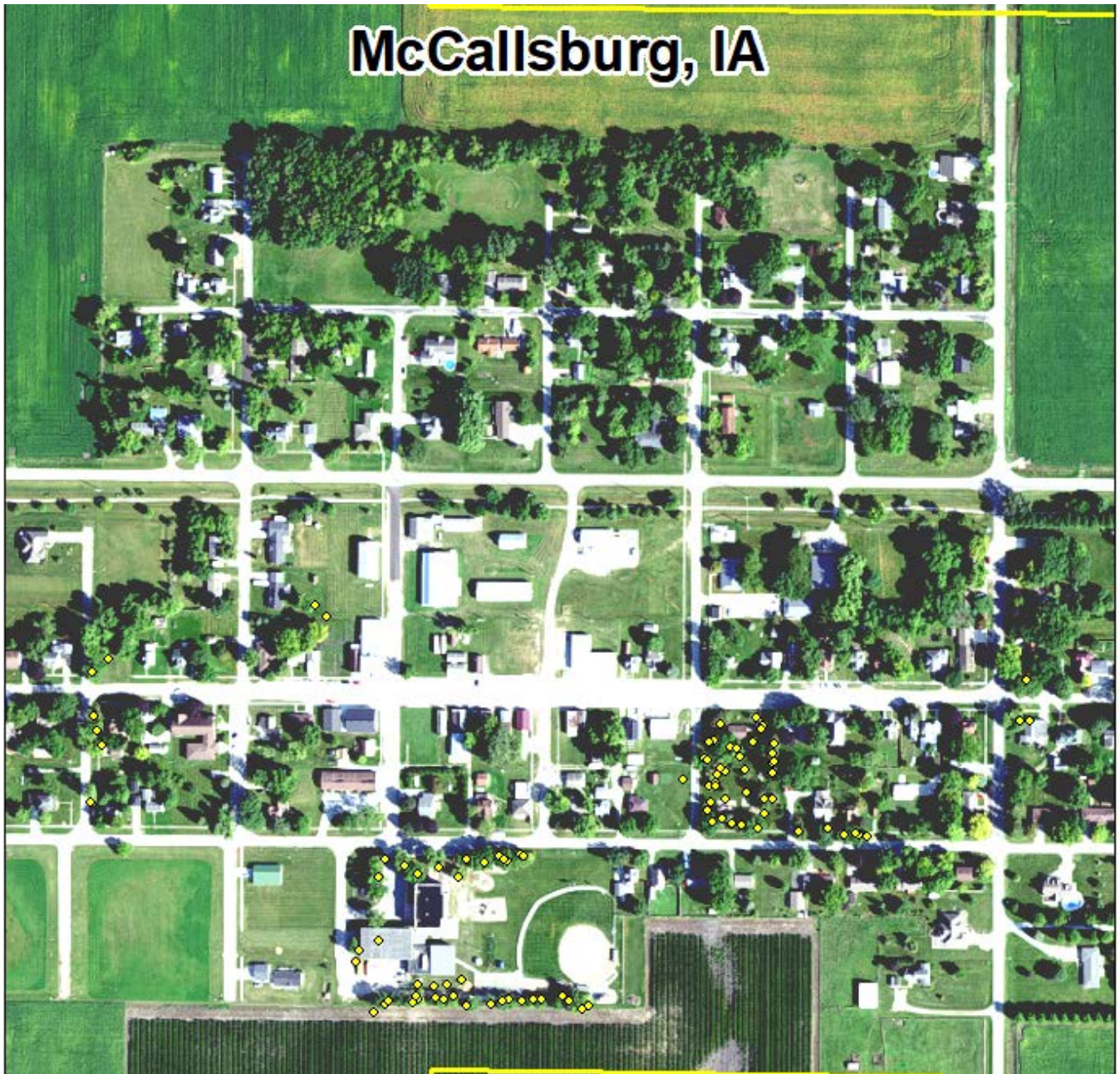


# McCallsburg, IA



2019 Urban Forest Management Plan  
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# Executive Summary

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## Overview

This plan was developed to assist the City of McCallsburg 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 43% of McCallsburg'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 2018, 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 96 trees inventoried.

- McCallsburg's trees provide \$16,698 of benefits annually, an average of \$174 a tree
- There are over 12 species of trees
- The top three genera are: Ash 43%, Maple 24%, and Spruce 9%
- 31% of trees are in need of some type of management
- 10 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 10 trees needing removal, 1 trees are over 42 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\\*](#)
- 11 of the 42 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 (\$2 per capita = \$666 estimated) it could take 44 years to remove ash – Suggestion: request a budget increase to \$4,950 annually and apply for grants to plant replacement trees
- Develop community tree ordinances

# Introduction

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This plan was developed to assist McCallsburg 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 McCallsburg, these costs can be extended over years and public safety issues from dead and dying ash trees mitigated.

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

## Inventory

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In 2018, 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

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The data collected for the 96 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

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### **Annual Energy Benefits**

Trees conserve energy by shading buildings and blocking winds. McCallsburg's trees reduce energy related costs by approximately \$4,435 annually (Appendix A, Table 1). These savings are both in Electricity (21.5 MWh) and in Natural Gas (2,863.1 Therms).

### **Annual Stormwater Benefits**

McCallsburg's trees intercept about 230,962 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides \$6,259 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 McCallsburg, it is estimated that trees remove 268.3 lbs of air pollution (ozone (O<sub>3</sub>), particulate matter less than 10 microns (PM<sub>10</sub>), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), and sulfur dioxide (SO<sub>2</sub>)) per year with a net value of \$751 (Appendix A, Table 3).

### **Annual Carbon Benefits**

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In McCallsburg, trees sequester about 52,028 lbs of carbon a year with an associated value of \$390 (Appendix A, Table 5). In addition, the trees store 889,262 lbs of carbon, with a yearly benefit of \$6,669 (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. McCallsburg receives \$4,618 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, McCallsburg's trees provide \$16,689 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 96 trees in McCallsburg provide approximately \$174 annually (Appendix A, Table 7).

# Forest Structure

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## Species Distribution

McCallsburg has over 12 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Ash	42	43%
Maple	23	24%
Spruce	9	9%
Apple (Crab)	9	9%
Oak	4	4%
Alder	3	3%
Locust	2	2%
Other Large Evergreen	4	4%

## Age Class

Most of McCallsburg's trees (48%) 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. McCallsburg'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 McCallsburg indicate that 71% of the trees are in good health, with only 15% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 84% of McCallsburg'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 11% of the population. This 11% 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).

Tree Removal	10	10%
Crown Cleaning	9	9%
Crown Reduction	6	6%
Treat Pest/Disease	2	2%
Tree Staking	2	2%
Crown Raising	1	1%

## Canopy Cover

The total canopy with both private and public trees is 11%, 35 acres. The canopy cover included in the McCallsburg inventory includes approximately 2.3 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 25 trees need to be planted annually on public and private lands.

## Land Use and Location

The majority of McCallsburg's city and park trees are in planting strips in single family residential neighborhoods (Appendix A, Figure 6 & Appendix A, Figure 7). The following describes the land use and locations for the street and park trees.

