



*Corning, IA:*

# 2020 Urban Forest Management Plan

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## **Executive Summary**

## EXECUTIVE SUMMARY

### Overview

**This plan was developed to assist the City of Corning 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 Corning'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 472 trees inventoried.

- Corning's trees provide \$127,428 of benefits annually, an average of \$270 per tree
- There are over 42 species of trees
- The top three genera are: Maple 36%, Oak 22%, and Ash 8%
- 38 percent of trees need some type of management
- 48 trees should be removed

### Recommendations

We detail our core recommendations in the Recommendations Section. In the Emerald Ash Borer Plan, we include management recommendations. Below are some key recommendations.

- Out of the 48 trees needing removal, 31 trees are over 24 inches in diameter at 4.5 ft and must be addressed immediately. [\\*City ownership of the trees recommended for removal should be verified prior to any removal\\*](#)
- 31 of the 39 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 could take 4 years to remove ash. We suggest that city officials request a budget increase to \$10,000 annually and apply for grants to plant replacement trees



## **| Introduction**

# INTRODUCTION



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



**Assist Corning with Managing its Urban Forest**



**Inform on the Benefits of a Healthy Urban Forest**



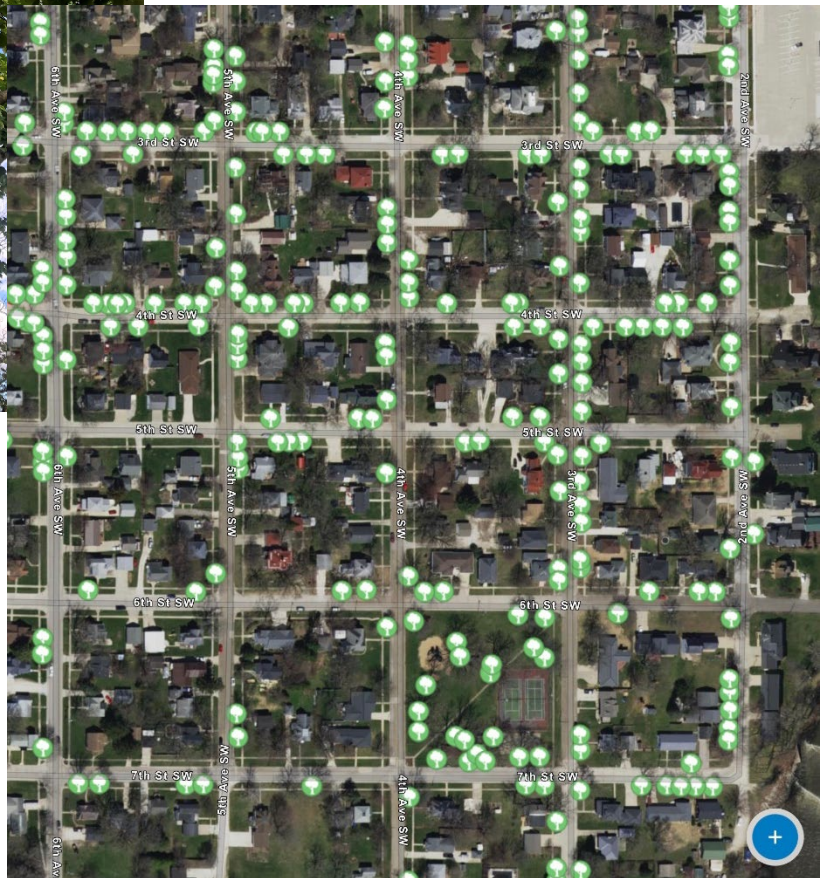
**Establish Preventative Treatment for Emerald Ash Borer**



**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 472 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. Corning's trees reduce energy-related costs by approximately \$31,302 annually (Appendix A, Table 1). These savings are both in electricity (149.5 MWh) and in natural gas (20,359.4 Therms).

### Annual Stormwater Benefits

Corning's trees intercept about 2,034,176 gallons of rainfall and snow melt per year (Appendix A, Table 2). This interception provides \$55,126 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 Corning, it is estimated that trees remove 2,049 lbs 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 \$5,779 (Appendix A, Table 3).

## Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Corning, trees sequester about 390,536 pounds of carbon per year with an associated value of \$2,929 (Appendix A, Table 5). In addition, the trees store 9,773,133 pounds of carbon, with a yearly benefit of \$73,298 (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. Corning receives \$30,776 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, Corning’s trees provide \$127,428 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 472 trees in Corning provide approximately \$270 annually (Appendix A, Table 7).

ENERGY	STORMWATER	AIR QUALITY	CARBON	AESTHETICS	SUMMARY
<ul style="list-style-type: none"> <li>Reduce energy cost by <b>\$31,302</b></li> </ul>	<ul style="list-style-type: none"> <li>Intercept <b>2,034,176 gallons</b></li> <li>Provides <b>\$55,126</b> benefit</li> </ul>	<ul style="list-style-type: none"> <li>Remove <b>2,049 lbs</b> of pollution</li> <li>Net value of <b>\$5,779</b></li> </ul>	<ul style="list-style-type: none"> <li>Sequester <b>390,536 lbs</b></li> <li>Value of <b>\$2,929</b></li> <li>Store <b>9,773,133 lbs</b></li> <li>Value of <b>\$73,298</b></li> </ul>	<ul style="list-style-type: none"> <li><b>\$30,776</b> in social benefits</li> </ul>	<ul style="list-style-type: none"> <li><b>\$127,428</b> annual benefits</li> <li>Each tree provides <b>\$270</b> annually</li> </ul>

# FOREST STRUCTURE

## Species Distribution

Corning 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	168	36%	Ginkgo	7	1%
Oak	105	22%	Hickory	5	1%
Ash	39	8%	Catalpa	4	<1%
Apple	26	6%	Sycamore	3	<1%
Spruce	16	3%	Redbud	3	<1%
Elm	14	3%	Pear	3	<1%
Hackberry	14	3%	Willow	2	<1%
Cedar	12	3%	Tulip Tree	1	<1%
Honey Locust	11	2%	Sweetgum	1	<1%
Cottonwood	11	2%	Linden	1	<1%
Walnut	11	2%	Other Deciduous	8	1%
Pine	7	1%			

## Age Class

Most of Corning’s trees (39 percent) are between 24 and 36 inches in diameter at 4.5 ft (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. Corning’s size curve is on the larger side, indicating an 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 Corning indicate that 87 percent of the trees are in good health, with only 13 percent of the foliage in poor health, dead, or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 83 percent of Corning’s trees are in good health for wood condition (Appendix A, Figure 4 & Appendix B, Figure 3). Sixteen percent of the tree population’s wood condition is in poor health, dead, or dying. This 16 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	247	52%
Tree Removal	81	17%
Crown Raising	46	10%
Crown Reduction	21	4%
Tree Staking	4	<1%

## Canopy Cover

The total canopy with both private and public trees is 237.32 acres or around 23 percent. The canopy cover included in the Corning inventory includes approximately 19 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 estimated that 25 trees need to be planted annually on public and private lands.

## Land Use and Location

The majority of Corning’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	57%
Industrial/Large Commercial	43%
Park/Vacant/Other	0%
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

Corning has 48 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 largest diameter removals first. There are 17 trees over 24 inches in diameter at 4.5 feet that should be addressed immediately. Please refer to the Proposed 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 318 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 48 removals, 15 are ash trees. There are a total of 39 ash trees, and 31 of those have signs and symptoms that have been associated with EAB. [\\*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 Inventory Results 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 Proposed 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 Corning.

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 (36 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: fruit-bearing trees, or any tree of the kind commonly known as cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut as outlined in section 151.02 of the city ordinance (Appendix C). All trees planted must meet the restrictions in city ordinance 151.02 (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 151.02 (Appendix C). The new plantings will be a diverse mix and will not include fruit-bearing trees, or any tree of the kind commonly known as cottonwood, poplar, box elder, Chinese elm, evergreen, willow, or black walnut.



## 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 151.06 states “If it is determined with reasonable certainty that any such condition exists on private property and that the danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Council shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days of said notification. If such owner, occupant or person in charge of said property fails to comply within 14 days of receipt of notice, the Council may cause the condition to be corrected and the cost assessed against the property.”



## **| Schedule & Budget**

## PROPOSED WORK SCHEDULE & BUDGET

Budget Allowance of \$7,000/Year – (Based off Reported Yearly Tree Budget)

YEAR 1	Est. Cost	YEAR 4	Est. Cost
Remove 8 trees recommended for immediate removal	\$5,600	Remove 5 ash trees in poor condition	\$3,500
Plant 9 trees in open locations	\$1,350	Plant 7 trees in open locations	\$1,050
Visual Survey of EAB Signs/Symptoms	n/a	Prune 1/3 of city owned trees	\$2,360
<b>TOTAL</b>	<b>\$6,950</b>	Visual Survey of EAB Signs/Symptoms	n/a
		<b>TOTAL</b>	<b>\$6,910</b>
YEAR 2	Est. Cost	YEAR 5	Est. Cost
Remove 5 trees recommended for immediate removal	\$3,500	Remove 9 ash trees in poor condition	\$6,300
Plant 7 trees in open locations	\$1,050	Plant 4 trees in open locations	\$600
Prune 1/3 of city owned trees	\$2,360	Visual Survey of EAB Signs/Symptoms	n/a
Visual Survey of EAB Signs/Symptoms	n/a	<b>TOTAL</b>	<b>\$6,900</b>
<b>TOTAL</b>	<b>\$6,910</b>		
YEAR 3	Est. Cost	YEAR 6	Est. Cost
Remove 4 trees recommended for immediate removal	\$2,800	Remove 5 ash trees in poor condition	\$3,500
Remove 5 ash trees in poor condition	\$3,500	Plant 7 trees in open locations	\$1,050
Plant 4 trees in open locations	\$600	Prune 1/3 of city owned trees	\$2,360
Visual Survey of EAB Signs/Symptoms	n/a	Visual Survey of EAB Signs/Symptoms	n/a
<b>TOTAL</b>	<b>\$6,900</b>	<b>TOTAL</b>	<b>\$6,910</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 \$12,000 a year. If the budget were increased to \$10,000 a year all ash and other damaged trees could be removed in 7 years.



