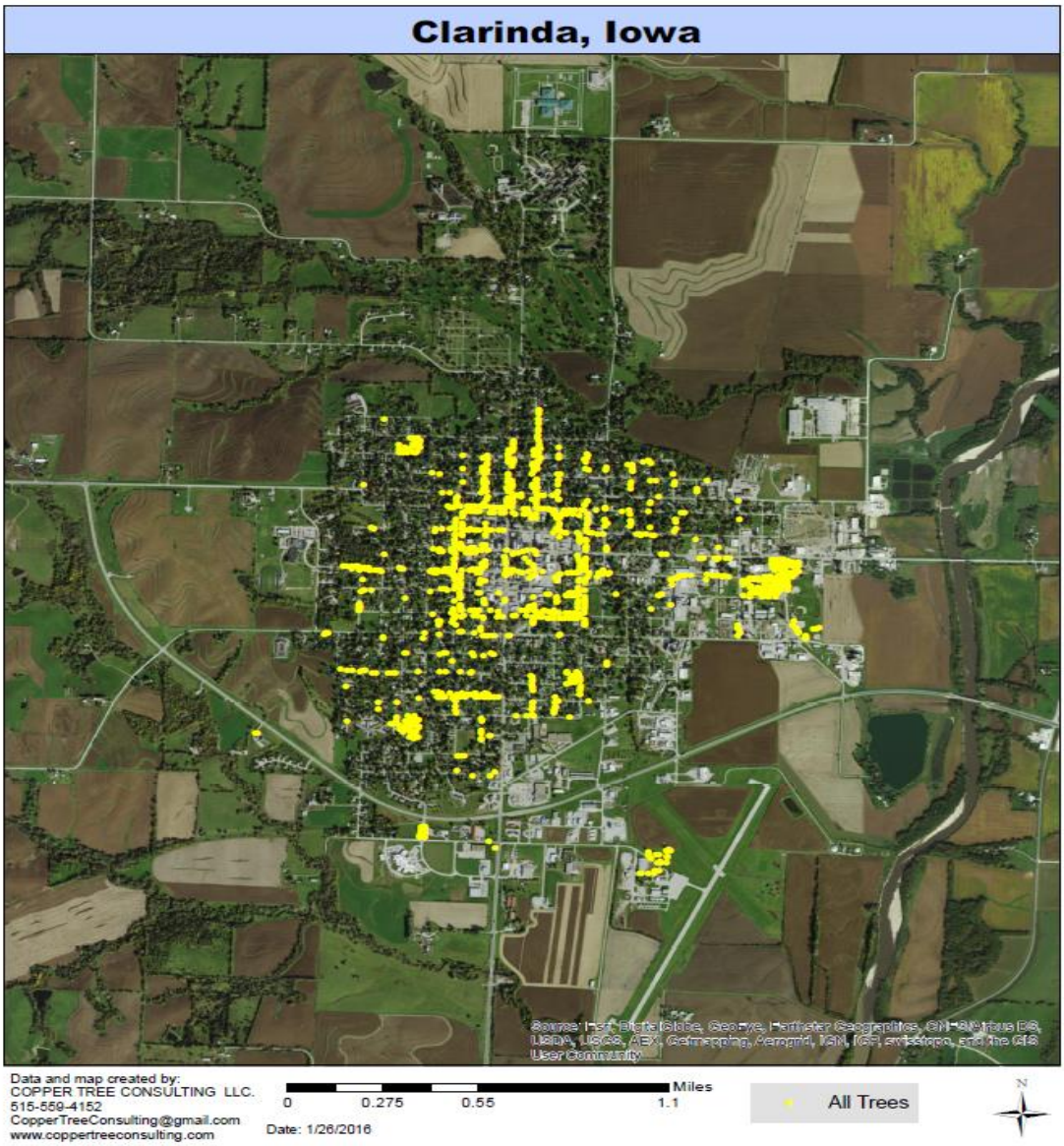
Clarinda, IA



2017 Urban Forest Management Plan
Prepared by Evan Miller
Bureau of Forestry, Iowa DNR

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Executive Summary

Overview

This plan was developed to assist the city of Clarinda 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 11% of Clarinda'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 2015, 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 1,243 trees inventoried.

- Clarinda's trees provide $251,667 of benefits annually, an average of $202 per tree
- There are over 50 species of trees
- The top three genera are: Maple 38%, Oak 16%, and Ash 11%
- 10% of trees are in need of some type of management
- 8 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 8 trees needing removal, 1 tree is over 30 inches in diameter at 4.5 ft. and should therefore be addressed as soon as possible. *City ownership of the trees recommended for removal should be verified prior to any removal*
- 12 of the 133 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 a budget of $6,500 it would take approximately 19 years to remove all of the ash trees in Clarinda; the suggested solution is to request a budget increase from the current level to the highest amount possible for removal, and to apply for grants to plant replacement trees

Introduction

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

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

Inventory

In 2015, a tree inventory was conducted that included 100% of the city owned park and street trees. 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 and 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 1,243 city trees was entered into the USDA Forest service program Street Tree Resource Analysis Tool for Urban forestry Management (STRATUM), part of the i-Tree suite. The following are results from the i-Tree STRATUM analysis.

Annual Benefits (Appendix A, Table 1)

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Clarinda's trees reduce energy related costs by approximately $65,195 annually. These savings are both in Electricity (311.5 MWh) and in Natural Gas (42,400.9 Therms).

Annual Stormwater Benefits

Clarinda's trees intercept about 3,616,150 gallons of rainfall or snowmelt a year. This interception provides $97,998 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 Clarinda, it is estimated that trees remove 3,961.6 lbs. of air pollution (ozone (O_3), particulate matter less than 10 microns (PM10), carbon monoxide (CO), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2)) per year with a net value of $11,035.

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Clarinda, trees sequester about 794,487 lbs. of carbon a year with an associated value of $5,959. In addition, the trees store 1,241,702 lbs. of carbon, with a yearly benefit of $9,313.

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. Clarinda receives $68,126 in annual social benefits from trees.

Financial Summary of all Benefits

According to the USDA Forest Service i-Tree STRATUM analysis, Clarinda's trees provide $251,670 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 1,243 trees in Clarinda provides $202.47 annually.

Forest Structure

Species Distribution

Clarinda has over 50 tree species along city streets and parks (Appendix A, Figure 1).

The distribution of trees by genera is as follows:

Maple	478	38.5%
Oak	203	16.3%
Ash	133	10.7%
Apple	83	6.7%
Hackberry	58	4.7%
Elm	38	3.1%
Spruce	38	3.1%
Linden	32	2.6%
Honeylocust	20	1.6%
Pine	17	1.4%
Lilac	15	1.2%
Birch	14	1.1%
American Sycamore	14	1.1%
Pear	9	0.7%
Plum/Cherry	8	0.6%
Black Walnut	6	0.5%
Redbud	6	0.5%
Catalpa	5	0.4%
Eastern Redcedar	5	0.4%
Ginkgo	5	0.4%
Magnolia	5	0.4%
Mulberry	5	0.4%
Dogwood	4	0.3%
Kentucky Coffeetree	3	0.2%
Tuliptree	3	0.2%
Cottonwood/Poplar	3	0.2%
Mountain Ash	2	0.2%
Ohio Buckeye	2	0.2%
Eastern White Cedar	1	<0.1%
Hickory	1	<0.1%
Other Broadleaf Deciduous	21	1.7%
Other Broadleaf Evergreen	4	0.3%
Other Conifer Evergreen	2	0.2%

Age Class

Nearly half of Clarinda's trees (44%) are 18 inches in diameter at 4.5 ft. or less, and over half (57%) are 24 inches or less (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. Clarinda's size curve is on the small-to-medium side, indicating a relatively young 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 Clarinda indicate that 98% of the trees are in good

health, with less than 1% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 89% of Clarinda'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 slightly less than 3% of the population. This 3% 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	42	3.4%
Crown Raising	5	0.4%
Crown Reduction	3	0.2%
Tree Removal	8	0.6%

Canopy Cover

The canopy cover of Clarinda is approximately 37 (Appendix A, Figure 5). According to the 2010 census, Clarinda occupies 3,241 acres. Thus the canopy cover on city land is about 1.1%.

