# Conrad, IA

# 2019 URBAN FOREST MANAGEMENT PLAN

IOWA DEPARTMENT OF NATURAL RESOURCES

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# Executive Summary

## Overview

This plan was developed to assist the City of Conrad 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 8.5% of Conrad'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 2019, 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 438 trees inventoried.

- Conrad's trees provide $87,840 of benefits annually, an average of $200.55 per tree
- There are over 25 species of trees
- The top three genera are: Maple 39%, Oak 15%, and Ash 8.5%
- 2.5% of trees need some type of management
- 3 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 3 trees needing removal, 1 tree is 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*
- All 38 ash trees should be carefully examined, as they may develop 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 12 years to remove ash. We suggest that city officials request a budget increase to $3,500 annually and apply for grants to plant replacement trees.

# Introduction

This plan was developed to assist Conrad 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 Conrad, 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 Conrad'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 Conrad 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 Conrad urban forestry goals.

# Inventory

In 2019, JEO conducted a tree inventory that included 100% of the city-owned trees on both streets and parks. The team collected tree data using a handheld Global Positioning System (GPS) receiver. The data collector gives Geographic Information Systems (GIS) coordinates with an accuracy of 3 meters, which can be used in Arc GIS as an active GIS data layer. Because the inventory is a digital document the data can be updated with new information and become a working document.

The 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 ft, recommended maintenance, priority of that maintenance, leaf health, and wood condition. Additionally, for all ash trees, the team notes signs and symptoms associated with EAB including canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

# Inventory Results

JEO entered the data collected for the 438 city trees into the USDA Forest service program Street Tree Resource Analysis Tool for Urban forestry Management as part of the i-Tree suite. Below are results from the i-Tree STREETS analysis.

# Annual Benefits

### Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Conrad's trees reduce energy-related costs by approximately $24,189 annually (Appendix A, Table 1). These savings are both in electricity (114.5 MWh) and in natural gas (15,810.9 Therms).

### Annual Stormwater Benefits

Conrad's trees intercept about 1,433,856 gallons of rainfall or snow melt per year (Appendix A, Table 2). This interception provides $38,857 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 Conrad, it is estimated that trees remove 1,528.1 lbs of air pollution (ozone ($O_3$), particulate matter less than 10 microns (PM10), carbon monoxide (CO), nitrogen dioxide ($NO_2$), and sulfur dioxide ($SO_2$)) per year with a net value of $4,278 (Appendix A, Table 3).

### Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Conrad, trees sequester about 207,326 lbs of carbon per year with an associated value of $1,555 (Appendix A, Table 5). In addition, the trees store 5,454,016 lbs of carbon, with a yearly benefit of $40,905 (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. Conrad receives $17,726 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, Conrad's trees provide $87,840 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 438 trees in Conrad provide approximately $200.55 annually (Appendix A, Table 7).

# Forest Structure

**Species Distribution**

Conrad has over 25 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

| | | |
|---|---|---|
| Maple | 171 | 39% |
| Oak | 65 | 15% |
| Ash | 38 | 8.5% |
| Spruce | 36 | 8% |
| Broadleaf Deciduous | 24 | 5% |
| Pine | 18 | 4% |
| Pear | 13 | 3% |
| Hackberry | 11 | 2.5% |
| Linden/Basswood | 9 | 2% |
| Walnut | 9 | 2% |
| Locust | 7 | 1% |
| Boxelder | 6 | 1% |
| Birch | 6 | 1% |
| Alder | 4 | 1% |
| Sycamore | 3 | <1% |
| Cottonwood | 2 | <1% |
| Hickory | 2 | <1% |
| Elm | 2 | <1% |
| Tulip tree | 2 | <1% |
| Ginkgo | 1 | <1% |
| Cherry | 1 | <1% |
| | | |
| Other Evergreen | 5 | 1% |

**Age Class**

Most of Conrad's trees (34.25%) are between 30 and 42 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. Conrad's size curve indicates 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 Conrad indicate that 87% of the trees are in good health, with only 2.5% of the foliage in poor health, dead, or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 83% of Conrad's trees are in good health for wood condition (Appendix A, Figure 4 & Appendix B, Figure 3). Three percent of the tree population's wood condition is in poor health, dead, or dying. This 3% is an estimate of trees that need management follow up.

**Management Needs**

The following outlines the specific management needs of the street and park trees by number of trees and percent of canopy (Appendix B, Figure 3).

| | | |
|---|---|---|
| Crown Cleaning | 0 | 0% |
| Crown Raising | 0 | 0% |
| Tree Staking | 0 | 0% |
| Tree Removal | 3 | <1% |
| Crown Reduction | 0 | 0% |
| Treat Pest/Disease | 8 | 2% |

**Land Use and Location**

The majority of Conrad'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 | |
|---|---|
| Single family residential | 77% |
| Park/vacant/other | 0% |
| Industrial/Large commercial | 22.6% |
| Small commercial | 0.46% |
| Multifamily residential | 2% |

# Recommendations

**Risk Management**

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

Hazardous trees

Conrad has 3 trees suggested for immediate removal. These trees in addition to other trees needing maintenance can be seen on the Location of Trees with Recommended Maintenance map (Appendix B, Figure 4). We recommend starting with the large-diameter, critical concern trees first. There is 1 tree over 24 inches in diameter at 4.5 ft that should be addressed immediately. Please refer to the Proposed Work Schedule and Budget at the end of this section. After all the critical concern trees are addressed, there should be follow up on the trees marked as needing maintenance. There are a total of 8 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). There are a total of 38 ash trees, and so far none of them have signs and symptoms that have been associated with EAB. In addition, there are 14 trees that are in poor health. *City ownership of the trees recommended for removal should be verified prior to any removal*

### Pruning Cycle

Proper pruning can extend the life and good health of trees, as well as reduce public safety issues. In the Management Needs section of the Findings there are four main maintenance issues to be addressed: routine pruning, crown cleaning, crown raising, and crown reduction. Crown cleaning removes dead, diseased, and damaged limbs. Crown raising removes lower branches that are two inches in diameter or larger to provide clearance for pedestrians or vehicles. Crown reduction removes individual limbs from structures or utility wires. We recommend that all trees be pruned on a routine schedule every five to seven years. Please refer to the Six Year Maintenance Plan 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%. 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 Conrad.

It is important to plant a diverse mix of species in the urban forest to maintain canopy health, since most insects and diseases target a genus (ash) or species (green ash) of trees. Current diversity recommendations advise that a genus (i.e. maple, oak) not make up more than 20% of the urban forest and a single species (i.e. silver maple, sugar maple, white oak, bur oak) not make up more than 10% of the total urban forest. Presently, the forest is heavily planted with maple (39%) (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: 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. 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 ash, maple, 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 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 fourteen (14) days of receipt of notice, the Council may cause the condition to be corrected and the cost assessed against the property."

# Proposed Work Schedule and Budget

Budget Allowance of $2,216/Year – (Based off $2/Capita Calculation Due to no City Reporting)

| **YEAR 1** | **ESTIMATED COSTS** |
|---|---|
| Remove 2 trees recommended for immediate removal | $1,400 |
| Plant 5 trees in open locations | $750 |
| Visual Survey of EAB Signs/Symptoms | |
| **YEAR 2** | |
| Remove 1 tree recommended for immediate removal | $700 |
| Remove 1 ash tree (prioritize largest diameter) | $700 |
| Plant 5 trees in open locations | $750 |
| Visual Survey of EAB Signs/Symptoms | |
| **YEAR 3** | |
| Remove 2 ash trees (prioritize largest diameter) | $1,400 |
| Plant 5 trees in open locations | $750 |
| Visual Survey of EAB Signs/Symptoms | |
| **YEAR 4** | |
| Remove 2 ash trees (prioritize largest diameter) | $1,400 |
| Plant 5 trees in open locations | $750 |
| Visual Survey of EAB Signs/Symptoms | |
| **YEAR 5** | |
| Remove 2 ash trees (prioritize largest diameter) | $1,400 |
| Plant 5 trees in open locations | $750 |
| Visual Survey of EAB Signs/Symptoms | |

**YEAR 6**

| | |
|---|---|
| Remove 2 ash trees (prioritize largest diameter) | $1,400 |
| Plant 5 trees in open locations | $750 |
| Visual Survey of EAB Signs/Symptoms | |

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 $4,500 a year. If the budget were increased to $3,500 a year all ash could be removed in 7.5 years.

# Proposed Work Schedule with Increased Budget

Budget Allowance of $3,500/Year – (Budget Increase Suggested to Best Manage City Trees)

| **YEAR 1** | **ESTIMATED COSTS** |
|---|---|
| Remove 3 trees recommended for immediate removal | $2,100 |
| Remove 1 ash tree (prioritize largest diameter) | $700 |
| Plant 4 trees in open locations | $600 |
| Visual Survey of EAB Signs/Symptoms | |

**YEAR 2**

| | |
|---|---|
| Remove 1 ash tree (prioritize largest diameter) | $700 |
| Plant 4 trees in open locations | $600 |
| Prune 1/3 of City Owned Trees | $2,190 |
| Visual Survey of EAB Signs/Symptoms | |

**YEAR 3**

| | |
|---|---|
| Remove 4 ash trees (prioritize largest diameter) | $2,800 |
| Plant 4 trees in open locations | $600 |
| Visual Survey of EAB Signs/Symptoms | |

**YEAR 4**

| | |
|---|---|
| Remove 1 ash tree (prioritize largest diameter) | $700 |
| Plant 4 trees in open locations | $600 |
| Prune 1/3 of City Owned Trees | $2,190 |
| Visual Survey of EAB Signs/Symptoms | |

## YEAR 5

| | |
|---|---|
| Remove 4 ash trees (prioritize largest diameter) | $2,800 |
| Plant 4 trees in open locations | $600 |
| Visual Survey of EAB Signs/Symptoms | |

## YEAR 6

| | |
|---|---|
| Remove 1 ash tree (prioritize largest diameter) | $700 |
| Plant 4 trees in open locations | $600 |
| Prune 1/3 of City Owned Trees | $2,190 |
| Visual Survey of EAB Signs/Symptoms | |

Purposed Budget Increase

EAB could potentially kill all ash trees in Conrad within four years of its arrival. To remove all ash trees within six years, the budget would need to be increased to $4,500 a year. If the budget were increased to $3,500 per year all ash could be removed within 7.5 years. Additionally, we recommend that Conrad 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 4 trees could be treated per year (every other year treatment). Eight trees would be selected for treatment, and Conrad would still need to find $21,000 for removal of the remaining ash. Alternatively, if there are 5 treatable trees, it would cost approximately $1,500 a year for treatment and leave $2,000 for removal. These are alternatives to straight removal of ash trees. However, whether the treatment option is selected, there will be an increased cost of dealing with ash trees if EAB is found in Conrad. We suggest considering an increased budget to plan for this.

