

Sheldahl, IA



2023 Urban Forest Management Plan
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Table of Contents

Executive Summary.....	1
Overview	1
Inventory and Results	1
Recommendations	1
Introduction	2
Inventory.....	2
Inventory Results	3
Annual Benefits.....	3
Annual Energy Benefits.....	3
Annual Stormwater Benefits.....	3
Annual Air Quality Benefits.....	3
Annual Carbon Benefits	3
Annual Aesthetics Benefits	3
Financial Summary of all Benefits.....	3
Forest Structure	4
Species Distribution	4
Age Class	4
Condition: Wood and Foliage	4
Management Needs.....	4
Canopy Cover	5
Land Use and Location	5
Recommendations	5
Risk Management	5
Pruning Cycle.....	6
Planting	6
Continual Monitoring.....	6
Six Year Maintenance Plan with No Additional Funding	6
Budget and Emerald Ash Borer Plan.....	6
Ash Tree Removal	7
Treatment of Ash Trees	8
EAB Quarantines	8
Wood Disposal	8
Canopy Replacement	8
Postponed Work	8
Monitoring	9
Private Ash Trees	9
Works Cited.....	10
Appendix A: i-Tree Data	11
Table 1: Annual Energy Benefits	11
Table 2: Annual Stormwater Benefits.....	12
Table 3: Annual Air Quality Benefits	12
Table 4: Annual Carbon Stored	13
Table 5: Annual Carbon Sequestered	13
Table 6: Annual Social and Aesthetic Benefits.....	14

Table 7: Summary of Benefits in Dollars	14
Figure 1: Species Distribution	15
Figure 2: Relative Age Class	15
Figure 3: Foliage Condition	16
Figure 4: Wood Condition	16
Figure 5: Canopy Cover in Acres	17
Figure 6: Land Use of city/park trees.....	18
Figure 7: Location of city/park trees.....	18
Appendix B: ArcGIS Mapping	19
Figure 1: Location of Ash Trees.....	19
Figure 2: Location of EAB symptoms	20
Figure 3: Location of Poor Condition Trees	21
Figure 4: Location of Trees with Recommended Maintenance.....	22
Figure 5: Maintenance Tasks	23
Appendix C: Sheldahl Tree Ordinances.....	24

Executive Summary

Overview

This plan was developed to assist the City of Sheldahl 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 16% of Sheldahl's city owned trees (ash) will die once EAB becomes established in the community, unless preventative treatment is used. 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 2022, 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 82 trees inventoried.

- Sheldahl's trees provide \$10,248 of benefits annually, an average of \$125 a tree
- There are over 13 species of trees
- The top three genera are: Maple 31%, Ash 16%, and Walnut 11%
- 26% of trees are in need of some type of management
- 9 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 9 trees needing removal, 5 trees are over 24 inches in diameter at 4.5 ft and must be addressed immediately
- All 13 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 with a visual survey yearly
- With the current budget it could take 15 years to remove ash – Suggestion: request a budget increase to \$2,200 annually and apply for grants to plant replacement trees

Introduction

This plan was developed to assist Sheldahl 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 recovery from Emerald Ash Borer (EAB), an invasive pest that kills native ash trees, it is time to prepare for the increased costs of tree removal or treatment and replacement planting. With proper planning and management of the current canopy in Sheldahl, these costs can be extended over years and public safety issues from dead and dying ash trees mitigated.

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

Inventory

In 2022, 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 82 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. Fin

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Sheldahl's trees reduce energy related costs by approximately \$2,721 annually (Appendix A, Table 1). These savings are both in Electricity (13.1 MWh) and in Natural Gas (1,762.3 Therms).

Annual Stormwater Benefits

Sheldahl's trees intercept about 143,688 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides \$3,894 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 Sheldahl, it is estimated that trees remove 164.4 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 \$461 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Sheldahl, trees sequester about 28,075 lbs of carbon a year with an associated value of \$211 (Appendix A, Table 5). In addition, the trees store 478,215 lbs of carbon, with a yearly benefit of \$3,587 (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. Sheldahl receives \$2,815 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, Sheldahl's trees provide \$10,248 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 82 trees in Sheldahl provide approximately \$125 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Sheldahl has over 13 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Maple	25	31%
Ash	13	16%
Black walnut	9	11%
Apple	8	10%
Spruce	6	7%
Cedar	5	6%
Northern catalpa	3	4%
Swamp white oak	3	4%
Basswood	2	3%
Kentucky coffeetree	2	3%
Mulberry	2	3%
Northern hackberry	2	3%
American elm	1	1%

Age Class

Most of Sheldahl's trees (28%) are between 6 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. Sheldahl'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 Sheldahl indicate that 49% of the trees are in good health, with only 12% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 54% of Sheldahl'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 13% of the population. This 26% 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).

