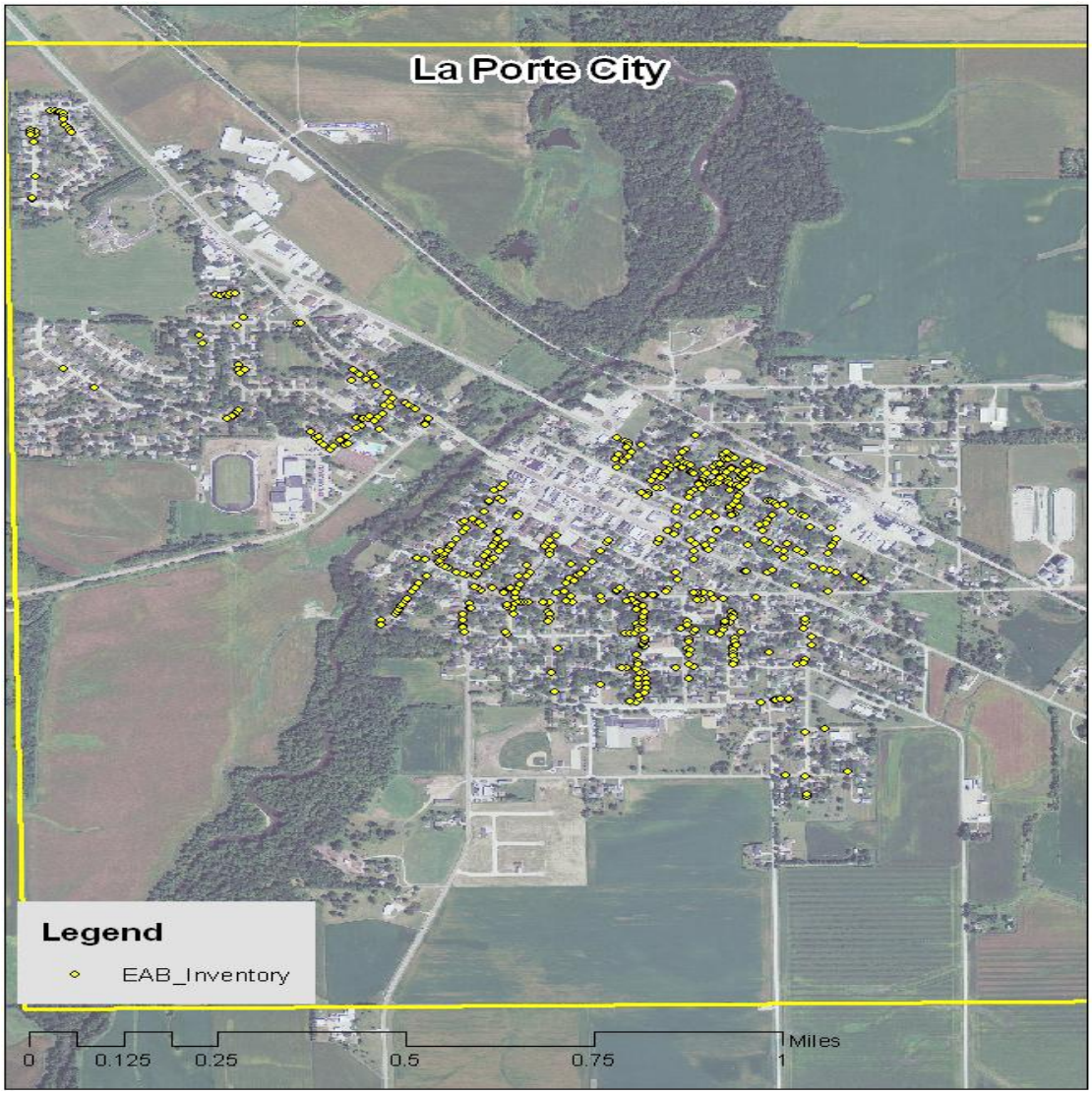
La Porte City, IA



2012 Management Plan
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Executive Summary

Overview

This plan was developed to assist the City of La Porte City 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 15% of La Porte City's city owned trees (ash) will die once EAB becomes established in the community. 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 2011, 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 525 trees inventoried.

- La Porte City's trees provide $93,117 of benefits annually, an average of $177 a tree
- There are over 39 species of trees
- The top three genus are: Maple 44%, Ash 15%, and Hackberry 9%
- 9% of trees are in need of some type of management
- 3 trees are recommended for removal

Recommendations

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

- Of the 3 trees needing removal, All 3 trees are over under 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*
- 4 of the 81 ash trees are in need of follow up because they are displaying signs and symptoms associated with EAB
- All trees should be pruned on a routine schedule- one third of the city every other year
- Plant a diverse mix of trees
- Check ash trees with a visual survey yearly
- With the current budget 9$2 per capita) it could take 20 years to remove ash – Suggestion: request a budget increase to $11,350 annually and apply for grants to plant replacement trees

Introduction

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

Trees are an important component of La Porte City'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 La Porte City 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 La Porte City's urban forestry goals.

