Albia, IA
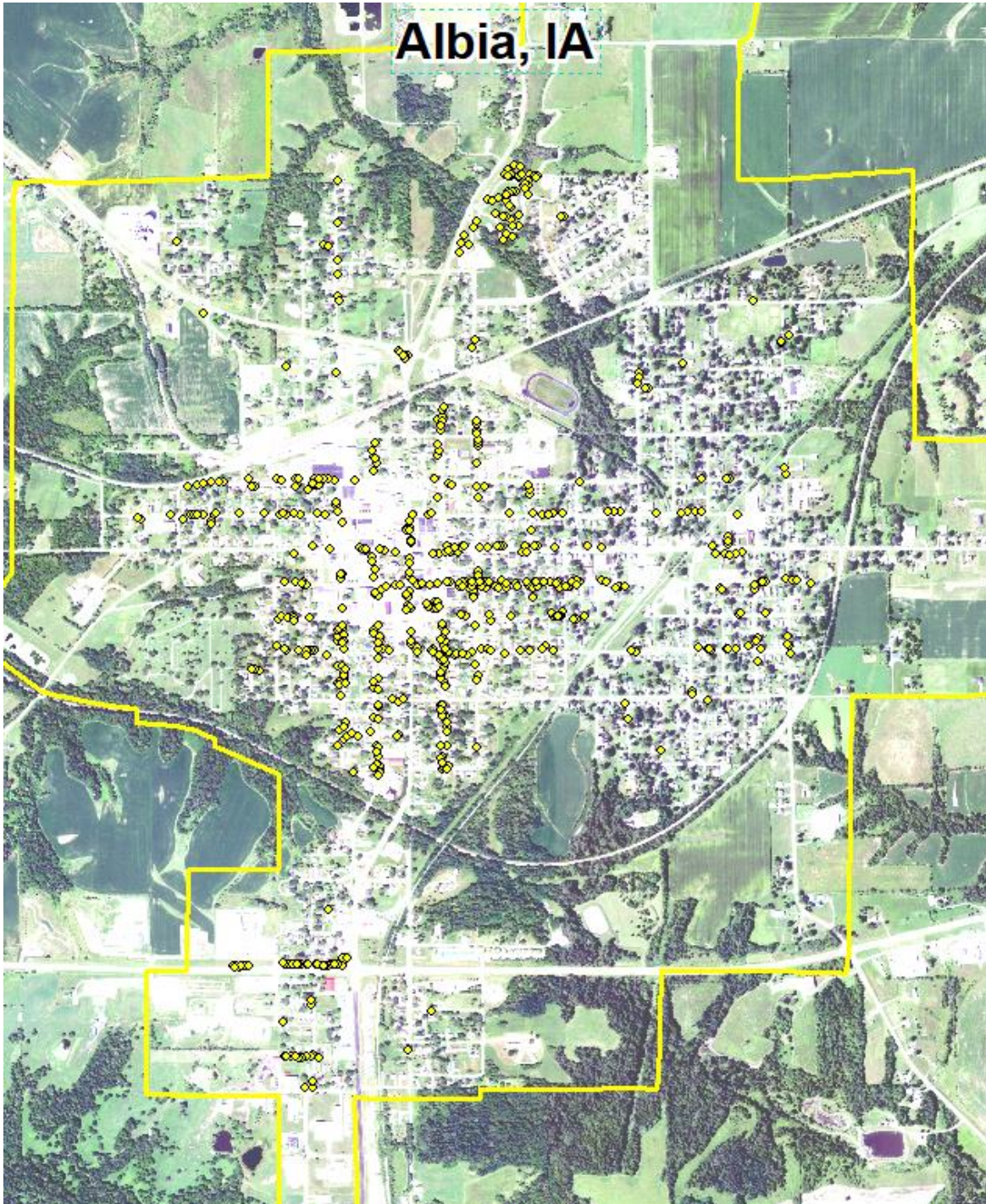

2023 Urban Forest Management Plan
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Executive Summary

Overview

This plan was developed to assist the City of Albia with managing its community trees, 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 has killed nearly all species of ash trees in Albia. The maples trees make up 27% of Albia's city owned trees and could be under threat if Asian long-horned beetle becomes established in the community. ALB has not been found in Iowa at this time. Planting more diversity will be very important for future urban forest resilience and overall health. 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 2021, 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 636 trees inventoried.

- Albia's trees provide $118,274 of benefits annually, an average of $186 a tree
- There are over 37 species of trees
- The top three genera are: Maple 37%, Pear/flowering 14%, and Apple 11%
- 53% of trees are in need of some type of management
- 48 trees are identified as critical concerns and recommended for immediate removal
- 54 trees are recommended for removal in the next 3 years
- Suitable sites for new plantings are nearly unlimited

Recommendations

The core recommendations are detailed in the Recommendations Section. Below are some key recommendations.

- Of the 121 trees needing removal, 48 trees are Critical Concern, 54 Immediate (1-3 years, and 19 Routine (up to five years) *City ownership of the trees recommended for removal should be verified prior to any removal*
- All trees should be improved with pruning on a routine schedule- one third of the city every other year, especially those less than 18" DBH
- Plant a diverse mix of trees that does not include: maple, ash, flowering pear, cottonwood, poplar, box elder, Siberian/Chinese elm, evergreen, willow or black walnut
- Check remaining ash trees with a visual survey yearly
- Request budget increase to implement the six-year work plan. The recommended budget to manage and improve the existing tree canopy is $179,125 total.
- Apply for grants to cover a portion of the $14,800 needed to plant replacement trees

Introduction

This plan was developed to assist Albia 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 recovery from Emerald Ash Borer (EAB), an invasive pest that kills native ash trees, it is time to prepare for the increased costs of tree removal or treatment and replacement planting. With proper planning and management of the current canopy in Albia, these costs can be extended over years and public safety issues from dead and dying ash trees mitigated.

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

Inventory

In 2021, 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 feet (DBH), 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 636 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. Albia's trees reduce energy related costs by approximately $30,382 annually (Appendix A, Table 1). These savings are both in Electricity (144.8 MWh) and in Natural Gas (19,791 Therms).

Annual Stormwater Benefits

Albia's trees intercept 1,687,174 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides $45,722 of benefits to the city.

Annual Air Quality Benefits

Air quality is a persistent public health issue in Iowa. The urban forest improves air quality by removing pollutants, lowering air temperature, and reducing energy consumption, which in turn reduces emissions from power plants, and emitting volatile organic matter (ozone). In Albia, it is estimated that trees remove 1,930 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 $5,446. (Appendix A, Table 3).

Annual Carbon Benefits

All plants store carbon. Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating carbon that has been released into the atmosphere. Sequestration refers to the process of capturing carbon dioxide gas from the atmosphere and depositing it in a reservoir over a period of time, in this case wood and plant tissue. Middle-aged trees (6-17: DBH) actually have the greatest sequestration capacity. Carbon storage refers to the long-term quantity stored in that reservoir. Albia's 636 trees sequester about 595,580 lbs. or 298 tons of carbon a year with an associated value of $4,467 (Appendix A, Table 5). In addition, the trees store 7,351,309 lbs. or 3,676 tons of carbon, with a yearly benefit of $55,135 (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. Albia receives $32,257 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, Albia's trees provide $118,274 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 636 trees in Albia provide approximately $186 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Albia has over 37 different tree species along city streets and parks (Appendix A, Figure 1). A community should strive to have less than 20% of any given genus; Individual species should not exceed 10%.

The top ten genera for Albia's streets and parks:

Genus	# trees	Percent of total trees
Maple (Acer)	234	37%
Flowering pear (Pyrus)	86	14%
Apple/crab (Malus)	68	11%
Ash (Fraxinus)	38	6%
Oak (Quercus)	32	5%
Elm (Ulmus)	27	4%
Hackberry (Celtis)	24	4%
Walnut (Juglans)	21	3%
Sycamore (Platanus)	16	3%
Linden/Basswood (Tilia)	15	2%

Age Class

Most of Albia's trees (49%) are mature and greater than 18" diameter at 4.5 feet above ground (DBH) (Appendix A, Figure 2). Albia's middle-aged trees (6-17" DBH) make up 28% of the street and park tree inventory. The youngest trees (<5" DBH) are only 5% of the entire list. 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. Albia's size curve is on the larger side, indicating a mature or overmature and larger than average tree size. Planting new trees and proper care of all trees, especially those less than 18" DBH, should be a top priority.

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 Albia indicate that 81% of the trees are in good or fair health, with 19% of the foliage in poor health, dead or dying health (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 66% of Albia's trees are in good or fair health for wood condition (appendix A, Figure 4 & Appendix B, Figure 3). Wood condition that is in poor health, dead or dying is about 34% of the population. Regular and proper pruning is the best tactic for future trees with good foliage and wood condition. Planting diverse, strong and long-lived native trees also minimizes many forest health concerns in the future.

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). The trees needing maintenance include 53% or 335 total

trees. You may also use the online database to "View my community's trees"
https://www.iowadnr.gov/Conservation/Forestry/Urban-Forestry

1. 48 trees were identified as Critical Concern for immediate removal and replacement-see hazardous trees below.

2. 301 trees (47%) do not need maintenance today but should be included in a routine 3-year schedule

3. 67 Immediate needs (deferring maintenance beyond one to three years would compromise health or longevity of tree) Plan and budget accordingly.
   ➢ 54 removal and replacement
   ➢ 8 cleaning
   ➢ 5 annual monitoring ("none")
   ➢ 0 crown raise
   ➢ 0 crown reduction

4. 522 routine needs (health or longevity of tree is not compromised by deferring maintenance for up to five years) Plan and budget accordingly.
   ➢ 19 removal and replacement
   ➢ 171 cleaning
   ➢ 35 crown raise
   ➢ 1 crown reduction
   ➢ 0 stake/train

Canopy Cover
The total canopy with both private and public trees is currently 477 acres or 23% of the total acres. The canopy cover on city owned properties included in the Albia inventory includes approximately 17 acres or less than 1% of the total acreage (Appendix A, Figure 4). The City's Canopy goal should be to increase canopy by 3%, in 30 years on all lands. To achieve this goal, it is estimated that 99 trees need to be planted annually on public and/or private lands.

Land Use and Location
The majority of Albia'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%
Industrial/Large commercial	18%
Park/vacant/other	15%
Multifamily residential	<1%
Small commercial	0%

Location	
Planting strip	76%
Other maintained locations	34%
Cutout (surrounded by pavement)	8%
Front yard	16%
Median	0

Comparison of 2015 and 2023 Results

A tree inventory was completed for Albia in 2015 by Copper Tree Consulting in cooperation with the Iowa DNR Forestry Bureau. Remarkable findings are listed below when comparing the 2015 and 2021 tree inventories.

