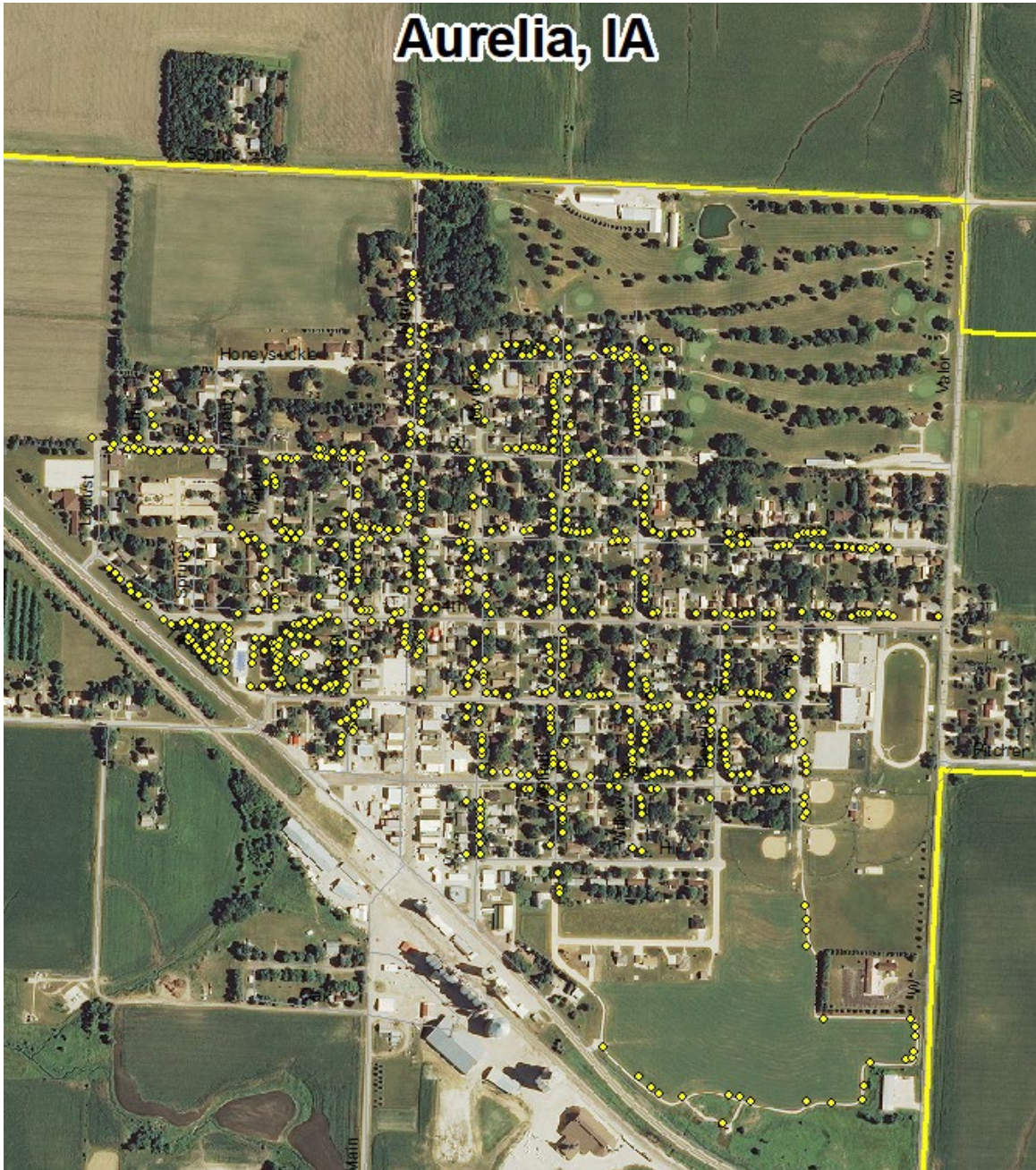


Aurelia, IA



2018 Urban Forest Management Plan
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Executive Summary

Overview

This plan was developed to assist the City of Aurelia 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 19% of Aurelia'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 2017, 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 744 trees inventoried.

- Aurelia's trees provide \$177,890 of benefits annually, an average of \$239 a tree
- There are over 39 species of trees
- The top three genera are: Maple 50%, Ash 19%, and Spruce 6%
- 5% of trees are in need of some type of management
- 16 trees are recommended for removal

Recommendations

The core recommendations are detailed in the Recommendations Section. The Emerald Ash Borer Plan includes management recommendations as well. Below are some key recommendations.

- Of the 16 trees needing removal, 12 trees are over 24 inches in diameter at 4.5 ft and must be addressed immediately [*City ownership of the trees recommended for removal should be verified prior to any removal*](#)
- 70 of the 142 ash trees should be carefully examined, as they have one or more symptoms that could be related to an EAB infestation
- All trees should be pruned on a routine schedule- one third of the city every other year
- Plant a diverse mix of trees that do not include: ash, maple, cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut
- Check ash trees with a visual survey yearly
- With the current budget it could take 40 years to remove ash – Suggestion: request a budget increase to \$10,000 annually and apply for grants to plant replacement trees

Introduction

This plan was developed to assist Aurelia 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 Aurelia, these costs can be extended over years and public safety issues from dead and dying ash trees mitigated.

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

Inventory

In 2017, 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 744 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. Aurelia's trees reduce energy related costs by approximately \$42,962 annually (Appendix A, Table 1). These savings are both in Electricity (204.4 MWh) and in Natural Gas (28,008.8 Therms).

Annual Stormwater Benefits

Aurelia's trees intercept about 2,664,179 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides \$72,199 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 Aurelia, it is estimated that trees remove 2,447lbs 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 \$7,658 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Aurelia, trees sequester about 570,587 lbs of carbon a year with an associated value of \$4,337 (Appendix A, Table 5). In addition, the trees store 10,435,073 lbs of carbon, with a yearly benefit of \$6,458 (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. Aurelia receives \$48,612 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, Aurelia's trees provide \$177,890 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 744 trees in Aurelia provide approximately \$239 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Aurelia has over 39 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Maple	374	50%
Ash	142	19%

Spruce	48	6%
Linden	44	6%
Oak	31	4%
Honeylocust	26	3%
Hackberry	17	2%
Apple (crabapple)	16	2%
Walnut	8	1%
Cottonwood	6	1%
Elm	4	1%
Sycamore	3	<1%
Cherry	3	<1%
Willow	3	<1%
Mountain ash	3	<1%
Birch	2	<1%
Redbud	2	<1%
Other Conifer	2	<1%
Ginkgo	2	<1%
Kentucky Coffeetree	2	<1%
Pine	2	<1%
Buckeye	1	<1%
Cedar	1	<1%
Pear	1	<1%
Other	1	<1%

Age Class

Most of Aurelia’s trees (40%) are over 30 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. Aurelia’s size curve is on the larger side, indicating an older than average stand.

Condition: Wood and Foliage

Both wood condition and leaf condition are good indicators of the overall health of the urban forest. The foliage condition results for Aurelia indicate that 95% of the trees are in good health, with only 3% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Also, 23% of Aurelia’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 8% of the population. This 8% 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	18	2%
Crown Raising	0	0%
Tree Staking	0	0%

Tree Removal	16	2%
Crown Reduction	3	<1%

Canopy Cover

The total canopy with both private and public trees is 14%, 94 acres. The canopy cover included in the Aurelia inventory includes approximately 25 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 49 trees need to be planted annually on public and private lands.

