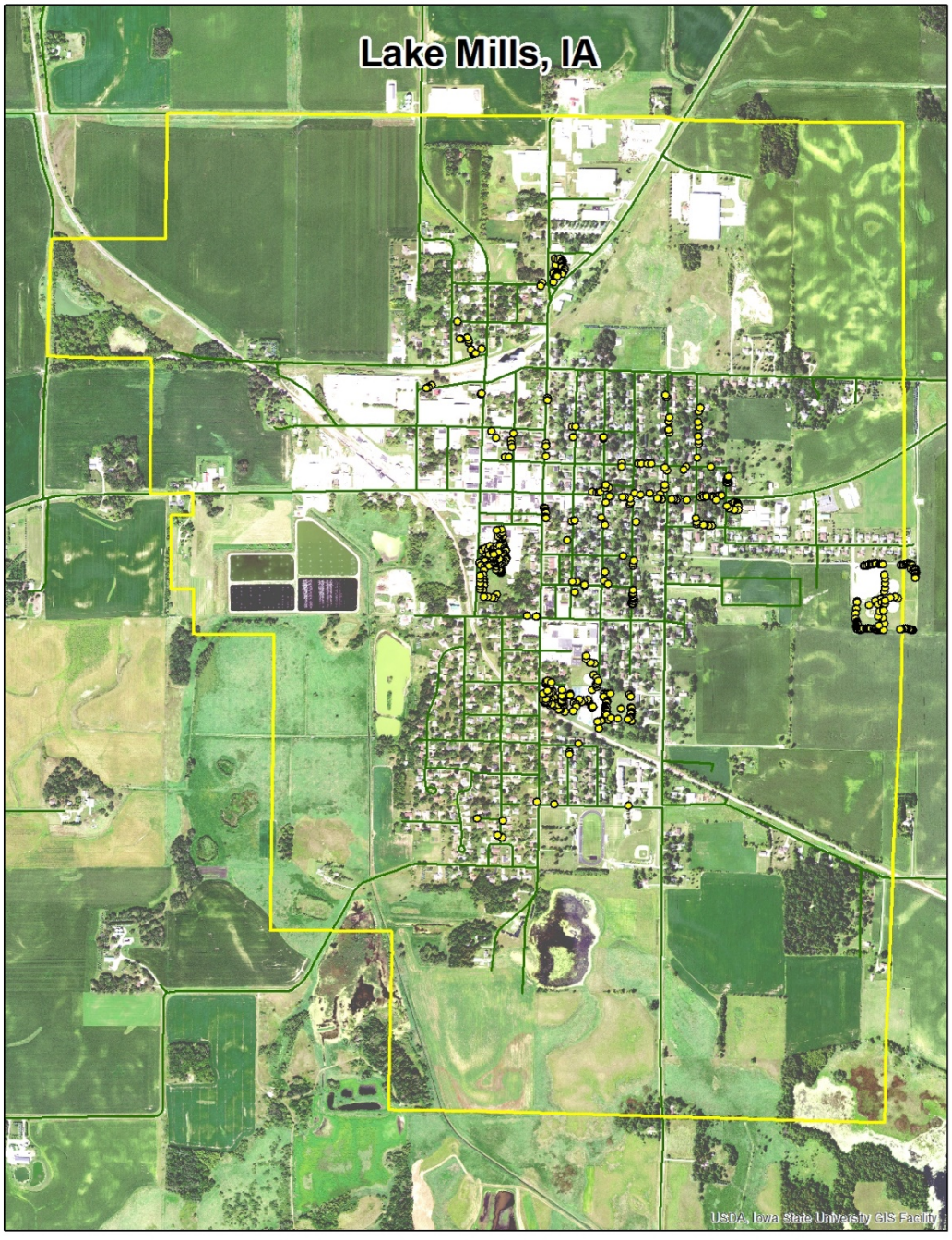
Lake Mills, IA



2020 Urban Forest Management Plan

Prepared by Vince Grube
Iowa Department of Natural Resources

Table of Contents

Executive Summary

Overview

This plan was developed to assist the City of Lake Mills 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 19% of Lake Mills' 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 503 trees inventoried.

- Lake Mills' trees provide $67,963 of benefits annually, an average of $134.58 a tree
- There are over 35 species of trees from at least 18 different genera
- The top three genera are: Maple 25%, Oak 24%, and Ash 19%
- 7% of trees are in need of some type of management
- 43 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 43 trees needing removal, 6 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*
- 13 of the 95 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: American Elm, Mulberry, Siberian Elm, Osage Orange (Hedge Apple), Chinese Elm, Pin Oak, Catalpa, Russian Olive, European Mountain Ash, Black Locust, Fruit or nut-bearing trees, Silver Maple, Honeylocust (thorny), Lombardy Poplar, Weeping European Birch, White Poplar, All evergreens (firs, spruces, conifers) and Willows
- Check ash trees with a visual survey yearly
- A budget increase would be need to treat ash trees- this should be considered to lower staff work load increases and long term benefits of keeping some trees

Introduction

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

Trees are an important component of Lake Mills' 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 Lake Mills 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 Lake Mills' 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 503 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. Lake Mills' trees reduce energy related costs by approximately $19,422 annually (Appendix A, Table 1). These savings are both in Electricity (92.8 MWh) and in Natural Gas (12,631.6 Therms).

Annual Stormwater Benefits

Lake Mills' trees intercept about 923,545 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides $25,028 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 Lake Mills, it is estimated that trees remove 1,118.3 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 $3,101 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Lake Mills, trees sequester about 181,963 lbs of carbon a year with an associated value of $1,365 (Appendix A, Table 5). In addition, the trees store 3,083,788 lbs of carbon, with a yearly benefit of $23,128 (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. Lake Mills receives $17,999 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, Lake Mills' trees provide $67,963 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 505 trees in Lake Mills provide approximately $134.58 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Lake Mills has over 35 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	128	25%
Oak	120	24%
Ash	95	19%
Spruce	86	17%
Cedar	17	3%
Apple	13	3%
Basswood	9	2%
Black Walnut	7	1%
Broadleaf Deciduous S/M/L	6	1%
Pine	5	1%
Conifer Evergreen S/M/L	4	1%
Elm	3	1%
Locust	3	1%
Mulberry	3	1%
Gingko	1	0%
Lilac	1	0%
Birch	1	0%
Sumac	1	0%

Age Class

Most of Lake Mills' trees (46%) are between 12 and 24 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). Lake Mills' size curve is slightly negative, however, only around 15% of the total trees in Lake Mills had a diameter of less than 6 inches at 4.5 feet. It is recommended that this number be increased to prepare for the natural mortality of larger/older trees and to maintain canopy cover.

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 Lake Mills indicate that 85% of the trees are in good health, with only 5% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 41% of Lake Mills' 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).

Crown Cleaning	46	9%
Crown Raising	6	1%
Tree Removal	43	9%

Canopy Cover

The total canopy with both private and public trees is 11%, 198 acres. The canopy cover included in the Lake Mills inventory includes approximately 9.64 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 197 trees need to be planted annually on public and private lands.

Land Use and Location

The majority of Lake Mills' 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.

Landuse	Count	Percent
Park/Vacant/Other	315	62%
Single Family Res.	181	36%
Industrial/Comm	4	<1%
Small Commercial	3	<1%
Multi-Family Res.	2	<1%

Location	Count	Percent
Front Yard	393	78%
Planting Strip	112	22%

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

Lake Mills has 11 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 are 5 trees 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 is a total of 36 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 43 removals, 9 are ash trees. There is a total of 95 ash trees, and 13 of those have signs and symptoms that have been associated with EAB. In addition, there are 47 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 Lake Mills.

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: American Elm, Mulberry, Siberian Elm, Osage Orange (Hedge Apple), Chinese Elm, Pin Oak, Catalpa, Russian Olive, European Mountain Ash, Black Locust, Fruit or nut-bearing trees, Silver Maple, Honeylocust (thorny), Lombardy Poplar, Weeping European Birch, White Poplar, All evergreens (firs, spruces, conifers) and Willows, as outlined in section 151.11 of the city ordinance (Appendix C). All trees planted must meet the restrictions in city ordinance 151.11 (Appendix C).

Continual Monitoring

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

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

Year 1

- Removal: 23 largest and critical concern trees
- Planting and Replacement: 28 trees to be planted in open locations
- Young Tree Pruning & Maintenance:
- Visual Survey for signs and symptoms of EAB

Year 2

- Removal: 20 critical concern trees and ash trees with poor health
- *Or saving for ash tree treatment and/or future ash removal

Planting and Replacement: 22 trees in open locations from year one removals
Young Tree Pruning & Maintenance:
Routine trimming: Trim 1/3 of the city trees
Visual Survey for signs and symptoms of EAB

Year 3
Removal: 23 trees - removal of any new critical concern trees and ash in poor health
*Or ash tree treatment and/or future ash removal
Planting and Replacement: 28 trees to be planted in open locations and locations from previous removals
Young Tree Pruning & Maintenance:
Visual Survey for signs and symptoms of EAB

Year 4
Removal: 20 trees - removal of any new critical concern trees and ash in poor health
*Or ash tree treatment and/or future ash removal
Planting and Replacement: 22 trees in open locations from previous removals
Routine trimming: Trim 1/3 of the city trees
Young Tree Pruning & Maintenance:
Visual Survey for signs and symptoms of EAB

Year 5
Removal: 23 trees - removal of any new critical concern trees and ash in poor health
*Or ash tree treatment and/or future ash removal
Planting and Replacement: 28 trees to be planted in open locations and locations from previous removals
Young Tree Pruning & Maintenance:
Visual Survey for signs and symptoms of EAB

Year 6
Removal: 20 trees - removal of any new critical concern trees and ash in poor health
*Or ash tree treatment and/or future ash removal
Planting and Replacement: 22 trees in open locations from previous removals
Routine trimming: Trim 1/3 of the city trees
Young Tree Pruning & Maintenance:
Visual Survey for signs and symptoms of EAB

* Increases in budget would be needed of treatment, but would reduce workload for exiting staff

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 151.11 (Appendix C). The new plantings will be a diverse mix and will not include American Elm, Mulberry, Siberian Elm, Osage Orange (Hedge Apple), Chinese Elm, Pin Oak, Catalpa, Russian Olive, European Mountain Ash, Black Locust, Fruit or nut-bearing trees, Silver Maple, Honeylocust (thorny), Lombardy Poplar, Weeping European Birch, White Poplar, All evergreens (firs, spruces, conifers) and Willows.

