West Point, IA

Urban Forestry Management Plan

SUMMER 2021

JEO CONSULTING GROUP

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Executive Summary

EXECUTIVE SUMMARY

Overview

This plan was developed to assist the City of West Point 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 9.5% of West Point'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 2021, 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 283 trees inventoried.

- West Point's trees provide $40,194 of benefits annually, an average of $142.03 per tree
- There are over 41 species of trees
- The top three genera are: Maple 43%, Ash 9.5%, and Oak 9%
- 46% of trees need some type of management
- 22 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 22 trees needing removal, 5 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*
- 15 of the 27 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 11 years to remove ash. We suggest that city officials request a budget increase to $5,000 annually and apply for grants to plant replacement trees

Introduction

INTRODUCTION

This plan was developed to assist West Point 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 West Point, 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 West Point'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 West Point 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 West Point's urban forestry goals.

Assist West Point 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

Findings

INVENTORY

In 2021, 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 283 city trees into the USDA Forest service program Street Tree Resource Analysis Tool for Urban forestry Management as part of the i-Tree suite. Following are results from the i-Tree STREETS analysis.

ANNUAL BENEFITS

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. West Point's trees reduce energy-related costs by approximately $10,823 annually (Appendix A, Table 1). These savings are both in electricity (51.6 MWh) and in natural gas (7,043.4 Therms).

Annual Stormwater Benefits

West Point's trees intercept about 570,051 gallons of rainfall or snow melt per year (Appendix A, Table 2). This interception provides $15,448 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 West Point, it is estimated that trees remove 666.6 lbs of air pollution (ozone (O3), particulate matter less than 10 microns (PM10), carbon monoxide (CO), nitrogen dioxide (NO2), and sulfur dioxide (SO2)) per year with a net value of $1,877 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In West Point, trees sequester about 116,280 lbs of carbon per year with an associated value of $872 (Appendix A, Table 5). In addition, the trees store 2,232,417 lbs of carbon, with a yearly benefit of $16,743 (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. West Point receives $10,609 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, West Point's trees provide $40,194 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 283 trees in West Point provide approximately $142.03 annually (Appendix A, Table 7).

ENERGY	STORMWATER	AIR QUALITY	CARBON	AESTHETICS	SUMMARY
• Reduce energy cost by **$10,823**	• Intercept **570,051 gallons** • Provides **$15,448** benefit	• Remove **666.6 lbs** of pollution • Net value of **$1,877**	• Sequester **116,280 lbs** • Value of **$872** • Store **2,232,417 lbs** • Value of **$16,743**	• **$10,609** in social benefits	• **$40,194** annual benefits • Each tree provides **$142.03** annually

FOREST STRUCTURE

Species Distribution

West Point has over 41 different tree species along city streets and parks (Appendix A, Figure 1).

The distribution of trees by genera is as follows:

Maple	122	43%	Pine	3	1%
Ash	27	9.5%	Sweetgum	2	<1%
Oak	25	9%	Black walnut	2	<1%
Cedar	24	8.5%	Juniper	2	<1%
Apple (Crab)	22	8%	Hickory	2	<1%
Sycamore	9	3%	Poplar	1	<1%
Spruce	9	3%	Hophornbeam	1	<1%
Eastern redbud	7	2.5%	Black cherry	1	<1%
Basswood/Linden	6	2%	Hackberry	1	<1%
Elm	4	1%	Southern magnolia	1	<1%
Tulip tree	3	1%	Ginkgo	1	<1%
Pear	3	1%	Other Deciduous	5	2%

Age Class

Most of West Point's trees (36.5%) are between 3 and 12 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. West Point's size curve is on the smaller side, indicating a younger than average stand.

Condition: Wood and Foliage

Both wood condition and leaf condition are good indicators of the urban forest's overall health. The foliage condition results for West Point indicate that 79% of the trees are in good health, 13% are in fair health with only 5% of the foliage in poor health, and 3% dead, or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 62% of West Point's trees are in good health for wood condition and 28% are in fair condition (Appendix A, Figure 4 & Appendix B, Figure 3). Six percent of the tree population's wood condition is in poor health, and 4% dead, or dying. This 10% 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	71	25%
Crown Reduction	26	9%
Tree Removal	22	8%
Crown Raising	31	11%
Tree Staking	2	<1%

Canopy Cover

The total canopy with both private and public trees is 45.37 acres or about 12% cover. The canopy cover included in the West Point inventory includes approximately 6 acres (Appendix A, Figure 5). The city's canopy goal is to increase canopy by 20% in 30 years. To achieve this goal it is estimated that 10 trees need to be planted annually on public and private lands.

Land Use and Location

The majority of West Point'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	56%
Industrial/Large Commercial	2%
Park/Vacant/Other	41%
Small Commercial	1%
Multifamily Residential	0%

Recommendations

RECOMMENDATIONS

Risk Management

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

HAZARDOUS TREES

West Point has 22 concerning trees that need immediate removal. These trees can be seen on the Location of Trees with Recommended Maintenance Map (Appendix B, Figure 4). We recommend starting with the large-diameter, critical concern trees first. There are 5 trees over 24 inches in diameter at 4.5 ft 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 130 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 22 removals, 13 are ash trees. There are a total of 27 ash trees, and 15 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 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 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%. 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 West Point.

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 (26%) (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: walnut, ash, elm, or other fruit/nut bearing trees. All trees planted must meet the restrictions in city ordinance 6-2.0103 (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. The new plantings should be a diverse mix of species and could include ginkgo, Kentucky coffeetree, basswood, swamp white oak, tulip tree, eastern redbud, and northern hackberry.

Postponed Work

While finances, staffing, and equipment are focused on the management of ash, usual services may be delayed. Tree removal requests on genera other than ash will be prioritized by hazardous or emergency situations only.

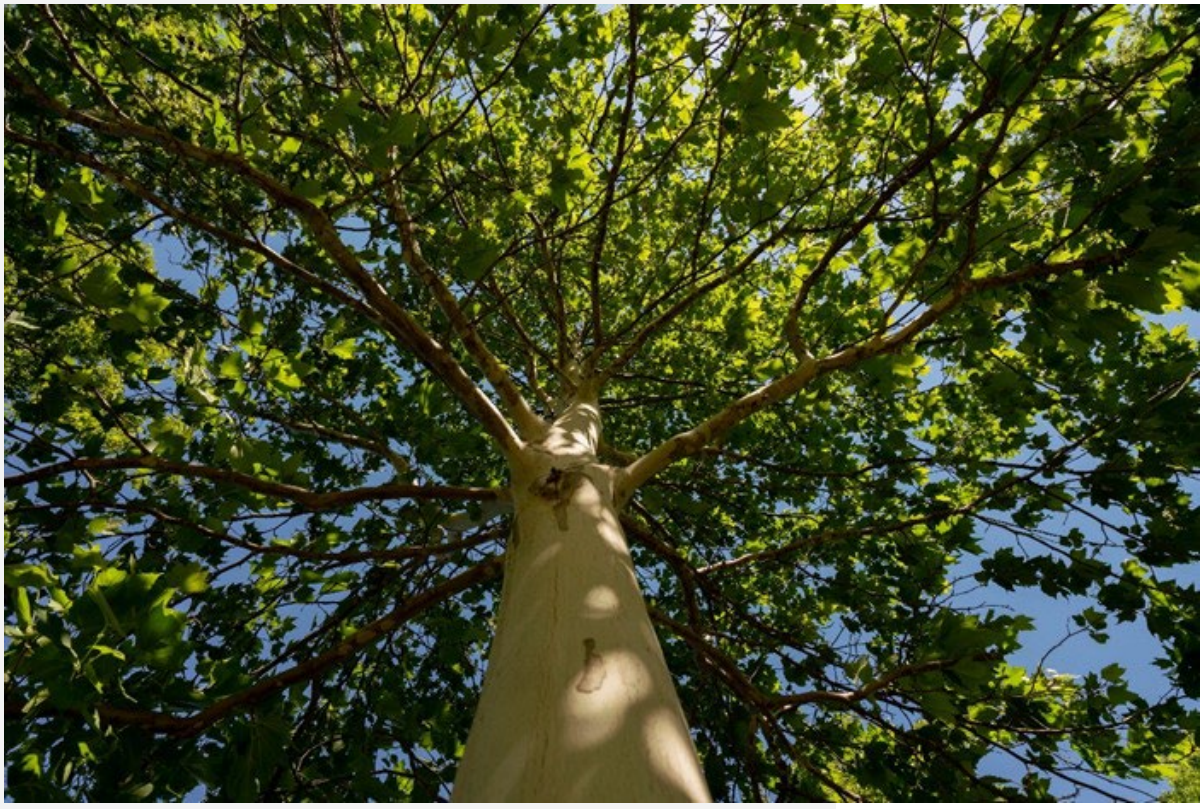
Monitoring

It is recommended that ash trees be checked with a visual survey every year for tree death and for EAB signs and symptoms including canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

Private Ash Trees

It is strongly recommended that private property owners start removing ash trees on their property upon arrival of EAB if preventative treatments are not being used. City Code 6-2.0107 states “The superintendent shall remove, on the order of the council, any tree on the streets of the city which interferes with the making of improvements or with travel thereon. He shall additionally remove any trees on the street, not on private property, which have become diseased, or which constitute a danger to the public, or which may otherwise be declared a nuisance.”

