



*Volga, IA:*

## 2020 Urban Forest Management Plan

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## **| Executive Summary**

## EXECUTIVE SUMMARY

### Overview

**This plan was developed to assist the City of Volga 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 4 percent of Volga'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 338 trees inventoried.

- Volga's trees provide \$46,273 of benefits annually, an average of \$136.90 per tree
- There are over 31 species of trees
- The top three genera are: pine 28%, walnut 19%, and maple 13%
- 22 percent of trees need some type of management
- 9 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 9 trees needing removal, 2 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\\*](#)
- While no ash trees exhibit one or more symptoms that could be related to an EAB infestation, we recommend that all ash trees should be carefully examined annually.
- All trees should be pruned on a routine schedule: one third of the city every other year.
- Plant a diverse mix of trees that do not include: American elm, Russian olive, boxelder, catalpa, weeping birch, willows, mulberry, Boileana poplar, silver maple, silver poplar, tree of heaven, Lombardy poplar, white poplar, Siberian elm, European mountain ash, cottonwood.
- Check ash trees yearly with a visual survey.
- The national standard for baseline tree care budget within a city is \$2 per capita, giving Volga a budget of \$388 annually. JEO proposes a budget increase of \$1,000, and apply for grants to plant replacement trees.



## | Introduction

# INTRODUCTION



This plan was developed to assist Volga 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 Volga, 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 Volga’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 Volga 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 Volga’s urban forestry goals.



**Assist Volga 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

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In 2020, JEO conducted a tree inventory that included 100 percent 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

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JEO entered the data collected for the 338 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

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### **Annual Energy Benefits**

Trees conserve energy by shading buildings and blocking winds. Volga's trees reduce energy-related costs by approximately \$12,327 annually (Appendix A, Table 1). These savings are both in electricity (58.8 MWh) and in natural gas (8,026.4 Therms).

### **Annual Stormwater Benefits**

Volga's trees intercept about 698,298 gallons of rainfall or snow melt per year (Appendix A, Table 2). This interception provides \$18,924 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 Volga, it is estimated that trees remove 692.4 pounds of air pollution (ozone (O<sub>3</sub>), particulate matter less than 10 microns (PM10), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), and sulfur dioxide (SO<sub>2</sub>)) per year with a net value of \$1,890 (Appendix A, Table 3).

## Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Volga, trees sequester about 194,252 pounds of carbon per year with an associated value of \$1,457 (Appendix A, Table 5). In addition, the trees store 2,322,481 pounds of carbon, with a yearly benefit of \$17,419 (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. Volga receives \$11,675 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, Volga’s trees provide \$46,273 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 338 trees in Volga provide approximately \$136.90 annually (Appendix A, Table 7).

ENERGY	STORMWATER	AIR QUALITY	CARBON	AESTHETICS	SUMMARY
<ul style="list-style-type: none"> <li>Reduce energy cost by <b>\$12,327</b></li> </ul>	<ul style="list-style-type: none"> <li>Intercept <b>698,298 gallons</b></li> <li>Provides <b>\$18,924</b> benefit</li> </ul>	<ul style="list-style-type: none"> <li>Remove <b>692.4 lbs</b> of pollution</li> <li>Net value of <b>\$1,890</b></li> </ul>	<ul style="list-style-type: none"> <li>Sequester <b>194,252 lbs</b></li> <li>Value of <b>\$1,457</b></li> <li>Store <b>2,322,481 lbs</b></li> <li>Value of <b>\$17,419</b></li> </ul>	<ul style="list-style-type: none"> <li><b>\$11,675</b> in social benefits</li> </ul>	<ul style="list-style-type: none"> <li><b>\$46,273</b> annual benefits</li> <li>Each tree provides <b>\$136.90</b> annually</li> </ul>

# FOREST STRUCTURE

## Species Distribution

Volga has over 31 different tree species along city streets and parks (Appendix A, Figure 1).

The distribution of trees by genera is as follows:

Pine	94	28%	Elm	5	1.5%
Walnut	63	19%	Honey locust	5	1.5%
Maple	45	13%	Basswood/Linden	3	1%
Oak	33	10%	Lilac	2	<1%
Spruce	21	6%	Quaking aspen	2	<1%
Hackberry	16	5%	Catalpa	1	<1%
Ash	15	4%	Pear	1	<1%
Apple	14	4%	Amur maple	1	<1%
Japanese tree lilac	8	2%	Cedar	1	<1%
Cottonwood	6	2%	Other Deciduous	2	<1%

## Age Class

Most of Volga’s trees (41 percent) are between 6 and 18 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. Volga’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 urban forest’s overall health. The foliage condition results for Volga indicate that 86 percent of the trees are in good health, with only 2.5 percent of the foliage in poor health, dead, or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 76 percent of Volga’s trees are in good health for wood condition (Appendix A, Figure 4 & Appendix B, Figure 3). Five percent of the tree population’s wood condition is in poor health, dead, or dying. This 5 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	43	13%
Tree Staking	12	3.5%
Tree Removal	9	2.5%
Crown Raising	6	1.5%
Crown Reduction	4	1%

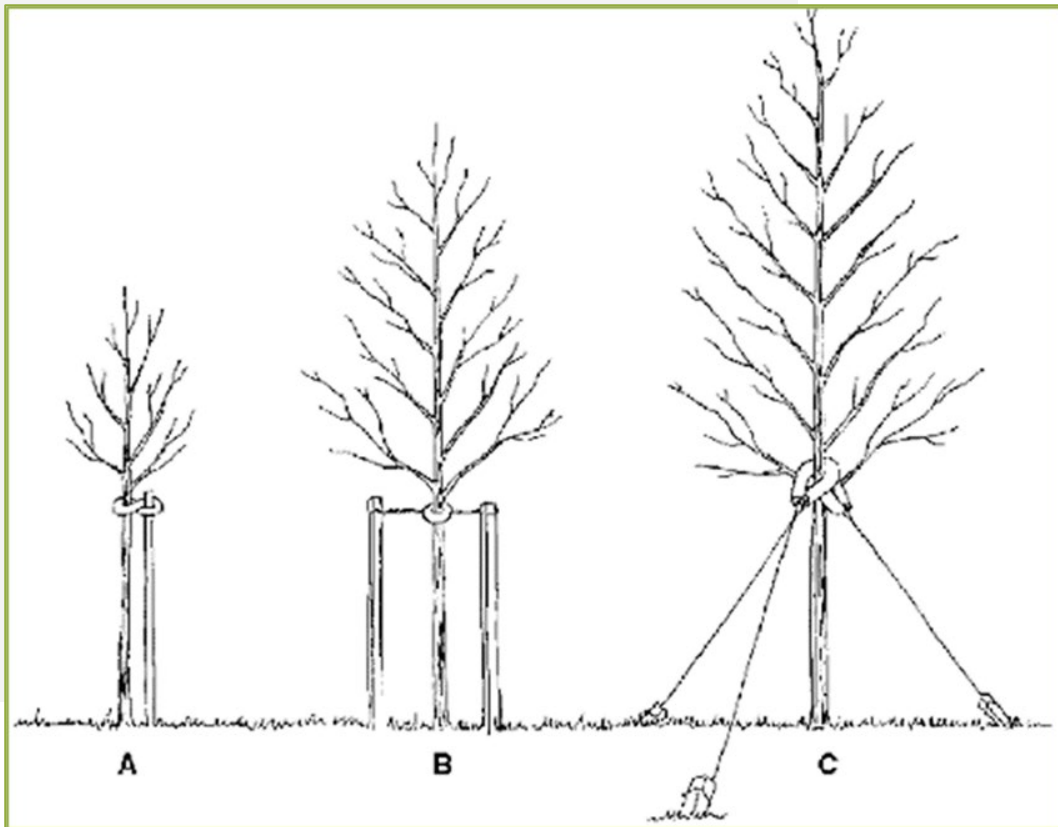
## Canopy Cover

The total canopy with both private and public trees is 131.26 acres or around 26 percent. The canopy cover included in the Durant inventory includes approximately 6 acres (Appendix A, Figure 4). The city's canopy goal is to increase canopy by 10 percent in 30 years. To achieve this goal it is recommended that at least 10 trees be planted annually on public and private lands.

## Land Use and Location

The majority of Volga'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
Industrial/Large Commercial	96%
Park/Vacant/Other	3.5%
Single Family Residential	<1%
Small Commercial	0%
Multifamily Residential	0%



## **| Recommendations**

## RECOMMENDATIONS

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### 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

Volga has 2 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. Both trees are greater than 42 inches in diameter and should be addressed immediately. Please refer to the Schedule and Budget at the end of this section. After all critical concern trees are addressed, there should be follow up on the trees marked as needing maintenance. There are a total of 74 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). While none of the 15 ash trees exhibit one or more symptoms that could be related to an EAB infestation, we recommend that all ash trees should be carefully examined annually. [\\*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 Volga.

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 pine (28 percent) (Appendix A, Figure 1). Pines should not be planted until this percentage can be lowered. Also, ash trees have not been recommended since 2002, due to the threat of EAB. Other species to avoid because they are public nuisances include: American elm, Russian olive, boxelder, catalpa, weeping birch, willows, mulberry, Boileana poplar, silver poplar, silver maple, tree of heaven, Lombardy poplar, white poplar, black locust, Siberian elm, European mountain ash, cottonwood as outlined in section 6-19-7 of the city ordinance (Appendix C). All trees planted must meet the restrictions in city ordinance 6-19-7 (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](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 6-19-7 (Appendix C). The new plantings will be a diverse mix and will not include American elm, Russian olive, boxelder, catalpa, weeping birch, willows, mulberry, Boileana poplar, silver poplar, silver maple, tree of heaven, Lombardy poplar, white poplar, black locust, Siberian elm, European mountain ash, cottonwood.