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 "Trees located on private property which are judged to be a hazard or a nuisance, as determined by the Council, shall be condemned by the City and removed by the owner."

Proposed Budget Increase
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 will likely die. For instance, in this treatment scenario, the average ash diameter is 20 inches and at $15 per inch, about 10 trees could be treated per year (every other year treatment) for $1500. Treatment would reduce the burden on the 3 to 4 staff doing city removals.

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

Lake Mills

Annual Energy Benefits of Public Trees

8/3/2020

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	20.3	1,542	2,768.3	2,713	4,255	(N/A)	18.2	21.9	46.25
Northern red oak	15.6	1,181	2,142.6	2,100	3,280	(N/A)	13.9	16.9	46.86
Spruce	4.3	324	597.3	585	910	(N/A)	12.1	4.7	14.91
Bur oak	12.9	979	1,759.6	1,724	2,704	(N/A)	8.5	13.9	62.88
Norway maple	9.6	732	1,358.1	1,331	2,063	(N/A)	8.3	10.6	49.11
Sugar maple	4.7	357	610.2	598	955	(N/A)	5.7	4.9	32.92
Silver maple	8.5	646	1,130.0	1,107	1,753	(N/A)	5.7	9.0	60.45
Blue spruce	2.4	184	311.7	305	490	(N/A)	4.6	2.5	21.30
Northern white cedar	0.6	47	76.0	74	121	(N/A)	3.4	0.6	7.13
Maple	0.7	57	104.9	103	160	(N/A)	3.4	0.8	9.39
Apple	1.2	91	191.2	187	279	(N/A)	2.6	1.4	21.44
Amur maple	1.0	73	137.8	135	208	(N/A)	1.6	1.1	26.00
Broadleaf Deciduous Mediu	1.0	76	143.2	140	216	(N/A)	1.4	1.1	30.85
Black walnut	1.8	133	233.4	229	362	(N/A)	1.4	1.9	51.71
Basswood	1.4	105	193.2	189	294	(N/A)	1.2	1.5	49.02
Eastern white pine	0.4	34	53.4	52	86	(N/A)	0.8	0.4	21.50
Conifer Evergreen Large	0.6	42	68.7	67	109	(N/A)	0.8	0.6	27.30
Northern pin oak	1.1	87	163.9	161	247	(N/A)	0.8	1.3	61.79
Mulberry	0.0	1	1.9	2	3	(N/A)	0.6	0.0	0.87
White ash	0.6	48	70.1	69	116	(N/A)	0.6	0.6	38.78
Red maple	0.5	42	65.3	64	106	(N/A)	0.6	0.5	35.25
Littleleaf linden	0.5	37	60.3	59	96	(N/A)	0.6	0.5	31.89
Honeylocust	1.0	72	123.1	121	193	(N/A)	0.6	1.0	64.28
American elm	0.3	25	39.2	38	64	(N/A)	0.4	0.3	31.77
Norway spruce	0.3	20	29.3	29	48	(N/A)	0.4	0.2	24.14
Lilac	0.0	0	0.6	1	1	(N/A)	0.2	0.0	0.87
White oak	0.2	18	27.0	26	44	(N/A)	0.2	0.2	44.23
Scotch pine	0.1	4	9.5	9	14	(N/A)	0.2	0.1	13.58
Sumac	0.1	6	12.8	13	18	(N/A)	0.2	0.1	18.19
Broadleaf Deciduous Small	0.2	14	24.7	24	38	(N/A)	0.2	0.2	38.13
Ginkgo	0.0	2	3.0	3	5	(N/A)	0.2	0.0	4.50
River birch	0.3	24	47.4	46	71	(N/A)	0.2	0.4	70.84
Swamp white oak	0.0	0	0.8	1	1	(N/A)	0.2	0.0	1.10
Pin oak	0.3	25	46.0	45	71	(N/A)	0.2	0.4	70.52
Elm	0.2	18	27.0	26	44	(N/A)	0.2	0.2	44.23
Total	92.8	7,043	12,631.6	12,379	19,422	(N/A)	100.0	100.0	38.46

Table 2: Annual Stormwater Benefits

Lake Mills

Annual Stormwater Benefits of Public Trees

8/3/2020

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	200,527	5,434	(N/A)	18.2	21.7	59.07
Northern red oak	158,162	4,286	(N/A)	13.9	17.1	61.23
Spruce	51,730	1,402	(N/A)	12.1	5.6	22.98
Bur oak	141,544	3,836	(N/A)	8.5	15.3	89.21
Norway maple	84,094	2,279	(N/A)	8.3	9.1	54.26
Sugar maple	33,424	906	(N/A)	5.7	3.6	31.23
Silver maple	107,385	2,910	(N/A)	5.7	11.6	100.35
Blue spruce	32,038	868	(N/A)	4.6	3.5	37.75
Northern white cedar	7,335	199	(N/A)	3.4	0.8	11.69
Maple	4,245	115	(N/A)	3.4	0.5	6.77
Apple	4,760	129	(N/A)	2.6	0.5	9.92
Amur maple	3,467	94	(N/A)	1.6	0.4	11.74
Broadleaf Deciduous Medium	5,748	156	(N/A)	1.4	0.6	22.25
Black walnut	14,759	400	(N/A)	1.4	1.6	57.14
Basswood	12,436	337	(N/A)	1.2	1.3	56.17
Eastern white pine	5,211	141	(N/A)	0.8	0.6	35.31
Conifer Evergreen Large	9,016	244	(N/A)	0.8	1.0	61.08
Northern pin oak	11,417	309	(N/A)	0.8	1.2	77.35
Mulberry	22	1	(N/A)	0.6	0.0	0.20
White ash	3,939	107	(N/A)	0.6	0.4	35.58
Red maple	3,345	91	(N/A)	0.6	0.4	30.22
Littleleaf linden	2,980	81	(N/A)	0.6	0.3	26.92
Honeylocust	9,147	248	(N/A)	0.6	1.0	82.63
American elm	1,823	49	(N/A)	0.4	0.2	24.70
Norway spruce	3,077	83	(N/A)	0.4	0.3	41.70
Lilac	7	0	(N/A)	0.2	0.0	0.20
White oak	1,466	40	(N/A)	0.2	0.2	39.72
Scotch pine	596	16	(N/A)	0.2	0.1	16.14
Sumac	264	7	(N/A)	0.2	0.0	7.17
Broadleaf Deciduous Small	667	18	(N/A)	0.2	0.1	18.06
Ginkgo	82	2	(N/A)	0.2	0.0	2.22
River birch	3,764	102	(N/A)	0.2	0.4	102.01
Swamp white oak	12	0	(N/A)	0.2	0.0	0.33
Pin oak	3,591	97	(N/A)	0.2	0.4	97.30
Elm	1,466	40	(N/A)	0.2	0.2	39.72
Citywide total	923,545	25,028	(N/A)	100.0	100.0	49.56