## PROPOSED WORK SCHEDULE WITH INCREASED BUDGET

Budget Allowance of \$10,000/Year – (Budget Increase Suggested to Best Manage City Trees)

YEAR 1	Est. Cost
Remove 12 trees recommended for immediate removal	\$8,400
Plant 10 trees in open locations	\$1,500
Visual Survey of EAB Signs/Symptoms	n/a
<b>TOTAL</b>	<b>\$9,900</b>

YEAR 2	Est. Cost
Remove 5 trees recommended for immediate removal	\$3,500
Remove 5 ash in poor condition	\$3,500
Plant 4 trees in open locations	\$600
Prune 1/3 of city owned trees	\$2,360
Visual Survey of EAB Signs/Symptoms	n/a
<b>TOTAL</b>	<b>\$9,960</b>

YEAR 3	Est. Cost
Remove 12 ash in poor condition	\$8,400
Plant 10 trees in open locations	\$1,500
Visual Survey of EAB Signs/Symptoms	n/a
<b>TOTAL</b>	<b>\$9,900</b>

YEAR 4	Est. Cost
Remove 10 ash in poor health	\$7,000
Plant 4 trees in open locations	\$600
Prune 1/3 of city owned trees	\$2,360
Visual Survey of EAB Signs/Symptoms	n/a
<b>TOTAL</b>	<b>\$9,960</b>

YEAR 5	Est. Cost
Remove 4 ash trees in poor health	\$2,800
Remove 8 ash trees	\$5,600
Visual Survey of EAB Signs/Symptoms	n/a
<b>TOTAL</b>	<b>\$8,400</b>

YEAR 6	Est. Cost
Prune 1/3 of city owned trees	\$2,360
Additional removal, planting, and maintenance	\$7,640
Visual Survey of EAB Signs/Symptoms	n/a
<b>TOTAL</b>	<b>\$10,000</b>

### Proposed Budget Increase

EAB could potentially kill all ash trees in Corning within four years of its arrival. To remove all ash trees within six years, the budget would need to be increased to \$10,000 a year rather than occasionally. If the budget were increased to \$10,000 per year all ash could be removed within 13 years. Additionally, we recommend that Corning 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 23 trees could be treated per year (every other year treatment). Twenty-three trees would be selected for treatment, and Corning would still need to find \$11,200 for removal. Alternatively, if there are 30 treatable trees, it would cost approximately \$9,000 a year for treatment and leave \$6,300 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 Corning. We suggest considering an increased budget to plan for this.

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## | Appendices

## APPENDIX A: i-TREE DATA

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**Table 1: Annual Energy Benefits**

**Corning**

**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
Silver maple	36.6	2,778	4,860.1	4,763	7,541 (N/A)	19.5	24.1	81.97
Bur oak	25.7	1,954	3,493.5	3,424	5,378 (N/A)	13.6	17.2	84.02
Norway maple	8.9	679	1,317.1	1,291	1,969 (N/A)	7.2	6.3	57.92
Green ash	10.9	830	1,509.7	1,480	2,310 (N/A)	7.0	7.4	69.99
Apple	3.3	252	510.4	500	752 (N/A)	5.5	2.4	28.94
Red maple	3.6	271	482.1	472	743 (N/A)	3.4	2.4	46.47
Pin oak	6.8	512	879.8	862	1,375 (N/A)	3.4	4.4	85.91
Northern hackberry	5.6	421	767.7	752	1,174 (N/A)	3.0	3.7	83.84
Sugar maple	4.7	358	637.8	625	984 (N/A)	3.0	3.1	70.25
Northern red oak	3.2	240	442.7	434	674 (N/A)	2.8	2.2	51.81
Eastern red cedar	1.3	97	188.8	185	282 (N/A)	2.5	0.9	23.48
Black walnut	3.9	299	548.3	537	836 (N/A)	2.3	2.7	76.01
Cottonwood	4.8	363	639.9	627	990 (N/A)	2.3	3.2	90.01
Honeylocust	4.0	301	516.4	506	808 (N/A)	2.3	2.6	73.41
Spruce	1.2	89	141.0	138	227 (N/A)	1.9	0.7	25.20
Maple	2.2	171	309.4	303	474 (N/A)	1.7	1.5	59.22
Broadleaf Deciduous Medium	1.2	92	167.9	165	257 (N/A)	1.5	0.8	36.71
Blue spruce	0.9	71	130.5	128	199 (N/A)	1.5	0.6	28.46
Ginkgo	1.0	77	137.8	135	212 (N/A)	1.5	0.7	30.33
Elm	1.8	139	254.4	249	388 (N/A)	1.5	1.2	55.41
Swamp white oak	1.7	127	245.0	240	367 (N/A)	1.5	1.2	52.42
Eastern white pine	1.1	84	147.6	145	229 (N/A)	1.3	0.7	38.17
White ash	2.2	168	270.9	265	433 (N/A)	1.3	1.4	72.22
Hickory	1.8	138	254.8	250	388 (N/A)	1.1	1.2	77.58
Catalpa	1.8	136	238.9	234	370 (N/A)	0.8	1.2	92.58
Oak	1.0	79	147.4	144	224 (N/A)	0.6	0.7	74.61
American sycamore	1.3	95	168.9	166	261 (N/A)	0.6	0.8	86.86
Eastern redbud	0.2	17	38.5	38	55 (N/A)	0.6	0.2	18.19
Amur maple	0.6	42	74.0	73	114 (N/A)	0.6	0.4	38.13
Chinese elm	1.5	110	189.3	186	296 (N/A)	0.6	0.9	98.63
Pear	0.3	26	57.3	56	83 (N/A)	0.6	0.3	27.51
Willow	0.6	44	87.0	85	130 (N/A)	0.4	0.4	64.76
American elm	1.0	73	124.1	122	195 (N/A)	0.4	0.6	97.41
Siberian elm	1.0	75	124.4	122	197 (N/A)	0.4	0.6	98.48
Boxelder	0.2	15	23.9	23	39 (N/A)	0.2	0.1	38.63
White oak	0.0	0	0.5	0	1 (N/A)	0.2	0.0	0.66
Broadleaf Deciduous Large	0.3	25	46.9	46	71 (N/A)	0.2	0.2	70.91
Scotch pine	0.2	14	24.6	24	38 (N/A)	0.2	0.1	38.17
Northern pin oak	0.3	24	47.4	46	71 (N/A)	0.2	0.2	70.84
Sweetgum	0.4	29	53.7	53	82 (N/A)	0.2	0.3	82.02
Tulip tree	0.3	25	46.9	46	71 (N/A)	0.2	0.2	70.91
Littleleaf linden	0.1	6	12.5	12	18 (N/A)	0.2	0.1	18.25
<b>Total</b>	<b>149.5</b>	<b>11,350</b>	<b>20,359.4</b>	<b>19,952</b>	<b>31,302 (N/A)</b>	<b>100.0</b>	<b>100.0</b>	<b>66.32</b>



**Annual Stormwater Benefits of Public Trees**

2/1/2021

Species	Total rainfall interception (Gal)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	608,473	16,490	(N/A)	19.5	29.9	179.23
Bur oak	380,241	10,305	(N/A)	13.6	18.7	161.01
Norway maple	98,323	2,665	(N/A)	7.2	4.8	78.37
Green ash	131,637	3,567	(N/A)	7.0	6.5	108.10
Apple	14,239	386	(N/A)	5.5	0.7	14.84
Red maple	29,611	802	(N/A)	3.4	1.5	50.15
Pin oak	96,830	2,624	(N/A)	3.4	4.8	164.01
Northern hackberry	58,278	1,579	(N/A)	3.0	2.9	112.81
Sugar maple	64,765	1,755	(N/A)	3.0	3.2	125.37
Northern red oak	34,583	937	(N/A)	2.8	1.7	72.09
Eastern red cedar	18,639	505	(N/A)	2.5	0.9	42.09
Black walnut	51,702	1,401	(N/A)	2.3	2.5	127.37
Cottonwood	71,288	1,932	(N/A)	2.3	3.5	175.63
Honeylocust	49,753	1,348	(N/A)	2.3	2.4	122.57
Spruce	18,654	506	(N/A)	1.9	0.9	56.17
Maple	21,673	587	(N/A)	1.7	1.1	73.42
Broadleaf Deciduous Medium	8,041	218	(N/A)	1.5	0.4	31.13
Blue spruce	15,086	409	(N/A)	1.5	0.7	58.40
Ginkgo	6,060	164	(N/A)	1.5	0.3	23.46
Elm	23,987	650	(N/A)	1.5	1.2	92.86
Swamp white oak	16,353	443	(N/A)	1.5	0.8	63.31
Eastern white pine	27,628	749	(N/A)	1.3	1.4	124.79
White ash	25,032	678	(N/A)	1.3	1.2	113.06
Hickory	24,357	660	(N/A)	1.1	1.2	132.02
Catalpa	27,207	737	(N/A)	0.8	1.3	184.33
Oak	13,376	363	(N/A)	0.6	0.7	120.83
American sycamore	18,421	499	(N/A)	0.6	0.9	166.40
Eastern redbud	793	22	(N/A)	0.6	0.0	7.17
Amur maple	2,000	54	(N/A)	0.6	0.1	18.06
Chinese elm	21,717	589	(N/A)	0.6	1.1	196.17
Pear	1,703	46	(N/A)	0.6	0.1	15.38
Willow	6,244	169	(N/A)	0.4	0.3	84.60
American elm	9,102	247	(N/A)	0.4	0.4	123.33
Siberian elm	14,703	398	(N/A)	0.4	0.7	199.22
Boxelder	1,456	39	(N/A)	0.2	0.1	39.46
White oak	18	0	(N/A)	0.2	0.0	0.48
Broadleaf Deciduous Large	3,943	107	(N/A)	0.2	0.2	106.85
Scotch pine	4,605	125	(N/A)	0.2	0.2	124.79
Northern pin oak	3,764	102	(N/A)	0.2	0.2	102.01
Sweetgum	5,491	149	(N/A)	0.2	0.3	148.79
Tulip tree	3,943	107	(N/A)	0.2	0.2	106.85
Littleleaf linden	461	12	(N/A)	0.2	0.0	12.48
Citywide total	2,034,176	55,126	(N/A)	100.0	100.0	116.79