Tree Removal	9	11%
Crown Raising	5	6%
Crown Cleaning	4	4%
Tree Staking	1	1%

Crown Reduction	1	1%
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Canopy Cover

The total canopy with both private and public trees is 7%, 38. The canopy cover on city own properties included in the Sheldahl inventory includes approximately 1.4 acres (Appendix A, Figure 4). The City's Canopy goal is to increase canopy by 1%, in 30 years on all lands. To achieve this goal, it is estimated that 13 trees need to be planted annually on public and/or private lands.

Land Use and Location

The majority of Sheldahl'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

Park/vacant/other	62%
Single family residential	38%

Location

Front yard	95%
Planting strip	5%

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

Sheldahl has 1 critical concern tree 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 5 trees over 18 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.

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 9 removals, 7 are ash trees. There is a total of 13 ash trees, and 13 of those have signs and symptoms that have been associated with EAB. In addition, there are 9 trees that are in poor health.

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 Sheldahl.

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). 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. All trees planted must meet the restrictions in city ordinance 150.02 (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 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 No Additional Funding

Current Budget \$600/year, Total **\$3,600** over 6 years

2023	Quantity	Est. Price
Removal (Schedule based on priority level)	1	\$600
Planting and Replacement		
Young Tree Pruning & Maintenance		

Visual Survey for signs and symptoms of EAB		
		\$600
2024		
Removal (Schedule based on priority level)		
Planting and Replacement	3	\$300
Young Tree Pruning & Maintenance	3	\$300
Routine trimming (1/3 of the city trees)		
Visual Survey for signs and symptoms of EAB		
		\$600
2025		
Removal (Schedule based on priority level)	1	\$600
Planting and Replacement		
Young Tree Pruning & Maintenance		
Visual Survey for signs and symptoms of EAB		
		\$600
2026		
Removal (Schedule based on priority level)		
Planting and Replacement	3	\$300
Young Tree Pruning & Maintenance	3	\$300
Routine trimming		
Visual Survey for signs and symptoms of EAB		
		\$600
2027		
Removal (Schedule based on priority level)	1	\$600
Planting and Replacement		
Young Tree Pruning & Maintenance		
Visual Survey for signs and symptoms of EAB		
		\$600
2028		
Removal (Schedule based on priority level)		
Planting and Replacement	3	\$300
Young Tree Pruning & Maintenance	3	\$300
Visual Survey for signs and symptoms of EAB		
		\$600

*Reduction of ash over 6 years: Approximately 13 ash trees removed. It will take approximately 13 years to remove all ash with the current budget. EAB could potentially kill all ash within 4 to 15 years of its arrival.

**To remove all ash trees within 6 years, the budget would need to be increased to \$1,300 a year.

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).

Treatment of Ash Trees

Chemical treatment can be effective tool for communities to spread removal costs out over several years while allowing trees to continue to provide 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 disposed of as you normally would if your county is not part of a quarantine.

Canopy Replacement

As budget permits, all removed trees will be replaced. All trees will meet the restrictions in city ordinance 151.02 (Appendix C). The new plantings will be a diverse mix and will not include ash, maple, cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut.

Postponed Work

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

Monitoring

It is recommended that ash trees be checked with a visual survey every year for tree death and for 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 150.06 states “If it is determined with reasonable certainty that any such condition exists (trees or shrubs in the City reported or suspected to be infected with or damaged by any disease or insect or disease pests) on private property and that the danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Council shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days of said notification. If such owner, occupant or person in charge of said property fails to comply within 14 days of receipt of notice, the Council may cause the condition to be corrected and the cost assessed against the property.”

Proposed Budget Increase

EAB could potentially kill all ash trees in Sheldahl within 4 years of its arrival. To remove all ash trees within 6 years the budget would need to be increased to \$2,200 a year. Additionally, it is recommended that Sheldahl 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 being considered by many communities is treating a number of 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 removed 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) would be \$1,200. 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 Sheldahl. It is suggested to consider increasing the budget to plan for this.

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Sheldahl

Annual Energy Benefits of Public Trees

1/27/2023

Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Red maple	0.5	41	79.4	78	119	(N/A)	18.3	4.4	7.94
Green ash	3.5	269	454.0	445	714	(N/A)	15.9	26.2	54.89
Black walnut	2.9	222	397.1	389	611	(N/A)	11.0	22.5	67.90
Apple	0.1	5	11.3	11	16	(N/A)	9.8	0.6	2.00
Black maple	1.7	127	229.6	225	352	(N/A)	7.3	12.9	58.73
Northern white cedar	0.7	53	88.4	87	140	(N/A)	6.1	5.1	27.94
Black spruce	0.4	34	61.0	60	93	(N/A)	6.1	3.4	18.68
Silver maple	1.3	101	178.4	175	276	(N/A)	4.9	10.1	69.02
Northern catalpa	0.4	30	54.6	54	83	(N/A)	3.7	3.1	27.78
Swamp white oak	0.0	1	2.4	2	3	(N/A)	3.7	0.1	1.10
Mulberry	0.4	28	49.3	48	76	(N/A)	2.4	2.8	38.13
Northern hackberry	0.4	32	64.1	63	95	(N/A)	2.4	3.5	47.37
American basswood	0.2	17	26.6	26	43	(N/A)	2.4	1.6	21.27
Kentucky coffeetree	0.0	0	0.9	1	1	(N/A)	2.4	0.0	0.66
Norway spruce	0.1	11	19.7	19	30	(N/A)	1.2	1.1	30.47
American elm	0.3	22	41.8	41	63	(N/A)	1.2	2.3	62.70
Eastern redbud	0.0	2	3.8	4	5	(N/A)	1.2	0.2	5.40
Total	13.1	994	1,762.3	1,727	2,721	(N/A)	100.0	100.0	33.19