Land Use and Location

The majority of Clarinda's city and park trees are in planting strips (with or without sidewalks) 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	67.3%
Park/vacant/other	29.2%
Small commercial	3.5%
Multifamily residential	<0.1%

Location	
Planting strip	57.1%
Front yard	42.9%

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

Of the 8 trees in need of removal, 2 are greater than 30" in diameter at breast height and should therefore be addressed as soon as possible, as large trees susceptible to collapse pose a greater danger than small ones. Next, any ash trees in need of removal should be dealt with, since EAB will effectively turn all ash trees into hazard trees once it arrives. Clarinda has 1 ash tree in its urban canopy that fits this criterion. Finally, the remaining 5 smaller non-ash species should be attended to (Appendix B, Figure 4). It is recommended to start with the large diameter critical concern trees first. After all of the removal trees are addressed, trees in need of other forms of maintenance, including cleaning, raising, pruning or reduction, should be considered. There are a total of 50 additional trees with these needs.

Poor tree species

After removal trees are addressed, ash trees in poor health should be assessed for removal (Appendix B, Figures 3 & 4). Of the 132 ash trees remaining after the aforementioned one has been removed, 23 have wood and/or leaf conditions designated as poor or fair. These trees should be considered for removal next, as they will be the most vulnerable once EAB arrives. *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 order to provide 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 Clarinda.

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 (38.5%) (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 (See Chapter 151, Section 151.05 in Appendix C for a list of acceptable species).

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.

PROPOSED WORK SCHEDULE AND ESTIMATED COSTS

Total $15,175 over 6 years ($2,530/year average)

YEAR 1	**ESTIMATED COSTS**
Remove 2 large-diameter trees designated for removal	$1,400
Plant 6 trees in open locations	$900
Inspect ash trees for signs of Emerald Ash Borer (EAB)	
YEAR 2	
Remove 3 trees, including one ash tree, designated for removal	$2,100
Prune half (25) of city-owned trees requiring maintenance	$375
Inspect ash trees for signs of EAB	
YEAR 3	
Remove 3 remaining trees designated for removal	$2,100
Plant 3 trees in open locations and locations from previous removals	$450
Inspect ash trees for signs of EAB	
YEAR 4	
Remove 2 ash trees in need of removal or showing poor wood and/or leaf condition	$1,400
Plant 5 trees in open locations and locations from previous removals	$750
Prune half (25) of city-owned trees requiring maintenance	$375
Inspect ash trees for signs of EAB	
YEAR 5	
Remove 3 ash trees in need of removal or showing poor wood and/or leaf condition, or 3 non-ash trees in need of removal	$2,100
Plant 3 trees in open locations and locations from previous removals	$450
Inspect ash trees for signs of EAB	
YEAR 6	
Remove 3 ash trees in need of removal or showing poor wood and/or leaf condition, or 3 non-ash trees in need of removal	$2,100
Plant 2 trees in open locations and locations from previous removals	$300

Prune 25 city-owned trees in need of maintenance	$375
Inspect ash trees for signs of EAB	

Estimated costs based on average costs of $700/tree for removal, $150/tree for planting and maintenance, and $15/tree for pruning.

*Reduction of ash over 6 years: Approximately 23 ash trees should be removed (approximately 17% of genus total), including trees showing poor or fair wood/leaf health and those displaying multiple symptoms of EAB. If a budget of $10,000/year were devoted solely to the removal of ash trees and excluded such activities as removal, replanting and maintenance of other species, it would take more than 9 years to remove all of the ash trees in Clarinda. EAB could potentially kill all ash within 4 to 15 years of its arrival. Treatment of ash would alter the cost and timeline and treatment price varies greatly by tree size and state location.

Emerald Ash Borer Plan

Ash Tree Removal

Tree removal will be prioritized with dead, dying, and 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 an 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 set forth in chapter 151 of the city ordinance (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. City Code 151.06 states “The City, on the advice of the Tree Board, shall have the right to cause the removal of any dead or diseased trees on private property within the City which such trees constitute a hazard to life and property or which harbor insects or diseases which constitute a potential threat to other trees within the City. The owners of such trees will be notified in writing. Removal shall be done by said owners at their own expense within sixty (60) days after the date of service of notice. In the event of failure of owners to comply with such provisions, the City shall have the authority to remove such trees and charge the cost of removal on the owner’s property tax notice.”

<u>Proposed Budget Increase</u>

EAB could potentially kill all ash trees in Clarinda within 4 years of its arrival. The total cost of maintaining, removing, and replanting the city’s current population of city trees, which would include removing and replanting all of the city’s ash trees, is estimated at $123,710. If the

current budget were increased to $6,500 per year, this work could be accomplished in approximately 19 years. Additionally, it is recommended that Clarinda 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 to treat a number of selected trees, either to maintain those trees in the landscape or to delay their removal – to reduce the costs and number of trees that need to be 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, the average diameter for the ash tree population of Clarinda is 21 inches; at $15 per inch, it would cost an average of approximately $315 per tree every two years, for as many years as the tree is preserved. While treatment is cheaper than removal in the short-run, it is more expensive in the long run, as it would only take 6 years of treatment per tree to exceed the cost of removal and replacement ($945 for treatment over a six-year period, compared with $850 for one-time removal and replacement, on average). Furthermore, treatment does not cure the tree of the devastation associated with emerald ash borer, but rather delays its onset for as long as treatment is carried out. Whether or not the treatment option is selected, there will be an increased cost of dealing with ash trees if EAB is found in Rockwell city; therefore, it is suggested that the budget be increased to plan for this regardless of how the problem is addressed.

