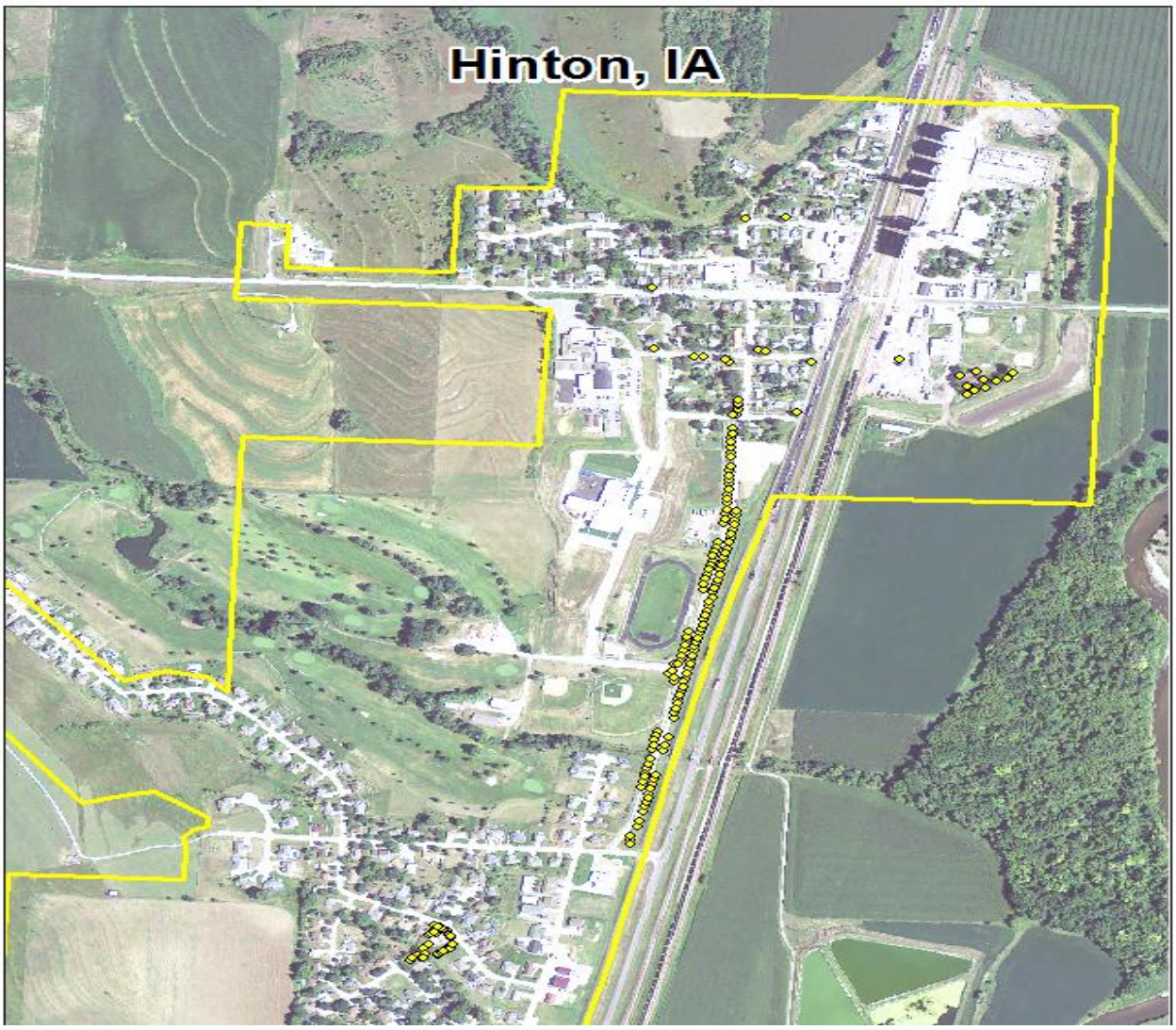
Emerald Ash Borer/Urban Plan
Hinton, Iowa



2014 Urban Forest Management Plan
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Executive Summary

Overview

This plan was developed to assist the City of Hinton with managing its urban forest, including budgeting and future planning. Trees can provide a multitude of benefits to Hinton, and sound management allows you 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 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 4% of Hinton'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 2014, 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 193 trees inventoried.

- Hinton's trees provide $5,408 of benefits annually, an average of $28 per tree.
- There are 14 species of trees.
- The top three genera are: Apple 75%, Maple 6%, and Ash 4%.
- 9% of trees are in need of some type of management.
- 12 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 12 trees needing removal, 3 trees are over 24 inches in diameter at 4.5 ft and must be addressed immediately. *City ownership of the trees recommended for removal should be verified prior to any removal*.
- Hinton is the first community whose ash trees do not any signs or symptoms 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

Introduction

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

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

Inventory

In 2014, a tree inventory was conducted that included 100% of the city owned trees along streets and in 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 193 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

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Hinton's trees reduce energy related costs by approximately $392 annually (Appendix A, Table 1). These savings are both in Electricity (4.2 MWh) and in Natural Gas (112.7 Therms).

Annual Stormwater Benefits

Hinton's trees intercept about 196,869 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides $1,221 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 mater (ozone). In Hinton, it is estimated that trees remove 116 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 $139 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Hinton, trees sequester about 7,660 lbs. of carbon a year with an associated value of $25 (Appendix A, Table 5). In addition, the trees store 277,701 lbs. of carbon, with a yearly benefit of $916 (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. Hinton receives $3,631 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, Hinton's trees provide $5,408 of benefits annually. Benefits of individual trees vary based on size, species, health and

location, but on average each of the 193 trees in Hinton provide approximately $28 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Hinton has 14 different tree species along city streets and in parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Crabapple/Apple	145	75%
Ash	8	4%
Boxelder	7	3%
Silver maple	6	3%
Amur maple	5	2%
Honeylocust	5	2%
Black maple	3	2%
American Basswood/Linden	3	2%
Maple	2	1%
Red maple	2	1%
Spruce	2	1%
Birch	2	1%
Blue spruce	1	<1%
Other Large Evergreen	1	<1%

Age Class

Most of Hinton's trees (91%) are between 0 and 6 inches in diameter at 4.5 ft (Appendix A, Figure 2). With regard to age/size, it is preferred that the highest number of trees have smaller trunk diameters, so younger and smaller trees will replace natural mortality and to maintain canopy cover. Hinton's size curve is on the very smaller side, indicating a very young 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 of 87% of the trees is good with only 5% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, the wood condition of 80% of Hinton's trees is good (Appendix A, Figure 4 & Appendix B, Figure 3) while 7% are in poor health, dead or dying. This 7% 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	5	3%
Crown Raising	1	<1%
Tree Staking	0	0%
Tree Removal	12	6%
Crown Reduction	0	0%

Canopy Cover

The canopy cover of Hinton is approximately 3 acres (Appendix A, figure 5). According to the 2010 census, Hinton occupies 442 acres. Thus the canopy cover is about .7%.

Land Use and Location

The majority of Hinton's city and park trees are in planting strips in single family residential neighborhoods (Appendix A, Figures 6 & 7). The following describes the land use and locations for the street and park trees.

Land Use	
Single family residential	72%
Park/vacant/other	28%
Industrial/Large commercial	0%
Small commercial	0%
Multifamily residential	0%

Location	
Planting strip	99.5%
Other maintained locations	0%
Cutout (surrounded by pavement)	0%
Front yard	0%
Median	.5%

Recommendations

Risk Management

Hazardous trees can be a significant threat to both people and property. Trees that are dead or dying, or that have problems such as trunk cracks longer than 24 inches should be removed. A few trees may have main trunks which forked between 2 feet and 8 feet above the ground. Any of these forked trees, with open splits exposing interior wood, 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

Hinton has 12 `removal' trees that need removal without regard to the species (Appendix A, Table 8) and their locations are shown on Figure 5, Appendix B. These trees are shown as red circles with a black X on the map titled Maintenance Tasks. Hinton also has 3 `critical concern' trees that need immediate appraisal for removal. These trees can be seen on the Location of Trees with Recommended Maintenance map looking for purple diamonds (Appendix B, Figure 4). By comparing Figures 4 & 5, you will notice that the 3 `critical concern' trees on Figure 4 may also be a `removal' trees on Figure 5. It is recommended to start with the `removal' trees first, and then proceed to the `critical' concern trees. Next, move to the 11 `young and mature' trees need `immediate' maintenance shown on Figure 4, Appendix B.