Land Use and Location

The majority of Aurelia’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.

<u>Land Use</u>	
Single family residential	85%
Park/vacant/other	0%
Industrial/Large commercial	14%
Small commercial	0%
Multifamily residential	0%
 <u>Location</u>	
Planting strip	50%
Other maintained locations	0%
Cutout (surrounded by pavement)	0%
Front yard	50%

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

Aurelia has 3 critical concern trees, 2 that need immediate removal and one that needs trimming. 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 8 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. There are a total of 24 trees with these needs.

Poor tree species

After the removal of the critical concern trees, ash trees in poor health should be assessed for removal (Appendix B, Figure 3 & Appendix B, Figure 4). Of the 16 removals, 6 are ash trees. There are a total of 142 ash trees, and 70 of those have signs and symptoms that have been associated with EAB. In addition, there are 7 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 Aurelia.

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 (50%) (Appendix A, Figure 1). Maples should not be planted until this percentage can be lowered. Also, ash trees have not been recommended since 2002, due to the threat of EAB. Other species to avoid because they are public nuisances include: cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut, as outlined in section 151.02 of the city ordinance (Appendix C). All trees planted must meet the restrictions in city ordinance 151.02 (Appendix C).

Continual Monitoring

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

Six Year Maintenance Plan with No Additional Funding

Year 1

Removal: 2 largest critical concern trees

Planting and Replacement: 3 trees to be planted in open locations

Young Tree Pruning & Maintenance:

Visual Survey for signs and symptoms of EAB

Year 2

Removal: 1 tree

*Or saving for ash tree treatment and/or future ash removal

Planting and Replacement: 1 tree in open location from year one removals

Young Tree Pruning & Maintenance: 2 trees

Routine trimming: Contract to trim 1/3 of the city trees

Visual Survey for signs and symptoms of EAB

Year 3

Removal: 2 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: 3 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: 1 tree

*Or saving for ash tree treatment and/or future ash removal

Planting and Replacement: 1 tree in open location from year one removals

Young Tree Pruning & Maintenance: 2 trees

Routine trimming: Contract to trim 1/3 of the city trees

Visual Survey for signs and symptoms of EAB

Year 5

Removal: 2 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: 3 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: 1 tree

*Or saving for ash tree treatment and/or future ash removal

Planting and Replacement: 1 tree in open location from year one removals

Young Tree Pruning & Maintenance: 2 trees

Routine trimming: Contract to trim 1/3 of the city trees

Visual Survey for signs and symptoms of EAB

*Reduction of ash over 6 years: Approximately 6 ash trees removed (approximately 25% of ash). It will take approximately 40 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 \$25,000 a year. If the budget were increased to \$10,000 a year all ash could be removed in 14 years.

Emerald Ash Borer Plan

Ash Tree Removal

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

Treatment of Ash Trees

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

EAB Quarantines

EAB is an extremely destructive plant pest and it is responsible for the death and decline of millions of ash trees. Ash in both forested and urban settings constitute a significant portion of the canopy cover in the United States. Current tools to detect, control, suppress and eradicate this pest are not as robust as the USDA would desire. In order to stay ahead of this hard to detect beetle, the USDA is attempting to contain the beetle before it spreads beyond its known positions by regulating articles.

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

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

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

Wood Disposal

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

Canopy Replacement

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

Postponed Work

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

Monitoring

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

Private Ash Trees

It is strongly recommended that private property owners start removing ash trees on their property upon arrival of EAB if preventative treatments are not being used. City Code 151.06 states "If it is determined with reasonable certainty that any such condition exists (trees or shrubs in the City reported or suspected to be infected with or damaged by any disease or insect or disease pests) on private property and that the danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Council shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days of said notification. If such owner, occupant or person in charge of said property fails to comply within 14 days of receipt of notice, the Council may cause the condition to be corrected and the cost assessed against the property.

Budget

Current Budget

Total \$12,000 over 6 years (\$2,000/year)

FY 2018 Budget

Removal: \$1600

Planting: \$300

Watering & Maintenance: \$100

FY 2019 Budget

Removal: \$800

Planting: \$100

Routine trimming: \$1,000

Watering & Maintenance: \$100

FY 2020 Budget

Removal: \$1600

Planting: \$300
Watering & Maintenance: \$100

FY 2021 Budget

Removal: \$800
Planting: \$100
Routine trimming: \$1,000
Watering & Maintenance: \$100

FY 2022 Budget

Removal: \$1600
Planting: \$300
Watering & Maintenance: \$100

FY 2023 Budget

Removal: \$800
*Or saving for ash tree treatment and/or future ash removal
Planting: \$100
Routine trimming: \$1,000
Watering & Maintenance: \$100

***Reduction of ash over 6 years: approximately 6 ash trees removed (approximately 5% of ash). It will take approximately 40 years to remove all ash with the current budget.**

Purposed Budget Increase

EAB could potentially kill all ash trees in Aurelia within 4 years of its arrival. To remove all ash trees within 6 years the budget would need to be increased to \$25,000 a year. If the budget were increased to \$10,000 a year all ash could be removed within 14 years. Additionally, it is recommended that Aurelia apply for grants to fund replacement trees. Utility Company grants are usually between \$500 and \$10,000 for community-based, tree-planting projects that include parks, gateways, cemeteries, nature trails, libraries, nursing homes, and schools.

Another option being considered by many communities is treating a number of selected trees, either to maintain those trees in the landscape or to delay their removal – to spread out the costs and number of trees needing removed all at once. Trunk injection is administered every two years for the life of the tree. If treatment is discontinued, the tree dies. For instance, in this treatment scenario, the average ash diameter is 20 inches and at \$15 per inch, about 4 trees could be treated per year (every other year treatment). This would be 8 trees selected for treatment, and Aurelia would still need to find \$102,400 for removal. Alternatively, if there are 15 treatable trees, it would cost approximately \$2,250 a year for treatment and leave \$96,800 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 Aurelia. It is suggested to consider increasing the budget to plan for this.

