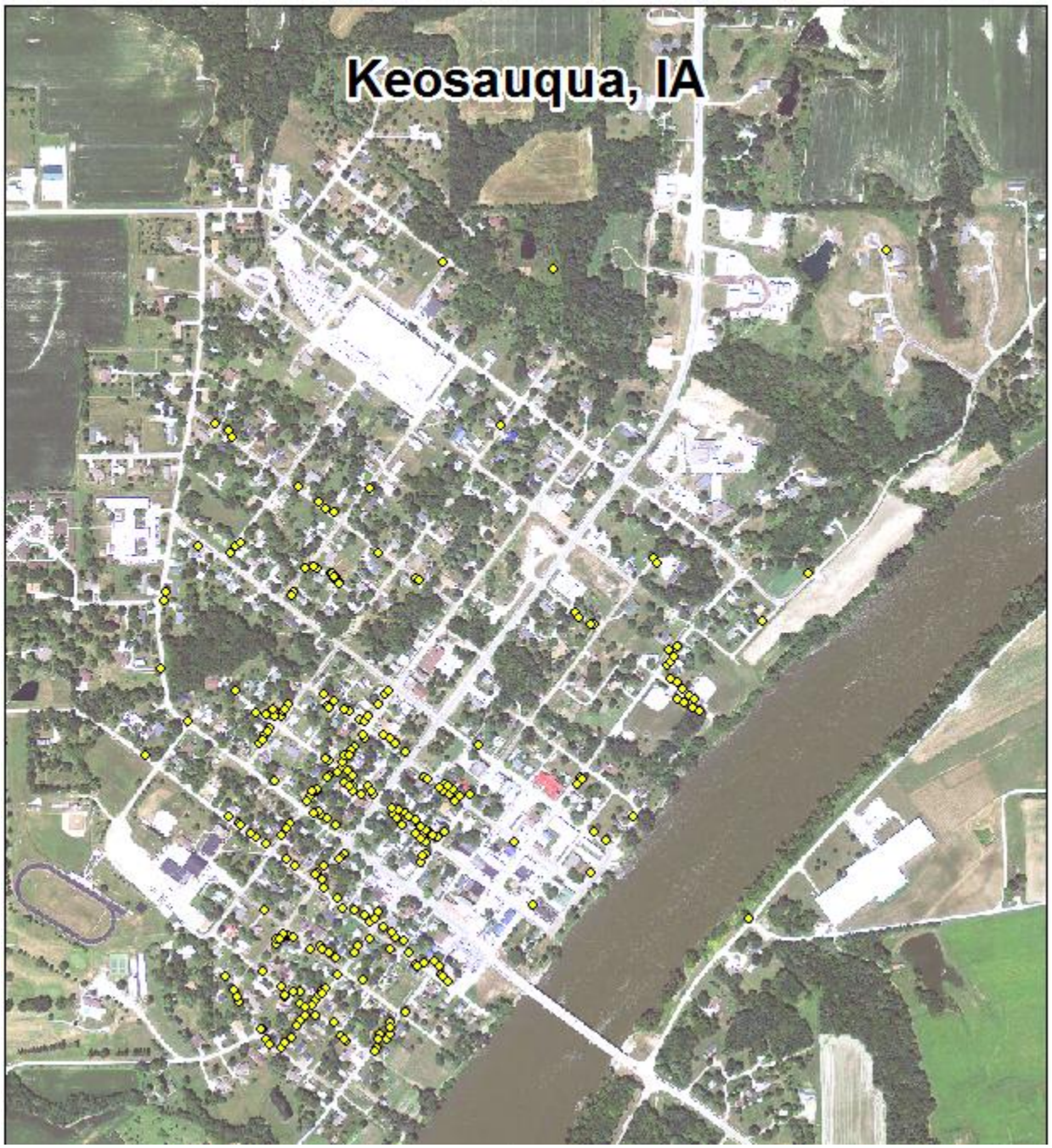
Keosauqua, IA



2014 Urban Forest Management Plan

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Executive Summary

Overview

This plan was developed to assist the City of Keosauqua 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 6.4% of Keosauqua'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 2014, a tree inventory was conducted using Global Positioning System (GPS) data collectors. The inventory was a complete inventory of street trees. Below are some key findings of the 282 trees inventoried.

- Keosauqua's trees provide $38,951 of benefits annually, an average of $138 a tree
- There are over 37 species of trees
- The top four genera are: Maple 36%, Thuja (Arborvitae), 8.2%,Cercis (Redbud) 6.7%, and Ash 6.4%
- 8.9% of trees are in need of some type of management
- 11 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 11 trees needing removal, 5 are over 18 inches in diameter at 4.5 ft and should be addressed immediately. 3 trees to remove are less than 6 inches in diameter. *City ownership of the trees recommended for removal should be verified prior to any removal*
- 3 of the 18 ash trees should be carefully examined, as they have one or more symptoms that could be related to an EAB infestation (Canopy dieback)
- 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
- It would take an annual budget of approximately $4133 to remove all ash and critical/immediate concern trees, maintain existing trees, and plant replacement trees.

Introduction

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

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

Inventory

In 2014, a tree inventory was conducted that included 100% of the city owned trees on streets. 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 282 city trees was entered into the USDA Forest service program Street Tree Resource Analysis Tool for Urban forestry Management (STRATUM), part of the i-Tree suite. The following are results from the i-Tree STRATUM analysis. Findings

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Keosauqua's trees reduce energy related costs by approximately $11,181 annually (Appendix A, Table 1). These savings are both in Electricity (53.7 MWh) and in Natural Gas (7,253 Therms).

Annual Stormwater Benefits

Keosauqua's trees intercept about 503,378 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides $13,696 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 Keosauqua, it is estimated that trees remove 657.8 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 $1,846 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Keosauqua, trees sequester about 109,458 lbs of carbon a year with an associated value of $887 (Appendix A, Table 5). In addition, the trees store 1,708,097 lbs of carbon, with a yearly benefit of $12,811 (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. Keosauqua receives $11,407 in annual social benefits from trees (Appendix A, Table 6).

Financial Summary of all Benefits

According to the USDA Forest Service i-Tree STRATUM analysis, Keosauqua's trees provide $38,951 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 282 trees in Keosauqua provide approximately $138 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Keosauqua has over 37 different tree species along city streets (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Maple	101	35.8%
Arborvitae	23	8.2
Redbud	19	6.7
Ash	18	6.4
Sycamore	16	5.7
Hackberry	14	5.0
Siberian elm	12	4.3
Oak	11	3.9
Walnut	11	3.9
All other species	57	20.2%

Age Class

Most of Keosauqua's trees (47%) are between 12 and 24 inches in diameter at 4.5 ft. 37% are less than 12 inches, while 16% are over 24 inches in diameter. 36% of street trees are over 18 inches in diameter. (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. Keosauqua's size curve appears slightly on the smaller side, but many of the trees are small trees such as redbud that may be reaching overmaturity. Continued planting of new or replacement trees is encouraged.

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 Keosauqua indicate that 92% of the trees are in good health, with only 2% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 81% of Keosauqua's trees are in good health for wood condition (appendix A, Figure 4 & Appendix B, Figure 3). Wood condition that is in poor health, dead or dying is about 6% of the population. This 6% is an estimate of trees that need management follow up.

Management Needs

The following outlines the specific management needs of the street trees by number of trees and percent of canopy (Appendix B, Figure 3).

Crown Cleaning	10	3.5%
Tree Removal	11	3.9
Crown Reduction	4	1.4

Canopy Cover

The total canopy with both private and public trees is 25%, which equals about 247 acres of Keosauqua's 1004 acres. The canopy cover included in the Keosauqua inventory includes approximately 5.6 acres (Appendix A, Figure 5).

Land Use and Location

The majority of Keosauqua'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 trees.

Land Use	
Single family residential	92.3%
Park/vacant/other	6.2%
Small commercial	1.5%

Location	
Planting strip	48%
Front yard	52%

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

Keosauqua has 1 critical concern tree that needs immediate removal. This tree can be seen on the Location of Trees with Recommended Maintenance map (Appendix B, Figure 4). There are 10 other trees designated for removal, 4 which are over 18 inches in diameter that should be addressed soon. It is recommended to start with the critical concern tree first. Please refer to the six year maintenance plan at the end of this section. After all of the critical/immediate concern trees are addressed, there should be follow up on the trees marked as needing maintenance. There are a total of 25 trees with these needs.

Poor tree species

After the removal of the critical/immediate concern trees, ash trees in poor health should be assessed for removal (Appendix B, Figure 3 & Appendix B, Figure 4). No ash trees are designated for immediate removal, but 3 of the 18 ash trees have signs and symptoms that have been associated with EAB (canopy dieback)

City ownership of 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 Keosauqua.

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 (36%) (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, willow, or other trees, as outlined in section 6-2-8 of the city ordinance (Appendix C). All trees planted must meet the restrictions in city ordinance 6-2-7 (Appendix C).

NOTE: 6-2-7 states: “Tree lawns must be at least 6 feet in width for large tree plantings and at least 10 feet wide for medium and small trees.” I believe it should be “at least 6 feet wide for small trees and 10 feet wide for medium and large trees”.

