Story City, IA:

2020 Urban Forest Management Plan

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Executive Summary

EXECUTIVE SUMMARY

Overview

This plan was developed to assist the City of Story City in managing its urban forest, including budgeting and future planning. Trees bring numerous benefits to a community, and sound management helps leaders take advantage of these benefits. Management is especially important now considering the serious threats posed by forest pests like 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 except mountain ash. There is a strong possibility that 8 percent of Story City's city-owned trees will die once EAB becomes established in the community, unless local leaders begin preventative treatment. With proper planning and management, the costs of removing dead and dying trees can be extended over years, mitigating public safety issues.

Inventory and Results

In 2020, JEO conducted a tree inventory 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 1,396 trees inventoried.

- Story City trees provide $233,173 of benefits annually, an average of $167.03 per tree
- There are over 42 species of trees
- The top three genera are: maple 22%, oak 11%, and ash 8%
- 51.5 percent of trees need some type of management
- 141 trees should be removed

Recommendations

Below are some key recommendations, for further details see the Recommendation and Emerald Ash Borer Plan Sections:

- Out of the 141 trees needing removal, 73 trees are over 24 inches in diameter at 4.5 feet and must be addressed immediately. *City ownership of the trees recommended for removal should be verified prior to any removal*
- 70 of the 109 ash trees should be carefully examined, as they have one or more symptoms that could be related to an EAB infestation.
- All trees should be pruned on a routine schedule: one third of the city every other year.
- Plant a diverse mix of trees that do not include: ash, maple, cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut.
- Check ash trees yearly with a visual survey.
- With the current budget it will take 3 years to remove ash. The current tree budget is sufficient for maintenance needs. We suggest applying for grants to help with any additional maintenance needs.

Introduction

INTRODUCTION

This plan was developed to assist Story City with managing, budgeting, and future planning of their urban forest. Across the state, forestry budgets continue to decrease as a higher percentage of the budgets are devoted to 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, treatment, and replacement planting. With proper planning and management of the current canopy in Story City, these costs can be spread out over the years and public safety issues from dead and dying ash trees can be mitigated.

Trees are an important part of Story City's infrastructure and one of the city's greatest assets. The benefits of trees are immense. Trees improve air quality, intercept stormwater runoff, conserve energy, lower traffic speeds, increase property values, reduce crime, improve mental health, and create a desirable place to live, to name just a few. Good urban forestry management will maintain these important benefits for the people of Story City and future generations.

Urban forestry management sets goals and develops management strategies to achieve them. To develop management strategies, a comprehensive public tree inventory must be conducted. The inventory informs maintenance, removal schedules, tree planting, and budgeting. Aligning management actions with the tree inventory results will help meet Story City's urban forestry goals.

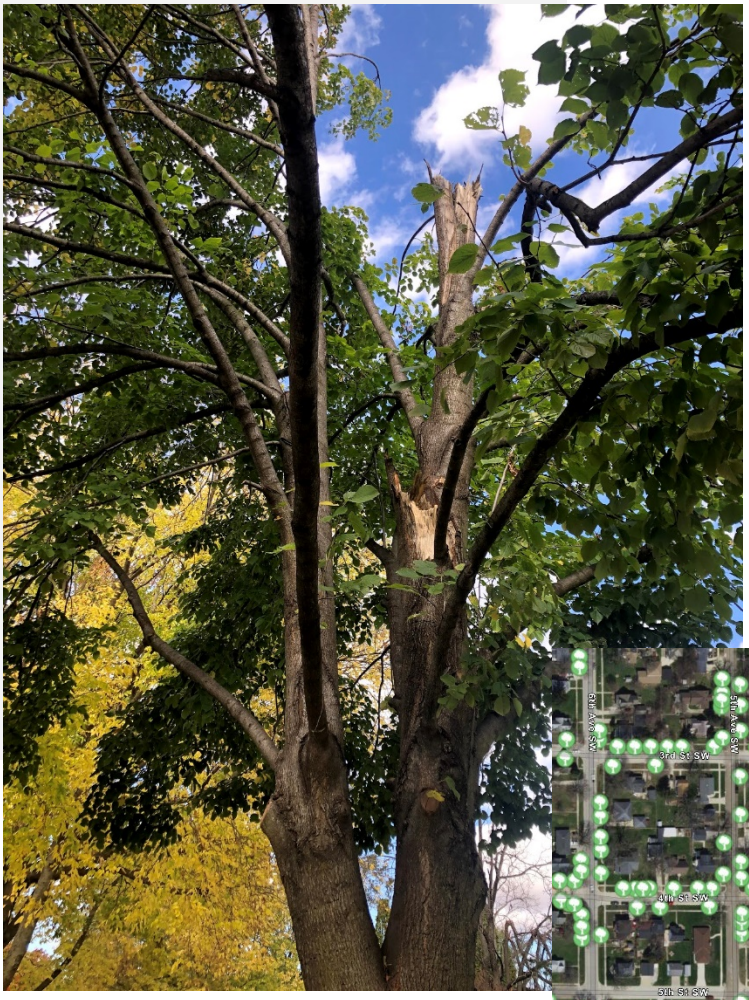
Assist Story City with Managing its Urban Forest

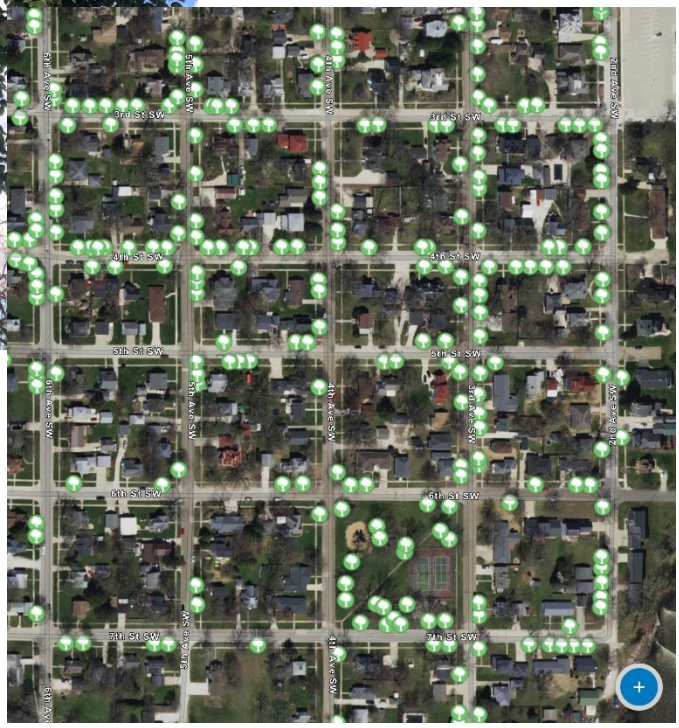
Inform on the Benefits of a Healthy Urban Forest

Establish Preventative Treatment for Emerald Ash Borer

Develop Efficient City Tree Management Techniques

Mitigate Public Safety Issues





Inventory Results

INVENTORY

In 2020, JEO conducted a tree inventory that included 100% of the city-owned trees on both streets and parks. The team collected tree data 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 ArcGIS 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 data collectors' programming 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 feet, recommended maintenance, priority of that maintenance, leaf health, and wood condition. Additionally, for all ash trees, the team notes signs and symptoms associated with EAB including canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

INVENTORY RESULTS

JEO entered the data collected for the 1,396 city trees into the USDA Forest Service Program Street Tree Resource Analysis Tool for Urban forestry Management as part of the i-Tree suite. Following are results from the i-Tree STREETS analysis.

ANNUAL BENEFITS

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Story City's trees reduce energy-related costs by approximately $64,044 annually (Appendix A, Table 1). These savings are both in electricity (303.1 MWh) and in natural gas (41,879.7 Therms).

Annual Stormwater Benefits

Story City's trees intercept about 3,341,430 gallons of rainfall or snow melt per year (Appendix A, Table 2). This interception provides $90,553 in benefit 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 lessens emissions of volatile organic matter (ozone). In Story City, it is estimated that trees remove 3,970 pounds 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 $11,168 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Story City, trees sequester about 601,546 pounds of carbon per year with an associated value of $4,512 (Appendix A, Table 5). In addition, the trees store 11,873,915 pounds of carbon, with a yearly benefit of $89,054 (Appendix A, Table 4).

Annual Aesthetics Benefits

The social benefits of trees are hard to capture. The i-Tree 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. Story City receives $59,537 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, Story City's trees provide $233,173 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 1,396 trees in Story City provide approximately $167.03 annually (Appendix A, Table 7).

ENERGY	STORMWATER	AIR QUALITY	CARBON	AESTHETICS	SUMMARY
• Reduce energy cost by **$64,044**	• Intercept **3,341,430 gallons** • Provides **$90,553** benefit	• Remove **3,970 lbs** of pollution • Net value of **$11,168**	• Sequester **601,546 lbs** • Value of **$4,512** • Store **11,873,915 lbs** • Value of **$89,054**	• **$59,537** in social benefits	• **$233,173** annual benefits • Each tree provides **$167.03** annually

FOREST STRUCTURE

Species Distribution

Story City has over 42 different tree species along city streets and parks (Appendix A, Figure 1).

The distribution of trees by genera is as follows:

Maple	450	22%
Oak	154	11%
Ash	109	8%
Hackberry	70	5%
Locust	68	5%
Apple	62	4%
Basswood/Linden	60	4%
Elm	60	4%
Walnut	39	3%
Kentucky Coffee	36	2.5%
Birch	32	2%
Pine	28	2%
Spruce	16	1%
Amur maple	16	1%
Eastern redbud	15	1%
Ginkgo	13	<1%
Hophornbeam	13	<1%
Poplar	12	<1%
Pear	10	<1%
Sycamore	9	<1%
Cottonwood	8	<1%
Cedar	7	<1%
Japanese tree lilac	7	<1%
Catalpa	6	<1%
Dogwood	6	<1%
Boxelder	5	<1%
Magnolia	5	<1%
Mountain ash	4	<1%
Tulip tree	4	<1%
Aspen	3	<1%
Mulberry	3	<1%
Plum	3	<1%
Buckeye	2	<1%
Cherry	2	<1%
Chestnut	2	<1%
Hickory	2	<1%
Juniper	2	<1%
Yellowwood	2	<1%
Willow	1	<1%
Broadleaf Evergreen Other	3	<1%
Conifer Evergreen Other	7	<1%
Other Deciduous	40	3%

Age Class

Most of Story City's trees (35.5 percent) are between 18 and 30 inches in diameter at 4.5 feet (Appendix A, Figure 2).

To prepare for natural mortality and to maintain canopy cover, most trees should be in the smallest size category (a downward slope), indicating youth. Story City's size curve is on the larger side, indicating an average to older than average stand.

Condition: Wood and Foliage

Both wood condition and leaf condition are good indicators of the urban forest's overall health. The foliage condition results for Story City indicate that 92 percent of the trees are in good health, with only 8 percent of the foliage in poor health, dead, or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 88 percent of Story City's trees are in good health for wood condition (Appendix A, Figure 4 & Appendix B, Figure 3). Twelve percent of the tree population's wood condition is in poor health, dead, or dying. This 12 percent 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).

Action	Number of Trees	Percentage
Crown Cleaning	366	26%
Crown Raising	143	10%
Tree Removal	141	10%
Tree Staking	39	2.5%
Crown Reduction	30	2%

Canopy Cover

The total canopy with both private and public trees is 220.399 acres or around 12 percent. The canopy cover included in the Story City inventory includes approximately 35 acres (Appendix A, Figure 4). The city's canopy goal is to increase canopy by 8 percent in 30 years. To achieve this goal it is estimated that 30 trees need to be planted annually on public and private lands.

Land Use and Location

The majority of Story City's city and park trees are in planting strips in single family residential neighborhoods (Appendix A, Figure 6 & Appendix A, Figure7). The following describes the land use and locations for the street and park trees.

Land Use	Percentage
Single Family Residential	67%
Park/Vacant/Other	31%
Small Commercial	1.5%
Multifamily Residential	<1%
Industrial/Large Commercial	0%

Recommendations

RECOMMENDATIONS

Risk Management

Hazardous trees can be a significant threat to both people and property. Trees that are dead, dying, or have large issues such as trunk cracks longer than 18 inches should be removed. Broken branches and branches that interfere with motorists' vision of pedestrians, vehicles, traffic signs and signals should be removed.

HAZARDOUS TREES

Story City has 72 trees in need of immediate removal. These trees can be seen on the Location of Trees with Recommended Maintenance Map (Appendix B, Figure 4). We recommend starting with the large-diameter, critical concern trees first. There are 49 trees over 24 inches in diameter at 4.5 feet that should be addressed immediately. Please refer to the Schedule and Budget 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 578 trees with maintenance needs.

POOR TREE SPECIES

After removing the critical concern trees, ash trees in poor health should be assessed for removal (Appendix B, Figure 3 & Appendix B, Figure 4). Of the 141 removals, 79 are ash trees. There are a total of 109 ash trees, 70 of those have signs and symptoms that have been associated with EAB. In addition, there are 41 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 removes lower branches that are two inches in diameter or larger to provide clearance for pedestrians or vehicles. Crown reduction removes individual limbs from structures or utility wires. We recommend that all trees be pruned on a routine schedule every five to seven years. Please refer to the Schedule and Budget for further information.

Planting

Most of the planting over the next five years will replace the trees that are removed. We recommend planting 1.2 trees for every tree removed, since survival rates will not be 100 percent. 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 Story City.

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 percent of the urban forest and a single species (i.e. silver maple, sugar maple, white oak, bur oak) not make up more than 10 percent of the total urban forest. Presently, the forest is heavily planted with maple (22 percent) (Appendix A, Figure 1). Maples should not be planted until this percentage can be lowered. Also, ash trees have not been recommended since 2002, due to the threat of EAB. Other species to avoid because they are public nuisances include: boxelder, silver maple, tree of heaven, white birch, cutleaf weeping birch, catalpa, Russian olive, female ginkgo, common honeylocust, black walnut, English walnut, white mulberry, red mulberry, white poplar, Bolleana poplar, cottonwood, Lombardy poplar, European mountain ash, willows, Chinese elm, Siberian elm, all ash species, all coniferous species as outlined in section 151.03 of the city ordinance
(Appendix C). All trees planted must meet the restrictions in city ordinance 151.03 (Appendix C).

