

ALBURNETT, IA



2012 Management Plan

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In Partnership with the Bureau of Forestry, Iowa DNR



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Executive Summary

Overview

This plan was developed to assist the City of Alburnett 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 serious threats posed by forest pests such as 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 (this does not include mountain ash). There is a strong possibility that 5.2% of Alburnett's city owned trees (ash) will die once EAB becomes established in the community. 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 2012, 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 58 trees inventoried.

- Alburnett's trees provide \$8,121.00 of benefits annually, an average of \$140 a tree
- There are over 14 species of trees
- The top three genus are: Maple 43.1%, White Pine 12.1%, and Oak 12.1%
- 37.9% of trees are in need of some type of management
- 2 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 2 trees needing removal, 2 trees are over 12-18 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*](#)
- 1 of the 3 ash trees are in need of follow up because they are displaying signs and symptoms associated with EAB
- 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 with a visual survey yearly
- With the current budget it could take 24 years to remove ash – Suggestion: request a budget increase to \$10,000 annually and apply for grants to plant replacement trees

Introduction

This plan was developed to assist Alburnett with the management, budgeting and future planning of their urban forest. Across the state, forestry budgets continue to decrease with more and more of that money spent on 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 and replacement planting. With proper planning and management of the current canopy in Alburnett, these costs can be extended over years and public safety issues from dead and dying ash trees mitigated.

Trees are an important component of Alburnett'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 Alburnett 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 Alburnett's urban forestry goals.

Inventory

In 2012, a tree inventory was conducted that included 100% of the city owned 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 of 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 58 city trees was entered into the USDA Forest service program Street Tree Resource Analysis Tool for Urban forestry Management (STRATUM), part of the i-Tree suite. The following are results from the i-Tree STRATUM analysis. Findings

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Alburnett's trees reduce energy related costs by approximately \$2,294 annually (Appendix A, Table 1). These savings are both in Electricity (11.1 MWh) and in Natural Gas (1,477.4 Therms).

Annual Stormwater Benefits

Alburnett's trees intercept about 100,700 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides \$2,729 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 Alburnett's it is estimated that trees remove 133.3 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 \$370.00 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Alburnett's, trees sequester about 279,253 lbs of carbon a year with an associated value of \$2,094 (Appendix A, Table 4). In addition, the trees store 41,045 lbs of carbon, with a yearly benefit of \$308.00 (Appendix A, Table 5).

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. Alburnett receives \$2,421.00 in annual social benefits from trees (Appendix A, Table 6).

Financial Summary of all Benefits

According to the USDA Forest Service i-Tree STRATUM analysis, Alburnett's trees provide \$8,121.00 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 58 trees in Alburnett provide approximately \$140.00 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Alburnett has over 10 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genus is as follows:

Maple Silver	15	25.9%
Ash	4	5.2%
Oak	8	12.1%
Walnut	2	3.4%
Black Cherry	4	8.6%

Pine	7	12.1%
Norway Maple	5	8.6%
Red Maple	5	8.6%
Eastern Red Bud	2	3.4%
Mulberry	2	3.4%
Other Species	4	8.6%

Age Class

Most of Alburnett’s trees (6.9%) are between 6 and 18 inches in diameter at 4.5 ft (Appendix A, Figure 2). For age, a Bell Curve is preferred and shows the highest amount of trees around 18 inches in diameter at 4.5 ft. Alburnett’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 Alburnett indicate that 62% of the trees are in good health, with only 7% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 83% of Alburnett’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 10% of the population. This 10% is an estimate of trees that need management follow up.

Management Needs

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

Crown Cleaning	38	44.7%
Crown Raising	1	1.17%
Tree Staking	0	0%
Tree Removal	2	2.35%
Crown Reduction	0	0%

Canopy Cover

The canopy cover of Alburnett is approximately 1 acres (Appendix A, Figure 4). According to the 2010 census, Alburnett occupies 524.8 acre. Thus the canopy cover on city land is about 0.2%.

Land Use and Location

The majority of Alburnett’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	38%
Park/vacant/other	62%
Industrial/Large commercial	0%
Small commercial	0%
Multifamily residential	0%

Location

Planting strip	83%
Other maintained locations	0%
Cutout (surrounded by pavement)	0%
Front yard	17%

Recommendations

Risk Management

Hazardous 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.

Hazardous trees

Alburnett has 2 critical concern trees that need immediate removal. These trees can be seen on the Location of Trees with Recommended Maintenance map (Appendix B, Figure 4). It is recommended to start with the large diameter critical concern trees first. There are 2 trees over 24 inches in diameter at 4.5 ft that should be addressed immediately. Please refer to the six year maintenance plan 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 that do not include trimming. There are a total of 38 trees with these needs.

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 2 removals, 1 is an ash trees. There are a total of 3 ash trees, and 1 of those have signs and symptoms that have been associated with EAB. In addition, there are 4 trees that are in poor health. [*City ownership of the trees recommended for removal should be verified prior to any removal*](#)

Pruning Cycle

Proper pruning can extend the life and good health of trees, as well as reduce public safety issues. In the Management Needs section of the Findings there are four main maintenance issues to be addressed: routine pruning, crown cleaning, crown raising, and crown reduction. Crown cleaning removes dead, diseased, and damaged limbs. Crown raising 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. Please refer to the six year maintenance plan for further information.

Planting

Most of the planting over the next 5 years will replace the trees that are 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 Alburnett.

