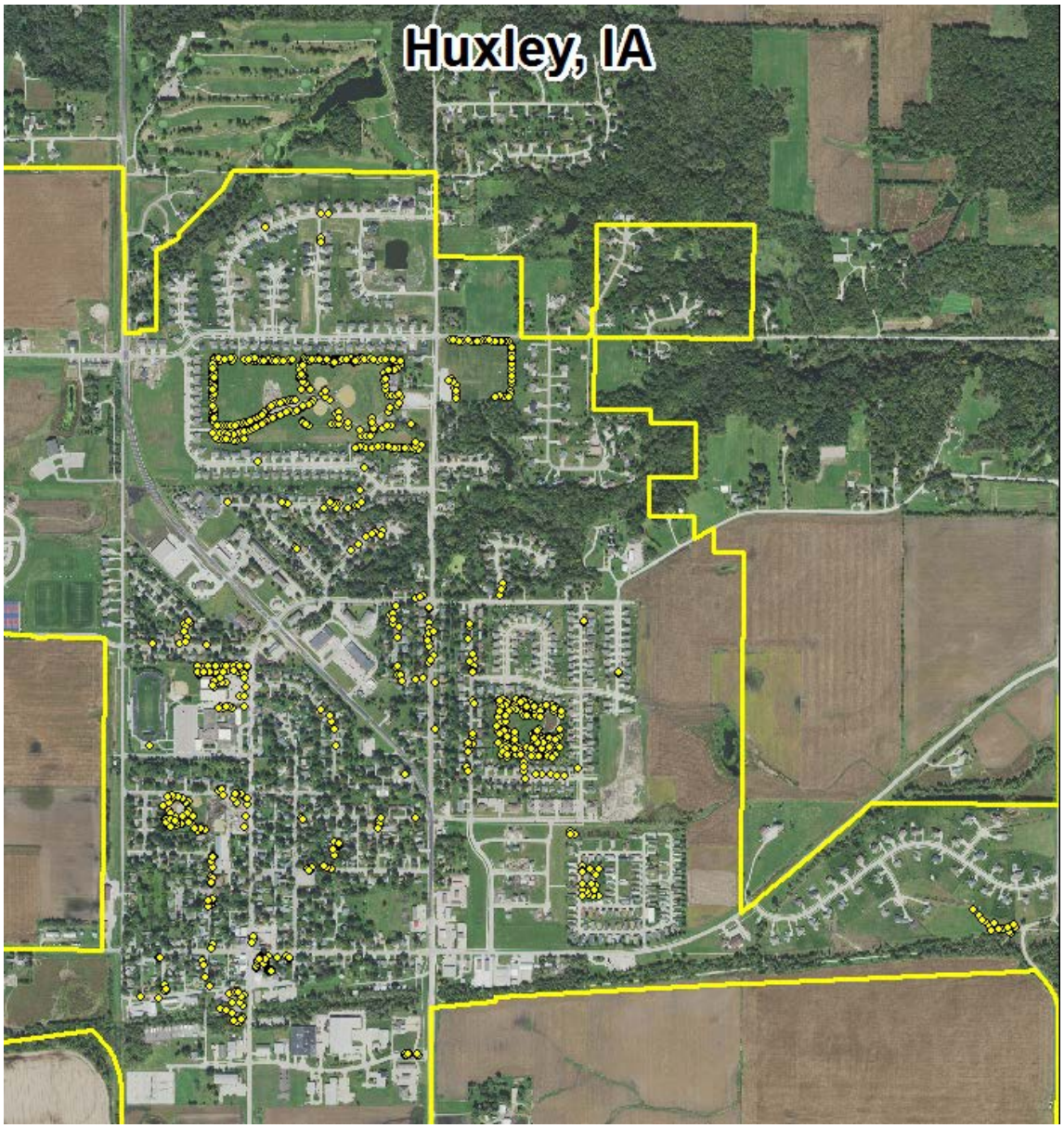
Huxley, IA



2017 Urban Forest Management Plan
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Executive Summary

Overview

This plan was developed to assist the City of Huxley 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 12% of Huxley'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 2016, 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 952 trees inventoried.

- Huxley's trees provide $83,407 of benefits annually, an average of $88 a tree
- There are over 65 species of trees
- The top three genera are: Maple 21%, Spruce 16% and Ash 12%,
- 27% 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, 7 trees are critical concerns*City ownership of the trees recommended for removal should be verified prior to any removal*
- 5 of the 115 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 and should comply with the city ordinance
- Check ash trees with a visual survey yearly

Introduction

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

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

Inventory

In 2016, 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 952 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. Huxley's trees reduce energy related costs by approximately $24,171 annually (Appendix A, Table 1). These savings are both in Electricity (114.3 MWh) and in Natural Gas (15,811.1 Therms).

Annual Stormwater Benefits

Huxley's trees intercept about 1,044,842 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides $28,315 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 Huxley, it is estimated that trees remove 1,389.5 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 $3,872 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Huxley, trees sequester about 390,898 lbs of carbon a year with an associated value of $2,932 (Appendix A, Table 4). In addition, the trees store 3,267,075 lbs of carbon, with a yearly benefit of $24,503 (Appendix A, Table 5).

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. Huxley receives $24,116 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, Huxley's trees provide $83,407 of benefits annually. Benefits of individual trees vary based on size, species, health and location,

but on average each of the 952 trees in Huxley provide approximately $88 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Huxley has over 65 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Maple	199	21%
Spruce	149	16%
Other	118	12%
Ash	115	12%
Oak	80	8%
Apple (crabapple)	57	6%
Pine	34	4%
Pear	28	3%
Linden	25	3%
Walnut	21	2%
Cherry	20	2%
Honeylocust	20	2%
Birch	13	1%
Hackberry	12	1%
Elm	11	1%
Red bud	10	1%
Cottonwood/Poplar	6	1%
Kentucky Coffeetree	5	1%
Mulberry	4	<1%
Red Cedar	4	<1%
Tulip tree	4	<1%
Catalpa	3	<1%
Ohio Buckey	3	<1%
Ginkgo	2	<1%
Sycamore	2	<1%
Black Locust	1	<1%
Hickory	1	<1%
Holly	1	<1%
lilac	1	<1%
Magnolia	1	<1%
Northern White Cedar	1	<1%
Sweetgum	1	<1%

Age Class

Most of Huxley's trees (80%) less than 18 inches in diameter at 4.5 ft (Appendix A, Figure 2). For age, it is preferred that the highest amounts of trees are in the smallest size category (a downward slope) to prepare for natural mortality and to maintain canopy cover. Huxley's size curve is on the smaller side, indicating a younger than average stand.

Condition: Wood and Foliage

Both wood condition and leaf condition are good indicators of the overall health of the urban forest. The foliage condition results for Huxley indicate that 85% of the trees are in good health, with only 3% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Also, 62% of Huxley'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 7% of the population. This 7% 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 Raising	142	15%
Crown Cleaning	52	5%
Tree Removal	43	5%
Crown Reduction	14	1%
Tree Staking	6	<1%

Canopy Cover

The total canopy with both private and public trees is 16%, 320 acres. The canopy cover included in the Huxley inventory includes approximately 12 acres (Appendix A, Figure 4). The City's Canopy goal is increase the canopy by 3% to 19%, in 30 years. To achieve this goal it is estimated that 147 trees need to be planted annually on public and private lands.

Land Use and Location

The majority of Huxley's city and park trees are in parks (Appendix A, Figure 6 & Appendix A, Figure7). The following describes the land use and locations for the street and park trees.

<u>Land Use</u>

Park/vacant/other	80%
Single family residential	18%
Industrial/Large commercial	<1%
Small commercial	<1%
Multifamily residential	<1%

<u>Location</u>

Front yard	81%
Planting strip	16%
Median	3%
Cutout (surrounded by pavement)	<1%

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

Huxley has 7 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. Please refer to the six year maintenance plan at the end of this section. After all of the critical concern trees are addressed, there should be follow up on the trees marked as needing maintenance. There are a total of 250 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, 4 are ash trees. There are a total of 115 ash trees, and 5 of those have signs and symptoms that have been associated with EAB. In addition, there are 8 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 Huxley.

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 (21%) (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. All trees planted must meet the restrictions in city ordinance 151.6(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: 7 critical concern trees and 36 other removals
Planting and Replacement: 18 trees to be planted in open locations and programs for private tree planting (147 trees)
Pruning & Maintenance: 40 trees
Visual Survey for signs and symptoms of EAB

Year 2

Removal: 15 removal of any new critical concern trees and ash in poor health
*Or in house ash tree treatment
Planting and Replacement: 18 trees to be planted in open locations and programs for private tree planting (147 trees)
Young Tree Pruning & Maintenance: 40 trees
Visual Survey for signs and symptoms of EAB

Year 3

Removal: 15 removal of any new critical concern trees and ash in poor health
*Or in house ash tree treatment
Planting and Replacement: 18 trees to be planted in open locations and programs for private tree planting (147 trees)
Young Tree Pruning & Maintenance: 40 trees
Visual Survey for signs and symptoms of EAB

Year 4

Removal: 15 removal of any new critical concern trees and ash in poor health
*Or in house ash tree treatment

Planting and Replacement: 18 trees to be planted in open locations and programs for private tree planting (147 trees)
Young Tree Pruning & Maintenance: 40 trees
Visual Survey for signs and symptoms of EAB

Year 5

Removal: 15 removal of any new critical concern trees and ash in poor health
*Or in house ash tree treatment
Planting and Replacement: 18 trees to be planted in open locations and programs for private tree planting (147 trees)
Young Tree Pruning & Maintenance: 40 trees
Visual Survey for signs and symptoms of EAB

Year 6

Removal: 15 removal of any new critical concern trees and ash in poor health
*Or in house ash tree treatment
Planting and Replacement: 18 trees to be planted in open locations and programs for private tree planting (147 trees)
Young Tree Pruning & Maintenance: 40 trees
Visual Survey for signs and symptoms of EAB

*Reduction of ash over 6 years: Approximately 4 to 75 ash trees removed (approximately 65% of ash). EAB could potentially kill all ash within 4 to 15 years of its arrival.

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 151.5 (Appendix C). The new plantings will be a diverse mix of species.

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 151.08 states "When the Public Works Director or department designee finds that a tree or bush growing on private property creates a hazard

that threatens the general public safety or welfare, said official shall order the owner to remove the tree or bush or otherwise eliminate the hazardous condition. Trees posing a hazard to human life or safety may require the pruning or removal of said trees or parts thereof which are in danger of falling."

Budget

Current Budget

$7,500 plus staff time

Removal & Pruning: staff time
*Discuss in house ash tree treatment vs ash removal
Tree Board Planting: $2,500
Stump Grinding & Maintenance: $5,000

*Reduction of ash over 6 years: Approximately 4 to 75 ash trees removed (approximately 65% of ash). . EAB could potentially kill all ash within 4 to 15 years of its arrival.

Purposed Budget Increase

EAB could potentially kill all ash trees in Huxley within 4 years of its arrival if preventative treatment is not used. An option being considered by many communities is treating a number of selected trees, either to maintain those trees in the landscape or to delay their removal – to spread out the costs and number of trees needing removed all at once. Trunk injection is administered every two years for the life of the tree. If treatment is discontinued, the tree dies. For instance, in this treatment scenario, the average ash diameter is 20 inches and at $15 per inch, about 5 trees could be treated per year (every other year treatment). This would be 10 trees selected for treatment for $1,500, and Huxley would still need to find $84,000 (or equivalent staff time) for removal. Alternatively, if there are 40 treatable trees, it would cost approximately $6,000 a year for treatment and leave $60,000 for removal (or equivalent staff time). These are alternatives to straight removal of ash trees. However, whether or not the treatment option is selected, there will be an increased cost of dealing with ash trees if EAB is found in Huxley. It is suggested to consider increasing the budget to plan for this even if treatment is done in house to cover the cost of the chemical. Additionally, it is recommended that Huxley 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.

