Ventura, 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 Ventura 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 30% of Ventura'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 69 trees inventoried.

- Ventura's trees provide $12,021 of benefits annually, an average of $174.22 per tree
- There are over 15 species of trees
- The top three genera are: Ash 30%, Maple 17%, and Cedar 11.5%
- 38% of trees need some type of management
- 12 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 12 trees needing removal, 7 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*
- 8 of the 21 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 10.5 years to remove ash. We suggest that city officials request a budget increase to $2,500 annually and apply for grants to plant replacement trees

Introduction

INTRODUCTION

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

Assist Ventura 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 69 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. Ventura's trees reduce energy-related costs by approximately $3,399 annually (Appendix A, Table 1). These savings are both in electricity (15.1 MWh) and in natural gas (2,236.2 Therms).

Annual Stormwater Benefits

Ventura's trees intercept about 174,815 gallons of rainfall or snow melt per year (Appendix A, Table 2). This interception provides $4,737 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 Ventura, it is estimated that trees remove 209.5 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 $593 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Ventura, trees sequester about 32,591 lbs of carbon per year with an associated value of $419 (Appendix A, Table 5). In addition, the trees store 684,789 lbs of carbon, with a yearly benefit of $5,136 (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. Ventura receives $2,872 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, Ventura's trees provide $12,021 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 69 trees in Ventura provide approximately $174.22 annually (Appendix A, Table 7).

ENERGY	STORMWATER	AIR QUALITY	CARBON	AESTHETICS	SUMMARY
• Reduce energy cost by **$3,399**	• Intercept **174,815 gallons** • Provides **$4,737** benefit	• Remove **209.5 lbs** of pollution • Net value of **$593**	• Sequester **32,591 lbs** • Value of **$419** • Store **684,789 lbs** • Value of **$5,136**	• **$2,872** in social benefits	• **$12,021** annual benefits • Each tree provides **$174.22** annually

FOREST STRUCTURE

Species Distribution

Ventura has over 15 different tree species along city streets and parks (Appendix A, Figure 1).

The distribution of trees by genera is as follows:

Ash	21	30%
Maple	12	17%
Cedar	8	11.5%
Spruce	7	10%
Walnut	5	7%
Apple (Crab)	5	7%
Elm	2	3%

Cottonwood	2	3%
Poplar	2	3%
Birch	2	3%
Linden	1	1%
Willow	1	1%
Plum	1	1%

Age Class

Most of Ventura's trees (46%) are between 12 and 24 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. Ventura's size curve is medium, indicating an average, middle aged 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 Ventura indicate that 54% of the trees are in good health, with only 10% of the foliage in poor health, dead, or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 48% of Ventura's trees are in good health for wood condition (Appendix A, Figure 4 & Appendix B, Figure 3). Thirteen percent of the tree population's wood condition is in poor health, dead, or dying. This 13% 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	26	38%
Crown Reduction	0	0%
Tree Removal	12	17%
Crown Raising	0	0%
Tree Staking	0	0%

Canopy Cover

The total canopy with both private and public trees is 190.58 acres or 12%. The canopy cover included in the Ventura inventory includes approximately 2 acres (Appendix A, Figure 4). The city's canopy goal is to increase canopy by 6% in 30 years. To achieve this goal it is estimated that 8 trees need to be planted annually on public and private lands.

Land Use and Location

The majority of Ventura'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	98.5%
Industrial/Large Commercial	0%
Park/Vacant/Other	1.5%
Small Commercial	0%
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

Ventura has 12 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 7 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 26 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 12 removals, 11 are ash trees. There are a total of 21 ash trees, and 8 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 Ventura.

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 ash (30%) and maple (17%) (Appendix A, Figure 1). Maples should not be planted until this percentage can be lowered. Also, ash trees have not been recommended since 2002, due to the threat of EAB. Other species to avoid because they are public nuisances include: fruit-bearing tree or any tree of the kinds commonly known as cottonwood, poplar, boxelder, Chinese elm, evergreen, willow, or black walnut.

Continual Monitoring

Due to the threat of EAB, it is important to continuously check the health of ash trees. We recommend that ash trees be checked with a visual survey every year for tree decline and for the following signs and symptoms: canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

EMERALD ASH BORER PLAN

Ash Tree Removal

Tree removal will be prioritized by first removing dead, dying, hazardous trees (Appendix B, Figure 4). Next will be all ash in poor condition that display EAB signs and symptoms (Appendix B, Figure 2 & Appendix B, Figure 3). *City ownership of the tree recommended for removal should be verified prior to any removal*

Treatment of Ash Trees

Chemical treatment can be an effective tool for communities to spread removal costs out over several years while allowing trees to continue providing benefits. However, treatment is not recommended if EAB is more than 15 miles away from the community. For more information on the cost of treatment strategies visit http://extension.entm.purdue.edu/treecomputer/

EAB Quarantines

EAB is an extremely destructive plant pest and it is responsible for the death and decline of millions of ash trees. Ash in both forested and urban settings constitute a significant portion of

the canopy cover in the United States. Current tools to detect, control, suppress and eradicate this pest are not as robust as the USDA would desire. In order to stay ahead of this hard to detect beetle, the USDA is attempting to contain the beetle before it spreads beyond its known positions by regulating articles.

A regulated article under the USDA's quarantine includes any of the following items:

- emerald ash borer
- firewood of all hardwood species (for example ash, oak, maple and hickory)
- nursery stock and green lumber of ash
- any other ash material, whether living, dead, cut or fallen, including logs, stumps, roots, branches, as well as composted and not composted chips of the genus ash (Mountain ash is not included)

In addition, any other article, product, or means of conveyance not listed above may be designated as a regulated article if a USDA inspector determines that it presents a risk of spreading EAB once a quarantine is in effect for your county.

Wood Disposal

A very important aspect of planning is determining how wood infested with EAB will be handled, keeping in mind that quarantines will restrict its movement. Consider who will cut and haul the dead and dying trees? Is there an accessible, secured site big enough to store and sort the hundreds of trees and the associated brush and chips? How will wood be disposed of or utilized? Do you have equipment capable of handling the amount and size of ash trees your tree inventory has identified? Once your county is under quarantine for EAB, contact USDA-APHIS-PPQ at 515-251-4083 or visit the website http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/regulatory.shtml. Wood waste can be normally disposed of if your county is not part of a quarantine.

Canopy Replacement

As budget permits, all removed trees will be replaced. All trees will meet the restrictions in city ordinance 151.03 (Appendix C). "No tree shall be planted in any street or parking except with Council approval." While council must approve any planting, we recommend planting species such as honey locust, Kentucky coffeetree, tulip tree, ginkgo, swamp white oak, and eastern redbud.