## 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 <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>							
Silver maple	121.5	20.6	58.1	5.4	651	173.0	25.3	24.1	165.5	1,081	-64.6	-242	529.0	1,490 (N/A)	19.5	16.19
Bur oak	63.7	10.2	28.3	2.9	333	122.7	17.9	17.0	116.6	765	0.0	0	379.3	1,098 (N/A)	13.6	17.15
Norway maple	21.9	3.8	10.5	1.0	118	43.6	6.3	6.0	40.6	269	-5.0	-19	128.6	368 (N/A)	7.2	10.83
Green ash	19.5	3.1	9.0	0.9	103	52.3	7.6	7.3	49.6	326	0.0	0	149.2	428 (N/A)	7.0	12.98
Apple	4.3	0.7	2.0	0.2	23	16.4	2.3	2.2	15.1	101	0.0	0	43.1	123 (N/A)	5.5	4.74
Red maple	6.9	1.2	3.3	0.3	37	17.0	2.5	2.4	16.2	106	-2.3	-9	47.3	134 (N/A)	3.4	8.37
Pin oak	19.7	3.4	9.7	0.9	107	31.8	4.7	4.4	30.6	199	-35.7	-134	69.5	172 (N/A)	3.4	10.75
Northern hackberry	11.1	1.9	5.5	0.5	60	26.6	3.9	3.7	25.2	166	0.0	0	78.3	226 (N/A)	3.0	16.12
Sugar maple	9.8	1.7	4.7	0.4	52	22.4	3.3	3.1	21.4	140	-7.5	-28	59.2	164 (N/A)	3.0	11.72
Northern red oak	7.5	1.3	3.6	0.3	40	15.2	2.2	2.1	14.3	94	-10.8	-40	35.7	94 (N/A)	2.8	7.24
Eastern red cedar	3.8	0.8	3.0	0.5	25	6.2	0.9	0.8	5.8	38	-10.3	-39	11.5	25 (N/A)	2.5	2.06
Black walnut	7.6	1.2	3.5	0.3	40	18.9	2.7	2.6	17.8	117	0.0	0	54.6	157 (N/A)	2.3	14.29
Cottonwood	13.2	2.1	5.8	0.6	69	22.7	3.3	3.2	21.7	142	0.0	0	72.5	211 (N/A)	2.3	19.14
Honeylocust	9.9	1.6	4.5	0.5	52	18.7	2.7	2.6	18.0	117	-8.0	-30	50.5	139 (N/A)	2.3	12.67
Spruce	2.2	0.4	1.8	0.3	14	5.4	0.8	0.8	5.3	34	-9.1	-34	7.8	14 (N/A)	1.9	1.59
Maple	5.6	0.9	2.6	0.2	30	10.7	1.6	1.5	10.2	67	-1.8	-7	31.5	90 (N/A)	1.7	11.19
Broadleaf Deciduous Medium	1.3	0.2	0.7	0.1	7	5.8	0.8	0.8	5.5	36	-0.3	-1	14.9	42 (N/A)	1.5	6.01
Blue spruce	2.4	0.5	1.9	0.3	16	4.5	0.7	0.6	4.3	28	-5.7	-22	9.4	22 (N/A)	1.5	3.15
Ginkgo	1.4	0.2	0.7	0.1	7	4.8	0.7	0.7	4.6	30	-0.5	-2	12.7	36 (N/A)	1.5	5.13
Elm	3.3	0.5	1.5	0.1	17	8.8	1.3	1.2	8.3	54	0.0	0	25.0	72 (N/A)	1.5	10.27
Swamp white oak	3.4	0.6	1.7	0.2	18	8.1	1.2	1.1	7.6	50	-0.8	-3	23.0	66 (N/A)	1.5	9.39
Eastern white pine	3.4	0.7	2.7	0.4	22	5.3	0.8	0.7	5.0	33	-17.2	-64	1.8	-9 (N/A)	1.3	-1.58
White ash	4.4	0.7	2.0	0.2	23	10.3	1.5	1.4	10.0	65	0.0	0	30.5	88 (N/A)	1.3	14.60
Hickory	3.4	0.5	1.5	0.2	18	8.7	1.3	1.2	8.3	54	0.0	0	25.1	72 (N/A)	1.1	14.42
Catalpa	5.1	0.8	2.2	0.2	27	8.5	1.2	1.2	8.1	53	0.0	0	27.5	80 (N/A)	0.8	19.96
Oak	1.8	0.3	0.8	0.1	9	5.0	0.7	0.7	4.7	31	0.0	0	14.2	41 (N/A)	0.6	13.55
American sycamore	3.2	0.5	1.4	0.1	17	6.0	0.9	0.8	5.7	37	0.0	0	18.7	54 (N/A)	0.6	18.02
Eastern redbud	0.1	0.0	0.1	0.0	1	1.1	0.2	0.2	1.0	7	0.0	0	2.7	8 (N/A)	0.6	2.55
Amur maple	0.6	0.1	0.3	0.0	3	2.6	0.4	0.4	2.5	16	0.0	0	6.9	20 (N/A)	0.6	6.56
Chinese elm	4.8	0.8	2.1	0.2	25	6.9	1.0	1.0	6.6	43	0.0	0	23.2	68 (N/A)	0.6	22.55
Pear	0.5	0.1	0.2	0.0	3	1.7	0.2	0.2	1.6	11	0.0	0	4.7	13 (N/A)	0.6	4.48
Willow	1.4	0.2	0.7	0.1	7	2.9	0.4	0.4	2.6	18	-0.3	-1	8.3	24 (N/A)	0.4	11.87
American elm	2.7	0.5	1.3	0.1	15	4.5	0.7	0.6	4.4	28	0.0	0	14.8	43 (N/A)	0.4	21.50
Siberian elm	3.3	0.6	1.5	0.1	18	4.6	0.7	0.6	4.5	29	0.0	0	16.0	47 (N/A)	0.4	23.37
Boxelder	0.1	0.0	0.1	0.0	1	0.9	0.1	0.1	0.9	6	-0.1	0	2.3	6 (N/A)	0.2	6.37
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)	0.2	0.08

# 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 <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>							
Broadleaf Deciduous Large	0.5	0.1	0.2	0.0	3	1.6	0.2	0.2	1.5	10	0.0	0	4.4	12 (N/A)	0.2	12.48
Scotch pine	0.6	0.1	0.4	0.1	4	0.9	0.1	0.1	0.8	5	-2.9	-11	0.3	-2 (N/A)	0.2	-1.58
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)	0.2	13.58
Sweetgum	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)	0.2	15.71
Tulip tree	0.5	0.1	0.2	0.0	3	1.6	0.2	0.2	1.5	10	0.0	0	4.4	12 (N/A)	0.2	12.48
Littleleaf linden	0.0	0.0	0.0	0.0	0	0.4	0.1	0.1	0.4	2	0.0	0	0.9	3 (N/A)	0.2	2.55
Citywide total	378.0	63.4	180.9	17.8	2,025	712.5	103.8	99.0	677.3	4,441	-183.1	-686	2,049.5	5,779 (N/A)	100.0	12.24

**Table 4: Annual Carbon Stored**

**Corning**

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

2/1/2021

Species	Total Stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	3,105,593	23,292	(N/A)	19.5	31.8	253.17
Bur oak	2,166,096	16,246	(N/A)	13.6	22.2	253.84
Norway maple	362,774	2,721	(N/A)	7.2	3.7	80.02
Green ash	649,920	4,874	(N/A)	7.0	6.7	147.71
Apple	67,684	508	(N/A)	5.5	0.7	19.52
Red maple	75,617	567	(N/A)	3.4	0.8	35.45
Pin oak	554,149	4,156	(N/A)	3.4	5.7	259.76
Northern hackberry	179,701	1,348	(N/A)	3.0	1.8	96.27
Sugar maple	288,229	2,162	(N/A)	3.0	2.9	154.41
Northern red oak	165,399	1,240	(N/A)	2.8	1.7	95.42
Eastern red cedar	12,400	93	(N/A)	2.5	0.1	7.75
Black walnut	249,931	1,874	(N/A)	2.3	2.6	170.41
Cottonwood	455,174	3,414	(N/A)	2.3	4.7	310.35
Honeylocust	129,191	969	(N/A)	2.3	1.3	88.08
Spruce	22,040	165	(N/A)	1.9	0.2	18.37
Maple	59,241	444	(N/A)	1.7	0.6	55.54
Broadleaf Deciduous	21,238	159	(N/A)	1.5	0.2	22.75
Blue spruce	19,173	144	(N/A)	1.5	0.2	20.54
Ginkgo	19,150	144	(N/A)	1.5	0.2	20.52
Elm	110,021	825	(N/A)	1.5	1.1	117.88
Swamp white oak	56,611	425	(N/A)	1.5	0.6	60.65
Eastern white pine	44,942	337	(N/A)	1.3	0.5	56.18
White ash	73,290	550	(N/A)	1.3	0.7	91.61
Hickory	109,375	820	(N/A)	1.1	1.1	164.06
Catalpa	177,166	1,329	(N/A)	0.8	1.8	332.19
Oak	57,489	431	(N/A)	0.6	0.6	143.72
American sycamore	111,013	833	(N/A)	0.6	1.1	277.53
Eastern redbud	2,724	20	(N/A)	0.6	0.0	6.81
Amur maple	9,111	68	(N/A)	0.6	0.1	22.78
Chinese elm	167,946	1,260	(N/A)	0.6	1.7	419.86
Pear	8,559	64	(N/A)	0.6	0.1	21.40
Willow	22,225	167	(N/A)	0.4	0.2	83.35
American elm	53,509	401	(N/A)	0.4	0.5	200.66
Siberian elm	82,529	619	(N/A)	0.4	0.8	309.48
Boxelder	3,624	27	(N/A)	0.2	0.0	27.18
White oak	12	0	(N/A)	0.2	0.0	0.09
Broadleaf Deciduous	15,773	118	(N/A)	0.2	0.2	118.30
Scotch pine	7,490	56	(N/A)	0.2	0.1	56.18
Northern pin oak	14,280	107	(N/A)	0.2	0.1	107.10
Sweetgum	25,943	195	(N/A)	0.2	0.3	194.57
Tulip tree	15,773	118	(N/A)	0.2	0.2	118.30
Littleleaf linden	1,025	8	(N/A)	0.2	0.0	7.68
Citywide total	9,773,133	73,298	(N/A)	100.0	100.0	155.29

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.

