Community Tree Management Plan
For Gilbert, IA

Prepared by the Iowa DNR
Bureau of Forestry
2014

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Executive Summary

Overview

This plan was developed to assist the City of Gilbert with managing its urban forest, including budgeting and future planning. Trees can provide a multitude of benefits to the community, and sound management of this resource is critical to fully reaping these rewards. 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 *(Fraxinus spp.)*. Experience from other states show that virtually all ash die once EAB becomes established in a community. With proper planning and management, the costs of removing dead and dying trees can be spread out over time, mitigating the financial burden as well as public safety issues.

Inventory and Results

In May 2013, 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 80 trees inventoried.

- Gilbert's trees provide $10,359 of benefits annually, at an average of $129 a tree
- There are at least 16 different species of trees in Gilbert
- The top three genus are: Maple 31%, Oak 19%, and Spruce 14%
- 26% of trees are in need of some type of maintenance (trimming, removal, etc.):
    - 11 trees need prompt attention to correct dangerous branches or training to prevent problems later on
    - 10 trees need trimming considered to be routine maintenance

Recommendations

The core recommendations are detailed in the *Recommendations* section. Some key ones include:

- Begin planting new trees using a diverse mix of species wherever space is available and replacing existing trees that are in poor health to diversify the tree population and buffer against catastrophic tree pests such as EAB
- Address the 21 trees needing maintenance
- Begin regularly monitoring the ash tree population for signs or symptoms associated with EAB

Introduction

This plan was developed to assist Gilbert 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, communities all across Iowa are preparing for increased costs of tree removal and replacement plantings. With proper planning and management of the forest canopy, these costs can be extended over years and public safety issues from dead and dying ash trees mitigated.

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

Inventory

In June 2013, 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 of EAB were sought on 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 80 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.

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Gilbert's trees reduce energy related costs by approximately $2,936 annually (Appendix A, Table 1). These savings are both in Electricity (13.9 MWh) and in Natural Gas (1,918 Therms).

Annual Stormwater Benefits

Gilbert's trees intercept about 140,190 gallons of rainfall or snowmelt a year (Appendix A, Table 2). This interception provides $3,799 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 mater (ozone). In Gilbert, it is estimated that trees remove 177 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 $496 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Gilbert, trees sequester about 25,738 lbs of carbon each year with an associated value of $193 (Appendix A, Table 5). This equates to 407,237 lbs of carbon being stored in Gilbert's trees with total benefit of $3,054 (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. Gilbert receives $2,775 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, Gilbert's trees provide $10,359 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 80 trees in Gilbert provide approximately $129 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Gilbert has at least 16 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genus is as follows:

Maple	31%
Oak	19%
Spruce	11%
Ash	8%
Walnut	8%
Crabapple	8%
All others	< 5% ea.

Size Class

The size distribution of Gilbert's trees is fairly normal, although there are more large trees and fewer small trees. Fifty-five percent of Gilbert's trees are between 6-18 inches in diameter (measured at 4.5 ft above ground), with 39% larger than that and 23% smaller (Appendix A, Figure 2). This indicates a slight imbalance in the city's tree population and suggests that as the larger, older trees decline and are removed, there is a lack of younger trees being planted to replace them. Having too many large trees and too few young ones increases the risk for catastrophic storm damage and a long "lag period" following major damage.

Condition: Wood and Foliage Health

Both wood condition and leaf condition are good indicators of the overall health of the urban forest. The survey results for Gilbert indicate that 96% of the trees are in either good or fair health, while 4% of the trees are in poor health (Appendix A, Figures 3 & 4 and Appendix B, Figure 3).

The 4% of trees classified as poor, dead, or dying represent opportunity costs to the city where time and space are being sacrificed. Trees in poor health should be promptly removed and replaced with new, healthy trees to diversify and improve the overall health and resiliency of Gilbert's urban tree population.

Canopy Cover

The amount of tree canopy cover over Gilbert is nearly 1.5 acres (Appendix A, Figure 5). According to the U.S. Census, Gilbert occupies 582 acres of land. Thus the canopy cover on city land is less than 1%.

Land Use and Location

The majority of Gilbert's city and park trees are in planting strips in single family residential neighborhoods (Appendix A, Figures 6 & 7).

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, Figures 4 & 5). Crown cleaning removes dead, diseased, and broken limbs. Staking/training is for recently planted young trees that need to be staked, pruned, or shaped for proper architecture to prevent problems later on. Raising removes lower branches from the tree trunk to eliminate obstructions or clearance issues. Crown reduction is removing individual limbs to avoid interference with nearby structures, utility wires, or other branches.

Task	#	Priority levels
Crown Cleaning	16	1 critical concern, 8 immediate, 7 routine
Tree Staking/Training	1	1 immediate
Crown Reduction	4	1 immediate, 3 routine

Recommendations

Risk Management

Hazardous trees and branches 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 immediately.

Hazardous trees & branches: Critical concerns and Immediate needs

Gilbert has 1 "critical concern" tree that needs attention right away and 10 more trees classified as having "immediate" maintenance needs, meaning within the next three years. Refer to the maps in Figures 3 and 4 of Appendix B to view the locations of these trees.

Routine maintenance trees

After dealing with the critical concern and immediate need trees, there are 10 trees needing "routine" maintenance within the next six years (Appendix B, Figures 3 & 4).

Routine Pruning

Proper pruning can extend the life and good health of trees, as well as reduce public safety issues. It is generally recommended that all trees be inspected for pruning needs every five to ten years. This would equate to pruning roughly 8 trees per year in Gilbert.

Planting

Theoretically, the city should be planting (and removing) about 1-2 trees per year in order to sustain the tree population and to spread the trees equally out among different ages (size classes). This assumes the typical lifespan of a tree in Gilbert to be 80-140 years; if the trees are not living that long, or if the goal is to *increase* the tree population, the target will be higher (3-5 trees/yr). 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 Gilbert.