Postponed Work

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

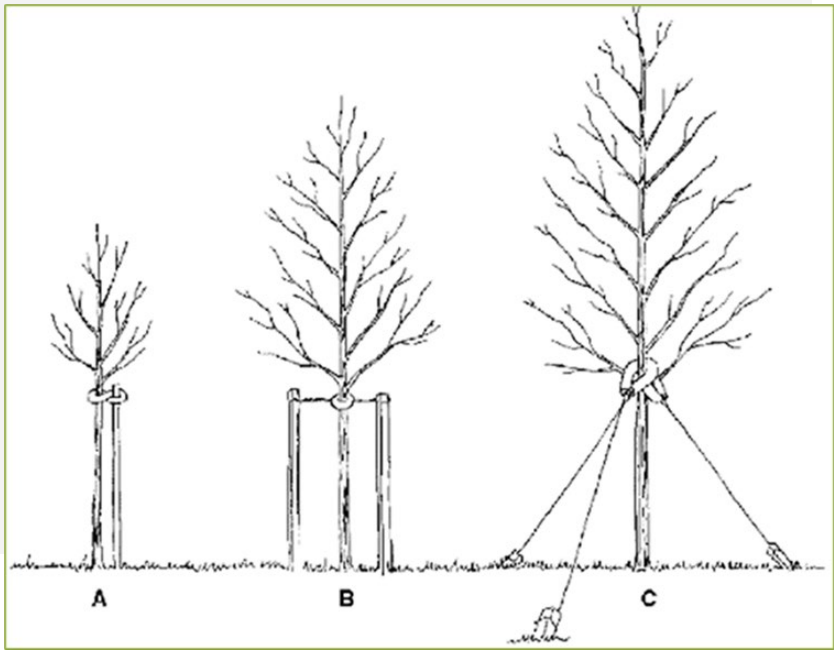
Monitoring

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

Private Ash Trees

It is strongly recommended that private property owners start removing ash trees on their property upon arrival of EAB if preventative treatments are not being used. City Code 151.07 states "The Director 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. The Director 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 $1,400/Year – (No Official Yearly Tree Budget, Calculated at $2/person)

YEAR 1	Est. Cost
Remove 2 trees recommended for immediate removal	$1,400
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,400**

YEAR 2	Est. Cost
Remove 2 trees recommended for immediate removal	$1,400
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,400**

YEAR 3	Est. Cost
Remove 2 trees recommended for immediate removal	$1,400
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,400**

YEAR 4	Est. Cost
Remove 2 trees recommended for immediate removal	$1,400
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,400**

YEAR 5	Est. Cost
Remove 2 trees recommended for immediate removal	$1,400
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,400**

YEAR 6	Est. Cost
Remove 2 trees recommended for immediate removal	$1,400
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,400**

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

***To remove all ash trees within 6 years alone, the budget would need to be $2,450 a year. If the budget were increased to $3,000 a year all ash could be removed in 5 years.*

PROPOSED WORK SCHEDULE WITH INCREASED BUDGET

Budget Allowance of $2,500/Year – (Budget Increase Suggested to Best Manage City Trees)

YEAR 1	Est. Cost
Remove 3 trees recommended for immediate removal	$2,100
Plant 2 trees in open locations	$300
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$2,400**

YEAR 2	Est. Cost
Remove 2 trees recommended for immediate removal	$1,400
Plant 5 trees in open locations	$750
Prune 1/3 of city owned trees	$345
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$2,495**

YEAR 3	Est. Cost
Remove 3 trees recommended for immediate removal	$2,100
Plant 2 trees in open locations	$300
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$2,400**

YEAR 4	Est. Cost
Remove 2 trees recommended for immediate removal	$1,400
Plant 5 trees in open locations	$750
Prune 1/3 of city owned trees	$345
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$2,495**

YEAR 5	Est. Cost
Remove 2 trees recommended for immediate removal	$1,400
Remove 1 ash tree	$700
Plant 2 trees in open locations	$300
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$2,400**

YEAR 6	Est. Cost
Remove 2 ash trees	$1,400
Plant 5 trees in open locations	$750
Prune 1/3 of city owned trees	$345
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$2,495**

Proposed Budget Increase

EAB could potentially kill all ash trees in Ventura within four years of its arrival. To remove all ash trees within six years, the budget would need to be increased to $2,450 a year. If the budget were increased to $3,000 per year all ash could be removed within 5 years. Additionally, we recommend that Ventura apply for grants to fund replacement trees. Utility Company grants are usually between $500 and $10,000 for community-based, tree-planting projects that include parks, gateways, cemeteries, nature trails, libraries, nursing homes, and schools.

Another option considered by many communities is treating selected trees, either to maintain those trees in the landscape or to delay their removal – to spread out the costs and number of trees needing removal all at once. Trunk injection is administered every two years for the life of the tree. If treatment is discontinued, the tree dies. For instance, in this treatment scenario, the average ash diameter is 20 inches and at $15 per inch, about 4 trees could be treated per year (every other year treatment). Four trees would be selected for treatment, and Ventura would still need to find $11,900 for removal. Alternatively, if there are 8 treatable trees, it would cost approximately $2,400 a year for treatment and leave $9,100 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 Ventura. 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

Ventura

Annual Energy Benefits of Public Trees

2/8/2022

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Ash	2.5	189	361.6	354	544	(N/A)	17.4	16.0	45.32
Norway maple	2.3	173	325.9	319	492	(N/A)	13.0	14.5	54.72
Green ash	2.9	224	417.9	410	633	(N/A)	13.0	18.6	70.36
Northern white cedar	0.5	40	81.1	79	119	(N/A)	11.6	3.5	14.90
Blue spruce	0.8	64	110.0	108	172	(N/A)	10.1	5.1	24.59
Apple	0.8	64	125.4	123	187	(N/A)	7.2	5.5	37.35
Black walnut	1.8	138	254.8	250	388	(N/A)	7.2	11.4	77.58
Silver maple	1.0	79	130.8	128	207	(N/A)	4.3	6.1	69.13
Cottonwood	0.8	63	112.7	110	173	(N/A)	2.9	5.1	86.52
American elm	0.3	25	39.2	38	64	(N/A)	2.9	1.9	31.77
Birch	0.5	40	79.1	78	117	(N/A)	2.9	3.5	58.69
Black poplar	1.0	74	126.2	124	197	(N/A)	2.9	5.8	98.63
Littleleaf linden	0.3	22	41.9	41	63	(N/A)	1.4	1.8	62.69
Plum	0.1	6	12.8	13	18	(N/A)	1.4	0.5	18.19
Willow	0.1	8	16.9	17	24	(N/A)	1.4	0.7	24.47
Total	15.9	1,208	2,236.2	2,191	3,399	(N/A)	100.0	100.0	49.27

Table 2: Annual Stormwater Benefits

Ventura

Annual Stormwater Benefits of Public Trees

2/8/2022

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Ash	20,253	549	(N/A)	17.4	11.6	45.74
Norway maple	19,103	518	(N/A)	13.0	10.9	57.52
Green ash	35,877	972	(N/A)	13.0	20.5	108.03
Northern white cedar	5,707	155	(N/A)	11.6	3.3	19.33
Blue spruce	11,557	313	(N/A)	10.1	6.6	44.74
Apple	3,946	107	(N/A)	7.2	2.3	21.39
Black walnut	24,357	660	(N/A)	7.2	13.9	132.02
Silver maple	15,431	418	(N/A)	4.3	8.8	139.39
Cottonwood	12,729	345	(N/A)	2.9	7.3	172.48
American elm	1,823	49	(N/A)	2.9	1.0	24.70
Birch	4,959	134	(N/A)	2.9	2.8	67.19
Black poplar	14,478	392	(N/A)	2.9	8.3	196.17
Littleleaf linden	3,744	101	(N/A)	1.4	2.1	101.46
Plum	264	7	(N/A)	1.4	0.2	7.17
Willow	586	16	(N/A)	1.4	0.3	15.88
Citywide total	174,815	4,737	(N/A)	100.0	100.0	68.66