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Appendix A: i-Tree Data

Table 1: Annual Benefits of Public Trees in Clarinda

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error
Silver maple	71.76	15.25	13.60	142.73	116.43	359.77	(N/A)
Norway maple	52.53	5.12	9.37	61.83	30.37	159.21	(N/A)
Pin oak	78.90	15.31	9.97	138.30	112.06	354.55	(N/A)
Green ash	56.78	7.32	10.41	85.08	49.19	208.79	(N/A)
Sugar maple	55.79	7.60	9.08	84.52	64.04	221.03	(N/A)
Apple	25.82	2.40	4.25	13.56	8.26	54.29	(N/A)
Red maple	32.01	3.96	5.53	30.67	39.63	111.80	(N/A)
Northern hackberry	75.98	7.53	13.74	95.88	59.31	252.43	(N/A)
Northern red oak	33.33	3.23	4.81	35.27	16.30	92.95	(N/A)
White ash	37.68	5.36	6.29	39.77	55.68	144.78	(N/A)
Chinese elm	85.36	9.97	17.30	159.80	55.51	327.93	(N/A)
Bur oak	74.55	9.83	14.17	130.17	60.48	289.20	(N/A)
American basswood	49.79	7.77	7.68	63.85	50.34	179.43	(N/A)
Honeylocust	56.67	6.00	9.61	82.55	85.12	239.95	(N/A)
Blue spruce	17.50	1.40	1.90	27.19	21.48	69.46	(N/A)
Spruce	26.22	2.35	0.25	70.24	20.43	119.49	(N/A)
Lilac	14.22	1.45	2.15	5.94	5.20	28.96	(N/A)
Swamp white oak	28.36	3.39	4.42	22.10	26.84	85.11	(N/A)
Birch	34.18	3.24	5.87	35.79	20.59	99.67	(N/A)
American sycamore	77.97	9.14	15.56	138.92	52.86	294.44	(N/A)
Amur maple	21.12	2.19	3.21	9.69	8.66	44.87	(N/A)
Broadleaf Deciduous	26.79	3.20	4.07	20.49	26.50	81.06	(N/A)
Eastern white pine	22.14	2.05	-0.03	63.30	20.10	107.56	(N/A)
Littleleaf linden	30.62	2.67	5.11	39.12	19.32	96.83	(N/A)
Siberian elm	66.46	8.06	12.38	87.98	43.26	218.14	(N/A)
Northern pin oak	58.96	5.00	10.69	73.74	25.11	173.50	(N/A)
Pear	17.33	1.89	2.75	8.57	7.74	38.29	(N/A)
Black walnut	63.10	8.51	11.36	93.25	56.49	232.72	(N/A)
Scotch pine	21.20	2.01	1.42	42.77	22.86	90.25	(N/A)
Broadleaf Deciduous L	64.29	7.92	11.74	92.23	52.18	228.37	(N/A)
Eastern redbud	29.50	2.64	4.85	14.91	8.36	60.26	(N/A)
Mulberry	44.54	3.35	7.99	29.07	8.86	93.80	(N/A)
Southern magnolia	56.37	5.54	7.95	90.36	34.46	194.68	(N/A)
Eastern red cedar	24.57	1.35	2.19	44.30	0.00	72.40	(N/A)
Catalpa	75.97	7.77	15.92	142.37	41.93	283.95	(N/A)
Norway spruce	24.14	2.43	2.82	41.70	32.32	103.40	(N/A)
Ginkgo	29.79	2.09	5.60	30.28	4.74	72.51	(N/A)
Dogwood	5.20	0.51	0.72	1.94	1.63	10.00	(N/A)
Water oak	20.59	2.57	2.16	20.32	58.26	103.90	(N/A)
Cherry plum	18.19	1.74	2.55	7.17	6.40	36.05	(N/A)
Broadleaf Deciduous S	4.27	0.44	0.56	1.45	1.55	8.27	(N/A)
American elm	59.35	5.72	10.26	71.42	49.09	195.84	(N/A)
Kentucky coffeetree	21.84	2.97	3.50	18.89	26.56	73.76	(N/A)
Black cherry	29.89	2.33	5.20	17.25	5.85	60.52	(N/A)
Tulip tree	37.44	4.55	7.37	71.04	30.72	151.13	(N/A)
Mountain ash	18.19	1.74	2.55	7.17	6.40	36.05	(N/A)
Broadleaf Evergreen L	33.73	4.36	3.47	44.40	77.75	163.72	(N/A)
Broadleaf Evergreen M	37.40	3.30	4.37	52.36	31.58	129.00	(N/A)
Oak	57.57	8.06	9.95	73.29	55.72	204.58	(N/A)

Ohio buckeye	46.78	5.71	7.92	38.19	39.16	137.75 (N/A)
Cottonwood	38.98	5.32	6.17	43.34	43.12	136.93 (N/A)
Elm	82.02	11.11	15.71	148.79	66.60	324.23 (N/A)
Hickory	20.64	2.71	2.99	16.47	28.56	71.37 (N/A)
Ponderosa pine	24.14	2.43	2.82	41.70	32.32	103.40 (N/A)
Northern white cedar	13.58	1.08	1.48	16.14	15.42	47.70 (N/A)
Black poplar	82.02	11.11	15.71	148.79	66.60	324.23 (N/A)
Plum	46.14	2.24	8.35	31.82	0.00	88.55 (N/A)
White oak	57.32	7.93	9.34	70.21	57.69	202.49 (N/A)
Conifer Evergreen Lar	24.14	2.43	2.82	41.70	32.32	103.40 (N/A)
Citywide Total	52.45	7.49	8.88	78.84	54.81	202.47 (N/A)

Figure 1: Species Distribution (%)

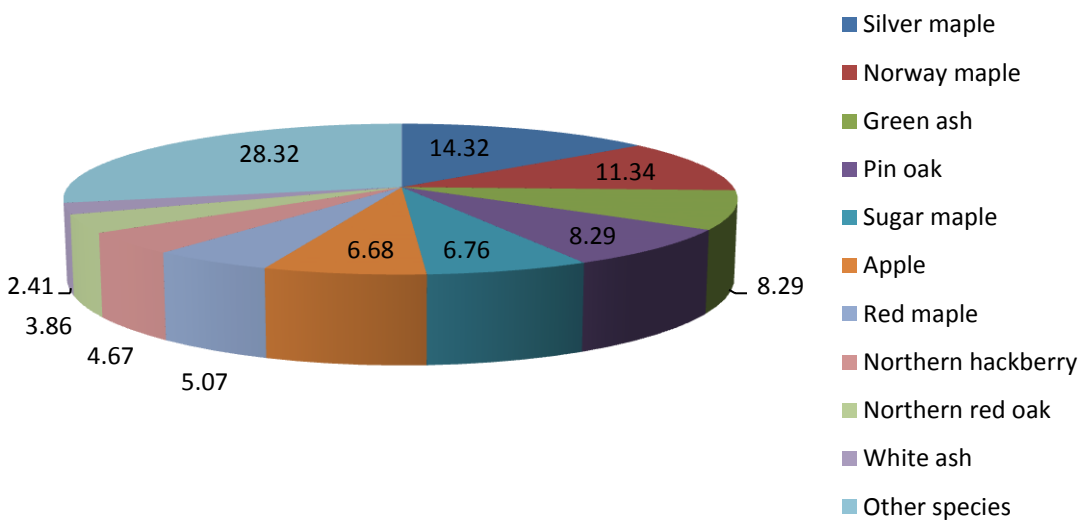
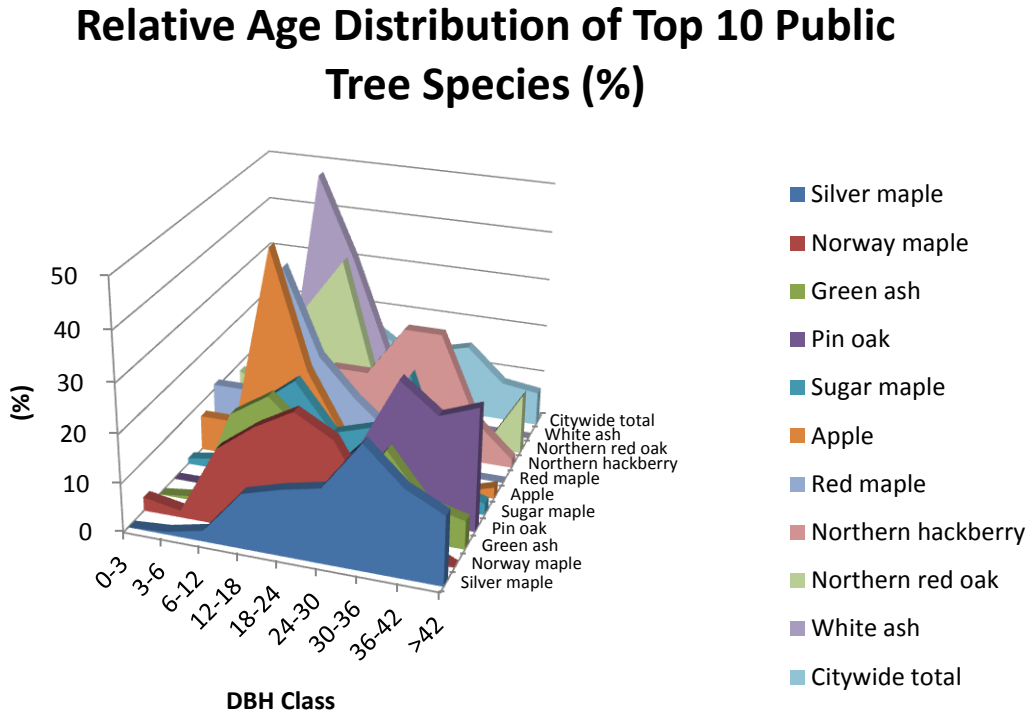