Continual Monitoring

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

EMERALD ASH BORER PLAN

Ash Tree Removal

Tree removal will be prioritized by first removing dead, dying, hazardous trees (Appendix B, Figure 4). Next will be all ash in poor condition that display EAB signs and symptoms (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 an effective tool for communities to spread removal costs out over several years while allowing trees to continue providing 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 normally disposed of 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 151.03 (Appendix C). The new plantings will be a diverse mix and will not include boxelder, silver maple, tree of heaven, white birch, cutleaf weeping birch, catalpa, Russian olive, female ginkgo, common honeylocust, black walnut, English walnut, white mulberry, red mulberry, white poplar, Bolleana poplar, cottonwood, Lombardy poplar, European mountain ash, willows, Chinese elm, Siberian elm, all ash species, all coniferous 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 EAB signs and symptoms including canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

Private Ash Trees

It is strongly recommended that private property owners start removing ash trees on their property upon arrival of EAB if preventative treatments are not being used. City Code 151.13 states “Every owner or occupant of real property bordering upon any street, alley, or public space shall keep the branches of any tree overhanging any street or right-of-way within the City pruned so that such branches shall not obstruct the light space of 15 feet above the surface of any right-of-way grounds and 8 feet above any sidewalk. Said owner or occupant, upon written notification by the Tree Board to abate a nuisance, shall remove all dead, diseased, and dangerous trees and broken or decayed limbs, which constitute a menace to the safety of the public. The City Tree Board or its official designee, upon five (5) days following the issuance of a written notice, has the authority to enter upon private property to inspect, prune or remove a tree, shrub, plant, or plant part that is determined to be a public nuisance, e.g., any tree with an infectious disease or insect problem; dead or dying trees; a tree or limb that obstructs street lights, traffic signals or signs or causes electric service interruptions, interferes with the free passage of pedestrians or vehicles; or any tree that poses a threat to public safety.”

Schedule & Budget

PROPOSED WORK SCHEDULE & BUDGET

Budget Allowance of $42,000/Year – (Based off Reported Yearly Tree Budget)

YEAR 1	Est. Cost
Remove 48 trees recommended for immediate removal	$33,600
Plant 56 trees in open locations	$8,400
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$42,000**

YEAR 2	Est. Cost
Remove 41 trees recommended for immediate removal	$28,700
Plant 42 trees in open locations	$6,300
Prune 1/3 of city owned trees	$6,980
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$41,980**

YEAR 3	Est. Cost
Remove 23 trees recommended for immediate removal	$16,100
Remove 25 ash trees in poor condition	$17,500
Plant 56 trees in open locations	$8,400
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$42,000**

YEAR 4	Est. Cost
Remove 41 ash trees in poor health	$28,700
Plant 42 trees in open locations	$6,300
Prune 1/3 of city owned trees	$6,980
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$41,980**

YEAR 5	Est. Cost
Remove 43 ash trees	$30,100
Plant 32 trees in open locations	$4,800
Prune 1/3 of city owned trees	$6,980
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$41,880**

YEAR 6	Est. Cost
Additional removal, planting and pruning	$35,020
Prune 1/3 of city owned trees	$6,980
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$42,000**

Estimated costs based on average costs of $700/tree for removal, $150/tree for planting and maintenance, and $15/tree for pruning.

Option for Treatment

Another option considered by many communities is treating 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 removal all at once. Trunk injection is administered every two years for the life of the tree. If treatment is discontinued, the tree dies. For instance, in this treatment scenario, the average ash diameter is 20 inches and at $15 per inch, about 4 trees could be treated per year (every other year treatment). Eight trees would be selected for treatment, and Story City would still need to find $8,000 for removal. Alternatively, if there are 15 treatable trees, it would cost approximately $2,250 a year for treatment and leave $1,800 for removal. These are alternatives to straight removal of ash trees. However, whether or not the treatment option is selected, there will be an increased cost of dealing with ash trees if EAB is found in Story City. We suggest considering an increased budget to plan for this.

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Appendices

APPENDIX A: i-TREE DATA

Annual Energy Benefits of Public Trees

2/1/2021

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	38.1	2,889	5,535.0	5,424	8,313	(N/A)	10.3	13.0	57.73
Silver maple	46.3	3,514	6,134.6	6,012	9,526	(N/A)	9.8	14.9	69.53
Ash	23.5	1,782	3,414.0	3,346	5,128	(N/A)	5.8	8.0	63.31
Red maple	11.8	895	1,582.8	1,551	2,446	(N/A)	5.0	3.8	34.94
Northern hackberry	23.2	1,760	3,274.9	3,209	4,970	(N/A)	5.0	7.8	71.00
Honeylocust	19.9	1,513	2,618.3	2,566	4,079	(N/A)	4.9	6.4	59.99
Black maple	16.1	1,220	2,188.2	2,144	3,365	(N/A)	4.4	5.3	54.27
Apple	7.7	587	1,139.6	1,117	1,703	(N/A)	4.4	2.7	27.47
Bur oak	10.5	793	1,411.7	1,383	2,177	(N/A)	3.6	3.4	43.54
Northern red oak	7.9	598	1,085.6	1,064	1,662	(N/A)	3.0	2.6	39.56
Swamp white oak	5.5	420	776.8	761	1,182	(N/A)	2.9	1.8	29.54
Black walnut	12.4	938	1,716.9	1,683	2,620	(N/A)	2.8	4.1	67.18
Kentucky coffeetree	2.2	170	306.9	301	470	(N/A)	2.6	0.7	13.06
American elm	4.0	301	510.3	500	801	(N/A)	2.2	1.3	25.84
Sugar maple	6.6	502	860.4	843	1,345	(N/A)	2.1	2.1	46.39
Littleleaf linden	6.8	515	967.5	948	1,463	(N/A)	2.0	2.3	52.24
Elm	1.9	142	252.9	248	390	(N/A)	1.9	0.6	14.43
Broadleaf Deciduous Small	0.4	34	77.8	76	110	(N/A)	1.9	0.2	4.23
Eastern white pine	4.0	302	521.2	511	813	(N/A)	1.6	1.3	35.34
American basswood	4.8	365	674.8	661	1,026	(N/A)	1.6	1.6	46.64
River birch	2.9	217	426.1	418	635	(N/A)	1.4	1.0	33.40
Amur maple	2.1	162	322.9	316	478	(N/A)	1.1	0.7	29.89
Eastern redbud	0.6	46	95.6	94	140	(N/A)	1.1	0.2	9.34
White ash	3.6	271	409.8	402	673	(N/A)	1.1	1.1	44.85
Green ash	4.5	341	609.4	597	938	(N/A)	0.9	1.5	72.16
Eastern hophornbeam	1.1	83	174.5	171	254	(N/A)	0.9	0.4	19.57
Ginkgo	0.9	65	108.3	106	171	(N/A)	0.9	0.3	13.14
Black poplar	3.7	283	515.1	505	788	(N/A)	0.9	1.2	65.65
Spruce	1.6	118	186.0	182	300	(N/A)	0.8	0.5	27.26
Broadleaf Deciduous Mediu	1.0	77	151.4	148	225	(N/A)	0.8	0.4	20.45
Oak	0.3	20	31.6	31	51	(N/A)	0.8	0.1	4.62
Basswood	2.1	156	290.9	285	441	(N/A)	0.7	0.7	44.10
American sycamore	3.6	272	480.5	471	743	(N/A)	0.6	1.2	82.50
Paper birch	1.1	85	161.1	158	243	(N/A)	0.6	0.4	27.00
Maple	1.1	85	159.4	156	241	(N/A)	0.6	0.4	30.14
Eastern red cedar	0.7	54	106.6	104	159	(N/A)	0.5	0.2	22.70
Japanese tree lilac	0.4	30	68.6	67	97	(N/A)	0.5	0.2	13.89
Catalpa	1.8	140	248.2	243	383	(N/A)	0.4	0.6	63.87
Cottonwood	2.3	174	304.3	298	472	(N/A)	0.4	0.7	78.75
Pear	1.1	86	161.9	159	245	(N/A)	0.4	0.4	40.80
Dogwood	0.1	9	19.6	19	28	(N/A)	0.4	0.0	4.65
Southern magnolia	0.1	9	19.6	19	28	(N/A)	0.4	0.0	5.61
Conifer Evergreen Large	0.5	40	68.5	67	107	(N/A)	0.4	0.2	21.40
Boxelder	0.7	56	99.0	97	153	(N/A)	0.4	0.2	30.52
Pin oak	1.8	140	239.9	235	375	(N/A)	0.4	0.6	75.03
Tulip tree	0.8	62	108.1	106	168	(N/A)	0.3	0.3	41.88
Birch	0.4	28	55.2	54	82	(N/A)	0.3	0.1	20.51
Scotch pine	0.6	44	78.4	77	120	(N/A)	0.3	0.2	30.10
White oak	0.3	21	39.5	39	59	(N/A)	0.3	0.1	14.82
Callery pear	1.0	78	148.2	145	223	(N/A)	0.3	0.3	55.71
Mountain ash	0.0	1	2.5	2	3	(N/A)	0.3	0.0	0.87
Broadleaf Deciduous Large	1.0	79	145.5	143	221	(N/A)	0.2	0.3	73.79
Quaking aspen	0.1	8	14.7	14	22	(N/A)	0.2	0.0	7.32
Blue spruce	0.5	36	66.0	65	101	(N/A)	0.2	0.2	33.53
Eastern cottonwood	1.0	74	126.2	124	197	(N/A)	0.1	0.3	98.63
American chestnut	0.0	0	0.9	1	1	(N/A)	0.1	0.0	0.66

Annual Energy Benefits of Public Trees

Table 1 Continued

2/1/2021

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Yellowwood	0.0	1	1.6	2	2	(N/A)	0.1	0.0	1.10
Mulberry	0.4	30	63.2	62	92	(N/A)	0.1	0.1	46.14
Juniper	0.2	17	32.9	32	49	(N/A)	0.1	0.1	24.57
Conifer Evergreen Small	0.0	1	1.3	1	2	(N/A)	0.1	0.0	0.93
Cherry plum	0.2	14	25.3	25	39	(N/A)	0.1	0.1	19.50
Ohio buckeye	0.2	16	33.7	33	49	(N/A)	0.1	0.1	24.47
Hickory	0.3	25	47.3	46	72	(N/A)	0.1	0.1	35.78
Black spruce	0.3	23	42.8	42	65	(N/A)	0.1	0.1	32.56
Black cherry	0.0	1	1.2	1	2	(N/A)	0.1	0.0	0.87
Broadleaf Evergreen Large	0.8	60	107.4	105	165	(N/A)	0.1	0.3	82.54
Chinese elm	0.7	55	90.1	88	143	(N/A)	0.1	0.2	71.43
Plum	0.0	0	0.6	1	1	(N/A)	0.1	0.0	0.87
Willow	0.0	0	0.8	1	1	(N/A)	0.1	0.0	1.10
White mulberry	0.2	14	24.7	24	38	(N/A)	0.1	0.1	38.13
Scarlet oak	0.1	7	13.7	13	21	(N/A)	0.1	0.0	20.64
American holly	0.2	17	28.2	28	44	(N/A)	0.1	0.1	44.11
Northern pin oak	0.3	24	47.4	46	71	(N/A)	0.1	0.1	70.84
Austrian pine	0.2	13	23.3	23	35	(N/A)	0.1	0.1	35.47
Total	303.1	23,002	41,879.7	41,042	64,044	(N/A)	100.0	100.0	45.88

Annual Stormwater Benefits of Public Trees

2/1/2021

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	387,005	10,488	(N/A)	10.3	11.6	72.83
Silver maple	671,576	18,200	(N/A)	9.8	20.1	132.84
Ash	248,053	6,722	(N/A)	5.8	7.4	82.99
Red maple	89,714	2,431	(N/A)	5.0	2.7	34.73
Northern hackberry	235,382	6,379	(N/A)	5.0	7.0	91.13
Honeylocust	239,754	6,497	(N/A)	4.9	7.2	95.55
Black maple	148,044	4,012	(N/A)	4.4	4.4	64.71
Apple	34,170	926	(N/A)	4.4	1.0	14.94
Bur oak	108,001	2,927	(N/A)	3.6	3.2	58.54
Northern red oak	72,236	1,958	(N/A)	3.0	2.2	46.61
Swamp white oak	45,287	1,227	(N/A)	2.9	1.4	30.68
Black walnut	161,975	4,390	(N/A)	2.8	4.8	112.55
Kentucky coffeetree	25,328	686	(N/A)	2.6	0.8	19.07
American elm	30,336	822	(N/A)	2.2	0.9	26.52
Sugar maple	69,435	1,882	(N/A)	2.1	2.1	64.89
Littleleaf linden	76,543	2,074	(N/A)	2.0	2.3	74.08
Elm	15,449	419	(N/A)	1.9	0.5	15.51
Broadleaf Deciduous Small	1,467	40	(N/A)	1.9	0.0	1.53
Eastern white pine	91,802	2,488	(N/A)	1.6	2.7	108.17
American basswood	42,304	1,146	(N/A)	1.6	1.3	52.11
River birch	26,575	720	(N/A)	1.4	0.8	37.90
Amur maple	10,392	282	(N/A)	1.1	0.3	17.60
Eastern redbud	2,562	69	(N/A)	1.1	0.1	4.63
White ash	24,916	675	(N/A)	1.1	0.7	45.02
Green ash	54,839	1,486	(N/A)	0.9	1.6	114.32
Eastern hophornbeam	5,272	143	(N/A)	0.9	0.2	10.99
Ginkgo	3,696	100	(N/A)	0.9	0.1	7.70
Black poplar	50,489	1,368	(N/A)	0.9	1.5	114.02
Spruce	24,487	664	(N/A)	0.8	0.7	60.33
Broadleaf Deciduous Medium	6,472	175	(N/A)	0.8	0.2	15.94
Oak	1,644	45	(N/A)	0.8	0.0	4.05
Basswood	24,911	675	(N/A)	0.7	0.7	67.51
American sycamore	53,475	1,449	(N/A)	0.6	1.6	161.02
Paper birch	11,764	319	(N/A)	0.6	0.4	35.42
Maple	10,012	271	(N/A)	0.6	0.3	33.92
Eastern red cedar	10,466	284	(N/A)	0.5	0.3	40.52
Japanese tree lilac	1,399	38	(N/A)	0.5	0.0	5.41
Catalpa	20,250	549	(N/A)	0.4	0.6	91.46
Cottonwood	32,154	871	(N/A)	0.4	1.0	145.23
Pear	5,014	136	(N/A)	0.4	0.2	22.65
Dogwood	351	10	(N/A)	0.4	0.0	1.58
Southern magnolia	479	13	(N/A)	0.4	0.0	2.60
Conifer Evergreen Large	11,009	298	(N/A)	0.4	0.3	59.67
Boxelder	7,685	208	(N/A)	0.4	0.2	41.65
Pin oak	22,619	613	(N/A)	0.4	0.7	122.59
Tulip tree	8,172	221	(N/A)	0.3	0.2	55.36
Birch	3,951	107	(N/A)	0.3	0.1	26.77
Scotch pine	12,774	346	(N/A)	0.3	0.4	86.54
White oak	2,644	72	(N/A)	0.3	0.1	17.92