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Huxley

Annual Energy Benefits of Public Trees

3/3/2017

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	20.0	1,518	2,617.1	2,565	4,083	(N/A)	9.8	16.9	43.90
Blue spruce	5.3	403	787.2	771	1,174	(N/A)	9.6	4.9	12.91
Apple	3.9	295	614.8	603	897	(N/A)	6.0	3.7	15.74
Broadleaf Deciduous Small	4.3	329	674.2	661	990	(N/A)	5.0	4.1	20.63
Silver maple	12.7	967	1,671.2	1,638	2,605	(N/A)	4.8	10.8	56.64
Norway maple	6.8	520	972.9	953	1,473	(N/A)	4.6	6.1	33.48
Broadleaf Deciduous Mediu	3.7	284	561.3	550	834	(N/A)	4.4	3.4	19.85
Spruce	3.4	255	446.7	438	693	(N/A)	4.2	2.9	17.33
Northern red oak	3.0	229	395.6	388	616	(N/A)	4.1	2.5	15.80
Red maple	3.5	265	475.4	466	731	(N/A)	3.3	3.0	23.59
Maple	2.6	194	348.2	341	535	(N/A)	3.0	2.2	18.46
Pear	1.9	147	303.2	297	445	(N/A)	2.9	1.8	15.88
Eastern white pine	2.3	172	317.5	311	483	(N/A)	2.8	2.0	17.90
Black maple	0.9	66	125.7	123	189	(N/A)	2.4	0.8	8.21
Black walnut	6.4	487	882.5	865	1,352	(N/A)	2.2	5.6	64.39
Honeylocust	3.4	258	460.5	451	709	(N/A)	2.1	2.9	35.47
Sugar maple	2.5	193	337.5	331	523	(N/A)	2.1	2.2	26.17
White ash	3.3	248	428.6	420	668	(N/A)	2.0	2.8	35.14
Black cherry	0.8	58	128.8	126	184	(N/A)	2.0	0.8	9.68
Swamp white oak	1.8	134	248.5	244	378	(N/A)	1.9	1.6	20.99
Conifer Evergreen Medium	0.7	51	108.7	107	157	(N/A)	1.5	0.7	11.24
Littleleaf linden	2.0	151	264.2	259	410	(N/A)	1.5	1.7	29.30
Norway spruce	0.2	15	34.5	34	49	(N/A)	1.3	0.2	4.05
Northern hackberry	2.2	168	322.7	316	484	(N/A)	1.3	2.0	40.35
American basswood	1.8	140	239.0	234	374	(N/A)	1.2	1.5	33.98
Eastern redbud	0.4	31	61.3	60	91	(N/A)	1.1	0.4	9.12
Bur oak	0.4	29	53.7	53	81	(N/A)	0.9	0.3	9.04
Conifer Evergreen Large	0.4	30	53.6	52	83	(N/A)	0.7	0.3	11.84
River birch	1.5	115	216.4	212	327	(N/A)	0.7	1.4	46.77
Pin oak	0.5	35	66.2	65	100	(N/A)	0.6	0.4	16.64
Black spruce	0.4	28	49.8	49	77	(N/A)	0.6	0.3	12.80
Birch	1.1	85	163.0	160	245	(N/A)	0.6	1.0	40.85
Scotch pine	0.7	53	82.7	81	134	(N/A)	0.6	0.6	22.38
Amur maple	0.5	38	83.0	81	119	(N/A)	0.5	0.5	23.78
Oak	0.4	30	48.6	48	77	(N/A)	0.5	0.3	15.43
Kentucky coffeetree	0.1	10	18.8	18	28	(N/A)	0.5	0.1	5.68
Elm	0.9	65	109.5	107	172	(N/A)	0.5	0.7	34.45
Eastern red cedar	0.2	12	23.9	23	35	(N/A)	0.4	0.1	8.85
Mulberry	0.1	9	21.0	21	30	(N/A)	0.4	0.1	7.47
Tulip tree	0.7	54	101.1	99	153	(N/A)	0.4	0.6	38.36
American elm	0.2	13	23.7	23	36	(N/A)	0.4	0.1	8.95
Catalpa	1.2	94	164.3	161	255	(N/A)	0.3	1.1	84.86
Broadleaf Deciduous Large	0.1	5	7.8	8	12	(N/A)	0.3	0.1	4.10
White oak	0.3	25	41.2	40	66	(N/A)	0.3	0.3	21.84
Ohio buckeye	0.2	19	31.1	30	49	(N/A)	0.3	0.2	16.33
Broadleaf Evergreen Mediur	0.6	44	73.2	72	116	(N/A)	0.3	0.5	38.70
Quaking aspen	0.7	55	90.1	88	143	(N/A)	0.2	0.6	71.43
American sycamore	0.2	18	27.5	27	45	(N/A)	0.2	0.2	22.44
Ginkgo	0.1	10	19.8	19	29	(N/A)	0.2	0.1	14.72
Cottonwood	0.5	36	54.0	53	88	(N/A)	0.2	0.4	44.23
Ash	0.6	44	87.0	85	130	(N/A)	0.2	0.5	64.76
Eastern cottonwood	0.5	37	67.4	66	103	(N/A)	0.2	0.4	51.33
Siberian elm	0.4	34	58.8	58	92	(N/A)	0.2	0.4	45.84
Broadleaf Evergreen Small	0.1	4	9.2	9	13	(N/A)	0.1	0.1	13.40
Sweetgum	0.1	7	13.7	13	21	(N/A)	0.1	0.1	20.64
Hickory	0.0	0	0.5	0	1	(N/A)	0.1	0.0	0.66

Cherry plum	0.1	6	12.8	13	18 (N/A)	0.1	0.1	18.19
Sweetbay	0.0	1	1.5	1	2 (N/A)	0.1	0.0	2.12
American holly	0.0	2	4.0	4	6 (N/A)	0.1	0.0	5.61
Boxelder	0.0	3	6.0	6	9 (N/A)	0.1	0.0	9.27
Austrian pine	0.1	5	10.2	10	15 (N/A)	0.1	0.1	14.80
Northern white cedar	0.0	0	0.7	1	1 (N/A)	0.1	0.0	0.93
Black locust	0.3	20	39.6	39	59 (N/A)	0.1	0.2	58.69
Japanese tree lilac	0.0	0	0.6	1	1 (N/A)	0.1	0.0	0.87
Black ash	0.3	24	47.4	46	71 (N/A)	0.1	0.3	70.84
Total	114.3	8,676	15,811.1	15,495	24,171 (N/A)	100.0	100.0	25.39

Table 2: Annual Stormwater Benefits

Huxley

Annual Stormwater Benefits of Public Trees

3/3/2017

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	185,424	5,025	(N/A)	9.8	17.7	54.03
Blue spruce	67,627	1,833	(N/A)	9.6	6.5	20.14
Apple	16,002	434	(N/A)	6.0	1.5	7.61
Broadleaf Deciduous Small	21,809	591	(N/A)	5.0	2.1	12.31
Silver maple	159,565	4,324	(N/A)	4.8	15.3	94.00
Norway maple	50,717	1,374	(N/A)	4.6	4.9	31.24
Broadleaf Deciduous Medium	26,902	729	(N/A)	4.4	2.6	17.36
Spruce	57,484	1,558	(N/A)	4.2	5.5	38.95
Northern red oak	17,937	486	(N/A)	4.1	1.7	12.46
Red maple	25,945	703	(N/A)	3.3	2.5	22.68
Maple	17,768	482	(N/A)	3.0	1.7	16.60
Pear	8,688	235	(N/A)	2.9	0.8	8.41
Eastern white pine	29,419	797	(N/A)	2.8	2.8	29.53
Black maple	5,245	142	(N/A)	2.4	0.5	6.18
Black walnut	76,462	2,072	(N/A)	2.2	7.3	98.67
Honeylocust	21,595	585	(N/A)	2.1	2.1	29.26
Sugar maple	17,146	465	(N/A)	2.1	1.6	23.23
White ash	27,327	741	(N/A)	2.0	2.6	38.98
Black cherry	3,095	84	(N/A)	2.0	0.3	4.41
Swamp white oak	10,776	292	(N/A)	1.9	1.0	16.22
Conifer Evergreen Medium	7,645	207	(N/A)	1.5	0.7	14.80
Littleleaf linden	14,159	384	(N/A)	1.5	1.4	27.41
Norway spruce	1,897	51	(N/A)	1.3	0.2	4.28
Northern hackberry	22,479	609	(N/A)	1.3	2.2	50.76
American basswood	12,574	341	(N/A)	1.2	1.2	30.98
Eastern redbud	1,900	51	(N/A)	1.1	0.2	5.15
Bur oak	2,392	65	(N/A)	0.9	0.2	7.20
Conifer Evergreen Large	4,579	124	(N/A)	0.7	0.4	17.73
River birch	13,575	368	(N/A)	0.7	1.3	52.55
Pin oak	3,323	90	(N/A)	0.6	0.3	15.01
Black spruce	4,115	112	(N/A)	0.6	0.4	18.58
Birch	10,307	279	(N/A)	0.6	1.0	46.55
Scotch pine	8,289	225	(N/A)	0.6	0.8	37.44
Amur maple	2,232	60	(N/A)	0.5	0.2	12.10
Oak	2,435	66	(N/A)	0.5	0.2	13.20
Kentucky coffeetree	833	23	(N/A)	0.5	0.1	4.52
Elm	6,301	171	(N/A)	0.5	0.6	34.15
Eastern red cedar	2,185	59	(N/A)	0.4	0.2	14.80
Mulberry	409	11	(N/A)	0.4	0.0	2.77
Tulip tree	8,229	223	(N/A)	0.4	0.8	55.75
American elm	871	24	(N/A)	0.4	0.1	5.90
Catalpa	17,069	463	(N/A)	0.3	1.6	154.19
Broadleaf Deciduous Large	361	10	(N/A)	0.3	0.0	3.26
White oak	2,091	57	(N/A)	0.3	0.2	18.89
Ohio buckeye	1,434	39	(N/A)	0.3	0.1	12.95
Broadleaf Evergreen Medium	5,639	153	(N/A)	0.3	0.5	50.94
Quaking aspen	8,704	236	(N/A)	0.2	0.8	117.95
American sycamore	1,483	40	(N/A)	0.2	0.1	20.10
Ginkgo	603	16	(N/A)	0.2	0.1	8.17

Cottonwood	2,931	79	(N/A)	0.2	0.3	39.72
Ash	6,244	169	(N/A)	0.2	0.6	84.60
Eastern cottonwood	6,098	165	(N/A)	0.2	0.6	82.63
Siberian elm	5,912	160	(N/A)	0.2	0.6	80.10
Broadleaf Evergreen Small	289	8	(N/A)	0.1	0.0	7.83
Sweetgum	608	16	(N/A)	0.1	0.1	16.47
Hickory	18	0	(N/A)	0.1	0.0	0.48
Cherry plum	264	7	(N/A)	0.1	0.0	7.17
Sweetbay	24	1	(N/A)	0.1	0.0	0.64
American holly	78	2	(N/A)	0.1	0.0	2.10
Boxelder	277	8	(N/A)	0.1	0.0	7.50
Austrian pine	755	20	(N/A)	0.1	0.1	20.47
Northern white cedar	49	1	(N/A)	0.1	0.0	1.32
Black locust	2,479	67	(N/A)	0.1	0.2	67.19
Japanese tree lilac	7	0	(N/A)	0.1	0.0	0.20
Black ash	3,764	102	(N/A)	0.1	0.4	102.01
Citywide total	1,044,842	28,315	(N/A)	100.0	100.0	29.74