Table 2: Annual Stormwater Benefits

Sheldahl

Annual Stormwater Benefits of Public Trees

1/27/2023

Species	Total rainfall interception (Gal)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Red maple	4,021	109 (N/A)		18.3	2.8	7.26
Green ash	35,620	965 (N/A)		15.9	24.8	74.25
Black walnut	35,766	969 (N/A)		11.0	24.9	107.70
Apple	182	5 (N/A)		9.8	0.1	0.62
Black maple	15,939	432 (N/A)		7.3	11.1	71.99
Northern white cedar	11,985	325 (N/A)		6.1	8.3	64.96
Black spruce	5,355	145 (N/A)		6.1	3.7	29.02
Silver maple	17,826	483 (N/A)		4.9	12.4	120.77
Northern catalpa	5,526	150 (N/A)		3.7	3.8	49.92
Swamp white oak	37	1 (N/A)		3.7	0.0	0.33
Mulberry	1,333	36 (N/A)		2.4	0.9	18.06
Northern hackberry	3,049	83 (N/A)		2.4	2.1	41.31
American basswood	1,197	32 (N/A)		2.4	0.8	16.22
Kentucky coffeetree	36	1 (N/A)		2.4	0.0	0.48
Norway spruce	2,969	80 (N/A)		1.2	2.1	80.46
American elm	2,779	75 (N/A)		1.2	1.9	75.32
Eastern redbud	69	2 (N/A)		1.2	0.0	1.86
Citywide total	143,688	3,894 (N/A)		100.0	100.0	47.49

Table 3: Annual Air Quality Benefits

Sheldahl

Annual Air Quality Benefits of Public Trees

1/27/2023

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								
Red maple	0.9	0.1	0.4	0.0	5	2.6	0.4	0.4	2.5	16	-0.3	-1	7.0	20 (N/A)		18.3	1.32
Green ash	4.3	0.7	2.1	0.2	23	16.6	2.4	2.3	16.0	104	0.0	0	44.7	127 (N/A)		15.9	9.79
Black walnut	4.8	0.8	2.2	0.2	25	13.9	2.0	1.9	13.3	87	0.0	0	39.1	112 (N/A)		11.0	12.46
Apple	0.0	0.0	0.0	0.0	0	0.3	0.0	0.0	0.3	2	0.0	0	0.7	2 (N/A)		9.8	0.26
Black maple	4.1	0.7	1.9	0.2	22	8.0	1.2	1.1	7.6	50	-1.3	-5	23.4	66 (N/A)		7.3	11.08
Northern white cedar	1.4	0.3	1.1	0.2	9	3.3	0.5	0.5	3.2	21	-5.2	-20	5.1	10 (N/A)		6.1	2.00
Black spruce	0.6	0.1	0.5	0.1	4	2.1	0.3	0.3	2.0	13	-1.8	-7	4.2	10 (N/A)		6.1	2.08
Silver maple	2.9	0.5	1.4	0.1	16	6.3	0.9	0.9	6.0	39	-1.5	-6	17.6	49 (N/A)		4.9	12.37
Northern catalpa	0.8	0.1	0.4	0.0	4	1.9	0.3	0.3	1.8	12	0.0	0	5.5	16 (N/A)		3.7	5.29
Swamp white oak	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	0	0.0	0	0.1	0 (N/A)		3.7	0.14
Mulberry	0.4	0.1	0.2	0.0	2	1.7	0.3	0.2	1.7	11	0.0	0	4.6	13 (N/A)		2.4	6.56
Northern hackberry	0.3	0.1	0.2	0.0	2	2.1	0.3	0.3	1.9	13	0.0	0	5.2	15 (N/A)		2.4	7.34
American basswood	0.1	0.0	0.1	0.0	1	1.0	0.1	0.1	1.0	6	-0.1	0	2.4	7 (N/A)		2.4	3.27
Kentucky coffeetree	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)		2.4	0.08
Norway spruce	0.3	0.1	0.3	0.0	2	0.7	0.1	0.1	0.7	4	-1.4	-5	0.9	1 (N/A)		1.2	1.45
American elm	0.2	0.0	0.1	0.0	1	1.4	0.2	0.2	1.3	9	0.0	0	3.5	10 (N/A)		1.2	9.99
Eastern redbud	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)		1.2	0.71
Citywide total	21.1	3.5	10.9	1.1	116	62.2	9.1	8.7	59.4	388	-11.6	-44	164.4	461 (N/A)		100.0	5.62