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 (45%) (Appendix A, Figure 1). Maples should not be planted until this percentage can be lowered. Also, ash trees have not been recommended since 2002, due to the threat of EAB. Other species to avoid because they are public nuisances include: cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut, as outlined in chapter 25 of the city ordinance (Appendix C). All trees planted must meet the restrictions in city ordinance chapter 25 (Appendix C).

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 death and for the following signs and symptoms: canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

Six Year Maintenance Plan with No Additional Funding

Year 1

Removal: 2 largest critical concern trees
Planting and Replacement: 2 trees to be planted in open locations
Visual Survey for signs and symptoms of EAB

Year 2

Removal: 4 additional with poor health
Planting and Replacement: 4 trees in open locations from year one removals
Routine trimming: Contract to trim 1/3 of the city trees
Visual Survey for signs and symptoms of EAB

Year 3

Removal: removal of any new critical concern trees and ash in poor health
Planting and Replacement: 4 trees to be planted in open locations and locations from previous removals
Visual Survey for signs and symptoms of EAB

Year 4

Removal: removal of any new critical concern trees and ash in poor health
Planting and Replacement: 2 trees in open locations from previous removals
Routine trimming: Contract to trim 1/3 of the city trees
Visual Survey for signs and symptoms of EAB

Year 5

Removal: removal of any new critical concern trees and ash in poor health
Planting and Replacement: 4 trees to be planted in open locations and locations from previous removals
Visual Survey for signs and symptoms of EAB

Year 6

Removal: removal of any new critical concern trees and ash in poor health
Planting and Replacement: 2 trees in open locations from previous removals
Routine trimming: Contract to trim 1/3 of the city trees
Visual Survey for signs and symptoms of EAB

*Reduction of ash over 6 years: Approximately 30 to 38 ash trees removed (approximately 25% of ash). It will take approximately 24 years to remove all ash with the current budget. EAB could potentially kill all ash within 4 years of its arrival.

** To remove all ash trees within 6 years, the budget would need to be increased to \$19,500 a year. If the budget were increased to \$10,000 a year all ash could be removed in 13 years.

Emerald Ash Borer Plan

Ash Tree Removal

Tree removal will be prioritized with dead, dying, hazardous 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*

EAB Quarantines

EAB is an extremely destructive plant pest and it is responsible for the death and decline of over 25 million 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 disposed of as you normally would if your county is not part of a quarantine.

Canopy Replacement

As budget permits, all removed ash trees will be replaced. All trees will meet the restrictions in city ordinance chapter 25 (Appendix C).

Postponed Work

While finances, staffing and equipment are focused on the management of ash, usual services may be delayed. Tree removal requests on genus 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. City Code chapter 25 states: “The Council shall inspect or cause to be inspected any trees or shrubs in the City reported or suspected to be dead, diseased or damaged, and such trees and shrubs shall be subject to the following:

(1) If it is determined that any such condition exists on any public property, including the strip between the curb and the lot line of private property, the Council may cause such condition to be corrected by treatment or removal. The Council may also order the removal of any trees on the streets of the City which interfere with the making of improvements or with travel thereon.

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

Budget

Current Budget

Total \$6,708 over 6 years (\$1,118/year)

FY 2013 Budget

Removal: \$1,000.00

Planting: \$100.00 (\$100.00 additional needed)

Watering & Maintenance: (\$500 additional needed)

Insect and Disease control (\$400.00 additional needed)

FY 2014 Budget

Removal: \$1,000.00 (\$1000.00 additional needed)

Planting: \$100.00 (\$300.00 additional needed)

Routine trimming: \$18.00 (60.00 additional needed)

Watering & Maintenance: (\$500 additional needed)

FY 2015 Budget

Removal: \$500.00

Planting: \$400.00

Watering & Maintenance: \$218.00 (282.00 additional needed)

Insect and Disease control (\$400.00 additional needed)

FY 2016 Budget

Removal: \$500.00

Planting: \$200.00

Routine trimming: \$78.00

Watering & Maintenance: \$160.00 (\$340.00 additional needed)

FY 2017 Budget

Removal: \$500.00

Planting: \$400.00

Watering & Maintenance: \$218.00 (\$282.00 additional needed)

Insect and Disease control (\$400.00 additional needed)

FY 2018 Budget

Removal: \$500.00

Planting: \$200.00

Watering & Maintenance: \$400.00

Routine trimming: \$18.00 (\$60.00 additional needed)

Purposed Budget Increase

EAB could potentially kill all ash trees in Alburnett within 4 years of its arrival. To remove all ash trees within 6 years the budget would need to be increased to \$1,000 a year. If the budget were increased to \$10,000 a year all ash could be removed within 13 years. Additionally, it is recommended that Alburnett 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.

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Alburnett

Annual Energy Benefits of Public Trees by Species

11/11/2012

Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	3.6	276	449.6	441	716	(N/A)	25.9	31.2	47.75
Eastern white pine	1.0	74	122.8	120	194	(N/A)	12.1	8.5	27.76
Swamp white oak	1.6	118	223.4	219	337	(N/A)	12.1	14.7	48.18
Norway maple	1.1	86	152.7	150	236	(N/A)	8.6	10.3	47.13
Red maple	0.8	64	100.6	99	163	(N/A)	8.6	7.1	32.51
Black cherry	1.0	72	137.2	135	207	(N/A)	8.6	9.0	41.33
Green ash	0.9	67	118.8	116	184	(N/A)	5.2	8.0	61.19
Eastern redbud	0.0	1	1.2	1	2	(N/A)	3.5	0.1	0.87
Black walnut	0.5	40	76.2	75	115	(N/A)	3.5	5.0	57.32
Mulberry	0.3	21	44.5	44	64	(N/A)	3.5	2.8	32.17
Callery pear	0.0	1	1.6	2	2	(N/A)	3.5	0.1	1.10
Sugar maple	0.3	24	44.2	43	68	(N/A)	1.7	2.9	67.52
River birch	0.0	0	0.8	1	1	(N/A)	1.7	0.1	1.10
White oak	0.0	2	3.7	4	6	(N/A)	1.7	0.3	5.82
Other street trees	0.0	0	0.0	0	0	(N/A)	0.0	0.0	0.00
Citywide total	11.1	846	1,477.4	1,448	2,294	(N/A)	100.0	100.0	39.54