## 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 6-19-8 discusses protocol for diseased elm on private property. JEO suggests this same action is taken for problematic ash. City Code 6-19-8 section 5 states "If the City upon inspection or examination, in person or by some qualified person acting for the City, shall determine with reasonable certainty that any condition as herein defined exists in or upon private premises, and that the danger to other ash trees within the City is imminent, he shall immediately notify by certified mail the occupant or person in charge of such property, to correct such condition within 14 days of said notification. If such owner, occupant, or person in charge of said property fails to comply within 14 days of receipt thereof, the Council may cause the nuisance to be removed and the cost assessed against the property for collection in the same manner as a property tax. (Code of Iowa, Section 364.12(3b,h))."



## **| Schedule & Budget**

## PROPOSED WORK SCHEDULE & BUDGET

Budget Allowance of \$1,000/Year – (Based off maintenance recommendation need)

YEAR 1	Est. Cost
Remove 1 tree recommended for immediate removal	\$700
Plant 2 trees in open locations	\$300
Visual Survey of EAB Signs/Symptoms	n/a
<b>TOTAL</b>	<b>\$1,000</b>

YEAR 2	Est. Cost
Remove 1 tree recommended for immediate removal	\$700
Plant 2 trees in open locations	\$300
Prune 1/3 of city owned trees	No funding available
Visual Survey of EAB Signs/Symptoms	n/a
<b>TOTAL</b>	<b>\$1,000</b>

YEAR 3	Est. Cost
Remove 1 tree recommended for immediate removal	\$700
Plant 2 trees in open locations	\$300
Visual Survey of EAB Signs/Symptoms	n/a
<b>TOTAL</b>	<b>\$1000</b>

YEAR 4	Est. Cost
Remove 1 tree recommended for immediate removal	\$700
Plant 2 trees in open locations	\$300
Prune 1/3 of city owned trees	No funding available
Visual Survey of EAB Signs/Symptoms	n/a
<b>TOTAL</b>	<b>\$1,000</b>

YEAR 5	Est. Cost
Remove 1 tree recommended for immediate removal	\$700
Plant 2 trees in open locations	\$300
Visual Survey of EAB Signs/Symptoms	n/a
<b>TOTAL</b>	<b>\$1,000</b>

YEAR 6	Est. Cost
Remove 1 tree recommended for immediate removal	\$700
Plant 2 trees in open locations	\$300
Prune 1/3 of city owned trees	No funding available
Visual Survey of EAB Signs/Symptoms	n/a
<b>TOTAL</b>	<b>\$1,000</b>

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

\*\*To remove all ash trees within 6 years alone, the budget would need to be \$2,100 a year. If the budget were increased to \$1,750 a year all ash could be removed in 7 years.

## Proposed Budget

EAB could potentially kill all ash trees in Volga within four years of its arrival. To remove all ash trees within six years, the budget would need to be made \$2,100 a year. If the budget were set to 1,300 per year all ash could be removed within 13 years. Additionally, we recommend that Volga 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.

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 3 trees could be treated per year (every other year treatment). Three trees would be selected for treatment, and Volga would still need to find \$8,300 for removal. Alternatively, if there are 9 treatable trees, it would cost approximately \$2,700 a year for treatment and leave \$4,200 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 Volga. We suggest considering an increased budget to plan for this.

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## | Appendices

## APPENDIX A: i-TREE DATA

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<b>Annual Energy Benefits of Public Trees</b>
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1/29/2021

Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total Standard (\$)	Error	% of Total Trees	% of Total \$	Avg. \$/tree
Eastern white pine	9.1	692	1,240.8	1,216	1,908	(N/A)	27.5	15.5	20.52
Black walnut	17.7	1,345	2,415.5	2,367	3,712	(N/A)	18.6	30.1	58.92
Bur oak	5.2	395	699.4	685	1,080	(N/A)	5.9	8.8	54.00
Silver maple	2.3	174	305.2	299	473	(N/A)	5.3	3.8	26.27
Sugar maple	3.6	270	486.6	477	747	(N/A)	5.3	6.1	41.51
Northern hackberry	4.1	311	554.0	543	854	(N/A)	4.7	6.9	53.35
Apple	1.1	82	170.6	167	250	(N/A)	4.1	2.0	17.82
Swamp white oak	0.6	48	100.9	99	146	(N/A)	3.6	1.2	12.20
Norway spruce	1.8	136	240.8	236	372	(N/A)	3.3	3.0	33.84
Green ash	2.2	165	302.3	296	462	(N/A)	3.0	3.7	46.15
Blue spruce	1.2	91	158.3	155	246	(N/A)	2.7	2.0	27.37
Japanese tree lilac	0.9	66	129.1	127	193	(N/A)	2.4	1.6	24.07
Norway maple	1.4	104	196.1	192	296	(N/A)	2.4	2.4	37.04
Eastern cottonwood	2.3	177	307.3	301	478	(N/A)	1.5	3.9	95.59
Honeylocust	0.1	9	18.9	18	28	(N/A)	1.5	0.2	5.53
White ash	1.5	111	185.8	182	293	(N/A)	1.5	2.4	58.61
American elm	0.3	19	28.0	27	47	(N/A)	1.2	0.4	11.64
Littleleaf linden	0.2	12	24.9	24	37	(N/A)	0.6	0.3	18.25
Broadleaf Deciduous Small	0.0	1	1.2	1	2	(N/A)	0.6	0.0	0.87
Quaking aspen	1.0	74	126.2	124	197	(N/A)	0.6	1.6	98.63
Lilac	0.4	30	63.2	62	92	(N/A)	0.6	0.7	46.14
Scotch pine	0.1	11	19.7	19	30	(N/A)	0.3	0.2	30.47
Northern white cedar	0.1	11	19.7	19	30	(N/A)	0.3	0.2	30.47
Amur maple	0.2	14	24.7	24	38	(N/A)	0.3	0.3	38.13
Cottonwood	0.4	33	59.0	58	91	(N/A)	0.3	0.7	91.02
Pear	0.0	0	0.6	1	1	(N/A)	0.3	0.0	0.87
Black maple	0.1	8	16.5	16	25	(N/A)	0.3	0.2	24.58
White oak	0.0	0	0.5	0	1	(N/A)	0.3	0.0	0.66
American basswood	0.1	7	13.8	14	20	(N/A)	0.3	0.2	20.27
Catalpa	0.4	33	59.0	58	91	(N/A)	0.3	0.7	91.02
Chinese elm	0.4	29	53.7	53	82	(N/A)	0.3	0.7	82.02
Spruce	0.0	2	4.0	4	6	(N/A)	0.3	0.0	5.61
<b>Total</b>	<b>58.8</b>	<b>4,461</b>	<b>8,026.4</b>	<b>7,866</b>	<b>12,327</b>	<b>(N/A)</b>	<b>100.0</b>	<b>100.0</b>	<b>36.47</b>

<b>Annual Stormwater Benefits of Public Trees</b>
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1/29/2021

Species	Total rainfall interception (Gal)	Total Standard (\$)	Error	% of Total Trees	% of Total \$	Avg. \$/tree
Eastern white pine	145,618	3,946	(N/A)	27.5	20.9	42.43
Black walnut	183,999	4,986	(N/A)	18.6	26.3	79.15
Bur oak	75,381	2,043	(N/A)	5.9	10.8	102.14
Silver maple	24,512	664	(N/A)	5.3	3.5	36.90
Sugar maple	35,426	960	(N/A)	5.3	5.1	53.34
Northern hackberry	32,254	874	(N/A)	4.7	4.6	54.63
Apple	4,315	117	(N/A)	4.1	0.6	8.35
Swamp white oak	3,072	83	(N/A)	3.6	0.4	6.94
Norway spruce	41,736	1,131	(N/A)	3.3	6.0	102.82
Green ash	23,566	639	(N/A)	3.0	3.4	63.86
Blue spruce	17,739	481	(N/A)	2.7	2.5	53.41
Japanese tree lilac	3,126	85	(N/A)	2.4	0.4	10.59
Norway maple	10,866	294	(N/A)	2.4	1.6	36.81
Eastern cottonwood	36,195	981	(N/A)	1.5	5.2	196.17
Honeylocust	420	11	(N/A)	1.5	0.1	2.28
White ash	13,001	352	(N/A)	1.5	1.9	70.46
American elm	1,401	38	(N/A)	1.2	0.2	9.49
Littleleaf linden	921	25	(N/A)	0.6	0.1	12.48
Broadleaf Deciduous Small	15	0	(N/A)	0.6	0.0	0.20
Quaking aspen	14,478	392	(N/A)	0.6	2.1	196.17
Lilac	2,348	64	(N/A)	0.6	0.3	31.82
Scotch pine	2,969	80	(N/A)	0.3	0.4	80.46
Northern white cedar	2,969	80	(N/A)	0.3	0.4	80.46
Amur maple	667	18	(N/A)	0.3	0.1	18.06
Cottonwood	7,239	196	(N/A)	0.3	1.0	196.17
Pear	7	0	(N/A)	0.3	0.0	0.20
Black maple	625	17	(N/A)	0.3	0.1	16.95
White oak	18	0	(N/A)	0.3	0.0	0.48
American basswood	474	13	(N/A)	0.3	0.1	12.83
Catalpa	7,239	196	(N/A)	0.3	1.0	196.17
Chinese elm	5,491	149	(N/A)	0.3	0.8	148.79
Spruce	213	6	(N/A)	0.3	0.0	5.77
<b>Citywide total</b>	<b>698,298</b>	<b>18,924</b>	<b>(N/A)</b>	<b>100.0</b>	<b>100.0</b>	<b>55.99</b>