Table 3: Annual Air Quality Benefits

Ventura

Annual Air Quality Benefits of Public Trees

2/8/2022

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								
Ash	3.7	0.6	1.9	0.2	20	12.1	1.8	1.7	11.3	75	-0.9	-3	32.4	92	(N/A)	17.4	7.65
Norway maple	3.6	0.6	1.8	0.2	20	11.0	1.6	1.5	10.3	68	-0.9	-3	29.8	85	(N/A)	13.0	9.41
Green ash	4.6	0.7	2.2	0.2	24	14.2	2.1	2.0	13.4	88	0.0	0	39.3	112	(N/A)	13.0	12.50
Northern white cedar	0.5	0.1	0.5	0.1	4	2.6	0.4	0.4	2.4	16	-1.7	-6	5.2	13	(N/A)	11.6	1.65
Blue spruce	1.5	0.3	1.3	0.2	10	4.0	0.6	0.6	3.8	25	-4.2	-16	8.0	19	(N/A)	10.1	2.76
Apple	1.3	0.2	0.6	0.1	7	4.1	0.6	0.6	3.8	25	0.0	0	11.3	32	(N/A)	7.2	6.47
Black walnut	3.4	0.5	1.5	0.2	18	8.7	1.3	1.2	8.3	54	0.0	0	25.1	72	(N/A)	7.2	14.42
Silver maple	2.7	0.5	1.3	0.1	14	4.9	0.7	0.7	4.7	31	-1.4	-5	14.2	40	(N/A)	4.3	13.28
Cottonwood	2.0	0.3	0.9	0.1	10	3.9	0.6	0.5	3.7	25	0.0	0	12.0	35	(N/A)	2.9	17.37
American elm	0.1	0.0	0.1	0.0	1	1.5	0.2	0.2	1.5	10	0.0	0	3.7	10	(N/A)	2.9	5.11
Birch	1.0	0.2	0.5	0.0	5	2.6	0.4	0.4	2.4	16	-0.2	-1	7.1	20	(N/A)	2.9	10.16
Black poplar	3.2	0.5	1.4	0.1	16	4.6	0.7	0.6	4.4	29	0.0	0	15.5	45	(N/A)	2.9	22.55
Littleleaf linden	0.7	0.1	0.3	0.0	4	1.4	0.2	0.2	1.3	9	-0.3	-1	4.0	11	(N/A)	1.4	11.21
Plum	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)	1.4	2.55
Willow	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)	1.4	3.47
Citywide total	28.4	4.8	14.3	1.4	154	76.5	11.1	10.6	72.1	475	-9.7	-36	209.5	593	(N/A)	100.0	8.60

Table 4: Annual Carbon Stored

Ventura

Stored CO2 Benefits of Public Trees

2/8/2022

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Ash	61,336	460	(N/A)	17.4	9.0	38.34
Norway maple	58,544	439	(N/A)	13.0	8.5	48.79
Green ash	147,665	1,107	(N/A)	13.0	21.6	123.05
Northern white cedar	2,967	22	(N/A)	11.6	0.4	2.78
Blue spruce	10,080	76	(N/A)	10.1	1.5	10.80
Apple	20,468	154	(N/A)	7.2	3.0	30.70
Black walnut	109,375	820	(N/A)	7.2	16.0	164.06
Silver maple	60,104	451	(N/A)	4.3	8.8	150.26
Cottonwood	65,202	489	(N/A)	2.9	9.5	244.51
American elm	3,945	30	(N/A)	2.9	0.6	14.79
Birch	15,891	119	(N/A)	2.9	2.3	59.59
Black poplar	111,964	840	(N/A)	2.9	16.4	419.86
Littleleaf linden	15,239	114	(N/A)	1.4	2.2	114.29
Plum	908	7	(N/A)	1.4	0.1	6.81
Willow	1,101	8	(N/A)	1.4	0.2	8.26
Citywide total	684,789	5,136	(N/A)	100.0	100.0	74.43

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

Ventura

Annual CO $_2$ Benefits of Public Trees

2/8/2022

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
Ash	4,303	32	-294	-25	-2	4,187	31	8,171	61 (N/A)	17.4	14.6	5.11
Norway maple	3,977	30	-281	-22	-2	3,825	29	7,499	56 (N/A)	13.0	13.4	6.25
Green ash	7,523	56	-709	-32	-6	4,944	37	11,727	88 (N/A)	13.0	21.0	9.77
Northern white cedar	484	4	-14	-10	0	877	7	1,337	10 (N/A)	11.6	2.4	1.25
Blue spruce	696	5	-48	-14	0	1,423	11	2,055	15 (N/A)	10.1	3.7	2.20
Apple	1,128	8	-98	-11	-1	1,411	11	2,429	18 (N/A)	7.2	4.4	3.64
Black walnut	4,593	34	-525	-20	-4	3,055	23	7,102	53 (N/A)	7.2	12.7	10.65
Silver maple	4,330	32	-289	-11	-2	1,749	13	5,780	43 (N/A)	4.3	10.4	14.45
Cottonwood	1,872	14	-313	-9	-2	1,384	10	2,934	22 (N/A)	2.9	5.3	11.00
American elm	332	2	-19	-3	0	555	4	865	6 (N/A)	2.9	1.6	3.24
Birch	940	7	-76	-5	-1	880	7	1,738	13 (N/A)	2.9	3.1	6.52
Black poplar	958	7	-537	-12	-4	1,626	12	2,034	15 (N/A)	2.9	3.6	7.63
Littleleaf linden	1,118	8	-73	-4	-1	478	4	1,519	11 (N/A)	1.4	2.7	11.39
Plum	114	1	-4	-1	0	124	1	232	2 (N/A)	1.4	0.4	1.74
Willow	224	2	-5	-1	0	176	1	393	3 (N/A)	1.4	0.7	2.95
Citywide total	32,591	244	-3,287	-181	-26	26,694	200	55,817	419 (N/A)	100.0	100.0	6.07

Table 6: Annual Social and Aesthetic Benefits

Ventura

Annual Aesthetic/Other Benefits of Public Trees

2/8/2022

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Ash	426	(N/A)	17.4	14.8	35.50
Norway maple	376	(N/A)	13.0	13.1	41.75
Green ash	577	(N/A)	13.0	20.1	64.06
Northern white cedar	140	(N/A)	11.6	4.9	17.53
Blue spruce	162	(N/A)	10.1	5.6	23.13
Apple	66	(N/A)	7.2	2.3	13.23
Black walnut	331	(N/A)	7.2	11.5	66.20
Silver maple	331	(N/A)	4.3	11.5	110.38
Cottonwood	125	(N/A)	2.9	4.3	62.47
American elm	57	(N/A)	2.9	2.0	28.34
Birch	86	(N/A)	2.9	3.0	43.05
Black poplar	57	(N/A)	2.9	2.0	28.57
Littleleaf linden	106	(N/A)	1.4	3.7	106.03
Plum	6	(N/A)	1.4	0.2	6.40
Willow	26	(N/A)	1.4	0.9	26.22
Citywide total	2,872	(N/A)	100.0	100.0	41.63

