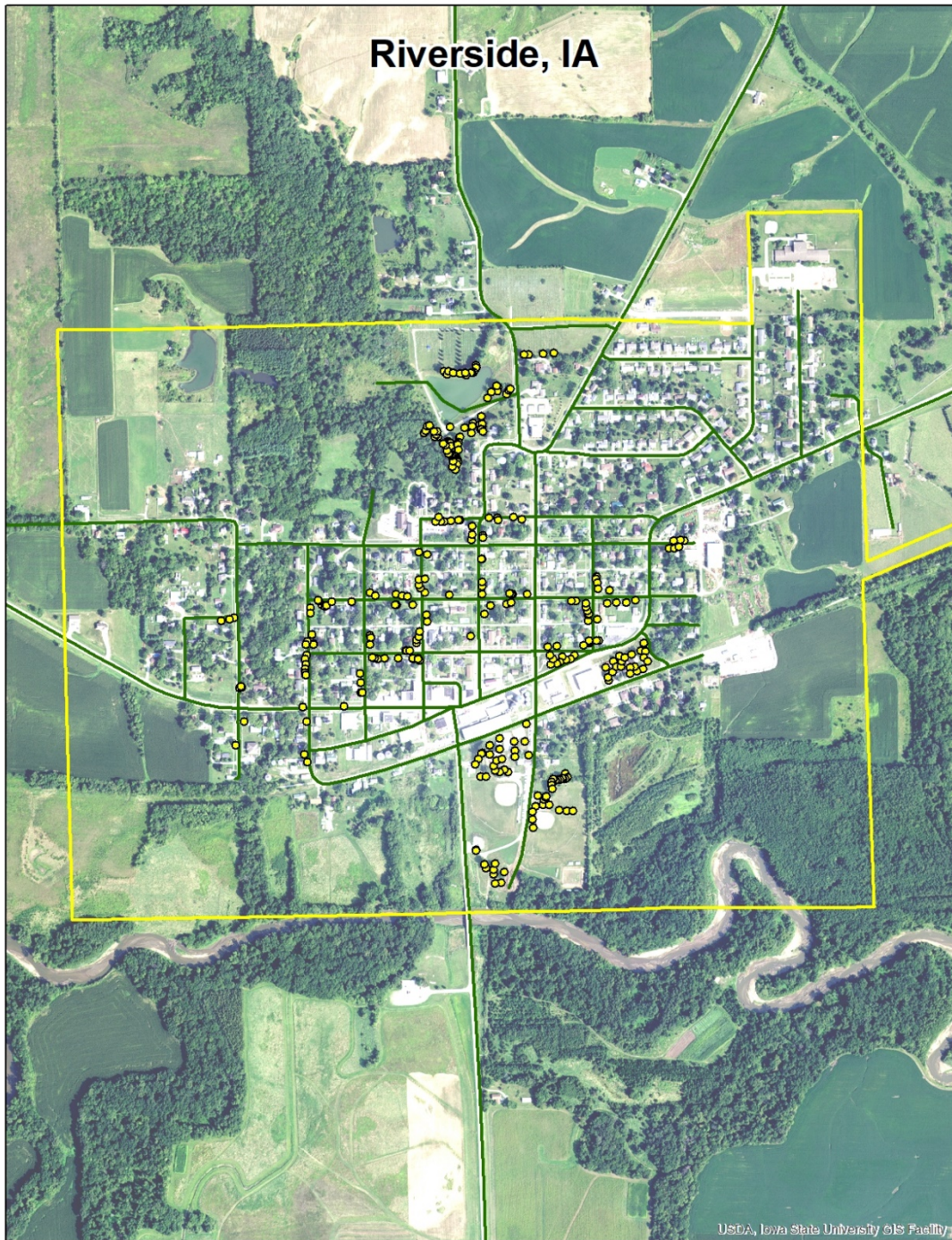


Riverside, IA



2020 Urban Forest Management Plan
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Executive Summary

Overview

This plan was developed to assist the City of Riverside 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 7% of Riverside'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 2020, 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 304 trees inventoried.

- Riverside's trees provide \$40,506 of benefits annually, an average of \$133.24 a tree
- There are over 45 species of trees from more than 27 genera
- The top three genera are: Maple 25%, Walnut 13%, and Oak 12%
- 24% of trees are in need of some type of management
- 24 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 24 trees needing removal, 4 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*
- 10 of the 21 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 12 years to remove ash – Suggestion: request a budget increase to \$8,500 annually and apply for grants to plant replacement trees

Introduction

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

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

Inventory

In 2020, 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 304 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. Riverside's trees reduce energy related costs by approximately \$7,197.4 annually (Appendix A, Table 1). These savings are both in Electricity (53.5 MWh) and in Natural Gas (4,062 Therms).

Annual Stormwater Benefits

Riverside's trees intercept about 540,959 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides \$14,660 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 Riverside, it is estimated that trees remove 659.7 lbs of air pollution (ozone (O₃), particulate matter less than 10 microns (PM₁₀), carbon monoxide (CO), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂)) per year with a net value of \$1,842 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Riverside, trees sequester about 118,851 lbs of carbon a year with an associated value of \$891 (Appendix A, Table 5). In addition, the trees store 1,782,101 lbs of carbon, with a yearly benefit of \$13,366 (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. Riverside receives \$11,393 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, Riverside's trees provide \$40,506 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 304 trees in Riverside provide approximately \$133.24 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Riverside has over 45 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Genus	Count	Percent
Maple	76	25%
Walnut	40	13%
Oak	35	12%
Apple	26	9%
Pine	25	8%
Ash	21	7%
Elm	13	4%
Spruce	13	4%
Cedar	7	2%
Redbud	6	2%
Lilac	6	2%
Hickory	5	2%
Birch	5	2%
Prunus	4	1%
Basswood	4	1%
Kentucky Coffeetree	3	1%
Broadleaf Deciduous		
S/M/L	2	1%
Cottonwood	2	1%
Hackberry	2	1%
Pear	2	1%
Alder	1	0%
Sycamore	1	0%
Ginkgo	1	0%
Honeylocust	1	0%
Buckeye	1	0%
Magnolia	1	0%
Willow	1	0%

Age Class

Most of Riverside's trees (46%) are between 6 and 18 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. Riverside's size curve is on the smaller side, indicating a younger 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 Riverside indicate that 73.03% of the trees are in good health, with only 7% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 41% of Riverside'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 17% of the population. This 17% 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	32	11%
Crown Raising	17	6%
Tree Removal	24	8%

Canopy Cover

The total canopy with both private and public trees is 18%, 199.58 acres. The canopy cover included in the Riverside inventory includes approximately 5.65 acres (Appendix A, Figure 4). The City's Canopy goal is to increase canopy by 3%, in 30 years. To achieve this goal it is estimated that 80 trees need to be planted annually on public and private lands.

Land Use and Location

The majority of Riverside'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	44%
Park/vacant/other	55%
Small commercial	<1%

Location

Planting strip	42%
Front yard	58%

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

Riverside has 6 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. There is 1 critical concern tree over 24 inches in diameter at 4.5 ft that should be addressed immediately. 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 64 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 24 removals, 5 are ash trees. There are a total of 21 ash trees, and 10 of those are displaying at least 2 signs and symptoms that have been associated with EAB. In addition, there are 46 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 Riverside.

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 (25%) (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: cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut, as outlined in section 151.02 of the city ordinance (Appendix C). All trees planted must meet the restrictions in city ordinance 151.02 (Appendix C).

Continual Monitoring

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

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 ash, maple, 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 treatments are not being used. City Code 151.06 states “If it is determined with reasonable certainty that any such condition exists (trees or shrubs in the City reported or suspected to be infected with or damaged by any disease or insect or disease pests) on private property and that the danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Council shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days of said notification. If such owner, occupant or person in charge of said property fails to comply within 14 days of receipt of notice, the Council may cause the condition to be corrected and the cost assessed against the property.”

Budget & Six Year Maintenance Plan

Current Budget

Total \$25,200 over 6 years (\$4,200/year)

FY 2020 Budget

Removal: 5 trees \$3,500

Planting: 5 trees \$500

Watering & Maintenance: \$200

FY 2021 Budget

Removal: 3 trees \$2,100

Planting: 4 trees \$400

Routine trimming: \$1,500

Watering & Maintenance: \$200

FY 2022 Budget

Removal: 5 trees \$3,500

Planting: 5 trees \$500

Watering & Maintenance: \$200

FY 2023 Budget

Removal: 3 trees \$2,100

Planting: 4 trees \$400
Routine trimming: \$1,500
Watering & Maintenance: \$200

FY 2024 Budget

Removal: 5 trees \$3,500
Planting: 5 trees \$500
Watering & Maintenance: \$200

FY 2025 Budget

Removal: 3 trees \$2,100
Planting: 4 trees \$400
Routine trimming: \$1,500
Watering & Maintenance: \$200

***Reduction of ash over 6 years: approximately 5 ash trees removed (approximately 24% of ash). It will take approximately 12 years to remove all ash with the current budget.**

Proposed Budget Increase

EAB could potentially kill all ash trees in Riverside within 4 years of its arrival. To remove all ash trees within 6 years the budget would need to be increased to \$8,400 a year. Additionally, it is recommended that Riverside 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) is \$1,200. This would be 8 trees selected for treatment, and Riverside would still need to find \$9,100 for removal. Alternatively, if there are 15 treatable trees, it would cost approximately \$2,250 a year for treatment and leave \$4,200 for removal. These are alternatives to straight removal of ash trees. However, whether or not the treatment option is selected, there will be an increased cost of dealing with ash trees if EAB is found in Riverside. 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