Poor and Dead/Dying Tree

After the hazardous trees have been dealt with, ash trees in poor health should be assessed for maintenance or removal (Appendix B, Figures 3 & 4 again). Of the 12 removal trees, 1 is an ash tree. There are a total of 8 ash trees, and none of them show any signs and symptoms that have been associated with EAB. When looking at the `wood condition' of the 193 trees, 6 have received a `poor' condition rating and 7 are rated as `dead and dying'. One of the dead and dying trees is an ash tree. *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 Hinton.

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 apple trees (crabapple and pure apple) (75%) (Appendix A, Figure 1). Apples 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) in the back of this plan. All trees planted must meet the restrictions in city ordinance 151.02 (Appendix C).

Continual Monitoring

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

Six Year Maintenance Plan with <u>No Additional Funding</u> **

Year 1

Removal: remove the 12 'removal' trees and appraise the single 'critical concern' tree, see Appendix B, Figures 3 & 5.
Planting and Replacement: 9 trees to be planted in open locations using annual utility grants.
Visual Survey for signs and symptoms of EAB.

Year 2

Assess the 'immediate' maintenance trees: take a careful look at the 11 young and mature trees, Appendix B, Figures 3 & 4.
Planting and Replacement: 6 trees in open locations using grant funds.
Routine trimming: Contract to trim city trees in your park to establish better branching form.
Visual Survey for signs and symptoms of EAB.

Year 3

Maintenance: switch to the 'poor, dead and dying' trees of any species. Provide care to these trees as needed. If removal is warranted, do so.
Planting and Replacement: 9 trees to be planted in open locations using grant funds.
Visual Survey for signs and symptoms of EAB.

Year 4

Maintenance: proceed with corrective pruning of the 145 crabapple trees as needed. Pruning vegetative suckers or sprouts is always needed; as well as, thinning the crowns of broken, rubbing, crossing-over branches.
Planting and Replacement: plant 7 trees in open locations using grant funds.
Routine trimming: None unless storms have caused additional damage.
Visual Survey for signs and symptoms of EAB.

Year 5

Maintenance: Table 9 shows 6 trees that need their crowns cleaned of branches and 1 tree needs the base of the tree raised for traffic or people on sidewalks. See Appendix B, Figure 5 for the locations of these trees.
Planting and Replacement: 9 trees to be planted using grant funds.
Visual Survey for signs and symptoms of EAB.

Year 6

Maintenance: appraise and treat storm damaged trees or check street trees for the need of Routine work.
Planting and Replacement: plant 7 trees in open locations using grant funds.
Routine trimming: none unless storm damaged.
Visual Survey for signs and symptoms of EAB.

**Reduction of ash: Hinton has 8 public ash trees along city streets or in a park. Only one ash tree was labeled for `removal' and another ash tree is rated as 'dead and dying.' Hinton does not have the ash tree population and the costs normally associated with their maintenance, removal, or treatment for EAB (Emerald Ash Borer). In the long run, the city will not have high costs for the care of LARGE trees. If Hinton continues to replant small street trees, such as the 145 Crabapples you now have, the City will need to spend money initially to establish good form and branching in the small trees. Initial care can lower future costs of maintenance.

Emerald Ash Borer Plan

Tree Removal/Ash Tree Removal

Tree removal can be prioritized with 'removal' trees shown on Appendix b, Figure 5 with the red circles and black X's within them. Then move on to those trees needing 'immediate care' shown on Figures 4 in Appendix B. This work is followed by dead, dying, or poor trees shown on Figure 3 in Appendix B. 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. Hinton has the added benefits of only having 8 public ash trees to deal with, and not finding any actual infestations of EAB. Chemical 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 infected 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? For some answers to these questions, 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 do since Hinton is not effected by EAB. At this time, the entire State of Iowa is under quarantine for EAB, and the moving of all types of firewood, nursery stock, and ash logs.

Canopy Replacement

As budget permits, all removed trees will be replaced. An updated, sample city tree code can be found in Appendix C covering public and private trees, past and present insect and disease problems, and sampling of trees for insect and disease problems. 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 may be initially focused on 'critical concern' trees, and 'removal' trees, usual services may be delayed for short time. 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 "If it is determined with reasonable certainty that any such condition exists (trees or shrubs in the City reported or suspected to be infected with or damaged by any disease or insect or disease pests) on private property and that the danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Council shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days of said notification. If such owner, occupant or person in charge of said property fails to comply within 14 days of receipt of notice, the Council may cause the condition to be corrected and the cost assessed against the property."

Budget

Tree removal will vary each year, so the costs of removal will vary each year. Annual expenditures were not available for 2012, 2013 and 2014 when this plan was written. Hence, tree removal costs are based on a cost of $550 per tree.

Current Budget

FY 2015 Budget

Removal: $6,600 to remove the 12 trees.
Planting: $900
Watering & Maintenance: $500.

FY 2016 Budget

Maintenance: $1,000 to raise a low crown, or clean a crown of bad branches.
Planting: $600
Routine trimming: $500 to trim some of the 145 crabapple trees.
Watering & Maintenance: $500 to mulch some of the crabapple trees.

FY 2017 Budget

Maintenance: $1,000 to work on young and mature trees needing immediate repairs.
Planting: $900
Routine trimming: $500 for further work on the 145 crabapple trees.
Watering & Maintenance: $500 mulching.

FY 2018 Budget

Maintenance: 13 trees are rated as poor, dead, or dying. One dead tree is an ash tree. Work on them as needed.
Planting: $600
Routine trimming: $500 for continued work on the 145 crabapple trees.
Watering & Maintenance: $500 mulching.

FY 2019 Budget

Removal: $2,000 for new storm damage.
Planting: $900
Routine trimming: $500 to continue work on the crabapple trees.
Watering & Maintenance: $500 mulching.

FY 2020 Budget

Removal: $1,200 for new storm damage.
Planting: $600
Routine trimming: $1,700
Watering & Maintenance: $500 mulching.

*Reduction of ash over 2 years: all 8 ash trees could be removed.

Purposed Budget Increase

EAB could potentially kill all 8 ash trees in Hinton within 1 years of its arrival. To remove all ash trees within 2 years the budget would need to be increased by $3,300 a year. If the budget were increased to $6,600 a year all ash could be removed within 1 year only if needed. Additionally, it is recommended that Hinton 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.

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Hinton

Annual Energy Benefits of Public Trees

1/12/2015

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Apple	0.3	18	16.2	16	34	(N/A)	75.5	8.6	0.23
Ash	0.9	61	27.9	27	88	(N/A)	4.2	22.5	11.02
Boxelder	0.7	49	24.3	24	72	(N/A)	3.6	18.4	10.33
Silver maple	0.7	50	23.3	23	73	(N/A)	3.1	18.6	12.15
Amur maple	0.1	5	2.9	3	8	(N/A)	2.6	2.0	1.56
Honeylocust	0.7	46	0.1	0	46	(N/A)	2.6	11.8	9.24
Black maple	0.3	19	7.4	7	26	(N/A)	1.6	6.6	8.58
American basswood	0.3	20	9.3	9	29	(N/A)	1.6	7.4	9.73
Maple	0.1	6	2.8	3	9	(N/A)	1.0	2.2	4.37
Red maple	0.0	2	1.2	1	3	(N/A)	1.0	0.8	1.56
Spruce	0.0	2	-1.1	-1	1	(N/A)	1.0	0.2	0.30
Birch	0.0	0	0.1	0	0	(N/A)	1.0	0.1	0.10
Blue spruce	0.0	1	-0.5	-1	0	(N/A)	0.5	0.1	0.30
Conifer Evergreen Large Otl	0.1	4	-1.1	-1	3	(N/A)	0.5	0.8	3.13
Total	4.2	282	112.7	110	392	(N/A)	100.0	100.0	2.04