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits
Aurelia

Annual Energy Benefits of Public Trees

3/29/2018

Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	66.6	5,057	8,718.9	8,545	13,602	(N/A)	25.7	31.7	71.21
Green ash	42.9	3,258	5,891.9	5,774	9,032	(N/A)	18.7	21.0	64.98
Norway maple	32.5	2,465	4,771.5	4,676	7,141	(N/A)	16.6	16.6	58.06
American basswood	10.1	763	1,452.7	1,424	2,187	(N/A)	4.6	5.1	64.32
Sugar maple	7.9	597	1,062.0	1,041	1,638	(N/A)	4.4	3.8	49.64
Blue spruce	3.0	226	429.8	421	647	(N/A)	3.6	1.5	23.98
Honeylocust	9.0	685	1,163.3	1,140	1,825	(N/A)	3.5	4.2	70.21
Red maple	2.7	204	366.0	359	563	(N/A)	2.4	1.3	31.26
Northern hackberry	5.6	425	785.5	770	1,195	(N/A)	2.3	2.8	70.30
Apple	1.2	91	195.5	192	282	(N/A)	2.2	0.7	17.65
Norway spruce	2.3	175	294.3	288	463	(N/A)	2.2	1.1	28.97
Pin oak	4.7	359	633.7	621	980	(N/A)	1.9	2.3	70.00
Littleleaf linden	2.5	193	357.1	350	543	(N/A)	1.3	1.3	54.26
Northern red oak	1.2	92	164.3	161	253	(N/A)	1.2	0.6	28.06
Black walnut	3.1	233	422.9	414	647	(N/A)	1.1	1.5	80.92
Maple	0.3	26	52.5	51	78	(N/A)	0.9	0.2	11.12
Bur oak	0.2	19	29.8	29	48	(N/A)	0.9	0.1	6.88
Eastern cottonwood	2.1	161	291.2	285	447	(N/A)	0.8	1.0	74.44
Spruce	0.6	46	82.8	81	128	(N/A)	0.7	0.3	25.53
American sycamore	0.6	43	76.4	75	117	(N/A)	0.4	0.3	39.16
Willow	1.0	73	142.2	139	213	(N/A)	0.4	0.5	70.84
Black cherry	0.6	45	94.9	93	138	(N/A)	0.4	0.3	46.14
White ash	0.3	21	40.0	39	60	(N/A)	0.4	0.1	20.10
Mountain ash	0.6	44	87.9	86	130	(N/A)	0.4	0.3	43.47
American elm	0.1	6	11.8	12	18	(N/A)	0.3	0.0	8.95
Ginkgo	0.0	0	0.8	1	1	(N/A)	0.3	0.0	0.57
Amur maple	0.4	29	56.3	55	84	(N/A)	0.3	0.2	42.14
Elm	0.6	43	83.8	82	125	(N/A)	0.3	0.3	62.69
Eastern redbud	0.0	2	4.4	4	6	(N/A)	0.3	0.0	3.13
Paper birch	0.6	45	85.0	83	128	(N/A)	0.3	0.3	64.12
Conifer Evergreen Medium	0.3	25	46.5	46	71	(N/A)	0.3	0.2	35.47
Kentucky coffeetree	0.2	18	27.5	27	45	(N/A)	0.3	0.1	22.44
Ohio buckeye	0.3	20	39.6	39	59	(N/A)	0.1	0.1	58.69
Pear	0.0	2	3.8	4	5	(N/A)	0.1	0.0	5.40
Austrian pine	0.1	5	10.2	10	15	(N/A)	0.1	0.0	14.80
Eastern red cedar	0.1	8	16.4	16	25	(N/A)	0.1	0.1	24.57
Red pine	0.1	4	9.5	9	14	(N/A)	0.1	0.0	13.58
Swamp white oak	0.0	3	6.2	6	9	(N/A)	0.1	0.0	8.99
UNKNOWN	0.0	0	0.0	0	0	(N/A)	0.0	0.0	0.00
Total	204.4	15,514	28,008.8	27,449	42,962	(N/A)	100.0	100.0	57.82

**Table 2: Annual Stormwater Benefits
Aurelia**

Annual Stormwater Benefits of Public Trees

3/29/2018

Species	Total rainfall interception (Gal)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	1,038,055	28,131	(N/A)	25.7	39.0	147.28
Green ash	534,902	14,496	(N/A)	18.7	20.1	104.29
Norway maple	341,630	9,258	(N/A)	16.6	12.8	75.27
American basswood	130,084	3,525	(N/A)	4.6	4.9	103.68
Sugar maple	96,166	2,606	(N/A)	4.4	3.6	78.97
Blue spruce	46,489	1,260	(N/A)	3.6	1.7	46.66
Honeylocust	108,363	2,937	(N/A)	3.5	4.1	112.95
Red maple	20,466	555	(N/A)	2.4	0.8	30.81
Northern hackberry	52,740	1,429	(N/A)	2.3	2.0	84.07
Apple	6,059	164	(N/A)	2.2	0.2	10.26
Norway spruce	43,092	1,168	(N/A)	2.2	1.6	72.99
Pin oak	58,434	1,584	(N/A)	1.9	2.2	113.11
Littleleaf linden	28,608	775	(N/A)	1.3	1.1	77.53
Northern red oak	10,071	273	(N/A)	1.2	0.4	30.33
Black walnut	44,722	1,212	(N/A)	1.1	1.7	151.50
Maple	1,923	52	(N/A)	0.9	0.1	7.44
Bur oak	1,573	43	(N/A)	0.9	0.1	6.09
Eastern cottonwood	31,758	861	(N/A)	0.8	1.2	143.44
Spruce	11,939	324	(N/A)	0.7	0.4	64.71
American sycamore	8,018	217	(N/A)	0.4	0.3	72.43
Willow	11,293	306	(N/A)	0.4	0.4	102.01
Black cherry	3,522	95	(N/A)	0.4	0.1	31.82
White ash	1,841	50	(N/A)	0.4	0.1	16.63
Mountain ash	3,015	82	(N/A)	0.4	0.1	27.23
American elm	436	12	(N/A)	0.3	0.0	5.90
Ginkgo	14	0	(N/A)	0.3	0.0	0.19
Amur maple	1,841	50	(N/A)	0.3	0.1	24.94
Elm	7,488	203	(N/A)	0.3	0.3	101.46
Eastern redbud	76	2	(N/A)	0.3	0.0	1.03
Paper birch	6,534	177	(N/A)	0.3	0.2	88.53
Conifer Evergreen Medium	5,849	159	(N/A)	0.3	0.2	79.26
Kentucky coffeetree	1,483	40	(N/A)	0.3	0.1	20.10
Ohio buckeye	2,479	67	(N/A)	0.1	0.1	67.19
Pear	69	2	(N/A)	0.1	0.0	1.86
Austrian pine	755	20	(N/A)	0.1	0.0	20.47
Eastern red cedar	1,635	44	(N/A)	0.1	0.1	44.30
Red pine	596	16	(N/A)	0.1	0.0	16.14
Swamp white oak	163	4	(N/A)	0.1	0.0	4.41
UNKNOWN	0	0	(N/A)	0.0	0.0	0.00
Citywide total	2,664,179	72,199	(N/A)	100.0	100.0	97.17

