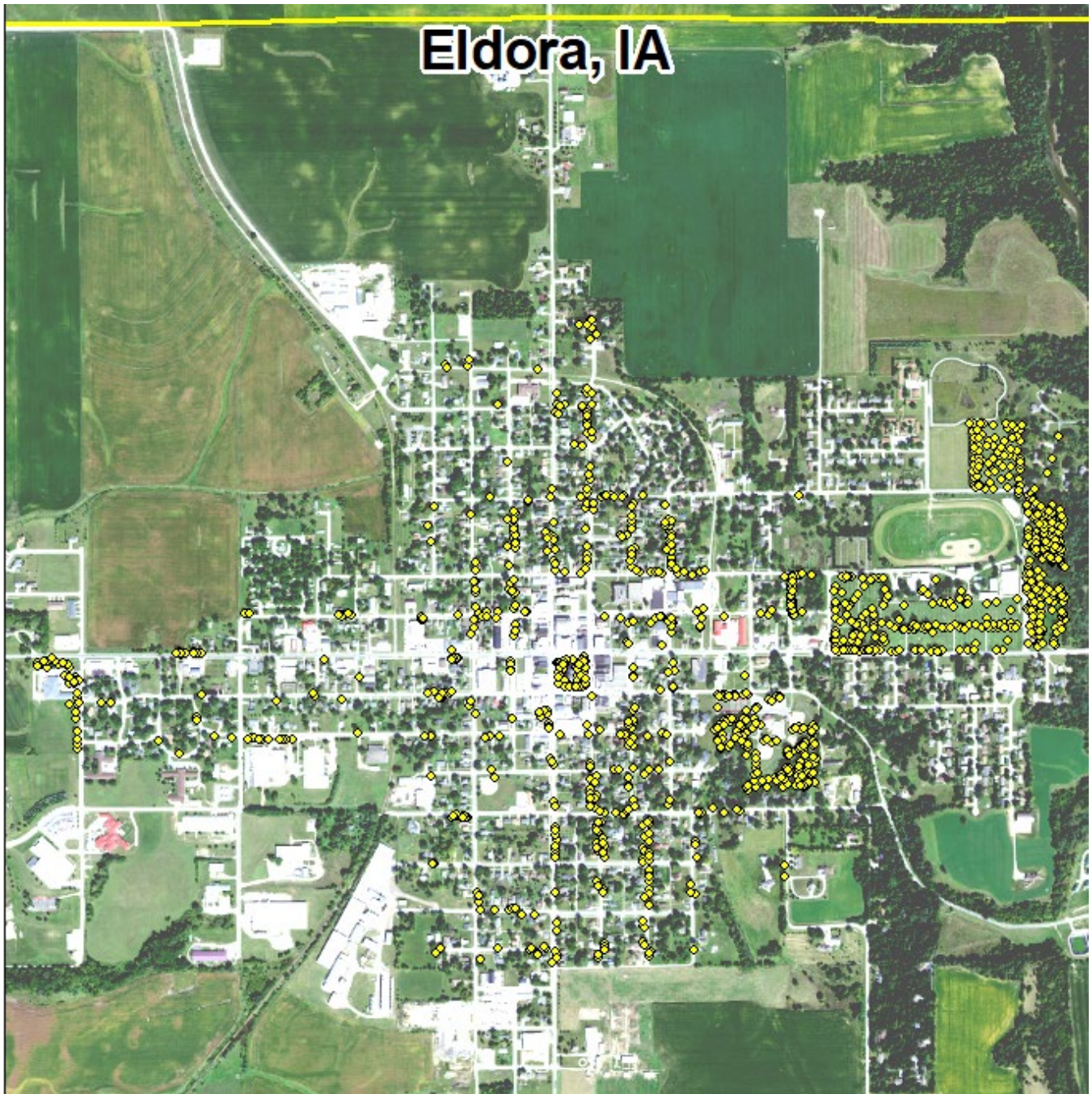


Eldora, IA



2019 Urban Forest Management Plan
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Executive Summary

Overview

This plan was developed to assist the City of Eldora 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 14% of Eldora'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 2018, 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 1,311 trees inventoried.

- Eldora's trees provide \$230,055 of benefits annually, an average of \$175 a tree
- There are over 63 species of trees
- The top three genera are: Oak 26%, Maple 22%, and Ash 14%
- 50% of trees are in need of some type of management
- 150 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.

- 150 trees needing removal, **City ownership of the trees recommended for removal should be verified prior to any removal**
- 69 of the 177 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: cottonwood, poplar, silver maple, box elder, American elm, Siberian elm, hawthorn, locust with thorns, female ginkgo, Russian olive, fir, juniper, larch, pine, Douglas fir, arborvitae, yew, hemlock, white birch, pin oak, willow, or catalpa
- Check ash trees with a visual survey yearly
- With the current budget it could take 12 years to remove ash – Suggestion: request a budget increase and apply for grants to plant replacement trees

Introduction

This plan was developed to assist Eldora 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 or treatment and replacement planting. With proper planning and management of the current canopy in Eldora, these costs can be extended over years and public safety issues from dead and dying ash trees mitigated.

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

Inventory

In 2018, 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 1060 city trees was entered into the USDA Forest service program Street Tree Resource Analysis Tool for Urban forestry Management as part of the i-Tree suite. The following are results from the i-Tree STREETS analysis.

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Eldora's trees reduce energy related costs by approximately \$63,035 annually (Appendix A, Table 1). These savings are both in Electricity (298.9 MWh) and in Natural Gas (41,174.2 Therms).

Annual Stormwater Benefits

Eldora's trees intercept about 63,035 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides \$98,407 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 Eldora, it is estimated that trees remove 3,696.8 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 \$10,203 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Eldora, trees sequester about 570,121 lbs of carbon a year with an associated value of \$7,527 (Appendix A, Table 5). In addition, the trees store 13,394,774 lbs of carbon, with a yearly benefit of \$100,461 (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. Eldora receives \$50,882 (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, Eldora's trees provide \$230,055 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 1311 trees in Eldora provide approximately \$175 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Eldora has over 63 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Oak	337	26%
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Maple	285	22%
Ash	177	14%
Apple (crabapple)	81	6%
Spruce	72	5%
Pine	65	5%
Other	42	3%
Basswood/Linden	41	3%
Hackberry	30	2%
Walnut	30	2%
Honeylocust	20	2%
White Cedar	18	1%
Cedar	15	1%
Sycamore	11	1%
Pear	11	1%
Hickory	9	1%
Redbud	9	1%
Cherry	9	1%
Willow	9	1%
Dogwood	7	1%
Catalpa	5	<1%
Elm	5	<1%
Magnolia	4	<1%
Poplar/Cottonwood	4	<1%
black locust	3	<1%
Birch	2	<1%
Tuliptree	2	<1%
Mulberry	2	<1%
Yellowwood	1	<1%
Ginkgo	1	<1%
Kentucky Coffeetree	1	<1%
Ironwood	1	<1%
Tree lilac	1	<1%

Age Class

Most of Eldora's trees (64%) are between 12 and 36 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. Eldora's size curve is high in the middle, indicating a middle aged 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 Eldora indicate that 58% of the trees are in good health, with only 17% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 53% of Eldora'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 13% is an estimate of trees that need management follow up.

Management Needs

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

Crown Cleaning	398	30%
Crown Raising	30	2%
Tree Staking	28	2%
Tree Removal	150	11%
Crown Reduction	31	2%
Treat Pest	20	1%

Canopy Cover

The total canopy with both private and public trees is 19%, 525 acres. The canopy cover included in the Eldora inventory includes approximately 34 acres (Appendix A, Figure 4). The City's Canopy goal is to increase canopy by 3%, in 30 years. To achieve this goal it is estimated that 202 trees need to be planted annually on public and private land.

Land Use and Location

The majority of Eldora'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	30%
Park/vacant/other	61%
Industrial/Large commercial	0%
Small commercial	4%
Multifamily residential	<1%

Location

Planting strip	37%
Other maintained locations	13%
Cutout (surrounded by pavement)	1%
Front yard	49%

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

Eldora has 26 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 36 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.

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 150 removals, 43 are ash trees. There are a total of 177 ash trees, and 69 of those have signs and symptoms that have been associated with EAB. In addition, there are 39 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 Eldora.

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 (22%) (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 prohibited for use on City streets due to hazardous thorns, weak wood, and messy fruit, to disease or insects or undesirable growth habits include: cottonwood, poplar, silver maple, box elder, American elm, Siberian elm, hawthorn, locust with thorns, female ginkgo, Russian olive, fir, juniper, larch, pine, Douglas fir, arborvitae, yew, hemlock, white birch, pin oak, willow or catalpa, as outlined in section 151.09 of the city ordinance (Appendix C). All trees planted must meet the restrictions in city ordinance 151.09 (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.

Six Year Maintenance Plan with No Additional Funding

Year 1

- Removal: 30 trees - 26 critical concern trees and 4 largest immediate
- Planting and Replacement: 36 trees to be planted in open locations
- Young Tree Pruning & Maintenance:
- Visual Survey for signs and symptoms of EAB

Year 2

- Removal: 20 immediate trees
- Planting and Replacement: 24 trees in open locations from year one removals
- Young Tree Pruning & Maintenance:
- Routine trimming: Contract to trim 1/3 of the city trees
- Visual Survey for signs and symptoms of EAB

Year 3

- Removal: 30 trees – 16 immediate and 14 ash in poor health
- Planting and Replacement: 36 trees to be planted in open locations and locations from previous removals
- Young Tree Pruning & Maintenance:
- Visual Survey for signs and symptoms of EAB

Year 4

- Removal: 20 trees
- *Or saving for ash tree treatment and/or future ash removal
- Planting and Replacement: 24 trees in open locations from previous removals
- Routine trimming: Contract to trim 1/3 of the city trees
- Young Tree Pruning & Maintenance:
- Visual Survey for signs and symptoms of EAB

Year 5

- Removal: 30 trees - removal of any new critical concern trees and ash in poor health
- *Or saving for ash tree treatment and/or future ash removal
- Planting and Replacement: 36 trees to be planted in open locations and locations from previous removals
- Young Tree Pruning & Maintenance:
- Visual Survey for signs and symptoms of EAB

Year 6

- Removal: 20 trees - removal of any new critical concern trees and ash in poor health
- *Or saving for ash tree treatment and/or future ash removal

Planting and Replacement: 24 trees in open locations from previous removals
Routine trimming: Contract to trim 1/3 of the city trees
Young Tree Pruning & Maintenance:
Visual Survey for signs and symptoms of EAB

*Reduction of ash over 6 years: Approximately 43 ash trees removed (approximately 24% of ash). It will take approximately 12 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 \$50,000 a year.

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*

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 151.09 (Appendix C). The new plantings will be a diverse mix and will not include cottonwood, poplar, silver maple, box elder, American elm, Siberian elm, hawthorn, locust with thorns, female ginkgo, Russian olive, fir, juniper, larch, pine, Douglas fir, arborvitae, yew, hemlock, white birch, pin oak, willow or catalpa, as outlined in section 151.09 of the city ordinance (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 genera other than ash will be prioritized by hazardous or emergency situations only.

Monitoring

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

Private Ash Trees

It is strongly recommended that private property owners start removing ash trees on their property upon arrival of EAB if preventative treatments are not being used. City Code 151.06 states “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 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 \$153,000 over 6 years (\$25,500/year)

FY 2019 Budget

Removal: \$21,000

Planting: \$2,400

Watering & Maintenance: \$2,100

FY 2020 Budget

Removal: \$14,000
Planting: \$2,400
Routine trimming: \$7,500
Watering & Maintenance: \$1,200

FY 2021 Budget

Removal: \$21,000
Planting: \$2,400
Watering & Maintenance: \$2,100

FY 2022 Budget

Removal: \$14,000
Planting: \$2,400
Routine trimming: \$1,700
Watering & Maintenance: \$1200

FY 2023 Budget

Removal: \$21,000
*Or saving for ash tree treatment and/or future ash removal
Planting: \$2,400
Watering & Maintenance: \$2,100

FY 2024 Budget

Removal: \$14,000
*Or saving for ash tree treatment and/or future ash removal
Planting: \$2,400
Routine trimming: \$1,700
Watering & Maintenance: \$1200

***Reduction of ash over 6 years: approximately 43 ash trees removed (approximately 24% of ash). It will take approximately 12 years to remove all ash with the current budget.**

Purposed Budget Increase

EAB could potentially kill all ash trees in Eldora within 4 years of its arrival. To remove all ash trees within 6 years the budget would need to be increased to \$50,000 a year. Additionally, it is recommended that Eldora 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 for \$1,200 (every other year treatment). This would be 8 trees selected for treatment, and Eldora would

still need to find \$118,300 for removal. Alternatively, if there are 50 treatable trees, it would cost approximately \$15,000 a year for treatment and leave \$88,900 for removal. These are alternatives to straight removal of ash trees. However, whether or not the treatment option is selected, there will be an increased cost of dealing with ash trees if EAB is found in Eldora. It is suggested to consider increasing the budget to plan for this.

