

Orleans, IA



2022 Urban Forest Management Plan
Prepared by Emma Hanigan
Iowa Department of Natural Resources



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Executive Summary

Overview

This plan was developed to assist the City of Orleans 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 35% of Orleans'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 2021, 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 71 trees inventoried.

- Orleans's trees provide \$10,604 of benefits annually, an average of \$149 a tree
- There are over 17 species of trees
- The top three genera are: Ash 35%, Maple 21%, and Oak 20%
- 8% of trees are in need of some type of management
- 3 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 3 trees needing removal 1 must be addressed immediately [*City ownership of the trees recommended for removal should be verified prior to any removal*](#)
- 12 of the 25 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 28 years to remove ash – Suggestion: request a budget increase to \$5,000 annually and apply for grants to plant replacement trees

Introduction

This plan was developed to assist Orleans with the management, budgeting and future planning of their urban forest. Across the state, forestry budgets continue to decrease with more and more of that money spent on tree removal. With the recovery from Emerald Ash Borer (EAB), an invasive pest that kills native ash trees, it is time to prepare for the increased costs of tree removal or treatment and replacement planting. With proper planning and management of the current canopy in Orleans, these costs can be extended over years and public safety issues from dead and dying ash trees mitigated.

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

Inventory

In 2021, 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 71 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. Orleans's trees reduce energy related costs by approximately \$2,935 annually (Appendix A, Table 1). These savings are both in Electricity (13.8 MWh) and in Natural Gas (1,922.8 Therms).

Annual Stormwater Benefits

Orleans's trees intercept about 144,727 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides \$3,922 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 Orleans, it is estimated that trees remove 177.1 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 \$503 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Orleans, trees sequester about 32,992 lbs of carbon a year with an associated value of \$401 (Appendix A, Table 5). In addition, the trees store 531,087 lbs of carbon, with a yearly benefit of \$3,983 (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. Orleans receives \$2,843 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, Orleans's trees provide \$10,604 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 71 trees in Orleans provide approximately \$149 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Orleans has over 17 different tree species along city streets and parks (Appendix A, Figure 1).

The distribution of trees by genera is as follows:

Ash	25	35%
Maple	15	21%
Oak	14	20%
Apple (crab)	8	11%
Spruce	2	3%
Walnut	1	1%
Catalpa	1	1%
Elm	1	1%
Ginkgo	1	1%
Hickory	1	1%
hackberry	1	1%
Birch	1	1%

Age Class

Most of Orleans's trees (42%) are under 12 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. Orleans's size curve is on the smaller side, indicating a younger than average stand.

Condition: Wood and Foliage

Both wood condition and leaf condition are good indicators of the overall health of the urban forest. The foliage condition results for Orleans indicate that 94% of the trees are in good health, with only 1% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 41% of Orleans'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 11% of the population. This 11% is an estimate of trees that need management follow up.

Management Needs

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

Tree Removal	3	4%
Cleaning (Pruning dead)	3	4%
Crown Raising	0	0%
Tree Staking	0	0%
Crown Reduction	0	0%

Canopy Cover

The total canopy with both private and public trees is 19%, 135 acres. The canopy cover on city own properties included in the Orleans inventory includes approximately 2 acres (Appendix A, Figure 4). The City's Canopy goal is to increase canopy by 3%, in 30 years on all lands. To achieve this goal, it is estimated that 102 trees need to be planted annually on public and/or private lands.

Land Use and Location

The majority of Orleans'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	52%
Park/vacant/other	48%
Industrial/Large commercial	0%
Small commercial	0%
Multifamily residential	0%

Location

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

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

Orleans has 3 removals and 1 is immediate. These trees can be seen on the Location of Trees with Recommended Maintenance map (Appendix B, Figure 4). After all of the immediate concern trees are addressed, there should be follow up on the trees marked as needing maintenance. There are a total of 5 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 3 removals, 1 is ash. There are a total of 25 ash trees, and 12 of those have signs and symptoms that have been associated with EAB. In addition, there are 4 trees that are in poor health. [*City ownership of the trees recommended for removal should be verified prior to any removal*](#)

Pruning Cycle

Proper pruning can extend the life and good health of trees, as well as reduce public safety issues. In the Management Needs section of the Findings there are four main maintenance issues to be

addressed: routine pruning, crown cleaning, crown raising, and crown reduction. Crown cleaning removes dead, diseased, and damaged limbs. Crown raising is the removal of lower branches that are 2 inches in diameter or larger in the case of providing clearance for pedestrians or vehicles. Crown reduction is removing individual limbs from structures or utility wires. It is recommended that all trees be pruned on a routine schedule every five to seven years. Please refer to the six year maintenance plan for further information.

