Winthrop, IA

2013 Management Plan
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Executive Summary

Overview

This plan was developed to assist the City of Winthrop with managing its urban forest, including budgeting and future planning. Trees can provide a multitude of benefits to the community, and with sound management, will allow your community to take advantage of these benefits. Management is especially important considering the serious threats posed by forest pests such as the Emerald Ash Borer (EAB). EAB is an invasive exotic insect which was accidently imported from Asia on wood shipping crates. This insect kills all species of ash trees (this does not include mountain ash). There is a strong possibility that 12% of Winthrop's city-owned trees (i.e. ash) will die once EAB becomes established within the community. With proper planning and management, the costs of removing dead and dying trees can be extended over years helping to mitigate public safety issues.

Inventory and Results

In the summer of 2013, a street and park tree inventory was conducted using Global Positioning System (GPS) data collectors. Below are some key findings of the 220 trees inventoried.

- Winthrop's trees provide $37,698 worth of benefits annually, an average of $171 per tree
- There were 34 species of trees inventoried
- The top three genus are: Maple 62%, Ash 11% & Spruce 5%
- 19% of the trees are in need of some type of management
- 14 trees are recommended for removal sometime in the near future

Recommendations

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

- Of the 14 trees recommended for removal, one was a dead American elm that was 12 to 18 inches in Diameter.
- Two of the 26 ash trees are in need of follow up because they are displaying signs and symptoms associated with EAB (canopy dieback).
- All trees should be pruned on a routine schedule- one third of the city every other year.
- Plant a diverse mix of trees that do not include: ash, maple, cottonwood, poplar, box-elder, Siberian elm, willow or black walnut.
- Check all ash trees yearly with a visual survey.

Introduction

This plan was developed to assist the City of Winthrop with management, budgeting and future planning of their urban forest. Across the state, forestry budgets continue to decrease with more and more of that money spent on tree removal. With the anticipated arrival of Emerald Ash Borer (EAB), it is time to prepare for the increased costs of tree removal and replacement. With proper planning and management, these costs can be extended over years and public safety issues from dead and dying ash trees can be mitigated.

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

Good management involves setting goals and developing strategies to achieve these goals. An essential part of developing management strategies is a comprehensive public tree inventory. The inventory supplies information that will be used for maintenance, removal schedules, tree planting and budgeting. Basing actions on this information will help meet Winthrop's urban forestry goals.

Inventory

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

The programming used to collect tree information on the data collectors was written to be compatible with a state-of-the-art software suite called i-Tree. i-Tree was developed by the USDA Forest Service to quantify the structure of community trees and the environmental services that trees provide. The i-Tree suite is a public domain which can be accessed for free.

To quantify the urban forest structure and benefits, specific data is collected for each tree. This data includes: location, land use, species, diameter at 4.5 ft, recommended maintenance, priority of that maintenance, leaf health, and wood condition. Additionally, signs and symptoms of EAB were noted for all ash trees. The signs and symptoms noted were canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

Inventory Results

The data collected for the 220 city-owned trees was entered into the USDA Forest service program Street Tree Resource Analysis Tool for Urban forestry Management (STRATUM), part of the i-Tree suite. The following are results from the i-Tree STRATUM analysis.

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Winthrop's trees reduce energy related costs by approximately $9,888 annually (Appendix A, Table 1). These savings are both in Electricity (47.3 MWh) and in Natural Gas (6,429 Therms).

Annual Stormwater Benefits

Winthrop's trees intercept about 1,907 cubic meters of rainfall and snowmelt a year (Appendix A, Table 2). This interception provides $13,652 worth of benefits to the city.

Annual Air Quality Benefits

Air quality is a persistent public health issue in Iowa. The urban forest improves air quality by removing pollutants, lowering air temperature, and reducing energy consumption, which in turn reduces emissions from power plants, and emitting volatile organic matter (ozone). In Winthrop, it is estimated that trees remove 275 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 $1,711 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Winthrop, trees sequester about 117,771 lbs of carbon per year. Trees help us use save energy by blocking cold winds and shading our home when it is hot. This helps us avoid releasing an additional 79,287 lbs of carbon into the atmosphere each year (Appendix A, Table 4). In addition, the trees store 1,743,433 lbs of carbon that might otherwise be negatively affecting our atmosphere (Appendix A, Table 5).

Annual Aesthetics Benefits

Social benefits of trees are hard to capture. The analysis does have a calculation for this area that includes: aesthetic value, property values, lowered rates of mental illness and crime, city livability and much more. Winthrop receives $11,032 in annual social benefits from trees (Appendix A, Table 6).

Financial Summary of all Benefits

According to the USDA Forest Service i-Tree STRATUM analysis, the City's trees provide $37,698 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 220 trees provide approximately $171 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Winthrop has over 34 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genus is as follows:

Norway Maple	59	26.8%
Silver Maple (& hybrids)	52	23.6%
Green Ash	24	10.9%
Sugar Maple	15	6.8%
Red Maple (& hybrids	8	3.6%
Blue Spruce	8	3.6%
Arborvitae	8	3.6%
Hackberry	5	2.3%
Black Walnut	5	2.3%
Apple	5	2.3%
Other broadleaves	2	0.9%
River Birch	2	0.9%
Catalpa	2	0.9%
White Ash	2	0.9%
Tulip Tree	2	0.9%
Aspen	2	0.9%
Littleleaf Linden	2	0.9%
Boxelder	1	0.5%
Black Maple	1	0.5%
Ohio Buckeye	1	0.5%
Paper Birch	1	0.5%
Ginkgo	1	0.5%
Honeylocust	1	0.5%
Norway Spruce	1	0.5%
Blackhills Spruce	1	0.5%
Sycamore	1	0.5%
Cottonwood	1	0.5%
Cherry Plum	1	0.5%
Black Cherry	1	0.5%
Callery Pear	1	0.5%
Northern Red Oak	1	0.5%
Sumac	1	0.5%
Mountain Ash	1	0.5%
American Elm	1	0.5%

Age Class

Most of Winthrop's trees (24.1%) are between 12 and 18 inches in diameter at 4.5 ft (Appendix A, Figure 2). Most of the City's trees are bunched in the middle of the sized distribution. It would be nice to see more trees in the smaller-sized classes because that would indicate there are plenty of new trees coming-up to replace older trees and ash trees as they die.

DBH (4.5 feet above ground)	# of trees	Percent
0-3 inches	15	6.8%
3-6 inches	13	5.9%
6-12 inches	44	20.0%
12-18 inches	53	24.1%
18-24 inches	43	19.5%
24-30 inches	21	9.5%
30-36 inches	14	6.4%
36-42 inches	17	7.7%
42+ inches	0	0.0%

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 indicate that 88% of the trees are in good health, with only 2% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 73% of the 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. These 8% of trees should all be looked at more closely to see if they are hazardous in any way to the public.

Management Needs

The following summery outlines the specific management needs for some of the street and park trees (Appendix B, Figure 5). Most of the trees (80.9%) needed no maintenance. Crown Cleaning primarily means pruning out dead and broken branches. Crown raising is where lower branches are pruned-up to assure free passage along sidewalks and other right-of-ways. Staking and training includes making sure the young trees have good branching architecture, and examples of crown reduction include pruning to make room for power lines and removing limbs that are touching structures. Trees recommended for removal had various issues such as being dead; having severe decay problems with their main stem, or growing in a bad location.

None	178	80.9%
Crown Cleaning	14	6.4%
Whole Tree Removal	14	6.4%
Canopy Raising	10	4.5%
Tree Staking & Training	3	1.4%
Canopy Reduction	1	0.5%

Canopy Cover

The canopy cover of Winthrop is approximately 5.3 acres (Appendix A, Figure 4). According to the 2010 census, the City occupies approximately 540 acres. Thus the urban forest canopy covers about 1% of the City.

Land Use and Location

The majority of the City's trees are in planting strips in single family residential neighborhoods (Appendix A, Figure 6 & Appendix A, Figure7). The following describes the land use and locations for the street and park trees.