## Annual Air Quality Benefits of Public Trees

1/29/2021

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 <sub>3</sub>	NO <sub>2</sub>	PM <sub>10</sub>	SO <sub>2</sub>		NO <sub>2</sub>	PM <sub>10</sub>	VOC	SO <sub>2</sub>							
Eastern white pine	16.1	3.2	13.7	2.0	107	43.4	6.3	6.0	41.3	271	-63.6	-238	68.4	139 (N/A)	27.5	1.50
Black walnut	21.4	3.4	10.5	1.0	115	84.5	12.3	11.7	80.3	527	0.0	0	225.1	641 (N/A)	18.6	10.18
Bur oak	13.1	2.1	5.8	0.6	69	24.7	3.6	3.4	23.6	154	0.0	0	77.0	223 (N/A)	5.9	11.14
Silver maple	3.0	0.5	1.6	0.1	17	10.8	1.6	1.5	10.4	68	-2.0	-7	27.6	77 (N/A)	5.3	4.28
Sugar maple	4.4	0.7	2.3	0.2	24	17.0	2.5	2.4	16.1	106	-3.5	-13	42.0	117 (N/A)	5.3	6.48
Northern hackberry	4.5	0.8	2.4	0.2	25	19.5	2.8	2.7	18.6	122	0.0	0	51.5	146 (N/A)	4.7	9.15
Apple	1.1	0.2	0.6	0.1	6	5.4	0.8	0.7	4.9	33	0.0	0	13.7	39 (N/A)	4.1	2.79
Swamp white oak	0.2	0.0	0.2	0.0	1	3.1	0.4	0.4	2.8	19	-0.1	0	7.2	20 (N/A)	3.6	1.69
Norway spruce	5.1	1.0	4.0	0.6	33	8.5	1.2	1.2	8.1	53	-24.3	-91	5.4	-5 (N/A)	3.3	-0.47
Green ash	2.8	0.4	1.4	0.1	15	10.4	1.5	1.4	9.9	65	0.0	0	28.0	80 (N/A)	3.0	7.99
Blue spruce	2.5	0.5	2.1	0.3	17	5.7	0.8	0.8	5.4	35	-6.7	-25	11.4	27 (N/A)	2.7	3.00
Japanese tree lilac	0.8	0.1	0.4	0.0	4	4.2	0.6	0.6	3.9	26	0.0	0	10.8	31 (N/A)	2.4	3.82
Norway maple	2.0	0.3	1.0	0.1	11	6.6	1.0	0.9	6.2	41	-0.5	-2	17.6	50 (N/A)	2.4	6.26
Eastern cottonwood	7.1	1.1	3.1	0.3	37	11.0	1.6	1.5	10.6	69	0.0	0	36.3	106 (N/A)	1.5	21.14
Honeylocust	0.0	0.0	0.0	0.0	0	0.6	0.1	0.1	0.5	4	0.0	0	1.3	4 (N/A)	1.5	0.75
White ash	1.3	0.2	0.7	0.1	7	6.8	1.0	1.0	6.6	43	0.0	0	17.7	50 (N/A)	1.5	10.04
American elm	0.1	0.0	0.1	0.0	0	1.1	0.2	0.2	1.1	7	0.0	0	2.8	8 (N/A)	1.2	1.95
Littleleaf linden	0.1	0.0	0.1	0.0	0	0.8	0.1	0.1	0.7	5	0.0	0	1.8	5 (N/A)	0.6	2.55
Broadleaf Deciduous Small	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.1	0 (N/A)	0.6	0.11
Quaking aspen	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)	0.6	22.55
Lilac	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)	0.6	8.35
Scotch pine	0.3	0.1	0.3	0.0	2	0.7	0.1	0.1	0.7	4	-1.4	-5	0.9	1 (N/A)	0.3	1.45
Northern white cedar	0.3	0.1	0.3	0.0	2	0.7	0.1	0.1	0.7	4	-1.4	-5	0.9	1 (N/A)	0.3	1.45
Amur maple	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)	0.3	6.56
Cottonwood	1.2	0.2	0.5	0.1	6	2.1	0.3	0.3	2.0	13	0.0	0	6.6	19 (N/A)	0.3	19.04
Pear	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)	0.3	0.11
Black maple	0.1	0.0	0.0	0.0	0	0.5	0.1	0.1	0.5	3	0.0	0	1.3	4 (N/A)	0.3	3.64
White oak	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0 (N/A)	0.3	0.08
American basswood	0.0	0.0	0.0	0.0	0	0.4	0.1	0.1	0.4	3	0.0	0	1.0	3 (N/A)	0.3	2.71
Catalpa	1.2	0.2	0.5	0.1	6	2.1	0.3	0.3	2.0	13	0.0	0	6.6	19 (N/A)	0.3	19.04
Chinese elm	0.8	0.1	0.4	0.0	4	1.9	0.3	0.3	1.8	12	0.0	0	5.5	16 (N/A)	0.3	15.71
Spruce	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	-0.1	0	0.2	1 (N/A)	0.3	0.56
Citywide total	93.7	16.1	53.6	6.1	532	280.3	40.8	38.9	266.3	1,747	-103.6	-388	692.4	1,890 (N/A)	100.0	5.59

**Table 4: Annual Carbon Stored**

**Volga**

**Stored CO<sub>2</sub> Benefits of Public Trees**

1/29/2021

Species	Total Stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Eastern white pine	147,800	1,109	(N/A)	27.5	6.4	11.92
Black walnut	692,238	5,192	(N/A)	18.6	29.8	82.41
Bur oak	452,491	3,394	(N/A)	5.9	19.5	169.68
Silver maple	70,878	532	(N/A)	5.3	3.1	29.53
Sugar maple	126,748	951	(N/A)	5.3	5.5	52.81
Northern hackberry	64,709	485	(N/A)	4.7	2.8	30.33
Apple	18,825	141	(N/A)	4.1	0.8	10.09
Swamp white oak	5,067	38	(N/A)	3.6	0.2	3.17
Norway spruce	62,717	470	(N/A)	3.3	2.7	42.76
Green ash	91,535	687	(N/A)	3.0	3.9	68.65
Blue spruce	17,779	133	(N/A)	2.7	0.8	14.82
Japanese tree lilac	12,921	97	(N/A)	2.4	0.6	12.11
Norway maple	32,219	242	(N/A)	2.4	1.4	30.20
Eastern cottonwood	246,463	1,848	(N/A)	1.5	10.6	369.69
Honeylocust	397	3	(N/A)	1.5	0.0	0.60
White ash	32,717	245	(N/A)	1.5	1.4	49.08
American elm	3,079	23	(N/A)	1.2	0.1	5.77
Littleleaf linden	2,049	15	(N/A)	0.6	0.1	7.68
Broadleaf Deciduous	28	0	(N/A)	0.6	0.0	0.10
Quaking aspen	111,964	840	(N/A)	0.6	4.8	419.86
Lilac	13,485	101	(N/A)	0.6	0.6	50.57
Scotch pine	3,343	25	(N/A)	0.3	0.1	25.07
Northern white cedar	3,343	25	(N/A)	0.3	0.1	25.07
Amur maple	3,037	23	(N/A)	0.3	0.1	22.78
Cottonwood	39,259	294	(N/A)	0.3	1.7	294.44
Pear	14	0	(N/A)	0.3	0.0	0.10
Black maple	1,101	8	(N/A)	0.3	0.0	8.26
White oak	12	0	(N/A)	0.3	0.0	0.09
American basswood	1,025	8	(N/A)	0.3	0.0	7.68
Catalpa	39,259	294	(N/A)	0.3	1.7	294.44
Chinese elm	25,943	195	(N/A)	0.3	1.1	194.57
Spruce	38	0	(N/A)	0.3	0.0	0.29
<b>Citywide total</b>	<b>2,322,481</b>	<b>17,419</b>	<b>(N/A)</b>	<b>100.0</b>	<b>100.0</b>	<b>51.53</b>

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.