Table 2: Annual Stormwater Benefits

Hinton

Annual Stormwater Benefits of Public Trees

1/12/2015

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Apple	7,190	45	(N/A)	75.5	3.7	0.31
Ash	38,562	239	(N/A)	4.2	19.6	29.89
Boxelder	36,005	223	(N/A)	3.6	18.3	31.89
Silver maple	42,278	262	(N/A)	3.1	21.5	43.69
Amur maple	2,772	17	(N/A)	2.6	1.4	3.44
Honeylocust	31,725	197	(N/A)	2.6	16.1	39.34
Black maple	13,433	83	(N/A)	1.6	6.8	27.76
American basswood	12,822	79	(N/A)	1.6	6.5	26.50
Maple	3,530	22	(N/A)	1.0	1.8	10.94
Red maple	1,109	7	(N/A)	1.0	0.6	3.44
Spruce	2,150	13	(N/A)	1.0	1.1	6.66
Birch	81	1	(N/A)	1.0	0.0	0.25
Blue spruce	1,075	7	(N/A)	0.5	0.5	6.66
Conifer Evergreen Large Othe	4,139	26	(N/A)	0.5	2.1	25.66
Citywide total	196,869	1,221	(N/A)	100.0	100.0	6.36

Table 3: Annual Air Quality Benefits

Hinton

Annual Air Quality Benefits of Public Trees

1/12/2015

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
Apple	2.0	0.4	0.9	0.3	3	0.9	0.3	0.3	3.1	6	0.0	0	8.2	9	(N/A)	75.5	0.06
Ash	6.5	1.2	2.5	0.9	10	2.9	0.9	0.9	10.7	20	0.0	0	26.7	30	(N/A)	4.2	3.73
Boxelder	5.2	1.1	2.2	0.8	9	2.4	0.7	0.7	8.6	16	-2.7	-1	19.1	24	(N/A)	3.6	3.36
Silver maple	5.8	1.2	2.5	0.9	10	2.4	0.8	0.8	8.8	16	-2.6	-1	20.6	25	(N/A)	3.1	4.17
Amur maple	0.5	0.1	0.2	0.1	1	0.2	0.1	0.1	0.9	2	-0.2	0	2.0	2	(N/A)	2.6	0.49
Honeylocust	5.5	1.1	2.4	0.9	9	2.0	0.7	0.7	8.1	15	-2.9	-1	18.5	23	(N/A)	2.6	4.59
Black maple	2.0	0.4	0.8	0.3	3	0.9	0.3	0.3	3.3	6	-0.9	0	7.4	9	(N/A)	1.6	2.99
American basswood	2.2	0.4	0.8	0.3	3	1.0	0.3	0.3	3.5	7	0.0	0	8.9	10	(N/A)	1.6	3.30
Maple	0.6	0.1	0.2	0.1	1	0.3	0.1	0.1	1.1	2	-0.2	0	2.3	3	(N/A)	1.0	1.42
Red maple	0.2	0.0	0.1	0.0	0	0.1	0.0	0.0	0.4	1	-0.1	0	0.8	1	(N/A)	1.0	0.49
Spruce	0.2	0.0	0.1	0.0	0	0.1	0.0	0.0	0.3	1	-0.5	0	0.3	1	(N/A)	1.0	0.37
Birch	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.1	0	(N/A)	1.0	0.03
Blue spruce	0.1	0.0	0.1	0.0	0	0.0	0.0	0.0	0.1	0	-0.2	0	0.2	0	(N/A)	0.5	0.37
Conifer Evergreen Large Othe	0.5	0.1	0.3	0.1	1	0.2	0.1	0.1	0.7	1	-0.7	0	1.3	2	(N/A)	0.5	2.02
Citywide total	31.4	6.3	13.1	4.8	51	13.5	4.2	4.2	49.7	91	-10.9	-3	116.3	139	(N/A)	100.0	0.72

Table 4: Annual Carbon Stored

Hinton

Stored CO2 Benefits of Public Trees

1/12/2015

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Apple	798	3	(N/A)	75.5	0.3	0.02
Ash	69,190	228	(N/A)	4.2	24.9	28.54
Boxelder	29,075	96	(N/A)	3.6	10.5	13.71
Silver maple	93,062	307	(N/A)	3.1	33.5	51.18
Amur maple	793	3	(N/A)	2.6	0.3	0.52
Honeylocust	47,171	156	(N/A)	2.6	17.0	31.13
Black maple	11,234	37	(N/A)	1.6	4.0	12.36
American basswood	23,216	77	(N/A)	1.6	8.4	25.54
Maple	1,520	5	(N/A)	1.0	0.5	2.51
Red maple	317	1	(N/A)	1.0	0.1	0.52
Spruce	312	1	(N/A)	1.0	0.1	0.51
Birch	17	0	(N/A)	1.0	0.0	0.03
Blue spruce	156	1	(N/A)	0.5	0.1	0.51
Conifer Evergreen La	840	3	(N/A)	0.5	0.3	2.77
Citywide total	277,701	916	(N/A)	100.0	100.0	4.77

Table 5: Annual Carbon Sequestered

Hinton

Annual CO Benefits of Public Trees

1/12/2015

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
Apple	798	3	-13	-109	0	0	0	676	2	(N/A)	75.5	8.8	0.02
Ash	2,816	9	-633	-84	0	0	0	2,099	7	(N/A)	4.2	27.4	0.87
Boxelder	1,154	4	-266	-68	0	0	0	821	3	(N/A)	3.6	10.7	0.39
Silver maple	3,249	11	-851	-93	0	0	0	2,305	8	(N/A)	3.1	30.1	1.27
Amur maple	196	1	-7	-11	0	0	0	178	1	(N/A)	2.6	2.3	0.12
Honeylocust	777	3	-431	-56	0	0	0	290	1	(N/A)	2.6	3.8	0.19
Black maple	389	1	-103	-29	0	0	0	257	1	(N/A)	1.6	3.4	0.28
American basswood	941	3	-212	-29	0	0	0	701	2	(N/A)	1.6	9.1	0.77
Maple	176	1	-14	-9	0	0	0	153	1	(N/A)	1.0	2.0	0.25
Red maple	78	0	-3	-5	0	0	0	71	0	(N/A)	1.0	0.9	0.12
Spruce	57	0	-3	-9	0	0	0	45	0	(N/A)	1.0	0.6	0.07
Birch	14	0	0	-2	0	0	0	12	0	(N/A)	1.0	0.2	0.02
Blue spruce	28	0	-1	-5	0	0	0	23	0	(N/A)	0.5	0.3	0.07
Conifer Evergreen Large C	46	0	-8	-8	0	0	0	30	0	(N/A)	0.5	0.4	0.10
Citywide total	10,720	35	-2,544	-515	-2	0	0	7,660	25	(N/A)	100.0	100.0	0.13

Table 6: Annual Social and Aesthetic Benefits

Hinton

Annual Aesthetic/Other Benefits of Public Trees

1/12/2015

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Apple	2,275	(N/A)	75.5	62.6	15.69
Ash	268	(N/A)	4.2	7.4	33.45
Boxelder	257	(N/A)	3.6	7.1	36.64
Silver maple	187	(N/A)	3.1	5.2	31.23
Amur maple	148	(N/A)	2.6	4.1	29.69
Honeylocust	88	(N/A)	2.6	2.4	17.69
Black maple	80	(N/A)	1.6	2.2	26.74
American basswood	96	(N/A)	1.6	2.7	32.09
Maple	80	(N/A)	1.0	2.2	39.82
Red maple	59	(N/A)	1.0	1.6	29.69
Spruce	33	(N/A)	1.0	0.9	16.67
Birch	18	(N/A)	1.0	0.5	9.06
Blue spruce	17	(N/A)	0.5	0.5	16.67
Conifer Evergreen Large Othe	24	(N/A)	0.5	0.7	24.06
Citywide total	3,631	(N/A)	100.0	100.0	18.91