Works Cited

Census Bureau. 2010. <http://censtats.census.gov/data/IA/1601964290.pdf> (April, 2013)

USDA Forest Service, et al. 2006. i-Tree Software Suite v1.0 User's Manual. Pp. 27-40.

McPherson EG, Simpson JR, Peper PJ, Gardner SL, Vargas KE, Ho J, Maco S, Xiao Q. 2005b. City of Charleston, South Carolina, municipal forest resource analysis. Internal Tech Rep. Davis, CA: U.S. Department of Agriculture, Center for Urban Forest Research. p. 57

Nowak, DJ and JF Dwyer. 2007. Understanding the benefits and costs of urban forest ecosystems. In: Kuser, J. (ed.) Urban and Community Forestry in the Northeast. New York: Springer. Pp. 25-46.

Peper, Paula J; McPherson, E Gregory; Simpson, James R; Vargas, Kelaine E; Xiao, Qingfu 2009. Lower Midwest community tree guide: benefits, costs, and strategic planting. Gen. Tech. Rep. PSW-GTR-219. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. p.115

Appendix A: i-Tree Data

Table 1: Annual Energy Ben

Eldora

Annual Energy Benefits of Public Trees

2/6/2019

Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
White oak	35.2	2,668	4,790.9	4,695	7,363	(N/A)	9.8	11.7	57.52
Bur oak	39.8	3,019	5,431.9	5,323	8,342	(N/A)	8.7	13.2	73.18
Sugar maple	25.8	1,960	3,455.7	3,387	5,347	(N/A)	7.6	8.5	53.47
Green ash	27.6	2,096	3,761.6	3,686	5,783	(N/A)	6.9	9.2	64.25
Ash	22.3	1,691	3,194.7	3,131	4,821	(N/A)	6.3	7.6	58.09
Apple	6.3	475	941.2	922	1,397	(N/A)	6.2	2.2	17.25
Norway maple	22.6	1,718	3,270.1	3,205	4,923	(N/A)	6.1	7.8	61.54
Eastern white pine	10.8	817	1,435.7	1,407	2,224	(N/A)	4.8	3.5	35.31
Silver maple	15.3	1,164	2,029.0	1,988	3,152	(N/A)	3.3	5.0	73.31
Northern red oak	5.8	438	801.7	786	1,224	(N/A)	3.2	1.9	29.14
Norway spruce	7.1	539	949.2	930	1,469	(N/A)	3.2	2.3	34.98
Black walnut	9.0	684	1,247.7	1,223	1,906	(N/A)	2.3	3.0	63.55
Northern hackberry	8.5	642	1,191.0	1,167	1,809	(N/A)	2.3	2.9	60.31
Oak	8.2	623	1,129.7	1,107	1,730	(N/A)	2.2	2.7	59.66
Maple	7.0	529	961.1	942	1,470	(N/A)	2.0	2.3	56.55
Littleleaf linden	3.3	250	477.9	468	719	(N/A)	1.6	1.1	34.22
Black maple	5.4	408	749.0	734	1,142	(N/A)	1.5	1.8	57.11
Honeylocust	5.9	447	744.7	730	1,176	(N/A)	1.5	1.9	58.82
Broadleaf Deciduous Small	0.8	57	116.2	114	171	(N/A)	1.5	0.3	8.55
American basswood	3.0	228	445.7	437	665	(N/A)	1.4	1.1	34.98
Swamp white oak	2.3	177	308.9	303	480	(N/A)	1.4	0.8	25.25
Northern white cedar	3.3	253	442.7	434	687	(N/A)	1.4	1.1	38.17
Blue spruce	1.7	130	239.9	235	365	(N/A)	1.3	0.6	21.45
Eastern red cedar	1.7	127	246.7	242	369	(N/A)	1.1	0.6	24.57
Spruce	1.2	88	144.9	142	230	(N/A)	0.9	0.4	19.15
Conifer Evergreen Large	1.4	104	185.4	182	286	(N/A)	0.8	0.5	25.96
American sycamore	3.3	253	457.9	449	701	(N/A)	0.8	1.1	63.75
Red maple	1.9	143	254.2	249	392	(N/A)	0.8	0.6	39.18
Willow	1.0	76	153.6	151	227	(N/A)	0.7	0.4	25.23
Hickory	1.5	111	197.6	194	305	(N/A)	0.7	0.5	33.89
Eastern redbud	0.2	15	34.2	33	49	(N/A)	0.7	0.1	5.40
Pear	0.5	39	88.4	87	125	(N/A)	0.7	0.2	13.93
Plum	0.4	30	60.3	59	89	(N/A)	0.6	0.1	11.09
Northern catalpa	0.5	38	65.0	64	101	(N/A)	0.4	0.2	20.25
Dogwood	0.1	7	15.8	15	22	(N/A)	0.4	0.0	4.50
Eastern cottonwood	1.4	109	201.1	197	306	(N/A)	0.3	0.5	76.46
Pin oak	1.1	85	141.6	139	224	(N/A)	0.3	0.4	55.88
Amur maple	0.5	36	72.9	71	108	(N/A)	0.3	0.2	26.97
Broadleaf Deciduous Medium	0.6	44	76.6	75	119	(N/A)	0.3	0.2	29.78
Southern magnolia	0.1	6	14.1	14	20	(N/A)	0.3	0.0	4.98
White ash	0.9	71	113.1	111	182	(N/A)	0.3	0.3	45.48
Broadleaf Evergreen Small	0.0	2	4.6	4	6	(N/A)	0.2	0.0	2.12
Conifer Evergreen Small	0.0	1	2.0	2	3	(N/A)	0.2	0.0	0.93
American elm	0.5	36	63.2	62	98	(N/A)	0.2	0.2	32.62
Black locust	1.0	73	142.2	139	213	(N/A)	0.2	0.3	70.84
Mulberry	0.1	6	13.5	13	19	(N/A)	0.2	0.0	9.53
River birch	0.4	27	53.6	53	80	(N/A)	0.2	0.1	39.91
Siberian elm	0.4	32	56.8	56	88	(N/A)	0.2	0.1	43.84
Callery pear	0.3	21	35.7	35	56	(N/A)	0.2	0.1	27.88
Tulip tree	0.1	7	14.2	14	21	(N/A)	0.2	0.0	10.65
Boxelder	0.4	32	54.7	54	85	(N/A)	0.2	0.1	42.69
Scotch pine	0.3	20	29.3	29	48	(N/A)	0.2	0.1	24.14
Flowering dogwood	0.0	1	1.2	1	2	(N/A)	0.2	0.0	0.87
Kentucky coffeetree	0.0	0	0.5	0	1	(N/A)	0.1	0.0	0.66
Eastern hophornbeam	0.0	0	0.6	1	1	(N/A)	0.1	0.0	0.87
Black cherry	0.0	2	3.8	4	5	(N/A)	0.1	0.0	5.40

efits

Ginkgo	0.0	0	0.4	0	1 (N/A)	0.1	0.0	0.57
Yellowwood	0.0	0	0.8	1	1 (N/A)	0.1	0.0	1.10
Quaking aspen	0.0	0	0.5	0	1 (N/A)	0.1	0.0	0.66
UNKNOWN	0.0	0	0.0	0	0 (N/A)	0.1	0.0	0.00
Japanese tree lilac	0.0	0	0.6	1	1 (N/A)	0.1	0.0	0.87
Scarlet oak	0.0	0	0.5	0	1 (N/A)	0.1	0.0	0.66
Basswood	0.3	25	46.9	46	71 (N/A)	0.1	0.1	70.91
Red pine	0.1	4	9.5	9	14 (N/A)	0.1	0.0	13.58
Total	298.9	22,685	41,174.2	40,351	63,035 (N/A)	100.0	100.0	48.08

Table 2: Annual Stormwater Benef

Eldora

Annual Stormwater Benefits of Public Trees

2/6/2019

Species	Total rainfall interception (Gal)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
White oak	359,972	9,755	(N/A)	9.8	9.9	76.21
Bur oak	575,519	15,597	(N/A)	8.7	15.8	136.81
Sugar maple	296,012	8,022	(N/A)	7.6	8.2	80.22
Green ash	322,821	8,748	(N/A)	6.9	8.9	97.20
Ash	218,492	5,921	(N/A)	6.3	6.0	71.34
Apple	23,963	649	(N/A)	6.2	0.7	8.02
Norway maple	231,047	6,261	(N/A)	6.1	6.4	78.27
Eastern white pine	259,893	7,043	(N/A)	4.8	7.2	111.80
Silver maple	235,934	6,394	(N/A)	3.3	6.5	148.69
Northern red oak	52,296	1,417	(N/A)	3.2	1.4	33.74
Norway spruce	171,906	4,659	(N/A)	3.2	4.7	110.92
Black walnut	100,708	2,729	(N/A)	2.3	2.8	90.97
Northern hackberry	81,519	2,209	(N/A)	2.3	2.2	73.64
Oak	88,620	2,402	(N/A)	2.2	2.4	82.81
Maple	66,269	1,796	(N/A)	2.0	1.8	69.07
Littleleaf linden	30,920	838	(N/A)	1.6	0.9	39.90
Black maple	53,221	1,442	(N/A)	1.5	1.5	72.11
Honeylocust	57,724	1,564	(N/A)	1.5	1.6	78.22
Broadleaf Deciduous Small	2,606	71	(N/A)	1.5	0.1	3.53
American basswood	31,934	865	(N/A)	1.4	0.9	45.55
Swamp white oak	13,702	371	(N/A)	1.4	0.4	19.54
Northern white cedar	82,884	2,246	(N/A)	1.4	2.3	124.79
Blue spruce	23,782	645	(N/A)	1.3	0.7	37.91
Eastern red cedar	24,518	664	(N/A)	1.1	0.7	44.30
Spruce	19,862	538	(N/A)	0.9	0.5	44.85
Conifer Evergreen Large	26,998	732	(N/A)	0.8	0.7	66.51
American sycamore	48,218	1,307	(N/A)	0.8	1.3	118.79
Red maple	15,950	432	(N/A)	0.8	0.4	43.22
Willow	5,674	154	(N/A)	0.7	0.2	17.08
Hickory	12,068	327	(N/A)	0.7	0.3	36.34
Eastern redbud	618	17	(N/A)	0.7	0.0	1.86
Pear	1,793	49	(N/A)	0.7	0.0	5.40
Plum	1,343	36	(N/A)	0.6	0.0	4.55
Northern catalpa	7,310	198	(N/A)	0.4	0.2	39.62
Dogwood	282	8	(N/A)	0.4	0.0	1.53
Eastern cottonwood	18,867	511	(N/A)	0.3	0.5	127.82
Pin oak	14,214	385	(N/A)	0.3	0.4	96.30
Amur maple	2,174	59	(N/A)	0.3	0.1	14.73
Broadleaf Deciduous Medium	3,416	93	(N/A)	0.3	0.1	23.15
Southern magnolia	324	9	(N/A)	0.3	0.0	2.20
White ash	7,164	194	(N/A)	0.3	0.2	48.54
Broadleaf Evergreen Small	71	2	(N/A)	0.2	0.0	0.64
Conifer Evergreen Small	73	2	(N/A)	0.2	0.0	0.66
American elm	4,652	126	(N/A)	0.2	0.1	42.02
Black locust	11,293	306	(N/A)	0.2	0.3	102.01
Mulberry	272	7	(N/A)	0.2	0.0	3.68
River birch	3,927	106	(N/A)	0.2	0.1	53.21
Siberian elm	4,770	129	(N/A)	0.2	0.1	64.64
Callery pear	1,572	43	(N/A)	0.2	0.0	21.30

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Tulip tree	626	17 (N/A)	0.2	0.0	8.48
Boxelder	3,689	100 (N/A)	0.2	0.1	49.99
Scotch pine	3,077	83 (N/A)	0.2	0.1	41.70
Flowering dogwood	15	0 (N/A)	0.2	0.0	0.20
Kentucky coffeetree	18	0 (N/A)	0.1	0.0	0.48
Eastern hophornbeam	7	0 (N/A)	0.1	0.0	0.20
Black cherry	69	2 (N/A)	0.1	0.0	1.86
Ginkgo	7	0 (N/A)	0.1	0.0	0.19
Yellowwood	12	0 (N/A)	0.1	0.0	0.33
Quaking aspen	18	0 (N/A)	0.1	0.0	0.48
UNKNOWN	0	0 (N/A)	0.1	0.0	0.00
Japanese tree lilac	7	0 (N/A)	0.1	0.0	0.20
Scarlet oak	18	0 (N/A)	0.1	0.0	0.48
Basswood	3,943	107 (N/A)	0.1	0.1	106.85
Red pine	596	16 (N/A)	0.1	0.0	16.14
Citywide total	3,631,267	98,407 (N/A)	100.0	100.0	75.06

