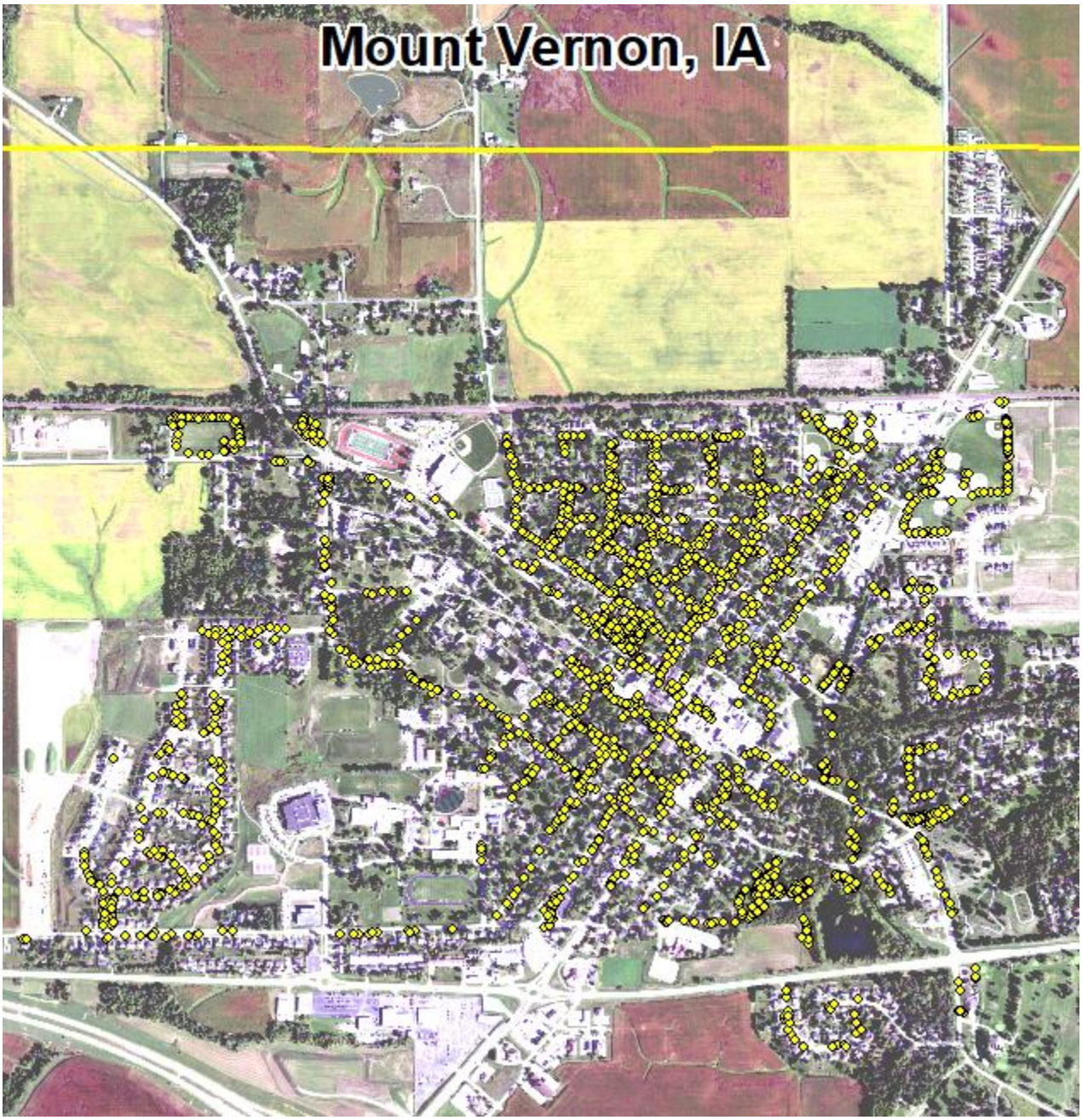
Mount Vernon, IA



2022 Urban Forest Management Plan
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Executive Summary

Overview

This plan was developed to assist Mount Vernon with managing its urban forest, including budgeting and future planning. Trees can provide a multitude of benefits to the community, and sound management allows a community to best take advantage of these benefits. Management is especially important considering the loss of ash due to the Emerald Ash Borer (EAB). EAB has been established in Mount Vernon for multiple years and 17% (36) of the ash identified in the 2012 inventory have been removed/lost and many of the remaining ash (56/174) were showing EAB related infestation symptoms in late 2021. The August 10, 2020 Derecho also caused significant tree loss in Mount Vernon. Between the 2012 inventory and the 2021 inventory 9% (198) of the public trees were removed/lost in Mount Vernon. To maintain quality tree canopy and cover in the community, management of public trees will be important and promotion of proper tree planting and care on private property will also be beneficial.

Inventory and Results

In 2021, a tree inventory was conducted 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 2,064 trees inventoried.

- Mount Vernon's trees provide $281,533 of benefits annually, an average of $136 a tree
- There are over 54 species of trees
- The top three genera are: Maple 45%, Oak 13%, and apple/crab 10%
- 38% of the public trees are in need of some type of management
- 119 trees are recommended for removal

Recommendations

The core recommendations are detailed in the Recommendations Section. The Emerald Ash Borer Plan includes management recommendations as well. Below are some key recommendations.

- Of the 119 trees needing removal (10 are currently ash), 21 trees are equal to or 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*
- 56 of the 174 remaining public ash trees should be carefully examined, as they have one or more symptoms that could be related to an EAB infestation. All public ash should be monitored annually
- All trees should be pruned on a routine schedule- one third of the city every other year
- Plant a diverse mix of trees that do not include all maple species plus trees on the Mount Vernon prohibited tree list
- To remove the remaining 174 public ash and the 109 non-ash trees suggested for removal it will most likely take an increase in budget

Introduction

This plan was developed to assist Mount Vernon with managing its urban forest, including budgeting and future planning. Trees can provide a multitude of benefits to the community, and sound management allows a community to best take advantage of these benefits. Management is especially important considering the loss of ash due to the Emerald Ash Borer (EAB). EAB has been established in Mount Vernon for multiple years and 17% of the ash identified in the 2012 inventory have been removed/lost and many of the remaining ash were showing EAB related infestation symptoms in late 2021. The August 10, 2020 Derecho also caused significant tree loss in Mount Vernon. Between the 2012 inventory and the 2021 inventory 9 % (198) of the public trees were removed/lost in Mount Vernon.

Trees are an important component of Mount Vernon's infrastructure and one of the greatest assets to the community. The benefits of trees are immense. Trees provide the community with improved air quality, stormwater runoff interception, energy conservation, lower traffic speeds, increased property values, reduced crime, improved mental health and create a desirable place to live, to name just a few benefits. It is essential that these benefits be maintained for the people of Mount Vernon and future generations through good urban forestry management.

Good urban forestry management involves setting goals and developing management strategies to achieve these goals. An essential part of developing management strategies is a comprehensive public tree inventory. The inventory supplies information that will be used for maintenance, removal schedules, tree planting and budgeting. Basing actions on this information will help meet Mount Vernon's urban forestry goals.

Inventory

In the fall of 2021, a tree inventory was conducted that included 100% of the city owned trees on both streets and parks. The tree data was collected 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 programming used to collect tree information on the data collectors 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, signs and symptoms associated with EAB were noted for all ash trees. The signs and symptoms noted were canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

Inventory Results

The data collected for the 2064 city trees was entered into the USDA Forest service program Street Tree Resource Analysis Tool for Urban Forestry Management as part of the i-Tree suite. The following are results from the i-Tree STREETS analysis.

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Mount Vernon's trees reduce energy related costs by approximately $78,870 annually (Appendix A, Table 1). These savings are both in Electricity (373.2 MWh) and in Natural Gas (51,576.3 Therms).

Annual Stormwater Benefits

Mount Vernon's trees intercept about 3,774,770 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides $102,296 of benefits 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 emitting volatile organic matter (ozone). In Mount Vernon, it is estimated that trees remove 4,709.9 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 $13,225 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Mount Vernon, trees sequester about 766,247 lbs of carbon a year with an associated value of $9,897 (Appendix A, Table 5). In addition, the trees store 14,255,514 lbs of carbon, with a yearly benefit of $106,916 (Appendix A, Table 4).

Annual Aesthetics Benefits

Social benefits of trees are hard to capture. The 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. Mount Vernon receives $77,245 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, Mount Vernon's trees provide $281,533 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 2064 trees in Mount Vernon provide approximately $136 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Mount Vernon has over 54 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Maple	630	31%
Oak	271	13%
Crab/Apple	214	10%
Ash	174	8%
Black Walnut	87	4%
Spruce	82	4%
Broadleaf(sm,md,lg)	55	3%
Hackberry	55	3%
Linden (Basswood)	54	3%
Honeylocust	53	3%
Callery Pear	49	2%
Other	340	16%

Age Class

Most of Mount Vernon's trees (64%) are between 0 and 18 inches in diameter at 4.5 ft (Appendix A, Figure 2). For age, it is preferred that the highest amounts of trees are in the smallest size category (a downward slope) to prepare for natural mortality and to maintain canopy cover. Mount Vernon'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 overall health of the urban forest. The foliage condition results for Mount Vernon indicate that 71% of the trees are in good health, with only 4% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Comparing, 41% of Mount Vernon's trees are in good health for wood condition (appendix A, Figure 4 & Appendix B, Figure 3). Wood condition that is in poor health, dead or dying is about 9% of the population. This 9% 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	316	15%
Crown Raising	254	12%
Tree Removal	119	6%
Crown Reduction	90	4%
Tree Staking	1	<1%

Canopy Cover

The total canopy with both private and public trees is 17%, 385 acres. The canopy cover on city own properties included in the Mount Vernon inventory includes approximately 41 acres (Appendix A, Figure 4). If the City's Canopy goal is to increase canopy by 1%, in 30 years on all lands it is estimated that 54 trees would need to be planted annually on public and/or private lands.

Land Use and Location

The majority of Mount Vernon'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	66%
Park/vacant/other	27%
Industrial/Large commercial	4%
Multifamily residential	2%

Location	
Planting strip	63%
Front Yard	36%
Cutout (surrounded by pavement)	1%

Changes in Forest Structure Since plan in 2012

The Emerald Ash Borer (EAB) infestation and the August 2020 Derecho have caused significant public and private tree loss in Mount Vernon. Between the 2012 inventory and the 2021 inventory 9% (198) of the public trees were removed/lost in Mount Vernon. Emerald Ash Borer (EAB) has been established in Mount Vernon for multiple years and over 17% (36) of the ash identified in the 2012 inventory have been removed/lost and a significant number of the remaining ash (56/174) were showing EAB related infestation symptoms in late 2021. The majority of public ash are not being treated for EAB, so tree loss will increase in the upcoming years. In recent years the city has committed to planting 50 new public trees annually.

Recommendations

Risk Management

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

Risk Trees

Mount Vernon has 1 critical concern trees that needs immediate removal, but there are another 118 trees needing removal. These trees can be seen on the Location of Trees with Recommended Maintenance map (Appendix B, Figure 5). It is recommended to start with the large diameter trees first. There are 21 trees over or equal to 24 inches in diameter at 4.5 ft that should be addressed as soon as possible. Please refer to the six year maintenance plan at the end of this section. After all of the remove trees are addressed, there should be follow up on the trees marked as needing maintenance. There are a total of 119 trees that are currently listed for removal.

Poor tree species

After the removal of the critical concern trees, ash trees in poor health should be assessed for removal (Appendix B, Figure 3 & Appendix B, Figure 4). Of the 119 removals, 10 are ash trees. As of fall 2021 there were a total of 174 ash trees, and 56 of those had signs and symptoms that have been associated with EAB. In addition, the majority of public ash are no longer being treated for EAB so loss of this species will most likely increase in the next few years. *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 is the removal of lower branches that are 2 inches in diameter or larger in the case of providing clearance for pedestrians or vehicles. Crown reduction is removing individual limbs from structures or utility wires. It is recommended that all trees be pruned on a routine schedule every five to seven years. Currently, Public Works performs ROW clearance checks on a biannual basis. With all of the new tree planting it is critical that good developmental pruning is administered timely to any newly planted trees in the first 5 to 15 years of establishment.