Table 7: Summary of Benefits in Dollars

Hinton

Total Annual Benefits of Public Trees by Species ($)

1/12/2015

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Apple	34	2	9	45	2,275	2,364	(N/A)	43.7
Ash	88	7	30	239	268	632	(N/A)	11.7
Boxelder	72	3	24	223	257	578	(N/A)	10.7
Silver maple	73	8	25	262	187	555	(N/A)	10.3
Amur maple	8	1	2	17	148	176	(N/A)	3.3
Honeylocust	46	1	23	197	88	355	(N/A)	6.6
Black maple	26	1	9	83	80	199	(N/A)	3.7
American basswood	29	2	10	79	96	217	(N/A)	4.0
Maple	9	1	3	22	80	114	(N/A)	2.1
Red maple	3	0	1	7	59	71	(N/A)	1.3
Spruce	1	0	1	13	33	48	(N/A)	0.9
Birch	0	0	0	1	18	19	(N/A)	0.4
Blue spruce	0	0	0	7	17	24	(N/A)	0.4
Conifer Evergreen Large	3	0	2	26	24	55	(N/A)	1.0
Citywide Total	392	25	139	1,221	3,631	5,408	(N/A)	100.0

Table 8: Priority Task Summary for Public Trees

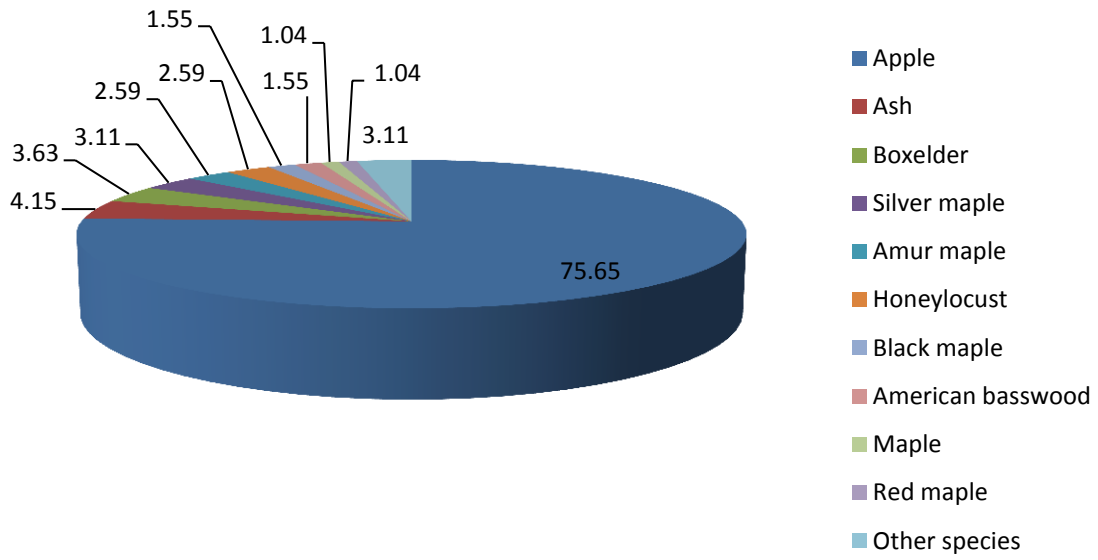
Hinton											
	Priority Task Summary for Public Trees										
	DBH Class (DBH-Diameter at Chest/Breast Height)										
Maintenance Type	0 to 3 inches	3 to 6 inches	6 to 12 inches	12 to 18 inches	18 to 24 inches	24 to 30 inches	30 to 36 inches	36 to 42 inches	>42 inches	Total number	% of Total Population
No work	143	7	6	4	9	5	0	1	0	175	90.67
Stake or Train	0	0	0	0	0	0	0	0	0	0	0
Clean Crown	0	0	0	3	1	0	1	0	0	5	2.59
Raise Crown	0	0	0	0	0	1	0	0	0	1	0.52
Reduce Crown	0	0	0	0	0	0	0	0	0	0	0
Remove Tree	4	0	0	3	2	1	0	2	0	12	6.22
Treat Pests/ or Diseases	0	0	0	0	0	0	0	0	0	0	0
City wide total	147	7	6	10	12	7	1	3	0	193	100

Table 9: Recommended Maintenance for Public Trees

Hinton											
	Recommended Maintenance for Public Trees										
	DBH Class in inches (DBH-Diameter at Chest/Breast Height)										
Maintenance Type	0 to 3 inches	3 to 6 inches	6 to 12 inches	12 to 18 inches	18 to 24 inches	24 to 30 inches	30 to 36 inches	36 to 42 inches	>42 inches	Total number	% fo Total Population
No work/None	0	0	0	0	0	0	0	0	0	0	0
Young Tree (routine)	142	2	0	0	0	0	0	0	0	144	74.61
Young Tree (immediate)	5	0	0	0	0	0	0	0	0	5	2.59
Mature Tree (routine)	0	5	6	7	10	6	0	1	0	35	18.13
Mature Tree (immediate)	0	0	0	1	1	1	1	2	0	6	3.11
Critical Concern (Public Safety)	0	0	0	2	1	0	0	0	0	3	1.35
City Wide Total	147	7	6	10	12	7	1	3	0	193	100