It is important to plant a diverse mix of differing species in the urban forest to maintain canopy health, since most insects and diseases target a single genus of trees (e.g., ash, maple, oak). Current diversity recommendations advise that a single genus not make up more than 20% of the urban forest and a single species (e.g. 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 the genus Maple, at 31% (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 for various reasons include: cottonwood, poplar, boxelder, Chinese elm, evergreens, willow, or black walnut, and any others identified in the city tree code.

A list containing generally acceptable and recommended trees for planting in Iowa is provided with this plan. Ensure each individual planting is tailored for the environmental conditions, available space, and other factors.

Continual Monitoring

Due to the threat of EAB, it is important to continuously check the health of ash trees. It is recommended that all ash trees which are showing any signs or symptoms of EAB be checked annually with a visual survey for tree death and for additional symptoms (canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage). All other ash trees in the city which aren't exhibiting these symptoms should still be routinely monitored as time allows.

Proposed Work Schedule & Estimated Costs

The following is a proposed 3-year work plan that would address the highest priority issues at this time. Estimated costs are based on $700/tree average for removal, $75/tree average for trimming*, and $150/tree average for planting. *Individual homeowners are presumed to be responsible for light trimming and staking/training of young trees in the City right-of-way.
For new tree plantings & replacements, it is recommended that Gilbert apply for grants. 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.

Year 1	Estimated Costs
Planting and replacements: 1-2 new trees	$225
Trimming: 1 critical concern tree, 6 immediate needs	$525
Staking & training: 1 tree needing immediate attention	

Year 2	
Planting and replacements: 1-2 new trees	$225
Trimming: 3 immediate needs, 4 routine	$525
Year 3	
Planting and replacements: 1-2 new trees	$225
Trimming: 6 routine needs	$450
Annually thereafter	
Removals: 1-2/year avg. focusing on poor condition ash & maple	$1050
Planting and replacements: 1-2/year avg.	$225
Routine trimming: 8 trees/year avg.	$600
Routine monitoring for EAB symptoms on ash trees	

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Maps and figures provided by Emma Bruemmer, Urban Forestry Coordinator. All data and information used for this report may be obtained by contacting the Iowa DNR Forestry Bureau.

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Annual Energy Benefits of Public Trees by Species

2/17/2014

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Black maple	4.3	323	578.4	567	889	(N/A)	23.8	30.3	46.81
Bur oak	0.1	9	17.9	18	27	(N/A)	12.5	0.9	2.65
Ash	2.1	162	316.2	310	472	(N/A)	8.8	16.1	67.37
Black walnut	1.1	85	152.3	149	234	(N/A)	8.8	8.0	33.40
Apple	0.7	52	104.5	102	154	(N/A)	8.8	5.3	22.06
Silver maple	2.1	162	281.9	276	438	(N/A)	7.5	14.9	73.01
Norway spruce	0.7	54	93.5	92	146	(N/A)	6.3	5.0	29.20
Blue spruce	0.2	15	27.8	27	43	(N/A)	5.0	1.5	10.65
River birch	0.7	54	88.5	87	140	(N/A)	3.8	4.8	46.78
Pin oak	0.3	24	44.4	43	67	(N/A)	3.8	2.3	22.43
Northern hackberry	0.7	56	107.9	106	162	(N/A)	2.5	5.5	81.12
Scotch pine	0.1	9	19.0	19	27	(N/A)	2.5	0.9	13.58
American basswood	0.4	33	52.1	51	84	(N/A)	2.5	2.9	41.84
Callery pear	0.0	3	6.2	6	9	(N/A)	1.3	0.3	8.99
White oak	0.0	2	3.7	4	6	(N/A)	1.3	0.2	5.82
Northern red oak	0.2	15	23.3	23	38	(N/A)	1.3	1.3	37.72
Other street trees	0.0	0	0.0	0	0	(N/A)	0.0	0.0	0.00
Citywide total	13.9	1,056	1,917.5	1,879	2,936	(N/A)	100.0	100.0	36.70

Table 2: Annual Stormwater Benefits

Gilbert

Annual Stormwater Benefits of Public Trees by Species

2/17/2014

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Black maple	35,968	975	(N/A)	23.8	25.7	51.30
Bur oak	769	21	(N/A)	12.5	0.6	2.08
Ash	23,779	644	(N/A)	8.8	17.0	92.06
Black walnut	10,756	292	(N/A)	8.8	7.7	41.64
Apple	2,460	67	(N/A)	8.8	1.8	9.52
Silver maple	31,538	855	(N/A)	7.5	22.5	142.46
Norway spruce	13,414	364	(N/A)	6.3	9.6	72.71
Blue spruce	2,376	64	(N/A)	5.0	1.7	16.10
River birch	4,227	115	(N/A)	3.8	3.0	38.19
Pin oak	2,570	70	(N/A)	3.8	1.8	23.22
Northern hackberry	7,239	196	(N/A)	2.5	5.2	98.09
Scotch pine	1,191	32	(N/A)	2.5	0.9	16.14
American basswood	2,377	64	(N/A)	2.5	1.7	32.21
Callery pear	163	4	(N/A)	1.3	0.1	4.41
White oak	172	5	(N/A)	1.3	0.1	4.65
Northern red oak	1,193	32	(N/A)	1.3	0.9	32.34
Other street trees	0	0	(N/A)	0.0	0.0	0.00
Citywide total	140,190	3,799	(N/A)	100.0	100.0	47.49