Table 2: Annual Stormwater Benefits

Alburnett

Annual Stormwater Benefits of Public Trees by Species

11/11/2012

Species	Total rainfall interception (Gal)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	33,117	898	(N/A)	25.9	32.9	59.84
Eastern white pine	16,491	447	(N/A)	12.1	16.4	63.85
Swamp white oak	12,897	350	(N/A)	12.1	12.8	49.93
Norway maple	8,577	232	(N/A)	8.6	8.5	46.49
Red maple	5,086	138	(N/A)	8.6	5.1	27.57
Black cherry	4,347	118	(N/A)	8.6	4.3	23.56
Green ash	9,546	259	(N/A)	5.2	9.5	86.24
Eastern redbud	15	0	(N/A)	3.5	0.0	0.20
Black walnut	5,181	140	(N/A)	3.5	5.1	70.21
Mulberry	1,438	39	(N/A)	3.5	1.4	19.49
Callery pear	24	1	(N/A)	3.5	0.0	0.33
Sugar maple	3,795	103	(N/A)	1.7	3.8	102.87
River birch	12	0	(N/A)	1.7	0.0	0.33
White oak	172	5	(N/A)	1.7	0.2	4.65
Other street trees	0	0	(N/A)	0.0	0.0	0.00
Citywide total	100,700	2,729	(N/A)	100.0	100.0	47.05

Table 3: Annual Air Quality Benefits

Alburnett

Annual Air Quality Benefits of Public Trees by Species

11/11/2012

Species	Deposition (lb)				Total Depos. (\$)	Avoided (lb)				Total Avoided (\$)	BVOC Emissions (lb)	BVOC Emissions (\$)	Total (lb)	Total (\$)	Standard Error	% of Total Trees	Avg. \$/tree
	O ₃	NO ₂	PM ₁₀	SO ₂		NO ₂	PM ₁₀	VOC	SO ₂								
Silver maple	3.8	0.6	2.1	0.2	21	16.9	2.5	2.4	16.4	106	-2.5	-10	42.4	118 (N/A)	25.9	7.86	
Eastern white pine	1.9	0.4	1.6	0.2	12	4.5	0.7	0.6	4.4	29	-7.1	-27	7.2	14 (N/A)	12.1	2.03	
Swamp white oak	2.4	0.4	1.2	0.1	13	7.5	1.1	1.0	7.1	47	-0.6	-2	20.3	58 (N/A)	12.1	8.24	
Norway maple	1.6	0.3	0.8	0.1	9	5.4	0.8	0.8	5.1	34	-0.4	-1	14.4	41 (N/A)	8.6	8.16	
Red maple	1.0	0.2	0.5	0.0	5	3.9	0.6	0.6	3.8	25	-0.4	-1	10.1	28 (N/A)	8.6	5.70	
Black cherry	1.5	0.2	0.7	0.1	8	4.6	0.7	0.6	4.3	29	0.0	0	12.7	36 (N/A)	8.6	7.27	
Green ash	1.2	0.2	0.6	0.1	6	4.2	0.6	0.6	4.0	26	0.0	0	11.4	32 (N/A)	5.2	10.82	
Eastern redbud	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.1	0 (N/A)	3.4	0.11	
Black walnut	0.5	0.1	0.3	0.0	3	2.5	0.4	0.4	2.4	16	0.0	0	6.6	19 (N/A)	3.4	9.34	
Mulberry	0.5	0.1	0.2	0.0	3	1.4	0.2	0.2	1.2	8	0.0	0	3.8	11 (N/A)	3.4	5.45	
Callery pear	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.1	0 (N/A)	3.4	0.14	
Sugar maple	0.5	0.1	0.2	0.0	3	1.5	0.2	0.2	1.4	9	-0.4	-1	3.9	11 (N/A)	1.7	10.75	
River birch	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0 (N/A)	1.7	0.14	
White oak	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	0.0	0	0.3	1 (N/A)	1.7	0.87	
Other street trees	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0 (N/A)	0.0	0.00	
Citywide total	14.8	2.6	8.2	0.8	83	52.8	7.7	7.4	50.5	330	-11.4	-43	133.3	370 (N/A)	100.0	6.38	

Table 4: Annual Carbon Stored

Alburnett

Stored CO₂ Benefits of Public Trees by Species

11/11/2012

Species	Total Stored CO ₂ (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	85,782	643	(N/A)	25.9	30.7	42.89
Eastern white pine	16,882	127	(N/A)	12.1	6.1	18.09
Swamp white oak	39,248	294	(N/A)	12.1	14.1	42.05
Norway maple	26,253	197	(N/A)	8.6	9.4	39.38
Red maple	11,309	85	(N/A)	8.6	4.1	16.96
Black cherry	22,597	169	(N/A)	8.6	8.1	33.90
Green ash	38,073	286	(N/A)	5.2	13.6	95.18
Eastern redbud	28	0	(N/A)	3.5	0.0	0.10
Black walnut	16,915	127	(N/A)	3.5	6.1	63.43
Mulberry	7,651	57	(N/A)	3.5	2.7	28.69
Callery pear	34	0	(N/A)	3.5	0.0	0.13
Sugar maple	14,280	107	(N/A)	1.7	5.1	107.10
River birch	17	0	(N/A)	1.7	0.0	0.13
White oak	185	1	(N/A)	1.7	0.1	1.39
Other street trees	0	0	(N/A)	0.0	0.0	0.00
Citywide total	279,253	2,094	(N/A)	100.0	100.0	36.11