Table 3: Annual Air Quality Benefits

Aurelia

Annual Air Quality Benefits of Public Trees

3/29/2018

Species	Deposition (lb)				Total Depos. (\$)	Avoided (lb)				Total Avoided (\$)	BVOC Emissions (lb)	BVOC Emissions (\$)	Total (lb)	Total Standard (\$ Error)	% of Total Trees	Avg. \$/tree
	O ₃	NO ₂	PM ₁₀	SO ₂		NO ₂	PM ₁₀	VOC	SO ₂							
Silver maple	184.4	31.3	89.6	8.2	992	313.5	45.9	43.9	301.3	1,963	-92.3	-346	925.8	2,608 (N/A)	25.7	13.66
Green ash	71.8	11.5	33.3	3.2	380	205.1	29.8	28.5	194.5	1,277	0.0	0	577.7	1,657 (N/A)	18.7	11.92
Norway maple	74.3	12.8	35.9	3.3	400	158.2	22.8	21.7	147.3	978	-17.0	-64	459.3	1,314 (N/A)	16.6	10.68
American basswood	19.2	3.3	9.2	0.8	103	48.8	7.0	6.7	45.6	302	-15.9	-60	124.7	345 (N/A)	4.6	10.16
Sugar maple	13.3	2.3	6.5	0.6	72	37.4	5.5	5.2	35.6	233	-10.4	-39	96.0	266 (N/A)	4.4	8.07
Blue spruce	6.9	1.4	5.7	0.8	45	14.4	2.1	2.0	13.5	89	-17.3	-65	29.4	70 (N/A)	3.6	2.58
Honeylocust	21.5	3.5	9.7	1.0	113	42.4	6.2	5.9	40.9	266	-17.2	-65	113.9	314 (N/A)	3.5	12.09
Red maple	4.5	0.8	2.1	0.2	24	12.8	1.9	1.8	12.2	80	-1.5	-6	34.6	98 (N/A)	2.4	5.44
Northern hackberry	8.1	1.4	4.2	0.4	44	27.0	3.9	3.7	25.4	168	0.0	0	74.1	212 (N/A)	2.3	12.47
Apple	1.9	0.3	0.9	0.1	10	6.0	0.9	0.8	5.4	37	0.0	0	16.3	47 (N/A)	2.2	2.93
Norway spruce	5.1	1.0	4.1	0.6	33	10.8	1.6	1.5	10.4	68	-21.8	-82	13.4	19 (N/A)	2.2	1.21
Pin oak	10.9	1.9	5.5	0.5	60	22.4	3.3	3.1	21.4	140	-20.1	-75	49.0	124 (N/A)	1.9	8.88
Littleleaf linden	5.2	0.9	2.5	0.2	28	12.2	1.8	1.7	11.5	76	-2.5	-9	33.6	95 (N/A)	1.3	9.47
Northern red oak	2.0	0.3	1.0	0.1	11	5.7	0.8	0.8	5.5	36	-2.8	-11	13.4	36 (N/A)	1.2	4.00
Black walnut	6.6	1.1	3.0	0.3	35	14.7	2.1	2.0	13.9	91	0.0	0	43.7	126 (N/A)	1.1	15.76
Maple	0.2	0.0	0.1	0.0	1	1.7	0.2	0.2	1.6	10	-0.1	0	4.1	11 (N/A)	0.9	1.63
Bur oak	0.1	0.0	0.1	0.0	1	1.2	0.2	0.2	1.1	7	0.0	0	2.8	8 (N/A)	0.9	1.13
Eastern cottonwood	4.8	0.8	2.1	0.2	25	10.1	1.5	1.4	9.6	63	0.0	0	30.6	88 (N/A)	0.8	14.71
Spruce	1.4	0.3	1.1	0.2	9	2.9	0.4	0.4	2.8	18	-6.6	-25	2.9	3 (N/A)	0.7	0.52
American sycamore	1.2	0.2	0.5	0.1	6	2.7	0.4	0.4	2.5	17	0.0	0	7.9	23 (N/A)	0.4	7.63
Willow	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)	0.4	13.58
Black cherry	1.3	0.2	0.6	0.1	7	3.0	0.4	0.4	2.7	18	0.0	0	8.7	25 (N/A)	0.4	8.35
White ash	0.1	0.0	0.1	0.0	0	1.3	0.2	0.2	1.3	8	0.0	0	3.1	9 (N/A)	0.4	2.91
Mountain ash	1.1	0.2	0.5	0.0	6	2.9	0.4	0.4	2.6	18	0.0	0	8.1	23 (N/A)	0.4	7.75
American elm	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)	0.3	1.29
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)	0.3	0.07
Amur maple	0.6	0.1	0.3	0.0	3	1.9	0.3	0.3	1.7	12	0.0	0	5.2	15 (N/A)	0.3	7.45
Elm	1.4	0.2	0.7	0.1	8	2.8	0.4	0.4	2.6	17	-0.7	-3	7.9	22 (N/A)	0.3	11.21
Eastern redbud	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	0.0	0	0.3	1 (N/A)	0.3	0.41
Paper birch	0.8	0.1	0.4	0.0	4	2.9	0.4	0.4	2.7	18	0.0	0	7.6	22 (N/A)	0.3	10.91
Conifer Evergreen Medium	1.1	0.2	0.8	0.1	7	1.6	0.2	0.2	1.5	10	-2.3	-9	3.5	8 (N/A)	0.3	4.16
Kentucky coffeetree	0.1	0.0	0.1	0.0	1	1.1	0.2	0.2	1.1	7	0.0	0	2.7	8 (N/A)	0.3	3.75
Ohio buckeye	0.5	0.1	0.2	0.0	3	1.3	0.2	0.2	1.2	8	-0.1	0	3.6	10 (N/A)	0.1	10.16
Pear	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
Austrian pine	0.1	0.0	0.1	0.0	0	0.3	0.0	0.0	0.3	2	-0.2	-1	0.6	2 (N/A)	0.1	1.53
Eastern red cedar	0.3	0.1	0.3	0.0	2	0.5	0.1	0.1	0.5	3	-0.9	-3	1.0	2 (N/A)	0.1	2.19
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
Swamp white oak	0.0	0.0	0.0	0.0	0	0.2	0.0	0.0	0.2	1	0.0	0	0.4	1 (N/A)	0.1	1.21
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)	0.0	0.00
Citywide total	453.5	76.7	222.6	21.3	2,447	975.2	142.0	135.4	925.7	6,075	-230.5	-864	2,722.1	7,658 (N/A)	100.0	10.31

Table 4: Annual Carbon Stored

Aurelia

Stored CO2 Benefits of Public Trees

3/29/2018

Species	Total Stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	4,091,781	30,688	(N/A)	25.7	39.2	160.67
Green ash	2,355,718	17,668	(N/A)	18.7	22.6	127.11
Norway maple	1,226,949	9,202	(N/A)	16.6	11.8	74.81
American basswood	719,520	5,396	(N/A)	4.6	6.9	158.72
Sugar maple	387,741	2,908	(N/A)	4.4	3.7	88.12
Blue spruce	52,850	396	(N/A)	3.6	0.5	14.68
Honeylocust	279,406	2,096	(N/A)	3.5	2.7	80.60
Red maple	49,947	375	(N/A)	2.4	0.5	20.81
Northern hackberry	121,975	915	(N/A)	2.3	1.2	53.81
Apple	31,369	235	(N/A)	2.2	0.3	14.70
Norway spruce	53,953	405	(N/A)	2.2	0.5	25.29
Pin oak	296,282	2,222	(N/A)	1.9	2.8	158.72
Littleleaf linden	110,437	828	(N/A)	1.3	1.1	82.83
Northern red oak	40,767	306	(N/A)	1.2	0.4	33.97
Black walnut	219,835	1,649	(N/A)	1.1	2.1	206.10
Maple	3,369	25	(N/A)	0.9	0.0	3.61
Bur oak	3,745	28	(N/A)	0.9	0.0	4.01
Eastern cottonwood	160,526	1,204	(N/A)	0.8	1.5	200.66
Spruce	16,664	125	(N/A)	0.7	0.2	25.00
American sycamore	40,479	304	(N/A)	0.4	0.4	101.20
Willow	42,840	321	(N/A)	0.4	0.4	107.10
Black cherry	20,228	152	(N/A)	0.4	0.2	50.57
White ash	3,104	23	(N/A)	0.4	0.0	7.76
Mountain ash	16,523	124	(N/A)	0.4	0.2	41.31
American elm	922	7	(N/A)	0.3	0.0	3.46
Ginkgo	9	0	(N/A)	0.3	0.0	0.03
Amur maple	9,780	73	(N/A)	0.3	0.1	36.67
Elm	30,478	229	(N/A)	0.3	0.3	114.29
Eastern redbud	192	1	(N/A)	0.3	0.0	0.72
Paper birch	24,230	182	(N/A)	0.3	0.2	90.86
Conifer Evergreen Mf	9,787	73	(N/A)	0.3	0.1	36.70
Kentucky coffeetree	3,684	28	(N/A)	0.3	0.0	13.81
Ohio buckeye	7,945	60	(N/A)	0.1	0.1	59.59
Pear	178	1	(N/A)	0.1	0.0	1.33
Austrian pine	284	2	(N/A)	0.1	0.0	2.13
Eastern red cedar	1,102	8	(N/A)	0.1	0.0	8.27
Red pine	257	2	(N/A)	0.1	0.0	1.93
Swamp white oak	218	2	(N/A)	0.1	0.0	1.64
UNKNOWN	0	0	(N/A)	0.0	0.0	0.00
Citywide total	10,435,073	78,263	(N/A)	100.0	100.0	105.33