Schedule & Budget



PROPOSED WORK SCHEDULE & BUDGET

Budget Allowance of $2,000/Year – (Based off Reported Yearly Tree Budget)

YEAR 1	Est. Cost
Remove 2 trees recommended for immediate removal	$1,600
Plant 2 trees in open locations	$300
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,900**

YEAR 2	Est. Cost
Remove 1 tree recommended for immediate removal	$800
Prune 1/3 of city owned trees	$1,425
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$2,225**

YEAR 3	Est. Cost
Remove 2 trees recommended for immediate removal	$1,600
Plant 2 trees in open locations	$300
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,900**

YEAR 4	Est. Cost
Remove 1 tree recommended for immediate removal	$800
Prune 1/3 of city owned trees	$1,425
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$2,225**

YEAR 5	Est. Cost
Remove 2 trees recommended for immediate removal	$1,600
Plant 2 trees in open locations	$300
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,900**

YEAR 6	Est. Cost
Remove 1 tree recommended for immediate removal	$800
Prune 1/3 of city owned trees	$1,425
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$2,225**

Estimated costs based on average costs of $800/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 $3,600 a year. If the budget were increased to $5,000 a year all ash could be removed in nearly 4 years.*

PROPOSED WORK SCHEDULE WITH INCREASED BUDGET

Budget Allowance of $5,000/Year – (Budget Increase Suggested to Best Manage City Trees)

YEAR 1	Est. Cost
Remove 5 trees recommended for immediate removal	$4,000
Prune 1/6 of city trees	$750
Plant 1 tree in open location	$150
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$5,000**

YEAR 2	Est. Cost
Remove 5 trees recommended for immediate removal	$4,000
Prune 1/6 of city trees	$750
Plant 1 tree in open location	$150
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$5,000**

YEAR 3	Est. Cost
Remove 5 trees recommended for immediate removal	$4,000
Prune 1/6 of city trees	$750
Plant 1 tree in open location	$150
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$5,000**

YEAR 4	Est. Cost
Remove 5 trees recommended for immediate removal	$4,000
Prune 1/6 of city trees	$750
Plant 1 tree in open location	$150
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$5,000**

YEAR 5	Est. Cost
Remove 2 trees recommended for immediate removal	$1,600
Remove 3 ash trees	$2,400
Prune 1/6 of city trees	$750
Plant 1 tree in open location	$150
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$5,000**

YEAR 6	Est. Cost
Remove 5 ash trees	$4,000
Prune 1/6 of city trees	$750
Plant 1 tree in open location	$150
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$5,000**

Proposed Budget Increase

EAB could potentially kill all ash trees in West Point within four years of its arrival. To remove all ash trees within six years, the budget would need to be increased to $3,600 a year. If the budget were increased to $5,000 per year all ash could be removed within 4.5 years. Additionally, we recommend that West Point 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 6 trees could be treated per year (every other year treatment). Six trees would be selected for treatment, and West Point would still need to find $16,800 for removal. Alternatively, if there are 10 treatable trees, it would cost approximately $3,000 a year for treatment and leave $13,600 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 West Point. We suggest considering an increased budget to plan for this.

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Appendices

APPENDIX A: i-TREE DATA

Table 1: Annual Energy Benefits

West Point

Annual Energy Benefits of Public Trees

2/1/2022

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Silver maple	10.9	829	1,435.8	1,407	2,236	(N/A)	14.1	20.7	55.89
Sugar maple	7.2	544	993.9	974	1,518	(N/A)	11.3	14.0	47.45
Norway maple	4.3	330	609.5	597	927	(N/A)	9.2	8.6	35.67
Red maple	2.4	184	328.9	322	506	(N/A)	8.5	4.7	21.09
Green ash	6.3	478	834.5	818	1,296	(N/A)	8.5	12.0	53.99
Apple	2.2	171	331.8	325	496	(N/A)	7.8	4.6	22.54
Northern white cedar	0.5	34	80.2	79	113	(N/A)	7.4	1.0	5.38
American sycamore	4.1	309	542.0	531	841	(N/A)	3.2	7.8	93.40
Northern red oak	1.0	76	134.0	131	207	(N/A)	2.8	1.9	25.91
Northern pin oak	1.7	133	260.1	255	388	(N/A)	2.5	3.6	55.38
Eastern redbud	0.6	44	92.6	91	134	(N/A)	2.5	1.2	19.21
Broadleaf Deciduous Small	0.1	8	19.0	19	27	(N/A)	1.8	0.2	5.40
Pin oak	0.3	19	37.6	37	56	(N/A)	1.4	0.5	14.05
American basswood	0.7	56	107.5	105	161	(N/A)	1.4	1.5	40.27
Eastern red cedar	0.3	25	49.3	48	74	(N/A)	1.1	0.7	24.57
Norway spruce	0.3	24	43.4	43	67	(N/A)	1.1	0.6	22.18
White ash	1.3	100	152.6	150	250	(N/A)	1.1	2.3	83.36
Chinese elm	1.4	103	181.1	177	281	(N/A)	1.1	2.6	93.56
Tulip tree	0.5	36	54.4	53	89	(N/A)	1.1	0.8	29.70
Black spruce	0.2	17	30.2	30	46	(N/A)	1.1	0.4	15.42
Oak	0.4	29	54.2	53	83	(N/A)	1.1	0.8	27.52
Callery pear	0.1	11	23.8	23	35	(N/A)	1.1	0.3	11.52
Sweetgum	0.2	14	27.5	27	41	(N/A)	0.7	0.4	20.64
Hickory	0.5	40	76.2	75	115	(N/A)	0.7	1.1	57.32
Black walnut	0.8	58	105.8	104	162	(N/A)	0.7	1.5	80.97
Juniper	0.2	17	32.9	32	49	(N/A)	0.7	0.5	24.57
Basswood	0.5	36	54.0	53	88	(N/A)	0.7	0.8	44.23
Blue spruce	0.2	15	29.7	29	44	(N/A)	0.7	0.4	22.22
Eastern white pine	0.2	15	29.2	29	44	(N/A)	0.7	0.4	22.02
Red pine	0.1	11	19.7	19	30	(N/A)	0.4	0.3	30.47
Black poplar	0.5	37	63.1	62	99	(N/A)	0.4	0.9	98.63
Eastern hophornbeam	0.1	6	12.8	13	18	(N/A)	0.4	0.2	18.19
Bur oak	0.1	7	13.7	13	21	(N/A)	0.4	0.2	20.64
Swamp white oak	0.1	8	16.9	17	24	(N/A)	0.4	0.2	24.47
Black cherry	0.1	6	12.8	13	18	(N/A)	0.4	0.2	18.19
Spruce	0.1	10	14.6	14	24	(N/A)	0.4	0.2	24.14
Ginkgo	0.0	0	0.4	0	1	(N/A)	0.4	0.0	0.57
Siberian elm	0.4	34	58.3	57	91	(N/A)	0.4	0.8	91.06
Southern magnolia	0.0	3	5.6	5	8	(N/A)	0.4	0.1	8.11
White oak	0.0	2	3.7	4	6	(N/A)	0.4	0.1	5.82
Northern hackberry	0.5	40	69.7	68	108	(N/A)	0.4	1.0	108.50
Total	51.6	3,920	7,043.4	6,903	10,823	(N/A)	100.0	100.0	38.24

Table 2: Annual Stormwater Benefits

West Point

Annual Stormwater Benefits of Public Trees

2/1/2022

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Silver maple	148,375	4,021	(N/A)	14.1	26.0	100.52
Sugar maple	77,961	2,113	(N/A)	11.3	13.7	66.02
Norway maple	34,790	943	(N/A)	9.2	6.1	36.26
Red maple	17,444	473	(N/A)	8.5	3.1	19.70
Green ash	58,994	1,599	(N/A)	8.5	10.3	66.61
Apple	8,056	218	(N/A)	7.8	1.4	9.92
Northern white cedar	4,304	117	(N/A)	7.4	0.8	5.55
American sycamore	63,402	1,718	(N/A)	3.2	11.1	190.91
Northern red oak	7,347	199	(N/A)	2.8	1.3	24.89
Northern pin oak	19,570	530	(N/A)	2.5	3.4	75.77
Eastern redbud	2,058	56	(N/A)	2.5	0.4	7.97
Broadleaf Deciduous Small	343	9	(N/A)	1.8	0.1	1.86
Pin oak	1,332	36	(N/A)	1.4	0.2	9.02
American basswood	8,711	236	(N/A)	1.4	1.5	59.02
Eastern red cedar	4,904	133	(N/A)	1.1	0.9	44.30
Norway spruce	6,151	167	(N/A)	1.1	1.1	55.57
White ash	17,428	472	(N/A)	1.1	3.1	157.43
Chinese elm	21,717	589	(N/A)	1.1	3.8	196.17
Tulip tree	2,949	80	(N/A)	1.1	0.5	26.64
Black spruce	2,556	69	(N/A)	1.1	0.4	23.09
Oak	4,286	116	(N/A)	1.1	0.8	38.72
Callery pear	761	21	(N/A)	1.1	0.1	6.87
Sweetgum	1,216	33	(N/A)	0.7	0.2	16.47
Hickory	5,181	140	(N/A)	0.7	0.9	70.21
Black walnut	11,182	303	(N/A)	0.7	2.0	151.51
Juniper	3,269	89	(N/A)	0.7	0.6	44.30
Basswood	2,931	79	(N/A)	0.7	0.5	39.72
Blue spruce	3,068	83	(N/A)	0.7	0.5	41.57
Eastern white pine	3,565	97	(N/A)	0.7	0.6	48.30
Red pine	2,969	80	(N/A)	0.4	0.5	80.46
Black poplar	7,239	196	(N/A)	0.4	1.3	196.17
Eastern hophornbeam	264	7	(N/A)	0.4	0.0	7.17
Bur oak	608	16	(N/A)	0.4	0.1	16.47
Swamp white oak	586	16	(N/A)	0.4	0.1	15.88
Black cherry	264	7	(N/A)	0.4	0.0	7.17
Spruce	1,539	42	(N/A)	0.4	0.3	41.70
Ginkgo	7	0	(N/A)	0.4	0.0	0.19
Siberian elm	5,904	160	(N/A)	0.4	1.0	159.99
Southern magnolia	155	4	(N/A)	0.4	0.0	4.21
White oak	172	5	(N/A)	0.4	0.0	4.65
Northern hackberry	6,493	176	(N/A)	0.4	1.1	175.96
Citywide total	570,051	15,448	(N/A)	100.0	100.0	54.59