**Table 5: Annual Carbon Sequestered**

Volga

**Annual CO<sub>2</sub> Benefits of Public Trees**

1/29/2021

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
Eastern white pine	9,951	75	-709	-166	-7	15,299	115	24,375	183 (N/A)	27.5	12.5	1.97
Black walnut	42,127	316	-3,323	-180	-26	29,723	223	68,347	513 (N/A)	18.6	35.2	8.14
Bur oak	9,268	70	-2,172	-62	-17	8,721	65	15,755	118 (N/A)	5.9	8.1	5.91
Silver maple	7,215	54	-344	-26	-3	3,840	29	10,685	80 (N/A)	5.3	5.5	4.45
Sugar maple	7,394	55	-608	-39	-5	5,973	45	12,720	95 (N/A)	5.3	6.5	5.30
Northern hackberry	4,323	32	-311	-35	-3	6,866	51	10,843	81 (N/A)	4.7	5.6	5.08
Apple	1,828	14	-90	-16	-1	1,819	14	3,541	27 (N/A)	4.1	1.8	1.90
Swamp white oak	1,442	11	-30	-8	0	1,051	8	2,455	18 (N/A)	3.6	1.3	1.53
Norway spruce	1,639	12	-301	-37	-3	3,010	23	4,311	32 (N/A)	3.3	2.2	2.94
Green ash	5,241	39	-439	-24	-3	3,653	27	8,431	63 (N/A)	3.0	4.3	6.32
Blue spruce	1,098	8	-85	-21	-1	2,014	15	3,005	23 (N/A)	2.7	1.5	2.50
Japanese tree lilac	1,296	10	-62	-11	-1	1,459	11	2,682	20 (N/A)	2.4	1.4	2.51
Norway maple	2,416	18	-155	-14	-1	2,300	17	4,548	34 (N/A)	2.4	2.3	4.26
Eastern cottonwood	3,261	24	-1,183	-28	-9	3,907	29	5,958	45 (N/A)	1.5	3.1	8.94
Honeylocust	122	1	-3	-2	0	202	2	318	2 (N/A)	1.5	0.2	0.48
White ash	3,522	26	-157	-12	-1	2,453	18	5,806	44 (N/A)	1.5	3.0	8.71
American elm	244	2	-15	-3	0	423	3	649	5 (N/A)	1.2	0.3	1.22
Littleleaf linden	447	3	-10	-2	0	267	2	702	5 (N/A)	0.6	0.4	2.63
Broadleaf Deciduous Smal	17	0	0	0	0	11	0	28	0 (N/A)	0.6	0.0	0.10
Quaking aspen	958	7	-537	-12	-4	1,626	12	2,034	15 (N/A)	0.6	1.0	7.63
Lilac	0	0	-65	-7	-1	670	5	598	4 (N/A)	0.6	0.3	2.24
Scotch pine	187	1	-16	-3	0	246	2	415	3 (N/A)	0.3	0.2	3.11
Northern white cedar	187	1	-16	-3	0	246	2	415	3 (N/A)	0.3	0.2	3.11
Amur maple	268	2	-15	-2	0	308	2	560	4 (N/A)	0.3	0.3	4.20
Cottonwood	912	7	-188	-5	-1	734	6	1,453	11 (N/A)	0.3	0.7	10.90
Pear	9	0	0	0	0	6	0	14	0 (N/A)	0.3	0.0	0.10
Black maple	165	1	-5	-1	0	186	1	344	3 (N/A)	0.3	0.2	2.58
White oak	3	0	0	0	0	4	0	7	0 (N/A)	0.3	0.0	0.05
American basswood	120	1	-5	-1	0	148	1	262	2 (N/A)	0.3	0.1	1.96
Catalpa	912	7	-188	-5	-1	734	6	1,453	11 (N/A)	0.3	0.7	10.90
Chinese elm	960	7	-125	-4	-1	650	5	1,481	11 (N/A)	0.3	0.8	11.11
Spruce	18	0	0	-1	0	38	0	55	0 (N/A)	0.3	0.0	0.41

# Annual CO<sub>2</sub> Benefits of Public Trees

1/29/2021

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
Citywide total	107,550	807	-11,159	-730	-89	98,590	739	194,252	1,457 (N/A)	100.0	100.0	4.31

<b>Annual Aesthetic/Other Benefits of Public Trees</b>
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1/29/2021

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Eastern white pine	2,477	(N/A)	27.5	21.2	26.63
Black walnut	3,549	(N/A)	18.6	30.4	56.33
Bur oak	702	(N/A)	5.9	6.0	35.08
Silver maple	792	(N/A)	5.3	6.8	44.02
Sugar maple	808	(N/A)	5.3	6.9	44.91
Northern hackberry	662	(N/A)	4.7	5.7	41.36
Apple	104	(N/A)	4.1	0.9	7.46
Swamp white oak	184	(N/A)	3.6	1.6	15.37
Norway spruce	262	(N/A)	3.3	2.2	23.79
Green ash	460	(N/A)	3.0	3.9	46.04
Blue spruce	201	(N/A)	2.7	1.7	22.31
Japanese tree lilac	74	(N/A)	2.4	0.6	9.26
Norway maple	239	(N/A)	2.4	2.0	29.90
Eastern cottonwood	202	(N/A)	1.5	1.7	40.48
Honeylocust	16	(N/A)	1.5	0.1	3.28
White ash	432	(N/A)	1.5	3.7	86.31
American elm	43	(N/A)	1.2	0.4	10.63
Littleleaf linden	62	(N/A)	0.6	0.5	31.20
Broadleaf Deciduous Small	0	(N/A)	0.6	0.0	0.03
Quaking aspen	57	(N/A)	0.6	0.5	28.57
Lilac	0	(N/A)	0.6	0.0	0.00
Scotch pine	47	(N/A)	0.3	0.4	47.08
Northern white cedar	47	(N/A)	0.3	0.4	47.08
Amur maple	15	(N/A)	0.3	0.1	15.48
Cottonwood	58	(N/A)	0.3	0.5	58.34
Pear	0	(N/A)	0.3	0.0	0.03
Black maple	30	(N/A)	0.3	0.3	29.84
White oak	5	(N/A)	0.3	0.0	5.26
American basswood	13	(N/A)	0.3	0.1	13.08
Catalpa	58	(N/A)	0.3	0.5	58.34
Chinese elm	67	(N/A)	0.3	0.6	66.60
Spruce	7	(N/A)	0.3	0.1	6.83
Citywide total	11,675	(N/A)	100.0	100.0	34.54

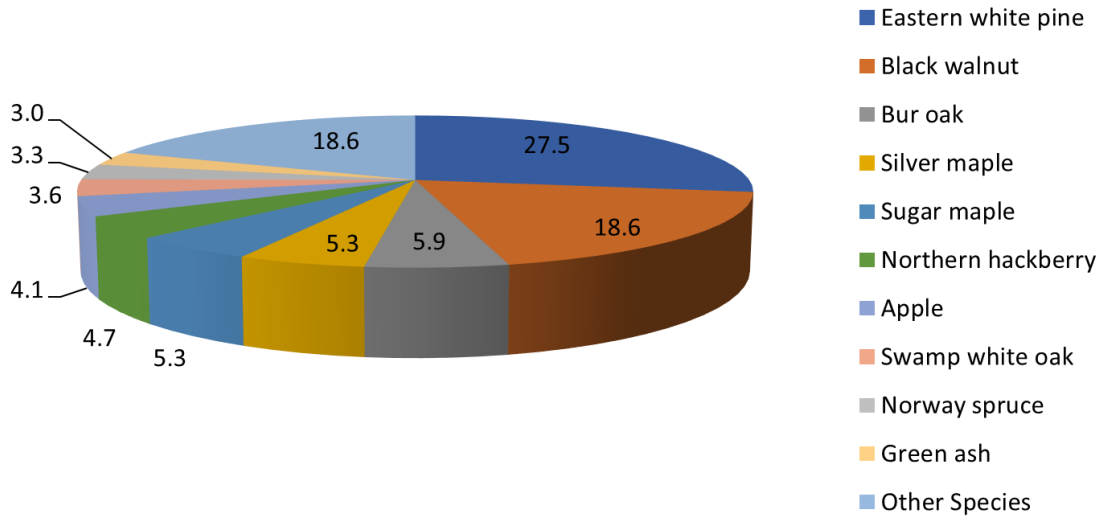
<b>Total Annual Benefits, Net Benefits, and Costs for Public Trees</b>
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1/29/2021

Benefits	Total (\$) Standard Error	\$/tree Standard Error	\$/capita Standard Error
Energy	12,327 (N/A)	36.47 (N/A)	0.00 (N/A)
CO2	1,457 (N/A)	4.31 (N/A)	0.00 (N/A)
Air Quality	1,890 (N/A)	5.59 (N/A)	0.00 (N/A)
Stormwater	18,924 (N/A)	55.99 (N/A)	0.00 (N/A)
Aesthetic/Other	11,675 (N/A)	34.54 (N/A)	0.00 (N/A)
<b>Total Benefits</b>	<b>46,273 (N/A)</b>	<b>136.90 (N/A)</b>	<b>0.00 (N/A)</b>
<b>Costs</b>			
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
<b>Total Costs</b>	<b>0</b>	<b>0.00</b>	<b>0.00</b>
<b>Net Benefits</b>	<b>46,273 (N/A)</b>	<b>136.90 (N/A)</b>	<b>0.00 (N/A)</b>
<b>Benefit-cost ratio</b>	<b>0.00 (N/A)</b>		