Planting

Most of the planting over the next 5 to 10 years will replace the trees that are removed (109 non-ash and potentially 174 ash to be removed). It is recommended to plant 1.2 trees for every tree removed, since survival rates will not be 100%. Please refer to the six year maintenance plan at the end of this section. 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 Mount Vernon. In the near future the Mount Vernon City Council has committed to having 50 new trees planted annually on public property.

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 (31%) (Appendix A, Figure 1). No Maples of any kind should be planted on public property until this percentage can be lowered. Section 151.04 of the city ordinance AUTHORIZED TREES AND PLANTING RESTRICTIONS indicates that

all trees on public property must have written approval from the City Administrator and there is a prohibited tree list for public property planting.

Continual Monitoring

Due to the threat of EAB, it is important to continuously check the health of ash trees. It is recommended 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.

Budget and Emerald Ash Borer Plan

Six Year Maintenance Plan with <u>No Additional Funding</u>

Current Budget Pre-Derecho the average contracted removal was ~$10,000

FY 2022

Removal: $29,000 was spent on removal and including pruning total expenditures were ~$40,000.

FY 2023

Removal: To date $14,500 has been spent on tree removal and including pruning total expenditures have been $21,200
Planting and Replacement: 100 trees were planted for free with a donation of trees from the Monarch Research Group
Young Tree Pruning & Maintenance: $1,000
Routine trimming: Public Works checks safety clearance
Visual Survey for signs and symptoms of EAB

FY 2024

Removal: @$800/tree approximately 12 trees can be removed for $10,000
Planting and Replacement: 50 trees annually at $200/tree are proposed for planting $10,000 total
Young Tree Pruning & Maintenance: $1,000
Visual Survey for signs and symptoms of EAB

FY 2025

Removal: @$800/tree approximately 12 trees can be removed for $10,000
Planting and Replacement: 50 trees annually at $200/tree are proposed for planting $10,000 total
Routine trimming: Public Works checks safety clearance
Young Tree Pruning & Maintenance: $1,000
Visual Survey for signs and symptoms of EAB

FY 2026

Removal: @$800/tree approximately 12 trees can be removed for $10,000
Planting and Replacement: 50 trees annually at $200/tree are proposed for planting $10,000 total
Young Tree Pruning & Maintenance: $1,000
Visual Survey for signs and symptoms of EAB

FY 2027

Removal: @$800/tree approximately 12 trees can be removed for $10,000
Planting and Replacement: 50 trees annually at $200/tree are proposed for planting $10,000 total
Routine trimming: Public Works checks safety clearance
Young Tree Pruning & Maintenance: $1,000
Visual Survey for signs and symptoms of EAB

Proposed Budget Increase

As of fall 2021 there were still 174 public ash present. EAB could potentially kill all ash trees in Mount Vernon within the next 2- 4 years if trees are no longer treated. To remove all public ash trees (174 based on 2021 inventory) within 3 years a budget of ~$46,400 (@$800/tree) a year would be needed to just remove the ash trees. This does not include the approximately 109 other non-ash trees that also need to be removed. At $800/tree another ~$87,200 would be needed to remove the additional 109 trees.

Ash Tree Removal

Tree removal will be prioritized with dead, dying, risk trees to be removed first (Appendix B, Figure 4). Next will be all ash in poor condition and displaying signs and symptoms of EAB (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

At this point if an ash tree has not already been treated on a regular basis it is too late to start treatments. Currently, the majority of Mount Vernon's public ash trees are not being treated.

EAB Quarantines

There are no longer USDA domestic quarantine regulations for EAB. It should be noted there are individual states (not Iowa) that still have some regulations.

Wood Disposal

There are no longer USDA domestic quarantine regulations for EAB. It should be noted there are individual states (not Iowa) that still have some regulations. Wood waste can be disposed of as you normally would since there are no EAB quarantines in Iowa. With that said attempt to utilize ash wood waste locally.

Canopy Replacement

As budget permits, all removed trees will be replaced. All trees will meet the restrictions in city ordinance 151.04 (Appendix C). The new plantings will be a diverse mix and will not include species on the Mount Vernon's prohibited tree list. All publicly planted trees have to have written approval from the City Administrator.

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 the following signs and symptoms: 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 151.07 #2 states "If it is determined with reasonable certainty that any such condition exists on private property and that the danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Clerk shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days of said notification. If such owner, occupant or person in charge of said property fails to comply within (14) days of receipt of notice, the City Administrator or designee may cause the condition to be corrected and the cost assessed against the property."

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Mount Vernon

Annual Energy Benefits of Public Trees

4/3/2022

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	62.4	4,736	8,879.0	8,701	13,437	(N/A)	13.0	17.0	49.95
Apple	10.0	762	1,691.2	1,657	2,420	(N/A)	10.4	3.1	11.31
Green ash	44.7	3,389	6,116.1	5,994	9,383	(N/A)	6.7	11.9	67.50
Sugar maple	36.3	2,753	4,879.0	4,781	7,534	(N/A)	6.5	9.6	55.81
Maple	11.8	896	1,606.0	1,574	2,470	(N/A)	5.2	3.1	22.87
Black walnut	23.9	1,816	3,269.6	3,204	5,021	(N/A)	4.2	6.4	57.71
Pin oak	17.2	1,303	2,253.0	2,208	3,511	(N/A)	3.1	4.5	54.86
Red maple	8.2	619	1,079.2	1,058	1,677	(N/A)	2.8	2.1	28.91
Northern hackberry	12.5	950	1,763.6	1,728	2,679	(N/A)	2.7	3.4	48.70
Silver maple	18.9	1,436	2,482.9	2,433	3,869	(N/A)	2.6	4.9	71.65
Norway spruce	3.9	298	588.4	577	874	(N/A)	2.6	1.1	16.19
Honeylocust	15.4	1,170	2,027.5	1,987	3,157	(N/A)	2.6	4.0	59.56
Callery pear	3.7	283	557.9	547	829	(N/A)	2.4	1.1	16.93
Northern red oak	6.9	520	941.8	923	1,443	(N/A)	2.4	1.8	29.46
Swamp white oak	4.6	347	693.3	679	1,026	(N/A)	2.2	1.3	22.81
Elm	4.7	354	627.5	615	969	(N/A)	1.8	1.2	25.50
Oak	5.6	426	719.2	705	1,131	(N/A)	1.8	1.4	30.57
Broadleaf Deciduous Small	0.6	48	109.2	107	155	(N/A)	1.7	0.2	4.43
Northern pin oak	8.3	632	1,219.0	1,195	1,827	(N/A)	1.6	2.3	57.09
Bur oak	3.6	270	478.4	469	738	(N/A)	1.5	0.9	23.82
American basswood	8.2	625	1,177.0	1,153	1,778	(N/A)	1.4	2.3	61.32
Eastern redbud	2.1	157	315.7	309	467	(N/A)	1.4	0.6	16.09
White ash	6.8	516	819.5	803	1,319	(N/A)	1.3	1.7	48.84
Littleleaf linden	3.9	294	529.2	519	813	(N/A)	1.2	1.0	32.52
Ginkgo	2.7	207	372.6	365	572	(N/A)	1.0	0.7	27.23
Tulip tree	1.4	107	187.5	184	291	(N/A)	1.0	0.4	14.53
American sycamore	7.5	570	1,014.9	995	1,565	(N/A)	0.9	2.0	82.37
Eastern white pine	3.0	228	388.2	380	609	(N/A)	0.9	0.8	32.05
River birch	1.7	132	266.4	261	393	(N/A)	0.9	0.5	21.81
Kentucky coffeetree	0.9	68	114.3	112	180	(N/A)	0.9	0.2	9.97
Eastern cottonwood	6.6	502	897.4	879	1,382	(N/A)	0.8	1.8	81.27
Blue spruce	1.1	84	152.9	150	234	(N/A)	0.7	0.3	15.59
Japanese tree lilac	0.4	30	68.0	67	97	(N/A)	0.7	0.1	6.91
White oak	1.2	92	168.4	165	257	(N/A)	0.6	0.3	19.77
Broadleaf Deciduous Mediu	1.0	73	146.3	143	216	(N/A)	0.6	0.3	16.64
Spruce	0.4	31	54.7	54	84	(N/A)	0.6	0.1	7.02
Boxelder	2.3	173	295.1	289	463	(N/A)	0.5	0.6	42.06
Conifer Evergreen Large	1.4	106	181.5	178	284	(N/A)	0.5	0.4	28.42
Eastern red cedar	0.8	58	116.4	114	172	(N/A)	0.5	0.2	17.24
Mulberry	1.7	125	236.9	232	357	(N/A)	0.5	0.5	35.75
Ash	1.9	148	281.5	276	424	(N/A)	0.4	0.5	52.95
Conifer Evergreen Small	0.1	4	8.9	9	13	(N/A)	0.4	0.0	1.60
Birch	0.6	43	83.2	82	125	(N/A)	0.4	0.2	15.58
Black cherry	0.6	48	101.7	100	147	(N/A)	0.3	0.2	21.04
Broadleaf Deciduous Large	1.6	119	203.1	199	318	(N/A)	0.3	0.4	45.37
Siberian elm	1.7	126	230.1	226	352	(N/A)	0.3	0.4	50.26
Black locust	0.9	65	121.9	119	185	(N/A)	0.3	0.2	26.42
Amur maple	0.5	38	79.8	78	116	(N/A)	0.3	0.1	19.38
Northern white cedar	0.2	18	40.4	40	58	(N/A)	0.3	0.1	9.59
Ohio buckeye	0.4	30	62.9	62	91	(N/A)	0.2	0.1	18.28
Scotch pine	0.3	23	43.1	42	65	(N/A)	0.2	0.1	16.22
Lilac	0.1	7	15.2	15	22	(N/A)	0.2	0.0	5.40
Dogwood	0.0	2	5.7	6	8	(N/A)	0.2	0.0	2.00
Hickory	0.2	15	27.9	27	42	(N/A)	0.1	0.1	13.98
Chinese elm	1.2	94	164.3	161	255	(N/A)	0.1	0.3	84.86
Broadleaf Evergreen Large	1.4	105	164.7	161	266	(N/A)	0.1	0.3	88.72
American elm	1.2	93	155.5	152	246	(N/A)	0.1	0.3	81.93
Mountain ash	0.3	20	37.5	37	56	(N/A)	0.1	0.1	28.16
Catalpa	0.1	7	14.2	14	21	(N/A)	0.1	0.0	10.65
American chestnut	0.7	57	101.2	99	156	(N/A)	0.1	0.2	77.98
Yellowwood	0.1	11	23.0	23	33	(N/A)	0.1	0.0	16.73
Rose-of-sharon	0.0	0	0.6	1	1	(N/A)	0.0	0.0	0.87
Cottonwood	0.4	33	59.0	58	91	(N/A)	0.0	0.1	91.02
Quaking aspen	0.0	2	3.7	4	6	(N/A)	0.0	0.0	5.82
Willow	0.3	24	47.4	46	71	(N/A)	0.0	0.1	70.84
Conifer Evergreen Medium	0.0	2	4.9	5	7	(N/A)	0.0	0.0	6.94
Black spruce	0.1	5	10.2	10	15	(N/A)	0.0	0.0	14.80
Total	373.2	28,325	51,576.3	50,545	78,870	(N/A)	100.0	100.0	38.23