Table 3: Annual Air Quality Benefits

Lake Mills

Annual Air Quality Benefits of Public Trees

8/3/2020

Species	Deposition (lb)				Total Depos. ($)	Avoided (lb)				Total Avoided ($)	BVOC Emissions (lb)	BVOC Emissions ($)	Total (lb)	Total Standard ($) Error	% of Total Trees	Avg. $/tree
	O_3	NO_2	PM_{10}	SO_2		NO_2	PM_{10}	VOC	SO_2							
Green ash	22.2	3.5	11.1	1.0	119	96.9	14.1	13.5	92.1	604	0.0	0	254.4	723 (N/A)	18.2	7.86
Northern red oak	33.7	5.8	16.3	1.5	181	74.3	10.8	10.3	70.5	463	-48.1	-180	175.1	464 (N/A)	13.9	6.62
Spruce	5.1	1.0	4.7	0.6	35	20.5	3.0	2.8	19.4	127	-18.4	-69	38.8	94 (N/A)	12.1	1.54
Bur oak	17.3	2.8	8.3	0.8	92	61.5	9.0	8.5	58.5	384	0.0	0	166.6	476 (N/A)	8.5	11.06
Norway maple	16.6	2.9	8.2	0.7	90	46.5	6.7	6.4	43.7	288	-3.9	-15	127.9	364 (N/A)	8.3	8.66
Sugar maple	3.3	0.6	1.9	0.1	19	22.1	3.2	3.1	21.3	139	-2.8	-11	52.9	147 (N/A)	5.7	5.06
Silver maple	16.4	2.8	8.3	0.7	89	40.2	5.9	5.6	38.5	251	-8.8	-33	109.7	308 (N/A)	5.7	10.61
Blue spruce	4.2	0.8	3.6	0.5	28	11.4	1.7	1.6	11.0	71	-11.6	-44	23.2	56 (N/A)	4.6	2.43
Northern white cedar	0.7	0.1	0.7	0.1	5	2.9	0.4	0.4	2.8	18	-2.6	-10	5.5	13 (N/A)	3.4	0.79
Maple	0.6	0.1	0.3	0.0	4	3.6	0.5	0.5	3.4	22	-0.3	-1	8.9	25 (N/A)	3.4	1.46
Apple	1.2	0.2	0.6	0.1	7	6.0	0.9	0.8	5.5	37	0.0	0	15.2	43 (N/A)	2.6	3.33
Amur maple	1.0	0.2	0.5	0.0	5	4.6	0.7	0.6	4.4	29	0.0	0	11.9	34 (N/A)	1.6	4.25
Broadleaf Deciduous Medium	0.7	0.1	0.4	0.0	4	4.8	0.7	0.7	4.5	30	-0.2	-1	11.8	33 (N/A)	1.4	4.74
Black walnut	1.4	0.2	0.7	0.1	8	8.3	1.2	1.2	8.0	52	0.0	0	21.1	60 (N/A)	1.4	8.52
Basswood	1.2	0.2	0.6	0.1	7	6.6	1.0	0.9	6.3	41	0.0	0	16.9	48 (N/A)	1.2	7.96
Eastern white pine	0.6	0.1	0.5	0.1	4	2.0	0.3	0.3	2.0	13	-1.8	-7	4.1	10 (N/A)	0.8	2.48
Conifer Evergreen Large	1.0	0.2	0.9	0.1	7	2.6	0.4	0.4	2.5	16	-3.8	-14	4.2	9 (N/A)	0.8	2.13
Northern pin oak	2.4	0.4	1.2	0.1	13	5.5	0.8	0.8	5.2	34	-0.6	-2	15.8	45 (N/A)	0.8	11.31
Mulberry	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.0	0	0.0	0	0.1	0 (N/A)	0.6	0.11
White ash	0.2	0.0	0.2	0.0	1	2.9	0.4	0.4	2.8	18	0.0	0	7.0	20 (N/A)	0.6	6.51
Red maple	0.7	0.1	0.3	0.0	4	2.5	0.4	0.4	2.5	16	-0.2	-1	6.6	19 (N/A)	0.6	6.21
Littleleaf linden	0.4	0.1	0.2	0.0	2	2.3	0.3	0.3	2.2	14	-0.2	-1	5.5	15 (N/A)	0.6	5.13
Honeylocust	1.7	0.3	0.8	0.1	9	4.5	0.7	0.6	4.3	28	-1.3	-5	11.7	32 (N/A)	0.6	10.79
American elm	0.1	0.0	0.1	0.0	1	1.5	0.2	0.2	1.5	10	0.0	0	3.7	10 (N/A)	0.4	5.11
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)	0.4	2.82
Lilac	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	0.11
White oak	0.1	0.0	0.1	0.0	1	1.1	0.2	0.2	1.1	7	0.0	0	2.6	7 (N/A)	0.2	7.42
Scotch 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
Sumac	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
Broadleaf Deciduous Small	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
Ginkgo	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	0.0	0	0.2	1 (N/A)	0.2	0.64
River birch	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
Swamp white oak	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	0.14
Pin oak	0.6	0.1	0.3	0.0	3	1.6	0.2	0.2	1.5	10	-1.1	-4	3.5	9 (N/A)	0.2	9.04
Elm	0.1	0.0	0.1	0.0	1	1.1	0.2	0.2	1.1	7	0.0	0	2.6	7 (N/A)	0.2	7.42
Citywide total	135.2	23.0	71.8	7.0	747	442.2	64.4	61.5	420.5	2,757	-107.3	-402	1,118.3	3,101 (N/A)	100.0	6.14

Table 4: Annual Carbon Stored

Lake Mills

Stored CO2 Benefits of Public Trees

8/3/2020

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	724,679	5,435	(N/A)	18.2	23.5	59.08
Northern red oak	724,635	5,435	(N/A)	13.9	23.5	77.64
Spruce	37,245	279	(N/A)	12.1	1.2	4.58
Bur oak	559,042	4,193	(N/A)	8.5	18.1	97.51
Norway maple	273,651	2,052	(N/A)	8.3	8.9	48.87
Sugar maple	95,486	716	(N/A)	5.7	3.1	24.69
Silver maple	349,817	2,624	(N/A)	5.7	11.3	90.47
Blue spruce	28,073	211	(N/A)	4.6	0.9	9.15
Northern white cedar	4,967	37	(N/A)	3.4	0.2	2.19
Maple	8,229	62	(N/A)	3.4	0.3	3.63
Apple	20,436	153	(N/A)	2.6	0.7	11.79
Amur maple	14,886	112	(N/A)	1.6	0.5	13.96
Broadleaf Deciduous	12,752	96	(N/A)	1.4	0.4	13.66
Black walnut	44,846	336	(N/A)	1.4	1.5	48.05
Basswood	38,537	289	(N/A)	1.2	1.2	48.17
Eastern white pine	3,767	28	(N/A)	0.8	0.1	7.06
Conifer Evergreen La	9,026	68	(N/A)	0.8	0.3	16.92
Northern pin oak	40,130	301	(N/A)	0.8	1.3	75.24
Mulberry	41	0	(N/A)	0.6	0.0	0.10
White ash	8,378	63	(N/A)	0.6	0.3	20.95
Red maple	7,467	56	(N/A)	0.6	0.2	18.67
Littleleaf linden	8,215	62	(N/A)	0.6	0.3	20.54
Honeylocust	22,025	165	(N/A)	0.6	0.7	55.06
American elm	3,945	30	(N/A)	0.4	0.1	14.79
Norway spruce	2,340	18	(N/A)	0.4	0.1	8.78
Lilac	14	0	(N/A)	0.2	0.0	0.10
White oak	3,672	28	(N/A)	0.2	0.1	27.54
Scotch pine	257	2	(N/A)	0.2	0.0	1.93
Sumac	908	7	(N/A)	0.2	0.0	6.81
Broadleaf Deciduous	3,037	23	(N/A)	0.2	0.1	22.78
Ginkgo	77	1	(N/A)	0.2	0.0	0.58
River birch	14,280	107	(N/A)	0.2	0.5	107.10
Swamp white oak	17	0	(N/A)	0.2	0.0	0.13
Pin oak	15,239	114	(N/A)	0.2	0.5	114.29
Elm	3,672	28	(N/A)	0.2	0.1	27.54
Citywide total	3,083,788	23,128	(N/A)	100.0	100.0	45.80

Table 5: Annual Carbon Sequestered

Lake Mills

Annual CO_2 Benefits of Public Trees

8/3/2020

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
Green ash	47,584	357	-3,478	-211	-28	34,086	256	77,980	585 (N/A)	18.2	24.2	6.36
Northern red oak	18,411	138	-3,478	-199	-28	26,091	196	40,824	306 (N/A)	13.9	12.7	4.37
Spruce	3,751	28	-179	-79	-2	7,168	54	10,661	80 (N/A)	12.1	3.3	1.31
Bur oak	30,980	232	-2,683	-132	-21	21,641	162	49,805	374 (N/A)	8.5	15.5	8.69
Norway maple	14,242	107	-1,314	-97	-11	16,169	121	29,001	218 (N/A)	8.3	9.0	5.18
Sugar maple	7,727	58	-464	-47	-4	7,883	59	15,099	113 (N/A)	5.7	4.7	3.90
Silver maple	30,679	230	-1,679	-89	-13	14,267	107	43,178	324 (N/A)	5.7	13.4	11.17
Blue spruce	1,914	14	-135	-41	-1	4,074	31	5,812	44 (N/A)	4.6	1.8	1.90
Northern white cedar	557	4	-24	-11	0	1,033	8	1,555	12 (N/A)	3.4	0.5	0.69
Maple	1,178	9	-40	-9	0	1,255	9	2,384	18 (N/A)	3.4	0.7	1.05
Apple	2,001	15	-98	-17	-1	2,019	15	3,905	29 (N/A)	2.6	1.2	2.25
Amur maple	1,421	11	-71	-12	-1	1,612	12	2,950	22 (N/A)	1.6	0.9	2.77
Broadleaf Deciduous Medi	1,892	14	-61	-10	-1	1,669	13	3,490	26 (N/A)	1.4	1.1	3.74
Black walnut	3,975	30	-215	-17	-2	2,944	22	6,687	50 (N/A)	1.4	2.1	7.16
Basswood	3,293	25	-185	-14	-1	2,317	17	5,411	41 (N/A)	1.2	1.7	6.76
Eastern white pine	399	3	-18	-7	0	744	6	1,118	8 (N/A)	0.8	0.3	2.10
Conifer Evergreen Large	606	5	-43	-9	0	926	7	1,479	11 (N/A)	0.8	0.5	2.77
Northern pin oak	1,596	12	-193	-12	-2	1,912	14	3,304	25 (N/A)	0.8	1.0	6.19
Mulberry	26	0	0	-1	0	17	0	42	0 (N/A)	0.6	0.0	0.10
White ash	1,169	9	-40	-5	0	1,053	8	2,177	16 (N/A)	0.6	0.7	5.44
Red maple	1,005	8	-36	-4	0	922	7	1,887	14 (N/A)	0.6	0.6	4.72
Littleleaf linden	1,252	9	-39	-5	0	807	6	2,015	15 (N/A)	0.6	0.6	5.04
Honeylocust	2,896	22	-106	-7	-1	1,596	12	4,379	33 (N/A)	0.6	1.4	10.95
American elm	332	2	-19	-3	0	555	4	865	6 (N/A)	0.4	0.3	3.24
Norway spruce	231	2	-11	-4	0	433	3	649	5 (N/A)	0.4	0.2	2.43
Lilac	9	0	0	0	0	6	0	14	0 (N/A)	0.2	0.0	0.10
White oak	445	3	-18	-2	0	393	3	819	6 (N/A)	0.2	0.3	6.14
Scotch pine	53	0	-1	-1	0	94	1	145	1 (N/A)	0.2	0.0	1.08
Sumac	114	1	-4	-1	0	124	1	232	2 (N/A)	0.2	0.1	1.74
Broadleaf Deciduous Smal	268	2	-15	-2	0	308	2	560	4 (N/A)	0.2	0.2	4.20
Ginkgo	16	0	0	-1	0	35	0	51	0 (N/A)	0.2	0.0	0.38
River birch	0	0	-69	-4	-1	539	4	466	3 (N/A)	0.2	0.1	3.49
Swamp white oak	5	0	0	0	0	7	0	12	0 (N/A)	0.2	0.0	0.09
Pin oak	1,491	11	-73	-4	-1	562	4	1,976	15 (N/A)	0.2	0.6	14.82
Elm	445	3	-18	-2	0	393	3	819	6 (N/A)	0.2	0.3	6.14
Citywide total	181,963	1,365	-14,809	-1,059	-119	155,655	1,167	321,750	2,413 (N/A)	100.0	100.0	4.78