Table 3: Annual Air Quality Benefits

West Point

Annual Air Quality Benefits of Public Trees

2/1/2022

Species	Deposition (lb)				Total Depos. ($)	Avoided (lb)				Total Avoided ($)	BVOC Emissions (lb)	BVOC Emissions ($)	Total (lb)	Total ($)	Standard Error	% of Total Trees	Avg. $/tree
	O_3	NO_2	PM_{10}	SO_2		NO_2	PM_{10}	VOC	SO_2								
Silver maple	24.4	4.1	12.1	1.1	132	51.5	7.5	7.2	49.4	322	-13.1	-49	144.3	405	(N/A)	14.1	10.13
Sugar maple	10.0	1.7	5.1	0.4	54	34.3	5.0	4.8	32.5	213	-7.9	-30	85.8	238	(N/A)	11.3	7.45
Norway maple	6.5	1.1	3.3	0.3	35	20.9	3.0	2.9	19.7	130	-1.6	-6	56.2	159	(N/A)	9.2	6.13
Red maple	3.7	0.6	1.8	0.2	20	11.5	1.7	1.6	11.0	72	-1.3	-5	30.7	87	(N/A)	8.5	3.61
Green ash	6.4	1.0	3.2	0.3	34	29.8	4.4	4.2	28.5	186	0.0	0	77.8	221	(N/A)	8.5	9.20
Apple	2.1	0.3	1.0	0.1	11	10.9	1.6	1.5	10.2	68	0.0	0	27.8	79	(N/A)	7.8	3.59
Northern white cedar	0.2	0.0	0.3	0.0	1	2.3	0.3	0.3	2.1	14	-1.1	-4	4.3	11	(N/A)	7.4	0.53
American sycamore	11.8	1.9	5.2	0.5	61	19.3	2.8	2.7	18.5	121	0.0	0	62.7	182	(N/A)	3.2	20.23
Northern red oak	1.3	0.2	0.7	0.1	7	4.7	0.7	0.7	4.5	30	-1.9	-7	11.1	30	(N/A)	2.8	3.75
Northern pin oak	4.4	0.8	2.1	0.2	24	8.5	1.2	1.2	7.9	53	-1.0	-4	25.3	73	(N/A)	2.5	10.37
Eastern redbud	0.4	0.1	0.2	0.0	2	2.9	0.4	0.4	2.6	18	0.0	0	7.0	20	(N/A)	2.5	2.86
Broadleaf Deciduous Small	0.0	0.0	0.0	0.0	0	0.6	0.1	0.1	0.5	3	0.0	0	1.3	4	(N/A)	1.8	0.71
Pin oak	0.1	0.0	0.1	0.0	1	1.2	0.2	0.2	1.2	8	-0.2	-1	2.7	7	(N/A)	1.4	1.82
American basswood	1.2	0.2	0.6	0.1	7	3.6	0.5	0.5	3.3	22	-1.0	-4	9.0	25	(N/A)	1.4	6.21
Eastern red cedar	1.0	0.2	0.8	0.1	7	1.6	0.2	0.2	1.5	10	-2.7	-10	3.1	7	(N/A)	1.1	2.19
Norway spruce	0.7	0.1	0.6	0.1	5	1.5	0.2	0.2	1.4	9	-2.8	-11	2.1	3	(N/A)	1.1	1.15
White ash	4.0	0.6	1.7	0.2	21	6.1	0.9	0.9	6.0	38	0.0	0	20.3	59	(N/A)	1.1	19.69
Chinese elm	3.9	0.6	1.7	0.2	20	6.5	0.9	0.9	6.2	40	0.0	0	20.9	61	(N/A)	1.1	20.21
Tulip tree	0.2	0.0	0.1	0.0	1	2.2	0.3	0.3	2.1	14	0.0	0	5.3	15	(N/A)	1.1	4.97
Black spruce	0.3	0.1	0.2	0.0	2	1.0	0.2	0.1	1.0	7	-0.9	-3	2.1	5	(N/A)	1.1	1.73
Oak	0.5	0.1	0.2	0.0	3	1.9	0.3	0.3	1.8	12	0.0	0	5.0	14	(N/A)	1.1	4.74
Callery pear	0.1	0.0	0.0	0.0	0	0.7	0.1	0.1	0.7	5	0.0	0	1.7	5	(N/A)	1.1	1.61
Sweetgum	0.0	0.0	0.0	0.0	0	0.9	0.1	0.1	0.9	6	0.0	0	2.1	6	(N/A)	0.7	2.99
Hickory	0.5	0.1	0.3	0.0	3	2.5	0.4	0.4	2.4	16	0.0	0	6.6	19	(N/A)	0.7	9.34
Black walnut	1.7	0.3	0.7	0.1	9	3.7	0.5	0.5	3.5	23	0.0	0	10.9	32	(N/A)	0.7	15.76
Juniper	0.7	0.1	0.5	0.1	4	1.1	0.2	0.1	1.0	7	-1.8	-7	2.0	4	(N/A)	0.7	2.19
Basswood	0.2	0.0	0.1	0.0	1	2.1	0.3	0.3	2.1	14	0.0	0	5.3	15	(N/A)	0.7	7.42
Blue spruce	0.4	0.1	0.4	0.1	3	1.0	0.1	0.1	0.9	6	-1.1	-4	2.0	5	(N/A)	0.7	2.32
Eastern white pine	0.4	0.1	0.3	0.0	3	1.0	0.1	0.1	0.9	6	-1.5	-6	1.5	3	(N/A)	0.7	1.46
Red pine	0.3	0.1	0.3	0.0	2	0.7	0.1	0.1	0.7	4	-1.4	-5	0.9	1	(N/A)	0.4	1.45
Black poplar	1.6	0.3	0.7	0.1	8	2.3	0.3	0.3	2.2	14	0.0	0	7.7	23	(N/A)	0.4	22.55
Eastern hophornbeam	0.0	0.0	0.0	0.0	0	0.4	0.1	0.1	0.3	2	0.0	0	0.9	3	(N/A)	0.4	2.55
Bur oak	0.0	0.0	0.0	0.0	0	0.5	0.1	0.1	0.4	3	0.0	0	1.1	3	(N/A)	0.4	2.99
Swamp white oak	0.1	0.0	0.0	0.0	0	0.5	0.1	0.1	0.5	3	0.0	0	1.2	3	(N/A)	0.4	3.47
Black cherry	0.0	0.0	0.0	0.0	0	0.4	0.1	0.1	0.3	2	0.0	0	0.9	3	(N/A)	0.4	2.55

West Point

Annual Air Quality Benefits of Public Trees

2/1/2022

Species	Deposition (lb)				Total Depos. ($)	Avoided (lb)				Total Avoided ($)	BVOC Emissions (lb)	BVOC Emissions ($)	Total (lb)	Total ($)	Standard Error	% of Total Trees	Avg. $/tree
	O_3	NO_2	PM_{10}	SO_2		NO_2	PM_{10}	VOC	SO_2								
Spruce	0.2	0.0	0.1	0.0	1	0.6	0.1	0.1	0.6	4	-0.5	-2	1.2	3	(N/A)	0.4	2.82
Ginkgo	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)	0.4	0.07
Siberian elm	1.2	0.2	0.6	0.1	6	2.1	0.3	0.3	2.0	13	0.0	0	6.8	20	(N/A)	0.4	19.64
Southern magnolia	0.0	0.0	0.0	0.0	0	0.2	0.0	0.0	0.2	1	0.0	0	0.4	1	(N/A)	0.4	1.05
White oak	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)	0.4	0.87
Northern hackberry	1.7	0.3	0.8	0.1	9	2.5	0.4	0.3	2.4	16	0.0	0	8.4	25	(N/A)	0.4	24.53
Citywide total	92.2	15.5	46.2	4.4	500	246.2	35.9	34.2	234.0	1,534	-42.0	-157	666.6	1,877	(N/A)	100.0	6.63

Table 4: Annual Carbon Stored

West Point

Stored CO2 Benefits of Public Trees

2/1/2022

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Silver maple	555,433	4,166	(N/A)	14.1	24.9	104.14
Sugar maple	284,194	2,131	(N/A)	11.3	12.7	66.61
Norway maple	107,656	807	(N/A)	9.2	4.8	31.05
Red maple	41,640	312	(N/A)	8.5	1.9	13.01
Green ash	207,474	1,556	(N/A)	8.5	9.3	64.84
Apple	33,357	250	(N/A)	7.8	1.5	11.37
Northern white cedar	766	6	(N/A)	7.4	0.0	0.27
American sycamore	406,905	3,052	(N/A)	3.2	18.2	339.09
Northern red oak	25,036	188	(N/A)	2.8	1.1	23.47
Northern pin oak	72,720	545	(N/A)	2.5	3.3	77.91
Eastern redbud	7,754	58	(N/A)	2.5	0.3	8.31
Broadleaf Deciduous	889	7	(N/A)	1.8	0.0	1.33
Pin oak	2,248	17	(N/A)	1.4	0.1	4.22
American basswood	46,871	352	(N/A)	1.4	2.1	87.88
Eastern red cedar	3,306	25	(N/A)	1.1	0.1	8.27
Norway spruce	6,724	50	(N/A)	1.1	0.3	16.81
White ash	55,558	417	(N/A)	1.1	2.5	138.90
Chinese elm	134,499	1,009	(N/A)	1.1	6.0	336.25
Tulip tree	7,356	55	(N/A)	1.1	0.3	18.39
Black spruce	1,445	11	(N/A)	1.1	0.1	3.61
Oak	16,144	121	(N/A)	1.1	0.7	40.36
Callery pear	1,336	10	(N/A)	1.1	0.1	3.34
Sweetgum	2,069	16	(N/A)	0.7	0.1	7.76
Hickory	16,915	127	(N/A)	0.7	0.8	63.43
Black walnut	55,031	413	(N/A)	0.7	2.5	206.37
Juniper	2,204	17	(N/A)	0.7	0.1	8.27
Basswood	7,344	55	(N/A)	0.7	0.3	27.54
Blue spruce	2,945	22	(N/A)	0.7	0.1	11.05
Eastern white pine	3,599	27	(N/A)	0.7	0.2	13.50
Red pine	3,343	25	(N/A)	0.4	0.1	25.07
Black poplar	55,982	420	(N/A)	0.4	2.5	419.86
Eastern hophornbeam	908	7	(N/A)	0.4	0.0	6.81
Bur oak	1,035	8	(N/A)	0.4	0.0	7.76
Swamp white oak	1,101	8	(N/A)	0.4	0.0	8.26
Black cherry	908	7	(N/A)	0.4	0.0	6.81
Spruce	1,170	9	(N/A)	0.4	0.1	8.78
Ginkgo	5	0	(N/A)	0.4	0.0	0.03
Siberian elm	29,353	220	(N/A)	0.4	1.3	220.15
Southern magnolia	73	1	(N/A)	0.4	0.0	0.55
White oak	185	1	(N/A)	0.4	0.0	1.39
Northern hackberry	28,932	217	(N/A)	0.4	1.3	216.99
Citywide total	2,232,417	16,743	(N/A)	100.0	100.0	59.16