Figure 2: Relative Age Class (%)



Species	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42
Silver maple	0.00	0.56	2.25	11.24	13.48	15.17	25.28	17.98	14.04
Norway maple	2.84	1.42	15.60	21.28	25.53	21.28	8.51	3.55	0.00
Green ash	0.00	0.97	19.42	24.27	17.48	6.80	17.48	7.77	5.83
Pin oak	0.00	0.00	2.91	2.91	4.85	13.59	28.16	22.33	25.24
Sugar maple	1.19	2.38	15.48	21.43	11.90	14.29	26.19	4.76	2.38
Apple	7.23	7.23	44.58	20.48	7.23	8.43	2.41	0.00	2.41
Red maple	11.11	11.11	38.10	20.63	12.70	6.35	0.00	0.00	0.00
Northern hackberry	0.00	0.00	6.90	15.52	15.52	25.86	25.86	8.62	1.72
Northern red oak	8.33	4.17	25.00	35.42	8.33	4.17	2.08	0.00	12.50
White ash	0.00	0.00	50.00	33.33	13.33	3.33	0.00	0.00	0.00
Citywide total	3.86	2.82	20.03	17.70	12.79	12.87	14.88	8.05	7.00

Figure 3: Leaf Condition

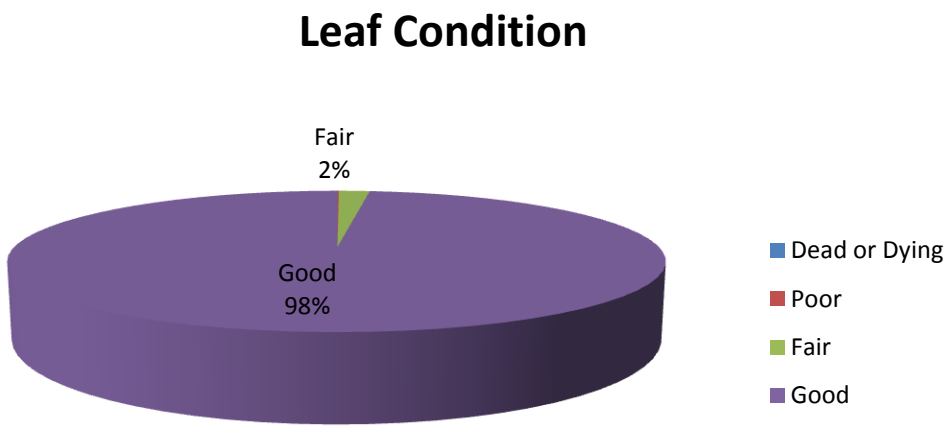


Figure 4: Wood Condition

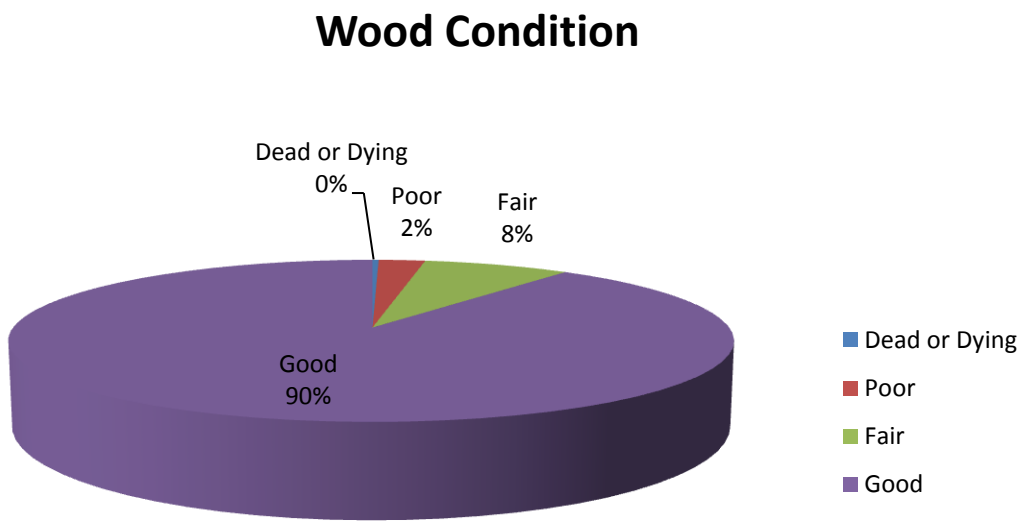


Figure 5: Canopy Cover in Acres

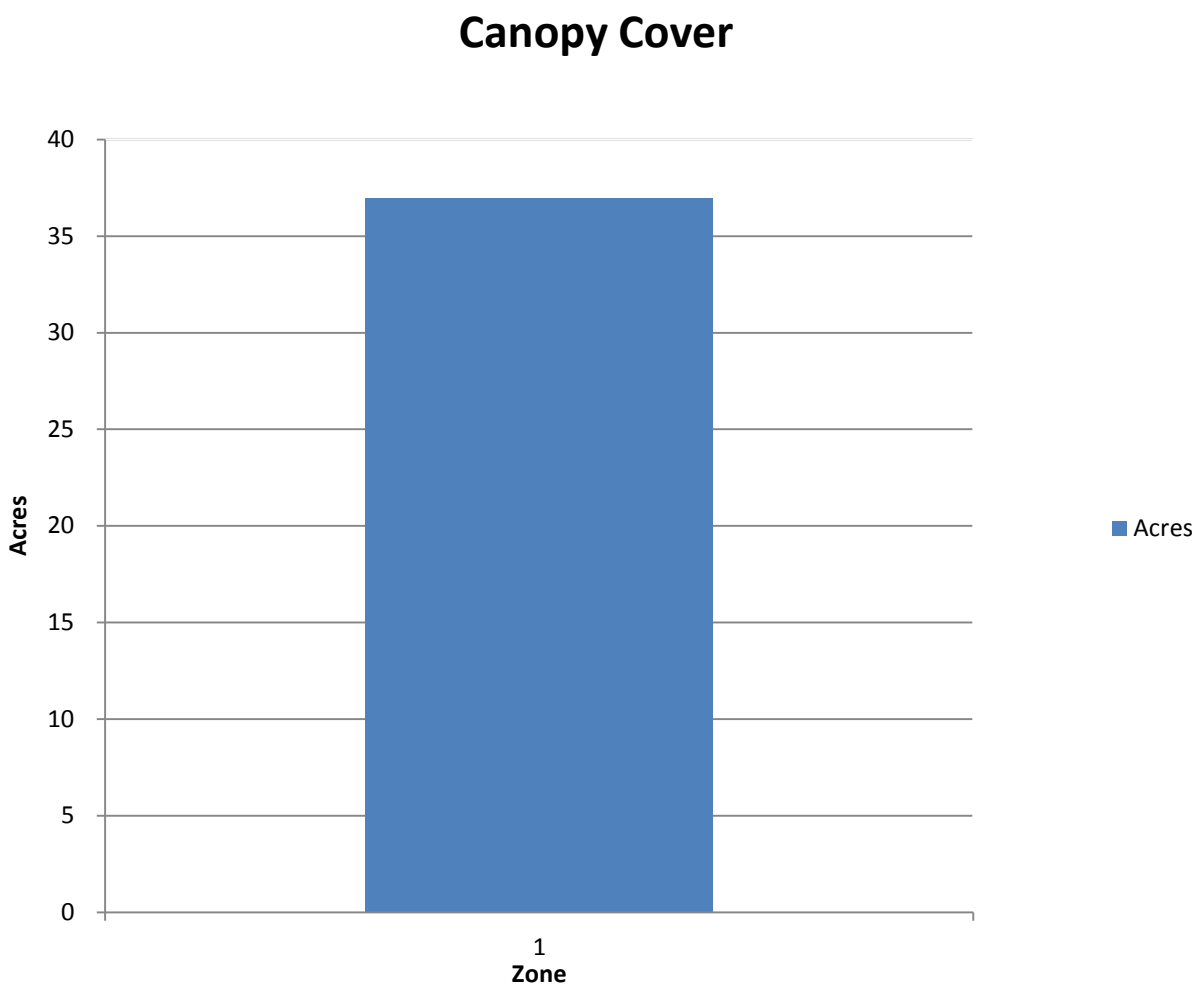


Figure 6: Land Use of City/Park Trees

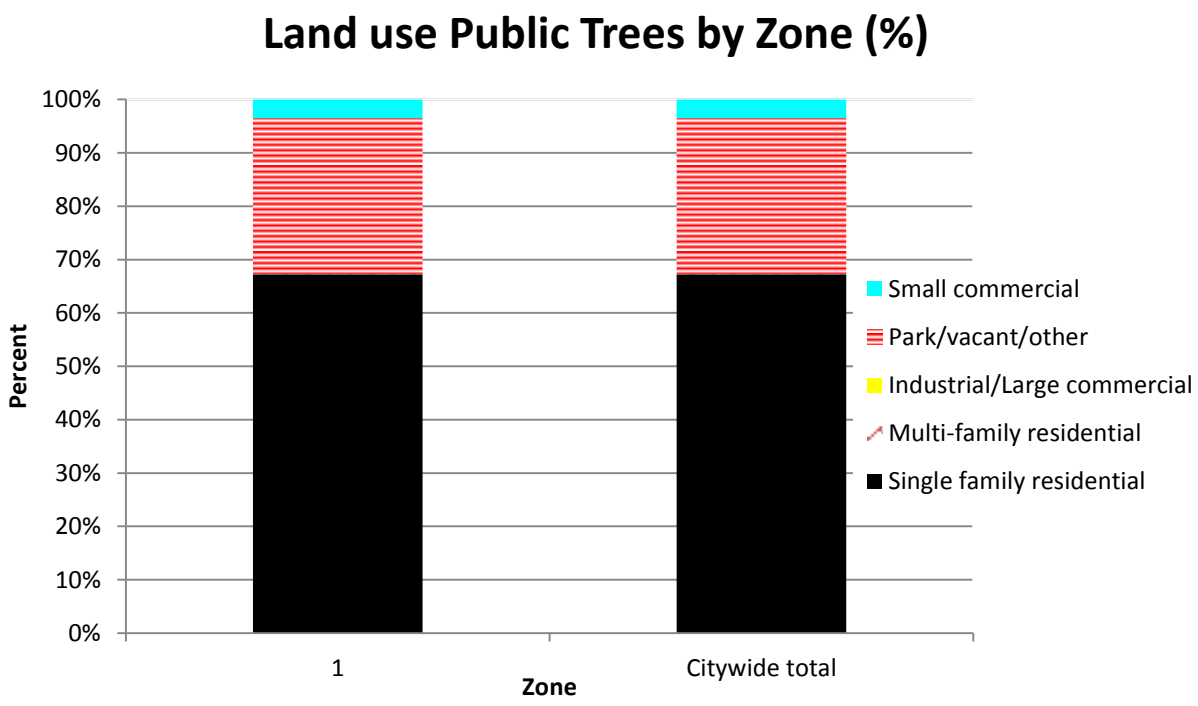
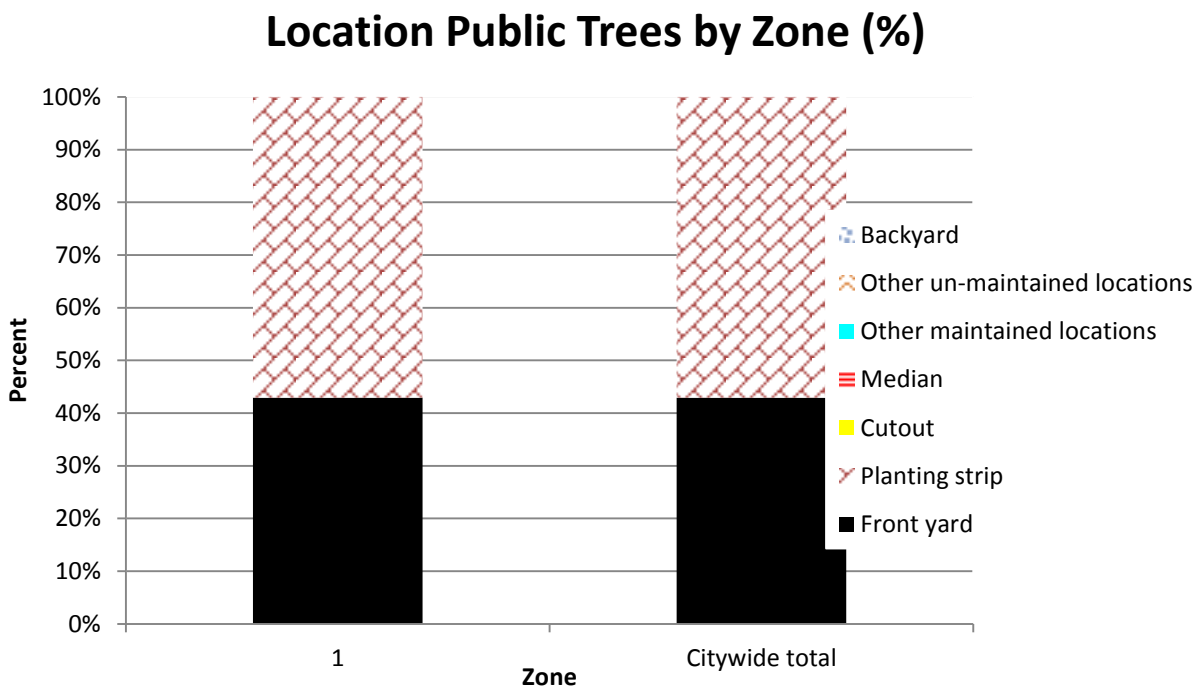