Planting

Most of the planting over the next 5 years will replace the trees that are removed. It is recommended to plant 1.2 trees for every tree removed, since survival rates will not be 100%. Please refer to the six year maintenance plan at the end of this section. It is not essential that the new trees be planted in the same location of the trees being removed. However, maintaining the same number of trees helps ensure continuation of the benefits of the existing forest in Orleans.

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 (21%) (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.

Budget and Emerald Ash Borer Plan

Six Year Maintenance Plan with No Additional Funding

Current Budget \$1050/year, Total \$42,000 over 6 years

FY 2022

Removal: 1 tree \$800

Planting and Replacement: 2 trees to be planted in open locations, \$200

Young Tree Pruning & Maintenance: \$50

Visual Survey for signs and symptoms of EAB

FY 2023

Removal: none

Planting and Replacement:
Routine trimming: \$1000 – 3 trees
Young Tree Pruning & Maintenance:
Visual Survey for signs and symptoms of EAB

FY 2024

Removal: 1 tree \$800
Planting and Replacement: 2 trees to be planted in open locations, \$200
Young Tree Pruning & Maintenance: \$50
Visual Survey for signs and symptoms of EAB

FY 2025

Removal: 1 tree \$800
Planting and Replacement: 2 trees to be planted in open locations, \$200
Young Tree Pruning & Maintenance: \$50
Visual Survey for signs and symptoms of EAB

FY 2026

Removal: 1 tree \$800 removal of any new critical concern trees and ash in poor health
Planting and Replacement: 2 trees to be planted in open locations, \$200
Young Tree Pruning & Maintenance: \$50
Visual Survey for signs and symptoms of EAB
*Or ash tree treatment

FY 2027

Removal: 1 tree \$800 removal of any new critical concern trees and ash in poor health
Planting and Replacement: 2 trees to be planted in open locations, \$200
Young Tree Pruning & Maintenance: \$50
Visual Survey for signs and symptoms of EAB
*Or ash tree treatment

*Reduction of ash over 6 years: Approximately 3 ash trees removed (approximately 12% of ash). It will take approximately 28 years to remove all ash with the current budget. EAB could potentially kill all ash within 4 years of its arrival.

**To remove all ash trees within 6 years, the budget would need to be increased to \$5,000 a year.

Ash Tree Removal

Tree removal will be prioritized with dead, dying, hazardous trees to be removed first (Appendix B, Figure 4). Next will be all ash in poor condition and displaying signs and symptoms of EAB (Appendix B, Figure 2 & Appendix B, Figure 3). [*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.”

Proposed Budget Increase

EAB could potentially kill all ash trees in Orleans within 4 years of its arrival. To remove all ash trees within 6 years the budget would need to be increased to \$5,000 a year. Additionally, it is recommended that Orleans apply for grants to fund replacement trees. Grants are usually between \$500 and \$10,000 for community-based, tree-planting projects that include parks, gateways, cemeteries, nature trails, libraries, nursing homes, and schools.

Another option being considered by many communities is treating a number of selected trees, either to maintain those trees in the landscape or to delay their removal – to spread out the costs and number of trees needing removed all at once. Trunk injection is administered every two years for the life of the tree. If treatment is discontinued, the tree dies. For instance, in this treatment scenario, the average ash diameter is 20 inches and at \$15 per inch, about 4 trees could be treated per year (every other year treatment) would be \$1,200. This would be 8 trees selected for treatment, and Orleans would still need to find \$13,600 for removal. Alternatively, if there are 15 treatable trees, it would cost approximately \$2,250 a year for treatment and leave \$8,000 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 Orleans. 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

Orleans

Annual Energy Benefits of Public Trees

5/30/2022

Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	5.0	376	675.2	662	1,038	(N/A)	28.2	35.4	51.90
Bur oak	4.1	311	576.7	565	877	(N/A)	18.3	29.9	67.43
Amur maple	0.4	29	66.5	65	94	(N/A)	11.3	3.2	11.80
Apple	0.4	34	69.3	68	102	(N/A)	11.3	3.5	12.69
White ash	0.3	26	48.5	47	74	(N/A)	7.0	2.5	14.72
Norway maple	0.8	60	106.4	104	164	(N/A)	4.2	5.6	54.80
Silver maple	1.1	84	144.3	141	225	(N/A)	4.2	7.7	75.08
Norway spruce	0.3	20	29.3	29	48	(N/A)	2.8	1.6	24.14
Ginkgo	0.0	0	0.4	0	1	(N/A)	1.4	0.0	0.57
Black walnut	0.4	29	53.7	53	82	(N/A)	1.4	2.8	82.02
Northern hackberry	0.4	28	54.0	53	81	(N/A)	1.4	2.8	81.12
River birch	0.1	8	16.9	17	24	(N/A)	1.4	0.8	24.47
Red maple	0.0	3	5.2	5	8	(N/A)	1.4	0.3	7.85
Hickory	0.4	29	53.7	53	82	(N/A)	1.4	2.8	82.02
Northern red oak	0.0	3	5.4	5	8	(N/A)	1.4	0.3	8.25
Catalpa	0.0	2	3.7	4	6	(N/A)	1.4	0.2	5.82
Elm	0.1	7	13.7	13	21	(N/A)	1.4	0.7	20.64
Total	13.8	1,050	1,922.8	1,884	2,935	(N/A)	100.0	100.0	41.33