<b>Annual CO<sub>2</sub> Benefits of Public Trees</b>
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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
Silver maple	193,249	1,449	-14,907	-451	-115	61,396	460	239,287	1,795 (N/A)	19.5	40.4	19.51
Bur oak	50,353	378	-10,397	-295	-80	43,182	324	82,842	621 (N/A)	13.6	14.0	9.71
Norway maple	7,885	59	-1,743	-104	-14	14,996	112	21,034	158 (N/A)	7.2	3.5	4.64
Green ash	23,686	178	-3,120	-118	-24	18,345	138	38,793	291 (N/A)	7.0	6.5	8.82
Apple	5,860	44	-325	-44	-3	5,571	42	11,063	83 (N/A)	5.5	1.9	3.19
Red maple	3,682	28	-363	-33	-3	5,990	45	9,277	70 (N/A)	3.4	1.6	4.35
Pin oak	14,618	110	-2,660	-78	-21	11,325	85	23,205	174 (N/A)	3.4	3.9	10.88
Northern hackberry	7,257	54	-863	-55	-7	9,312	70	15,653	117 (N/A)	3.0	2.6	8.39
Sugar maple	12,574	94	-1,384	-55	-11	7,923	59	19,058	143 (N/A)	3.0	3.2	10.21
Northern red oak	2,907	22	-794	-42	-6	5,298	40	7,369	55 (N/A)	2.8	1.2	4.25
Eastern red cedar	83	1	-60	-23	-1	2,137	16	2,138	16 (N/A)	2.5	0.4	1.34
Black walnut	9,167	69	-1,200	-43	-9	6,603	50	14,526	109 (N/A)	2.3	2.5	9.90
Cottonwood	7,804	59	-2,185	-56	-17	8,022	60	13,586	102 (N/A)	2.3	2.3	9.26
Honeylocust	8,365	63	-620	-30	-5	6,663	50	14,378	108 (N/A)	2.3	2.4	9.80
Spruce	967	7	-106	-20	-1	1,959	15	2,800	21 (N/A)	1.9	0.5	2.33
Maple	1,407	11	-284	-21	-2	3,770	28	4,871	37 (N/A)	1.7	0.8	4.57
Broadleaf Deciduous Medi	2,171	16	-103	-12	-1	2,041	15	4,098	31 (N/A)	1.5	0.7	4.39
Blue spruce	948	7	-92	-18	-1	1,577	12	2,414	18 (N/A)	1.5	0.4	2.59
Ginkgo	1,110	8	-92	-15	-1	1,706	13	2,710	20 (N/A)	1.5	0.5	2.90
Elm	4,315	32	-528	-21	-4	3,063	23	6,829	51 (N/A)	1.5	1.2	7.32
Swamp white oak	2,044	15	-272	-18	-2	2,803	21	4,556	34 (N/A)	1.5	0.8	4.88
Eastern white pine	512	4	-216	-26	-2	1,866	14	2,136	16 (N/A)	1.3	0.4	2.67
White ash	6,385	48	-352	-18	-3	3,711	28	9,726	73 (N/A)	1.3	1.6	12.16
Hickory	4,593	34	-525	-20	-4	3,055	23	7,102	53 (N/A)	1.1	1.2	10.65
Catalpa	2,829	21	-850	-21	-7	3,010	23	4,968	37 (N/A)	0.8	0.8	9.32
Oak	2,673	20	-276	-11	-2	1,755	13	4,141	31 (N/A)	0.6	0.7	10.35
American sycamore	2,248	17	-533	-14	-4	2,100	16	3,800	29 (N/A)	0.6	0.6	9.50
Eastern redbud	342	3	-13	-4	0	372	3	697	5 (N/A)	0.6	0.1	1.74
Amur maple	803	6	-44	-6	0	925	7	1,679	13 (N/A)	0.6	0.3	4.20
Chinese elm	1,437	11	-806	-18	-6	2,439	18	3,052	23 (N/A)	0.6	0.5	7.63
Pear	706	5	-41	-5	0	583	4	1,243	9 (N/A)	0.6	0.2	3.11
Willow	840	6	-107	-6	-1	979	7	1,706	13 (N/A)	0.4	0.3	6.40
American elm	1,179	9	-257	-9	-2	1,618	12	2,531	19 (N/A)	0.4	0.4	9.49

# Annual CO<sub>2</sub> 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
Siberian elm	1,966	15	-396	-12	-3	1,658	12	3,217	24 (N/A)	0.4	0.5	12.06
Boxelder	418	3	-17	-2	0	336	3	735	6 (N/A)	0.2	0.1	5.51
White oak	3	0	0	0	0	4	0	7	0 (N/A)	0.2	0.0	0.05
Broadleaf Deciduous Large	857	6	-76	-4	-1	552	4	1,330	10 (N/A)	0.2	0.2	9.97
Scotch pine	256	2	-36	-4	0	311	2	528	4 (N/A)	0.2	0.1	3.96
Northern pin oak	0	0	-69	-4	-1	539	4	466	3 (N/A)	0.2	0.1	3.49
Sweetgum	960	7	-125	-4	-1	650	5	1,481	11 (N/A)	0.2	0.2	11.11
Tulip tree	857	6	-76	-4	-1	552	4	1,330	10 (N/A)	0.2	0.2	9.97
Littleleaf linden	223	2	-5	-1	0	134	1	351	3 (N/A)	0.2	0.1	2.63
Citywide total	390,536	2,929	-46,913	-1,741	-365	250,829	1,881	592,711	4,445 (N/A)	100.0	100.0	9.42

<b>Annual Aesthetic/Other Benefits of Public Trees</b>
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2/1/2021

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	13,356	(N/A)	19.5	43.4	145.18
Bur oak	3,440	(N/A)	13.6	11.2	53.75
Norway maple	727	(N/A)	7.2	2.4	21.37
Green ash	1,852	(N/A)	7.0	6.0	56.12
Apple	342	(N/A)	5.5	1.1	13.15
Red maple	522	(N/A)	3.4	1.7	32.61
Pin oak	1,048	(N/A)	3.4	3.4	65.48
Northern hackberry	902	(N/A)	3.0	2.9	64.43
Sugar maple	1,222	(N/A)	3.0	4.0	87.27
Northern red oak	202	(N/A)	2.8	0.7	15.53
Eastern red cedar	35	(N/A)	2.5	0.1	2.92
Black walnut	674	(N/A)	2.3	2.2	61.25
Cottonwood	516	(N/A)	2.3	1.7	46.88
Honeylocust	2,139	(N/A)	2.3	7.0	194.46
Spruce	227	(N/A)	1.9	0.7	25.22
Maple	175	(N/A)	1.7	0.6	21.87
Broadleaf Deciduous Medium	226	(N/A)	1.5	0.7	32.27
Blue spruce	132	(N/A)	1.5	0.4	18.83
Ginkgo	91	(N/A)	1.5	0.3	13.06
Elm	343	(N/A)	1.5	1.1	48.97
Swamp white oak	198	(N/A)	1.5	0.6	28.23
Eastern white pine	53	(N/A)	1.3	0.2	8.75
White ash	666	(N/A)	1.3	2.2	111.02
Hickory	331	(N/A)	1.1	1.1	66.20
Catalpa	182	(N/A)	0.8	0.6	45.52
Oak	198	(N/A)	0.6	0.6	65.93
American sycamore	153	(N/A)	0.6	0.5	50.83
Eastern redbud	19	(N/A)	0.6	0.1	6.40
Amur maple	46	(N/A)	0.6	0.2	15.48
Chinese elm	86	(N/A)	0.6	0.3	28.57
Pear	42	(N/A)	0.6	0.1	13.87
Willow	75	(N/A)	0.4	0.2	37.26
American elm	151	(N/A)	0.4	0.5	75.53
Siberian elm	108	(N/A)	0.4	0.4	54.03
Boxelder	39	(N/A)	0.2	0.1	39.36
White oak	5	(N/A)	0.2	0.0	5.26
Broadleaf Deciduous Large	66	(N/A)	0.2	0.2	65.59
Scotch pine	26	(N/A)	0.2	0.1	26.25
Northern pin oak	0	(N/A)	0.2	0.0	0.00
Sweetgum	67	(N/A)	0.2	0.2	66.60
Tulip tree	66	(N/A)	0.2	0.2	65.59
Littleleaf linden	31	(N/A)	0.2	0.1	31.20
Citywide total	30,776	(N/A)	100.0	100.0	65.20