**Species Distribution of Public Trees**

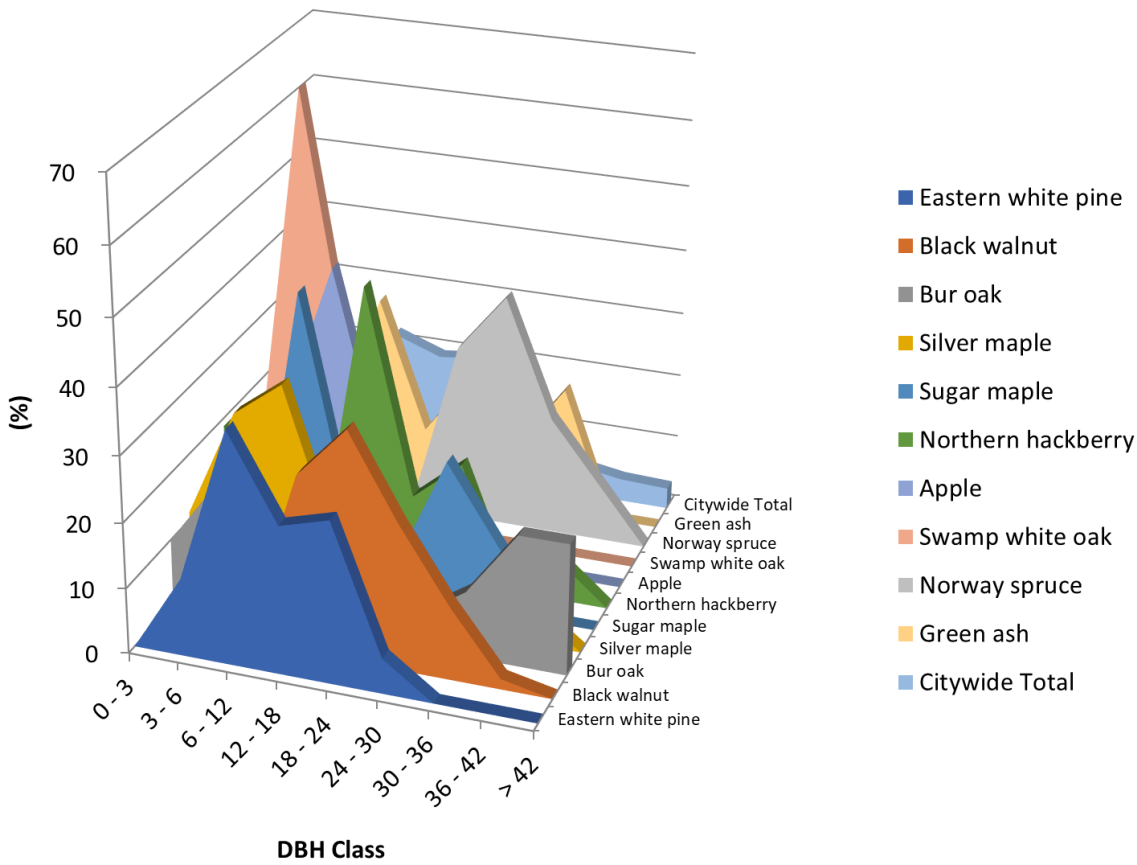
1/29/2021



Species	Percent
Eastern white pine	27.5
Black walnut	18.6
Bur oak	5.9
Silver maple	5.3
Sugar maple	5.3
Northern hackberry	4.7
Apple	4.1
Swamp white oak	3.6
Norway spruce	3.3
Green ash	3.0
Other Species	18.6
Total	100.0

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

1/29/2021



Species	DBH class (in)								
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	> 42
Eastern white pine	0.00	11.83	35.48	22.58	24.73	5.38	0.00	0.00	0.00
Black walnut	0.00	0.00	3.17	26.98	34.92	22.22	11.11	1.59	0.00
Bur oak	10.00	20.00	15.00	0.00	0.00	5.00	10.00	20.00	20.00
Silver maple	11.11	27.78	33.33	11.11	5.56	5.56	0.00	5.56	0.00
Sugar maple	5.56	0.00	44.44	11.11	5.56	22.22	11.11	0.00	0.00
Northern hackberry	18.75	0.00	0.00	43.75	12.50	18.75	0.00	6.25	0.00
Apple	14.29	21.43	42.86	14.29	7.14	0.00	0.00	0.00	0.00
Swamp white oak	8.33	66.67	25.00	0.00	0.00	0.00	0.00	0.00	0.00
Norway spruce	0.00	0.00	9.09	0.00	27.27	36.36	18.18	9.09	0.00
Green ash	0.00	10.00	30.00	10.00	20.00	10.00	20.00	0.00	0.00
Citywide Total	6.80	10.65	21.89	19.23	20.12	9.76	4.73	3.55	3.25



Figure 3: Foliage Condition

Functional (Foliage) Condition of Public Trees by Zone

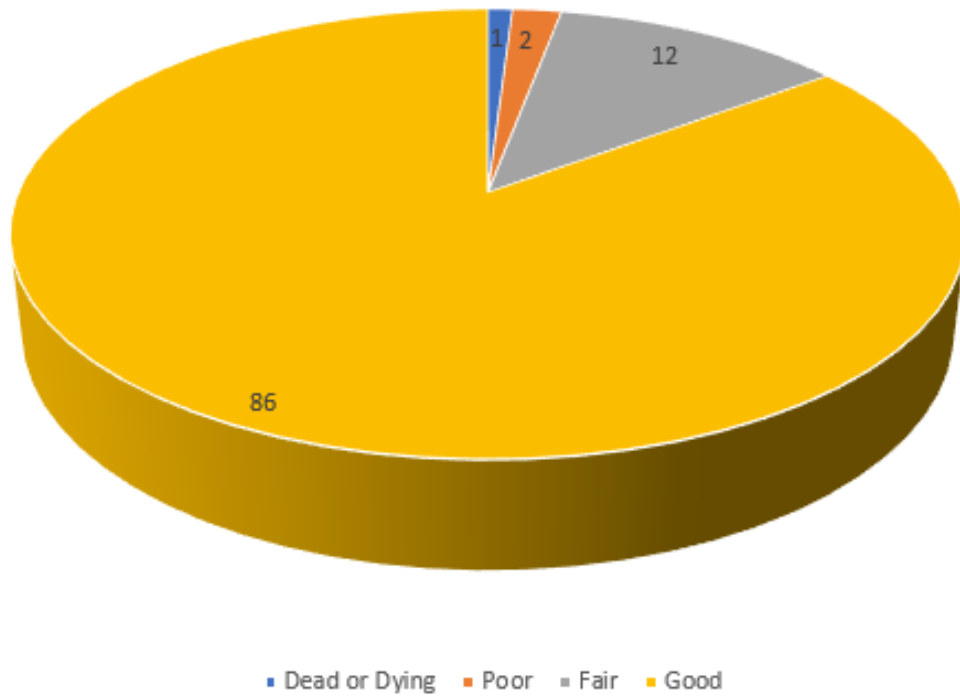
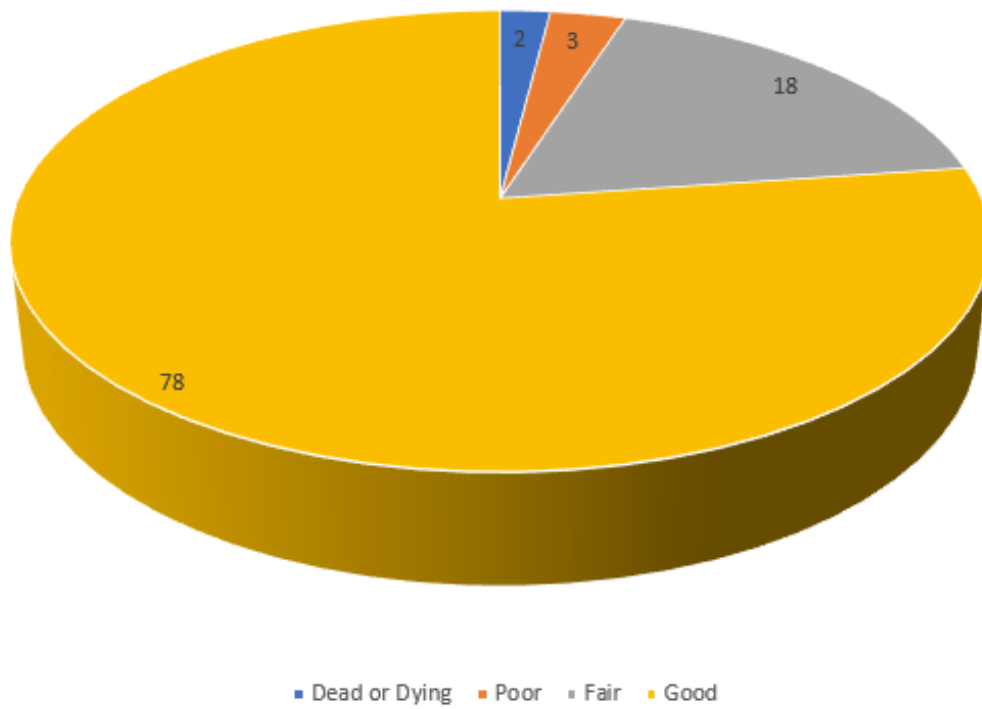