Figure 7: Location of City/Park Trees



Appendix B: ArcGIS Mapping

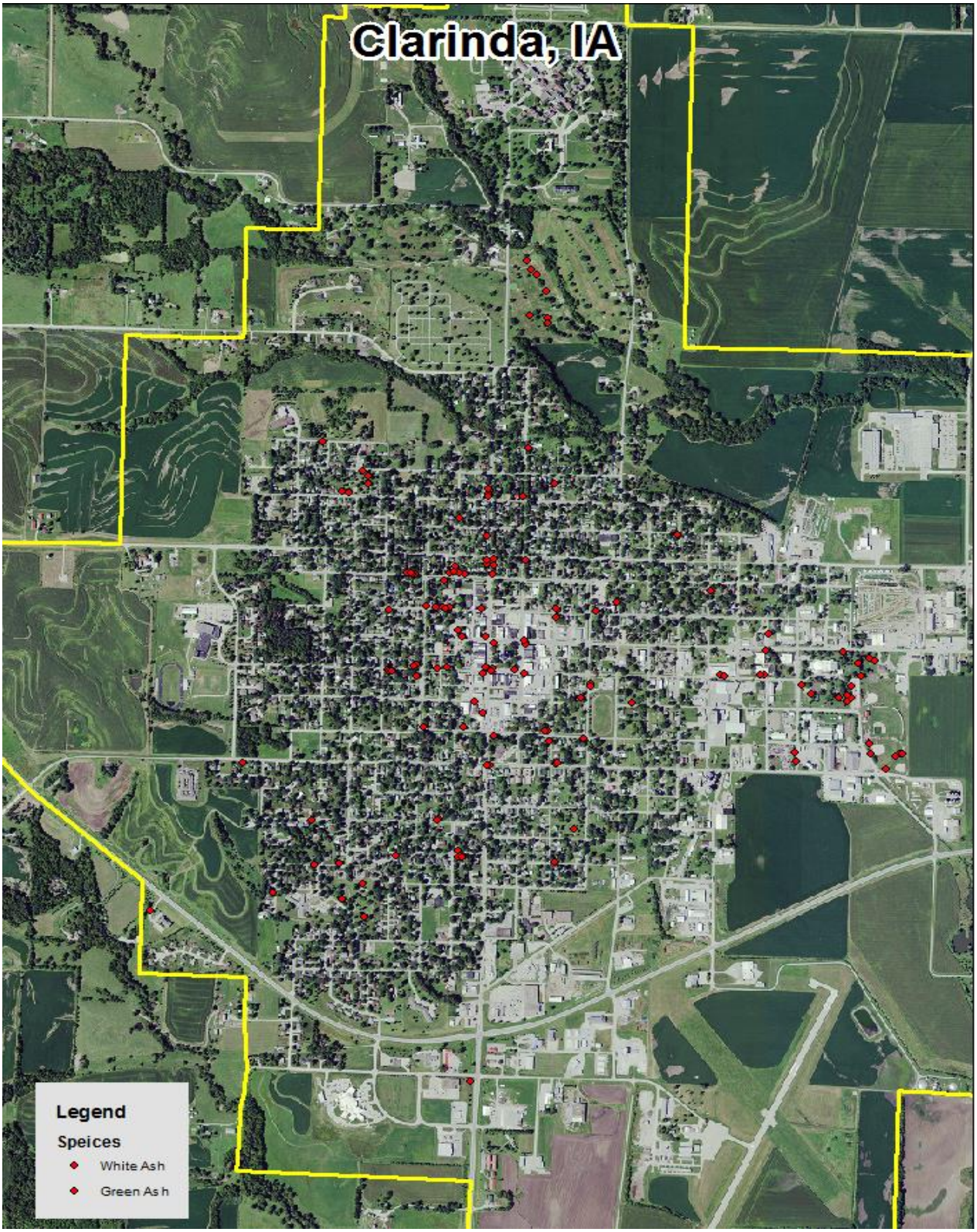


Figure 1: Location of Ash Trees

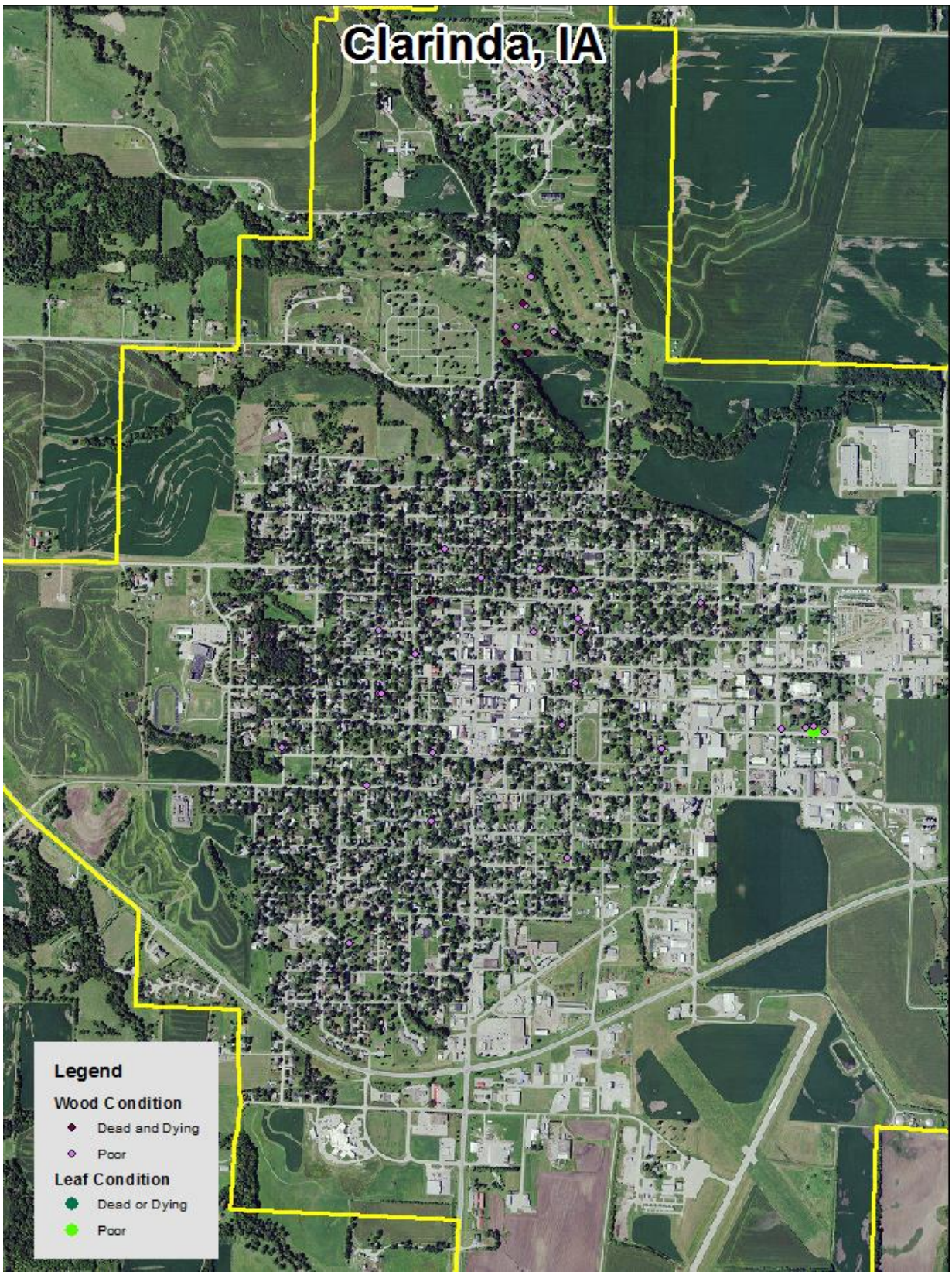


Figure 2: Location of Poor Condition Trees

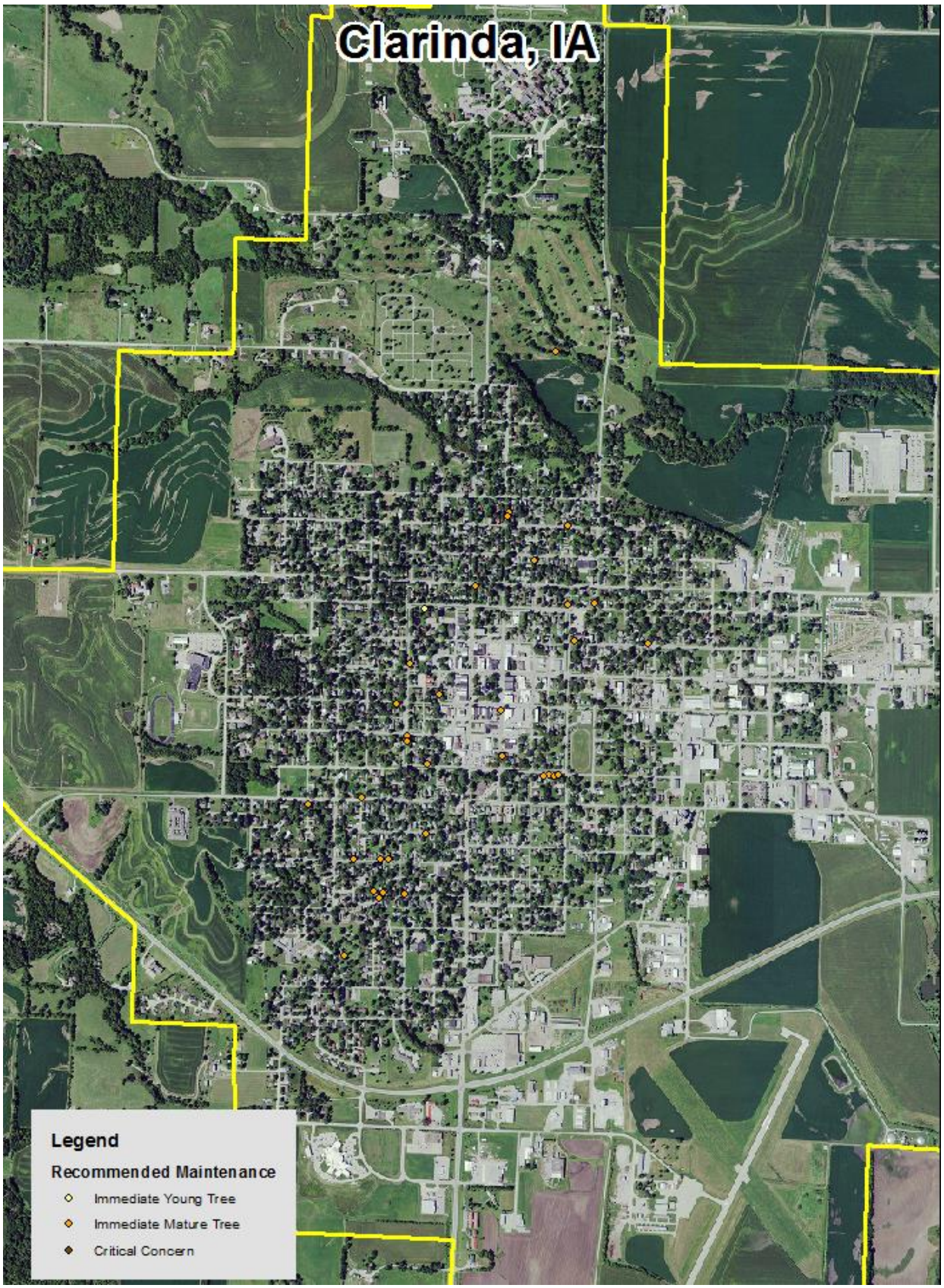


Figure 3: Location of Trees with Recommended Maintenance

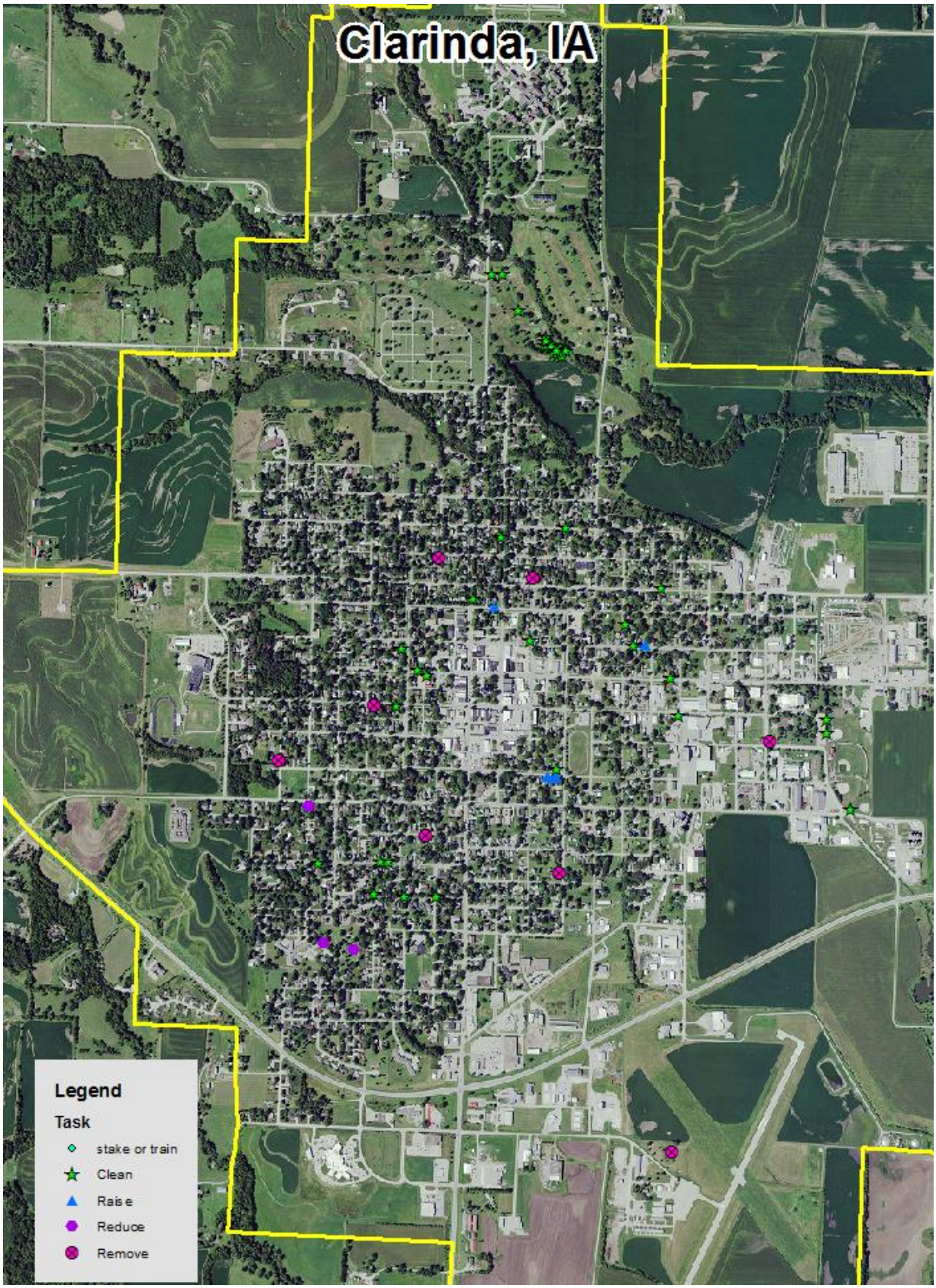


Figure 4: Maintenance Tasks
(*City ownership of the trees recommended for removal should be verified prior to any removal*)

CHAPTER 151

TREES

151.01 Purpose
151.02 Definitions
151.03 Street Tree Species to be Planted
151.04 Public Tree Care
151.05 Removal of Trees
151.06 Removal of Dead or Diseased Trees on Private Property
151.07 Duty to Trim Trees on Private Property
151.08 Trimming of Trees
151.09 Removal of Stumps
151.10 Protection of Trees
151.11 Arborist's License and Bond
151.12 Permits

151.01 PURPOSE. The purpose of this chapter is to beautify and preserve the appearance of the City by requiring street trees to be uniformly located and maintained. The primary responsibility for maintaining street trees is placed upon the abutting property owner, but the City Tree Board may supervise any planting, cutting, trimming or removal of said trees.

151.02 DEFINITIONS. For use in this chapter, the following terms are defined:

1. "City Tree Board" means the City Tree Board established under Chapter 25 of this Code of Ordinances.

2. "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.

3. "Park trees" means trees, shrubs, bushes and all other woody vegetation in public parks having individual names and all areas owned by the City or to which the public has free access as a park.

4. "Property owner" means a person owning private property in the City as shown by the County Auditor's plats of the City.

5. "Public property" means any and all property located within the confines of the City and owned by the City or held in the name of the City by any of the departments, commissions or agencies within the City government.

6. "Street" means the entire width between property lines of streets, avenues or highways.

7. "Street trees" means trees, shrubs, bushes and all other woody vegetation on land lying between property lines on either side of all streets, avenues or highways within the City.