<u>Land Use</u>	
Single family residential	60%
Park/vacant/other	39%
<u>Location</u>	
Front yard	86%
Planting strip	13%

## Recommendations

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### 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

McCallsburg has 1 immediate concern trees that needs immediate removal. This tree 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 trees first. Please refer to the six year maintenance plan at the end of this section. After the immediate concern tree is addressed, there should be follow up on the trees marked as needing maintenance. There are a total of 30 trees with these needs.

#### Poor tree species

After the removal of the immediate concern trees, ash trees in poor health should be assessed for removal (Appendix B, Figure 3 & Appendix B, Figure 4). There are a total of 42 ash trees, and 11 of those have signs and symptoms that have been associated with EAB. In addition, there is 1 tree that is 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 McCallsburg.

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 (24%) (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.

## **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**

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## **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](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. 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.

# PROPOSED WORK SCHEDULE AND ESTIMATED COSTS

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## **YEAR 1**

## **ESTIMATED COSTS**

Remove 1 recommended tree & 3 ash trees	\$2,800
Plant 10 trees in open locations	\$1,000
Water & Maintenance	\$500
Inspect ash trees for signs of Emerald Ash Borer	

## **YEAR 2**

Remove 3 ash trees	\$2,100
Plant 10 trees in open locations	\$1,000
Water & Maintenance	\$500
Prune 1/3 of city owned trees	\$960
Inspect ash trees for signs of Emerald Ash Borer	

## **YEAR 3**

Remove 3 ash trees	\$2,100
Plant 10 trees in open locations	\$1,000
Water & Maintenance	\$500
Inspect ash trees for signs of EAB	

## **YEAR 4**

Remove 3 ash trees	\$2,100
Plant 10 trees in open locations	\$1,000
Water & Maintenance	\$500
Prune 1/3 of city owned trees	\$960
Inspect ash trees for signs of EAB	

## **YEAR 5**

Remove 3 ash trees	\$2,100
Plant 10 trees in open locations	\$1,000
Water & Maintenance	\$500
Inspect ash trees for signs of EAB	

## **YEAR 6**

Remove 3 ash trees	\$2,100
Plant 10 trees in open locations	\$1,000
Water & Maintenance	\$500
Prune 1/3 of city owned trees	\$960

### **Average annual budget: \$4,950**

Estimated costs based on average costs of \$700/tree for removal, \$100/tree for planting, \$50/tree for water and maintenance, and \$30/tree for pruning.

This plan removes 18 ash trees, or 42.8% of all ash trees in the city.

### **Purposed Budget Increase**

EAB could potentially kill all ash trees in McCallsburg within 4 years of its arrival. To remove all ash trees within 6 years the budget would need to be increased to \$6,890 a year. Additionally, it is recommended that McCallsburg apply for grants to fund replacement trees. Utility Company grants are usually between \$500 and \$10,000 for community-based, tree-planting projects that include parks, gateways, cemeteries, nature trails, libraries, nursing homes, and schools.

Another option being considered by many communities is treating a number of selected trees, either to maintain those trees in the landscape or to delay their removal – to spread out the costs and number of trees needing removed all at once. Trunk injection is administered every two years for the life of the tree. If treatment is discontinued, the tree dies. For instance, in this treatment scenario, the average ash diameter is 20 inches and at \$15 per inch, about 4 trees could be treated per year (every other year treatment). This would be 8 trees selected for treatment, and McCallsburg would still need to find \$3,966 for removal. Alternatively, if there are 15 treatable trees, it would cost approximately \$2,250 a year for treatment and leave \$3,150 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 McCallsburg. 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**

McCallsburg

### Annual Energy Benefits of Public Trees

1/14/2019

Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	11.7	891	1,539.1	1,508	2,400	(N/A)	43.8	54.1	57.14
Silver maple	4.3	325	562.6	551	876	(N/A)	12.5	19.7	72.99
Norway spruce	1.2	94	161.9	159	252	(N/A)	9.4	5.7	28.04
Apple	1.2	91	165.2	162	253	(N/A)	9.4	5.7	28.14
Red maple	0.5	37	65.3	64	101	(N/A)	6.3	2.3	16.86
Broadleaf Evergreen Medium	0.3	25	50.8	50	75	(N/A)	4.2	1.7	18.82
Northern red oak	0.3	23	39.9	39	62	(N/A)	4.2	1.4	15.54
Alder	0.2	17	38.5	38	55	(N/A)	3.1	1.2	18.19
Norway maple	1.0	73	142.2	139	213	(N/A)	3.1	4.8	70.84
Amur maple	0.1	11	25.7	25	36	(N/A)	2.1	0.8	18.19
Honeylocust	0.3	23	42.3	41	65	(N/A)	1.0	1.5	64.79
Black locust	0.2	18	29.5	29	47	(N/A)	1.0	1.1	46.78
Total	21.5	1,629	2,863.1	2,806	4,435	(N/A)	100.0	100.0	46.20

**Table 2: Annual Stormwater Benefits**

McCallsburg

### Annual Stormwater Benefits of Public Trees

1/14/2019

Species	Total rainfall interception (Gal)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	116,531	3,158	(N/A)	43.8	50.5	75.19
Silver maple	62,681	1,699	(N/A)	12.5	27.1	141.56
Norway spruce	23,123	627	(N/A)	9.4	10.0	69.63
Apple	4,340	118	(N/A)	9.4	1.9	13.07
Red maple	2,889	78	(N/A)	6.3	1.3	13.05
Broadleaf Evergreen Medium	2,707	73	(N/A)	4.2	1.2	18.34
Northern red oak	1,760	48	(N/A)	4.2	0.8	11.92
Alder	793	22	(N/A)	3.1	0.3	7.17
Norway maple	11,293	306	(N/A)	3.1	4.9	102.01
Amur maple	529	14	(N/A)	2.1	0.2	7.17
Honeylocust	2,905	79	(N/A)	1.0	1.3	78.73
Black locust	1,409	38	(N/A)	1.0	0.6	38.19
Citywide total	230,962	6,259	(N/A)	100.0	100.0	65.20