Table 5: Annual Carbon Sequestered

Alburnett

Annual CO₂ Benefits of Public Trees by Species

11/11/2012

Species	Sequestered (lb)	Sequestered (\$)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released (\$)	Avoided (lb)	Avoided (\$)	Net Total (lb)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	9,983	75	-412	-3	-3	6,090	46	15,659	117	(N/A)	25.9	38.2	7.83
Eastern white pine	1,096	8	-81	-1	-1	1,635	12	2,649	20	(N/A)	12.1	6.5	2.84
Swamp white oak	2,747	21	-188	-1	-1	2,615	20	5,172	39	(N/A)	12.1	12.6	5.54
Norway maple	1,752	13	-126	-1	-1	1,899	14	3,524	26	(N/A)	8.6	8.6	5.29
Red maple	1,527	11	-54	-1	0	1,413	11	2,885	22	(N/A)	8.6	7.0	4.33
Black cherry	1,760	13	-108	-1	-1	1,595	12	3,245	24	(N/A)	8.6	7.9	4.87
Green ash	2,065	15	-183	-1	-1	1,484	11	3,366	25	(N/A)	5.2	8.2	8.41
Eastern redbud	17	0	0	0	0	11	0	28	0	(N/A)	3.5	0.1	0.11
Black walnut	1,319	10	-81	0	-1	883	7	2,121	16	(N/A)	3.5	5.2	7.95
Mulberry	592	4	-37	0	0	459	3	1,014	8	(N/A)	3.5	2.5	3.80
Callery pear	11	0	0	0	0	14	0	25	0	(N/A)	3.5	0.1	0.09
Sugar maple	758	6	-69	0	-1	535	4	1,224	9	(N/A)	1.7	3.0	9.18
River birch	5	0	0	0	0	7	0	12	0	(N/A)	1.7	0.0	0.09
White oak	74	1	-1	0	0	49	0	122	1	(N/A)	1.7	0.3	0.91
Other street trees	0	0	0	0	0	0	0	0	0	(N/A)	0.0	0.0	0.00
Citywide total	23,707	178	-1,340	-11	-10	18,690	140	41,045	308	(N/A)	100.0	100.0	5.31

Table 6: Annual Social and Aesthetic Benefits

Alburnett

Annual Aesthetic/Other Benefits of Public Trees by Species

11/11/2012

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	960	(N/A)	25.9	39.7	64.03
Eastern white pine	285	(N/A)	12.1	11.8	40.75
Swamp white oak	263	(N/A)	12.1	10.9	37.63
Norway maple	175	(N/A)	8.6	7.2	35.03
Red maple	212	(N/A)	8.6	8.8	42.45
Black cherry	104	(N/A)	8.6	4.3	20.81
Green ash	170	(N/A)	5.2	7.0	56.71
Eastern redbud	0	(N/A)	3.5	0.0	0.03
Black walnut	115	(N/A)	3.5	4.8	57.69
Mulberry	35	(N/A)	3.5	1.5	17.60
Callery pear	5	(N/A)	3.5	0.2	2.74
Sugar maple	76	(N/A)	1.7	3.2	76.42
River birch	3	(N/A)	1.7	0.1	2.74
White oak	15	(N/A)	1.7	0.6	14.73
Other street trees	0	(±NaN)	0.0	0.0	0.00
Citywide total	2,421	(N/A)	100.0	100.0	41.74