Land Use	
Single family residential	84%
Park/vacant/other	13%
Small commercial	3%

Location	
Planting strip	55%
Front yard	45%

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

The survey showed one tree of critical concern that should be attended to by removal immediately. This tree (a dead American elm) can be found on the location of Trees with Recommended Maintenance map (Appendix B, Figure 4). There are 7 trees that should be addressed immediately for various reasons and are also located on the same map. They should all be looked at more closely. Four of the 7 are recommended to be removed. The other 2 need dead wood and hanging branches be removed so no one gets injured.

Poor tree species

Ash trees in poor health should be assessed for removal (Appendix B, Figure 3 & Appendix B, Figure 4). Three of the 14 trees recommended for removal are ash trees. There are a total of 26 ash trees, with 2 of them having signs and symptoms that have been associated with EAB (canopy dieback). In addition, there are 5 trees that are either dead or in poor health.

Pruning Cycle

Proper pruning can extend the life and maintain good health of trees. Pruning also reduces public safety issues. In the Management Needs section of the Findings there are four main maintenance issues to be addressed: routine pruning, crown cleaning, crown raising, and crown reduction. Crown cleaning removes dead, diseased, and damaged limbs. Crown raising is the removal of lower branches that are 2 inches in diameter or larger in the case of providing clearance for pedestrians or vehicles. Crown reduction is removing individual limbs from structures or utility wires. It is recommended that all trees be pruned on a routine schedule every five to seven years. Please refer to the six year maintenance plan for further information.

Planting

Most of the planting over the next 5 years will replace trees that are removed. Since survival rates will not be 100%, it is recommended to plant 1.5 trees for every tree removed. Please refer to the six year maintenance plan at the end of this section. It is not essential that the new trees be planted in the same location of the trees being removed. However, maintaining the same number of trees helps ensure continuation of the benefits of the existing urban forest.

It is important to plant a diverse mix of species in the urban forest to maintain canopy health, since most insects and diseases target a genus (ash) or species (green ash) of trees. Current diversity recommendations advise that a genus (i.e. maple, oak) not make up more than 20% of the urban forest and a single species (i.e. silver maple, sugar maple, white oak, bur oak) not make up more than 10% of the total. *Presently, the forest is heavily planted with Maple species (62%) (Appendix A, Figure 1). Maples should not be planted until this percentage can be lowered.* Also, ash trees have not been recommended since 2002 due to the threat of EAB. Other species to avoid because they are public nuisances include: cottonwood, poplar, box elder, Siberian elm, willow or black walnut.

Continual Monitoring

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

Emerald Ash Borer Plan

Ash Tree Removal

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

Treatment of Ash Trees

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

EAB Quarantines

EAB is an extremely destructive plant pest and it is responsible for the death and decline of over 25 million ash trees. Ash in both forested and urban settings constitute a significant portion of the canopy cover in the United States. Current tools to detect, control, suppress and eradicate this pest are not as robust as the USDA would desire. In order to stay ahead of this hard to detect beetle, the USDA is attempting to contain the beetle before it spreads beyond its known positions by regulating articles.

A regulated article under the USDA's quarantine includes any of the following items:
- emerald ash borer
- firewood of all hardwood species (for example ash, oak, maple and hickory)
- nursery stock and green lumber of ash
- any other ash material, whether living, dead, cut or fallen, including logs, stumps, roots, branches, as well as composted and not composted chips of the genus ash (Mountain ash is not included)

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

Wood Disposal

A very important aspect of planning is determining how wood infested with EAB will be handled, keeping in mind that quarantines will restrict its movement. Consider who will cut and haul the dead and dying trees? Is there an accessible, secured site big enough to store and sort the hundreds of trees and the associated brush and chips? How will wood be disposed of or utilized? Do you have equipment capable of handling the amount and size of ash trees your tree inventory has identified? Once your county is under quarantine for EAB, contact USDA-APHIS-PPQ at 515-251-4083 or visit the website http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/regulatory.shtml.

Wood waste can be disposed of as you normally would if your county is not part of a quarantine.

Canopy Replacement

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

Postponed Work

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

Monitoring

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

Private Ash Trees

It is strongly recommended that private property owners start removing ash trees on their property upon arrival of EAB.

Proposed Budget Increase

EAB could potentially kill all of the ash trees in Hopkinton within a decade after its arrival. It is recommended that the City apply for grants to fund replacement tree planting. Utility Company grants are usually between $500 and $10,000 for community-based, tree-planting projects that include parks, gateways, cemeteries, nature trails, libraries, nursing homes, and schools. There were a total of 26 ash trees surveyed. Because EAB is moving closer every year, we recommend that at least 1/2 (13 trees) of them be removed and replaced over the next 6 years. You should replant 2 trees for every one that is removed. First, remove the 1 tree of critical concern for public safely (Appendix B, Figure 4). Next, remove the 4 ash trees showing signs and symptoms of possible EAB infestation (Appendix B, Figure 2). Finally, remove any 8 of the remaining 26 ash trees where they occur in groups throughout the City (Appendix B, Figure 1). Finally, we recommend that the City adopt a policy of allocating somewhere between $2 to $4 per capita per year into a *forestry budget* to be used for planting, removals and tree maintenance.

Recommended Budget: $18,600 total over 6 years.

FY 2014 Budget
- Removal: $1500
- Planting: $750 (10 trees planted per year)
- Watering & Maintenance: $400 ($40/ tree per year for the first 6 years)

FY 2015 Budget
- Removal: $1500
- Planting: $750
- Watering & Maintenance: $400

FY 2016 Budget
- Removal: $1000
- Planting: $750
- Watering & Maintenance: $400

FY 2017 Budget
- Removal: $1000
- Planting: $750
- Watering & Maintenance: $400

FY 2018 Budget
- Removal: $1000
- Planting: $750
- Watering & Maintenance: $400

FY 2019 Budget
- Removal: $1000
- Planting: $750
- Watering & Maintenance: $400

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Winthrop

Annual Energy Benefits of Public Trees by Species

12/10/2013

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	11.5	876	1,665.8	1,632	2,508	(N/A)	26.8	25.4	42.52
Silver maple	13.9	1,052	1,807.2	1,771	2,823	(N/A)	23.6	28.6	54.29
Green ash	6.5	490	896.3	878	1,369	(N/A)	10.9	13.8	57.03
Sugar maple	3.7	283	478.7	469	752	(N/A)	6.8	7.6	50.14
Red maple	1.3	95	154.7	152	247	(N/A)	3.6	2.5	30.88
Blue spruce	0.5	36	66.5	65	101	(N/A)	3.6	1.0	12.64
Northern white cedar	0.5	34	76.0	74	109	(N/A)	3.6	1.1	13.58
Northern hackberry	1.8	134	240.7	236	370	(N/A)	2.3	3.7	73.92
Black walnut	1.0	77	139.4	137	214	(N/A)	2.3	2.2	42.75
Apple	0.6	49	90.6	89	138	(N/A)	2.3	1.4	27.60
Other street trees	6.1	461	813.4	797	1,258	(N/A)	14.1	12.7	40.58
Citywide total	47.3	3,588	6,429.3	6,301	9,888	(N/A)	100.0	100.0	44.95

Table 2: Annual Stormwater Benefits

Winthrop

Annual Stormwater Benefits of Public Trees by Species

12/10/2013

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	96,379	2,612	(N/A)	26.8	19.1	44.27
Silver maple	193,989	5,257	(N/A)	23.6	38.5	101.11
Green ash	73,720	1,998	(N/A)	10.9	14.6	83.25
Sugar maple	34,064	923	(N/A)	6.8	6.8	61.55
Red maple	7,689	208	(N/A)	3.6	1.5	26.05
Blue spruce	5,407	147	(N/A)	3.6	1.1	18.32
Northern white cedar	4,764	129	(N/A)	3.6	1.0	16.14
Northern hackberry	16,584	449	(N/A)	2.3	3.3	89.89
Black walnut	9,214	250	(N/A)	2.3	1.8	49.94
Apple	2,333	63	(N/A)	2.3	0.5	12.64
Other street trees	59,570	1,614	(N/A)	14.1	11.8	52.08
Citywide total	503,713	13,652	(N/A)	100.0	100.0	62.05