Riverside

Annual Energy Benefits of Public Trees

8/6/2020

Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total Standard (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Black walnut	10.1	763	1,329.7	1,303	2,066	(N/A)	13.2	18.6	51.66
Norway maple	5.8	441	803.2	787	1,228	(N/A)	8.6	11.0	47.24
Apple	1.4	110	218.1	214	323	(N/A)	8.6	2.9	12.43
Eastern white pine	2.9	217	356.3	349	566	(N/A)	7.6	5.1	24.62
Silver maple	7.8	592	1,042.0	1,021	1,614	(N/A)	7.2	14.5	73.35
Green ash	4.5	339	570.4	559	898	(N/A)	6.9	8.1	42.77
Sugar maple	2.6	197	350.6	344	540	(N/A)	3.9	4.9	45.04
Siberian elm	2.4	180	310.2	304	484	(N/A)	3.6	4.4	43.99
Northern red oak	0.7	50	93.9	92	142	(N/A)	3.0	1.3	15.76
Swamp white oak	0.8	58	115.5	113	172	(N/A)	2.6	1.5	21.45
Red maple	0.8	63	119.5	117	180	(N/A)	2.3	1.6	25.78
Lilac	0.1	10	22.8	22	32	(N/A)	2.0	0.3	5.40
Northern pin oak	1.6	122	235.2	230	352	(N/A)	2.0	3.2	58.73
Eastern redbud	0.3	21	44.3	43	64	(N/A)	2.0	0.6	10.68
Blue spruce	0.6	46	75.8	74	120	(N/A)	2.0	1.1	19.97
Hickory	1.2	90	163.8	161	250	(N/A)	1.6	2.3	50.08
Spruce	0.6	43	68.0	67	110	(N/A)	1.6	1.0	22.02
Eastern red cedar	0.6	42	82.2	81	123	(N/A)	1.6	1.1	24.57
Paper birch	0.7	54	99.6	98	152	(N/A)	1.6	1.4	30.33
White oak	1.9	144	260.7	256	400	(N/A)	1.6	3.6	79.98
Littleleaf linden	0.6	43	72.8	71	114	(N/A)	1.3	1.0	28.48
Bur oak	0.1	10	18.4	18	28	(N/A)	1.3	0.2	6.94
Oak	0.8	61	100.8	99	159	(N/A)	1.0	1.4	53.12
Maple	0.3	23	36.0	35	58	(N/A)	1.0	0.5	19.28
Kentucky coffeetree	0.4	32	54.4	53	86	(N/A)	1.0	0.8	28.50
Boxelder	0.4	33	61.5	60	94	(N/A)	1.0	0.8	31.24
Plum	0.0	4	8.2	8	12	(N/A)	1.0	0.1	3.89
Pear	0.4	29	56.3	55	84	(N/A)	0.7	0.8	42.14
Cottonwood	0.7	51	86.0	84	135	(N/A)	0.7	1.2	67.63
Northern hackberry	0.4	33	61.6	60	93	(N/A)	0.7	0.8	46.68
Scotch pine	0.0	3	7.9	8	11	(N/A)	0.7	0.1	5.61
Amur maple	0.0	2	4.4	4	6	(N/A)	0.7	0.1	3.13
Northern white cedar	0.1	9	19.0	19	27	(N/A)	0.7	0.2	13.58
Norway spruce	0.3	20	29.3	29	48	(N/A)	0.7	0.4	24.14
Broadleaf Deciduous Small	0.0	1	1.2	1	2	(N/A)	0.7	0.0	0.87
American elm	0.7	53	88.6	87	140	(N/A)	0.7	1.3	70.11
Alder	0.2	14	24.7	24	38	(N/A)	0.3	0.3	38.13
Black cherry	0.2	15	31.6	31	46	(N/A)	0.3	0.4	46.14
Honey locust	0.3	23	42.3	41	65	(N/A)	0.3	0.6	64.79
American sycamore	0.0	2	3.7	4	6	(N/A)	0.3	0.1	5.82
Ohio buckeye	0.0	0	0.8	1	1	(N/A)	0.3	0.0	1.10
Willow	0.0	0	0.8	1	1	(N/A)	0.3	0.0	1.10
Southern magnolia	0.2	18	24.2	24	41	(N/A)	0.3	0.4	41.29
Ginkgo	0.0	0	0.4	0	1	(N/A)	0.3	0.0	0.57
Black maple	0.0	0	0.7	1	1	(N/A)	0.3	0.0	1.03
Total	53.5	4,062	7,197.4	7,053	11,115	(N/A)	100.0	100.0	36.56

Table 2: Annual Stormwater Benefits

Riverside

Annual Stormwater Benefits of Public Trees

8/6/2020

Species	Total rainfall interception (Gal)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Black walnut	91,202	2,472	(N/A)	13.2	16.9	61.79
Norway maple	46,481	1,260	(N/A)	8.6	8.6	48.45
Apple	5,502	149	(N/A)	8.6	1.0	5.74
Eastern white pine	43,621	1,182	(N/A)	7.6	8.1	51.40
Silver maple	114,325	3,098	(N/A)	7.2	21.1	140.83
Green ash	33,660	912	(N/A)	6.9	6.2	43.44
Sugar maple	25,608	694	(N/A)	3.9	4.7	57.83
Siberian elm	23,644	641	(N/A)	3.6	4.4	58.25
Northern red oak	6,639	180	(N/A)	3.0	1.2	19.99
Swamp white oak	4,241	115	(N/A)	2.6	0.8	14.37
Red maple	7,145	194	(N/A)	2.3	1.3	27.66
Lilac	412	11	(N/A)	2.0	0.1	1.86
Northern pin oak	15,091	409	(N/A)	2.0	2.8	68.16
Eastern redbud	1,395	38	(N/A)	2.0	0.3	6.30
Blue spruce	7,189	195	(N/A)	2.0	1.3	32.47
Hickory	11,198	303	(N/A)	1.6	2.1	60.69
Spruce	6,750	183	(N/A)	1.6	1.2	36.58
Eastern red cedar	8,173	221	(N/A)	1.6	1.5	44.30
Paper birch	8,442	229	(N/A)	1.6	1.6	45.76
White oak	26,502	718	(N/A)	1.6	4.9	143.64
Littleleaf linden	3,440	93	(N/A)	1.3	0.6	23.31
Bur oak	815	22	(N/A)	1.3	0.2	5.52
Oak	6,874	186	(N/A)	1.0	1.3	62.10
Maple	1,753	48	(N/A)	1.0	0.3	15.83
Kentucky coffeetree	2,681	73	(N/A)	1.0	0.5	24.22
Boxelder	5,020	136	(N/A)	1.0	0.9	45.35
Plum	145	4	(N/A)	1.0	0.0	1.31
Pear	1,841	50	(N/A)	0.7	0.3	24.94
Cottonwood	8,704	236	(N/A)	0.7	1.6	117.95
Northern hackberry	5,002	136	(N/A)	0.7	0.9	67.78
Scotch pine	426	12	(N/A)	0.7	0.1	5.77
Amur maple	76	2	(N/A)	0.7	0.0	1.03
Northern white cedar	1,191	32	(N/A)	0.7	0.2	16.14
Norway spruce	3,077	83	(N/A)	0.7	0.6	41.70
Broadleaf Deciduous Small	15	0	(N/A)	0.7	0.0	0.20
American elm	5,942	161	(N/A)	0.7	1.1	80.51
Alder	667	18	(N/A)	0.3	0.1	18.06
Black cherry	1,174	32	(N/A)	0.3	0.2	31.82
Honeylocust	2,905	79	(N/A)	0.3	0.5	78.73
American sycamore	172	5	(N/A)	0.3	0.0	4.65
Ohio buckeye	12	0	(N/A)	0.3	0.0	0.33
Willow	12	0	(N/A)	0.3	0.0	0.33
Southern magnolia	1,775	48	(N/A)	0.3	0.3	48.11
Ginkgo	7	0	(N/A)	0.3	0.0	0.19
Black maple	12	0	(N/A)	0.3	0.0	0.32
Citywide total	540,959	14,660	(N/A)	100.0	100.0	48.22