**Table 3: Annual Air Quality Benefits**

McCallsburg

**Annual Air Quality Benefits of Public Trees**

1/14/2019

Species	Deposition (lb)				Total Depos. (\$)	Avoided (lb)				Total Avoided (\$)	BVOC Emissions (lb)	BVOC Emissions (\$)	Total (lb)	Total Standard (\$) Error	% of Total Trees	Avg. \$/tree
	O <sub>3</sub>	NO <sub>2</sub>	PM <sub>10</sub>	SO <sub>2</sub>		NO <sub>2</sub>	PM <sub>10</sub>	VOC	SO <sub>2</sub>							
Green ash	14.4	2.3	7.0	0.6	77	55.5	8.1	7.8	53.2	347	0.0	0	149.0	424 (N/A)	43.8	10.10
Silver maple	11.7	2.0	5.7	0.5	63	20.2	3.0	2.8	19.3	126	-6.4	-24	58.8	165 (N/A)	12.5	13.77
Norway spruce	2.7	0.5	2.2	0.3	18	5.8	0.9	0.8	5.6	36	-11.0	-41	7.8	13 (N/A)	9.4	1.42
Apple	1.3	0.2	0.6	0.1	7	5.8	0.8	0.8	5.5	36	0.0	0	15.0	43 (N/A)	9.4	4.74
Red maple	0.5	0.1	0.2	0.0	3	2.3	0.3	0.3	2.2	15	-0.2	-1	5.8	16 (N/A)	6.3	2.74
Broadleaf Evergreen Medium	0.1	0.0	0.2	0.0	1	1.6	0.2	0.2	1.5	10	-0.7	-3	3.2	8 (N/A)	4.2	2.10
Northern red oak	0.3	0.0	0.2	0.0	2	1.4	0.2	0.2	1.4	9	-0.4	-1	3.3	9 (N/A)	4.2	2.27
Alder	0.1	0.0	0.1	0.0	1	1.1	0.2	0.2	1.0	7	0.0	0	2.7	8 (N/A)	3.1	2.55
Norway maple	2.6	0.4	1.2	0.1	14	4.7	0.7	0.6	4.4	29	-0.6	-2	14.2	41 (N/A)	3.1	13.58
Amur maple	0.1	0.0	0.1	0.0	1	0.8	0.1	0.1	0.7	5	0.0	0	1.8	5 (N/A)	2.1	2.55
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)	1.0	10.61
Black locust	0.2	0.0	0.1	0.0	1	1.1	0.2	0.2	1.1	7	-0.1	0	2.8	8 (N/A)	1.0	7.92
Citywide total	34.6	5.8	17.8	1.8	189	101.8	14.9	14.2	97.2	636	-19.7	-74	268.3	751 (N/A)	100.0	7.82

**Table 4: Annual Carbon Stored**

McCallsburg

**Stored CO2 Benefits of Public Trees**

1/14/2019

Species	Total Stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	476,675	3,575	(N/A)	43.8	53.6	85.12
Silver maple	296,260	2,222	(N/A)	12.5	33.3	185.16
Norway spruce	26,801	201	(N/A)	9.4	3.0	22.33
Apple	19,322	145	(N/A)	9.4	2.2	16.10
Red maple	5,876	44	(N/A)	6.3	0.7	7.35
Broadleaf Evergreen l	1,935	15	(N/A)	4.2	0.2	3.63
Northern red oak	4,645	35	(N/A)	4.2	0.5	8.71
Alder	2,724	20	(N/A)	3.1	0.3	6.81
Norway maple	42,840	321	(N/A)	3.1	4.8	107.10
Amur maple	1,816	14	(N/A)	2.1	0.2	6.81
Honeylocust	6,743	51	(N/A)	1.0	0.8	50.57
Black locust	3,624	27	(N/A)	1.0	0.4	27.18
Citywide total	889,262	6,669	(N/A)	100.0	100.0	69.47

**Table 5: Annual Carbon Sequestered**

McCallsburg

**Annual CO<sub>2</sub> Benefits of Public Trees**

1/14/2019

Species	Sequestered (lb)	Sequestered (\$)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released (\$)	Avoided (lb)	Avoided (\$)	Net Total (lb)	Total Standard (\$ Error)	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	25,559	192	-2,288	-116	-18	19,701	148	42,856	321 (N/A)	43.8	51.3	7.65
Silver maple	19,849	149	-1,422	-49	-11	7,172	54	25,551	192 (N/A)	12.5	30.6	15.97
Norway spruce	1,477	11	-129	-22	-1	2,070	16	3,396	25 (N/A)	9.4	4.1	2.83
Apple	1,766	13	-93	-14	-1	2,018	15	3,678	28 (N/A)	9.4	4.4	3.06
Red maple	822	6	-28	-5	0	822	6	1,611	12 (N/A)	6.3	1.9	2.01
Broadleaf Evergreen Medi	225	2	-9	-5	0	563	4	774	6 (N/A)	4.2	0.9	1.45
Northern red oak	438	3	-22	-4	0	510	4	923	7 (N/A)	4.2	1.1	1.73
Alder	342	3	-13	-4	0	372	3	697	5 (N/A)	3.1	0.8	1.74
Norway maple	0	0	-206	-13	-2	1,616	12	1,397	10 (N/A)	3.1	1.7	3.49
Amur maple	228	2	-9	-2	0	248	2	465	3 (N/A)	2.1	0.6	1.74
Honeylocust	936	7	-32	-3	0	515	4	1,417	11 (N/A)	1.0	1.7	10.62
Black locust	386	3	-17	-2	0	395	3	762	6 (N/A)	1.0	0.9	5.71
Citywide total	52,028	390	-4,269	-238	-34	36,004	270	83,526	626 (N/A)	100.0	100.0	6.53

**Table 6: Annual Social and Aesthetic Benefits**

McCallsburg

**Annual Aesthetic/Other Benefits of Public Trees**

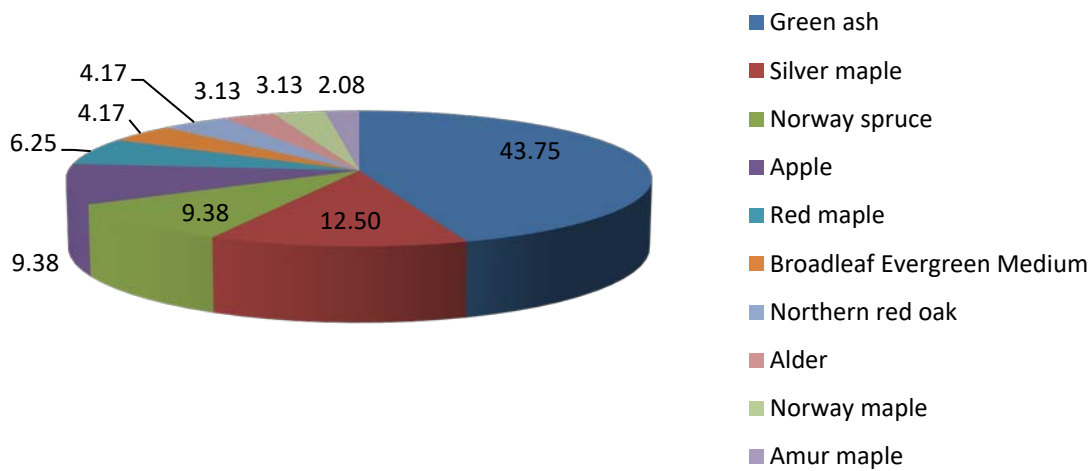
1/14/2019

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	2,203	(N/A)	43.8	47.7	52.44
Silver maple	1,449	(N/A)	12.5	31.4	120.77
Norway spruce	342	(N/A)	9.4	7.4	37.97
Apple	101	(N/A)	9.4	2.2	11.27
Red maple	126	(N/A)	6.3	2.7	20.95
Broadleaf Evergreen Medium	88	(N/A)	4.2	1.9	21.93
Northern red oak	43	(N/A)	4.2	0.9	10.85
Alder	19	(N/A)	3.1	0.4	6.40
Norway maple	0	(N/A)	3.1	0.0	0.00
Amur maple	13	(N/A)	2.1	0.3	6.40
Honeylocust	195	(N/A)	1.0	4.2	194.60
Black locust	39	(N/A)	1.0	0.8	39.16
Citywide total	4,618	(N/A)	100.0	100.0	48.10