Table 3: Annual Air Quality Benefits

Huxley

Annual Air Quality Benefits of Public Trees

3/3/2017

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	22.0	3.5	10.9	1.0	118	94.4	13.8	13.2	90.6	591	0.0	0	249.5	709	(N/A)	9.8	7.63
Blue spruce	8.0	1.6	7.1	1.0	54	25.8	3.7	3.5	24.0	160	-23.0	-86	51.7	127	(N/A)	9.6	1.40
Apple	4.3	0.7	2.1	0.2	23	19.3	2.8	2.6	17.6	118	0.0	0	49.6	141	(N/A)	6.0	2.48
Broadleaf Deciduous Small	7.3	1.2	3.4	0.3	39	21.4	3.1	2.9	19.7	132	0.0	0	59.3	170	(N/A)	5.0	3.55
Silver maple	25.5	4.3	12.8	1.1	138	60.1	8.8	8.4	57.7	376	-14.2	-53	164.6	461	(N/A)	4.8	10.03
Norway maple	8.8	1.5	4.6	0.4	48	33.1	4.8	4.6	31.1	205	-2.2	-8	86.5	245	(N/A)	4.6	5.57
Broadleaf Deciduous Medium	4.4	0.8	2.3	0.2	24	18.3	2.6	2.5	17.0	113	-1.1	-4	47.0	133	(N/A)	4.4	3.17
Spruce	6.4	1.3	5.4	0.8	43	15.9	2.3	2.2	15.2	99	-26.7	-100	22.9	42	(N/A)	4.2	1.05
Northern red oak	2.9	0.5	1.6	0.1	16	14.2	2.1	2.0	13.6	89	-4.0	-15	33.0	90	(N/A)	4.1	2.31
Red maple	5.6	1.0	2.7	0.2	30	16.6	2.4	2.3	15.8	104	-1.9	-7	44.8	127	(N/A)	3.3	4.08
Maple	3.6	0.6	1.8	0.2	20	12.2	1.8	1.7	11.6	76	-1.3	-5	32.2	91	(N/A)	3.0	3.13
Pear	2.6	0.4	1.2	0.1	14	9.6	1.4	1.3	8.8	59	0.0	0	25.5	73	(N/A)	2.9	2.60
Eastern white pine	3.0	0.6	2.7	0.4	21	10.9	1.6	1.5	10.3	68	-10.7	-40	20.3	48	(N/A)	2.8	1.79
Black maple	0.9	0.2	0.5	0.0	5	4.2	0.6	0.6	3.9	26	-0.3	-1	10.6	30	(N/A)	2.4	1.29
Black walnut	10.4	1.7	4.9	0.5	55	30.7	4.5	4.3	29.1	191	0.0	0	85.9	246	(N/A)	2.2	11.72
Honeylocust	3.5	0.6	1.7	0.2	19	16.2	2.4	2.3	15.4	101	-2.2	-8	39.9	111	(N/A)	2.1	5.57
Sugar maple	1.6	0.3	1.0	0.1	9	12.0	1.8	1.7	11.5	75	-1.4	-5	28.4	79	(N/A)	2.1	3.95
White ash	2.6	0.4	1.4	0.1	14	15.4	2.3	2.2	14.8	96	0.0	0	39.1	111	(N/A)	2.0	5.82
Black cherry	0.7	0.1	0.4	0.0	4	3.8	0.5	0.5	3.4	23	0.0	0	9.6	27	(N/A)	2.0	1.44
Swamp white oak	1.5	0.3	0.9	0.1	9	8.5	1.2	1.2	8.0	53	-0.4	-2	21.3	60	(N/A)	1.9	3.33
Conifer Evergreen Medium	0.7	0.1	0.7	0.1	5	3.3	0.5	0.5	3.0	20	-2.3	-9	6.5	16	(N/A)	1.5	1.17
Littleleaf linden	1.9	0.3	1.0	0.1	11	9.5	1.4	1.3	9.1	59	-1.0	-4	23.5	66	(N/A)	1.5	4.70
Norway spruce	0.1	0.0	0.1	0.0	1	1.0	0.1	0.1	0.9	6	-0.5	-2	1.8	5	(N/A)	1.3	0.39
Northern hackberry	3.6	0.6	1.8	0.2	20	10.8	1.6	1.5	10.0	67	0.0	0	30.0	86	(N/A)	1.3	7.18
American basswood	1.2	0.2	0.7	0.1	7	8.7	1.3	1.2	8.4	54	-1.2	-5	20.5	57	(N/A)	1.2	5.16
Eastern redbud	0.6	0.1	0.3	0.0	3	2.0	0.3	0.3	1.9	12	0.0	0	5.5	16	(N/A)	1.1	1.58
Bur oak	0.1	0.0	0.1	0.0	1	1.8	0.3	0.3	1.7	11	0.0	0	4.2	12	(N/A)	0.9	1.32
Conifer Evergreen Large	0.4	0.1	0.4	0.1	3	1.9	0.3	0.3	1.8	12	-1.5	-6	3.7	9	(N/A)	0.7	1.32
River birch	2.7	0.5	1.3	0.1	15	7.3	1.1	1.0	6.9	46	-0.6	-2	20.3	58	(N/A)	0.7	8.26
Pin oak	0.4	0.1	0.2	0.0	2	2.2	0.3	0.3	2.1	14	-0.8	-3	4.8	13	(N/A)	0.6	2.16
Black spruce	0.4	0.1	0.4	0.1	3	1.8	0.3	0.2	1.7	11	-1.4	-5	3.5	9	(N/A)	0.6	1.47
Birch	2.1	0.4	1.0	0.1	11	5.5	0.8	0.8	5.1	34	-0.5	-2	15.2	43	(N/A)	0.6	7.19
Scotch pine	0.9	0.2	0.8	0.1	6	3.2	0.5	0.5	3.2	20	-2.9	-11	6.4	16	(N/A)	0.6	2.60
Amur maple	0.6	0.1	0.3	0.0	3	2.5	0.4	0.3	2.2	15	0.0	0	6.5	19	(N/A)	0.5	3.71
Oak	0.1	0.0	0.1	0.0	1	1.8	0.3	0.3	1.8	11	0.0	0	4.4	12	(N/A)	0.5	2.45
Kentucky coffeetree	0.0	0.0	0.0	0.0	0	0.6	0.1	0.1	0.6	4	0.0	0	1.5	4	(N/A)	0.5	0.82
Elm	0.5	0.1	0.3	0.0	3	4.0	0.6	0.6	3.9	25	0.0	0	10.0	28	(N/A)	0.5	5.61
Eastern red cedar	0.4	0.1	0.3	0.0	2	0.8	0.1	0.1	0.7	5	-1.2	-4	1.3	3	(N/A)	0.4	0.69
Mulberry	0.1	0.0	0.0	0.0	0	0.6	0.1	0.1	0.6	4	0.0	0	1.4	4	(N/A)	0.4	1.02
Tulip tree	1.0	0.2	0.5	0.0	5	3.4	0.5	0.5	3.2	21	0.0	0	9.3	27	(N/A)	0.4	6.67
American elm	0.0	0.0	0.0	0.0	0	0.8	0.1	0.1	0.8	5	0.0	0	1.8	5	(N/A)	0.4	1.29
Catalpa	3.4	0.5	1.5	0.2	18	5.8	0.9	0.8	5.6	37	0.0	0	18.8	54	(N/A)	0.3	18.15
Broadleaf Deciduous Large	0.0	0.0	0.0	0.0	0	0.3	0.0	0.0	0.3	2	0.0	0	0.7	2	(N/A)	0.3	0.61
White oak	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)	0.3	3.50
Ohio buckeye	0.2	0.0	0.1	0.0	1	1.1	0.2	0.2	1.1	7	-0.1	0	2.9	8	(N/A)	0.3	2.73
Broadleaf Evergreen Medium	0.4	0.1	0.5	0.1	3	2.7	0.4	0.4	2.6	17	-1.6	-6	5.6	14	(N/A)	0.3	4.74
Quaking aspen	1.7	0.3	0.8	0.1	9	3.4	0.5	0.5	3.3	21	0.0	0	10.4	30	(N/A)	0.2	14.99
American sycamore	0.1	0.0	0.1	0.0	1	1.1	0.2	0.2	1.1	7	0.0	0	2.7	8	(N/A)	0.2	3.75
Ginkgo	0.1	0.0	0.0	0.0	0	0.6	0.1	0.1	0.6	4	0.0	0	1.5	4	(N/A)	0.2	2.12
Cottonwood	0.2	0.0	0.1	0.0	1	2.1	0.3	0.3	2.1	14	0.0	0	5.3	15	(N/A)	0.2	7.42
Ash	1.4	0.2	0.7	0.1	7	2.9	0.4	0.4	2.6	18	-0.3	-1	8.3	24	(N/A)	0.2	11.87
Eastern cottonwood	0.8	0.1	0.4	0.0	4	2.3	0.3	0.3	2.2	14	0.0	0	6.5	19	(N/A)	0.2	9.35
Siberian elm	1.2	0.2	0.6	0.1	6	2.1	0.3	0.3	2.0	13	0.0	0	6.8	20	(N/A)	0.2	9.86
Broadleaf Evergreen Small	0.0	0.0	0.0	0.0	0	0.3	0.0	0.0	0.3	2	0.0	0	0.7	2	(N/A)	0.1	2.06
Sweetgum	0.0	0.0	0.0	0.0	0	0.5	0.1	0.1	0.4	3	0.0	0	1.1	3	(N/A)	0.1	2.99
Hickory	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)	0.1	0.08
Cherry plum	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)	0.1	2.55
Sweetbay	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)	0.1	0.27
American holly	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	0.0	0	0.3	1	(N/A)	0.1	0.75
Boxelder	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)	0.1	1.36
Austrian pine	0.1	0.0	0.1	0.0	0	0.3	0.0	0.0	0.3	2	-0.2	-1	0.6	2	(N/A)	0.1	1.53
Northern white cedar	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)	0.1	0.05
Black locust	0.5	0.1	0.2	0.0	3	1.3	0.2	0.2	1.2	8	-0.1	0	3.6	10	(N/A)	0.1	10.16
Japanese tree 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)	0.1	0.11
Black ash	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)	0.1	13.58
Citywide total	154.9	26.4	85.5	8.6	866	546.9	79.5	75.8	518.0	3,404	-106.1	-398	1,389.5	3,872	(N/A)	100.0	4.07

Table 4: Annual Carbon Stored

Huxley

Stored CO2 Benefits of Public Trees

3/3/2017

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	742,155	5,566	(N/A)	9.8	22.7	59.85
Blue spruce	50,416	378	(N/A)	9.6	1.5	4.16
Apple	71,781	538	(N/A)	6.0	2.2	9.44
Broadleaf Deciduous	115,692	868	(N/A)	5.0	3.5	18.08
Silver maple	589,348	4,420	(N/A)	4.8	18.0	96.09
Norway maple	148,020	1,110	(N/A)	4.6	4.5	25.23
Broadleaf Deciduous	76,438	573	(N/A)	4.4	2.3	13.65
Spruce	63,305	475	(N/A)	4.2	1.9	11.87
Northern red oak	49,240	369	(N/A)	4.1	1.5	9.47
Red maple	63,113	473	(N/A)	3.3	1.9	15.27
Maple	42,052	315	(N/A)	3.0	1.3	10.88
Pear	42,318	317	(N/A)	2.9	1.3	11.34
Eastern white pine	22,365	168	(N/A)	2.8	0.7	6.21
Black maple	11,819	89	(N/A)	2.4	0.4	3.85
Black walnut	342,679	2,570	(N/A)	2.2	10.5	122.39
Honeylocust	42,732	320	(N/A)	2.1	1.3	16.02
Sugar maple	46,743	351	(N/A)	2.1	1.4	17.53
White ash	64,576	484	(N/A)	2.0	2.0	25.49
Black cherry	13,012	98	(N/A)	2.0	0.4	5.14
Swamp white oak	26,643	200	(N/A)	1.9	0.8	11.10
Conifer Evergreen M	2,691	20	(N/A)	1.5	0.1	1.44
Littleleaf linden	43,143	324	(N/A)	1.5	1.3	23.11
Norway spruce	315	2	(N/A)	1.3	0.0	0.20
Northern hackberry	55,751	418	(N/A)	1.3	1.7	34.84
American basswood	45,065	338	(N/A)	1.2	1.4	30.73
Eastern redbud	9,890	74	(N/A)	1.1	0.3	7.42
Bur oak	3,696	28	(N/A)	0.9	0.1	3.08
Conifer Evergreen La	2,897	22	(N/A)	0.7	0.1	3.10
River birch	45,073	338	(N/A)	0.7	1.4	48.29
Pin oak	9,641	72	(N/A)	0.6	0.3	12.05
Black spruce	2,408	18	(N/A)	0.6	0.1	3.01
Birch	34,030	255	(N/A)	0.6	1.0	42.54
Scotch pine	6,108	46	(N/A)	0.6	0.2	7.63
Amur maple	10,374	78	(N/A)	0.5	0.3	15.56
Oak	5,089	38	(N/A)	0.5	0.2	7.63
Kentucky coffeetree	1,256	9	(N/A)	0.5	0.0	1.88
Elm	17,021	128	(N/A)	0.5	0.5	25.53
Eastern red cedar	1,231	9	(N/A)	0.4	0.0	2.31
Mulberry	1,277	10	(N/A)	0.4	0.0	2.39
Tulip tree	31,916	239	(N/A)	0.4	1.0	59.84
American elm	1,843	14	(N/A)	0.4	0.1	3.46
Catalpa	120,422	903	(N/A)	0.3	3.7	301.05
Broadleaf Deciduous	383	3	(N/A)	0.3	0.0	0.96
White oak	4,719	35	(N/A)	0.3	0.1	11.80
Ohio buckeye	3,658	27	(N/A)	0.3	0.1	9.14
Broadleaf Evergreen I	6,731	50	(N/A)	0.3	0.2	16.83
Quaking aspen	59,654	447	(N/A)	0.2	1.8	223.70
American sycamore	3,684	28	(N/A)	0.2	0.1	13.81
Ginkgo	948	7	(N/A)	0.2	0.0	3.56
Cottonwood	7,344	55	(N/A)	0.2	0.2	27.54
Ash	22,225	167	(N/A)	0.2	0.7	83.35
Eastern cottonwood	26,978	202	(N/A)	0.2	0.8	101.17
Siberian elm	29,367	220	(N/A)	0.2	0.9	110.13
Broadleaf Evergreen S	908	7	(N/A)	0.1	0.0	6.81
Sweetgum	1,035	8	(N/A)	0.1	0.0	7.76

Hickory	12	0	(N/A)	0.1	0.0	0.09
Cherry plum	908	7	(N/A)	0.1	0.0	6.81
Sweetbay	14	0	(N/A)	0.1	0.0	0.10
American holly	178	1	(N/A)	0.1	0.0	1.33
Boxelder	218	2	(N/A)	0.1	0.0	1.64
Austrian pine	284	2	(N/A)	0.1	0.0	2.13
Northern white cedar	2	0	(N/A)	0.1	0.0	0.02
Black locust	7,945	60	(N/A)	0.1	0.2	59.59
Japanese tree lilac	14	0	(N/A)	0.1	0.0	0.10
Black ash	14,280	107	(N/A)	0.1	0.4	107.10
Citywide total	3,267,075	24,503	(N/A)	100.0	100.0	25.74