Table 7: Summary of Benefits in Dollars

Alburnett**Total Annual Benefits of Public Trees by Species (\$)**

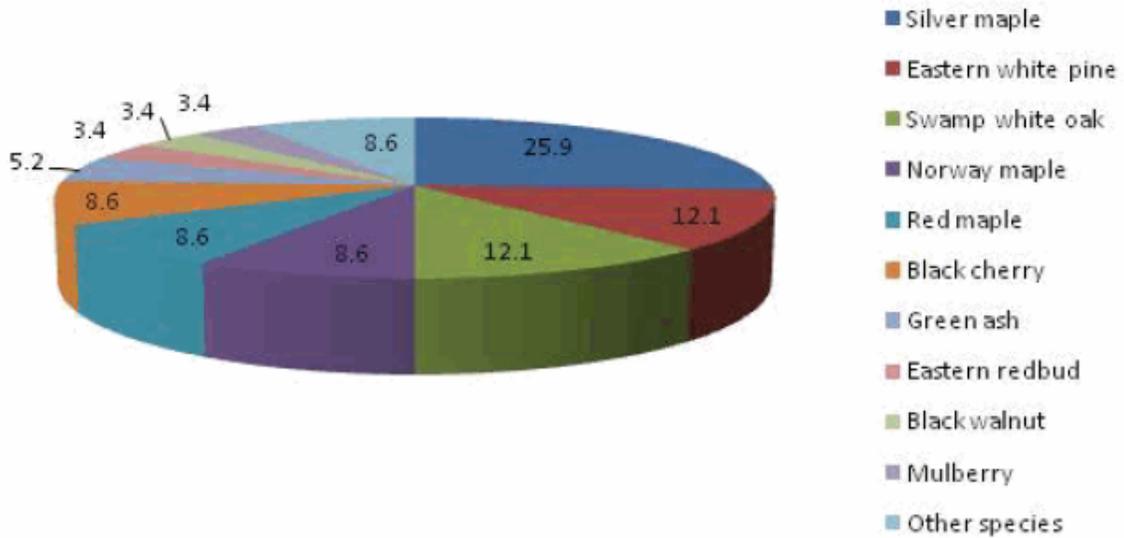
11/11/20

Species	Energy	CO ₂	Air Quality	Stormwater	Aesthetic/Other	Total (\$)	Standard Error	% of Total \$
Silver maple	716	117	118	898	960	2,810 (±0)		34.6
Eastern white pine	194	20	14	447	285	961 (±0)		11.8
Swamp white oak	337	39	58	350	263	1,047 (±0)		12.9
Norway maple	236	26	41	232	175	710 (±0)		8.7
Red maple	163	22	28	138	212	563 (±0)		6.9
Black cherry	207	24	36	118	104	489 (±0)		6.0
Green ash	184	25	32	259	170	670 (±0)		8.3
Eastern redbud	2	0	0	0	0	3 (±0)		0.0
Black walnut	115	16	19	140	115	405 (±0)		5.0
Mulberry	64	8	11	39	35	157 (±0)		1.9
Callery pear	2	0	0	1	5	9 (±0)		0.1
Sugar maple	68	9	11	103	76	267 (±0)		3.3
River birch	1	0	0	0	3	4 (±0)		0.1
White oak	6	1	1	5	15	27 (±0)		0.3
Other street trees	0	0	0	0	0	0 (±0)		0.0
Citywide Total	2,294	308	370	2,729	2,421	8,121 (±0)		100.0

Alburnett

Species Distribution of Public Trees (%)

11/11/2012



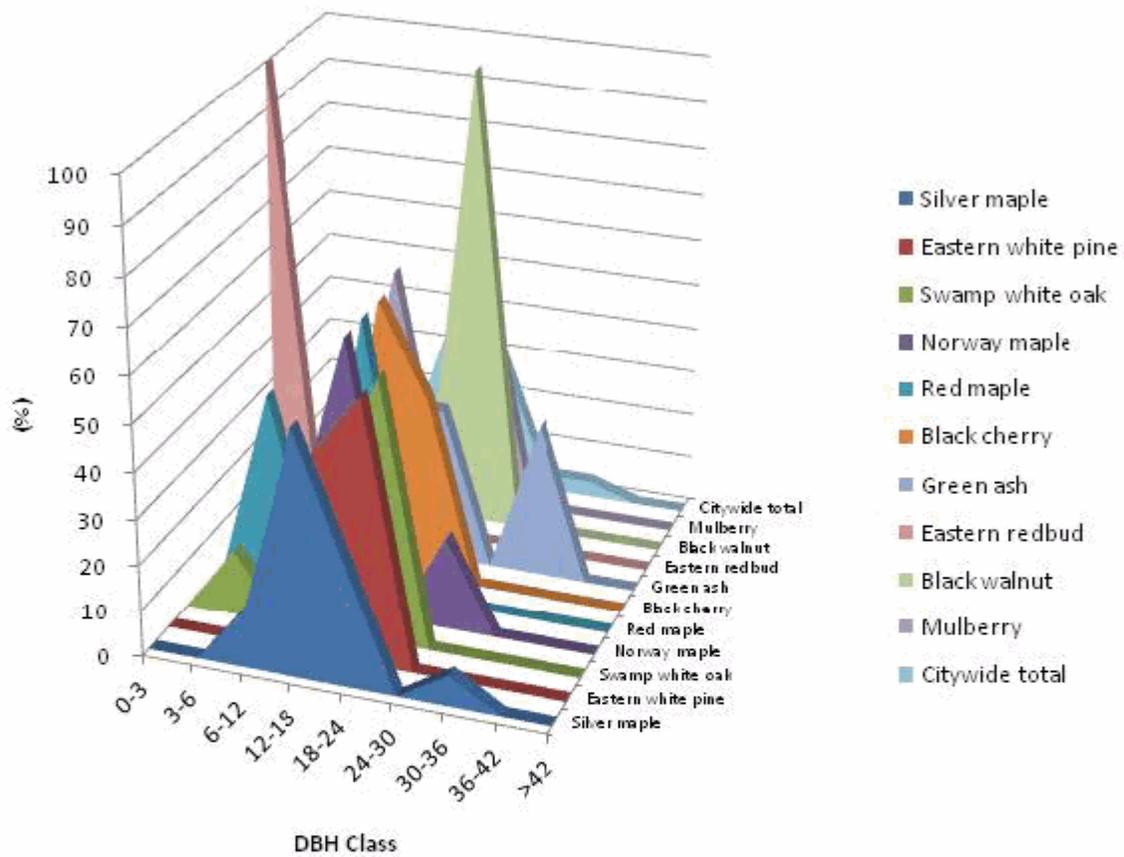
Species	Percent
Silver maple	25.9
Eastern white pine	12.1
Swamp white oak	12.1
Norway maple	8.6
Red maple	8.6
Black cherry	8.6
Green ash	5.2
Eastern redbud	3.4
Black walnut	3.4
Mulberry	3.4
Other species	8.6
Total	100.0