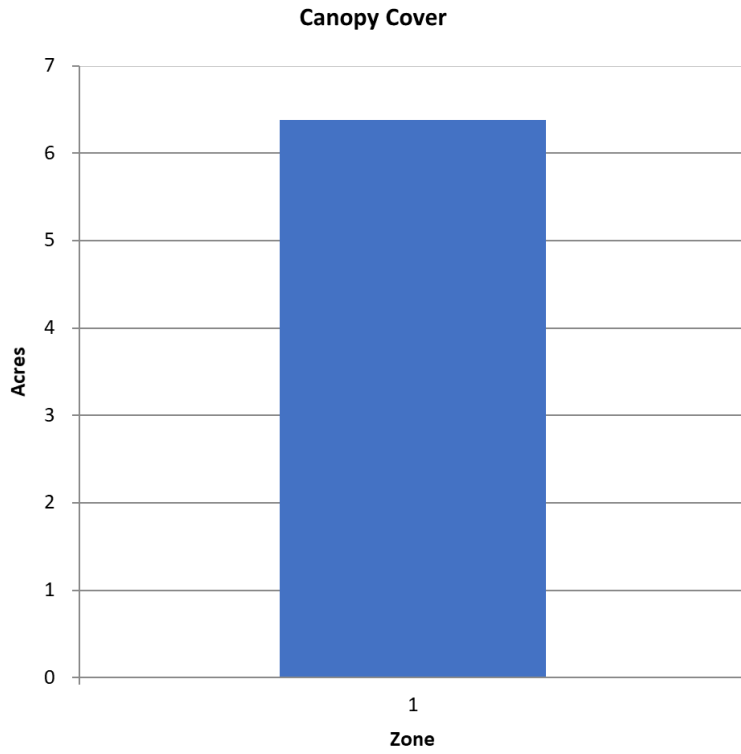
Figure 4: Wood Condition

Structural (Woody) Condition of Public Trees by Zone



**Canopy Cover of Public Trees (Acres)**

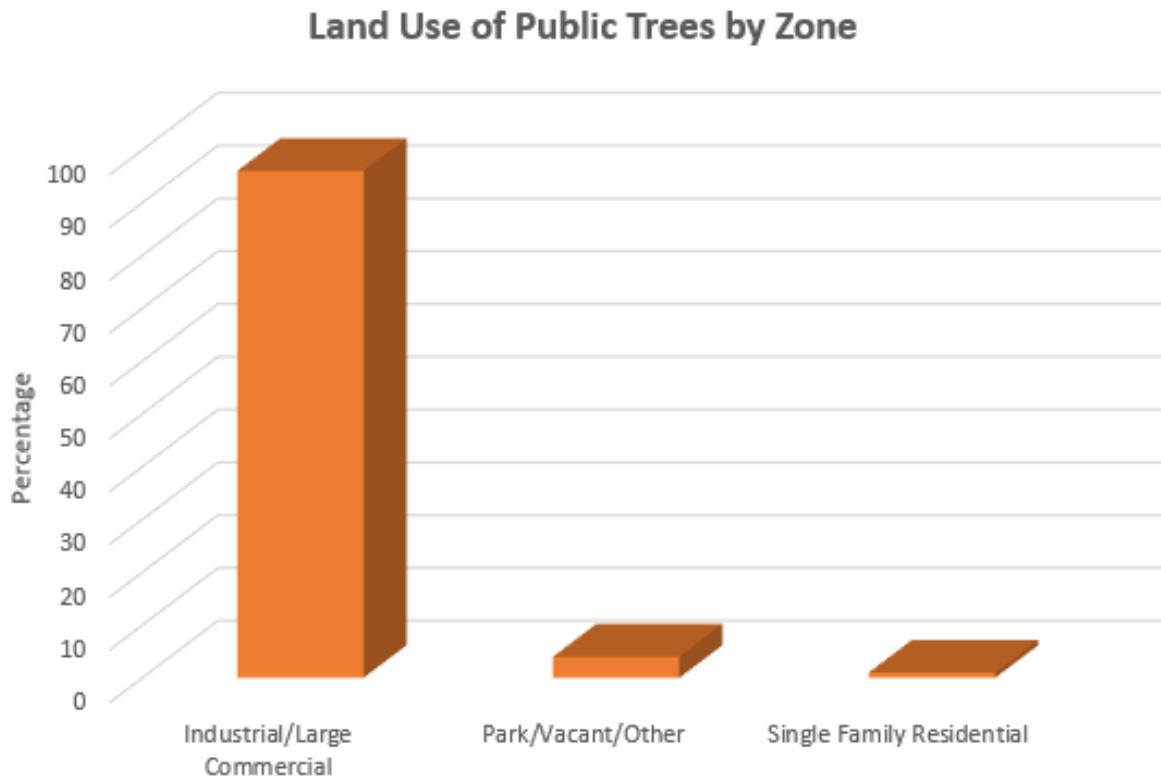
1/29/2021



Zone	Acres	% of Total Canopy Cover
1	6	100.0
Citywide total	6	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	6	0.00	0.00

Figure 6: Land Use of City/Park Trees



## APPENDIX B: ArcGIS MAPPING

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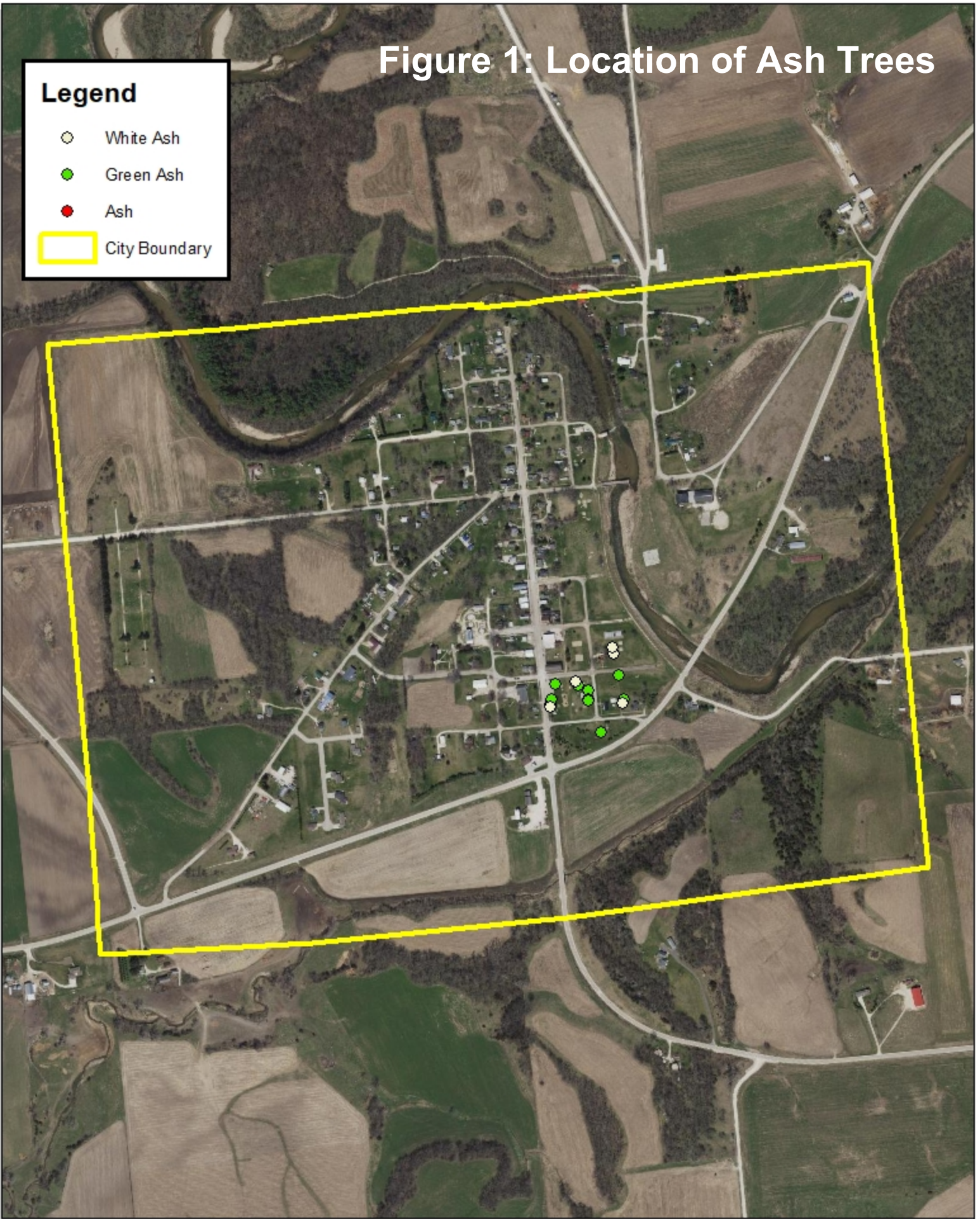