Annual Stormwater Benefits of Public Trees

Table 2 Continued

2/1/2021

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Callery pear	8,847	240	(N/A)	0.3	0.3	59.94
Mountain ash	30	1	(N/A)	0.3	0.0	0.20
Broadleaf Deciduous Large	13,572	368	(N/A)	0.2	0.4	122.60
Quaking aspen	644	17	(N/A)	0.2	0.0	5.81
Blue spruce	8,161	221	(N/A)	0.2	0.2	73.73
Eastern cottonwood	14,478	392	(N/A)	0.1	0.4	196.17
American chestnut	36	1	(N/A)	0.1	0.0	0.48
Yellowwood	24	1	(N/A)	0.1	0.0	0.33
Mulberry	2,348	64	(N/A)	0.1	0.1	31.82
Juniper	3,269	89	(N/A)	0.1	0.1	44.30
Conifer Evergreen Small	49	1	(N/A)	0.1	0.0	0.66
Cherry plum	674	18	(N/A)	0.1	0.0	9.13
Ohio buckeye	1,172	32	(N/A)	0.1	0.0	15.88
Hickory	3,961	107	(N/A)	0.1	0.1	53.67
Black spruce	5,237	142	(N/A)	0.1	0.2	70.96
Black cherry	15	0	(N/A)	0.1	0.0	0.20
Broadleaf Evergreen Large	15,840	429	(N/A)	0.1	0.5	214.64
Chinese elm	8,704	236	(N/A)	0.1	0.3	117.95
Plum	7	0	(N/A)	0.1	0.0	0.20
Willow	12	0	(N/A)	0.1	0.0	0.33
White mulberry	667	18	(N/A)	0.1	0.0	18.06
Scarlet oak	608	16	(N/A)	0.1	0.0	16.47
American holly	2,052	56	(N/A)	0.1	0.1	55.60
Northern pin oak	3,764	102	(N/A)	0.1	0.1	102.01
Austrian pine	2,925	79	(N/A)	0.1	0.1	79.26
Citywide total	3,341,430	90,553	(N/A)	100.0	100.0	64.87

Annual Air Quality Benefits of Public Trees

2/1/2021

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								
Norway maple	82.9	14.3	40.2	3.7	446	184.9	26.7	25.4	172.7	1,144	-19.1	-72	531.7	1,519	(N/A)	10.3	10.55
Silver maple	116.4	19.7	57.0	5.2	627	218.6	32.0	30.5	209.4	1,367	-59.6	-224	629.2	1,770	(N/A)	9.8	12.92
Ash	54.3	9.4	26.2	2.4	292	114.1	16.5	15.7	106.5	706	-12.4	-47	332.7	952	(N/A)	5.8	11.75
Red maple	19.7	3.4	9.4	0.9	106	55.9	8.2	7.8	53.4	349	-6.8	-26	151.8	429	(N/A)	5.0	6.13
Northern hackberry	39.9	6.9	20.0	1.8	217	111.8	16.2	15.4	105.2	694	0.0	0	317.2	911	(N/A)	5.0	13.01
Honeylocust	47.5	7.8	21.5	2.2	250	93.9	13.8	13.1	90.2	588	-37.7	-141	252.3	697	(N/A)	4.9	10.25
Black maple	37.1	6.3	17.1	1.6	197	76.5	11.2	10.6	72.8	477	-12.2	-46	221.2	629	(N/A)	4.4	10.14
Apple	11.1	1.8	5.2	0.5	59	37.6	5.4	5.2	35.0	233	-0.1	0	101.8	291	(N/A)	4.4	4.70
Bur oak	12.7	2.0	6.2	0.6	68	49.7	7.3	6.9	47.4	310	0.0	0	132.7	378	(N/A)	3.6	7.56
Northern red oak	14.7	2.5	7.2	0.7	80	37.6	5.5	5.2	35.7	234	-20.8	-78	88.3	236	(N/A)	3.0	5.61
Swamp white oak	8.6	1.5	4.3	0.4	47	26.7	3.9	3.7	25.1	166	-2.1	-8	72.1	205	(N/A)	2.9	5.12
Black walnut	22.3	3.6	10.2	1.0	117	59.2	8.6	8.2	56.0	368	0.0	0	169.0	486	(N/A)	2.8	12.45
Kentucky coffeetree	3.1	0.5	1.5	0.1	17	10.7	1.6	1.5	10.1	66	0.0	0	29.1	83	(N/A)	2.6	2.31
American elm	2.4	0.4	1.5	0.1	14	18.6	2.7	2.6	18.0	117	0.0	0	46.3	130	(N/A)	2.2	4.21
Sugar maple	9.1	1.5	4.6	0.4	49	31.1	4.6	4.4	30.0	195	-7.2	-27	78.5	218	(N/A)	2.1	7.50
Littleleaf linden	13.8	2.4	6.7	0.6	74	32.8	4.7	4.5	30.8	203	-6.5	-25	89.8	253	(N/A)	2.0	9.04
Elm	1.3	0.2	0.7	0.1	7	8.9	1.3	1.2	8.5	55	0.0	0	22.2	63	(N/A)	1.9	2.33
Broadleaf Deciduous Small	0.2	0.0	0.1	0.0	1	2.3	0.3	0.3	2.0	14	0.0	0	5.3	15	(N/A)	1.9	0.57
Eastern white pine	11.2	2.2	8.9	1.4	73	18.7	2.7	2.6	18.0	117	-54.5	-204	11.4	-14	(N/A)	1.6	-0.61
American basswood	4.9	0.8	2.6	0.2	27	23.1	3.4	3.2	21.8	144	-4.5	-17	55.6	154	(N/A)	1.6	7.01
River birch	5.3	0.9	2.6	0.2	29	14.0	2.0	1.9	13.0	86	-1.3	-5	38.8	110	(N/A)	1.4	5.82
Amur maple	3.5	0.6	1.6	0.2	19	10.5	1.5	1.4	9.7	64	0.0	0	28.9	83	(N/A)	1.1	5.19
Eastern redbud	0.7	0.1	0.3	0.0	4	3.0	0.4	0.4	2.8	19	0.0	0	7.8	22	(N/A)	1.1	1.49
White ash	1.9	0.3	1.1	0.1	11	16.3	2.4	2.3	16.2	104	0.0	0	40.7	114	(N/A)	1.1	7.62
Green ash	8.7	1.4	4.0	0.4	46	21.4	3.1	3.0	20.3	133	0.0	0	62.3	179	(N/A)	0.9	13.78
Eastern hophornbeam	1.7	0.3	0.8	0.1	9	5.5	0.8	0.7	5.0	33	0.0	0	14.7	42	(N/A)	0.9	3.25
Ginkgo	0.5	0.1	0.3	0.0	3	4.0	0.6	0.6	3.9	25	-0.2	-1	9.8	27	(N/A)	0.9	2.10
Black poplar	7.6	1.2	3.5	0.3	40	17.8	2.6	2.5	16.9	111	0.0	0	52.4	151	(N/A)	0.9	12.59
Spruce	2.8	0.6	2.3	0.3	19	7.1	1.1	1.0	7.0	45	-11.5	-43	10.9	21	(N/A)	0.8	1.90
Broadleaf Deciduous Medium	0.9	0.2	0.5	0.0	5	4.9	0.7	0.7	4.6	31	-0.3	-1	12.3	35	(N/A)	0.8	3.15
Oak	0.1	0.0	0.1	0.0	1	1.2	0.2	0.2	1.2	8	0.0	0	2.9	8	(N/A)	0.8	0.75
Basswood	3.2	0.5	1.5	0.1	17	9.9	1.4	1.4	9.3	61	0.0	0	27.4	78	(N/A)	0.7	7.84
American sycamore	9.5	1.5	4.2	0.4	50	17.0	2.5	2.4	16.2	106	0.0	0	53.8	156	(N/A)	0.6	17.33
Paper birch	1.3	0.2	0.6	0.1	7	5.4	0.8	0.7	5.1	34	0.0	0	14.3	41	(N/A)	0.6	4.51
Maple	2.4	0.4	1.1	0.1	13	5.4	0.8	0.7	5.1	33	-0.8	-3	15.2	43	(N/A)	0.6	5.41
Eastern red cedar	2.1	0.4	1.7	0.3	14	3.5	0.5	0.5	3.2	22	-5.8	-22	6.4	14	(N/A)	0.5	1.96

Story City

Annual Air Quality Benefits of Public Trees — Table 3 Continued

2/1/2021

Species	Deposition (lb) O_3	Deposition (lb) NO_2	Deposition (lb) PM_{10}	Deposition (lb) SO_2	Total Depos. ($)	Avoided (lb) NO_2	Avoided (lb) PM_{10}	Avoided (lb) VOC	Avoided (lb) SO_2	Total Avoided ($)	BVOC Emissions (lb)	BVOC Emissions ($)	Total (lb)	Total ($) Standard Error	% of Total Trees	Avg. $/tree
Japanese tree lilac	0.2	0.0	0.1	0.0	1	2.0	0.3	0.3	1.8	12	0.0	0	4.8	14 (N/A)	0.5	1.94
Catalpa	2.5	0.4	1.2	0.1	13	8.8	1.3	1.2	8.4	55	0.0	0	23.8	68 (N/A)	0.4	11.33
Cottonwood	6.6	1.1	2.9	0.3	35	10.9	1.6	1.5	10.4	68	0.0	0	35.3	103 (N/A)	0.4	17.09
Pear	1.7	0.3	0.8	0.1	9	5.5	0.8	0.8	5.1	34	0.0	0	15.0	43 (N/A)	0.4	7.15
Dogwood	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)	0.4	0.61
Southern magnolia	0.0	0.0	0.0	0.0	0	0.6	0.1	0.1	0.5	4	-0.1	0	1.3	4 (N/A)	0.4	0.70
Conifer Evergreen Large	1.3	0.3	1.1	0.2	9	2.5	0.4	0.3	2.4	16	-6.3	-24	2.0	0 (N/A)	0.4	0.06
Boxelder	1.0	0.2	0.5	0.0	5	3.5	0.5	0.5	3.3	22	-0.4	-2	9.1	25 (N/A)	0.4	5.10
Pin oak	4.3	0.7	2.2	0.2	23	8.7	1.3	1.2	8.4	54	-7.8	-29	19.1	48 (N/A)	0.4	9.66
Tulip tree	1.0	0.2	0.5	0.0	5	3.8	0.6	0.5	3.7	24	0.0	0	10.2	29 (N/A)	0.3	7.28
Birch	0.9	0.2	0.4	0.0	5	1.8	0.3	0.2	1.7	11	-0.2	-1	5.3	15 (N/A)	0.3	3.77
Scotch pine	1.5	0.3	1.2	0.2	10	2.7	0.4	0.4	2.6	17	-7.3	-27	2.1	0 (N/A)	0.3	-0.06
White oak	0.3	0.0	0.1	0.0	1	1.3	0.2	0.2	1.2	8	0.0	0	3.4	10 (N/A)	0.3	2.40
Callery pear	1.7	0.3	0.8	0.1	9	5.0	0.7	0.7	4.6	31	-0.4	-2	13.5	38 (N/A)	0.3	9.60
Mountain ash	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	0	0.0	0	0.2	0 (N/A)	0.3	0.11
Broadleaf Deciduous Large	1.9	0.3	0.9	0.1	10	5.0	0.7	0.7	4.7	31	0.0	0	14.2	41 (N/A)	0.2	13.59
Quaking aspen	0.0	0.0	0.0	0.0	0	0.5	0.1	0.1	0.5	3	0.0	0	1.1	3 (N/A)	0.2	1.05
Blue spruce	1.4	0.3	1.1	0.2	9	2.3	0.3	0.3	2.1	14	-3.2	-12	4.9	11 (N/A)	0.2	3.81
Eastern cottonwood	3.2	0.5	1.4	0.1	16	4.6	0.7	0.6	4.4	29	0.0	0	15.5	45 (N/A)	0.1	22.55
American chestnut	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	0.08
Yellowwood	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	0.14
Mulberry	0.9	0.1	0.4	0.0	5	2.0	0.3	0.3	1.8	12	0.0	0	5.8	17 (N/A)	0.1	8.35
Juniper	0.7	0.1	0.5	0.1	4	1.1	0.2	0.1	1.0	7	-1.8	-7	2.0	4 (N/A)	0.1	2.19
Conifer Evergreen Small	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.1	0 (N/A)	0.1	0.09
Cherry plum	0.2	0.0	0.1	0.0	1	0.9	0.1	0.1	0.8	6	0.0	0	2.3	7 (N/A)	0.1	3.33
Ohio buckeye	0.1	0.0	0.1	0.0	1	1.0	0.1	0.1	1.0	6	0.0	0	2.5	7 (N/A)	0.1	3.47
Hickory	0.5	0.1	0.2	0.0	3	1.6	0.2	0.2	1.5	10	0.0	0	4.4	13 (N/A)	0.1	6.28
Black spruce	0.9	0.2	0.7	0.1	6	1.5	0.2	0.2	1.4	9	-2.0	-8	3.1	7 (N/A)	0.1	3.63
Black cherry	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	0.11
Broadleaf Evergreen Large	2.9	0.6	2.3	0.4	19	3.7	0.5	0.5	3.5	23	-7.4	-28	7.1	14 (N/A)	0.1	7.16
Chinese elm	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)	0.1	14.99
Plum	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
Willow	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	0.14
White mulberry	0.2	0.0	0.1	0.0	1	0.9	0.1	0.1	0.8	5	0.0	0	2.3	7 (N/A)	0.1	6.56
Scarlet oak	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
American holly	0.7	0.1	0.5	0.1	4	1.0	0.1	0.1	1.0	6	0.0	0	3.7	11 (N/A)	0.1	10.84