Figure 1: Species Distribution

Alburnett

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

11/11/2012



Species	DBH class (in)								
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42
Silver maple	0.0	0.0	13.3	53.3	26.7	0.0	6.7	0.0	0.0
Eastern white pine	0.0	0.0	0.0	42.9	57.1	0.0	0.0	0.0	0.0
Swamp white oak	0.0	14.3	0.0	28.6	57.1	0.0	0.0	0.0	0.0
Norway maple	0.0	0.0	20.0	60.0	0.0	20.0	0.0	0.0	0.0
Red maple	0.0	40.0	0.0	60.0	0.0	0.0	0.0	0.0	0.0
Black cherry	0.0	0.0	0.0	60.0	40.0	0.0	0.0	0.0	0.0
Green ash	0.0	0.0	0.0	33.3	33.3	0.0	33.3	0.0	0.0
Eastern redbud	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Black walnut	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Mulberry	0.0	0.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0
Citywide total	8.6	6.9	6.9	39.7	31.0	3.4	3.4	0.0	0.0

Figure 2: Relative Age Class

Alburnett

Functional (Foliage) Condition of Public Trees by Species (%)

11/11/2012

Citywide total

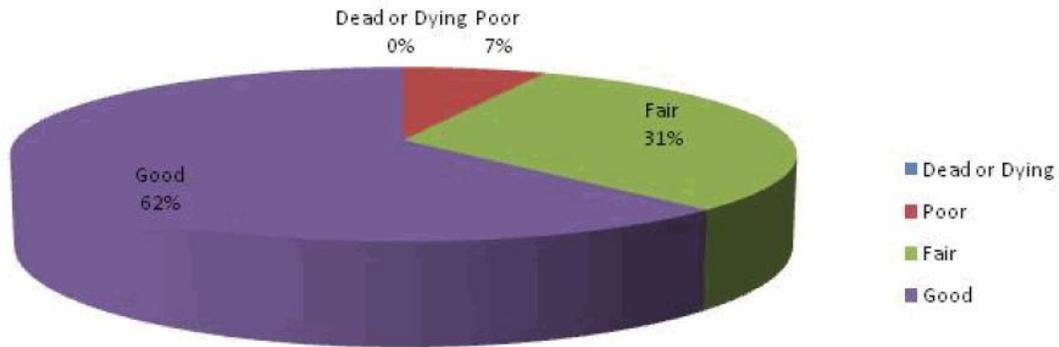


Figure 3: Foliage Condition

Alburnett

Structural (Woody) Condition of Public Trees by Species (%)

11/11/2012

Citywide total

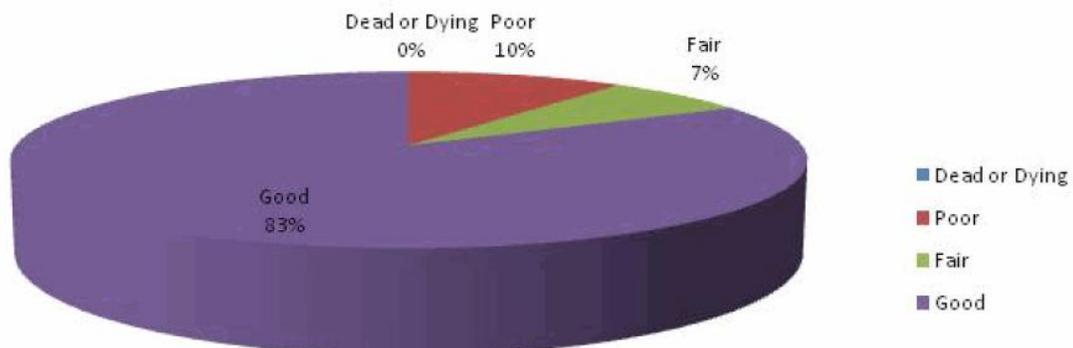
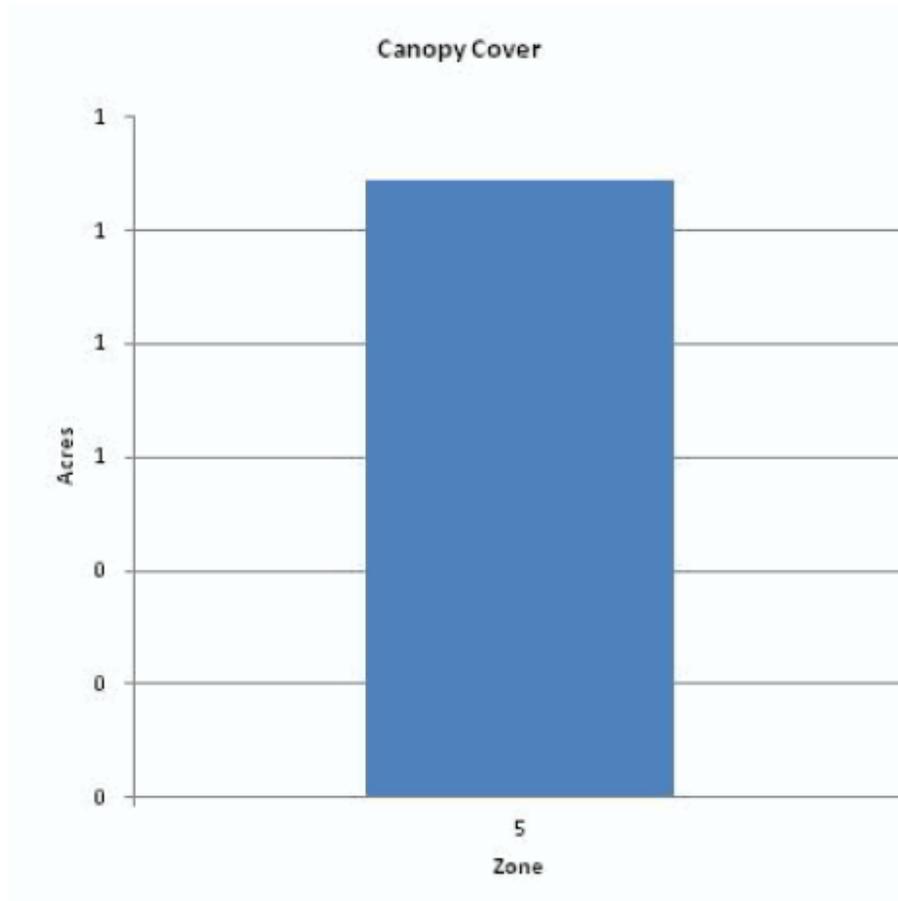