**Table 7: Summary of Benefits in Dollars****McCallsburg****Total Annual Benefits of Public Trees by Species (\$)**

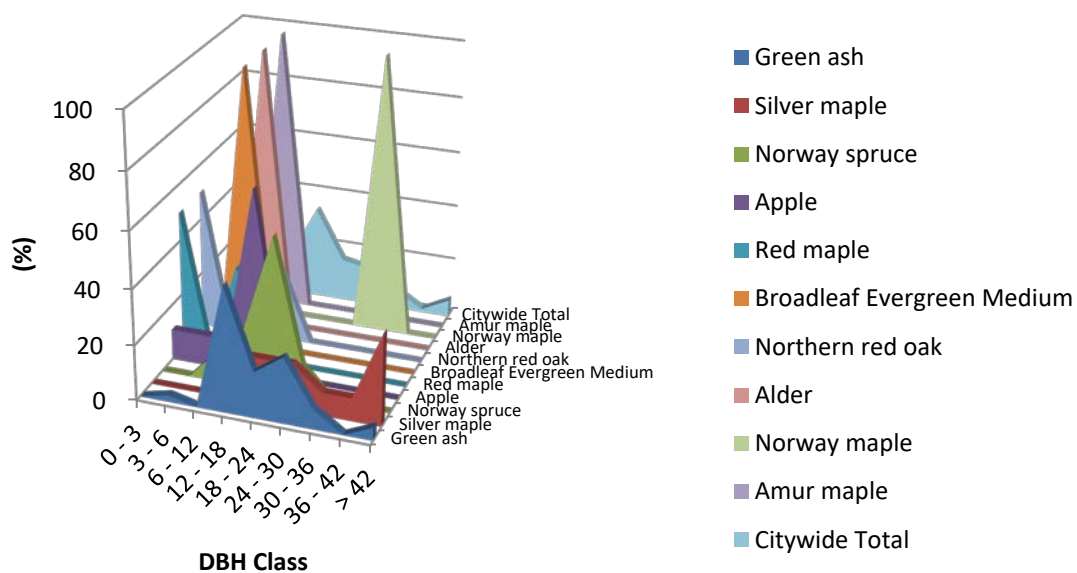
1/14/2019

Species	Energy	CO <sub>2</sub>	Air Quality	Stormwater	Aesthetic/Other	Total (\$)	Standard Error	% of Total \$
Green ash	2,400	321	424	3,158	2,203	8,506	(N/A)	51.0
Silver maple	876	192	165	1,699	1,449	4,381	(N/A)	26.2
Norway spruce	252	25	13	627	342	1,259	(N/A)	7.5
Apple	253	28	43	118	101	543	(N/A)	3.3
Red maple	101	12	16	78	126	334	(N/A)	2.0
Broadleaf Evergreen Me	75	6	8	73	88	251	(N/A)	1.5
Northern red oak	62	7	9	48	43	169	(N/A)	1.0
Alder	55	5	8	22	19	108	(N/A)	0.6
Norway maple	213	10	41	306	0	570	(N/A)	3.4
Amur maple	36	3	5	14	13	72	(N/A)	0.4
Honeylocust	65	11	11	79	195	359	(N/A)	2.2
Black locust	47	6	8	38	39	138	(N/A)	0.8
Citywide Total	4,435	626	751	6,259	4,618	16,689	(N/A)	100.0

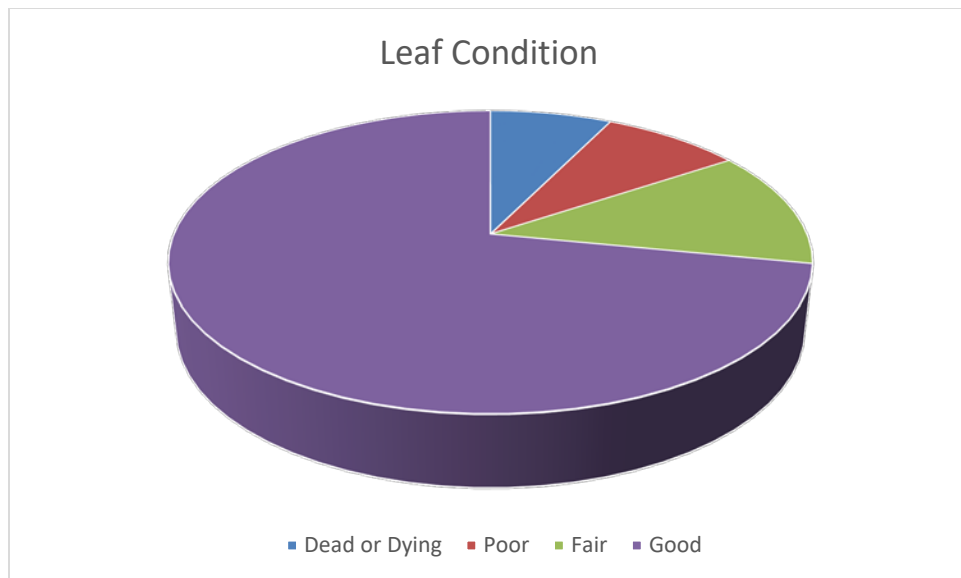


**Figure 1: Species Distribution**

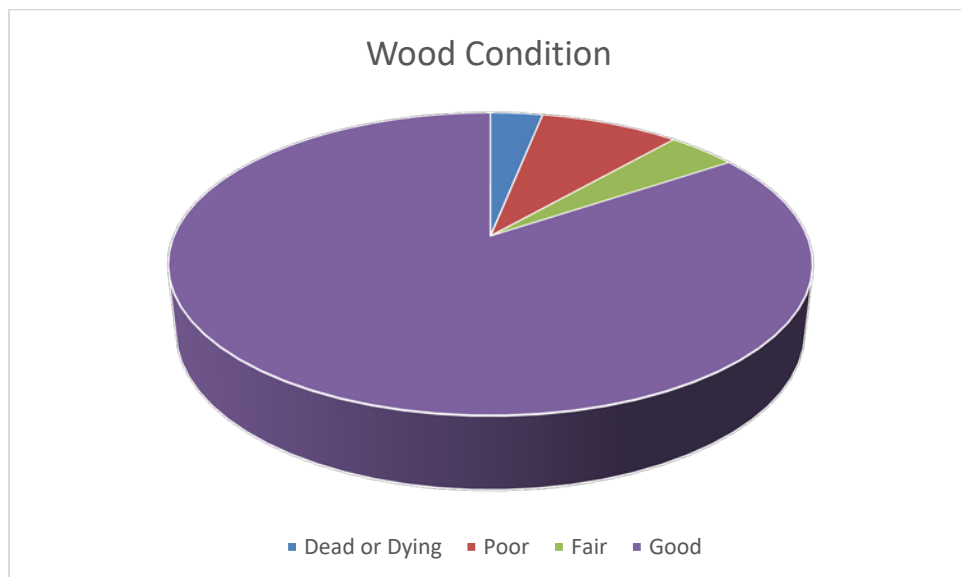
## Relative Age Distribution of Top 10 Public Tree Species (%)