❖ Total number of city owned trees has decreased by 104
❖ Ash trees are dead/dying
❖ Critical Concern trees increased by 16-fold
❖ Maple composition has increased by more than 11%
❖ Tree age class has dramatically increased
❖ Foliage health has decreased by 18%
❖ Wood condition has decreased by 33%
❖ Percentage of trees needing maintenance is unchanged
❖ Budget needs exploded from $5,000 to $29,854 annually

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.

High Risk Trees
Albia has 48 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 an additional 287 trees with these needs. *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 6 years will be to 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%. Planting 145 trees will be needed just to replace the trees identified for removal in this plan. 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. The suitable spaces for new plantings along the streets and parks is nearly unlimited throughout Albia. However, maintaining the same number of trees helps ensure continuation of the benefits of the existing forest in Albia.

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 (oak) or species (red oak) of trees. Current diversity recommendations advise that a genus (i.e. oak, maple) 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 (37%) (Appendix A, Figure 1). Maples should not be planted in parks or street trees for at least 15 years or until this percentage can be lowered to less than 20%. Also, flowering pear trees are not recommended, due to their invasive nature in our native forests and wild areas. Other species to avoid because that are public nuisances include: cottonwood, poplar, box elder, Siberian/Chinese elm, evergreen, willow or black walnut, as outlined. All trees planted must meet the restrictions in city ordinance, if applicable.

Continual Monitoring

Due to the threat of insects and diseases, it is important to check the health of all trees. It is recommended that any remaining 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.

Asian long-horned beetle (ALB) has not been found in Iowa but poses a serious threat to kill your maple trees if it is moved into your community. It could also harm industries such as maple syrup production, hardwood lumber processing, nurseries, and tourism. Since its discovery in 1996, ALB has been found in Illinois, Ohio, and 3 other eastern states. All states are considered at risk. Insects or eggs may be spread in firewood, logs, lumber, trimmings, and/or packing materials. The larvae feed inside the tree where they're out of sight. Watch for declining maple trees with dead, dying, or fallen branches and pencil to dime size holes. The presence of excessive sawdust-like material may be visible near the base of the tree. The mature insect may be easier to find at 1" to 1 ½" body length, shiny black with white dots. Antennae are 1 ½ to 2 ½ times the size of its body. Adult beetles emerge and are most active during summer. Find it. Report it. Save trees.

For more information about emerging insect and disease threats to Iowa's forests visit iowatreepests.com

Budget

Six Year Maintenance Plan
Recommended Budget Total **$179,125** over 6 years, **Average $29,854/year**

2024
> Removal: 24 Critical Concern trees, largest DBH first, $24,000
> Planting and Replacement: 29 trees to be planted in open locations, $2,900
> Young Tree Pruning, Watering, & Maintenance: $725

2025
> Removal: 24 remaining Critical Concern trees plus any new, $2,400
> Planting and Replacement: 29 trees to be planted in open locations, $2,900
> Young Tree Pruning, Watering, & Maintenance: $725
> Routine trimming to improve tree health and mitigate risk: Contract to trim 1/3 of the city trees, up to $12,875

2026
> Removal: 27 Immediate trees – plus any new Critical Concern trees, $27,000
> Planting and Replacement: 33 trees to be planted in open locations and locations from previous removals, $3,300
> Young Tree Pruning & Maintenance: $825
> Visual Survey for signs and symptoms of EAB

2027
> Removal: remaining 27 Immediate trees – plus any new Critical Concern trees, $27,000
> Planting and Replacement: 33 trees to be planted in open locations and locations from previous removals, $3,300
> Routine trimming to improve tree health and mitigate risk: Contract to trim 1/3 of the city trees, up to $12,875
> Young Tree Pruning & Maintenance: $825
> Visual Survey/continual monitoring

2028
> Removal: 10 Routine trees – plus any new Critical Concern trees, $10,000
> Planting and Replacement: 12 trees to be planted in open locations and locations from previous removals, $1,200
> Young Tree Pruning & Maintenance: $300

2029
> Removal: remaining 10 Routine trees – plus any new Critical Concern trees, $10,000
> Planting and Replacement: 12 trees to be planted in open locations and locations from previous removals, $1,200
> Young Tree Pruning & Maintenance: $300
> Routine trimming to improve tree health and mitigate risk: Contract to trim 1/3 of the city trees, up to $12,875
> Visual Survey/continual monitoring

Works Cited

Census Bureau. 2010. http://censtats.census.gov/data/IA/1601964290.pdf (April, 2013)

USDA Forest Service, et al. 2006. i-Tree Software Suite v1.0 User's Manual. Pp. 27-40.

McPherson EG, Simpson JR, Peper PJ, Gardner SL, Vargas KE, Ho J, Maco S, Xiao Q. 2005b. City of Charleston, South Carolina, municipal forest resource analysis. Internal Tech Rep. Davis, CA: U.S. Department of Agriculture, Center for Urban Forest Research. p. 57

Nowak, DJ and JF Dwyer. 2007. Understanding the benefits and costs of urban forest ecosystems. In: Kuser, J. (ed.) Urban and Community Forestry in the Northeast. New York: Springer. Pp. 25-46.

Peper, Paula J; McPherson, E Gregory; Simpson, James R; Vargas, Kelaine E; Xiao, Qingfu 2009. Lower Midwest community tree guide: benefits, costs, and strategic planting. Gen. Tech. Rep. PSW-GTR-219. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. p.115

Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Albia

Annual Energy Benefits of Public Trees

4/4/2022

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Silver maple	46.0	3,492	6,057.6	5,936	9,428	(N/A)	21.6	31.0	68.82
Apple	4.6	350	720.3	706	1,056	(N/A)	10.7	3.5	15.53
Callery pear	7.2	549	1,009.0	989	1,537	(N/A)	8.2	5.1	29.56
Norway maple	12.5	947	1,787.1	1,751	2,699	(N/A)	8.0	8.9	52.91
Pear	3.0	225	454.9	446	671	(N/A)	5.4	2.2	19.74
Ash	7.8	593	1,149.2	1,126	1,720	(N/A)	4.7	5.7	57.32
Siberian elm	9.5	725	1,257.2	1,232	1,957	(N/A)	3.9	6.4	78.27
Sugar maple	6.0	459	822.3	806	1,265	(N/A)	3.6	4.2	55.00
Black walnut	5.6	423	744.4	729	1,152	(N/A)	3.3	3.8	54.88
American sycamore	6.2	469	824.8	808	1,278	(N/A)	2.5	4.2	79.86
Eastern white pine	1.7	129	219.9	216	344	(N/A)	2.2	1.1	24.59
Eastern redbud	1.1	86	167.9	165	251	(N/A)	1.9	0.8	20.89
Red maple	1.7	133	236.8	232	365	(N/A)	1.9	1.2	30.38
Honeylocust	3.9	292	506.2	496	789	(N/A)	1.7	2.6	71.69
Northern hackberry	3.7	282	523.0	513	794	(N/A)	1.6	2.6	79.44
Littleleaf linden	1.1	84	156.9	154	238	(N/A)	1.6	0.8	23.78
Pin oak	3.1	236	408.2	400	636	(N/A)	1.6	2.1	63.58
Catalpa	2.0	154	278.5	273	427	(N/A)	1.4	1.4	47.49
Black maple	2.2	168	299.5	294	462	(N/A)	1.3	1.5	57.75
Northern pin oak	2.5	191	371.5	364	555	(N/A)	1.3	1.8	69.32
Bur oak	1.3	96	166.7	163	259	(N/A)	1.3	0.9	32.36
Green ash	2.2	168	296.5	291	458	(N/A)	1.1	1.5	65.45
Broadleaf Deciduous Small	0.2	17	31.0	30	47	(N/A)	0.9	0.2	7.83
American basswood	1.7	131	248.2	243	374	(N/A)	0.8	1.2	74.87
Northern red oak	0.8	64	106.4	104	168	(N/A)	0.6	0.6	42.10
Eastern red cedar	0.3	24	48.7	48	72	(N/A)	0.6	0.2	18.02
Norway spruce	0.5	35	58.9	58	93	(N/A)	0.5	0.3	30.93
Cherry plum	0.0	2	5.0	5	7	(N/A)	0.5	0.0	2.38
Broadleaf Deciduous Large	0.6	48	86.4	85	132	(N/A)	0.5	0.4	44.10
Willow	0.8	62	116.5	114	176	(N/A)	0.5	0.6	58.77
Eastern cottonwood	0.9	66	116.8	114	181	(N/A)	0.3	0.6	90.32
Swamp white oak	0.1	6	12.4	12	18	(N/A)	0.3	0.1	8.99
White mulberry	0.1	6	13.5	13	19	(N/A)	0.3	0.1	9.53
Amur maple	0.4	28	49.3	48	76	(N/A)	0.3	0.3	38.13
Elm	0.5	35	62.7	61	97	(N/A)	0.3	0.3	48.42
Broadleaf Deciduous Mediu	0.1	11	23.0	23	33	(N/A)	0.3	0.1	16.73
Northern catalpa	0.9	70	122.1	120	190	(N/A)	0.3	0.6	94.83
Southern magnolia	0.2	19	27.1	27	45	(N/A)	0.3	0.1	22.62
Conifer Evergreen Small	0.0	1	2.5	2	4	(N/A)	0.2	0.0	3.62
Blue spruce	0.1	10	15.2	15	25	(N/A)	0.2	0.1	24.51
Mulberry	0.2	14	24.7	24	38	(N/A)	0.2	0.1	38.13
Cottonwood	0.5	37	63.1	62	99	(N/A)	0.2	0.3	98.63
Spruce	0.0	0	0.7	1	1	(N/A)	0.2	0.0	0.93
Red pine	0.1	4	9.5	9	14	(N/A)	0.2	0.0	13.58
Austrian pine	0.1	10	15.2	15	25	(N/A)	0.2	0.1	24.51
Ginkgo	0.1	5	9.9	10	15	(N/A)	0.2	0.0	14.72
Rose-of-sharon	0.0	2	3.8	4	5	(N/A)	0.2	0.0	5.40
Ohio buckeye	0.3	24	47.4	46	71	(N/A)	0.2	0.2	70.84
Japanese maple	0.1	6	12.8	13	18	(N/A)	0.2	0.1	18.19
Total	144.8	10,987	19,791.0	19,395	30,382	(N/A)	100.0	100.0	47.92