Table 2: Annual Stormwater Benefits

Mount Vernon

Annual Stormwater Benefits of Public Trees

4/3/2022

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	541,479	14,674	(N/A)	13.0	14.3	54.55
Apple	35,260	956	(N/A)	10.4	0.9	4.47
Green ash	553,202	14,992	(N/A)	6.7	14.7	107.85
Sugar maple	417,711	11,320	(N/A)	6.5	11.1	83.85
Maple	78,877	2,138	(N/A)	5.2	2.1	19.79
Black walnut	273,027	7,399	(N/A)	4.2	7.2	85.05
Pin oak	153,754	4,167	(N/A)	3.1	4.1	65.11
Red maple	53,843	1,459	(N/A)	2.8	1.4	25.16
Northern hackberry	107,322	2,908	(N/A)	2.7	2.8	52.88
Silver maple	280,459	7,600	(N/A)	2.6	7.4	140.75
Norway spruce	50,760	1,376	(N/A)	2.6	1.3	25.47
Honeylocust	172,307	4,670	(N/A)	2.6	4.6	88.10
Callery pear	20,196	547	(N/A)	2.4	0.5	11.17
Northern red oak	56,552	1,533	(N/A)	2.4	1.5	31.28
Swamp white oak	25,649	695	(N/A)	2.2	0.7	15.45
Elm	38,999	1,057	(N/A)	1.8	1.0	27.81
Oak	53,956	1,462	(N/A)	1.8	1.4	39.52
Broadleaf Deciduous Small	2,011	55	(N/A)	1.7	0.1	1.56
Northern pin oak	86,439	2,342	(N/A)	1.6	2.3	73.20
Bur oak	24,415	662	(N/A)	1.5	0.6	21.34
American basswood	93,209	2,526	(N/A)	1.4	2.5	87.10
Eastern redbud	7,365	200	(N/A)	1.4	0.2	6.88
White ash	54,219	1,469	(N/A)	1.3	1.4	54.42
Littleleaf linden	30,623	830	(N/A)	1.2	0.8	33.20
Ginkgo	18,464	500	(N/A)	1.0	0.5	23.83
Tulip tree	14,900	404	(N/A)	1.0	0.4	20.19
American sycamore	112,286	3,043	(N/A)	0.9	3.0	160.15
Eastern white pine	62,345	1,690	(N/A)	0.9	1.7	88.92
River birch	11,558	313	(N/A)	0.9	0.3	17.40
Kentucky coffeetree	7,450	202	(N/A)	0.9	0.2	11.22
Eastern cottonwood	96,160	2,606	(N/A)	0.8	2.5	153.29
Blue spruce	13,062	354	(N/A)	0.7	0.3	23.60
Japanese tree lilac	1,292	35	(N/A)	0.7	0.0	2.50
White oak	7,734	210	(N/A)	0.6	0.2	16.12
Broadleaf Deciduous Medium	5,177	140	(N/A)	0.6	0.1	10.79
Spruce	4,603	125	(N/A)	0.6	0.1	10.40
Boxelder	22,247	603	(N/A)	0.5	0.6	54.81
Conifer Evergreen Large	26,297	713	(N/A)	0.5	0.7	71.27
Eastern red cedar	10,993	298	(N/A)	0.5	0.3	29.79
Mulberry	6,876	186	(N/A)	0.5	0.2	18.63
Ash	17,086	463	(N/A)	0.4	0.5	57.88
Conifer Evergreen Small	514	14	(N/A)	0.4	0.0	1.74
Birch	3,216	87	(N/A)	0.4	0.1	10.89
Black cherry	2,253	61	(N/A)	0.3	0.1	8.72
Broadleaf Deciduous Large	18,796	509	(N/A)	0.3	0.5	72.77
Siberian elm	13,442	364	(N/A)	0.3	0.4	52.04
Black locust	4,901	133	(N/A)	0.3	0.1	18.98
Amur maple	1,793	49	(N/A)	0.3	0.0	8.10
Northern white cedar	2,425	66	(N/A)	0.3	0.1	10.95
Ohio buckeye	2,083	56	(N/A)	0.2	0.1	11.29
Scotch pine	3,325	90	(N/A)	0.2	0.1	22.53
Lilac	275	7	(N/A)	0.2	0.0	1.86
Dogwood	91	2	(N/A)	0.2	0.0	0.62
Hickory	1,234	33	(N/A)	0.1	0.0	11.14
Chinese elm	17,069	463	(N/A)	0.1	0.5	154.19
Broadleaf Evergreen Large	18,368	498	(N/A)	0.1	0.5	165.92
American elm	10,493	284	(N/A)	0.1	0.3	94.79
Mountain ash	931	25	(N/A)	0.1	0.0	12.62
Catalpa	626	17	(N/A)	0.1	0.0	8.48
American chestnut	9,830	266	(N/A)	0.1	0.3	133.19
Yellowwood	749	20	(N/A)	0.1	0.0	10.14
Rose-of-sharon	7	0	(N/A)	0.0	0.0	0.20
Cottonwood	7,239	196	(N/A)	0.0	0.2	196.17
Quaking aspen	172	5	(N/A)	0.0	0.0	4.65
Willow	3,764	102	(N/A)	0.0	0.1	102.01
Conifer Evergreen Medium	256	7	(N/A)	0.0	0.0	6.95
Black spruce	755	20	(N/A)	0.0	0.0	20.47
Citywide total	3,774,770	102,296	(N/A)	100.0	100.0	49.59

Table 3: Annual Air Quality Benefits

Mount Vernon

Annual Air Quality Benefits of Public Trees

4/3/2022

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							
Norway maple	105.9	18.3	52.6	4.7	574	301.5	43.7	41.6	283.1	1,870	-25.2	-95	826.1	2,349 (N/A)	13.0	8.73
Apple	6.0	1.0	3.5	0.3	34	50.7	7.2	6.8	45.5	309	0.0	0	121.0	343 (N/A)	10.4	1.60
Green ash	78.4	12.5	36.2	3.5	414	213.3	31.0	29.6	202.4	1,328	0.0	0	606.9	1,742 (N/A)	6.7	12.53
Sugar maple	57.8	9.8	28.5	2.6	312	172.2	25.1	24.0	164.3	1,075	-45.3	-170	439.0	1,217 (N/A)	6.5	9.02
Maple	15.1	2.6	7.5	0.7	82	56.2	8.2	7.8	53.5	350	-5.5	-21	146.0	411 (N/A)	5.2	3.81
Black walnut	38.7	6.2	18.1	1.7	205	114.2	16.6	15.9	108.5	712	0.0	0	319.9	917 (N/A)	4.2	10.53
Pin oak	23.9	4.2	12.8	1.1	133	81.0	11.9	11.3	77.8	507	-46.1	-173	177.9	467 (N/A)	3.1	7.29
Red maple	10.4	1.8	5.2	0.5	56	38.6	5.6	5.4	37.0	241	-3.8	-14	100.5	283 (N/A)	2.8	4.88
Northern hackberry	16.9	2.9	8.8	0.8	93	60.3	8.7	8.3	56.8	375	0.0	0	163.5	467 (N/A)	2.7	8.49
Silver maple	49.8	8.4	24.3	2.2	268	89.1	13.1	12.5	85.6	558	-26.0	-98	258.9	728 (N/A)	2.6	13.49
Norway spruce	5.1	1.0	4.7	0.6	35	19.1	2.8	2.6	17.8	118	-19.2	-72	34.5	81 (N/A)	2.6	1.50
Honeylocust	33.7	5.5	15.3	1.5	178	72.7	10.6	10.2	69.8	455	-26.3	-98	193.0	534 (N/A)	2.6	10.07
Callery pear	2.2	0.4	1.4	0.1	13	18.3	2.6	2.5	16.9	113	-0.7	-3	43.6	123 (N/A)	2.4	2.50
Northern red oak	10.9	1.9	5.5	0.5	59	32.7	4.8	4.5	31.1	204	-15.5	-58	76.4	205 (N/A)	2.4	4.19
Swamp white oak	2.8	0.5	1.8	0.1	16	22.5	3.2	3.1	20.7	138	-0.9	-3	53.8	151 (N/A)	2.2	3.37
Elm	3.6	0.6	1.9	0.2	20	22.2	3.2	3.1	21.1	138	0.0	0	55.8	158 (N/A)	1.8	4.16
Oak	6.7	1.1	3.3	0.3	36	26.4	3.9	3.7	25.4	165	0.0	0	70.6	201 (N/A)	1.8	5.43
Broadleaf Deciduous Small	0.2	0.0	0.2	0.0	1	3.2	0.5	0.4	2.9	19	0.0	0	7.3	21 (N/A)	1.7	0.59
Northern pin oak	18.7	3.2	9.1	0.8	101	40.5	5.9	5.6	37.8	251	-4.3	-16	117.3	335 (N/A)	1.6	10.48
Bur oak	1.6	0.2	1.0	0.1	9	16.9	2.5	2.3	16.1	105	0.0	0	40.7	114 (N/A)	1.5	3.69
American basswood	12.9	2.2	6.3	0.6	69	39.8	5.8	5.5	37.4	247	-10.9	-41	99.4	275 (N/A)	1.4	9.50
Eastern redbud	1.8	0.3	0.9	0.1	10	10.2	1.5	1.4	9.4	63	0.0	0	25.4	72 (N/A)	1.4	2.49
White ash	5.1	0.8	2.8	0.2	28	31.4	4.6	4.4	30.8	198	0.0	0	80.3	226 (N/A)	1.3	8.39
Littleleaf linden	4.4	0.8	2.3	0.2	24	18.5	2.7	2.6	17.6	116	-2.3	-9	46.8	131 (N/A)	1.2	5.25
Ginkgo	4.7	0.8	2.3	0.2	26	13.0	1.9	1.8	12.3	81	-1.5	-6	35.6	101 (N/A)	1.0	4.80
Tulip tree	2.2	0.4	1.1	0.1	12	6.7	1.0	0.9	6.4	42	0.0	0	18.7	54 (N/A)	1.0	2.68
American sycamore	19.4	3.1	8.6	0.9	101	35.8	5.2	5.0	34.1	223	0.0	0	111.9	324 (N/A)	0.9	17.07
Eastern white pine	7.5	1.5	6.0	0.9	49	14.1	2.1	2.0	13.6	89	-33.9	-127	13.7	10 (N/A)	0.9	0.54
River birch	1.7	0.3	0.9	0.1	9	8.6	1.2	1.2	7.9	53	-0.5	-2	21.3	60 (N/A)	0.9	3.35
Kentucky coffeetree	0.7	0.1	0.4	0.0	4	4.2	0.6	0.6	4.0	26	0.0	0	10.7	30 (N/A)	0.9	1.67
Eastern cottonwood	15.3	2.4	6.8	0.7	80	31.5	4.6	4.4	30.0	196	0.0	0	95.7	277 (N/A)	0.8	16.27
Blue spruce	1.4	0.3	1.3	0.2	10	5.3	0.8	0.7	5.0	33	-4.4	-16	10.6	26 (N/A)	0.7	1.74
Japanese tree lilac	0.1	0.0	0.1	0.0	1	2.0	0.3	0.3	1.8	12	0.0	0	4.6	13 (N/A)	0.7	0.93
White oak	0.4	0.1	0.3	0.0	2	5.8	0.8	0.8	5.5	36	0.0	0	13.7	38 (N/A)	0.6	2.95
Citywide total	600.3	101.2	301.6	28.6	3,258	1,785.9	259.7	247.6	1,691.3	11,115	-306.2	-1,148	4,709.9	13,225 (N/A)	100.0	6.41