Table 3: Annual Air Quality Benefits

Eldora

Annual Air Quality Benefits of Public Trees

2/6/2019

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								
White oak	42.2	6.8	20.7	1.9	226	167.7	24.4	23.3	159.3	1,045	0.0	0	446.3	1,271 (N/A)		9.8	9.93
Bur oak	90.8	14.5	40.6	4.1	475	189.8	27.6	26.4	180.2	1,183	0.0	0	574.0	1,658 (N/A)		8.7	14.54
Sugar maple	39.9	6.8	19.8	1.8	216	122.5	17.9	17.1	117.0	765	-31.2	-117	311.4	863 (N/A)		7.6	8.63
Green ash	43.0	6.9	20.2	1.9	228	131.7	19.2	18.3	125.2	821	0.0	0	366.4	1,049 (N/A)		6.9	11.66
Ash	46.2	8.0	22.5	2.0	249	107.8	15.6	14.8	101.1	668	-10.7	-40	307.4	877 (N/A)		6.3	10.57
Apple	6.4	1.1	3.2	0.3	35	30.6	4.4	4.2	28.3	189	0.0	0	78.5	223 (N/A)		6.2	2.76
Norway maple	49.8	8.6	24.1	2.2	268	109.8	15.9	15.1	102.7	680	-11.4	-43	316.7	905 (N/A)		6.1	11.31
Eastern white pine	31.9	6.3	25.2	3.9	207	51.0	7.5	7.1	48.8	319	-158.6	-595	23.0	-69 (N/A)		4.8	-1.09
Silver maple	44.8	7.6	21.6	2.0	240	72.4	10.6	10.1	69.4	453	-24.0	-90	214.5	603 (N/A)		3.3	14.03
Northern red oak	10.5	1.8	5.2	0.5	57	27.6	4.0	3.8	26.1	172	-15.0	-56	64.6	172 (N/A)		3.2	4.11
Norway spruce	21.1	4.2	16.7	2.6	137	33.6	4.9	4.7	32.2	210	-104.9	-393	15.0	-46 (N/A)		3.2	-1.10
Black walnut	12.3	2.0	5.9	0.6	66	43.1	6.3	6.0	40.8	268	0.0	0	117.0	334 (N/A)		2.3	11.14
Northern hackberry	13.7	2.4	6.9	0.6	75	40.7	5.9	5.6	38.4	253	0.0	0	114.2	328 (N/A)		2.3	10.92
Oak	10.6	1.7	5.1	0.5	57	39.2	5.7	5.4	37.2	244	0.0	0	105.5	301 (N/A)		2.2	10.37
Maple	16.9	2.9	7.8	0.7	89	33.3	4.8	4.6	31.5	207	-5.5	-21	97.0	276 (N/A)		2.0	10.61
Littleleaf linden	4.9	0.9	2.5	0.2	27	16.0	2.3	2.2	15.0	99	-2.4	-9	41.5	117 (N/A)		1.6	5.56
Black maple	13.8	2.4	6.3	0.6	73	25.8	3.7	3.6	24.4	160	-4.5	-17	76.0	217 (N/A)		1.5	10.83
Honeylocust	11.0	1.8	5.1	0.5	58	27.5	4.0	3.9	26.6	173	-8.5	-32	72.0	199 (N/A)		1.5	9.97
Broadleaf Deciduous Small	0.6	0.1	0.3	0.0	3	3.7	0.5	0.5	3.4	23	0.0	0	9.2	26 (N/A)		1.5	1.30
American basswood	4.2	0.7	2.1	0.2	23	14.7	2.1	2.0	13.6	91	-3.6	-14	36.0	100 (N/A)		1.4	5.25
Swamp white oak	2.0	0.3	1.1	0.1	11	11.1	1.6	1.5	10.6	69	-0.5	-2	27.8	78 (N/A)		1.4	4.11
Northern white cedar	10.2	2.0	8.1	1.3	66	15.8	2.3	2.2	15.1	99	-51.6	-193	5.4	-28 (N/A)		1.4	-1.58
Blue spruce	3.1	0.6	2.6	0.4	20	8.2	1.2	1.1	7.7	51	-8.5	-32	16.4	39 (N/A)		1.3	2.31
Eastern red cedar	5.2	1.0	4.1	0.6	33	8.1	1.2	1.1	7.6	50	-13.5	-51	15.3	33 (N/A)		1.1	2.19
Spruce	2.3	0.5	1.9	0.3	15	5.4	0.8	0.8	5.2	34	-9.3	-35	7.8	14 (N/A)		0.9	1.19
Conifer Evergreen Large	3.1	0.6	2.6	0.4	21	6.5	0.9	0.9	6.2	41	-13.5	-51	7.7	10 (N/A)		0.8	0.95
American sycamore	7.1	1.1	3.2	0.3	37	15.9	2.3	2.2	15.1	99	0.0	0	47.3	136 (N/A)		0.8	12.39
Red maple	3.8	0.6	1.8	0.2	20	8.9	1.3	1.2	8.5	56	-1.3	-5	25.1	71 (N/A)		0.8	7.12
Willow	0.6	0.1	0.4	0.0	4	5.0	0.7	0.7	4.6	31	-0.2	-1	11.9	33 (N/A)		0.7	3.71
Hickory	1.1	0.2	0.6	0.0	6	7.0	1.0	1.0	6.7	44	0.0	0	17.5	50 (N/A)		0.7	5.50
Eastern redbud	0.0	0.0	0.0	0.0	0	1.0	0.1	0.1	0.9	6	0.0	0	2.3	6 (N/A)		0.7	0.71
Pear	0.3	0.0	0.2	0.0	2	2.6	0.4	0.3	2.3	16	0.0	0	6.1	17 (N/A)		0.7	1.93
Plum	0.3	0.0	0.1	0.0	2	1.9	0.3	0.3	1.8	12	0.0	0	4.7	13 (N/A)		0.6	1.67
Northern catalpa	1.6	0.3	0.7	0.1	8	2.3	0.3	0.3	2.2	15	0.0	0	7.9	23 (N/A)		0.4	4.58
Dogwood	0.0	0.0	0.0	0.0	0	0.5	0.1	0.1	0.4	3	0.0	0	1.0	3 (N/A)		0.4	0.59

Eastern cottonwood	2.6	0.4	1.2	0.1	14	6.9	1.0	1.0	6.5	43	0.0	0	19.6	56 (N/A)	0.3	14.09
Pin oak	2.8	0.5	1.4	0.1	15	5.2	0.8	0.7	5.1	33	-5.1	-19	11.5	29 (N/A)	0.3	7.20
Amur maple	0.7	0.1	0.3	0.0	4	2.4	0.3	0.3	2.2	15	0.0	0	6.3	18 (N/A)	0.3	4.54
Broadleaf Deciduous Medium	0.5	0.1	0.3	0.0	3	2.8	0.4	0.4	2.6	17	-0.1	-1	6.9	19 (N/A)	0.3	4.86
Southern magnolia	0.0	0.0	0.0	0.0	0	0.4	0.1	0.1	0.4	2	0.0	0	0.9	2 (N/A)	0.3	0.62
White ash	0.6	0.1	0.3	0.0	3	4.3	0.6	0.6	4.2	27	0.0	0	10.9	31 (N/A)	0.3	7.68
Broadleaf Evergreen Small	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)	0.2	0.27
Conifer Evergreen Small	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.0	0	0.0	0	0.1	0 (N/A)	0.2	0.09
American elm	0.9	0.2	0.5	0.0	5	2.2	0.3	0.3	2.1	14	0.0	0	6.6	19 (N/A)	0.2	6.36
Black locust	2.6	0.4	1.2	0.1	14	4.7	0.7	0.6	4.4	29	-0.6	-2	14.2	41 (N/A)	0.2	13.58
Mulberry	0.0	0.0	0.0	0.0	0	0.4	0.1	0.1	0.4	2	0.0	0	0.9	3 (N/A)	0.2	1.33
River birch	0.9	0.2	0.4	0.0	5	1.8	0.3	0.2	1.6	11	-0.2	-1	5.2	15 (N/A)	0.2	7.40
Siberian elm	0.8	0.1	0.4	0.0	4	2.0	0.3	0.3	1.9	13	0.0	0	5.9	17 (N/A)	0.2	8.47
Callery pear	0.2	0.0	0.1	0.0	1	1.3	0.2	0.2	1.2	8	-0.1	0	3.2	9 (N/A)	0.2	4.56
Tulip tree	0.0	0.0	0.0	0.0	0	0.5	0.1	0.1	0.4	3	0.0	0	1.1	3 (N/A)	0.2	1.54
Boxelder	0.4	0.1	0.2	0.0	2	2.0	0.3	0.3	1.9	12	-0.2	-1	5.0	14 (N/A)	0.2	6.96
Scotch pine	0.3	0.1	0.3	0.0	2	1.2	0.2	0.2	1.2	7	-1.1	-4	2.3	6 (N/A)	0.2	2.82
Flowering dogwood	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)	0.2	0.11
Kentucky coffeetree	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)	0.1	0.08
Eastern hophornbeam	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)	0.1	0.11
Black cherry	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)	0.1	0.71
Ginkgo	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)	0.1	0.07
Yellowwood	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)	0.1	0.14
Quaking aspen	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)	0.1	0.08
UNKNOWN	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)	0.1	0.00
Japanese tree lilac	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)	0.1	0.11
Scarlet oak	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)	0.1	0.08
Basswood	0.5	0.1	0.2	0.0	3	1.6	0.2	0.2	1.5	10	0.0	0	4.4	12 (N/A)	0.1	12.48
Red pine	0.1	0.0	0.1	0.0	0	0.3	0.0	0.0	0.3	2	-0.2	-1	0.6	1 (N/A)	0.1	1.48
Citywide total	569.1	97.0	296.1	31.4	3,131	1,429.0	207.9	198.2	1,354.5	8,897	-486.5	-1,824	3,696.8	10,203 (N/A)	100.0	7.78

Table 4: Annual Carbon Stored

Eldora

Stored CO2 Benefits of Public Trees

2/6/2019

Species	Total Stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
White oak	1,373,723	10,303	(N/A)	9.8	10.3	80.49
Bur oak	3,048,505	22,864	(N/A)	8.7	22.8	200.56
Sugar maple	1,153,936	8,655	(N/A)	7.6	8.6	86.55
Green ash	1,419,904	10,649	(N/A)	6.9	10.6	118.33
Ash	763,031	5,723	(N/A)	6.3	5.7	68.95
Apple	104,451	783	(N/A)	6.2	0.8	9.67
Norway maple	819,790	6,148	(N/A)	6.1	6.1	76.86
Eastern white pine	412,556	3,094	(N/A)	4.8	3.1	49.11
Silver maple	1,123,323	8,425	(N/A)	3.3	8.4	195.93
Northern red oak	221,394	1,660	(N/A)	3.2	1.7	39.53
Norway spruce	272,961	2,047	(N/A)	3.2	2.0	48.74
Black walnut	399,235	2,994	(N/A)	2.3	3.0	99.81
Northern hackberry	213,300	1,600	(N/A)	2.3	1.6	53.33
Oak	342,575	2,569	(N/A)	2.2	2.6	88.60
Maple	179,925	1,349	(N/A)	2.0	1.3	51.90
Littleleaf linden	107,666	807	(N/A)	1.6	0.8	38.45
Black maple	146,656	1,100	(N/A)	1.5	1.1	55.00
Honeylocust	141,435	1,061	(N/A)	1.5	1.1	53.04
Broadleaf Deciduous	9,989	75	(N/A)	1.5	0.1	3.75
American basswood	154,729	1,160	(N/A)	1.4	1.2	61.08
Swamp white oak	33,514	251	(N/A)	1.4	0.3	13.23
Northern white cedar	134,825	1,011	(N/A)	1.4	1.0	56.18
Blue spruce	20,053	150	(N/A)	1.3	0.1	8.85
Eastern red cedar	16,531	124	(N/A)	1.1	0.1	8.27
Spruce	22,209	167	(N/A)	0.9	0.2	13.88
Conifer Evergreen La	33,416	251	(N/A)	0.8	0.2	22.78
American sycamore	235,408	1,766	(N/A)	0.8	1.8	160.51
Red maple	41,264	309	(N/A)	0.8	0.3	30.95
Willow	11,547	87	(N/A)	0.7	0.1	9.62
Hickory	35,898	269	(N/A)	0.7	0.3	29.91
Eastern redbud	1,600	12	(N/A)	0.7	0.0	1.33
Pear	5,981	45	(N/A)	0.7	0.0	4.98
Plum	5,012	38	(N/A)	0.6	0.0	4.70
Northern catalpa	56,031	420	(N/A)	0.4	0.4	84.05
Dogwood	725	5	(N/A)	0.4	0.0	1.09
Eastern cottonwood	83,432	626	(N/A)	0.3	0.6	156.43
Pin oak	78,839	591	(N/A)	0.3	0.6	147.82
Amur maple	10,866	81	(N/A)	0.3	0.1	20.37
Broadleaf Deciduous	8,366	63	(N/A)	0.3	0.1	15.69
Southern magnolia	82	1	(N/A)	0.3	0.0	0.15
White ash	16,836	126	(N/A)	0.3	0.1	31.57
Broadleaf Evergreen !	41	0	(N/A)	0.2	0.0	0.10
Conifer Evergreen Sn	8	0	(N/A)	0.2	0.0	0.02
American elm	19,920	149	(N/A)	0.2	0.1	49.80
Black locust	42,840	321	(N/A)	0.2	0.3	107.10
Mulberry	922	7	(N/A)	0.2	0.0	3.46
River birch	14,499	109	(N/A)	0.2	0.1	54.37
Siberian elm	19,906	149	(N/A)	0.2	0.1	74.65
Callery pear	3,843	29	(N/A)	0.2	0.0	14.41
Tulip tree	1,047	8	(N/A)	0.2	0.0	3.93
Boxelder	11,569	87	(N/A)	0.2	0.1	43.39
Scotch pine	2,340	18	(N/A)	0.2	0.0	8.78
Flowering dogwood	28	0	(N/A)	0.2	0.0	0.10
Kentucky coffeetree	12	0	(N/A)	0.1	0.0	0.09
Eastern hophornbeam	14	0	(N/A)	0.1	0.0	0.10