Table 3: Annual Air Quality Benefits

Riverside

Annual Air Quality Benefits of Public Trees

8/6/2020

Species	Deposition (lb)				Total Depos (S)	Avoided (lb)				Total Avoided (S)	BVOC Emissions (lb)	BVOC Emissions (S)	Total (lb)	Total Standard (S) Error	% of Total Trees	Avg. \$/tree
	O ₃	NO ₂	PM ₁₀	SO ₂		NO ₂	PM ₁₀	VOC	SO ₂							
Black walnut	9.5	1.5	4.9	0.4	51	47.6	7.0	6.6	45.6	298	0.0	0	123.1	349 (N/A)	13.2	8.73
Norway maple	8.7	1.5	4.4	0.4	47	27.9	4.1	3.9	26.4	173	-2.1	-8	75.0	213 (N/A)	8.6	8.19
Apple	1.4	0.2	0.7	0.1	8	7.1	1.0	1.0	6.5	44	0.0	0	18.1	51 (N/A)	8.6	1.98
Eastern white pine	4.9	1.0	4.1	0.6	33	13.3	2.0	1.9	12.9	84	-18.0	-67	22.7	49 (N/A)	7.6	2.13
Silver maple	20.2	3.4	9.9	0.9	109	36.9	5.4	5.1	35.3	231	-10.5	-39	106.7	300 (N/A)	7.2	13.64
Green ash	2.9	0.5	1.6	0.1	16	21.0	3.1	2.9	20.3	132	0.0	0	52.3	148 (N/A)	6.9	7.02
Sugar maple	3.1	0.5	1.6	0.1	17	12.3	1.8	1.7	11.7	77	-2.5	-9	30.5	85 (N/A)	3.9	7.06
Siberian elm	3.8	0.6	1.9	0.2	21	11.2	1.6	1.6	10.7	70	0.0	0	31.6	91 (N/A)	3.6	8.23
Northern red oak	1.4	0.2	0.7	0.1	7	3.2	0.5	0.4	3.0	20	-2.0	-8	7.4	20 (N/A)	3.0	2.17
Swamp white oak	0.5	0.1	0.3	0.0	3	3.8	0.5	0.5	3.5	23	-0.1	-1	9.0	25 (N/A)	2.6	3.18
Red maple	1.7	0.3	0.8	0.1	9	4.0	0.6	0.6	3.8	25	-0.6	-2	11.2	32 (N/A)	2.3	4.53
Lilac	0.0	0.0	0.0	0.0	0	0.7	0.1	0.1	0.6	4	0.0	0	1.5	4 (N/A)	2.0	0.71
Northern pin oak	3.0	0.5	1.5	0.1	16	7.8	1.1	1.1	7.3	48	-0.7	-3	21.8	62 (N/A)	2.0	10.35
Eastern redbud	0.4	0.1	0.2	0.0	2	1.4	0.2	0.2	1.2	8	0.0	0	3.7	11 (N/A)	2.0	1.78
Blue spruce	0.8	0.2	0.7	0.1	6	2.8	0.4	0.4	2.7	18	-2.5	-9	5.7	14 (N/A)	2.0	2.31
Hickory	1.2	0.2	0.6	0.1	6	5.7	0.8	0.8	5.4	35	0.0	0	14.6	42 (N/A)	1.6	8.31
Spruce	0.7	0.1	0.6	0.1	5	2.6	0.4	0.4	2.6	17	-2.3	-9	5.2	13 (N/A)	1.6	2.55
Eastern red cedar	1.7	0.3	1.4	0.2	11	2.7	0.4	0.4	2.5	17	-4.5	-17	5.1	11 (N/A)	1.6	2.19
Paper birch	1.1	0.2	0.5	0.0	6	3.4	0.5	0.5	3.2	21	0.0	0	9.4	27 (N/A)	1.6	5.38
White oak	4.3	0.7	1.9	0.2	23	9.1	1.3	1.3	8.6	57	0.0	0	27.4	79 (N/A)	1.6	15.82
Littleleaf linden	0.4	0.1	0.2	0.0	2	2.6	0.4	0.4	2.5	17	-0.2	-1	6.4	18 (N/A)	1.3	4.49
Bur oak	0.0	0.0	0.0	0.0	0	0.6	0.1	0.1	0.6	4	0.0	0	1.4	4 (N/A)	1.3	1.01
Oak	0.7	0.1	0.4	0.0	4	3.7	0.5	0.5	3.6	23	0.0	0	9.6	27 (N/A)	1.0	9.11
Maple	0.3	0.1	0.2	0.0	2	1.4	0.2	0.2	1.3	9	-0.1	0	3.6	10 (N/A)	1.0	3.33
Kentucky coffeetree	0.2	0.0	0.1	0.0	1	2.0	0.3	0.3	1.9	12	0.0	0	4.8	13 (N/A)	1.0	4.47
Boxelder	0.7	0.1	0.3	0.0	4	2.1	0.3	0.3	2.0	13	-0.2	-1	5.6	16 (N/A)	1.0	5.27
Plum	0.0	0.0	0.0	0.0	0	0.2	0.0	0.0	0.2	1	0.0	0	0.5	2 (N/A)	1.0	0.51
Pear	0.6	0.1	0.3	0.0	3	1.9	0.3	0.3	1.7	12	0.0	0	5.2	15 (N/A)	0.7	7.45
Cottonwood	1.3	0.2	0.6	0.1	7	3.2	0.5	0.4	3.0	20	0.0	0	9.2	26 (N/A)	0.7	13.23
Northern hackberry	0.9	0.1	0.4	0.0	5	2.1	0.3	0.3	2.0	13	0.0	0	6.1	18 (N/A)	0.7	8.84
Scotch pine	0.0	0.0	0.0	0.0	0	0.2	0.0	0.0	0.2	1	-0.1	0	0.4	1 (N/A)	0.7	0.56
Amur maple	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)	0.7	0.41
Northern white cedar	0.1	0.0	0.1	0.0	1	0.6	0.1	0.1	0.5	3	-0.3	-1	1.1	3 (N/A)	0.7	1.48
Norway spruce	0.3	0.1	0.3	0.0	2	1.2	0.2	0.2	1.2	7	-1.1	-4	2.3	6 (N/A)	0.7	2.82
Broadleaf Deciduous Small	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.1	0 (N/A)	0.7	0.11
American elm	1.0	0.2	0.5	0.0	6	3.3	0.5	0.5	3.2	21	0.0	0	9.2	26 (N/A)	0.7	13.10
Alder	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)	0.3	6.56
Black cherry	0.4	0.1	0.2	0.0	2	1.0	0.1	0.1	0.9	6	0.0	0	2.9	8 (N/A)	0.3	8.35
Honeylocust	0.5	0.1	0.3	0.0	3	1.5	0.2	0.2	1.4	9	-0.4	-1	3.8	11 (N/A)	0.3	10.61
American sycamore	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)	0.3	0.87
Ohio buckeye	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)	0.3	0.14
Willow	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)	0.3	0.14
Southern magnolia	0.1	0.0	0.1	0.0	1	1.0	0.2	0.1	1.0	7	-0.5	-2	2.1	5 (N/A)	0.3	5.49
Ginkgo	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)	0.3	0.07
Black maple	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)	0.3	0.13
Citywide total	79.2	13.5	42.4	4.2	439	254.2	37.1	35.4	242.5	1,587	-48.9	-183	659.7	1,842 (N/A)	100.0	6.06

Table 4: Annual Carbon Stored

Riverside

Stored CO2 Benefits of Public Trees

8/6/2020

Species	Total Stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Black walnut	306,131	2,296	(N/A)	13.2	17.2	57.40
Norway maple	143,502	1,076	(N/A)	8.6	8.1	41.39
Apple	23,831	179	(N/A)	8.6	1.3	6.87
Eastern white pine	41,336	310	(N/A)	7.6	2.3	13.48
Silver maple	462,125	3,466	(N/A)	7.2	25.9	157.54
Green ash	94,425	708	(N/A)	6.9	5.3	33.72
Sugar maple	88,659	665	(N/A)	3.9	5.0	55.41
Siberian elm	94,636	710	(N/A)	3.6	5.3	64.52
Northern red oak	31,088	233	(N/A)	3.0	1.7	25.91
Swamp white oak	8,682	65	(N/A)	2.6	0.5	8.14
Red maple	18,344	138	(N/A)	2.3	1.0	19.65
Lilac	1,067	8	(N/A)	2.0	0.1	1.33
Northern pin oak	49,685	373	(N/A)	2.0	2.8	62.11
Eastern redbud	7,304	55	(N/A)	2.0	0.4	9.13
Blue spruce	4,800	36	(N/A)	2.0	0.3	6.00
Hickory	37,394	280	(N/A)	1.6	2.1	56.09
Spruce	4,938	37	(N/A)	1.6	0.3	7.41
Eastern red cedar	5,510	41	(N/A)	1.6	0.3	8.27
Paper birch	34,784	261	(N/A)	1.6	2.0	52.18
White oak	145,414	1,091	(N/A)	1.6	8.2	218.12
Littleleaf linden	9,239	69	(N/A)	1.3	0.5	17.32
Bur oak	1,244	9	(N/A)	1.3	0.1	2.33
Oak	23,116	173	(N/A)	1.0	1.3	57.79
Maple	3,859	29	(N/A)	1.0	0.2	9.65
Kentucky coffeetree	5,741	43	(N/A)	1.0	0.3	14.35
Boxelder	24,125	181	(N/A)	1.0	1.4	60.31
Plum	369	3	(N/A)	1.0	0.0	0.92
Pear	9,780	73	(N/A)	0.7	0.5	36.67
Cottonwood	42,930	322	(N/A)	0.7	2.4	160.99
Northern hackberry	13,512	101	(N/A)	0.7	0.8	50.67
Scotch pine	76	1	(N/A)	0.7	0.0	0.29
Amur maple	192	1	(N/A)	0.7	0.0	0.72
Northern white cedar	513	4	(N/A)	0.7	0.0	1.93
Norway spruce	2,340	18	(N/A)	0.7	0.1	8.78
Broadleaf Deciduous	28	0	(N/A)	0.7	0.0	0.10
American elm	22,765	171	(N/A)	0.7	1.3	85.37
Alder	3,037	23	(N/A)	0.3	0.2	22.78
Black cherry	6,743	51	(N/A)	0.3	0.4	50.57
Honeylocust	6,743	51	(N/A)	0.3	0.4	50.57
American sycamore	185	1	(N/A)	0.3	0.0	1.39
Ohio buckeye	17	0	(N/A)	0.3	0.0	0.13
Willow	17	0	(N/A)	0.3	0.0	0.13
Southern magnolia	1,851	14	(N/A)	0.3	0.1	13.88
Ginkgo	5	0	(N/A)	0.3	0.0	0.03
Black maple	17	0	(N/A)	0.3	0.0	0.13
Citywide total	1,782,101	13,366	(N/A)	100.0	100.0	43.97