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# Appendix A: i-Tree Data

**Table 1: Annual Energy Benefits**

## Annual Energy Benefits of Public Trees

4/16/2020

| Species | Total Electricity (MWh) | Electricity ($) | Total Natural Gas (Therms) | Natural Gas ($) | Total ($) | Standard Error | % of Total Trees | % of Total $ | Avg. $/tree |
|---|---|---|---|---|---|---|---|---|---|
| Norway maple | 20.6 | 1,560 | 3,007.5 | 2,947 | 4,507 | (N/A) | 15.8 | 18.6 | 65.32 |
| Silver maple | 17.5 | 1,326 | 2,329.3 | 2,283 | 3,608 | (N/A) | 10.7 | 14.9 | 76.77 |
| Red maple | 9.8 | 740 | 1,333.9 | 1,307 | 2,047 | (N/A) | 9.4 | 8.5 | 49.94 |
| Northern red oak | 7.4 | 560 | 1,022.2 | 1,002 | 1,561 | (N/A) | 7.8 | 6.5 | 45.92 |
| Green ash | 9.1 | 691 | 1,228.5 | 1,204 | 1,895 | (N/A) | 6.6 | 7.8 | 65.36 |
| Norway spruce | 2.4 | 179 | 317.4 | 311 | 490 | (N/A) | 4.1 | 2.0 | 27.20 |
| Broadleaf Deciduous Me | 2.8 | 210 | 386.1 | 378 | 588 | (N/A) | 3.9 | 2.4 | 34.60 |
| Pear | 2.4 | 183 | 364.5 | 357 | 540 | (N/A) | 3.0 | 2.2 | 41.53 |
| Blue spruce | 2.0 | 155 | 285.6 | 280 | 435 | (N/A) | 3.0 | 1.8 | 33.43 |
| Eastern white pine | 1.9 | 147 | 255.9 | 251 | 398 | (N/A) | 2.7 | 1.6 | 33.15 |
| Northern hackberry | 5.1 | 385 | 698.7 | 685 | 1,070 | (N/A) | 2.5 | 4.4 | 97.25 |
| Black maple | 2.3 | 174 | 316.0 | 310 | 484 | (N/A) | 2.5 | 2.0 | 43.97 |
| Northern pin oak | 2.9 | 223 | 435.7 | 427 | 650 | (N/A) | 2.3 | 2.7 | 64.99 |
| Black walnut | 3.3 | 254 | 452.5 | 443 | 697 | (N/A) | 2.1 | 2.9 | 77.45 |
| Littleleaf linden | 2.1 | 158 | 301.1 | 295 | 453 | (N/A) | 1.8 | 1.9 | 56.60 |
| Scarlet oak | 3.2 | 246 | 443.8 | 435 | 681 | (N/A) | 1.8 | 2.8 | 85.13 |
| White ash | 4.1 | 312 | 489.4 | 480 | 792 | (N/A) | 1.8 | 3.3 | 99.02 |
| Broadleaf Deciduous Sm | 0.1 | 10 | 23.4 | 23 | 33 | (N/A) | 1.6 | 0.1 | 4.75 |
| Honeylocust | 2.6 | 195 | 331.9 | 325 | 520 | (N/A) | 1.6 | 2.1 | 74.28 |
| Austrian pine | 0.8 | 60 | 104.1 | 102 | 162 | (N/A) | 1.4 | 0.7 | 27.08 |
| Bur oak | 2.4 | 181 | 323.8 | 317 | 499 | (N/A) | 1.4 | 2.1 | 83.09 |
| Boxelder | 0.5 | 41 | 71.6 | 70 | 111 | (N/A) | 1.4 | 0.5 | 18.56 |
| Birch | 1.2 | 93 | 185.0 | 181 | 274 | (N/A) | 1.4 | 1.1 | 45.63 |
| Black spruce | 0.7 | 55 | 96.4 | 94 | 150 | (N/A) | 1.1 | 0.6 | 29.92 |
| Alder | 0.0 | 2 | 5.7 | 6 | 8 | (N/A) | 0.9 | 0.0 | 2.00 |
| White oak | 1.4 | 104 | 183.1 | 179 | 284 | (N/A) | 0.9 | 1.2 | 70.90 |
| Swamp white oak | 0.2 | 19 | 39.9 | 39 | 58 | (N/A) | 0.7 | 0.2 | 19.31 |
| American sycamore | 0.9 | 67 | 118.4 | 116 | 183 | (N/A) | 0.7 | 0.8 | 60.90 |
| Hickory | 0.9 | 66 | 118.0 | 116 | 182 | (N/A) | 0.5 | 0.8 | 91.02 |
| Cottonwood | 0.7 | 50 | 93.7 | 92 | 142 | (N/A) | 0.5 | 0.6 | 70.91 |
| Chinese elm | 0.7 | 53 | 97.1 | 95 | 148 | (N/A) | 0.5 | 0.6 | 74.17 |
| Maple | 0.3 | 22 | 35.3 | 35 | 57 | (N/A) | 0.5 | 0.2 | 28.40 |
| Conifer Evergreen Mediu | 0.2 | 14 | 25.4 | 25 | 39 | (N/A) | 0.5 | 0.2 | 19.66 |
| Conifer Evergreen Large | 0.4 | 28 | 49.2 | 48 | 76 | (N/A) | 0.5 | 0.3 | 38.17 |
| Tulip tree | 0.0 | 0 | 0.9 | 1 | 1 | (N/A) | 0.5 | 0.0 | 0.66 |
| Eastern redbud | 0.1 | 11 | 25.7 | 25 | 36 | (N/A) | 0.5 | 0.2 | 18.19 |
| American basswood | 0.4 | 27 | 51.4 | 50 | 77 | (N/A) | 0.2 | 0.3 | 77.27 |
| Black cherry | 0.2 | 14 | 24.7 | 24 | 38 | (N/A) | 0.2 | 0.2 | 38.13 |
| Southern magnolia | 0.3 | 20 | 36.3 | 36 | 56 | (N/A) | 0.2 | 0.2 | 55.99 |
| Broadleaf Deciduous Lar | 0.0 | 2 | 3.7 | 4 | 6 | (N/A) | 0.2 | 0.0 | 5.82 |
| Ginkgo | 0.2 | 18 | 32.0 | 31 | 49 | (N/A) | 0.2 | 0.2 | 49.28 |
| Black ash | 0.2 | 18 | 29.5 | 29 | 47 | (N/A) | 0.2 | 0.2 | 46.78 |
| Sugar maple | 0.3 | 20 | 36.7 | 36 | 56 | (N/A) | 0.2 | 0.2 | 55.65 |
| Total | 114.5 | 8,694 | 15,810.9 | 15,495 | 24,189 | (N/A) | 100.0 | 100.0 | 55.23 |

**Table 2: Annual Stormwater Benefits**

## Annual Stormwater Benefits of Public Trees

4/16/2020

| Species | Total rainfall interception (Gal) | Total ($) | Standard Error | % of Total Trees | % of Total $ | Avg. $/tree |
|---|---|---|---|---|---|---|
| Norway maple | 226,008 | 6,125 | (N/A) | 15.8 | 15.8 | 88.77 |
| Silver maple | 279,317 | 7,569 | (N/A) | 10.7 | 19.5 | 161.05 |
| Red maple | 87,553 | 2,373 | (N/A) | 9.4 | 6.1 | 57.87 |
| Northern red oak | 76,807 | 2,081 | (N/A) | 7.8 | 5.4 | 61.22 |
| Green ash | 107,535 | 2,914 | (N/A) | 6.6 | 7.5 | 100.49 |
| Norway spruce | 48,146 | 1,305 | (N/A) | 4.1 | 3.4 | 72.49 |
| Broadleaf Deciduous Medi | 19,837 | 538 | (N/A) | 3.9 | 1.4 | 31.62 |
| Pear | 12,323 | 334 | (N/A) | 3.0 | 0.9 | 25.69 |
| Blue spruce | 35,238 | 955 | (N/A) | 3.0 | 2.5 | 73.46 |
| Eastern white pine | 42,377 | 1,148 | (N/A) | 2.7 | 3.0 | 95.70 |
| Northern hackberry | 62,658 | 1,698 | (N/A) | 2.5 | 4.4 | 154.37 |
| Black maple | 21,833 | 592 | (N/A) | 2.5 | 1.5 | 53.79 |
| Northern pin oak | 33,180 | 899 | (N/A) | 2.3 | 2.3 | 89.92 |
| Black walnut | 46,388 | 1,257 | (N/A) | 2.1 | 3.2 | 139.68 |
| Littleleaf linden | 24,712 | 670 | (N/A) | 1.8 | 1.7 | 83.71 |
| Scarlet oak | 49,370 | 1,338 | (N/A) | 1.8 | 3.4 | 167.24 |
| White ash | 60,477 | 1,639 | (N/A) | 1.8 | 4.2 | 204.87 |
| Broadleaf Deciduous Small | 419 | 11 | (N/A) | 1.6 | 0.0 | 1.62 |
| Honeylocust | 32,793 | 889 | (N/A) | 1.6 | 2.3 | 126.96 |
| Austrian pine | 11,570 | 314 | (N/A) | 1.4 | 0.8 | 52.26 |
| Bur oak | 33,741 | 914 | (N/A) | 1.4 | 2.4 | 152.40 |
| Boxelder | 3,726 | 101 | (N/A) | 1.4 | 0.3 | 16.83 |
| Birch | 11,766 | 319 | (N/A) | 1.4 | 0.8 | 53.14 |
| Black spruce | 11,250 | 305 | (N/A) | 1.1 | 0.8 | 60.98 |
| Alder | 91 | 2 | (N/A) | 0.9 | 0.0 | 0.62 |
| White oak | 18,534 | 502 | (N/A) | 0.9 | 1.3 | 125.57 |
| Swamp white oak | 1,335 | 36 | (N/A) | 0.7 | 0.1 | 12.06 |
| American sycamore | 14,496 | 393 | (N/A) | 0.7 | 1.0 | 130.94 |
| Hickory | 14,478 | 392 | (N/A) | 0.5 | 1.0 | 196.17 |
| Cottonwood | 7,886 | 214 | (N/A) | 0.5 | 0.5 | 106.85 |
| Chinese elm | 9,830 | 266 | (N/A) | 0.5 | 0.7 | 133.19 |
| Maple | 1,741 | 47 | (N/A) | 0.5 | 0.1 | 23.59 |
| Conifer Evergreen Medium | 2,300 | 62 | (N/A) | 0.5 | 0.2 | 31.16 |
| Conifer Evergreen Large | 9,209 | 250 | (N/A) | 0.5 | 0.6 | 124.79 |
| Tulip tree | 36 | 1 | (N/A) | 0.5 | 0.0 | 0.48 |
| Eastern redbud | 529 | 14 | (N/A) | 0.5 | 0.0 | 7.17 |
| American basswood | 4,609 | 125 | (N/A) | 0.2 | 0.3 | 124.90 |
| Black cherry | 667 | 18 | (N/A) | 0.2 | 0.0 | 18.06 |
| Southern magnolia | 3,187 | 86 | (N/A) | 0.2 | 0.2 | 86.37 |
| Broadleaf Deciduous Large | 172 | 5 | (N/A) | 0.2 | 0.0 | 4.65 |
| Ginkgo | 1,857 | 50 | (N/A) | 0.2 | 0.1 | 50.33 |
| Black ash | 1,409 | 38 | (N/A) | 0.2 | 0.1 | 38.19 |
| Sugar maple | 2,466 | 67 | (N/A) | 0.2 | 0.2 | 66.84 |
| Citywide total | 1,433,856 | 38,857 | (N/A) | 100.0 | 100.0 | 88.72 |