Black cherry	178	1 (N/A)	0.1	0.0	1.33
Ginkgo	5	0 (N/A)	0.1	0.0	0.03
Yellowwood	17	0 (N/A)	0.1	0.0	0.13
Quaking aspen	12	0 (N/A)	0.1	0.0	0.09
UNKNOWN	0	0 (N/A)	0.1	0.0	0.00
Japanese tree lilac	14	0 (N/A)	0.1	0.0	0.10
Scarlet oak	12	0 (N/A)	0.1	0.0	0.09
Basswood	15,773	118 (N/A)	0.1	0.1	118.30
Red pine	257	2 (N/A)	0.1	0.0	1.93
Citywide total	13,394,774	100,461 (N/A)	100.0	100.0	76.63

Table 5: Annual Carbon Sequestered

Eldora

Annual CO₂ Benefits of Public Trees

2/6/2019

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
White oak	82,146	616	-6,594	-357	-52	58,963	442	134,158	1,006 (N/A)	9.8	13.4	7.86
Bur oak	85,581	642	-14,633	-451	-113	66,723	500	137,220	1,029 (N/A)	8.7	13.7	9.03
Sugar maple	58,818	441	-5,545	-281	-44	43,326	325	96,318	722 (N/A)	7.6	9.6	7.22
Green ash	63,234	474	-6,816	-290	-53	46,331	347	102,459	768 (N/A)	6.9	10.2	8.54
Ash	21,572	162	-3,663	-248	-29	37,361	280	55,022	413 (N/A)	6.3	5.5	4.97
Apple	9,712	73	-502	-90	-4	10,494	79	19,614	147 (N/A)	6.2	2.0	1.82
Norway maple	23,390	175	-3,935	-251	-31	37,978	285	57,182	429 (N/A)	6.1	5.7	5.36
Eastern white pine	3,896	29	-1,980	-247	-17	18,066	135	19,735	148 (N/A)	4.8	2.0	2.35
Silver maple	73,845	554	-5,392	-180	-42	25,725	193	93,998	705 (N/A)	3.3	9.4	16.39
Northern red oak	7,235	54	-1,063	-74	-9	9,680	73	15,778	118 (N/A)	3.2	1.6	2.82
Norway spruce	3,540	27	-1,310	-160	-11	11,912	89	13,982	105 (N/A)	3.2	1.4	2.50
Black walnut	21,851	164	-1,916	-94	-15	15,111	113	34,952	262 (N/A)	2.3	3.5	8.74
Northern hackberry	10,468	79	-1,025	-81	-8	14,188	106	23,550	177 (N/A)	2.3	2.3	5.89
Oak	19,720	148	-1,644	-84	-13	13,767	103	31,758	238 (N/A)	2.2	3.2	8.21
Maple	5,474	41	-864	-66	-7	5,474	88	16,224	122 (N/A)	2.0	1.6	4.68
Littleleaf linden	9,721	73	-517	-42	-4	5,531	41	14,694	110 (N/A)	1.6	1.5	5.25
Black maple	3,256	24	-704	-51	-6	9,023	68	11,524	86 (N/A)	1.5	1.1	4.32
Honeylocust	9,243	69	-680	-44	-5	9,870	74	18,390	138 (N/A)	1.5	1.8	6.90
Broadleaf Deciduous Smal	1,183	9	-48	-13	0	1,263	9	2,385	18 (N/A)	1.5	0.2	0.89
American basswood	9,293	70	-743	-38	-6	5,033	38	13,546	102 (N/A)	1.4	1.3	5.35
Swamp white oak	4,021	30	-161	-22	-1	3,914	29	7,752	58 (N/A)	1.4	0.8	3.06
Northern white cedar	768	6	-647	-87	-6	5,597	42	5,632	42 (N/A)	1.4	0.6	2.35
Blue spruce	1,407	11	-96	-31	-1	2,864	21	4,144	31 (N/A)	1.3	0.4	1.83
Eastern red cedar	257	2	-79	-29	-1	2,803	21	2,951	22 (N/A)	1.1	0.3	1.48
Spruce	1,038	8	-107	-21	-1	1,940	15	2,851	21 (N/A)	0.9	0.3	1.78
Conifer Evergreen Large	1,688	13	-160	-26	-1	2,297	17	3,799	28 (N/A)	0.8	0.4	2.59
American sycamore	7,867	59	-1,130	-38	-9	5,581	42	12,280	92 (N/A)	0.8	1.2	8.37
Red maple	3,149	24	-198	-18	-2	3,154	24	6,088	46 (N/A)	0.8	0.6	4.57
Willow	2,049	15	-56	-11	-1	1,691	13	3,673	28 (N/A)	0.7	0.4	3.06
Hickory	3,317	25	-172	-15	-1	2,463	18	5,592	42 (N/A)	0.7	0.6	4.66
Eastern redbud	341	3	-8	-5	0	335	3	663	5 (N/A)	0.7	0.1	0.55
Pear	797	6	-29	-9	0	856	6	1,616	12 (N/A)	0.7	0.2	1.35
Plum	609	5	-24	-7	0	656	5	1,234	9 (N/A)	0.6	0.1	1.16
Northern catalpa	489	4	-269	-7	-2	831	6	1,044	8 (N/A)	0.4	0.1	1.57
Dogwood	160	1	-4	-3	0	154	1	309	2 (N/A)	0.4	0.0	0.46
Eastern cottonwood	3,633	27	-400	-16	-3	2,405	18	5,621	42 (N/A)	0.3	0.6	10.54
Pin oak	6,307	47	-378	-12	-3	1,874	14	7,790	58 (N/A)	0.3	0.8	14.61
Amur maple	898	7	-52	-6	0	805	6	1,644	12 (N/A)	0.3	0.2	3.08
Broadleaf Deciduous Medi	1,001	8	-40	-5	0	973	7	1,929	14 (N/A)	0.3	0.2	3.62
Southern magnolia	20	0	0	-1	0	135	1	154	1 (N/A)	0.3	0.0	0.29
White ash	2,014	15	-81	-8	-1	1,572	12	3,497	26 (N/A)	0.3	0.3	6.56
Broadleaf Evergreen Small	13	0	0	-1	0	42	0	54	0 (N/A)	0.2	0.0	0.13
Conifer Evergreen Small	2	0	0	-1	0	18	0	19	0 (N/A)	0.2	0.0	0.05
American elm	618	5	-96	-5	-1	795	6	1,312	10 (N/A)	0.2	0.1	3.28
Black locust	0	0	-206	-13	-2	1,616	12	1,397	10 (N/A)	0.2	0.1	3.49
Mulberry	123	1	-4	-1	0	130	1	246	2 (N/A)	0.2	0.0	0.92
River birch	466	3	-70	-4	-1	603	5	994	7 (N/A)	0.2	0.1	3.73
Siberian elm	854	6	-96	-5	-1	708	5	1,462	11 (N/A)	0.2	0.1	5.48
Callery pear	482	4	-19	-3	0	460	3	919	7 (N/A)	0.2	0.1	3.45
Tulip tree	211	2	-5	-1	0	163	1	368	3 (N/A)	0.2	0.0	1.38
Boxelder	1,113	8	-56	-5	0	702	5	1,755	13 (N/A)	0.2	0.2	6.58
Scotch pine	231	2	-11	-4	0	433	3	649	5 (N/A)	0.2	0.1	2.43
Flowering dogwood	17	0	0	0	0	11	0	28	0 (N/A)	0.2	0.0	0.10
Kentucky coffeetree	3	0	0	0	0	4	0	7	0 (N/A)	0.1	0.0	0.05
Eastern hophornbeam	9	0	0	0	0	6	0	14	0 (N/A)	0.1	0.0	0.10
Black cherry	38	0	-1	-1	0	37	0	74	1 (N/A)	0.1	0.0	0.55
Ginkgo	2	0	0	0	0	4	0	6	0 (N/A)	0.1	0.0	0.04
Yellowwood	5	0	0	0	0	7	0	12	0 (N/A)	0.1	0.0	0.09
Quaking aspen	3	0	0	0	0	4	0	7	0 (N/A)	0.1	0.0	0.05
UNKNOWN	0	0	0	0	0	0	0	0	0 (N/A)	0.1	0.0	0.00
Japanese tree lilac	9	0	0	0	0	6	0	14	0 (N/A)	0.1	0.0	0.10
Scarlet oak	3	0	0	0	0	4	0	7	0 (N/A)	0.1	0.0	0.05
Basswood	857	6	-76	-4	-1	552	4	1,330	10 (N/A)	0.1	0.1	9.97
Red pine	53	0	-1	-1	0	94	1	145	1 (N/A)	0.1	0.0	1.08
Citywide total	570,121	4,276	-64,309	-3,564	-509	501,325	3,760	1,003,572	7,527 (N/A)	100.0	100.0	5.74

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

2/6/2019

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
White oak	6,994	(N/A)	9.8	13.7	54.64
Bur oak	6,007	(N/A)	8.7	11.8	52.69
Sugar maple	6,076	(N/A)	7.6	11.9	60.76
Green ash	5,059	(N/A)	6.9	9.9	56.21
Ash	2,071	(N/A)	6.3	4.1	24.96
Apple	555	(N/A)	6.2	1.1	6.85
Norway maple	2,162	(N/A)	6.1	4.2	27.02
Eastern white pine	577	(N/A)	4.8	1.1	9.16
Silver maple	5,331	(N/A)	3.3	10.5	123.98
Northern red oak	603	(N/A)	3.2	1.2	14.36
Norway spruce	482	(N/A)	3.2	0.9	11.48
Black walnut	1,772	(N/A)	2.3	3.5	59.07
Northern hackberry	1,421	(N/A)	2.3	2.8	47.35
Oak	1,632	(N/A)	2.2	3.2	56.28
Maple	694	(N/A)	2.0	1.4	26.68
Littleleaf linden	1,071	(N/A)	1.6	2.1	51.00
Black maple	393	(N/A)	1.5	0.8	19.66
Honeylocust	2,191	(N/A)	1.5	4.3	109.55
Broadleaf Deciduous Small	63	(N/A)	1.5	0.1	3.14
American basswood	689	(N/A)	1.4	1.4	36.28
Swamp white oak	437	(N/A)	1.4	0.9	23.02
Northern white cedar	79	(N/A)	1.4	0.2	4.38
Blue spruce	369	(N/A)	1.3	0.7	21.73
Eastern red cedar	82	(N/A)	1.1	0.2	5.47
Spruce	294	(N/A)	0.9	0.6	24.46
Conifer Evergreen Large	358	(N/A)	0.8	0.7	32.54
American sycamore	565	(N/A)	0.8	1.1	51.35
Red maple	410	(N/A)	0.8	0.8	40.97
Willow	236	(N/A)	0.7	0.5	26.18
Hickory	344	(N/A)	0.7	0.7	38.22
Eastern redbud	19	(N/A)	0.7	0.0	2.06
Pear	45	(N/A)	0.7	0.1	4.95
Plum	34	(N/A)	0.6	0.1	4.28
Northern catalpa	50	(N/A)	0.4	0.1	9.92
Dogwood	8	(N/A)	0.4	0.0	1.65
Eastern cottonwood	264	(N/A)	0.3	0.5	66.10
Pin oak	460	(N/A)	0.3	0.9	114.95
Amur maple	53	(N/A)	0.3	0.1	13.19
Broadleaf Deciduous Medium	107	(N/A)	0.3	0.2	26.82
Southern magnolia	9	(N/A)	0.3	0.0	2.37
White ash	262	(N/A)	0.3	0.5	65.56
Broadleaf Evergreen Small	1	(N/A)	0.2	0.0	0.50
Conifer Evergreen Small	13	(N/A)	0.2	0.0	4.27
American elm	82	(N/A)	0.2	0.2	27.25
Black locust	0	(N/A)	0.2	0.0	0.00
Mulberry	6	(N/A)	0.2	0.0	3.22
River birch	44	(N/A)	0.2	0.1	22.17
Siberian elm	65	(N/A)	0.2	0.1	32.46