Figure 4: Wood Condition

Alburnett

Canopy Cover of Public Trees (Acres)

11/11/2012



Zone	Acres	% of Total Canopy Cover
5	1	100.0
Citywide total	1	100.0

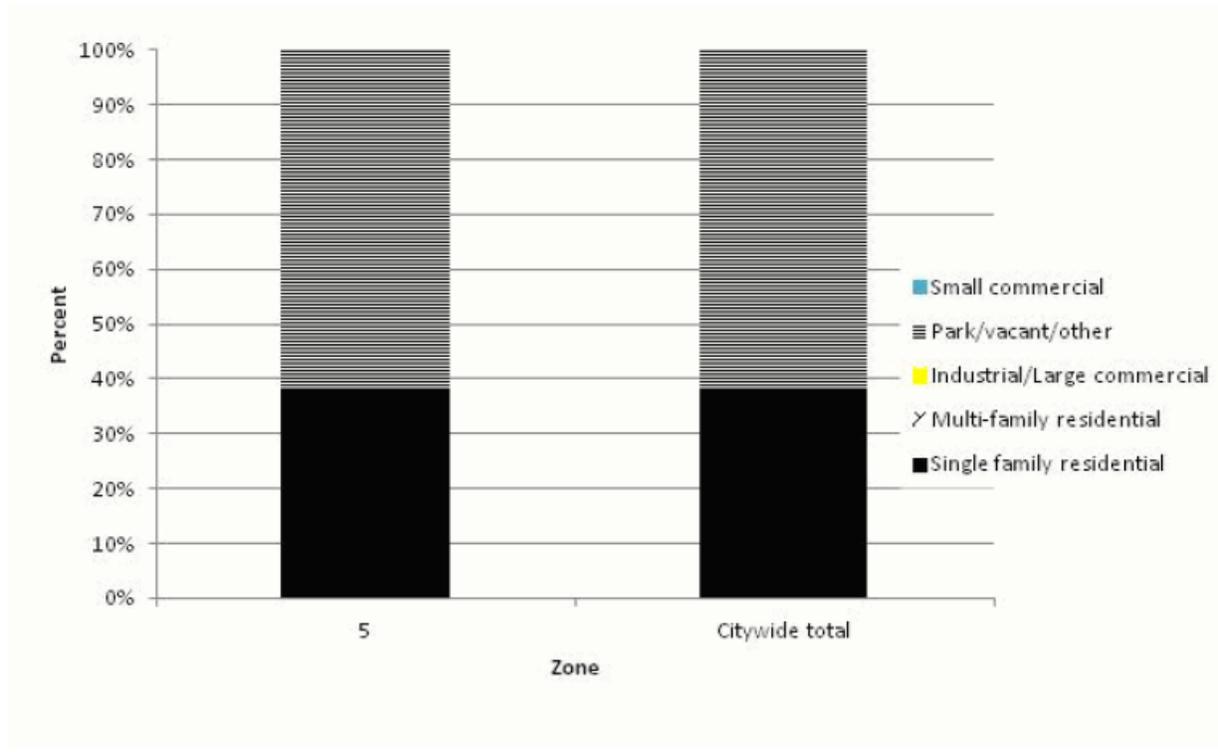
	Total Land Area	Total Street and Sidewalk Area	Total Canopy Cover	Canopy Cover as % of Total Land Area	Canopy Cover as % of Total Streets and Sidewalks
Citywide	0	0	1		

Figure 5: Canopy Cover in Acres

Alburnett

Land Use of Public Trees by Zone (%)