Table 3: Annual Air Quality Benefits

Winthrop

Annual Air Quality Benefits of Public Trees by Species

12/10/2013

Species	Deposition (lb) O_3	NO_2	PM_{10}	SO_2	Total Depos. ($)	Avoided (lb) NO_2	PM_{10}	VOC	SO_2	Total Avoided ($)	BVOC Emissions (lb)	BVOC Emissions ($)	Total (lb)	Total ($)	Standard Error	% of Total Trees	Avg. $/tree
Norway maple	18.2	3.1	9.1	0.8	99	56.0	8.1	7.7	52.4	347	-4.4	-16	151.0	429	(N/A)	26.8	7.27
Silver maple	31.8	5.4	15.7	1.4	172	65.2	9.6	9.1	62.7	408	-16.7	-63	184.1	517	(N/A)	23.6	9.95
Green ash	9.2	1.5	4.4	0.4	49	31.0	4.5	4.3	29.3	193	0.0	0	84.5	241	(N/A)	10.9	10.06
Sugar maple	4.2	0.7	2.2	0.2	23	17.5	2.6	2.5	16.9	110	-3.3	-13	43.3	120	(N/A)	6.8	8.00
Red maple	1.4	0.2	0.7	0.1	8	5.8	0.9	0.8	5.7	37	-0.5	-2	15.1	43	(N/A)	3.6	5.32
Blue spruce	0.6	0.1	0.5	0.1	4	2.3	0.3	0.3	2.1	14	-1.8	-7	4.5	11	(N/A)	3.6	1.41
Northern white cedar	0.4	0.1	0.4	0.1	3	2.3	0.3	0.3	2.0	14	-1.3	-5	4.6	12	(N/A)	3.6	1.48
Northern hackberry	2.6	0.5	1.3	0.1	14	8.4	1.2	1.2	8.0	52	0.0	0	23.3	67	(N/A)	2.3	13.34
Black walnut	0.9	0.1	0.5	0.0	5	4.9	0.7	0.7	4.6	30	0.0	0	12.4	35	(N/A)	2.3	7.04
Apple	0.7	0.1	0.3	0.0	4	3.1	0.5	0.4	2.9	19	0.0	0	8.1	23	(N/A)	2.3	4.58
Other street trees	8.7	1.5	4.4	0.4	47	28.8	4.2	4.0	27.5	180	-3.9	-15	75.7	213	(N/A)	14.1	6.86
Citywide total	78.6	13.3	39.7	3.6	427	225.2	32.8	31.3	214.2	1,404	-32.1	-120	606.6	1,711	(N/A)	100.0	7.78

Table 4: Annual Carbon Stored

Winthrop

Stored CO2 Benefits of Public Trees by Species

12/10/2013

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	301,114	2,258	(N/A)	26.8	17.3	38.28
Silver maple	715,081	5,363	(N/A)	23.6	41.0	103.14
Green ash	300,316	2,252	(N/A)	10.9	17.2	93.85
Sugar maple	119,976	900	(N/A)	6.8	6.9	59.99
Red maple	16,732	125	(N/A)	3.6	1.0	15.69
Blue spruce	2,936	22	(N/A)	3.6	0.2	2.75
Northern white	2,054	15	(N/A)	3.6	0.1	1.93
Northern	39,966	300	(N/A)	2.3	2.3	59.95
Black walnut	29,971	225	(N/A)	2.3	1.7	44.96
Apple	10,197	76	(N/A)	2.3	0.6	15.30
Other street trees	93,028	1,538	(N/A)	14.1	11.8	49.62
Citywide total	1,743,433	13,076	(N/A)	100.0	100.0	59.44

Table 5: Annual Carbon Sequestered

Winthrop

Annual CO_2 Benefits of Public Trees by Species

12/10/2013

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
Norway maple	18,852	141	-1,445	-12	-11	19,360	145	36,755	276	(N/A)	26.8	19.5	4.67
Silver maple	54,904	412	-3,432	-10	-26	23,251	174	74,712	560	(N/A)	23.6	39.6	10.78
Green ash	15,421	116	-1,442	-5	-11	10,836	81	24,810	186	(N/A)	10.9	13.2	7.75
Sugar maple	7,132	53	-576	-3	-4	6,254	47	12,807	96	(N/A)	6.8	6.8	6.40
Red maple	2,269	17	-80	-2	-1	2,108	16	4,295	32	(N/A)	3.6	2.3	4.03
Blue spruce	297	2	-14	-2	0	794	6	1,074	8	(N/A)	3.6	0.6	1.01
Northern white cedar	421	3	-10	-2	0	755	6	1,165	9	(N/A)	3.6	0.6	1.09
Northern hackberry	2,107	16	-192	-1	-1	2,956	22	4,871	37	(N/A)	2.3	2.6	7.31
Black walnut	2,379	18	-144	-1	-1	1,704	13	3,939	30	(N/A)	2.3	2.1	5.91
Apple	955	7	-49	-1	0	1,087	8	1,992	15	(N/A)	2.3	1.1	2.99
Other street trees	13,035	98	-984	-6	-7	10,183	76	22,228	167	(N/A)	14.1	11.8	5.38
Citywide total	117,771	883	-8,368	-43	-63	79,287	595	188,647	1,415	(N/A)	100.0	100.0	6.43

Table 6: Annual Social and Aesthetic Benefits

Winthrop

Annual Aesthetic/Other Benefits of Public Trees by Species

12/10/2013

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	1,874	(N/A)	26.8	17.0	31.77
Silver maple	4,468	(N/A)	23.6	40.5	85.93
Green ash	1,267	(N/A)	10.9	11.5	52.78
Sugar maple	782	(N/A)	6.8	7.1	52.15
Red maple	323	(N/A)	3.6	2.9	40.41
Blue spruce	135	(N/A)	3.6	1.2	16.82
Northern white cedar	123	(N/A)	3.6	1.1	15.42
Northern hackberry	285	(N/A)	2.3	2.6	56.93
Black walnut	226	(N/A)	2.3	2.1	45.25
Apple	55	(N/A)	2.3	0.5	10.98
Other street trees	1,494	(N/A)	14.1	13.5	48.19
Citywide total	11,032	(N/A)	100.0	100.0	50.15

Table 7: Summary of Benefits in Dollars

Species	Energy Saved	$ of CO2 not burned	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Norway maple	$2508	$276	$429	$2612	$1874	$7,699.52	(±0)	20.4
Silver maple	$2823	$560	$517	$5257	$4468	$13,626.33	(±0)	36.1
Green ash	$1369	$186	$241	$1998	$1267	$5,060.95	(±0)	13.4
Sugar maple	$752	$96	$120	$923	$782	$2,673.45	(±0)	7.1
Red maple	$247	$32	$43	$208	$323	$853.46	(±0)	2.3
Blue spruce	$101	$8	$11	$147	$135	$401.57	(±0)	1.1
Northern white cedar	$109	$9	$12	$129	$123	$381.67	(±0)	1.0
Northern hackberry	$370	$37	$67	$449	$285	$1,206.99	(±0)	3.2
Black walnut	$214	$30	$35	$250	$226	$754.47	(±0)	2.0
Apple	$138	$15	$23	$63	$55	$293.97	(±0)	0.8
Other street trees	$1258	$167	$213	$1614	$1494	$4,745.65	(±0)	12.6
Citywide total	$9888	$1415	$1711	$13652	$11032	$37,698.04	(±0)	100.0