**Figure 2: Relative Age Class**

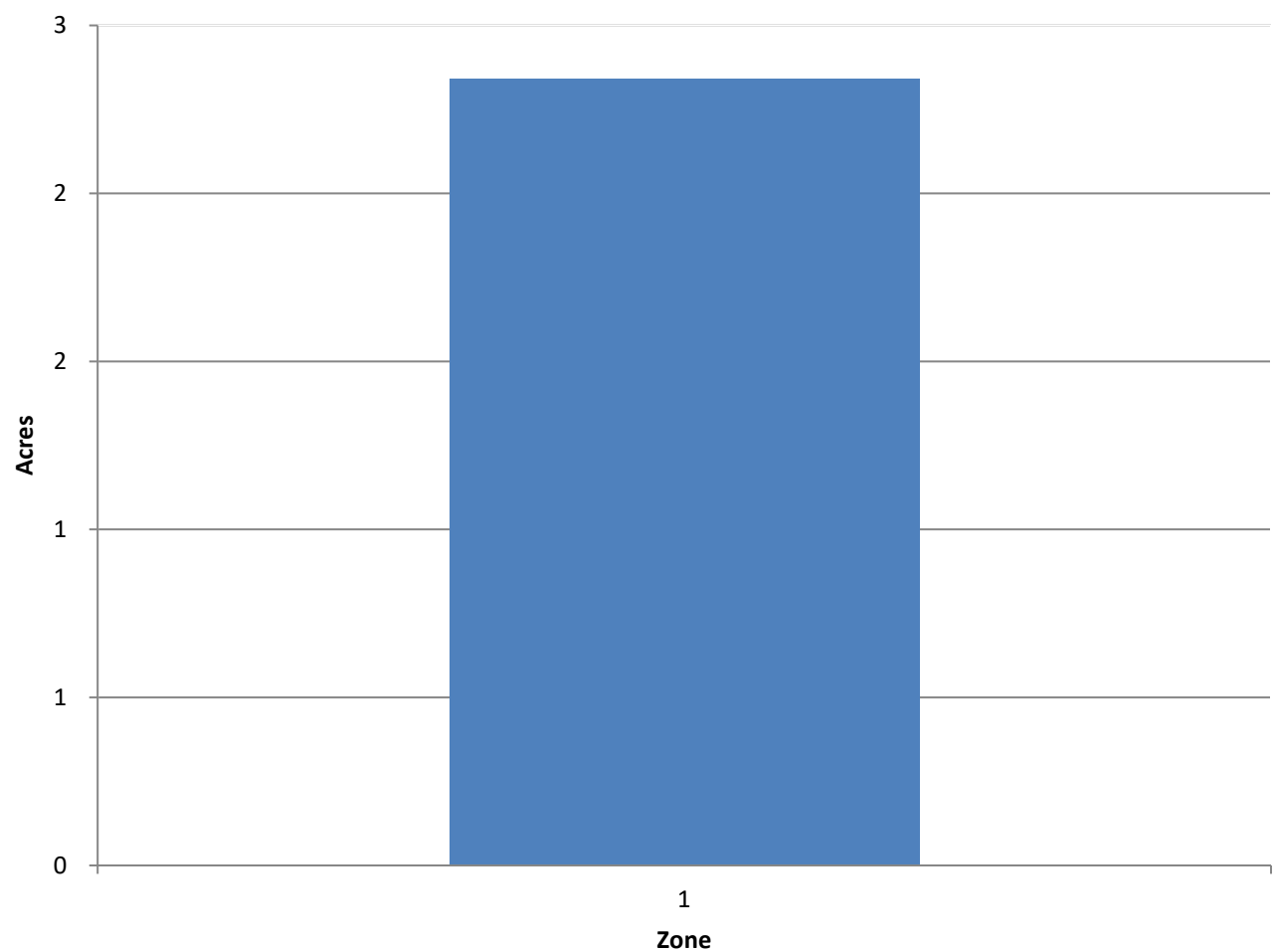


**Figure 3: Foliage Condition**



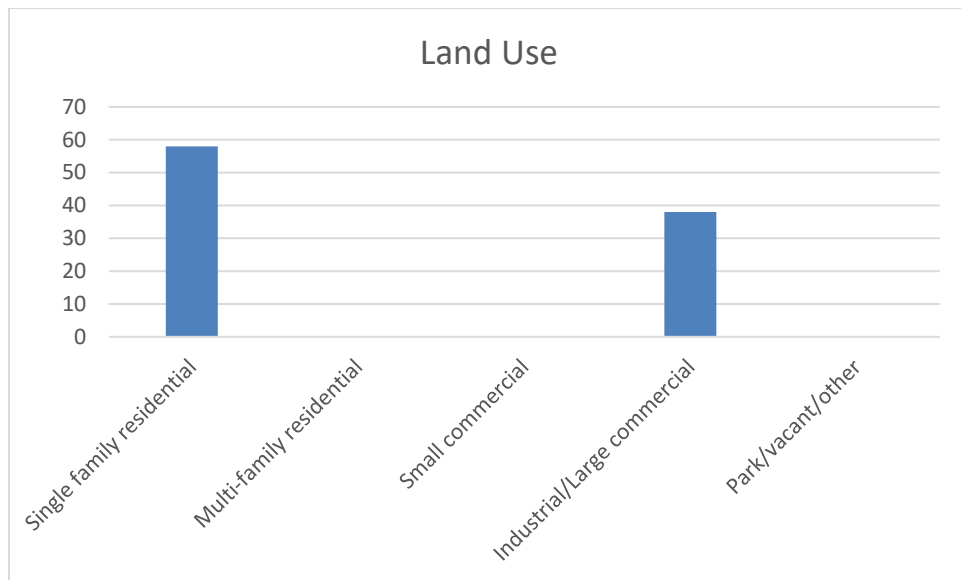
**Figure 4: Wood Condition**

**Canopy Cover of Public Trees (Acres)**