**Table 2: Annual Stormwater Benefits
Orleans**

Annual Stormwater Benefits of Public Trees

5/30/2022

Species	Total rainfall interception (Gal)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	49,465	1,341	(N/A)	28.2	34.2	67.03
Bur oak	47,819	1,296	(N/A)	18.3	33.0	99.68
Amur maple	1,333	36	(N/A)	11.3	0.9	4.51
Apple	1,539	42	(N/A)	11.3	1.1	5.21
White ash	2,168	59	(N/A)	7.0	1.5	11.75
Norway maple	6,583	178	(N/A)	4.2	4.5	59.46
Silver maple	16,465	446	(N/A)	4.2	11.4	148.74
Norway spruce	3,077	83	(N/A)	2.8	2.1	41.70
Ginkgo	7	0	(N/A)	1.4	0.0	0.19
Black walnut	5,491	149	(N/A)	1.4	3.8	148.79
Northern hackberry	3,620	98	(N/A)	1.4	2.5	98.09
River birch	586	16	(N/A)	1.4	0.4	15.88
Red maple	137	4	(N/A)	1.4	0.1	3.72
Hickory	5,491	149	(N/A)	1.4	3.8	148.79
Northern red oak	168	5	(N/A)	1.4	0.1	4.54
Catalpa	172	5	(N/A)	1.4	0.1	4.65
Elm	608	16	(N/A)	1.4	0.4	16.47
Citywide total	144,727	3,922	(N/A)	100.0	100.0	55.24

**Table 3: Annual Air Quality Benefits
Orleans**

Annual Air Quality Benefits of Public Trees

5/30/2022

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								
Green ash	5.5	0.9	2.8	0.2	30	23.6	3.4	3.3	22.5	147	0.0	0	62.3	177	(N/A)	28.2	8.86
Bur oak	6.0	1.0	2.8	0.3	32	19.7	2.9	2.7	18.6	123	0.0	0	53.9	154	(N/A)	18.3	11.86
Amur maple	0.2	0.0	0.1	0.0	1	2.0	0.3	0.3	1.7	12	0.0	0	4.6	13	(N/A)	11.3	1.63
Apple	0.3	0.1	0.2	0.0	2	2.2	0.3	0.3	2.0	13	0.0	0	5.4	15	(N/A)	11.3	1.90
White ash	0.1	0.0	0.1	0.0	0	1.6	0.2	0.2	1.6	10	0.0	0	3.8	11	(N/A)	7.0	2.14
Norway maple	1.3	0.2	0.6	0.1	7	3.8	0.6	0.5	3.6	24	-0.3	-1	10.4	29	(N/A)	4.2	9.81
Silver maple	2.9	0.5	1.4	0.1	16	5.2	0.8	0.7	5.0	33	-1.4	-5	15.2	43	(N/A)	4.2	14.26
Norway spruce	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)	2.8	2.82
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)	1.4	0.07
Black walnut	0.8	0.1	0.4	0.0	4	1.9	0.3	0.3	1.8	12	0.0	0	5.5	16	(N/A)	1.4	15.71
Northern hackberry	0.6	0.1	0.3	0.0	3	1.8	0.3	0.2	1.7	11	0.0	0	5.0	14	(N/A)	1.4	14.21
River birch	0.1	0.0	0.0	0.0	0	0.5	0.1	0.1	0.5	3	0.0	0	1.2	3	(N/A)	1.4	3.47
Red maple	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)	1.4	1.12
Hickory	0.8	0.1	0.4	0.0	4	1.9	0.3	0.3	1.8	12	0.0	0	5.5	16	(N/A)	1.4	15.71
Northern red 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)	1.4	1.15
Catalpa	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	0.0	0	0.3	1	(N/A)	1.4	0.87
Elm	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)	1.4	2.99
Citywide total	18.8	3.1	9.4	0.9	102	66.3	9.6	9.2	62.7	412	-2.8	-11	177.1	503	(N/A)	100.0	7.09