Callery pear	52 (N/A)	0.2	0.1	26.02
Tulip tree	34 (N/A)	0.2	0.1	16.91
Boxelder	91 (N/A)	0.2	0.2	45.50
Scotch pine	65 (N/A)	0.2	0.1	32.32
Flowering dogwood	0 (N/A)	0.2	0.0	0.03
Kentucky coffeetree	5 (N/A)	0.1	0.0	5.26
Eastern hophornbeam	0 (N/A)	0.1	0.0	0.03
Black cherry	2 (N/A)	0.1	0.0	2.06
Ginkgo	0 (N/A)	0.1	0.0	0.37
Yellowwood	3 (N/A)	0.1	0.0	2.74
Quaking aspen	5 (N/A)	0.1	0.0	5.26
UNKNOWN	0 (N/A)	0.1	0.0	0.00
Japanese tree lilac	0 (N/A)	0.1	0.0	0.03
Scarlet oak	5 (N/A)	0.1	0.0	5.26
Basswood	66 (N/A)	0.1	0.1	65.59
Red pine	15 (N/A)	0.1	0.0	15.42
Citywide total	50,882 (N/A)	100.0	100.0	38.81

Table 7: Summary

Eldora

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

2/6/2019

Species	Energy	CO ₂	Air Quality	Stormwater	Aesthetic/Other	Total (\$)	Standard Error	% of Total \$
White oak	7,363	1,006	1,271	9,755	6,994	26,390	(N/A)	11.5
Bur oak	8,342	1,029	1,658	15,597	6,007	32,633	(N/A)	14.2
Sugar maple	5,347	722	863	8,022	6,076	21,031	(N/A)	9.1
Green ash	5,783	768	1,049	8,748	5,059	21,407	(N/A)	9.3
Ash	4,821	413	877	5,921	2,071	14,104	(N/A)	6.1
Apple	1,397	147	223	649	555	2,972	(N/A)	1.3
Norway maple	4,923	429	905	6,261	2,162	14,680	(N/A)	6.4
Eastern white pine	2,224	148	-69	7,043	577	9,924	(N/A)	4.3
Silver maple	3,152	705	603	6,394	5,331	16,185	(N/A)	7.0
Northern red oak	1,224	118	172	1,417	603	3,535	(N/A)	1.5
Norway spruce	1,469	105	-46	4,659	482	6,668	(N/A)	2.9
Black walnut	1,906	262	334	2,729	1,772	7,004	(N/A)	3.0
Northern hackberry	1,809	177	328	2,209	1,421	5,943	(N/A)	2.6
Oak	1,730	238	301	2,402	1,632	6,303	(N/A)	2.7
Maple	1,470	122	276	1,796	694	4,357	(N/A)	1.9
Littleleaf linden	719	110	117	838	1,071	2,855	(N/A)	1.2
Black maple	1,142	86	217	1,442	393	3,281	(N/A)	1.4
Honeylocust	1,176	138	199	1,564	2,191	5,269	(N/A)	2.3
Broadleaf Deciduous Sm	171	18	26	71	63	348	(N/A)	0.2
American basswood	665	102	100	865	689	2,421	(N/A)	1.1
Swamp white oak	480	58	78	371	437	1,425	(N/A)	0.6
Northern white cedar	687	42	-28	2,246	79	3,026	(N/A)	1.3
Blue spruce	365	31	39	645	369	1,449	(N/A)	0.6
Eastern red cedar	369	22	33	664	82	1,170	(N/A)	0.5
Spruce	230	21	14	538	294	1,097	(N/A)	0.5
Conifer Evergreen Large	286	28	10	732	358	1,414	(N/A)	0.6
American sycamore	701	92	136	1,307	565	2,801	(N/A)	1.2
Red maple	392	46	71	432	410	1,351	(N/A)	0.6
Willow	227	28	33	154	236	677	(N/A)	0.3
Hickory	305	42	50	327	344	1,067	(N/A)	0.5
Eastern redbud	49	5	6	17	19	95	(N/A)	0.0
Pear	125	12	17	49	45	248	(N/A)	0.1
Plum	89	9	13	36	34	182	(N/A)	0.1
Northern catalpa	101	8	23	198	50	380	(N/A)	0.2
Dogwood	22	2	3	8	8	44	(N/A)	0.0
Eastern cottonwood	306	42	56	511	264	1,180	(N/A)	0.5
Pin oak	224	58	29	385	460	1,156	(N/A)	0.5
Amur maple	108	12	18	59	53	250	(N/A)	0.1
Broadleaf Deciduous M	119	14	19	93	107	353	(N/A)	0.2
Southern magnolia	20	1	2	9	9	42	(N/A)	0.0
White ash	182	26	31	194	262	695	(N/A)	0.3
Broadleaf Evergreen Sm	6	0	1	2	1	11	(N/A)	0.0
Conifer Evergreen Smal	3	0	0	2	13	18	(N/A)	0.0
American elm	98	10	19	126	82	335	(N/A)	0.1
Black locust	213	10	41	306	0	570	(N/A)	0.2
Mulberry	19	2	3	7	6	37	(N/A)	0.0
River birch	80	7	15	106	44	253	(N/A)	0.1
Siberian elm	88	11	17	129	65	310	(N/A)	0.1

of Benefits in Dollars

Callery pear	56	7	9	43	52	166 (N/A)	0.1
Tulip tree	21	3	3	17	34	78 (N/A)	0.0
Boxelder	85	13	14	100	91	303 (N/A)	0.1
Scotch pine	48	5	6	83	65	207 (N/A)	0.1
Flowering dogwood	2	0	0	0	0	3 (N/A)	0.0
Kentucky coffeetree	1	0	0	0	5	7 (N/A)	0.0
Eastern hophornbeam	1	0	0	0	0	1 (N/A)	0.0
Black cherry	5	1	1	2	2	11 (N/A)	0.0
Ginkgo	1	0	0	0	0	1 (N/A)	0.0
Yellowwood	1	0	0	0	3	4 (N/A)	0.0
Quaking aspen	1	0	0	0	5	7 (N/A)	0.0
UNKNOWN	0	0	0	0	0	0 (N/A)	0.0
Japanese tree lilac	1	0	0	0	0	1 (N/A)	0.0
Scarlet oak	1	0	0	0	5	7 (N/A)	0.0
Basswood	71	10	12	107	66	266 (N/A)	0.1
Red pine	14	1	1	16	15	48 (N/A)	0.0
Citywide Total	63,035	7,527	10,203	98,407	50,882	230,055 (N/A)	100.0

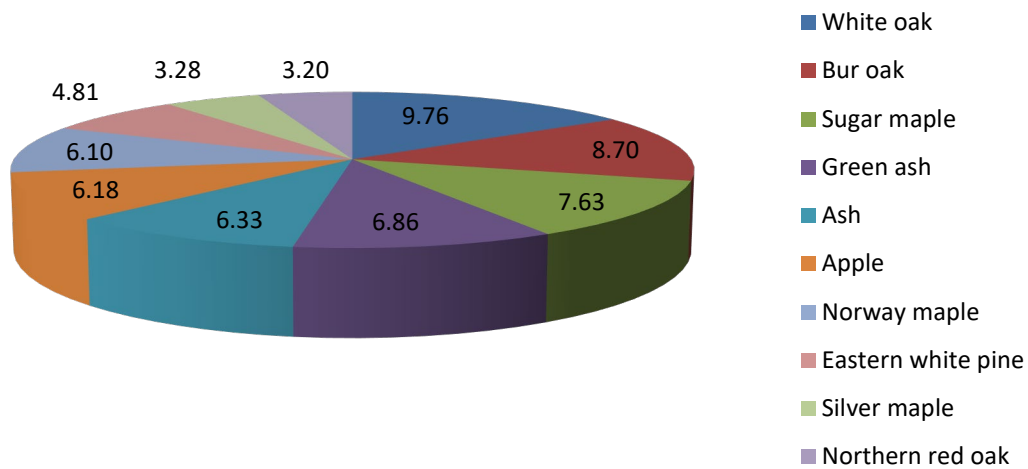


Figure 1: Species Distribution

Relative Age Distribution of Top 10 Public Tree Species for Zone 1 (%)