# ArcGIS

# Figure 1: Location of Ash Trees

## Legend

- White Ash
- Green Ash
- Ash
- City Boundary



0 0.125 0.25 0.5 Miles

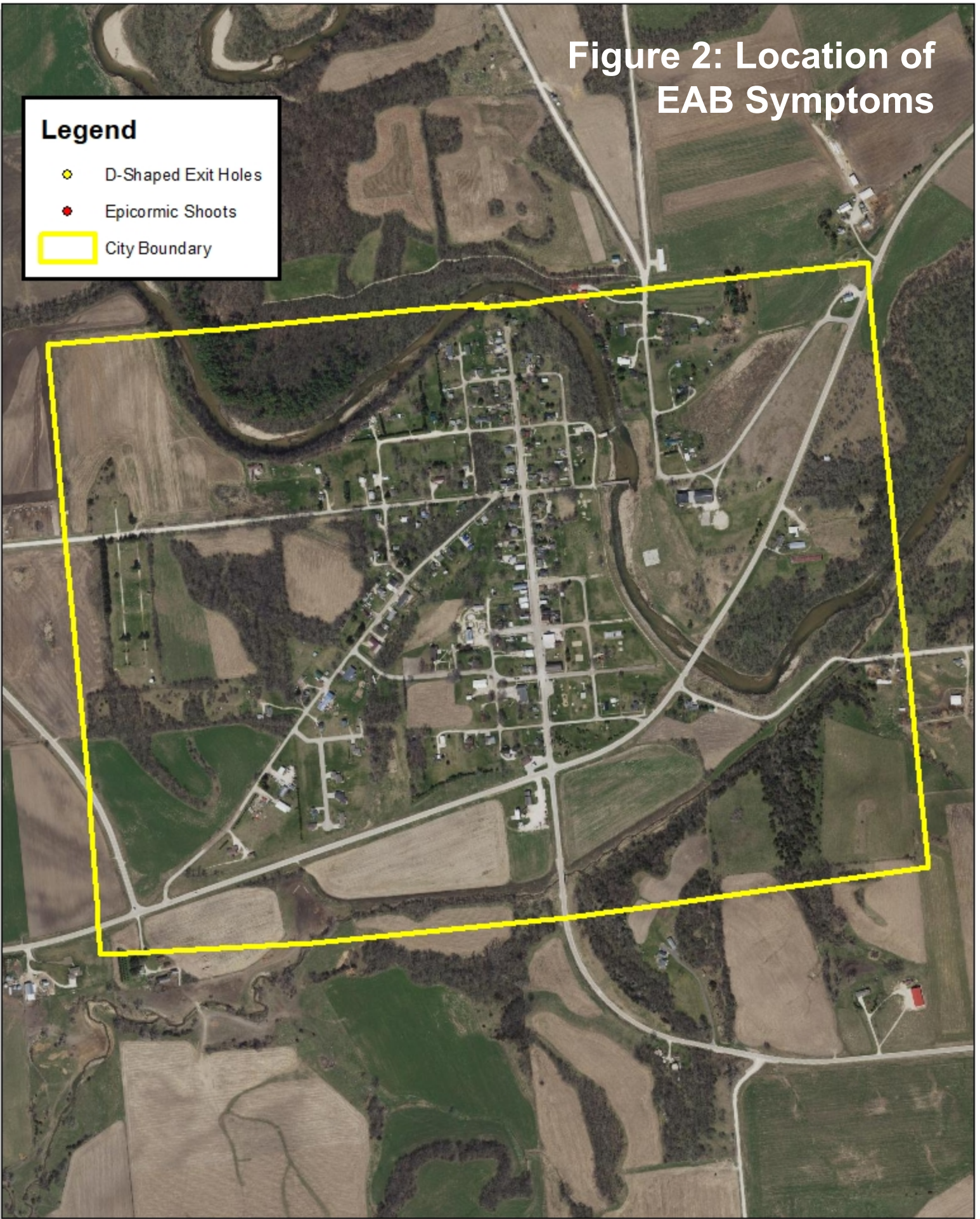
Volga, Iowa



Figure 2: Location of EAB Symptoms

**Legend**

- ◊ D-Shaped Exit Holes
- Epicormic Shoots
- City Boundary



0 0.125 0.25 0.5 Miles

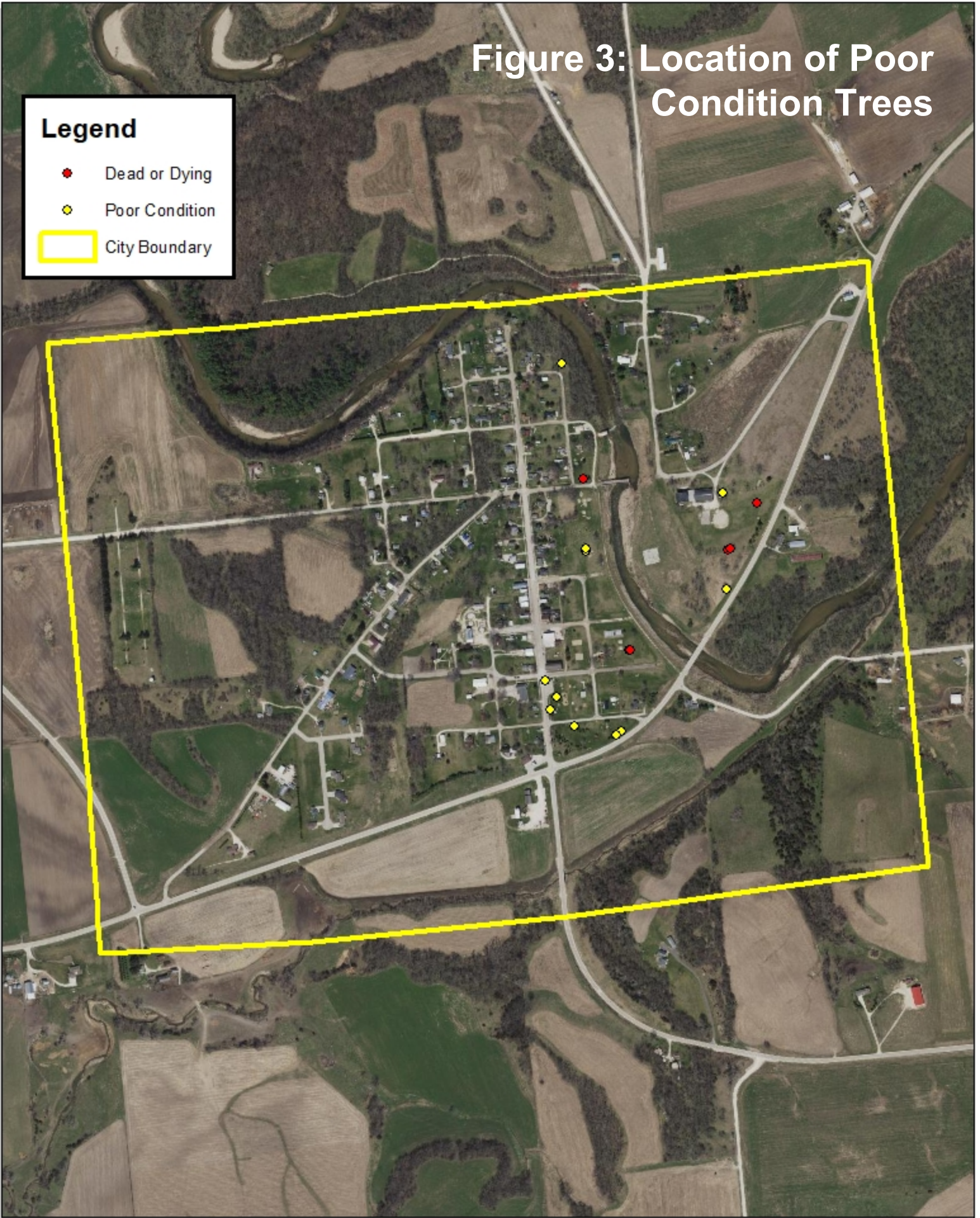
**Volga, Iowa**



# Figure 3: Location of Poor Condition Trees

**Legend**

- Dead or Dying
- Poor Condition
- City Boundary



0 0.125 0.25 0.5 Miles

**Volga, Iowa**

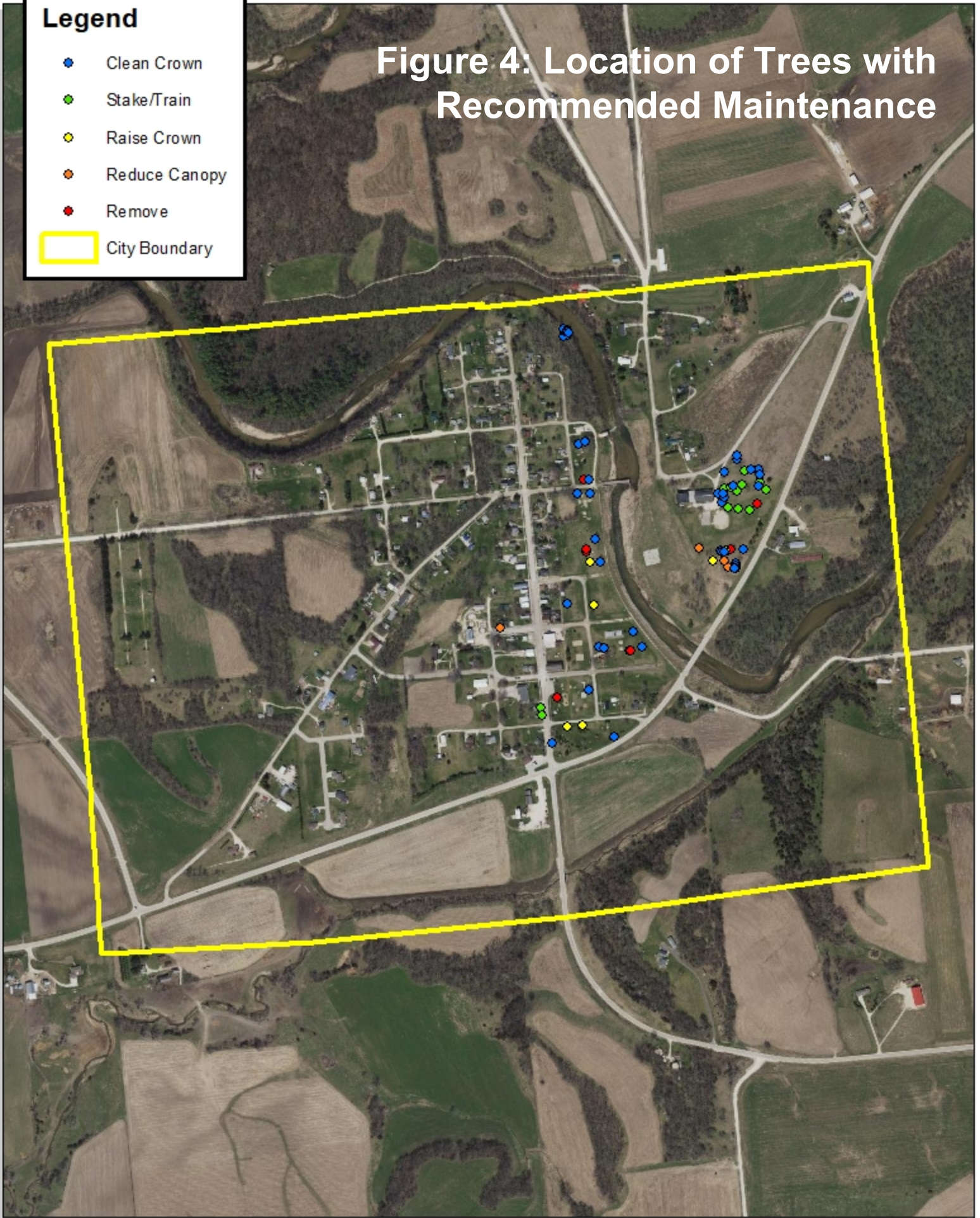




# Legend

- Clean Crown
- Stake/Train
- Raise Crown
- Reduce Canopy
- Remove
- City Boundary

## Figure 4: Location of Trees with Recommended Maintenance



0 0.125 0.25 0.5 Miles

Volga, Iowa



## APPENDIX C: VOLGA TREE ORDINANCES

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### CHAPTER 19 TREES

- 6-19-1 Definitions
- 6-19-2 Arboricultural Specifications and Standards of Practice
- 6-19-3 Removal of Trees 6-19-4 Duty to Trim Trees
- 6-19-5 Trimming Trees to Be Supervised 6-19-6 Assessment
- 6-19-7 Trees Not Recommended for Planting
- 6-19-8 Dutch Elm Disease Control

**6-19-1 DEFINITIONS.** For use in this chapter, the following term is defined:

1. "PARKING" means that part of the street, avenue, or highway 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 highway lying between the lot line and that portion of the street usually traveled by vehicular traffic.

#### **6-19-2 ARBORCULTURAL SPECIFICATIONS AND STANDARDS OF PRACTICE.**

1. **SPACING.** All trees hereafter planted shall be planted inside the property lines and not between the sidewalk and the curb.

2. **PLANTING.** The following regulations shall be followed in the planting of trees within the city.

- a. **SIZE.** All trees planted on the streets shall be of sufficient size to warrant satisfactory results and stand the abuse common to street trees.
- b. **GRADE.** Unless otherwise allowed for substantial reasons, all standard sized trees shall have comparatively straight trunks, well-developed leaders, and tip and root characteristics of the species or variety showing evidence of proper nursery pruning. All trees must be free of insect, disease, mechanical injuries, and other objectionable features at time of planting. To compensate for any serious loss of roots, the top of the tree should be reduced by thinning or cutting back as determined by the growth characteristics of the tree species. The leader shall not be cut off in such trimming.
- c. **PLANTING.** Trees shall not be planted on the parkways if it is less than nine (9) feet in width, or contains less than eighty-one (81) square feet of exposed soil surface. Trees shall not be planted closer than twenty (20) feet to street intersections (property lines extended) and ten (10) feet to driveways. If it is at all possible, trees should be planted inside the property lines and not between the sidewalk and the curb.

- d. **METHOD OF SUPPORT.** Trees may be guyed or supported in an upright position according to accepted arboricultural practices. The guys or supports shall be fastened

in such a way that they will not girdle or cause serious injury to the trees or endanger public safety.

3. **TRIMMING OR PRUNING.** Tress shall be trimmed or pruned according to the following:

- a. All cuts are to be made sufficiently close to the parent stem so that healing can rapidly start under normal conditions.
- b. All dead and diseased wood shall be removed.
- c. All limbs one inch in diameter or more must be precut to prevent splitting. All branches in danger of injuring the tree in falling shall be lowered by ropes.
- d. A crossed or rubbing branch shall be removed where practicable, but removal shall not leave large holes in the general outline of the tree. Crossed or rubbing branches may be cabled apart.
- e. Where there is a known danger of transmitting disease by tools, said tools shall be disinfected with alcohol before use on another tree.
- f. Improperly healed scars, where callous growth is not established, are to be traced and painted, unless the city designates other treatment.
- g. No topping or dehorning of trees shall be permitted except by special written permissions of the city. Trees becoming stag-headed may have the dead portions removed back to sound green wood, with a proper forty-five (45) degree cut only.
- h. Elm wood trimmed, pruned, or removed shall not be used for any purpose, but shall be disposed of immediately by burning or burying.