APPENDIX A. GRAPHS

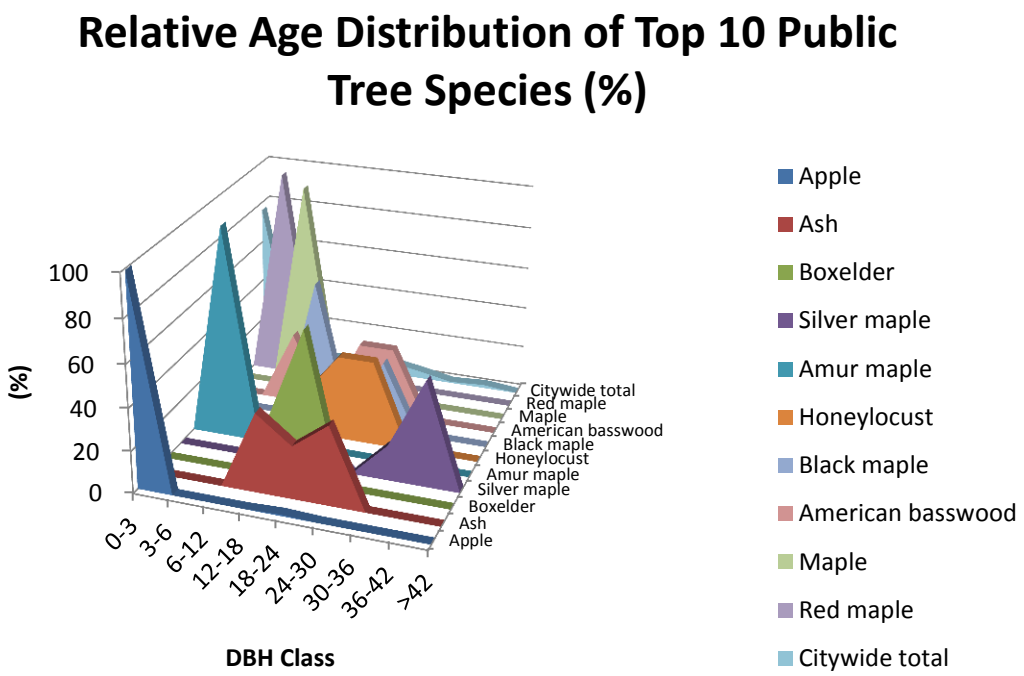
Figure 1: Species Distribution



Species Distribution of Public Trees (%)
1/12/2015

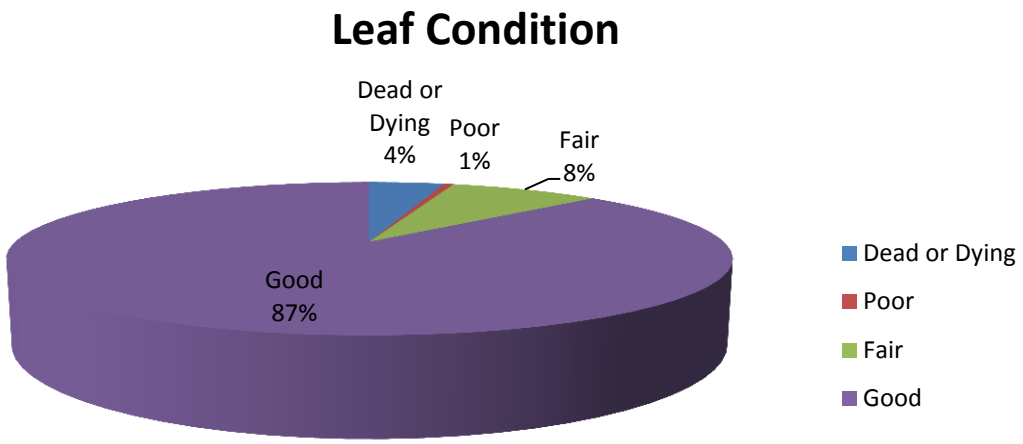
Species	Percent
Apple	75.65
Ash	4.15
Boxelder	3.63
Silver maple	3.11
Amur maple	2.59
Honeylocust	2.59
Black maple	1.55
American basswood	1.55
Maple	1.04
Red maple	1.04
Other species	3.11
Total	100.00

Figure 2: Relative Age Class



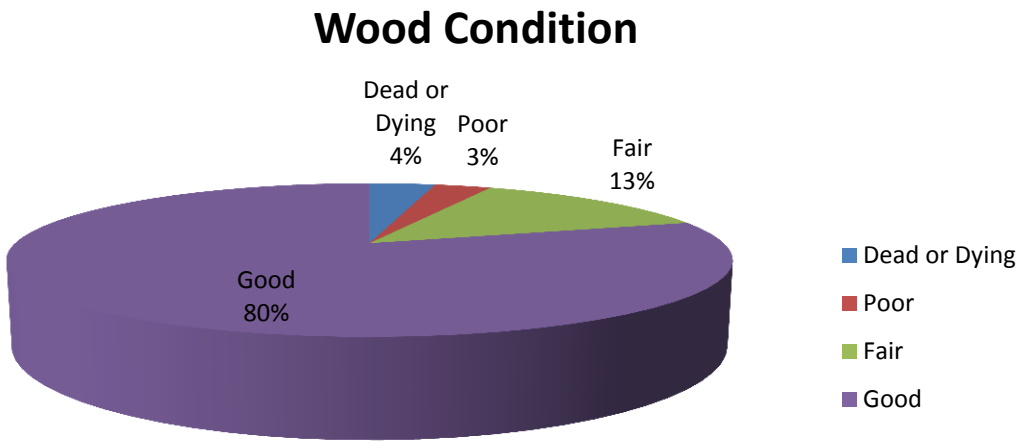
Hinton									
Relative Age Distribution of Top 10 Public Tree Species (%)									
1/12/2015									
	DBH class (in)								
Species	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42
Apple	99.32	0.00	0.00	0.00	0.68	0.00	0.00	0.00	0.00
Ash	0.00	0.00	0.00	37.50	25.00	37.50	0.00	0.00	0.00
Boxelder	0.00	0.00	0.00	28.57	71.43	0.00	0.00	0.00	0.00
Silver maple	0.00	0.00	0.00	16.67	16.67	0.00	16.67	50.00	0.00
Amur maple	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Honeylocust	0.00	0.00	0.00	20.00	40.00	40.00	0.00	0.00	0.00
Black maple	0.00	0.00	0.00	66.67	0.00	33.33	0.00	0.00	0.00
American basswood	0.00	0.00	33.33	0.00	33.33	33.33	0.00	0.00	0.00
Maple	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
Red maple	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Citywide total	76.17	3.63	3.11	5.18	6.22	3.63	0.52	1.55	0.00

Figure 3: Foliage Condition



Hinton				
Condition (Foliage) of Public Trees by Species (%)				
1/12/2015				
Species Name	Dead or Dying	Poor	Fair	Good
Apple	4.79	0.00	6.16	89.04
Ash	0.00	12.50	0.00	87.50
Boxelder	14.29	0.00	0.00	85.71
Silver maple	0.00	0.00	66.67	33.33
Amur maple	0.00	0.00	0.00	100.00
Honeylocust	0.00	0.00	20.00	80.00
Black maple	0.00	0.00	0.00	100.00
American basswood	0.00	0.00	0.00	100.00
Maple	0.00	0.00	0.00	100.00
Red maple	0.00	0.00	0.00	100.00
Birch	0.00	0.00	100.00	0.00
Spruce	0.00	0.00	0.00	100.00
Citywide total	4.15	0.52	8.29	87.05

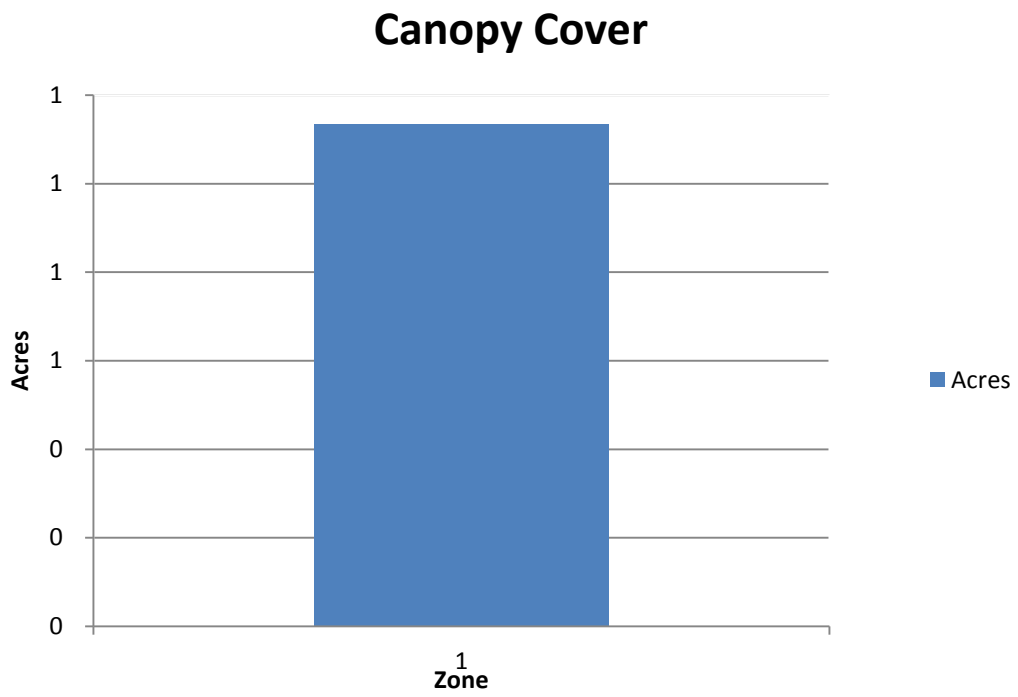
Figure 4: Wood Condition



Hinton
Condition (Woody) of Public Trees by Species (%)
1/12/2015

Species Name	Dead or Dying	Poor	Fair	Good
Apple	3.42	0.00	5.48	91.10
Ash	12.50	0.00	12.50	75.00
Boxelder	14.29	28.57	42.86	14.29
Silver maple	0.00	33.33	16.67	50.00
Amur maple	0.00	0.00	100.00	0.00
Honeylocust	0.00	0.00	80.00	20.00
Black maple	0.00	66.67	0.00	33.33
American basswood	0.00	0.00	66.67	33.33
Maple	0.00	0.00	0.00	100.00
Red maple	0.00	0.00	100.00	0.00
Birch	0.00	0.00	0.00	100.00
Spruce	0.00	0.00	0.00	100.00
Citywide total	3.63	3.11	13.47	79.79