Table 5: Annual Carbon Sequestered

Huxley

Annual CO Benefits of Public Trees

3/3/2017

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	41,790	313	-3,562	-203	-28	33,543	252	71,568	537 (N/A)	9.8	18.3	5.77
Blue spruce	3,648	27	-242	-99	-3	8,906	67	12,213	92 (N/A)	9.6	3.1	1.01
Apple	4,933	37	-345	-62	-3	6,517	49	11,042	83 (N/A)	6.0	2.8	1.45
Broadleaf Deciduous Smal	6,697	50	-556	-66	-5	7,277	55	13,352	100 (N/A)	5.0	3.4	2.09
Silver maple	47,760	358	-2,829	-135	-22	21,381	160	66,178	496 (N/A)	4.8	16.9	10.79
Norway maple	11,366	85	-718	-70	-6	11,482	86	22,059	165 (N/A)	4.6	5.6	3.76
Broadleaf Deciduous Medi	6,139	46	-382	-45	-3	6,272	47	11,983	90 (N/A)	4.4	3.1	2.14
Spruce	3,520	26	-304	-63	-3	5,643	42	8,796	66 (N/A)	4.2	2.3	1.65
Northern red oak	4,405	33	-237	-35	-2	5,052	38	9,185	69 (N/A)	4.1	2.3	1.77
Red maple	5,175	39	-303	-35	-3	5,866	44	10,703	80 (N/A)	3.3	2.7	2.59
Maple	2,631	20	-202	-27	-2	4,291	32	6,693	50 (N/A)	3.0	1.7	1.73
Pear	1,775	13	-203	-32	-2	3,259	24	4,798	36 (N/A)	2.9	1.2	1.29
Eastern white pine	2,231	17	-107	-41	-1	3,803	29	5,885	44 (N/A)	2.8	1.5	1.63
Black maple	1,579	12	-57	-13	-1	1,448	11	2,957	22 (N/A)	2.4	0.8	0.96
Black walnut	14,788	111	-1,645	-68	-13	10,771	81	23,845	179 (N/A)	2.2	6.1	8.52
Honeylocust	6,834	51	-205	-28	-2	5,706	43	12,307	92 (N/A)	2.1	3.1	4.61
Sugar maple	4,116	31	-227	-27	-2	4,257	32	8,119	61 (N/A)	2.1	2.1	3.04
White ash	7,516	56	-310	-32	-3	5,472	41	12,647	95 (N/A)	2.0	3.2	4.99
Black cherry	904	7	-63	-14	-1	1,273	10	2,101	16 (N/A)	2.0	0.5	0.83
Swamp white oak	3,333	25	-134	-19	-1	2,967	22	6,147	46 (N/A)	1.9	1.6	2.56
Conifer Evergreen Mediun	387	3	-13	-13	0	1,122	8	1,483	11 (N/A)	1.5	0.4	0.79
Littleleaf linden	5,603	42	-208	-23	-2	3,344	25	8,716	65 (N/A)	1.5	2.2	4.67
Norway spruce	158	1	-2	-5	0	327	2	478	4 (N/A)	1.3	0.1	0.30
Northern hackberry	2,793	21	-268	-23	-2	3,713	28	6,216	47 (N/A)	1.3	1.6	3.88
American basswood	3,428	26	-216	-19	-2	3,086	23	6,279	47 (N/A)	1.2	1.6	4.28
Eastern redbud	816	6	-48	-6	0	688	5	1,450	11 (N/A)	1.1	0.4	1.09
Bur oak	857	6	-18	-6	0	635	5	1,468	11 (N/A)	0.9	0.4	1.22
Conifer Evergreen Large	361	3	-14	-7	0	672	5	1,012	8 (N/A)	0.7	0.3	1.08
River birch	1,931	14	-217	-16	-2	2,548	19	4,246	32 (N/A)	0.7	1.1	4.55
Pin oak	1,169	9	-46	-5	0	774	6	1,891	14 (N/A)	0.6	0.5	2.36
Black spruce	230	2	-12	-6	0	619	5	831	6 (N/A)	0.6	0.2	1.04
Birch	1,427	11	-164	-12	-1	1,885	14	3,136	24 (N/A)	0.6	0.8	3.92
Scotch pine	630	5	-29	-11	0	1,177	9	1,767	13 (N/A)	0.6	0.5	2.21
Amur maple	455	3	-50	-8	0	831	6	1,229	9 (N/A)	0.5	0.3	1.84
Oak	805	6	-24	-4	0	653	5	1,429	11 (N/A)	0.5	0.4	2.14
Kentucky coffeetree	291	2	-6	-2	0	221	2	503	4 (N/A)	0.5	0.1	0.75
Elm	1,833	14	-82	-8	-1	1,435	11	3,178	24 (N/A)	0.5	0.8	4.77
Eastern red cedar	40	0	-6	-4	0	266	2	296	2 (N/A)	0.4	0.1	0.56
Mulberry	198	1	-6	-3	0	204	2	394	3 (N/A)	0.4	0.1	0.74
Tulip tree	1,862	14	-153	-8	-1	1,202	9	2,903	22 (N/A)	0.4	0.7	5.44
American elm	236	2	-9	-3	0	278	2	503	4 (N/A)	0.4	0.1	0.94
Catalpa	1,617	12	-578	-14	-4	2,067	16	3,092	23 (N/A)	0.3	0.8	7.73
Broadleaf Deciduous Larg	151	1	-2	-1	0	102	1	249	2 (N/A)	0.3	0.1	0.62
White oak	657	5	-23	-3	0	556	4	1,187	9 (N/A)	0.3	0.3	2.97
Ohio buckeye	397	3	-18	-2	0	409	3	786	6 (N/A)	0.3	0.2	1.97
Broadleaf Evergreen Medi	459	3	-32	-6	0	980	7	1,400	11 (N/A)	0.3	0.4	3.50
Quaking aspen	924	7	-286	-8	-2	1,206	9	1,836	14 (N/A)	0.2	0.5	6.88
American sycamore	448	3	-18	-2	0	397	3	825	6 (N/A)	0.2	0.2	3.09
Ginkgo	115	1	-5	-2	0	223	2	331	2 (N/A)	0.2	0.1	1.24
Cottonwood	891	7	-35	-4	0	786	6	1,637	12 (N/A)	0.2	0.4	6.14
Ash	470	4	-107	-7	-1	979	7	1,335	10 (N/A)	0.2	0.3	5.01
Eastern cottonwood	1,168	9	-129	-5	-1	809	6	1,842	14 (N/A)	0.2	0.5	6.91
Siberian elm	926	7	-141	-5	-1	754	6	1,533	11 (N/A)	0.2	0.4	5.75
Broadleaf Evergreen Small	81	1	-4	-1	0	98	1	174	1 (N/A)	0.1	0.0	1.30
Sweetgum	209	2	-5	-1	0	159	1	361	3 (N/A)	0.1	0.1	2.71
Hickory	3	0	0	0	0	4	0	7	0 (N/A)	0.1	0.0	0.05
Cherry plum	114	1	-4	-1	0	124	1	232	2 (N/A)	0.1	0.1	1.74
Sweetbay	4	0	0	0	0	14	0	18	0 (N/A)	0.1	0.0	0.13
American holly	27	0	-1	-1	0	38	0	64	0 (N/A)	0.1	0.0	0.48
Boxelder	57	0	-2	-1	0	76	1	131	1 (N/A)	0.1	0.0	0.98
Austrian pine	39	0	-1	-1	0	106	1	142	1 (N/A)	0.1	0.0	1.07
Northern white cedar	4	0	0	0	0	6	0	9	0 (N/A)	0.1	0.0	0.07
Black locust	470	4	-38	-3	0	440	3	869	7 (N/A)	0.1	0.2	6.52
Japanese tree lilac	9	0	0	0	0	6	0	14	0 (N/A)	0.1	0.0	0.10
Black ash	370	3	-69	-4	-1	539	4	837	6 (N/A)	0.1	0.2	6.27
Citywide total	216,261	1,622	-15,722	-1,383	-128	191,742	1,438	390,898	2,932 (N/A)	100.0	100.0	3.08

Table 6: Annual Social and Aesthetic Benefits

Huxley

Annual Aesthetic/Other Benefits of Public Trees

3/3/2017

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	3,967	(N/A)	9.8	16.4	42.66
Blue spruce	1,430	(N/A)	9.6	5.9	15.71
Apple	276	(N/A)	6.0	1.1	4.85
Broadleaf Deciduous Small	389	(N/A)	5.0	1.6	8.11
Silver maple	3,945	(N/A)	4.8	16.4	85.76
Norway maple	1,196	(N/A)	4.6	5.0	27.17
Broadleaf Deciduous Medium	722	(N/A)	4.4	3.0	17.20
Spruce	898	(N/A)	4.2	3.7	22.46
Northern red oak	431	(N/A)	4.1	1.8	11.06
Red maple	734	(N/A)	3.3	3.0	23.67
Maple	412	(N/A)	3.0	1.7	14.20
Pear	97	(N/A)	2.9	0.4	3.47
Eastern white pine	621	(N/A)	2.8	2.6	23.00
Black maple	227	(N/A)	2.4	0.9	9.85
Black walnut	1,173	(N/A)	2.2	4.9	55.85
Honeylocust	1,351	(N/A)	2.1	5.6	67.54
Sugar maple	506	(N/A)	2.1	2.1	25.32
White ash	1,023	(N/A)	2.0	4.2	53.83
Black cherry	47	(N/A)	2.0	0.2	2.47
Swamp white oak	374	(N/A)	1.9	1.5	20.75
Conifer Evergreen Medium	237	(N/A)	1.5	1.0	16.91
Littleleaf linden	634	(N/A)	1.5	2.6	45.31
Norway spruce	78	(N/A)	1.3	0.3	6.48
Northern hackberry	402	(N/A)	1.3	1.7	33.53
American basswood	295	(N/A)	1.2	1.2	26.80
Eastern redbud	45	(N/A)	1.1	0.2	4.46
Bur oak	146	(N/A)	0.9	0.6	16.18
Conifer Evergreen Large	114	(N/A)	0.7	0.5	16.26
River birch	192	(N/A)	0.7	0.8	27.42
Pin oak	124	(N/A)	0.6	0.5	20.60
Black spruce	100	(N/A)	0.6	0.4	16.62
Birch	141	(N/A)	0.6	0.6	23.48
Scotch pine	177	(N/A)	0.6	0.7	29.50
Amur maple	26	(N/A)	0.5	0.1	5.12
Oak	109	(N/A)	0.5	0.5	21.83
Kentucky coffeetree	59	(N/A)	0.5	0.2	11.82
Elm	193	(N/A)	0.5	0.8	38.54
Eastern red cedar	40	(N/A)	0.4	0.2	10.03
Mulberry	11	(N/A)	0.4	0.0	2.64
Tulip tree	161	(N/A)	0.4	0.7	40.16
American elm	44	(N/A)	0.4	0.2	10.90
Catalpa	115	(N/A)	0.3	0.5	38.28
Broadleaf Deciduous Large	35	(N/A)	0.3	0.1	11.58
White oak	80	(N/A)	0.3	0.3	26.56
Ohio buckeye	45	(N/A)	0.3	0.2	14.88
Broadleaf Evergreen Medium	98	(N/A)	0.3	0.4	32.71
Quaking aspen	74	(N/A)	0.2	0.3	37.21
American sycamore	51	(N/A)	0.2	0.2	25.56

Ginkgo	14 (N/A)	0.2	0.1	6.77
Cottonwood	92 (N/A)	0.2	0.4	45.86
Ash	43 (N/A)	0.2	0.2	21.53
Eastern cottonwood	95 (N/A)	0.2	0.4	47.58
Siberian elm	65 (N/A)	0.2	0.3	32.46
Broadleaf Evergreen Small	4 (N/A)	0.1	0.0	4.38
Sweetgum	29 (N/A)	0.1	0.1	28.56
Hickory	5 (N/A)	0.1	0.0	5.26
Cherry plum	6 (N/A)	0.1	0.0	6.40
Sweetbay	0 (N/A)	0.1	0.0	0.50
American holly	1 (N/A)	0.1	0.0	0.99
Boxelder	19 (N/A)	0.1	0.1	19.09
Austrian pine	21 (N/A)	0.1	0.1	21.08
Northern white cedar	6 (N/A)	0.1	0.0	5.76
Black locust	43 (N/A)	0.1	0.2	43.05
Japanese tree lilac	0 (N/A)	0.1	0.0	0.03
Black ash	31 (N/A)	0.1	0.1	31.46
Citywide total	24,116 (N/A)	100.0	100.0	25.33

Table 7: Summary of Benefits in Dollars

Huxley

Total Annual Benefits of Public Trees by Species ($)