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 Recommendation

Year 1

Removal: 5 largest critical/immediate concern trees
Planting and Replacement: 6 trees to be planted in open locations
Visual Survey for signs and symptoms of EAB

Year 2

Removal: 6 critical/immediate concern trees (3 less than 6 inches)
Planting and Replacement: 8 trees in open locations
Routine trimming: Contract to trim 1/3 of the city trees
Visual Survey for signs and symptoms of EAB

Year 3

Removal: 5 trees - removal of any new critical concern trees and ash in poor health
*Or saving for ash tree treatment
Planting and Replacement: 6 trees to be planted in open locations and locations from previous removals
Visual Survey for signs and symptoms of EAB

Year 4

Removal: 5 trees - removal of any new critical concern trees and ash in poor health
*Or saving for ash tree treatment
Planting and Replacement: 6 trees in open locations from previous removals
Routine trimming: Contract to trim 1/3 of the city trees
Visual Survey for signs and symptoms of EAB

Year 5

Removal: 5 trees - removal of any new critical concern trees and ash in poor health
*Or saving for ash tree treatment
Planting and Replacement: 6 trees to be planted in open locations and locations from previous removals
Visual Survey for signs and symptoms of EAB

Year 6

Removal: 5 trees - removal of any new critical concern trees and ash in poor health
*Or saving for ash tree treatment
Planting and Replacement: 6 trees in open locations from previous removals
Routine trimming: Contract to trim 1/3 of the city trees
Visual Survey for signs and symptoms of EAB

*Reduction of ash over 6 years: All ash needing removal should have been removed. EAB could potentially kill all ash within 4 years of its arrival.

**To remove all ash trees and critical/immediate concern trees within 6 years, maintain existing trees, and plant replacement trees, the budget would need to be approximately $4,133 per year.

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 6-2-8 (Appendix C). The new plantings will be a diverse mix and will not include maple, cottonwood, poplar, box elder, Chinese elm, willow, or other trees as stated.
NOTE: Ash should be added to 'Not Recommended' list

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. City Code 6-2-4 states: The Superintendent shall have the following powers and duties: 1." To direct, manage, supervise, and control the city street program to include all planting, removal, maintenance, and protection of all trees and shrubs on Public areas " and 2. "To guard all trees and shrubs within the city to prevent the spread of disease or pests, and to eliminate dangerous conditions that may affect the life, health, or safety of persons or property." City Code 6-2-5 states: "The City Superintendent shall have the authority and jurisdiction of regulating the planting, maintenance, and removal of trees on streets and other publicly owned property to ensure or preserve or enhance the aesthetics of such public sites." City Code 6-2-10 states: "All street trees planted in violation of, or not maintained in strict compliance with the provisions of this Ordinance, or that are dead or dangerous, are declared to constitute a public nuisance. The City Superintendent shall cause written notice by certified mail, to be served on the property owner requiring such nuisances to be corrected within 30 days, or the cost of correction will be assessed against the property owner."

Budget

Estimated Budget Needs
Total $24,800 over 6 years ($4,133/year)

FY 2011 Budget
Removal: $2,500
Planting: $600
Watering & Maintenance: $500

FY 2012 Budget
Removal: $2,500
*Or saving for ash tree treatment
Planting: $800
Routine trimming: $1,000
Watering & Maintenance: $500

FY 2013 Budget
Removal: $2,500
*Or saving for ash tree treatment
Planting: $600
Watering & Maintenance: $500

FY 2014 Budget
Removal: $2,500
*Or saving for ash tree treatment
Planting: $600
Routine trimming: $1,000
Watering & Maintenance: $500

FY 2015 Budget
Removal: $2,500
*Or saving for ash tree treatment
Planting: $600
Watering & Maintenance: $500

FY 2016 Budget
Removal: $2,500
*Or saving for ash tree treatment
Planting: $600
Routine trimming: $1,000
Watering & Maintenance: $500

*Reduction of ash over 6 years: All ash needing removal will have been removed in 6 years.

Purposed Budget Increase

EAB could potentially kill all ash trees in Keosauqua within 4 years of its arrival. To remove all ash trees and critical/immediate concern trees within 6 years, maintain existing trees, and plant replacement trees, the budget would need to be approximately $4,133 per year. Additionally, it is recommended that Keosauqua 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.

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, D.J. and J.F. 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

Keosauqua

Annual Energy Benefits of Public Trees

11/16/2014

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Sugar maple	10.7	814	1,415.9	1,388	2,202	(N/A)	17.0	19.7	45.87
Silver maple	9.8	744	1,264.8	1,240	1,983	(N/A)	12.4	17.7	56.67
Northern white cedar	0.2	18	41.8	41	59	(N/A)	8.2	0.5	2.55
Eastern redbud	1.6	122	258.1	253	375	(N/A)	6.7	3.4	19.76
Green ash	3.9	296	494.8	485	781	(N/A)	6.4	7.0	43.41
American sycamore	5.2	395	720.1	706	1,101	(N/A)	5.7	9.8	68.80
Northern hackberry	3.8	288	535.7	525	813	(N/A)	5.0	7.3	58.07
Siberian elm	3.5	263	457.1	448	711	(N/A)	4.3	6.4	59.25
Black walnut	2.7	208	365.9	359	566	(N/A)	3.9	5.1	51.47
Apple	0.6	45	96.4	94	140	(N/A)	2.8	1.3	17.49
Norway maple	2.0	149	266.2	261	410	(N/A)	2.8	3.7	51.24
Blue spruce	0.3	22	42.3	41	63	(N/A)	2.5	0.6	9.06
Red maple	1.2	88	159.4	156	244	(N/A)	2.5	2.2	34.86
Northern red oak	1.0	76	133.2	131	206	(N/A)	2.1	1.8	34.38
Black locust	1.5	113	207.2	203	316	(N/A)	2.1	2.8	52.73
Catalpa	1.4	109	200.4	196	305	(N/A)	2.1	2.7	50.91
Eastern red cedar	0.4	29	57.3	56	85	(N/A)	1.4	0.8	21.30
American basswood	0.8	60	117.5	115	175	(N/A)	1.1	1.6	58.23
Callery pear	0.1	9	18.6	18	27	(N/A)	1.1	0.2	8.99
Red pine	0.3	24	38.8	38	62	(N/A)	1.1	0.6	20.62
Swamp white oak	0.3	24	50.6	50	73	(N/A)	1.1	0.7	24.47
Maple	0.1	5	10.4	10	16	(N/A)	0.7	0.1	7.85
White oak	0.1	4	7.4	7	12	(N/A)	0.7	0.1	5.82
Broadleaf Deciduous Large	0.1	9	17.4	17	26	(N/A)	0.7	0.2	13.23
Eastern white pine	0.3	22	39.4	39	61	(N/A)	0.7	0.5	30.47
Dogwood	0.0	3	7.6	7	11	(N/A)	0.7	0.1	5.40
Conifer Evergreen Small	0.0	1	1.3	1	2	(N/A)	0.7	0.0	0.93
Broadleaf Deciduous Mediu	0.0	3	6.2	6	9	(N/A)	0.4	0.1	8.99
Boxelder	0.3	20	36.3	36	55	(N/A)	0.4	0.5	55.14
Black poplar	0.3	25	46.9	46	71	(N/A)	0.4	0.6	70.91
Birch	0.1	8	16.9	17	24	(N/A)	0.4	0.2	24.47
Tulip tree	0.2	18	27.0	26	44	(N/A)	0.4	0.4	44.23
River birch	0.2	18	29.5	29	47	(N/A)	0.4	0.4	46.78
Kentucky coffeetree	0.2	18	27.0	26	44	(N/A)	0.4	0.4	44.23
Broadleaf Deciduous Small	0.0	0	0.6	1	1	(N/A)	0.4	0.0	0.87
Black spruce	0.1	5	10.2	10	15	(N/A)	0.4	0.1	14.80
Cottonwood	0.2	18	27.0	26	44	(N/A)	0.4	0.4	44.23
Total	53.7	4,073	7,253.0	7,108	11,181	(N/A)	100.0	100.0	39.65

Table 2: Annual Stormwater Benefits

Keosauqua

Annual Stormwater Benefits of Public Trees

11/16/2014

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Sugar maple	91,258	2,473	(N/A)	17.0	18.1	51.52
Silver maple	119,746	3,245	(N/A)	12.4	23.7	92.72
Northern white cedar	2,433	66	(N/A)	8.2	0.5	2.87
Eastern redbud	5,779	157	(N/A)	6.7	1.1	8.24
Green ash	30,154	817	(N/A)	6.4	6.0	45.40
American sycamore	63,964	1,733	(N/A)	5.7	12.7	108.34
Northern hackberry	29,828	808	(N/A)	5.0	5.9	57.74
Siberian elm	30,624	830	(N/A)	4.3	6.1	69.16
Black walnut	24,914	675	(N/A)	3.9	4.9	61.38
Apple	2,126	58	(N/A)	2.8	0.4	7.20
Norway maple	14,483	392	(N/A)	2.8	2.9	49.06
Blue spruce	3,145	85	(N/A)	2.5	0.6	12.18
Red maple	9,214	250	(N/A)	2.5	1.8	35.67
Northern red oak	8,152	221	(N/A)	2.1	1.6	36.82
Black locust	11,665	316	(N/A)	2.1	2.3	52.69
Catalpa	16,989	460	(N/A)	2.1	3.4	76.73
Eastern red cedar	5,563	151	(N/A)	1.4	1.1	37.69
American basswood	7,550	205	(N/A)	1.1	1.5	68.20
Callery pear	488	13	(N/A)	1.1	0.1	4.41
Red pine	3,673	100	(N/A)	1.1	0.7	33.18
Swamp white oak	1,758	48	(N/A)	1.1	0.3	15.88
Maple	275	7	(N/A)	0.7	0.1	3.72
White oak	343	9	(N/A)	0.7	0.1	4.65
Broadleaf Deciduous Large	779	21	(N/A)	0.7	0.2	10.56
Eastern white pine	5,938	161	(N/A)	0.7	1.2	80.46
Dogwood	137	4	(N/A)	0.7	0.0	1.86
Conifer Evergreen Small	49	1	(N/A)	0.7	0.0	0.66
Broadleaf Deciduous Medium	163	4	(N/A)	0.4	0.0	4.41
Boxelder	3,090	84	(N/A)	0.4	0.6	83.73
Black poplar	3,943	107	(N/A)	0.4	0.8	106.85
Birch	586	16	(N/A)	0.4	0.1	15.88
Tulip tree	1,466	40	(N/A)	0.4	0.3	39.72
River birch	1,409	38	(N/A)	0.4	0.3	38.19
Kentucky coffeetree	1,466	40	(N/A)	0.4	0.3	39.72
Broadleaf Deciduous Small	7	0	(N/A)	0.4	0.0	0.20
Black spruce	755	20	(N/A)	0.4	0.1	20.47
Cottonwood	1,466	40	(N/A)	0.4	0.3	39.72
Citywide total	505,378	13,696	(N/A)	100.0	100.0	48.57