Inventory

In 2011, a tree inventory was conducted that included 100% of the city owned streets 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, 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 525 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. La Porte City's trees reduce energy related costs by approximately $25,237 annually (Appendix A, Table 1). These savings are both in Electricity (120.8 MWh) and in Natural Gas (16,393.6 Therms).

Annual Stormwater Benefits

La Porte City's trees intercept about 1,232,764 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides $33,410 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 La Porte City, it is estimated that trees remove 1,494 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 $4,184 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In La Porte City, trees sequester about 451,401 lbs of carbon a year with an associated value of $3,386 (Appendix A, Table 4). In addition, the trees store 4,231,398 lbs of carbon, with a yearly benefit of $31,735 (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. La Porte City receives $26,900 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, La Porte City's trees provide $93,117 of benefits annually. Benefits of individual trees vary based on size, species, health and

location, but on average each of the 525 trees in La Porte City provide approximately $177 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

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

Maple	232	44%
Ash	81	15%
Hackberry	49	9%
Walnut	35	7%
Oak	28	5%
Spruce	21	4%
Apple (Crab)	14	3%
Locust	9	2%
Birch	9	2%
Sycamore	7	2%
Juniper	5	1%
Linden/Basswood	5	1%
Poplar	3	1%
Buckeye	2	<1%
Elm	2	<1%
Pine	2	<1%
Catalpa	1	<1%
Coffeetree	1	<1%
Dogwood	1	<1%
Ginkgo	1	<1%

Age Class

Most of La Porte City's trees (43%) are between 6 and 18 inches in diameter at 4.5 ft (Appendix A, Figure 2). For age, a Bell Curve is preferred and shows the highest amount of trees around 18 inches in diameter at 4.5 ft. La Porte City's size curve is on the smaller side, indicating a younger than average stand.

Condition: Wood and Foliage

Both wood condition and leaf condition are good indicators of the overall health of the urban forest. The foliage condition results for La Porte City indicate that 78% of the trees are in good health, with only 3% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Additionally, 38% of La Porte City's trees are in good health for wood

condition (appendix A, Figure 4 & Appendix B, Figure 3). Wood condition that is in poor health, dead or dying is about 6% of the population. This 6% 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	40	8%
Tree Removal	3	1%
Tree Staking	1	<1%
Crown Reduction	1	<1%

Canopy Cover

The canopy cover of La Porte City is approximately 13 acres (Appendix A, Figure 4). According to the 2010 census, La Porte City occupies 1632 acres. Thus the canopy cover on city land is about 1%.

Land Use and Location

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

Land Use	
Single family residential	93%
Park/vacant/other	6%
Multifamily residential	1%

Location	
Planting strip	74%
Front yard	19%
Other maintained locations	6%
Cutout (surrounded by pavement)	1%

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

La Porte City has 3 trees that need immediate removal. These trees can be seen on the Location of Trees with Recommended Maintenance map (Appendix B, Figure 4). It is recommended to start with the large diameter trees first. Please refer to the six year maintenance plan at the end of this section. After all of the critical concern trees are addressed, there should be follow up on the trees marked as needing maintenance that is a critical concern. There are a total of 6 trees marked as critical concern that need cleaning. Cleaning refers to removing any dead, diseased, damaged, poorly attached, or crossing branches.

Poor tree species

After the removal of the critical concern trees, ash trees in poor health should be assessed for removal (Appendix B, Figure 3 & Appendix B, Figure 4). There are a total of 81 ash trees, and 4 of those have signs and symptoms that have been associated with EAB. In addition, there are 12 trees that are in poor health. *City ownership of the trees recommended for removal should be verified prior to any removal*

Pruning Cycle

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

Planting

Most of the planting over the next 5 years will replace the trees that are removed. It is recommended to plant 1.2 trees for every tree removed, since survival rates will not be 100%. Please refer to the six year maintenance plan at the end of this section. It is not essential that the new trees be planted in the same location of the trees being removed. However, maintaining the same number of trees helps ensure continuation of the benefits of the existing forest in La Porte City. According to the city code 151.03 PLANTING It shall be unlawful for any person, firm or corporation to plant or cause to be planted any tree, shrub or other planting, excluding grasses and flowers within the public right-of-way of any public street.

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 (43%) (Appendix A, Figure 1). Maples should not be planted until this percentage can be lowered.

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.