3/3/2017

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Green ash	4,083	537	709	5,025	3,967	14,321	(N/A)	17.2
Blue spruce	1,174	92	127	1,833	1,430	4,656	(N/A)	5.6
Apple	897	83	141	434	276	1,832	(N/A)	2.2
Broadleaf Deciduous Sn	990	100	170	591	389	2,241	(N/A)	2.7
Silver maple	2,605	496	461	4,324	3,945	11,832	(N/A)	14.2
Norway maple	1,473	165	245	1,374	1,196	4,454	(N/A)	5.3
Broadleaf Deciduous M	834	90	133	729	722	2,508	(N/A)	3.0
Spruce	693	66	42	1,558	898	3,257	(N/A)	3.9
Northern red oak	616	69	90	486	431	1,693	(N/A)	2.0
Red maple	731	80	127	703	734	2,375	(N/A)	2.8
Maple	535	50	91	482	412	1,570	(N/A)	1.9
Pear	445	36	73	235	97	886	(N/A)	1.1
Eastern white pine	483	44	48	797	621	1,994	(N/A)	2.4
Black maple	189	22	30	142	227	609	(N/A)	0.7
Black walnut	1,352	179	246	2,072	1,173	5,022	(N/A)	6.0
Honeylocust	709	92	111	585	1,351	2,849	(N/A)	3.4
Sugar maple	523	61	79	465	506	1,634	(N/A)	2.0
White ash	668	95	111	741	1,023	2,636	(N/A)	3.2
Black cherry	184	16	27	84	47	358	(N/A)	0.4
Swamp white oak	378	46	60	292	374	1,149	(N/A)	1.4
Conifer Evergreen Medi	157	11	16	207	237	629	(N/A)	0.8
Littleleaf linden	410	65	66	384	634	1,559	(N/A)	1.9
Norway spruce	49	4	5	51	78	186	(N/A)	0.2
Northern hackberry	484	47	86	609	402	1,629	(N/A)	2.0
American basswood	374	47	57	341	295	1,113	(N/A)	1.3
Eastern redbud	91	11	16	51	45	214	(N/A)	0.3
Bur oak	81	11	12	65	146	315	(N/A)	0.4
Conifer Evergreen Large	83	8	9	124	114	338	(N/A)	0.4
River birch	327	32	58	368	192	977	(N/A)	1.2
Pin oak	100	14	13	90	124	341	(N/A)	0.4
Black spruce	77	6	9	112	100	303	(N/A)	0.4
Birch	245	24	43	279	141	732	(N/A)	0.9
Scotch pine	134	13	16	225	177	565	(N/A)	0.7
Amur maple	119	9	19	60	26	233	(N/A)	0.3
Oak	77	11	12	66	109	275	(N/A)	0.3
Kentucky coffeetree	28	4	4	23	59	118	(N/A)	0.1
Elm	172	24	28	171	193	588	(N/A)	0.7
Eastern red cedar	35	2	3	59	40	140	(N/A)	0.2
Mulberry	30	3	4	11	11	59	(N/A)	0.1
Tulip tree	153	22	27	223	161	586	(N/A)	0.7
American elm	36	4	5	24	44	112	(N/A)	0.1
Catalpa	255	23	54	463	115	910	(N/A)	1.1
Broadleaf Deciduous La	12	2	2	10	35	61	(N/A)	0.1
White oak	66	9	10	57	80	221	(N/A)	0.3
Ohio buckeye	49	6	8	39	45	147	(N/A)	0.2
Broadleaf Evergreen Me	116	11	14	153	98	392	(N/A)	0.5
Quaking aspen	143	14	30	236	74	497	(N/A)	0.6
American sycamore	45	6	8	40	51	150	(N/A)	0.2

Ginkgo	29	2	4	16	14	66 (N/A)	0.1
Cottonwood	88	12	15	79	92	287 (N/A)	0.3
Ash	130	10	24	169	43	376 (N/A)	0.5
Eastern cottonwood	103	14	19	165	95	396 (N/A)	0.5
Siberian elm	92	11	20	160	65	348 (N/A)	0.4
Broadleaf Evergreen Sm	13	1	2	8	4	29 (N/A)	0.0
Sweetgum	21	3	3	16	29	71 (N/A)	0.1
Hickory	1	0	0	0	5	7 (N/A)	0.0
Cherry plum	18	2	3	7	6	36 (N/A)	0.0
Sweetbay	2	0	0	1	0	4 (N/A)	0.0
American holly	6	0	1	2	1	10 (N/A)	0.0
Boxelder	9	1	1	8	19	38 (N/A)	0.0
Austrian pine	15	1	2	20	21	59 (N/A)	0.1
Northern white cedar	1	0	0	1	6	8 (N/A)	0.0
Black locust	59	7	10	67	43	186 (N/A)	0.2
Japanese tree lilac	1	0	0	0	0	1 (N/A)	0.0
Black ash	71	6	14	102	31	224 (N/A)	0.3
Citywide Total	24,171	2,932	3,872	28,315	24,116	83,407 (N/A)	100.0