Table 5: Annual Carbon Sequestered

Riverside

Annual CO₂ Benefits of Public Trees

8/6/2020

Species	Sequestered (lb)	Sequestered (\$)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released (\$)	Avoided (lb)	Avoided (\$)	Net Total (lb)	Total Standard (\$ Error)	% of Total Trees	% of Total \$	Avg. \$/tree
Black walnut	23,094	173	-1,469	-98	-12	16,871	127	38,397	288 (N/A)	13.2	19.3	7.20
Norway maple	9,081	68	-690	-56	-6	9,748	73	18,083	136 (N/A)	8.6	9.1	5.22
Apple	2,398	18	-115	-22	-1	2,421	18	4,682	35 (N/A)	8.6	2.3	1.35
Eastern white pine	3,009	23	-198	-48	-2	4,796	36	7,558	57 (N/A)	7.6	3.8	2.46
Silver maple	33,655	252	-2,218	-87	-17	13,094	98	44,444	333 (N/A)	7.2	22.3	15.15
Green ash	9,557	72	-453	-42	-4	7,495	56	16,557	124 (N/A)	6.9	8.3	5.91
Sugar maple	5,367	40	-427	-27	-3	4,350	33	9,263	69 (N/A)	3.9	4.6	5.79
Siberian elm	4,286	32	-455	-26	-4	3,974	30	7,780	58 (N/A)	3.6	3.9	5.30
Northern red oak	925	7	-149	-10	-1	1,102	8	1,868	14 (N/A)	3.0	0.9	1.56
Swamp white oak	1,569	12	-44	-8	0	1,292	10	2,808	21 (N/A)	2.6	1.4	2.63
Red maple	375	3	-88	-9	-1	1,399	10	1,677	13 (N/A)	2.3	0.8	1.80
Lilac	228	2	-5	-4	0	223	2	442	3 (N/A)	2.0	0.2	0.55
Northern pin oak	2,636	20	-238	-16	-2	2,694	20	5,074	38 (N/A)	2.0	2.5	6.34
Eastern redbud	610	5	-35	-5	0	458	3	1,027	8 (N/A)	2.0	0.5	1.28
Blue spruce	413	3	-23	-10	0	1,006	8	1,387	10 (N/A)	2.0	0.7	1.73
Hickory	2,830	21	-179	-12	-1	1,987	15	4,625	35 (N/A)	1.6	2.3	6.94
Spruce	515	4	-24	-9	0	960	7	1,443	11 (N/A)	1.6	0.7	2.16
Eastern red cedar	129	1	-26	-10	0	934	7	1,027	8 (N/A)	1.6	0.5	1.54
Paper birch	1,770	13	-167	-8	-1	1,193	9	2,788	21 (N/A)	1.6	1.4	4.18
White oak	3,867	29	-698	-21	-5	3,191	24	6,339	48 (N/A)	1.6	3.2	9.51
Littleleaf linden	1,475	11	-44	-6	0	941	7	2,365	18 (N/A)	1.3	1.2	4.44
Bur oak	288	2	-6	-2	0	216	2	496	4 (N/A)	1.3	0.2	0.93
Oak	1,748	13	-111	-7	-1	1,338	10	2,967	22 (N/A)	1.0	1.5	7.42
Maple	525	4	-19	-3	0	498	4	1,001	8 (N/A)	1.0	0.5	2.50
Kentucky coffeetree	863	6	-28	-4	0	710	5	1,541	12 (N/A)	1.0	0.8	3.85
Boxelder	1,692	13	-116	-6	-1	739	6	2,308	17 (N/A)	1.0	1.2	5.77
Plum	85	1	-2	-1	0	80	1	161	1 (N/A)	1.0	0.1	0.40
Pear	746	6	-47	-5	0	643	5	1,338	10 (N/A)	0.7	0.7	5.02
Cottonwood	1,357	10	-206	-7	-2	1,127	8	2,272	17 (N/A)	0.7	1.1	8.52
Northern hackberry	620	5	-65	-4	-1	729	5	1,279	10 (N/A)	0.7	0.6	4.80
Scotch pine	36	0	0	-1	0	76	1	110	1 (N/A)	0.7	0.1	0.41
Amur maple	47	0	-1	-1	0	43	0	88	1 (N/A)	0.7	0.0	0.33
Northern white cedar	105	1	-2	-2	0	189	1	289	2 (N/A)	0.7	0.1	1.08
Norway spruce	231	2	-11	-4	0	433	3	649	5 (N/A)	0.7	0.3	2.43
Broadleaf Deciduous Smal	17	0	0	0	0	11	0	28	0 (N/A)	0.7	0.0	0.10
American elm	788	6	-109	-6	-1	1,180	9	1,852	14 (N/A)	0.7	0.9	6.95
Alder	268	2	-15	-2	0	308	2	560	4 (N/A)	0.3	0.3	4.20
Black cherry	478	4	-32	-3	0	335	3	778	6 (N/A)	0.3	0.4	5.84
Honeylocust	936	7	-32	-3	0	515	4	1,417	11 (N/A)	0.3	0.7	10.62
American sycamore	74	1	-1	-1	0	49	0	121	1 (N/A)	0.3	0.1	0.91
Ohio buckeye	5	0	0	0	0	7	0	12	0 (N/A)	0.3	0.0	0.09
Willow	5	0	0	0	0	7	0	12	0 (N/A)	0.3	0.0	0.09
Southern magnolia	143	1	-9	-2	0	388	3	520	4 (N/A)	0.3	0.3	3.90
Ginkgo	2	0	0	0	0	4	0	6	0 (N/A)	0.3	0.0	0.04
Black maple	3	0	0	0	0	7	0	9	0 (N/A)	0.3	0.0	0.07
Citywide total	118,851	891	-8,562	-601	-69	89,762	673	199,451	1,496 (N/A)	100.0	100.0	4.92

Table 6: Annual Social and Aesthetic Benefits

Riverside

Annual Aesthetic/Other Benefits of Public Trees

8/6/2020

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Black walnut	2,070	(N/A)	13.2	18.2	51.76
Norway maple	889	(N/A)	8.6	7.8	34.19
Apple	135	(N/A)	8.6	1.2	5.19
Eastern white pine	802	(N/A)	7.6	7.0	34.88
Silver maple	2,557	(N/A)	7.2	22.4	116.24
Green ash	951	(N/A)	6.9	8.3	45.28
Sugar maple	576	(N/A)	3.9	5.1	47.97
Siberian elm	355	(N/A)	3.6	3.1	32.30
Northern red oak	75	(N/A)	3.0	0.7	8.38
Swamp white oak	183	(N/A)	2.6	1.6	22.84
Red maple	67	(N/A)	2.3	0.6	9.58
Lilac	12	(N/A)	2.0	0.1	2.06
Northern pin oak	243	(N/A)	2.0	2.1	40.47
Eastern redbud	35	(N/A)	2.0	0.3	5.84
Blue spruce	134	(N/A)	2.0	1.2	22.38
Hickory	255	(N/A)	1.6	2.2	51.08
Spruce	145	(N/A)	1.6	1.3	28.94
Eastern red cedar	41	(N/A)	1.6	0.4	8.21
Paper birch	159	(N/A)	1.6	1.4	31.80
White oak	277	(N/A)	1.6	2.4	55.36
Littleleaf linden	173	(N/A)	1.3	1.5	43.15
Bur oak	54	(N/A)	1.3	0.5	13.45
Oak	157	(N/A)	1.0	1.4	52.43
Maple	73	(N/A)	1.0	0.6	24.40
Kentucky coffeetree	103	(N/A)	1.0	0.9	34.32
Boxelder	125	(N/A)	1.0	1.1	41.57
Plum	4	(N/A)	1.0	0.0	1.38
Pear	44	(N/A)	0.7	0.4	22.14
Cottonwood	104	(N/A)	0.7	0.9	52.10
Northern hackberry	76	(N/A)	0.7	0.7	38.18
Scotch pine	14	(N/A)	0.7	0.1	6.83
Amur maple	2	(N/A)	0.7	0.0	1.05
Northern white cedar	31	(N/A)	0.7	0.3	15.42
Norway spruce	65	(N/A)	0.7	0.6	32.32
Broadleaf Deciduous Small	0	(N/A)	0.7	0.0	0.03
American elm	111	(N/A)	0.7	1.0	55.63
Alder	15	(N/A)	0.3	0.1	15.48
Black cherry	29	(N/A)	0.3	0.3	28.80
Honey locust	195	(N/A)	0.3	1.7	194.60
American sycamore	15	(N/A)	0.3	0.1	14.73
Ohio buckeye	3	(N/A)	0.3	0.0	2.74
Willow	3	(N/A)	0.3	0.0	2.74
Southern magnolia	35	(N/A)	0.3	0.3	34.98
Ginkgo	0	(N/A)	0.3	0.0	0.37
Black maple	0	(N/A)	0.3	0.0	0.04
Citywide total	11,393	(N/A)	100.0	100.0	37.48