Table 7: Summary of Benefits in Dollars

Ventura

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

2/8/2022

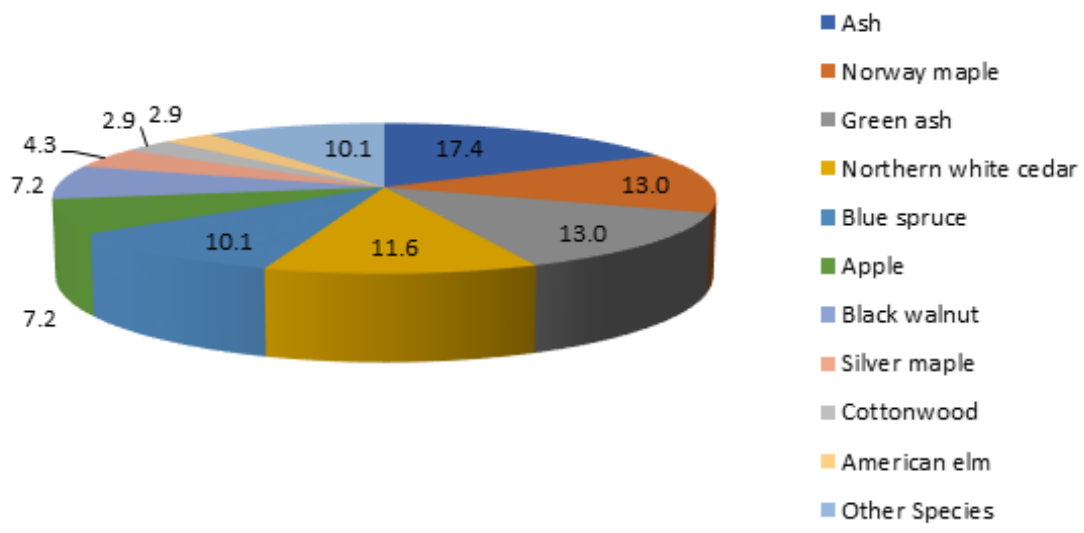
Benefits	Total ($)	Standard Error	$/tree	Standard Error	$/capita	Standard Error
Energy	3,399	(N/A)	49.27	(N/A)	0.00	(N/A)
CO2	419	(N/A)	6.07	(N/A)	0.00	(N/A)
Air Quality	593	(N/A)	8.60	(N/A)	0.00	(N/A)
Stormwater	4,737	(N/A)	68.66	(N/A)	0.00	(N/A)
Aesthetic/Other	2,872	(N/A)	41.63	(N/A)	0.00	(N/A)
Total Benefits	12,021	(N/A)	174.22	(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	12,021	(N/A)	174.22	(N/A)	0.00	(N/A)
Benefit-cost ratio	0.00	(N/A)				

Figure 1: Species Distribution

Ventura

Species Distribution of Public Trees

2/8/2022



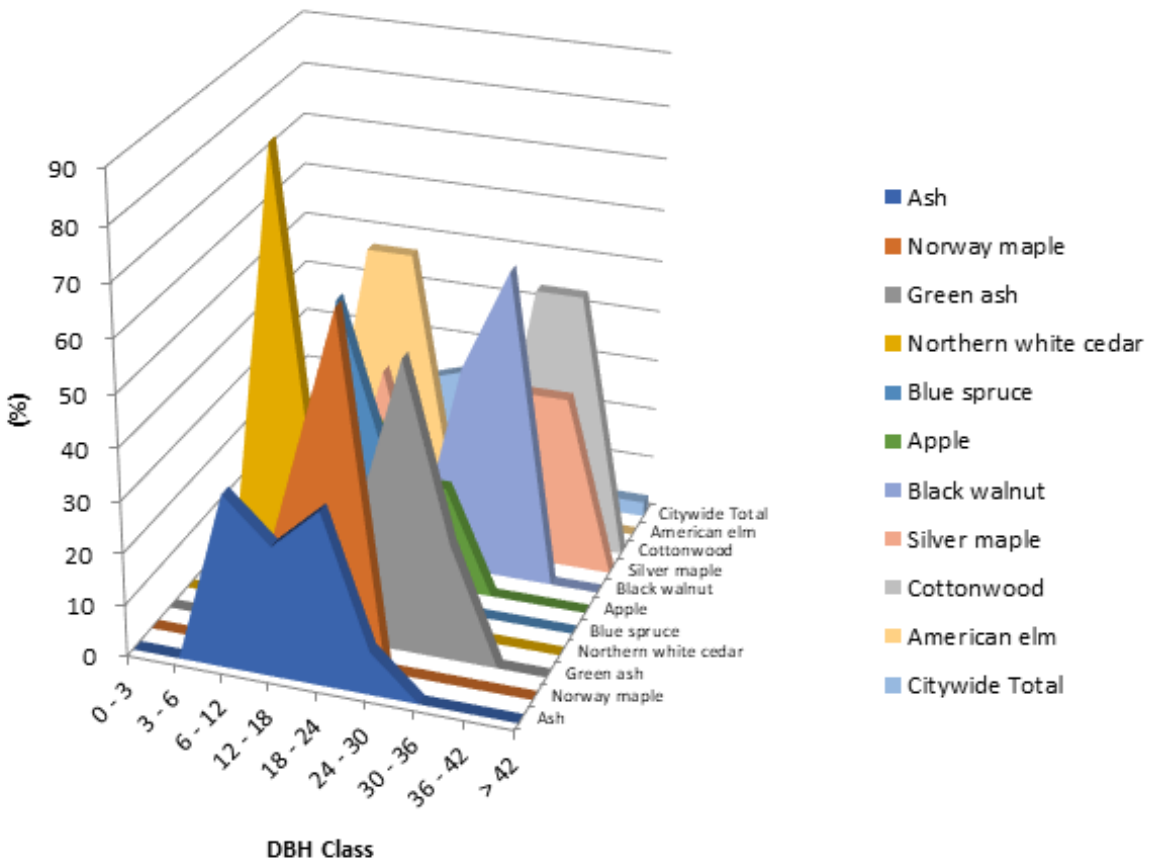
Species	Percent
Ash	17.4
Norway maple	13.0
Green ash	13.0
Northern white cedar	11.6
Blue spruce	10.1
Apple	7.2
Black walnut	7.2
Silver maple	4.3
Cottonwood	2.9
American elm	2.9
Other Species	10.1
Total	100.0

Figure 2: Relative Age Class

Ventura

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

2/8/2022



	DBH class (in)								
Species	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	> 42
Ash	0.00	0.00	33.33	25.00	33.33	8.33	0.00	0.00	0.00
Norway maple	0.00	0.00	0.00	33.33	66.67	0.00	0.00	0.00	0.00
Green ash	0.00	0.00	0.00	0.00	22.22	55.56	22.22	0.00	0.00
Northern white cedar	0.00	0.00	87.50	12.50	0.00	0.00	0.00	0.00	0.00
Blue spruce	0.00	0.00	14.29	57.14	28.57	0.00	0.00	0.00	0.00
Apple	0.00	0.00	20.00	40.00	20.00	20.00	0.00	0.00	0.00
Black walnut	0.00	0.00	0.00	0.00	0.00	40.00	60.00	0.00	0.00
Silver maple	0.00	0.00	0.00	33.33	0.00	0.00	33.33	33.33	0.00
Cottonwood	0.00	0.00	0.00	0.00	0.00	0.00	50.00	50.00	0.00
American elm	0.00	0.00	50.00	50.00	0.00	0.00	0.00	0.00	0.00
Citywide Total	0.00	0.00	23.19	21.74	24.64	14.49	10.14	2.90	2.90