151.03 STREET TREE SPECIES TO BE PLANTED. A City tree reference guide constitutes the official street tree species for the City. Copies are available at the City Hall. The guide also indicates the arboricultural specifications and standard practices for the City. To insure that trees are properly placed with the right species a permit must be issued by the City.

151.04 PUBLIC TREE CARE. The City, on the advice of the City Tree Board, shall have the right to plant, prune and maintain trees, plants and shrubs within the lines of all streets, alleys, 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 grounds.

151.05 REMOVAL OF TREES. The City, on the advice of the City Tree Board, shall remove any tree on the streets of the City which interferes with the making of improvements, public utilities or with travel thereon. The City shall additionally remove any trees on the street, not on private property, which have become diseased and which cannot be saved by proper treatment with pesticides and removal of diseased limbs or branches or which constitute a danger to the public or which may otherwise be declared a nuisance. In all instances of removal of said trees, a permit must be secured from the City Tree Board.

151.06 REMOVAL OF DEAD OR DISEASED TREES ON PRIVATE PROPERTY. The City, on the advice of the Tree Board, shall have the right to cause the removal of any dead or diseased trees on private property within the City which such trees constitute a hazard to life and property or which harbor insects or disease which constitute a potential threat to other trees within the City. The owners of such trees will be notified in writing. Removal shall be done by said owners at their own expense within sixty (60) days after the date of service of notice. In the event of failure of owners to comply with such provisions, the City shall have the authority to remove such trees and charge the cost of removal on the owner's property tax notice.

151.07 DUTY TO TRIM TREES ON PRIVATE PROPERTY. The property owner shall trim trees that are located on private property so that all branches will be at least thirteen (13) feet above the surface of the street and nine (9) feet above the sidewalks. The City shall have the right to prune any tree or shrub on private property when it interferes with the proper spread of light along the street from a streetlight or interferes with visibility of any traffic control device or sign.