Table 7: Summary of Benefits in Dollars

Riverside

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

8/6/2020

Species	Energy	CO ₂	Air Quality	Stormwater	Aesthetic/Other	Total (\$)	Standard Error	% of Total \$
Black walnut	2,066	288	349	2,472	2,070	7,245	(N/A)	17.9
Norway maple	1,228	136	213	1,260	889	3,725	(N/A)	9.2
Apple	323	35	51	149	135	694	(N/A)	1.7
Eastern white pine	566	57	49	1,182	802	2,656	(N/A)	6.6
Silver maple	1,614	333	300	3,098	2,557	7,903	(N/A)	19.5
Green ash	898	124	148	912	951	3,033	(N/A)	7.5
Sugar maple	540	69	85	694	576	1,964	(N/A)	4.8
Siberian elm	484	58	91	641	355	1,629	(N/A)	4.0
Northern red oak	142	14	20	180	75	431	(N/A)	1.1
Swamp white oak	172	21	25	115	183	516	(N/A)	1.3
Red maple	180	13	32	194	67	485	(N/A)	1.2
Lilac	32	3	4	11	12	64	(N/A)	0.2
Northern pin oak	352	38	62	409	243	1,104	(N/A)	2.7
Eastern redbud	64	8	11	38	35	155	(N/A)	0.4
Blue spruce	120	10	14	195	134	473	(N/A)	1.2
Hickory	250	35	42	303	255	886	(N/A)	2.2
Spruce	110	11	13	183	145	461	(N/A)	1.1
Eastern red cedar	123	8	11	221	41	404	(N/A)	1.0
Paper birch	152	21	27	229	159	587	(N/A)	1.4
White oak	400	48	79	718	277	1,522	(N/A)	3.8
Littleleaf linden	114	18	18	93	173	415	(N/A)	1.0
Bur oak	28	4	4	22	54	111	(N/A)	0.3
Oak	159	22	27	186	157	553	(N/A)	1.4
Maple	58	8	10	48	73	196	(N/A)	0.5
Kentucky coffeetree	86	12	13	73	103	286	(N/A)	0.7
Boxelder	94	17	16	136	125	388	(N/A)	1.0
Plum	12	1	2	4	4	22	(N/A)	0.1
Pear	84	10	15	50	44	203	(N/A)	0.5
Cottonwood	135	17	26	236	104	519	(N/A)	1.3
Northern hackberry	93	10	18	136	76	333	(N/A)	0.8
Scotch pine	11	1	1	12	14	38	(N/A)	0.1
Amur maple	6	1	1	2	2	12	(N/A)	0.0
Northern white cedar	27	2	3	32	31	95	(N/A)	0.2
Norway spruce	48	5	6	83	65	207	(N/A)	0.5
Broadleaf Deciduous Sn	2	0	0	0	0	3	(N/A)	0.0
American elm	140	14	26	161	111	453	(N/A)	1.1
Alder	38	4	7	18	15	82	(N/A)	0.2
Black cherry	46	6	8	32	29	121	(N/A)	0.3
Honeylocust	65	11	11	79	195	359	(N/A)	0.9
American sycamore	6	1	1	5	15	27	(N/A)	0.1
Ohio buckeye	1	0	0	0	3	4	(N/A)	0.0
Willow	1	0	0	0	3	4	(N/A)	0.0
Southern magnolia	41	4	5	48	35	134	(N/A)	0.3
Ginkgo	1	0	0	0	0	1	(N/A)	0.0
Black maple	1	0	0	0	0	2	(N/A)	0.0
Citywide Total	11,115	1,496	1,842	14,660	11,393	40,506	(N/A)	100.0