Table 4: Annual Carbon Stored

Mount Vernon

Stored CO2 Benefits of Public Trees

4/3/2022

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	1,743,717	13,078	(N/A)	13.0	12.2	48.62
Apple	122,172	916	(N/A)	10.4	0.9	4.28
Green ash	2,607,617	19,557	(N/A)	6.7	18.3	140.70
Sugar maple	1,686,594	12,649	(N/A)	6.5	11.8	93.70
Maple	177,194	1,329	(N/A)	5.2	1.2	12.31
Black walnut	1,301,777	9,763	(N/A)	4.2	9.1	112.22
Pin oak	612,556	4,594	(N/A)	3.1	4.3	71.78
Red maple	120,992	907	(N/A)	2.8	0.8	15.65
Northern hackberry	259,277	1,945	(N/A)	2.7	1.8	35.36
Silver maple	1,162,580	8,719	(N/A)	2.6	8.2	161.47
Norway spruce	40,458	303	(N/A)	2.6	0.3	5.62
Honeylocust	433,216	3,249	(N/A)	2.6	3.0	61.30
Callery pear	41,118	308	(N/A)	2.4	0.3	6.29
Northern red oak	219,635	1,647	(N/A)	2.4	1.5	33.62
Swamp white oak	52,519	394	(N/A)	2.2	0.4	8.75
Elm	119,539	897	(N/A)	1.8	0.8	23.59
Oak	226,715	1,700	(N/A)	1.8	1.6	45.96
Broadleaf Deciduous	5,789	43	(N/A)	1.7	0.0	1.24
Northern pin oak	308,468	2,314	(N/A)	1.6	2.2	72.30
Bur oak	56,252	422	(N/A)	1.5	0.4	13.61
American basswood	476,232	3,572	(N/A)	1.4	3.3	123.16
Eastern redbud	29,359	220	(N/A)	1.4	0.2	7.59
White ash	131,555	987	(N/A)	1.3	0.9	36.54
Littleleaf linden	97,920	734	(N/A)	1.2	0.7	29.38
Ginkgo	67,529	506	(N/A)	1.0	0.5	24.12
Tulip tree	78,545	589	(N/A)	1.0	0.6	29.45
American sycamore	662,394	4,968	(N/A)	0.9	4.6	261.47
Eastern white pine	85,830	644	(N/A)	0.9	0.6	33.88
River birch	29,617	222	(N/A)	0.9	0.2	12.34
Kentucky coffeetree	23,645	177	(N/A)	0.9	0.2	9.85
Eastern cottonwood	517,025	3,878	(N/A)	0.8	3.6	228.10
Blue spruce	7,427	56	(N/A)	0.7	0.1	3.71
Japanese tree lilac	3,785	28	(N/A)	0.7	0.0	2.03
White oak	14,215	107	(N/A)	0.6	0.1	8.20
Broadleaf Deciduous	10,254	77	(N/A)	0.6	0.1	5.92
Spruce	2,727	20	(N/A)	0.6	0.0	1.70
Boxelder	92,364	693	(N/A)	0.5	0.6	62.98
Conifer Evergreen La	32,119	241	(N/A)	0.5	0.2	24.09
Eastern red cedar	6,662	50	(N/A)	0.5	0.0	5.00
Mulberry	33,524	251	(N/A)	0.5	0.2	25.14
Ash	54,410	408	(N/A)	0.4	0.4	51.01
Conifer Evergreen Sn	101	1	(N/A)	0.4	0.0	0.09
Birch	6,994	52	(N/A)	0.4	0.0	6.56
Black cherry	8,485	64	(N/A)	0.3	0.1	9.09
Broadleaf Deciduous	88,115	661	(N/A)	0.3	0.6	94.41
Siberian elm	37,659	282	(N/A)	0.3	0.3	40.35
Black locust	10,987	82	(N/A)	0.3	0.1	11.77
Amur maple	6,847	51	(N/A)	0.3	0.0	8.56
Northern white cedar	885	7	(N/A)	0.3	0.0	1.11
Ohio buckeye	3,739	28	(N/A)	0.2	0.0	5.61
Scotch pine	1,940	15	(N/A)	0.2	0.0	3.64
Lilac	711	5	(N/A)	0.2	0.0	1.33
Dogwood	219	2	(N/A)	0.2	0.0	0.41
Hickory	2,081	16	(N/A)	0.1	0.0	5.20
Chinese elm	120,422	903	(N/A)	0.1	0.8	301.05
Broadleaf Evergreen I	34,073	256	(N/A)	0.1	0.2	85.18
American elm	52,118	391	(N/A)	0.1	0.4	130.30
Mountain ash	3,945	30	(N/A)	0.1	0.0	14.79
Catalpa	1,047	8	(N/A)	0.1	0.0	3.93
American chestnut	64,440	483	(N/A)	0.1	0.5	241.65
Yellowwood	1,319	10	(N/A)	0.1	0.0	4.95
Rose-of-sharon	14	0	(N/A)	0.0	0.0	0.10
Cottonwood	39,259	294	(N/A)	0.0	0.3	294.44
Quaking aspen	185	1	(N/A)	0.0	0.0	1.39
Willow	14,280	107	(N/A)	0.0	0.1	107.10
Conifer Evergreen M	43	0	(N/A)	0.0	0.0	0.32
Black spruce	284	2	(N/A)	0.0	0.0	2.13
Citywide total	14,255,514	106,916	(N/A)	100.0	100.0	51.83

Table 5: Annual Carbon Sequestered

Mount Vernon

Annual CO Benefits of Public Trees

4/3/2022

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
Norway maple	91,565	687	-8,380	-638	-68	104,666	785	187,212	1,404 (N/A)	13.0	14.2	5.22
Apple	15,988	120	-587	-179	-6	16,850	126	32,072	241 (N/A)	10.4	2.4	1.12
Green ash	99,898	749	-12,517	-481	-97	74,906	562	161,806	1,214 (N/A)	6.7	12.3	8.73
Sugar maple	84,108	631	-8,099	-398	-64	60,831	456	136,443	1,023 (N/A)	6.5	10.3	7.58
Maple	20,559	154	-852	-118	-7	19,794	148	39,383	295 (N/A)	5.2	3.0	2.73
Black walnut	50,772	381	-6,249	-258	-49	40,144	301	84,409	633 (N/A)	4.2	6.4	7.28
Pin oak	57,808	434	-2,940	-168	-23	28,798	216	83,498	626 (N/A)	3.1	6.3	9.78
Red maple	15,053	113	-581	-76	-5	13,682	103	28,078	211 (N/A)	2.8	2.1	3.63
Northern hackberry	14,084	106	-1,247	-118	-10	20,999	157	33,718	253 (N/A)	2.7	2.6	4.60
Silver maple	82,396	618	-5,580	-212	-43	31,733	238	108,336	813 (N/A)	2.6	8.2	15.05
Norway spruce	3,633	27	-194	-77	-2	6,577	49	9,939	75 (N/A)	2.6	0.8	1.38
Honeylocust	30,965	232	-2,081	-121	-17	25,850	194	54,613	410 (N/A)	2.6	4.1	7.73
Callery pear	7,597	57	-211	-42	-2	6,248	47	13,592	102 (N/A)	2.4	1.0	2.08
Northern red oak	9,073	68	-1,054	-85	-9	11,501	86	19,436	146 (N/A)	2.4	1.5	2.97
Swamp white oak	9,244	69	-257	-49	-2	7,667	57	16,605	125 (N/A)	2.2	1.3	2.77
Elm	10,502	79	-574	-51	-5	7,822	59	17,699	133 (N/A)	1.8	1.3	3.49
Oak	11,534	87	-1,088	-61	-9	9,417	71	19,801	149 (N/A)	1.8	1.5	4.01
Broadleaf Deciduous Smal	1,088	8	-28	-16	0	1,057	8	2,100	16 (N/A)	1.7	0.2	0.45
Northern pin oak	6,246	47	-1,481	-99	-12	13,975	105	18,641	140 (N/A)	1.6	1.4	4.37
Bur oak	7,622	57	-270	-39	-2	5,956	45	13,269	100 (N/A)	1.5	1.0	3.21
American basswood	27,418	206	-2,286	-96	-18	13,809	104	38,845	291 (N/A)	1.4	2.9	10.05
Eastern redbud	3,138	24	-141	-29	-1	3,473	26	6,441	48 (N/A)	1.4	0.5	1.67
White ash	15,051	113	-631	-56	-5	11,394	85	25,758	193 (N/A)	1.3	2.0	7.15
Littleleaf linden	10,407	78	-471	-46	-4	6,507	49	16,397	123 (N/A)	1.2	1.2	4.92
Ginkgo	2,325	17	-324	-41	-3	4,565	34	6,525	49 (N/A)	1.0	0.5	2.33
Tulip tree	2,596	19	-377	-19	-3	2,363	18	4,562	34 (N/A)	1.0	0.3	1.71
American sycamore	13,931	104	-3,180	-87	-24	12,608	95	23,273	175 (N/A)	0.9	1.8	9.19
Eastern white pine	3,494	26	-412	-55	-4	5,048	38	8,076	61 (N/A)	0.9	0.6	3.19
River birch	3,299	25	-144	-20	-1	2,907	22	6,042	45 (N/A)	0.9	0.5	2.52
Kentucky coffeetree	1,930	14	-114	-11	-1	1,492	11	3,297	25 (N/A)	0.9	0.2	1.37
Eastern cottonwood	13,644	102	-2,482	-74	-19	11,096	83	22,184	166 (N/A)	0.8	1.7	9.79
Conifer Evergreen Mediun	12	0	0	-1	0	48	0	60	0 (N/A)	0.0	0.0	0.45
Black spruce	39	0	-1	-1	0	106	1	142	1 (N/A)	0.0	0.0	1.07
Citywide total	766,247	5,747	-68,479	-4,139	-545	625,975	4,695	1,319,604	9,897 (N/A)	100.0	100.0	4.80

Table 6: Annual Social and Aesthetic Benefits

Mount Vernon

Annual Aesthetic/Other Benefits of Public Trees

4/3/2022

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	8,885	(N/A)	13.0	11.5	33.03
Apple	887	(N/A)	10.4	1.1	4.15
Green ash	7,772	(N/A)	6.7	10.1	55.91
Sugar maple	8,630	(N/A)	6.5	11.2	63.93
Maple	3,019	(N/A)	5.2	3.9	27.95
Black walnut	4,258	(N/A)	4.2	5.5	48.94
Pin oak	4,942	(N/A)	3.1	6.4	77.21
Red maple	2,169	(N/A)	2.8	2.8	37.39
Northern hackberry	2,128	(N/A)	2.7	2.8	38.69
Silver maple	6,233	(N/A)	2.6	8.1	115.43
Norway spruce	993	(N/A)	2.6	1.3	18.38
Honeylocust	7,361	(N/A)	2.6	9.5	138.89
Callery pear	908	(N/A)	2.4	1.2	18.54
Northern red oak	783	(N/A)	2.4	1.0	15.98
Swamp white oak	1,071	(N/A)	2.2	1.4	23.79
Elm	1,142	(N/A)	1.8	1.5	30.06
Oak	1,167	(N/A)	1.8	1.5	31.54
Broadleaf Deciduous Small	53	(N/A)	1.7	0.1	1.50
Northern pin oak	604	(N/A)	1.6	0.8	18.86
Bur oak	935	(N/A)	1.5	1.2	30.15
American basswood	1,952	(N/A)	1.4	2.5	67.32
Eastern redbud	176	(N/A)	1.4	0.2	6.06
White ash	1,895	(N/A)	1.3	2.5	70.20
Littleleaf linden	1,169	(N/A)	1.2	1.5	46.75
Ginkgo	188	(N/A)	1.0	0.2	8.94
Tulip tree	323	(N/A)	1.0	0.4	16.17
American sycamore	944	(N/A)	0.9	1.2	49.69
Eastern white pine	628	(N/A)	0.9	0.8	33.04
River birch	380	(N/A)	0.9	0.5	21.09
Kentucky coffeetree	255	(N/A)	0.9	0.3	14.18
Eastern cottonwood	955	(N/A)	0.8	1.2	56.20
Blue spruce	295	(N/A)	0.7	0.4	19.64
Japanese tree lilac	35	(N/A)	0.7	0.0	2.53
White oak	351	(N/A)	0.6	0.5	27.03
Broadleaf Deciduous Medium	240	(N/A)	0.6	0.3	18.47
Spruce	135	(N/A)	0.6	0.2	11.26
Boxelder	526	(N/A)	0.5	0.7	47.81
Conifer Evergreen Large	353	(N/A)	0.5	0.5	35.32
Eastern red cedar	112	(N/A)	0.5	0.1	11.24
Mulberry	106	(N/A)	0.5	0.1	10.57
Ash	277	(N/A)	0.4	0.4	34.59
Conifer Evergreen Small	52	(N/A)	0.4	0.1	6.55
Birch	129	(N/A)	0.4	0.2	16.10
Black cherry	54	(N/A)	0.3	0.1	7.70
Broadleaf Deciduous Large	280	(N/A)	0.3	0.4	40.03
Siberian elm	254	(N/A)	0.3	0.3	36.25
Black locust	183	(N/A)	0.3	0.2	26.11
Amur maple	43	(N/A)	0.3	0.1	7.19
Northern white cedar	67	(N/A)	0.3	0.1	11.13
Ohio buckeye	104	(N/A)	0.2	0.1	20.89
Scotch pine	79	(N/A)	0.2	0.1	19.65
Lilac	8	(N/A)	0.2	0.0	2.06
Dogwood	2	(N/A)	0.2	0.0	0.54
Hickory	62	(N/A)	0.1	0.1	20.79
Chinese elm	115	(N/A)	0.1	0.1	38.28
Broadleaf Evergreen Large	97	(N/A)	0.1	0.1	32.42
American elm	194	(N/A)	0.1	0.3	64.53
Mountain ash	22	(N/A)	0.1	0.0	10.94
Catalpa	34	(N/A)	0.1	0.0	16.91
American chestnut	86	(N/A)	0.1	0.1	43.13
Yellowwood	39	(N/A)	0.1	0.1	19.55
Rose-of-sharon	0	(N/A)	0.0	0.0	0.03
Cottonwood	58	(N/A)	0.0	0.1	58.34
Quaking aspen	15	(N/A)	0.0	0.0	14.73
Willow	0	(N/A)	0.0	0.0	0.00
Conifer Evergreen Medium	12	(N/A)	0.0	0.0	12.31
Black spruce	21	(N/A)	0.0	0.0	21.08
Citywide total	77,245	(N/A)	100.0	100.0	37.44