Table 5: Annual Carbon Sequestered

Aurelia

Annual CO₂ Benefits of Public Trees

3/29/2018

Species	Sequestered (lb)	Sequestered (\$)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released (\$)	Avoided (lb)	Avoided (\$)	Net Total (lb)	Total Standard (\$ Error)	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	292,428	2,193	-19,643	-753	-153	111,761	838	383,792	2,878 (N/A)	25.7	44.6	15.07
Green ash	102,550	769	-11,307	-461	-88	71,991	540	162,773	1,221 (N/A)	18.7	18.9	8.78
Norway maple	29,908	224	-5,891	-375	-47	54,470	409	78,112	586 (N/A)	16.6	9.1	4.76
American basswood	39,229	294	-3,454	-122	-27	16,866	126	52,518	394 (N/A)	4.6	6.1	11.58
Sugar maple	18,870	142	-1,861	-88	-15	13,202	99	30,122	226 (N/A)	4.4	3.5	6.85
Blue spruce	2,861	21	-254	-58	-2	5,001	38	7,550	57 (N/A)	3.6	0.9	2.10
Honeylocust	16,482	124	-1,341	-67	-11	15,145	114	30,219	227 (N/A)	3.5	3.5	8.72
Red maple	4,410	33	-240	-26	-2	4,509	34	8,652	65 (N/A)	2.4	1.0	3.61
Northern hackberry	6,891	52	-585	-52	-5	9,400	71	15,654	117 (N/A)	2.3	1.8	6.91
Apple	1,599	12	-151	-20	-1	2,007	15	3,435	26 (N/A)	2.2	0.4	1.61
Norway spruce	2,451	18	-259	-41	-2	3,869	29	6,020	45 (N/A)	2.2	0.7	2.82
Pin oak	25,487	191	-1,422	-52	-11	7,932	59	31,945	240 (N/A)	1.9	3.7	17.11
Littleleaf linden	4,568	34	-530	-33	-4	4,257	32	8,263	62 (N/A)	1.3	1.0	6.20
Northern red oak	1,015	8	-196	-15	-2	2,022	15	2,826	21 (N/A)	1.2	0.3	2.36
Black walnut	7,132	53	-1,055	-34	-8	5,147	39	11,189	84 (N/A)	1.1	1.3	10.49
Maple	507	4	-16	-4	0	584	4	1,070	8 (N/A)	0.9	0.1	1.15
Bur oak	461	3	-18	-3	0	419	3	859	6 (N/A)	0.9	0.1	0.92
Eastern cottonwood	4,762	36	-771	-24	-6	3,564	27	7,531	56 (N/A)	0.8	0.9	9.41
Spruce	733	5	-80	-11	-1	1,027	8	1,669	13 (N/A)	0.7	0.2	2.50
American sycamore	1,195	9	-194	-7	-2	942	7	1,936	15 (N/A)	0.4	0.2	4.84
Willow	370	3	-206	-12	-2	1,616	12	1,768	13 (N/A)	0.4	0.2	4.42
Black cherry	957	7	-97	-9	-1	1,004	8	1,855	14 (N/A)	0.4	0.2	4.64
White ash	546	4	-15	-4	0	467	3	994	7 (N/A)	0.4	0.1	2.49
Mountain ash	1,225	9	-79	-7	-1	978	7	2,116	16 (N/A)	0.4	0.2	5.29
American elm	118	1	-4	-1	0	139	1	251	2 (N/A)	0.3	0.0	0.94
Ginkgo	4	0	0	0	0	7	0	11	0 (N/A)	0.3	0.0	0.04
Amur maple	746	6	-47	-5	0	643	5	1,338	10 (N/A)	0.3	0.2	5.02
Elm	0	0	-146	-9	-1	955	7	801	6 (N/A)	0.3	0.1	3.00
Eastern redbud	47	0	-1	-1	0	43	0	88	1 (N/A)	0.3	0.0	0.33
Paper birch	1,517	11	-116	-6	-1	994	7	2,388	18 (N/A)	0.3	0.3	8.95
Conifer Evergreen Medium	377	3	-47	-7	0	560	4	883	7 (N/A)	0.3	0.1	3.31
Kentucky coffeetree	448	3	-18	-2	0	397	3	825	6 (N/A)	0.3	0.1	3.09
Ohio buckeye	470	4	-38	-3	0	440	3	869	7 (N/A)	0.1	0.1	6.52
Pear	38	0	-1	-1	0	37	0	74	1 (N/A)	0.1	0.0	0.55
Austrian pine	39	0	-1	-1	0	106	1	142	1 (N/A)	0.1	0.0	1.07
Eastern red cedar	0	0	-5	-2	0	187	1	180	1 (N/A)	0.1	0.0	1.35
Red pine	53	0	-1	-1	0	94	1	145	1 (N/A)	0.1	0.0	1.08
Swamp white oak	96	1	-2	-1	0	65	0	158	1 (N/A)	0.1	0.0	1.18
UNKNOWN	0	0	0	0	0	0	0	0	0 (N/A)	0.0	0.0	0.00
Citywide total	570,587	4,279	-50,094	-2,321	-393	342,848	2,571	861,020	6,458 (N/A)	100.0	100.0	8.69

Table 6: Annual Social and Aesthetic Benefits

Aurelia

Annual Aesthetic/Other Benefits of Public Trees

3/29/2018

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	22,093	(N/A)	25.7	45.4	115.67
Green ash	7,936	(N/A)	18.7	16.3	57.09
Norway maple	2,808	(N/A)	16.6	5.8	22.83
American basswood	2,663	(N/A)	4.6	5.5	78.32
Sugar maple	1,911	(N/A)	4.4	3.9	57.92
Blue spruce	519	(N/A)	3.6	1.1	19.23
Honeylocust	4,229	(N/A)	3.5	8.7	162.64
Red maple	617	(N/A)	2.4	1.3	34.26
Northern hackberry	931	(N/A)	2.3	1.9	54.75
Apple	92	(N/A)	2.2	0.2	5.72
Norway spruce	523	(N/A)	2.2	1.1	32.72
Pin oak	1,888	(N/A)	1.9	3.9	134.87
Littleleaf linden	459	(N/A)	1.3	0.9	45.88
Northern red oak	100	(N/A)	1.2	0.2	11.11
Black walnut	498	(N/A)	1.1	1.0	62.26
Maple	90	(N/A)	0.9	0.2	12.81
Bur oak	77	(N/A)	0.9	0.2	11.06
Eastern cottonwood	336	(N/A)	0.8	0.7	55.96
Spruce	116	(N/A)	0.7	0.2	23.13
American sycamore	102	(N/A)	0.4	0.2	33.88
Willow	31	(N/A)	0.4	0.1	10.49
Black cherry	58	(N/A)	0.4	0.1	19.20
White ash	100	(N/A)	0.4	0.2	33.42
Mountain ash	73	(N/A)	0.4	0.2	24.36
American elm	22	(N/A)	0.3	0.0	10.90
Ginkgo	1	(N/A)	0.3	0.0	0.37
Amur maple	44	(N/A)	0.3	0.1	22.14
Elm	0	(N/A)	0.3	0.0	0.00
Eastern redbud	2	(N/A)	0.3	0.0	1.05
Paper birch	123	(N/A)	0.3	0.3	61.64
Conifer Evergreen Medium	26	(N/A)	0.3	0.1	12.81
Kentucky coffeetree	51	(N/A)	0.3	0.1	25.56
Ohio buckeye	43	(N/A)	0.1	0.1	43.05
Pear	2	(N/A)	0.1	0.0	2.06
Austrian pine	21	(N/A)	0.1	0.0	21.08
Eastern red cedar	0	(N/A)	0.1	0.0	0.00
Red pine	15	(N/A)	0.1	0.0	15.42
Swamp white oak	13	(N/A)	0.1	0.0	12.89
UNKNOWN	0	(N/A)	0.0	0.0	0.00
Citywide total	48,612	(N/A)	100.0	100.0	65.43