Table 4: Annual Carbon Stored

Orleans

Stored CO2 Benefits of Public Trees

5/30/2022

Species	Total Stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	179,763	1,348	(N/A)	28.2	33.8	67.41
Bur oak	191,341	1,435	(N/A)	18.3	36.0	110.39
Amur maple	4,343	33	(N/A)	11.3	0.8	4.07
Apple	5,742	43	(N/A)	11.3	1.1	5.38
White ash	3,475	26	(N/A)	7.0	0.7	5.21
Norway maple	21,528	161	(N/A)	4.2	4.1	53.82
Silver maple	59,892	449	(N/A)	4.2	11.3	149.73
Norway spruce	2,340	18	(N/A)	2.8	0.4	8.78
Ginkgo	5	0	(N/A)	1.4	0.0	0.03
Black walnut	25,943	195	(N/A)	1.4	4.9	194.57
Northern hackberry	8,047	60	(N/A)	1.4	1.5	60.35
River birch	1,101	8	(N/A)	1.4	0.2	8.26
Red maple	218	2	(N/A)	1.4	0.0	1.64
Hickory	25,943	195	(N/A)	1.4	4.9	194.57
Northern red oak	187	1	(N/A)	1.4	0.0	1.40
Catalpa	185	1	(N/A)	1.4	0.0	1.39
Elm	1,035	8	(N/A)	1.4	0.2	7.76
Citywide total	531,087	3,983	(N/A)	100.0	100.0	56.10

Table 5: Annual Carbon Sequestered

Orleans

Annual CO Benefits of Public Trees

5/30/2022

Species	Sequestered (lb)	Sequestered (\$)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released (\$)	Avoided (lb)	Avoided (\$)	Net Total (lb)	Total Standard (\$ Error)	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	11,707	88	-863	-51	-7	8,315	62	19,109	143 (N/A)	28.2	35.7	7.17
Bur oak	10,342	78	-918	-43	-7	6,883	52	16,263	122 (N/A)	18.3	30.4	9.38
Amur maple	607	5	-21	-7	0	645	5	1,225	9 (N/A)	11.3	2.3	1.15
Apple	685	5	-28	-7	0	743	6	1,393	10 (N/A)	11.3	2.6	1.31
White ash	677	5	-18	-5	0	577	4	1,232	9 (N/A)	7.0	2.3	1.85
Norway maple	1,142	9	-103	-7	-1	1,329	10	2,360	18 (N/A)	4.2	4.4	5.90
Silver maple	4,580	34	-287	-12	-2	1,852	14	6,132	46 (N/A)	4.2	11.5	15.33
Norway spruce	231	2	-11	-4	0	433	3	649	5 (N/A)	2.8	1.2	2.43
Ginkgo	2	0	0	0	0	4	0	6	0 (N/A)	1.4	0.0	0.04
Black walnut	960	7	-125	-4	-1	650	5	1,481	11 (N/A)	1.4	2.8	11.11
Northern hackberry	499	4	-39	-4	0	624	5	1,081	8 (N/A)	1.4	2.0	8.11
River birch	224	2	-5	-1	0	176	1	393	3 (N/A)	1.4	0.7	2.95
Red maple	39	0	-1	-1	0	60	0	97	1 (N/A)	1.4	0.2	0.73
Hickory	960	7	-125	-4	-1	650	5	1,481	11 (N/A)	1.4	2.8	11.11
Northern red oak	55	0	-1	-1	0	65	0	119	1 (N/A)	1.4	0.2	0.89
Catalpa	74	1	-1	-1	0	49	0	121	1 (N/A)	1.4	0.2	0.91
Elm	209	2	-5	-1	0	159	1	361	3 (N/A)	1.4	0.7	2.71
Citywide total	32,992	247	-2,550	-153	-20	23,213	174	53,503	401 (N/A)	100.0	100.0	5.65

Table 6: Annual Social and Aesthetic Benefits

Orleans

Annual Aesthetic/Other Benefits of Public Trees

5/30/2022

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	1,028	(N/A)	28.2	36.1	51.38
Bur oak	811	(N/A)	18.3	28.5	62.40
Amur maple	34	(N/A)	11.3	1.2	4.23
Apple	39	(N/A)	11.3	1.4	4.82
White ash	126	(N/A)	7.0	4.4	25.16
Norway maple	110	(N/A)	4.2	3.9	36.59
Silver maple	350	(N/A)	4.2	12.3	116.79
Norway spruce	65	(N/A)	2.8	2.3	32.32
Ginkgo	0	(N/A)	1.4	0.0	0.37
Black walnut	67	(N/A)	1.4	2.3	66.60
Northern hackberry	64	(N/A)	1.4	2.2	63.56
River birch	26	(N/A)	1.4	0.9	26.22
Red maple	7	(N/A)	1.4	0.3	7.28
Hickory	67	(N/A)	1.4	2.3	66.60
Northern red oak	7	(N/A)	1.4	0.3	7.21
Catalpa	15	(N/A)	1.4	0.5	14.73
Elm	29	(N/A)	1.4	1.0	28.56
Citywide total	2,843	(N/A)	100.0	100.0	40.04

