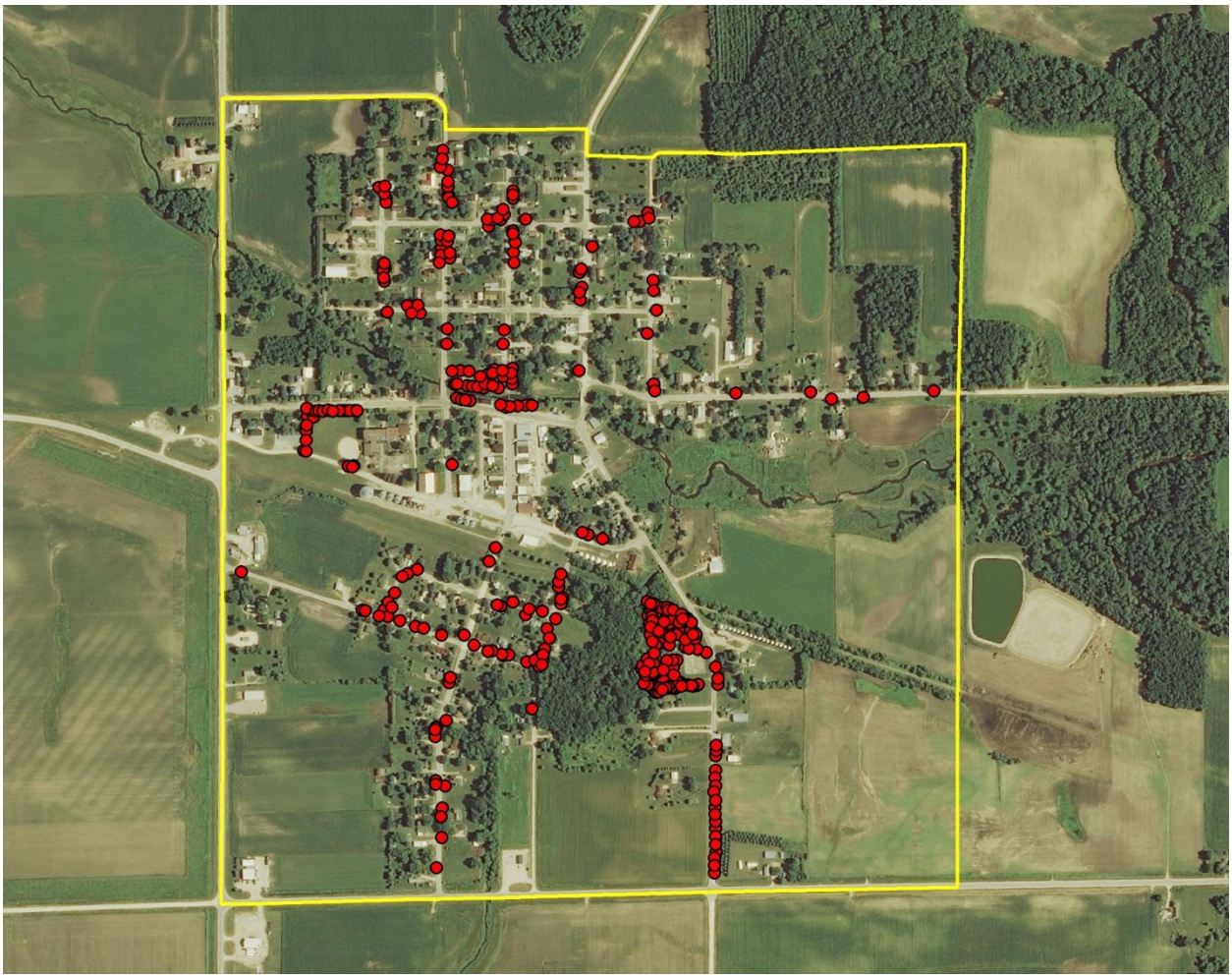
Lamont, IA



2013 Management Plan
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Executive Summary

Overview

This plan was developed to assist the City of Lamont with managing its urban forest, including budgeting and future planning. Trees can provide a multitude of benefits to the community, and with sound management, will allow your community to 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 exotic insect which was accidently imported from Asia on wood shipping crates. This insect kills all species of ash trees (this does not include mountain ash). There is a strong possibility that 13% of Lamont's city-owned trees (i.e. all your ash trees) will die once EAB becomes established within the community. With proper planning and management, the costs of removing dead and dying trees can be extended over years helping to mitigate public safety issues.

Inventory and Results

In the summer of 2013, a street and park tree inventory was conducted using Global Positioning System (GPS) data collectors. Below are some key findings of the 325 trees inventoried.

- Lamont's trees provide $48,834 worth of benefits annually, an average of $150 per tree
- There were 38 species of trees inventoried
- The top 3 genuses are: Maple 28%, Ash 13% & Oak 12%.
- Approximately 22% of the trees are in need of some type of management
- 14 trees are recommended for removal sometime in the near future

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 14 trees recommended for removal: 2 were green ash with canopy dieback and epicormic sprouts; 3 were dead arborvitae (drought), 1 was a dead cottonwood, 1 a dead white pine, 1 bur oak that should be thinned to improve the health of other trees and 6 with rotten trunks that could be hazardous.
- Three of the 42 total ash trees are in need of follow up inspections because they are displaying signs and symptoms associated with EAB (all three with canopy dieback and epicormic branching).
- 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, Siberian elm, willow or black walnut.
- Check all ash trees yearly with a visual survey.

Introduction

This plan was developed to assist the City of Lamont with 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), it is time to prepare for the increased costs of tree removal and replacement. With proper planning and management, these costs can be extended over years and public safety issues from dead and dying ash trees can be mitigated.

Trees are an important component of Lamont's infrastructure and one of the greatest assets to the community. Trees provide the community with improved air quality, interception of storm-water runoff, energy conservation, lower traffic speeds, increased property values, reduced crime, improved mental health and creation of more desirable living places to name just a few. It is essential that these benefits be maintained for the people of Lamont through good urban forestry management.

Good management involves setting goals and developing 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 Lamont's urban forestry goals.

Inventory

In 2013, a tree inventory was conducted that included City-owned trees on the streets and in the parks. The tree data was collected using a handheld integrated Global Positioning System (GPS) receiver/data collector. The data collector gives Geographic Information Systems (GIS) coordinates with an accuracy of 3 meters. This data can then be used with ArcGIS software as an active GIS data layer. Because the inventory is a digital document the data can be updated with anytime with new information.

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 325 city-owned 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.

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Lamont's trees reduce energy related costs by approximately $13,116 annually (Appendix A, Table 1). These savings are both in Electricity (63.3 MWh) and in Natural Gas (8,484 Therms).