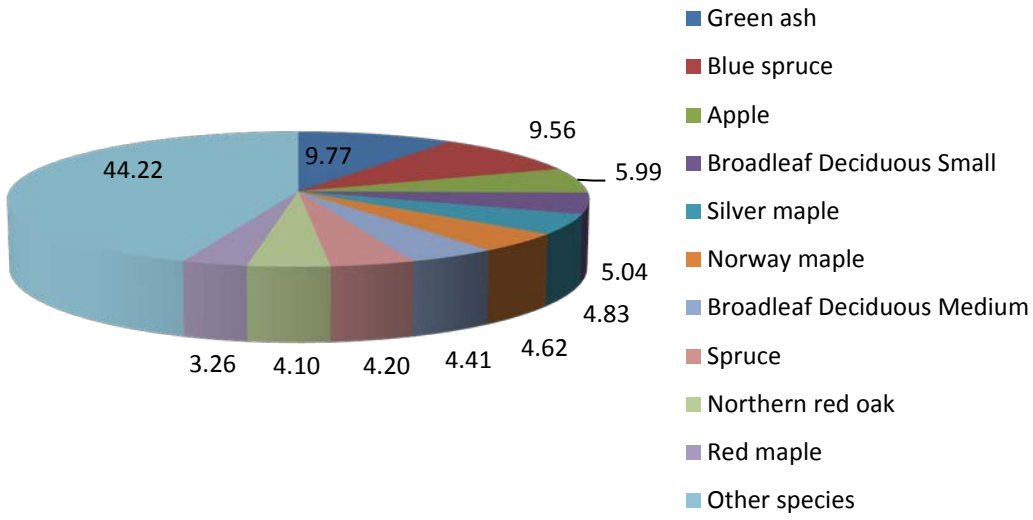

Figure 1: Species Distribution

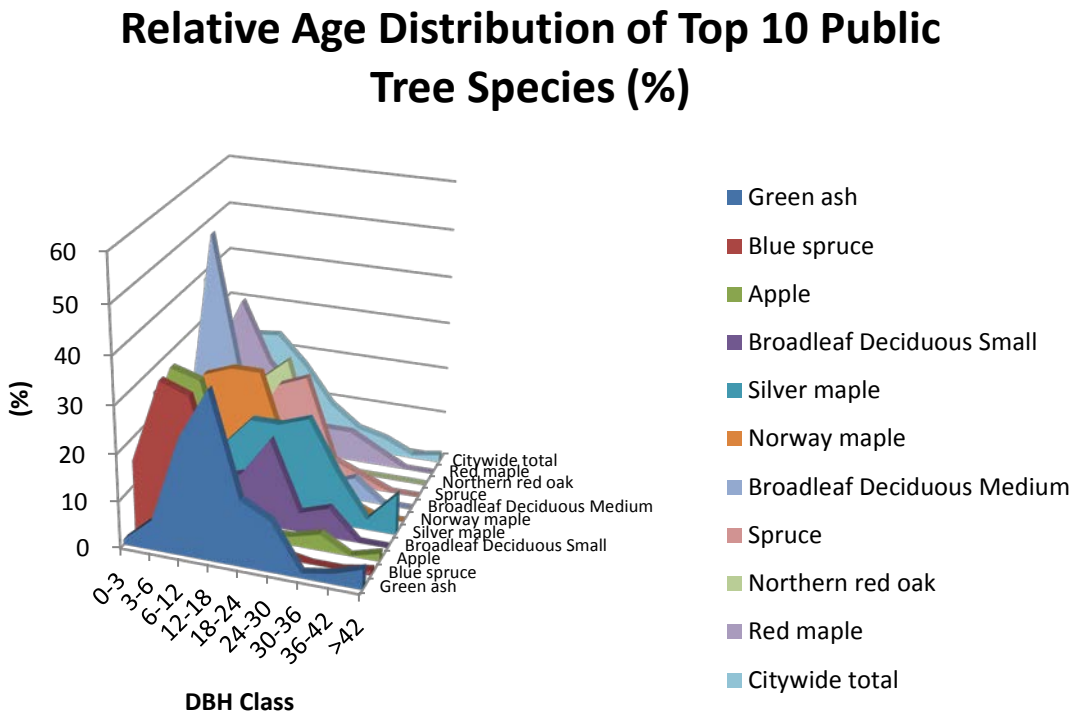

Figure 2: Relative Age Class

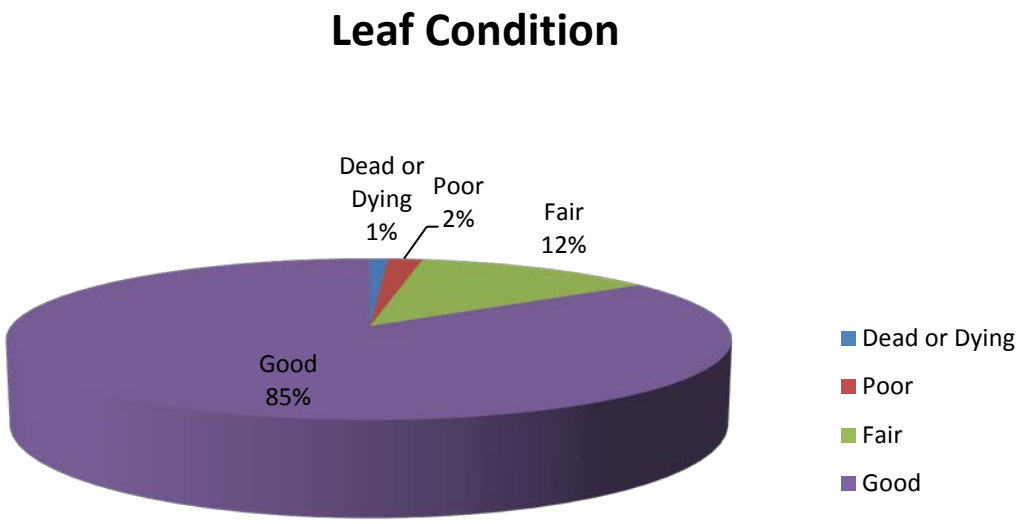

Figure 3: Foliage Condition

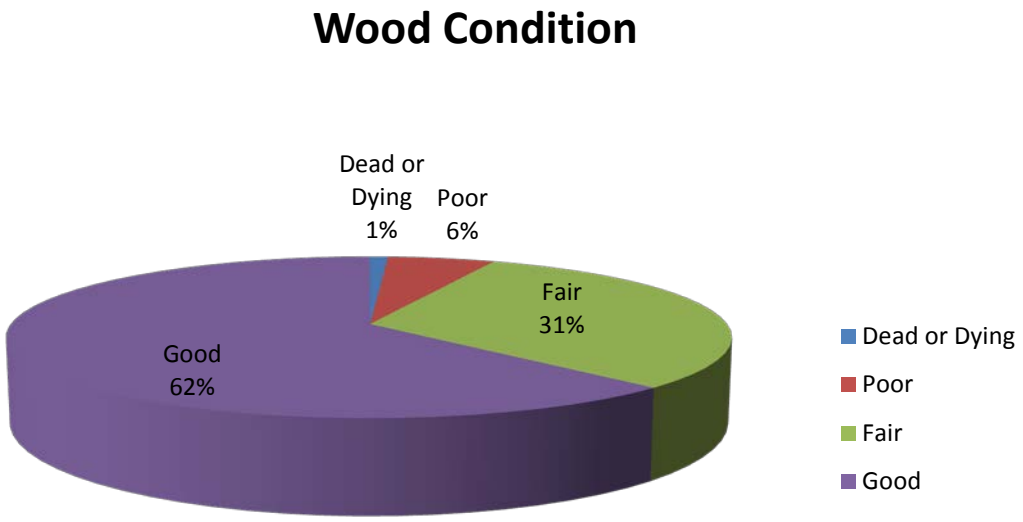

Figure 4: Wood Condition

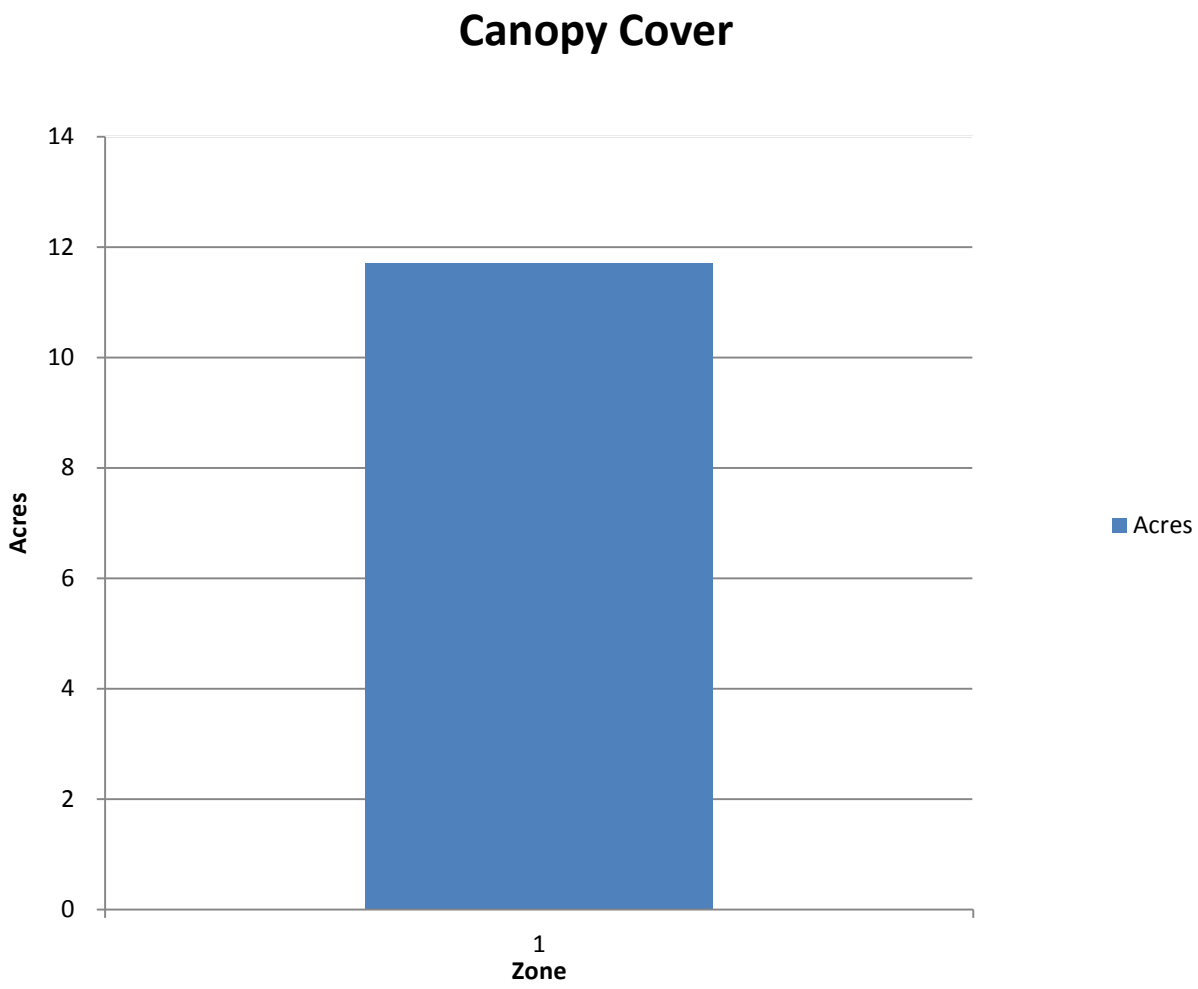

Figure 5: Canopy Cover in Acres

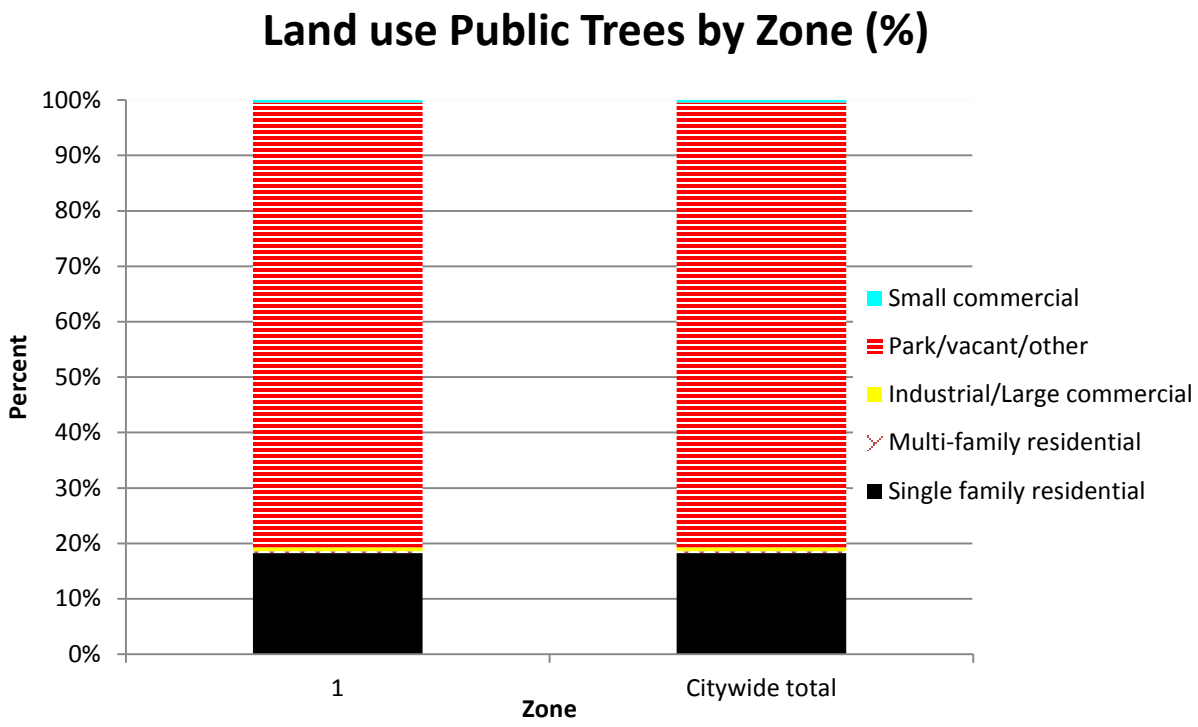

Figure 6: Land Use of city/park trees

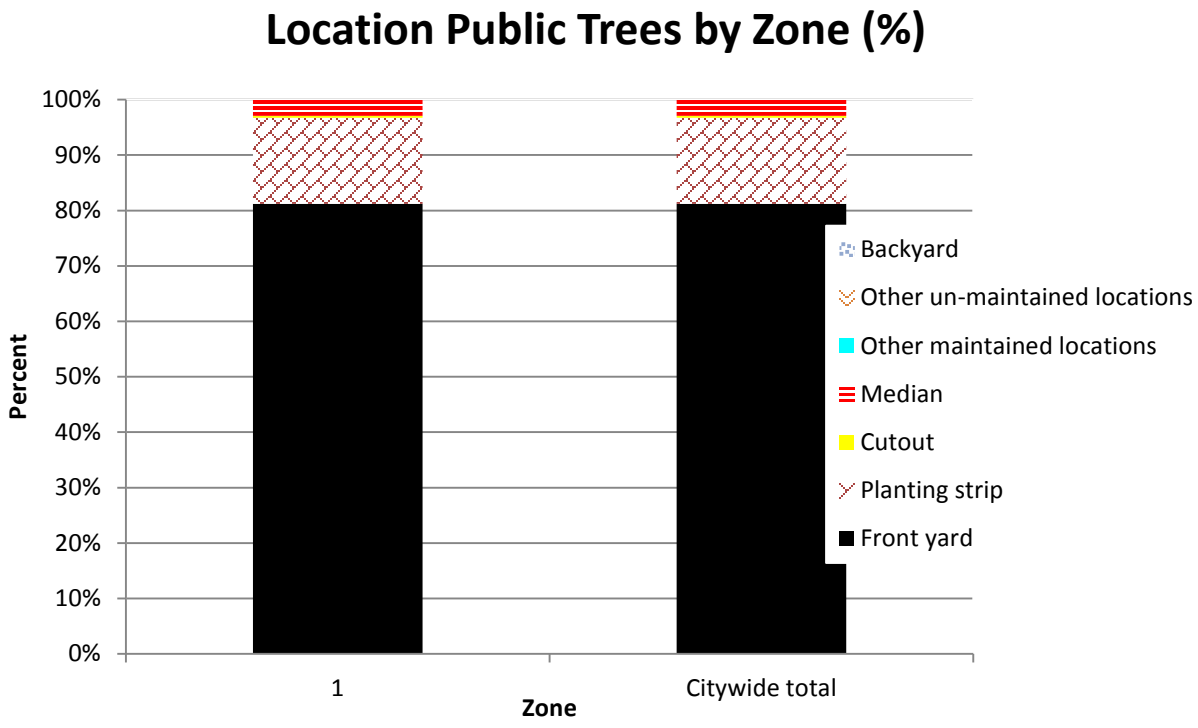

Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping

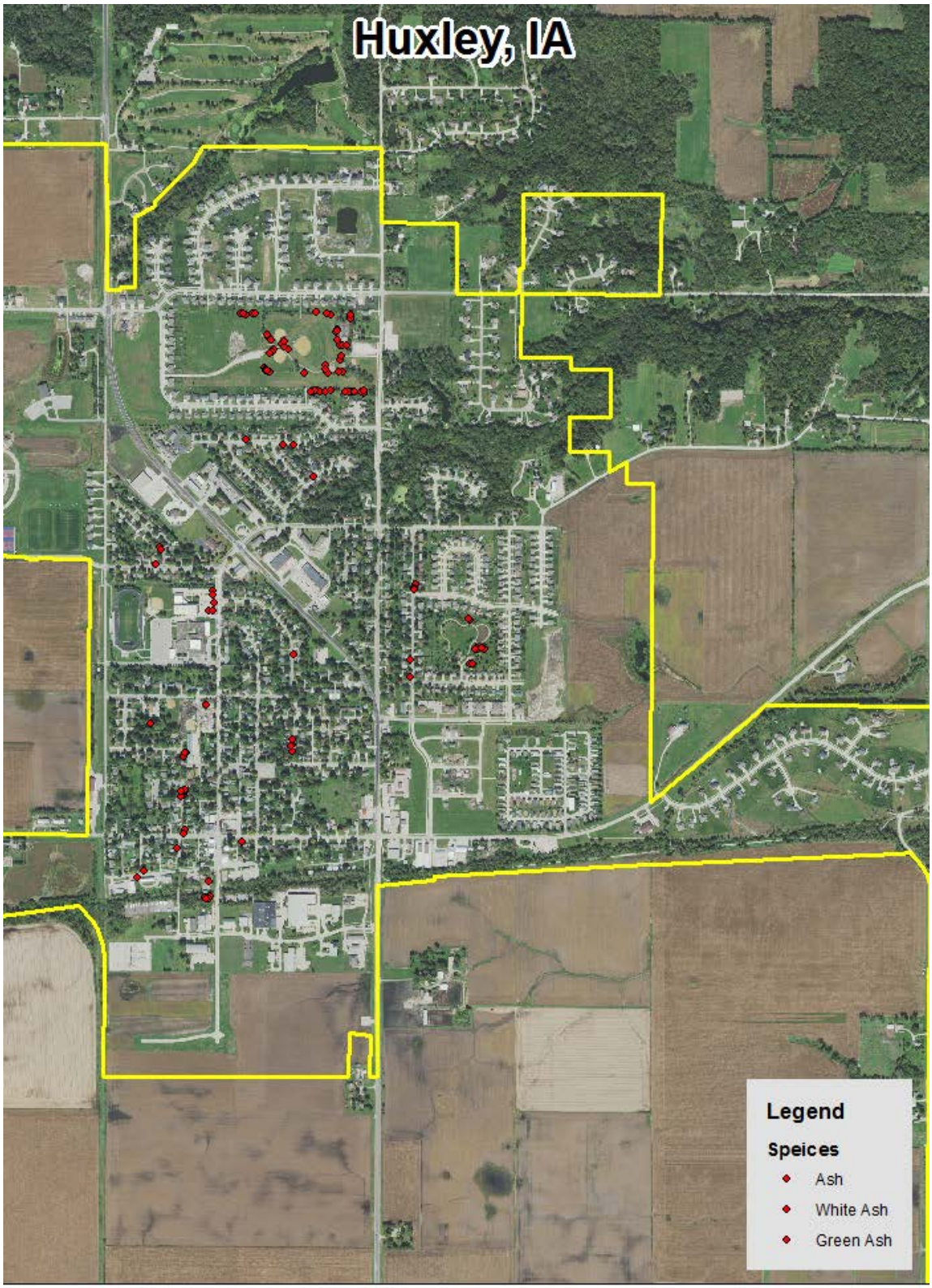

Figure 1: Location of Ash Trees

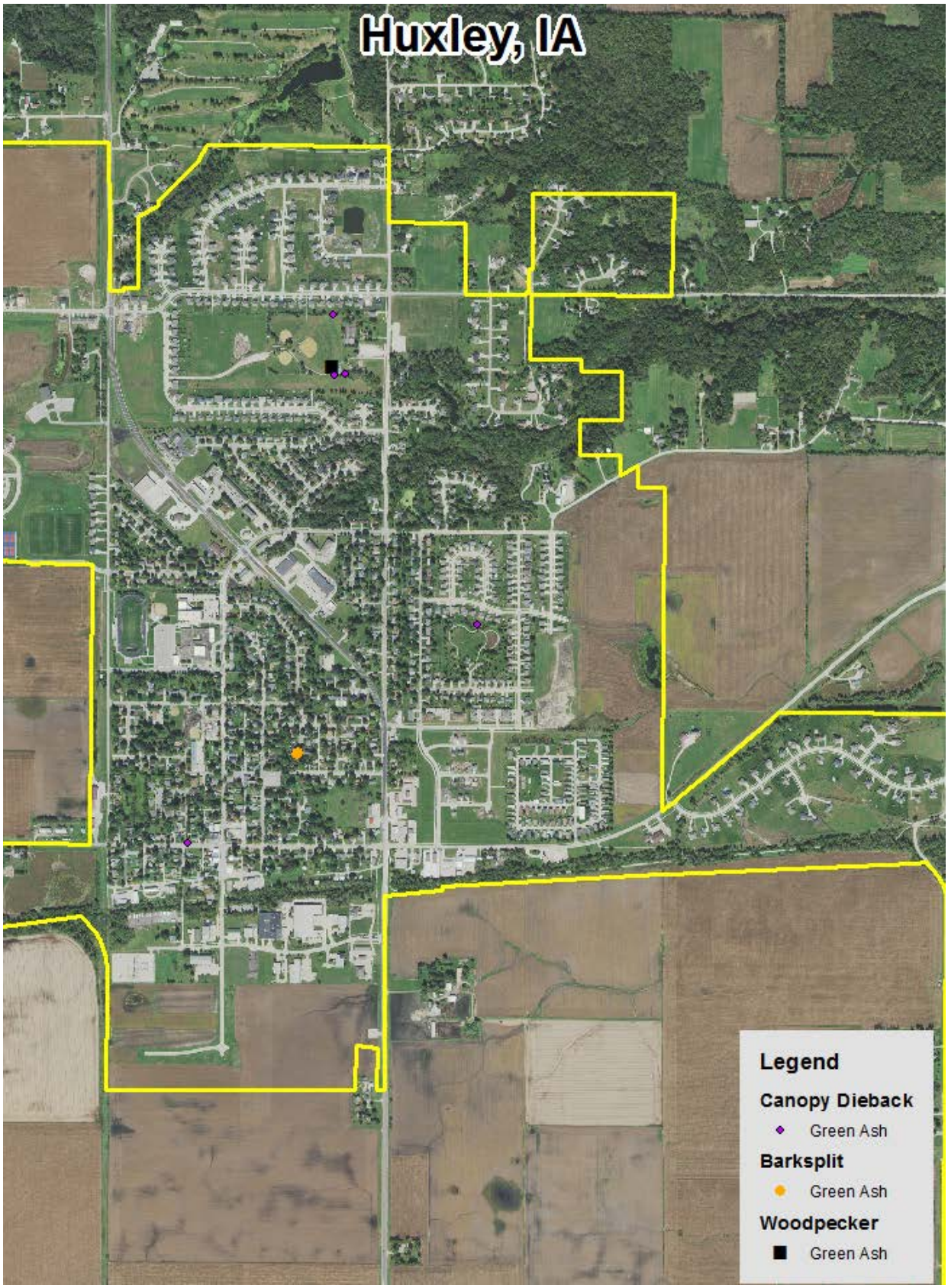

Figure 2: Location of EAB symptoms

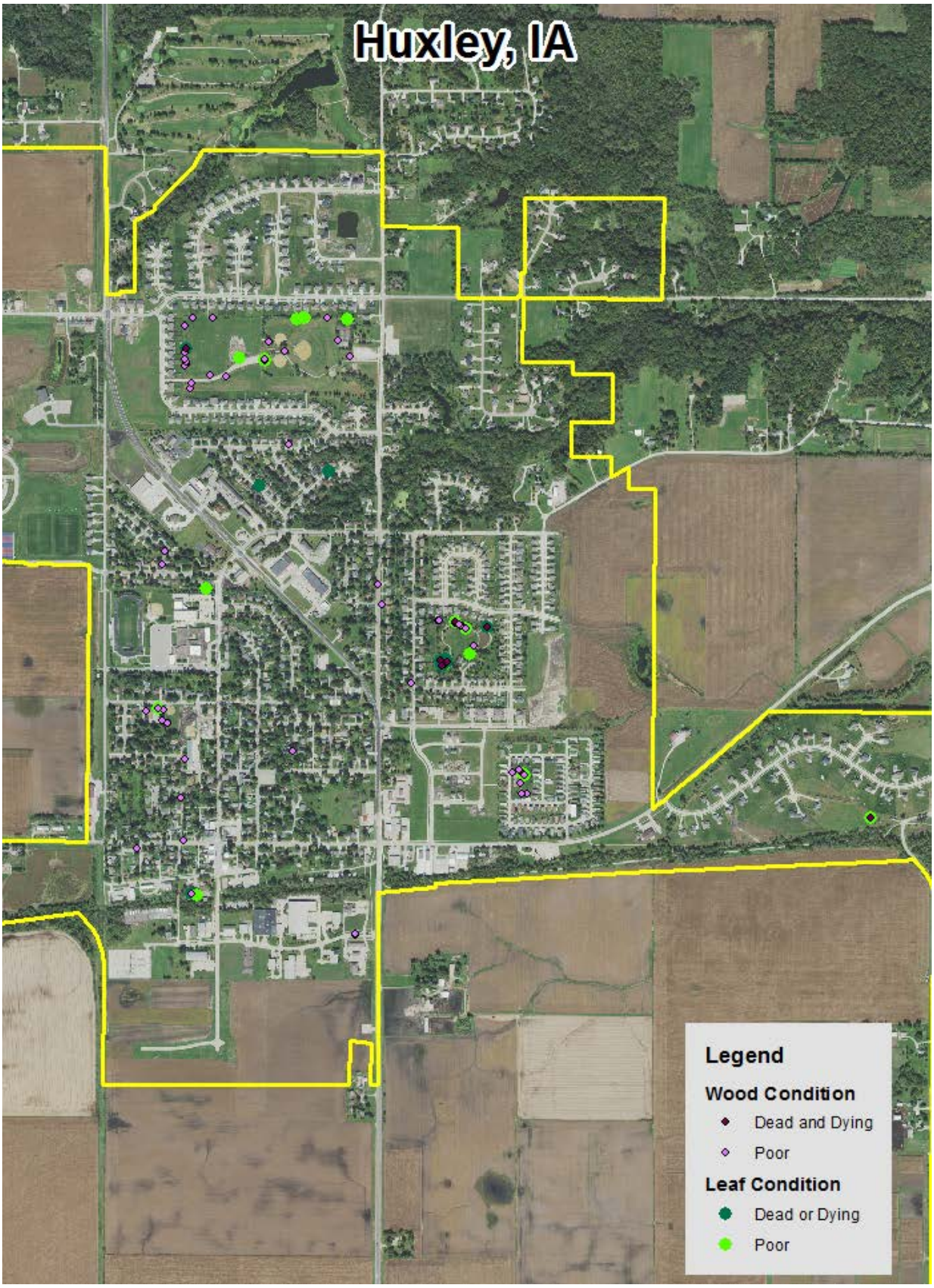

Figure 3: Location of Poor Condition Trees

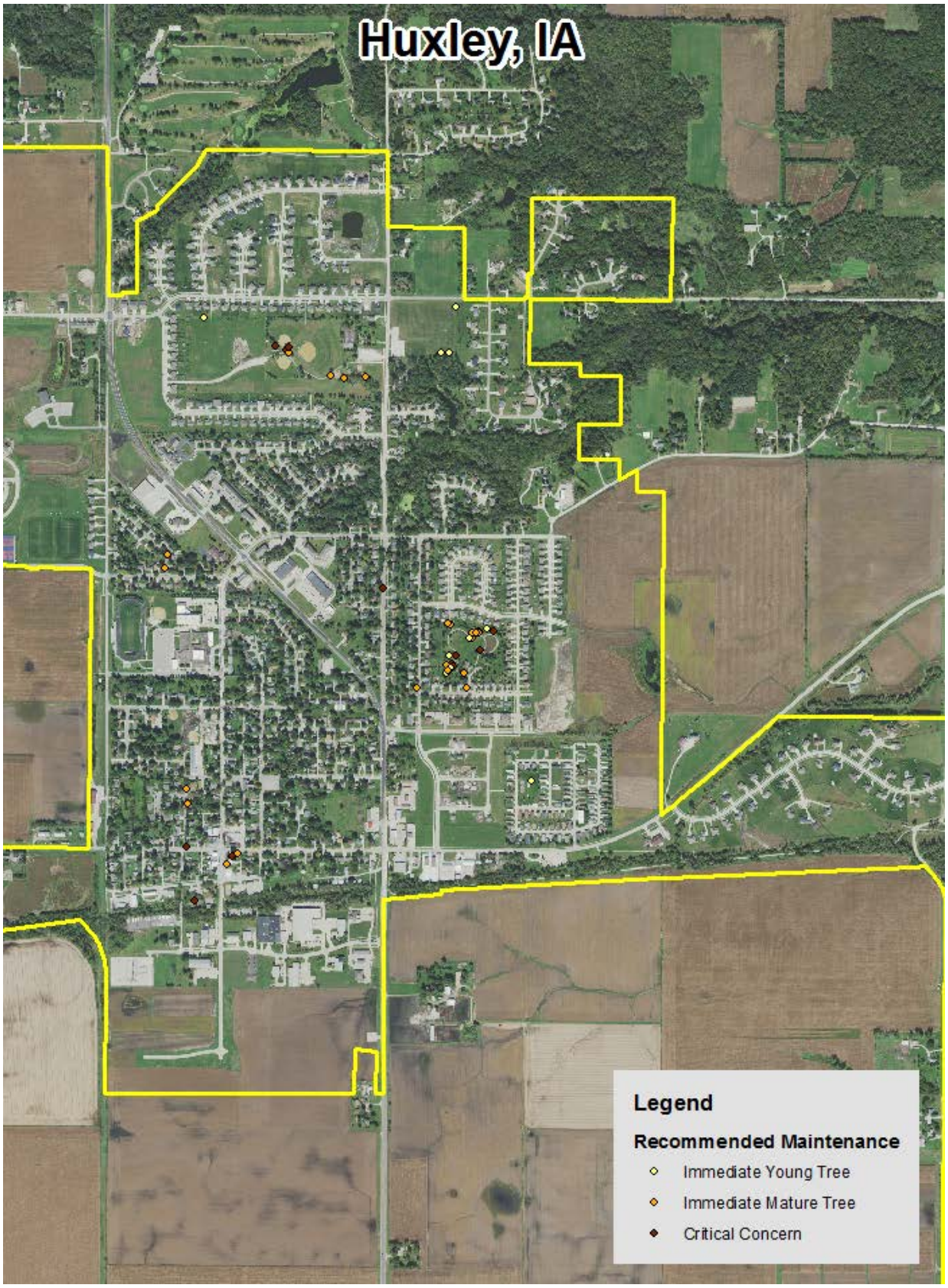

Figure 4: Location of Trees with Recommended Maintenance