Table 7: Summary of Benefits in Dollars

Mount Vernon

Total Annual Benefits of Public Trees by Species ($)

4/3/2022

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Norway maple	13,437	1,404	2,349	14,674	8,885	40,750	(N/A)	14.5
Apple	2,420	241	343	956	887	4,846	(N/A)	1.7
Green ash	9,383	1,214	1,742	14,992	7,772	35,103	(N/A)	12.5
Sugar maple	7,534	1,023	1,217	11,320	8,630	29,725	(N/A)	10.6
Maple	2,470	295	411	2,138	3,019	8,333	(N/A)	3.0
Black walnut	5,021	633	917	7,399	4,258	18,227	(N/A)	6.5
Pin oak	3,511	626	467	4,167	4,942	13,712	(N/A)	4.9
Red maple	1,677	211	283	1,459	2,169	5,798	(N/A)	2.1
Northern hackberry	2,679	253	467	2,908	2,128	8,435	(N/A)	3.0
Silver maple	3,869	813	728	7,600	6,233	19,243	(N/A)	6.8
Norway spruce	874	75	81	1,376	993	3,398	(N/A)	1.2
Honeylocust	3,157	410	534	4,670	7,361	16,131	(N/A)	5.7
Callery pear	829	102	123	547	908	2,510	(N/A)	0.9
Northern red oak	1,443	146	205	1,533	783	4,110	(N/A)	1.5
Swamp white oak	1,026	125	151	695	1,071	3,068	(N/A)	1.1
Elm	969	133	158	1,057	1,142	3,459	(N/A)	1.2
Oak	1,131	149	201	1,462	1,167	4,109	(N/A)	1.5
Broadleaf Deciduous Sn	155	16	21	55	53	299	(N/A)	0.1
Northern pin oak	1,827	140	335	2,342	604	5,248	(N/A)	1.9
Bur oak	738	100	114	662	935	2,548	(N/A)	0.9
American basswood	1,778	291	275	2,526	1,952	6,823	(N/A)	2.4
Eastern redbud	467	48	72	200	176	963	(N/A)	0.3
White ash	1,319	193	226	1,469	1,895	5,103	(N/A)	1.8
Littleleaf linden	813	123	131	830	1,169	3,066	(N/A)	1.1
Ginkgo	572	49	101	500	188	1,410	(N/A)	0.5
Tulip tree	291	34	54	404	323	1,106	(N/A)	0.4
American sycamore	1,565	175	324	3,043	944	6,051	(N/A)	2.1
Eastern white pine	609	61	10	1,690	628	2,997	(N/A)	1.1
River birch	393	45	60	313	380	1,191	(N/A)	0.4
Kentucky coffeetree	180	25	30	202	255	691	(N/A)	0.2
Eastern cottonwood	1,382	166	277	2,606	955	5,386	(N/A)	1.9
Blue spruce	234	19	26	354	295	927	(N/A)	0.3
Japanese tree lilac	97	10	13	35	35	190	(N/A)	0.1
White oak	257	34	38	210	351	891	(N/A)	0.3
Broadleaf Deciduous M	216	27	32	140	240	655	(N/A)	0.2
Spruce	84	8	9	125	135	361	(N/A)	0.1
Boxelder	463	79	78	603	526	1,749	(N/A)	0.6
Conifer Evergreen Large	284	29	13	713	353	1,391	(N/A)	0.5
Eastern red cedar	172	11	14	298	112	607	(N/A)	0.2
Mulberry	357	33	61	186	106	744	(N/A)	0.3
Ash	424	44	74	463	277	1,281	(N/A)	0.5
Conifer Evergreen Smal	13	1	1	14	52	81	(N/A)	0.0
Birch	125	15	19	87	129	374	(N/A)	0.1
Black cherry	147	15	22	61	54	299	(N/A)	0.1
Broadleaf Deciduous La	318	40	60	509	280	1,207	(N/A)	0.4
Siberian elm	352	41	58	364	254	1,069	(N/A)	0.4
Black locust	185	23	29	133	183	552	(N/A)	0.2
Amur maple	116	12	17	49	43	237	(N/A)	0.1
Northern white cedar	58	4	6	66	67	201	(N/A)	0.1
Ohio buckeye	91	11	13	56	104	276	(N/A)	0.1
Scotch pine	65	6	7	90	79	247	(N/A)	0.1
Lilac	22	2	3	7	8	42	(N/A)	0.0
Dogwood	8	1	1	2	2	15	(N/A)	0.0
Hickory	42	5	6	33	62	149	(N/A)	0.1
Chinese elm	255	23	54	463	115	910	(N/A)	0.3
Broadleaf Evergreen La	266	19	29	498	97	909	(N/A)	0.3
American elm	246	24	50	284	194	798	(N/A)	0.3
Mountain ash	56	6	9	25	22	118	(N/A)	0.0
Catalpa	21	3	3	17	34	78	(N/A)	0.0
American chestnut	156	16	32	266	86	556	(N/A)	0.2
Yellowwood	33	4	5	20	39	102	(N/A)	0.0
Rose-of-sharon	1	0	0	0	0	1	(N/A)	0.0
Cottonwood	91	11	19	196	58	375	(N/A)	0.1
Quaking aspen	6	1	1	5	15	27	(N/A)	0.0
Willow	71	3	14	102	0	190	(N/A)	0.1
Conifer Evergreen Medi	7	0	1	7	12	27	(N/A)	0.0
Black spruce	15	1	2	20	21	59	(N/A)	0.0
Citywide Total	78,870	9,897	13,225	102,296	77,245	281,533	(N/A)	100.0