Figure 3: Foliage Condition

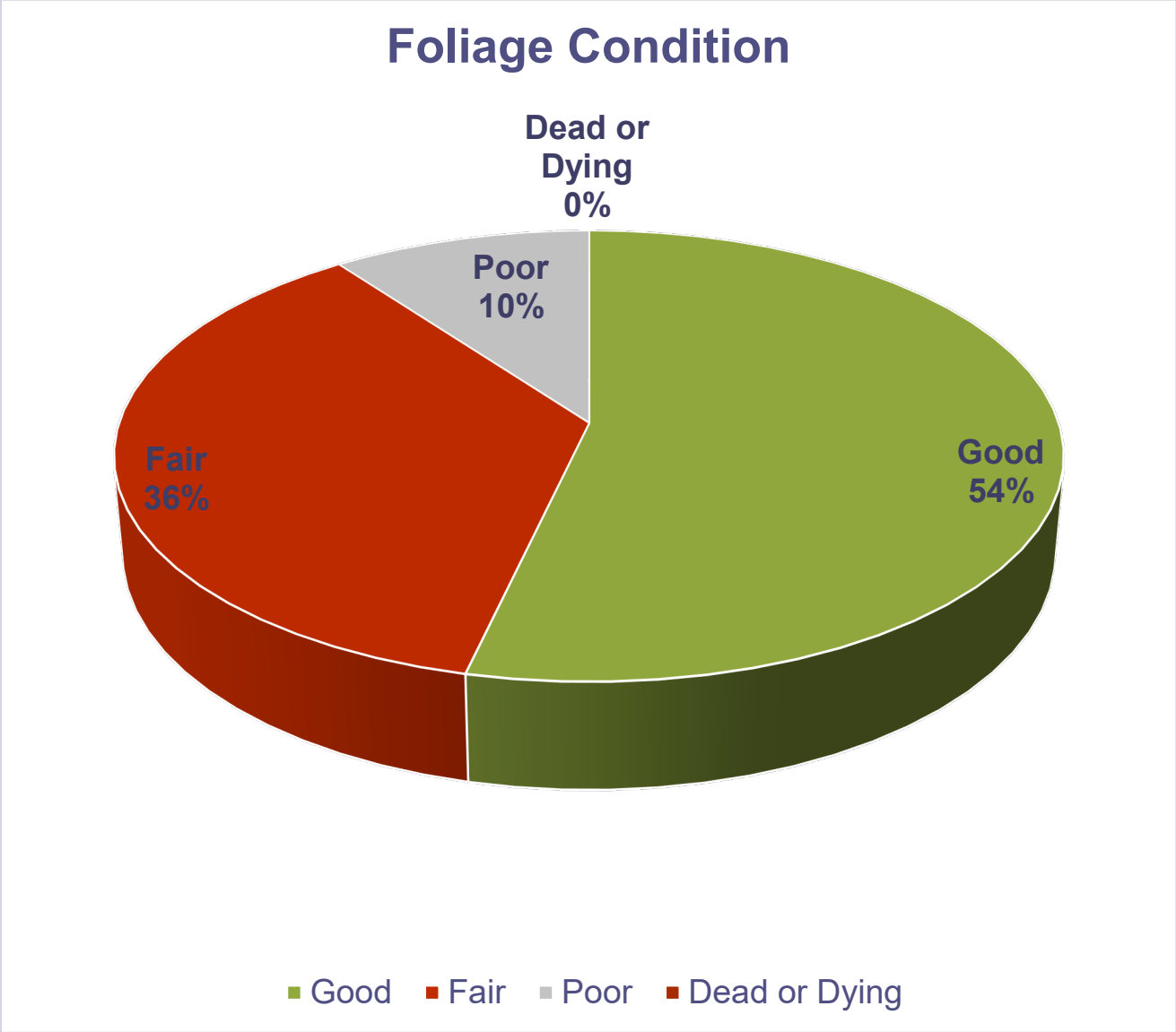


Figure 4: Wood Condition

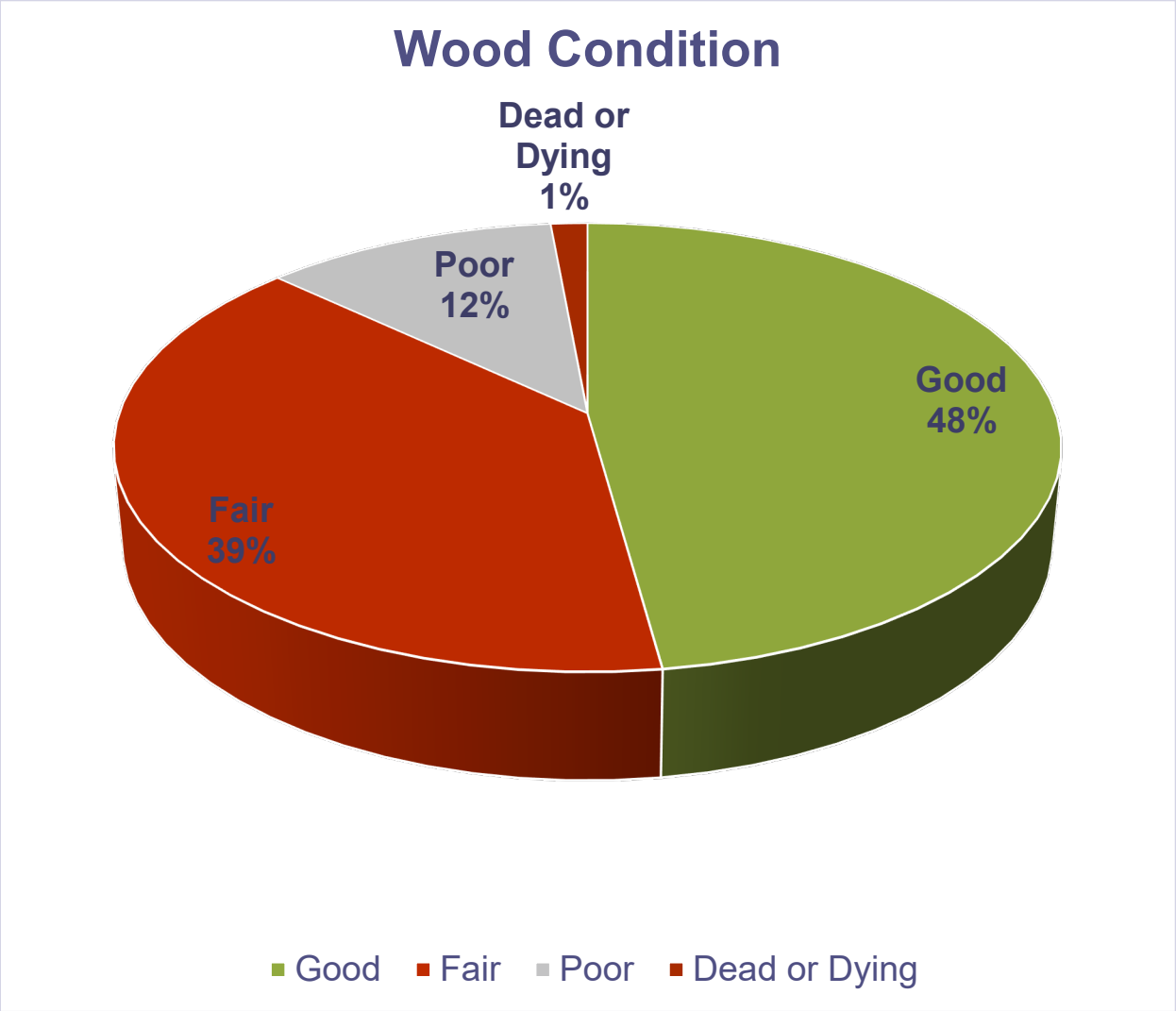
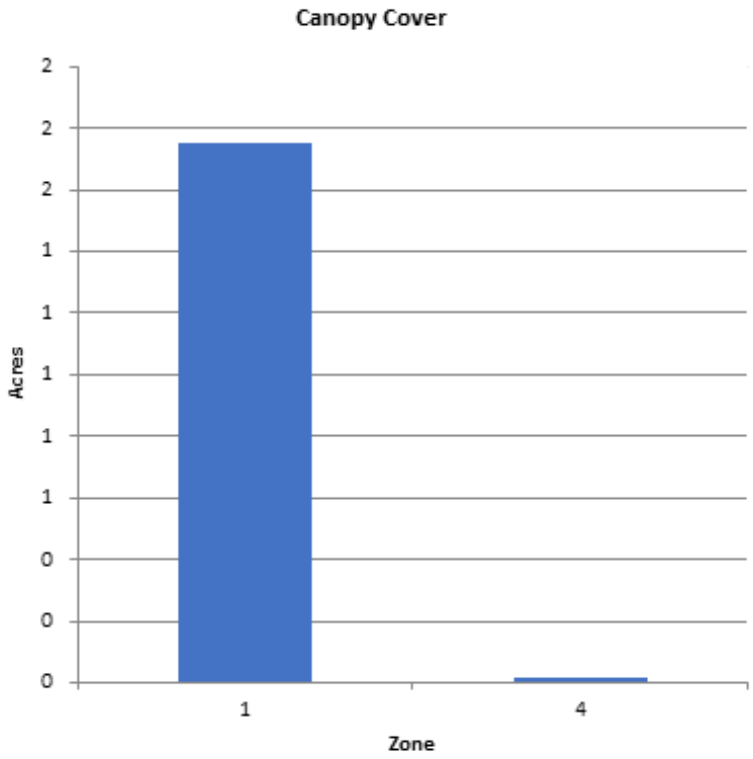