Table 2: Annual Stormwater Benefits

Albia

Annual Stormwater Benefits of Public Trees

4/4/2022

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Silver maple	694,515	18,821	(N/A)	21.6	41.2	137.38
Apple	17,191	466	(N/A)	10.7	1.0	6.85
Callery pear	42,768	1,159	(N/A)	8.2	2.5	22.29
Norway maple	111,950	3,034	(N/A)	8.0	6.6	59.49
Pear	11,929	323	(N/A)	5.4	0.7	9.51
Ash	75,983	2,059	(N/A)	4.7	4.5	68.64
Siberian elm	118,171	3,202	(N/A)	3.9	7.0	128.10
Sugar maple	65,603	1,778	(N/A)	3.6	3.9	77.30
Black walnut	53,277	1,444	(N/A)	3.3	3.2	68.75
American sycamore	93,744	2,540	(N/A)	2.5	5.6	158.78
Eastern white pine	27,295	740	(N/A)	2.2	1.6	52.83
Eastern redbud	4,072	110	(N/A)	1.9	0.2	9.20
Red maple	13,857	376	(N/A)	1.9	0.8	31.29
Honeylocust	46,194	1,252	(N/A)	1.7	2.7	113.80
Northern hackberry	37,870	1,026	(N/A)	1.6	2.2	102.63
Littleleaf linden	7,656	207	(N/A)	1.6	0.5	20.75
Pin oak	34,704	940	(N/A)	1.6	2.1	94.05
Catalpa	24,967	677	(N/A)	1.4	1.5	75.18
Black maple	20,410	553	(N/A)	1.3	1.2	69.14
Northern pin oak	28,830	781	(N/A)	1.3	1.7	97.66
Bur oak	13,026	353	(N/A)	1.3	0.8	44.12
Green ash	26,332	714	(N/A)	1.1	1.6	101.94
Broadleaf Deciduous Small	765	21	(N/A)	0.9	0.0	3.46
American basswood	24,216	656	(N/A)	0.8	1.4	131.25
Northern red oak	6,610	179	(N/A)	0.6	0.4	44.78
Eastern red cedar	4,588	124	(N/A)	0.6	0.3	31.08
Norway spruce	9,112	247	(N/A)	0.5	0.5	82.32
Cherry plum	84	2	(N/A)	0.5	0.0	0.75
Broadleaf Deciduous Large	8,455	229	(N/A)	0.5	0.5	76.37
Willow	7,653	207	(N/A)	0.5	0.5	69.13
Eastern cottonwood	12,729	345	(N/A)	0.3	0.8	172.48
Swamp white oak	325	9	(N/A)	0.3	0.0	4.41
White mulberry	272	7	(N/A)	0.3	0.0	3.68
Amur maple	1,333	36	(N/A)	0.3	0.1	18.06
Elm	7,411	201	(N/A)	0.3	0.4	100.41
Broadleaf Deciduous Medium	749	20	(N/A)	0.3	0.0	10.14
Northern catalpa	14,478	392	(N/A)	0.3	0.9	196.17
Southern magnolia	1,832	50	(N/A)	0.3	0.1	24.82
Conifer Evergreen Small	183	5	(N/A)	0.2	0.0	4.97
Blue spruce	1,544	42	(N/A)	0.2	0.1	41.85
Mulberry	667	18	(N/A)	0.2	0.0	18.06
Cottonwood	7,239	196	(N/A)	0.2	0.4	196.17
Spruce	49	1	(N/A)	0.2	0.0	1.32
Red pine	596	16	(N/A)	0.2	0.0	16.14
Austrian pine	1,544	42	(N/A)	0.2	0.1	41.85
Ginkgo	301	8	(N/A)	0.2	0.0	8.17
Rose-of-sharon	69	2	(N/A)	0.2	0.0	1.86
Ohio buckeye	3,764	102	(N/A)	0.2	0.2	102.01
Japanese maple	264	7	(N/A)	0.2	0.0	7.17
Citywide total	1,687,174	45,722	(N/A)	100.0	100.0	72.12

Table 3: Annual Air Quality Benefits

Annual Air Quality Benefits of Public Trees

4/4/2022

Species	Deposition (lb) O₃	NO₂	PM₁₀	SO₂	Total Depos. ($)	Avoided (lb) NO₂	PM₁₀	VOC	SO₂	Total Avoided ($)	BVOC Emissions (lb)	BVOC Emissions ($)	Total (lb)	Total ($) Standard Error	% of Total Trees	Avg. $/tree
Silver maple	131.0	22.2	63.4	5.8	704	217.0	31.8	30.3	208.1	1,357	-71.5	-268	638.1	1,793 (N/A)	21.6	13.09
Apple	4.1	0.7	2.1	0.2	22	22.8	3.3	3.1	20.9	140	0.0	0	57.1	162 (N/A)	10.7	2.39
Callery pear	5.8	1.0	3.3	0.3	33	34.8	5.0	4.8	32.8	216	-1.6	-6	86.1	243 (N/A)	8.2	4.66
Norway maple	22.3	3.9	11.0	1.0	121	60.4	8.7	8.3	56.6	374	-5.3	-20	167.0	475 (N/A)	8.0	9.32
Pear	3.3	0.5	1.6	0.2	18	14.6	2.1	2.0	13.5	90	0.0	0	37.7	108 (N/A)	5.4	3.16
Ash	15.7	2.7	7.7	0.7	85	38.1	5.5	5.2	35.5	236	-3.7	-14	107.4	307 (N/A)	4.7	10.22
Siberian elm	23.2	4.0	10.9	1.0	124	45.1	6.6	6.3	43.3	282	0.0	0	140.4	406 (N/A)	3.9	16.25
Sugar maple	8.5	1.4	4.3	0.4	46	28.8	4.2	4.0	27.4	180	-6.7	-25	72.3	201 (N/A)	3.6	8.72
Black walnut	5.8	0.9	2.9	0.3	31	26.4	3.9	3.7	25.3	165	0.0	0	69.2	197 (N/A)	3.3	9.36
American sycamore	17.2	2.8	7.6	0.8	90	29.3	4.3	4.1	28.0	183	0.0	0	94.1	273 (N/A)	2.5	17.07
Eastern white pine	3.1	0.6	2.6	0.4	20	8.0	1.2	1.1	7.7	50	-11.5	-43	13.1	27 (N/A)	2.2	1.94
Eastern redbud	1.1	0.2	0.5	0.0	6	5.5	0.8	0.8	5.1	34	0.0	0	14.0	40 (N/A)	1.9	3.32
Red maple	3.1	0.5	1.5	0.1	17	8.3	1.2	1.2	7.9	52	-1.1	-4	22.8	65 (N/A)	1.9	5.38
Honeylocust	9.2	1.5	4.1	0.4	48	18.2	2.7	2.5	17.4	114	-7.2	-27	48.8	135 (N/A)	1.7	12.26
Northern hackberry	6.6	1.1	3.3	0.3	36	17.9	2.6	2.5	16.8	111	0.0	0	51.1	147 (N/A)	1.6	14.70
Littleleaf linden	0.9	0.2	0.5	0.0	5	5.3	0.8	0.7	5.0	33	-0.5	-2	13.0	36 (N/A)	1.6	3.64
Pin oak	6.3	1.1	3.2	0.3	34	14.7	2.1	2.0	14.1	92	-11.7	-44	32.1	82 (N/A)	1.6	8.22
Catalpa	4.3	0.7	1.9	0.2	22	9.7	1.4	1.3	9.2	61	0.0	0	28.8	83 (N/A)	1.4	9.21
Black maple	5.1	0.9	2.4	0.2	27	10.5	1.5	1.5	10.1	66	-1.7	-6	30.5	87 (N/A)	1.3	10.84
Northern pin oak	6.5	1.1	3.1	0.3	35	12.3	1.8	1.7	11.4	76	-1.5	-6	36.7	105 (N/A)	1.3	13.15
Bur oak	2.0	0.3	0.9	0.1	11	6.0	0.9	0.8	5.7	37	0.0	0	16.7	48 (N/A)	1.3	5.99
Green ash	3.5	0.6	1.6	0.2	19	10.5	1.5	1.5	10.0	65	0.0	0	29.3	84 (N/A)	1.1	12.00
Broadleaf Deciduous Small	0.2	0.0	0.1	0.0	1	1.1	0.2	0.1	1.0	7	0.0	0	2.7	8 (N/A)	0.9	1.28
American basswood	3.8	0.6	1.8	0.2	20	8.4	1.2	1.2	7.8	52	-3.1	-12	21.8	60 (N/A)	0.8	12.07
Northern red oak	1.3	0.2	0.6	0.1	7	3.9	0.6	0.6	3.8	25	-1.8	-7	9.3	25 (N/A)	0.6	6.25
Eastern red cedar	0.8	0.2	0.7	0.1	5	1.6	0.2	0.2	1.5	10	-2.5	-9	2.7	6 (N/A)	0.6	1.40
Norway spruce	1.1	0.2	0.9	0.1	7	2.2	0.3	0.3	2.1	14	-4.8	-18	2.4	3 (N/A)	0.5	0.90
Cherry plum	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)	0.5	0.31
Broadleaf Deciduous Large	1.2	0.2	0.6	0.1	6	3.0	0.4	0.4	2.8	19	0.0	0	8.7	25 (N/A)	0.5	8.34
Willow	1.6	0.3	0.8	0.1	8	4.0	0.6	0.5	3.7	25	-0.4	-1	11.1	32 (N/A)	0.5	10.55
Eastern cottonwood	2.4	0.4	1.0	0.1	12	4.1	0.6	0.6	4.0	26	0.0	0	13.2	38 (N/A)	0.3	19.13
Swamp white oak	0.0	0.0	0.0	0.0	0	0.4	0.1	0.1	0.3	2	0.0	0	0.9	2 (N/A)	0.3	1.21
White mulberry	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)	0.3	1.33
Amur maple	0.4	0.1	0.2	0.0	2	1.7	0.3	0.2	1.7	11	0.0	0	4.6	13 (N/A)	0.3	6.56
Elm	1.2	0.2	0.5	0.1	6	2.2	0.3	0.3	2.1	14	0.0	0	6.9	20 (N/A)	0.3	9.95
Broadleaf Deciduous Medium	0.1	0.0	0.0	0.0	0	0.7	0.1	0.1	0.7	4	0.0	0	1.7	5 (N/A)	0.3	2.34
Northern catalpa	2.7	0.4	1.2	0.1	14	4.4	0.6	0.6	4.2	27	0.0	0	14.3	42 (N/A)	0.3	20.79
Southern magnolia	0.1	0.0	0.1	0.0	1	1.1	0.2	0.2	1.1	7	-0.5	-2	2.3	6 (N/A)	0.3	2.98
Conifer Evergreen Small	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	0	-0.1	0	0.1	0 (N/A)	0.2	0.20
Blue 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)	0.2	2.89
Mulberry	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
Cottonwood	1.6	0.3	0.7	0.1	8	2.3	0.3	0.3	2.2	14	0.0	0	7.7	23 (N/A)	0.2	22.55
Spruce	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	0.05
Red pine	0.1	0.0	0.1	0.0	0	0.3	0.0	0.0	0.3	2	-0.2	-1	0.6	1 (N/A)	0.2	1.48
Austrian pine	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)	0.2	2.89
Ginkgo	0.0	0.0	0.0	0.0	0	0.3	0.0	0.0	0.3	2	0.0	0	0.8	2 (N/A)	0.2	2.12
Rose-of-sharon	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
Ohio buckeye	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
Japanese maple	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)	0.2	2.55
Citywide total	308.8	52.3	150.9	14.2	1,663	690.5	100.6	95.9	655.8	4,302	-138.7	-520	1,930.1	5,446 (N/A)	100.0	8.59