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

Year 1

Removal: 3 immediate trees
Planting and Replacement: 4 trees to be planted in open locations (This would be other city property with current restriction in city code)
Visual Survey for signs and symptoms of EAB

Year 2

Removal: removal of any new critical concern trees or ash in poor health
Planting and Replacement: 4 trees in open locations (This would be other city property with current restriction in city code)
Routine trimming: Contract to trim 1/3 of the city trees (Could be the requirement of citizen)
Visual Survey for signs and symptoms of EAB

Year 3

Removal: Removal of any new critical concern trees
Planting and Replacement: 4 trees in open locations (This would be other city property with current restriction in city code)
Visual Survey for signs and symptoms of EAB

Year 4

Removal: removal of any new critical concern trees
Planting and Replacement: 4 trees in open locations (This would be other city property with current restriction in city code)
Routine trimming: Contract to trim 1/3 of the city trees Could be the requirement of citizen)
Visual Survey for signs and symptoms of EAB

Year 5

Removal: Removal of any new critical concern trees
Planting and Replacement: 4 trees in open locations (This would be other city property with current restriction in city code)
Visual Survey for signs and symptoms of EAB

Year 6

Removal: Removal of any new critical concern trees
Planting and Replacement: 4 trees in open locations (This would be other city property with current restriction in city code)

Routine trimming: Contract to trim 1/3 of the city trees Could be the requirement of citizen)
Visual Survey for signs and symptoms of EAB

* To remove all ash trees it will cost approximately $40,500. It is likely that when EAB arrives all untreated ash trees in the area will die for EAB within 3 to 6 years. With the suggested budget below ($2 per capita) an money set aside for EAB it will take about 20 years to address removals for EAB.

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*

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 ordinance 151.03 (Appendix C). The new plantings will be a diverse mix. Please see the DNR suggested planting list (Appendix D).

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. City Code 151.05 INSPECTION AND REMOVAL. The Council shall inspect or cause to be inspected any trees or shrubs in the City reported or suspected to be dead, diseased or damaged, and such trees and shrubs shall be subject to the following:
2. Private Property. If it is determined with reasonable certainty that any such condition exists on private property and that danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Council shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within 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 condition to be corrected and the cost assessed against the property. (Code ofIowa, Sec. 364.12[3b & h])
151.06 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.

Budget

Current Budget

Total $27,600 over 6 years ($4,600/year). This amount is based on the Tree City USA standards which are $2 per capita.

FY 2012 Budget

Removal: $1,500
Planting: $400 (This would be other city property with current restriction in city code)
Watering & Maintenance: $200
EAB fund: $2,500

FY 2013 Budget

Removal: $1,500
Planting: $400 (This would be other city property with current restriction in city code)
Routine trimming: $1,100 (Could be the requirement of citizen)
Watering & Maintenance: $200
EAB fund: $1,400

FY 2014 Budget

Removal: $1,500
Planting: $400 (This would be other city property with current restriction in city code)
Watering & Maintenance: $200
EAB fund: $2,500

FY 2015 Budget

Removal: $1,500
Planting: $400 (This would be other city property with current restriction in city code)
Routine trimming: $1,100 (Could be the requirement of citizen)
Watering & Maintenance: $200
EAB fund: $1,400

FY 2016 Budget

Removal: $1,500
Planting: $400 (This would be other city property with current restriction in city code)
Watering & Maintenance: $200
EAB fund: $2,500

FY 2017 Budget

Removal: $1,500
Planting: $400 (This would be other city property with current restriction in city code)
Routine trimming: $1,100 (Could be the requirement of citizen)
Watering & Maintenance: $200
EAB fund: $1,400

* To remove all ash trees it will cost approximately $40,500. It is likely that when EAB arrives all untreated ash trees in the area will die for EAB within 3 to 6 years. With the suggested budget below ($2 per capita) an money set aside for EAB i**t will take about 20 years to address removals for EAB with the current budget.**

Purposed Budget Increase

EAB could potentially kill all ash trees in La Porte City within 3 to 6 years of its arrival. To remove all ash trees within 6 years the budget would need to be increased to $11,350 a year. Additionally, it is recommended that La Porte City 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

Annual Energy Benefits of Public Trees by Species

10/28/2011

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standar d Error	% of Total Trees	% of Total $	Avg. $/tree
Sugar maple	22.9	1,739	3,054.5	2,993	4,732	(N/A)	15.4	18.8	58.42
Green ash	17.7	1,340	2,344.4	2,297	3,638	(N/A)	14.7	14.4	47.24
Norway maple	14.9	1,134	2,126.8	2,084	3,219	(N/A)	14.1	12.8	43.50
Silver maple	16.1	1,226	2,117.9	2,076	3,301	(N/A)	11.1	13.1	56.91
Northern hackberry	14.4	1,091	2,022.6	1,982	3,073	(N/A)	9.3	12.2	62.71
Black walnut	8.7	658	1,185.1	1,161	1,820	(N/A)	6.7	7.2	52.00
Pin oak	5.0	380	673.4	660	1,040	(N/A)	3.4	4.1	57.76
Apple	0.9	65	131.3	129	194	(N/A)	2.7	0.8	13.84
Callery pear	2.0	153	273.6	268	421	(N/A)	2.5	1.7	32.38
Spruce	1.4	103	175.5	172	275	(N/A)	1.9	1.1	27.48
Blue spruce	0.7	55	99.3	97	153	(N/A)	1.9	0.6	15.25
Honeylocust	2.6	197	334.6	328	525	(N/A)	1.7	2.1	58.34
Red maple	0.9	66	127.7	125	191	(N/A)	1.3	0.8	27.35
American sycamore	3.0	227	402.5	394	622	(N/A)	1.3	2.5	88.84
Bur oak	1.5	116	208.7	204	320	(N/A)	1.1	1.3	53.41
Other street trees	8.1	618	1,118.9	1,097	1,714	(N/A)	10.9	6.8	30.07
Citywide total	120.8	9,168	16,396.6	16,069	25,237	(N/A)	100.0	100.0	48.07