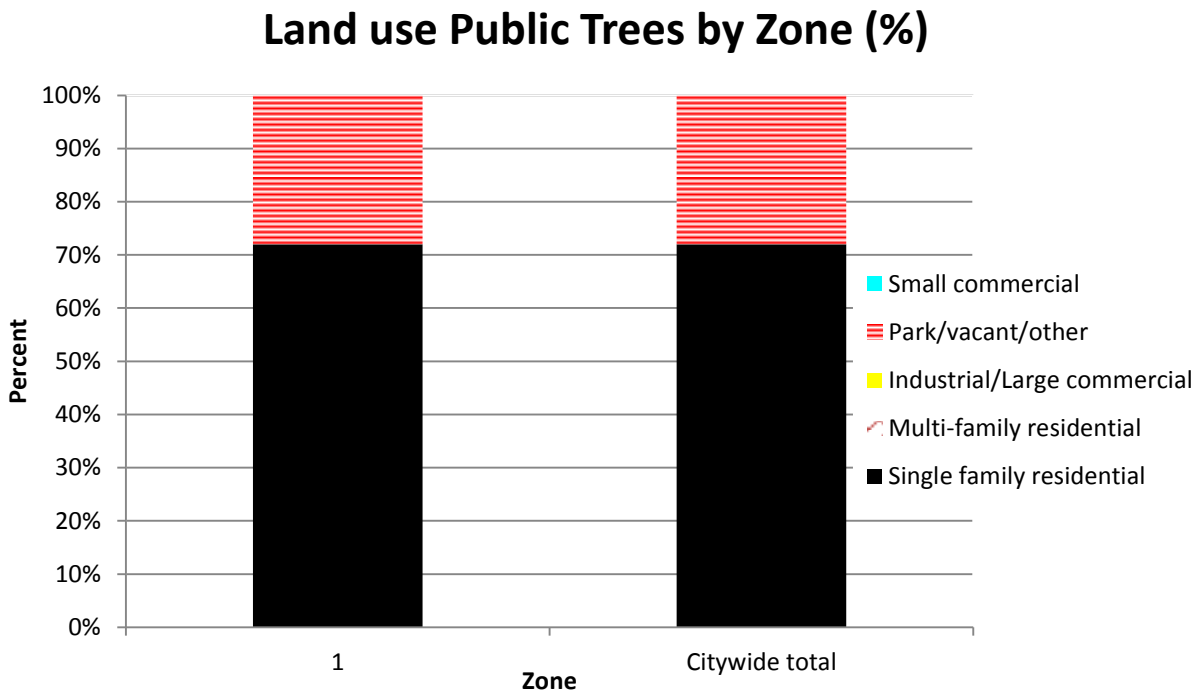
Figure 5: Canopy Cover in Acres



Hinton
Canopy Cover of Public Trees (Acres)
1/12/2015

	Total Land Area	Total Canopy Cover	Canopy Cover as % of Total Land Area
Citywide total	442.00	3.00	0.70

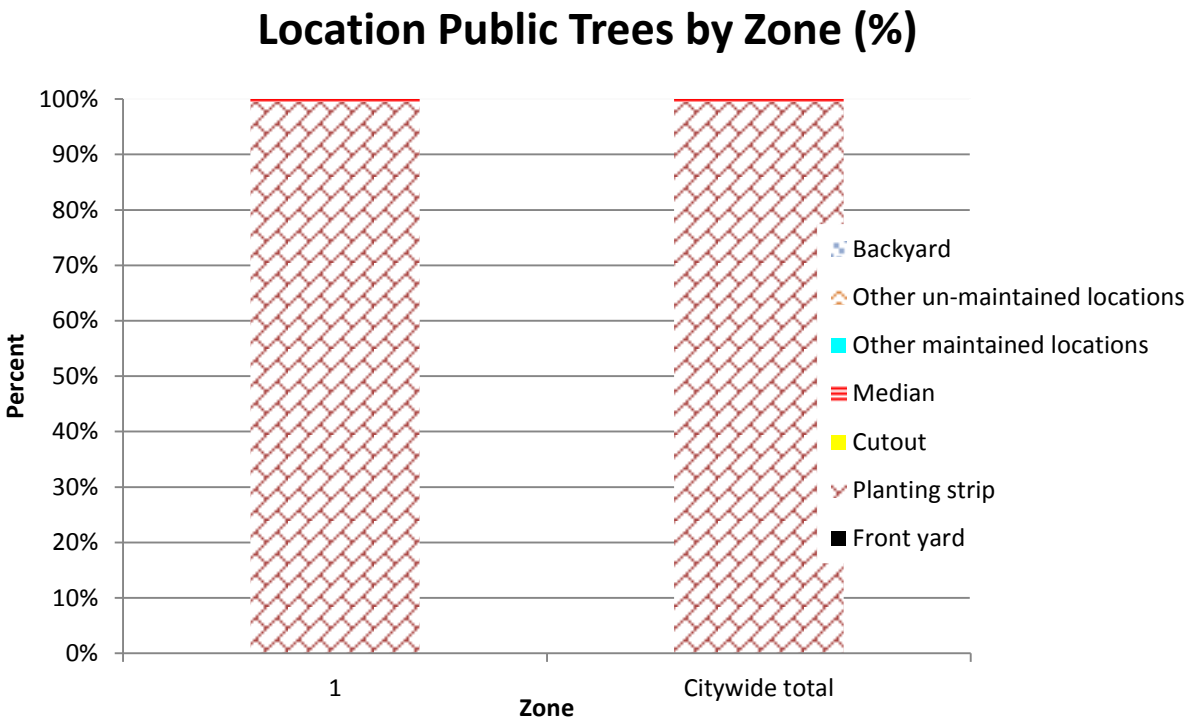
Figure 6: Land Use of city/park trees



Hinton
Land use Public Trees by Zone (%)
1/12/2015

Zone	Single family residential	Multi-family residential	Industrial/Large commercial	Park/vacant/other	Small commercial
1	72.02	0.00	0.00	27.98	0.00
Citywide total	72.02	0.00	0.00	27.98	0.00

Figure 7: Location of city/park trees



Hinton
Location Public Trees by Zone (%)
1/12/2015

Zone	Front yard	Planting strip	Cutout	Median	Other maintained locations	Other un-maintained locations	Backyard
1	0.00	99.48	0.00	0.52	0.00	0.00	0.00
Citywide total	0.00	99.48	0.00	0.52	0.00	0.00	0.00