Table 4: Annual Carbon Stored

Albia

Stored CO2 Benefits of Public Trees

4/4/2022

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Silver maple	3,350,859	25,131	(N/A)	21.6	45.6	183.44
Apple	70,352	528	(N/A)	10.7	1.0	7.76
Callery pear	100,756	756	(N/A)	8.2	1.4	14.53
Norway maple	367,989	2,760	(N/A)	8.0	5.0	54.12
Pear	53,622	402	(N/A)	5.4	0.7	11.83
Ash	257,554	1,932	(N/A)	4.7	3.5	64.39
Siberian elm	569,500	4,271	(N/A)	3.9	7.7	170.85
Sugar maple	244,385	1,833	(N/A)	3.6	3.3	79.69
Black walnut	188,818	1,416	(N/A)	3.3	2.6	67.43
American sycamore	596,044	4,470	(N/A)	2.5	8.1	279.40
Eastern white pine	26,678	200	(N/A)	2.2	0.4	14.29
Eastern redbud	16,894	127	(N/A)	1.9	0.2	10.56
Red maple	34,655	260	(N/A)	1.9	0.5	21.66
Honeylocust	118,187	886	(N/A)	1.7	1.6	80.58
Northern hackberry	104,300	782	(N/A)	1.6	1.4	78.22
Littleleaf linden	21,568	162	(N/A)	1.6	0.3	16.18
Pin oak	170,668	1,280	(N/A)	1.6	2.3	128.00
Catalpa	147,833	1,109	(N/A)	1.4	2.0	123.19
Black maple	54,920	412	(N/A)	1.3	0.7	51.49
Northern pin oak	107,906	809	(N/A)	1.3	1.5	101.16
Bur oak	70,737	531	(N/A)	1.3	1.0	66.32
Green ash	115,404	866	(N/A)	1.1	1.6	123.65
Broadleaf Deciduous	3,270	25	(N/A)	0.9	0.0	4.09
American basswood	145,629	1,092	(N/A)	0.8	2.0	218.44
Northern red oak	26,024	195	(N/A)	0.6	0.4	48.79
Eastern red cedar	2,758	21	(N/A)	0.6	0.0	5.17
Norway spruce	12,003	90	(N/A)	0.5	0.2	30.01
Cherry plum	205	2	(N/A)	0.5	0.0	0.51
Broadleaf Deciduous	41,328	310	(N/A)	0.5	0.6	103.32
Willow	25,850	194	(N/A)	0.5	0.4	64.62
Eastern cottonwood	81,925	614	(N/A)	0.3	1.1	307.22
Swamp white oak	437	3	(N/A)	0.3	0.0	1.64
White mulberry	922	7	(N/A)	0.3	0.0	3.46
Amur maple	6,074	46	(N/A)	0.3	0.1	22.78
Elm	39,444	296	(N/A)	0.3	0.5	147.91
Broadleaf Deciduous	1,319	10	(N/A)	0.3	0.0	4.95
Northern catalpa	95,241	714	(N/A)	0.3	1.3	357.15
Southern magnolia	1,854	14	(N/A)	0.3	0.0	6.95
Conifer Evergreen Sn	43	0	(N/A)	0.2	0.0	0.32
Blue spruce	1,118	8	(N/A)	0.2	0.0	8.39
Mulberry	3,037	23	(N/A)	0.2	0.0	22.78
Cottonwood	55,982	420	(N/A)	0.2	0.8	419.86
Spruce	2	0	(N/A)	0.2	0.0	0.02
Red pine	257	2	(N/A)	0.2	0.0	1.93
Austrian pine	1,118	8	(N/A)	0.2	0.0	8.39
Ginkgo	474	4	(N/A)	0.2	0.0	3.56
Rose-of-sharon	178	1	(N/A)	0.2	0.0	1.33
Ohio buckeye	14,280	107	(N/A)	0.2	0.2	107.10
Japanese maple	908	7	(N/A)	0.2	0.0	6.81
Citywide total	7,351,309	55,135	(N/A)	100.0	100.0	86.96

Table 5: Annual Carbon Sequestered

Albia

Annual CO₂ Benefits of Public Trees

4/4/2022

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
Silver maple	219,657	1,647	-16,086	-540	-125	77,162	579	280,193	2,101	(N/A)	21.6	47.0	15.34
Apple	7,405	56	-338	-69	-3	7,735	58	14,732	110	(N/A)	10.7	2.5	1.62
Callery pear	13,291	100	-487	-70	-4	12,122	91	24,857	186	(N/A)	8.2	4.2	3.59
Norway maple	16,850	126	-1,766	-131	-14	20,934	157	35,887	269	(N/A)	8.0	6.0	5.28
Pear	4,547	34	-257	-43	-2	4,981	37	9,228	69	(N/A)	5.4	1.5	2.04
Ash	9,164	69	-1,236	-87	-10	13,115	98	20,956	157	(N/A)	4.7	3.5	5.24
Siberian elm	18,600	139	-2,734	-106	-21	16,018	120	31,777	238	(N/A)	3.9	5.3	9.53
Sugar maple	13,266	99	-1,173	-65	-9	10,145	76	22,173	166	(N/A)	3.6	3.7	7.23
Black walnut	12,879	97	-906	-55	-7	9,348	70	21,266	159	(N/A)	3.3	3.6	7.60
American sycamore	10,011	75	-2,861	-73	-22	10,375	78	17,451	131	(N/A)	2.5	2.9	8.18
Eastern white pine	1,860	14	-128	-30	-1	2,844	21	4,546	34	(N/A)	2.2	0.8	2.44
Eastern redbud	1,695	13	-81	-15	-1	1,903	14	3,503	26	(N/A)	1.9	0.6	2.19
Red maple	4,279	32	-167	-17	-1	2,930	22	7,026	53	(N/A)	1.9	1.2	4.39
Honeylocust	5,781	43	-567	-30	-4	6,464	48	11,647	87	(N/A)	1.7	2.0	7.94
Northern hackberry	4,779	36	-501	-36	-4	6,229	47	10,471	79	(N/A)	1.6	1.8	7.85
Littleleaf linden	3,176	24	-104	-14	-1	1,859	14	4,917	37	(N/A)	1.6	0.8	3.69
Pin oak	8,858	66	-819	-33	-6	5,211	39	13,216	99	(N/A)	1.6	2.2	9.91
Catalpa	3,581	27	-710	-24	-6	3,414	26	6,261	47	(N/A)	1.4	1.1	5.22
Black maple	3,736	28	-264	-20	-2	3,723	28	7,176	54	(N/A)	1.3	1.2	6.73
Northern pin oak	470	4	-518	-33	-4	4,210	32	4,129	31	(N/A)	1.3	0.7	3.87
Bur oak	2,224	17	-340	-15	-3	2,111	16	3,980	30	(N/A)	1.3	0.7	3.73
Green ash	5,041	38	-554	-23	-4	3,703	28	8,167	61	(N/A)	1.1	1.4	8.75
Broadleaf Deciduous Smal	340	3	-16	-3	0	368	3	689	5	(N/A)	0.9	0.1	0.86
American basswood	7,593	57	-699	-21	-5	2,898	22	9,771	73	(N/A)	0.8	1.6	14.66
Northern red oak	844	6	-125	-9	-1	1,418	11	2,127	16	(N/A)	0.6	0.4	3.99
Eastern red cedar	165	1	-13	-6	0	538	4	684	5	(N/A)	0.6	0.1	1.28
Norway spruce	303	2	-58	-10	-1	774	6	1,009	8	(N/A)	0.5	0.2	2.52
Cherry plum	55	0	-1	-1	0	48	0	102	1	(N/A)	0.5	0.0	0.25
Broadleaf Deciduous Large	1,330	10	-198	-7	-2	1,052	8	2,176	16	(N/A)	0.5	0.4	5.44
Willow	1,226	9	-124	-8	-1	1,374	10	2,467	19	(N/A)	0.5	0.4	6.17
Eastern cottonwood	1,438	11	-393	-10	-3	1,463	11	2,498	19	(N/A)	0.3	0.4	9.37
Swamp white oak	191	1	-3	-1	0	129	1	316	2	(N/A)	0.3	0.1	1.18
White mulberry	123	1	-4	-1	0	130	1	246	2	(N/A)	0.3	0.0	0.92
Amur maple	535	4	-29	-4	0	617	5	1,119	8	(N/A)	0.3	0.2	4.20
Elm	986	7	-189	-6	-1	783	6	1,574	12	(N/A)	0.3	0.3	5.90
Broadleaf Deciduous Medi	320	2	-7	-2	0	240	2	551	4	(N/A)	0.3	0.1	2.07
Northern catalpa	1,391	10	-457	-11	-4	1,547	12	2,470	19	(N/A)	0.3	0.4	9.26
Southern magnolia	144	1	-9	-2	0	414	3	547	4	(N/A)	0.3	0.1	2.05
Conifer Evergreen Small	13	0	0	-1	0	26	0	39	0	(N/A)	0.2	0.0	0.29
Blue spruce	91	1	-5	-2	0	213	2	296	2	(N/A)	0.2	0.0	2.22
Mulberry	268	2	-15	-2	0	308	2	560	4	(N/A)	0.2	0.1	4.20
Cottonwood	479	4	-269	-6	-2	813	6	1,017	8	(N/A)	0.2	0.2	7.63
Spruce	4	0	0	0	0	6	0	9	0	(N/A)	0.2	0.0	0.07
Red pine	53	0	-1	-1	0	94	1	145	1	(N/A)	0.2	0.0	1.08
Austrian pine	91	1	-5	-2	0	213	2	296	2	(N/A)	0.2	0.0	2.22
Ginkgo	58	0	-2	-1	0	111	1	165	1	(N/A)	0.2	0.0	1.24
Rose-of-sharon	38	0	-1	-1	0	37	0	74	1	(N/A)	0.2	0.0	0.55
Ohio buckeye	370	3	-69	-4	-1	539	4	837	6	(N/A)	0.2	0.1	6.27
Japanese maple	114	1	-4	-1	0	124	1	232	2	(N/A)	0.2	0.0	1.74
Citywide total	389,713	2,923	-35,295	-1,651	-277	242,813	1,821	595,580	4,467	(N/A)	100.0	100.0	7.05