## Table 3: Annual Air Quality Benefits

**Annual Air Quality Benefits of Public Trees**

4/16/2020

| Species | Deposition (lb) $O_3$ | $NO_2$ | $PM_{10}$ | $SO_2$ | Total Depos. ($) | Avoided (lb) $NO_2$ | $PM_{10}$ | VOC | $SO_2$ | Total Avoided ($) | BVOC Emissions (lb) | BVOC Emissions ($) | Total (lb) | Total ($) | Standard Error | % of Total Trees | Avg. $/tree |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Norway maple | 50.4 | 8.7 | 24.2 | 2.2 | 271 | 100.0 | 14.4 | 13.7 | 93.2 | 619 | -11.5 | -43 | 295.6 | 847 | (N/A) | 15.8 | 12.27 |
| Silver maple | 53.4 | 9.1 | 25.7 | 2.4 | 287 | 82.6 | 12.1 | 11.5 | 79.0 | 516 | -28.2 | -106 | 247.6 | 697 | (N/A) | 10.7 | 14.83 |
| Red maple | 21.5 | 3.7 | 10.0 | 1.0 | 115 | 46.5 | 6.8 | 6.5 | 44.2 | 290 | -7.2 | -27 | 132.9 | 377 | (N/A) | 9.4 | 9.21 |
| Northern red oak | 16.4 | 2.8 | 7.9 | 0.7 | 88 | 35.3 | 5.1 | 4.9 | 33.4 | 219 | -23.6 | -88 | 83.1 | 220 | (N/A) | 7.8 | 6.46 |
| Green ash | 14.1 | 2.3 | 6.6 | 0.6 | 75 | 43.3 | 6.3 | 6.0 | 41.3 | 270 | 0.0 | 0 | 120.6 | 345 | (N/A) | 6.6 | 11.90 |
| Norway spruce | 5.7 | 1.1 | 4.6 | 0.7 | 37 | 11.2 | 1.6 | 1.6 | 10.7 | 70 | -25.9 | -97 | 11.2 | 10 | (N/A) | 4.1 | 0.55 |
| Broadleaf Deciduous Medi | 3.4 | 0.6 | 1.8 | 0.2 | 19 | 13.3 | 1.9 | 1.8 | 12.6 | 83 | -0.9 | -3 | 34.7 | 98 | (N/A) | 3.9 | 5.77 |
| Pear | 4.3 | 0.7 | 2.0 | 0.2 | 23 | 11.8 | 1.7 | 1.6 | 10.9 | 73 | 0.0 | 0 | 33.2 | 96 | (N/A) | 3.0 | 7.35 |
| Blue spruce | 6.3 | 1.2 | 5.0 | 0.8 | 41 | 9.8 | 1.4 | 1.4 | 9.2 | 61 | -13.7 | -51 | 21.4 | 50 | (N/A) | 3.0 | 3.88 |
| Eastern white pine | 5.1 | 1.0 | 4.1 | 0.6 | 33 | 9.1 | 1.3 | 1.3 | 8.8 | 57 | -23.1 | -87 | 8.2 | 4 | (N/A) | 2.7 | 0.30 |
| Northern hackberry | 12.3 | 2.1 | 5.9 | 0.6 | 66 | 24.3 | 3.5 | 3.4 | 23.0 | 151 | 0.0 | 0 | 75.1 | 217 | (N/A) | 2.5 | 19.77 |
| Black maple | 5.6 | 1.0 | 2.6 | 0.2 | 30 | 10.9 | 1.6 | 1.5 | 10.4 | 68 | -1.8 | -7 | 32.0 | 91 | (N/A) | 2.5 | 8.26 |
| Northern pin oak | 7.5 | 1.3 | 3.6 | 0.3 | 40 | 14.3 | 2.1 | 2.0 | 13.3 | 89 | -1.7 | -6 | 42.7 | 122 | (N/A) | 2.3 | 12.23 |
| Black walnut | 7.2 | 1.2 | 3.2 | 0.3 | 38 | 15.9 | 2.3 | 2.2 | 15.1 | 99 | 0.0 | 0 | 47.5 | 137 | (N/A) | 2.1 | 15.23 |
| Littleleaf linden | 4.6 | 0.8 | 2.2 | 0.2 | 24 | 10.1 | 1.5 | 1.4 | 9.4 | 62 | -2.1 | -8 | 28.0 | 79 | (N/A) | 1.8 | 9.86 |
| Scarlet oak | 7.5 | 1.2 | 3.4 | 0.3 | 39 | 15.5 | 2.3 | 2.1 | 14.7 | 96 | 0.0 | 0 | 47.0 | 136 | (N/A) | 1.8 | 16.97 |
| White ash | 14.4 | 2.3 | 6.3 | 0.6 | 75 | 19.0 | 2.8 | 2.7 | 18.6 | 120 | 0.0 | 0 | 66.8 | 195 | (N/A) | 1.8 | 24.36 |
| Broadleaf Deciduous Small | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0.7 | 0.1 | 0.1 | 0.6 | 4 | 0.0 | 0 | 1.6 | 4 | (N/A) | 1.6 | 0.62 |
| Honeylocust | 6.6 | 1.1 | 3.0 | 0.3 | 35 | 12.0 | 1.8 | 1.7 | 11.6 | 75 | -5.3 | -20 | 32.7 | 90 | (N/A) | 1.6 | 12.87 |
| Austrian pine | 1.6 | 0.3 | 1.3 | 0.2 | 11 | 3.7 | 0.5 | 0.5 | 3.6 | 23 | -4.3 | -16 | 7.6 | 18 | (N/A) | 1.4 | 2.99 |
| Bur oak | 5.9 | 0.9 | 2.6 | 0.3 | 31 | 11.4 | 1.7 | 1.6 | 10.8 | 71 | 0.0 | 0 | 35.1 | 102 | (N/A) | 1.4 | 16.94 |
| Boxelder | 0.3 | 0.0 | 0.2 | 0.0 | 2 | 2.6 | 0.4 | 0.4 | 2.5 | 16 | -0.2 | -1 | 6.1 | 17 | (N/A) | 1.4 | 2.83 |
| Birch | 2.4 | 0.4 | 1.2 | 0.1 | 13 | 6.0 | 0.9 | 0.8 | 5.5 | 37 | -0.6 | -2 | 16.7 | 48 | (N/A) | 1.4 | 7.95 |
| Black spruce | 1.8 | 0.4 | 1.4 | 0.2 | 12 | 3.4 | 0.5 | 0.5 | 3.3 | 21 | -4.3 | -16 | 7.3 | 17 | (N/A) | 1.1 | 3.44 |
| Alder | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0.2 | 0.0 | 0.0 | 0.1 | 1 | 0.0 | 0 | 0.4 | 1 | (N/A) | 0.9 | 0.26 |
| White oak | 2.7 | 0.4 | 1.2 | 0.1 | 14 | 6.5 | 1.0 | 0.9 | 6.2 | 41 | 0.0 | 0 | 19.1 | 55 | (N/A) | 0.9 | 13.71 |
| Swamp white oak | 0.1 | 0.0 | 0.1 | 0.0 | 1 | 1.2 | 0.2 | 0.2 | 1.1 | 8 | 0.0 | 0 | 2.9 | 8 | (N/A) | 0.7 | 2.72 |
| American sycamore | 2.3 | 0.4 | 1.0 | 0.1 | 12 | 4.2 | 0.6 | 0.6 | 4.0 | 26 | 0.0 | 0 | 13.2 | 38 | (N/A) | 0.7 | 12.72 |
| Hickory | 2.3 | 0.4 | 1.0 | 0.1 | 12 | 4.2 | 0.6 | 0.6 | 4.0 | 26 | 0.0 | 0 | 13.1 | 38 | (N/A) | 0.5 | 19.04 |
| Cottonwood | 1.0 | 0.2 | 0.5 | 0.0 | 5 | 3.2 | 0.5 | 0.4 | 3.0 | 20 | 0.0 | 0 | 8.7 | 25 | (N/A) | 0.5 | 12.48 |
| Chinese elm | 1.4 | 0.2 | 0.6 | 0.1 | 7 | 3.4 | 0.5 | 0.5 | 3.2 | 21 | 0.0 | 0 | 9.9 | 28 | (N/A) | 0.5 | 14.19 |
| Maple | 0.3 | 0.1 | 0.2 | 0.0 | 2 | 1.4 | 0.2 | 0.2 | 1.3 | 9 | -0.1 | 0 | 3.5 | 10 | (N/A) | 0.5 | 4.94 |
| Conifer Evergreen Medium | 0.3 | 0.1 | 0.2 | 0.0 | 2 | 0.9 | 0.1 | 0.1 | 0.9 | 6 | -0.8 | -3 | 1.8 | 4 | (N/A) | 0.5 | 2.21 |
| Conifer Evergreen Large | 1.1 | 0.2 | 0.9 | 0.1 | 7 | 1.8 | 0.3 | 0.2 | 1.7 | 11 | -5.7 | -21 | 0.6 | -3 | (N/A) | 0.5 | -1.58 |
| Tulip tree | 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) | 0.5 | 0.08 |
| Eastern redbud | 0.1 | 0.0 | 0.1 | 0.0 | 1 | 0.8 | 0.1 | 0.1 | 0.7 | 5 | 0.0 | 0 | 1.8 | 5 | (N/A) | 0.5 | 2.55 |
| American basswood | 0.7 | 0.1 | 0.3 | 0.0 | 4 | 1.7 | 0.2 | 0.2 | 1.6 | 11 | -0.6 | -2 | 4.4 | 12 | (N/A) | 0.2 | 12.18 |
| Black cherry | 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) | 0.2 | 6.56 |
| Southern magnolia | 0.3 | 0.1 | 0.3 | 0.0 | 2 | 1.3 | 0.2 | 0.2 | 1.2 | 8 | -0.9 | -3 | 2.6 | 7 | (N/A) | 0.2 | 6.63 |
| Broadleaf Deciduous Large | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0.1 | 0.0 | 0.0 | 0.1 | 1 | 0.0 | 0 | 0.3 | 1 | (N/A) | 0.2 | 0.87 |
| Ginkgo | 0.5 | 0.1 | 0.3 | 0.0 | 3 | 1.1 | 0.2 | 0.2 | 1.1 | 7 | -0.2 | -1 | 3.3 | 9 | (N/A) | 0.2 | 9.29 |
| Black ash | 0.2 | 0.0 | 0.1 | 0.0 | 1 | 1.1 | 0.2 | 0.2 | 1.1 | 7 | -0.1 | 0 | 2.8 | 8 | (N/A) | 0.2 | 7.92 |
| Sugar maple | 0.3 | 0.0 | 0.2 | 0.0 | 2 | 1.2 | 0.2 | 0.2 | 1.2 | 8 | -0.2 | -1 | 3.0 | 8 | (N/A) | 0.2 | 8.46 |
| Citywide total | 272.3 | 46.5 | 135.9 | 13.9 | 1,479 | 547.8 | 79.7 | 75.9 | 519.0 | 3,410 | -162.9 | -611 | 1,528.1 | 4,278 | (N/A) | 100.0 | 9.77 |