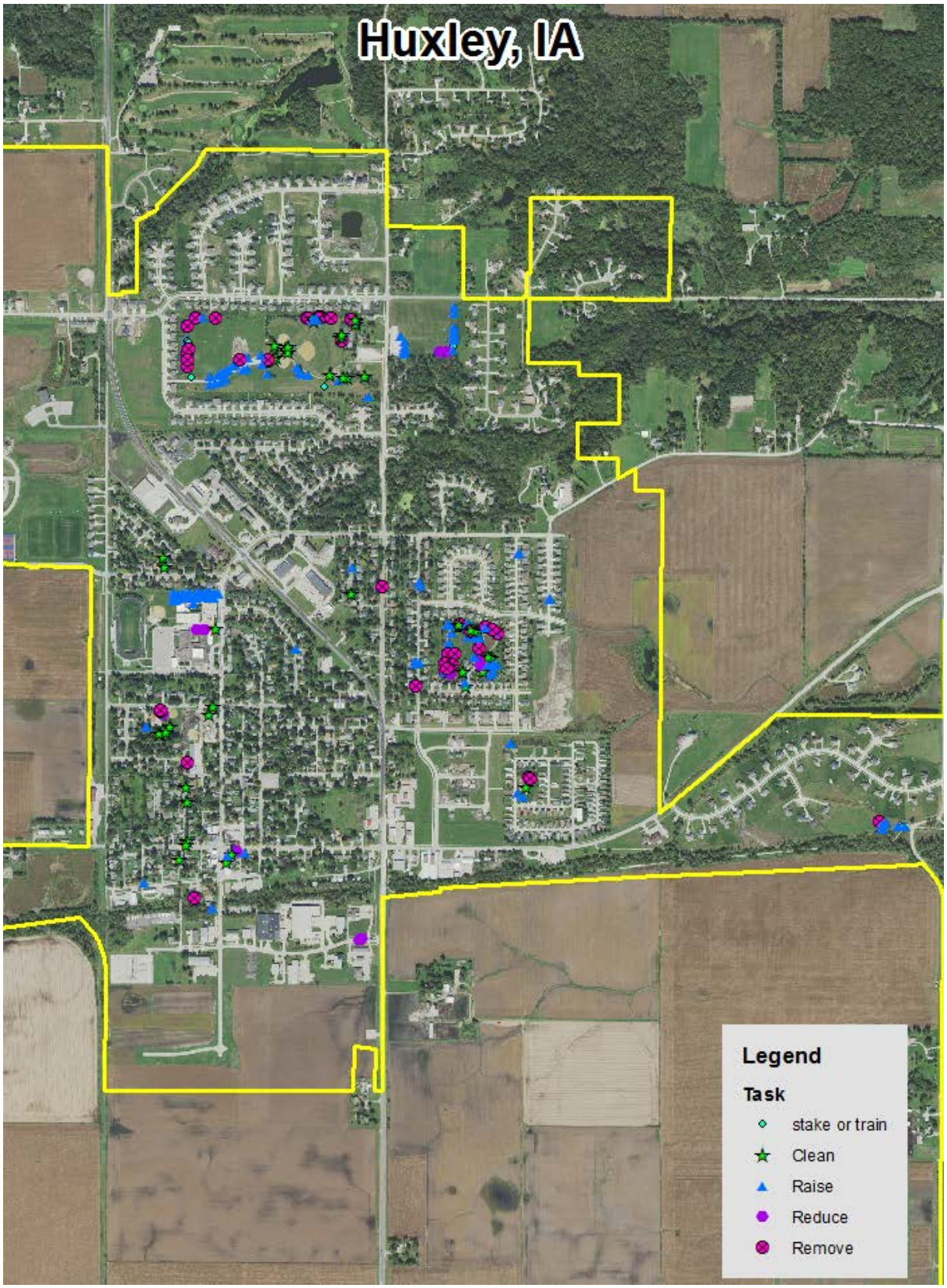

Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*

Appendix C: Huxley Tree Ordinances

PARKS AND RECREATION BOARD

24.1 Parks and Recreation Board Created
24.2 Board Organization
24.3 Duties of the Board

24.4 Hiring Director
24.5 R ules

24.1 PARKS AND RECREATION BOARD CREATED. A Parks and Recreation Board is hereby created to advise and assist the Council on the needed facilities and program s to provide open space such as parks, playground s, swimming pools and community facilities for other forms of recreation. It shall also plan and oversee programs, both indoor and outdoor, for the leisure time of the City's residents of all ages. It shall work with the Tree Board in writing a plan for the care, preservation. pruning. planting, replanting, removal and disposition of trees and shrubs within the City parks.