Annual Stormwater Benefits

Lamont's trees intercept about 649,261 gallons of rainfall and snowmelt a year (Appendix A, Table 2). This interception provides $17,596 worth 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 Lamont, it is estimated that trees remove 751 lbs of air pollution (ozone (O_3), particulate matter less than 10 microns (PM10), carbon monoxide (CO), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2)) per year with a net value of $2,076 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Lamont, trees sequester about 137,665 lbs of carbon per year as they grow. Trees help us use save energy by blocking cold winds and shading our home when it is hot. This helps us avoid releasing carbon into the atmosphere when making energy to the tune of 106,111 lbs of carbon each year (Appendix A, Table 4). In addition, your trees store a total of 2,147,206 lbs of carbon that might otherwise be negatively affecting our atmosphere (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. Lamont receives $14,218 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, the City's trees provide $48,834 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 325 trees provide approximately $150 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Lamont has over 38 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genus is as follows:

Species	# of trees	Percent of total
Green Ash var.	40	12.3%
Sugar Maple	34	10.5%
Bur Oak	30	9.2%
Norway Maple	27	8.3%
Silver Maple (& hybrids)	27	8.3%
Arborvitae	26	8.0%
American Linden	22	6.8%
Hickory (shagbark)	20	6.2%
Apple var.	18	5.5%
White Pine	18	5.5%
Littleleaf Linden	8	2.5%
Norway Spruce	7	2.2%
Eastern Red Cedar	4	1.2%
Deciduous Broadleaf (medium)	4	1.2%
Black Cherry	3	0.9%
Cottonwood	3	0.9%
Pin Oak	3	0.9%
Red Maple	3	0.9%
Red Oak	3	0.9%
Siberian Elm	3	0.9%
Black Walnut	2	0.6%
Hackberry	2	0.6%
River Birch	2	0.6%
Swamp White Oak	2	0.6%
Ash sp.	1	0.3%
Callery Pear	1	0.3%
Boxelder	1	0.3%
Deciduous Broadleaf (small)	1	0.3%
Kentucky Coffeetree	1	0.3%
Japanese Tree Lilac	1	0.3%
Ginkgo	1	0.3%
Honeylocust	1	0.3%
Lilac	1	0.3%
Paper Birch	1	0.3%
Red Pine	1	0.3%
Red Bud	1	0.3%
White Ash var.	1	0.3%
Mountain Ash	1	0.3%
totals--------->	325	100.0%

Age Class

Most of Lamont's trees (31%) are between 12 and 18 inches in diameter at 4.5 ft (Appendix A, Figure 2). Most of the City's trees are bunched in the middle of the sized distribution. It would be nice to see more trees in the smaller-sized classes because that would indicate there are plenty of new trees coming-up to replace older trees, and ash trees, as they die.

DBH (4.5 feet above ground)	# of trees	Percent
0-3 inches	9	2.8%
3-6 inches	34	10.5%
6-12 inches	64	19.7%
12-18 inches	100	30.8%
18-24 inches	46	14.2%
24-30 inches	39	12.0%
30-36 inches	18	5.5%
36-42 inches	15	4.6%
totals------>	325	100.0%

Condition: Wood and Foliage

Both wood condition and leaf condition are good indicators of the overall health of a tree. The foliage condition results indicated that 95% of the trees were in good to fair health, with 5% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 95% of the trees were in good to fair health for wood condition (appendix A, Figure 4 & Appendix B, Figure 3). Trees with wood condition in poor health are 5% of all trees. All of these trees should be looked at more closely (See Appendix B, Figure 3) to see if they are hazardous to the public.

Management Needs

The following summery outlines the specific management needs for some of the street and park trees (Appendix B, Figure 5). Most of the trees (7%) needed no maintenance. Crown Cleaning primarily means pruning out dead and broken branches. Crown raising is where lower branches are pruned-up to assure free passage along sidewalks and other right-of-ways. Staking and training includes making sure the young trees have good branching architecture, and examples of crown reduction include pruning to make room for power lines and removing limbs that are touching structures. Trees recommended for removal had various issues such as being dead; having severe decay problems with their main stem, or growing in a bad location.

None	253	77.8%
Crown Cleaning	27	8.3%
Canopy Raising	17	5.2%
Whole Tree Removal	14	4.3%
Canopy Reduction	8	2.5%
Tree Staking & Training	6	1.8%
Totals------->	325	100.0%

Canopy Cover

The canopy cover of Lamont is approximately 6.6 acres (Appendix A, Figure 4). According to the 2010 census, the City occupies approximately 373 acres.

Land Use and Location

The majority of the City's 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.

<u>Land Use</u>	
Single family residential	40%
Park/vacant/other	60%
<u>Location</u>	
Planting strip	26%
Front yard/Park	74%

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

There are 14 trees that we are recommending to be removed for various reasons. There are 17 trees with poor/rotten wood that should be looked at carefully (Appendix B, Figure 3), one is already dead. All of the trees recommended for cleaning (25 total trees) should also be looked at as many of these may shed limbs that may cause injury to people and property.

Poor tree species

Ash trees in poor health should be assessed for removal (Appendix B, Figure 3 & Appendix B, Figure 4). Two of the 42 trees recommended for removal are ash. Three ash trees had symptoms that have been associated with EAB (canopy dieback in this case).

Pruning Cycle

Proper pruning can extend the life and maintain good health of trees. Pruning also reduces 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 trees that are removed. Since survival rates will not be 100%, it is recommended to plant 1.5 trees for every tree removed. 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 urban forest.

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. *Presently, the forest is heavily planted with Maple species (28%) (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, Siberian elm, willow or black walnut.

Continual Monitoring

Due to the threat of EAB, it is important to continuously check the health of ash trees. This invasive insect is rapidly moving from the East to many of our communities. It is often much more easy to see EAB symptoms that it is to see EAB signs. This is because EAB tends to first infest the top of the trees where it is difficult to thoroughly examine them. 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.

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).

Treatment of Ash Trees

Chemical treatment can be effective, spreading 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. Also, communities and individuals need to weigh potential adverse non-target effects from using toxic pesticides. You should do research to become fully informed before making the decision to treat with pesticides. 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 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 ordinances (Appendix C). The new plantings will be a diverse mix and will not include ash, maple, cottonwood, poplar, box elder, Siberian elm, 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 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.

Proposed Budget Increase

EAB has the potential to kill 100% of the ash trees within the City within a decade of its initial arrival! It is recommended that the City apply for grants to fund replacement tree plantings, *starting now*! 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. There were a total of 42 ash trees surveyed. Because EAB is moving closer every year (and, seems to be spreading faster all the time) we recommend that 1/2 (21 trees) of them be removed and replaced over the next 6 years. You should replant 1.5 trees for every tree that is removed (39 total trees). First, remove the 2 ash with canopy dieback and epicormic branches. Next, remove other ash with signs and symptoms consistent with EAB. Next, remove the 12 other trees recommended for removal. Finally, we recommend that the City adopt a policy of allocating somewhere between $2 to $4 per capita per year into a *forestry budget* to be used for planting, removals and tree maintenance.

Recommended Budget: $10,510 total over 6 years.