Table 7: Summary of Benefits in Dollars

Aurelia

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

3/29/2018

Species	Energy	CO ₂	Air Quality	Stormwater	Aesthetic/Other	Total (\$)	Standard Error	% of Total \$
Silver maple	13,602	2,878	2,608	28,131	22,093	69,312	(N/A)	39.0
Green ash	9,032	1,221	1,657	14,496	7,936	34,340	(N/A)	19.3
Norway maple	7,141	586	1,314	9,258	2,808	21,107	(N/A)	11.9
American basswood	2,187	394	345	3,525	2,663	9,114	(N/A)	5.1
Sugar maple	1,638	226	266	2,606	1,911	6,648	(N/A)	3.7
Blue spruce	647	57	70	1,260	519	2,553	(N/A)	1.4
Honeylocust	1,825	227	314	2,937	4,229	9,531	(N/A)	5.4
Red maple	563	65	98	555	617	1,897	(N/A)	1.1
Northern hackberry	1,195	117	212	1,429	931	3,884	(N/A)	2.2
Apple	282	26	47	164	92	611	(N/A)	0.3
Norway spruce	463	45	19	1,168	523	2,219	(N/A)	1.2
Pin oak	980	240	124	1,584	1,888	4,816	(N/A)	2.7
Littleleaf linden	543	62	95	775	459	1,933	(N/A)	1.1
Northern red oak	253	21	36	273	100	683	(N/A)	0.4
Black walnut	647	84	126	1,212	498	2,567	(N/A)	1.4
Maple	78	8	11	52	90	239	(N/A)	0.1
Bur oak	48	6	8	43	77	183	(N/A)	0.1
Eastern cottonwood	447	56	88	861	336	1,788	(N/A)	1.0
Spruce	128	13	3	324	116	582	(N/A)	0.3
American sycamore	117	15	23	217	102	474	(N/A)	0.3
Willow	213	13	41	306	31	604	(N/A)	0.3
Black cherry	138	14	25	95	58	330	(N/A)	0.2
White ash	60	7	9	50	100	227	(N/A)	0.1
Mountain ash	130	16	23	82	73	324	(N/A)	0.2
American elm	18	2	3	12	22	56	(N/A)	0.0
Ginkgo	1	0	0	0	1	2	(N/A)	0.0
Amur maple	84	10	15	50	44	203	(N/A)	0.1
Elm	125	6	22	203	0	357	(N/A)	0.2
Eastern redbud	6	1	1	2	2	12	(N/A)	0.0
Paper birch	128	18	22	177	123	468	(N/A)	0.3
Conifer Evergreen Medi	71	7	8	159	26	270	(N/A)	0.2
Kentucky coffeetree	45	6	8	40	51	150	(N/A)	0.1
Ohio buckeye	59	7	10	67	43	186	(N/A)	0.1
Pear	5	1	1	2	2	11	(N/A)	0.0
Austrian pine	15	1	2	20	21	59	(N/A)	0.0
Eastern red cedar	25	1	2	44	0	72	(N/A)	0.0
Red pine	14	1	1	16	15	48	(N/A)	0.0
Swamp white oak	9	1	1	4	13	29	(N/A)	0.0
UNKNOWN	0	0	0	0	0	0	(N/A)	0.0
Citywide Total	42,962	6,458	7,658	72,199	48,612	177,890	(N/A)	100.0