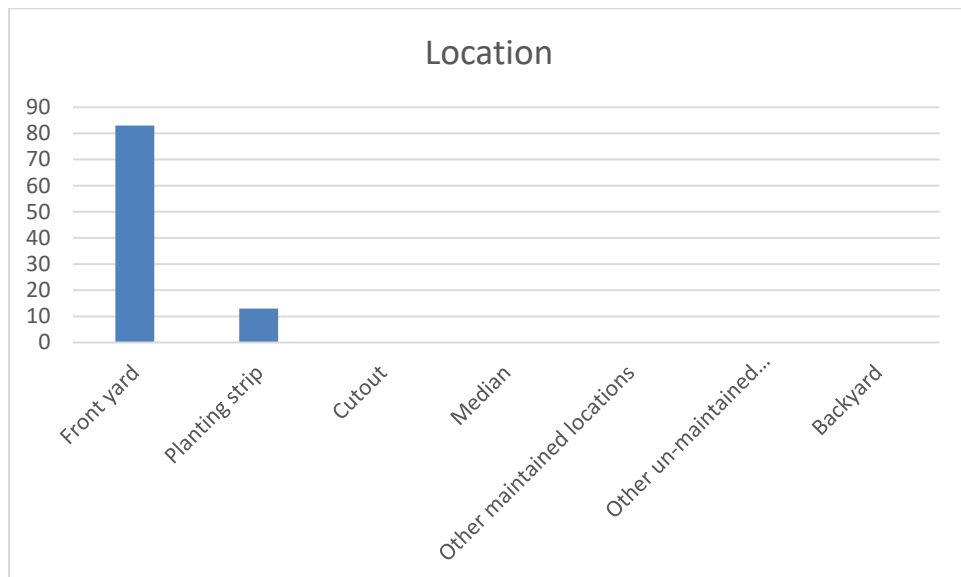


**Figure 5: Canopy Cover in Acres**



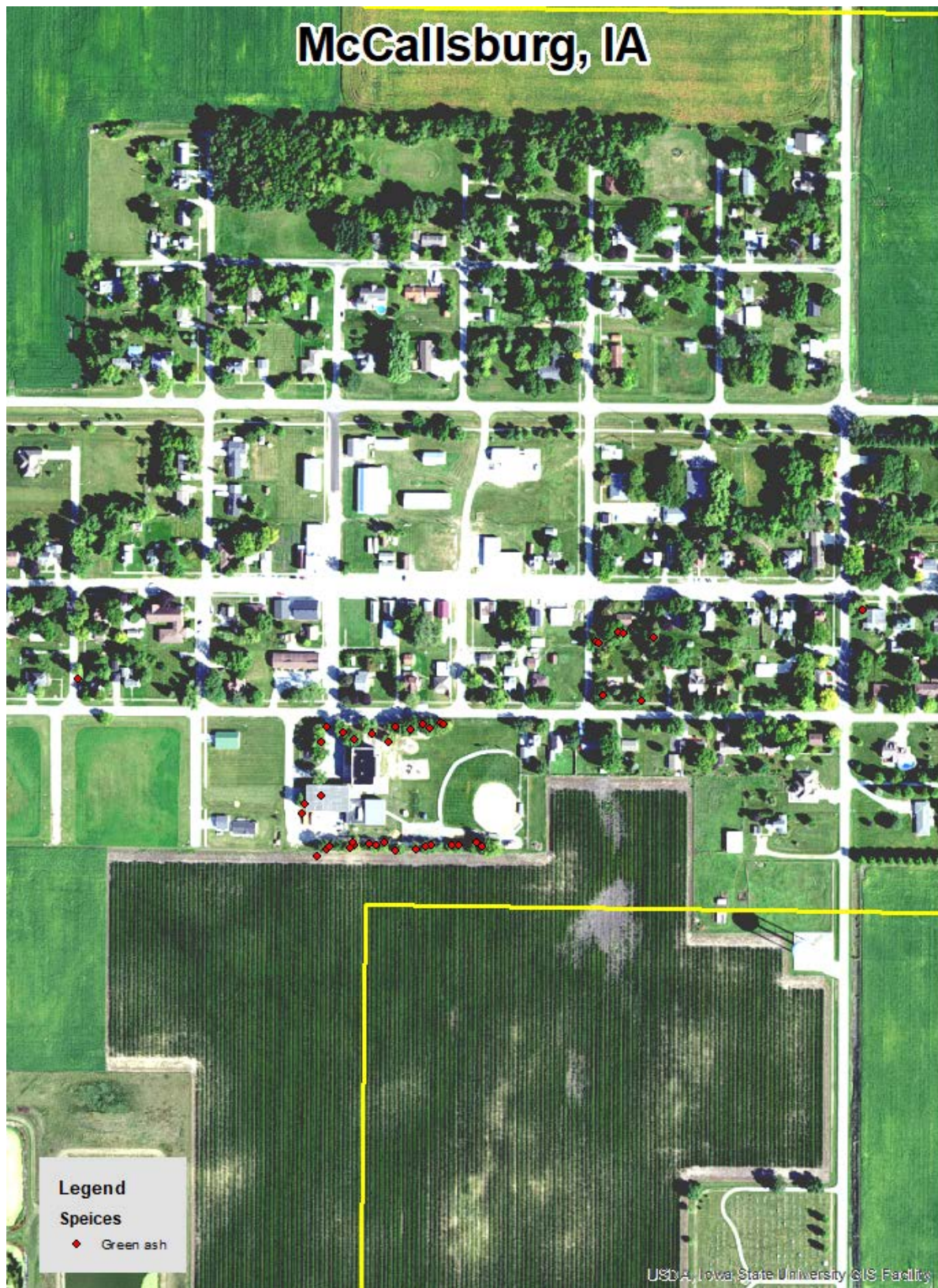


**Figure 6: Land Use of city/park trees**



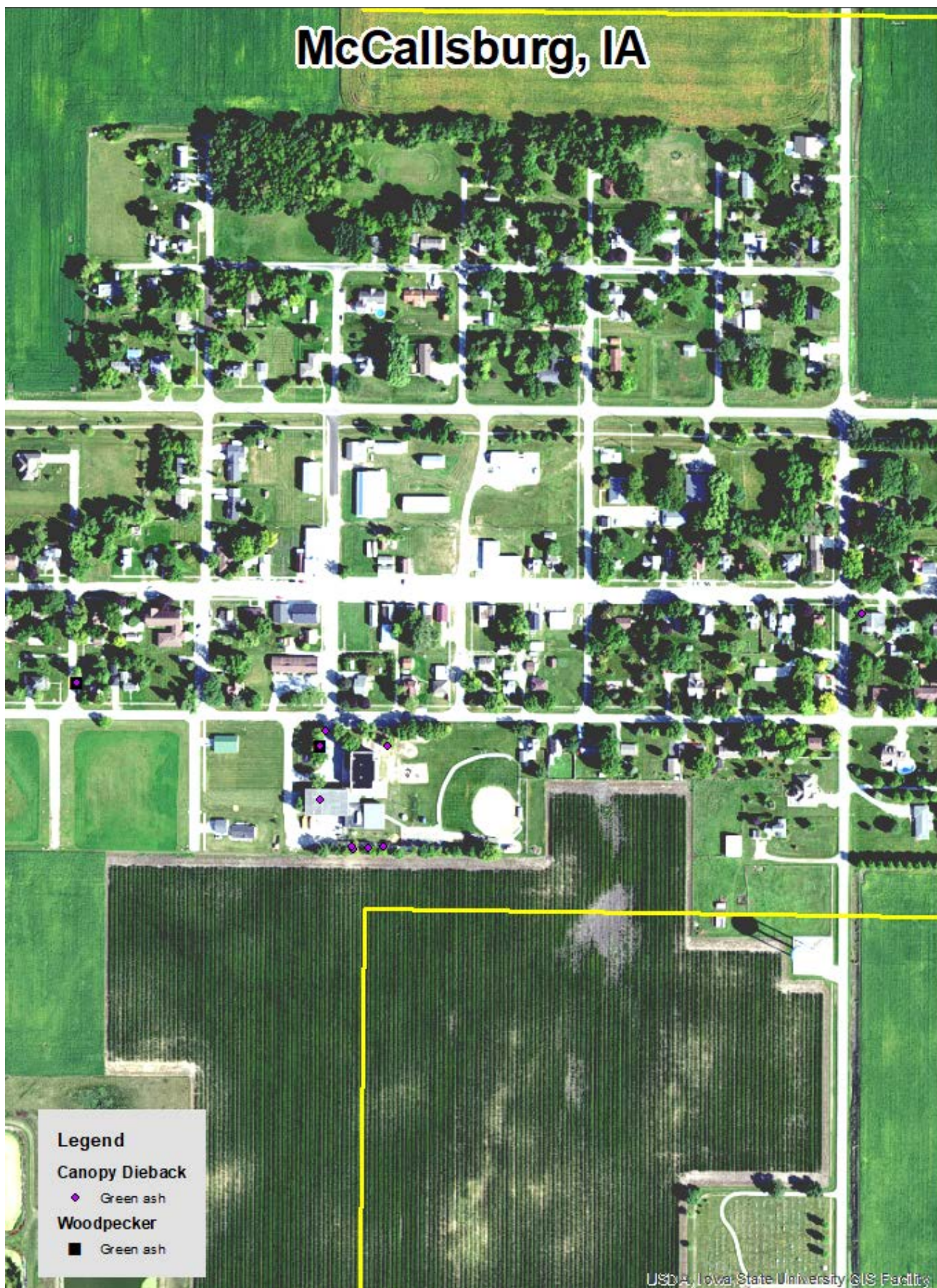