FY 2014 Budget
- Removal: $1500 (3 trees @ $500/tree)
- Planting: $350 (7 trees@ $50/tree)
- Watering & Maintenance: $280 ($40/tree for 6 years worth of maintenance)

FY 2015 Budget
- Removal: $1500
- Planting: $350
- Watering & Maintenance: $280

FY 2016 Budget
- Removal: $1000
- Planting: $350
- Watering & Maintenance: $280

FY 2017 Budget
- Removal: $1000
- Planting: $300
- Watering & Maintenance: $240

FY 2018 Budget
- Removal: $1000
- Planting: $300
- Watering & Maintenance: $240

FY 2019 Budget
- Removal: $1000
- Planting: $300
- Watering & Maintenance: $240

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Lamont

Annual Energy Benefits of Public Trees by Species

1/27/2014

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	5.8	444	774.8	759	1,203	(N/A)	12.3	9.2	30.08
Sugar maple	9.9	750	1,324.0	1,298	2,047	(N/A)	10.4	15.6	60.21
Bur oak	8.2	624	1,111.1	1,089	1,713	(N/A)	9.2	13.1	57.11
Norway maple	5.6	429	769.3	754	1,182	(N/A)	8.3	9.0	43.80
Silver maple	8.3	633	1,102.6	1,081	1,713	(N/A)	8.3	13.1	63.46
Northern white cedar	1.5	110	217.8	213	324	(N/A)	8.0	2.5	12.44
American basswood	6.4	487	929.6	911	1,398	(N/A)	6.8	10.7	63.54
Hickory	4.6	347	549.9	539	885	(N/A)	6.1	6.8	44.27
Apple	1.0	76	151.2	148	224	(N/A)	5.5	1.7	12.44
Eastern white pine	2.4	183	283.5	278	461	(N/A)	5.5	3.5	25.62
Littleleaf linden	1.1	81	137.1	134	215	(N/A)	2.5	1.6	26.92
Norway spruce	1.2	94	162.2	159	253	(N/A)	2.2	1.9	36.17
Broadleaf Deciduous	0.5	41	82.8	81	122	(N/A)	1.5	0.9	24.45
Eastern red cedar	0.4	29	57.3	56	85	(N/A)	1.2	0.7	21.30
Other street trees	6.2	474	830.9	814	1,289	(N/A)	12.3	9.8	32.21
Citywide total	63.3	4,801	8,484.0	8,314	13,116	(N/A)	100.0	100.0	40.23

Table 2: Annual Stormwater Benefits

Lamont

Annual Stormwater Benefits of Public Trees by Species

1/27/2014

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	42,847	1,161	(N/A)	12.3	6.6	29.03
Sugar maple	110,174	2,986	(N/A)	10.4	17.0	87.82
Bur oak	85,480	2,317	(N/A)	9.2	13.2	77.22
Norway maple	41,745	1,131	(N/A)	8.3	6.4	41.90
Silver maple	116,470	3,157	(N/A)	8.3	17.9	116.91
Northern white cedar	15,810	428	(N/A)	8.0	2.4	16.48
American basswood	74,044	2,007	(N/A)	6.8	11.4	91.22
Hickory	31,390	851	(N/A)	6.1	4.8	42.54
Apple	3,507	95	(N/A)	5.5	0.5	5.28
Eastern white pine	33,620	911	(N/A)	5.5	5.2	50.62
Littleleaf linden	6,513	177	(N/A)	2.5	1.0	22.07
Norway spruce	29,165	790	(N/A)	2.2	4.5	112.92
Broadleaf Deciduous	4,838	131	(N/A)	1.5	0.8	26.22
Eastern red cedar	5,562	151	(N/A)	1.2	0.9	37.69
Other street trees	48,095	1,303	(N/A)	12.3	7.4	32.59
Citywide total	649,261	17,596	(N/A)	100.0	100.0	53.98

Table 3: Annual Air Quality Benefits

Lamont

Annual Air Quality Benefits of Public Trees by Species

1/27/2014

Species	Deposition (lb) O_3	NO_2	PM_{10}	SO_2	Total Depos. ($)	Avoided (lb) NO_2	PM_{10}	VOC	SO_2	Total Avoided ($)	BVOC Emissions (lb)	BVOC Emissions ($)	Total (lb)	Total ($)	Standard Error	% of Total Trees	Avg. $/tree
Green ash	3.3	0.5	1.9	0.1	19	27.7	4.0	3.9	26.5	173	0.0	0	68.0	192	(N/A)	12.3	4.79
Sugar maple	14.6	2.5	7.3	0.6	79	46.8	6.8	6.5	44.7	293	-11.5	-43	118.5	329	(N/A)	10.4	9.66
Bur oak	10.1	1.6	4.9	0.5	54	39.1	5.7	5.4	37.3	244	0.0	0	104.6	298	(N/A)	9.2	9.94
Norway maple	7.4	1.3	3.8	0.3	41	27.0	3.9	3.7	25.6	168	-1.8	-7	71.3	202	(N/A)	8.3	7.47
Silver maple	19.1	3.2	9.5	0.8	103	39.3	5.8	5.5	37.7	246	-9.9	-37	111.0	312	(N/A)	8.3	11.56
Northern white cedar	1.4	0.3	1.4	0.2	10	7.1	1.0	1.0	6.6	44	-4.9	-18	14.1	36	(N/A)	8.0	1.37
American basswood	10.3	1.7	5.0	0.5	55	31.1	4.5	4.3	29.1	193	-8.7	-33	77.8	216	(N/A)	6.7	9.80
Hickory	2.5	0.4	1.5	0.1	14	21.1	3.1	3.0	20.7	133	0.0	0	52.5	148	(N/A)	6.1	7.38
Apple	0.8	0.1	0.4	0.0	5	4.9	0.7	0.7	4.5	30	0.0	0	12.2	35	(N/A)	5.5	1.92
Eastern white pine	3.8	0.8	3.2	0.5	25	11.1	1.6	1.6	10.9	70	-13.8	-52	19.7	44	(N/A)	5.5	2.42
Littleleaf linden	0.7	0.1	0.4	0.0	4	5.0	0.7	0.7	4.8	32	-0.4	-2	12.2	34	(N/A)	2.5	4.27
Norway spruce	3.6	0.7	2.8	0.4	23	5.8	0.9	0.8	5.6	37	-17.7	-66	3.0	-7	(N/A)	2.1	-0.95
Broadleaf Deciduous	0.9	0.2	0.5	0.0	5	2.7	0.4	0.4	2.5	16	-0.2	-1	7.3	21	(N/A)	1.5	4.14
Eastern red cedar	1.1	0.2	0.9	0.1	7	1.9	0.3	0.3	1.7	12	-3.1	-11	3.4	7	(N/A)	1.2	1.79
Other street trees	6.8	1.2	3.6	0.3	37	29.6	4.3	4.1	28.3	185	-2.9	-11	75.3	211	(N/A)	12.3	5.29
Citywide total	86.4	14.8	47.1	4.6	482	300.3	43.9	41.8	286.7	1,875	-74.9	-281	750.8	2,076	(N/A)	100.0	6.37

Table 4: Annual Carbon Stored

Lamont

Stored CO2 Benefits of Public Trees by Species

1/27/2014

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	113,234	849	(N/A)	12.3	5.3	21.23
Sugar maple	420,355	3,153	(N/A)	10.4	19.6	92.73
Bur oak	328,960	2,467	(N/A)	9.2	15.3	82.24
Norway maple	122,781	921	(N/A)	8.3	5.7	34.11
Silver maple	416,896	3,127	(N/A)	8.3	19.4	115.80
Northern white	8,362	63	(N/A)	8.0	0.4	2.41
American	378,172	2,836	(N/A)	6.8	17.6	128.92
Hickory	84,308	632	(N/A)	6.1	3.9	31.62
Apple	13,879	104	(N/A)	5.5	0.7	5.78
Eastern white pine	31,729	238	(N/A)	5.5	1.5	13.22
Littleleaf linden	17,641	132	(N/A)	2.5	0.8	16.54
Norway spruce	46,112	346	(N/A)	2.2	2.2	49.41
Broadleaf	16,036	120	(N/A)	1.5	0.8	24.05
Eastern red cedar	3,583	27	(N/A)	1.2	0.2	6.72
Other street trees	65,843	1,089	(N/A)	12.3	6.8	27.22
Citywide total	2,147,206	16,104	(N/A)	100.0	100.0	49.40