Table 3: Annual Air Quality Benefits

Keosauqua

Annual Air Quality Benefits of Public Trees

11/16/2014

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								
Sugar maple	10.4	1.8	5.6	0.5	57	50.7	7.4	7.1	48.6	317	-8.5	-32	123.5	343	(N/A)	17.0	7.14
Silver maple	18.7	3.2	9.5	0.8	102	46.0	6.8	6.4	44.4	288	-10.7	-40	125.1	350	(N/A)	12.4	10.00
Northern white cedar	0.1	0.0	0.1	0.0	1	1.2	0.2	0.2	1.1	7	-0.7	-3	2.1	5	(N/A)	8.2	0.23
Eastern redbud	1.3	0.2	0.7	0.1	7	8.0	1.1	1.1	7.3	49	0.0	0	19.8	56	(N/A)	6.7	2.95
Green ash	2.7	0.4	1.5	0.1	15	18.3	2.7	2.6	17.7	115	0.0	0	46.0	130	(N/A)	6.4	7.21
American sycamore	8.4	1.4	3.9	0.4	45	24.9	3.6	3.5	23.6	155	0.0	0	69.7	200	(N/A)	5.7	12.49
Northern hackberry	4.0	0.7	2.2	0.2	22	18.3	2.7	2.5	17.2	114	0.0	0	47.7	136	(N/A)	5.0	9.69
Siberian elm	4.3	0.7	2.2	0.2	23	16.4	2.4	2.3	15.7	102	0.0	0	44.1	126	(N/A)	4.3	10.47
Black walnut	2.6	0.4	1.3	0.1	14	13.0	1.9	1.8	12.4	81	0.0	0	33.5	95	(N/A)	3.9	8.64
Apple	0.4	0.1	0.2	0.0	2	3.0	0.4	0.4	2.7	18	0.0	0	7.3	21	(N/A)	2.8	2.59
Norway maple	2.6	0.4	1.3	0.1	14	9.4	1.4	1.3	8.9	58	-0.6	-2	24.8	70	(N/A)	2.8	8.76
Blue spruce	0.3	0.1	0.3	0.0	2	1.4	0.2	0.2	1.3	9	-1.0	-4	2.8	7	(N/A)	2.5	1.01
Red maple	2.1	0.4	1.0	0.1	11	5.5	0.8	0.8	5.2	34	-0.7	-3	15.1	43	(N/A)	2.5	6.11
Northern red oak	1.6	0.3	0.8	0.1	9	4.7	0.7	0.7	4.5	30	-2.2	-8	11.1	30	(N/A)	2.1	4.96
Black locust	2.1	0.4	1.1	0.1	12	7.2	1.0	1.0	6.8	45	-0.5	-2	19.1	54	(N/A)	2.1	9.04
Catalpa	2.6	0.4	1.2	0.1	14	6.9	1.0	1.0	6.5	43	0.0	0	19.8	57	(N/A)	2.1	9.46
Eastern red cedar	1.1	0.2	0.9	0.1	7	1.9	0.3	0.3	1.7	12	-3.1	-11	3.4	7	(N/A)	1.4	1.79
American basswood	0.9	0.2	0.5	0.0	5	3.8	0.6	0.5	3.6	24	-0.8	-3	9.2	26	(N/A)	1.1	8.52
Callery pear	0.0	0.0	0.0	0.0	0	0.6	0.1	0.1	0.5	4	0.0	0	1.3	4	(N/A)	1.1	1.21
Red pine	0.4	0.1	0.3	0.0	3	1.5	0.2	0.2	1.4	9	-1.3	-5	2.9	7	(N/A)	1.1	2.37
Swamp white oak	0.2	0.0	0.1	0.0	1	1.6	0.2	0.2	1.4	10	-0.1	0	3.7	10	(N/A)	1.1	3.47
Maple	0.0	0.0	0.0	0.0	0	0.3	0.1	0.0	0.3	2	0.0	0	0.8	2	(N/A)	0.7	1.12
White oak	0.0	0.0	0.0	0.0	0	0.3	0.0	0.0	0.3	2	0.0	0	0.6	2	(N/A)	0.7	0.87
Broadleaf Deciduous Large	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)	0.7	1.93
Eastern white pine	0.7	0.1	0.6	0.1	5	1.4	0.2	0.2	1.3	9	-2.8	-10	1.8	3	(N/A)	0.7	1.45
Dogwood	0.0	0.0	0.0	0.0	0	0.2	0.0	0.0	0.2	1	0.0	0	0.5	1	(N/A)	0.7	0.71
Conifer Evergreen 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	0.09
Broadleaf Deciduous Medium	0.0	0.0	0.0	0.0	0	0.2	0.0	0.0	0.2	1	0.0	0	0.4	1	(N/A)	0.4	1.21
Boxelder	0.4	0.1	0.2	0.0	2	1.2	0.2	0.2	1.2	8	-0.2	-1	3.3	9	(N/A)	0.4	9.31
Black poplar	0.5	0.1	0.2	0.0	3	1.6	0.2	0.2	1.5	10	0.0	0	4.4	12	(N/A)	0.4	12.48
Birch	0.1	0.0	0.0	0.0	0	0.5	0.1	0.1	0.5	3	0.0	0	1.2	3	(N/A)	0.4	3.47
Tulip tree	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)	0.4	7.42
River birch	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)	0.4	7.92
Kentucky coffeetree	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)	0.4	7.42
Broadleaf Deciduous Small	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0	(N/A)	0.4	0.11

Table 4: Annual Carbon Stored

Keosauqua

Stored CO2 Benefits of Public Trees

11/16/2014

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Sugar maple	295,640	2,217	(N/A)	17.0	17.3	46.19
Silver maple	449,963	3,375	(N/A)	12.4	26.3	96.42
Northern white cedar	342	3	(N/A)	8.2	0.0	0.11
Eastern redbud	22,014	165	(N/A)	6.7	1.3	8.69
Green ash	89,317	670	(N/A)	6.4	5.2	37.22
American sycamore	276,674	2,075	(N/A)	5.7	16.2	129.69
Northern hackberry	57,265	429	(N/A)	5.0	3.4	30.68
Siberian elm	105,207	789	(N/A)	4.3	6.2	65.75
Black walnut	83,953	630	(N/A)	3.9	4.9	57.24
Apple	7,932	59	(N/A)	2.8	0.5	7.44
Norway maple	41,957	315	(N/A)	2.8	2.5	39.33
Blue spruce	1,536	12	(N/A)	2.5	0.1	1.65
Red maple	22,817	171	(N/A)	2.5	1.3	24.45
Northern red oak	31,858	239	(N/A)	2.1	1.9	39.82
Black locust	34,708	260	(N/A)	2.1	2.0	43.39
Catalpa	89,717	673	(N/A)	2.1	5.3	112.15
Eastern red cedar	3,583	27	(N/A)	1.4	0.2	6.72
American basswood	31,675	238	(N/A)	1.1	1.9	79.19
Callery pear	655	5	(N/A)	1.1	0.0	1.64
Red pine	2,597	19	(N/A)	1.1	0.2	6.49
Swamp white oak	3,302	25	(N/A)	1.1	0.2	8.26
Maple	437	3	(N/A)	0.7	0.0	1.64
White oak	371	3	(N/A)	0.7	0.0	1.39
Broadleaf Deciduous	1,220	9	(N/A)	0.7	0.1	4.57
Eastern white pine	6,685	50	(N/A)	0.7	0.4	25.07
Dogwood	356	3	(N/A)	0.7	0.0	1.33
Conifer Evergreen Sn	5	0	(N/A)	0.7	0.0	0.02
Broadleaf Deciduous	218	2	(N/A)	0.4	0.0	1.64
Boxelder	14,280	107	(N/A)	0.4	0.8	107.10
Black poplar	15,773	118	(N/A)	0.4	0.9	118.30
Birch	1,101	8	(N/A)	0.4	0.1	8.26
Tulip tree	3,672	28	(N/A)	0.4	0.2	27.54
River birch	3,624	27	(N/A)	0.4	0.2	27.18
Kentucky coffeetree	3,672	28	(N/A)	0.4	0.2	27.54
Broadleaf Deciduous	14	0	(N/A)	0.4	0.0	0.10
Black spruce	284	2	(N/A)	0.4	0.0	2.13
Cottonwood	3,672	28	(N/A)	0.4	0.2	27.54
Citywide total	1,708,097	12,811	(N/A)	100.0	100.0	45.43