Table 2: Annual Stormwater Benefits

Annual Stormwater Benefits of Public Trees by Species

10/28/2011

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Sugar maple	263,119	7,131	(N/A)	15.4	21.3	88.04
Green ash	164,699	4,464	(N/A)	14.7	13.4	57.97
Norway maple	121,249	3,286	(N/A)	14.1	9.8	44.41
Silver maple	196,973	5,338	(N/A)	11.1	16.0	92.04
Northern hackberry	119,435	3,237	(N/A)	9.3	9.7	66.06
Black walnut	88,983	2,412	(N/A)	6.7	7.2	68.90
Pin oak	52,270	1,417	(N/A)	3.4	4.2	78.70
Apple	3,470	94	(N/A)	2.7	0.3	6.72
Callery pear	11,709	317	(N/A)	2.5	1.0	24.41
Spruce	26,810	727	(N/A)	1.9	2.2	72.66
Blue spruce	9,325	253	(N/A)	1.9	0.8	25.27
Honeylocust	24,714	670	(N/A)	1.7	2.0	74.42
Red maple	6,130	166	(N/A)	1.3	0.5	23.73
American sycamore	43,877	1,189	(N/A)	1.3	3.6	169.88
Bur oak	17,604	477	(N/A)	1.1	1.4	79.52
Other street trees	82,397	2,233	(N/A)	10.9	6.7	39.18
Citywide total	1,232,764	33,410	(N/A)	100.0	100.0	63.64

Table 3: Annual Air Quality Benefits

Annual Air Quality Benefits of Public Trees by Species

10/28/2011

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
Sugar maple	35.5	6.0	17.5	1.6	192	108.5	15.9	15.1	103.8	678	-27.7	-104	276.2	766	(N/A)	15.4	9.45
Green ash	17.7	2.8	8.9	0.8	95	83.7	12.2	11.7	80.0	523	0.0	0	217.8	618	(N/A)	14.7	8.03
Norway maple	22.6	3.9	11.4	1.0	123	72.2	10.5	10.0	67.8	448	-5.5	-21	193.9	550	(N/A)	14.1	7.44
Silver maple	29.9	5.1	15.2	1.3	163	76.1	11.1	10.6	73.1	476	-16.7	-63	205.8	576	(N/A)	11.0	9.94
Northern hackberry	16.7	2.9	8.9	0.7	92	69.2	10.0	9.6	65.2	430	0.0	0	183.2	522	(N/A)	9.3	10.65
Black walnut	10.2	1.6	5.0	0.5	55	41.4	6.0	5.7	39.3	258	0.0	0	109.8	313	(N/A)	6.7	8.93
Pin oak	8.9	1.6	4.6	0.4	49	23.8	3.5	3.3	22.7	148	-16.6	-62	52.0	135	(N/A)	3.4	7.48
Apple	1.0	0.2	0.5	0.0	5	4.2	0.6	0.6	3.9	26	0.0	0	10.9	31	(N/A)	2.7	2.22
Callery pear	1.6	0.3	0.9	0.1	9	9.6	1.4	1.3	9.1	60	-0.4	-2	23.9	67	(N/A)	2.5	5.17
Spruce	3.2	0.6	2.6	0.4	21	6.4	0.9	0.9	6.1	40	-14.7	-55	6.4	6	(N/A)	1.9	0.56
Blue spruce	1.1	0.2	1.0	0.1	8	3.5	0.5	0.5	3.3	22	-3.3	-12	6.9	17	(N/A)	1.9	1.69
Honeylocust	4.7	0.8	2.2	0.2	25	12.2	1.8	1.7	11.8	76	-3.5	-13	31.8	88	(N/A)	1.7	9.79
Red maple	1.1	0.2	0.6	0.1	6	4.2	0.6	0.6	4.0	26	-0.4	-2	10.9	31	(N/A)	1.3	4.41
American sycamore	8.0	1.3	3.5	0.4	42	14.2	2.1	2.0	13.6	89	0.0	0	45.0	131	(N/A)	1.3	18.65
Bur oak	2.2	0.4	1.1	0.1	12	7.3	1.1	1.0	6.9	45	0.0	0	20.0	57	(N/A)	1.1	9.55
Other street trees	14.1	2.4	7.5	0.8	78	38.9	5.7	5.4	36.9	242	-11.7	-44	99.9	276	(N/A)	10.9	4.85
Citywide total	178.4	30.2	91.3	8.4	974	575.4	83.9	80.0	547.4	3,588	-100.6	-377	1,494.5	4,184	(N/A)	100.0	7.97