Figure 5: Canopy Cover in Acres

Ventura

Canopy Cover of Public Trees (Acres)

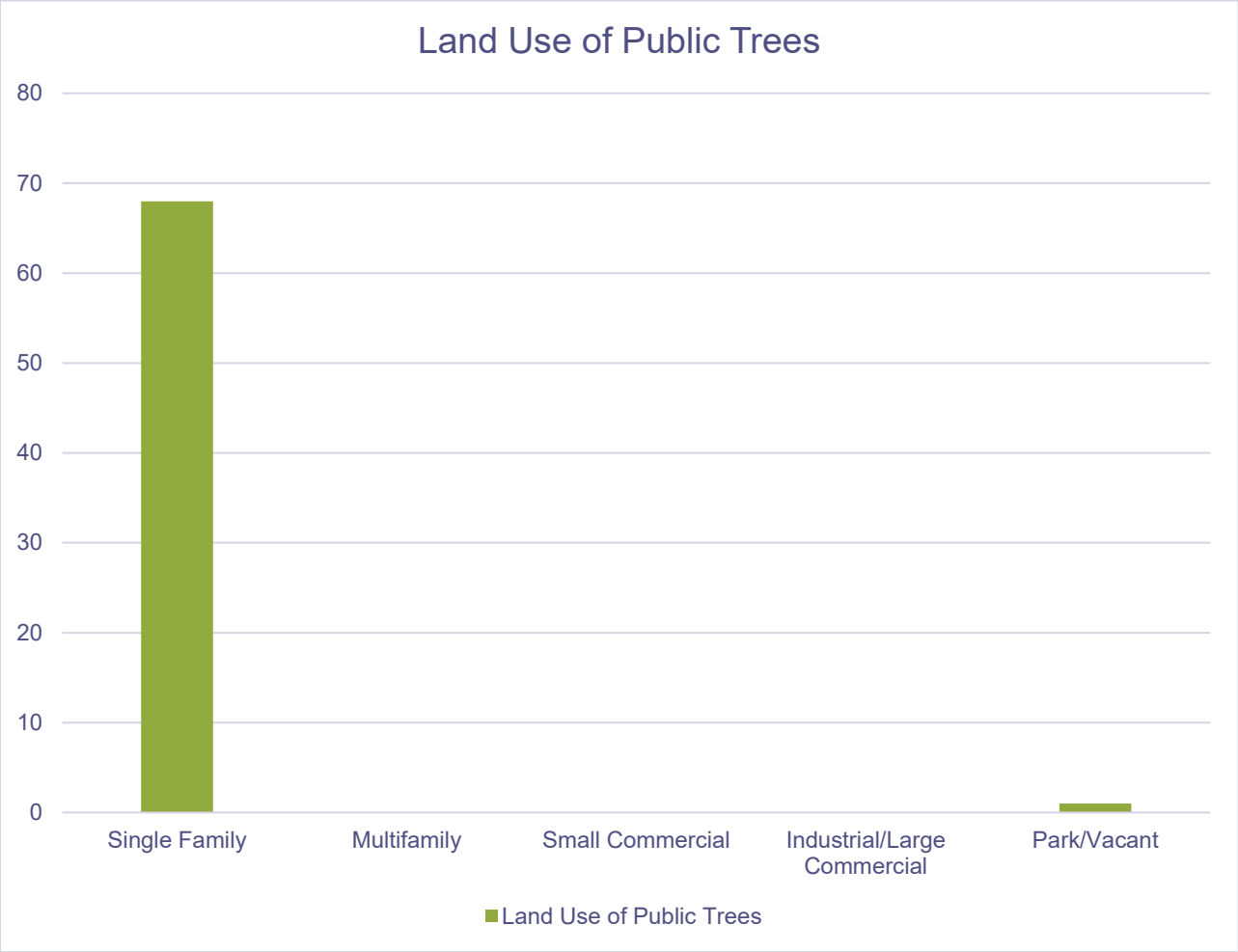
2/8/2022



Zone	Acres	% of Total Canopy Cover
1	2	99.0
4	0	1.0
Citywide total	2	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	2	0.00	0.00