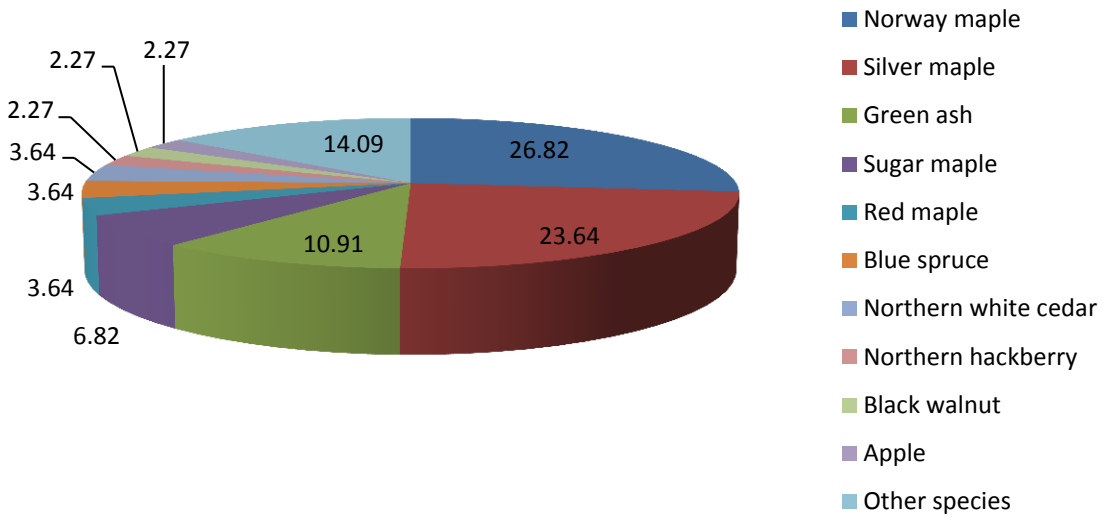

Figure 1: Species Distribution

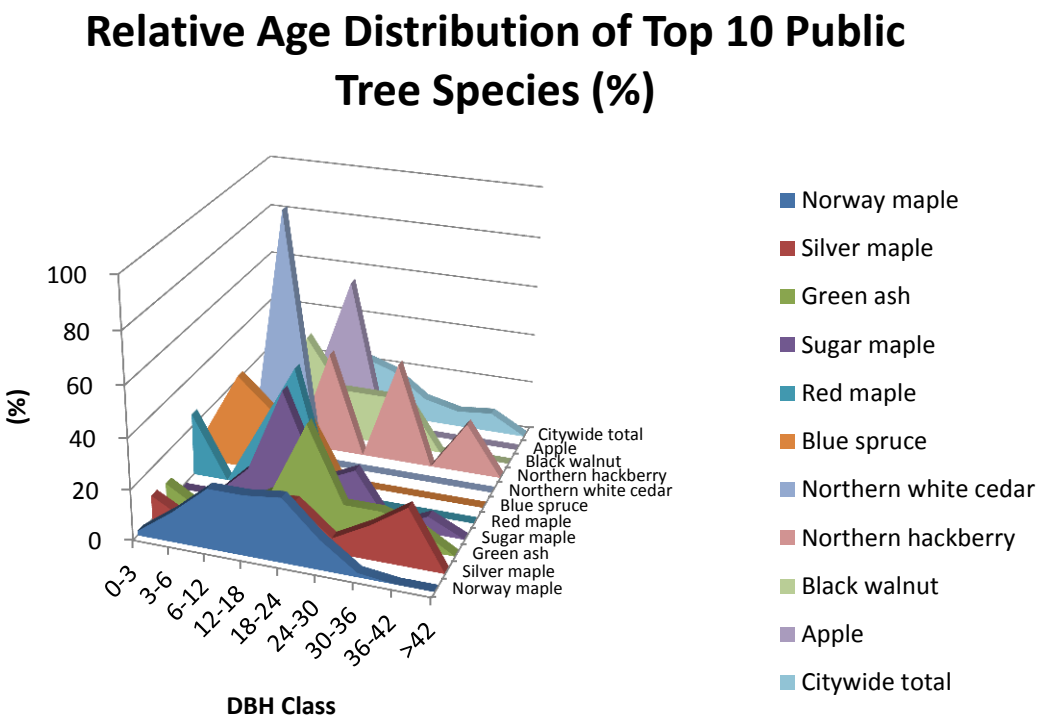

Figure 2: Relative Age Class

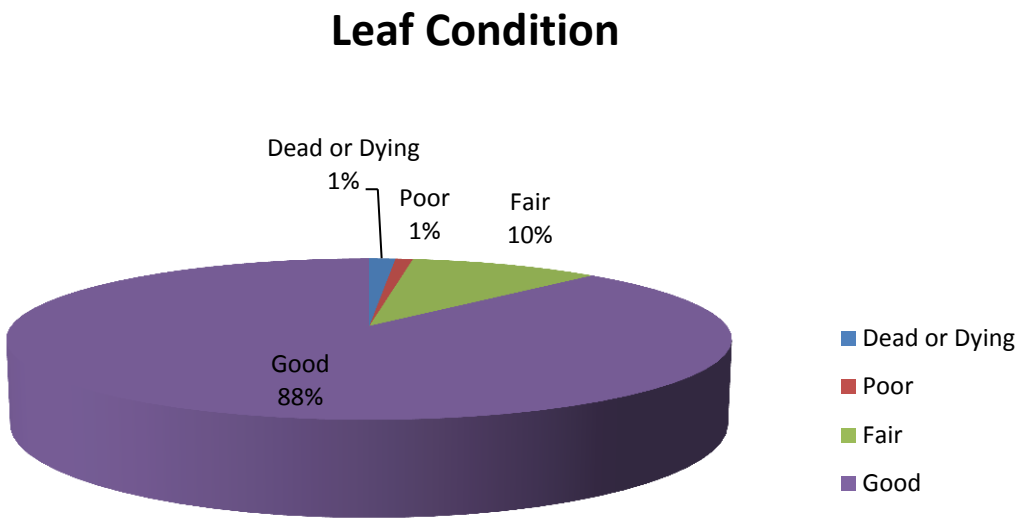

Figure 3: Foliage Condition

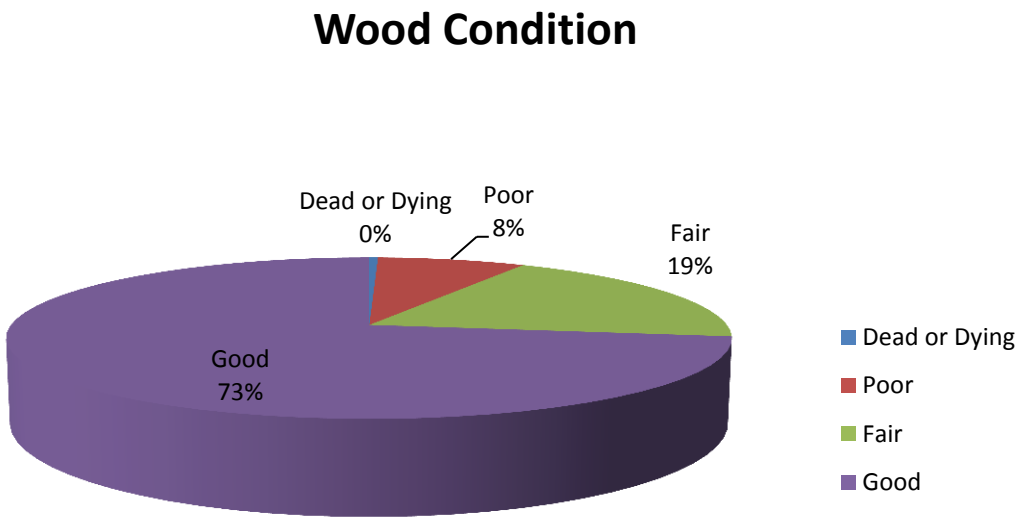

Figure 4: Wood Condition

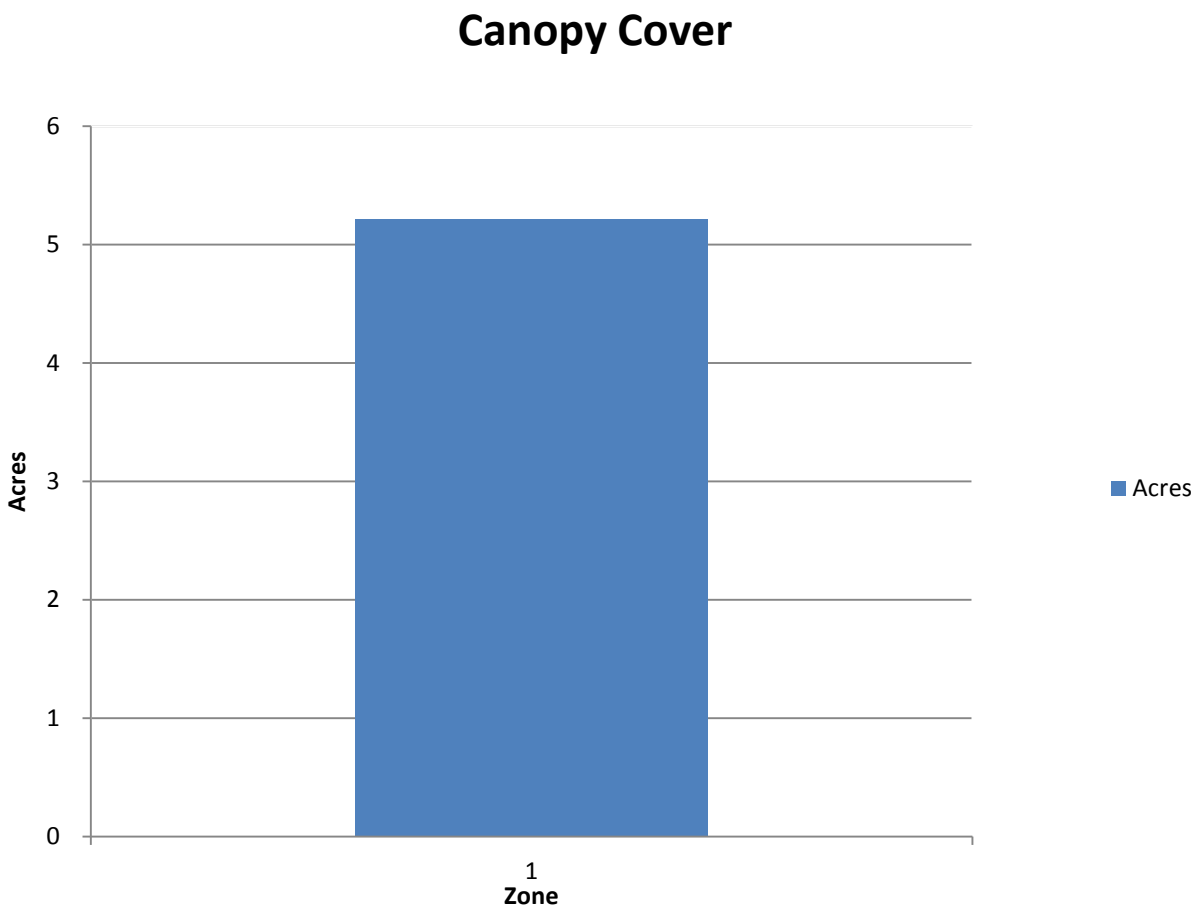

Figure 5: Canopy Cover in Acres

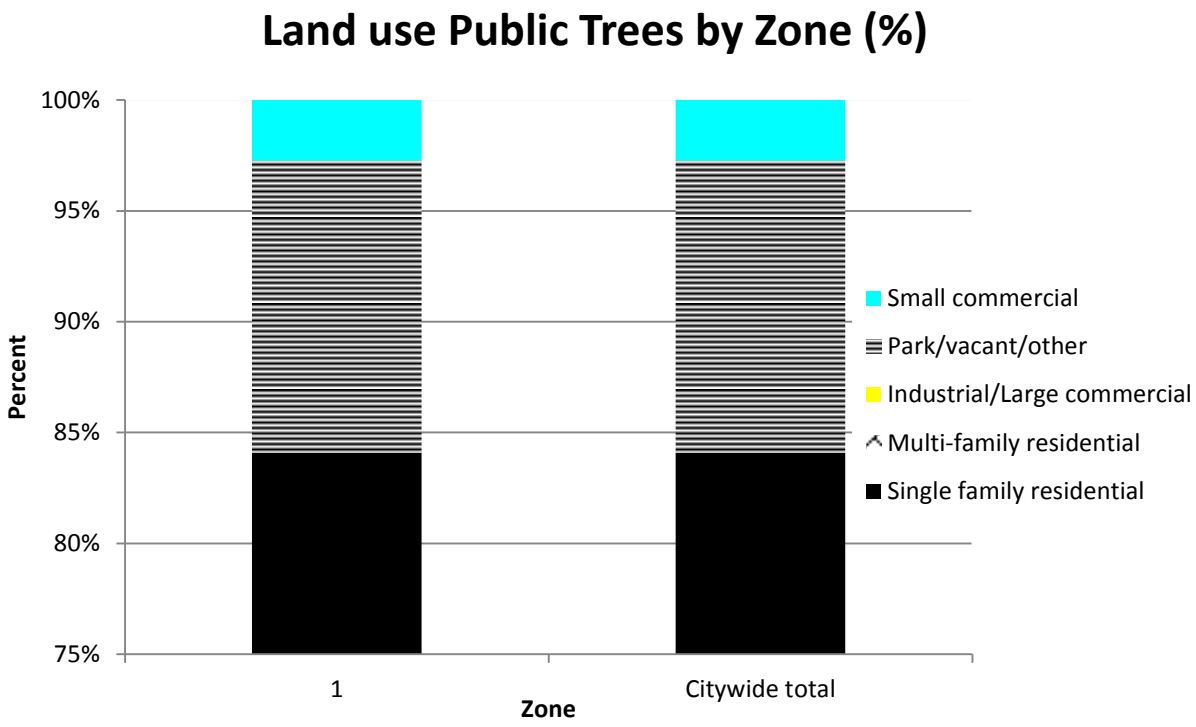

Figure 6: Land Use of city/park trees

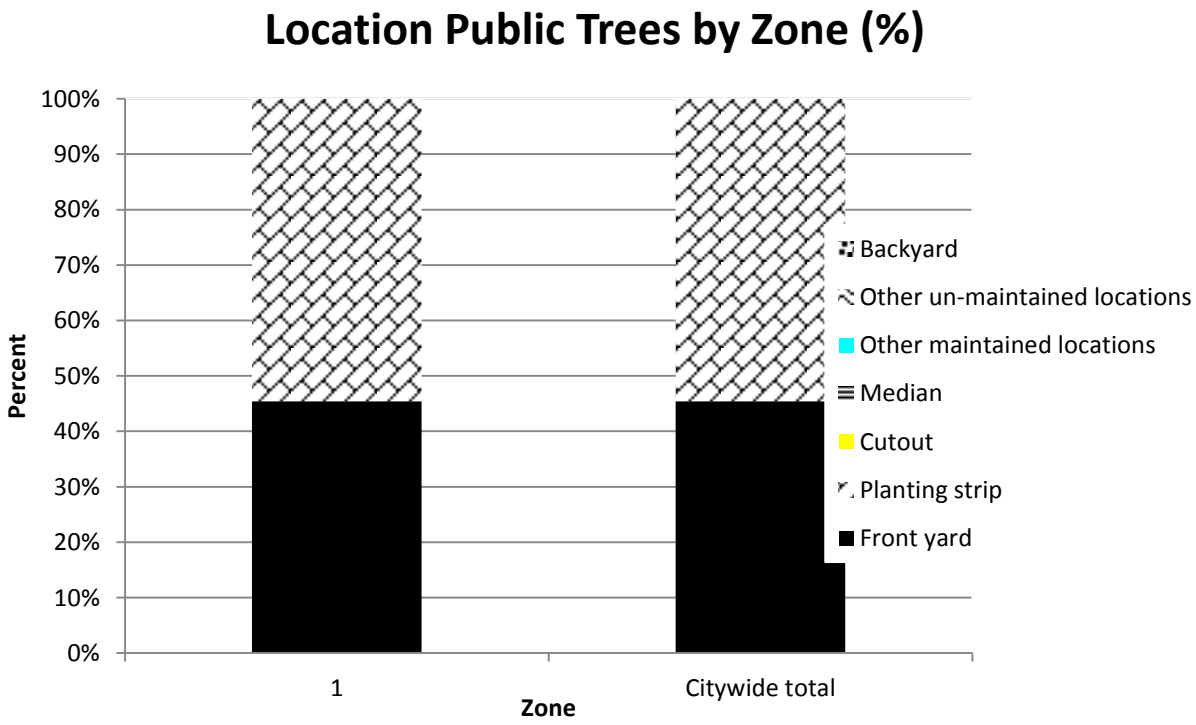

Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping

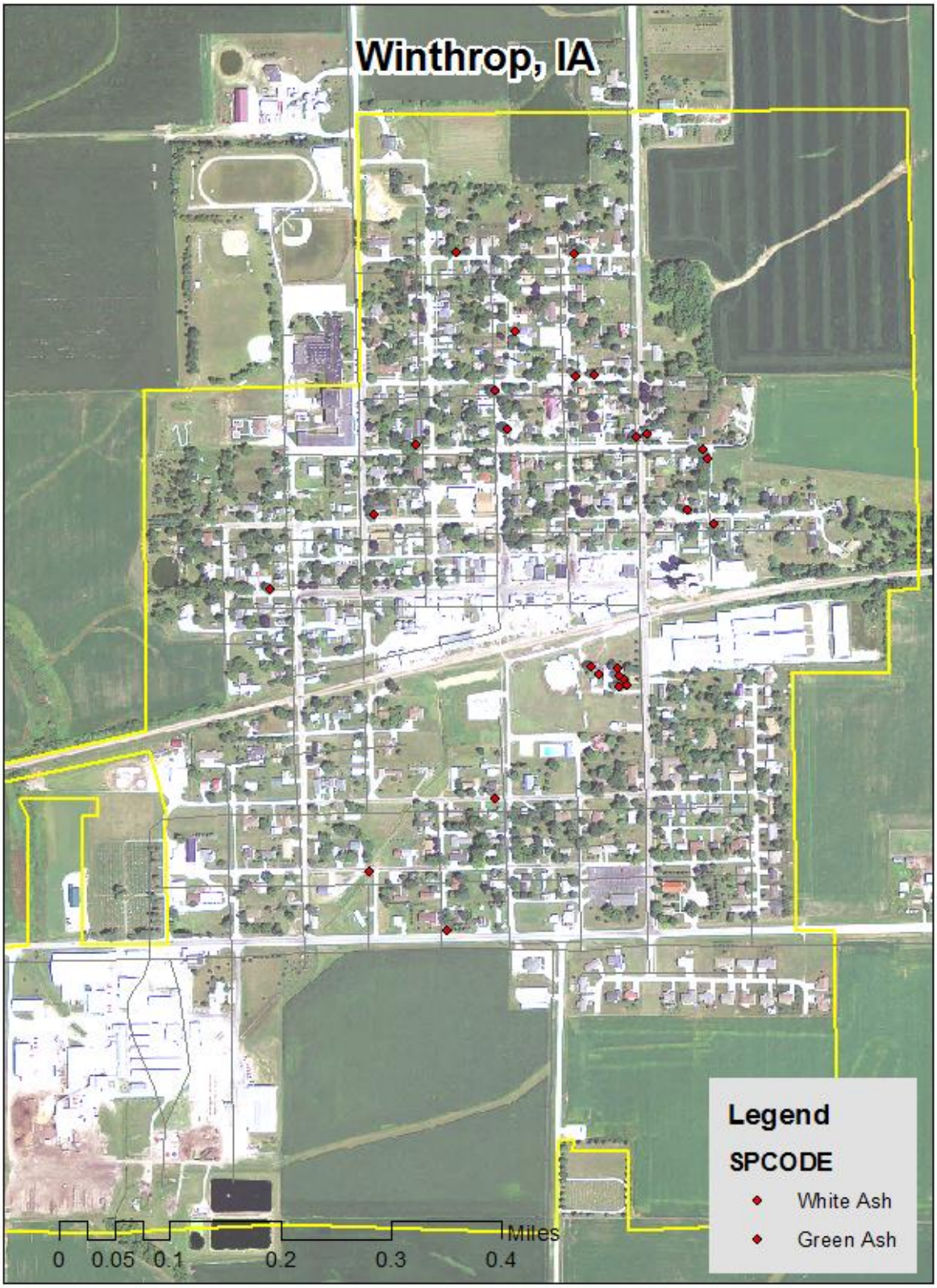

Figure 1: Location of Ash Trees

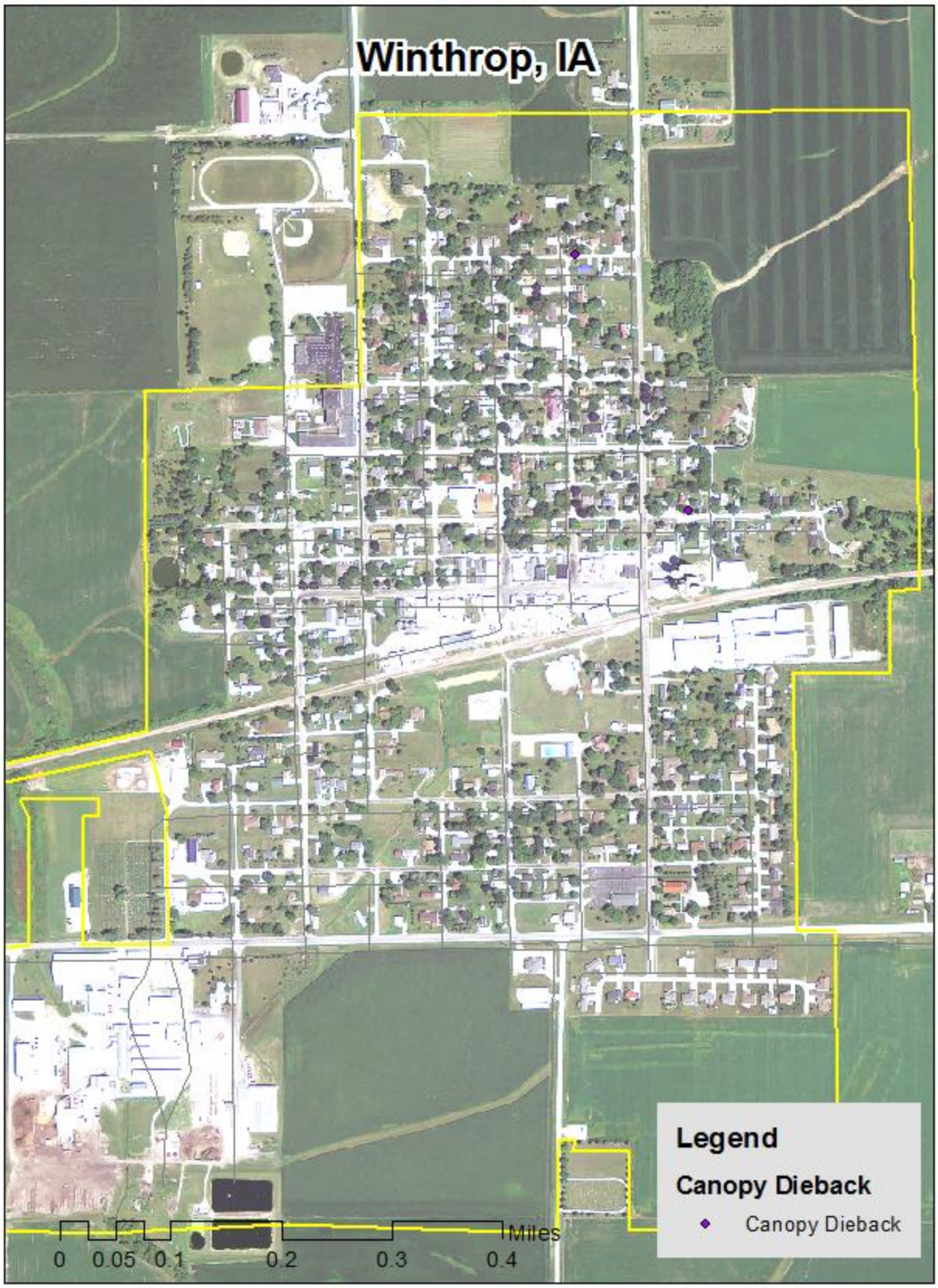

Figure 2: Location of EAB symptoms

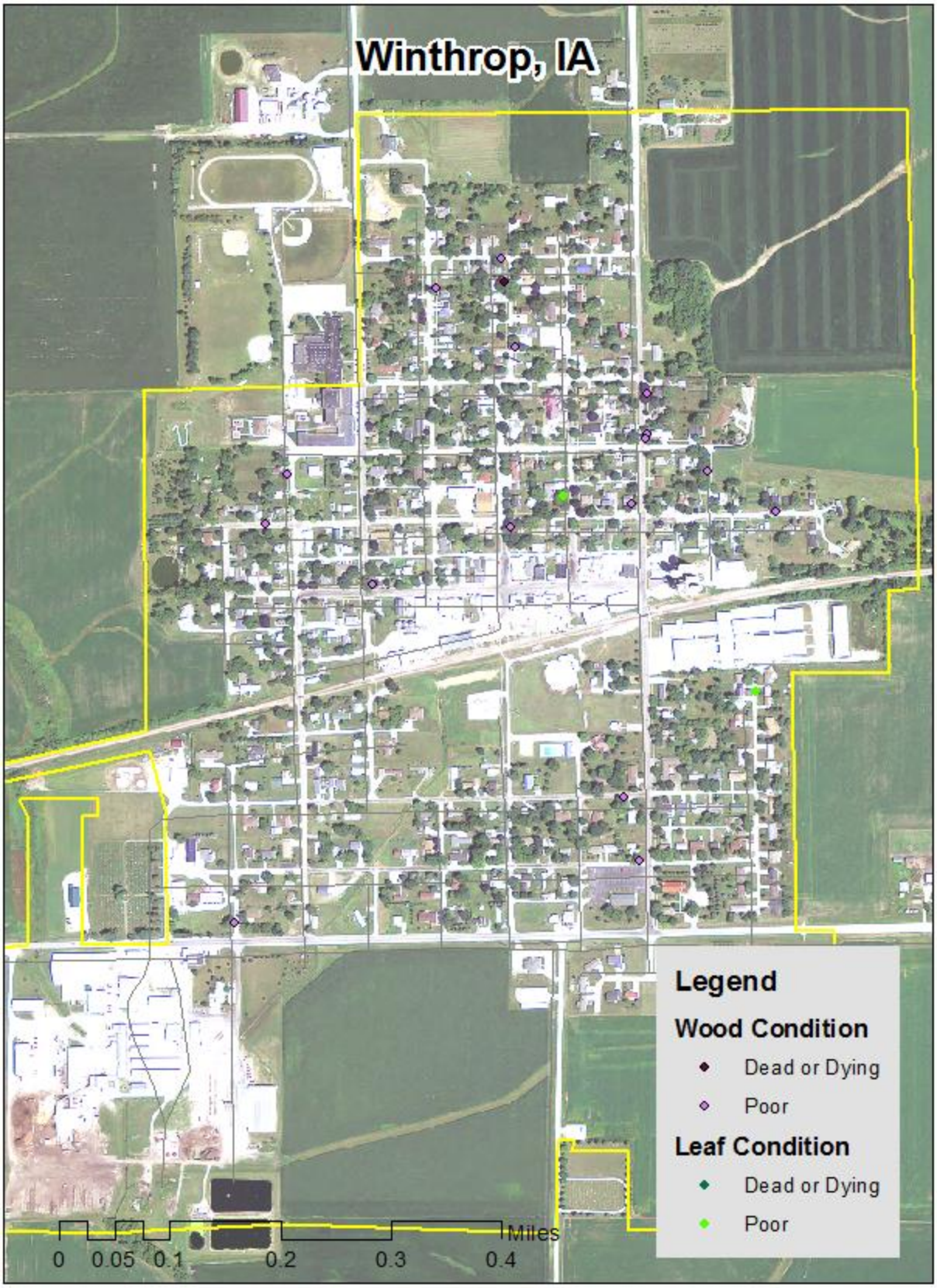

Figure 3: Location of Poor Condition Trees

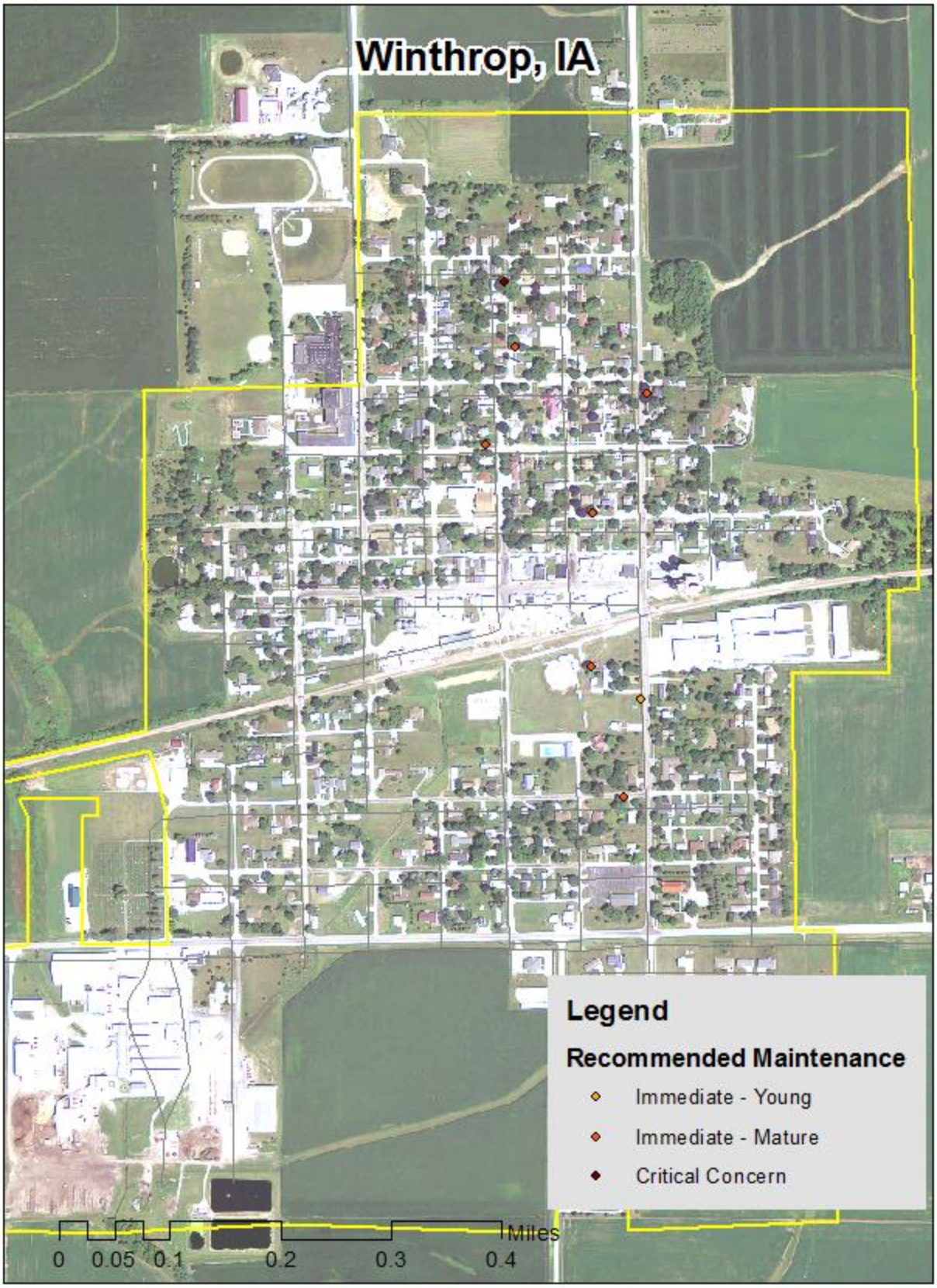

Figure 4: Location of Trees with Recommended Maintenance

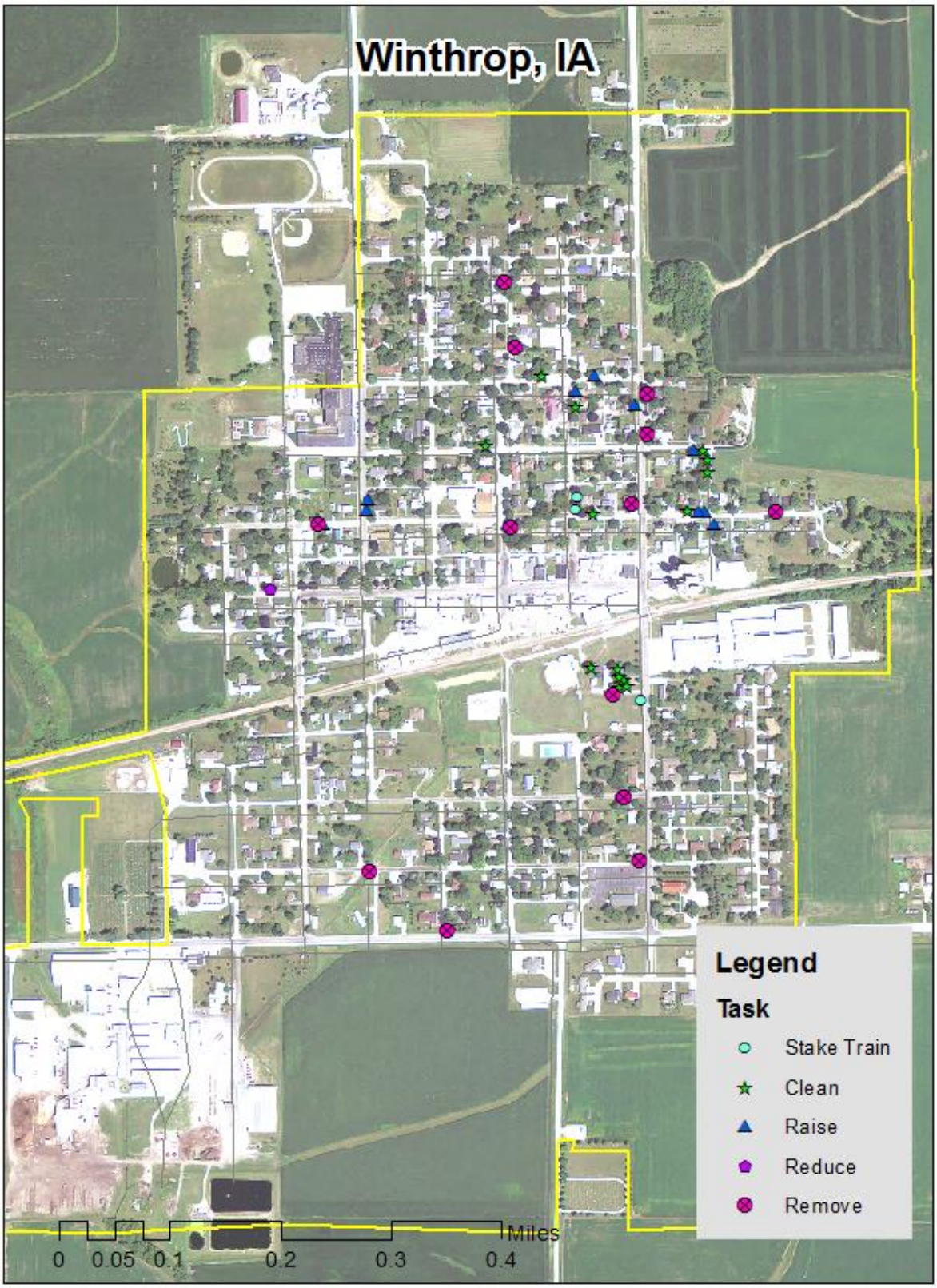

Figure 5: Maintenance Tasks ***City ownership of the trees recommended for removal should be verified prior to any removal***

Appendix C: Winthrop Tree Ordinances

TITLE V - BUILDING AND PROPERTY REGULATIONS

CHAPTER 140
TREES - GENERAL PROVISIONS

140.01 PURPOSE. The purpose of the chapters in this Code of Ordinances pertaining to Trees is to beautify and preserve the appearance of the City by regulating and providing for the planting, care and removal of trees.