151.08 TRIMMING OF TREES. Except as allowed in Section 151.07, no person may trim or cut any tree in a street or public place without securing a permit from the City. This section shall not be construed as to conflict with any of the provisions of the existing utility franchises.

151.09 REMOVAL OF STUMPS. All stumps of street and park trees shall be removed not less than six (6) inches below the surface of the ground so that the top of the stump shall not project above the surface of the ground.

151.10 PROTECTION OF TREES. During any redevelopment, razing or renovating, no more than fifty percent (50%) of the trees shall be cut, damaged or removed except by specific permit. No person shall excavate any ditch, tunnels, trenches, or lay any drive within a radius of twenty (20) feet from any tree. No person shall intentionally damage, cut, carve, attach any rope, wire, nails, advertising posters or any other contrivance to any tree or allow any gaseous, liquid, chemical or solid substance that is harmful to such trees to come in contact with them, or set fires or permit fire to burn when such fire or the heat will injure any portion of any tree. Tree topping is not allowed on any publicly owned tree except by specific permit. Permits will be issued by the City after review and agreed upon by the City Tree Board.

151.11 ARBORIST'S LICENSE AND BOND. It is unlawful for any person to engage in the business or occupation of pruning, treating or removing trees within the City without first applying for and procuring a license. The license fee shall be fifty dollars ($50.00) annually in advance; provided, however, no license shall be required of any public service company or City employee doing such work in the pursuit of such person's public service endeavors. Before any license shall be issued, each applicant shall first file evidence of possession of general liability insurance in the minimum amounts of $250,000.00 for bodily injury and $250,000.00 property damage indemnifying the City or any person injured or damaged, resulting from the pursuit of such endeavors as herein described.

151.12 PERMITS. Any person wishing to plant or remove any tree on the street right-of-way, also known as "terrace," must file a written application to obtain a permit from the Clerk's office.

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.