Table 6: Annual Social and Aesthetic Benefits

Albia

Annual Aesthetic/Other Benefits of Public Trees

4/4/2022

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Silver maple	16,013	(N/A)	21.6	49.6	116.88
Apple	420	(N/A)	10.7	1.3	6.17
Callery pear	1,453	(N/A)	8.2	4.5	27.93
Norway maple	1,632	(N/A)	8.0	5.1	31.99
Pear	261	(N/A)	5.4	0.8	7.68
Ash	870	(N/A)	4.7	2.7	28.98
Siberian elm	1,189	(N/A)	3.9	3.7	47.54
Sugar maple	1,404	(N/A)	3.6	4.4	61.02
Black walnut	1,129	(N/A)	3.3	3.5	53.77
American sycamore	674	(N/A)	2.5	2.1	42.14
Eastern white pine	490	(N/A)	2.2	1.5	35.02
Eastern redbud	96	(N/A)	1.9	0.3	8.01
Red maple	556	(N/A)	1.9	1.7	46.33
Honeylocust	1,362	(N/A)	1.7	4.2	123.78
Northern hackberry	614	(N/A)	1.6	1.9	61.38
Littleleaf linden	382	(N/A)	1.6	1.2	38.16
Pin oak	730	(N/A)	1.6	2.3	73.03
Catalpa	317	(N/A)	1.4	1.0	35.25
Black maple	459	(N/A)	1.3	1.4	57.38
Northern pin oak	43	(N/A)	1.3	0.1	5.38
Bur oak	233	(N/A)	1.3	0.7	29.18
Green ash	399	(N/A)	1.1	1.2	56.95
Broadleaf Deciduous Small	18	(N/A)	0.9	0.1	2.95
American basswood	493	(N/A)	0.8	1.5	98.69
Northern red oak	72	(N/A)	0.6	0.2	18.06
Eastern red cedar	70	(N/A)	0.6	0.2	17.51
Norway spruce	79	(N/A)	0.5	0.2	26.47
Cherry plum	2	(N/A)	0.5	0.0	0.71
Broadleaf Deciduous Large	115	(N/A)	0.5	0.4	38.48
Willow	114	(N/A)	0.5	0.4	37.89
Eastern cottonwood	95	(N/A)	0.3	0.3	47.59
Swamp white oak	26	(N/A)	0.3	0.1	12.89
White mulberry	6	(N/A)	0.3	0.0	3.22
Amur maple	31	(N/A)	0.3	0.1	15.48
Elm	73	(N/A)	0.3	0.2	36.54
Broadleaf Deciduous Medium	39	(N/A)	0.3	0.1	19.55
Northern catalpa	87	(N/A)	0.3	0.3	43.45
Southern magnolia	35	(N/A)	0.3	0.1	17.49
Conifer Evergreen Small	13	(N/A)	0.2	0.0	13.37
Blue spruce	25	(N/A)	0.2	0.1	25.23
Mulberry	15	(N/A)	0.2	0.0	15.48
Cottonwood	29	(N/A)	0.2	0.1	28.57
Spruce	6	(N/A)	0.2	0.0	5.76
Red pine	15	(N/A)	0.2	0.0	15.42
Austrian pine	25	(N/A)	0.2	0.1	25.23
Ginkgo	7	(N/A)	0.2	0.0	6.77
Rose-of-sharon	2	(N/A)	0.2	0.0	2.06
Ohio buckeye	31	(N/A)	0.2	0.1	31.46
Japanese maple	6	(N/A)	0.2	0.0	6.40
Citywide total	32,257	(N/A)	100.0	100.0	50.88

Table 7: Summary of Benefits in Dollars

Albia

Total Annual Benefits of Public Trees by Species ($)

4/4/2022

| Species	Energy	CO$_2$	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Silver maple	9,428	2,101	1,793	18,821	16,013	48,157	(N/A)	40.7
Apple	1,056	110	162	466	420	2,215	(N/A)	1.9
Callery pear	1,537	186	243	1,159	1,453	4,578	(N/A)	3.9
Norway maple	2,699	269	475	3,034	1,632	8,109	(N/A)	6.9
Pear	671	69	108	323	261	1,432	(N/A)	1.2
Ash	1,720	157	307	2,059	870	5,112	(N/A)	4.3
Siberian elm	1,957	238	406	3,202	1,189	6,992	(N/A)	5.9
Sugar maple	1,265	166	201	1,778	1,404	4,813	(N/A)	4.1
Black walnut	1,152	159	197	1,444	1,129	4,082	(N/A)	3.5
American sycamore	1,278	131	273	2,540	674	4,896	(N/A)	4.1
Eastern white pine	344	34	27	740	490	1,636	(N/A)	1.4
Eastern redbud	251	26	40	110	96	523	(N/A)	0.4
Red maple	365	53	65	376	556	1,413	(N/A)	1.2
Honeylocust	789	87	135	1,252	1,362	3,624	(N/A)	3.1
Northern hackberry	794	79	147	1,026	614	2,660	(N/A)	2.2
Littleleaf linden	238	37	36	207	382	900	(N/A)	0.8
Pin oak	636	99	82	940	730	2,488	(N/A)	2.1
Catalpa	427	47	83	677	317	1,551	(N/A)	1.3
Black maple	462	54	87	553	459	1,615	(N/A)	1.4
Northern pin oak	555	31	105	781	43	1,515	(N/A)	1.3
Bur oak	259	30	48	353	233	923	(N/A)	0.8
Green ash	458	61	84	714	399	1,716	(N/A)	1.5
Broadleaf Deciduous Sn	47	5	8	21	18	98	(N/A)	0.1
American basswood	374	73	60	656	493	1,658	(N/A)	1.4
Northern red oak	168	16	25	179	72	461	(N/A)	0.4
Eastern red cedar	72	5	6	124	70	277	(N/A)	0.2
Norway spruce	93	8	3	247	79	429	(N/A)	0.4
Cherry plum	7	1	1	2	2	13	(N/A)	0.0
Broadleaf Deciduous La	132	16	25	229	115	518	(N/A)	0.4
Willow	176	19	32	207	114	548	(N/A)	0.5
Eastern cottonwood	181	19	38	345	95	678	(N/A)	0.6
Swamp white oak	18	2	2	9	26	57	(N/A)	0.0
White mulberry	19	2	3	7	6	37	(N/A)	0.0
Amur maple	76	8	13	36	31	165	(N/A)	0.1
Elm	97	12	20	201	73	402	(N/A)	0.3
Broadleaf Deciduous M	33	4	5	20	39	102	(N/A)	0.1
Northern catalpa	190	19	42	392	87	729	(N/A)	0.6
Southern magnolia	45	4	6	50	35	140	(N/A)	0.1
Conifer Evergreen Smal	4	0	0	5	13	22	(N/A)	0.0
Blue spruce	25	2	3	42	25	97	(N/A)	0.1
Mulberry	38	4	7	18	15	82	(N/A)	0.1
Cottonwood	99	8	23	196	29	354	(N/A)	0.3
Spruce	1	0	0	1	6	8	(N/A)	0.0
Red pine	14	1	1	16	15	48	(N/A)	0.0
Austrian pine	25	2	3	42	25	97	(N/A)	0.1
Ginkgo	15	1	2	8	7	33	(N/A)	0.0
Rose-of-sharon	5	1	1	2	2	11	(N/A)	0.0
Ohio buckeye	71	6	14	102	31	224	(N/A)	0.2
Japanese maple	18	2	3	7	6	36	(N/A)	0.0
Citywide Total	30,382	4,467	5,446	45,722	32,257	118,274	(N/A)	100.0
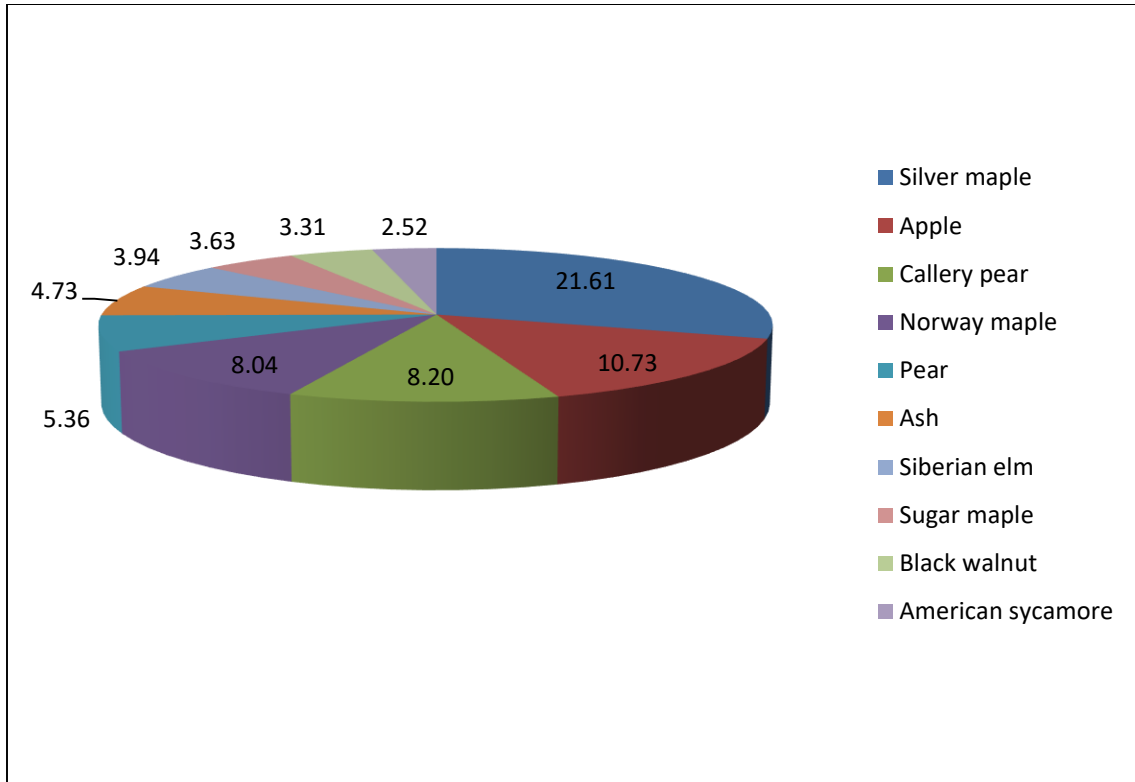
Figure 1: Species Distribution
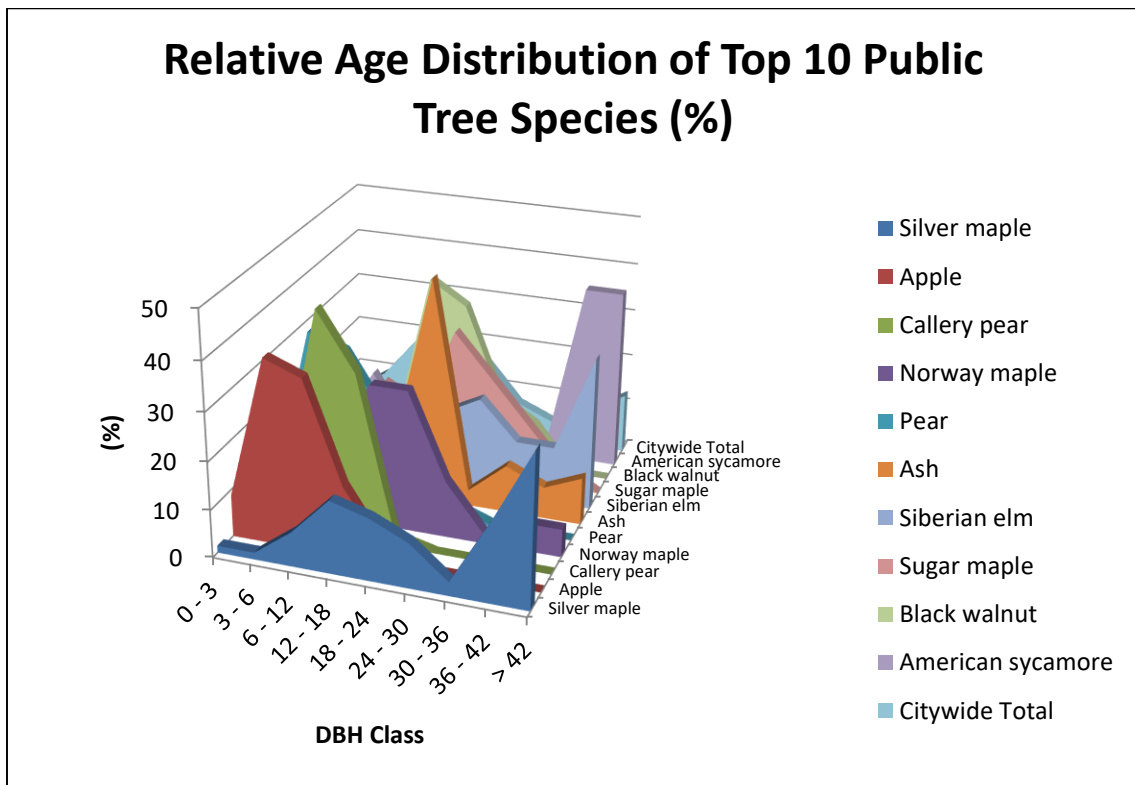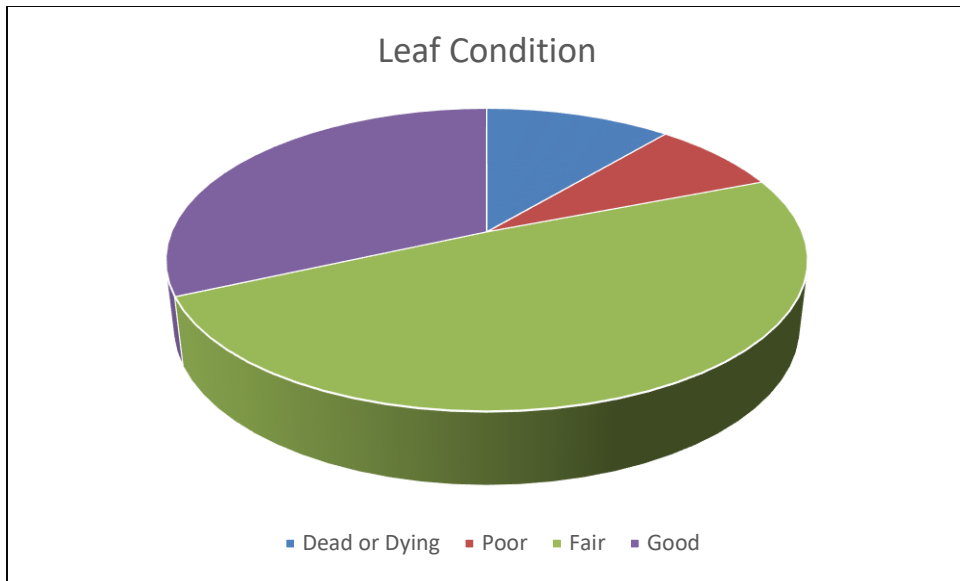