Table 4: Annual Carbon Stored

Stored CO2 Benefits of Public Trees by Species

10/28/2011

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Sugar maple	1,019,392	7,645	(N/A)	15.4	24.1	94.39
Green ash	576,331	4,322	(N/A)	14.7	13.6	56.14
Norway maple	374,421	2,808	(N/A)	14.1	8.9	37.95
Silver maple	672,051	5,040	(N/A)	11.1	15.9	86.90
Northern	242,557	1,819	(N/A)	9.3	5.7	37.13
Black walnut	329,506	2,471	(N/A)	6.7	7.8	70.61
Pin oak	230,532	1,729	(N/A)	3.4	5.5	96.05
Apple	15,741	118	(N/A)	2.7	0.4	8.43
Callery pear	27,685	208	(N/A)	2.5	0.7	15.97
Spruce	37,110	278	(N/A)	1.9	0.9	27.83
Blue spruce	6,875	52	(N/A)	1.9	0.2	5.16
Honeylocust	59,509	446	(N/A)	1.7	1.4	49.59
Red maple	13,667	103	(N/A)	1.3	0.3	14.64
American	274,864	2,061	(N/A)	1.3	6.5	294.50
Bur oak	73,400	551	(N/A)	1.1	1.7	91.75
Other street trees	125,989	2,083	(N/A)	10.9	6.6	36.55
Citywide total	4,231,398	31,735	(N/A)	100.0	100.0	60.45

Table 5: Annual Carbon Sequestered

Annual CO_2 Benefits of Public Trees by Species

10/28/2011

Species	Sequestered (lb)	Sequestered ($)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released ($)	Avoided (lb)	Avoided ($)	Net Total (lb)	Total ($)	Standar d Error	% of Total Trees	% of Total $	Avg. $/tree
Sugar maple	52,214	392	-4,893	-16	-37	38,427	288	85,732	643	(N/A)	15.4	19.0	7.94
Green ash	40,376	303	-2,766	-15	-21	29,621	222	67,216	504	(N/A)	14.7	14.9	6.55
Norway maple	24,336	183	-1,797	-14	-14	25,071	188	47,596	357	(N/A)	14.1	10.5	4.82
Silver maple	57,675	433	-3,226	-11	-24	27,083	203	81,521	611	(N/A)	11.1	18.1	10.54
Northern hackberry	16,075	121	-1,164	-10	-9	24,102	181	39,003	293	(N/A)	9.3	8.6	5.97
Black walnut	20,749	156	-1,582	-7	-12	14,552	109	33,712	253	(N/A)	6.7	7.5	7.22
Pin oak	21,776	163	-1,107	-4	-8	8,393	63	29,059	218	(N/A)	3.4	6.4	12.11
Apple	1,495	11	-76	-3	-1	1,440	11	2,857	21	(N/A)	2.7	0.6	1.53
Callery pear	3,627	27	-133	-3	-1	3,378	25	6,870	52	(N/A)	2.5	1.5	3.96
Spruce	1,117	8	-178	-2	-1	2,272	17	3,209	24	(N/A)	1.9	0.7	2.41
Blue spruce	540	4	-33	-2	0	1,221	9	1,726	13	(N/A)	1.9	0.4	1.29
Honeylocust	6,312	47	-286	-2	-2	4,357	33	10,381	78	(N/A)	1.7	2.3	8.65
Red maple	1,788	13	-66	-1	-1	1,465	11	3,187	24	(N/A)	1.3	0.7	3.41
American sycamore	5,125	38	-1,319	-1	-10	5,025	38	8,830	66	(N/A)	1.3	2.0	9.46
Bur oak	3,639	27	-352	-1	-3	2,563	19	5,848	44	(N/A)	1.1	1.3	7.31
Other street trees	12,352	93	-1,333	-11	-10	13,649	102	24,657	185	(N/A)	10.9	5.5	3.24
Citywide total	269,195	2,019	-20,311	-102	-153	202,620	1,520	451,401	3,386	(N/A)	100.0	100.0	6.45