Figure 6: Land Use of City/Park Trees



APPENDIX B: ArcGIS MAPPING

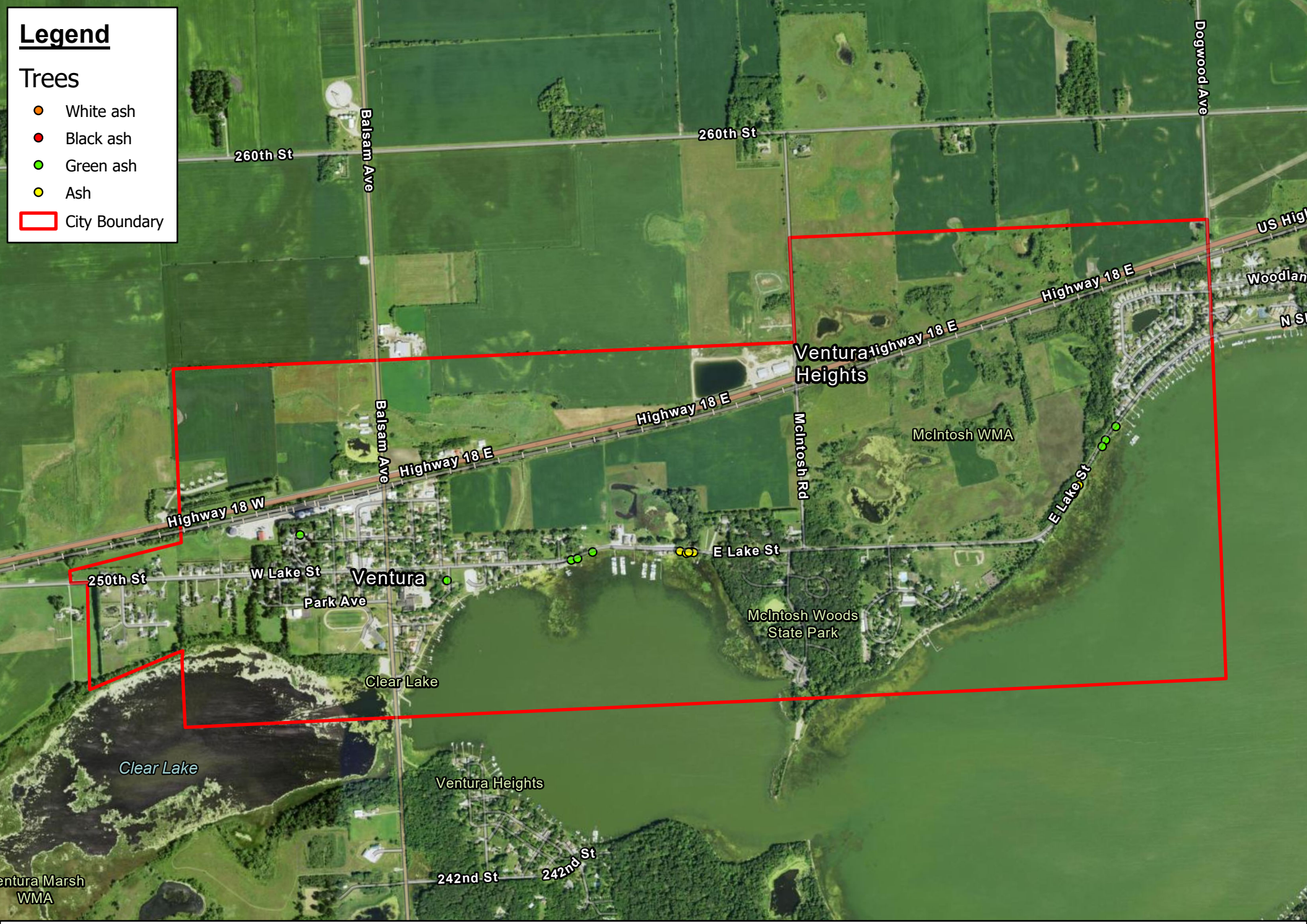
Figure 1: Location of Ash Trees

Figure 2: Location of EAB Symptoms

Figure 3: Location of Poor Condition Trees

Figure 4: Location of Trees with Recommended Maintenance

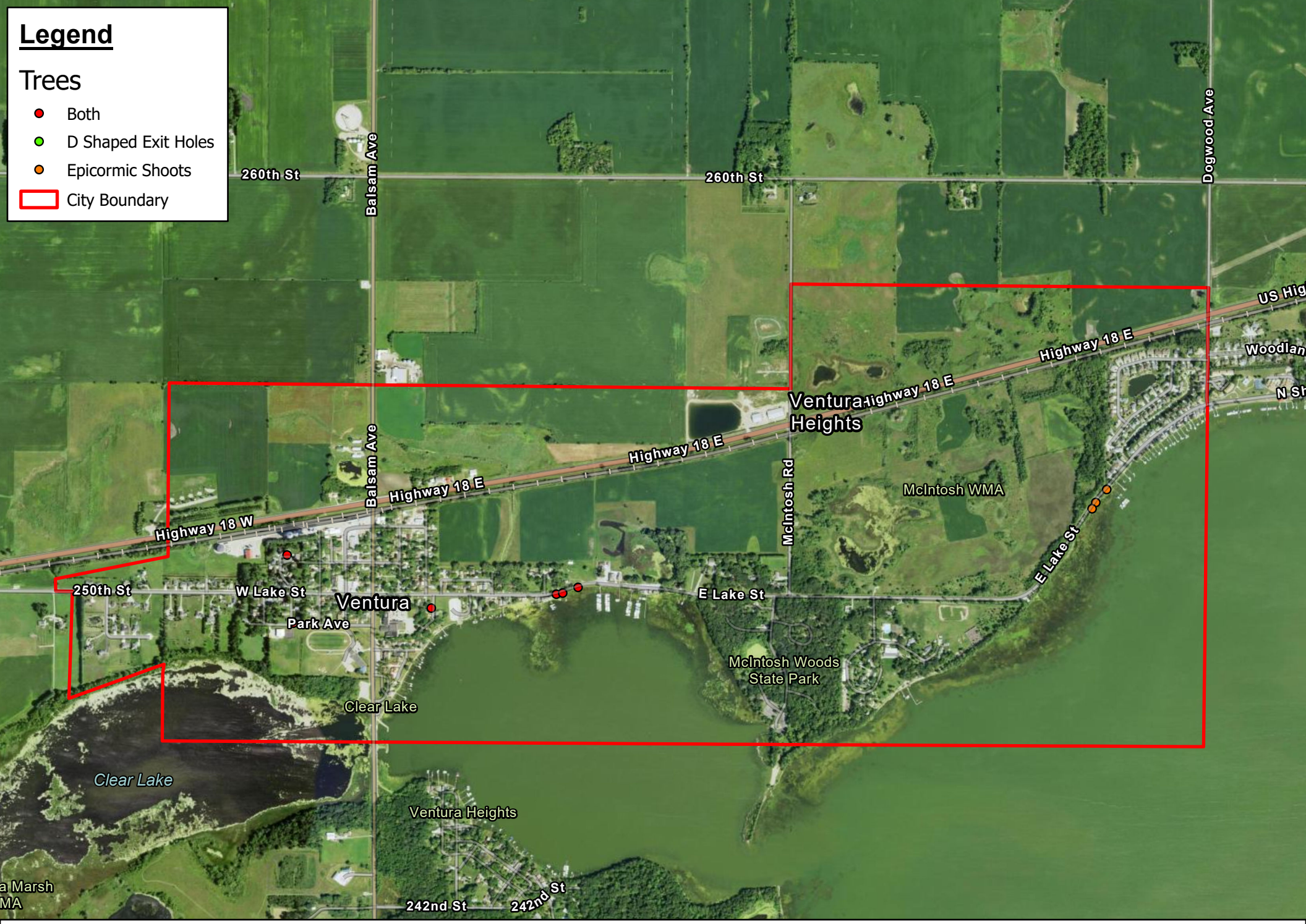
City ownership of the trees recommended for removal should be verified prior to any removal