Figure 2: Relative Age Class
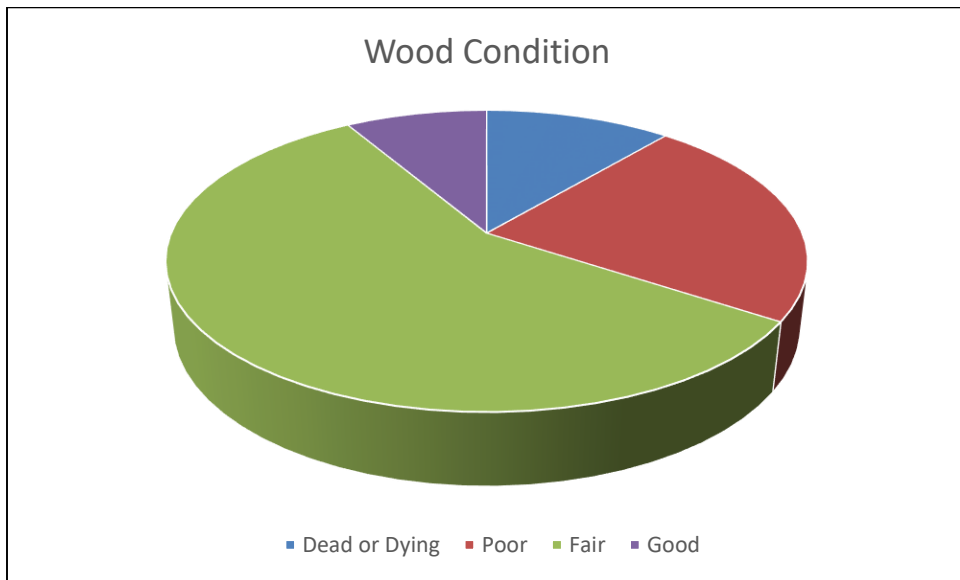
Figure 3: Foliage Condition

Figure 4: Wood Condition

Canopy Cover of Public Trees (Acres)

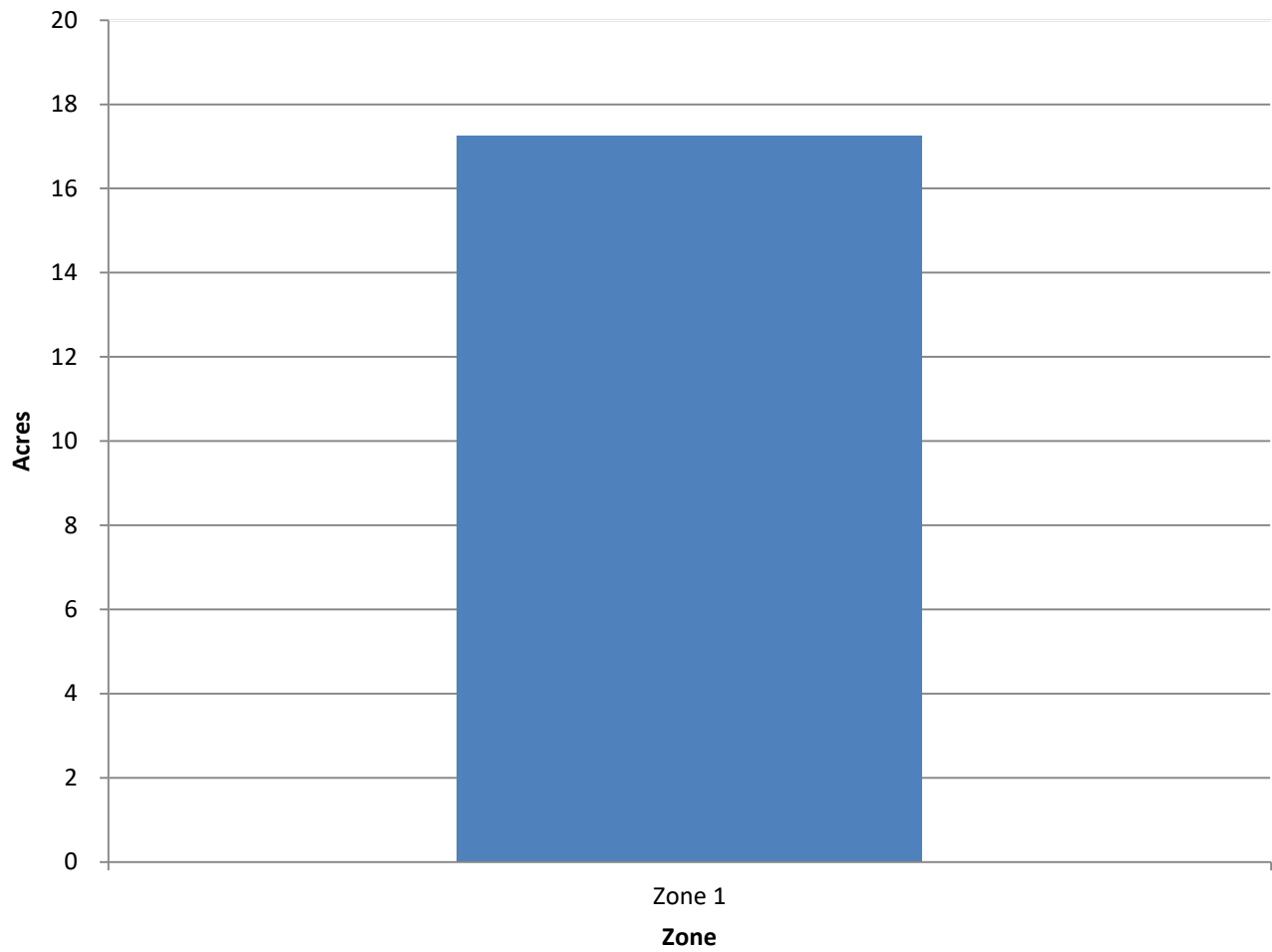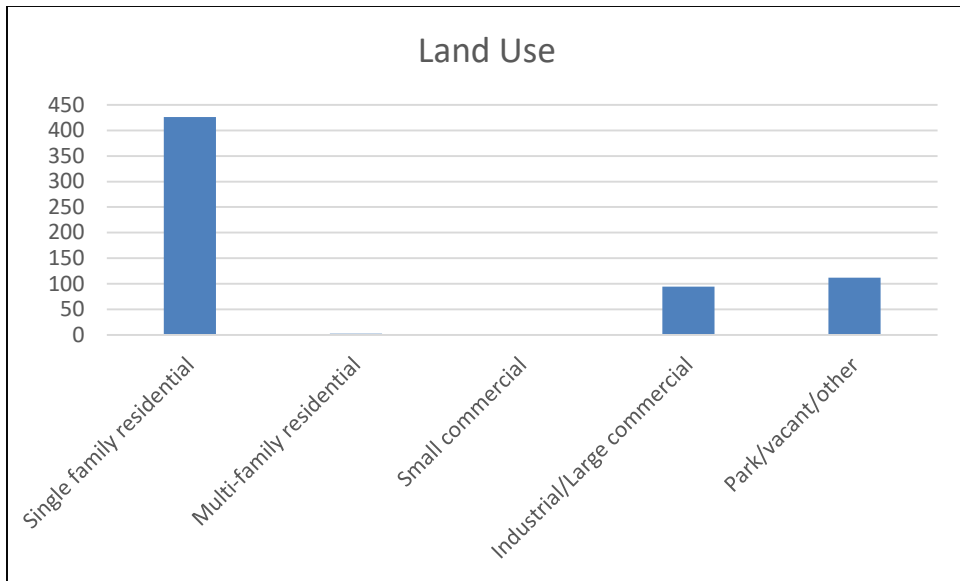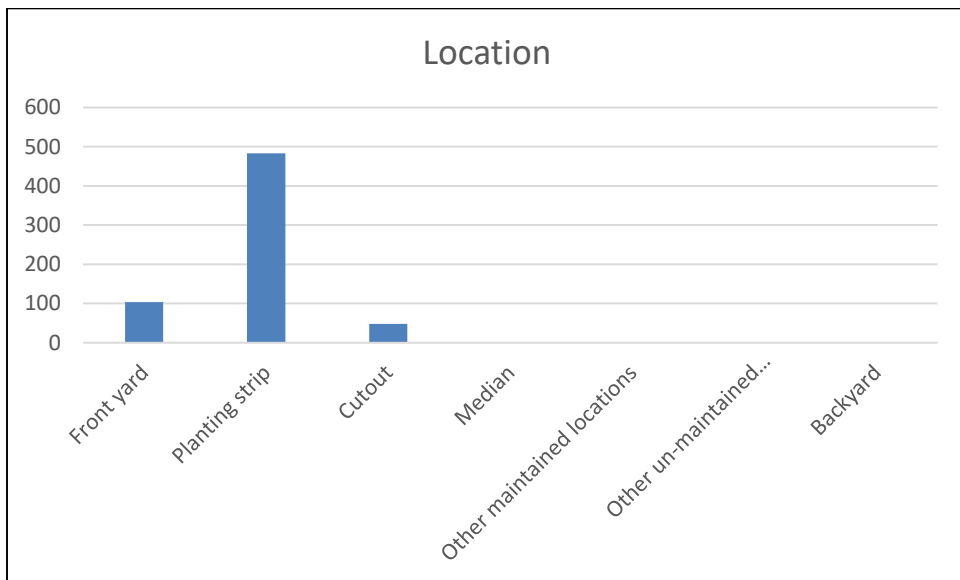**Figure 5: Canopy Cover in Acres**