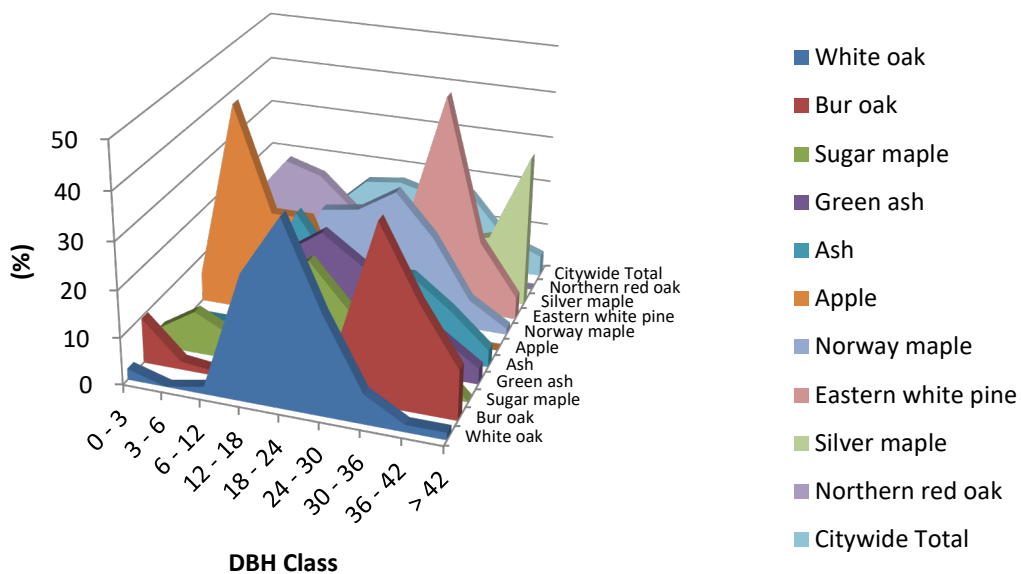


Figure 2: Relative Age Class

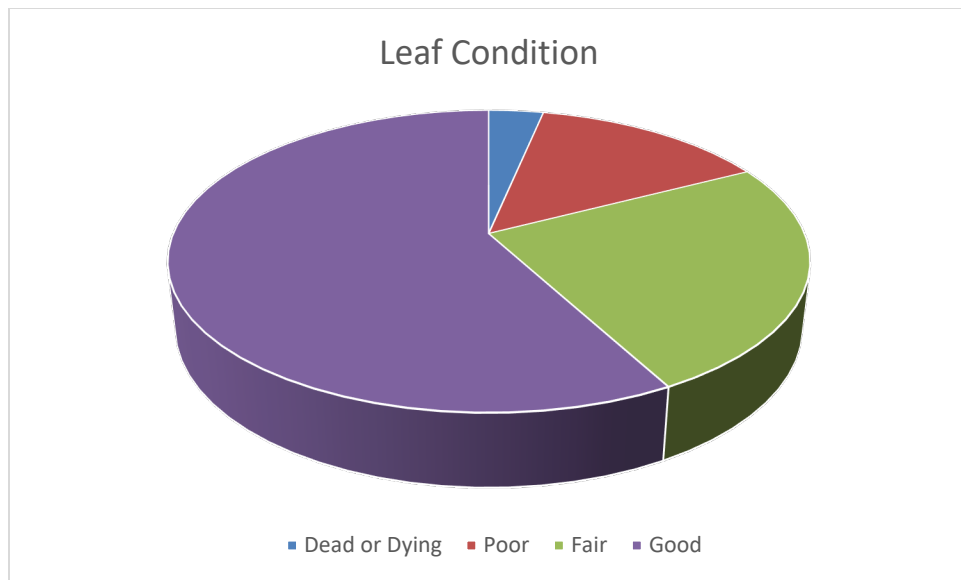


Figure 3: Foliage Condition

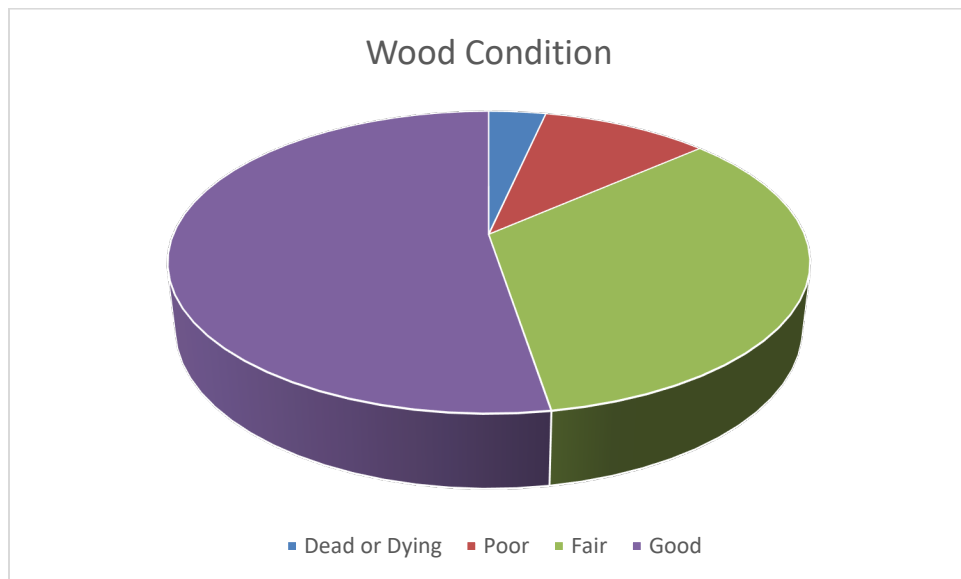


Figure 4: Wood Condition

Canopy Cover of Public Trees (Acres)

