cut all offensive vegetation on their respective lots or parcels of ground. The provisions of this section also apply to all lands and lots abutting on any street or public way to that portion of the property that lies between the property line of the property and curb line, but only where curb and gutter have been installed. If the property owner fails to remove such offensive vegetation, 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.

151.07 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.

151.08 INSPECTION AND REMOVAL. The Council shall inspect or cause to be inspected any trees or shrubs in the City reported or suspected to be dead, diseased or damaged, and such trees and shrubs shall be subject to the following:

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 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 fourteen (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])

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.