Story City

Annual Air Quality Benefits of Public Trees — Table 3 Continued

2/1/2021

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								
Northern pin oak	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
Austrian pine	0.5	0.1	0.4	0.1	3	0.8	0.1	0.1	0.8	5	-1.1	-4	1.8	4	(N/A)	0.1	4.16
Citywide total	605.3	103.0	299.4	29.0	3,276	1,450.0	210.9	201.0	1,373.2	9,024	-301.7	-1,132	3,970.0	11,168	(N/A)	100.0	8.00

Story City

Table 4: Annual Carbon Stored

Stored CO_2 Benefits of Public Trees

2/1/2021

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	1,366,476	10,249	(N/A)	10.3	11.5	71.17
Silver maple	2,581,873	19,364	(N/A)	9.8	21.7	141.34
Ash	896,272	6,722	(N/A)	5.8	7.5	82.99
Red maple	219,742	1,648	(N/A)	5.0	1.9	23.54
Northern hackberry	621,896	4,664	(N/A)	5.0	5.2	66.63
Honeylocust	614,836	4,611	(N/A)	4.9	5.2	67.81
Black maple	397,720	2,983	(N/A)	4.4	3.3	48.11
Apple	171,335	1,285	(N/A)	4.4	1.4	20.73
Bur oak	416,509	3,124	(N/A)	3.6	3.5	62.48
Northern red oak	303,095	2,273	(N/A)	3.0	2.6	54.12
Swamp white oak	143,356	1,075	(N/A)	2.9	1.2	26.88
Black walnut	726,396	5,448	(N/A)	2.8	6.1	139.69
Kentucky coffeetree	104,903	787	(N/A)	2.6	0.9	21.85
American elm	71,699	538	(N/A)	2.2	0.6	17.35
Sugar maple	263,456	1,976	(N/A)	2.1	2.2	68.14
Littleleaf linden	292,454	2,193	(N/A)	2.0	2.5	78.34
Elm	44,753	336	(N/A)	1.9	0.4	12.43
Broadleaf Deciduous	4,591	34	(N/A)	1.9	0.0	1.32
Eastern white pine	140,874	1,057	(N/A)	1.6	1.2	45.94
American basswood	179,188	1,344	(N/A)	1.6	1.5	61.09
River birch	88,174	661	(N/A)	1.4	0.7	34.81
Amur maple	54,804	411	(N/A)	1.1	0.5	25.69
Eastern redbud	11,837	89	(N/A)	1.1	0.1	5.92
White ash	56,737	426	(N/A)	1.1	0.5	28.37
Green ash	294,157	2,206	(N/A)	0.9	2.5	169.71
Eastern hophornbeam	26,728	200	(N/A)	0.9	0.2	15.42
Ginkgo	7,754	58	(N/A)	0.9	0.1	4.47
Black poplar	255,435	1,916	(N/A)	0.9	2.2	159.65
Spruce	27,685	208	(N/A)	0.8	0.2	18.88
Broadleaf Deciduous	15,981	120	(N/A)	0.8	0.1	10.90
Oak	3,793	28	(N/A)	0.8	0.0	2.59
Basswood	104,563	784	(N/A)	0.7	0.9	78.42
American sycamore	328,472	2,464	(N/A)	0.6	2.8	273.73
Paper birch	42,121	316	(N/A)	0.6	0.4	35.10
Maple	26,289	197	(N/A)	0.6	0.2	24.65
Eastern red cedar	6,890	52	(N/A)	0.5	0.1	7.38
Japanese tree lilac	4,731	35	(N/A)	0.5	0.0	5.07
Catalpa	80,605	605	(N/A)	0.4	0.7	100.76
Cottonwood	233,420	1,751	(N/A)	0.4	2.0	291.78
Pear	25,634	192	(N/A)	0.4	0.2	32.04
Dogwood	903	7	(N/A)	0.4	0.0	1.13
Southern magnolia	156	1	(N/A)	0.4	0.0	0.23
Conifer Evergreen La	16,191	121	(N/A)	0.4	0.1	24.29
Boxelder	32,218	242	(N/A)	0.4	0.3	48.33
Pin oak	116,066	870	(N/A)	0.4	1.0	174.10
Tulip tree	31,684	238	(N/A)	0.3	0.3	59.41
Birch	14,532	109	(N/A)	0.3	0.1	27.25
Scotch pine	18,580	139	(N/A)	0.3	0.2	34.84
White oak	8,494	64	(N/A)	0.3	0.1	15.93
Callery pear	27,460	206	(N/A)	0.3	0.2	51.49
Mountain ash	55	0	(N/A)	0.3	0.0	0.10
Broadleaf Deciduous	60,344	453	(N/A)	0.2	0.5	150.86
Quaking aspen	1,059	8	(N/A)	0.2	0.0	2.65
Blue spruce	12,448	93	(N/A)	0.2	0.1	31.12
Eastern cottonwood	111,964	840	(N/A)	0.1	0.9	419.86
American chestnut	24	0	(N/A)	0.1	0.0	0.09

The value of stored carbon dioxide is calculated as the total amount of carbon dioxide sequestered annually over the life of each tree, summed for the population. This value should not be added to the Replacement Value or double-counting of the carbon dioxide storage benefit will occur.

Stored CO_2 Benefits of Public Trees

Table 4 Continued

2/1/2021

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Yellowwood	34	0	(N/A)	0.1	0.0	0.13
Mulberry	13,485	101	(N/A)	0.1	0.1	50.57
Juniper	2,204	17	(N/A)	0.1	0.0	8.27
Conifer Evergreen Sm	5	0	(N/A)	0.1	0.0	0.02
Cherry plum	3,051	23	(N/A)	0.1	0.0	11.44
Ohio buckeye	2,201	17	(N/A)	0.1	0.0	8.26
Hickory	15,785	118	(N/A)	0.1	0.1	59.19
Black spruce	7,555	57	(N/A)	0.1	0.1	28.33
Black cherry	28	0	(N/A)	0.1	0.0	0.10
Broadleaf Evergreen I	30,478	229	(N/A)	0.1	0.3	114.29
Chinese elm	59,654	447	(N/A)	0.1	0.5	223.70
Plum	14	0	(N/A)	0.1	0.0	0.10
Willow	17	0	(N/A)	0.1	0.0	0.13
White mulberry	3,037	23	(N/A)	0.1	0.0	22.78
Scarlet oak	1,035	8	(N/A)	0.1	0.0	7.76
American holly	6,743	51	(N/A)	0.1	0.1	50.57
Northern pin oak	14,280	107	(N/A)	0.1	0.1	107.10
Austrian pine	4,893	37	(N/A)	0.1	0.0	36.70
Citywide total	11,873,915	89,054	(N/A)	100.0	100.0	63.79

The value of stored carbon dioxide is calculated as the total amount of carbon dioxide sequestered annually over the life of each tree, summed for the population. This value should not be added to the Replacement Value or double-counting of the carbon dioxide storage benefit will occur.

Story City

Table 5: Annual Carbon Sequestered

Annual CO_2 Benefits of Public Trees

2/1/2021

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
Norway maple	49,268	370	-6,562	-406	-52	63,836	479	106,136	796 (N/A)	10.3	10.1	5.53
Silver maple	192,692	1,445	-12,397	-512	-97	77,657	582	257,440	1,931 (N/A)	9.8	24.5	14.09
Ash	15,869	119	-4,302	-279	-34	39,390	295	50,677	380 (N/A)	5.8	4.8	4.69
Red maple	24,731	185	-1,055	-111	-9	19,776	148	43,341	325 (N/A)	5.0	4.1	4.64
Northern hackberry	29,898	224	-2,986	-224	-24	38,901	292	65,589	492 (N/A)	5.0	6.2	7.03
Honeylocust	31,602	237	-2,954	-156	-23	33,439	251	61,931	464 (N/A)	4.9	5.9	6.83
Black maple	13,888	104	-1,909	-149	-15	26,966	202	38,796	291 (N/A)	4.4	3.7	4.69
Apple	13,532	101	-823	-99	-7	12,963	97	25,573	192 (N/A)	4.4	2.4	3.09
Bur oak	24,019	180	-1,999	-109	-16	17,534	132	39,444	296 (N/A)	3.6	3.8	5.92
Northern red oak	11,291	85	-1,455	-98	-12	13,208	99	22,946	172 (N/A)	3.0	2.2	4.10
Swamp white oak	8,772	66	-694	-57	-6	9,293	70	17,314	130 (N/A)	2.9	1.6	3.25
Black walnut	30,332	227	-3,487	-135	-27	20,721	155	47,431	356 (N/A)	2.8	4.5	9.12
Kentucky coffeetree	5,159	39	-504	-30	-4	3,747	28	8,372	63 (N/A)	2.6	0.8	1.74
American elm	4,411	33	-347	-40	-3	6,652	50	10,677	80 (N/A)	2.2	1.0	2.58
Sugar maple	14,051	105	-1,266	-70	-10	11,094	83	23,809	179 (N/A)	2.1	2.3	6.16
Littleleaf linden	19,811	149	-1,404	-83	-11	11,373	85	29,696	223 (N/A)	2.0	2.8	7.95
Elm	4,315	32	-215	-23	-2	3,134	24	7,211	54 (N/A)	1.9	0.7	2.00
Broadleaf Deciduous Smal	764	6	-23	-11	0	746	6	1,477	11 (N/A)	1.9	0.1	0.43
Eastern white pine	2,445	18	-676	-86	-6	6,675	50	8,358	63 (N/A)	1.6	0.8	2.73
American basswood	11,873	89	-860	-53	-7	8,063	60	19,023	143 (N/A)	1.6	1.8	6.48
River birch	3,972	30	-430	-33	-3	4,799	36	8,308	62 (N/A)	1.4	0.8	3.28
Amur maple	3,305	25	-263	-30	-2	3,577	27	6,589	49 (N/A)	1.1	0.6	3.09
Eastern redbud	1,140	9	-57	-11	-1	1,024	8	2,096	16 (N/A)	1.1	0.2	1.05
White ash	7,173	54	-272	-28	-2	5,991	45	12,863	96 (N/A)	1.1	1.2	6.43
Green ash	8,985	67	-1,412	-49	-11	7,532	56	15,056	113 (N/A)	0.9	1.4	8.69
Eastern hophornbeam	2,214	17	-128	-16	-1	1,845	14	3,914	29 (N/A)	0.9	0.4	2.26
Ginkgo	702	5	-37	-13	0	1,431	11	2,082	16 (N/A)	0.9	0.2	1.20
Black poplar	8,182	61	-1,226	-42	-10	6,254	47	13,167	99 (N/A)	0.9	1.3	8.23
Spruce	1,368	10	-133	-26	-1	2,600	20	3,809	29 (N/A)	0.8	0.4	2.60
Broadleaf Deciduous Medi	2,011	15	-80	-11	-1	1,692	13	3,612	27 (N/A)	0.8	0.3	2.46
Oak	471	4	-19	-4	0	437	3	886	7 (N/A)	0.8	0.1	0.60
Basswood	5,019	38	-502	-23	-4	3,446	26	7,940	60 (N/A)	0.7	0.8	5.95
American sycamore	6,198	46	-1,577	-42	-12	6,003	45	10,583	79 (N/A)	0.6	1.0	8.82