**6-19-3 REMOVAL OF TREES.** The City shall have removed, on the order of the council, any tree on the streets of the city which interferes with the making of improvements or with travel thereon. He shall additionally remove any trees on the street, not on private property, which may have become diseased, or which constitute a danger to the public or which may otherwise be declared a nuisance. (Code of Iowa, Sec 364.12(2c))

**6-19-4 DUTY TO TRIM TREES.** The owner or agent of the abutting property shall keep the trees on or overhanging the street, trimmed so that all branches will be at least fifteen (15) feet above the surface of the street and eight (8) feet above the sidewalks. (Code of Iowa, Sec 364.12(2c))

**6-19-5 TRIMMING TREES TO BE SUPERVISED.** It shall be unlawful for any person to trim or cut any tree in a street or public place unless the work is done under the supervision of the city.

**6-19-6 ASSESSMENT.** If the abutting property owner fails to trim the trees as required in this chapter, the city may serve notice on the abutting property owner requiring him to do so within five (5) days. If he fails to trim the trees within that time, the city may perform the required action and assess the costs against the abutting property for collection in the same manner as a property tax. (Code of Iowa, Sec 364.12(2d&e))

**6-19-7 TREES NOT RECOMMENDED FOR PLANTING.** The following trees are not recommended for planting:

- American Elm\* Russian
- Olive
- Boxelder
- Catalpa
- Weeping Birch
- Willows
- Mulberry
- Boileana
- Poplar Silver
- Poplar Silver
- Maple Tree of Heaven
- Lombardy
- Poplar White
- Poplar Black
- Locust Siberian
- Elm\*\*
- European Mountain
- Ash Cottonwood

\*Hybrid and resistant American elm cultivar are encouraged

\*\*Siberian Elm is often referred to as Chinese Elm

## 6-19-8 DUTCH ELM DISEASE CONTROL.

1. TREES SUBJECT TO REMOVAL. The council having determined that the health of the elm trees within the City are threatened by a fatal disease known as the Dutch Elm Disease hereby declares the following shall be removed:

- a. LIVING OR STANDING TREES. Any living or standing elm tree or part thereof infected with the Dutch Elm Disease fungus or which harbors any of the elm bark beetles that is scolytus multistriatus (eichb.) or hylurgopinus rufipes (marsh.).
- b. DEAD TREES. Any dead elm tree or part thereof, including logs, branches, stumps, firewood, or other elm material from which the bark has not been removed and burned or sprayed with an effective elm bark beetle destroying insecticide.

2. DUTY TO REMOVE. No person, firm or corporation shall permit any tree or material infected with Dutch Elm Disease to remain on the premises owned, controlled, or occupied by him within the City. (Code of Iowa, Section 364.12(3b))

3. INSPECTION. The City shall inspect or cause to be inspected all premises and places within the City to determine whether any condition as defined in Section 6-19-8(1) of this ordinance exists thereon, and shall also inspect or cause to be inspected any elm trees reported or suspected to be infected with the Dutch Elm Disease or any elm bark bearing material reported or suspected to be infected with the elm bark beetles.

4. REMOVAL FROM CITY PROPERTY. If the City, upon inspection or examination, in person or by some qualified person acting for the City, shall determine that any condition as herein defined exists in or upon any public street, alley, park or any public place, including the strip between the curb and the lot line of private property within the City, and that the danger of other elm trees within the City is imminent, he shall immediately cause it to be removed and burned or otherwise correct the same in such manner as to destroy or prevent as fully as possible the spread of Dutch Elm Disease or the insect pests or vectors known to carry such disease fungus.

5. REMOVAL FROM PRIVATE PROPERTY. If the City upon inspection or examination, in person or by some qualified person acting for the City, shall determine with reasonable certainty that any condition as herein defined exists in or upon private premises, and that the danger to other elm trees within the City is imminent, he shall immediately notify by certified mail the occupant or person in charge of such property, to correct such condition within 14 days of said notification. If such owner, occupant, or person in charge of said property fails to comply within 14 days of receipt thereof, the Council may cause the nuisance to be removed and the cost

assessed against the property for collection in the same manner as a property tax. (Code of Iowa, Section 364.12(3b,h))

6. **REASONABLE CERTAINTY.** If the City is unable to determine with reasonable certainty whether or not a tree in or upon private premises is infected with Dutch Elm Disease, a City representative is authorized to remove or cut specimens from said tree, and obtain a diagnosis of such specimens.

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