24.2 BOARD ORGANIZATJON. The Board shall consist of seven members, all residents of the City, appointed by the Mayor with the approval of the Council. for overlapping terms of three years. The Board shall annually choose from i ts mem bershi p a Chairperson, Vice Chairperson and Secretary. Mem bers shall serve without compensation, but may receive reimbursement for expenses incurred in the performance of their duties. Vacancies shall be filled in the same manner as the original appointment for the balance of the term.

24.3 DUTIES OF THE BOARD. The Board shall have the following duties and responsibilities:
l . Advise the Parks and Recreation Director (herein referred to as the "Director") on the use and development of the City parks, City outdoor/indoor recreational programs. and 3Cs.
2. Work with the Tree Board in developing a plan for maintenance and possible add ition of trees and foliage within the parks.
3. Develop a comprehensive plan for the City's parks and recreational program s. This plan shall cover a five-year period and incl ude. but not be limited to. the following items:
A. Location of future parks and designating the type of parks:
B. Timetable for expansion of current parks and recreational facilities;
C. Timetable for capital improvements of the City's parks and facilities;
D. Hold an annual public hearing to gather input from the citizenry on what they feel the needs of the community may be in the areas of leisure time activities and recreational facilities. Upon completion of this plan, it shall be submitted to the Council for a presentation by the Director for the Council 's consideration. The Board, with the assistance of the Director, will be responsible for reviewing and updating the Parks and Recreation Comprehensive Plan annually.

4. Adopt its own rules and regulations not inconsistent with the ordinances and policies of the City or the laws of the State with regard to the administration of its own internal affairs.
5. Assist the Director in the preparation of grant applications and presentations.
6. Advise and assist the Director in the development of the Department's annual budget.
7. Assist the Director in the compiling and submission to the Council of an annual report on the state of the City's parks and recreational activities and development.
8. Submit to the Council for approval the recommended fees, regulations and policies for the use of the City parks and recreational facilities.
9. Nominate new Board members for the Council's review and approval.
10. Advise, assist and approve the action necessary for the Director to begin the process of hiring any pa.rt-time , temporary or seasonal employees to be forwarded to the Council for approval to hire.
11. Evaluate annually the full-time staff and other designated personnel within the Parks and Recreation Department and report same to the City Administrator.

24.4 HIRING DIRECTOR. For the purpose of hiring a Director or any full time administrative position within the Department, a committee shall be appointed by the Council that shall be comprised of no less than three members of the Parks and Recreation Board, no less than two members of the Council, and the City Administrator. This comminee shall submit to the Council their recommendation for approval and hiring.

24.5 RULES. The Board has the power to make rules and regulations for the use of parks or other recreational facilities or for the conduct of recreation programs, subject to the approval of the rules by the Council. Such rules shall be either posted on the facility or otherwise publicized in a manner to provide adequate notice to the using public. Violation of a rule or regulation so posted or publicized may be cause for denial of use of the facility or if it is a violation of this Code of Ordinances may be prosecuted as a simple misdemeanor.

TREE BOARD

25.0J Tree Board Esta blished
25.2 Duties

25.3 Compensation
25.4 Operation

25.1 TREE BOARD ESTABLISHED. There is hereby created and established a City Tree Board for the City. which consists of five members. appointed by the Mayor with the approval of the CounciL for staggered three-year terms.

25.2 DUTIES. The Tree Board is an advisory board with in the Parks and Recreation Department. The Tree Board, working with the Public Works Director, has the duty to prepare. revise annually and admi nister a written plan for the care, preservation, pruning, planting, replanting, removal and disposition of trees and shrubs located within the right-of- way boundaries of all City streets or located on any other property owned by the City. The Tree Board shall develop this plan and work i n conjunction with the Parks and Recreation Board regarding trees located within City parks. Said plan shall be presented to the Council annually for approval. Upon the request of the Council, the City Tree Board shall consider. investigate. make findings, report on and provide recommendations concerning any special matters or questions coming within the scope of its work.

25.3 COMPENSATION. Members of the Board shall serve without compensation.

25.4 OPERATION. The City Tree Board shall choose its own officers, establish rules and regu lations within the scope of its duties and keep a journal of its proceed ings. A majori ty of the members shall be quorum for the transaction of business.

CHAPTER 151

TREES

151.1 DEFINITIONS. The following words and phrases are defined for use in this chapter.

1. "Drip-line" means the outline of a tree's canopy at its greatest circumference transposed down to the ground.
2. ‘'Shrub" means any plant material that may grow between one (I) foot and fifteen (J 5) feet in height. Shrubs must be less than eighteen (18) inches at mature growth or more than ten (10) feet at mature growth.
3. "'Street right-of-way" means the area commonly known as the '·parki ng" and existing between the traveled portion of a street and the lot line of adjacent private property.
4. "Street tree" means a tree or shrub within the street right-of-way.
5. "Traffic control device" means any official sign, signal or device that regulates the movement or parking of motor vehicle, pedestrian , or other traffic upon or across streets.
6. "Tree" means any single-stemmed, perennial woody plant with a minim um average mature height of fifteen (I 5) feet.
7. "Tree care" means cutting, trimming, pruning. removing. spraying. or otherwise treating trees.

8. "Tree topping" means the severe cutting back of tree limbs to stubs within a tree's crown so as to remove the normal canopy and disfigure the tree.
9. "Utility lines" means City-maintained utilities and privately owned underground and overhead utilities.

151.2 TREE OWNERSHIP. Trees existing and planted in the street right-of-way are the property of the City.

151.3 TREE CARE OF STREET TREES. Any cost created by tree care for work on or around an existing utility or for new construction of a utility shall be borne by the entity needing the tree care. An abutting property owner may, at the owner's expense, provide tree care. The City may perform required tree care if the abutting property owner does not maintain the street trees. Except as provided by Chapter 384 of the Code of Iowa, the resultant cost may not be passed on to the abutting property owner by the City. Street tree care includes the following requirements:
1. Trees shall be kept trimmed to a clearance height of fourteen (14) feet for branches overhanging a street and eight (8) feet for branches overhanging a sidewalk. Private trees whose growth enters the street right-of-wa y or area above the sidewalk must be kept trimmed to the same distances as above.
2. Tree topping is not permitted on any tree in the street right-of-wa y. If tree topping is needed due to conflict with utilities, tree removal is required.
3. The City will remove any trees from the street right-of-way if they are a public hazard. Trees that fall into this category are dead trees, trees severely damaged by storms or insects. and trees that are leaning precariously. No stumps may remain in the street right-of-way. No burning or chemical means of stump removal is allowed. The City Administrator or Departm ent of Public Works will make the final determination of what constitutes a publ ic hazard.
4. No person shall intentionally damage. cut. carve, attach any rope, wire. nail s, advertising posters. or other contrivance to any tree in the street right-of-way; or allow any gaseous. liquid, chemical or solid substance that is harmful to such trees to come into contact with them; or set fire to any such tree or part thereof; or cause or permit any burning which will damage any such tree.
5. Tree care required after natural disasters will be initiated and managed by the City as needed.

151.4 UNDERGROUND UTILITY OR ABOVE GROUND CONSTRUCTION.
1. Construction work is to be designed and performed by means of boring or other means to avoid existing trees in street right-of-way where possible. If a new underground utility cannot be located except where trees or tree roots are located, then such trees are subject to removal. Al l costs of such work shall be borne by the entity requesting tree removal. The City may require such cost to incl ude the cost, in cash or in kind. of replacement street trees. The Tree Board may coordinate tree selection and planting.
2. Vehicle traffic or stockpiling of construction materials shall not take place within a tree's drip-line.
3. Suitable construction fencing located no closer to a tree than its drip-line is required to prevent damage to trees and tree roots during construction.

151.5 STREET RJGHT-OF-WAY PLANTINGS. Tree plantings are subject to the following conditions:

1. A person shall not engage in any excavation unless the requirements of Chapter 480 of the Code of Iowa have been satisfied . Before planting all new trees in the right-of-way. property owners must call lowa One-Call (J -800-DlG-lOWA) to have the location of underground utilities marked for tree location.
2. No trees shall be planted in the street right-of-way if the street right-of-wa y width is less than five (5) feet.
3. Trees may be planted over City utility lines if said lines are at least 4 feet deep.
4. Unless approved in writing by the utility owner, no street tree shall be planted less than two feet from any private utility. Utility owner shall be contacted immediately if damage occurs or is suspected during tree planting.

5. A full list of acceptable street trees is maintained and enforced by the Tree Board.

151.6 STREET RIGHT-OF-WAY SPACING REQUIREMENTS.

1. Trees shall be spaced at least fifteen (15) feet apart, center-to-center.
2. Trees shall be at least ten (10) lineal feet from water hydrants , utility poles. transformers, telephone junction boxes and manholes.
3. Trees shall be at least fifteen (15) lineal feet from traffic signs and street lights.
4. Trees shall be at least twenty (20) lineal feet in all directions from intersecting roads with traffic control devices and thirty (30) lineal feet from intersections with partial or no traffic control devices.
5. Trees shall be at least five (5) feet from residential driveway approaches.

151.7 PROPERTY OWNER RESPONSIBILITY. The abutting property owner is required to maintain all property outside the lot and property lines and outside the curb lines upon the pu blic street, except that the property owner shall not be required to remove diseased trees or dead wood on the publicly owned property or right-of-way.

151.8 DISEASED, DEAD OR DANGEROUS TREES AND BUSHES.

1. When the Public Works Director or department designee finds that a tree or bush growing on private property creates a hazard that threatens the general public safety or welfare, said official shall order the owner to remove the tree or bush or otherwise eliminate the hazardous condition. Trees posing a hazard to human life or safety may require the pruning or removal of said trees or parts thereof which are in danger of falling.
2. It is unlawful for an owner or occupier of property to permit any tree, bush, or other plant to remain on the property if such tree. bush. or other plant endangers persons and vehjcJes using the streets, alleys, and sidewalks of the City or poses a risk of fire or other property damage because of its location and/or condition.
3. It is unlawful for any responsible person to permit a dead and/or diseased tree that might endanger the health or safety of persons or property to remain on real property in the City.
4. The City Public Works Director or department designee may give a written notice of violation to the owner or occupier of property to remove any such tree, bush, or other plant. For

the purpose of this chapter, "dead tree that might endanger the health or safety of persons or property" means any dead tree, any tree that is diseased; or has a dead, diseased, or broken limb or a dead, diseased or broken trunk, or any tree that is totally or partially uprooted, if the height of the tree or the length or the limb or trunk is such that, if it were to fall, the tree, limb, or trunk could fall within the publ ic right-of-way or strike a structure or improvement to real property. Such notice shall give the owner or occupier 10 days after the date of service of the notice to inform the Public Works Director or department designee as to when the tree shall be removed. Owners shall have no more than 30 days after informing the Public Works Director or department designee to remove such trees unless the Public Works Director or department designee indicates otherwise in writing.

5. If the property owner fails to comply with such order within 30 days of notification, or sooner if necessary to protect the public safety. the City or its contractor may enter the property. remove the tree or bush or otherwise mitigate the hazardous condition. and assess the cost thereof against the property owner.

6. In an emergency. the City may have the tree. bush. or other plant removed without prior notice and require the owner or occupier of the property to pay the cost of removal.

7. lf the cost of such removal remains unpaid for 60 days. the cost of removal shall be added to the ne>-. real estate tax bill of the property owner.