Table 6: Annual Social and Aesthetic Benefits

Annual Aesthetic/Other Benefits of Public Trees by Species

10/28/2011

Species	Total ($)	Standar d Error	% of Total Trees	% of Total $	Avg. $/tree
Sugar maple	5,358	(N/A)	15.4	19.9	66.14
Green ash	3,683	(N/A)	14.7	13.7	47.83
Norway maple	2,425	(N/A)	14.1	9.0	32.77
Silver maple	4,884	(N/A)	11.1	18.2	84.21
Northern hackberry	2,398	(N/A)	9.3	8.9	48.94
Black walnut	1,789	(N/A)	6.7	6.7	51.12
Pin oak	1,713	(N/A)	3.4	6.4	95.17
Apple	85	(N/A)	2.7	0.3	6.07
Callery pear	392	(N/A)	2.5	1.5	30.14
Spruce	219	(N/A)	1.9	0.8	21.88
Blue spruce	174	(N/A)	1.9	0.7	17.40
Honeylocust	1,483	(N/A)	1.7	5.5	164.75
Red maple	266	(N/A)	1.3	1.0	37.93
American sycamore	343	(N/A)	1.3	1.3	48.98
Bur oak	302	(N/A)	1.1	1.1	50.29
Other street trees	1,388	(N/A)	10.9	5.2	24.34
Citywide total	26,900	(N/A)	100.0	100.0	51.24

Table 7: Summary of Benefits in Dollars

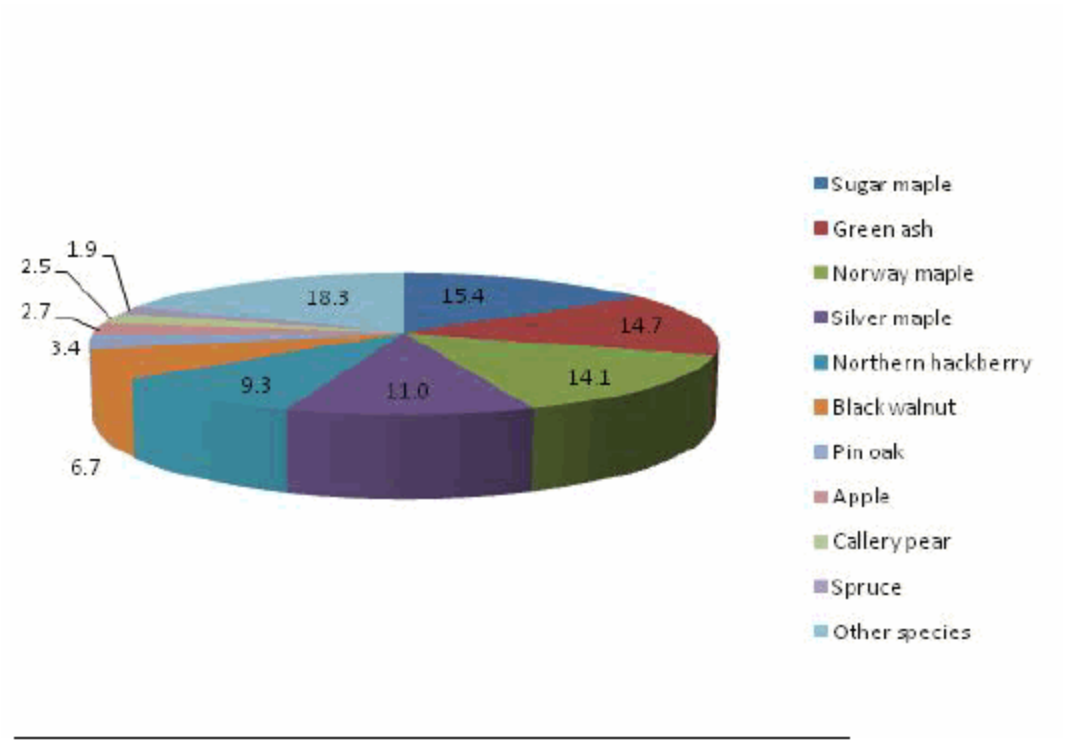
Total Annual Benefits of Public Trees by Species ($)

10/28/20

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Sugar maple	4,732	643	766	7,131	5,358	18,630	(±0)	20.0
Green ash	3,638	504	618	4,464	3,683	12,907	(±0)	13.9
Norway maple	3,219	357	550	3,286	2,425	9,837	(±0)	10.6
Silver maple	3,301	611	576	5,338	4,884	14,711	(±0)	15.8
Northern hackberry	3,073	293	522	3,237	2,398	9,522	(±0)	10.2
Black walnut	1,820	253	313	2,412	1,789	6,586	(±0)	7.1
Pin oak	1,040	218	135	1,417	1,713	4,522	(±0)	4.9
Apple	194	21	31	94	85	425	(±0)	0.5
Callery pear	421	52	67	317	392	1,249	(±0)	1.3
Spruce	275	24	6	727	219	1,250	(±0)	1.3
Blue spruce	153	13	17	253	174	609	(±0)	0.7
Honeylocust	525	78	88	670	1,483	2,844	(±0)	3.1
Red maple	191	24	31	166	266	678	(±0)	0.7
American sycamore	622	66	131	1,189	343	2,351	(±0)	2.5
Bur oak	320	44	57	477	302	1,200	(±0)	1.3
Other street trees	1,714	185	276	2,233	1,388	5,796	(±0)	6.2
Citywide Total	25,237	3,386	4,184	33,410	26,900	93,117	(±0)	100.0