Ash Tree Location

0 5001,000 2,000 Feet

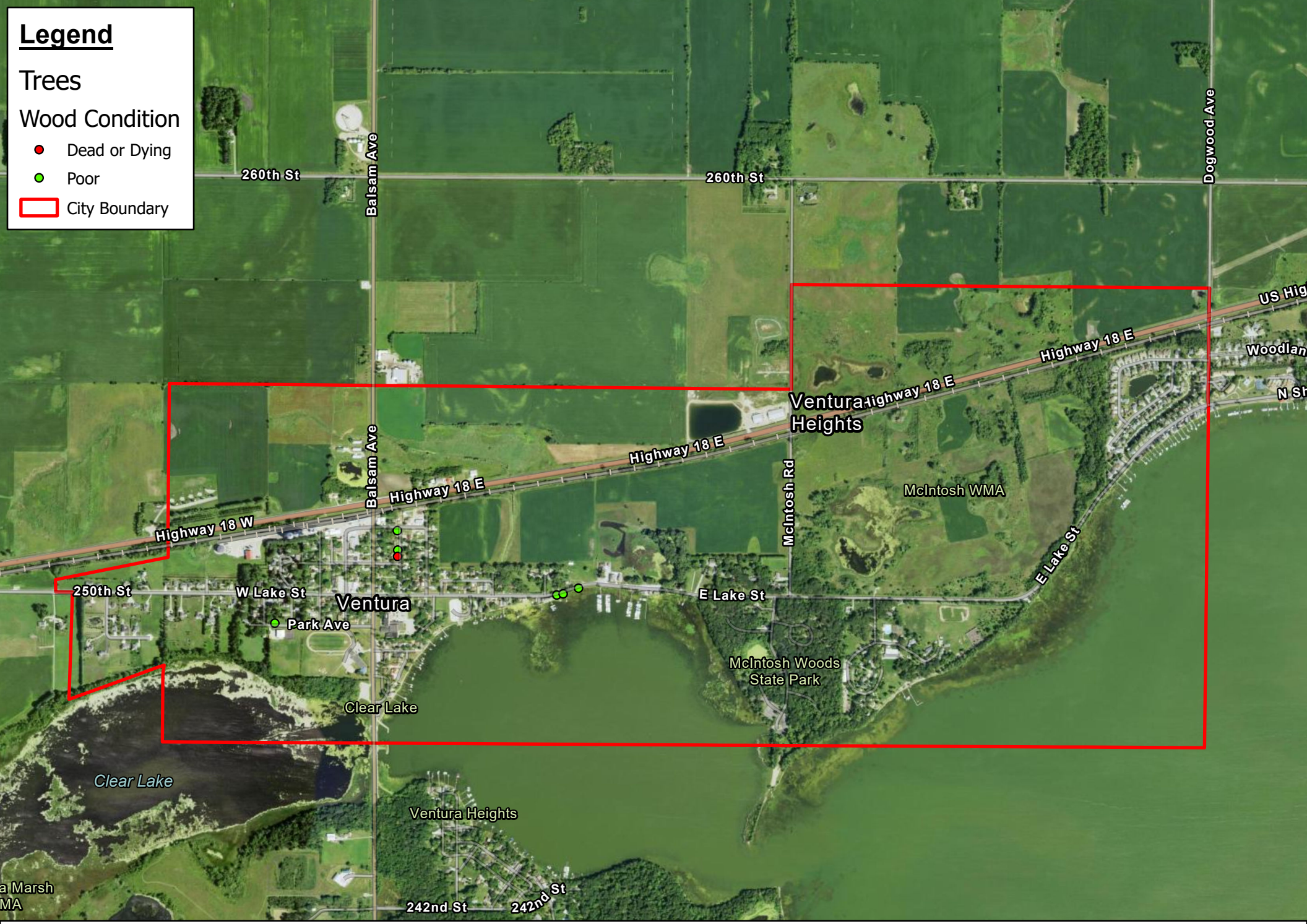
N



EAB Signs/Symptoms

0 5001,000 2,000 Feet

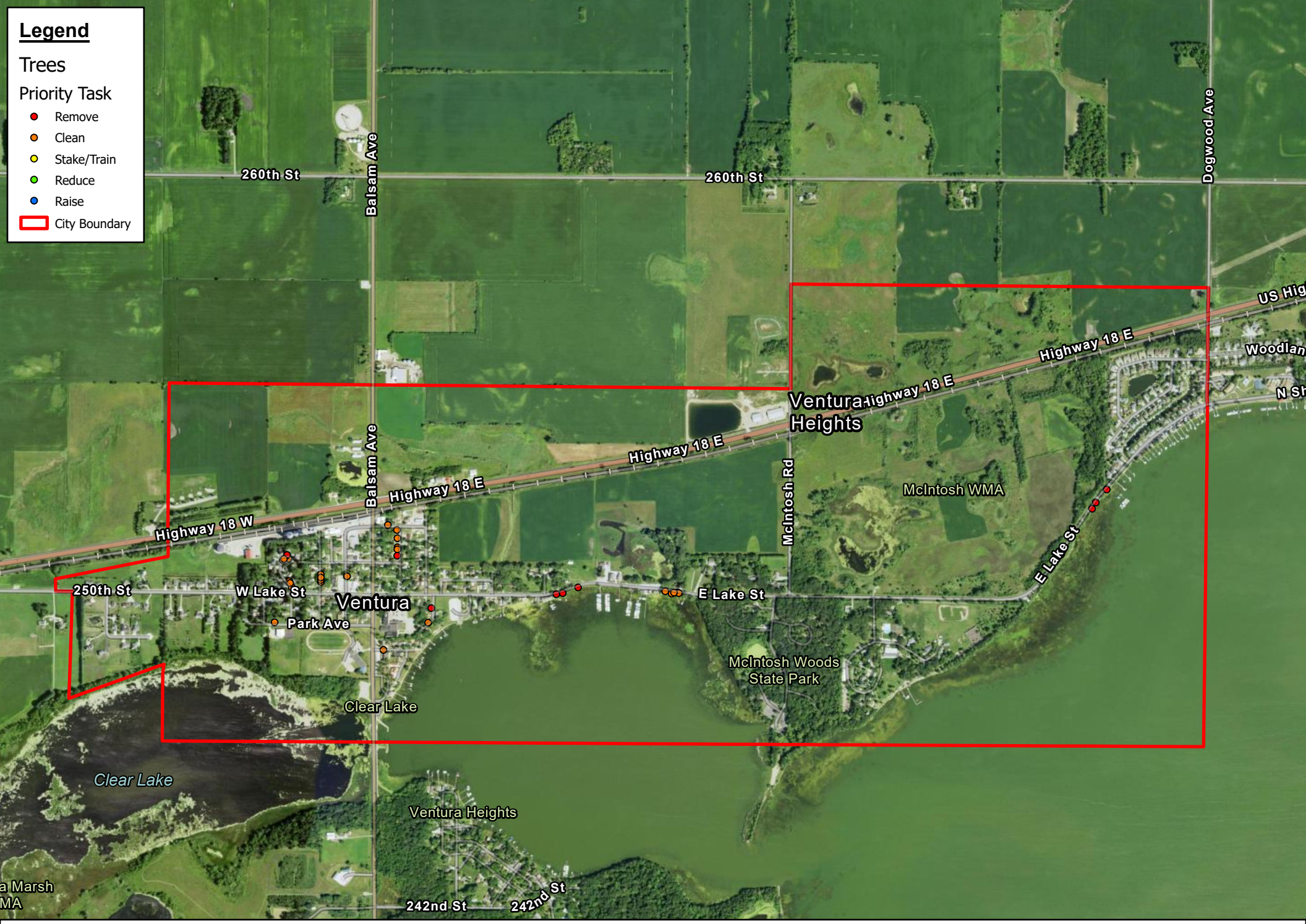
N



Poor Condition Trees

0 5001,000 2,000 Feet

N



Priority Task

0 5001,000 2,000 Feet

N

APPENDIX C: VENTURA TREE ORDINANCES

151.01 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.

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

1. "Director" means the Public Works Director of the City or such other person as may be designated by the Council.

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

151.03 PLANTING RESTRICTIONS.
No tree shall be planted in any street or parking except with Council approval.

151.04 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 10 feet above the surface of the street and 10 feet above the sidewalks.

151.05 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 said owner to do so within five days. If the owner 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.

151.06 TRIMMING TREES TO BE SUPERVISED.
It is unlawful for any person to trim or cut any tree in a street or public place unless the work is done under the supervision of the City.

151.07 REMOVAL OF TREES.
The Director 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. The Director 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.

1. All trees within the public right-of-way are the property of the City. Removal of any City tree without written approval of the Council is strictly forbidden and is a violation of this chapter. In addition to penalties as specified in Chapter 4 of this Code of Ordinances, violators shall be responsible for damages and the cost of replacing the removed tree.

2. Authorization to remove City trees may be obtained by first submitting a completed application to the Council. Applications may be obtained from the Clerk. Upon inspection by the Council or its representatives, authorization may be granted for the following reasons:

A. The tree created a safety hazard.

B. The tree is dead or diseased.

C. The tree is designated a nuisance or undesirable species that provides fruit, sap or pods, etc.