Table 4: Annual Carbon Stored

Sheldahl

Stored CO2 Benefits of Public Trees

1/27/2023

Species	Total Stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Red maple	9,870	74	(N/A)	18.3	2.1	4.93
Green ash	142,113	1,066	(N/A)	15.9	29.7	81.99
Black walnut	157,120	1,178	(N/A)	11.0	32.9	130.93
Apple	438	3	(N/A)	9.8	0.1	0.41
Black maple	43,351	325	(N/A)	7.3	9.1	54.19
Northern white cedar	12,369	93	(N/A)	6.1	2.6	18.55
Black spruce	3,089	23	(N/A)	6.1	0.6	4.63
Silver maple	59,311	445	(N/A)	4.9	12.4	111.21
Northern catalpa	25,967	195	(N/A)	3.7	5.4	64.92
Swamp white oak	51	0	(N/A)	3.7	0.0	0.13
Mulberry	6,074	46	(N/A)	2.4	1.3	22.78
Northern hackberry	4,568	34	(N/A)	2.4	1.0	17.13
American basswood	3,608	27	(N/A)	2.4	0.8	13.53
Kentucky coffeetree	24	0	(N/A)	2.4	0.0	0.09
Norway spruce	3,343	25	(N/A)	1.2	0.7	25.07
American elm	6,743	51	(N/A)	1.2	1.4	50.57
Eastern redbud	178	1	(N/A)	1.2	0.0	1.33
Citywide total	478,215	3,587	(N/A)	100.0	100.0	43.74

Table 5: Annual Carbon Sequestered

Sheldahl

Annual CO Benefits of Public Trees

1/27/2023

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
Red maple	1,233	9	-48	-8	0	912	7	2,089	16 (N/A)	18.3	4.4	1.04
Green ash	7,674	58	-682	-35	-5	5,937	45	12,894	97 (N/A)	15.9	27.1	7.44
Black walnut	6,858	51	-754	-31	-6	4,905	37	10,978	82 (N/A)	11.0	23.1	9.15
Apple	128	1	-2	-2	0	108	1	231	2 (N/A)	9.8	0.5	0.22
Black maple	3,253	24	-208	-16	-2	2,816	21	5,845	44 (N/A)	7.3	12.3	7.31
Northern white cedar	793	6	-59	-12	-1	1,172	9	1,894	14 (N/A)	6.1	4.0	2.84
Black spruce	297	2	-15	-7	0	744	6	1,019	8 (N/A)	6.1	2.1	1.53
Silver maple	4,998	37	-285	-14	-2	2,238	17	6,936	52 (N/A)	4.9	14.6	13.01
Northern catalpa	965	7	-125	-5	-1	659	5	1,494	11 (N/A)	3.7	3.1	3.74
Swamp white oak	16	0	0	-1	0	22	0	37	0 (N/A)	3.7	0.1	0.09
Mulberry	535	4	-29	-4	0	617	5	1,119	8 (N/A)	2.4	2.4	4.20
Northern hackberry	433	3	-22	-4	0	706	5	1,113	8 (N/A)	2.4	2.3	4.17
American basswood	319	2	-17	-2	0	365	3	665	5 (N/A)	2.4	1.4	2.49
Kentucky coffeetree	5	0	0	0	0	9	0	13	0 (N/A)	2.4	0.0	0.05
Norway spruce	187	1	-16	-3	0	246	2	415	3 (N/A)	1.2	0.9	3.11
American elm	342	3	-32	-3	0	481	4	788	6 (N/A)	1.2	1.7	5.91
Eastern redbud	38	0	-1	-1	0	37	0	74	1 (N/A)	1.2	0.2	0.55
Citywide total	28,075	211	-2,297	-146	-18	21,973	165	47,605	357 (N/A)	100.0	100.0	4.35

Table 6: Annual Social and Aesthetic Benefits**Sheldahl****Annual Aesthetic/Other Benefits of Public Trees**