Table 5: Annual Carbon Sequestered

Keosauqua

Annual CO Benefits of Public Trees

11/16/2014

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
Sugar maple	19,698	148	-1,419	-108	-1	0	0	18,171	136	(N/A)	17.0	16.6	2.84
Silver maple	36,190	271	-2,161	-102	-1	0	0	33,927	254	(N/A)	12.4	31.0	7.27
Northern white cedar	197	1	-2	-8	0	0	0	188	1	(N/A)	8.2	0.2	0.06
Eastern redbud	2,444	18	-106	-23	0	0	0	2,315	17	(N/A)	6.7	2.1	0.91
Green ash	8,322	62	-429	-37	0	0	0	7,856	59	(N/A)	6.4	7.2	3.27
American sycamore	12,461	93	-1,328	-55	0	0	0	11,078	83	(N/A)	5.7	10.1	5.19
Northern hackberry	4,014	30	-275	-34	0	0	0	3,705	28	(N/A)	5.0	3.4	1.98
Siberian elm	6,026	45	-505	-34	0	0	0	5,487	41	(N/A)	4.3	5.0	3.43
Black walnut	6,248	47	-403	-27	0	0	0	5,818	44	(N/A)	3.9	5.3	3.97
Apple	913	7	-38	-9	0	0	0	866	6	(N/A)	2.8	0.8	0.81
Norway maple	3,339	25	-201	-18	0	0	0	3,120	23	(N/A)	2.8	2.9	2.93
Blue spruce	169	1	-7	-5	0	0	0	156	1	(N/A)	2.5	0.1	0.17
Red maple	2,826	21	-110	-11	0	0	0	2,705	20	(N/A)	2.5	2.5	2.90
Northern red oak	1,517	11	-153	-12	0	0	0	1,352	10	(N/A)	2.1	1.2	1.69
Black locust	2,568	19	-167	-14	0	0	0	2,387	18	(N/A)	2.1	2.2	2.98
Catalpa	2,867	21	-431	-16	0	0	0	2,420	18	(N/A)	2.1	2.2	3.02
Eastern red cedar	126	1	-17	-7	0	0	0	101	1	(N/A)	1.4	0.1	0.19
American basswood	2,119	16	-152	-9	0	0	0	1,958	15	(N/A)	1.1	1.8	4.89
Callery pear	287	2	-5	-2	0	0	0	280	2	(N/A)	1.1	0.3	0.70
Red pine	284	2	-12	-5	0	0	0	266	2	(N/A)	1.1	0.2	0.67
Swamp white oak	672	5	-16	-4	0	0	0	652	5	(N/A)	1.1	0.6	1.63
Maple	77	1	-2	-1	0	0	0	74	1	(N/A)	0.7	0.1	0.28
White oak	148	1	-2	-1	0	0	0	145	1	(N/A)	0.7	0.1	0.55
Broadleaf Deciduous Larg	283	2	-6	-2	0	0	0	275	2	(N/A)	0.7	0.3	1.03
Eastern white pine	375	3	-32	-5	0	0	0	337	3	(N/A)	0.7	0.3	1.26
Dogwood	76	1	-2	-1	0	0	0	73	1	(N/A)	0.7	0.1	0.27
Conifer Evergreen Small	1	0	0	0	0	0	0	1	0	(N/A)	0.7	0.0	0.00
Broadleaf Deciduous Medi	96	1	-2	-1	0	0	0	93	1	(N/A)	0.4	0.1	0.70
Boxelder	1,038	8	-69	-4	0	0	0	966	7	(N/A)	0.4	0.9	7.25
Black poplar	857	6	-76	-4	0	0	0	778	6	(N/A)	0.4	0.7	5.83
Birch	224	2	-5	-1	0	0	0	217	2	(N/A)	0.4	0.2	1.63
Tulip tree	445	3	-18	-2	0	0	0	426	3	(N/A)	0.4	0.4	3.19

Table 6: Annual Social and Aesthetic Benefits

Keosauqua

Annual Aesthetic/Other Benefits of Public Trees

11/16/2014

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Sugar maple	2,241	(N/A)	17.0	19.6	46.69
Silver maple	2,993	(N/A)	12.4	26.2	85.51
Northern white cedar	141	(N/A)	8.2	1.2	6.13
Eastern redbud	138	(N/A)	6.7	1.2	7.27
Green ash	819	(N/A)	6.4	7.2	45.52
American sycamore	965	(N/A)	5.7	8.5	60.28
Northern hackberry	634	(N/A)	5.0	5.6	45.31
Siberian elm	479	(N/A)	4.3	4.2	39.94
Black walnut	567	(N/A)	3.9	5.0	51.55
Apple	52	(N/A)	2.8	0.5	6.45
Norway maple	325	(N/A)	2.8	2.8	40.62
Blue spruce	93	(N/A)	2.5	0.8	13.33
Red maple	374	(N/A)	2.5	3.3	53.36
Northern red oak	123	(N/A)	2.1	1.1	20.49
Black locust	247	(N/A)	2.1	2.2	41.11
Catalpa	243	(N/A)	2.1	2.1	40.56
Eastern red cedar	49	(N/A)	1.4	0.4	12.18
American basswood	165	(N/A)	1.1	1.4	54.93
Callery pear	39	(N/A)	1.1	0.3	12.89
Red pine	80	(N/A)	1.1	0.7	26.69
Swamp white oak	79	(N/A)	1.1	0.7	26.22
Maple	15	(N/A)	0.7	0.1	7.28
White oak	29	(N/A)	0.7	0.3	14.73
Broadleaf Deciduous Large	43	(N/A)	0.7	0.4	21.64
Eastern white pine	94	(N/A)	0.7	0.8	47.08
Dogwood	4	(N/A)	0.7	0.0	2.06
Conifer Evergreen Small	9	(N/A)	0.7	0.1	4.27
Broadleaf Deciduous Medium	13	(N/A)	0.4	0.1	12.89
Boxelder	65	(N/A)	0.4	0.6	65.43
Black poplar	66	(N/A)	0.4	0.6	65.59
Birch	26	(N/A)	0.4	0.2	26.22
Tulip tree	46	(N/A)	0.4	0.4	45.86
River birch	39	(N/A)	0.4	0.3	39.16
Kentucky coffeetree	46	(N/A)	0.4	0.4	45.86
Broadleaf Deciduous Small	0	(N/A)	0.4	0.0	0.03
Black spruce	21	(N/A)	0.4	0.2	21.08
Cottonwood	46	(N/A)	0.4	0.4	45.86
Citywide total	11,407	(N/A)	100.0	100.0	40.45

Table 7: Summary of Benefits in Dollars

Keosauqua

Total Annual Benefits of Public Trees by Species ($)

11/16/201

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Sugar maple	2,202	136	343	2,473	2,241	7,395	(N/A)	19.0
Silver maple	1,983	254	350	3,245	2,993	8,826	(N/A)	22.7
Northern white cedar	59	1	5	66	141	272	(N/A)	0.7
Eastern redbud	375	17	56	157	138	744	(N/A)	1.9
Green ash	781	59	130	817	819	2,607	(N/A)	6.7
American sycamore	1,101	83	200	1,733	965	4,082	(N/A)	10.5
Northern hackberry	813	28	136	808	634	2,419	(N/A)	6.2
Siberian elm	711	41	126	830	479	2,187	(N/A)	5.6
Black walnut	566	44	95	675	567	1,947	(N/A)	5.0
Apple	140	6	21	58	52	276	(N/A)	0.7
Norway maple	410	23	70	392	325	1,221	(N/A)	3.1
Blue spruce	63	1	7	85	93	250	(N/A)	0.6
Red maple	244	20	43	250	374	930	(N/A)	2.4
Northern red oak	206	10	30	221	123	590	(N/A)	1.5
Black locust	316	18	54	316	247	951	(N/A)	2.4
Catalpa	305	18	57	460	243	1,084	(N/A)	2.8
Eastern red cedar	85	1	7	151	49	293	(N/A)	0.8
American basswood	175	15	26	205	165	584	(N/A)	1.5
Callery pear	27	2	4	13	39	85	(N/A)	0.2
Red pine	62	2	7	100	80	251	(N/A)	0.6
Swamp white oak	73	5	10	48	79	215	(N/A)	0.6
Maple	16	1	2	7	15	41	(N/A)	0.1
White oak	12	1	2	9	29	53	(N/A)	0.1
Broadleaf Deciduous La	26	2	4	21	43	97	(N/A)	0.2
Eastern white pine	61	3	3	161	94	321	(N/A)	0.8
Dogwood	11	1	1	4	4	21	(N/A)	0.1
Conifer Evergreen Smal	2	0	0	1	9	12	(N/A)	0.0
Broadleaf Deciduous M	9	1	1	4	13	28	(N/A)	0.1
Boxelder	55	7	9	84	65	221	(N/A)	0.6
Black poplar	71	6	12	107	66	262	(N/A)	0.7
Birch	24	2	3	16	26	72	(N/A)	0.2
Tulip tree	44	3	7	40	46	140	(N/A)	0.4
River birch	47	3	8	38	39	135	(N/A)	0.3
Kentucky coffeetree	44	3	7	40	46	140	(N/A)	0.4
Broadleaf Deciduous Sn	1	0	0	0	0	1	(N/A)	0.0
Black spruce	15	0	2	20	21	58	(N/A)	0.1
Cottonwood	44	3	7	40	46	140	(N/A)	0.4
Citywide Total	11,181	821	1,846	13,696	11,407	38,951	(N/A)	100.0