**Table 4: Annual Carbon Stored**

## Stored CO2 Benefits of Public Trees

4/16/2020

| Species | Total Stored CO2 (lbs) | Total ($) | Standard Error | % of Total Trees | % of Total $ | Avg. $/tree |
|---|---|---|---|---|---|---|
| Norway maple | 833,191 | 6,249 | (N/A) | 15.8 | 15.3 | 90.56 |
| Silver maple | 1,322,717 | 9,920 | (N/A) | 10.7 | 24.3 | 211.07 |
| Red maple | 232,143 | 1,741 | (N/A) | 9.4 | 4.3 | 42.47 |
| Northern red oak | 358,407 | 2,688 | (N/A) | 7.8 | 6.6 | 79.06 |
| Green ash | 464,652 | 3,485 | (N/A) | 6.6 | 8.5 | 120.17 |
| Norway spruce | 65,061 | 488 | (N/A) | 4.1 | 1.2 | 27.11 |
| Broadleaf Deciduou | 57,363 | 430 | (N/A) | 3.9 | 1.1 | 25.31 |
| Pear | 66,998 | 502 | (N/A) | 3.0 | 1.2 | 38.65 |
| Blue spruce | 56,774 | 426 | (N/A) | 3.0 | 1.0 | 32.75 |
| Eastern white pine | 58,678 | 440 | (N/A) | 2.7 | 1.1 | 36.67 |
| Northern hackberry | 203,536 | 1,527 | (N/A) | 2.5 | 3.7 | 138.77 |
| Black maple | 59,493 | 446 | (N/A) | 2.5 | 1.1 | 40.56 |
| Northern pin oak | 123,287 | 925 | (N/A) | 2.3 | 2.3 | 92.47 |
| Black walnut | 243,376 | 1,825 | (N/A) | 2.1 | 4.5 | 202.81 |
| Littleleaf linden | 96,226 | 722 | (N/A) | 1.8 | 1.8 | 90.21 |
| Scarlet oak | 250,636 | 1,880 | (N/A) | 1.8 | 4.6 | 234.97 |
| White ash | 197,375 | 1,480 | (N/A) | 1.8 | 3.6 | 185.04 |
| Broadleaf Deciduou | 1,081 | 8 | (N/A) | 1.6 | 0.0 | 1.16 |
| Honeylocust | 85,714 | 643 | (N/A) | 1.6 | 1.6 | 91.84 |
| Austrian pine | 11,338 | 85 | (N/A) | 1.4 | 0.2 | 14.17 |
| Bur oak | 201,396 | 1,510 | (N/A) | 1.4 | 3.7 | 251.75 |
| Boxelder | 6,481 | 49 | (N/A) | 1.4 | 0.1 | 8.10 |
| Birch | 39,808 | 299 | (N/A) | 1.4 | 0.7 | 49.76 |
| Black spruce | 14,685 | 110 | (N/A) | 1.1 | 0.3 | 22.03 |
| Alder | 219 | 2 | (N/A) | 0.9 | 0.0 | 0.41 |
| White oak | 90,647 | 680 | (N/A) | 0.9 | 1.7 | 169.96 |
| Swamp white oak | 2,420 | 18 | (N/A) | 0.7 | 0.0 | 6.05 |
| American sycamore | 78,529 | 589 | (N/A) | 0.7 | 1.4 | 196.32 |
| Hickory | 78,517 | 589 | (N/A) | 0.5 | 1.4 | 294.44 |
| Cottonwood | 31,546 | 237 | (N/A) | 0.5 | 0.6 | 118.30 |
| Chinese elm | 47,716 | 358 | (N/A) | 0.5 | 0.9 | 178.94 |
| Maple | 3,843 | 29 | (N/A) | 0.5 | 0.1 | 14.41 |
| Conifer Evergreen ! | 1,402 | 11 | (N/A) | 0.5 | 0.0 | 5.26 |
| Conifer Evergreen I | 14,981 | 112 | (N/A) | 0.5 | 0.3 | 56.18 |
| Tulip tree | 24 | 0 | (N/A) | 0.5 | 0.0 | 0.09 |
| Eastern redbud | 1,816 | 14 | (N/A) | 0.5 | 0.0 | 6.81 |
| American basswood | 24,952 | 187 | (N/A) | 0.2 | 0.5 | 187.14 |
| Black cherry | 3,037 | 23 | (N/A) | 0.2 | 0.1 | 22.78 |
| Southern magnolia | 4,397 | 33 | (N/A) | 0.2 | 0.1 | 32.98 |
| Broadleaf Deciduou | 185 | 1 | (N/A) | 0.2 | 0.0 | 1.39 |
| Ginkgo | 7,800 | 59 | (N/A) | 0.2 | 0.1 | 58.50 |
| Black ash | 3,624 | 27 | (N/A) | 0.2 | 0.1 | 27.18 |
| Sugar maple | 7,945 | 60 | (N/A) | 0.2 | 0.1 | 59.59 |
| Citywide total | 5,454,016 | 40,905 | (N/A) | 100.0 | 100.0 | 93.39 |

## Table 5: Annual Carbon Sequestered

**Annual $CO_2$ Benefits of Public Trees**

4/16/2020

| Species | Sequestered (lb) | Sequestered ($) | Decomposition Release (lb) | Maintenance Release (lb) | Total Released ($) | Avoided (lb) | Avoided ($) | Net Total (lb) | Total ($) | Standard Error | % of Total Trees | % of Total $ | Avg. $/tree |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Norway maple | 9,523 | 71 | -3,999 | -254 | -32 | 34,478 | 259 | 39,748 | 298 | (N/A) | 15.8 | 10.7 | 4.32 |
| Silver maple | 86,157 | 646 | -6,350 | -209 | -49 | 29,297 | 220 | 108,895 | 817 | (N/A) | 10.7 | 29.3 | 17.38 |
| Red maple | 12,003 | 90 | -1,114 | -91 | -9 | 16,360 | 123 | 27,158 | 204 | (N/A) | 9.4 | 7.3 | 4.97 |
| Northern red oak | 6,600 | 50 | -1,720 | -96 | -14 | 12,367 | 93 | 17,151 | 129 | (N/A) | 7.8 | 4.6 | 3.78 |
| Green ash | 20,958 | 157 | -2,230 | -95 | -17 | 15,279 | 115 | 33,912 | 254 | (N/A) | 6.6 | 9.1 | 8.77 |
| Norway spruce | 1,909 | 14 | -312 | -49 | -3 | 3,946 | 30 | 5,494 | 41 | (N/A) | 4.1 | 1.5 | 2.29 |
| Broadleaf Deciduous Me | 4,596 | 34 | -277 | -27 | -2 | 4,639 | 35 | 8,931 | 67 | (N/A) | 3.9 | 2.4 | 3.94 |
| Pear | 3,577 | 27 | -322 | -33 | -3 | 4,036 | 30 | 7,258 | 54 | (N/A) | 3.0 | 2.0 | 4.19 |
| Blue spruce | 1,128 | 8 | -273 | -43 | -2 | 3,418 | 26 | 4,231 | 32 | (N/A) | 3.0 | 1.1 | 2.44 |
| Eastern white pine | 1,496 | 11 | -282 | -41 | -2 | 3,250 | 24 | 4,423 | 33 | (N/A) | 2.7 | 1.2 | 2.76 |
| Northern hackberry | 7,268 | 55 | -977 | -53 | -8 | 8,508 | 64 | 14,747 | 111 | (N/A) | 2.5 | 4.0 | 10.05 |
| Black maple | 2,374 | 18 | -286 | -22 | -2 | 3,844 | 29 | 5,910 | 44 | (N/A) | 2.5 | 1.6 | 4.03 |
| Northern pin oak | 1,434 | 11 | -592 | -37 | -5 | 4,925 | 37 | 5,730 | 43 | (N/A) | 2.3 | 1.5 | 4.30 |
| Black walnut | 6,994 | 52 | -1,168 | -37 | -9 | 5,605 | 42 | 11,393 | 85 | (N/A) | 2.1 | 3.1 | 9.49 |
| Littleleaf linden | 2,093 | 16 | -462 | -29 | -4 | 3,485 | 26 | 5,088 | 38 | (N/A) | 1.8 | 1.4 | 4.77 |
| Scarlet oak | 7,384 | 55 | -1,203 | -37 | -9 | 5,440 | 41 | 11,584 | 87 | (N/A) | 1.8 | 3.1 | 10.86 |
| White ash | 9,005 | 68 | -947 | -36 | -7 | 6,905 | 52 | 14,927 | 112 | (N/A) | 1.8 | 4.0 | 13.99 |
| Broadleaf Deciduous Sm | 236 | 2 | -5 | -4 | 0 | 229 | 2 | 456 | 3 | (N/A) | 1.6 | 0.1 | 0.49 |
| Honeylocust | 0 | 0 | -411 | -19 | -3 | 4,303 | 32 | 3,873 | 29 | (N/A) | 1.6 | 1.0 | 4.15 |
| Austrian pine | 713 | 5 | -54 | -14 | -1 | 1,336 | 10 | 1,981 | 15 | (N/A) | 1.4 | 0.5 | 2.48 |
| Bur oak | 4,346 | 33 | -967 | -27 | -7 | 4,004 | 30 | 7,356 | 55 | (N/A) | 1.4 | 2.0 | 9.19 |
| Boxelder | 950 | 7 | -33 | -6 | 0 | 911 | 7 | 1,822 | 14 | (N/A) | 1.4 | 0.5 | 2.28 |
| Birch | 1,512 | 11 | -191 | -14 | -2 | 2,045 | 15 | 3,351 | 25 | (N/A) | 1.4 | 0.9 | 4.19 |
| Black spruce | 517 | 4 | -70 | -14 | -1 | 1,218 | 9 | 1,651 | 12 | (N/A) | 1.1 | 0.4 | 2.48 |
| Alder | 64 | 0 | -1 | -1 | 0 | 54 | 0 | 116 | 1 | (N/A) | 0.9 | 0.0 | 0.22 |
| White oak | 2,929 | 22 | -435 | -15 | -3 | 2,303 | 17 | 4,782 | 36 | (N/A) | 0.9 | 1.3 | 8.97 |
| Swamp white oak | 544 | 4 | -12 | -3 | 0 | 416 | 3 | 945 | 7 | (N/A) | 0.7 | 0.3 | 2.36 |
| American sycamore | 1,827 | 14 | -377 | -10 | -3 | 1,473 | 11 | 2,913 | 22 | (N/A) | 0.7 | 0.8 | 7.28 |
| Hickory | 1,824 | 14 | -377 | -10 | -3 | 1,469 | 11 | 2,906 | 22 | (N/A) | 0.5 | 0.8 | 10.90 |
| Cottonwood | 1,714 | 13 | -151 | -7 | -1 | 1,105 | 8 | 2,660 | 20 | (N/A) | 0.5 | 0.7 | 9.97 |
| Chinese elm | 1,572 | 12 | -229 | -8 | -2 | 1,176 | 9 | 2,511 | 19 | (N/A) | 0.5 | 0.7 | 9.42 |
| Maple | 522 | 4 | -18 | -3 | 0 | 491 | 4 | 992 | 7 | (N/A) | 0.5 | 0.3 | 3.72 |
| Conifer Evergreen Medi | 129 | 1 | -7 | -3 | 0 | 319 | 2 | 439 | 3 | (N/A) | 0.5 | 0.1 | 1.64 |
| Conifer Evergreen Large | 0 | 0 | -72 | -9 | -1 | 622 | 5 | 541 | 4 | (N/A) | 0.5 | 0.1 | 2.03 |
| Tulip tree | 5 | 0 | 0 | 0 | 0 | 9 | 0 | 13 | 0 | (N/A) | 0.5 | 0.0 | 0.05 |
| Eastern redbud | 228 | 2 | -9 | -2 | 0 | 248 | 2 | 465 | 3 | (N/A) | 0.5 | 0.1 | 1.74 |
| American basswood | 1,365 | 10 | -120 | -4 | -1 | 594 | 4 | 1,835 | 14 | (N/A) | 0.2 | 0.5 | 13.76 |
| Black cherry | 268 | 2 | -15 | -2 | 0 | 308 | 2 | 560 | 4 | (N/A) | 0.2 | 0.2 | 4.20 |
| Southern magnolia | 260 | 2 | -21 | -3 | 0 | 451 | 3 | 687 | 5 | (N/A) | 0.2 | 0.2 | 5.15 |
| Broadleaf Deciduous La | 74 | 1 | -1 | -1 | 0 | 49 | 0 | 121 | 1 | (N/A) | 0.2 | 0.0 | 0.91 |
| Ginkgo | 319 | 2 | -37 | -4 | 0 | 396 | 3 | 674 | 5 | (N/A) | 0.2 | 0.2 | 5.06 |
| Black ash | 386 | 3 | -17 | -2 | 0 | 395 | 3 | 762 | 6 | (N/A) | 0.2 | 0.2 | 5.71 |
| Sugar maple | 523 | 4 | -38 | -3 | 0 | 435 | 3 | 917 | 7 | (N/A) | 0.2 | 0.2 | 6.88 |
| Citywide total | 207,326 | 1,555 | -26,185 | -1,374 | -207 | 192,139 | 1,441 | 371,906 | 2,789 | (N/A) | 100.0 | 100.0 | 6.37 |