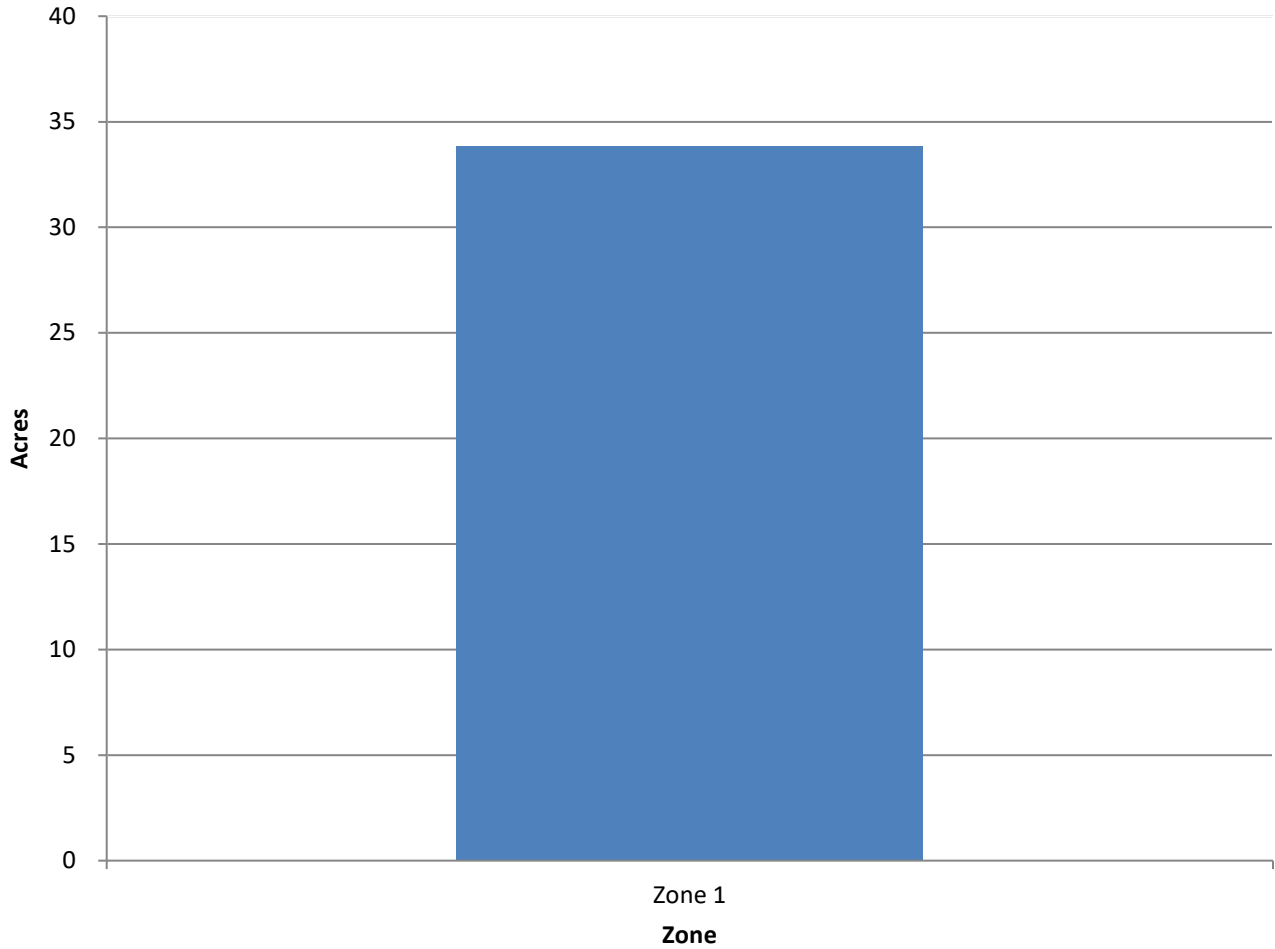


Figure 5: Canopy Cover in Acres

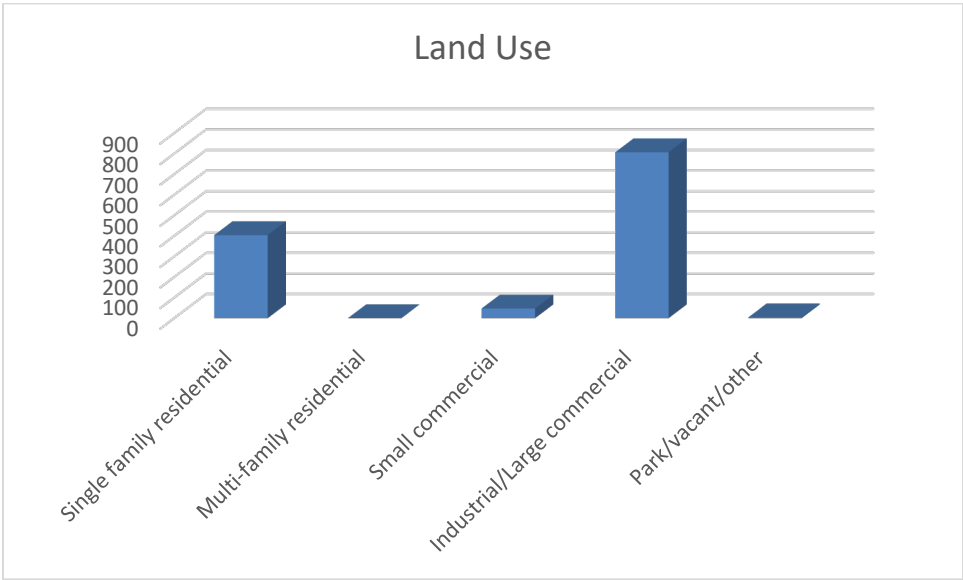


Figure 6: Land Use of city/park trees

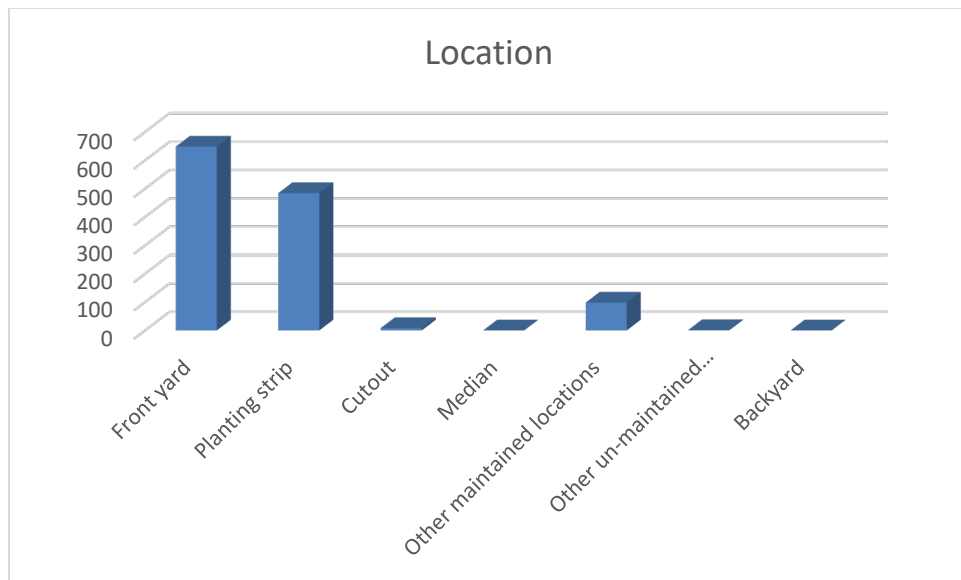


Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping



Figure 1: Location of Ash Trees

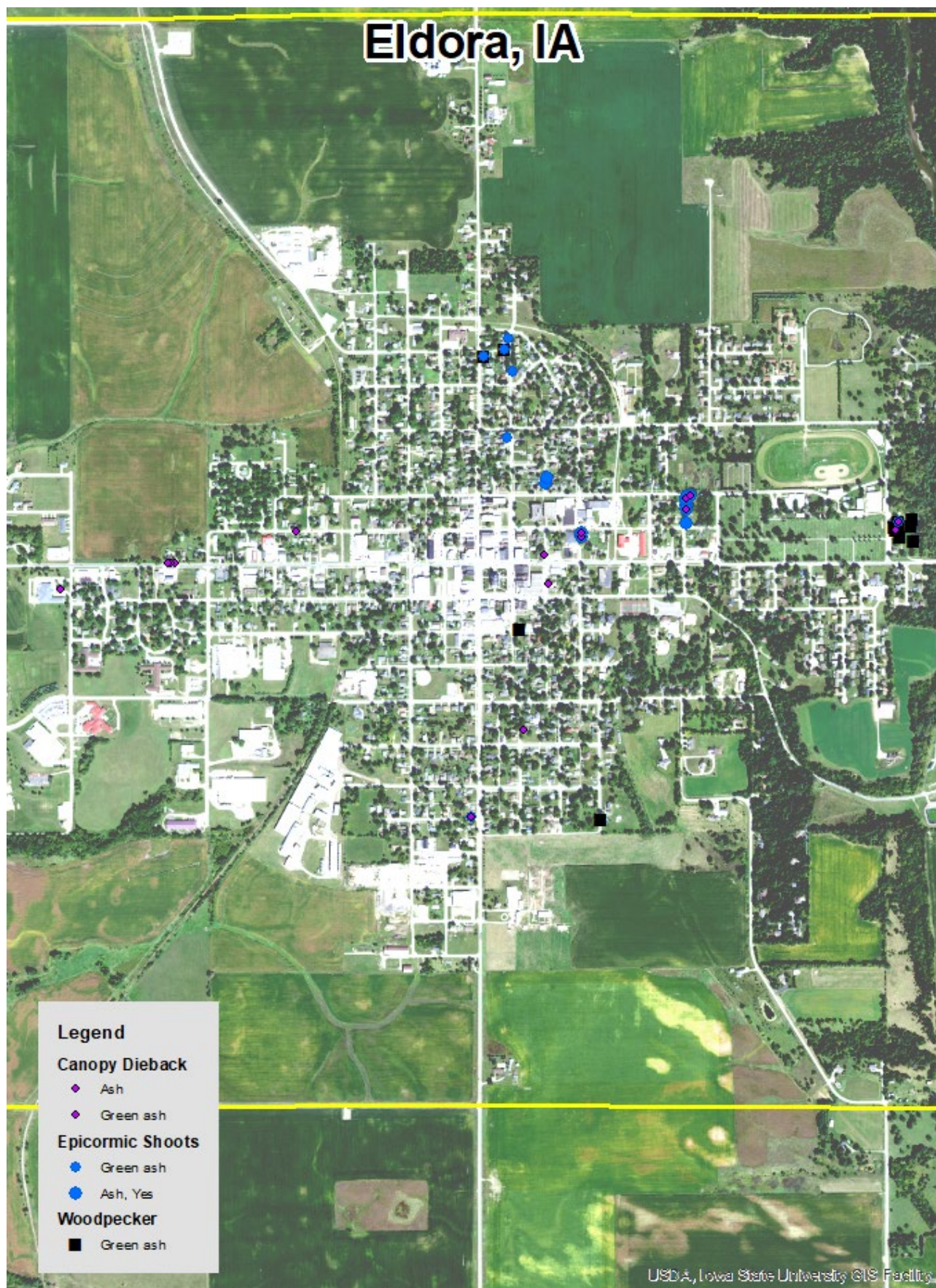


Figure 2: Location of EAB symptoms

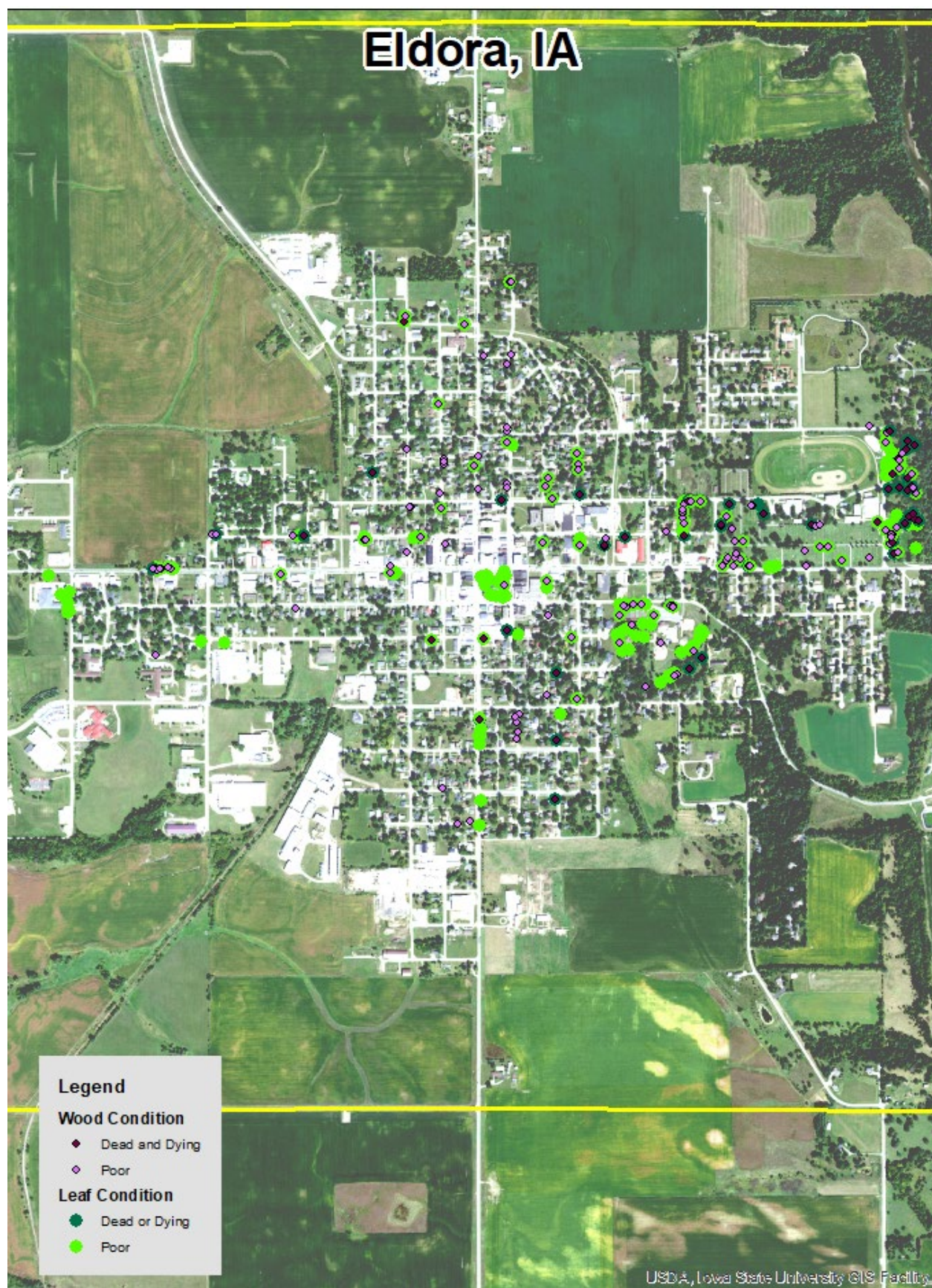


Figure 3: Location of Poor Condition Trees

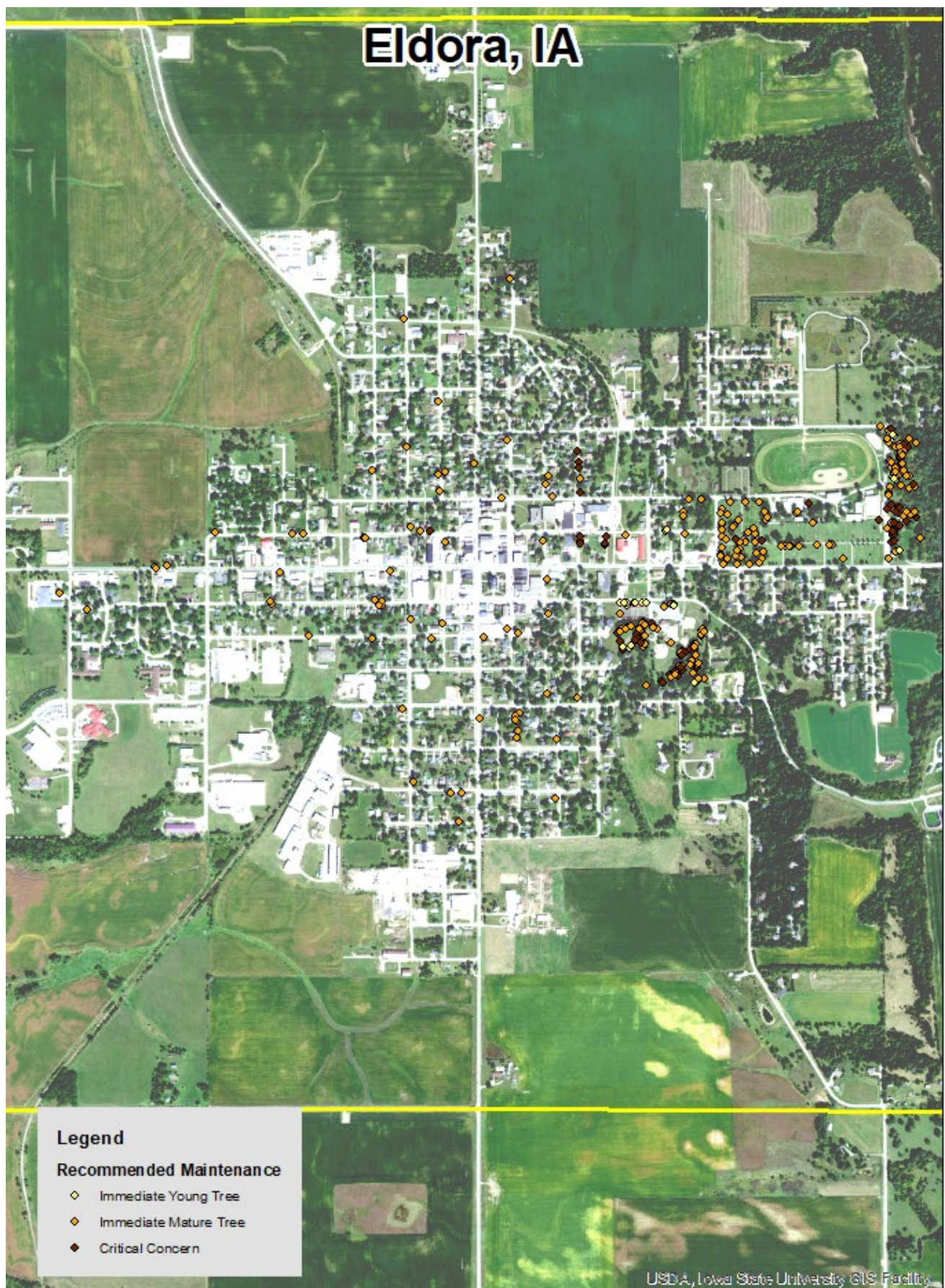


Figure 4: Location of Trees with Recommended Maintenance

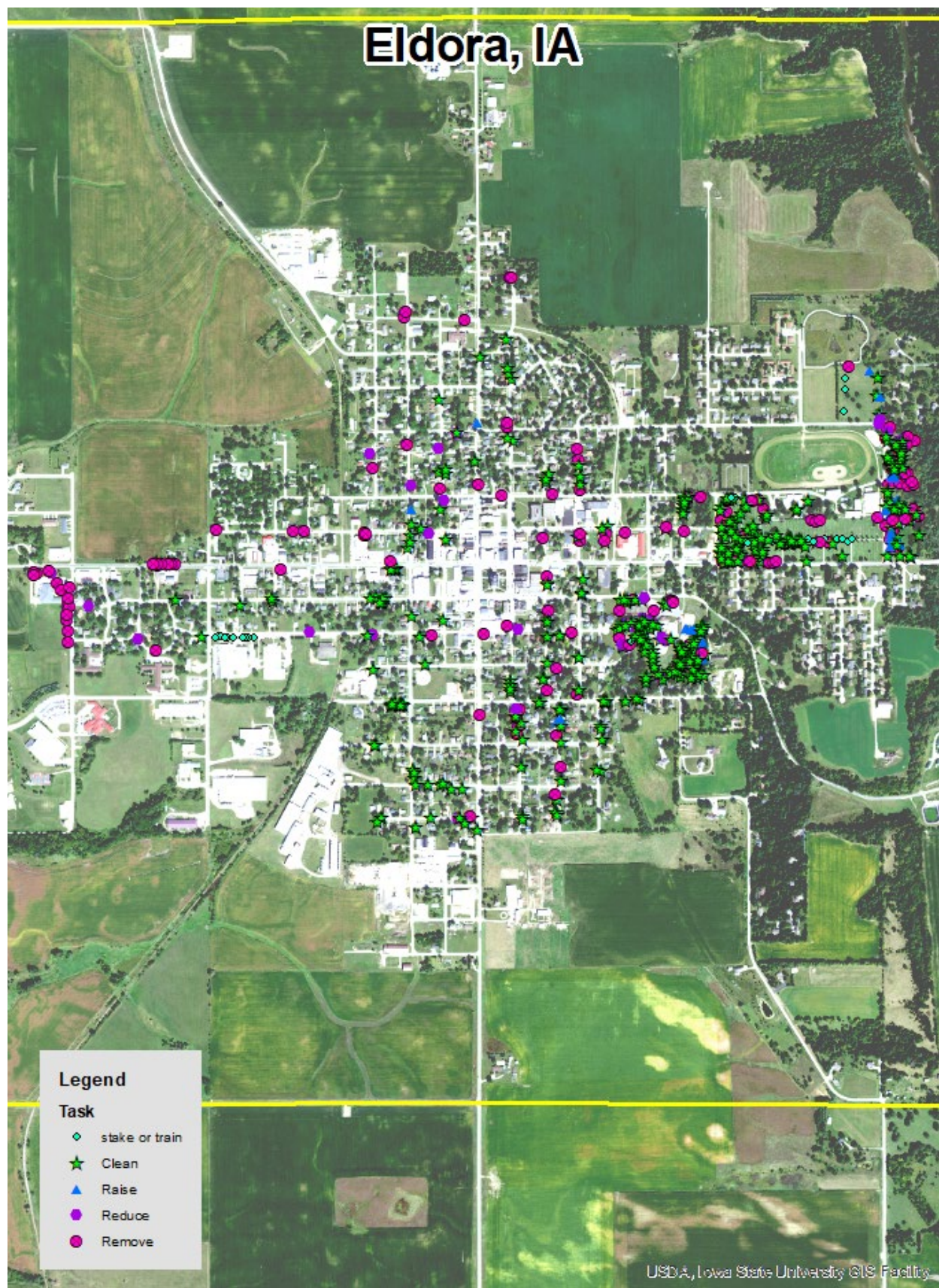


Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*

Appendix C: Eldora Tree Ordinances

CHAPTER 151

TREES

151.01 Definition
151.02 Planting Restrictions
151.03 Duty to Trim Trees
151.04 Permission to Trim

151.05 Disease Control
151.06 Inspection and Removal
151.07 Liability of Abutting Landowners
151.08 Licensing of Tree Trimmers
151.09 City Tree Plan and Landscape Plan

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.