<b>Total Annual Benefits, Net Benefits, and Costs for Public Trees</b>
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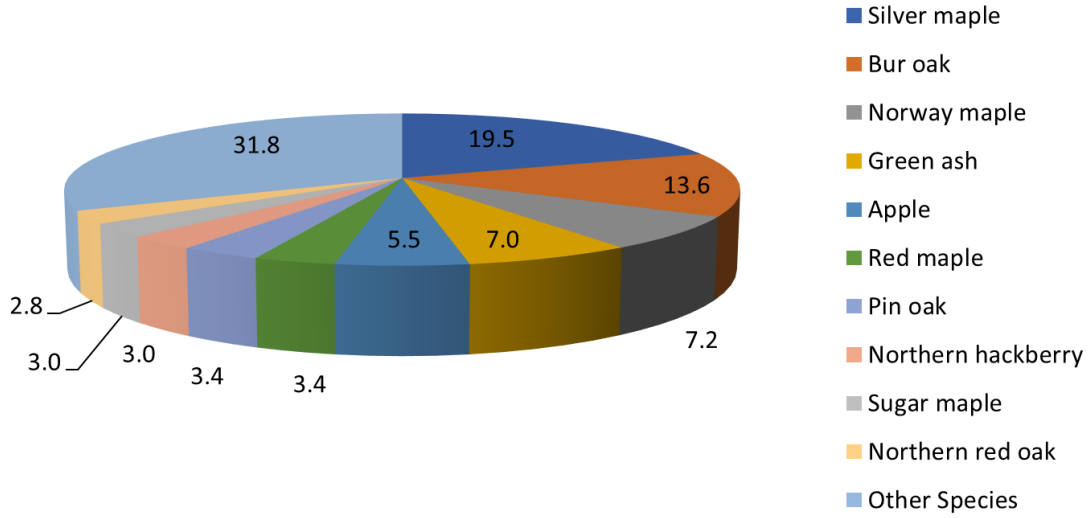
2/1/2021

Benefits	Total (\$)	Standard Error	\$/tree	Standard Error	\$/capita	Standard Error
Energy	31,302	(N/A)	66.32	(N/A)	0.00	(N/A)
CO2	4,445	(N/A)	9.42	(N/A)	0.00	(N/A)
Air Quality	5,779	(N/A)	12.24	(N/A)	0.00	(N/A)
Stormwater	55,126	(N/A)	116.79	(N/A)	0.00	(N/A)
Aesthetic/Other	30,776	(N/A)	65.20	(N/A)	0.00	(N/A)
<b>Total Benefits</b>	<b>127,428</b>	<b>(N/A)</b>	<b>269.98</b>	<b>(N/A)</b>	<b>0.00</b>	<b>(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>127,428</b>	<b>(N/A)</b>	<b>269.98</b>	<b>(N/A)</b>	<b>0.00</b>	<b>(N/A)</b>
<b>Benefit-cost ratio</b>	<b>0.00</b>	<b>(N/A)</b>				



**Species Distribution of Public Trees**

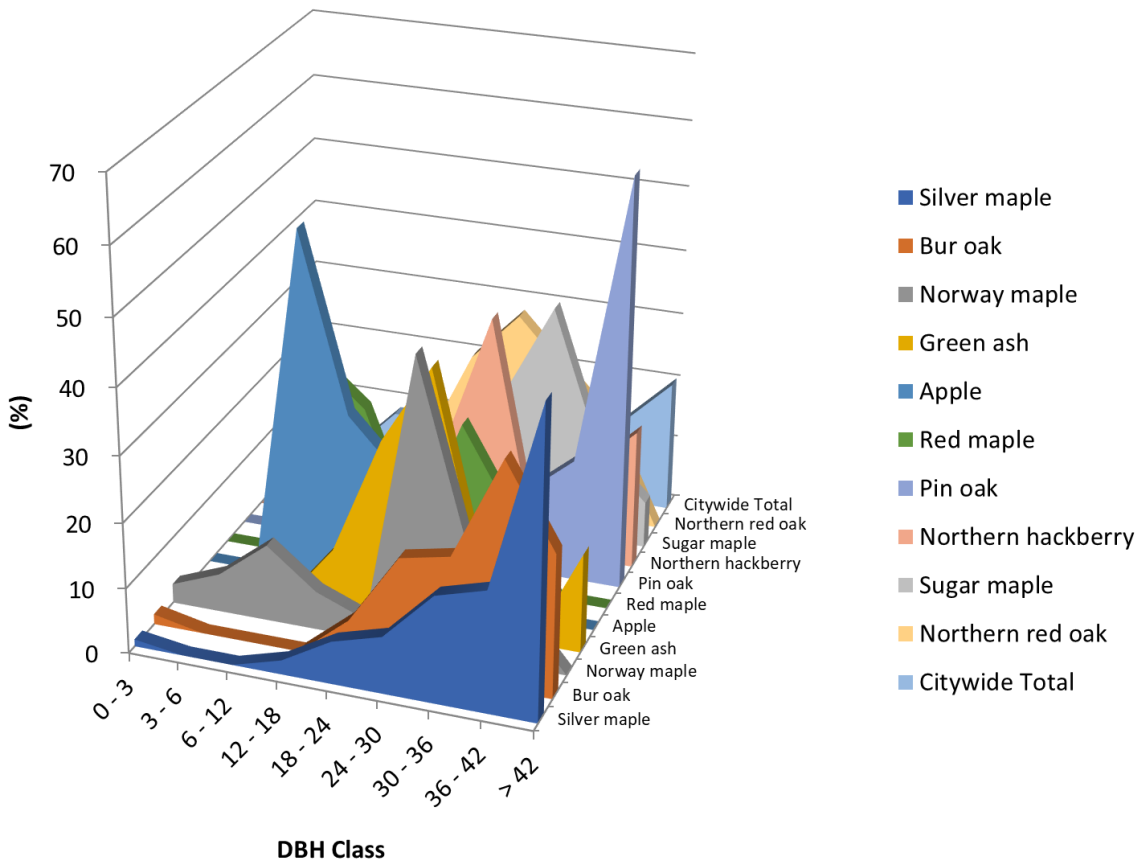
2/1/2021



Species	Percent
Silver maple	19.5
Bur oak	13.6
Norway maple	7.2
Green ash	7.0
Apple	5.5
Red maple	3.4
Pin oak	3.4
Northern hackberry	3.0
Sugar maple	3.0
Northern red oak	2.8
Other Species	31.8
Total	100.0

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

2/1/2021



Species	DBH class (in)								
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	> 42
Silver maple	1.09	0.00	0.00	2.17	6.52	8.70	16.30	18.48	46.74
Bur oak	1.56	0.00	0.00	0.00	6.25	17.19	18.75	34.38	21.88
Norway maple	2.94	5.88	11.76	5.88	2.94	44.12	17.65	8.82	0.00
Green ash	0.00	0.00	0.00	9.09	27.27	39.39	9.09	0.00	15.15
Apple	0.00	0.00	53.85	26.92	19.23	0.00	0.00	0.00	0.00
Red maple	0.00	0.00	31.25	25.00	6.25	25.00	12.50	0.00	0.00
Pin oak	0.00	0.00	0.00	0.00	0.00	6.25	12.50	18.75	62.50
Northern hackberry	0.00	0.00	0.00	14.29	14.29	35.71	0.00	14.29	21.43
Sugar maple	0.00	0.00	7.14	0.00	14.29	21.43	35.71	14.29	7.14
Northern red oak	0.00	0.00	0.00	7.69	23.08	30.77	23.08	15.38	0.00
Citywide Total	0.85	1.06	8.47	8.69	10.81	21.61	15.04	13.14	20.34