Table 5: Annual Carbon Sequestered

Lamont

Annual CO_2 Benefits of Public Trees by Species

1/27/2014

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
Green ash	12,551	94	-544	-8	-4	9,810	74	21,810	164	(N/A)	12.3	9.0	4.09
Sugar maple	22,017	165	-2,018	-7	-15	16,565	124	36,557	274	(N/A)	10.4	15.0	8.06
Bur oak	19,050	143	-1,579	-6	-12	13,797	103	31,263	234	(N/A)	9.2	12.8	7.82
Norway maple	8,991	67	-589	-5	-4	9,471	71	17,868	134	(N/A)	8.3	7.3	4.96
Silver maple	32,765	246	-2,001	-5	-15	13,986	105	44,744	336	(N/A)	8.3	18.4	12.43
Northern white cedar	1,308	10	-40	-5	0	2,434	18	3,697	28	(N/A)	8.0	1.5	1.07
American basswood	21,780	163	-1,815	-4	-14	10,761	81	30,721	230	(N/A)	6.8	12.6	10.47
Hickory	9,179	69	-405	-4	-3	7,659	57	16,429	123	(N/A)	6.1	6.7	6.16
Apple	1,529	11	-67	-4	-1	1,673	13	3,133	23	(N/A)	5.5	1.3	1.31
Eastern white pine	2,108	16	-152	-4	-1	4,051	30	6,003	45	(N/A)	5.5	2.5	2.50
Littleleaf linden	2,786	21	-85	-2	-1	1,792	13	4,492	34	(N/A)	2.5	1.8	4.21
Norway spruce	1,396	10	-221	-1	-2	2,082	16	3,255	24	(N/A)	2.2	1.3	3.49
Broadleaf Deciduous	881	7	-77	-1	-1	908	7	1,711	13	(N/A)	1.5	0.7	2.57
Eastern red cedar	40	0	-17	-1	0	642	5	664	5	(N/A)	1.2	0.3	1.25
Other street trees	11,652	87	-697	-8	-5	10,480	79	21,428	161	(N/A)	12.3	8.8	4.02
Citywide total	148,035	1,110	-10,307	-64	-78	106,111	796	243,776	1,828	(N/A)	100.0	100.0	5.61

Table 6: Annual Social and Aesthetic Benefits

Lamont

Annual Aesthetic/Other Benefits of Public Trees by Species

1/27/2014

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	1,413	(N/A)	12.3	9.9	35.33
Sugar maple	2,291	(N/A)	10.4	16.1	67.38
Bur oak	1,625	(N/A)	9.2	11.4	54.15
Norway maple	902	(N/A)	8.3	6.3	33.41
Silver maple	2,647	(N/A)	8.3	18.6	98.04
Northern white cedar	391	(N/A)	8.0	2.8	15.05
American basswood	1,543	(N/A)	6.8	10.9	70.14
Hickory	921	(N/A)	6.1	6.5	46.07
Apple	85	(N/A)	5.5	0.6	4.70
Eastern white pine	579	(N/A)	5.5	4.1	32.16
Littleleaf linden	324	(N/A)	2.5	2.3	40.56
Norway spruce	164	(N/A)	2.2	1.2	23.37
Broadleaf Deciduous	96	(N/A)	1.5	0.7	19.27
Eastern red cedar	21	(N/A)	1.2	0.2	5.34
Other street trees	1,215	(N/A)	12.3	8.6	30.38
Citywide total	14,218	(N/A)	100.0	100.0	43.61

Table 7: Summary of Benefits in Dollars

Average Annual Benefits of Public Trees by Species

Species	Energy	CO2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Green ash	$1,203	$164	$192	$1,161	$1,413	$4,132.56	(±0)	8.5
Sugar maple	$2,047	$274	$329	$2,986	$2,291	$7,926.77	(±0)	16.2
Bur oak	$1,713	$234	$298	$2,317	$1,625	$6,186.90	(±0)	12.7
Norway maple	$1,182	$134	$202	$1,131	$902	$3,551.75	(±0)	7.3
Silver maple	$1,713	$336	$312	$3,157	$2,647	$8,164.61	(±0)	16.7
Northern white cedar	$324	$28	$36	$428	$391	$1,206.48	(±0)	2.5
American basswood	$1,398	$230	$216	$2,007	$1,543	$5,393.74	(±0)	11.0
Hickory	$885	$123	$148	$851	$921	$2,928.49	(±0)	6.0
Apple	$224	$23	$35	$95	$85	$461.66	(±0)	1.0
Eastern white pine	$461	$45	$44	$911	$579	$2,039.86	(±0)	4.2
Littleleaf linden	$215	$34	$34	$177	$324	$784.23	(±0)	1.6
Norway spruce	$253	$24	$-7	$790	$164	$1,224.97	(±0)	2.5
Broadleaf Deciduous Medium	$122	$13	$21	$131	$96	$383.24	(±0)	0.8
Eastern red cedar	$85	$5	$7	$151	$21	$269.44	(±0)	0.6
Other street trees	$1,289	$161	$211	$1,303	$1,215	$4,179.59	(±0)	8.6
Citywide total	$13,116	$1,828	$2,076	$17,596	$14,218	$48,834.29	(±0)	100.0