Table 3: Annual Air Quality Benefits

Gilbert

Annual Air Quality Benefits of Public Trees by Species

2/17/2014

Species	Deposition (lb) O_3	NO_2	PM_{10}	SO_2	Total Depos. ($)	Avoided (lb) NO_2	PM_{10}	VOC	SO_2	Total Avoided ($)	BVOC Emissions (lb)	BVOC Emissions ($)	Total (lb)	Total ($)	Standard Error	% of Total Trees	Avg. $/tree
Black maple	8.5	1.4	4.0	0.4	45	20.2	2.9	2.8	19.3	126	-2.9	-11	56.7	161	(N/A)	23.8	8.46
Bur oak	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)	12.5	0.37
Ash	5.3	0.9	2.5	0.2	28	10.4	1.5	1.4	9.7	64	-1.2	-5	30.8	88	(N/A)	8.8	12.60
Black walnut	1.1	0.2	0.6	0.1	6	5.3	0.8	0.7	5.0	33	0.0	0	13.8	39	(N/A)	8.8	5.62
Apple	0.6	0.1	0.3	0.0	3	3.4	0.5	0.5	3.1	21	0.0	0	8.5	24	(N/A)	8.8	3.43
Silver maple	5.4	0.9	2.6	0.2	29	10.1	1.5	1.4	9.6	63	-2.7	-10	29.1	82	(N/A)	7.5	13.65
Norway spruce	1.5	0.3	1.3	0.2	10	3.4	0.5	0.5	3.2	21	-6.1	-23	4.8	9	(N/A)	6.3	1.72
Blue spruce	0.3	0.1	0.2	0.0	2	1.0	0.1	0.1	0.9	6	-0.8	-3	1.9	5	(N/A)	5.0	1.19
River birch	0.7	0.1	0.3	0.0	4	3.3	0.5	0.5	3.2	21	-0.2	-1	8.4	24	(N/A)	3.8	7.92
Pin oak	0.3	0.1	0.2	0.0	2	1.5	0.2	0.2	1.4	9	-0.7	-3	3.3	9	(N/A)	3.8	2.90
Northern hackberry	1.1	0.2	0.6	0.0	6	3.6	0.5	0.5	3.4	22	0.0	0	9.9	28	(N/A)	2.5	14.21
Scotch pine	0.1	0.0	0.1	0.0	1	0.6	0.1	0.1	0.5	3	-0.3	-1	1.1	3	(N/A)	2.5	1.48
American basswood	0.2	0.0	0.1	0.0	1	2.0	0.3	0.3	2.0	13	-0.2	-1	4.7	13	(N/A)	2.5	6.46
Callery pear	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)	1.3	1.21
White oak	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	0.0	0	0.3	1	(N/A)	1.3	0.87
Northern red oak	0.2	0.0	0.1	0.0	1	0.9	0.1	0.1	0.9	6	-0.3	-1	2.1	6	(N/A)	1.3	5.79
Other street trees	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)	0.0	0.00
Citywide total	25.4	4.4	13.0	1.3	139	66.5	9.7	9.2	63.1	414	-15.3	-58	177.3	496	(N/A)	100.0	6.20

Table 4: Annual Carbon Stored

Gilbert

Stored CO2 Benefits of Public Trees by Species

2/17/2014

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Black maple	92,608	695	(N/A)	23.8	22.7	36.56
Bur oak	1,144	9	(N/A)	12.5	0.3	0.86
Ash	87,291	655	(N/A)	8.8	21.4	93.53
Black walnut	37,484	281	(N/A)	8.8	9.2	40.16
Apple	9,884	74	(N/A)	8.8	2.4	10.59
Silver maple	115,792	868	(N/A)	7.5	28.4	144.74
Norway spruce	14,541	109	(N/A)	6.3	3.6	21.81
Blue spruce	1,407	11	(N/A)	5.0	0.4	2.64
River birch	10,872	82	(N/A)	3.8	2.7	27.18
Pin oak	8,417	63	(N/A)	3.8	2.1	21.04
Northern	16,095	121	(N/A)	2.5	4.0	60.35
Scotch pine	513	4	(N/A)	2.5	0.1	1.93
American	7,190	54	(N/A)	2.5	1.8	26.96
Callery pear	218	2	(N/A)	1.3	0.1	1.64
White oak	185	1	(N/A)	1.3	0.1	1.39
Northern red oak	3,595	27	(N/A)	1.3	0.9	26.96
Other street trees	0	0	(N/A)	0.0	0.0	0.00
Citywide total	407,237	3,054	(N/A)	100.0	100.0	38.18

Table 5: Annual Carbon Sequestered

Gilbert

Annual CO_2 Benefits of Public Trees by Species

2/17/2014

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
Black maple	5,694	43	-445	-4	-3	7,129	53	12,376	93	(N/A)	23.8	26.3	4.89
Bur oak	232	2	-5	-2	0	198	1	423	3	(N/A)	12.5	0.9	0.32
Ash	2,050	15	-419	-1	-3	3,573	27	5,203	39	(N/A)	8.8	11.0	5.57
Black walnut	2,653	20	-180	-1	-1	1,868	14	4,340	33	(N/A)	8.8	9.2	4.65
Apple	1,029	8	-47	-1	0	1,151	9	2,131	16	(N/A)	8.8	4.5	2.28
Silver maple	8,794	66	-556	-1	-4	3,576	27	11,813	89	(N/A)	7.5	25.1	14.77
Norway spruce	865	6	-70	-1	-1	1,202	9	1,996	15	(N/A)	6.3	4.2	2.99
Blue spruce	133	1	-7	-1	0	340	3	465	3	(N/A)	5.0	1.0	0.87
River birch	1,158	9	-52	-1	0	1,185	9	2,290	17	(N/A)	3.8	4.9	5.73
Pin oak	943	7	-40	-1	0	526	4	1,428	11	(N/A)	3.8	3.0	3.57
Northern hackberry	998	7	-77	0	-1	1,248	9	2,169	16	(N/A)	2.5	4.6	8.13
Scotch pine	105	1	-2	0	0	189	1	291	2	(N/A)	2.5	0.6	1.09
American basswood	632	5	-35	0	0	721	5	1,318	10	(N/A)	2.5	2.8	4.94
Callery pear	96	1	-1	0	0	65	0	159	1	(N/A)	1.3	0.3	1.19
White oak	74	1	-1	0	0	49	0	122	1	(N/A)	1.3	0.3	0.91
Northern red oak	281	2	-17	0	0	329	2	592	4	(N/A)	1.3	1.3	4.44
Other street trees	0	0	0	0	0	0	0	0	0	(N/A)	0.0	0.0	0.00
Citywide total	25,738	193	-1,955	-16	-15	23,348	175	47,115	353	(N/A)	100.0	100.0	4.42