Table 6: Annual Social and Aesthetic Benefits

Lake Mills

Annual Aesthetic/Other Benefits of Public Trees

8/3/2020

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	4,306	(N/A)	18.2	23.9	46.80
Northern red oak	1,331	(N/A)	13.9	7.4	19.02
Spruce	1,096	(N/A)	12.1	6.1	17.97
Bur oak	2,519	(N/A)	8.5	14.0	58.57
Norway maple	1,371	(N/A)	8.3	7.6	32.64
Sugar maple	931	(N/A)	5.7	5.2	32.10
Silver maple	2,572	(N/A)	5.7	14.3	88.70
Blue spruce	478	(N/A)	4.6	2.7	20.76
Northern white cedar	214	(N/A)	3.4	1.2	12.58
Maple	186	(N/A)	3.4	1.0	10.92
Apple	115	(N/A)	2.6	0.6	8.85
Amur maple	81	(N/A)	1.6	0.5	10.15
Broadleaf Deciduous Medium	209	(N/A)	1.4	1.2	29.92
Black walnut	368	(N/A)	1.4	2.0	52.62
Basswood	305	(N/A)	1.2	1.7	50.86
Eastern white pine	112	(N/A)	0.8	0.6	28.09
Conifer Evergreen Large	159	(N/A)	0.8	0.9	39.70
Northern pin oak	145	(N/A)	0.8	0.8	36.28
Mulberry	0	(N/A)	0.6	0.0	0.03
White ash	161	(N/A)	0.6	0.9	53.63
Red maple	139	(N/A)	0.6	0.8	46.35
Littleleaf linden	141	(N/A)	0.6	0.8	47.13
Honeylocust	686	(N/A)	0.6	3.8	228.74
American elm	57	(N/A)	0.4	0.3	28.34
Norway spruce	65	(N/A)	0.4	0.4	32.32
Lilac	0	(N/A)	0.2	0.0	0.03
White oak	46	(N/A)	0.2	0.3	45.86
Scotch pine	15	(N/A)	0.2	0.1	15.42
Sumac	6	(N/A)	0.2	0.0	6.40
Broadleaf Deciduous Small	15	(N/A)	0.2	0.1	15.48
Ginkgo	3	(N/A)	0.2	0.0	2.76
River birch	0	(N/A)	0.2	0.0	0.00
Swamp white oak	3	(N/A)	0.2	0.0	2.74
Pin oak	116	(N/A)	0.2	0.6	116.38
Elm	46	(N/A)	0.2	0.3	45.86
Citywide total	17,999	(N/A)	100.0	100.0	35.64

Table 7: Summary of Benefits in Dollars

Lake Mills

Total Annual Benefits of Public Trees by Species ($)

8/3/2020

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Green ash	4,255	585	723	5,434	4,306	15,304	(N/A)	22.5
Northern red oak	3,280	306	464	4,286	1,331	9,668	(N/A)	14.2
Spruce	910	80	94	1,402	1,096	3,582	(N/A)	5.3
Bur oak	2,704	374	476	3,836	2,519	9,907	(N/A)	14.6
Norway maple	2,063	218	364	2,279	1,371	6,294	(N/A)	9.3
Sugar maple	955	113	147	906	931	3,051	(N/A)	4.5
Silver maple	1,753	324	308	2,910	2,572	7,867	(N/A)	11.6
Blue spruce	490	44	56	868	478	1,935	(N/A)	2.8
Northern white cedar	121	12	13	199	214	559	(N/A)	0.8
Maple	160	18	25	115	186	503	(N/A)	0.7
Apple	279	29	43	129	115	595	(N/A)	0.9
Amur maple	208	22	34	94	81	439	(N/A)	0.6
Broadleaf Deciduous M	216	26	33	156	209	640	(N/A)	0.9
Black walnut	362	50	60	400	368	1,240	(N/A)	1.8
Basswood	294	41	48	337	305	1,025	(N/A)	1.5
Eastern white pine	86	8	10	141	112	358	(N/A)	0.5
Conifer Evergreen Large	109	11	9	244	159	532	(N/A)	0.8
Northern pin oak	247	25	45	309	145	772	(N/A)	1.1
Mulberry	3	0	0	1	0	4	(N/A)	0.0
White ash	116	16	20	107	161	420	(N/A)	0.6
Red maple	106	14	19	91	139	368	(N/A)	0.5
Littleleaf linden	96	15	15	81	141	348	(N/A)	0.5
Honeylocust	193	33	32	248	686	1,192	(N/A)	1.8
American elm	64	6	10	49	57	186	(N/A)	0.3
Norway spruce	48	5	6	83	65	207	(N/A)	0.3
Lilac	1	0	0	0	0	1	(N/A)	0.0
White oak	44	6	7	40	46	143	(N/A)	0.2
Scotch pine	14	1	1	16	15	48	(N/A)	0.1
Sumac	18	2	3	7	6	36	(N/A)	0.1
Broadleaf Deciduous Sn	38	4	7	18	15	82	(N/A)	0.1
Ginkgo	5	0	1	2	3	10	(N/A)	0.0
River birch	71	3	14	102	0	190	(N/A)	0.3
Swamp white oak	1	0	0	0	3	4	(N/A)	0.0
Pin oak	71	15	9	97	116	308	(N/A)	0.5
Elm	44	6	7	40	46	143	(N/A)	0.2
Citywide Total	19,422	2,413	3,101	25,028	17,999	67,963	(N/A)	100.0