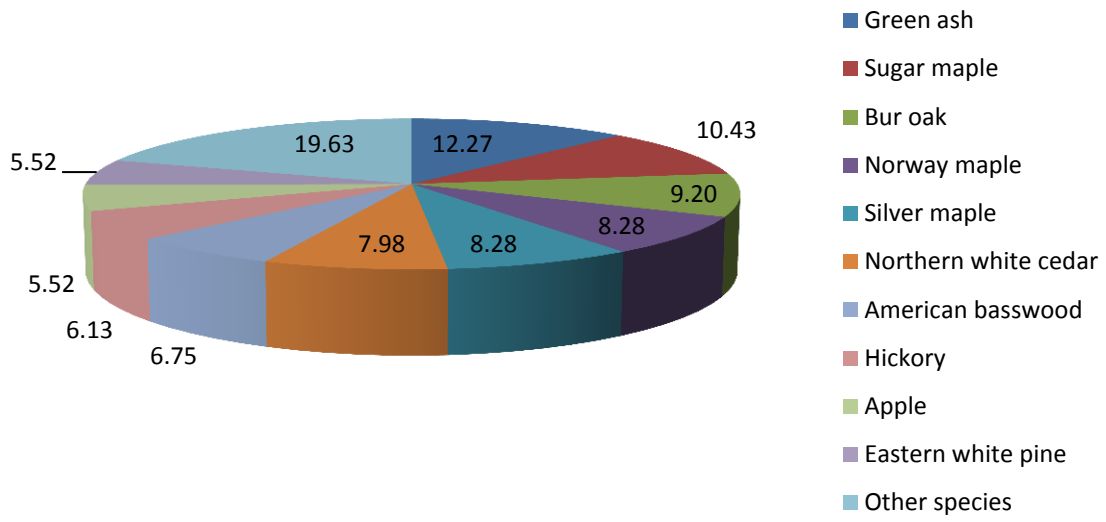

Figure 1: Species Distribution

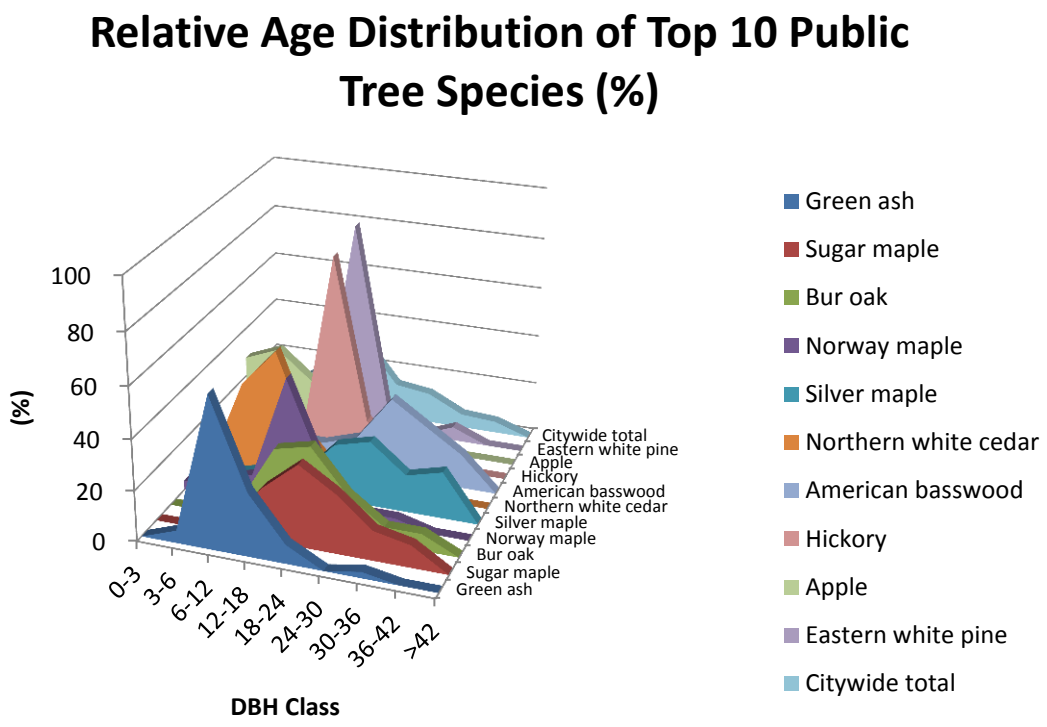

Figure 2: Relative Age Class

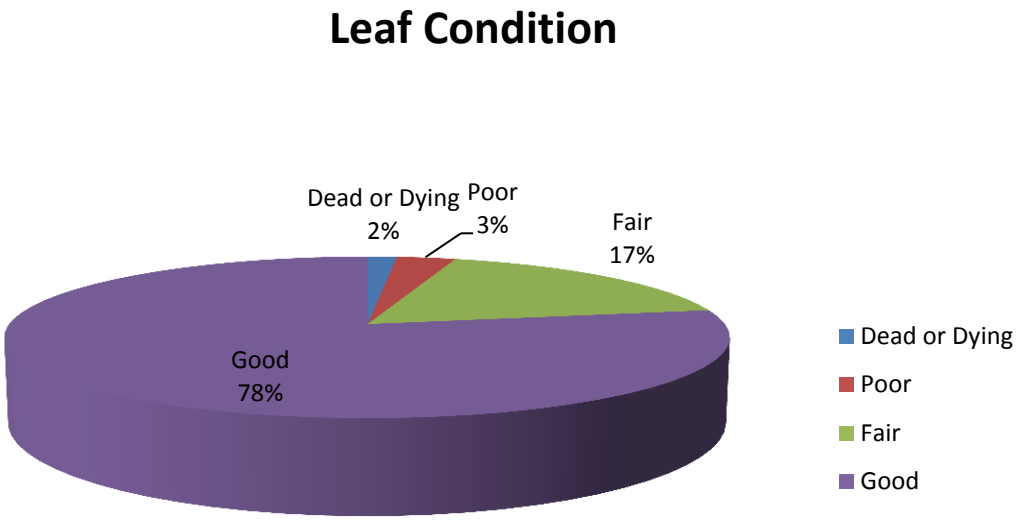

Figure 3: Foliage Condition

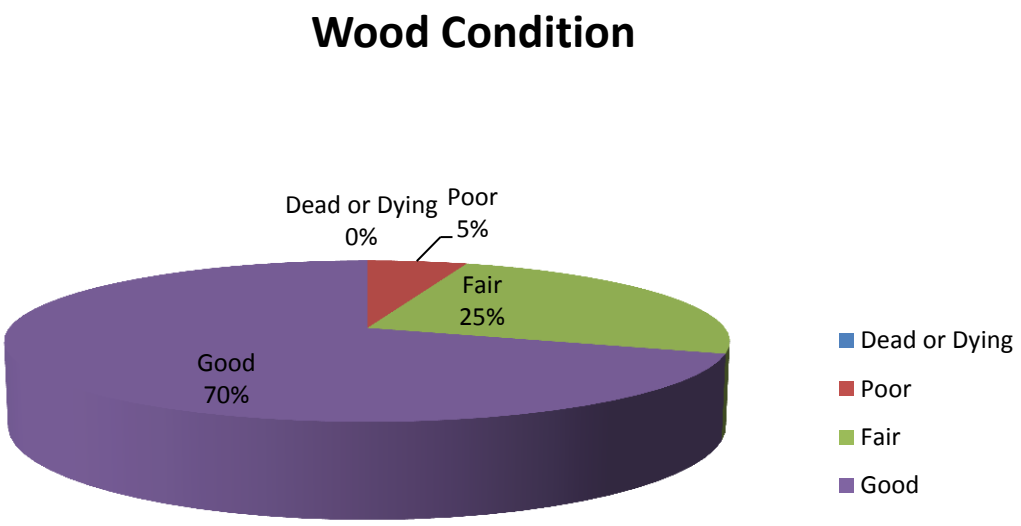

Figure 4: Wood Condition

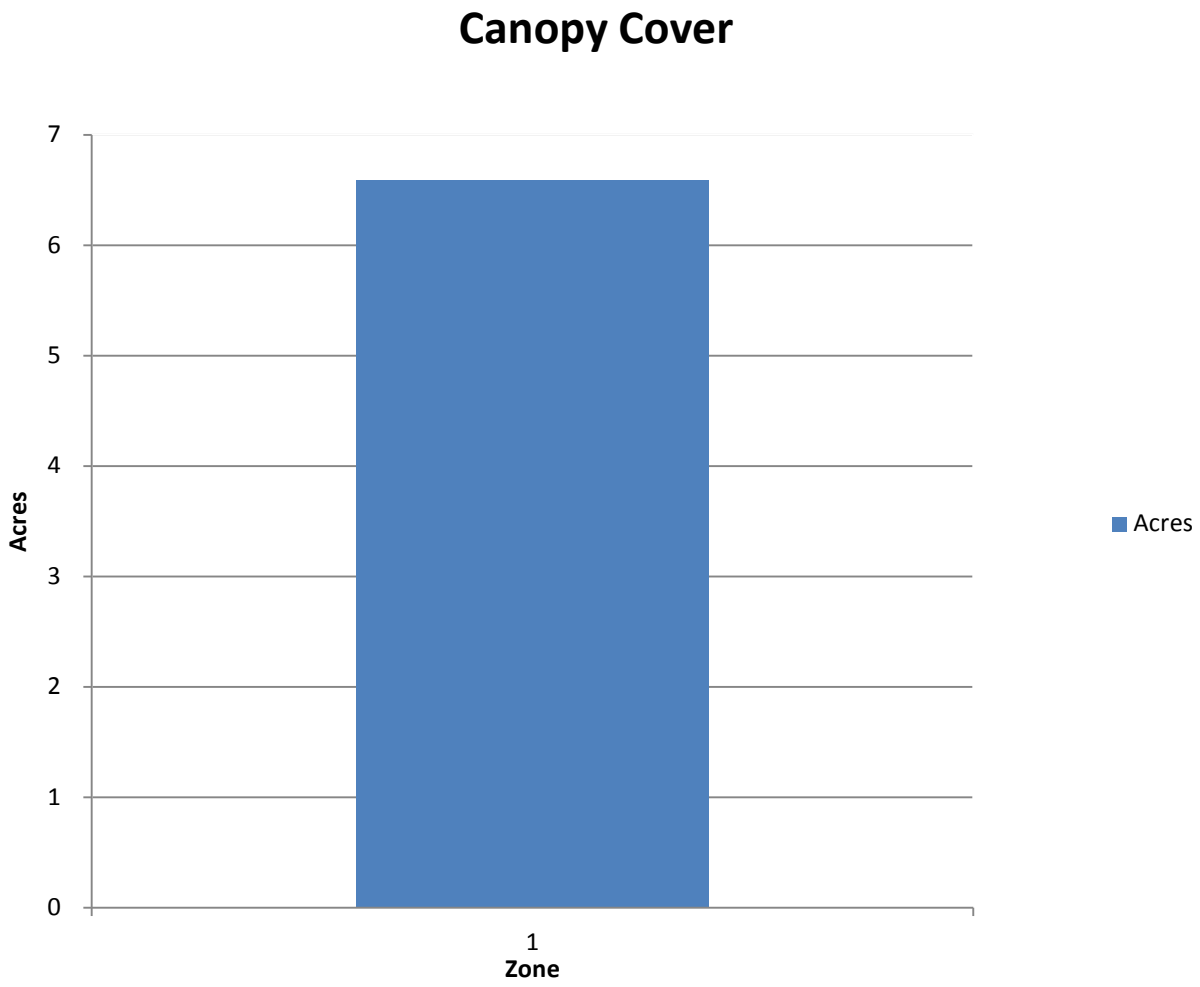

Figure 5: Canopy Cover in Acres

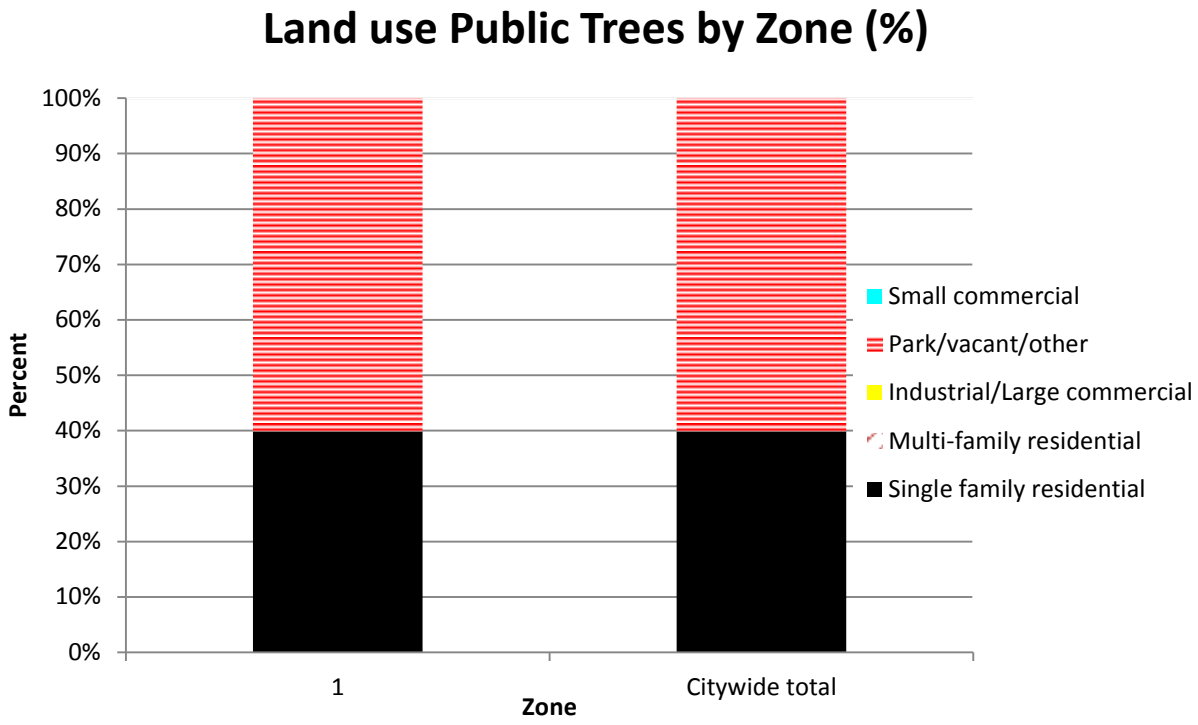

Figure 6: Land Use of city/park trees

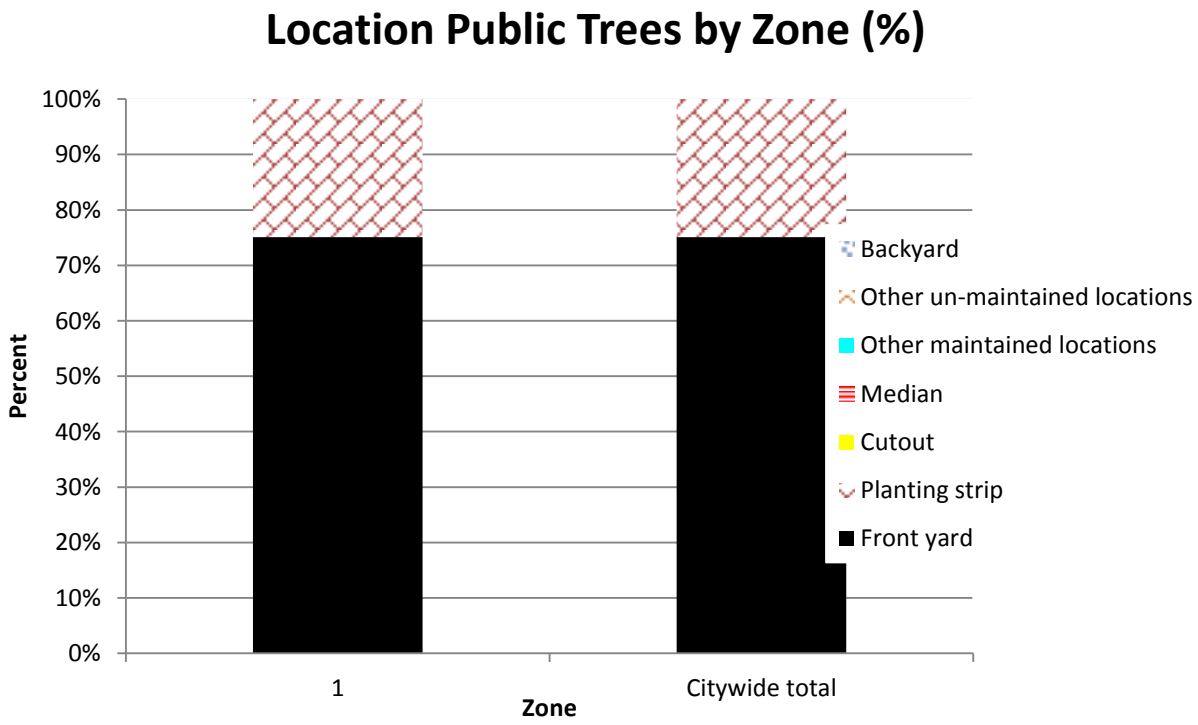

Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping

Figure 1: Location of Ash Trees

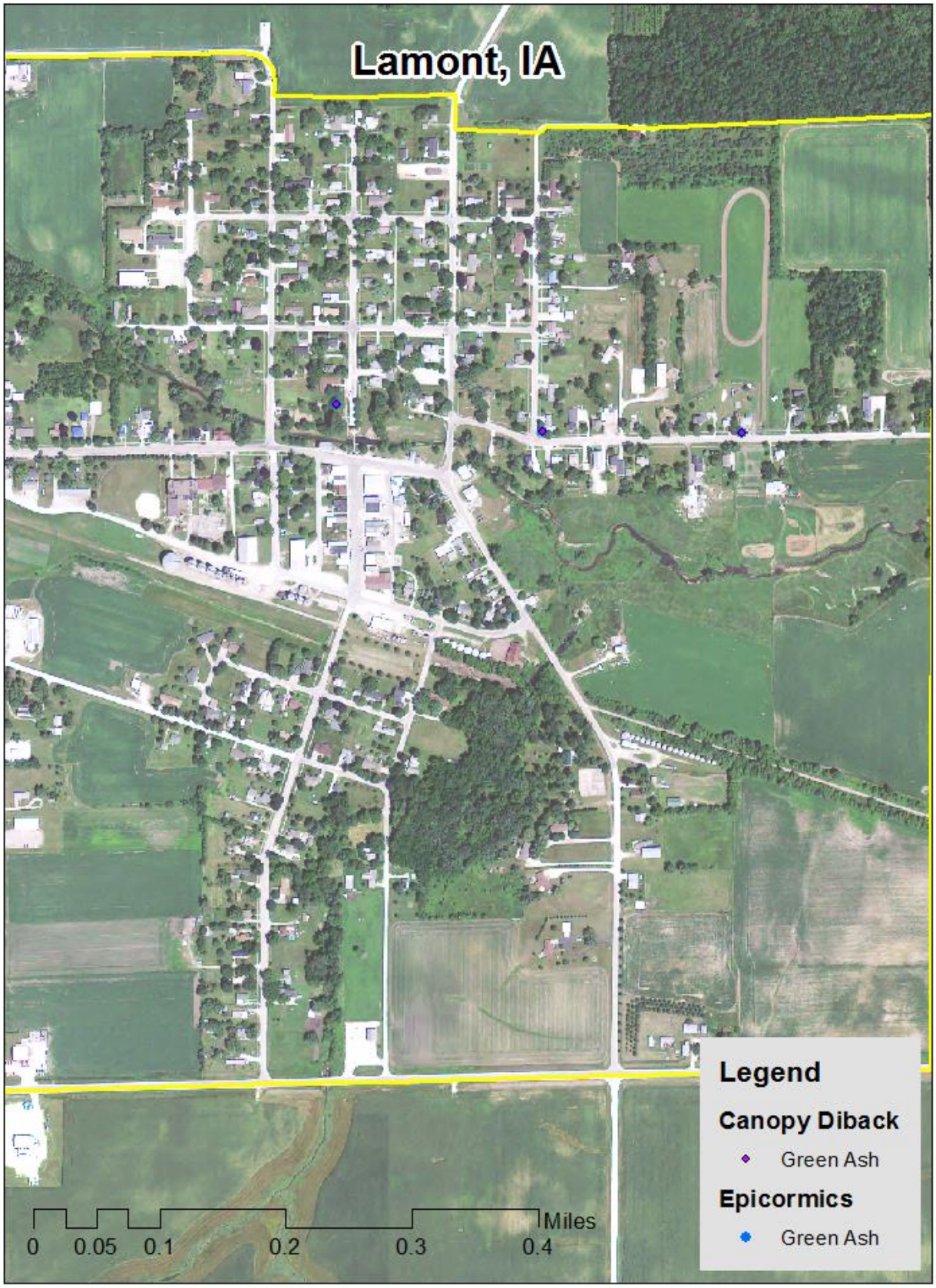

Figure 2: Location of EAB symptoms

Figure 3: Location of Poor Condition Trees

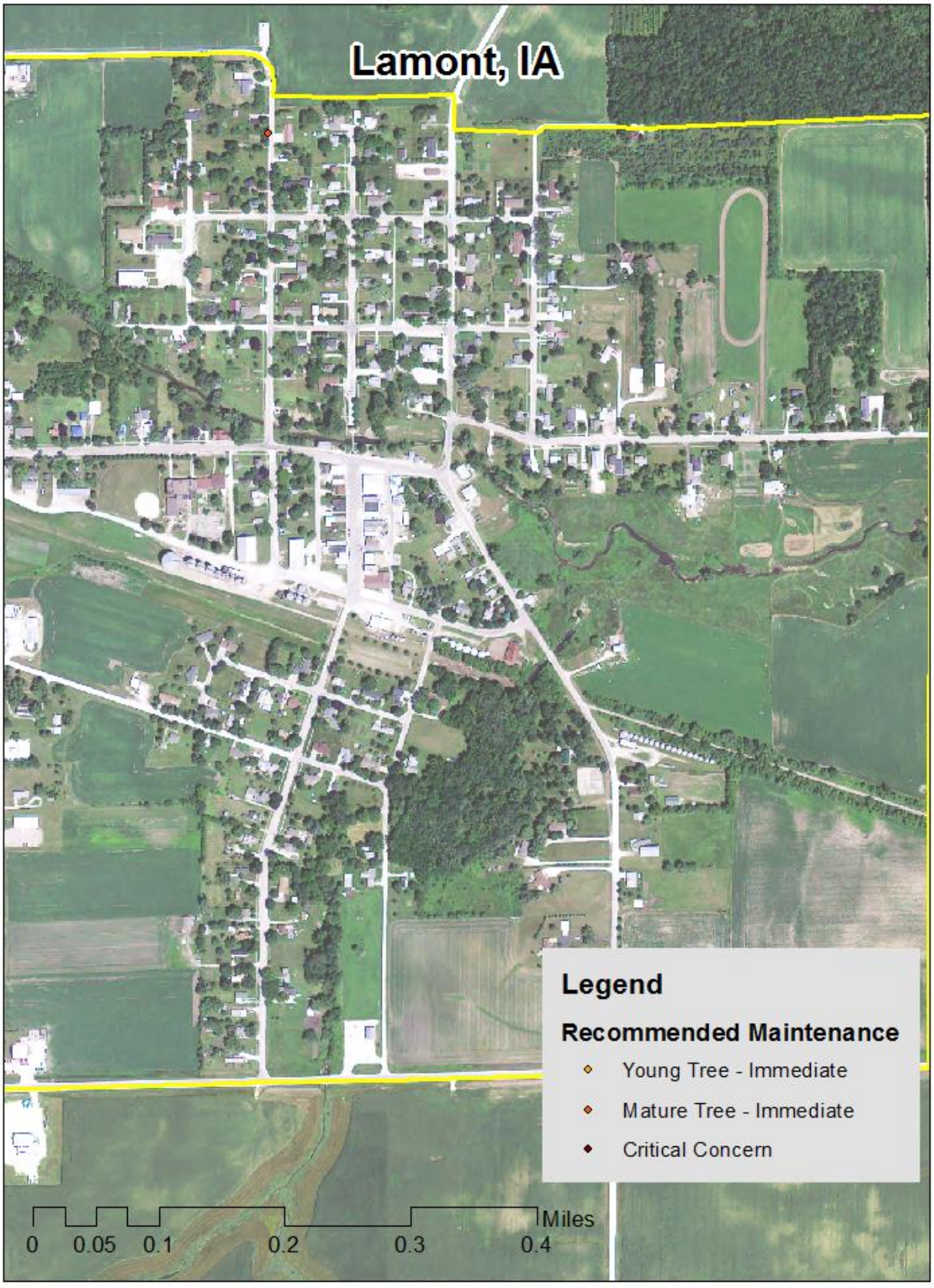

Figure 4: Location of Trees with Recommended Maintenance

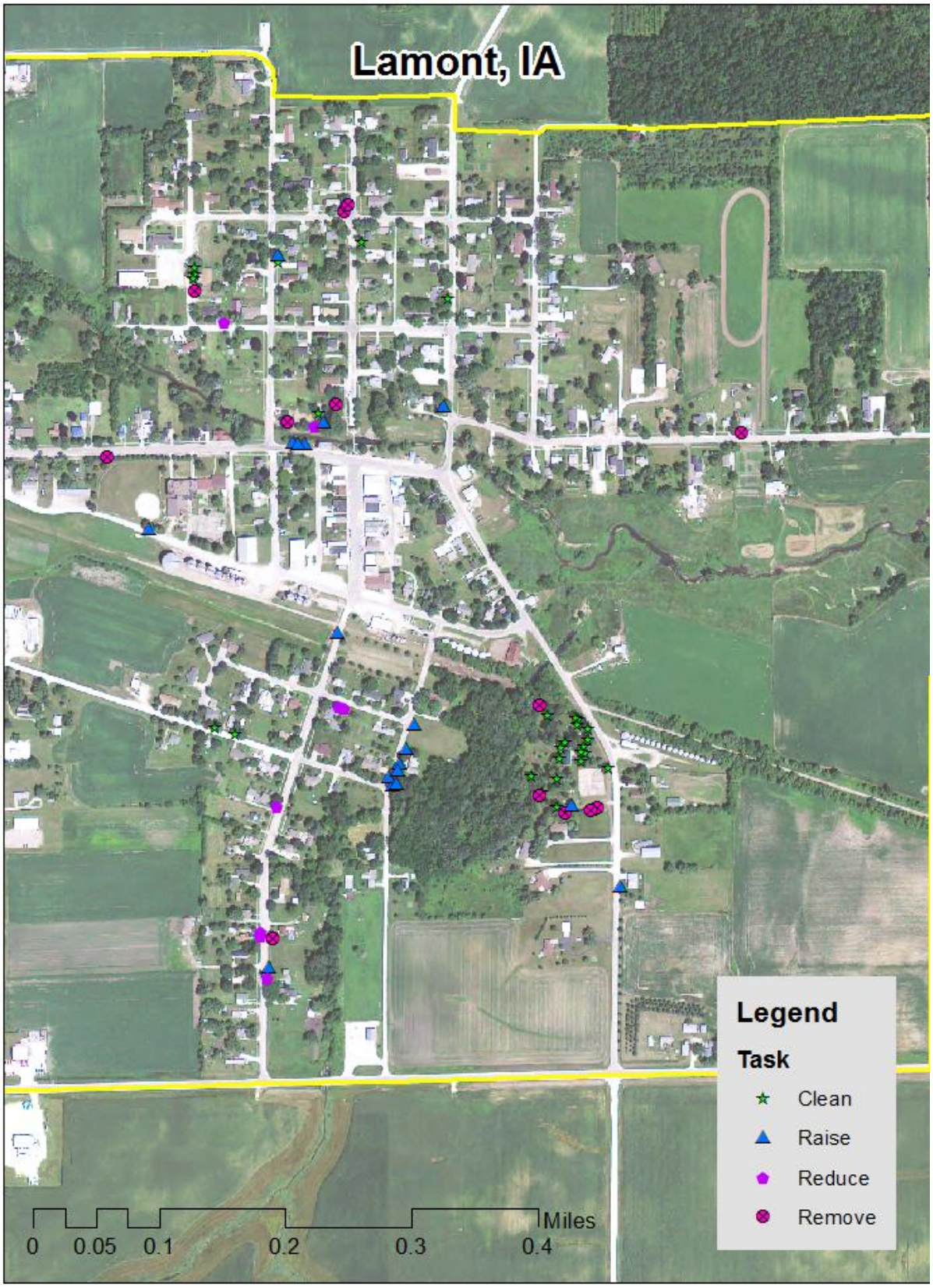

Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*