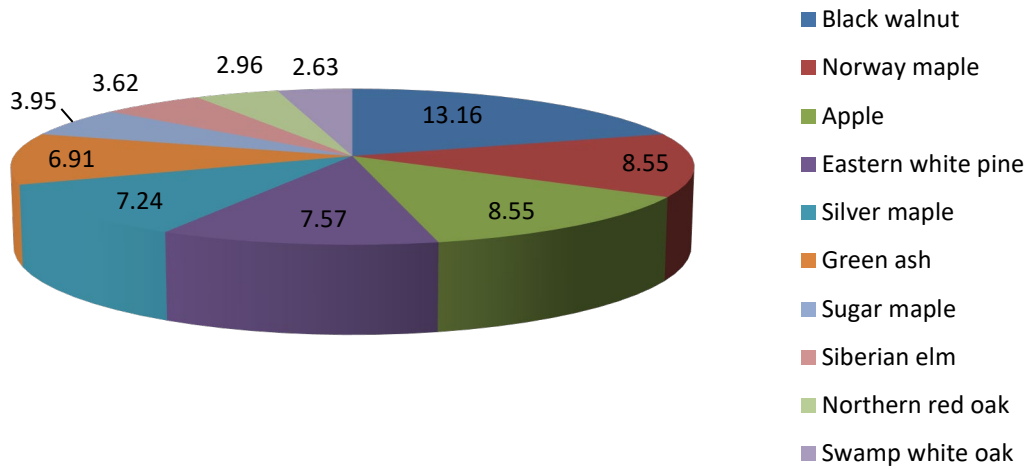


Figure 1: Species Distribution

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

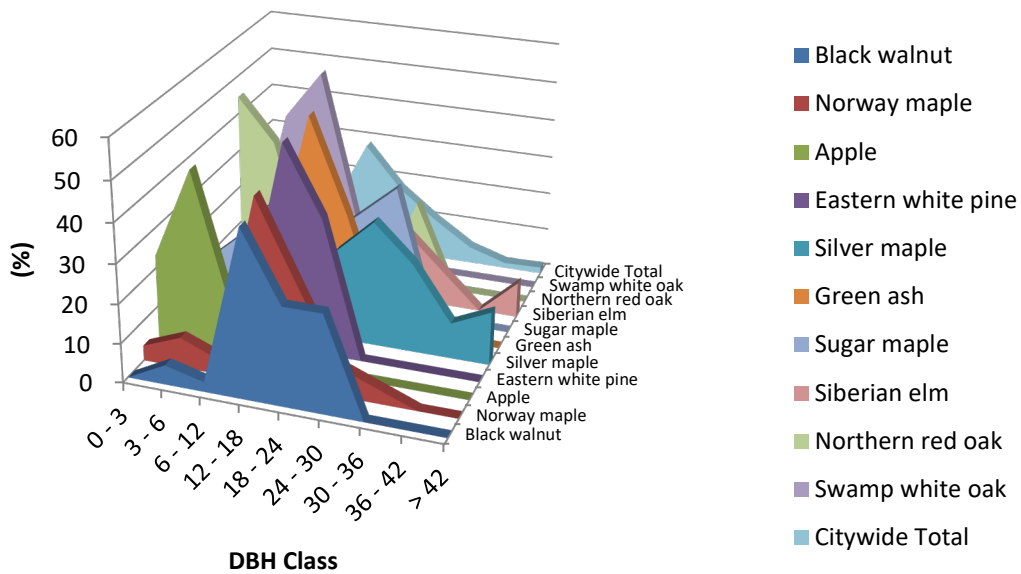


Figure 2: Relative Age Class

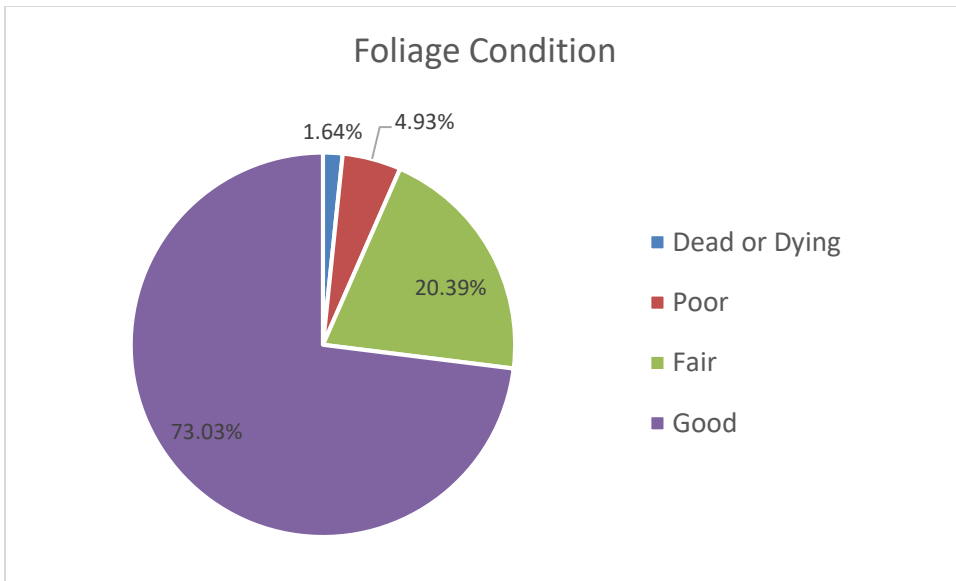


Figure 3: Foliage Condition

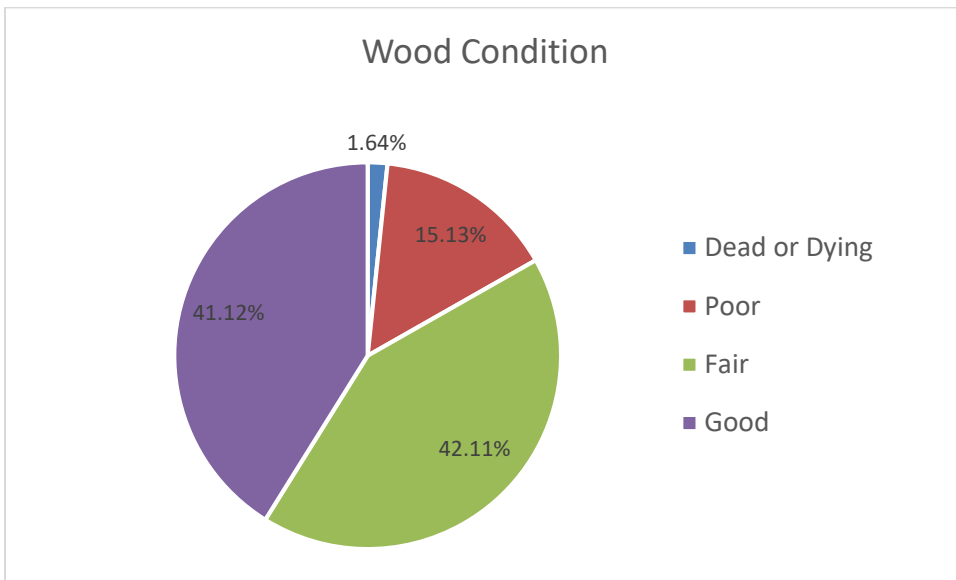


Figure 4: Wood Condition

Canopy Cover of Public Trees (Acres)