Table 6: Annual Social and Aesthetic Benefits

Gilbert

Annual Aesthetic/Other Benefits of Public Trees by Species

2/17/2014

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Black maple	770	(N/A)	23.8	27.7	40.52
Bur oak	76	(N/A)	12.5	2.7	7.59
Ash	180	(N/A)	8.8	6.5	25.78
Black walnut	254	(N/A)	8.8	9.2	36.31
Apple	59	(N/A)	8.8	2.1	8.38
Silver maple	683	(N/A)	7.5	24.6	113.76
Norway spruce	221	(N/A)	6.3	8.0	44.13
Blue spruce	56	(N/A)	5.0	2.0	14.09
River birch	117	(N/A)	3.8	4.2	39.16
Pin oak	92	(N/A)	3.8	3.3	30.60
Northern hackberry	127	(N/A)	2.5	4.6	63.56
Scotch pine	31	(N/A)	2.5	1.1	15.42
American basswood	57	(N/A)	2.5	2.1	28.70
Callery pear	13	(N/A)	1.3	0.5	12.89
White oak	15	(N/A)	1.3	0.5	14.73
Northern red oak	24	(N/A)	1.3	0.9	24.08
Other street trees	0	(±NaN)	0.0	0.0	0.00
Citywide total	2,775	(N/A)	100.0	100.0	34.69

Table 7: Summary of Benefits in Dollars

Average Annual Benefits of Public Trees by Species

Species	Energy	CO2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Black maple	889	93	161	975	770	$2,887.55	(±0)	27.87
Bur oak	27	3	4	21	76	$130.19	(±0)	1.26
Ash	472	39	88	644	180	$1,423.74	(±0)	13.74
Black walnut	234	33	39	292	254	$851.31	(±0)	8.22
Apple	154	16	24	67	59	$319.71	(±0)	3.09
Silver maple	438	89	82	855	683	$2,145.83	(±0)	20.71
Norway spruce	146	15	9	364	221	$753.79	(±0)	7.28
Blue spruce	43	3	5	64	56	$171.63	(±0)	1.66
River birch	140	17	24	115	117	$413.30	(±0)	3.99
Pin oak	67	11	9	70	92	$248.16	(±0)	2.40
Northern hackberry	162	16	28	196	127	$530.22	(±0)	5.12
Scotch pine	27	2	3	32	31	$95.42	(±0)	0.92
American basswood	84	10	13	64	57	$228.31	(±0)	2.20
Callery pear	9	1	1	4	13	$28.68	(±0)	0.28
White oak	6	1	1	5	15	$26.99	(±0)	0.26
Northern red oak	38	4	6	32	24	$104.37	(±0)	1.01
Other street trees	0	0	0	0	0	$0.00	(±0)	0.00
Citywide total	2,936	353	496	3,799	2,775	$10,359.22	(±0)	100.00