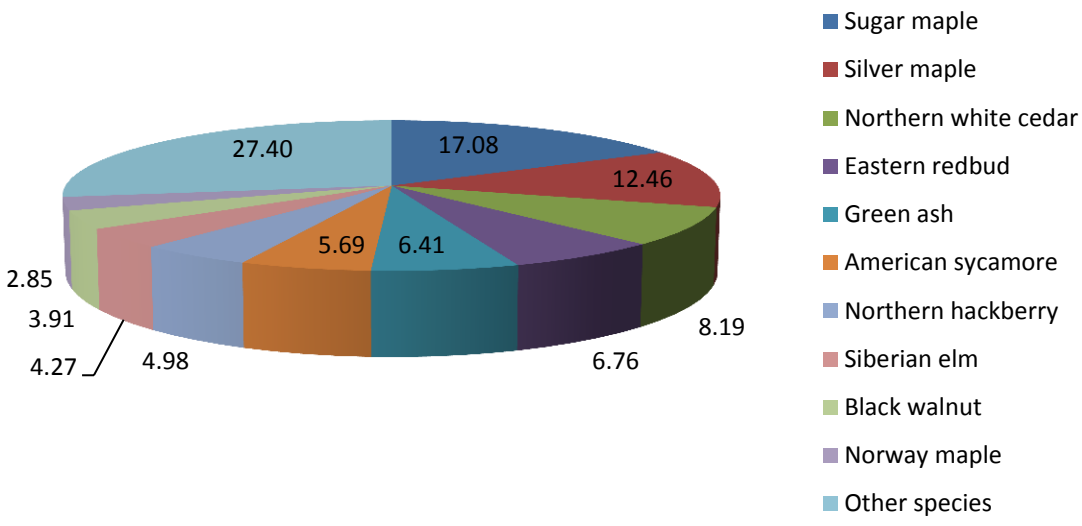

Figure 1: Species Distribution

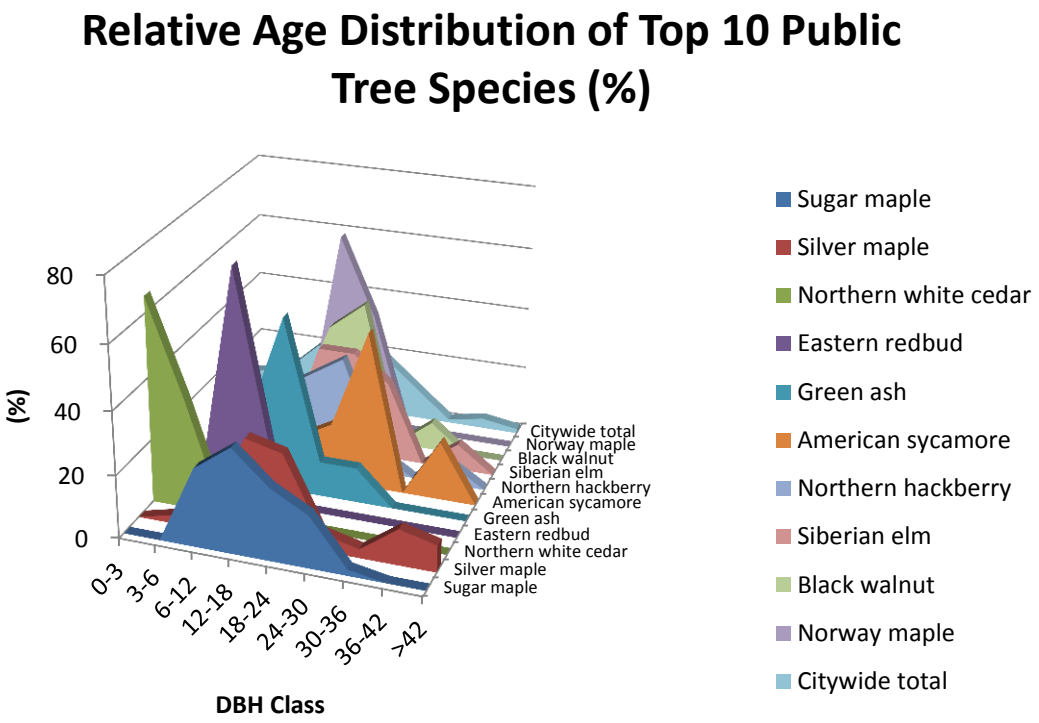

Figure 2: Relative Age Class

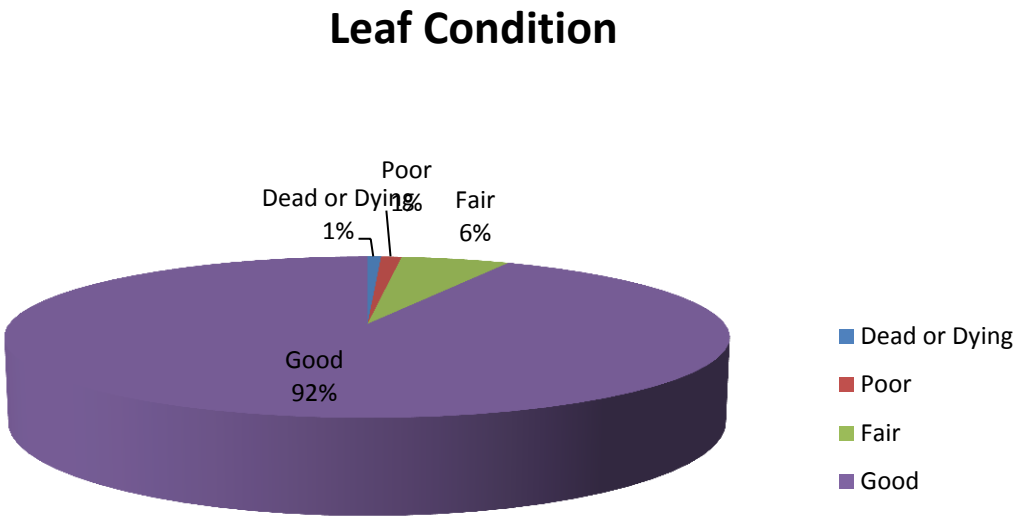

Figure 3: Foliage Condition

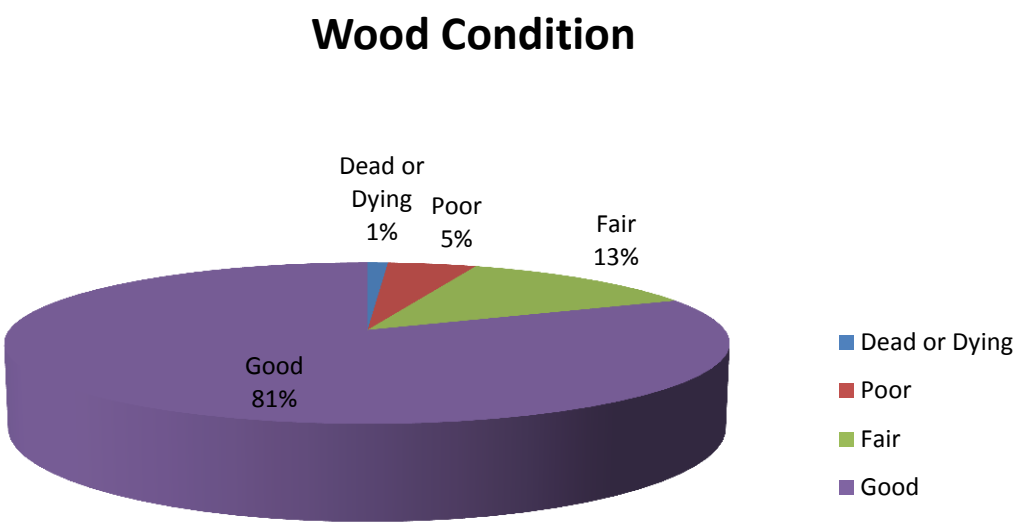

Figure 4: Wood Condition

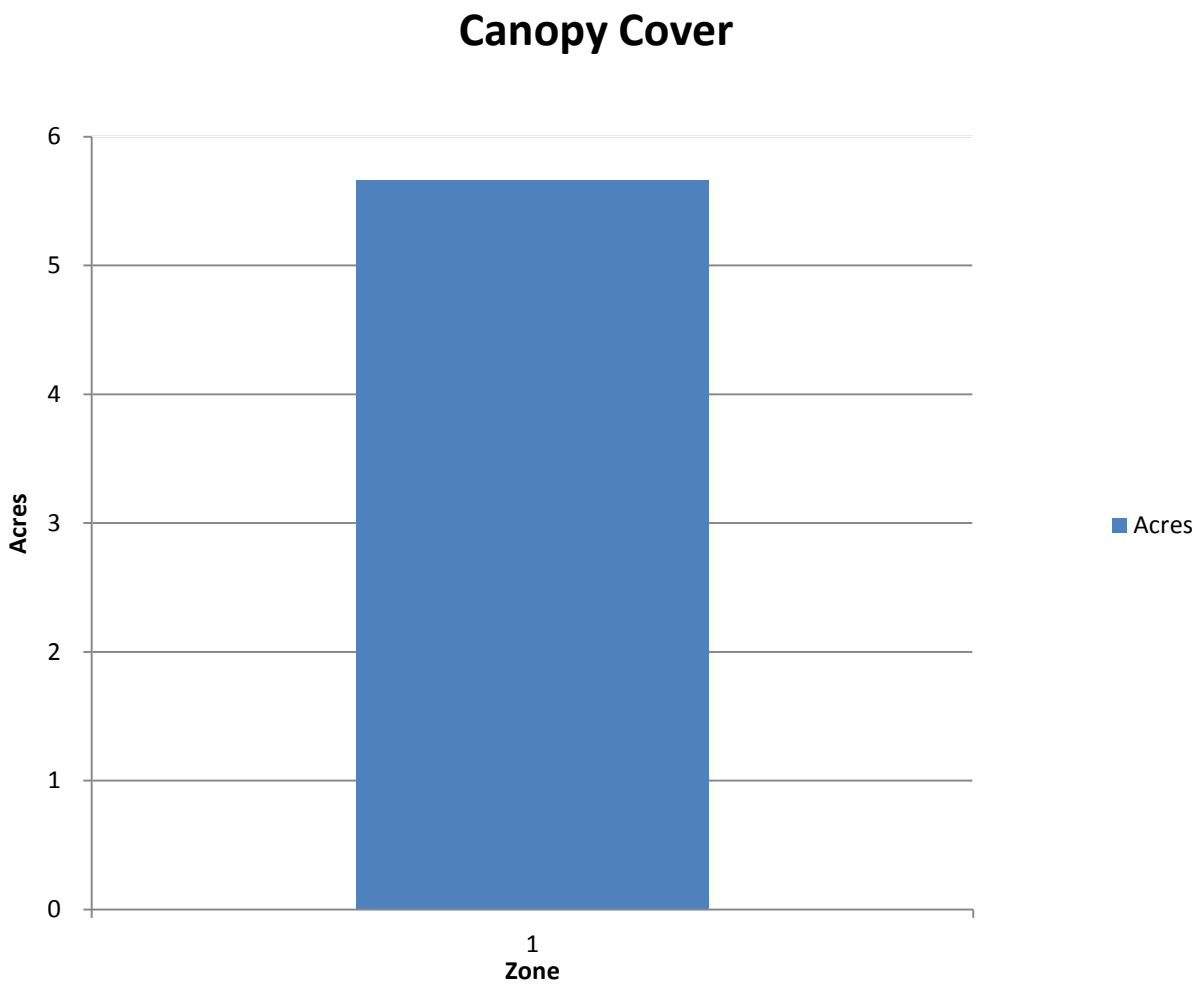

Figure 5: Canopy Cover in Acres

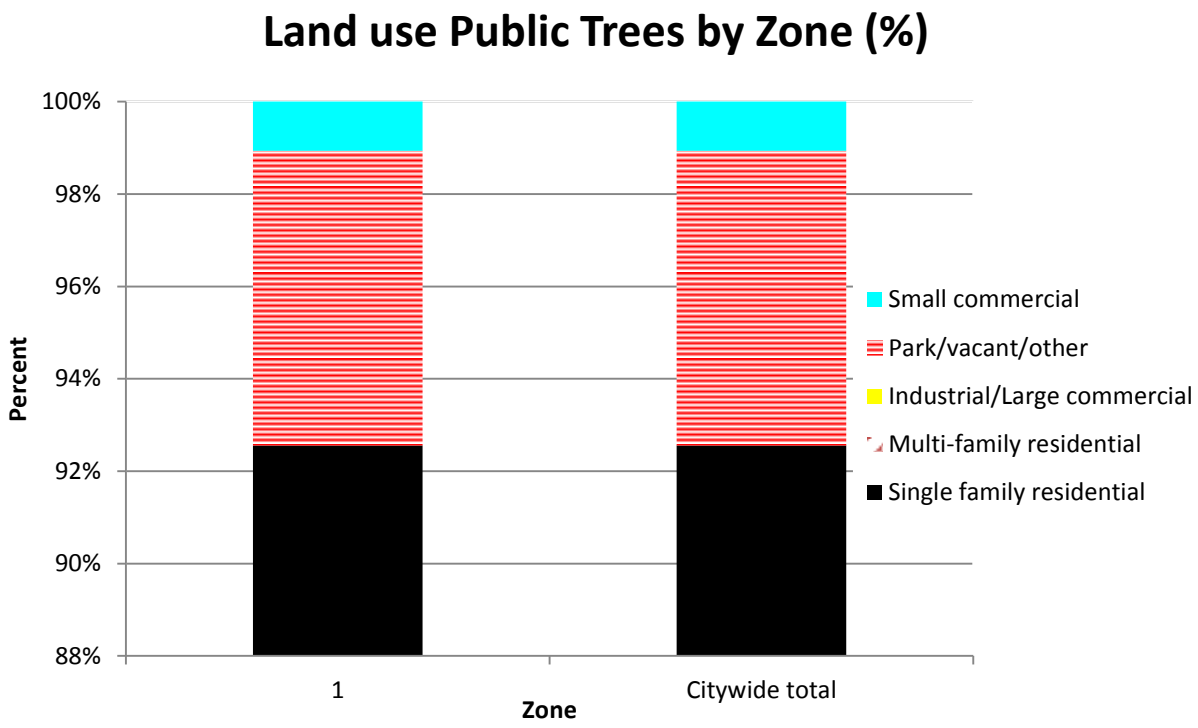

Figure 6: Land Use of city/park trees

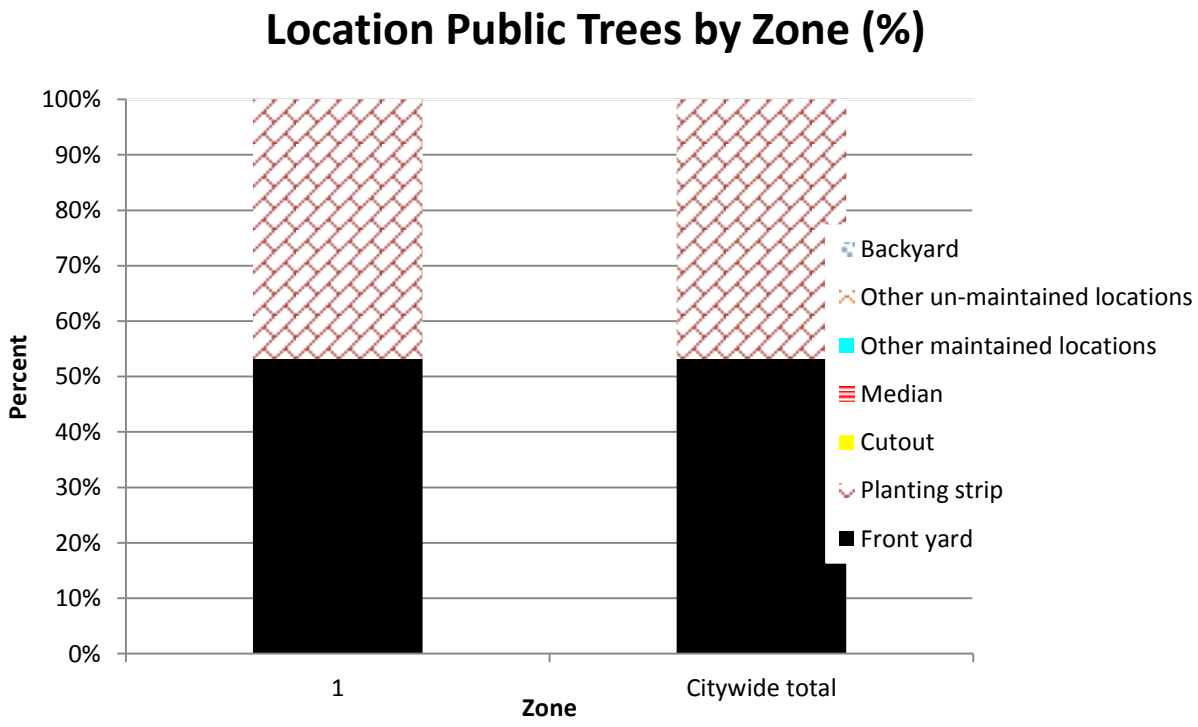

Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping

Figure 1: Location of Ash Trees

Figure 2: Location of EAB symptoms

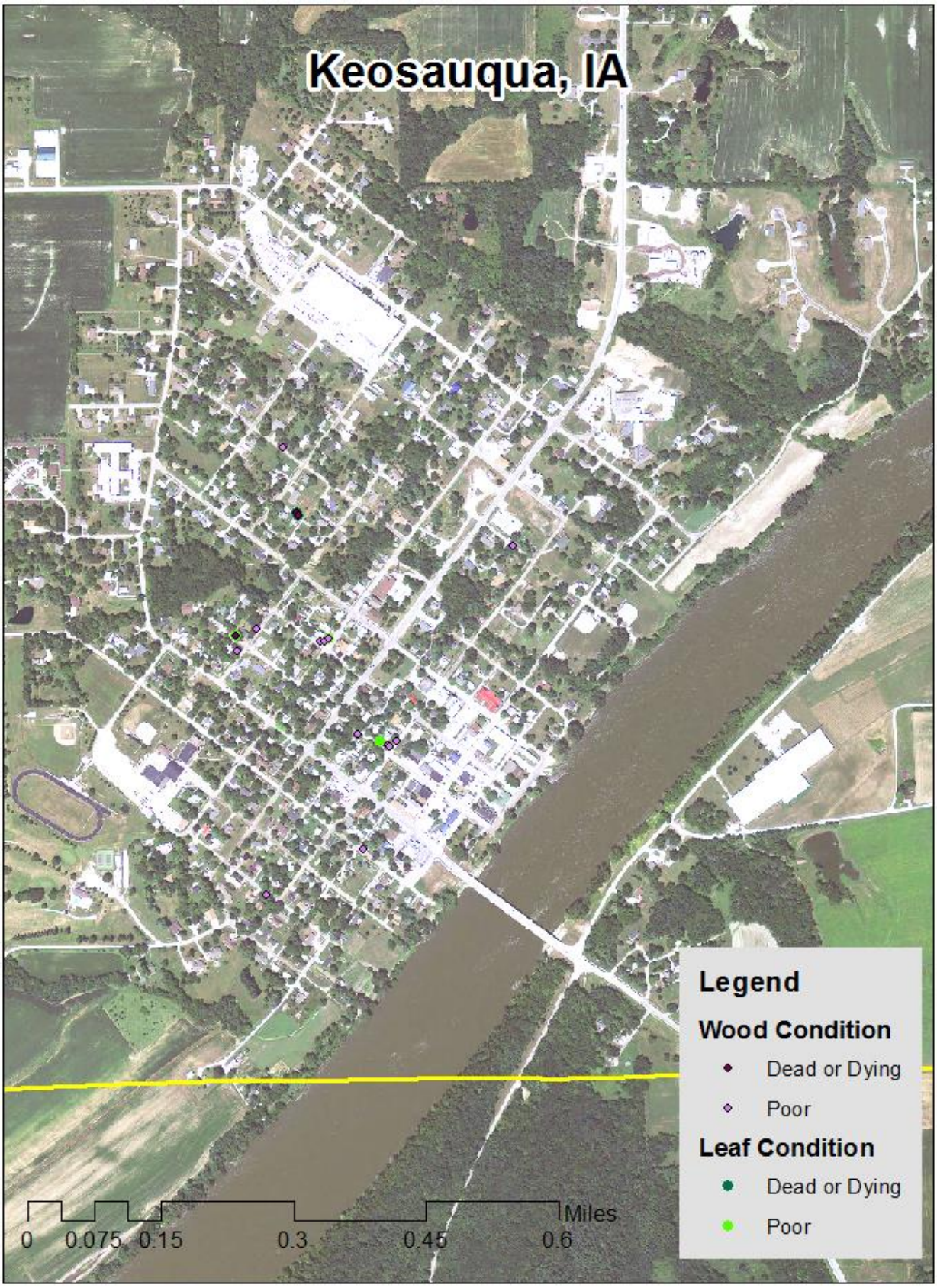