1/27/2023

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Red maple	161	(N/A)	18.3	5.7	10.74
Green ash	664	(N/A)	15.9	23.6	51.10
Black walnut	531	(N/A)	11.0	18.9	58.98
Apple	4	(N/A)	9.8	0.2	0.54
Black maple	393	(N/A)	7.3	14.0	65.52
Northern white cedar	206	(N/A)	6.1	7.3	41.18
Black spruce	114	(N/A)	6.1	4.0	22.74
Silver maple	408	(N/A)	4.9	14.5	101.95
Northern catalpa	77	(N/A)	3.7	2.7	25.71
Swamp white oak	8	(N/A)	3.7	0.3	2.74
Mulberry	31	(N/A)	2.4	1.1	15.48
Northern hackberry	77	(N/A)	2.4	2.7	38.26
American basswood	30	(N/A)	2.4	1.1	15.24
Kentucky coffeetree	11	(N/A)	2.4	0.4	5.26
Norway spruce	47	(N/A)	1.2	1.7	47.08
American elm	51	(N/A)	1.2	1.8	51.00
Eastern redbud	2	(N/A)	1.2	0.1	2.06
Citywide total	2,815	(N/A)	100.0	100.0	34.33

Table 7: Summary of Benefits in Dollars**Sheldahl****Total Annual Benefits of Public Trees by Species (\$)**

1/27/2023

Species	Energy	CO ₂	Air Quality	Stormwater	Aesthetic/Other	Total (\$)	Standard Error	% of Total \$
Red maple	119	16	20	109	161	425	(N/A)	4.1
Green ash	714	97	127	965	664	2,567	(N/A)	25.1
Black walnut	611	82	112	969	531	2,306	(N/A)	22.5
Apple	16	2	2	5	4	29	(N/A)	0.3
Black maple	352	44	66	432	393	1,288	(N/A)	12.6
Northern white cedar	140	14	10	325	206	695	(N/A)	6.8
Black spruce	93	8	10	145	114	370	(N/A)	3.6
Silver maple	276	52	49	483	408	1,268	(N/A)	12.4
Northern catalpa	83	11	16	150	77	337	(N/A)	3.3
Swamp white oak	3	0	0	1	8	13	(N/A)	0.1
Mulberry	76	8	13	36	31	165	(N/A)	1.6
Northern hackberry	95	8	15	83	77	277	(N/A)	2.7
American basswood	43	5	7	32	30	117	(N/A)	1.1
Kentucky coffeetree	1	0	0	1	11	13	(N/A)	0.1
Norway spruce	30	3	1	80	47	163	(N/A)	1.6
American elm	63	6	10	75	51	205	(N/A)	2.0
Eastern redbud	5	1	1	2	2	11	(N/A)	0.1
Citywide Total	2,721	357	461	3,894	2,815	10,248	(N/A)	100.0