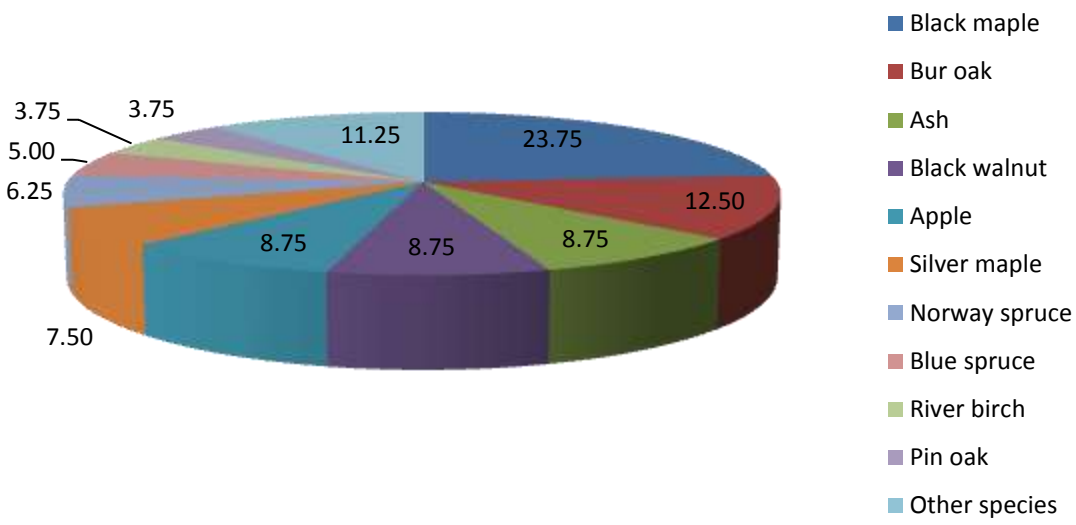

Figure 1: Species Distribution

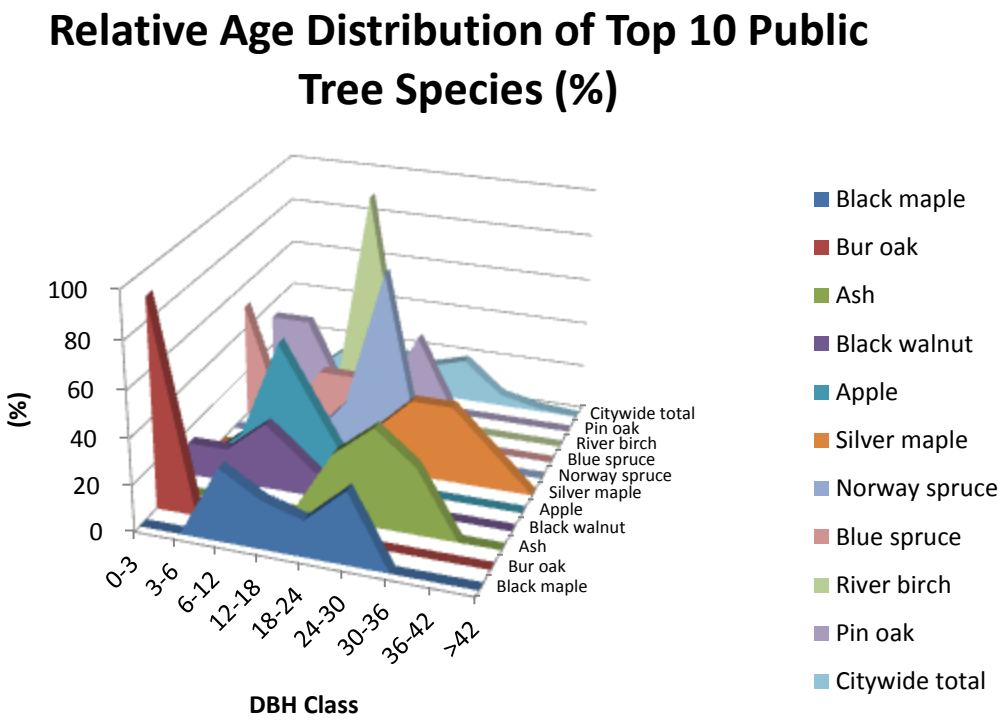

Figure 2: Relative Age Class

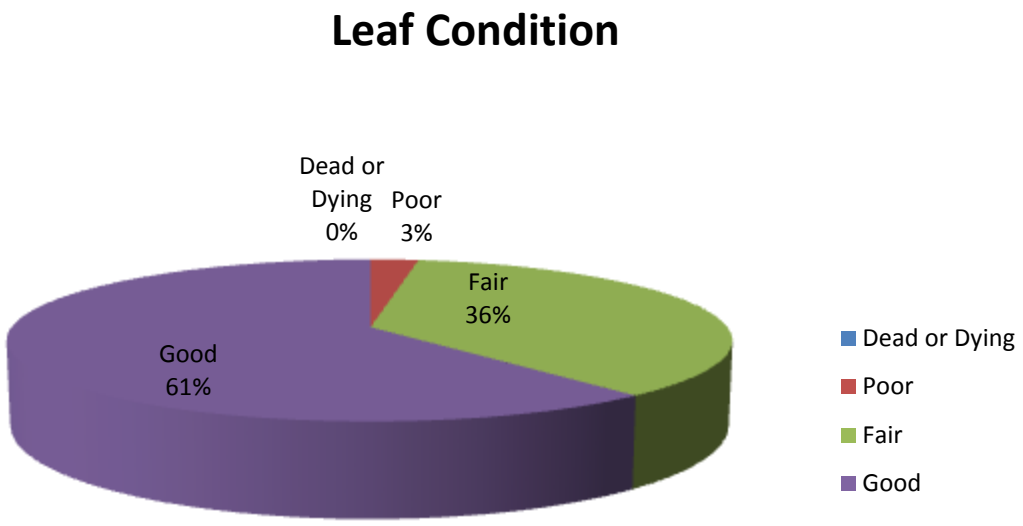

Figure 3: Foliage Condition

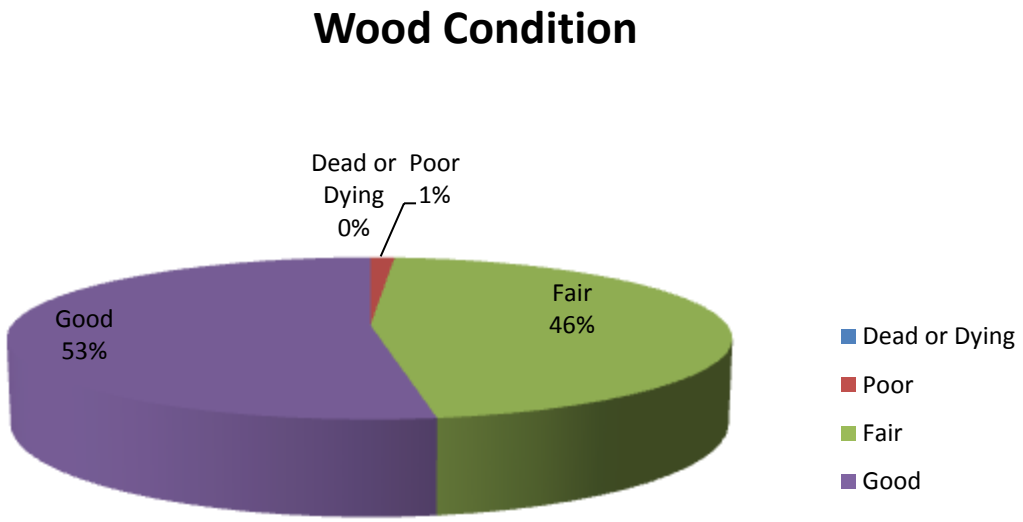

Figure 4: Wood Condition

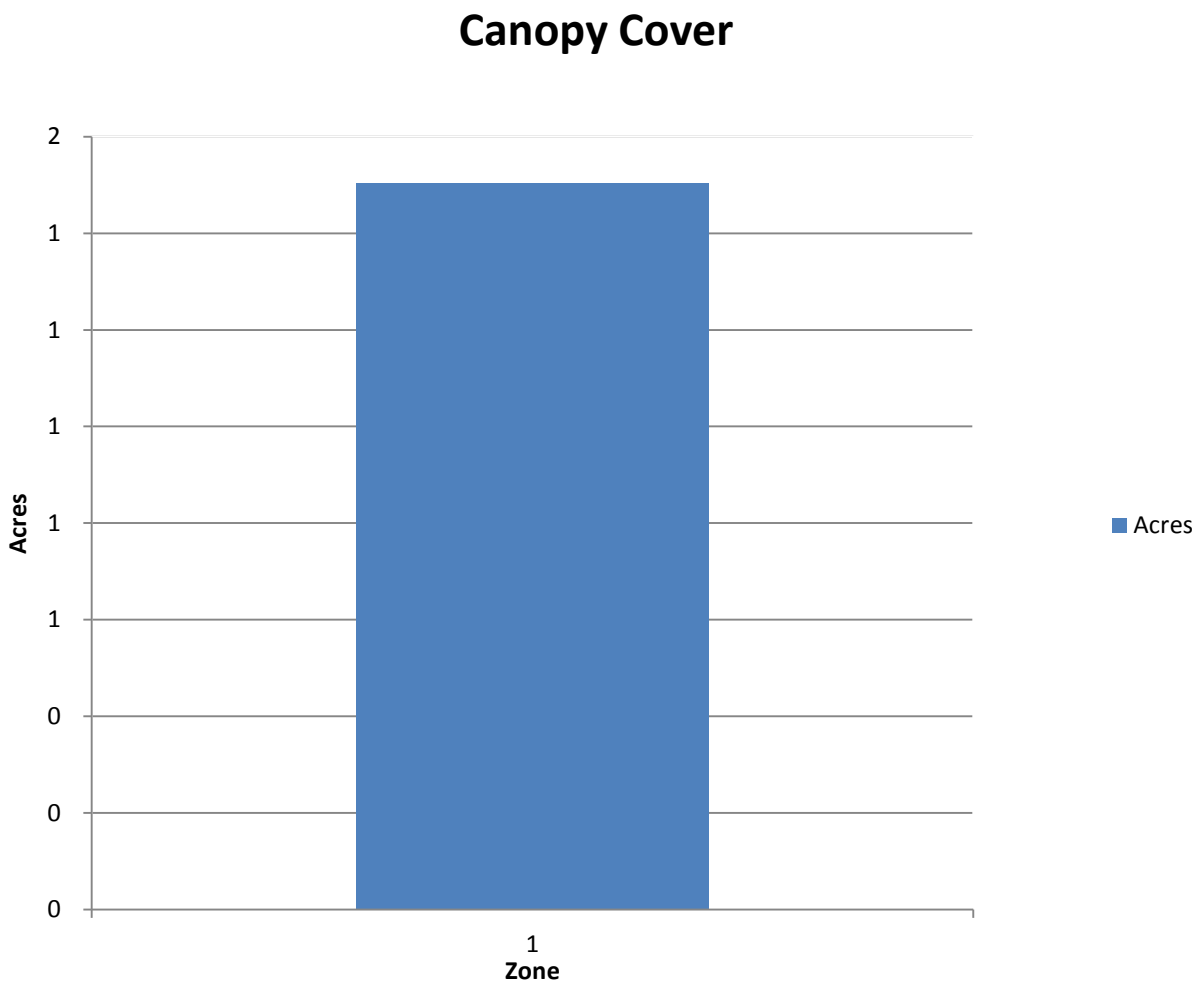

Figure 5: Canopy Cover in Acres

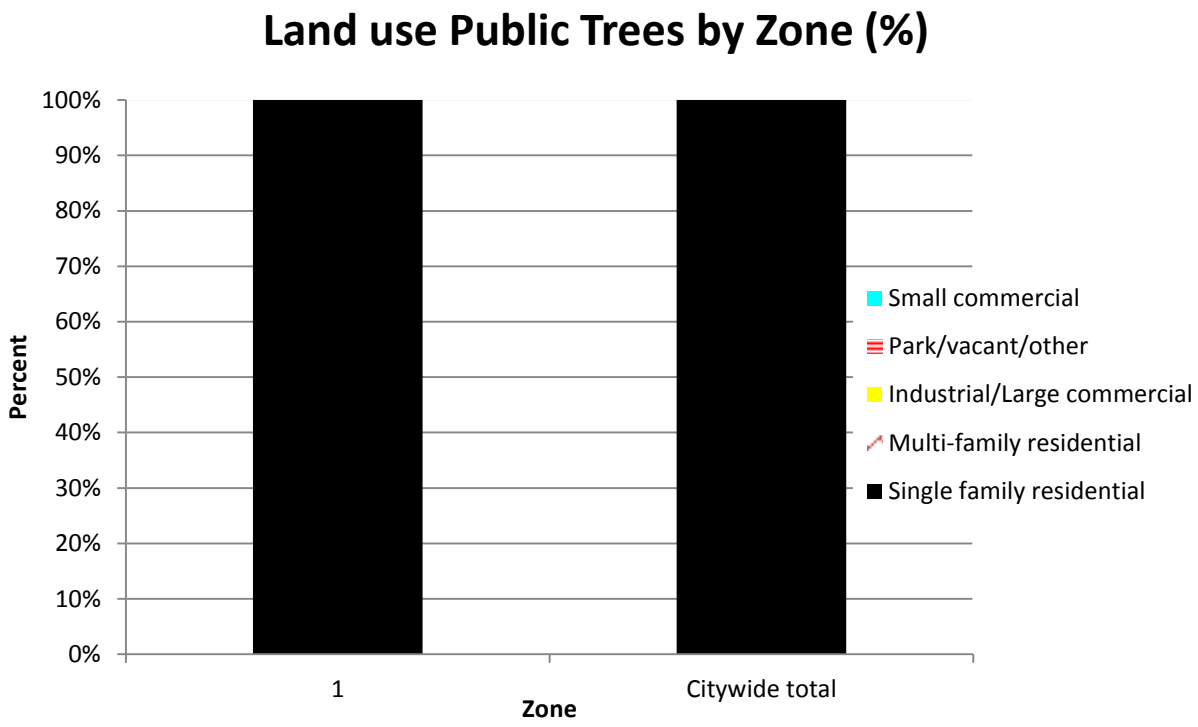

Figure 6: Land Use of city/park trees