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

Table 5: Annual Carbon Sequestered

West Point

Annual CO $_2$ Benefits of Public Trees

2/1/2022

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	43,074	323	-2,669	-119	-21	18,313	137	58,599	439 (N/A)	14.1	30.6	10.99
Sugar maple	15,936	120	-1,365	-79	-11	12,029	90	26,521	199 (N/A)	11.3	13.8	6.22
Norway maple	7,063	53	-519	-43	-4	7,293	55	13,794	103 (N/A)	9.2	7.2	3.98
Red maple	5,298	40	-200	-25	-2	4,061	30	9,134	69 (N/A)	8.5	4.8	2.85
Green ash	14,335	108	-996	-62	-8	10,562	79	23,840	179 (N/A)	8.5	12.4	7.45
Apple	3,356	25	-160	-29	-1	3,771	28	6,938	52 (N/A)	7.8	3.6	2.37
Northern white cedar	363	3	-4	-12	0	762	6	1,110	8 (N/A)	7.4	0.6	0.40
American sycamore	6,524	49	-1,953	-48	-15	6,839	51	11,362	85 (N/A)	3.2	5.9	9.47
Northern red oak	1,589	12	-120	-12	-1	1,678	13	3,134	24 (N/A)	2.8	1.6	2.94
Northern pin oak	1,060	8	-350	-22	-3	2,933	22	3,622	27 (N/A)	2.5	1.9	3.88
Eastern redbud	875	7	-37	-8	0	966	7	1,796	13 (N/A)	2.5	0.9	1.92
Broadleaf Deciduous Smal	190	1	-4	-3	0	186	1	368	3 (N/A)	1.8	0.2	0.55
Pin oak	390	3	-11	-3	0	428	3	804	6 (N/A)	1.4	0.4	1.51
American basswood	2,661	20	-225	-9	-2	1,231	9	3,658	27 (N/A)	1.4	1.9	6.86
Eastern red cedar	0	0	-16	-6	0	561	4	539	4 (N/A)	1.1	0.3	1.35
Norway spruce	393	3	-32	-6	0	531	4	885	7 (N/A)	1.1	0.5	2.21
White ash	494	4	-267	-12	-2	2,221	17	2,435	18 (N/A)	1.1	1.3	6.09
Chinese elm	2,303	17	-646	-16	-5	2,282	17	3,923	29 (N/A)	1.1	2.0	9.81
Tulip tree	893	7	-35	-4	0	790	6	1,644	12 (N/A)	1.1	0.9	4.11
Black spruce	141	1	-7	-4	0	367	3	498	4 (N/A)	1.1	0.3	1.25
Oak	1,005	8	-77	-5	-1	650	5	1,573	12 (N/A)	1.1	0.8	3.93
Callery pear	325	2	-7	-2	0	248	2	563	4 (N/A)	1.1	0.3	1.41
Sweetgum	418	3	-10	-2	0	318	2	723	5 (N/A)	0.7	0.4	2.71
Hickory	1,319	10	-81	-5	-1	883	7	2,115	16 (N/A)	0.7	1.1	7.93
Black walnut	1,769	13	-264	-9	-2	1,287	10	2,783	21 (N/A)	0.7	1.5	10.44
Juniper	0	0	-11	-4	0	374	3	359	3 (N/A)	0.7	0.2	1.35
Basswood	891	7	-35	-4	0	786	6	1,637	12 (N/A)	0.7	0.9	6.14
Blue spruce	186	1	-14	-4	0	339	3	506	4 (N/A)	0.7	0.3	1.90
Eastern white pine	240	2	-17	-4	0	341	3	560	4 (N/A)	0.7	0.3	2.10
Red pine	187	1	-16	-3	0	246	2	415	3 (N/A)	0.4	0.2	3.11
Black poplar	479	4	-269	-6	-2	813	6	1,017	8 (N/A)	0.4	0.5	7.63
Eastern hophornbeam	114	1	-4	-1	0	124	1	232	2 (N/A)	0.4	0.1	1.74

Annual CO $_2$ Benefits of Public Trees

2/1/2022

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
Bur oak	209	2	-5	-1	0	159	1	361	3 (N/A)	0.4	0.2	2.71
Swamp white oak	224	2	-5	-1	0	176	1	393	3 (N/A)	0.4	0.2	2.95
Black cherry	114	1	-4	-1	0	124	1	232	2 (N/A)	0.4	0.1	1.74
Spruce	116	1	-6	-2	0	216	2	324	2 (N/A)	0.4	0.2	2.43
Ginkgo	2	0	0	0	0	4	0	6	0 (N/A)	0.4	0.0	0.04
Siberian elm	911	7	-141	-5	-1	749	6	1,514	11 (N/A)	0.4	0.8	11.36
Southern magnolia	16	0	0	-1	0	59	0	74	1 (N/A)	0.4	0.0	0.55
White oak	74	1	-1	-1	0	49	0	121	1 (N/A)	0.4	0.1	0.91
Northern hackberry	745	6	-139	-6	-1	887	7	1,488	11 (N/A)	0.4	0.8	11.16
Citywide total	116,280	872	-10,724	-588	-85	86,633	650	191,602	1,437 (N/A)	100.0	100.0	5.08

Table 6: Annual Social and Aesthetic Benefits

West Point

Annual Aesthetic/Other Benefits of Public Trees

2/1/2022

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Silver maple	3,518	(N/A)	14.1	33.2	87.94
Sugar maple	1,679	(N/A)	11.3	15.8	52.48
Norway maple	711	(N/A)	9.2	6.7	27.34
Red maple	718	(N/A)	8.5	6.8	29.92
Green ash	1,272	(N/A)	8.5	12.0	52.99
Apple	192	(N/A)	7.8	1.8	8.72
Northern white cedar	142	(N/A)	7.4	1.3	6.78
American sycamore	414	(N/A)	3.2	3.9	46.03
Northern red oak	135	(N/A)	2.8	1.3	16.91
Northern pin oak	102	(N/A)	2.5	1.0	14.58
Eastern redbud	50	(N/A)	2.5	0.5	7.08
Broadleaf Deciduous Small	10	(N/A)	1.8	0.1	2.06
Pin oak	55	(N/A)	1.4	0.5	13.74
American basswood	182	(N/A)	1.4	1.7	45.45
Eastern red cedar	0	(N/A)	1.1	0.0	0.00
Norway spruce	101	(N/A)	1.1	1.0	33.67
White ash	64	(N/A)	1.1	0.6	21.25
Chinese elm	145	(N/A)	1.1	1.4	48.42
Tulip tree	97	(N/A)	1.1	0.9	32.32
Black spruce	59	(N/A)	1.1	0.6	19.54
Oak	95	(N/A)	1.1	0.9	31.69
Callery pear	42	(N/A)	1.1	0.4	13.95
Sweetgum	57	(N/A)	0.7	0.5	28.56
Hickory	115	(N/A)	0.7	1.1	57.69
Black walnut	124	(N/A)	0.7	1.2	61.96
Juniper	0	(N/A)	0.7	0.0	0.00
Basswood	92	(N/A)	0.7	0.9	45.86
Blue spruce	41	(N/A)	0.7	0.4	20.53
Eastern white pine	63	(N/A)	0.7	0.6	31.25
Red pine	47	(N/A)	0.4	0.4	47.08
Black poplar	29	(N/A)	0.4	0.3	28.57
Eastern hophornbeam	6	(N/A)	0.4	0.1	6.40
Bur oak	29	(N/A)	0.4	0.3	28.56
Swamp white oak	26	(N/A)	0.4	0.2	26.22
Black cherry	6	(N/A)	0.4	0.1	6.40
Spruce	32	(N/A)	0.4	0.3	32.32
Ginkgo	0	(N/A)	0.4	0.0	0.37
Siberian elm	54	(N/A)	0.4	0.5	53.50
Southern magnolia	9	(N/A)	0.4	0.1	9.46
White oak	15	(N/A)	0.4	0.1	14.73
Northern hackberry	81	(N/A)	0.4	0.8	81.25
Citywide total	10,609	(N/A)	100.0	100.0	37.49