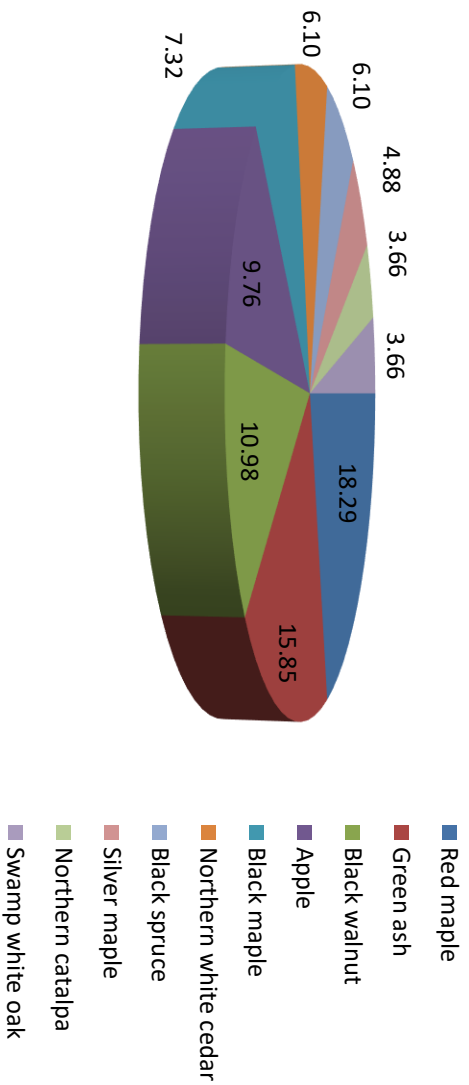


Figure 1: Species Distribution

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

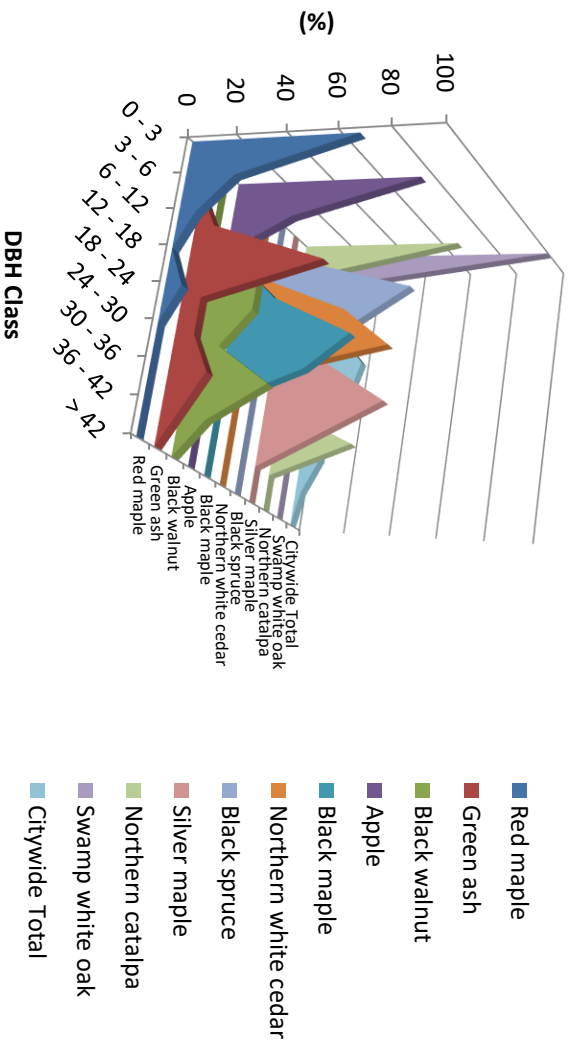


Figure 2: Relative Age Class

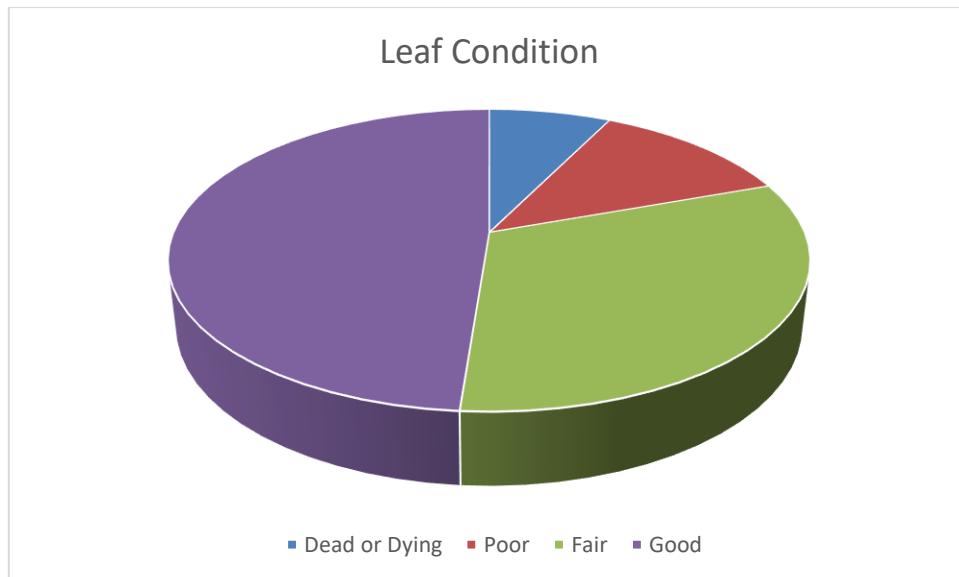


Figure 3: Foliage Condition

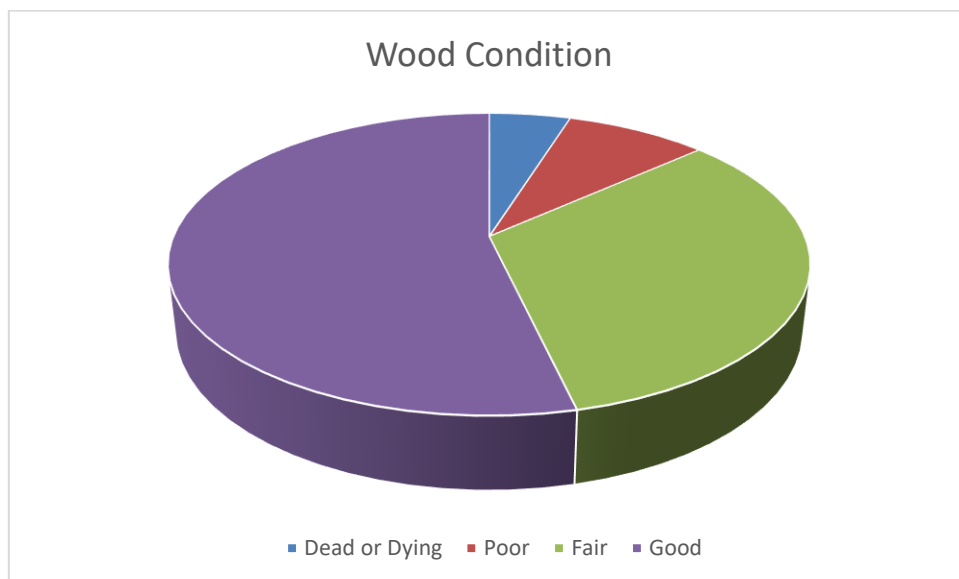


Figure 4: Wood Condition

Canopy Cover of Public Trees (Acres)