Figure 3: Foliage Condition

### Functional (Foliage) Condition of Public Trees by Zone

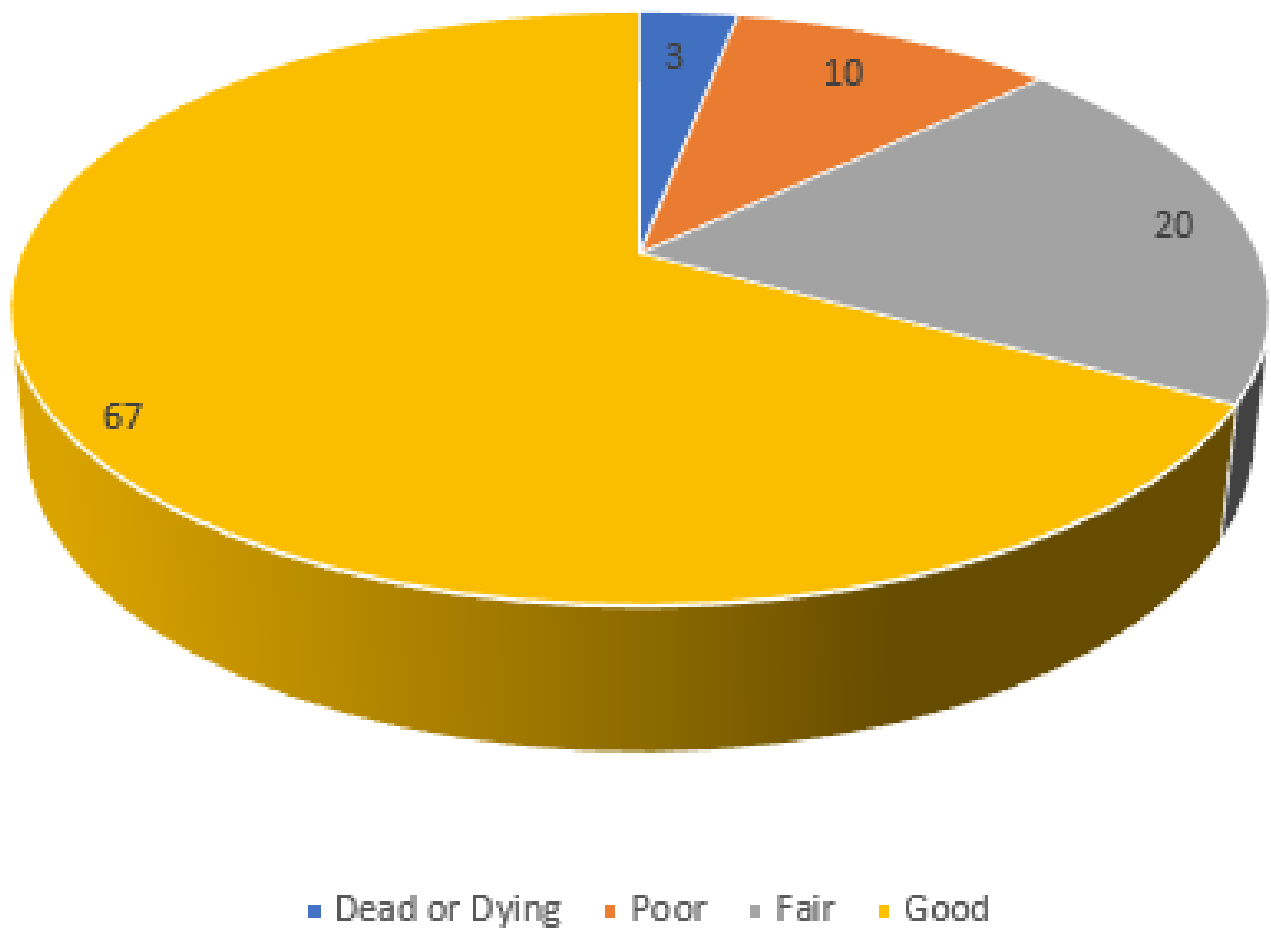
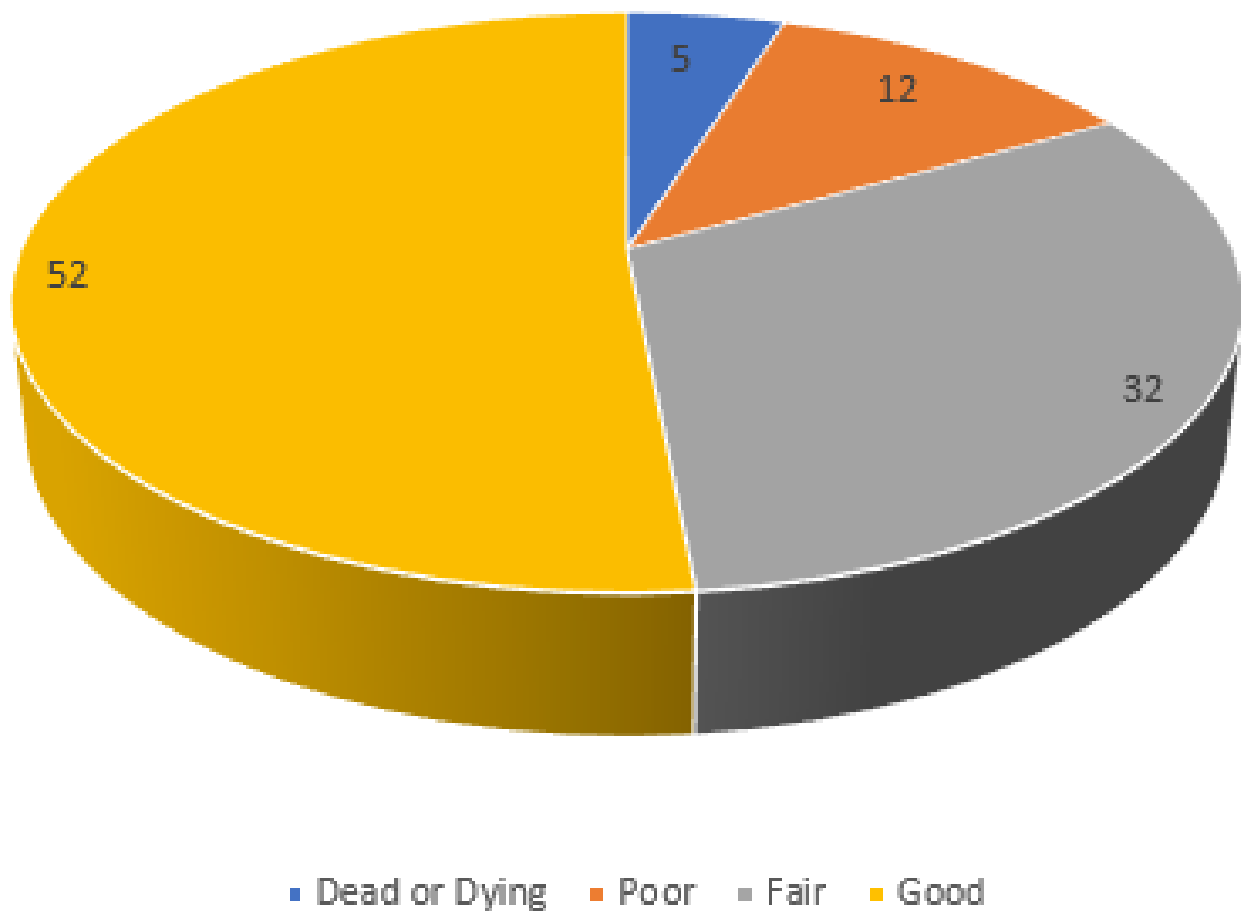


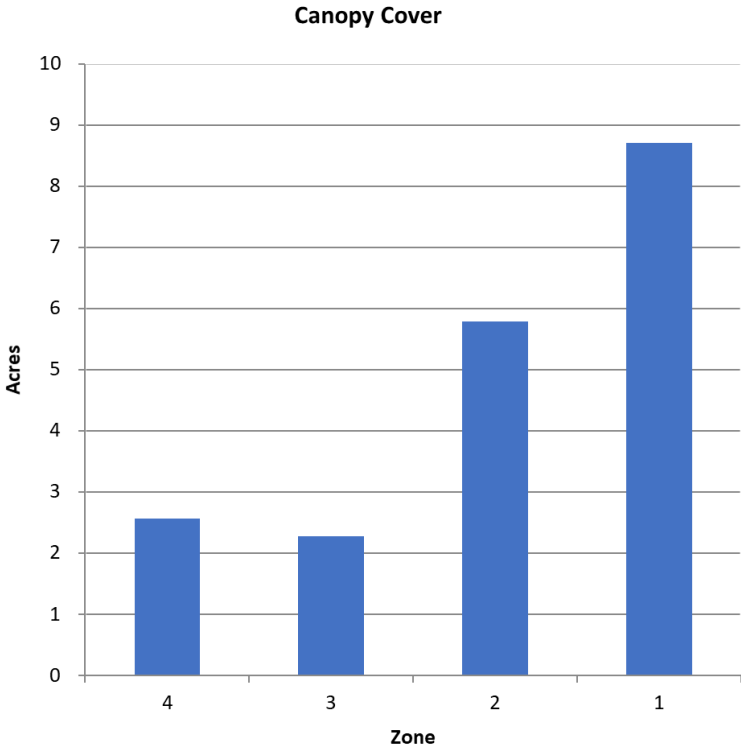
Figure 4: Wood Condition

### Structural (Woody) Condition of Public Trees by Zone



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

2/1/2021

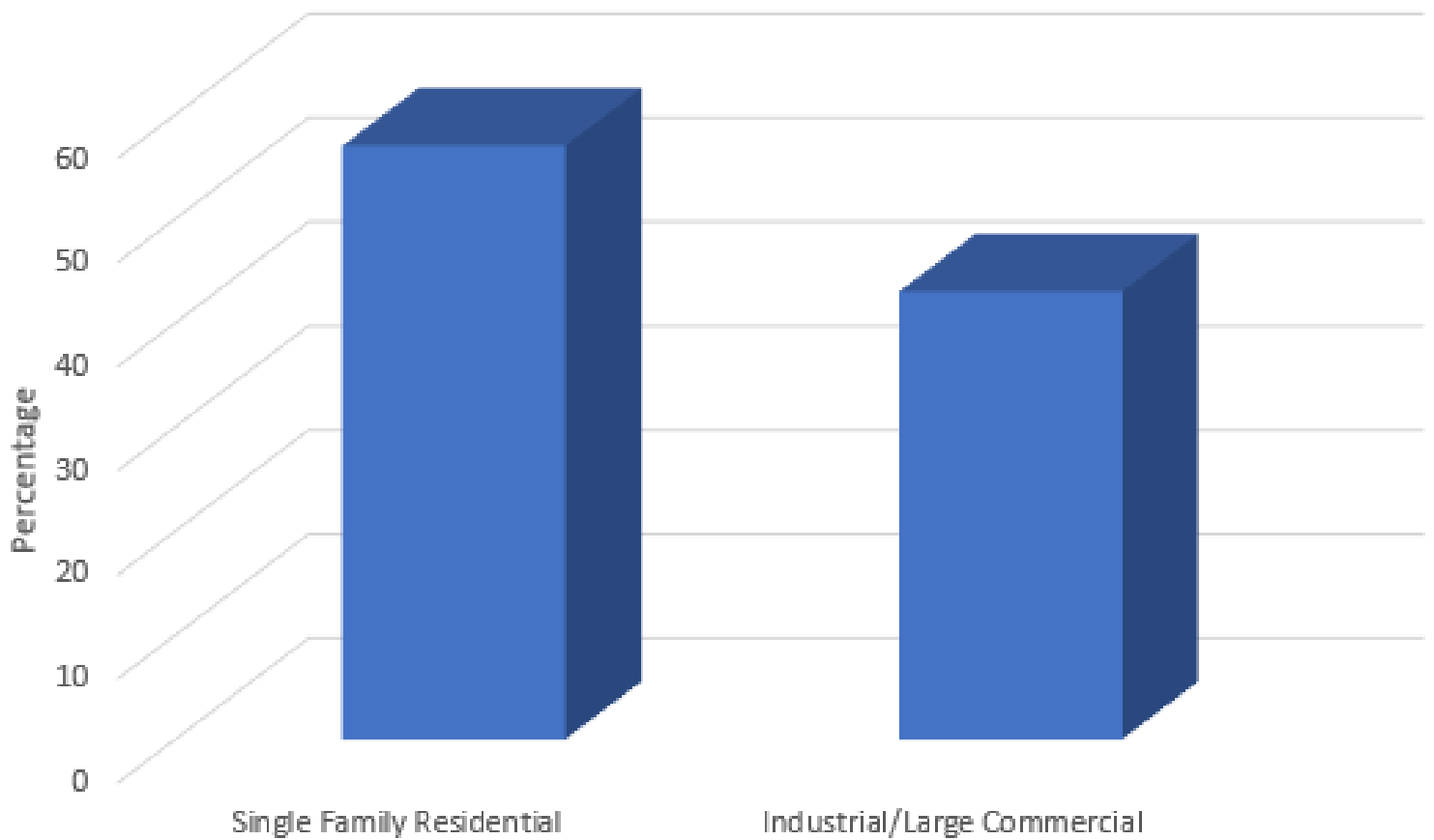


Zone	Acres	% of Total Canopy Cover
4	3	13.3
3	2	11.8
2	6	29.9
1	9	45.0
Citywide total	19	100.0