**Table 6: Annual Social and Aesthetic Benefits**

## Annual Aesthetic/Other Benefits of Public Trees

4/16/2020

| Species | Total ($) | Standard Error | % of Total Trees | % of Total $ | Avg. $/tree |
|---|---|---|---|---|---|
| Norway maple | 894 | (N/A) | 15.8 | 5.0 | 12.96 |
| Silver maple | 6,177 | (N/A) | 10.7 | 34.8 | 131.43 |
| Red maple | 1,557 | (N/A) | 9.4 | 8.8 | 37.98 |
| Northern red oak | 490 | (N/A) | 7.8 | 2.8 | 14.41 |
| Green ash | 1,664 | (N/A) | 6.6 | 9.4 | 57.37 |
| Norway spruce | 421 | (N/A) | 4.1 | 2.4 | 23.39 |
| Broadleaf Deciduous Medit | 484 | (N/A) | 3.9 | 2.7 | 28.45 |
| Pear | 212 | (N/A) | 3.0 | 1.2 | 16.33 |
| Blue spruce | 105 | (N/A) | 3.0 | 0.6 | 8.09 |
| Eastern white pine | 341 | (N/A) | 2.7 | 1.9 | 28.42 |
| Northern hackberry | 827 | (N/A) | 2.5 | 4.7 | 75.18 |
| Black maple | 291 | (N/A) | 2.5 | 1.6 | 26.49 |
| Northern pin oak | 132 | (N/A) | 2.3 | 0.7 | 13.22 |
| Black walnut | 505 | (N/A) | 2.1 | 2.8 | 56.10 |
| Littleleaf linden | 218 | (N/A) | 1.8 | 1.2 | 27.26 |
| Scarlet oak | 499 | (N/A) | 1.8 | 2.8 | 62.34 |
| White ash | 865 | (N/A) | 1.8 | 4.9 | 108.09 |
| Broadleaf Deciduous Small | 12 | (N/A) | 1.6 | 0.1 | 1.77 |
| Honeylocust | 0 | (N/A) | 1.6 | 0.0 | 0.00 |
| Austrian pine | 136 | (N/A) | 1.4 | 0.8 | 22.60 |
| Bur oak | 305 | (N/A) | 1.4 | 1.7 | 50.89 |
| Boxelder | 151 | (N/A) | 1.4 | 0.9 | 25.14 |
| Birch | 153 | (N/A) | 1.4 | 0.9 | 25.53 |
| Black spruce | 83 | (N/A) | 1.1 | 0.5 | 16.65 |
| Alder | 2 | (N/A) | 0.9 | 0.0 | 0.54 |
| White oak | 220 | (N/A) | 0.9 | 1.2 | 55.05 |
| Swamp white oak | 65 | (N/A) | 0.7 | 0.4 | 21.78 |
| American sycamore | 122 | (N/A) | 0.7 | 0.7 | 40.65 |
| Hickory | 117 | (N/A) | 0.5 | 0.7 | 58.34 |
| Cottonwood | 131 | (N/A) | 0.5 | 0.7 | 65.59 |
| Chinese elm | 116 | (N/A) | 0.5 | 0.7 | 58.01 |
| Maple | 73 | (N/A) | 0.5 | 0.4 | 36.59 |
| Conifer Evergreen Medium | 46 | (N/A) | 0.5 | 0.3 | 23.16 |
| Conifer Evergreen Large | 0 | (N/A) | 0.5 | 0.0 | 0.00 |
| Tulip tree | 11 | (N/A) | 0.5 | 0.1 | 5.26 |
| Eastern redbud | 13 | (N/A) | 0.5 | 0.1 | 6.40 |
| American basswood | 94 | (N/A) | 0.2 | 0.5 | 94.13 |
| Black cherry | 15 | (N/A) | 0.2 | 0.1 | 15.48 |
| Southern magnolia | 41 | (N/A) | 0.2 | 0.2 | 41.22 |
| Broadleaf Deciduous Large | 15 | (N/A) | 0.2 | 0.1 | 14.73 |
| Ginkgo | 23 | (N/A) | 0.2 | 0.1 | 22.94 |
| Black ash | 39 | (N/A) | 0.2 | 0.2 | 39.16 |
| Sugar maple | 59 | (N/A) | 0.2 | 0.3 | 58.58 |
| Citywide total | 17,726 | (N/A) | 100.0 | 100.0 | 40.47 |

**Table 7: Summary of Benefits in Dollars**

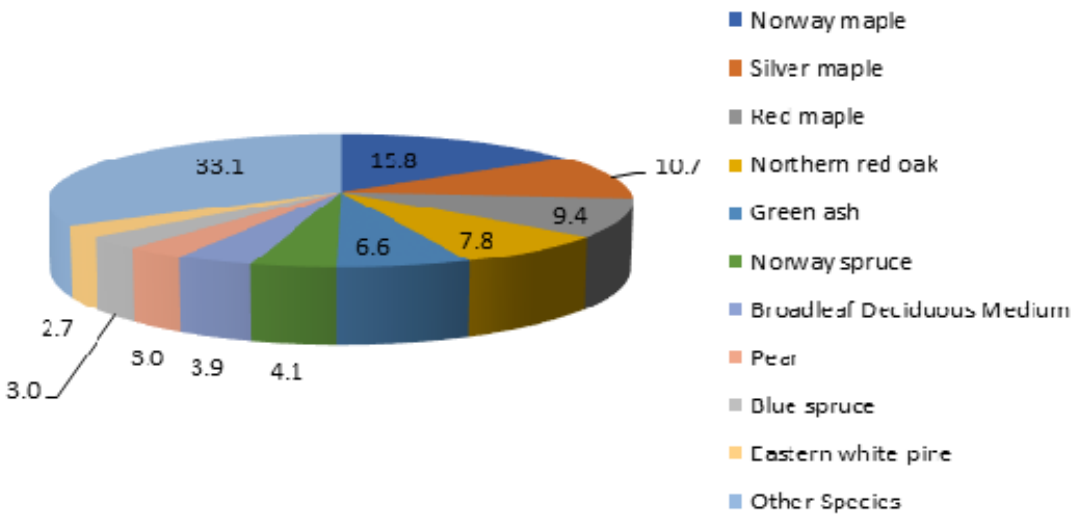
## Annual Benefits of Public Trees by Species ($/tree)

4/16/2020

| Species | Energy | $CO_2$ | Air Quality | Stormwater | Aesthetic/Other | Total ($) | Standard Error |
|---|---|---|---|---|---|---|---|
| Norway maple | 65.32 | 4.32 | 12.27 | 88.77 | 12.96 | 183.64 | (N/A) |
| Silver maple | 76.77 | 17.38 | 14.83 | 161.05 | 131.43 | 401.47 | (N/A) |
| Red maple | 49.94 | 4.97 | 9.21 | 57.87 | 37.98 | 159.97 | (N/A) |
| Northern red oak | 45.92 | 3.78 | 6.46 | 61.22 | 14.41 | 131.80 | (N/A) |
| Green ash | 65.36 | 8.77 | 11.90 | 100.49 | 57.37 | 243.88 | (N/A) |
| Norway spruce | 27.20 | 2.29 | 0.55 | 72.49 | 23.39 | 125.92 | (N/A) |
| Broadleaf Deciduou | 34.60 | 3.94 | 5.77 | 31.62 | 28.45 | 104.39 | (N/A) |
| Pear | 41.53 | 4.19 | 7.35 | 25.69 | 16.33 | 95.09 | (N/A) |
| Blue spruce | 33.43 | 2.44 | 3.88 | 73.46 | 8.09 | 121.29 | (N/A) |
| Eastern white pine | 33.15 | 2.76 | 0.30 | 95.70 | 28.42 | 160.34 | (N/A) |
| Northern hackberry | 97.25 | 10.05 | 19.77 | 154.37 | 75.18 | 356.62 | (N/A) |
| Black maple | 43.97 | 4.03 | 8.26 | 53.79 | 26.49 | 136.54 | (N/A) |
| Northern pin oak | 64.99 | 4.30 | 12.23 | 89.92 | 13.22 | 184.65 | (N/A) |
| Black walnut | 77.45 | 9.49 | 15.23 | 139.68 | 56.10 | 297.96 | (N/A) |
| Littleleaf linden | 56.60 | 4.77 | 9.86 | 83.71 | 27.26 | 182.20 | (N/A) |
| Scarlet oak | 85.13 | 10.86 | 16.97 | 167.24 | 62.34 | 342.55 | (N/A) |
| White ash | 99.02 | 13.99 | 24.36 | 204.87 | 108.09 | 450.32 | (N/A) |
| Broadleaf Deciduou | 4.75 | 0.49 | 0.62 | 1.62 | 1.77 | 9.26 | (N/A) |
| Honeylocust | 74.28 | 4.15 | 12.87 | 126.96 | 0.00 | 218.26 | (N/A) |
| Austrian pine | 27.08 | 2.48 | 2.99 | 52.26 | 22.60 | 107.41 | (N/A) |
| Bur oak | 83.09 | 9.19 | 16.94 | 152.40 | 50.89 | 312.52 | (N/A) |
| Boxelder | 18.56 | 2.28 | 2.83 | 16.83 | 25.14 | 65.63 | (N/A) |
| Birch | 45.63 | 4.19 | 7.95 | 53.14 | 25.53 | 136.45 | (N/A) |
| Black spruce | 29.92 | 2.48 | 3.44 | 60.98 | 16.65 | 113.46 | (N/A) |
| Alder | 2.00 | 0.22 | 0.26 | 0.62 | 0.54 | 3.63 | (N/A) |
| White oak | 70.90 | 8.97 | 13.71 | 125.57 | 55.05 | 274.20 | (N/A) |
| Swamp white oak | 19.31 | 2.36 | 2.72 | 12.06 | 21.78 | 58.22 | (N/A) |
| American sycamore | 60.90 | 7.28 | 12.72 | 130.94 | 40.65 | 252.49 | (N/A) |
| Hickory | 91.02 | 10.90 | 19.04 | 196.17 | 58.34 | 375.47 | (N/A) |
| Cottonwood | 70.91 | 9.97 | 12.48 | 106.85 | 65.59 | 265.81 | (N/A) |
| Chinese elm | 74.17 | 9.42 | 14.19 | 133.19 | 58.01 | 288.98 | (N/A) |
| Maple | 28.40 | 3.72 | 4.94 | 23.59 | 36.59 | 97.24 | (N/A) |
| Conifer Evergreen M | 19.66 | 1.64 | 2.21 | 31.16 | 23.16 | 77.83 | (N/A) |
| Conifer Evergreen I | 38.17 | 2.03 | -1.58 | 124.79 | 0.00 | 163.41 | (N/A) |
| Tulip tree | 0.66 | 0.05 | 0.08 | 0.48 | 5.26 | 6.53 | (N/A) |
| Eastern redbud | 18.19 | 1.74 | 2.55 | 7.17 | 6.40 | 36.05 | (N/A) |
| American basswood | 77.27 | 13.76 | 12.18 | 124.90 | 94.13 | 322.23 | (N/A) |
| Black cherry | 38.13 | 4.20 | 6.56 | 18.06 | 15.48 | 82.43 | (N/A) |
| Southern magnolia | 55.99 | 5.15 | 6.63 | 86.37 | 41.22 | 195.37 | (N/A) |
| Broadleaf Deciduou | 5.82 | 0.91 | 0.87 | 4.65 | 14.73 | 26.98 | (N/A) |
| Ginkgo | 49.28 | 5.06 | 9.29 | 50.33 | 22.94 | 136.90 | (N/A) |
| Black ash | 46.78 | 5.71 | 7.92 | 38.19 | 39.16 | 137.75 | (N/A) |
| Sugar maple | 55.65 | 6.88 | 8.46 | 66.84 | 58.58 | 196.41 | (N/A) |
| Citywide Total | 55.23 | 6.37 | 9.77 | 88.72 | 40.47 | 200.55 | (N/A) |