Table 7: Summary of Benefits in Dollars

West Point

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

2/1/2022

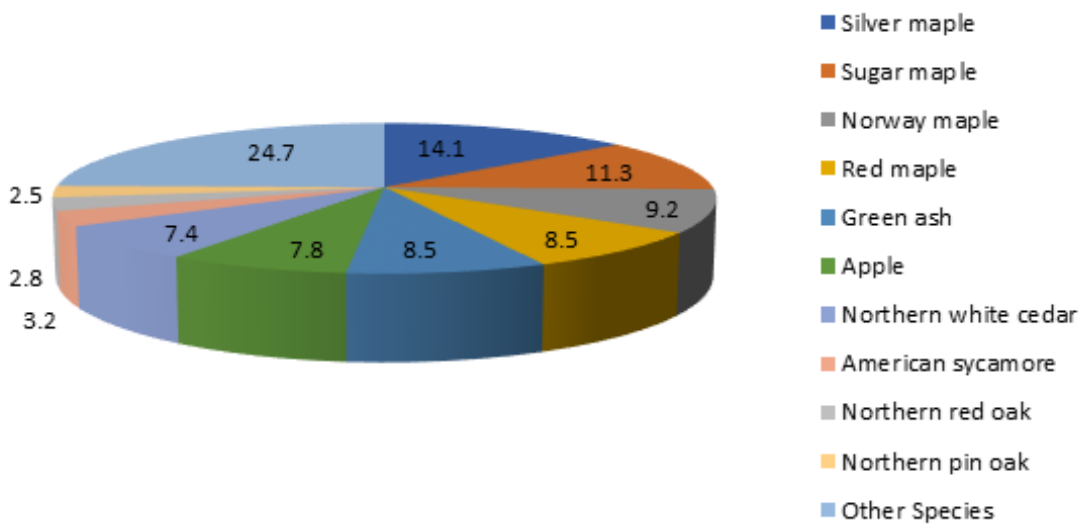
Benefits	Total ($)	Standard Error	$/tree	Standard Error	$/capita	Standard Error
Energy	10,823	(N/A)	38.24	(N/A)	0.00	(N/A)
CO2	1,437	(N/A)	5.08	(N/A)	0.00	(N/A)
Air Quality	1,877	(N/A)	6.63	(N/A)	0.00	(N/A)
Stormwater	15,448	(N/A)	54.59	(N/A)	0.00	(N/A)
Aesthetic/Other	10,609	(N/A)	37.49	(N/A)	0.00	(N/A)
Total Benefits	40,194	(N/A)	142.03	(N/A)	0.00	(N/A)
Costs						
Planting	0		0.00		0.00	
Contract Pruning	0		0.00		0.00	
Pest Management	0		0.00		0.00	
Irrigation	0		0.00		0.00	
Removal	0		0.00		0.00	
Administration	0		0.00		0.00	
Inspection/Service	0		0.00		0.00	
Infrastructure Repairs	0		0.00		0.00	
Litter Clean-up	0		0.00		0.00	
Liability/Claims	0		0.00		0.00	
Other Costs	0		0.00		0.00	
Total Costs	0		0.00		0.00	
Net Benefits	40,194	(N/A)	142.03	(N/A)	0.00	(N/A)
Benefit-cost ratio	0.00	(N/A)				

Figure 1: Species Distribution

West Point

Species Distribution of Public Trees

2/1/2022



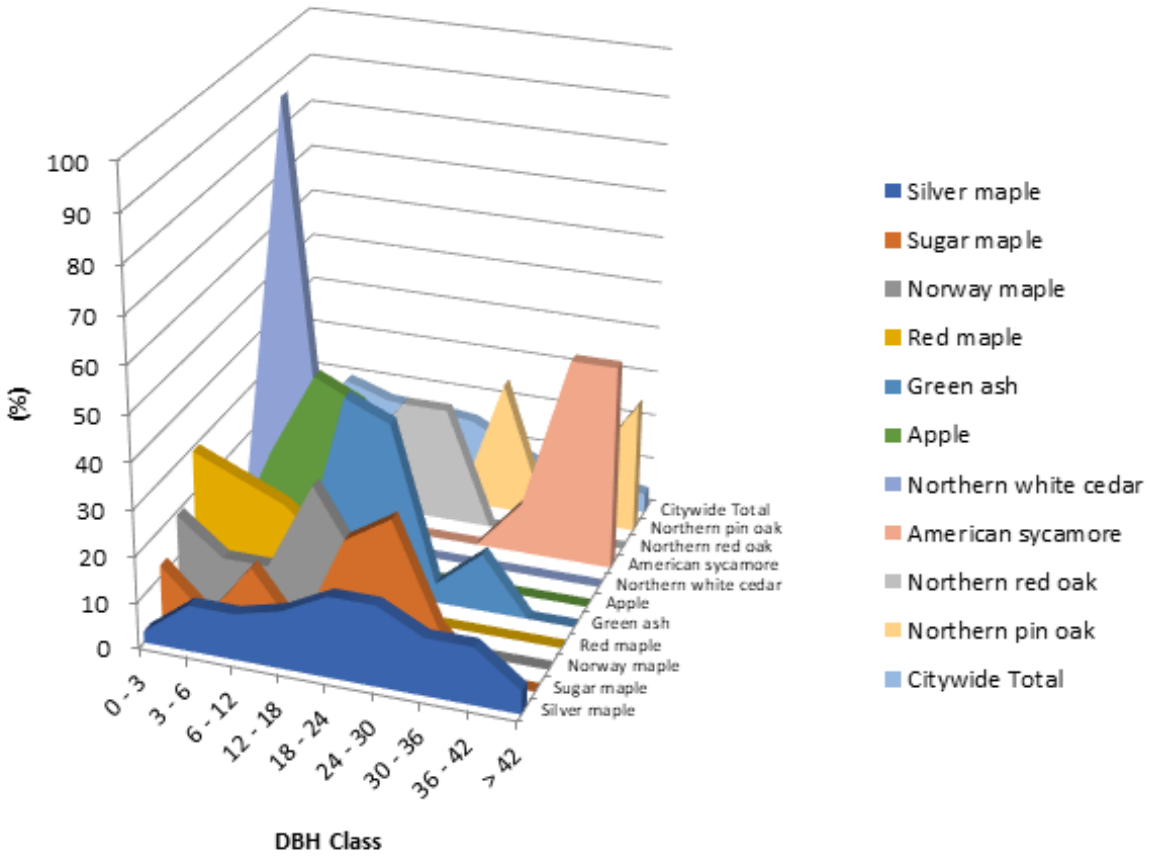
Species	Percent
Silver maple	14.1
Sugar maple	11.3
Norway maple	9.2
Red maple	8.5
Green ash	8.5
Apple	7.8
Northern white cedar	7.4
American sycamore	3.2
Northern red oak	2.8
Northern pin oak	2.5
Other Species	24.7
Total	100.0

Figure 2: Relative Age Class

West Point

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

2/1/2022



	DBH class (in)								
Species	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	> 42
Silver maple	2.50	10.00	10.00	12.50	17.50	17.50	12.50	12.50	5.00
Sugar maple	12.50	3.13	15.63	3.13	25.00	31.25	9.38	0.00	0.00
Norway maple	19.23	11.54	11.54	30.77	15.38	11.54	0.00	0.00	0.00
Red maple	29.17	25.00	20.83	12.50	12.50	0.00	0.00	0.00	0.00
Green ash	0.00	0.00	4.17	41.67	37.50	4.17	12.50	0.00	0.00
Apple	0.00	22.73	40.91	36.36	0.00	0.00	0.00	0.00	0.00
Northern white cedar	4.76	95.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American sycamore	0.00	0.00	0.00	0.00	0.00	0.00	11.11	44.44	44.44
Northern red oak	12.50	25.00	12.50	25.00	25.00	0.00	0.00	0.00	0.00
Northern pin oak	0.00	14.29	14.29	0.00	0.00	28.57	0.00	14.29	28.57
Citywide Total	8.48	19.79	16.61	15.90	14.84	9.89	4.59	5.65	4.24