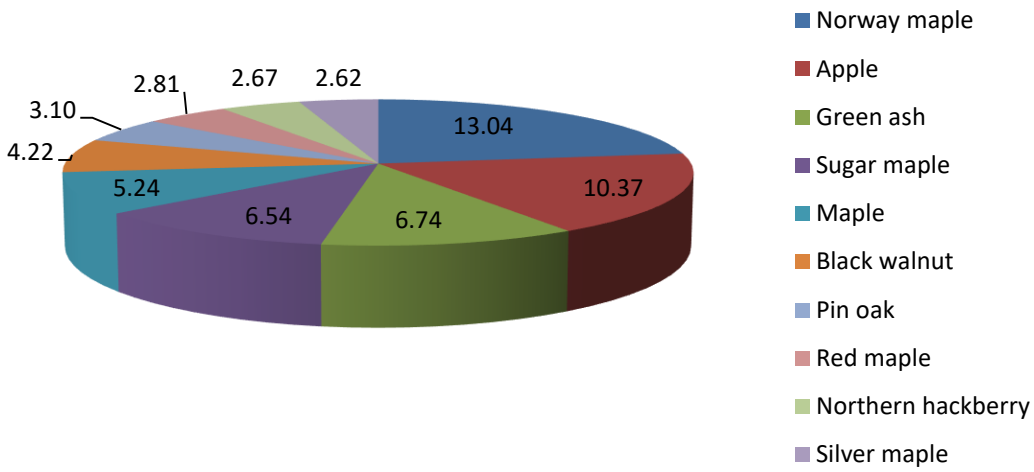

Figure 1: Species Distribution

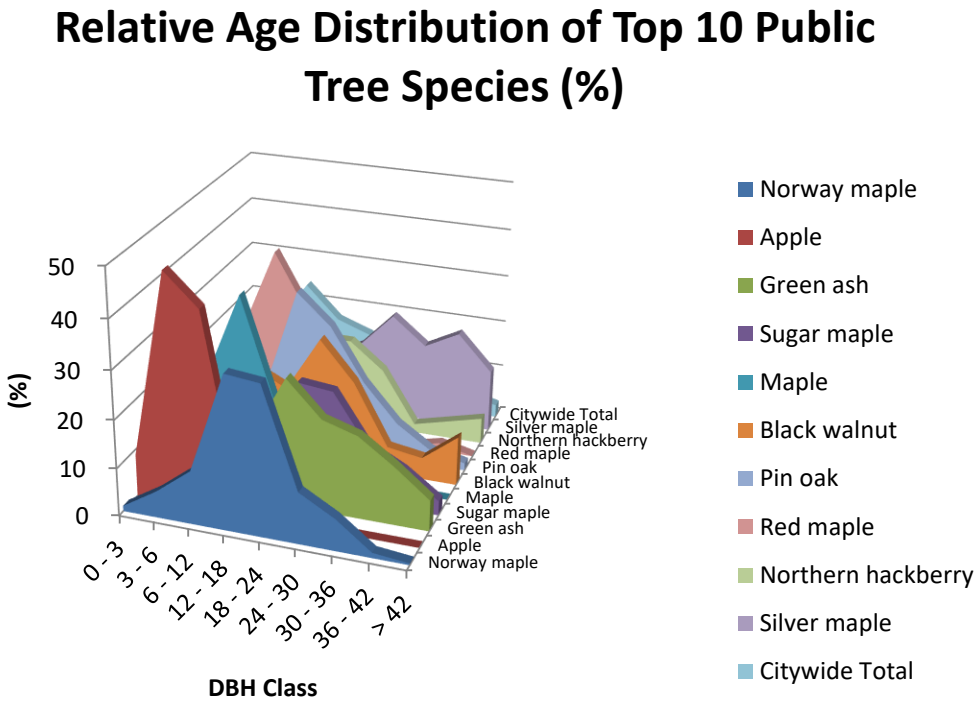

Figure 2: Relative Age Class

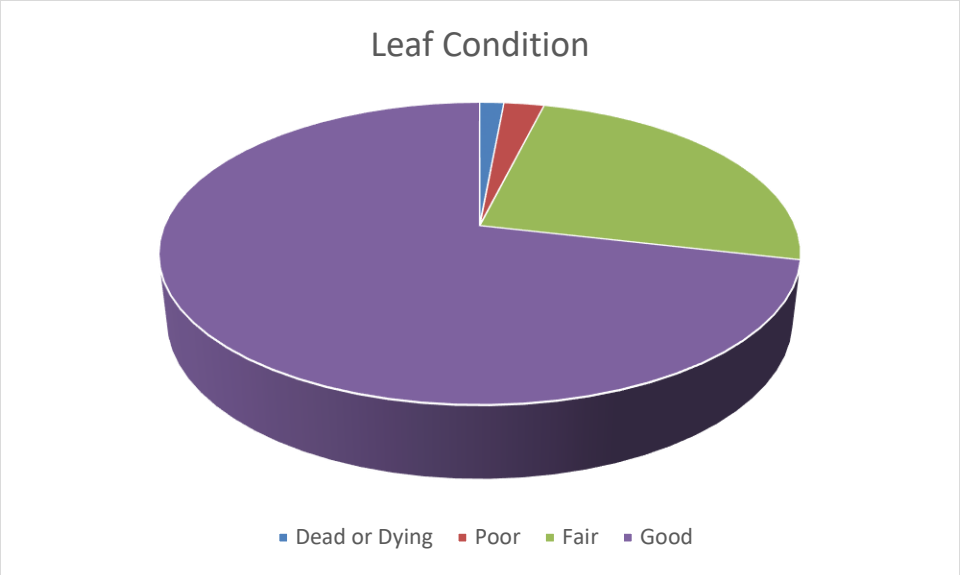

Figure 3: Foliage Condition

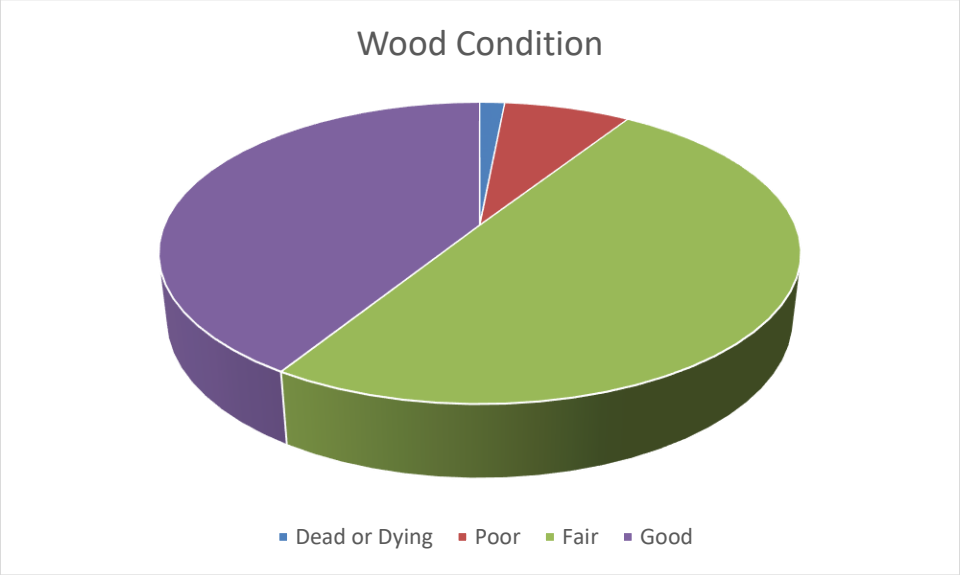

Figure 4: Wood Condition

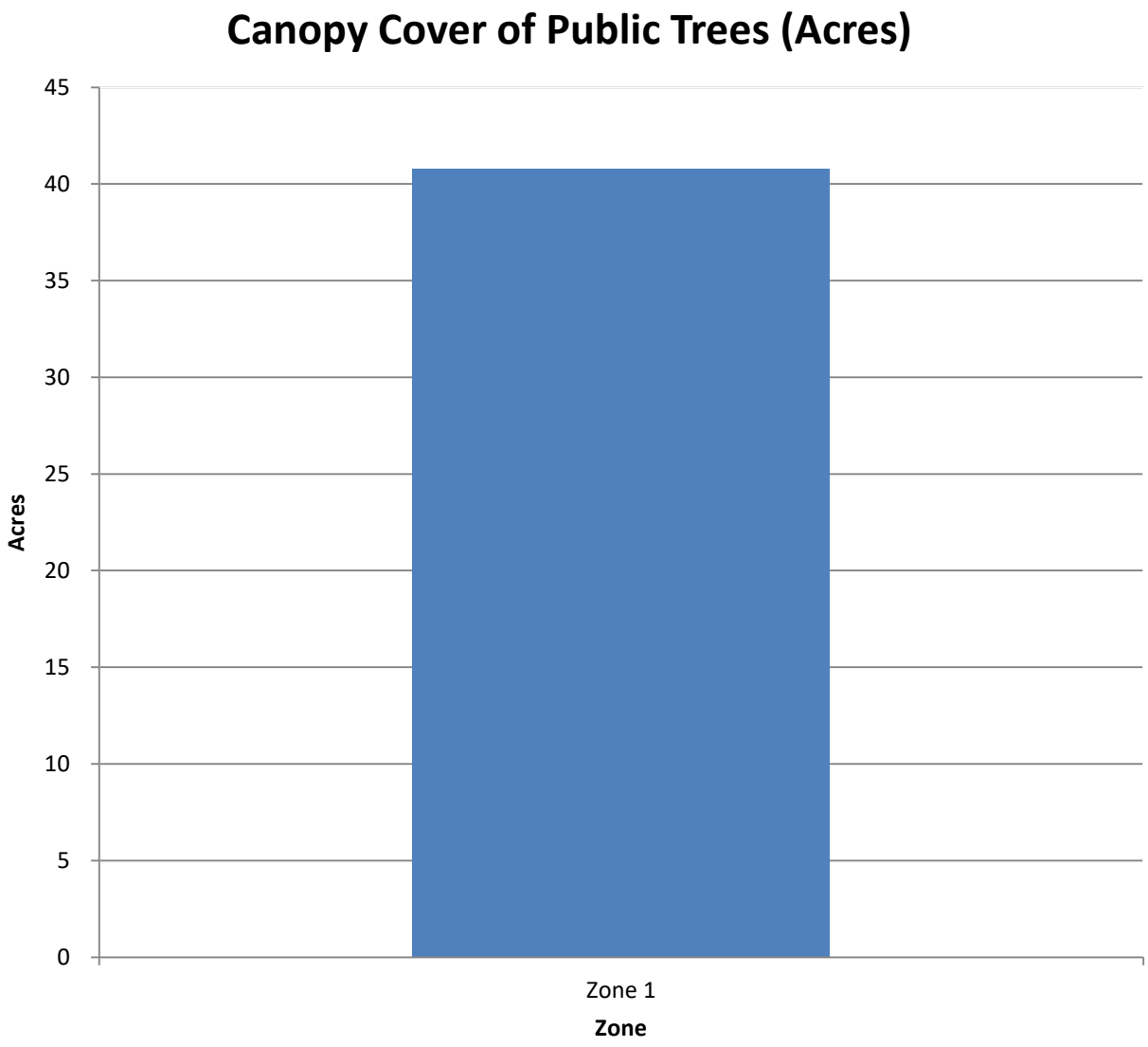

Figure 5: Canopy Cover in Acres

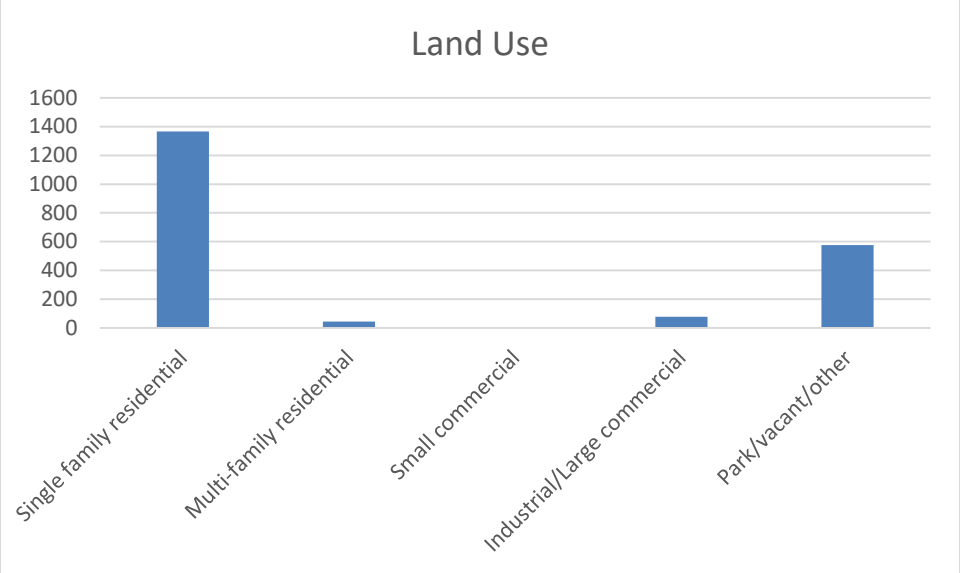