140.02 DEFINITIONS. For use in these chapters, the following terms are defined:

1. "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.

2. "Superintendent" means such person as may be designated by the Council.

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

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

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

3. Prohibited Trees. No person shall plant in any street any fruit-bearing tree or any tree of the kinds commonly known as cottonwood, poplar, boxelder, chinese elm, or evergreens.

140.04 DUTY TO TRIM TREES. The owner or agent of the abutting property shall keep the trees on, or overhanging the street, trimmed so that all branches will be at least fifteen (15) feet above the surface of the street and eight (8) feet above the sidewalks.

(Code of Iowa, Sec. 364.12[2c])

140.05 ASSESSMENT. If the abutting property owner fails to trim the trees as required in this chapter, the City may serve notice on the abutting property owner requiring that such action be taken within five (5) days. If such action is not taken within that time, the City may perform the required action and assess the costs against the abutting property for collection in the same manner as a property tax.

(Code of Iowa, Sec. 364.12[2d & e])

140.06 TRIMMING TREES TO BE SUPERVISED. It shall be 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.

140.07 REMOVAL OF TREES. The superintendent shall remove, on order of the Council, any tree on the streets of the City which interferes with the making of improvements or with travel thereon. The superintendent shall additionally remove any trees on the street, not on private property, which are dead or have become diseased, or which constitute a danger to the public, or which may otherwise be declared a nuisance.

(Code of Iowa, Sec. 364.12 [2c] & 372.13 [4])

TITLE V - BUILDING AND PROPERTY REGULATIONS

CHAPTER 141
TREES - DUTCH ELM DISEASE CONTROL

141.01 TREES SUBJECT TO REMOVAL. The Council, having determined that the health of the elm trees within the City is threatened by a fatal disease known as the Dutch Elm Disease, hereby declares the following shall be removed:
(Code of Iowa, Sec. 364.12[3b])

1. Living or Standing Trees. Any living or standing elm tree or part thereof infected with the Dutch Elm Disease fungus or which harbors any of the elm bark beetles, that is scolytus multistriatus (eichb.) or hylurgopinus rufipes (marsh.).