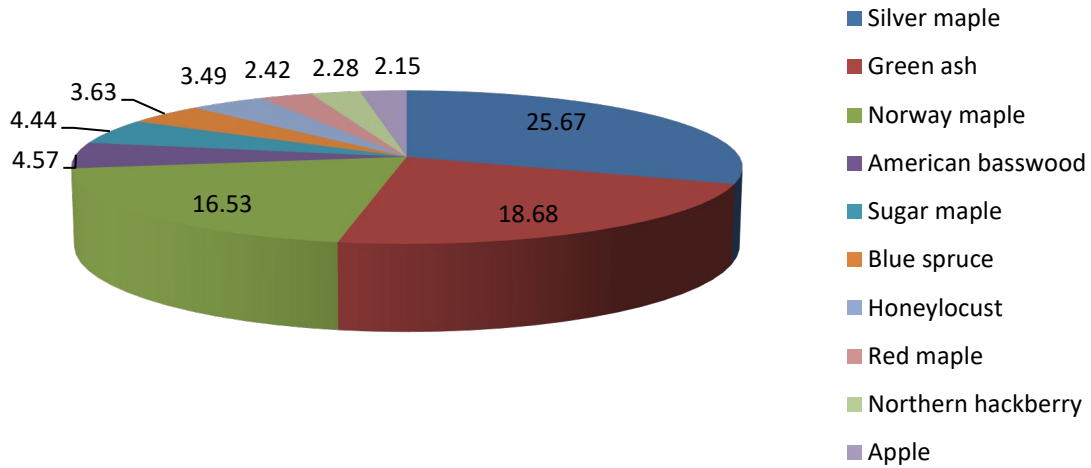


Figure 1: Species Distribution

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

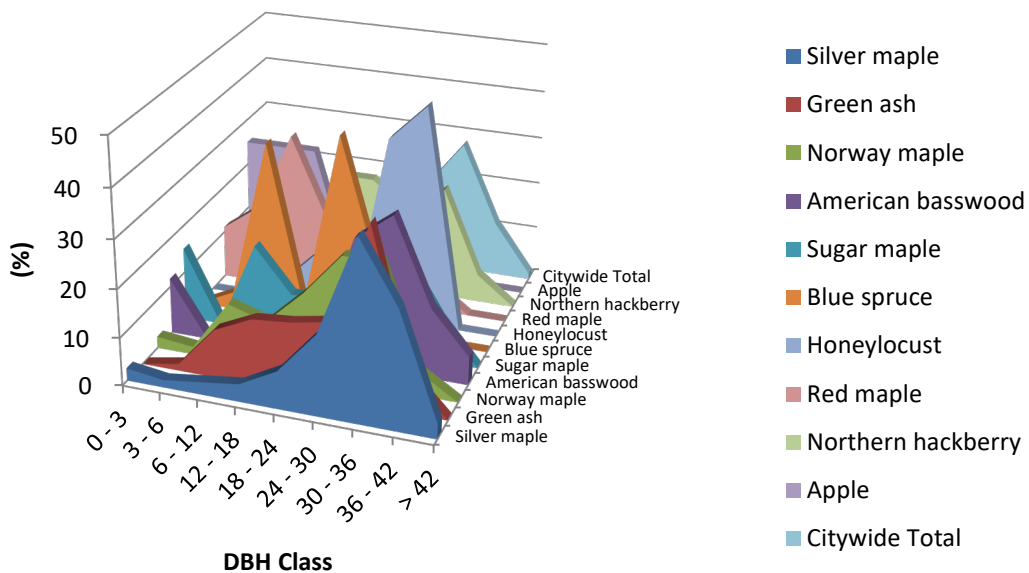


Figure 2: Relative Age Class



Figure 3: Foliage Condition

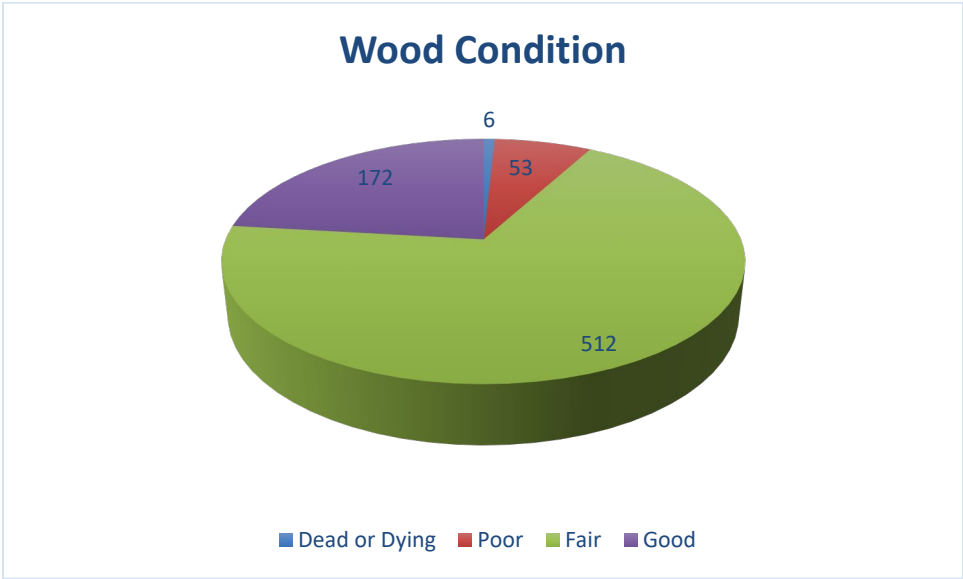


Figure 4: Wood Condition

Canopy Cover of Public Trees (Acres)