Annual CO_2 Benefits of Public Trees

Table 5 Continued

2/1/2021

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
Paper birch	2,801	21	-202	-13	-2	1,881	14	4,467	34 (N/A)	0.6	0.4	3.72
Maple	375	3	-126	-12	-1	1,876	14	2,113	16 (N/A)	0.6	0.2	1.98
Eastern red cedar	126	1	-33	-13	0	1,203	9	1,283	10 (N/A)	0.5	0.1	1.37
Japanese tree lilac	616	5	-23	-7	0	664	5	1,250	9 (N/A)	0.5	0.1	1.34
Catalpa	4,421	33	-387	-19	-3	3,093	23	7,108	53 (N/A)	0.4	0.7	8.88
Cottonwood	2,784	21	-1,120	-27	-9	3,852	29	5,488	41 (N/A)	0.4	0.5	6.86
Pear	2,027	15	-123	-13	-1	1,904	14	3,795	28 (N/A)	0.4	0.4	4.74
Dogwood	198	1	-4	-3	0	192	1	382	3 (N/A)	0.4	0.0	0.48
Southern magnolia	36	0	-1	-2	0	194	1	228	2 (N/A)	0.4	0.0	0.34
Conifer Evergreen Large	649	5	-78	-10	-1	882	7	1,444	11 (N/A)	0.4	0.1	2.17
Boxelder	2,526	19	-155	-9	-1	1,228	9	3,590	27 (N/A)	0.4	0.3	5.39
Pin oak	9,972	75	-557	-20	-4	3,094	23	12,489	94 (N/A)	0.4	1.2	18.73
Tulip tree	1,823	14	-152	-9	-1	1,360	10	3,022	23 (N/A)	0.3	0.3	5.67
Birch	106	1	-71	-5	-1	617	5	648	5 (N/A)	0.3	0.1	1.22
Scotch pine	752	6	-89	-11	-1	963	7	1,615	12 (N/A)	0.3	0.2	3.03
White oak	667	5	-41	-3	0	455	3	1,078	8 (N/A)	0.3	0.1	2.02
Callery pear	1,796	13	-132	-10	-1	1,715	13	3,369	25 (N/A)	0.3	0.3	6.32
Mountain ash	35	0	0	-1	0	22	0	56	0 (N/A)	0.3	0.0	0.10
Broadleaf Deciduous Large	2,579	19	-290	-11	-2	1,741	13	4,019	30 (N/A)	0.2	0.4	10.05
Quaking aspen	214	2	-5	-2	0	168	1	375	3 (N/A)	0.2	0.0	0.94
Blue spruce	336	3	-60	-10	-1	792	6	1,058	8 (N/A)	0.2	0.1	2.65
Eastern cottonwood	958	7	-537	-12	-4	1,626	12	2,034	15 (N/A)	0.1	0.2	7.63
American chestnut	5	0	0	0	0	9	0	13	0 (N/A)	0.1	0.0	0.05
Yellowwood	11	0	0	0	0	14	0	25	0 (N/A)	0.1	0.0	0.09
Mulberry	957	7	-65	-5	-1	670	5	1,556	12 (N/A)	0.1	0.1	5.84
Juniper	0	0	-11	-4	0	374	3	359	3 (N/A)	0.1	0.0	1.35
Conifer Evergreen Small	1	0	0	0	0	12	0	13	0 (N/A)	0.1	0.0	0.05
Cherry plum	276	2	-15	-2	0	314	2	574	4 (N/A)	0.1	0.1	2.15
Ohio buckeye	448	3	-11	-2	0	352	3	787	6 (N/A)	0.1	0.1	2.95
Hickory	859	6	-76	-4	-1	557	4	1,337	10 (N/A)	0.1	0.1	5.01
Black spruce	147	1	-36	-6	0	512	4	617	5 (N/A)	0.1	0.1	2.31
Black cherry	17	0	0	0	0	11	0	28	0 (N/A)	0.1	0.0	0.10
Broadleaf Evergreen Large	1,828	14	-146	-7	-1	1,321	10	2,995	22 (N/A)	0.1	0.3	11.23
Chinese elm	924	7	-286	-8	-2	1,206	9	1,836	14 (N/A)	0.1	0.2	6.88
Plum	9	0	0	0	0	6	0	14	0 (N/A)	0.1	0.0	0.10

Annual CO_2 Benefits of Public Trees

Table 5 Continued

2/1/2021

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
Willow	5	0	0	0	0	7	0	12	0 (N/A)	0.1	0.0	0.09
White mulberry	268	2	-15	-2	0	308	2	560	4 (N/A)	0.1	0.1	4.20
Scarlet oak	209	2	-5	-1	0	159	1	361	3 (N/A)	0.1	0.0	2.71
American holly	325	2	-32	-2	0	365	3	656	5 (N/A)	0.1	0.1	4.92
Northern pin oak	0	0	-69	-4	-1	539	4	466	3 (N/A)	0.1	0.0	3.49
Austrian pine	0	0	-23	-4	0	280	2	253	2 (N/A)	0.1	0.0	1.90
Citywide total	601,546	4,512	-57,032	-3,330	-453	508,336	3,813	1,049,519	7,871 (N/A)	100.0	100.0	5.64

Annual Aesthetic/Other Benefits of Public Trees

2/1/2021

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	4,532	(N/A)	10.3	7.6	31.47
Silver maple	15,004	(N/A)	9.8	25.2	109.52
Ash	1,494	(N/A)	5.8	2.5	18.44
Red maple	3,318	(N/A)	5.0	5.6	47.40
Northern hackberry	3,881	(N/A)	5.0	6.5	55.44
Honeylocust	7,658	(N/A)	4.9	12.9	112.61
Black maple	1,790	(N/A)	4.4	3.0	28.87
Apple	790	(N/A)	4.4	1.3	12.74
Bur oak	2,148	(N/A)	3.6	3.6	42.97
Northern red oak	870	(N/A)	3.0	1.5	20.72
Swamp white oak	897	(N/A)	2.9	1.5	22.41
Black walnut	2,251	(N/A)	2.8	3.8	57.73
Kentucky coffeetree	592	(N/A)	2.6	1.0	16.44
American elm	697	(N/A)	2.2	1.2	22.49
Sugar maple	1,478	(N/A)	2.1	2.5	50.97
Littleleaf linden	1,964	(N/A)	2.0	3.3	70.14
Elm	534	(N/A)	1.9	0.9	19.78
Broadleaf Deciduous Small	34	(N/A)	1.9	0.1	1.32
Eastern white pine	396	(N/A)	1.6	0.7	17.21
American basswood	935	(N/A)	1.6	1.6	42.52
River birch	405	(N/A)	1.4	0.7	21.29
Amur maple	194	(N/A)	1.1	0.3	12.13
Eastern redbud	63	(N/A)	1.1	0.1	4.22
White ash	940	(N/A)	1.1	1.6	62.69
Green ash	694	(N/A)	0.9	1.2	53.40
Eastern hophornbeam	129	(N/A)	0.9	0.2	9.95
Ginkgo	72	(N/A)	0.9	0.1	5.53
Black poplar	620	(N/A)	0.9	1.0	51.63
Spruce	332	(N/A)	0.8	0.6	30.17
Broadleaf Deciduous Medium	228	(N/A)	0.8	0.4	20.73
Oak	98	(N/A)	0.8	0.2	8.95
Basswood	415	(N/A)	0.7	0.7	41.48
American sycamore	421	(N/A)	0.6	0.7	46.83
Paper birch	267	(N/A)	0.6	0.4	29.67
Maple	67	(N/A)	0.6	0.1	8.38
Eastern red cedar	49	(N/A)	0.5	0.1	6.96
Japanese tree lilac	34	(N/A)	0.5	0.1	4.87
Catalpa	355	(N/A)	0.4	0.6	59.18
Cottonwood	201	(N/A)	0.4	0.3	33.42
Pear	120	(N/A)	0.4	0.2	19.92
Dogwood	10	(N/A)	0.4	0.0	1.72
Southern magnolia	19	(N/A)	0.4	0.0	3.79
Conifer Evergreen Large	97	(N/A)	0.4	0.2	19.48
Boxelder	201	(N/A)	0.4	0.3	40.22
Pin oak	724	(N/A)	0.4	1.2	144.87
Tulip tree	170	(N/A)	0.3	0.3	42.39
Birch	18	(N/A)	0.3	0.0	4.59
Scotch pine	115	(N/A)	0.3	0.2	28.75

Annual Aesthetic/Other Benefits of Public Trees

Table 6 Continued

2/1/2021

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
White oak	73	(N/A)	0.3	0.1	18.37
Callery pear	168	(N/A)	0.3	0.3	42.08
Mountain ash	0	(N/A)	0.3	0.0	0.03
Broadleaf Deciduous Large	191	(N/A)	0.2	0.3	63.63
Quaking aspen	39	(N/A)	0.2	0.1	13.03
Blue spruce	33	(N/A)	0.2	0.1	10.93
Eastern cottonwood	57	(N/A)	0.1	0.1	28.57
American chestnut	11	(N/A)	0.1	0.0	5.26
Yellowwood	5	(N/A)	0.1	0.0	2.74
Mulberry	58	(N/A)	0.1	0.1	28.80
Juniper	0	(N/A)	0.1	0.0	0.00
Conifer Evergreen Small	9	(N/A)	0.1	0.0	4.27
Cherry plum	16	(N/A)	0.1	0.0	7.76
Ohio buckeye	52	(N/A)	0.1	0.1	26.22
Hickory	71	(N/A)	0.1	0.1	35.43
Black spruce	20	(N/A)	0.1	0.0	9.99
Black cherry	0	(N/A)	0.1	0.0	0.03
Broadleaf Evergreen Large	263	(N/A)	0.1	0.4	131.54
Chinese elm	74	(N/A)	0.1	0.1	37.21
Plum	0	(N/A)	0.1	0.0	0.03
Willow	3	(N/A)	0.1	0.0	2.74
White mulberry	15	(N/A)	0.1	0.0	15.48
Scarlet oak	29	(N/A)	0.1	0.0	28.56
American holly	27	(N/A)	0.1	0.0	27.26
Northern pin oak	0	(N/A)	0.1	0.0	0.00
Austrian pine	0	(N/A)	0.1	0.0	0.00
Citywide total	59,537	(N/A)	100.0	100.0	42.65

Story City

Table 7: Summary of Benefits in Dollars

Total Annual Benefits, Net Benefits, and Costs for Public Trees

2/1/2021

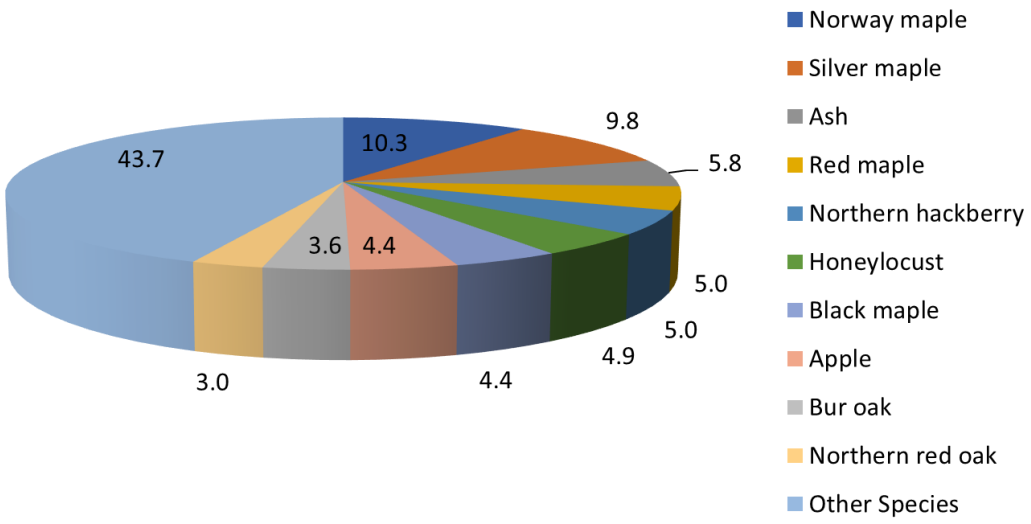
Benefits	Total ($)	Standard Error	$/tree	Standard Error	$/capita	Standard Error
Energy	64,044	(N/A)	45.88	(N/A)	0.00	(N/A)
CO2	7,871	(N/A)	5.64	(N/A)	0.00	(N/A)
Air Quality	11,168	(N/A)	8.00	(N/A)	0.00	(N/A)
Stormwater	90,553	(N/A)	64.87	(N/A)	0.00	(N/A)
Aesthetic/Other	59,537	(N/A)	42.65	(N/A)	0.00	(N/A)
Total Benefits	233,173	(N/A)	167.03	(N/A)	0.00	(N/A)
Costs						
Planting	0		0.00		0.00	
Contract Pruning	0		0.00		0.00	
Pest Management	0		0.00		0.00	
Irrigation	0		0.00		0.00	
Removal	0		0.00		0.00	
Administration	0		0.00		0.00	
Inspection/Service	0		0.00		0.00	
Infrastructure Repairs	0		0.00		0.00	
Litter Clean-up	0		0.00		0.00	
Liability/Claims	0		0.00		0.00	
Other Costs	0		0.00		0.00	
Total Costs	0		0.00		0.00	
Net Benefits	233,173	(N/A)	167.03	(N/A)	0.00	(N/A)
Benefit-cost ratio	0.00	(N/A)				

Story City

Species Distribution of Public Trees

2/1/2021

Figure 1: Species Distribution



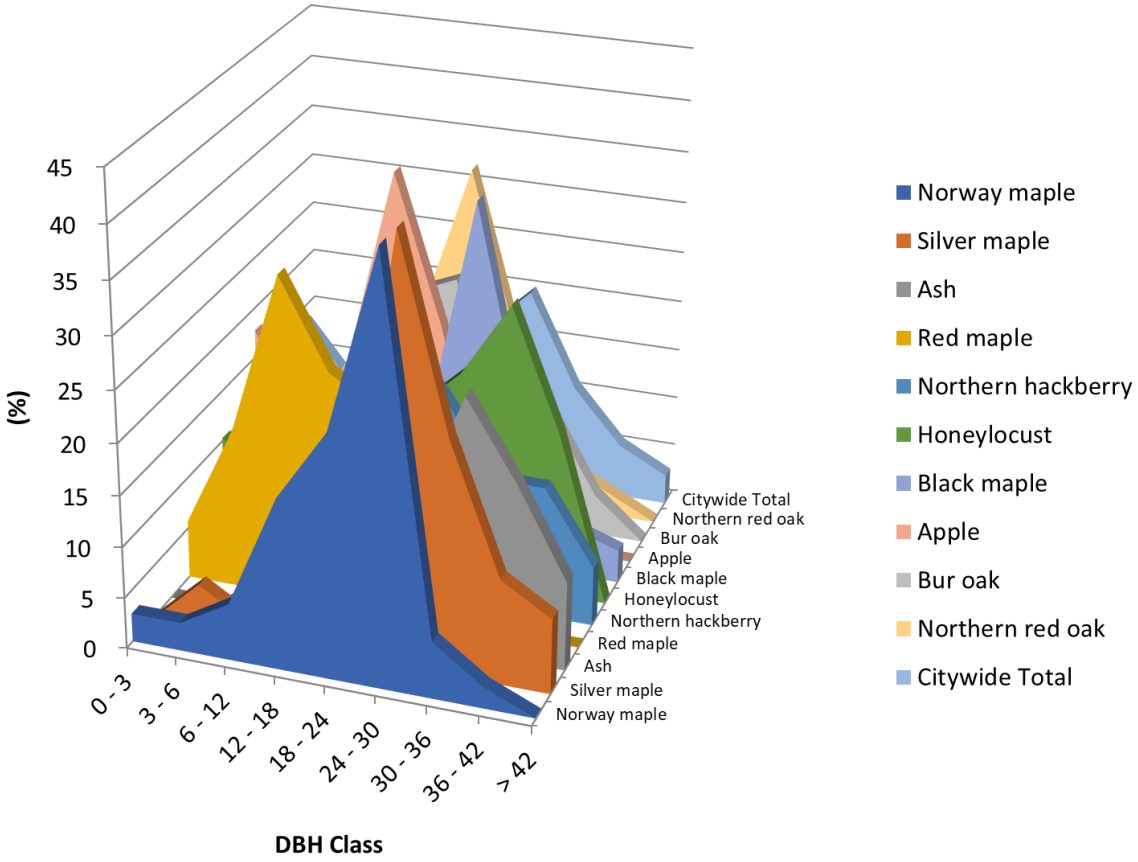
Species	Percent
Norway maple	10.3
Silver maple	9.8
Ash	5.8
Red maple	5.0
Northern hackberry	5.0
Honeylocust	4.9
Black maple	4.4
Apple	4.4
Bur oak	3.6
Northern red oak	3.0
Other Species	43.7
Total	100.0