Figure 6: Land Use of city/park trees

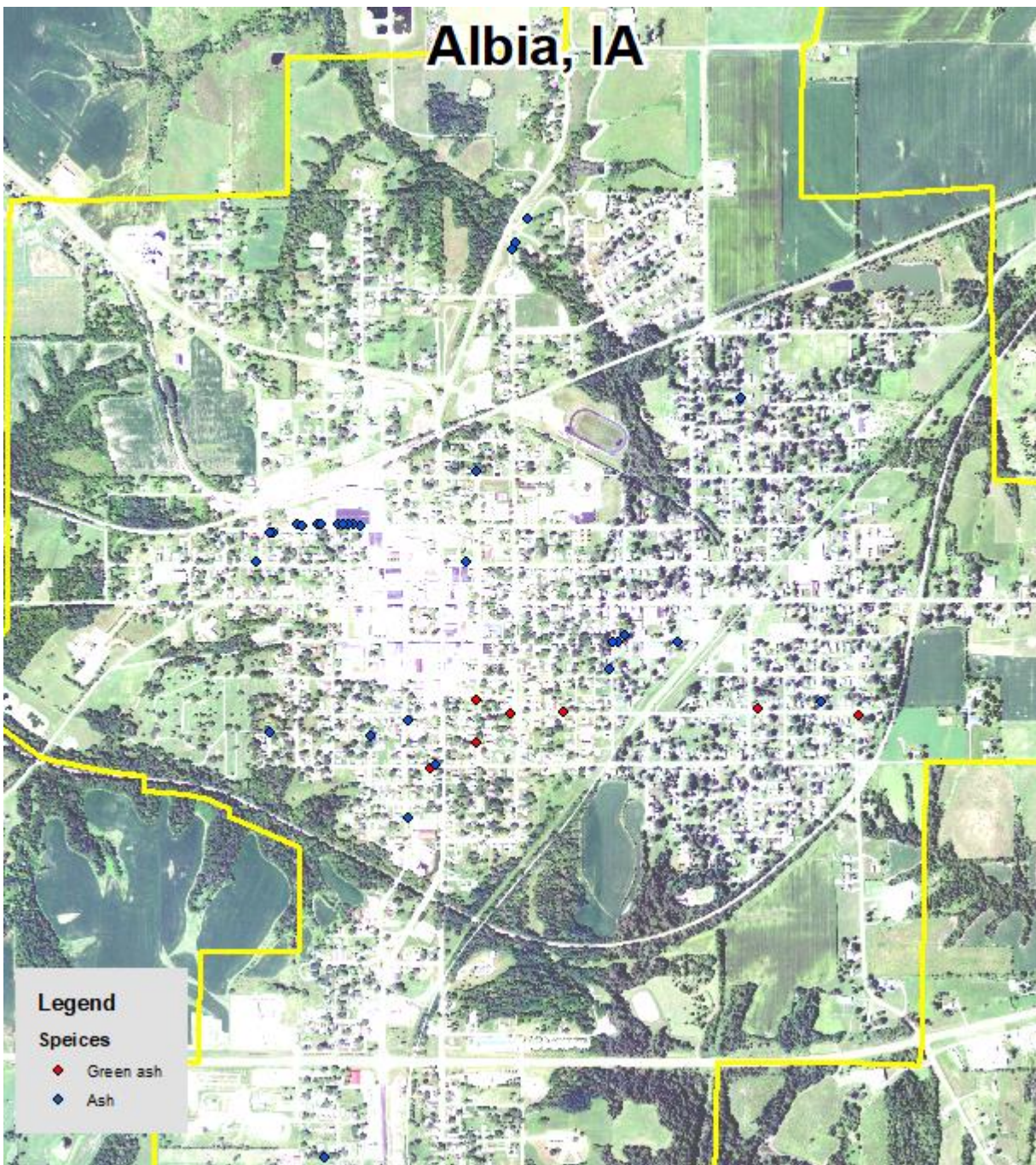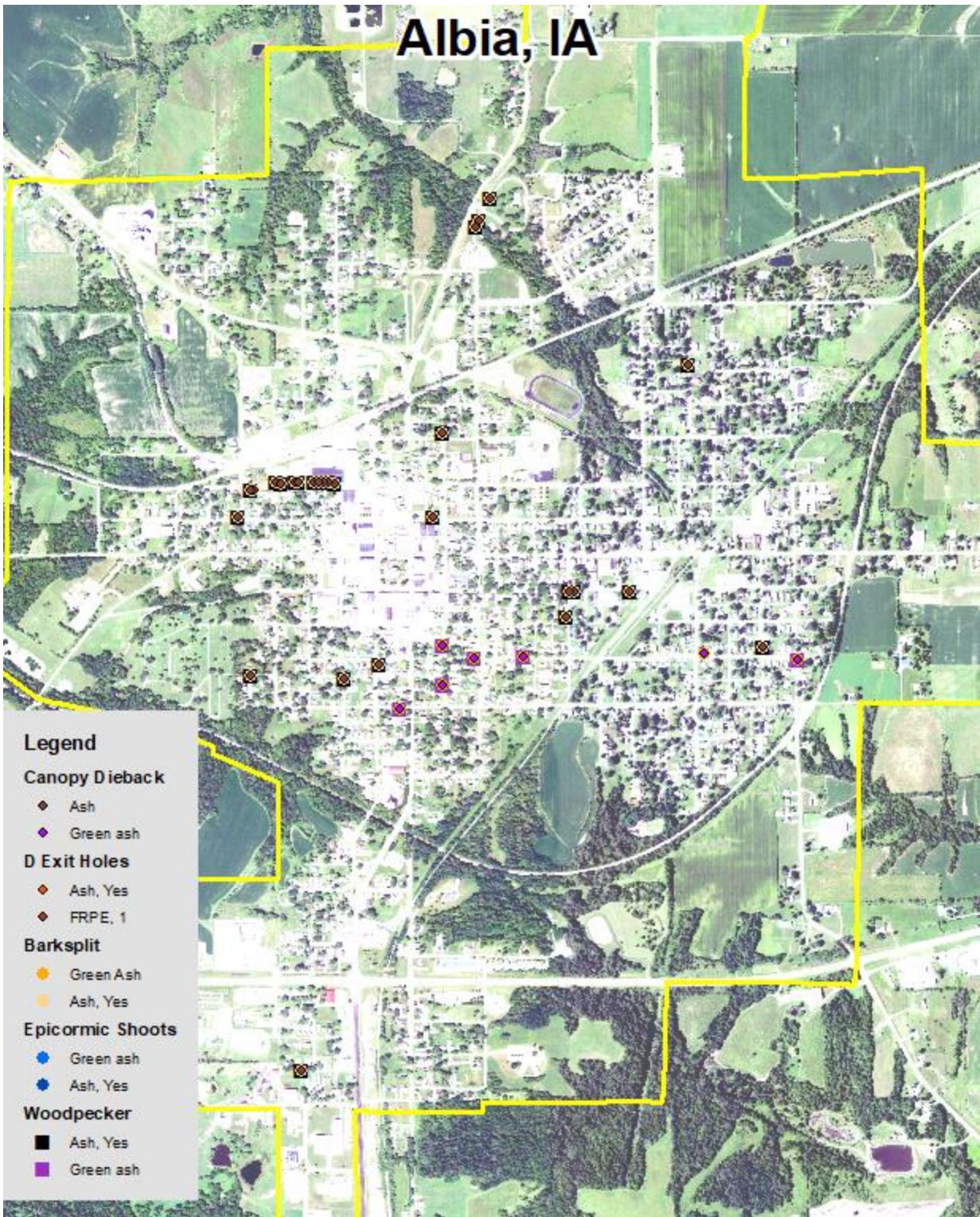**Figure 7: Location of city/park trees**