11/11/2012



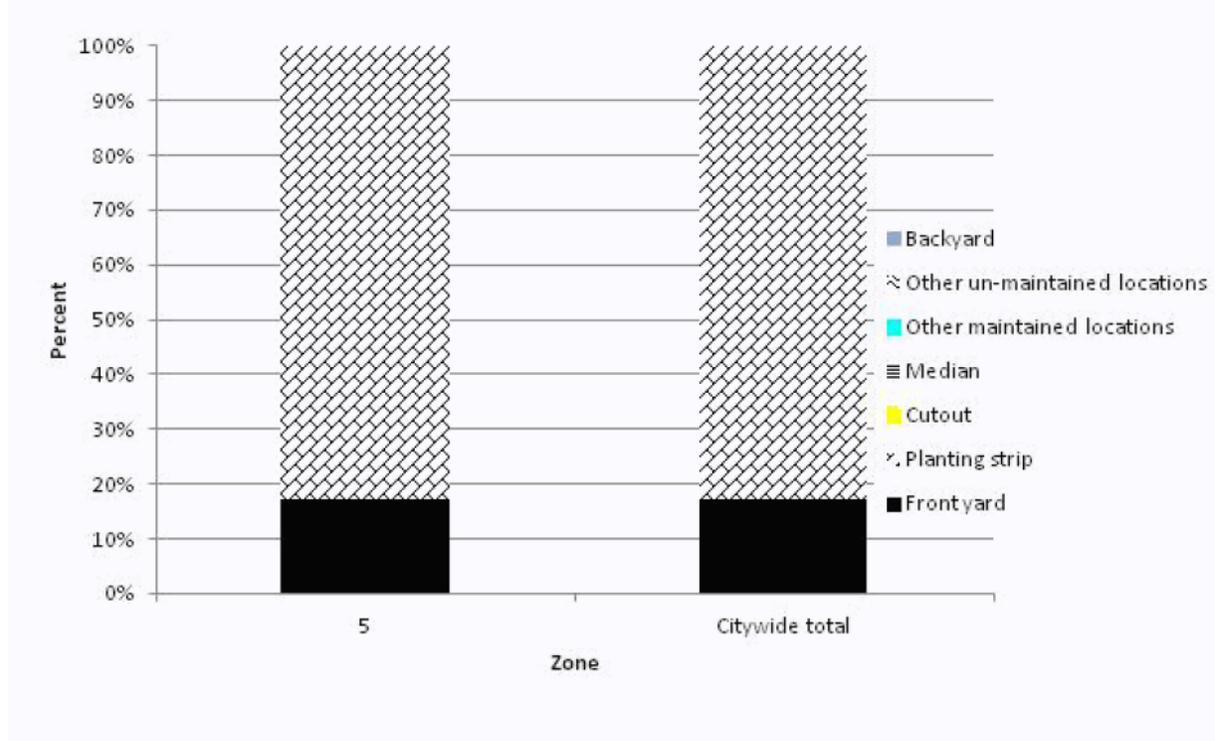
Zone	Single family residential	Multi-family residential	Industrial/ Large commercial	Park/vacant/ other	Small commercial
5	37.9	0.0	0.0	62.1	0.0
Citywide total	37.9	0.0	0.0	62.1	0.0

Figure 6: Land Use of city/park trees

Alburnett

Location of Public Trees by Zone (%)

11/11/2012



Zone	Front yard	Planting strip	Cutout	Median	Other maintained locations	Other un-maintained locations	Backyard
5	17.2	82.8	0.0	0.0	0.0	0.0	0.0
Citywide total	17.2	82.8	0.0	0.0	0.0	0.0	0.0

Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping



Figure 1:

Location of Ash Trees



Location of EAB symptoms

Figure 2:



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: Alburnett Tree Ordinances

CHAPTER 25

REGULATING THE PLANTING, CARE AND TRIMMING OF TREES

declared a nuisance. Any diseased tree cut down should be removed to a designated disposal area immediately.

- 3-25-1 Definitions
- 3-25-2 Planting Restrictipns
- 3-25-3 Duty to Trim Trees
- 3-25-4 Removal ofTreeJ

Trimming of Trees Under the Supervision of the Public Works Director
Inspection and RJmoval

SECTION 3-25-1 DEFINIITIONS. For use in this ordinance, the following terms are defined:

- (1) The term "persol" shall mean individual, firm, corporation, trust, association or any other organized group .

- (2) The "street" shall mean the entire width between property lines of avenues or highways.

- (3) The term "parking" shall mean that part of the street, avenue or highway in the city not covered by sidewalk and laying between the lot lines and curb line; or, on unpaved street, that part of the street, avenue or highway lYil in^g between the lot line and that portion of the street usually traveled by vehicular traffic. .

- (4) The term "property owner" shall mean a person owning private property in the city as shown by the county auditor's plats of the city.

- (5) The term "public property" shall mean any and all property located within the confines of the city and owned by the city or held in the name of the city by any of the departments, commissions or agencies within the city government.

SECTION 3-25-2 PLANTING RESTRICTIONS. No tree shall be planted in any parking or street.

SECTION 3-25-3 DUTY TO TRIM TREES. The owner ofthe abutting property shall keep the trees on, or overhanging the street, trimmed so that all branches shall be at least fifteen (15) feet above the surface of the street and eight (8) feet above the Jidewalks. If the abutting property owner fails to trim the trees, the City may serve notice on the abutting prope~ owner requiring that such action be taken within five (5) days. If such action is not taken within that time,the City may perform the required action and assess the costs against the abutting property for collection in the same manner as a property tax.

SECTION 3-25-4 REMOVAL OF TREES. The City shall remove, on the order of the council, any trees on the streets of this municipality which interferes with the making of improvements or with travel thereon. The City 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

SECTION 3-25-5

TRIMMING OF TREES UNDER THE SUPERVISION OF THE PUBLIC

WORKS DIRECTOR. Except as allowed this Code of Ordinance, no person may trim or cut any tree

in a street or public place unless the work is done under personal supervision of the City.

SECTION 3-25-6 INSPECTION AND REMOVAL. The Council shall inspect or cause to be inspected any trees or shrubs in the City reported or suspected to be dead, diseased or damaged, and such trees and shrubs shall be subject to the following:

(1) If it is determined that any such condition exists on any public property, including the strip between the curb and the lot line of private property, the Council may cause such condition to be

corrected by treatment or removal. The Council may also order the removal of any trees on the streets

of the City which interfere with the making of improvements of with travel thereon.

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

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 515-281-5918.