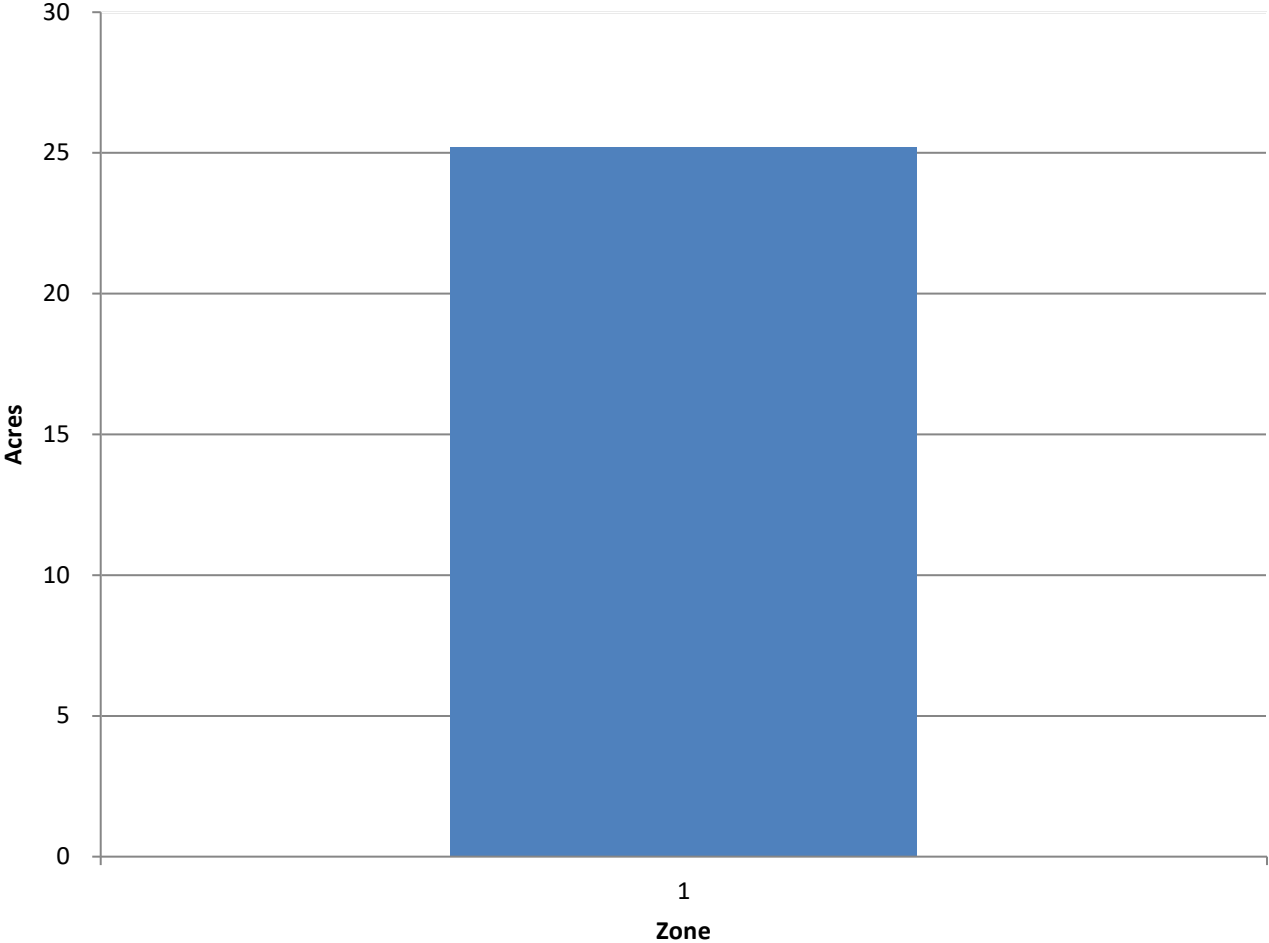


Figure 5: Canopy Cover in Acres

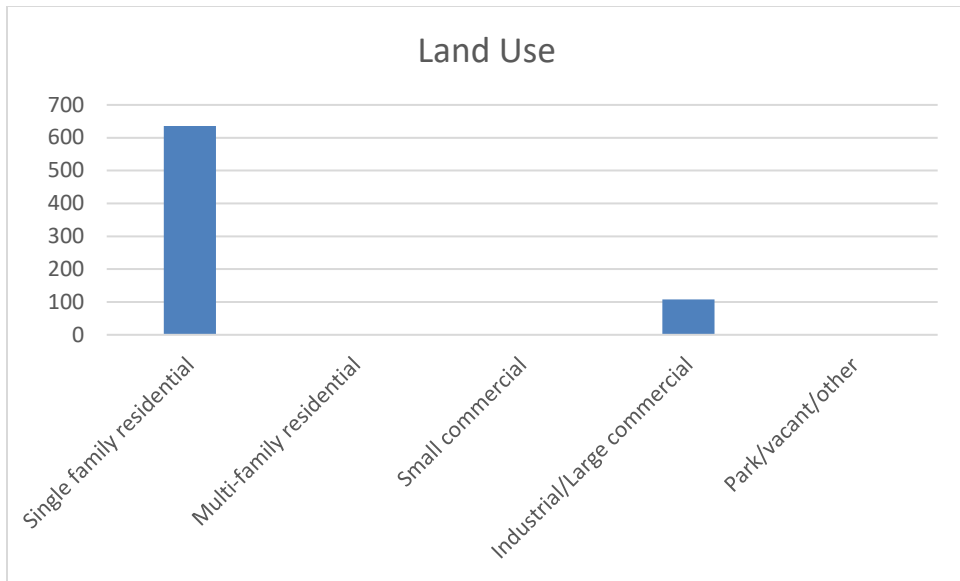


Figure 6: Land Use of city/park trees

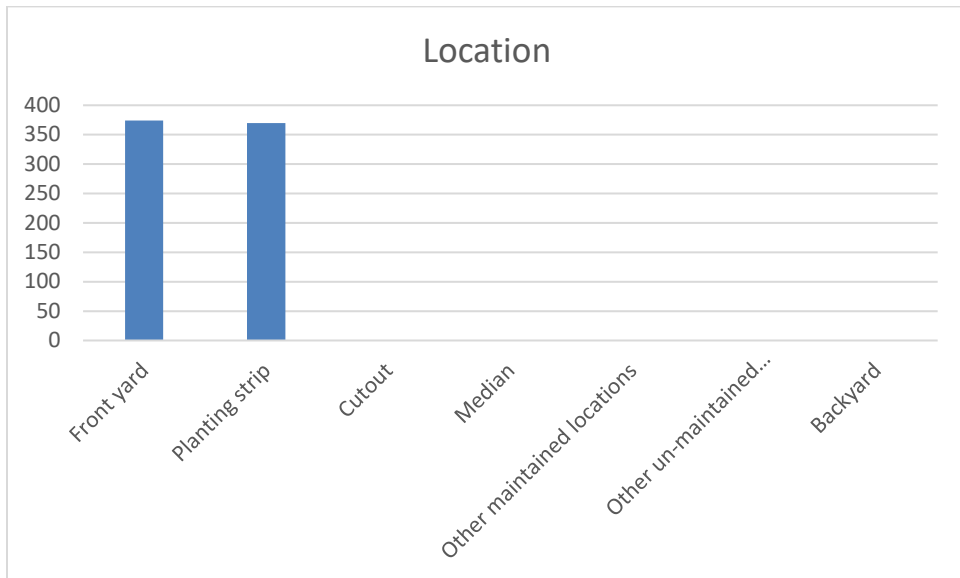


Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping



Figure 1: Location of Ash Trees

Aurelia, IA



Figure 2: Location of EAB symptoms



Figure 3: Location of Poor Condition Trees

Aurelia, IA



Figure 4: Location of Trees with Recommended Maintenance

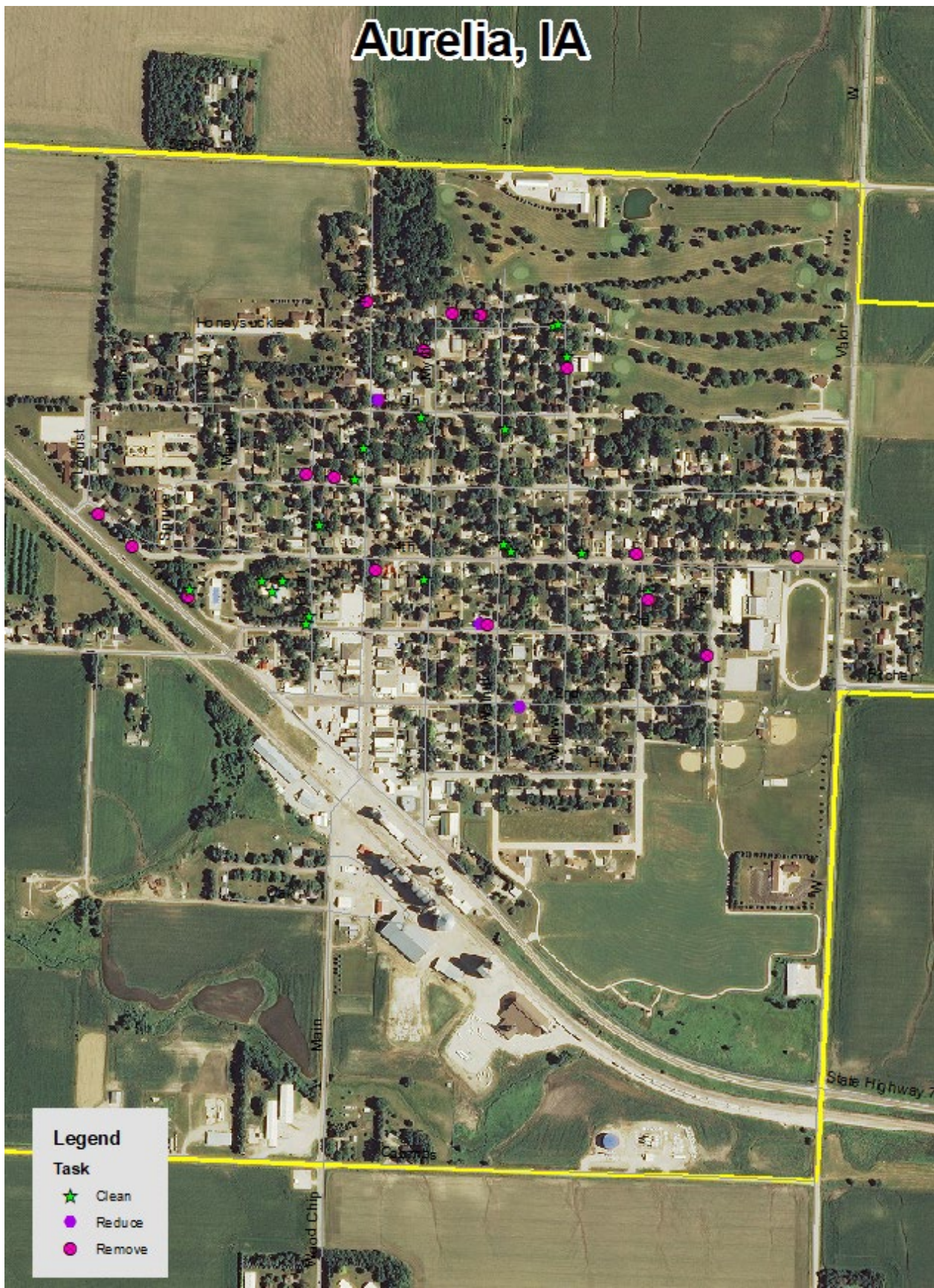


Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*

Appendix C: Aurelia Tree Ordinances

CHAPTER 151 TREES

151.01 Definition	151.04 Trimming Trees to Be Supervised
151.02 Planting Restrictions	151.05 Disease Control
151.03 Duty to Trim Trees	151.06 Inspection and Removal

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 10 feet from the property line.
2. Spacing. Trees shall not be planted on any parking that is less than nine feet in width, or contains less than 81 square feet of exposed soil surface per tree. Trees shall not be planted closer than 20 feet from street intersections (property lines extended) and 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 15 feet above the surface of the street and eight 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 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 that 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 14 days of said notification. If such owner, occupant, or person in charge of said property fails to comply within 14 days of receipt of notice, the Council may cause the condition to be corrected and the cost assessed against the property.

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

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

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

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