Appendix B: ArcGIS Mapping

Figure 1: Location of Ash Trees

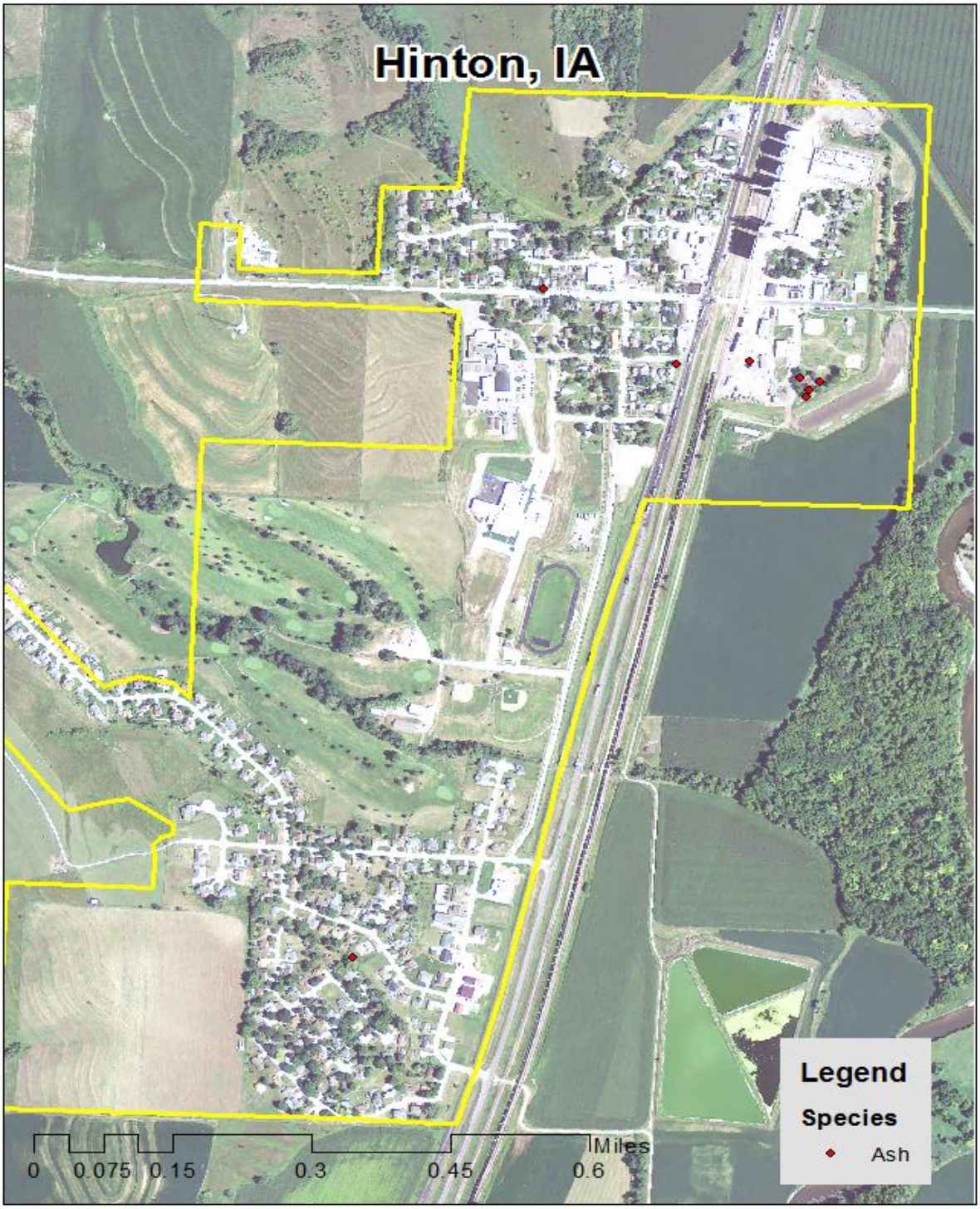


Figure 2: Location of EAB symptoms

NO SIGNS OR SYMPTOMS MAP

Figure 3: Location of Poor Condition Trees

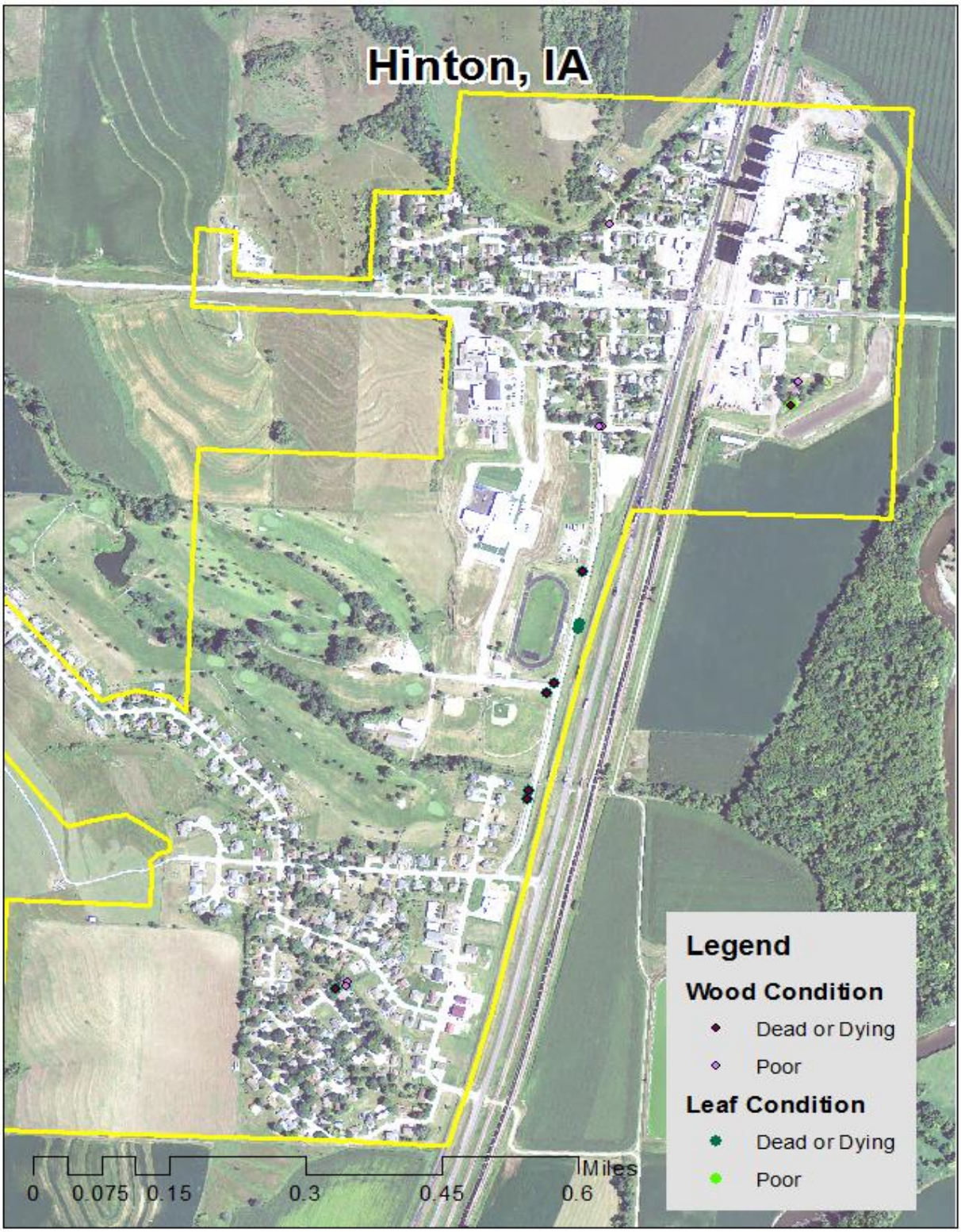


Figure 4: Location of Trees with Recommended Maintenance

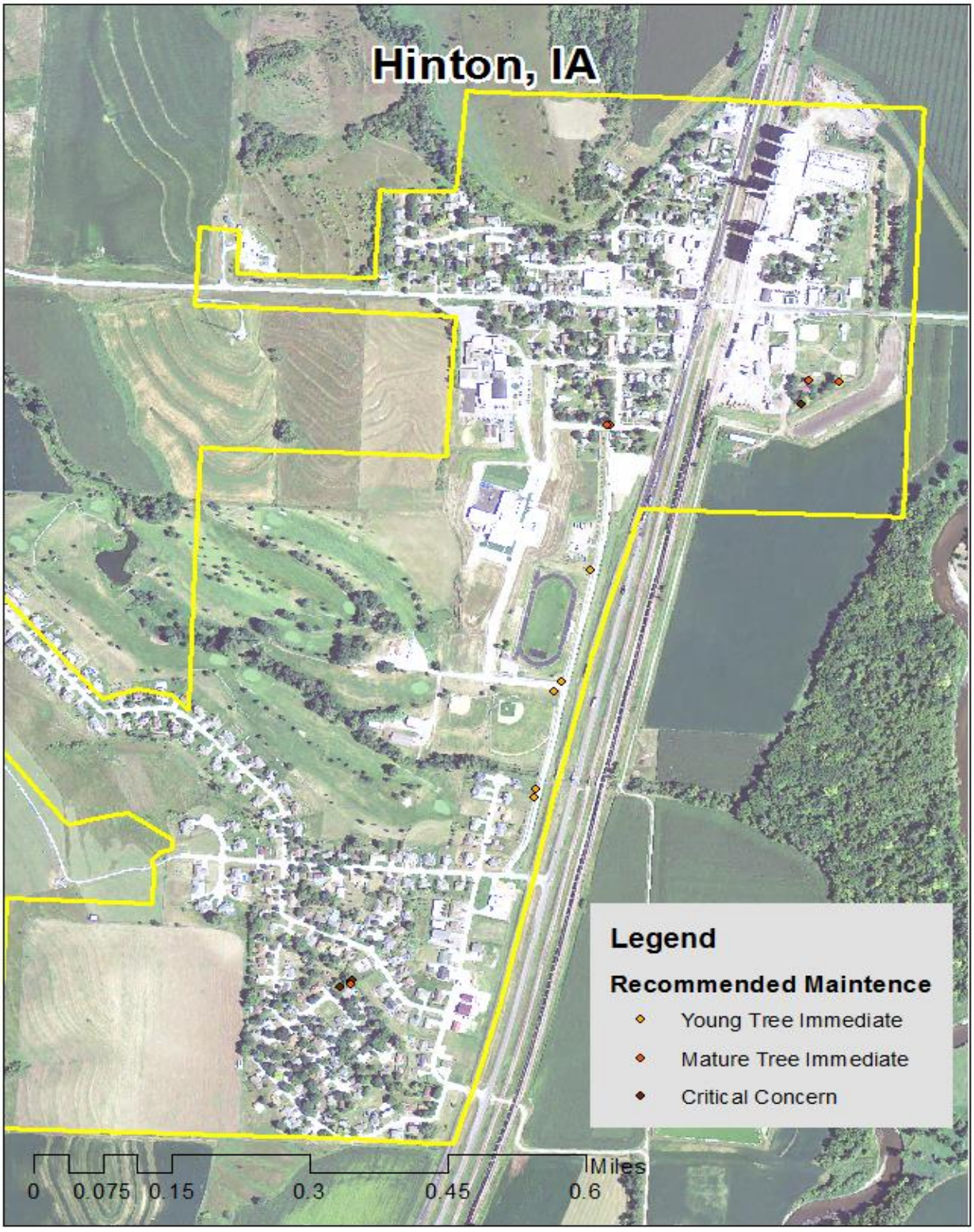
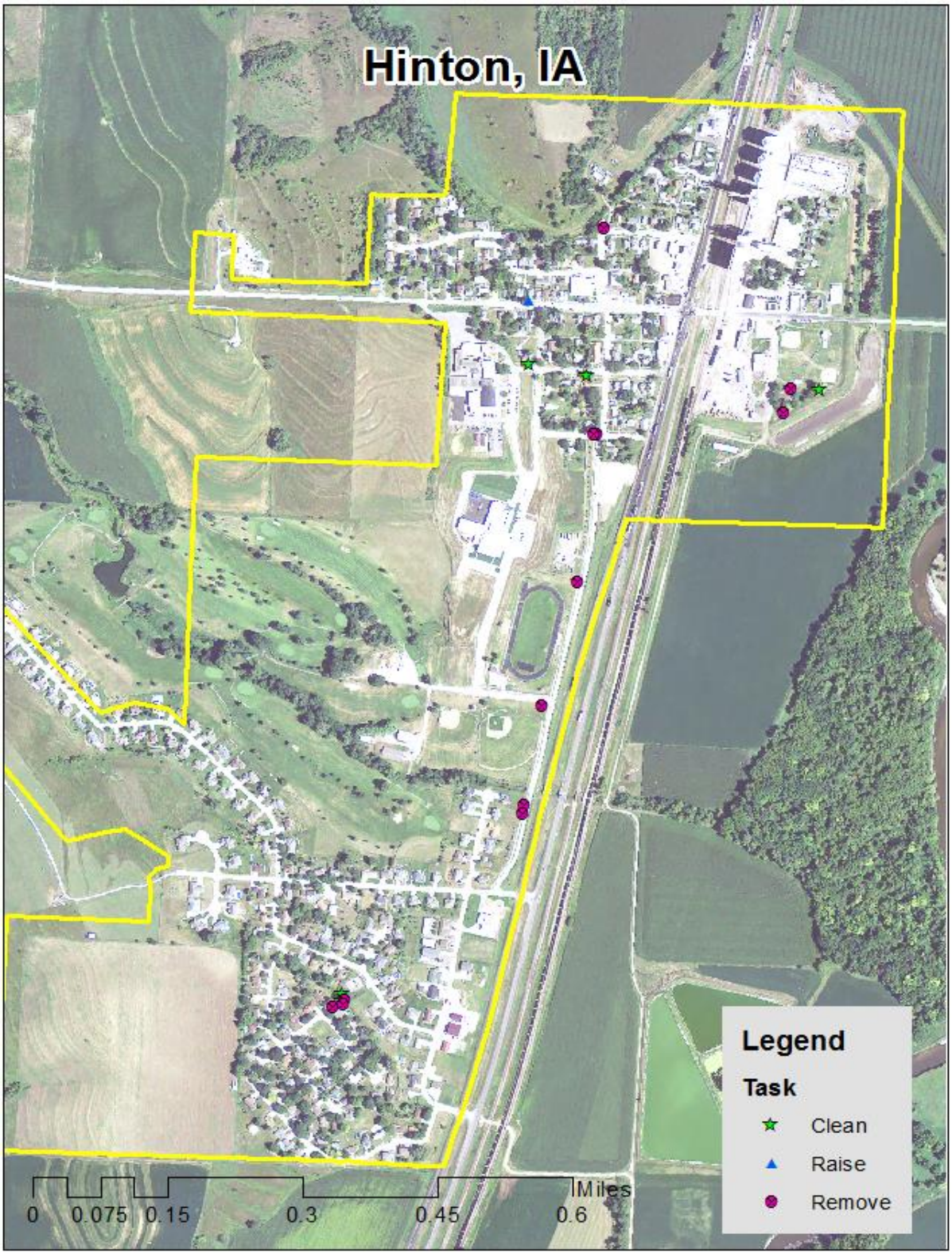


Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*.



Appendix C: Hinton Tree Ordinances

CHAPTER 151
TREES AND GRASS

151.01 DEFINITION. For use in this chapter, "boulevard" 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 boulevard or street except in accordance with the following:
1. Alignment. All tress planted in any street shall be planted in the boulevard 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 boulevard 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, box elder, Chinese elm, evergreen, willow or black walnut.

151.03 DUTY TO TRIM TREES. The owner or agent of the abutting property shall keep the trees on, or overhanging the street, trimmed so that all branches will be at least eighteen (18) feet above the surface of a street, twenty (20) feet above the surface of a primary highway, and eight (8) 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 (5) days. If such action is not taken within that time, the
City may perform the required action and assess the costs against the abutting property for collection in the same manner as a property tax.
(Code of Iowa, Sec. 364.12[2c, d, & e])

151.04 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 which may harbor serious insect or disease pests or disease injurious to other trees is hereby declared to be a nuisance.

151.06 INSPECTION AND REMOVAL. The Council shall inspect or cause to be inspected any trees or shrubs in the City reported or suspected to be infected with or damaged by any disease or insect or disease pests, and such trees and shrubs shall be subject to removal as follows:
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 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.
(Code of Iowa, Sec. 364.12[3b & h])

151.07 CUTTING OR MOWING OF GRASS.
1. Duty to Cut and Mow Lawns and Lots. The owner of any property shall cut and mow all lawns and lots so that such growth shall be less than four (4) inches at all times.
2. Cutting and Mowing by City. If a property owner refuses or fails to cut and mow lawns and lots within forty-eight (48) hours after being delivered a notice from the City to perform such action, the Council may require said work to be done and the cost and expenses thereof shall be assessed to the property owner after due notice is given. The amount of such assessment shall be certified to the County Auditor as provided by law and the same shall be collected with and in the same manner as general property taxes.

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 515-725-8282.