Figure 3: Foliage Condition

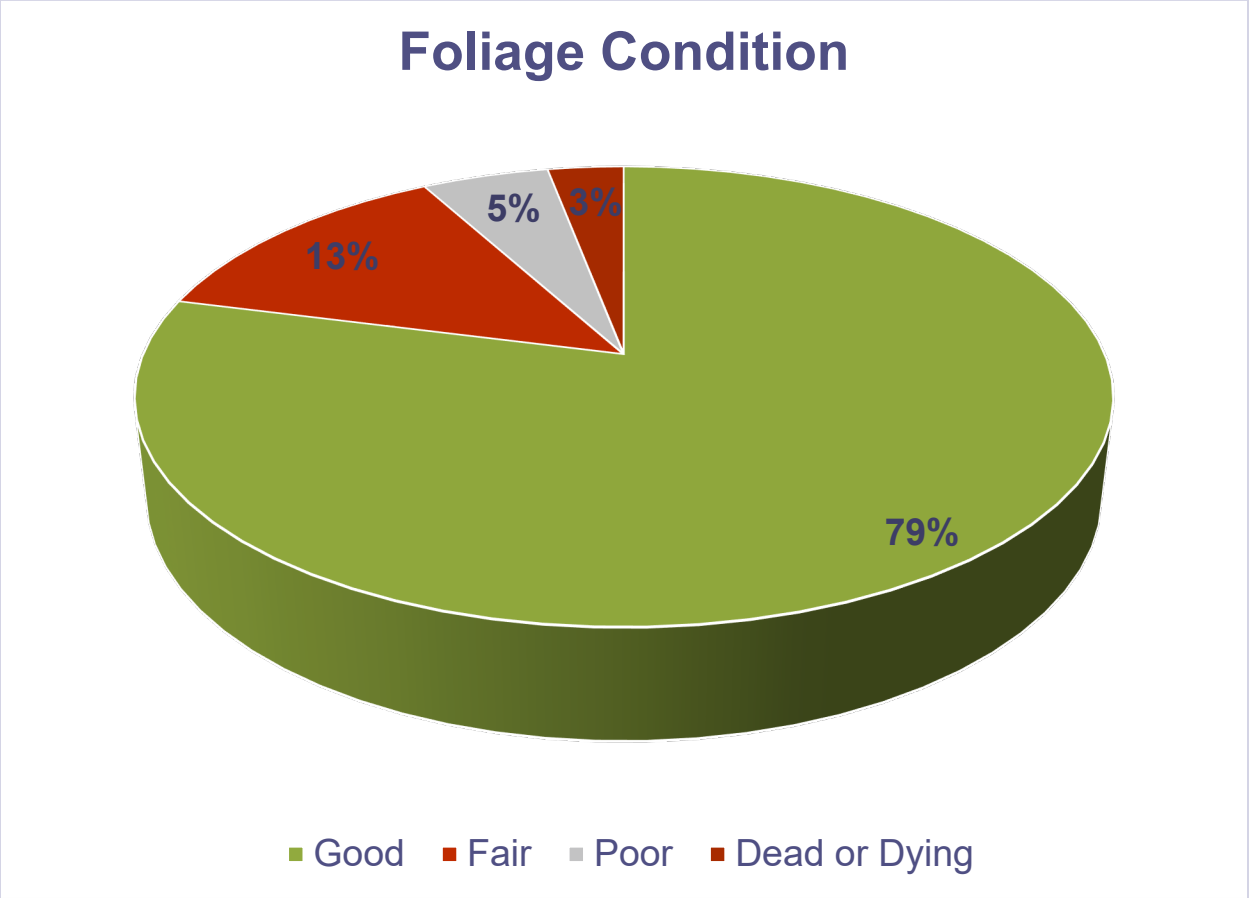


Figure 4: Wood Condition

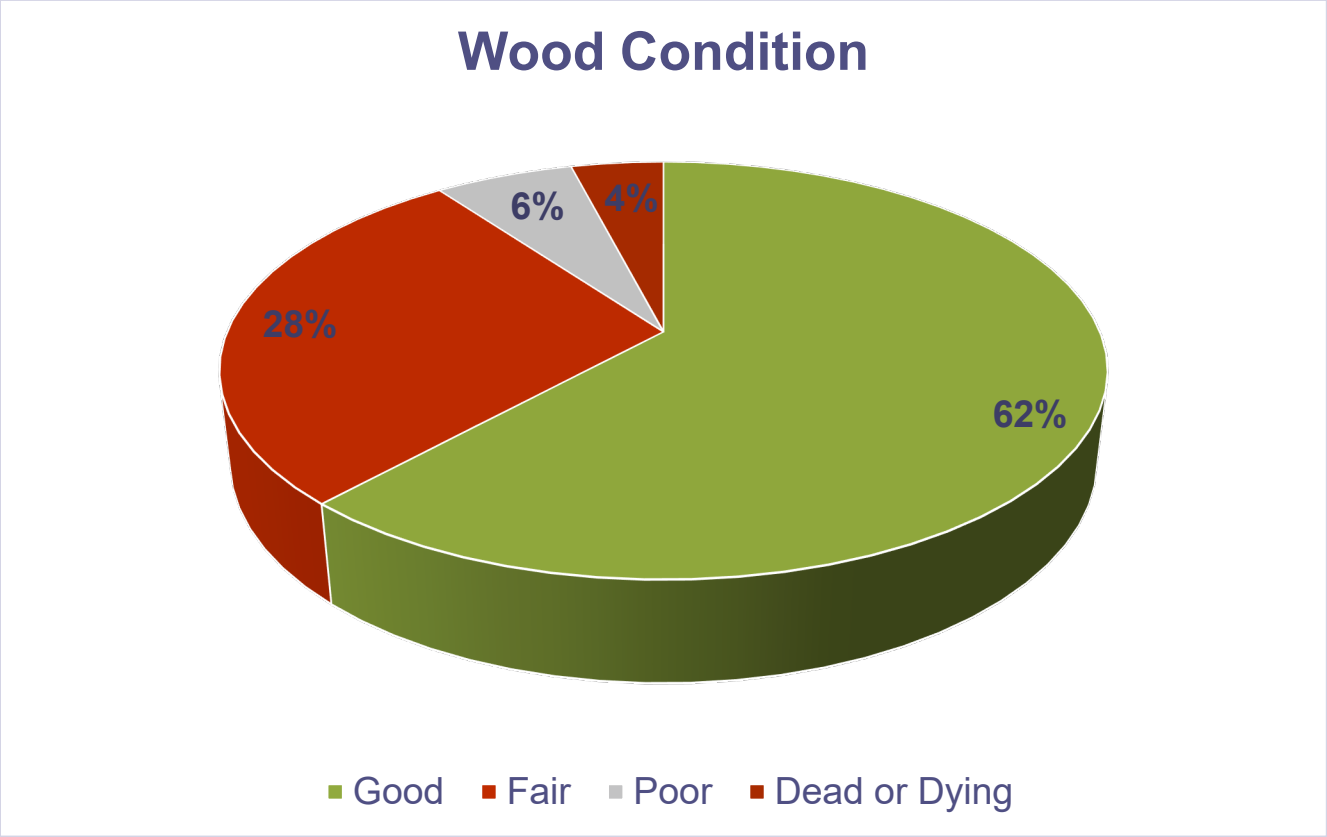
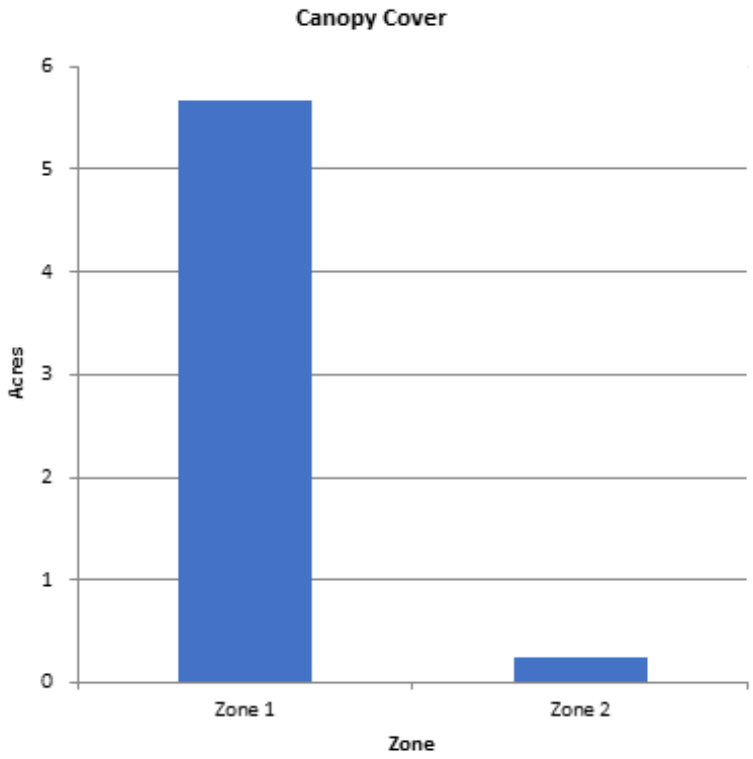


Figure 5: Canopy Cover in Acres

West Point

Canopy Cover of Public Trees (Acres)

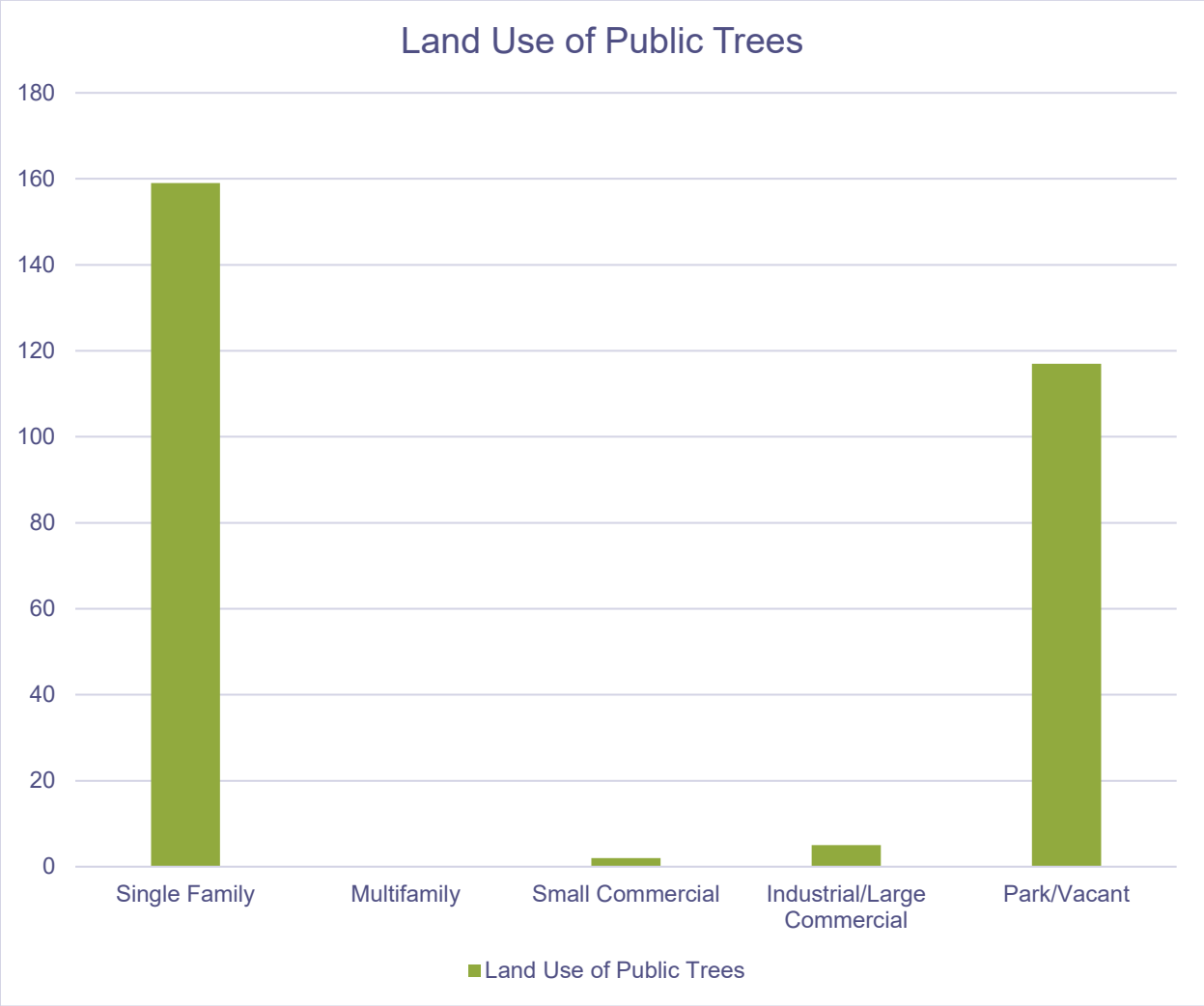
2/1/2022



Zone	Acres	% of Total Canopy Cover
Zone 1	6	96.0
Zone 2	0	4.0
Citywide total	6	100.0

	Total Land Area	Total Street and Sidewalk Area	Total Canopy Cover	Canopy Cover as % of Total Land Area	Canopy Cover as % of Total Streets and Sidewalks
Citywide Total	0	0	6	0.00	0.00