Species Distribution of Public Trees (%)

10/28/2011

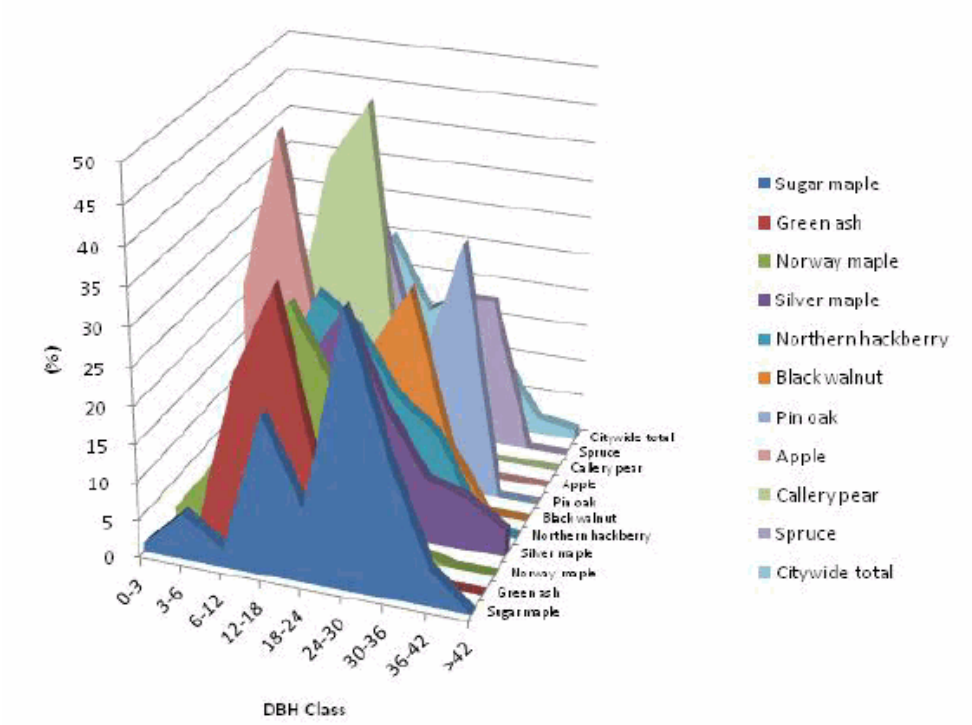


Species	Percent
Sugar maple	15.4
Green ash	14.7
Norway maple	14.1
Silver maple	11.0
Northern hackberry	9.3
Black walnut	6.7
Pin oak	3.4
Apple	2.7
Callery pear	2.5
Spruce	1.9
Other species	18.3
Total	100.0

Figure 1: Species Distribution

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

10/28/2011



	DBH class (in)								
Species	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42
Sugar maple	1.2	6.2	2.5	21.0	9.9	35.8	18.5	4.9	0.0
Green ash	0.0	2.6	23.4	35.1	11.7	20.8	6.5	0.0	0.0
Norway maple	1.4	8.1	24.3	31.1	21.6	12.2	1.4	0.0	0.0
Silver maple	0.0	1.7	12.1	20.7	29.3	17.2	8.6	6.9	3.4
Northern hackberry	0.0	0.0	16.3	28.6	24.5	16.3	12.2	2.0	0.0
Black walnut	2.9	2.9	14.3	22.9	20.0	28.6	8.6	0.0	0.0
Pin oak	0.0	5.6	16.7	11.1	16.7	16.7	33.3	0.0	0.0
Apple	21.4	42.9	14.3	14.3	7.1	0.0	0.0	0.0	0.0
Callery pear	0.0	15.4	38.5	46.2	0.0	0.0	0.0	0.0	0.0
Spruce	0.0	10.0	10.0	30.0	10.0	20.0	20.0	0.0	0.0
Citywide total	2.5	7.8	17.7	25.0	15.2	18.5	9.9	2.1	1.3