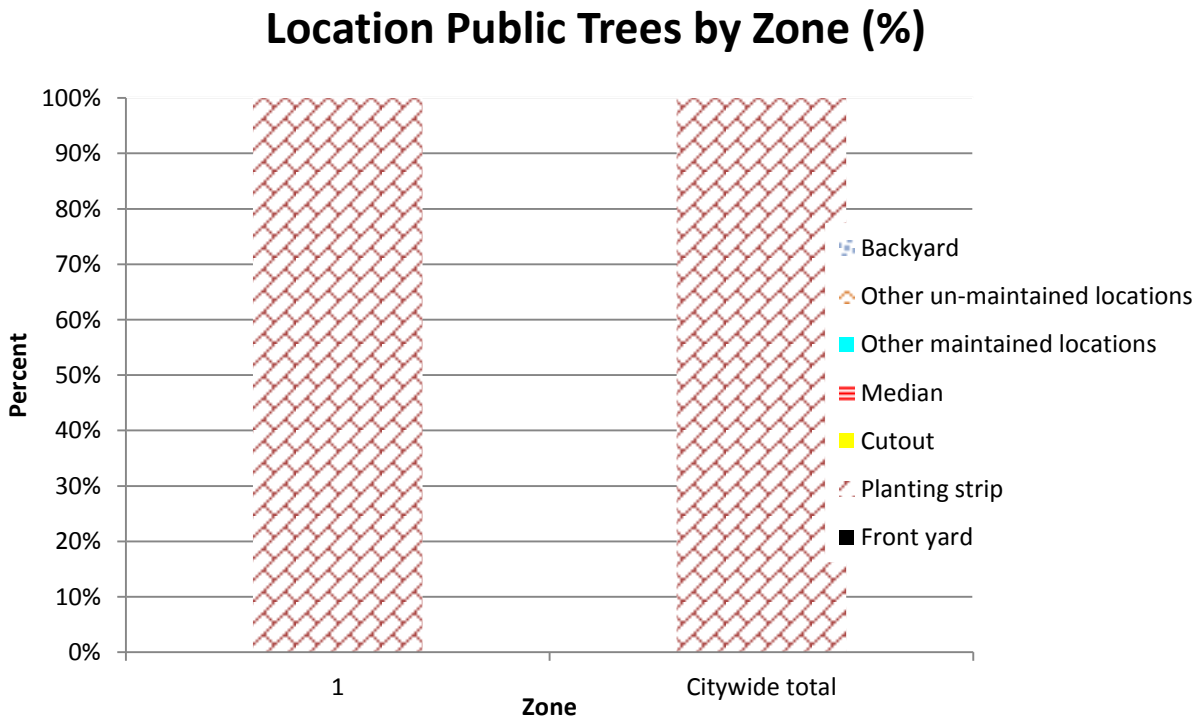

Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping

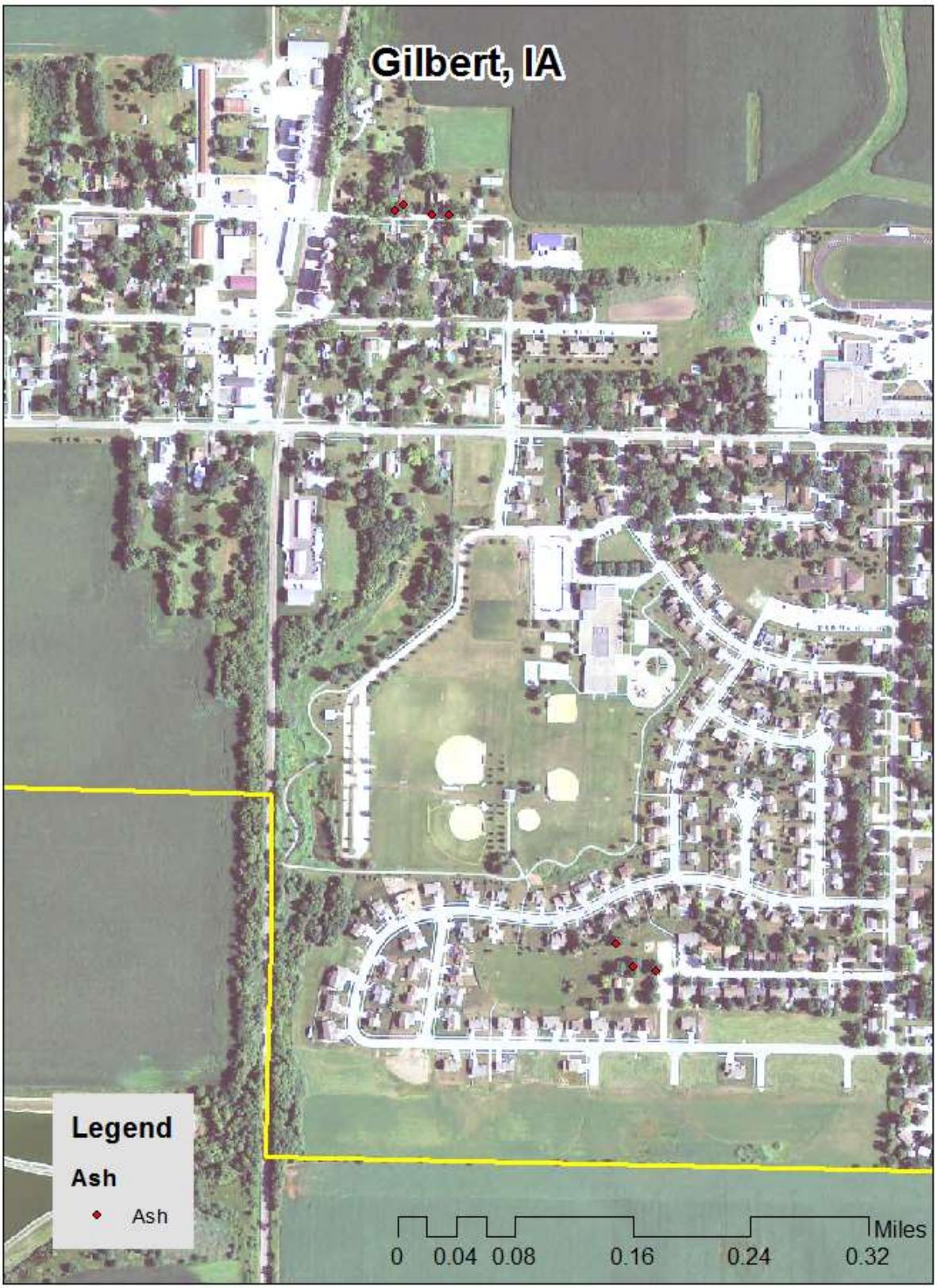

Figure 1: Location of Ash Trees

Figure 3: Location of Poor Condition Trees

Figure 4: Location of Trees with Recommended Maintenance

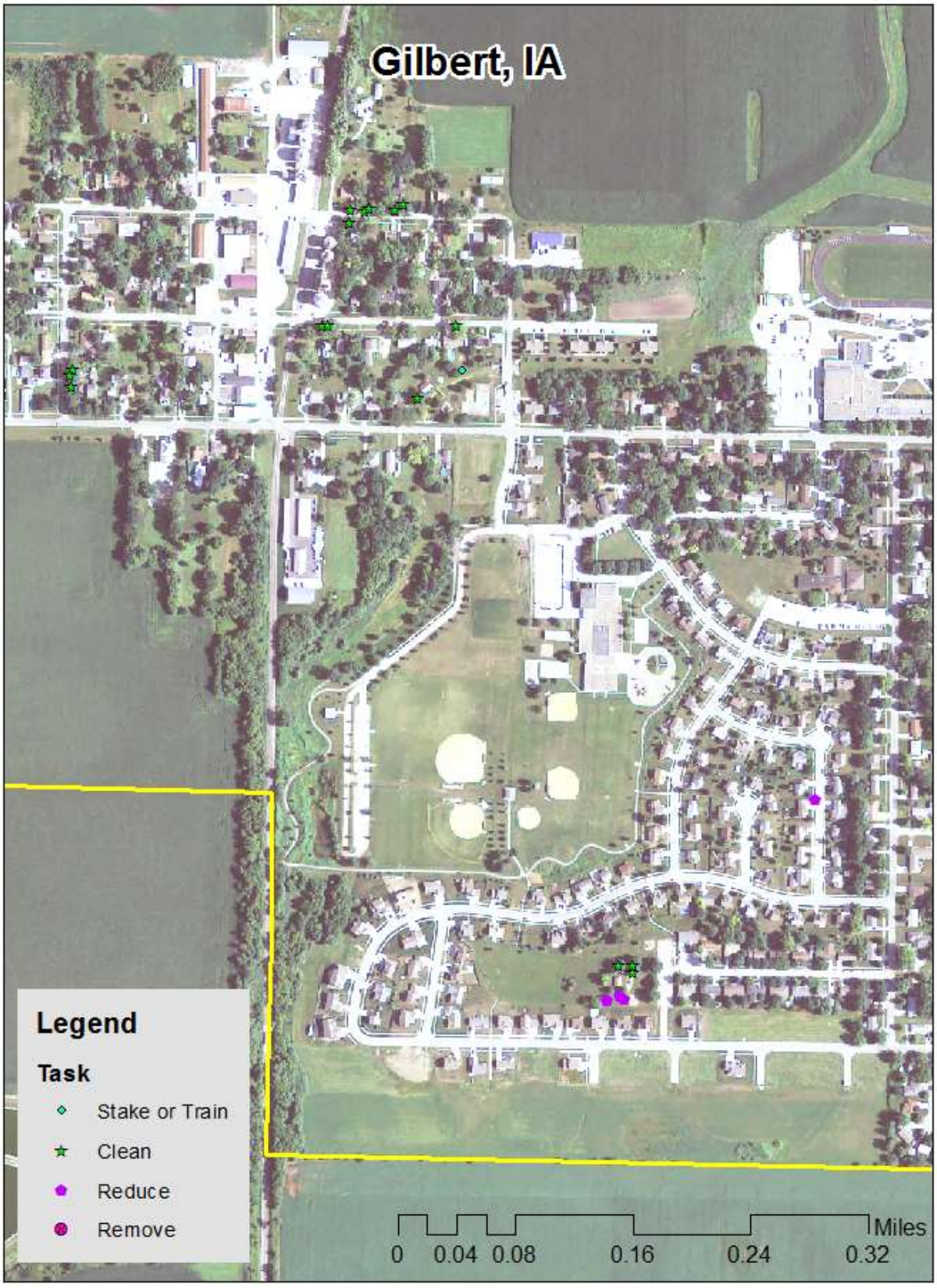

Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*

Appendix C: Proposed Emerald Ash Borer Plan

Ash Tree Removal

Ash tree removal will be prioritized with dead, dying, hazardous trees to be removed first. Next will be all ash in poor condition and displaying signs and symptoms of EAB. *City ownership of the tree recommended for removal should be verified prior to any removal*

EAB Quarantines

EAB is an extremely destructive plant pest and it is responsible for the death and decline of over 25 million 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 ash trees will be replaced. All trees will meet the guidelines in the City Code.

Postponed Work

While finances, staffing and equipment are focused on the management of ash, usual services may be delayed. Tree removal requests on trees 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.

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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.