Story City

Figure 2: Relative Age Class

Relative Age Distribution of Top 10 Public Tree Species for All Zones (%)

2/1/2021



	DBH class (in)								
Species	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	> 42
Norway maple	2.78	2.78	5.56	16.67	23.61	40.97	5.56	2.08	0.00
Silver maple	0.00	4.38	1.46	2.19	10.95	40.88	22.63	10.22	7.30
Ash	0.00	0.00	3.70	16.05	16.05	13.58	24.69	17.28	8.64
Red maple	5.71	15.71	31.43	22.86	20.00	2.86	1.43	0.00	0.00
Northern hackberry	7.14	2.86	2.86	10.00	25.71	20.00	12.86	12.86	5.71
Honeylocust	10.29	7.35	1.47	0.00	16.18	20.59	27.94	16.18	0.00
Black maple	1.61	1.61	6.45	19.35	12.90	35.48	14.52	4.84	3.23
Apple	17.74	8.06	16.13	35.48	20.97	1.61	0.00	0.00	0.00
Bur oak	12.00	6.00	16.00	22.00	24.00	4.00	12.00	4.00	0.00
Northern red oak	0.00	9.52	14.29	19.05	33.33	16.67	4.76	2.38	0.00
Citywide Total	13.47	7.81	9.10	15.11	15.54	19.99	10.67	5.37	2.94

Figure 3: Foliage Condition

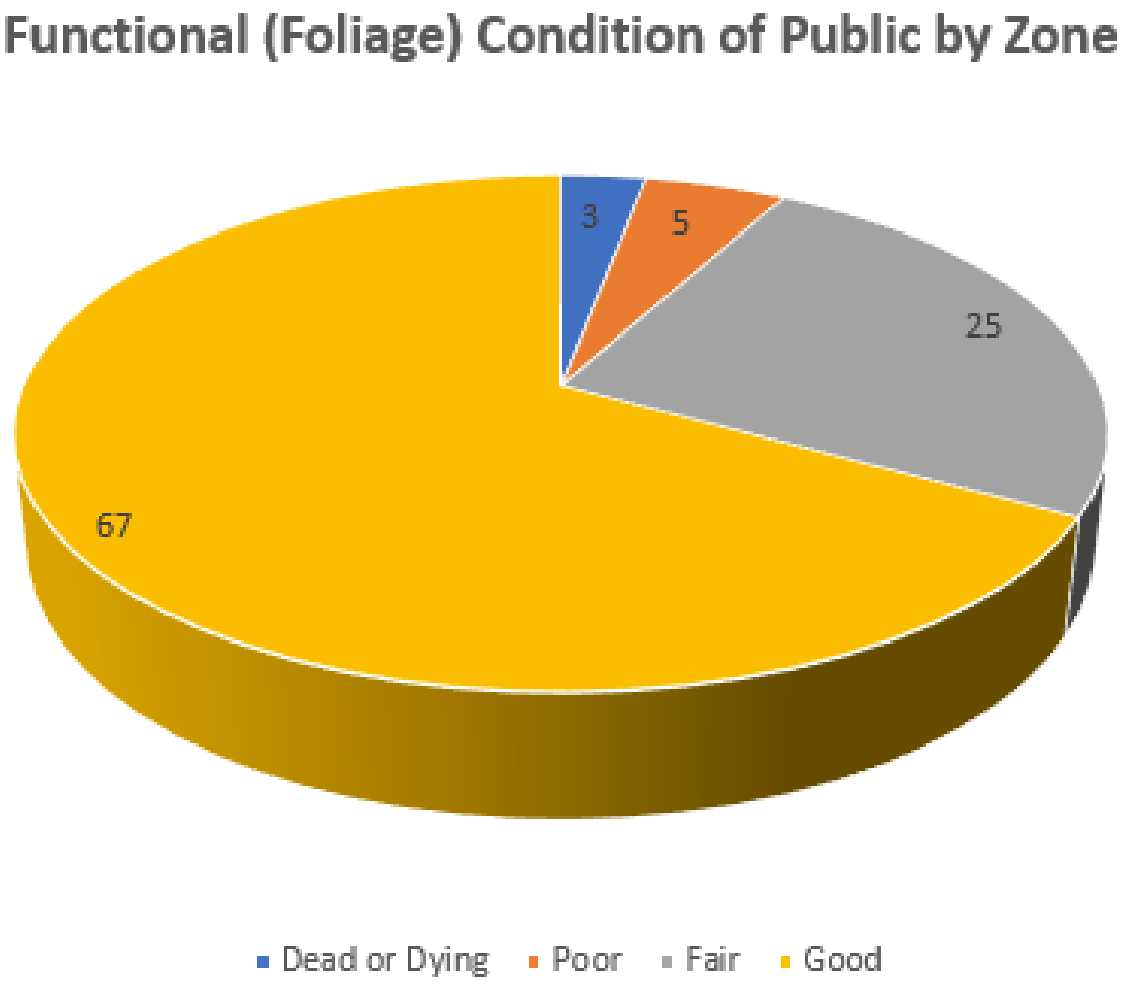
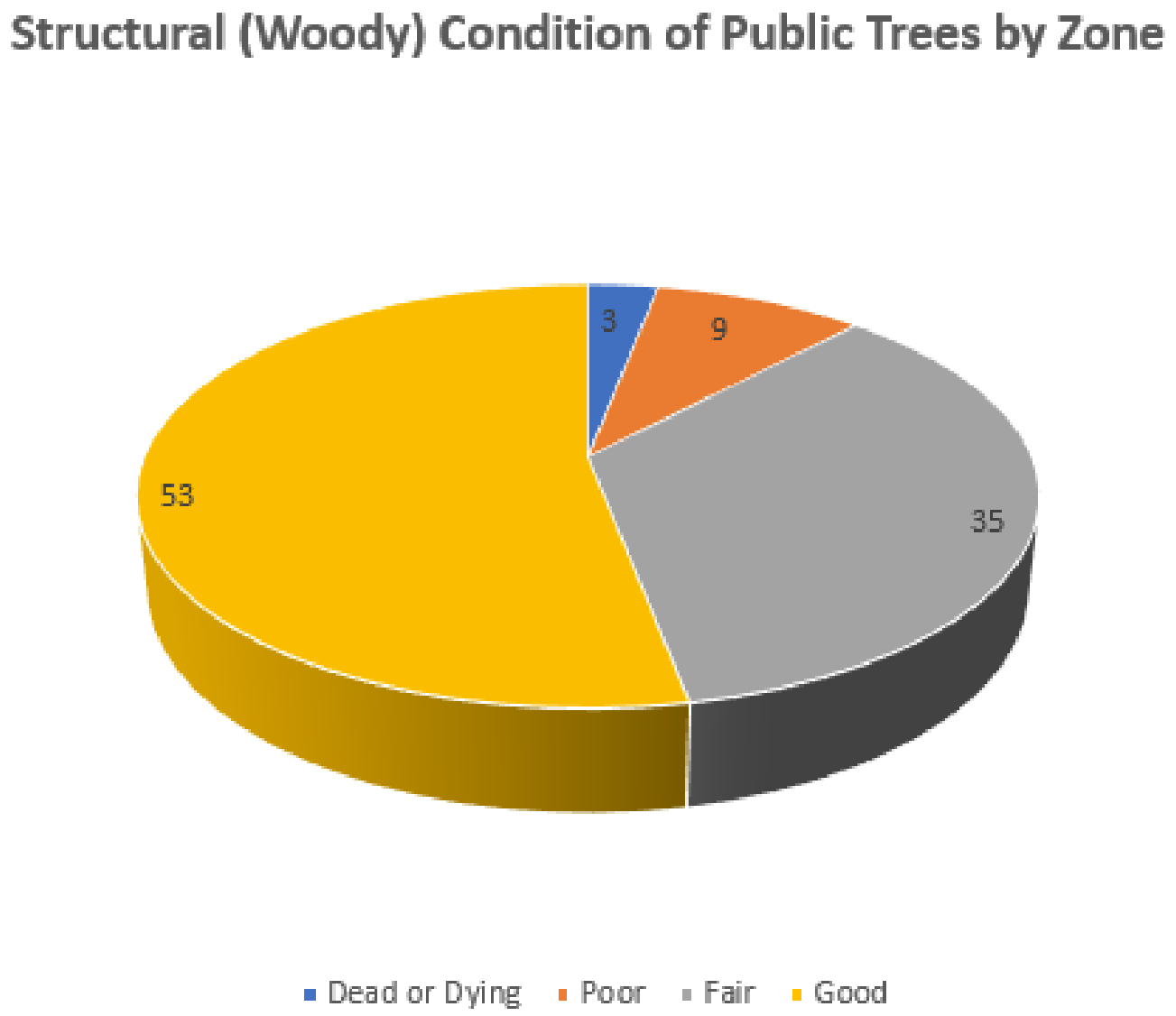


Figure 4: Wood Condition

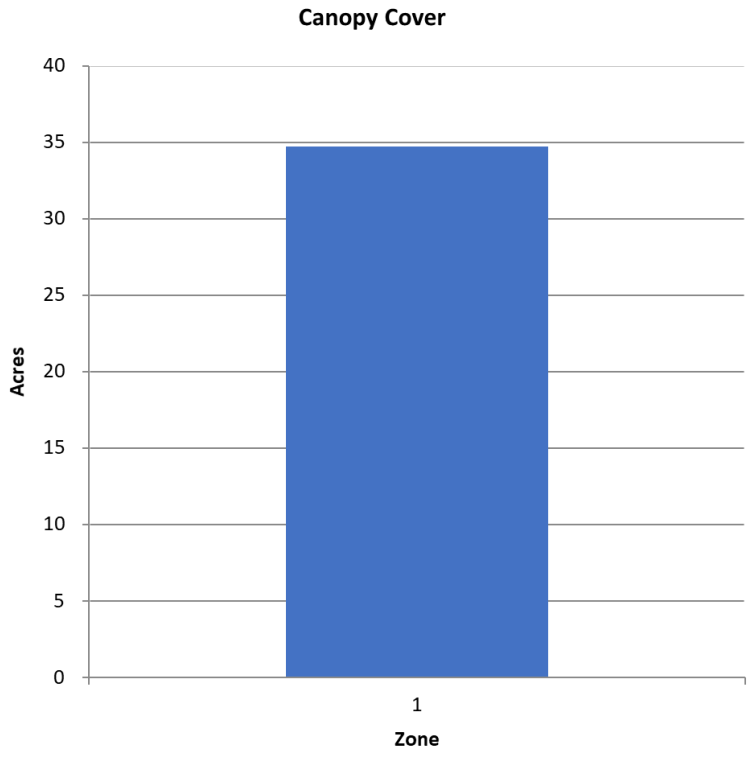


Story City

Canopy Cover of Public Trees (Acres)