**Figure 7: Location of city/park trees**

## Appendix B: ArcGIS Mapping



**Figure 1: Location of Ash Trees**





**Figure 2: Location of EAB symptoms**



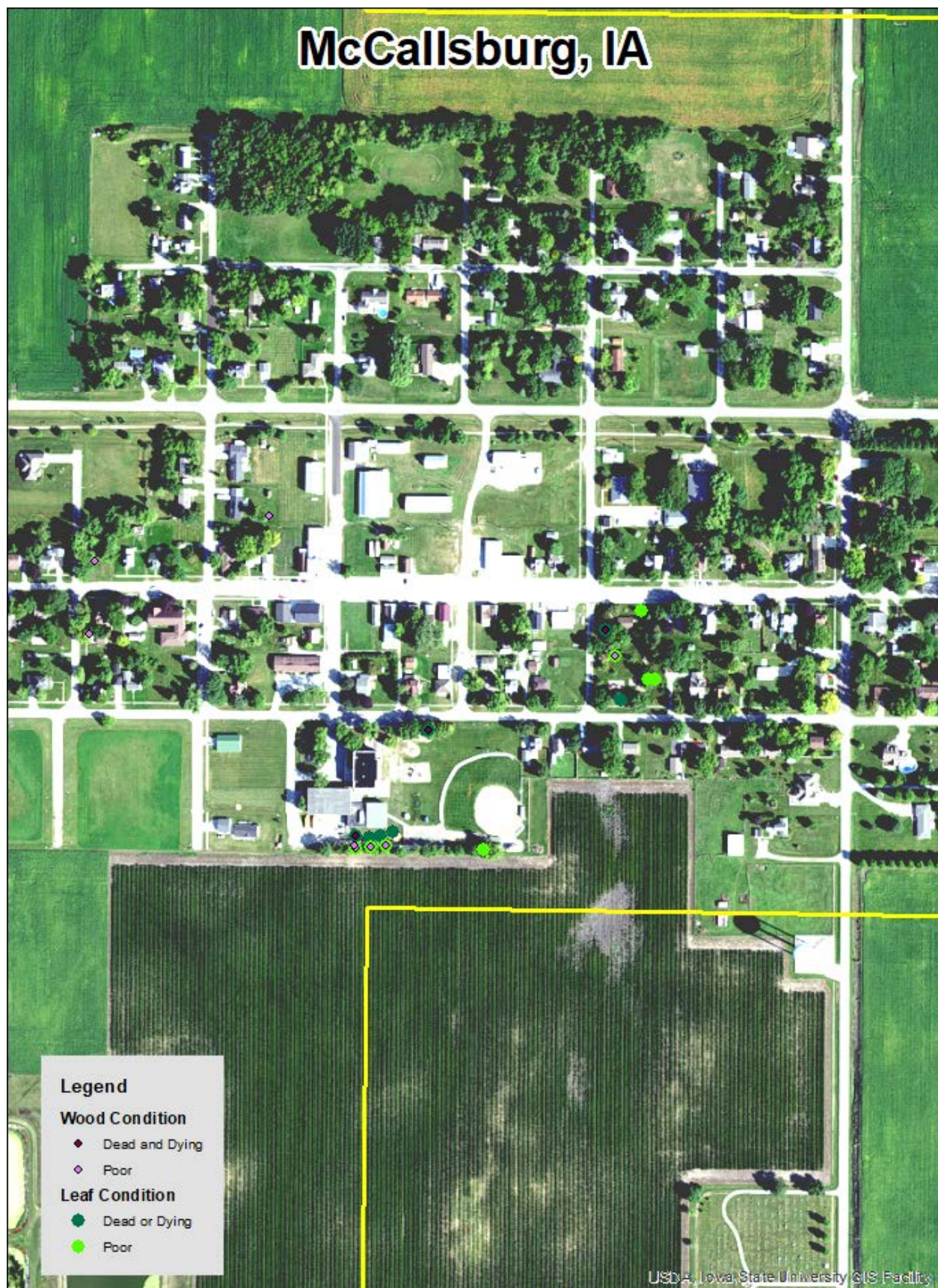
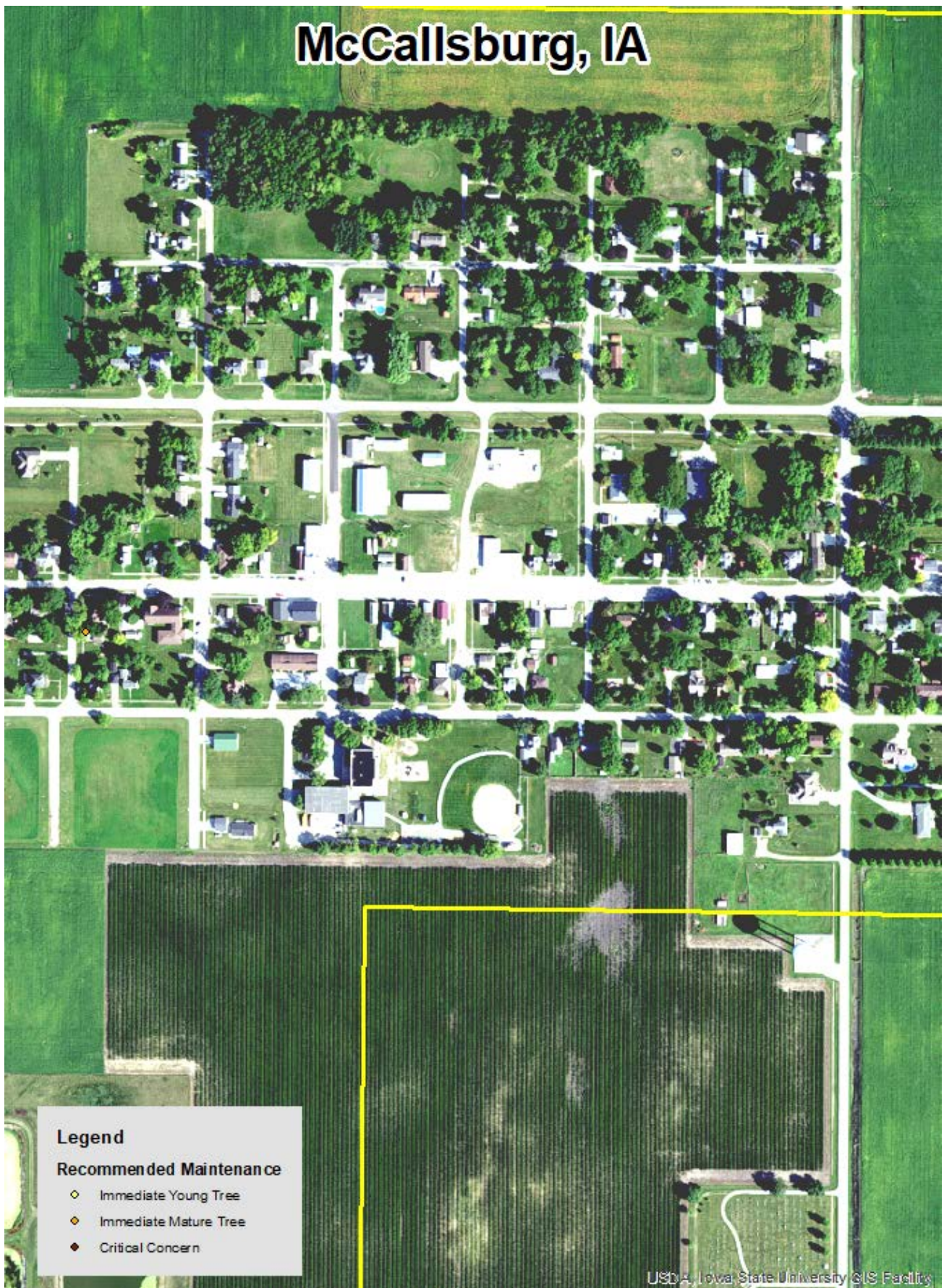