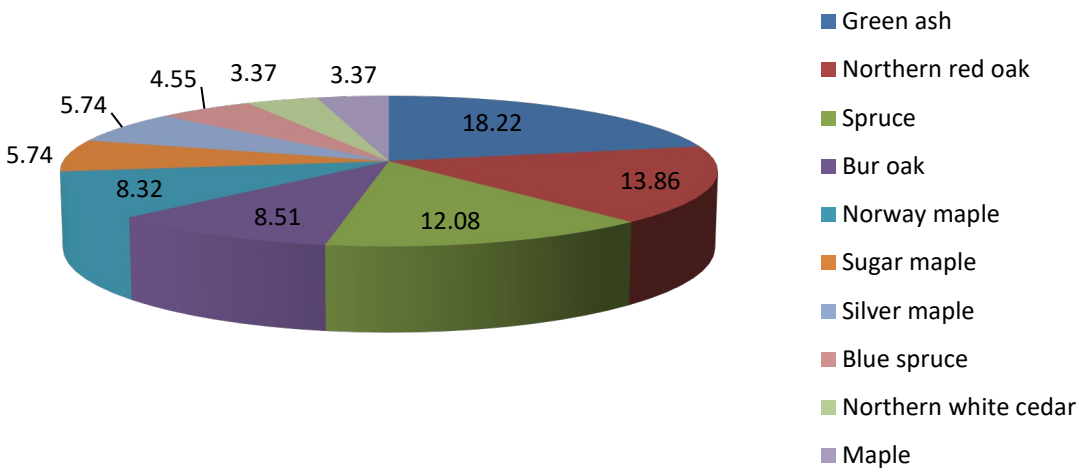


Figure 1: Species Distribution

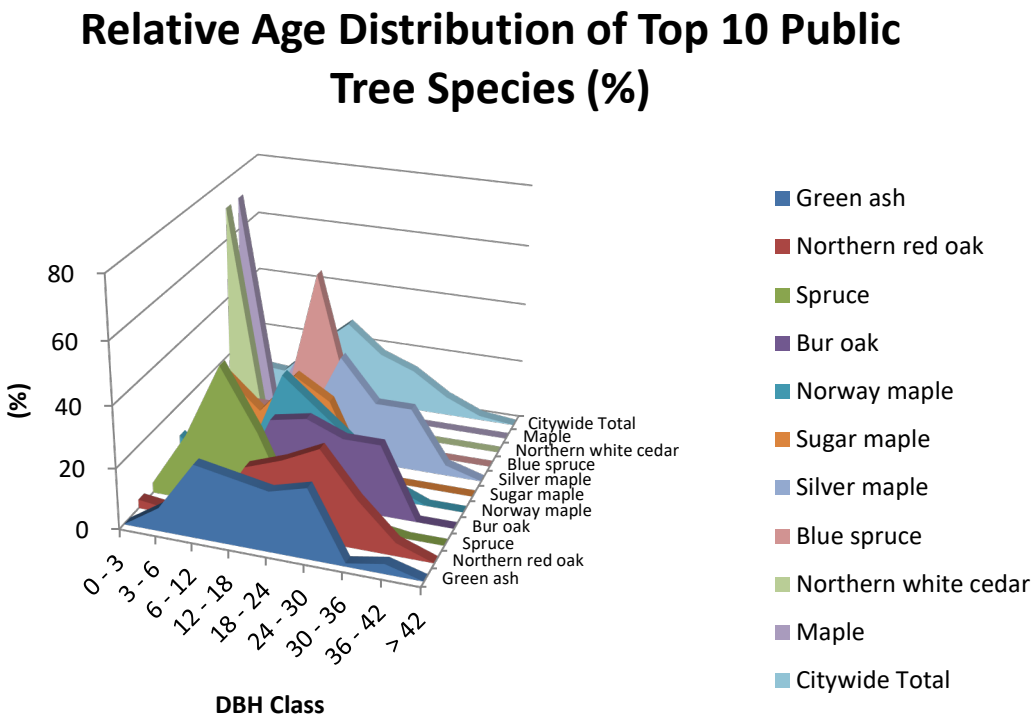


Figure 2: Relative Age Class

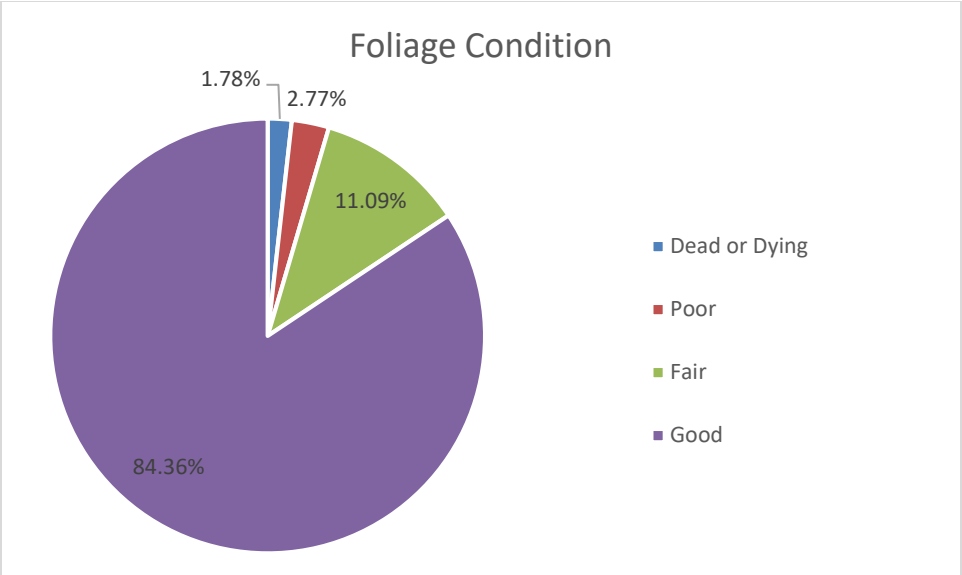


Figure 3: Foliage Condition

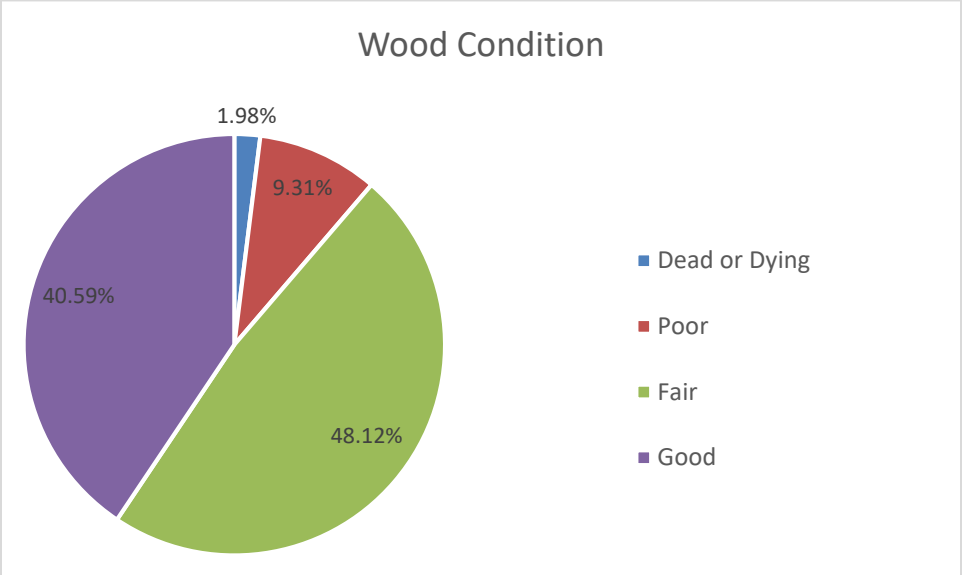


Figure 4: Wood Condition

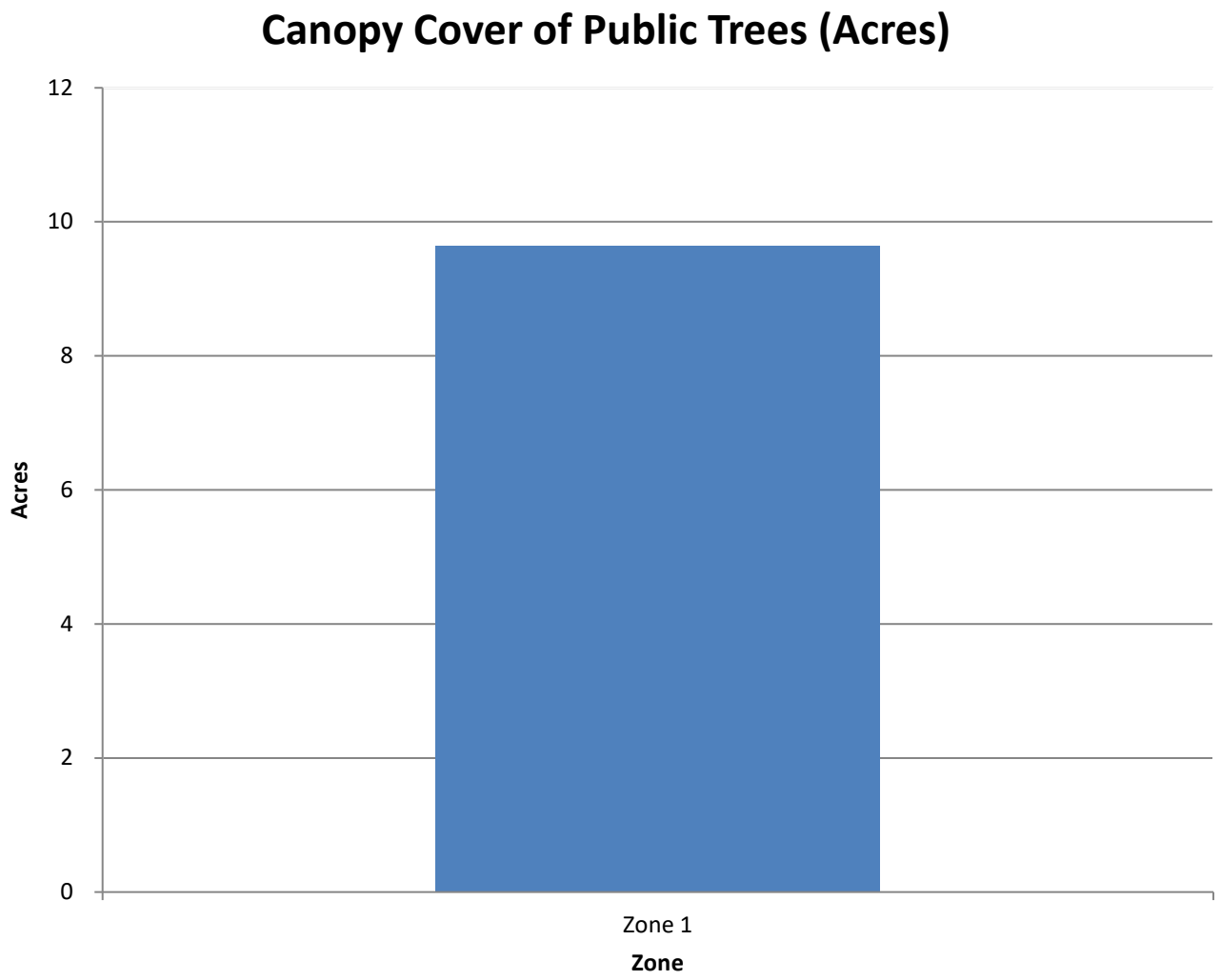


Figure 5: Canopy Cover in Acres

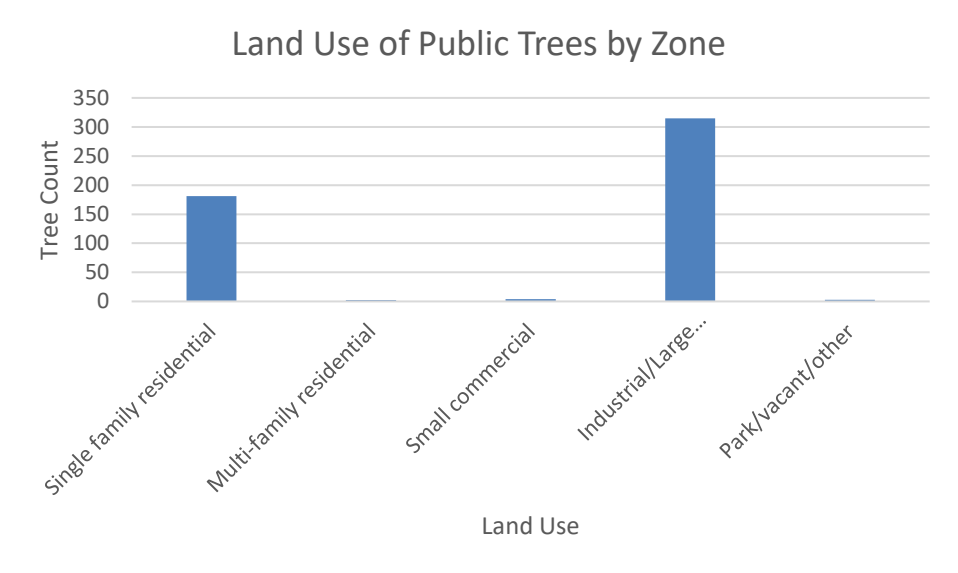


Figure 6: Land Use of city/park trees

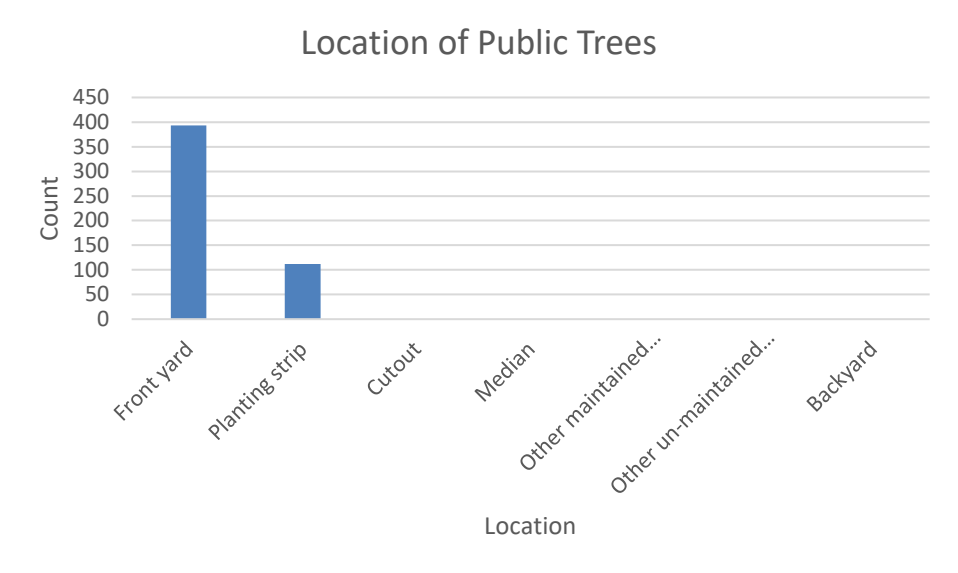


Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping

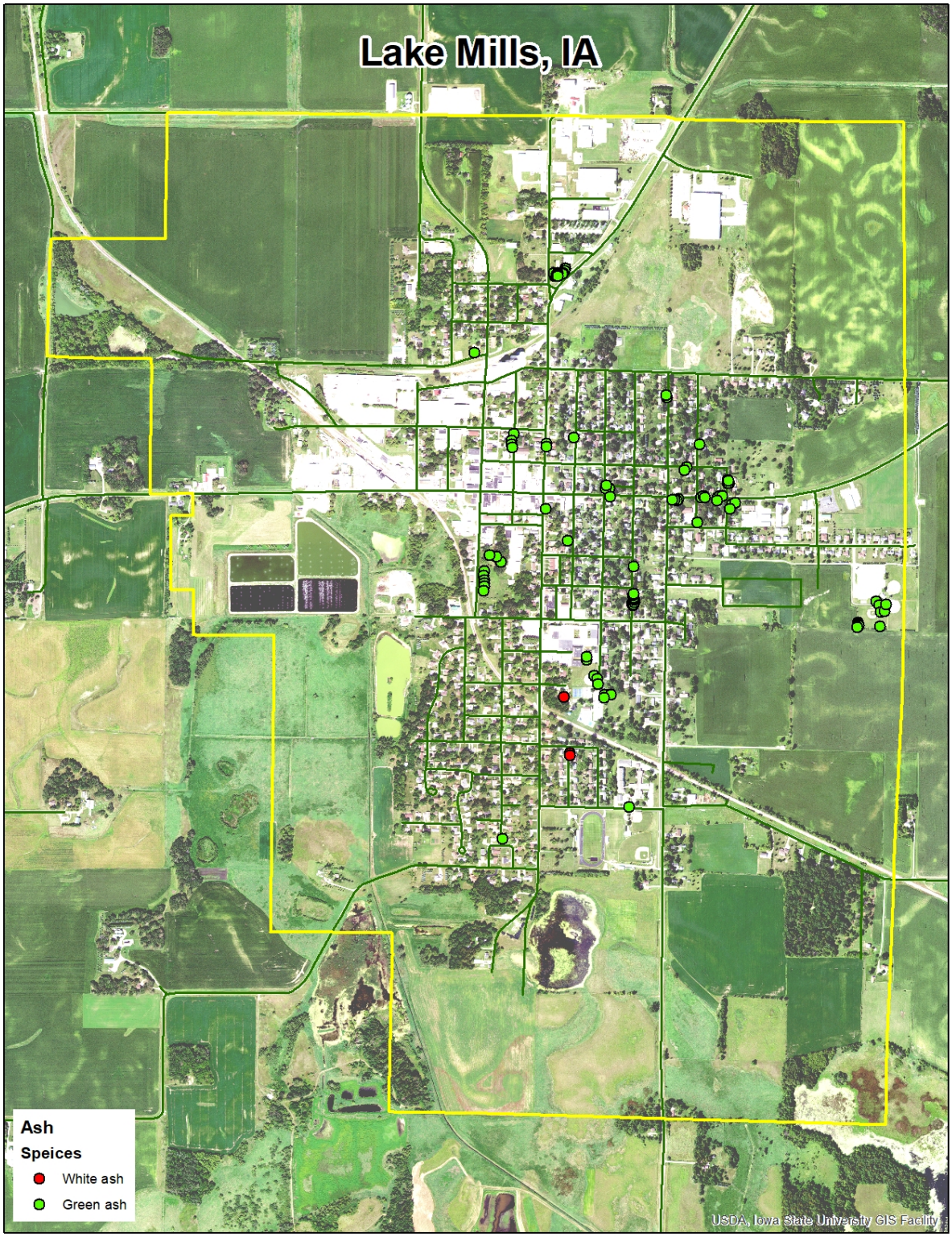


Figure 1: Location of Ash Trees

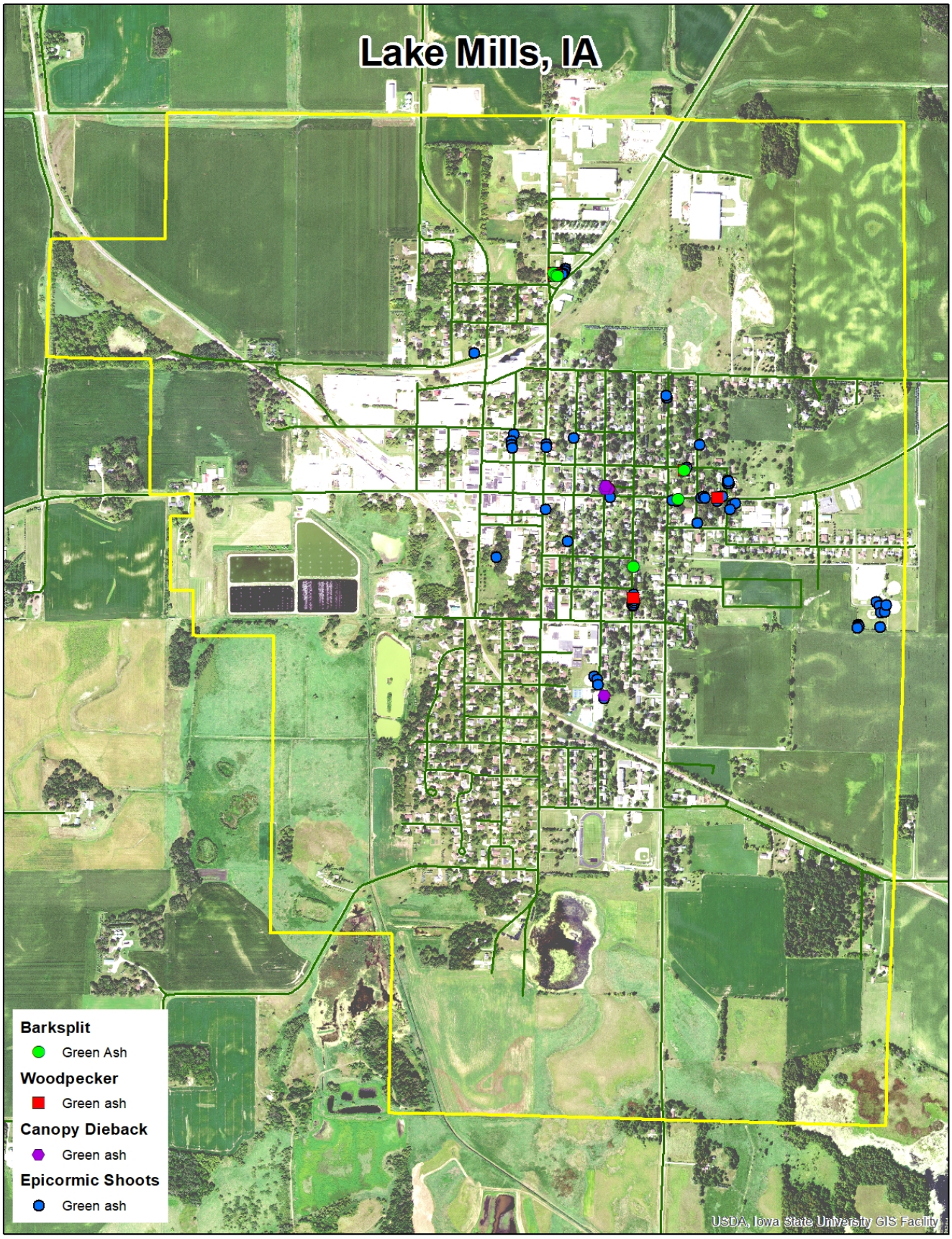


Figure 2: Location of EAB symptoms

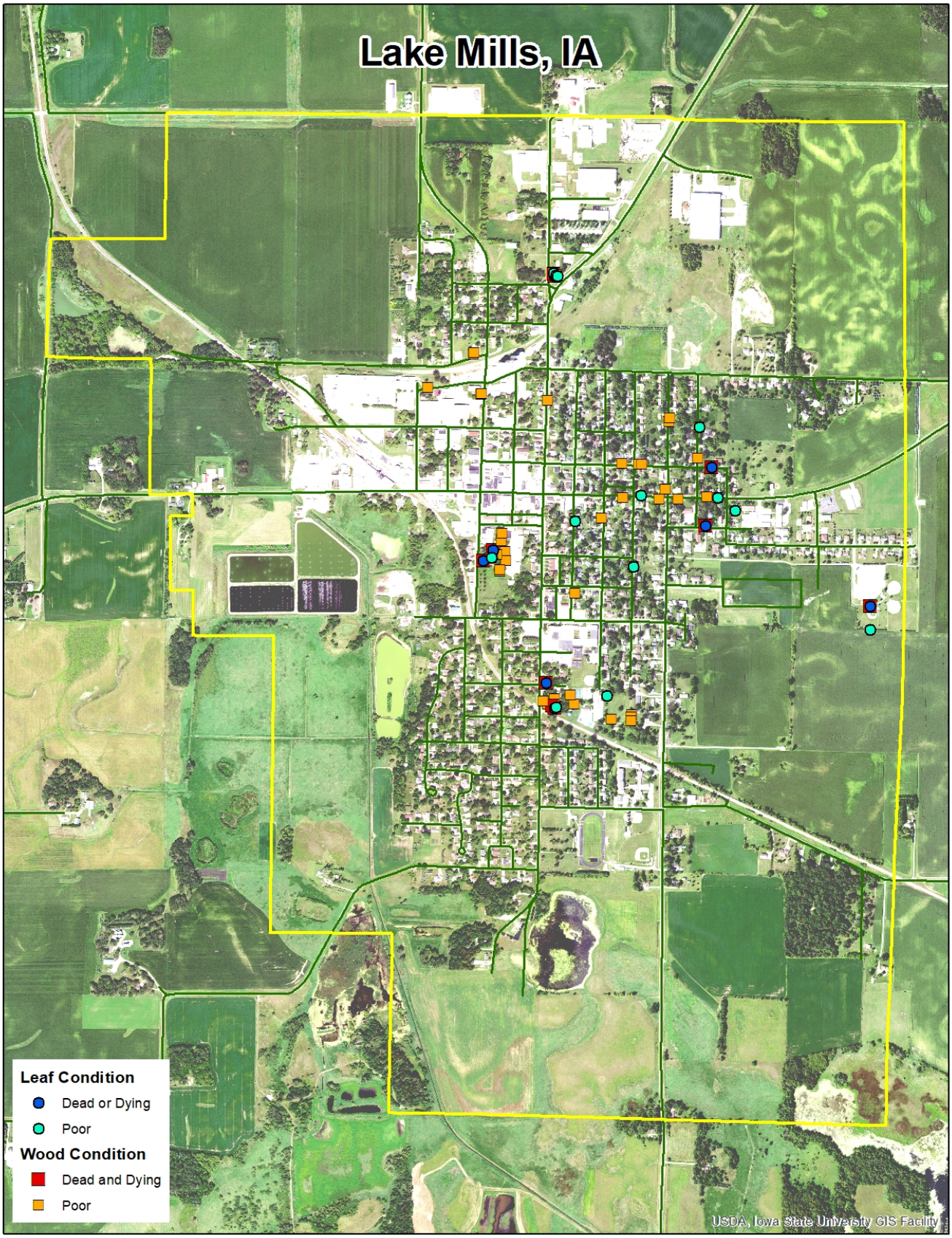


Figure 3: Location of Poor Condition Trees

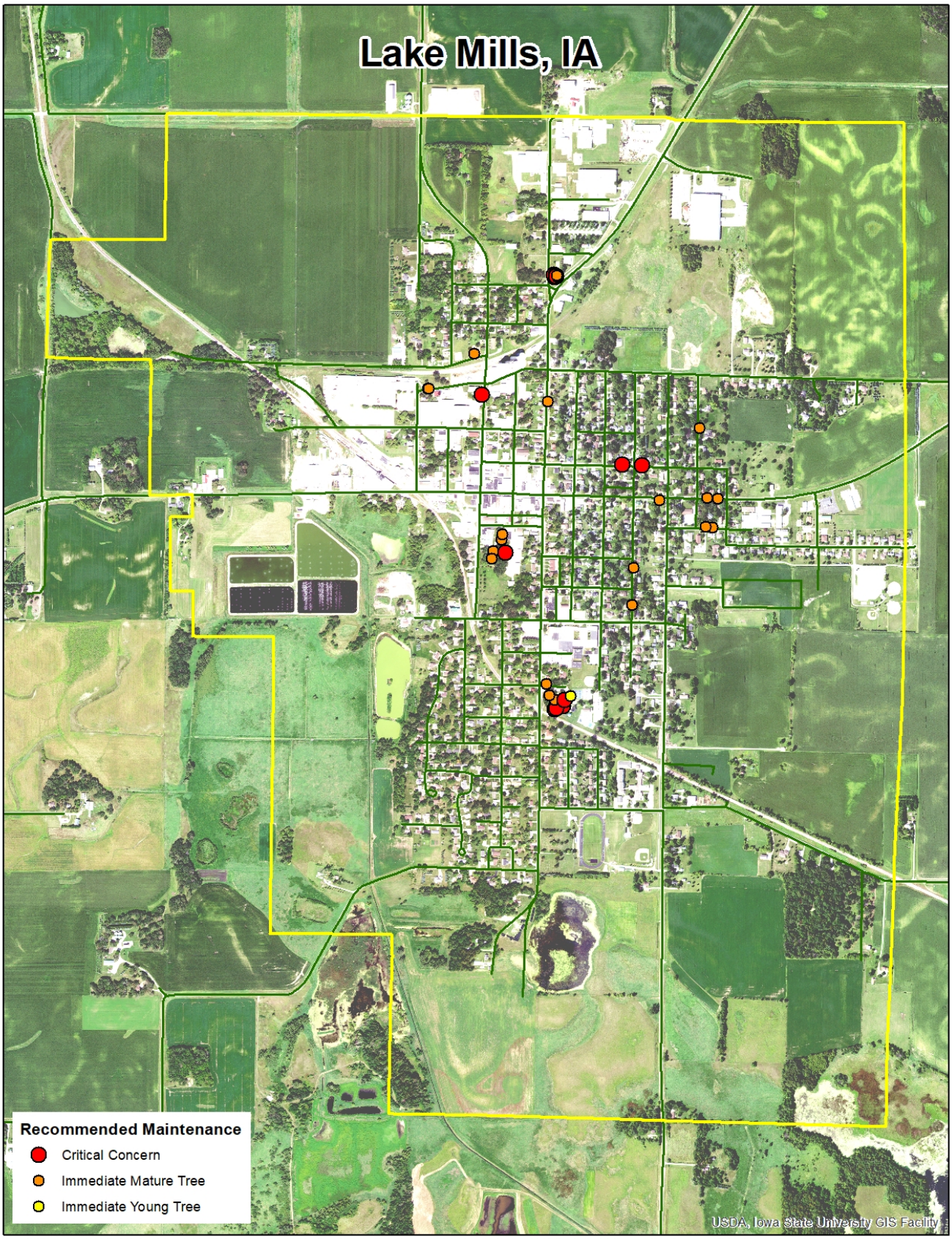


Figure 4: Location of Trees with Recommended Maintenance

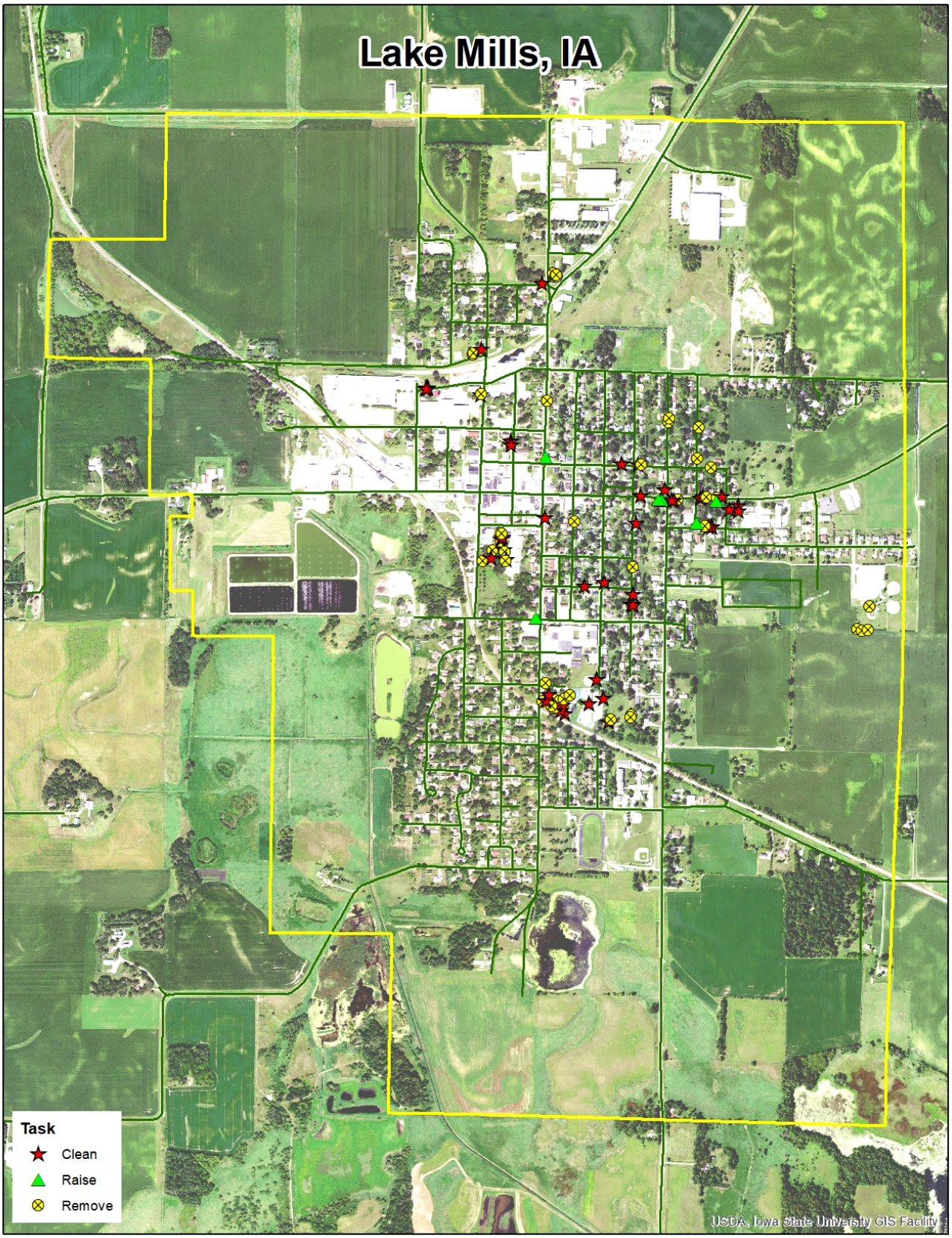


Figure 5: Maintenance Tasks ***City ownership of the trees recommended for removal should be verified prior to any removal***

Appendix C: Lake Mills Tree Ordinances

CHAPTER 151

TREES

151.01 PLANTING RESTRICTIONS. An adjoining property owner may plant trees upon and within a street right-of-way or terrace, being that area located between a property owner's lot line and that portion of the street usually traveled by vehicular traffic, subject to the terms and conditions contained in this chapter.

151.02 RESPONSIBILITY OF PROPERTY OWNER. The adjoining property owner shall be liable and responsible for the proper care, maintenance, pruning and trimming of such trees, including fallen branches, so as to prevent interference with visibility and physical obstruction of pedestrian and vehicular traffic, utility service lines, street signs and traffic control devices. Tree trimming contractors operating within the City shall carry adequate insurance to cover losses to public and private property which may be incurred by negligent operations.

151.03 TREE TRIMMING. All trees shall be trimmed to a minimum height of fifteen feet, six inches (15′6″) above the traveled roadway and to a minimum height of eight feet (8′) above a sidewalk. Additional height restrictions may be imposed by the City where necessary to insure adequate visibility in specific situations.