Appendix C: Lamont Tree Ordinances

CHAPTER 151

TREES

151.01 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.

151.02 PLANTING RESTRICTIONS. No tree shall be planted in any parking or street except in accordance with the following:

1. Alignment. All trees planted in any street shall be planted in the parking midway between the outer line of the sidewalk and the curb. In the event a curb line is not established, trees shall be planted on a line ten (10) feet from the property line.

2. Spacing. Trees shall not be planted on any parking which is less than nine (9) feet in width, or contains less than eighty-one (81) square feet of exposed soil surface per tree. Trees shall not be planted closer than twenty (20) feet from street intersections (property lines extended) and ten (10) feet from driveways. If it is at all possible trees should be planted inside the property lines and not between the sidewalk and the curb.

3. Prohibited Trees. No person shall plant in any street any fruit-bearing tree or any tree of the kinds commonly known as cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut.

151.03 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])

151.04 TRIMMING TREES TO BE SUPERVISED. Except as allowed in Section 151.03, 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.

151.05 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.

151.06 INSPECTION AND REMOVAL. The Council shall inspect or cause to be inspected any trees or shrubs in the City reported or suspected to be infected with or damaged by any disease or insect or disease pests, and such trees and shrubs shall be subject to removal as follows:

1. Removal from 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, and that danger to other trees within the City is imminent, the Council shall immediately cause such condition to be corrected by treatment or removal so as to destroy or prevent as fully as possible the spread of the disease or the insect or disease pests. 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. Removal from Private Property. If it is determined with reasonable certainty that any such condition exists on private property and that the danger to other trees within the City is imminent, the Council shall immediately notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days of said notification. If such owner, occupant or person in charge of said property fails to comply within fourteen (14) days of receipt of notice, the Council may cause the nuisance to be removed and the cost assessed against the property.

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

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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.