Figure 6: Land Use of City/Park Trees



APPENDIX B: ArcGIS MAPPING

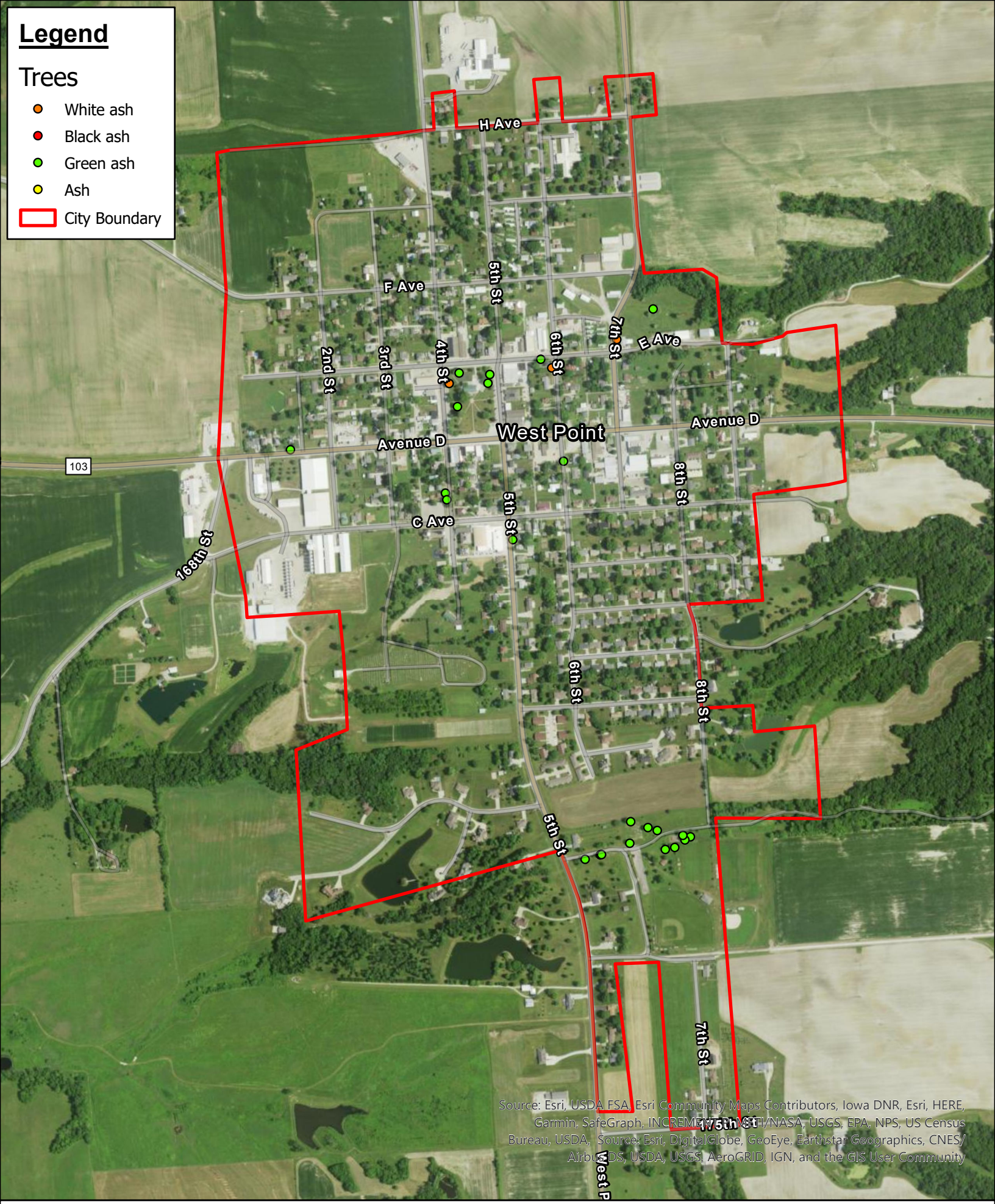
Figure 1: Location of Ash Trees

Figure 2: Location of EAB Symptoms

Figure 3: Location of Poor Condition Trees

Figure 4: Location of Trees with Recommended Maintenance

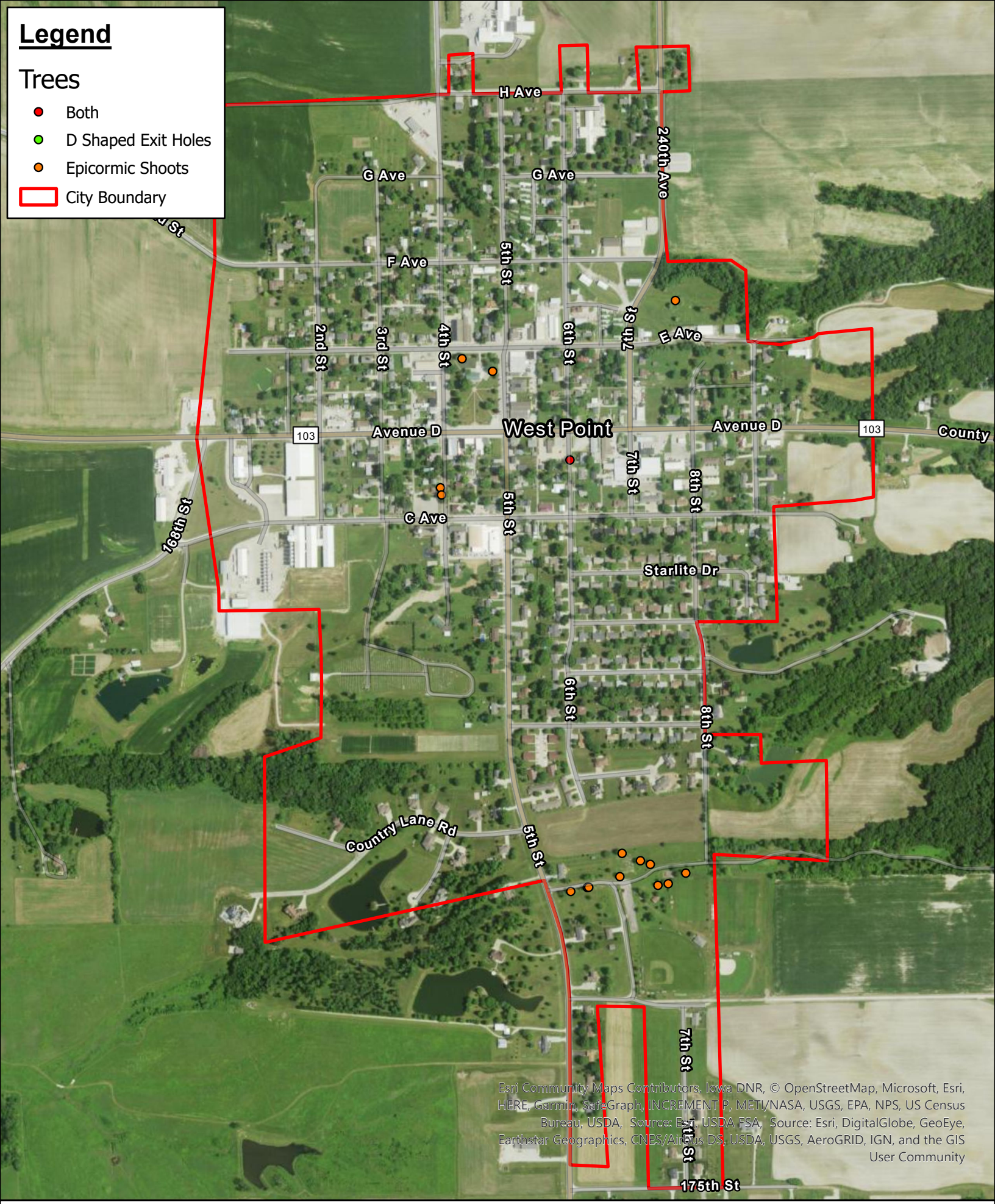
City ownership of the trees recommended for removal should be verified prior to any removal