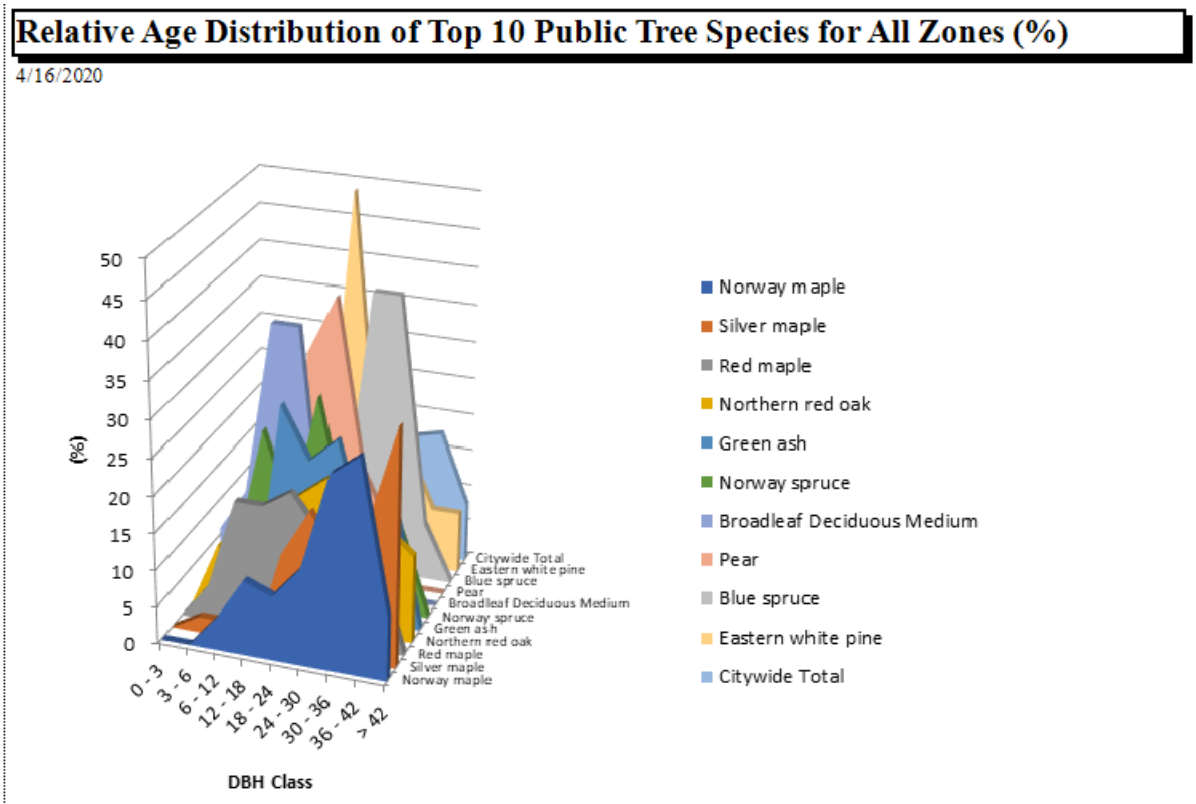
## Species Distribution of Public Trees

4/16/2020




| Species | Percent |
|---|---|
| Norway maple | 15.8 |
| Silver maple | 10.7 |
| Red maple | 9.4 |
| Northern red oak | 7.8 |
| Green ash | 6.6 |
| Norway spruce | 4.1 |
| Broadleaf Deciduous Me | 3.9 |
| Pear | 3.0 |
| Blue spruce | 3.0 |
| Eastern white pine | 2.7 |
| Other Species | 33.1 |
| Total | 100.0 |

**Figure 1: Species Distribution**




| | DBH class (in) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Species | 0-3 | 3-6 | 6-12 | 12-18 | 18-24 | 24-30 | 30-36 | 36-42 | > 42 |
| Norway maple | 0.00 | 0.00 | 4.35 | 10.14 | 8.70 | 13.04 | 26.09 | 28.99 | 8.70 |
| Silver maple | 0.00 | 2.13 | 2.13 | 0.00 | 12.77 | 19.15 | 12.77 | 19.15 | 31.91 |
| Red maple | 0.00 | 4.88 | 17.07 | 17.07 | 19.51 | 14.63 | 14.63 | 12.20 | 0.00 |
| Northern red oak | 0.00 | 8.82 | 2.94 | 14.71 | 17.65 | 20.59 | 8.82 | 14.71 | 11.76 |
| Green ash | 0.00 | 0.00 | 0.00 | 27.59 | 20.69 | 24.14 | 10.34 | 17.24 | 0.00 |
| Norway spruce | 0.00 | 5.56 | 22.22 | 11.11 | 27.78 | 11.11 | 11.11 | 11.11 | 0.00 |
| Broadleaf Deciduous M | 5.88 | 11.76 | 35.29 | 35.29 | 0.00 | 11.76 | 0.00 | 0.00 | 0.00 |
| Pear | 0.00 | 0.00 | 7.69 | 30.77 | 38.46 | 15.38 | 7.69 | 0.00 | 0.00 |
| Blue spruce | 0.00 | 0.00 | 7.69 | 0.00 | 7.69 | 38.46 | 38.46 | 7.69 | 0.00 |
| Eastern white pine | 0.00 | 0.00 | 0.00 | 8.33 | 50.00 | 8.33 | 16.67 | 8.33 | 8.33 |
| Citywide Total | 2.28 | 5.25 | 7.99 | 12.33 | 14.84 | 15.07 | 16.67 | 17.58 | 7.99 |

**Figure 2: Relative Age Class**

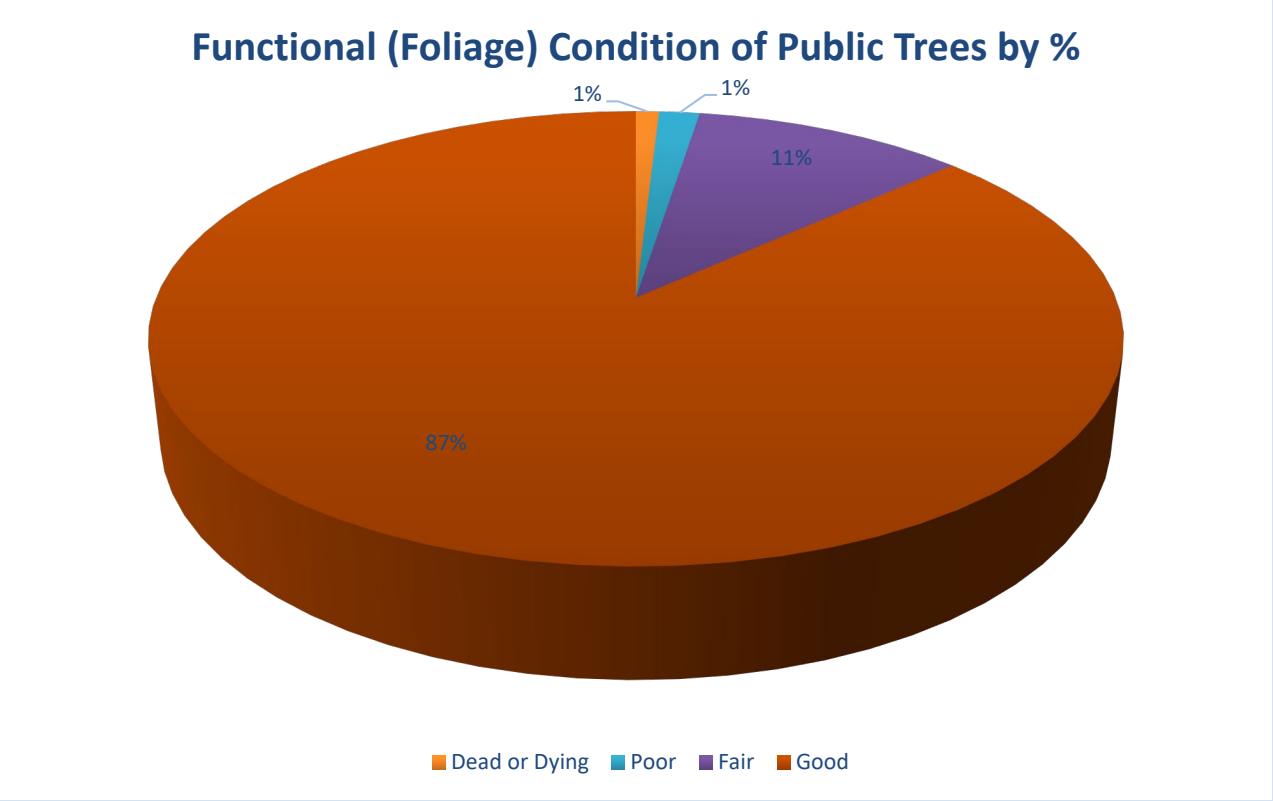



**Figure 3: Foliage Condition**

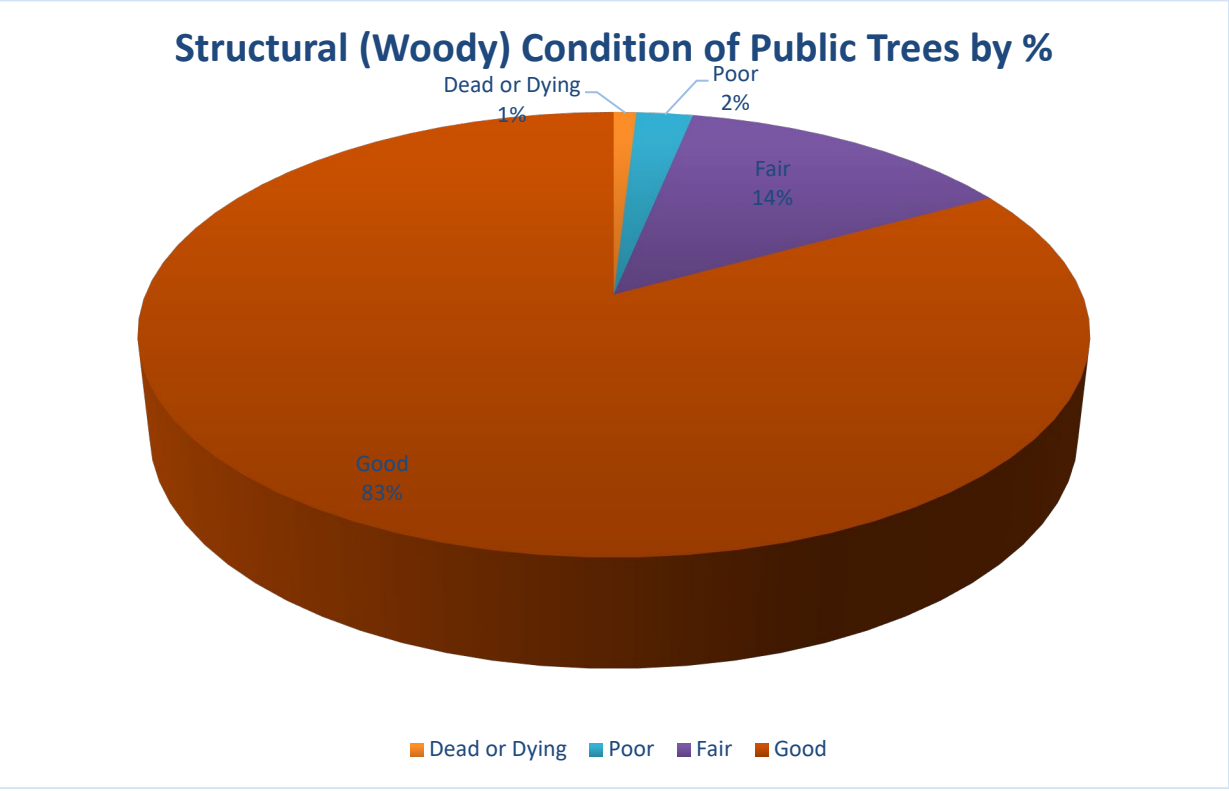
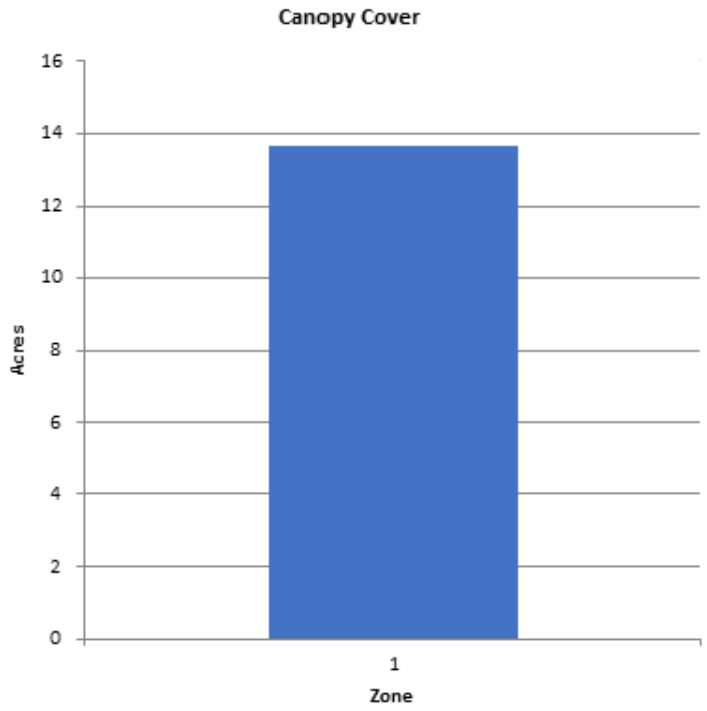