Figure 6: Land Use of city/park trees

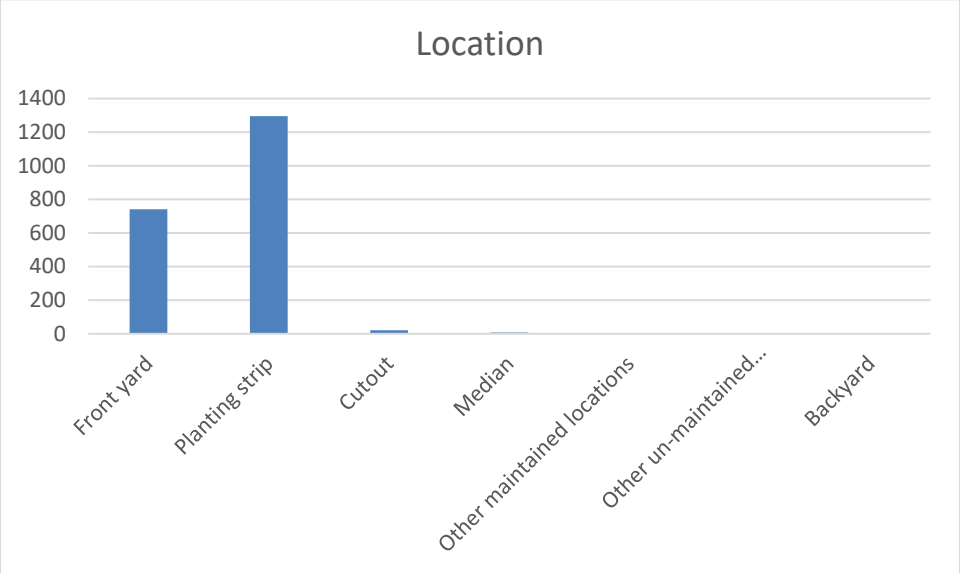

Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping

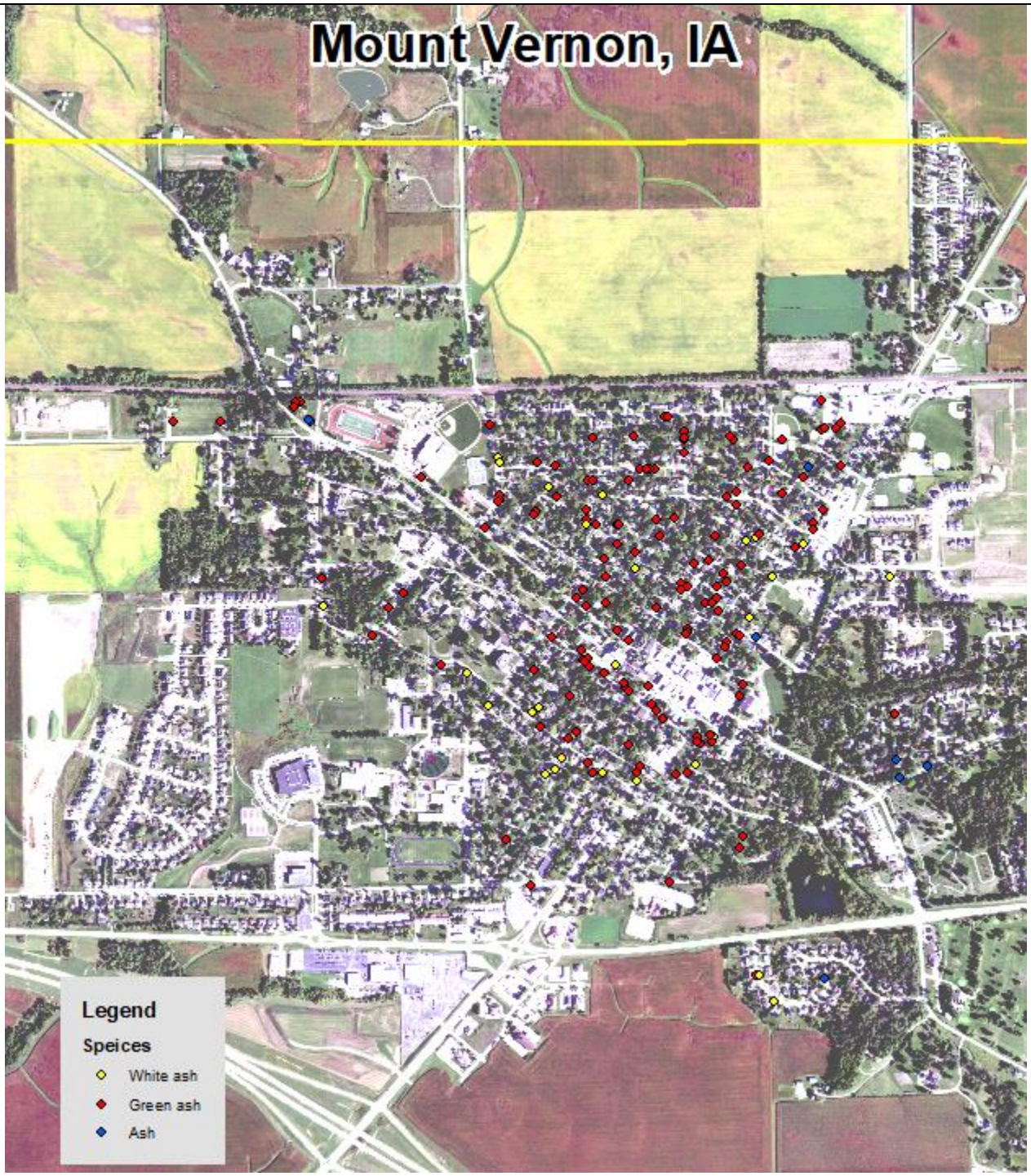

Figure 1: Location of Ash Trees

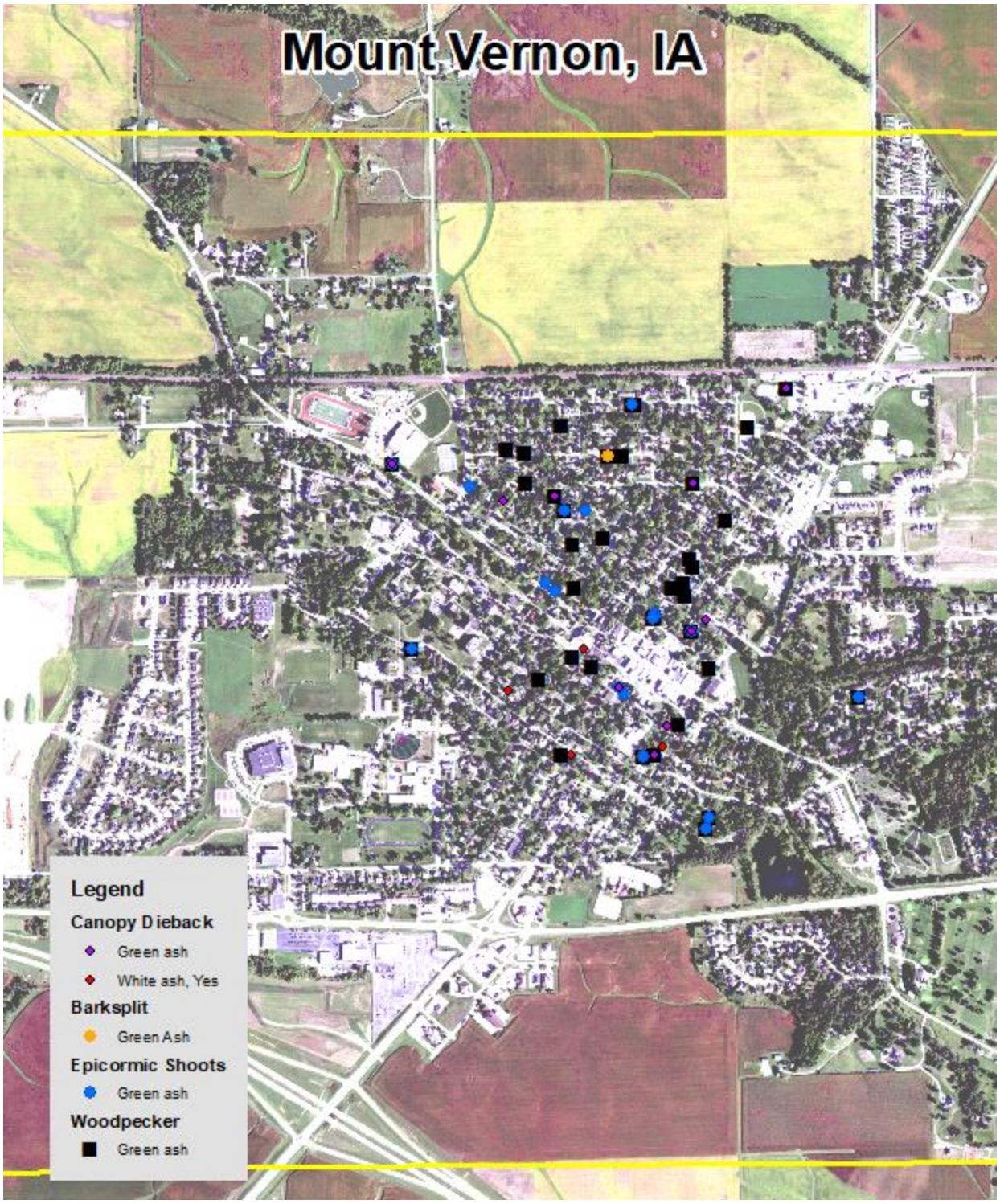

Figure 2: Location of EAB symptoms

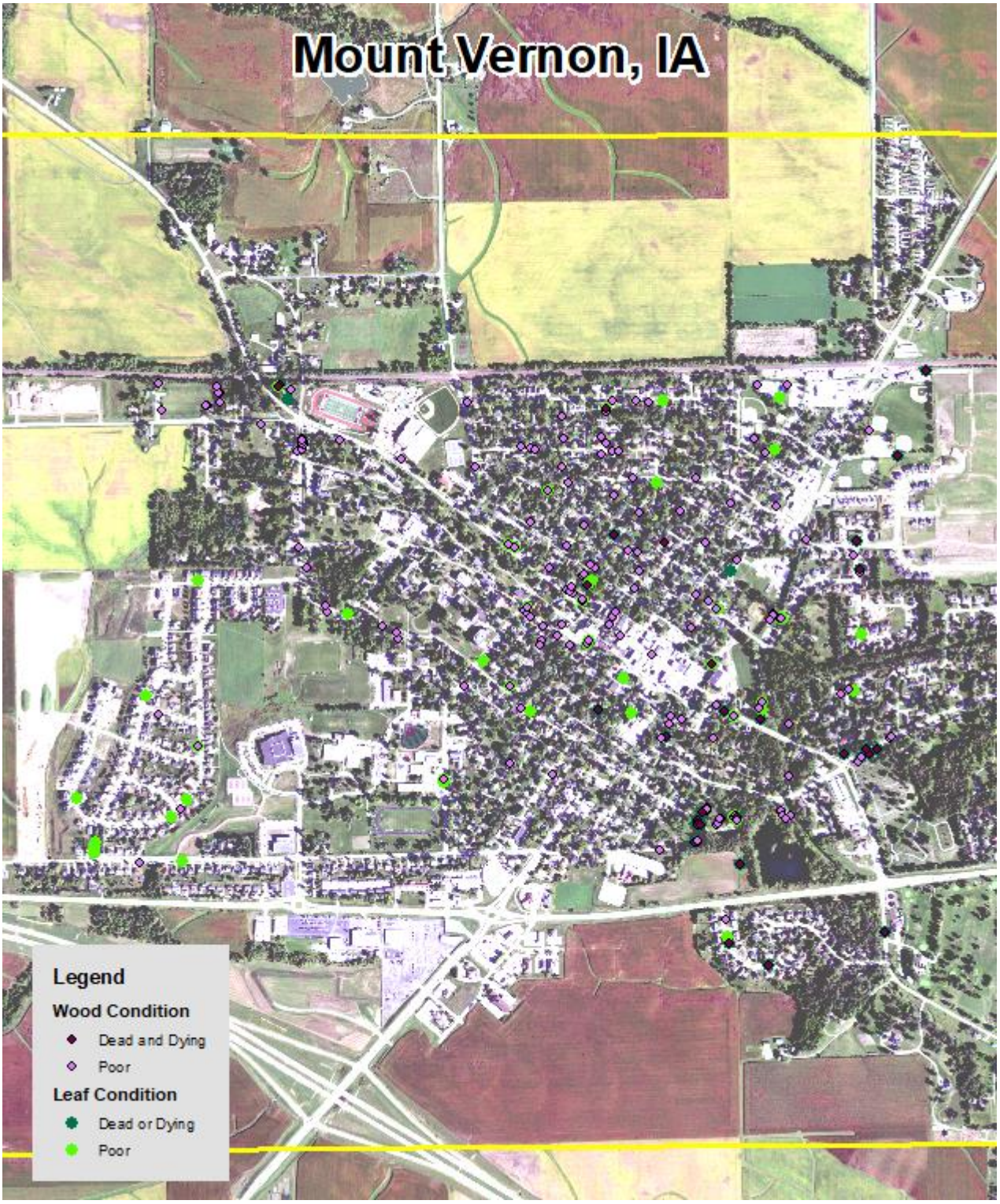
Mount Vernon, IA
Legend
Wood Condition
Dead and Dying
Poor
Leaf Condition
Dead or Dying
Poor