2. Dead Trees. Any dead elm tree or part thereof including logs, branches, stumps, firewood or other elm material from which the bark has not been removed and burned or sprayed with an effective elm bark beetle destroying insecticide.

141.02 DUTY TO REMOVE. No person or entity shall permit any tree or material as defined in Section 141.01 to remain on the premises owned, controlled or occupied by such person or entity within the City.
(Code of Iowa, Sec. 364.12[3b])

141.03 INSPECTION. The superintendent shall inspect or cause to be inspected all premises and places within the City to determine whether any condition as defined in Section 141.01 exists thereon, and also shall inspect or cause to be inspected any elm trees reported or suspected to be infected with the Dutch Elm Disease or any elm bark bearing material reported or suspected to be infected with the elm bark beetles.

141.04 REMOVAL FROM CITY PROPERTY. If the superintendent, upon inspection or examination, determines that any condition as herein defined exists in or upon any public street, alley, park

or any public place, including the strip between the curb and the lot line of private property, within the City and that danger to other elm trees within the City is imminent, the superintendent shall immediately cause such condition to be corrected so as to destroy or prevent as fully as possible the spread of Dutch Elm Disease or the insect pests or vectors known to carry such disease fungus.

141.05 REMOVAL FROM PRIVATE PROPERTY. If the superintendent, upon inspection or examination, shall determine with reasonable certainty that any condition as herein defined exists in or upon private premises and that the danger to other elm trees within the City is imminent, the superintendent shall immediately notify by certified mail the owner, occupant or person in charge of such property to correct such condition within fourteen (14) days of said notification. If such owner, occupant or person in charge of said property fails to comply within fourteen (14) days of receipt of notice, the Council may cause the nuisance to be removed and the cost assessed against the property as provided in Chapter 56.

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

If the superintendent is unable to determine with reasonable certainty whether or not a tree in or upon private premises is infected with Dutch Elm Disease, the superintendent is authorized to remove or cut specimens from said tree, and obtain a diagnosis of such specimens.

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 515-281-5918.