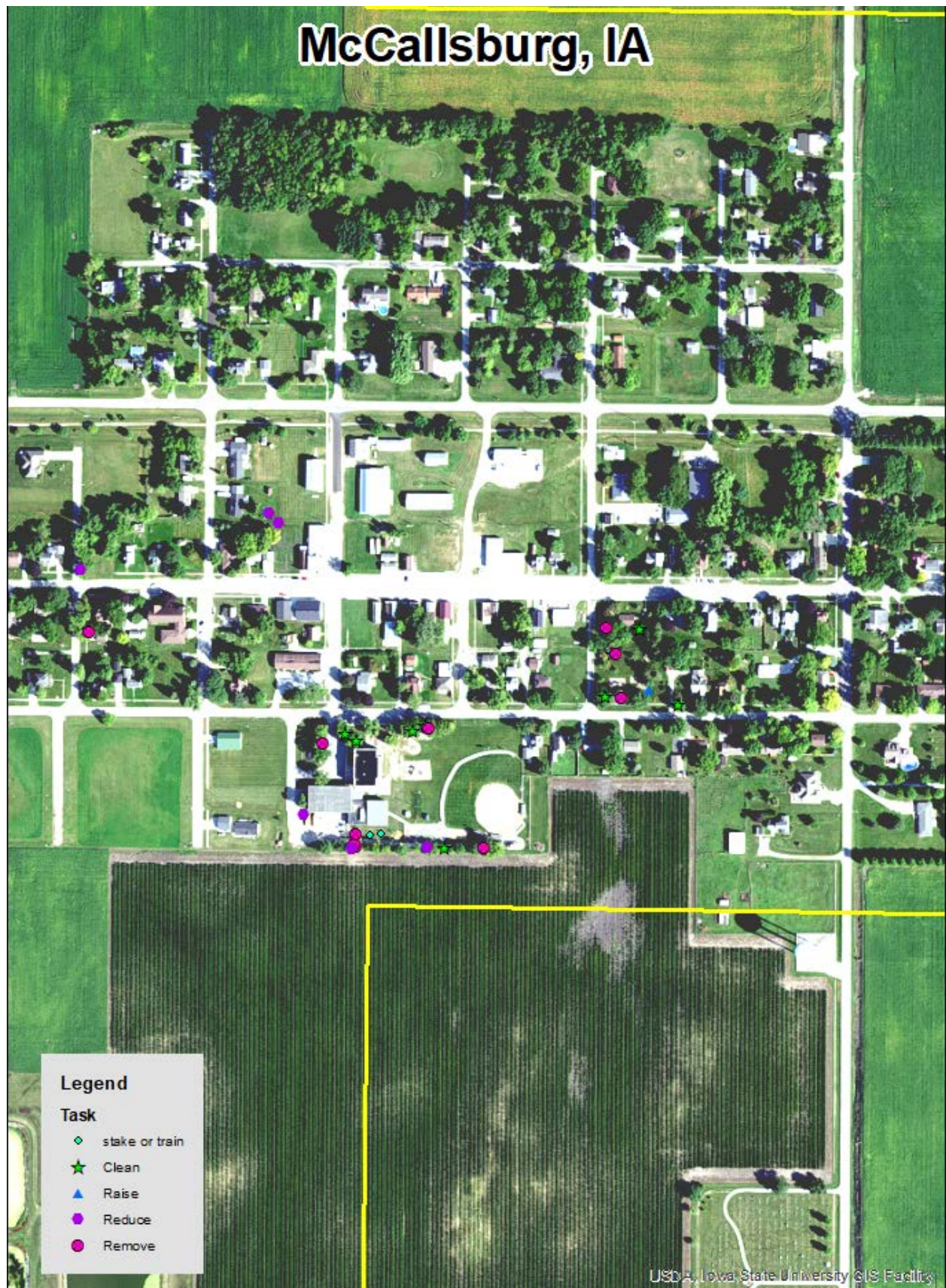
Figure 3: Location of Poor Condition Trees





**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: McCallsburg Tree Ordinances

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None found.

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