	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	19	0.00	0.00

Figure 6: Land Use of City/Park Trees

### Land Use of Public Trees by Zone



## APPENDIX B: ArcGIS MAPPING



# ArcGIS

Figure 1: Location of Ash Trees

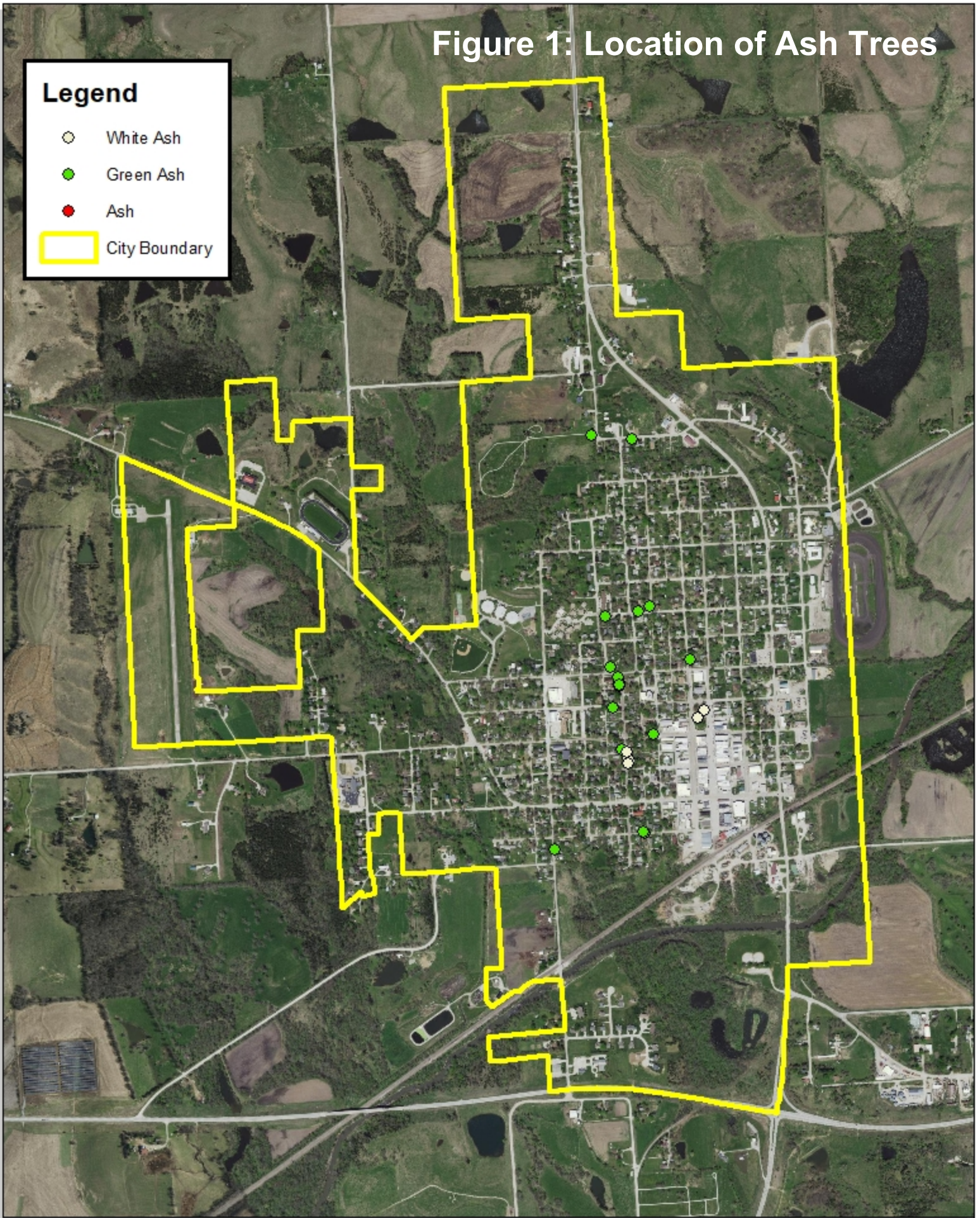
**Legend**

○ White Ash

● Green Ash

● Ash

□ City Boundary



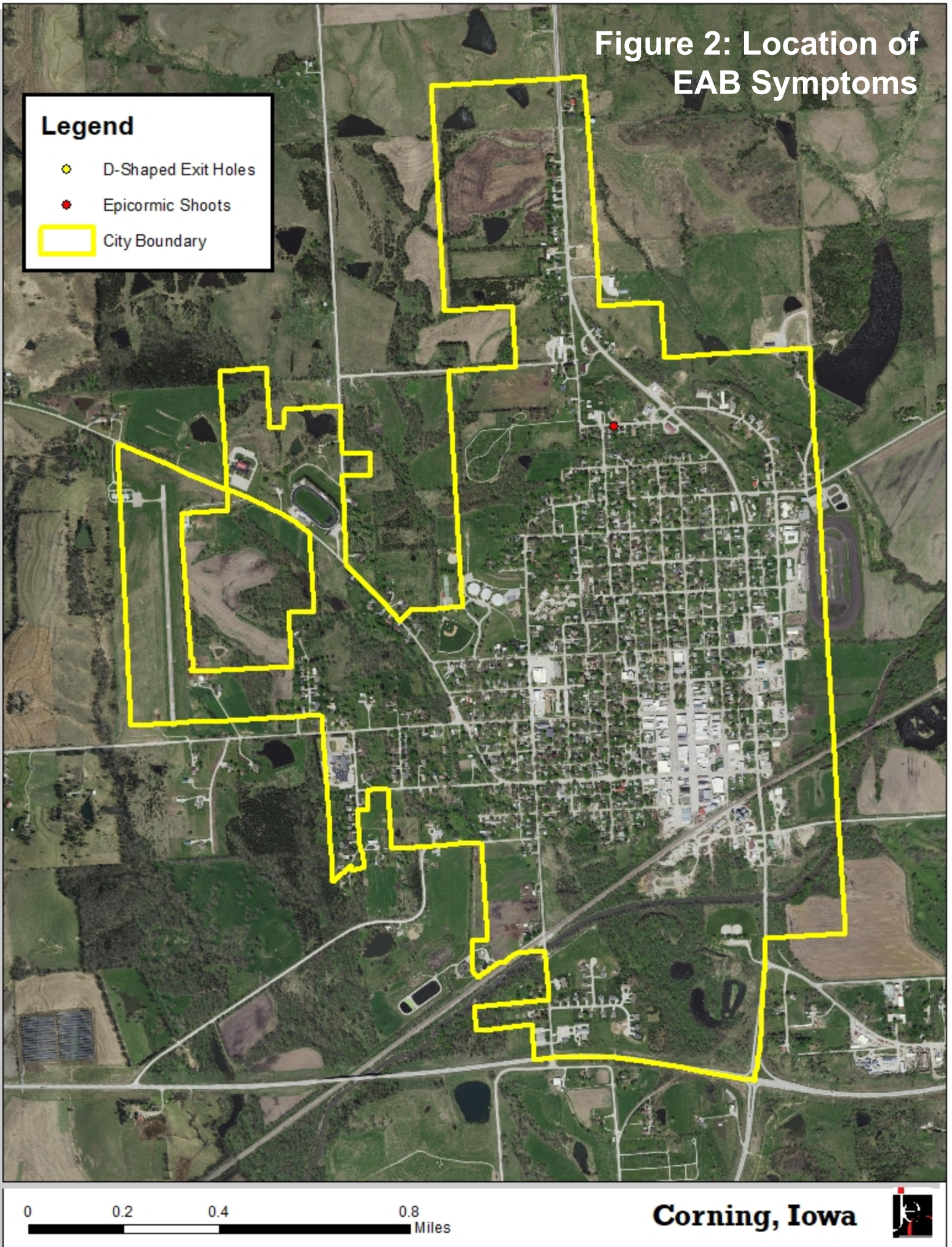
0 0.225 0.45 0.9 Miles

**Corning, Iowa**





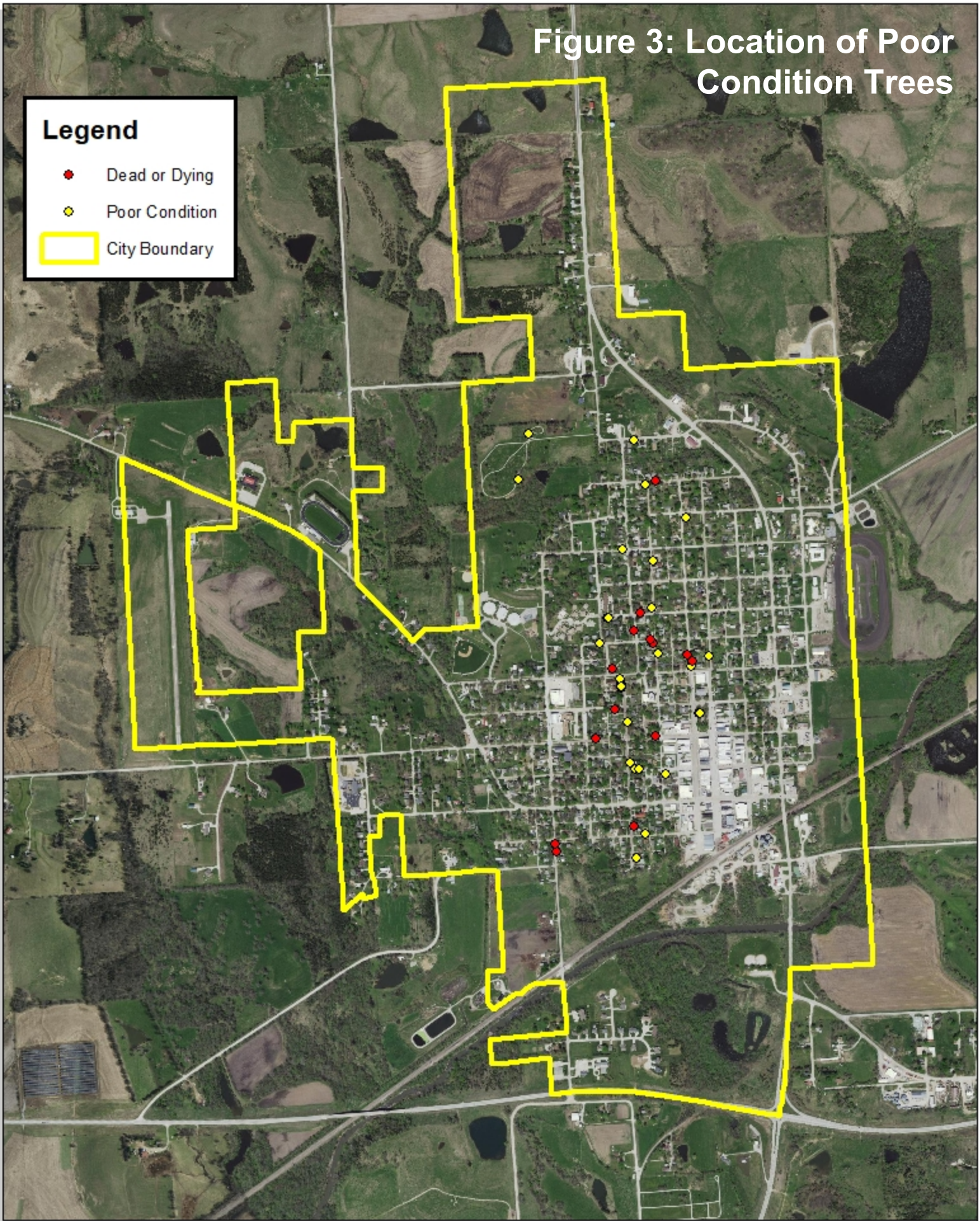
**Figure 2: Location of EAB Symptoms**



**Figure 3: Location of Poor Condition Trees**

**Legend**

- Dead or Dying
- ◆ Poor Condition
- City Boundary



0 0.225 0.45 0.9 Miles

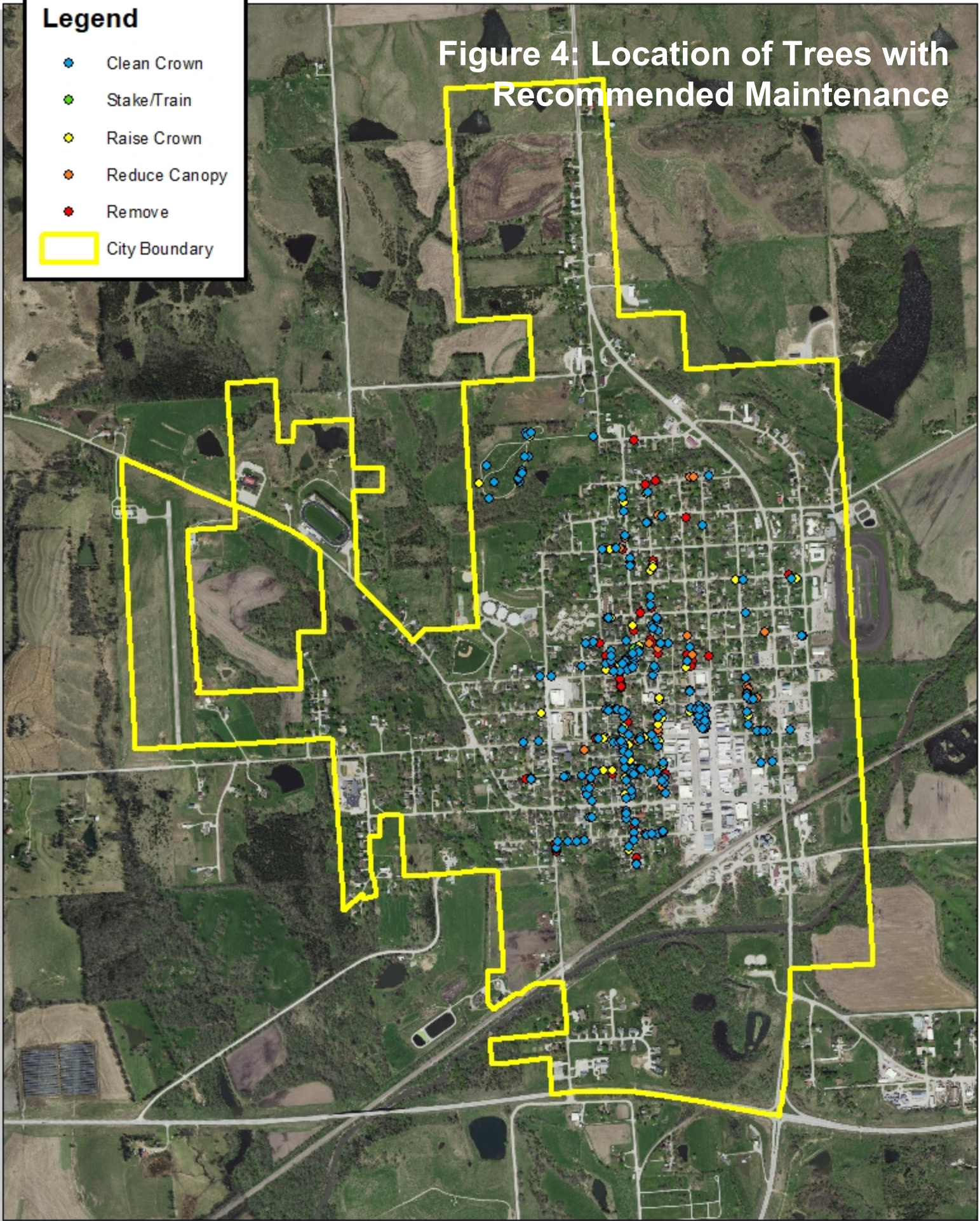
**Corning, Iowa**



# Legend

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

## Figure 4: Location of Trees with Recommended Maintenance



0 0.225 0.45 0.9 Miles

Corning, Iowa



## APPENDIX C: CORNING TREE ORDINANCES

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### CHAPTER 151

#### TREES AND GRASS

151.01 Definition 151.05 Disease Control

151.02 Planting Restrictions 151.06 Inspection and Removal

151.03 Duty to Trim Trees 151.07 Cutting or Mowing of Grass

151.04 Trimming Trees to be Supervised

**151.01 DEFINITION.** For use in this chapter, “boulevard” 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.

**151.02 PLANTING RESTRICTIONS.** No tree shall be planted in any boulevard or street except in accordance with the following:

1. **Alignment.** All trees planted in any street shall be planted in the boulevard midway between the outer line of the sidewalk and the curb. In the event a curb line is not established, trees shall be planted on a line ten (10) feet from the property line.
2. **Spacing.** Trees shall not be planted on any boulevard which is less than nine (9) feet in width, or contains less than eighty-one (81) square feet of exposed soil surface per tree. Trees shall not be planted closer than twenty (20) feet from street intersections (property lines extended) and ten (10) feet from driveways. If it is at all possible trees should be planted inside the property lines and not between the sidewalk and the curb.
3. **Prohibited Trees.** No person shall plant in any street any fruit-bearing tree or any tree of the kinds commonly known as cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut.