151.04 TOPPING PROHIBITED. Topping, also referred to as heading, stubbing, rounding, tipping, dehorning or the drastic removal of large branches, is defined as the severe cutting back of limbs to stubs larger than three (3) inches in diameter within the tree's crown to such a degree so as to remove the normal canopy and disfigure the tree. It is unlawful as a normal practice for any person or firm to top any street tree, park tree or other tree on City property. Proper early training, selective branch thinning or entire tree removal are acceptable tree maintenance alternatives to topping. Allowable natural shape branch thinning techniques include drop-crotch, under pruning, side pruning and through pruning.

151.05 TRIMMING BY UTILITY COMPANIES. Public utility service companies shall have the authority to prune trees, using acceptable branch thinning techniques, to remove branches or limbs which disrupt utility service lines. When half or more of the mature tree shape has been removed due to pruning or other cause, as determined by the Council, the public utility service company shall first give notice to the adjacent property owner and the City, and completely remove the tree, excluding the stump. The cost incurred by the utility for the tree removal shall not be assessed against the adjacent property owner.

151.06 REMOVAL OF DEAD OR DISEASED TREES. The City is responsible and liable for the removal of dead, diseased or hazardous trees located upon or within a street right-of-way. Trees located on private property which are judged to be a hazard or a nuisance, as determined by the Council, shall be condemned by the City and removed by the owner.

151.07 PLANTING PERMIT. A planting permit shall first be obtained from the City, at no cost to the owner, before a tree is planted upon or within a street right-of-way area. Trees may be planted in utility easement areas only after obtaining a planting permit from the City, but no trees may be planted within a utility easement area.

151.08 LOCATION. No tree shall be planted less than twenty (20) feet from the intersection of a street or alley, less than ten (10) feet from a driveway, less than three (3) feet from a street or less than two (2) feet from a sidewalk.

151.09 CLASS A SMALL TREES. For the purpose of this chapter, small trees, including by example the following recommended types of trees, shall be deemed to be in the Class A category:

Amur Corktree	Japanese Tree Lilac
Amur Maackia	Hornbeam
Amur Maple	North Star Cherry
Cockspur Hawthorn	Sargent Cherry
Crabapple	Serviceberry (single stem)
Eastern Redbud	Tatarian Maple
Japanese Pagoda	Washington Hawthorn (single stem)

Trees in the Class A category may be planted under the following conditions:

1. Where there is a minimum growing space of 25 feet diameter.

2. Where there is an existing sidewalk and street pavement in the public right-of-way, midway between the street and the existing sidewalk but not less than two (2) feet from the sidewalk and not less than three (3) feet from the street; except for Maple trees, which shall not be less than three (3) feet from the sidewalk and not less than four (4) feet from the street.

3. Where there is no existing sidewalk or pavement in the public right-of-way, clearance distances for planting shall be the same as if the sidewalk and pavement were in place.

4. Trees in the least restricted category which have reached a height exceeding fourteen (14) feet shall be pruned so that all branches and limbs are removed from the trunk up to a height of at least six (6) feet from the ground.

151.10 CLASS B MEDIUM AND CLASS C LARGE TREES. For the purpose of this chapter, medium size trees, including by example the following recommended types of trees, shall be deemed to be in the Class B category:

Callery Pear	Littleleaf Linden

Freeman Maple
Green Ash
Hophornbeam
Horsechestnut
River Birch
Sugar Maple
Zelkova

For the purposes of this chapter, large size trees, including by example the following recommended types of trees, shall be deemed to be in the Class C category, and may only be planted in terraces with adequate growth space:

American Linden
Baldcypress
Black Maple
Bur Oak
English Oak
Ginkgo (male)
Hackberry
Honeylocust (thornless and podless)
Norway Maple
Red Maple
Red Oak
Shingle Oak
Swamp White Oak
Tulip
White Ash
White Oak

Trees in the Class B and Class C categories may be planted under the following conditions:

1. Where the minimum available growing space for Class B trees is at least 35 feet and for Class C trees is at least 45 feet.

2. Where there is an existing sidewalk and street pavement in the public right-of-way, not less than four (4) feet from the sidewalk and not less than five (5) feet from the street; except for Maple trees, which shall not be less than five (5) feet from the sidewalk and not less than seven (7) feet from the street.