Figure 3: Location of Poor Condition Trees

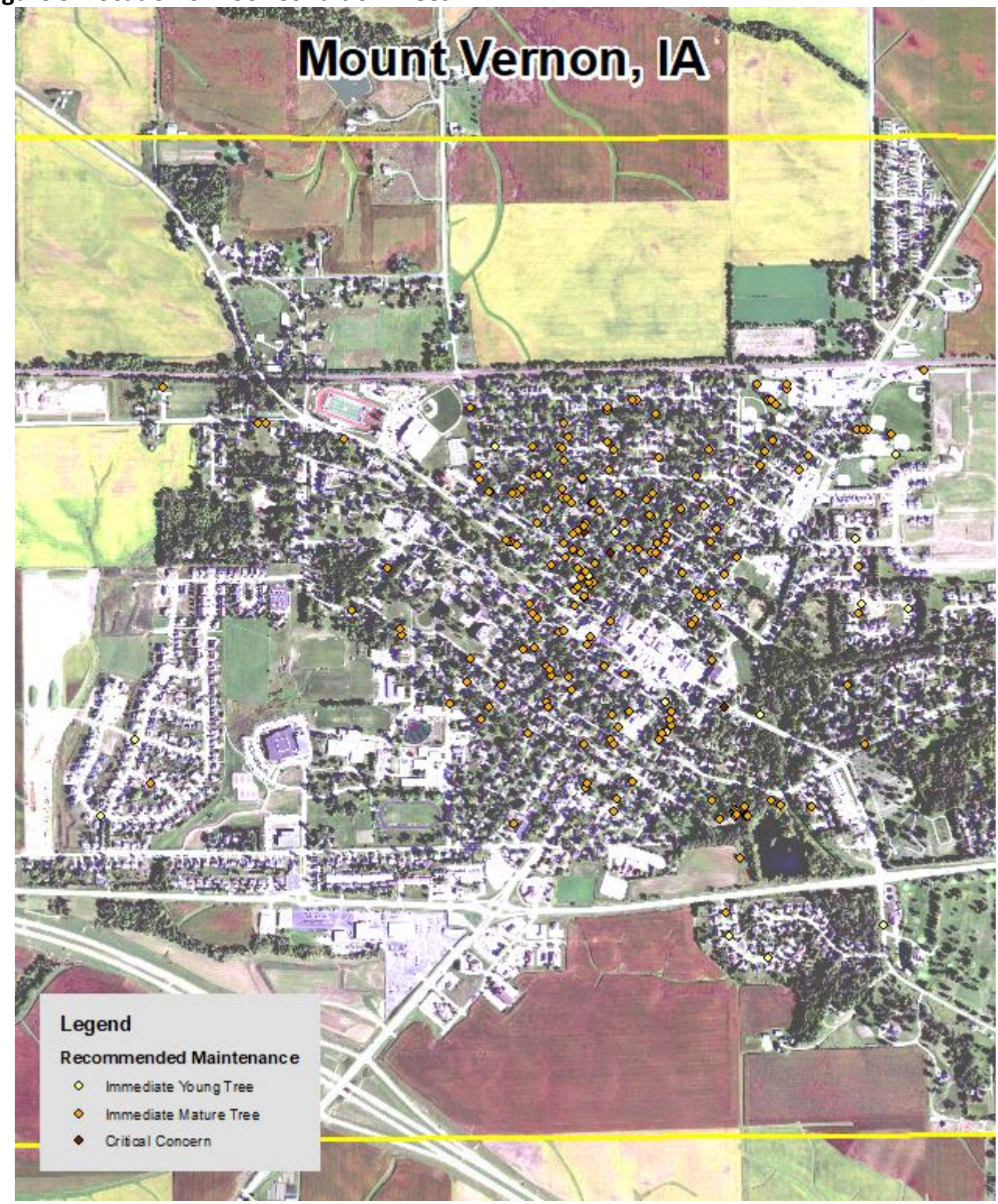

Figure 4: Location of Trees with Recommended Maintenance

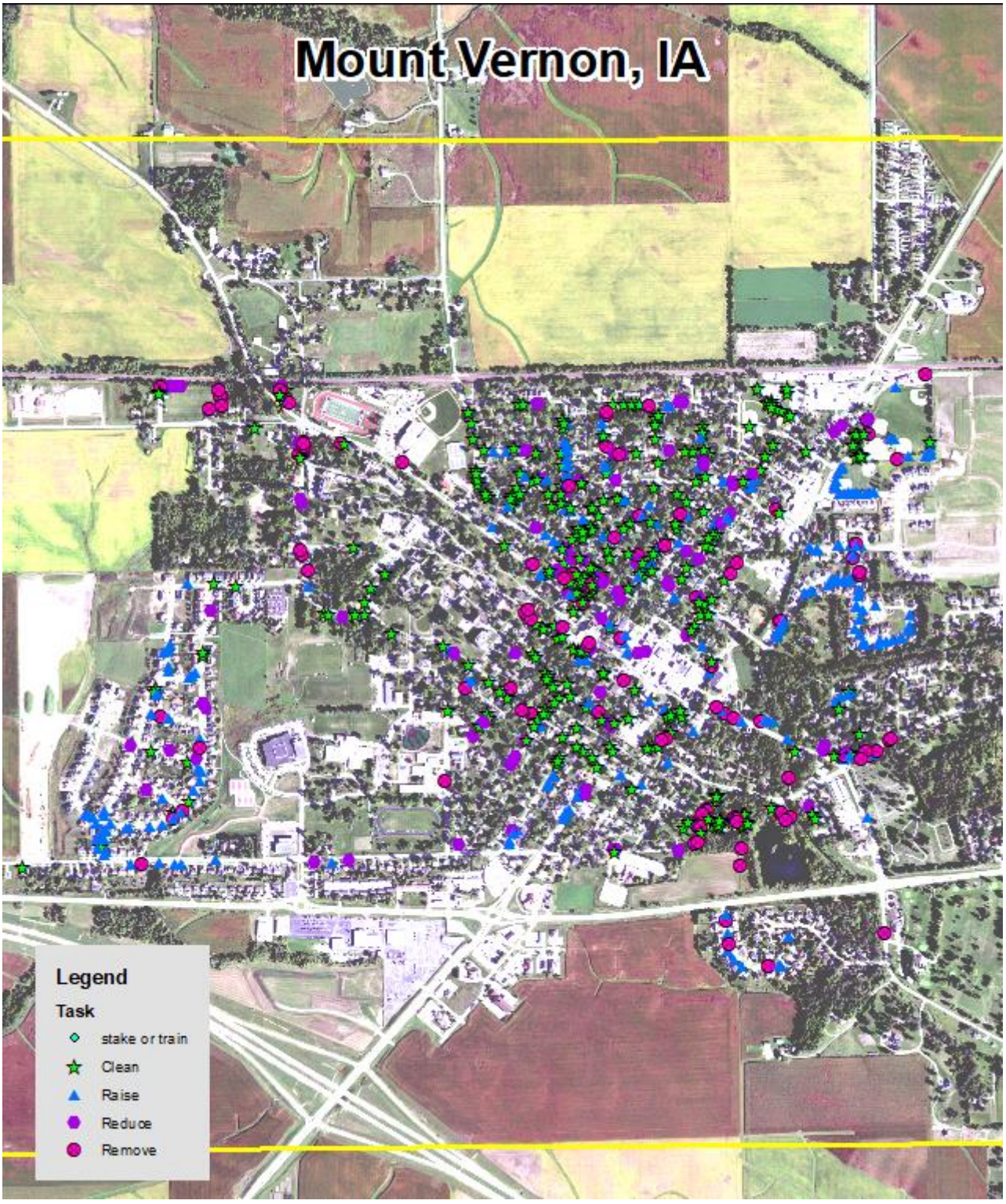

Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*

Appendix C: Mount Vernon Tree Ordinances

CHAPTER 151
TREES

151.01 PURPOSE.
The purpose of this chapter is to assume charge, custody and control of all trees upon the public streets and upon public property by the City; to provide rules and regulations relating thereto and to define tree nuisances and provide for their abatement, in order to provide for the safety, preserve the health, promote the prosperity, improve the order, comfort and convenience of the City.

151.02 DEFINITIONS.
For use in this chapter, the following terms are defined:

1. "Parking" means that part of the street, avenue or highway in the City not covered by sidewalk and lying between the lot line and the curb line; or, on unpaved streets, that part of the street, avenue or highway lying between the lot line and that portion of the street usually traveled by vehicular traffic.

2. "Trees" means all woody vegetation except where otherwise indicated.

151.03 TREE DIVISION.
1. There is hereby established a Tree Division of the City.

2. The Tree Division shall have the responsibility to create a list of recommended trees for streets, parks and other public land. The Tree Division shall also have the authority to add or remove trees from the permitted list at any time to ensure public safety and preserve the symmetry of public places.

3. The Tree Division shall consist of five members. One member will be the City Administrator or designee, the other four members will be appointed by the Mayor and approved by the City Council. The terms of the four appointed members shall be for three (3) years beginning on January 1, 2012. Any Tree Division member appointed prior to January 1, 2012, will serve from the date of the initial appointment plus a three (3) year term beginning January 1, 2012. The appointed members of the Tree Division need not be residents of Mount Vernon, Iowa.

4. The City Administrator or designee shall have the authority to perform and to regulate the planning, maintenance and removal of trees on streets and other public property in order to ensure public safety and preserve the symmetry of public places. The City Administrator or designee shall promote public information on tree planting, maintenance and removal. The City Administrator or designee shall have the authority and duty to supervise or inspect all work done in accordance with the terms of this chapter.

151.04 AUTHORIZED TREES AND PLANTING RESTRICTIONS.

1. Authorized Trees . The City Administrator or designee shall keep a list of authorized trees for street right-of-way or public property as approved by the Tree Division.

2. Whenever any tree shall be planted in conflict with the provisions of this section, it shall be lawful for the City Administrator or designee to require its removal.

3. No tree shall be planted in the parking or public right-of-way without prior written approval of the City Administrator or designee. Before planting any tree, the abutting property owner must demonstrate to the City Administrator or designee the following:

A. That the owner has located all overhead and underground utilities, including City utilities.

B. That the tree planting is in compliance with Section 151.09.

C. That the tree will not be or become a traffic obstruction. (See Section 50.02(15))

D. That the tree is an authorized tree.

151.05 FELLING OR TRIMMING OF TREES .

1. No tree shall be removed from the parking or public right-of-way without prior written approval of the City Administrator or designee. Written approval must address the need for traffic control, if any, when a tree will be felled or trimmed onto any street. Trees or branches which are felled or trimmed onto public property must be removed immediately.

2. Any person or entity felling or trimming a tree shall agree to indemnify and hold the City harmless for any personal injury, property damage or attorney fees.

151.06 OBSTRUCTION.

1. Trees on public or private property bordering on any street shall be trimmed to sufficient height to allow free passage of pedestrians and vehicular travel and so they will not obstruct or shade the street lights, the vision of traffic signs or the view of any street intersections. The minimum clearance of any overhanging portion of such trees shall be nine (9) feet over sidewalks and eighteen (18) feet over all streets.

2. Public Property. The maintenance of the parking or terrace of public right of way shall conform to Section 135.10.

(Ord. 12-19-2016B - Jan. 17 Supp.)

3. Private Property. When the City Administrator or designee shall find it necessary to order obstructing trees on private property to be trimmed, the City Administrator or designee shall cause written notice to be served on the property owner requiring such trees to be trimmed to the minimum heights set out above within thirty (30) days after receipt of the said notice. The notice required herein shall be served by mailing a copy of the notice to the last known address of the property owner by certified mail. If the City Administrator or designee is unable to secure notice

on the property owner, said written notice may be served on the occupant or person in charge of the property in the same manner as set out herein.

4. Failure to Comply. When a person to whom such notice is directed shall fail to comply within the specified time, the City Administrator or designee shall cause the trees to be trimmed and the exact cost of such work shall be certified by the City Administrator or designee to the County Treasurer to be collected with and in the same manner as general property taxes.

151.07 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. The City Administrator or designee 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 City Administrator or designee may cause such condition to be corrected by treatment or removal. The City Administrator or designee may also order the removal of any trees on the streets of the City which interfere with the making of improvements or with travel thereon.

2. Private Property. If it is determined with reasonable certainty that any such condition exists on private property and that danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Clerk 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 City Administrator or designee may cause the condition to be corrected and the cost assessed against the property.

151.08 INTERFERENCE WITH CLERK.

No person shall hinder, prevent, delay or interfere with the City Administrator or designee or any of the City Administrator or designee's assistants while they are engaged in carrying out the execution or enforcement of this chapter; provided, however, that nothing herein shall be construed as an attempt to prohibit the pursuit of any remedy, legal or equitable, in any court of competent jurisdiction for the protection of property rights by the owner of any property within the City.

151.09 ARBORICULTURAL SPECIFICATIONS AND STANDARDS OF PRACTICE.

The following Arboricultural Specifications and Standards of Practice are hereby adopted by the City:

1. Planting. All trees planted on the streets shall be of sufficient size to warrant satisfactory results and stand the abuse common to street trees . Unless otherwise allowed for substantial reasons, all standard sized trees shall have comparatively straight trunks, well developed leaders, top and root characteristics of the species or variety showing evidence of proper nursery pruning. All trees must be free of insects, disease, mechanical injuries and other objectionable features at the time of planting. To compensate for any serious loss of roots, the top of the tree should be reduced by thinning or cutting back as determined by the growth characteristics of the tree species. The leader shall not be cut off in such trimming. Trees cannot be planted on the parking if it is less than four feet in width for columnar trees , five to eight feet for others, or contains

less than twenty-five square feet of exposed soil surface. Trees should not be planted to obstruct or shade the street lights, vision of traffic signs or the view of street intersection. If it is at all possible, trees should be planted inside the property lines and not between the sidewalk and curb. In all newly platted additions, trees are to be placed inside the property lines rather than on the parking. Trees may be guyed or supported in an upright position according to accepted arboricultural practices. The guys or supports shall be fastened in such a way that they will not girdle or cause serious injury to the trees or endanger public safety.

2. Pruning. Trees can be pruned anytime of the year, except during initial bud break. Utilize the three step method of pruning to protect the branch collar and to promote natural sealing. Do not use pruning paints or sealers. No topping or dehorning of public trees shall be permitted.

3. Cotton-bearing Trees . Cotton-bearing cottonwood trees and all other cotton-bearing poplar trees are prohibited.

151.10 DECISION-APPEAL.

Any decision of the City Administrator or designee under this Chapter may be appealed to the Tree Division within five (5) business days of the decision.

(Ch. 151 - Ord. 5-2-201IA - June 11 Supp.)

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.