**151.03 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 eighteen (18) feet above the surface of a street, twenty (20) feet above the surface of a primary highway, and eight (8) feet above the sidewalks. If the abutting property owner fails to trim the trees, the City may serve notice on the abutting property owner requiring that such action be taken within five (5) days. If such action is not taken 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[2c, d, & e])

**151.04 TRIMMING TREES TO BE SUPERVISED.** Except as allowed in Section 151.03, it is 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.

**151.05 DISEASE CONTROL.** Any dead, diseased or damaged tree or shrub which may harbor serious insect or disease pests or disease injurious to other trees is hereby declared to be a nuisance.

**151.06 INSPECTION AND REMOVAL.** The Council shall inspect or cause to be inspected any trees or shrubs in the City reported or suspected to be infected with or damaged by any disease or insect or disease pests, and such trees and shrubs shall be subject to removal as follows:

1. **City Property.** If it is determined that any such condition exists on any public property, including the strip between the curb and the lot line of private property, the Council may cause such condition to be corrected by treatment or removal. The Council may also order the removal of any trees on the streets of the City which interfere with the making of improvements or with travel thereon.
2. **Private Property.** If it is determined with reasonable certainty that any such condition exists on private property and that the danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Council shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days of said notification. If such owner, occupant or person in charge of said property fails to comply within 14 days of receipt of notice, the Council may cause the condition to be corrected and the cost assessed against the property.

(Code of Iowa, Sec. 364.12[3b & h])

**151.07 CUTTING OR MOWING OF GRASS.**

1. **Duty to Cut and Mow Lawns and Lots.** The owner of any property shall cut and mow all lawns and lots so that such growth shall be less than four (4) inches at all times.
2. **Cutting and Mowing by City.** If a property owner refuses or fails to cut and mow lawns and lots within forty-eight(48) hours after being delivered a notice from the City to perform such action, the Council may require said work to be done and the cost and expenses thereof shall be assessed to the property owner after due notice is given. The amount of such assessment

shall be certified to the County Auditor as provided by law and the same shall be collected with and in the same manner as general property taxes.

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.