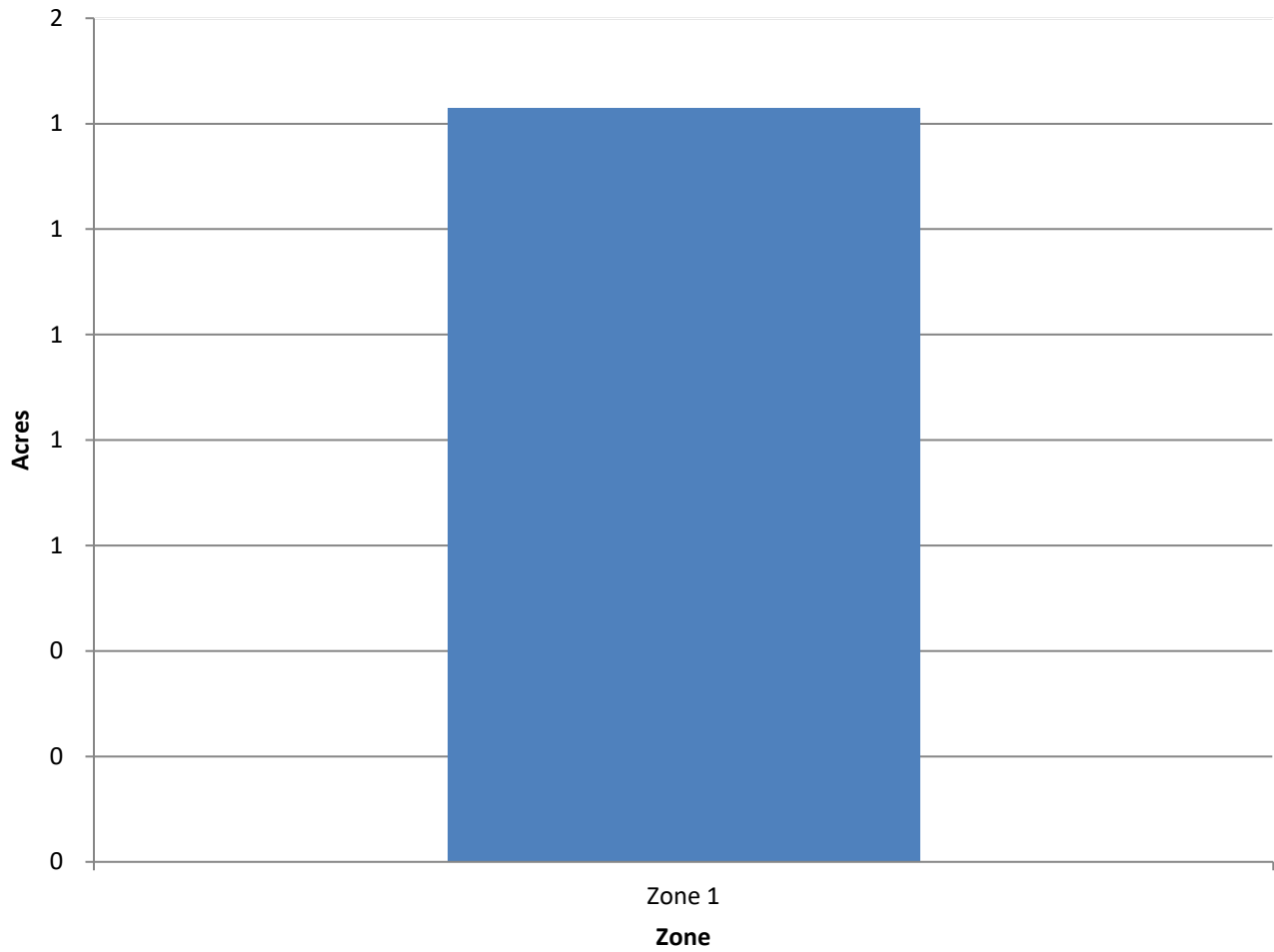


Figure 5: Canopy Cover in Acres

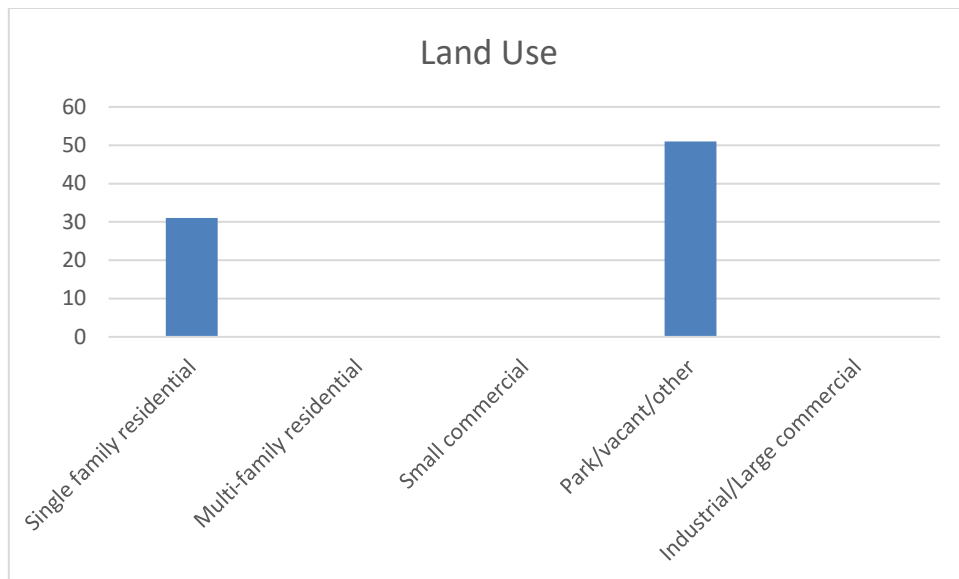


Figure 6: Land Use of city/park trees

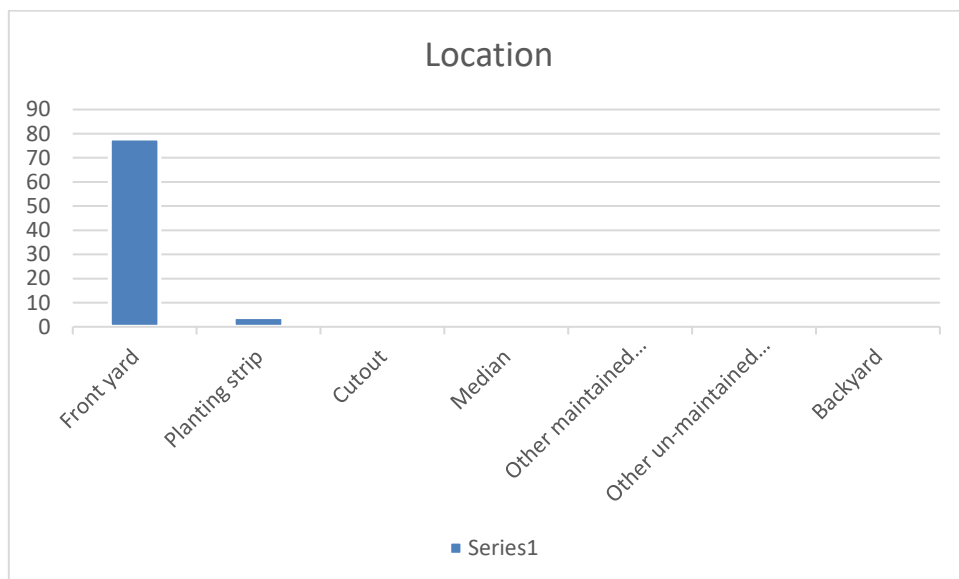


Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping



Figure 1: Location of Ash Trees



Figure 2: Location of EAB symptoms



Figure 3: Location of Poor Condition Trees



Figure 4: Location of Trees with Recommended Maintenance



Figure 5: Maintenance Tasks

Appendix C: Sheldahl Tree Ordinances

CHAPTER 150

TREES

150.01 Definition

150.02 Planting Prohibited

150.03 Duty to Trim Trees

150.04 Trimming Trees to Be Supervised

150.05 Disease Control

150.06 Inspection and Removal

150.01 DEFINITION. For use in this chapter, "parking" means that part of the street, avenue, or highway in the City not covered by sidewalk and lying between the lot line and the curb line or, on unpaved streets, that part of the street, avenue, or highway lying between the lot line and that portion of the street usually traveled by vehicular traffic.

150.02 PLANTING PROHIBITED. It is unlawful to plant any street trees within the City limits, and no existing street trees shall be replaced following their removal. As used in this section, "street tree" means trees, shrubs, bushes and all other woody vegetation on land lying outside of the lot and property lines and inside the curb lines, as shown by the assessor's web page, upon the public streets within the City. If owners do not remove a tree planted in violation of this section within one week after written notice, the City staff will remove the tree and charge the hourly City rate set by resolution of the Council.

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

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

150.04 TRIMMING TREES TO BE SUPERVISED. Except as allowed in Section 150.03, it is unlawful for any person to trim or cut any tree in a street or public place unless the work is done under the supervision of the City.

150.05 DISEASE CONTROL. Any dead, diseased, or damaged tree or shrub which may harbor serious insect or disease pests or disease injurious to other trees is hereby declared to be a nuisance.

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

- I. City Property. If it is determined that any such condition exists on any public property, including the strip between the curb and the lot line of private property, the Council may cause such condition to be corrected by treatment or removal. The Council may also order the removal of any trees on the streets of the City which

interfere with the making of improvements or with travel thereon.

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

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

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.