Figure 3: Location of Poor Condition Trees

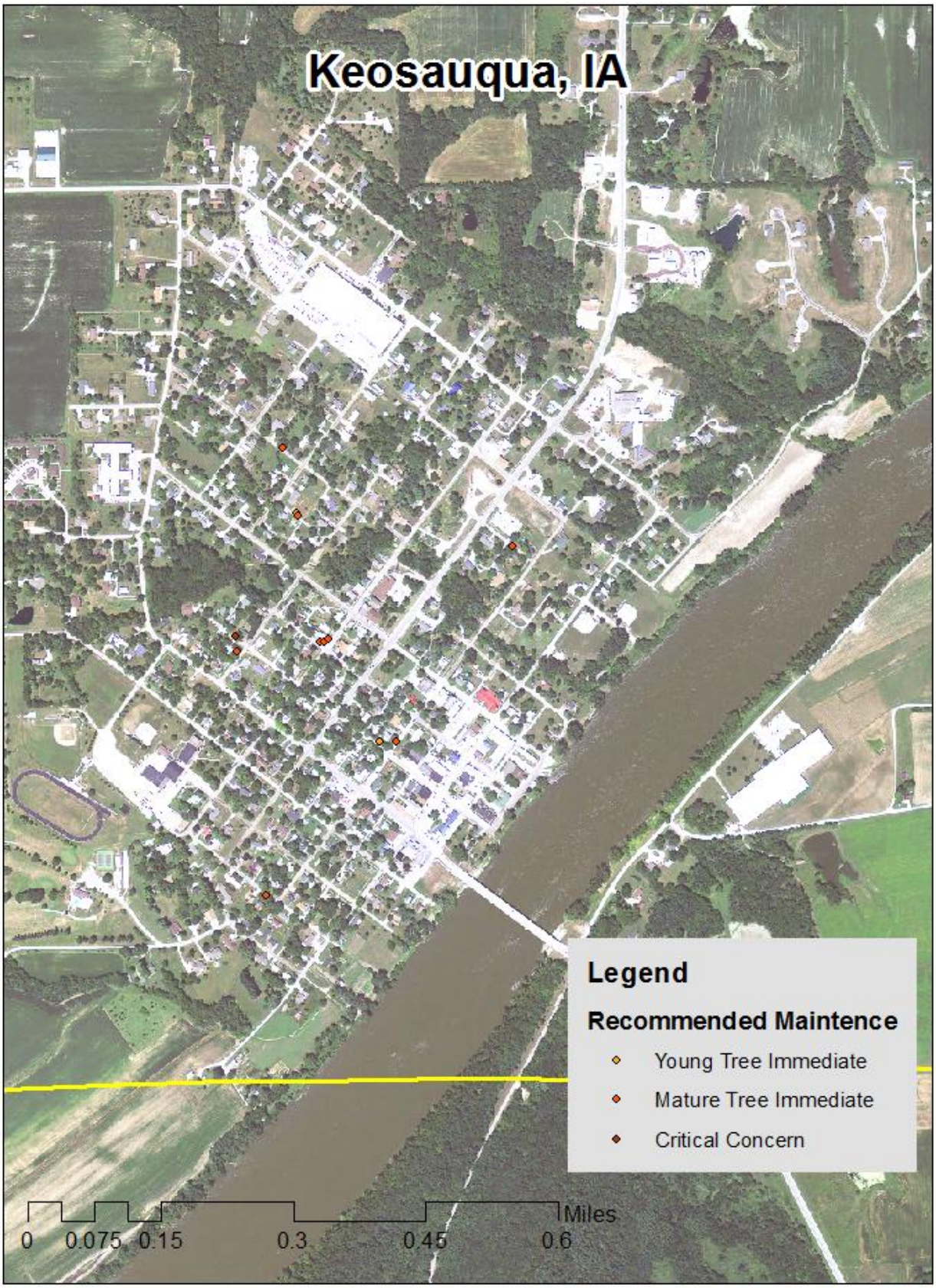

Figure 4: Location of Trees with Recommended Maintenance

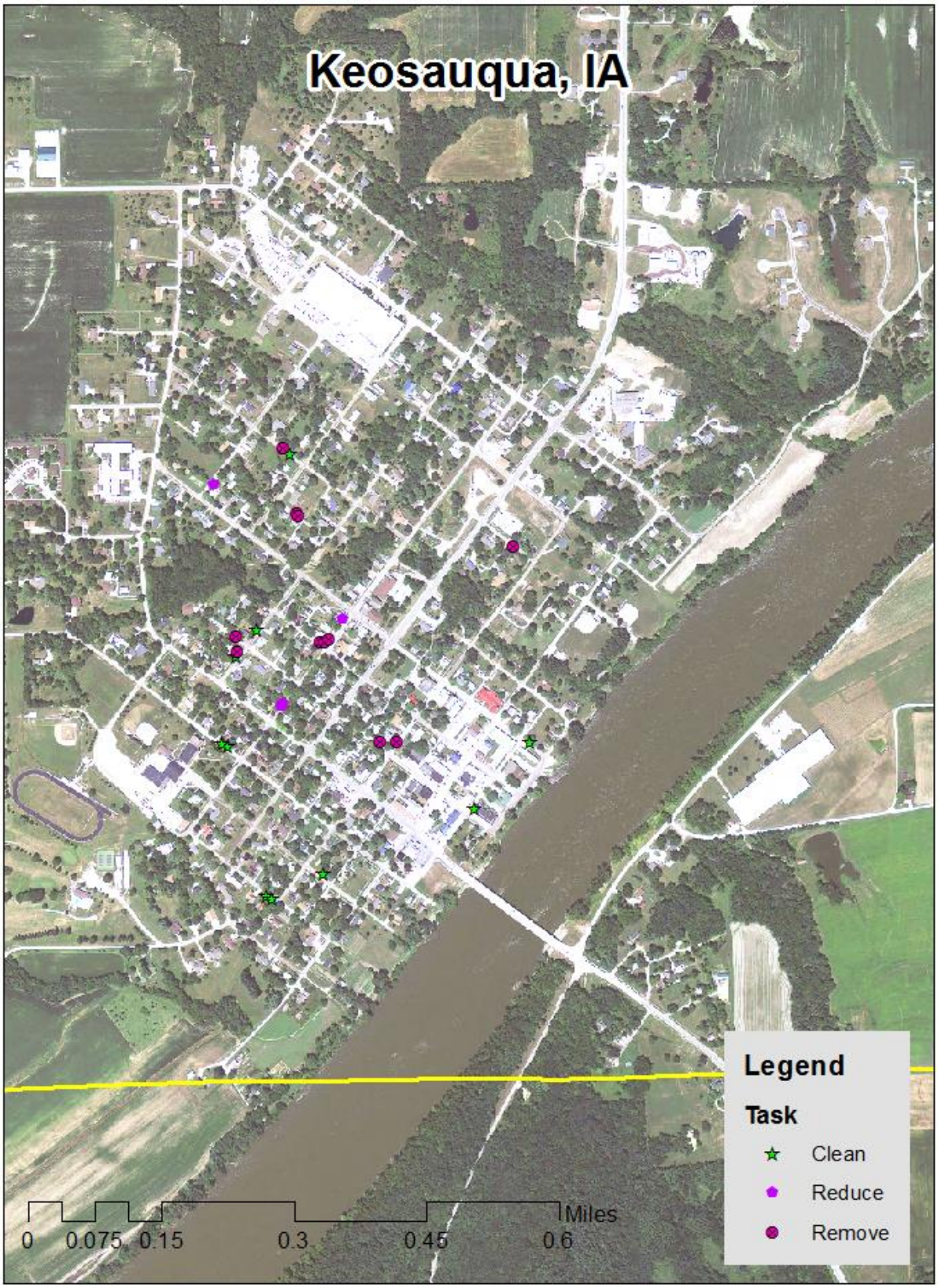

Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*

Appendix C: Keosauqua Tree Ordinances

TITLE VI - PHYSICAL ENVIRONMENT

CHAPTER 2 TREES

6-2-1 PURPOSE. It is the purpose of this Ordinance to promote and protect the public health, safety, and general welfare, by providing for the regulation of the planting, maintenance, and removal of trees, shrubs, and other plants within the City of Keosauqua.

6-2-2 DEFINITIONS.

1. **PROPERTY OWNER**: The contract purchaser, if there is one of record, otherwise the record holder of legal title.
2. **LARGE TREES**: Those trees attaining a height of 45 feet or more.
3. **PARK:** All public parks having individual names.
4. **TREE LAWN:** The part of a street or highway not covered by sidewalk or other paving, lying between the property line and that portion of the street or highway usually used for vehicular traffic.

6-2-3 TREE BOARD. There is hereby created and established a tree board for the City of Keosauqua which shall consist of 5 members, citizens and residents of this City, who shall be appointed by the Mayor with the approval of the City Council.