Ash Tree Location

0 385 770 1,540 Feet

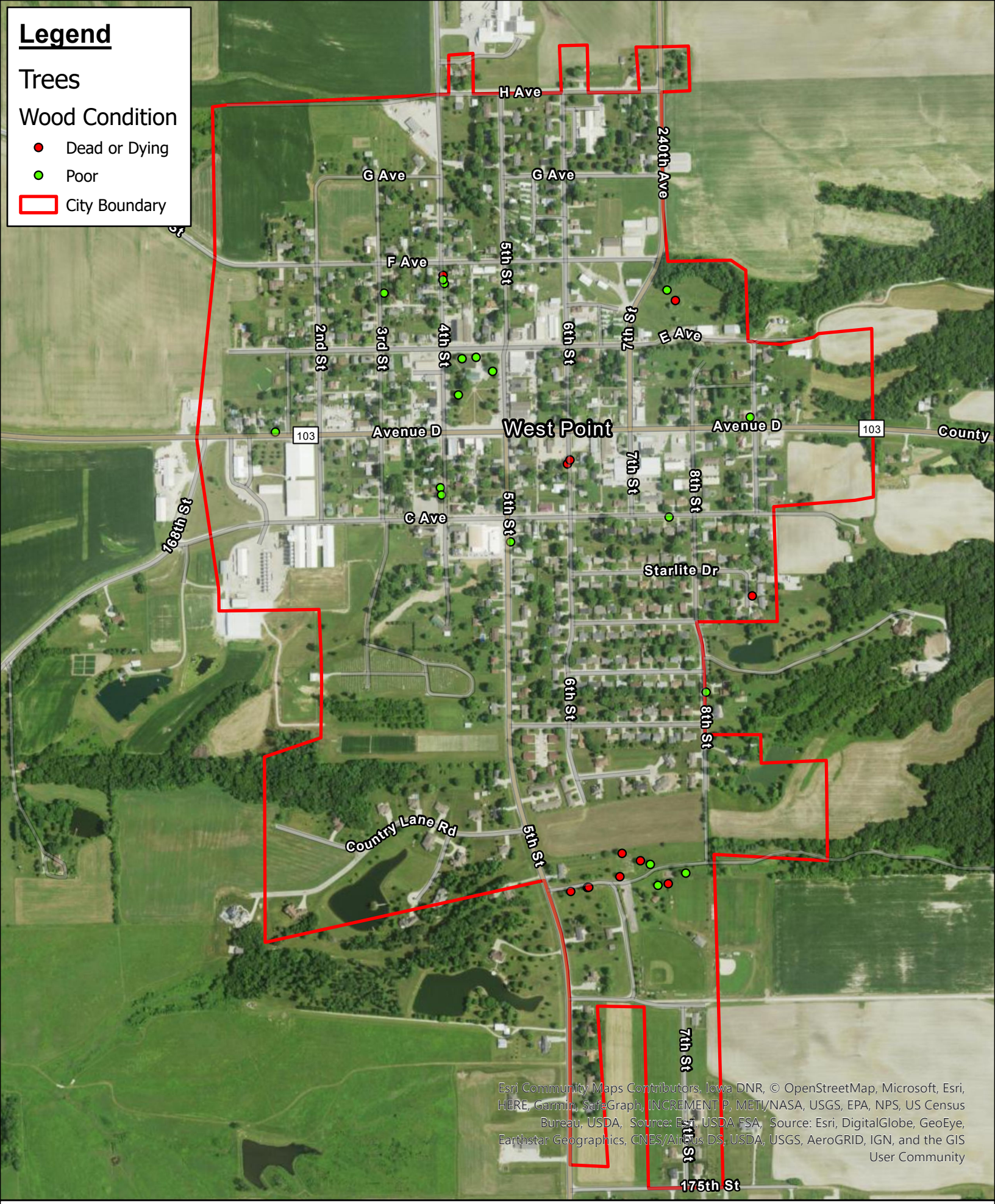
N



EAB Signs/Symptoms

0 355 710 1,420 Feet

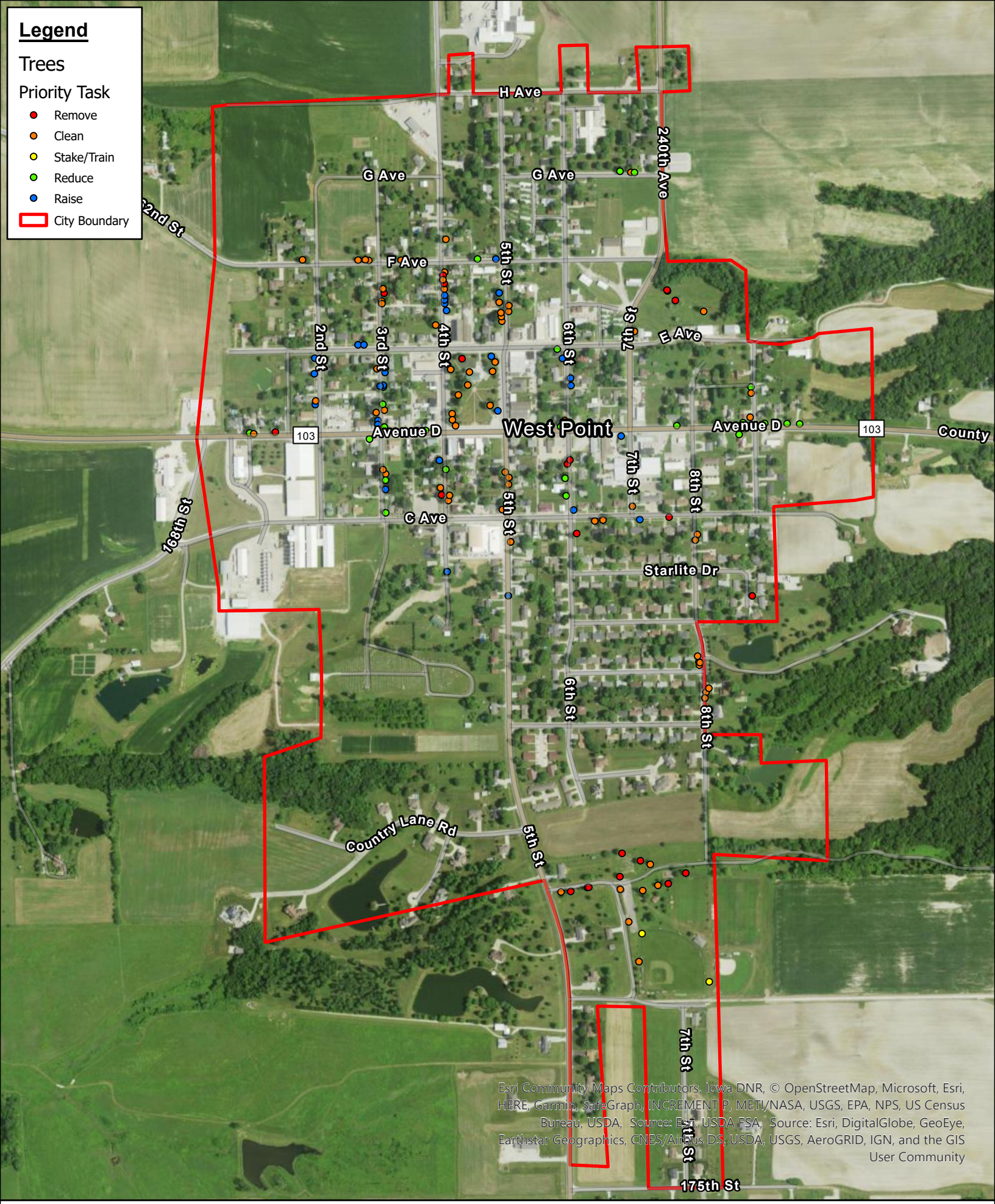
N



Poor Condition Trees

0 355 710 1,420 Feet

N



Priority Task

0 355 710 1,420 Feet

N

APPENDIX C: WEST POINT TREE ORDINANCES

TITLE VI - COMMUNITY DEVELOPMENT AND ENVIRONMENT
CHAPTER 2- TREES

ARTICLE 1
GENERAL PROVISIONS

6-2.0101 PURPOSE. The purpose of this chapter is to beautify and preserve the appearance of the city by regulating and providing for the planting, care and removal of trees.

6-2.0102 DEFINITIONS. For use in this chapter, the following terms are defined:

1. "Parking": shall mean 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.

2. "Superintendent": shall mean the superintendent of streets or such other person as may be designated by the council.

6-2.0103 PLANTING RESTRICTIONS. No tree shall be planted in any street or parking.

6-2.0104 DUTY TO TRIM TREES. The owner or agent of the abutting property shall keep the trees on, or overhanging the street trimmed so that all branches will be at least fifteen (15) feet above the surface of the street and eight (8) feet above the sidewalks.

(Code of Iowa, 1981, Sec. 364.12[2c])

TITLE VI - COMMUNITY DEVELOPMENT AND ENVIRONMENT
CHAPTER 2- TREES

ARTICLE 2
DUTCH ELM DISEASE CONTROL

6-2.0201 TREES SUBJECT TO REMOVAL. The council having determined that the health of the elm trees within the city is threatened by a fatal disease known as the Dutch Elm Disease hereby declares the following shall be removed:
(Code of Iowa, 1981, Sec. 364.12[3b])

1. Living or Standing Trees. Any living or standing elm tree or part thereof infected with the Dutch Elm Disease fungus or which harbors any of the elm bark beetles, that is scolytus multistriatus (eichb.) or hylurgopinus rufipes (marsh.).

2. Dead Trees. Any dead elm tree or part thereof including logs, branches, stumps, firewood or other elm material from which the bark has not been removed and burned or sprayed with an effective elm bark beetle destroying insecticide.

6-2.0202 DUTY TO REMOVE. No person, firm or corporation shall permit any tree or material as defined in Section 1 of this article to remain on the premises owned, controlled or occupied by him within the city.
(Code of Iowa, 1981, Sec. 364.12[3b])

6-2.0203 INSPECTION. The superintendent shall inspect or cause to be inspected all premises and places within the city to determine whether any condition as defined in Section 1 of this

WEST POINT, IOWA VI-5

6-2.0105 ASSESSMENT. If the abutting property owner fails to trim the trees as required in this chapter, the city may serve notice on the abutting property owner requiring him to do so within five (5) days. If he fails to trim the trees within that time, the city may perform the required action and assess the costs against the abutting property for collection in the same manner as a property tax.

(Code of Iowa, 1981, Sec. 364.12[2d & e])

6-2.0106 TRIMMING TREES TO BE SUPERVISED. It shall be unlawful for any person to trim or cut any tree in a street or public place unless the work is done under the supervision of the city.

6-2.0107 REMOVAL OF TREES. The superintendent shall remove, on the order of the council, any tree on the streets of the city which interferes with the making of improvements or with travel thereon. He shall additionally remove any trees on the street, not on private property, which have become diseased, or which constitute a danger to the public, or which may otherwise be declared a nuisance.

(Code of Iowa, 1981, Sec. 364.12 [2c] & 372.13 [4])

The superintendent shall remove, on the order of the council, any tree on the streets of the city which interferes with the making of improvements or with travel thereon. He shall additionally remove any trees on the street, not on private property, which have become diseased, or which constitute a danger to the public, or which may otherwise be declared a nuisance.

article exists thereon, and shall also inspect or cause to be inspected any elm trees reported or suspected to be infected with the Dutch Elm Disease or any elm bark bearing material reported or suspected to be infected with the elm bark beetles.

6-2.0204 REMOVAL FROM CITY PROPERTY. If the superintendent upon inspection or examination, in person or by some qualified person acting for him, shall determine that any condition as herein defined exists in or upon any public street, alley, park or any public place, including the strip between the curb and the lot line of private property, within the city and that the danger of other elm trees within the city is imminent, he shall immediately cause it to be removed and burned or otherwise correct the same in such manner as to destroy or prevent as fully as possible the spread of Dutch Elm Disease or the insect pests or vectors known to carry such disease fungus.

6-2.0205 REMOVAL FROM PRIVATE PROPERTY. If the superintendent upon inspection or examination, in person or by some qualified person acting for him, shall determine with reasonable certainty that any condition as herein defined exists in or upon private premises and that the danger to other elm trees within the city is imminent, he shall immediately notify by certified mail the owner, occupant or person in charge of such property, to correct such condition 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 thereof, the council may cause the nuisance to be removed and the cost assessed against the property as provided in Article 2, Chapter 1, of Title III.

(Code of Iowa, 1981, Sec. 364.12[3b & h])

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

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.