2/1/2021

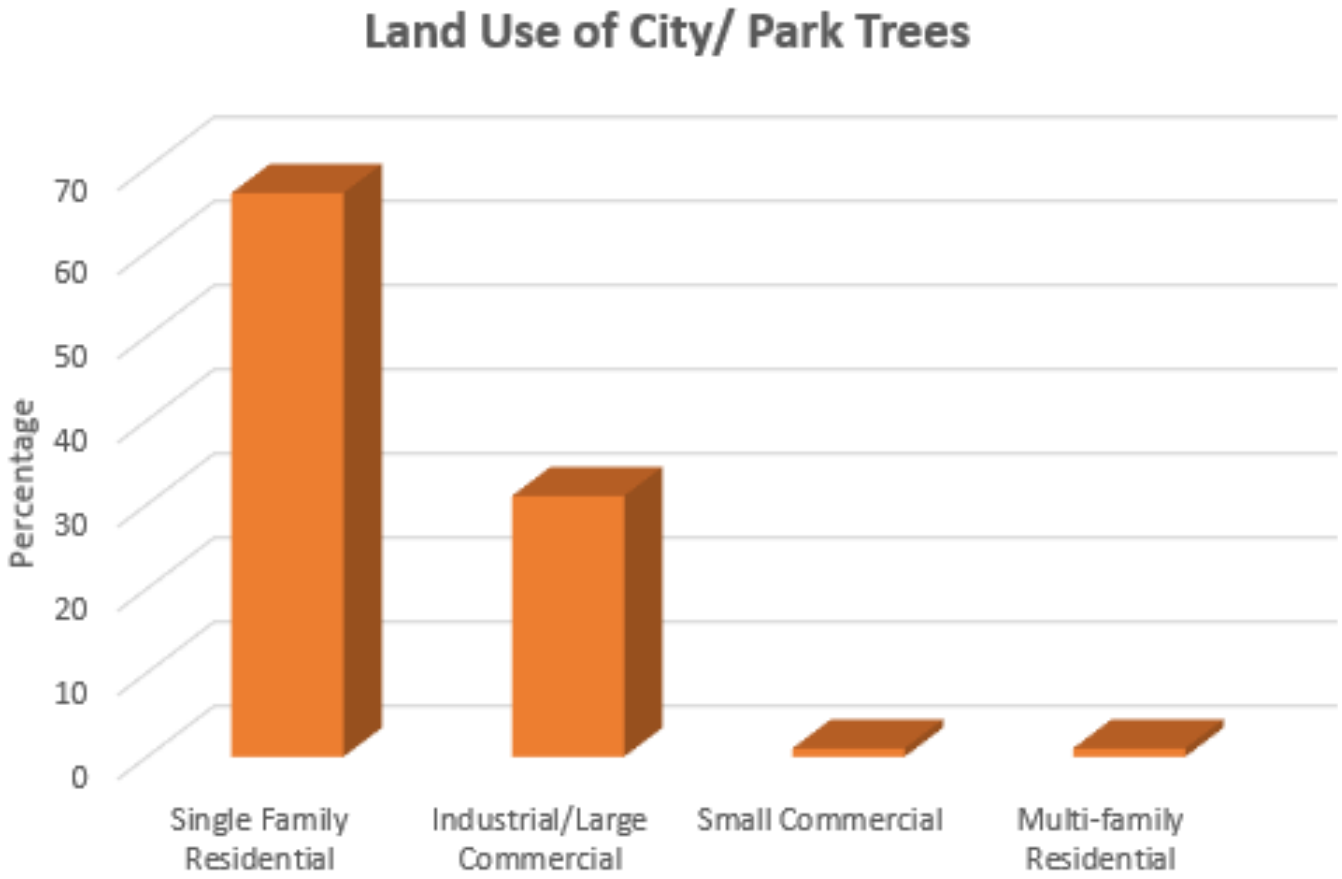
Figure 5: Canopy Cover in Acres



Zone	Acres	% of Total Canopy Cover
1	35	100.0
Citywide total	35	100.0

	Total Land Area	Total Street and Sidewalk Area	Total Canopy Cover	Canopy Cover as % of Total Land Area	Canopy Cover as % of Total Streets and Sidewalks
Citywide Total	0	0	35	0.00	0.00

Figure 6: Land Use of City/Park Trees



APPENDIX B: ArcGIS MAPPING

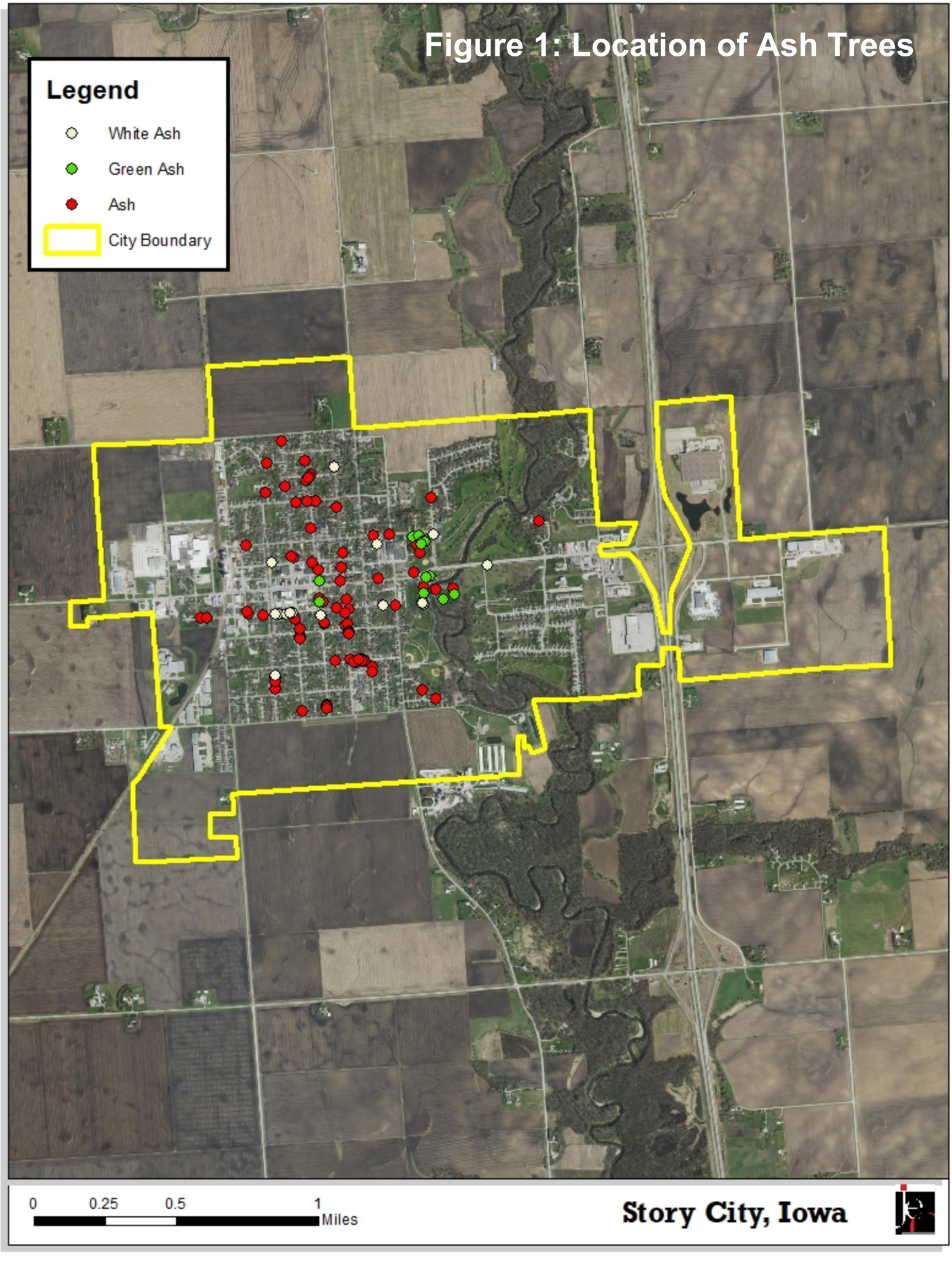


Figure 1: Location of Ash Trees
Legend
White Ash
Green Ash
Ash
City Boundary
0
0.25
0.5
1
Miles
Story City, Iowa

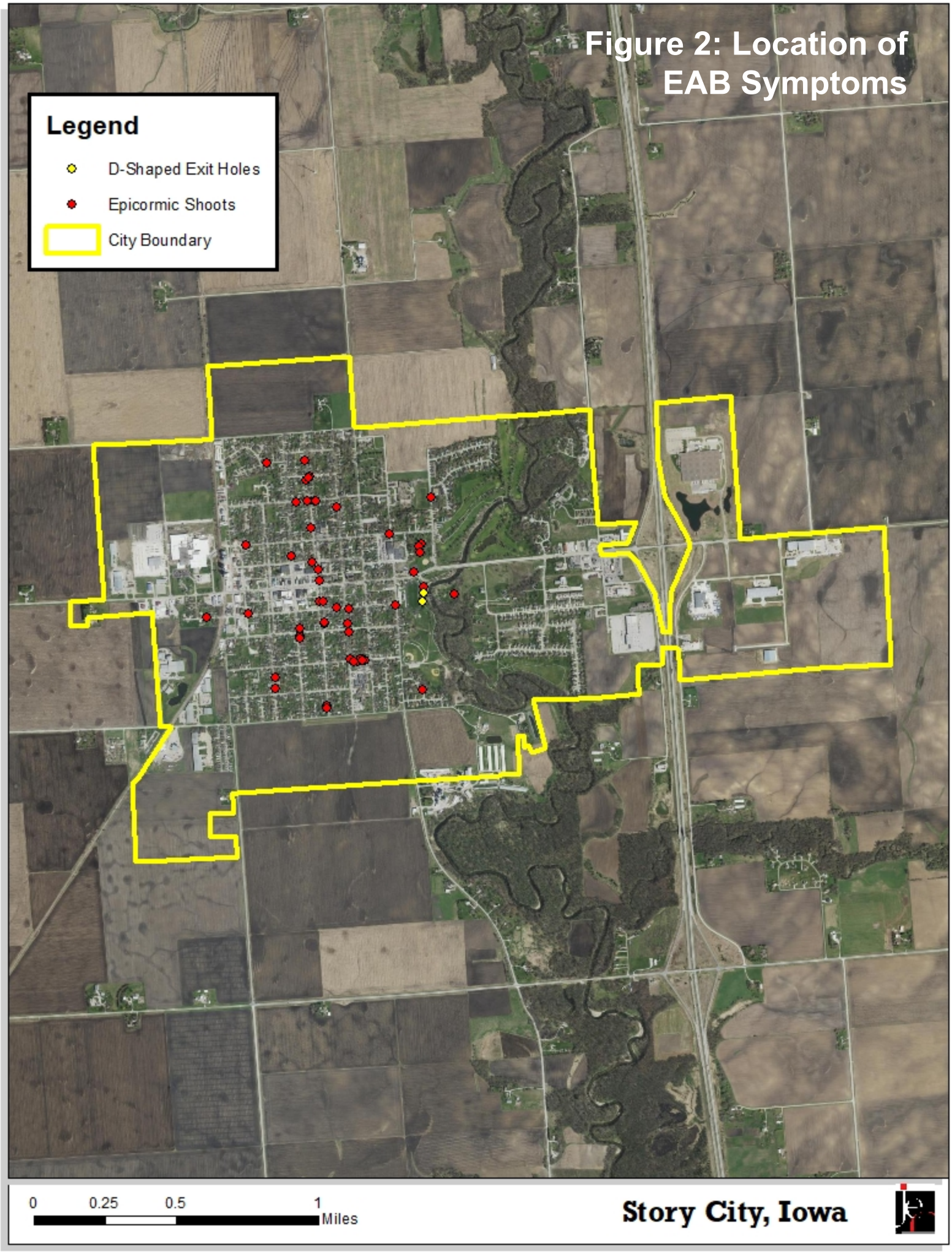


Figure 2: Location of EAB Symptoms
Legend
D-Shaped Exit Holes
Epicormic Shoots
City Boundary
0
0.25
0.5
1
Miles
Story City, Iowa