Table 7: Summary of Benefits in Dollars

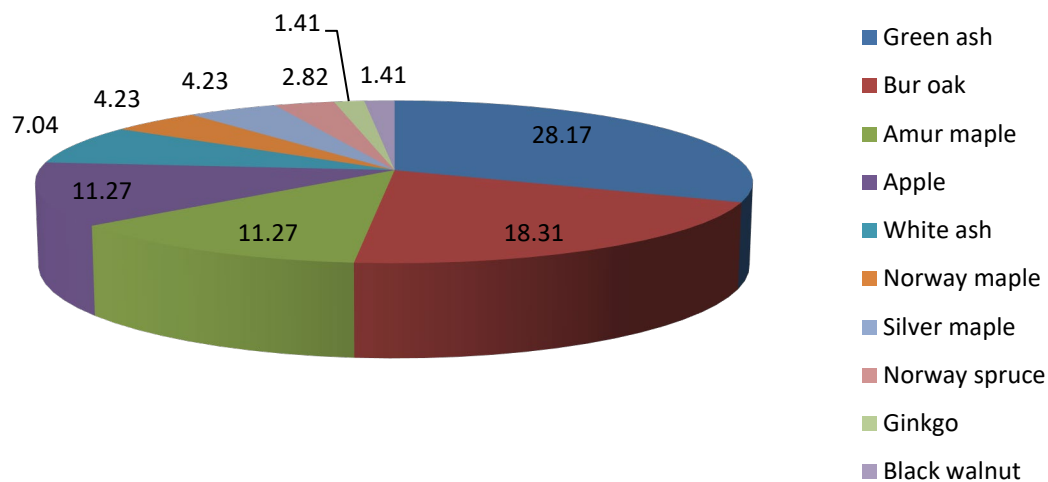


Figure 1: Species Distribution

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

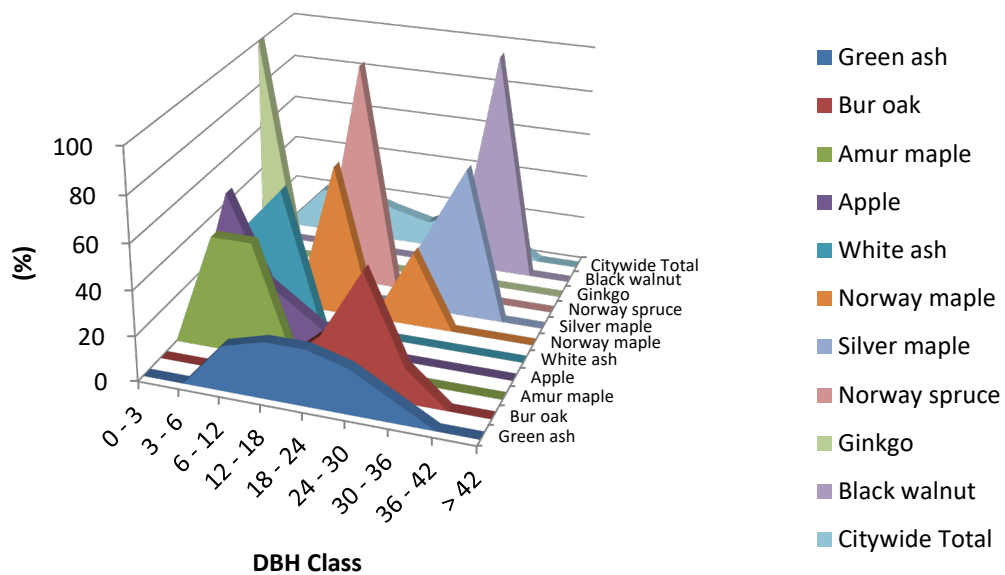


Figure 2: Relative Age Class



Figure 3: Foliage Condition

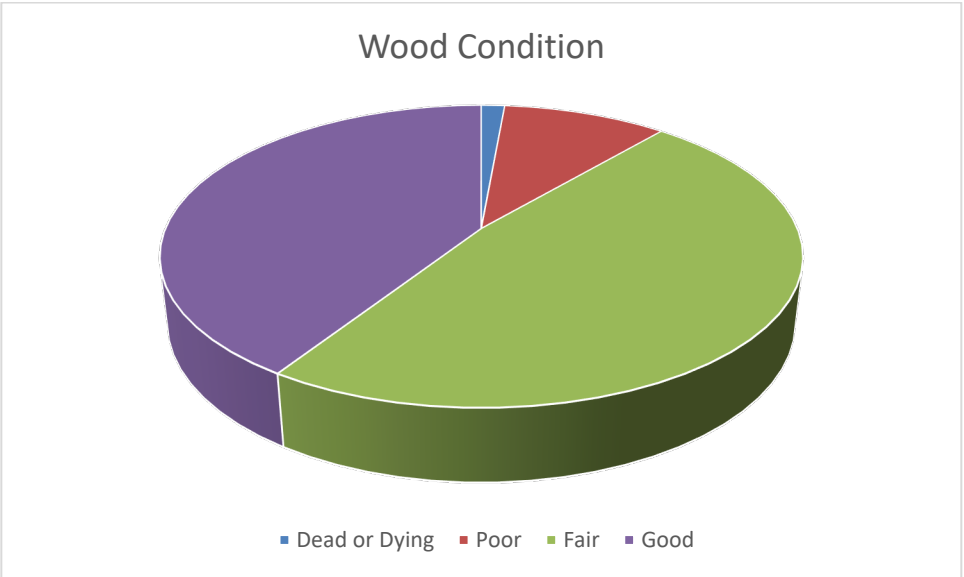


Figure 4: Wood Condition

Canopy Cover of Public Trees (Acres)