3. Where there is no existing sidewalk or pavement in the public right-of-way, clearance distances for planting shall be the same as if the sidewalk and pavement were in place.

4. Where there are no overhead utility wires within the growing space.

5. Trees in the Class B and Class C categories exceeding eighteen (18) feet in height shall be pruned so that all branches and limbs are removed from the trunk up to a height of at least eight (8) feet from the ground.

151.11 CLASS D TREES. For the purpose of this chapter, large or messy trees and those which restrict visibility may not be planted on terraces and, including by example the following types of trees, shall be deemed to be in the Class D category:

American Elm
Siberian Elm
Chinese Elm
Catalpa
European Mountain Ash
Fruit or nut-bearing trees
Mulberry
Osage Orange (Hedge Apple)
Pin Oak
Russian Olive
Black Locust
Silver Maple

Honeylocust (thorny)	Lombardy Poplar
Weeping European Birch	White Poplar
All evergreens (firs, spruces, conifers)	Willows

Trees in the Class D category may be planted on private property but shall not be planted upon or within a street right-of-way or easement area.

151.12 PROHIBITED TREES. The following nuisance types of trees shall not be planted upon public or private property, and are subject to removal at the property owner's expense as determined by the Council:

Ailanthus (Tree of Heaven)	Cottonwood
Cotton-bearing Poplar	Box elder

151.13 NOTICE; REQUEST FOR HEARING. The City shall not assess the expense of pruning, trimming or removing a tree to a property owner without first giving at least ten (10) days' written notice to the property owner. A property owner shall have until the end of the ten-day period in which to submit a written request for a public hearing before the Council on assessment cases, and on all other disputes shall submit the hearing request within thirty (30) days of the date of the action in dispute.

151.14 REMOVAL OF OR DAMAGE TO TREES. Any person who negligently or willfully removes, except as approved by the Council, or causes damage to a tree planted on a street right-of-way or other City property is deemed to be guilty of a misdemeanor.

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.