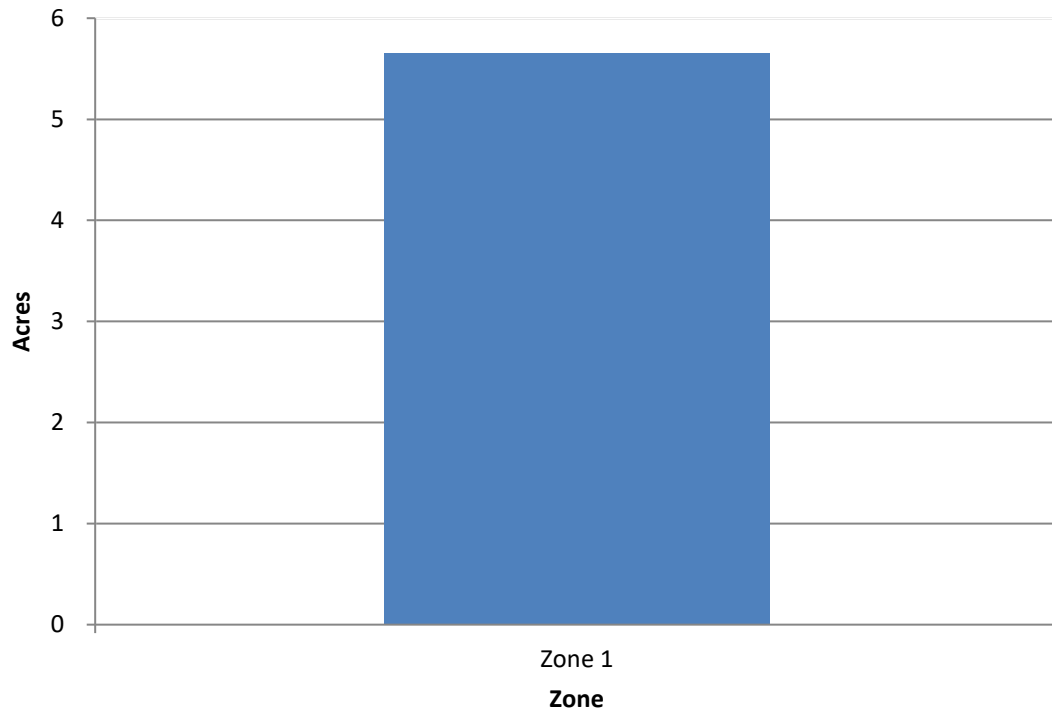


Figure 5: Canopy Cover in Acres

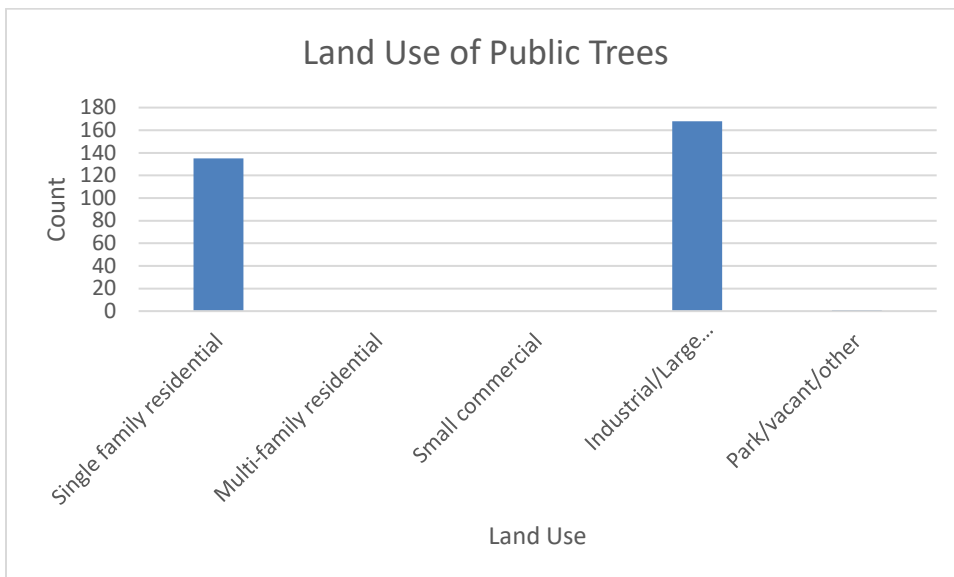


Figure 6: Land Use of city/park trees

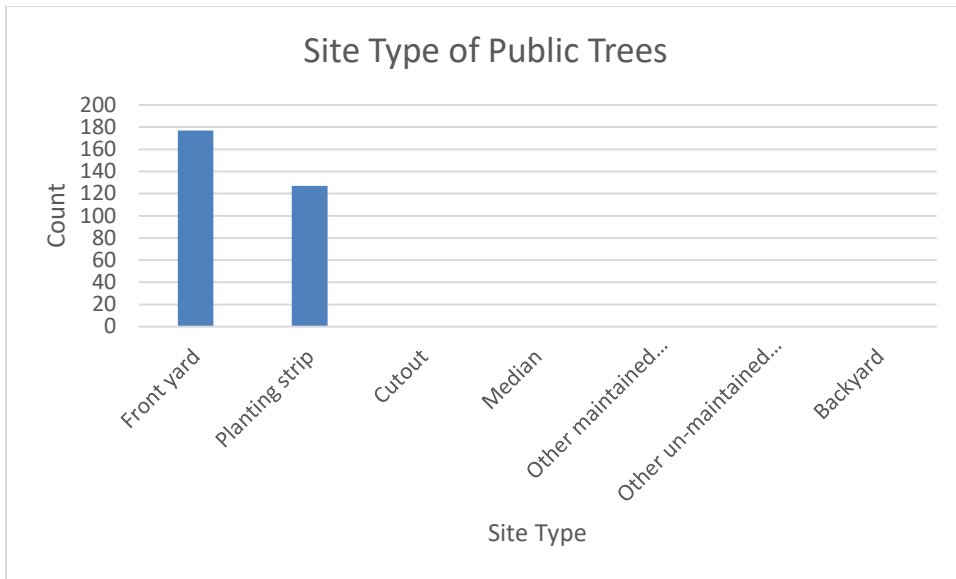


Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping

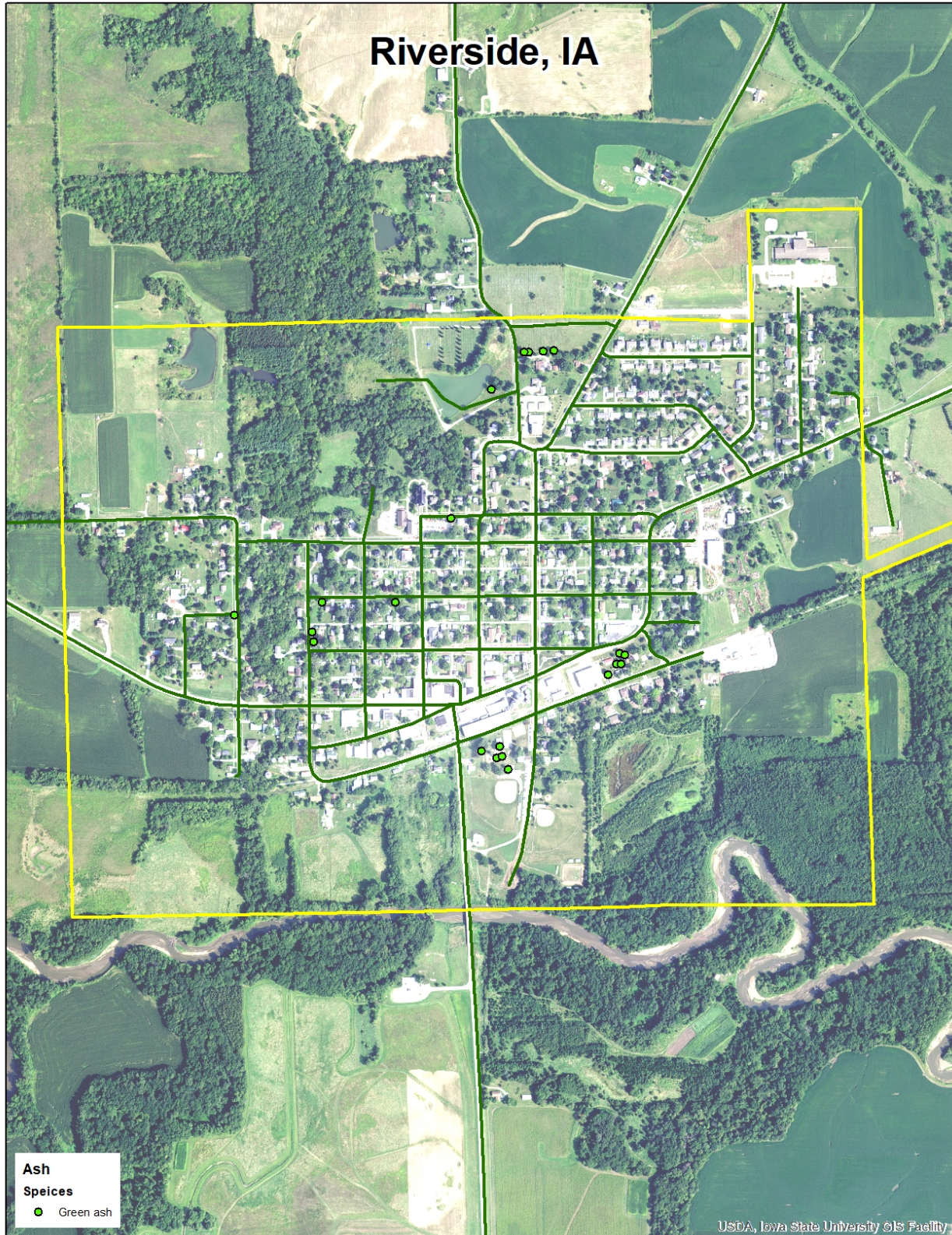


Figure 1: Location of Ash Trees

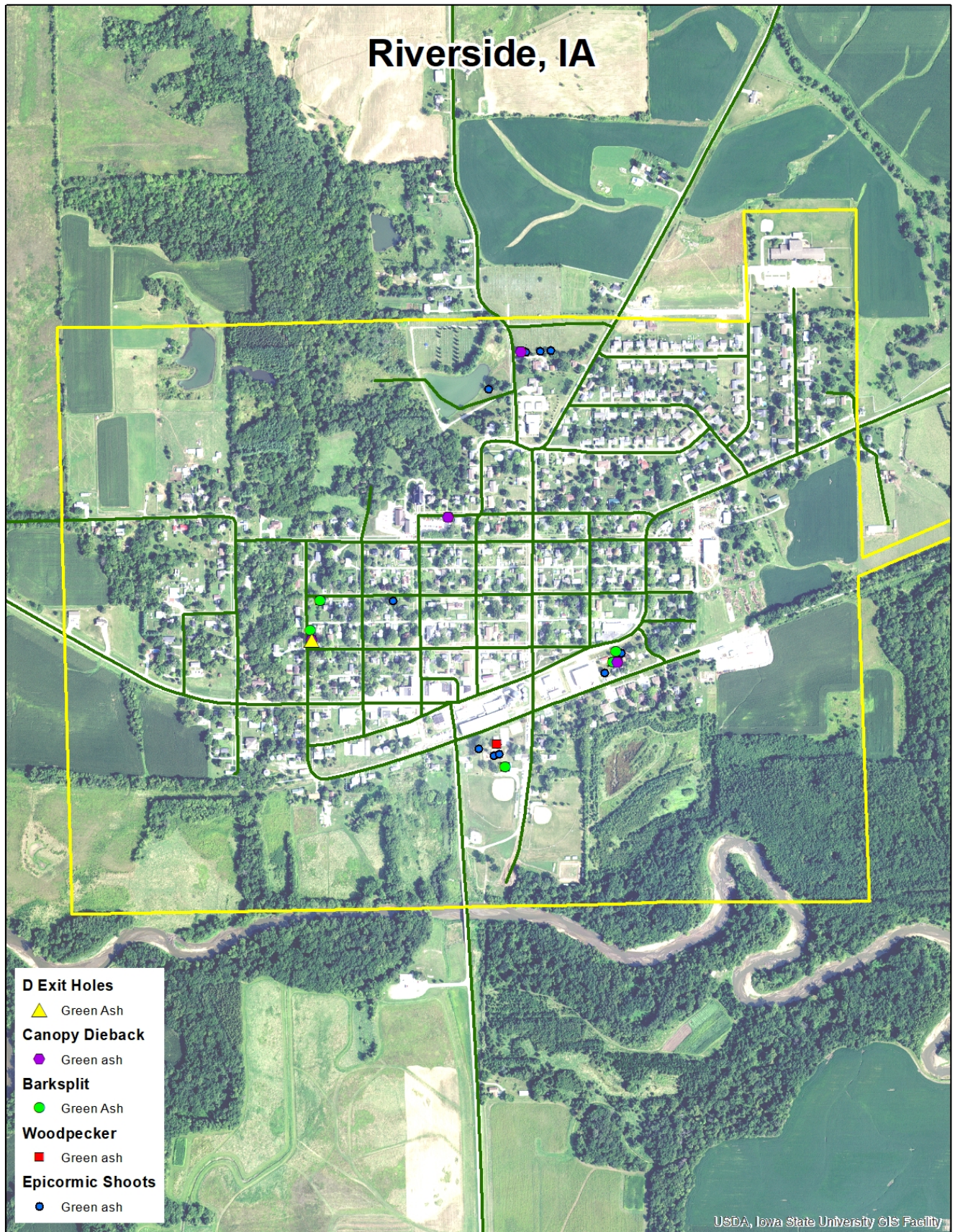


Figure 2: Location of EAB symptoms

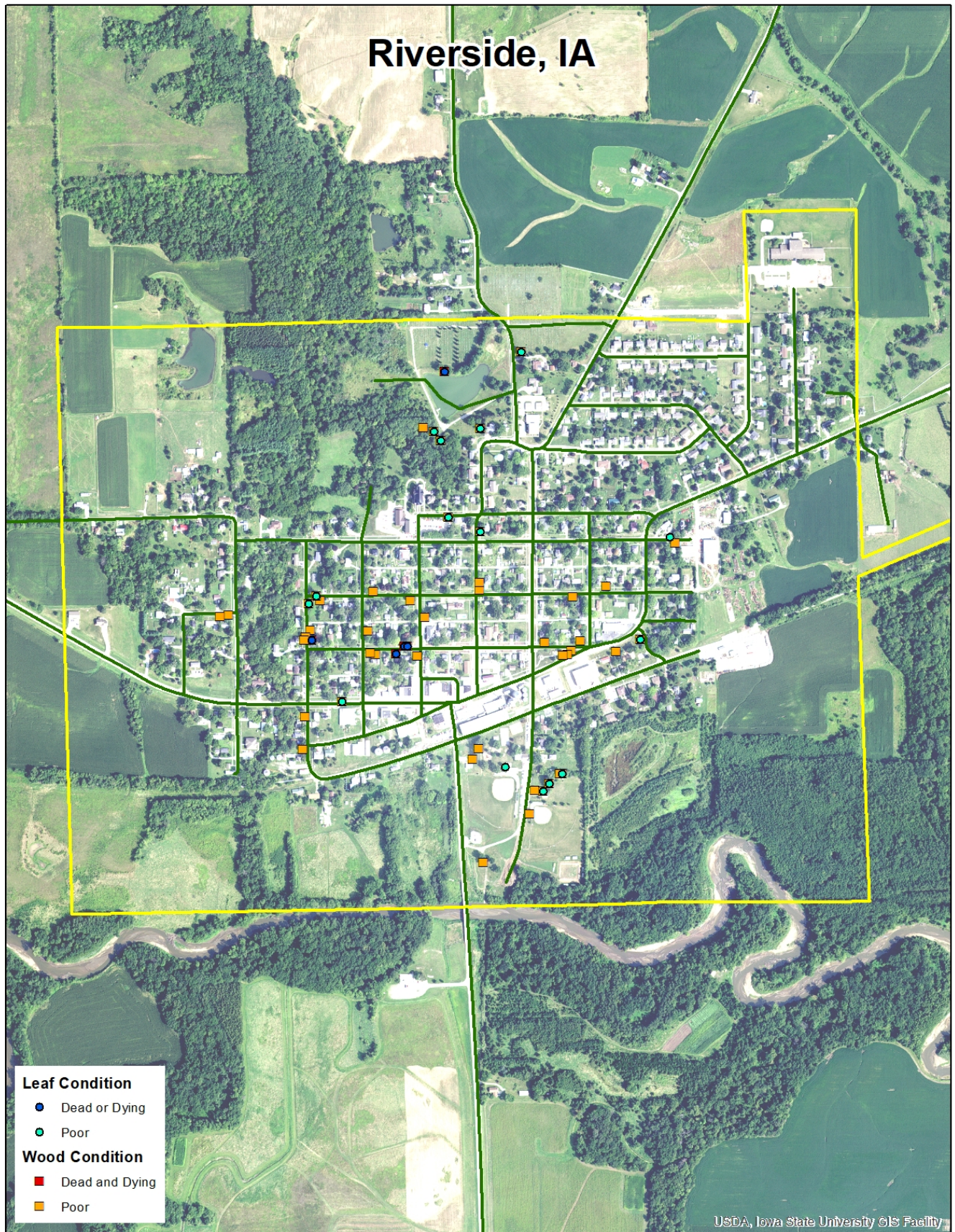


Figure 3: Location of Poor Condition Trees

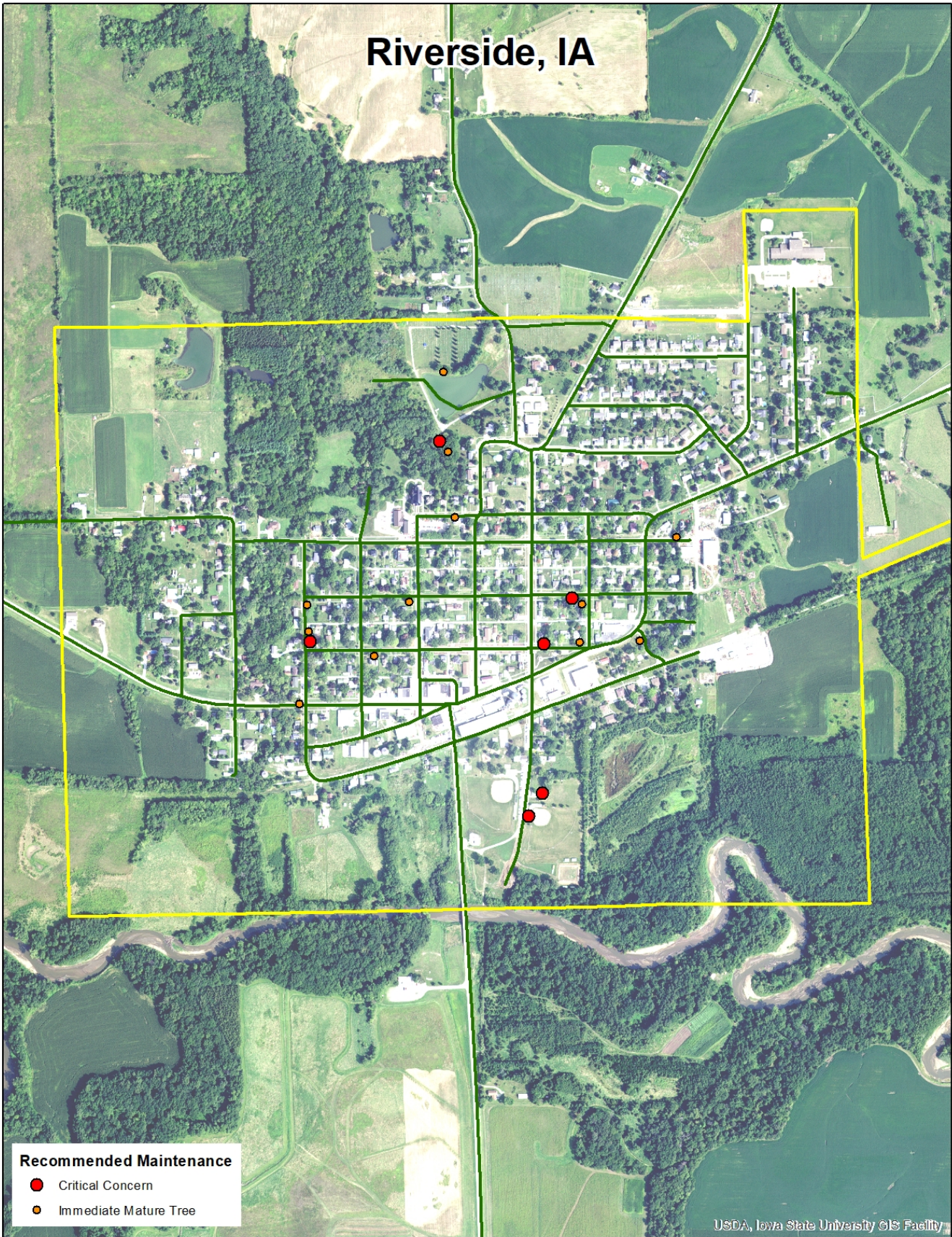


Figure 4: Location of Trees with Recommended Maintenance

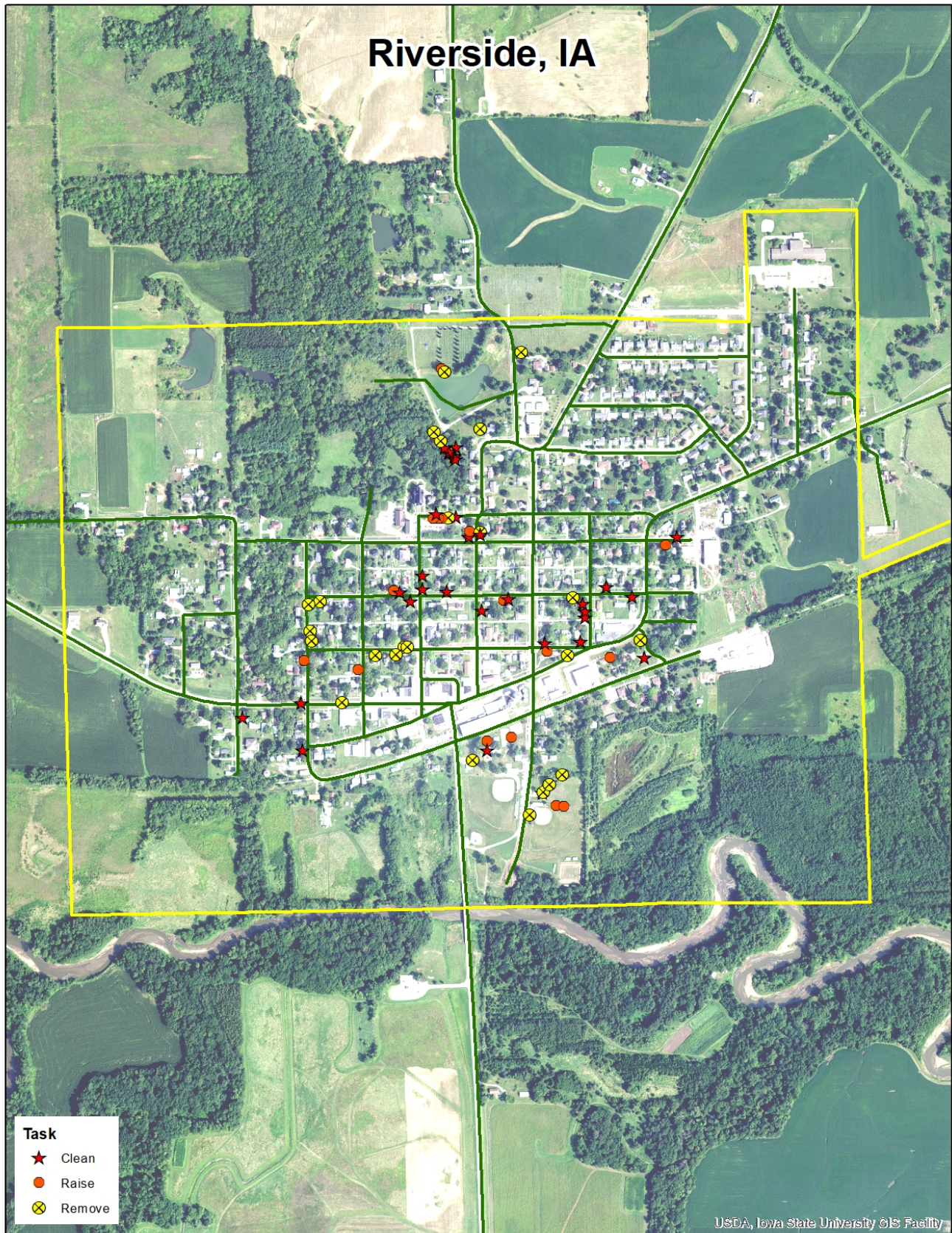


Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*

Appendix C: Riverside Tree Ordinances

CHAPTER 151 TREES

151.01 Definition 151.04 Trimming Trees to be Supervised

151.02 Planting Restrictions 151.05 Disease Control

151.03 Duty to Trim Trees 151.06 Inspection and Removal

151.01 DEFINITION. For use in this chapter, “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 DISEASE CONTROL. Any dead, diseased or damaged tree or shrub which may harbor serious insect or disease pests or disease injurious to other trees is hereby declared to be a nuisance.

151.06 INSPECTION AND REMOVAL. The Council shall inspect or cause to be inspected any trees or shrubs in the City reported or suspected to be infected with or damaged by any disease or insect or disease pests, and such trees and shrubs shall be subject to removal as follows:

1. City Property. If it is determined that any such condition exists on any public property, including the strip between the curb and the lot line of private property, the Council may cause such condition to be corrected by treatment or removal. The Council may also order the removal of any trees on the streets of the City which interfere with the making of improvements or with travel thereon.

2. Private Property. If it is determined with reasonable certainty that any such condition exists on private property and that danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Council shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days of said notification. If such owner, occupant, or person in charge of said property fails to comply within 14 days of receipt of notice, the Council may cause the condition to be corrected and the cost assessed against the property.

(Code of Iowa, Sec. 364.12[3b & h])

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.