1. The term of the tree board shall be 3 years, except that the term of two members appointed to the first board shall be only 1 year, and the term for two members of the first board shall be for 2 years. Members of the board shall serve without compensation.
2. In the event that a vacancy shall occur during the term of any member, his or her successor shall be appointed to the un-expired portion of the term. The City Superintendent will serve as ex-officio member of the tree board.
3. It shall be the responsibility of the board to:
   a. Study, investigate, counsel, and develop a written plan for the care, preservation, trimming, planting, replanting, removal, or disposition of trees and shrubs in public areas. Such a plan will be presented to the City Council, and upon its acceptance and approval, shall constitute the official comprehensive tree plan for the City of Keosauqua, Iowa.

b. The board shall review annually, and update if needed, the comprehensive tree plan.

c. The board, when requested by the City Council, shall consider, investigate, make findings, report, and recommend upon any special matter of question within the scope of its work.

4. The board shall choose its own officers, make its own rules and regulations, and keep a journal of its proceedings. A majority of the members shall be a quorum for the transaction of business.

6-2-4 CITY SUPERINTENDENT. The Superintendent shall have the following powers and duties:

1. To direct, manage, supervise, and control the city street program to include all planting, removal, maintenance, and protection of all trees and shrubs on Public areas,

2. To guard all trees and shrubs within the city to prevent the spread of disease or pests, and to eliminate dangerous conditions that may affect the life, health, or safety of persons or property,

3. Such other powers and duties as are provided by the laws of Iowa, and by the Ordinances of the City.

6-2-5 AUTHORITY. The City Superintendent shall have the authority and jurisdiction of regulating the planting, maintenance, and removal of trees on streets and other publicly owned property to ensure safety or preserve or enhance the aesthetics of such public sites. The City Superintendent shall have the authority to supervise or inspect all work done under a permit issued in accordance with the terms of this Ordinance. The City Superintendent shall have the authority to formulate and publish a master tree plan with the advice, hearing, and approval of the tree board.

6-2-6 PERMITS. No person shall plant, spray, fertilize, preserve, prune, remove, cut above or below ground, or otherwise disturb any tree on any municipal-owned property without first filing an application and procuring a permit from the City Tree Board. The person receiving the permit shall abide by the arboricultural specifications and standards of practice adopted by the Keosauqua Tree Board. No permit will be required to spray, fertilize, preserve, or prune private-owned trees.

The Superintendent shall have the authority to require posting of a bond adequate to fully repay the City of Keosauqua for any and all costs attendant to the completion of the work under the permit. In addition, the contractor is required to show adequate insurance coverage from potential damages during the excavation work.

6-2-7 MAINTENANCE. All trees planted shall have trunks no less than ½ inch in diameter at 6 inches above the ground. No tree shall be planted closer than 3 feet from the curb line, or outer line of the sidewalk. Tree lawns must be at least 6 feet in width for large tree plantings and at least 10 feet wide for medium and small trees. All tress shall be planted in line with each other and at a spacing of 40 to 60 feet depending on the species planted. No street trees shall be planted under or within 10 lateral feet at maturity size of any overhead utility wire, or over or within 5 lateral feet of any underground utility wire. No trees shall be planted within 20 lateral feet from street corners or street intersections.

All trees and shrubs on public or private property which have branches overhanging a public street or sidewalk, shall have said branches trimmed to a clearance height of 14 feet on the street side and 10 feet on the sidewalk side. No permit will be required for privately owned trees and shrubs.

All public trees designated for removal shall be completely removed from the growing site and disposed of in an authorized manner.

6-2-8 SPECIES, CULTIVATORS, AND VARIETIES. The tree board develops and maintains a list of desirable trees for planting along streets in three size classes: small, medium, and large. A list of tree species not suitable for planting as tree streets is hereby created and enforced by the Tree Board.

Desirable trees include:

Small Trees: Crab-applies (Persistent Type), Redbud Medium Trees: Linden, Pear, Crimson Maple

Large Trees: Pin Oak, Red Oak, White Oak, Sugar Maple, Red Maple, Hackberry, Pines, Spruce

Trees not recommended for Keosauqua, include:

Boxelder	Siberian Elm	Chinese Elm	Cottonwood	White Poplar	Lombardy Poplar
Willows	Tree of Heaven	European Mountain Ash		American Elm	Russian Olive
Catalpa	Black Locust	Lolleana Poplar	Weeping Birch	Silver Maple	

6-2-9 OBSTRUCTION. It shall be the duty of any person or persons owning or occupying real property bordering on any street upon which property, there may be trees to prune such trees in a manner that they will not obstruct or shade the street lights, obstruct the passage of pedestrians on sidewalks, obstruct the vision of traffic signs, or obstruct the view of any street or alley intersection. The minimum clearance of any overhanging portion thereof shall be 10 feet over sidewalks and 14 feet over all streets. No permit will be required for this.

When a person, to whom an order is directed, shall fail to comply within the specified time, it shall be lawful for the city to prune such trees with the cost assessed to the owner as provided by law in special assessments.

6-2-10 NUISANCE AND CONDEMNATION. All street trees planted in violations of, or not maintained in strict compliance with the provisions of this Ordinance, or that are dead or dangerous, are declared to constitute a public nuisance. The City Superintendent shall cause written notice by certified mail, to be served on the property owner requiring such nuisances to be corrected within 30 days, or cost of correction will be assessed against the property owner.

6-2-11 PROTECTION OF TREES. During development, re-development, razing, or renovating, no more than 50% of the trees shall be cut, damaged, or removed except by specific permit. No person shall excavate any ditches, tunnels, trenches, or lay any drive within a radius of 20 feet from any tree except by specific permit. This applies only to trees on tree lawns on city owned property.

No person shall intentionally damage, cut, carve, attach any rope, wire, nails, advertising poster or other contrivance to any tree; allow any gaseous, liquid, chemical, or solid substance that is harmful to such trees, come in contact with them, or set fire or permit fire to burn when such fire or the heat will injure any portion of the tree.

Tree topping is not allowed on any publicly owned tree without the written consent, which may be by permit from the Keosauqua Tree Board.

6-2-12 APPEALS. Any person who receives an order from the Superintendent and objects to all or part thereof, may, within eight days of receipt thereof, notify the Keosauqua Tree Board and City Council in writing of the nature of the objection, and request a hearing thereon. The hearing shall be held at the next regularly scheduled City Council meeting. The City of Keosauqua shall notify the person objecting of the final decision.

6-12-13 INTERFERENCE. No person shall prevent, delay, or interfere with the City Superintendent or his assistants in the execution or enforcement of this Ordinance.

6-2-14 PENALTIES. Any person, firm, or corporation violating or failing to comply with any of the provisions of this Ordinance shall be guilty of a misdemeanor, and upon conviction thereof, shall be fined a sum no less than $1.00 and no more than $100.00, or may be imprisoned for a term not exceeding 30 days.

6-2-15 SEVERABILITY CLAUSE. If any section, provision, or part of this Ordinance shall be adjudged invalid or unconstitutional, such adjudication shall not affect the validity of the Ordinance as a whole or any section, provision, or part thereof not adjudged invalid or unconstitutional.

‘Sample’ Recommended Planting List:

Common Name	Scientific Name	Cultivars/ Selections
Shade Trees		
Black Maple	*Acer nigrum*	
Red Maple	*Acer rubrum*	Burgundy Belle, Red Sunset, Scarlet Jewel, Redpoint, Somerset
Sugar Maple	*Acer saccharum*	Commemoration, Crescendo, Endowment, Fall Fiesta, Legacy, Green Mountain
Hackberry	*Celtis occidentalis*	Chicagoland, Prairie Pride, Windy City
Yellowwood	*Cladrastis kentuckea*	
Ginkgo (male only)	*Ginkgo biloba*	Autumn Gold, Golden Colonnade, Halka, Magyar, Presidential Gold, Princeton Sentry
Thornless Honeylocust	*Gleditisia triacanthos*	Northern Acclaim, Skyline, Shademaster
Kentucky Coffeetree	*Gymnocladus dioicus*	
Larch	*Larix decidua*	
American Hophornbeam	*Ostrya virginiana*	
London Planetree	*Platanus x acerfolia*	Bloodgood
Corktree (male only)	*Phellodendron spp.*	Macho, Longenecker, Eye Stopper and His Majesty
White Oak	*Quercus alba*	
Swamp White Oak	*Quercus bicolor*	
Shingle Oak	*Quercus imbricaria*	
Bur Oak	*Quercus macrocarpa*	
Chinkapin Oak	*Quercus muehlenbergii*	
English Oak	*Quercus robur*	
Northern Red Oak	*Quercus rubra*	
Bald Cypress	*Taxodium distichum*	
American Linden	*Tilia americana*	Boulevard, Front Yard, Legend
Silver Linden	*Tillia tomemtosa*	
Low Growing Trees		

Serviceberry	*Amelanchier spp.*	Autumn Brilliance, Cole's Select, Cumulus, Princess Diana, Strata
American Hornbeam	*Carpinus caroliniana*	
Eastern Redbud	*Cercis canadensis*	
Pagoda Dogwood	*Cornus alternifolia*	
Flowering Crabapple	*Malus spp.*	Adirondack, Cardinal, David, Donald Wyman, Doublooms, Florbunda, Golden Raindrops, Harvest Gold, Indian Magic, Louisa, Mary Potter, Purple Prince, Red Jewel, Royal Fountain, Royal Raindrops, Sugar Tyme
Japanese Tree Lilac	*Syringa reticulata*	Ivory Silk, Summer Snow
***Parks only* Conifers**		
White Fir	*Abies concolor*	
Norway Spruce	*Picea abies*	
White Spruce	*Picea glauca*	
Black Hills Spruce	*Picea glauca var. densata*	
Serbian Spruce	*Picea omorika*	
White Pine	*Pinus strobus*	
Arborvitae	*Thuja occidentalis*	
Eastern Hemlock	*Tsuga canadensis*	

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If you need accommodations because of disability to access the services of this Agency, please contact the Director at 515-281-5918.