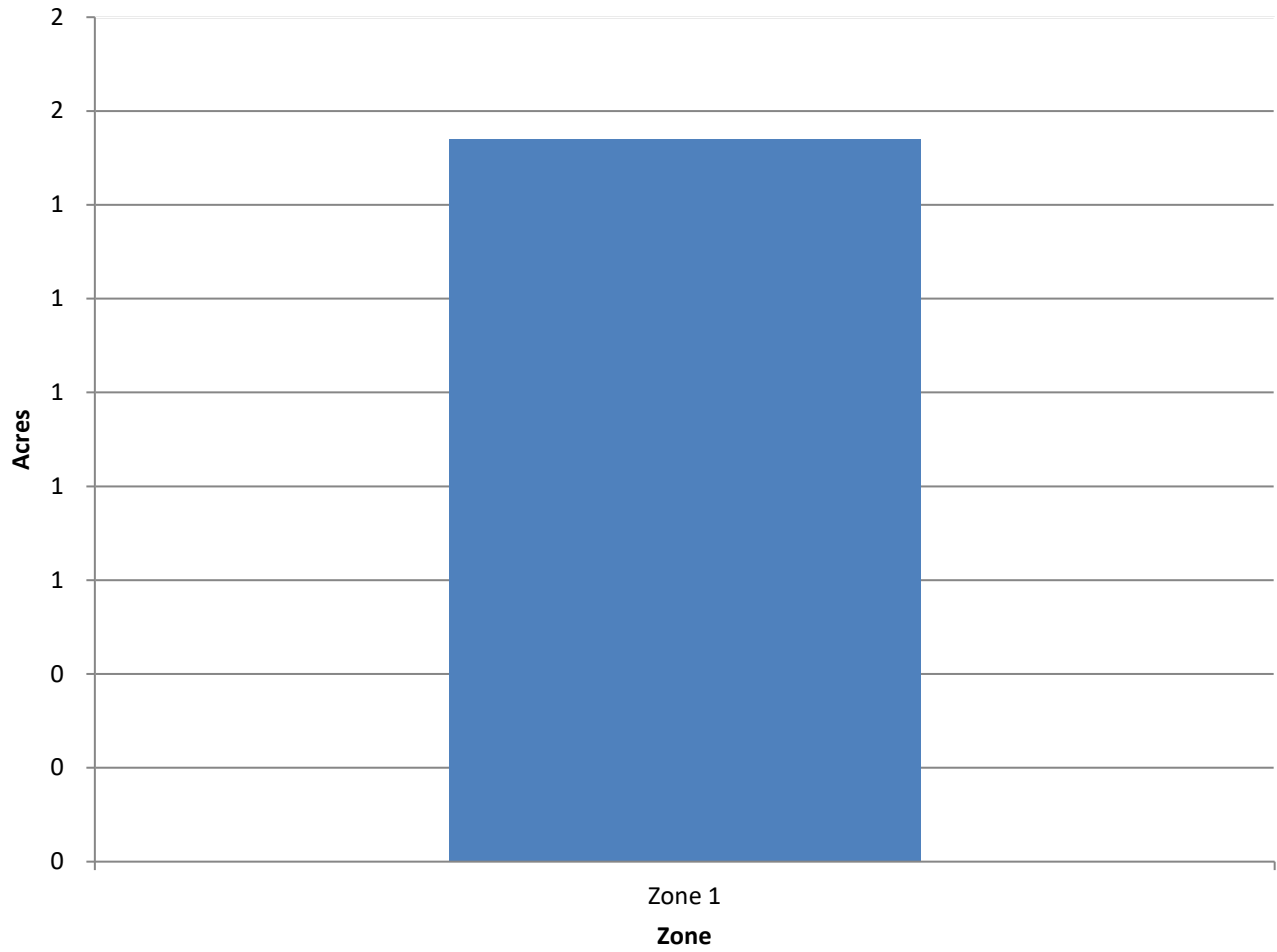


Figure 5: Canopy Cover in Acres

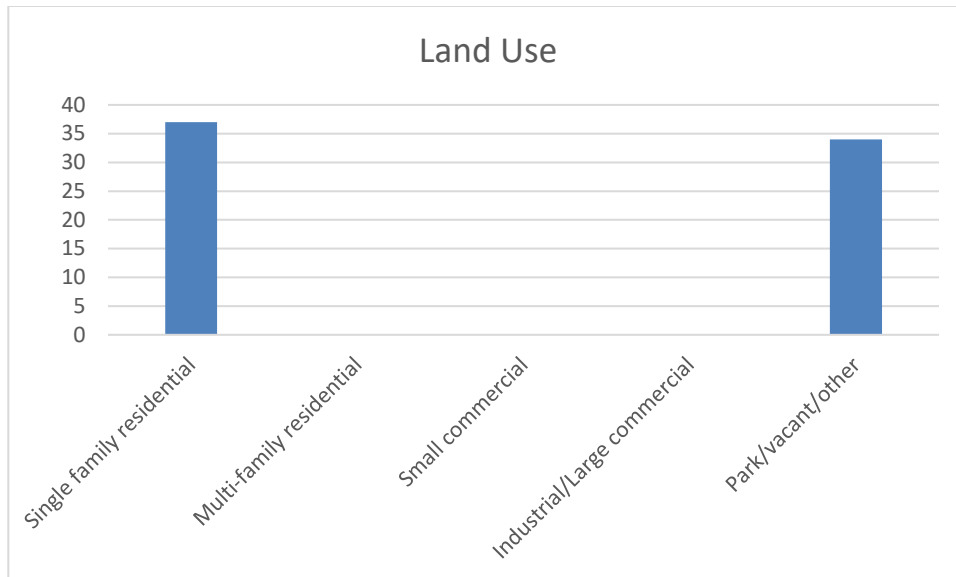


Figure 6: Land Use of city/park trees

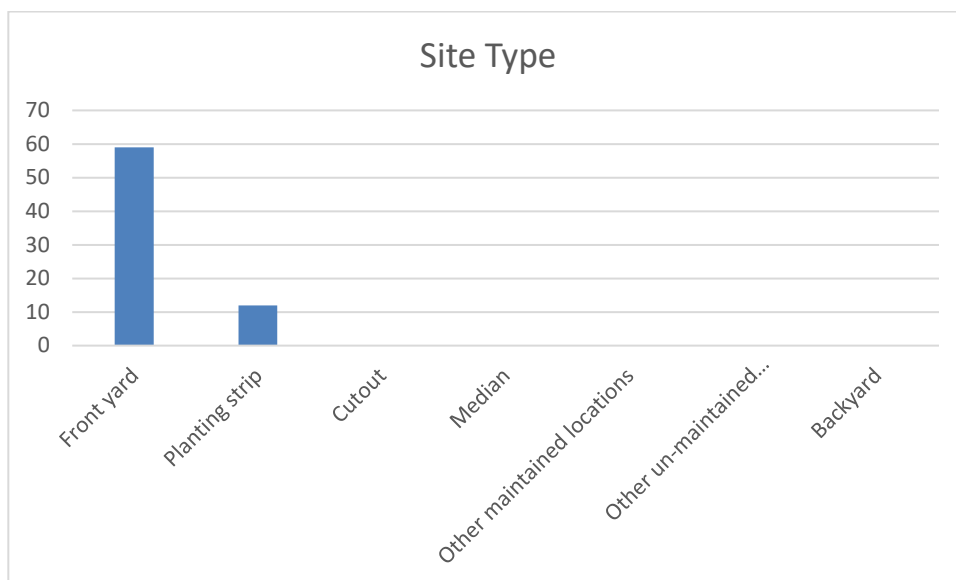


Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping



Figure 1: Location of Ash Trees



Figure 2: Location of EAB symptoms

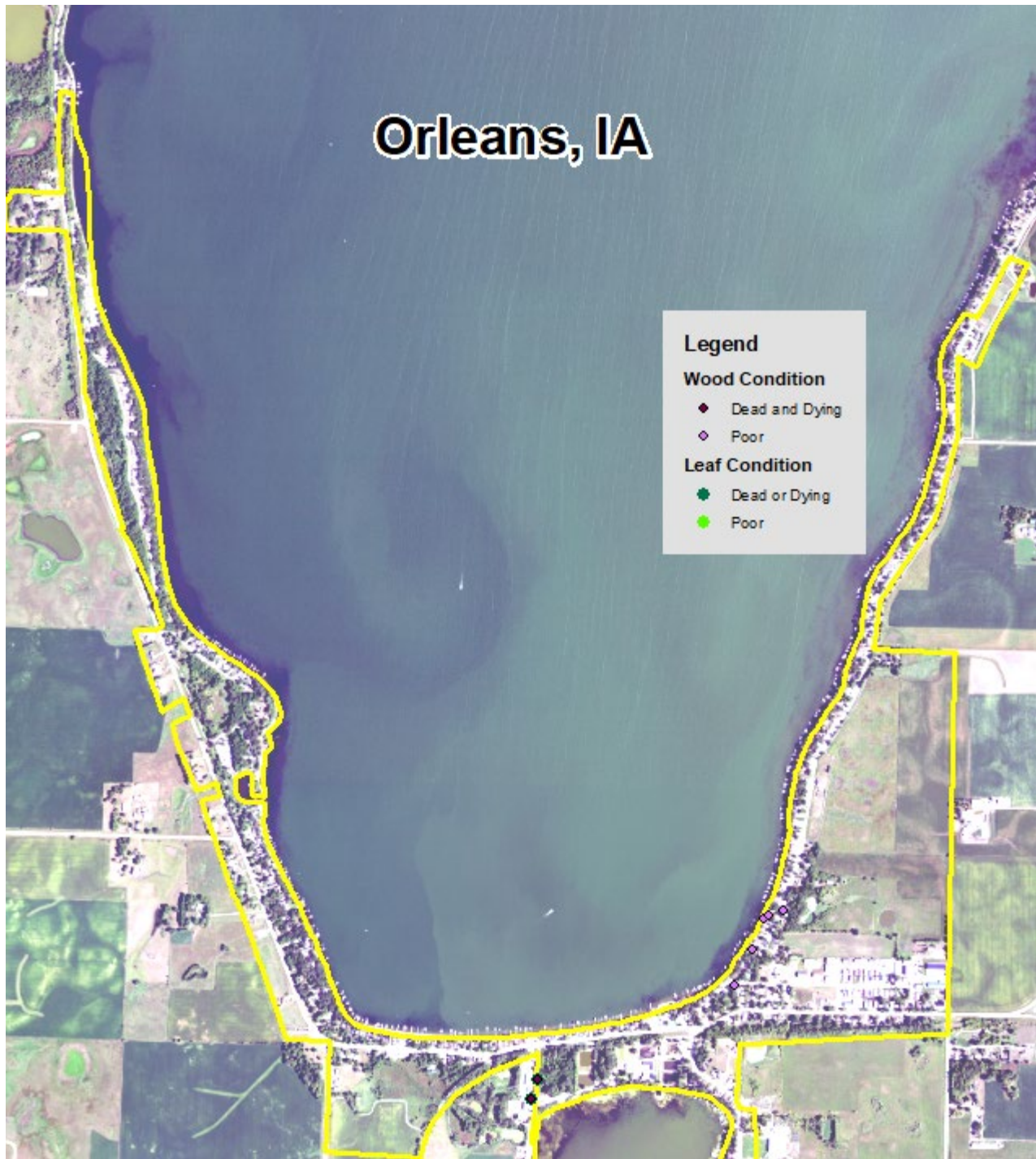


Figure 3: Location of Poor Condition Trees

NONE

Figure 4: Location of Trees with Critical Maintenance

Orleans, IA

Legend

Task

- ★ Clean
- Remove



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

Appendix C: Orleans Tree Ordinances

CHAPTER 151

TREES

151.01 Definition

151.02 Planting Restrictions

151.03 Duty to Trim Trees

151.04 Trimming Trees to Be Supervised

151.05 Disease Control

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. No coniferous evergreen trees shall be planted in the parking.
2. Spacing. Trees shall not be planted closer than 30 feet from one another and 10 feet from street intersections (property lines extended) and driveways. No plant should be planted within five feet of the curb line or sidewalk except in the business district. 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.
4. Plantings. It is unlawful to plant or maintain on any parking, street, or other public place, any shrubbery or other plantings, except trees or annual flowers.
5. Electrical Wires. No tree shall be planted under any electrical distribution or transmission wires.

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])

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

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