1. **Approval Required.** No trees shall be planted, seeded or permitted to grow from self-seeding in any of the streets or parking strips in the City, unless first approved by the Council.
2. **Location.** No trees or shrubs shall be planted, seeded or permitted to grow from self-seeding on any street, parking or private property within four (4) feet from any public sidewalk or sidewalk area along the property line, or in any place where they will, at the time of planting or when they get their growth, obstruct the view of those operating motor vehicles at street intersections. All trees and shrubs shall be placed so as to avoid unnecessary interference with overhead utility wires or underground cables, sewers or drains. Any deviation from these provisions must be approved by the Council.
3. **Prohibited Trees on Public Property.** No person shall plant in any street or parking any fruit-bearing tree or any tree of the kinds commonly known as cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut.
4. **Prohibited Trees on Private Property.** No person shall plant, seed, or permit to grow from self-seeding any cottonwood trees, other cotton-bearing trees, or elm trees on any private property within the City, unless first approved by the Council.

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 twelve (12) feet above the surface of the street or

sidewalk. 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 PERMISSION TO TRIM. Except as allowed in Section 151.03, no person shall trim or cut any tree in any public street or other public place without permission of the Council.

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 dead, diseased or damaged, and such trees and shrubs shall be subject to the following:

1. City Property. If it is determined that any such condition exists on any public property, including the strip between the curb and the lot line of private property, the 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 fourteen (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])

151.07 LIABILITY OF ABUTTING LANDOWNERS. Except as to diseased or dead trees the abutting landowner shall be liable for the failure to reasonably maintain trees in the parkway or right-of-way, notwithstanding whether or not any notice has or has not been served under this chapter. If damages are to be awarded under this section against the abutting property

owner, the claimant has the burden of proving the amount of the damages. To authorize recovery of more than a nominal amount, facts must exist and be shown by the evidence which afford a reasonable basis for measuring the amount of the claimant's actual damages, and the amount of actual damages shall not be determined by speculation, conjecture, or surmise. All legal or equitable defenses are available to the abutting property owner in an action brought pursuant to this section.

151.08 LICENSING OF TREE TRIMMERS. Any and all tree surgeons, tree trimmers or tree cutters engaged in the removal or trimming of trees shall obtain a license to operate and perform any such service in the City, said license fee to be in the sum of thirty dollars (\$30.00), and any applicant for such a license shall provide sufficient and adequate liability insurance to protect persons and property in the sum of five hundred thousand dollars (\$500,000.00), which insurance shall be approved by the City before any license will be issued. Licenses shall be good for one year and shall be renewed by July 1st.

(Ord. 793 – Jan. 10 Supp.)

151.09 CITY TREE PLAN AND LANDSCAPE PLAN.

1. Purpose. This section establishes a long-range vision of Eldora, which recognizes that the aesthetics, amenities and infrastructure of a city are more than just luxuries for its residents; they are vital ingredients to maintain and create cultural and economic value for the members of the community. The purpose of this section is to establish planting specifications and maintenance requirements for any street, parking strip or other public use areas under the jurisdiction of the City of Eldora.

2. Objectives. The goal of maintaining the aesthetic image of Eldora is intended to contribute to a strong sense of neighborhood and community. The objectives of this section are:

- A. To safeguard and enhance property values and protect public and private investment.
- B. To significantly impact the City's future quality of life.
- C. To preserve and enhance our natural environment and aid in stabilizing the environment's ecological balance.
- D. To encourage the preservation of trees, which promote clean air, provide shade, beautify the environment, reduce the amount of soil runoff and minimize erosion.
- E. To establish height, spacing and placement of trees for public areas.

- F. To prohibit the indiscriminate removal of trees.
- 3. Definitions.
 - A. Street: All that tract of land used or set out to be used for a public thoroughfare lying between the property lines extending along each side thereof.
 - B. May: The indicated action is permissive.
 - C. Shall: The indicated action is mandatory.
 - D. Shrub: Any multiple stemmed woody plant with a mature height less than fifteen feet.
 - E. Tree: Any single stemmed woody plant with a mature height of a minimum of fifteen feet.
 - F. Small Tree: Any tree with a mature height of fifteen to twenty-five feet.
 - G. Large Tree: Any tree with a mature height of more than twenty-five feet.
 - H. Street Tree: Any tree on land lying between the property line on either side of all street, avenues, or ways within the City.
 - I. Park Tree: Trees, shrubs and all other woody vegetation in public parks and all areas owned by the City, or to which the public has free access as a park.
 - J. Parkway: Land lying between the property line on either side of all street, avenues or ways within the City.
- 4. Permits. A permit granted by the City Administrator, with recommendation by the City Tree Board, is required prior to planting, destruction or removal of a street tree.
- 5. Planting of Trees. Hereafter no trees shall be planted, seeded or permitted to grow from self-seeding in any parks, along streets and in other public areas in the City, unless first presented to the City Tree Board and then approved by the City Council. No trees or shrubs shall hereafter be planted, seeded or permitted to grow from self-seeding where they will at the time of planting or as a mature specimen detract from the health, safety and welfare of the public. All trees and shrubs shall hereafter be placed so as to avoid unnecessary interference with overhead utility wire, underground cables, gas mains, sanitary sewer services and mains, storm sewers, water service lines and mains, and any other infrastructure necessary to the area. The City Tree Board must

agree to and the City Council must approve any deviation from the provisions of this section.

6. **Visibility Triangles.** No tree, shrub, soil or other landscape material or any fence, wall, structure or other obstruction having a height greater than two feet as measured from the top of the curb of the adjacent streets shall be placed within any visibility triangle as defined herein. This restriction shall not apply to trees within the parkway area not more than twelve inches in diameter, when measured two feet above curb level when such trees are trimmed at all times so that no branch or growth is less than twelve feet above any portion of a street or eight feet above the curb level at all other points. This restriction shall not apply to permanent buildings or utility related equipment placed within such area by the approval of the City Council.

7. **Planting Specifications.** Small trees shall be planted at least twenty feet from one another but not closer than thirty feet from a large tree. Large trees shall be planted at least thirty feet from one another.

No small tree shall be planted on parkways that are less than eight feet wide. Small trees shall be planted not less than four feet to the curb or curb line. No large trees shall be planted on parkways that are less than twelve feet wide and shall be planted not less than six feet to the curb or curb line. Whenever possible, trees shall be centered between the curb or curb line and the sidewalk or property line.

Trees planted on the parkway shall be at least twenty feet from intersecting lot lines, at least five feet from any alley or driveway, and at least ten feet from any fireplug or utility pole adhering to the visibility triangle regulations.

Trees planted under utility lines shall reach a maximum height of twenty-five feet at maturity. Large trees shall be planted so that branches do not come within ten feet of power lines.

8. **Prohibited Trees and Shrubs.** The following varieties are prohibited for use on City streets due to hazardous thorns, weak wood, and messy fruit, to disease or insects or undesirable growth habits. This list may be updated at any time.

A.	Populus deltoids	Cottonwood
B.	Populus species	Popular
C.	Acer saccharins	Silver Maple
D.	Acer negundo	Boxelder
E.	Uhnus americans	American Elm
F.	Ulmus parvifulia	Siberian Elm

G.	<i>Crataegus</i> species	Hawthorn
H.	<i>Gleditsia triacanthus</i>	Locust (excluding thornless and seedless varieties)
I.	<i>Ginkgo biloba</i>	Ginkgo (female)
J.	<i>Elaeagnus angustifolia</i>	Russian Olive
K.	<i>Abies</i> species	Fir
L.	<i>Juniperus</i> species	Juniper
M.	<i>Larix</i> species	Larch
N.	<i>Picea</i> species	Spruce
O.	<i>Pinus</i> species	Pine
P.	<i>Pseudotsuga</i> species	Douglas Fir
Q.	<i>Taxus</i> species	Arborvitae
R.	<i>Thuja</i> species	Yew
S.	<i>Tsuga</i> species	Hemlock
T.	<i>Betula papyrifera</i>	White Birch
U.	<i>Quercus palustris</i>	Pin Oak
V.	<i>Salix</i> species	Willow
W.	<i>Catalpa</i> species	Catalpas

9. Landowner Responsibilities. Every owner or occupant of real property bordering upon any street, alley, or public place shall keep the branches of any tree overhanging any street or right-of-way within the City pruned so that they shall not obstruct the light from any street lamp or obstruct the view of any street intersection. They shall maintain a clear space of twelve feet about the surface of the right-of-way grounds and eight feet above any sidewalk. Said owner shall remove all dead, diseased or dangerous broken or decayed limbs that constitute a menace to the health, safety, or welfare of the public. Except as to diseased or dead trees the abutting landowner shall be liable for the failure to reasonably maintain trees in the parkway or right-of-way, notwithstanding whether or not any notice has or has not been served under this chapter.

10. Public Tree Care. The City shall have the right to plant, prune, maintain and remove trees, plants and shrubs within the lines of all streets, alley, avenues, lanes, squares, and public grounds, as may be necessary to insure public safety or to preserve or enhance the symmetry and beauty of such public ground. The City, upon recommendation of the City Tree Board, may remove or order to be removed any tree or part thereof which is in an unsafe condition or which by reason of its nature is injurious to sewers, electric power lines, gas lines, water lines, underground cables or public improvements, or is infected with or affected by any injurious fungus, insect or other pest.

The City shall have the right to prune any tree, shrub, plant or plant part on private property when it interferes with the proper spread of light along the street from a street light, interferes with visibility or any traffic control device or sign, interferes with the free passage of pedestrian traffic on sidewalk, or causes electric service interruptions.

11. Removal of Stumps. All stumps of street and park trees shall be removed below the surface of the ground so that the top of the stump shall not project above the surface of the ground.

12. Abuse or Mutilation of Public Trees. It shall be unlawful as a normal practice for any person, firm, or City department to top any street, park, or other tree on public property. Topping is defined as the severe cutting back of limbs to stubs within the tree's crown to such a degree as to remove the normal canopy and disfigure the tree. Trees severely damaged by storms or other causes, or certain trees under utility wires or other obstructions where other pruning practices are impractical may be exempted from this section at the determination of the City Council, upon the recommendation of the City Tree Board.

Unless specifically authorized by the City Tree Board, no person shall intentionally damage, cut, carve, transplant, or remove any tree on public property; attach any rope, wire, nail, advertising poster, or other contrivance to any tree on public property; allow any gas, liquid or solid substance that is harmful to such trees come in contact with them or their roots; or set fire or permit any fire to burn when such fire or the heat thereof will injure any portion of any tree on public property. Growth retardants approved by the City Tree Board may be utilized and shall not be a violation of this section.

13. Notice to Trim. The City shall provide written notice to landowner of record of a violation of this section by ordinary mail to the landowner's last known address. Such notice shall provide a reasonable time by which the violation shall be remedied, but not less than ten days from the time of the mailing.

14. Landowner Appeal. The landowner wishing to appeal the notice to trim shall file the notice of appeal with the City Clerk within five days of receiving the notice. The City Council shall hear the appeal at its next regularly scheduled meeting. Failure of the landowner to appear at the next regularly scheduled meeting shall be conclusively presumed as an admission of the violation.

(Ord. 740 – Jun. 03 Supp.)

The State of Iowa is an Equal Opportunity Employer and provider of ADA services.

Federal law prohibits employment discrimination on the basis of race, color, age, religion, national origin, sex or disability. State law prohibits employment discrimination on the basis of race, color, creed, age, sex, sexual orientation, gender identity, national origin, religion, pregnancy, or disability. State law also prohibits public accommodation (such as access to services or physical facilities) discrimination on the basis of race, color, creed, religion, sex, sexual orientation, gender identity, religion, national origin, or disability. If you believe you have been discriminated against in any program, activity or facility as described above, or if you desire further information, please contact the Iowa Civil Rights Commission, 1-800-457-4416, or write to the Iowa Department of Natural Resources, Wallace State Office Bldg., 502 E 9th St, Des Moines IA 50319.

If you need accommodations because of disability to access the services of this Agency, please contact the Director at 515-725-8200.