Figure 1: Location of Ash Trees

Figure 2: Location of EAB symptoms
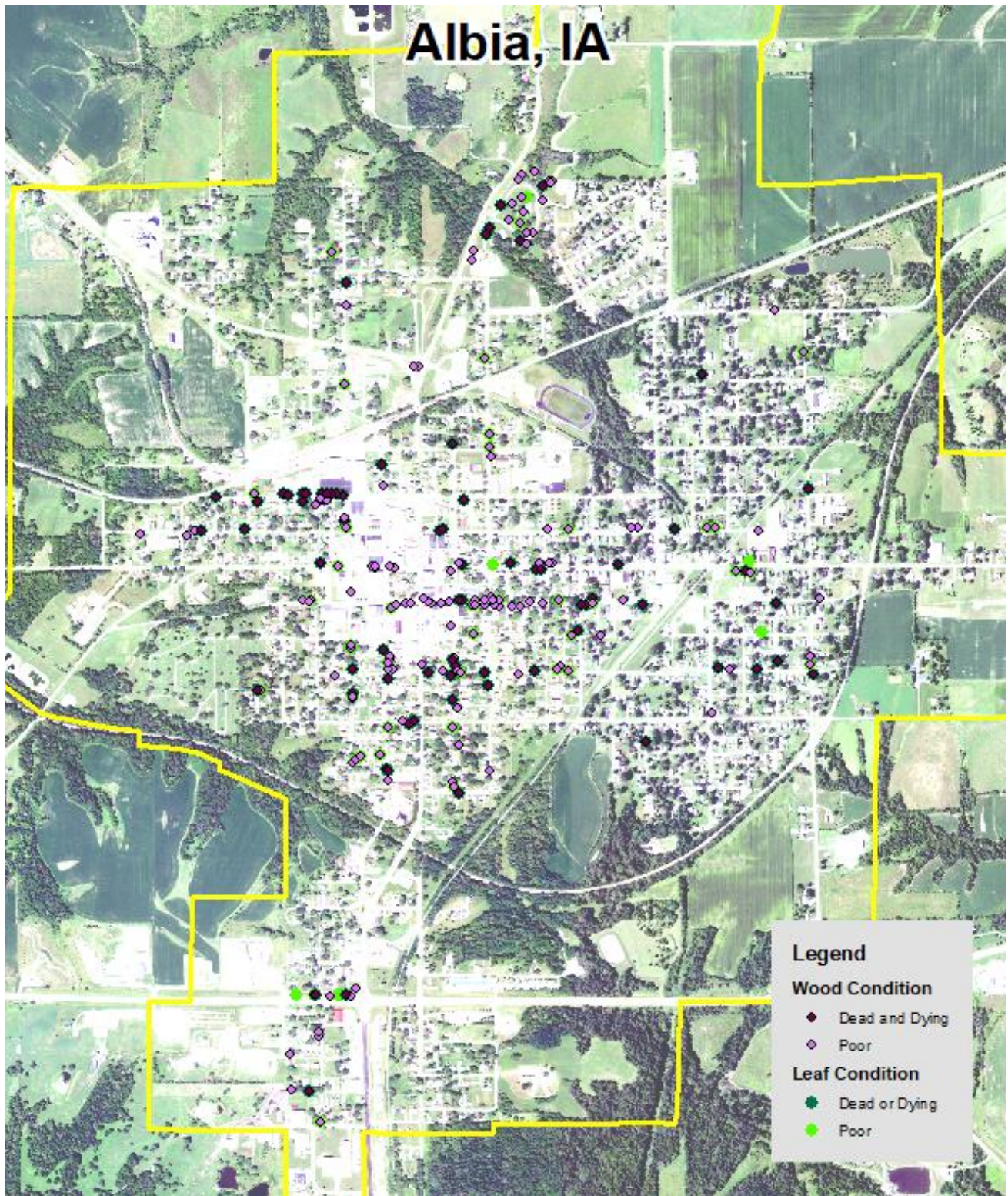
Figure 3: Location of Poor Condition Trees
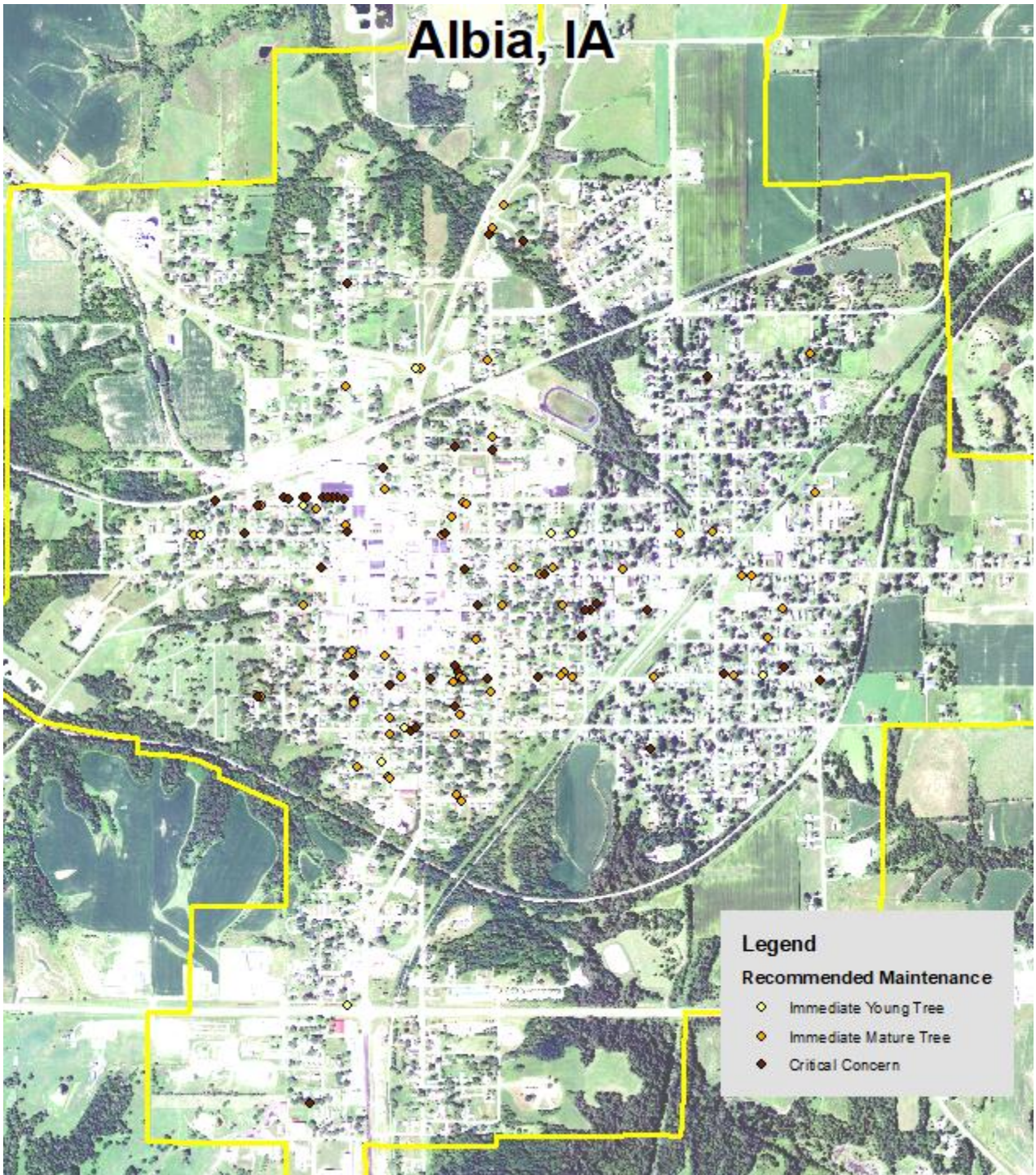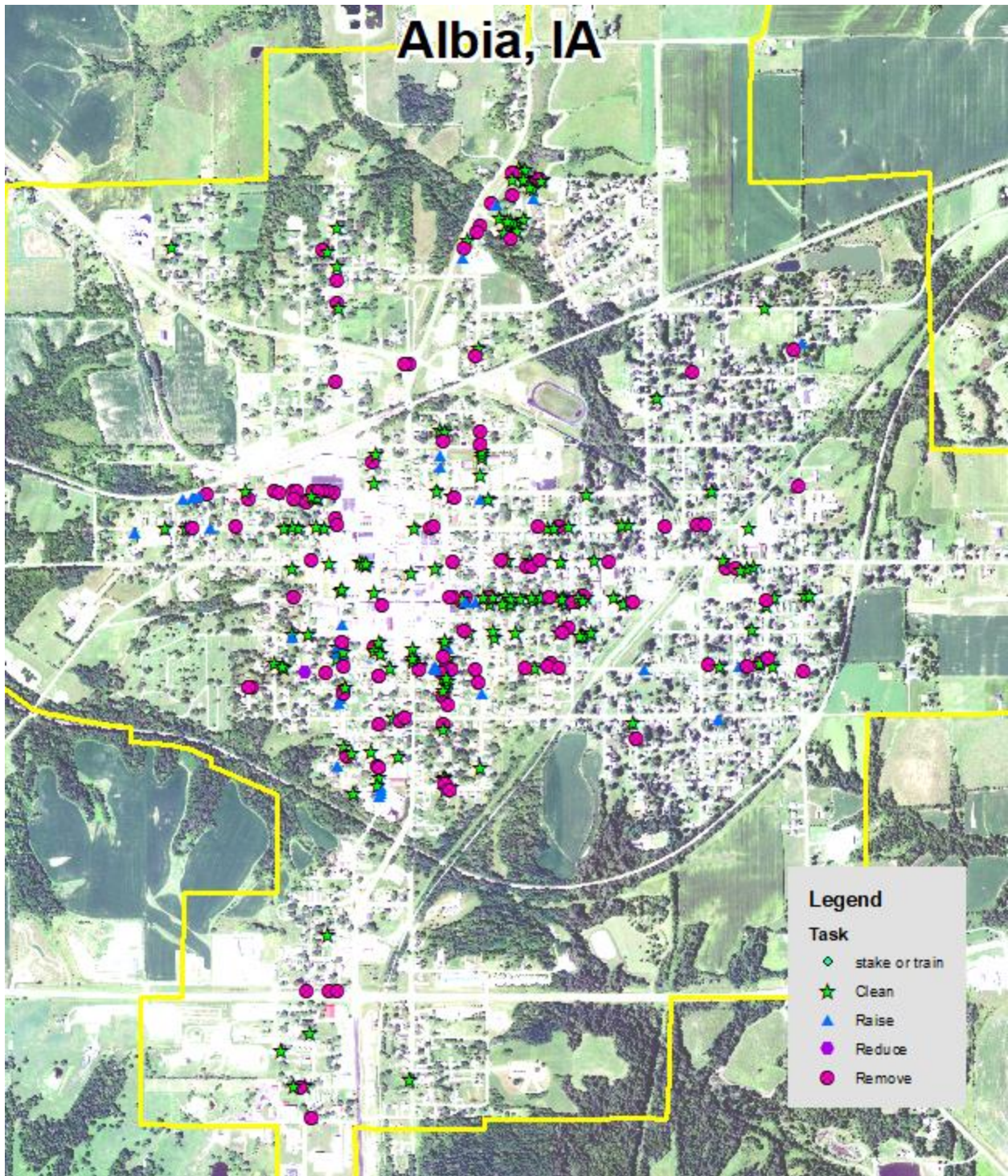
Figure 4: Location of Trees with Recommended Maintenance

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