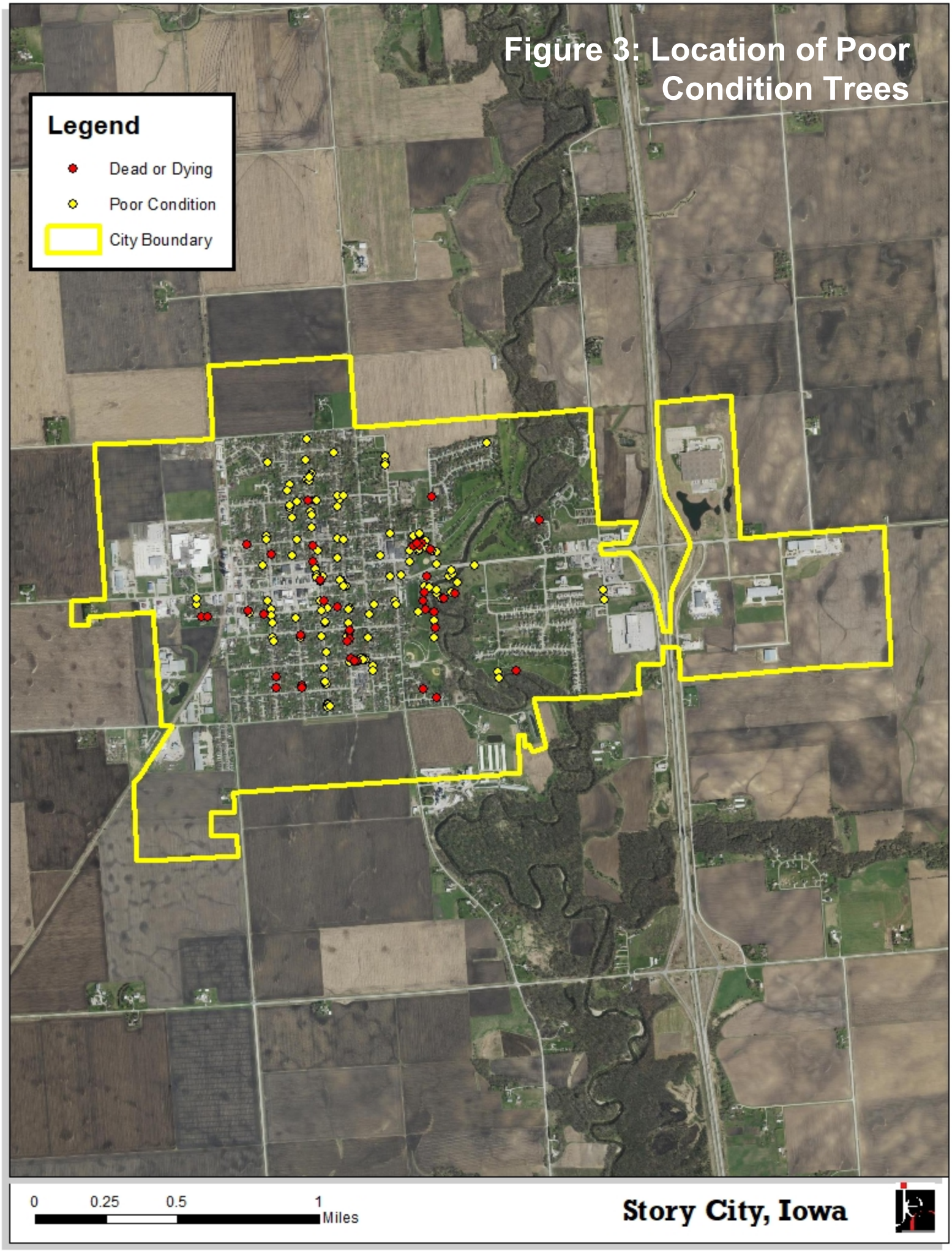
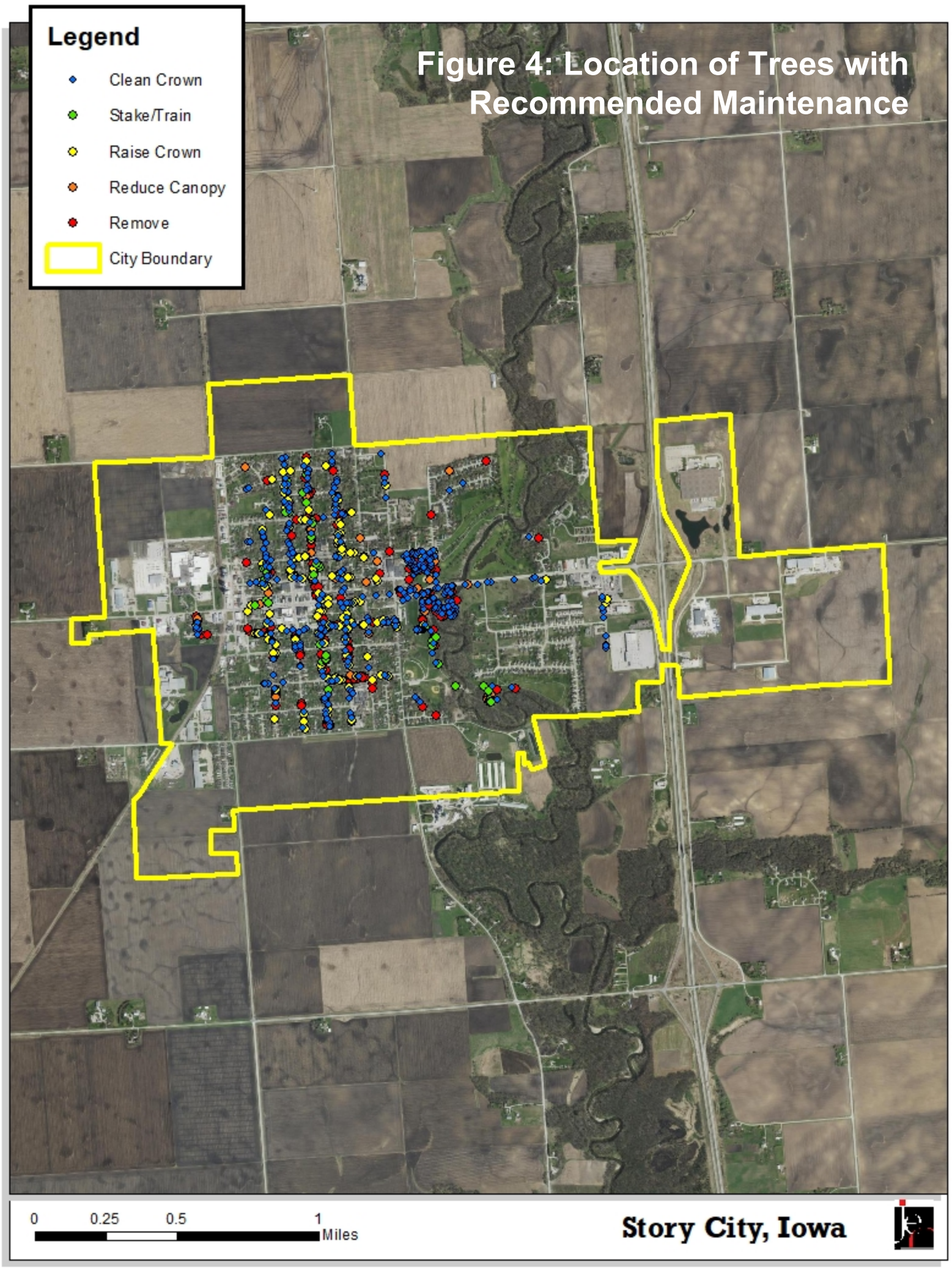


Figure 3: Location of Poor Condition Trees
Legend
Dead or Dying
Poor Condition
City Boundary
0
0.25
0.5
1
Miles
Story City, Iowa


Legend
Clean Crown
Stake/Train
Raise Crown
Reduce Canopy
Remove
City Boundary
Figure 4: Location of Trees with Recommended Maintenance
0
0.25
0.5
1
Miles
Story City, Iowa

APPENDIX C: STORY CITY TREE ORDINANCES

151.01 PURPOSE.

It is the purpose of this chapter to provide for the placement of trees and regulate the height and spacing of trees in public ways; and to require permits therefor.

151.02 DEFINITIONS.

For use in this chapter the following terms are defined:

1. “Large tree” means any tree with a mature height of more than 25 feet.
2. “Park trees” are trees, shrubs and other woody vegetation in public parks having individual names and all areas owned by the City or to which the public has free access as a park.
3. “Parking” means that part of the street, avenue or way in the City not covered by sidewalk and lying between the lot line and the curb line or, on unpaved streets, that part of the street, avenue or way lying between the lot line and that portion of the street usually traveled by vehicular traffic.
4. “Shrub” means any multiple-stemmed woody plant.
5. “Small tree” means any tree with a mature height of 15 to 25 feet.
6. “Street trees” are trees on land lying between property lines on either side of all streets, avenues or ways within the City.
7. “Tree” means a single-stemmed woody plant with a mature height of a minimum of 15 feet.
8. “Tree Board designee” means the Parks and Recreation Superintendent or such other person as may be designated by the Tree Board.

151.03 STREET TREE SPECIES.

The Tree Board shall provide a listing of trees that are recommended for planting as street and park trees. The Board shall also provide a listing of trees that are not allowed to be planted as street trees. These lists of trees shall be updated annually by the Tree Board. These lists shall be provided with a planting permit application from the Tree Board.

151.04 SPACING.

Small trees shall not be planted closer than 20 feet from one another or closer than 30 feet from a large tree. Large trees shall not be planted closer than 30 feet from one another.

151.05 DISTANCE FROM CURB AND SIDEWALK.

No trees shall be planted on parkings that are less than 8 feet wide. Small trees shall be planted no closer than 4 feet to the curb or curb line and no closer than 4 feet to the sidewalk or property line. No large tree shall be planted on parkings that are less than 10 feet wide. Large trees shall be planted no closer than 5 feet to the curb or curb line and no closer than five feet to

the sidewalk or property line. Whenever possible trees shall be centered between the curb or curb line and the sidewalk or property line.

151.06 DISTANCE FROM STREET CORNERS, ALLEYS AND FIREPLUGS.

No street trees shall be planted closer than 25 feet to the intersecting lot lines of a corner lot. No street trees shall be planted within 10 feet of any alley or drive. No street trees shall be planted closer than 10 feet to any fireplug or utility pole.

151.07 VISIBILITY AT INTERSECTIONS.

On a corner lot, nothing shall be erected, placed, planted or allowed to grow in such a manner as to materially impede vision between a height of 2½ and 10 feet above the centerline grades of the intersecting streets in the area bounded by the street lines of such corner lots and a line joining points along said street lines 25 feet from the point of intersection of the right-of-way lines.

151.08 VARIANCES.

Any spacing or distance requirements provided by Sections 151.05, 151.06 and 151.07 of this chapter may be waived and a variance granted by the City Tree Board.

151.09 UTILITIES.

No street trees other than small trees may be planted under or within 10 lateral feet of any overhead utility wire, or over or within 5 lateral feet of any underground water line or sewer line. The electric utility shall be given permission to trim trees that are growing into the conductors (wires) of the overhead power lines energized above 600 volts to a sufficient distance from the conductors to provide reliable, uninterrupted service. This shall include private trees that are overhanging the public rights-of-way.

151.10 PERMITS FOR PLANTING OR REMOVAL REQUIRED.

No street tree shall be planted unless a permit is obtained. No living tree shall be destroyed or removed from the parking unless a permit is obtained. Permits shall be obtained from the Board at no charge.

151.11 ARBORIST'S LICENSE AND BOND.

It is unlawful for any person or firm to engage in the business or occupation of pruning, treating or removing street or park trees within the City without first applying for and procuring a license. The annual license fee shall be such amount established for all such licenses by the Council; provided, however, no license shall be required of any public service company or City employees doing such work in the pursuit of their public service endeavors. Before any license shall be issued, each applicant shall first file evidence of possession of general liability insurance in the minimum amounts of $250,000.00 for bodily injury and $250,000.00 property damage indemnifying the City or any person injured or damaged, resulting from the pursuit of such endeavors as herein described.

151.12 PUBLIC TREE CARE.

The City shall have the right to plant, prune, maintain and remove trees, plants and shrubs within the lines of all streets, alleys, avenues, lanes, squares and public grounds, as may be necessary to insure public safety or to preserve or enhance the symmetry and beauty of such public grounds. The City, upon recommendation of the City Tree Board, may remove or leave as is any tree or part thereof which is in an unsafe condition or which by reason of its nature is injurious to sewers, electric power lines, gas lines, water lines or public improvements, or is infected with or affected by any injurious fungus, insect or other pest. This section does not prohibit the planting of street trees by adjacent property owners, providing that the selection and location of such trees is in accordance with Section 151.03 through 151.09 of this chapter.

151.13 PRIVATE TREE CARE.

Every owner or occupant of real property bordering upon any street, alley, or public space shall keep the branches of any tree overhanging any street or right-of-way within the City pruned so that such branches shall not obstruct the light from any street lamp or obstruct the view of any street intersection. There shall be a clear space of 15 feet above the surface of any right-of-way grounds and 8 feet above any sidewalk. Said owner or occupant, upon written notification by the Tree Board to abate a nuisance, shall remove all dead, diseased, and dangerous trees and broken or decayed limbs, which constitute a menace to the safety of the public. The City Tree Board or its official designee, upon five (5) days following the issuance of a written notice, has the authority to enter upon private property to inspect, prune or remove a tree, shrub, plant, or plant part that is determined to be a public nuisance, e.g., any tree with an infectious disease or insect problem; dead or dying trees; a tree or limb that obstructs street lights, traffic signals or signs or causes electric service interruptions, interferes with the free passage of pedestrians or vehicles; or any tree that poses a threat to public safety.

151.14 APPEALS PROCEDURE.

Any owner or occupant of real property so ordered to abate a tree nuisance as determined by the Tree Board's designee may appeal the determination of nuisance or the remedy so ordered to the City Tree Board. A written appeal and request for hearing before the Tree Board by the owner/occupant must be received in the office of the Clerk within ten (10) days of the notice to abate. At the subsequently scheduled hearing, the Tree Board may affirm, rescind, or modify the determination of nuisance and order to abate. If the appealing party is still not satisfied with the decision of the Tree Board, the party may appeal to the Council by filing a written request for a hearing with the office of the Clerk within three (3) days of the Tree Board's decision.

151.15 REMOVAL OF STUMPS.

All stumps of street and park trees shall be removed to a minimum depth of four (4) inches below the surface of the ground.

151.16 FLOWERS ON THE RIGHT-OF-WAY.

Flowers may be grown on public right-of-way if maintained under two (2) feet above ground level and if they present no safety hazard. No vegetables may be planted on public right-of-ways.

151.17 ABUSE OR MUTILATION OF PUBLIC TREES.

It is unlawful as a normal practice for any person, firm or City department to top any street, park or other tree on public property. "Topping" is defined as the severe cutting back of limbs to stubs within the tree's crown to such a degree so as to remove the normal canopy and disfigure the tree. Trees severely damaged by storms or other causes, or certain trees under utility wires or other obstructions where other pruning practices are impractical may be exempted from this section at the determination of the Council, upon the recommendation of the City Tree Board. Unless specifically authorized by the City Tree Board, no person shall intentionally damage, cut, carve, transplant or remove any tree on public property; attach any rope, wire, nail, advertising poster or other contrivance to any tree on public property; allow any gaseous liquid or solid substance that is harmful to such trees to come in contact with them or with their roots; or set fire or permit any fire to burn when such fire or the heat thereof will injure any portion of any tree on public property. Growth retardants approved by the City Tree Board may be utilized and shall not be a violation of this section.

151.18 INTERFERENCE WITH CITY TREE BOARD.

It is unlawful for any person to prevent, delay or interfere with the City Tree Board or any of its agents while engaging in and about the planting, cultivation, mulching, pruning, spraying or removing any street trees, park trees or other trees on public property as authorized in this chapter.

151.19 FUNDS RECEIVED FOR DAMAGE OR LOSS OF TREES.

Any funds received or collected by the City for damage or loss of street or park trees shall be designated for the purchase of replacement street and park trees.

151.20 DISPOSITION OF WOOD PRODUCTS.

Upon recommendation by the City Tree Board and approval by the Council, the City Administrator shall be given the authority to entertain bids for the sale of wood by-products to be disposed of by the City. Such by-products may include saw-logs, veneer-logs, firewood and wood chips.

151.21 PENALTY.

Any person violating any provision of this Chapter shall be, upon conviction or a plea of guilty, subject to a fine not to exceed one thousand dollars.

The State of Iowa is an Equal Opportunity Employer and provider of ADA services.

Federal law prohibits employment discrimination on the basis of race, color, age, religion, national origin, sex or disability. State law prohibits employment discrimination on the basis of race, color, creed, age, sex, sexual orientation, gender identity, national origin, religion, pregnancy, or disability. State law also prohibits public accommodation (such as access to services or physical facilities) discrimination on the basis of race, color, creed, religion, sex, sexual orientation, gender identity, religion, national origin, or disability. If you believe you have been discriminated against in any program, activity or facility as described above, or if you desire further information, please contact the Iowa Civil Rights Commission, 1-800-457-4416, or write to the Iowa Department of Natural Resources, Wallace State Office Bldg., 502 E 9th St, Des Moines IA 50319.

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