**Figure 4: Wood Condition**

## Canopy Cover of Public Trees (Acres)

4/16/2020




| Zone | Acres | % of Total Canopy Cover |
|---|---|---|
| 1 | 14 | 100.0 |
| Citywide total | 14 | 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 | 14 | 0.00 | 0.00 |

**Figure 5: Canopy Cover in Acres**

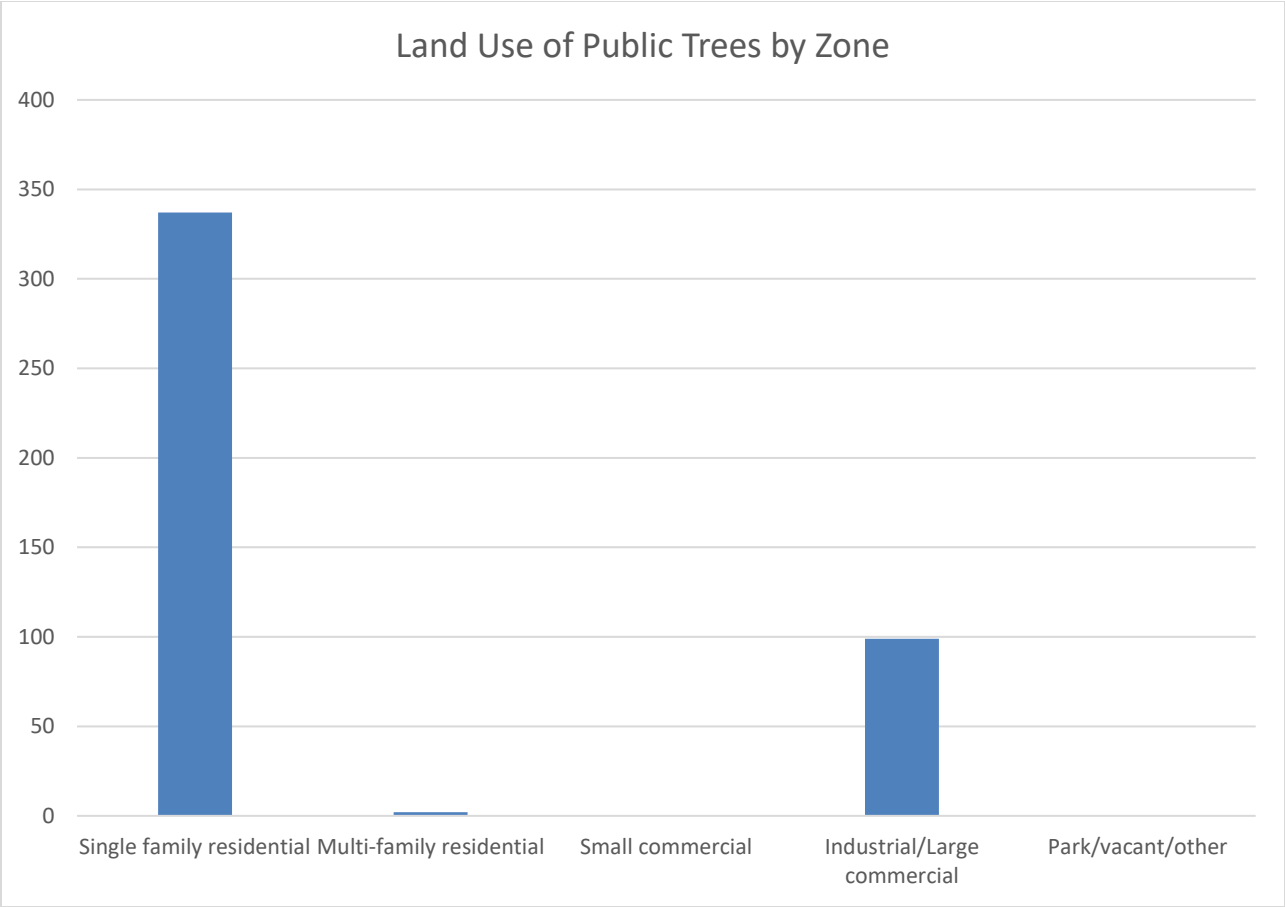



**Figure 6: Land Use of city/park trees**

# Appendix B: ArcGIS Mapping

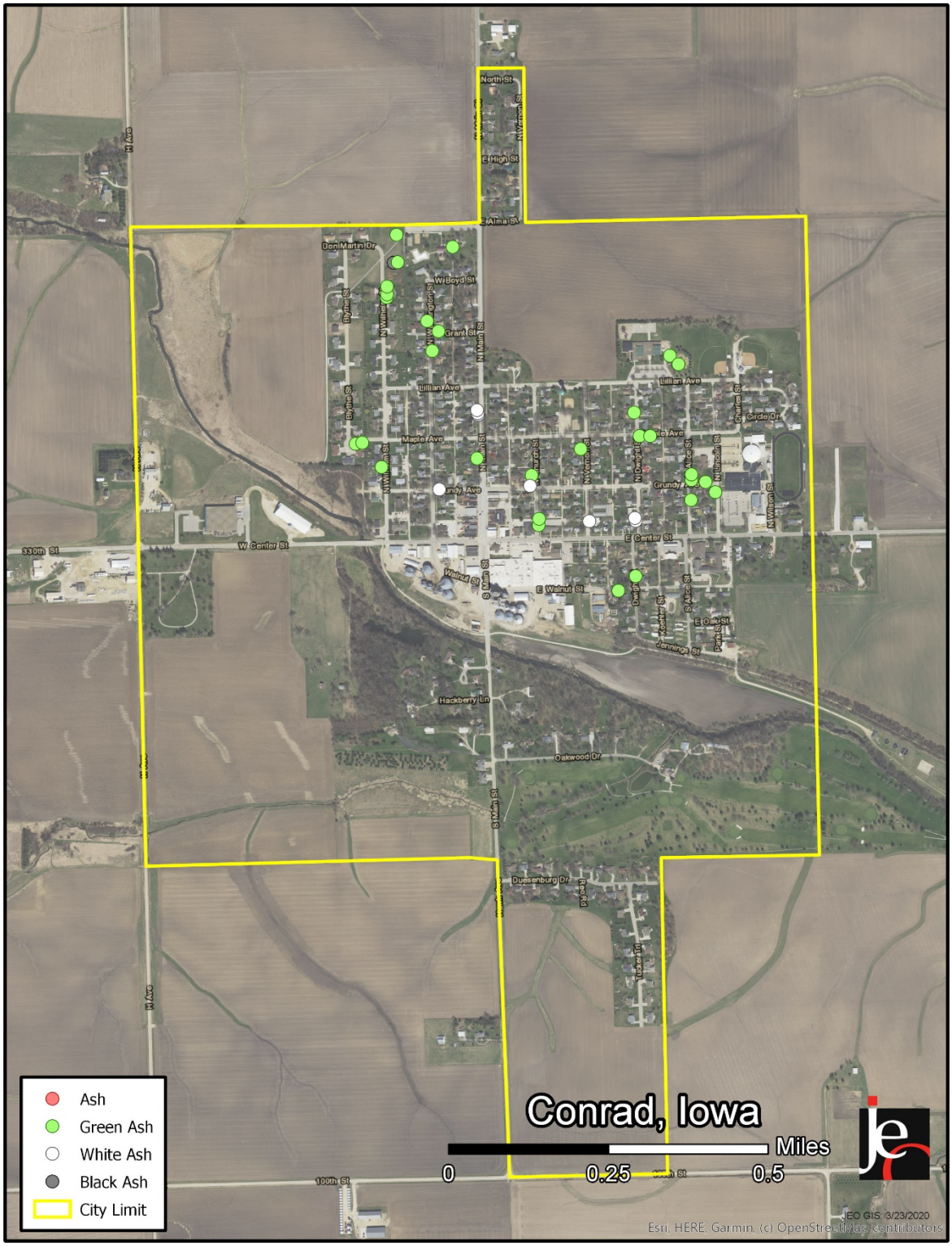



**Figure 1: Location of Ash Trees**

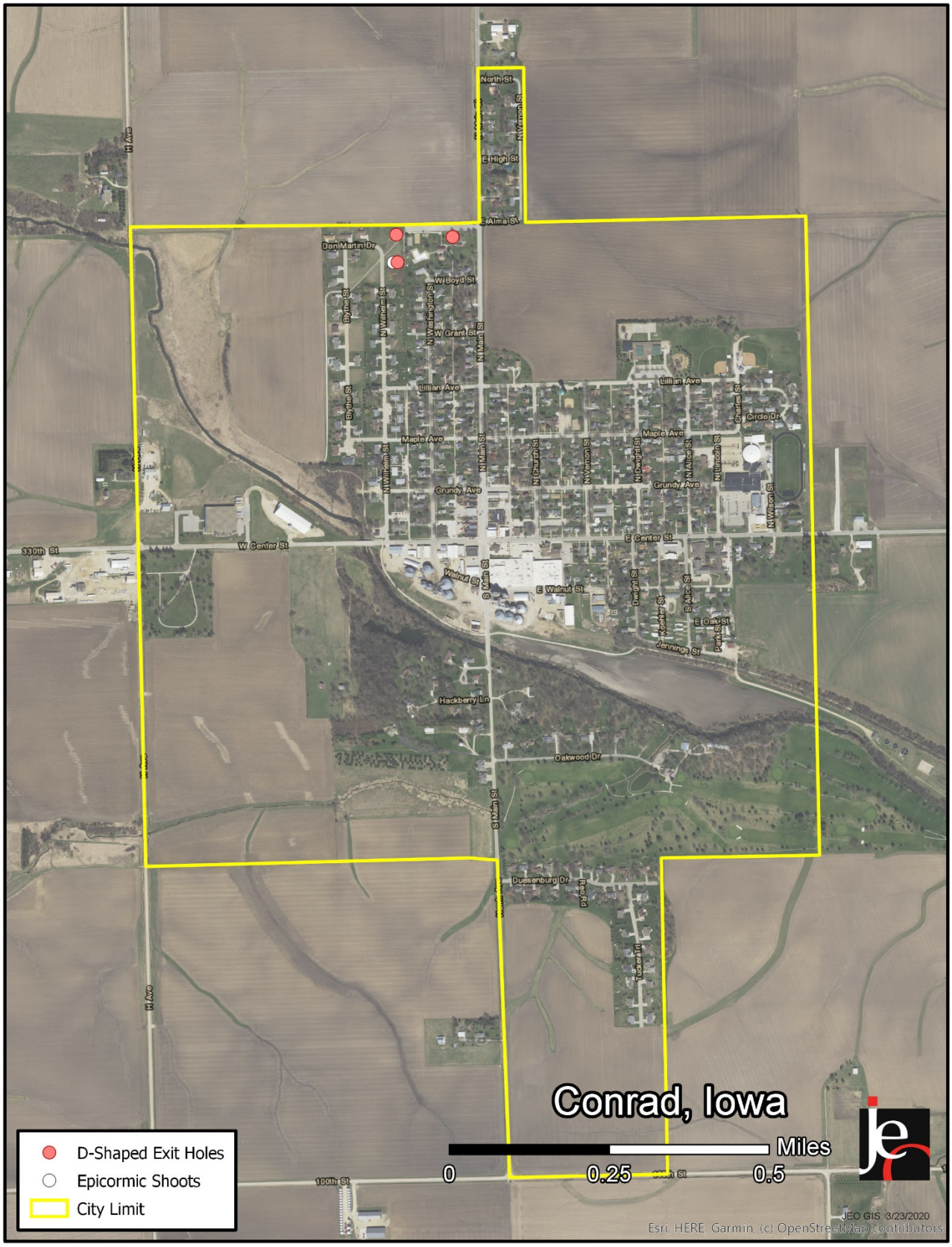



**Figure 2: Location of EAB symptoms**

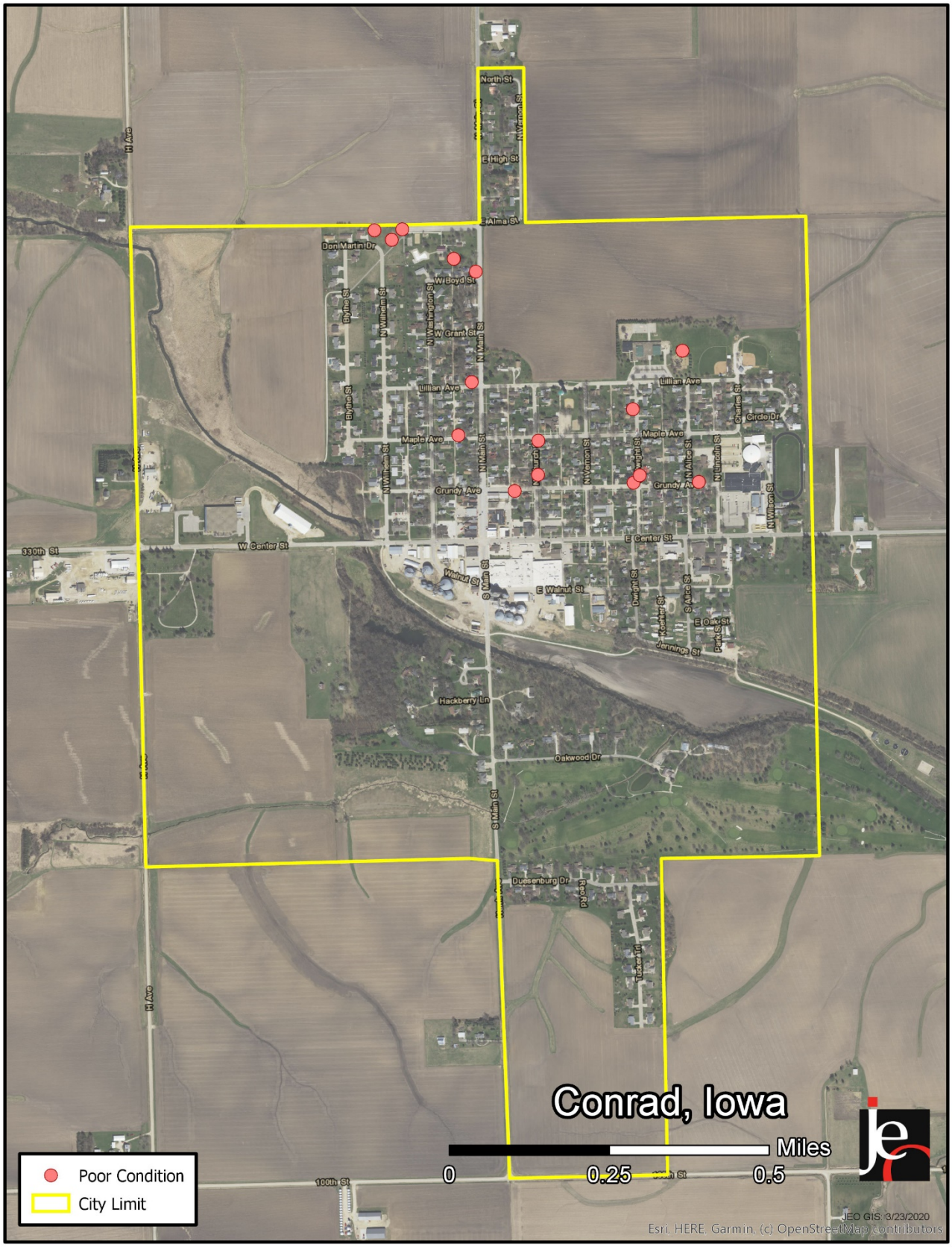



**Figure 3: Location of Poor Condition Trees**

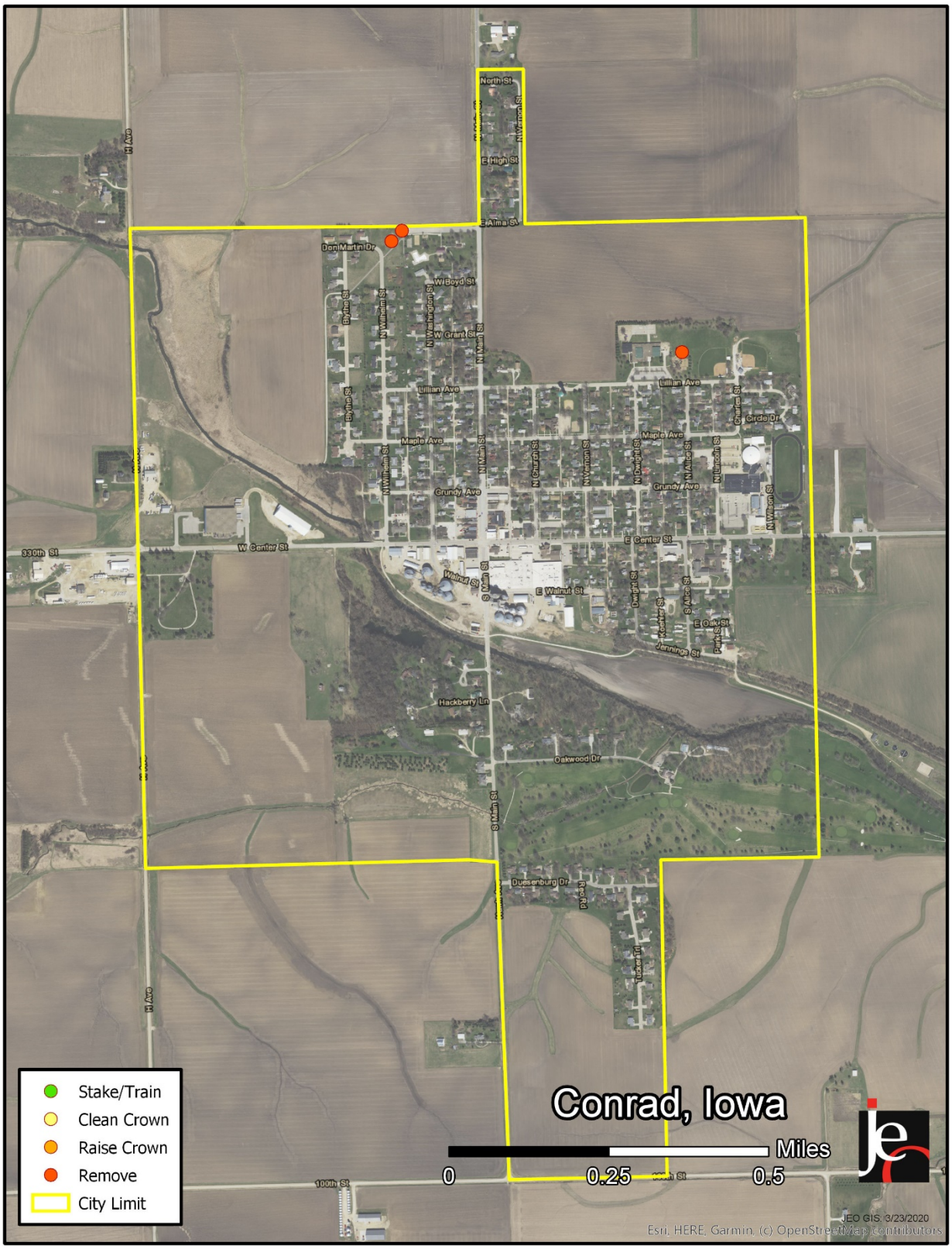



**Figure 4: Location of Trees with Recommended Maintenance *City ownership of the trees recommended for removal should be verified prior to any removal***

# Appendix C: Conrad Tree Ordinances

**CHAPTER 151 TREES**

**151.01 DEFINITION.**
For use in this chapter, "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.

**151.02 PLANTING RESTRICTIONS.**
No tree shall be planted in any parking or street except in accordance with the following:
1. Alignment. All trees planted in any street shall be planted in the parking 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 parking 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 (measured from the extended property lines) 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 fruitbearing 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 fifteen (15) feet above the surface of the street 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 dead, diseased or damaged, and such trees and shrubs shall be subject to the following:
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. Removal of trees from public property shall be at the City's expense.
2. Private Property. If it is determined with reasonable certainty that any such condition exists on private property and that 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 fourteen (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 DESTRUCTION OF NOXIOUS WEEDS.**
It is the duty of every property owner or person, owning or occupying real estate within the corporation limits of the City, to remove from their property or the streets or highways adjoining property all noxious weeds thereon as defined by State law at such times and in such manner as the Council shall provide by resolution. The Council may fix by resolution a date for the destruction of noxious weeds. The Council shall publish a notice of said resolution in one publication of a newspaper of general circulation which serves the City. The notice shall state therein the time for destruction of such weeds, the manner of destroying the same, if other than by cutting, and that unless said resolution is complied with, the Council will cause said weeds to be destroyed and the cost thereof taxed against the owner of the property.

**151.08 CONTROL OF VEGETATION.**
It is the duty of every owner and the person occupying any real estate within the corporation limits of the City which is platted or used for residential, commercial or industrial purposes, other than property being used as timberland or for agricultural purposes, to maintain the property in such a condition so that all uncultivated vegetation thereon is cut, sprayed or otherwise controlled so that the height does not exceed six (6) inches.

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.