Figure 2: Relative Age Class

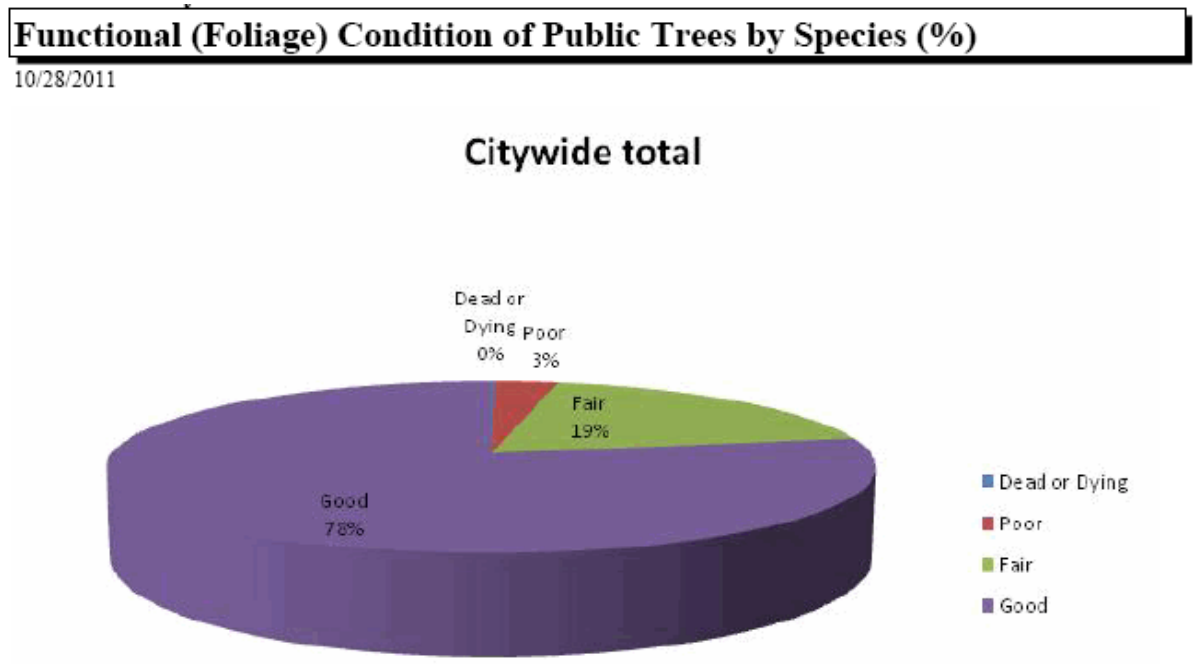


Figure 3: Foliage Condition

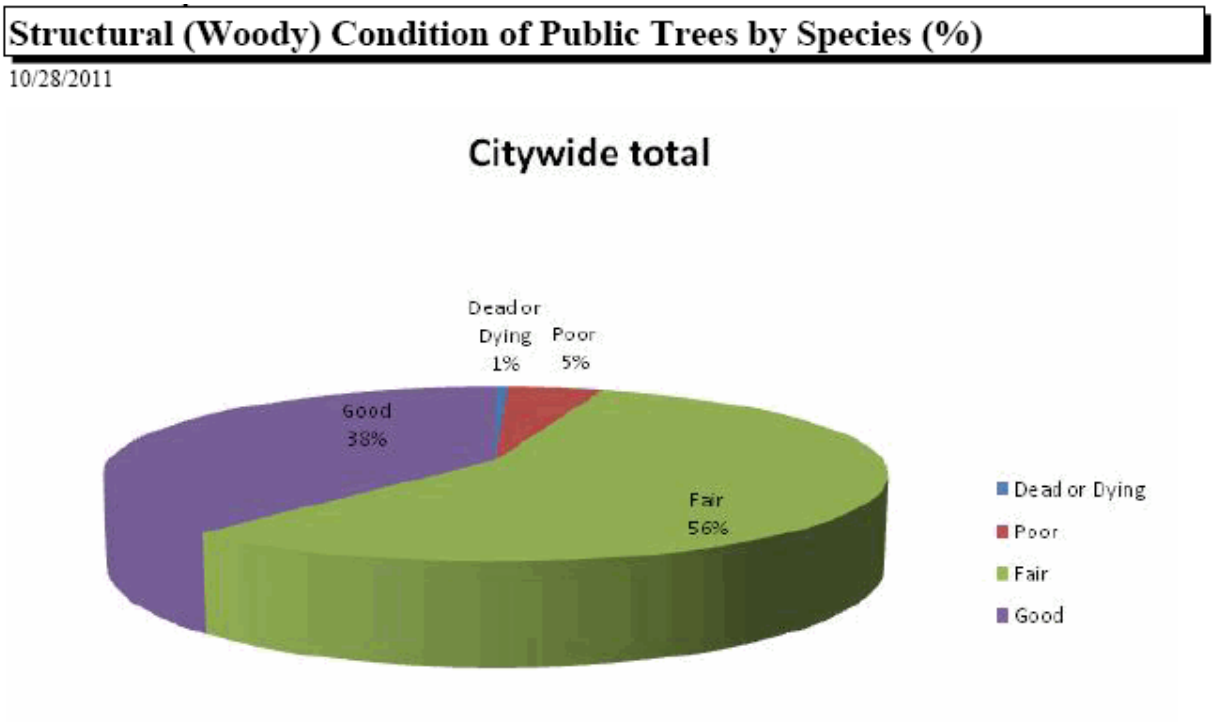
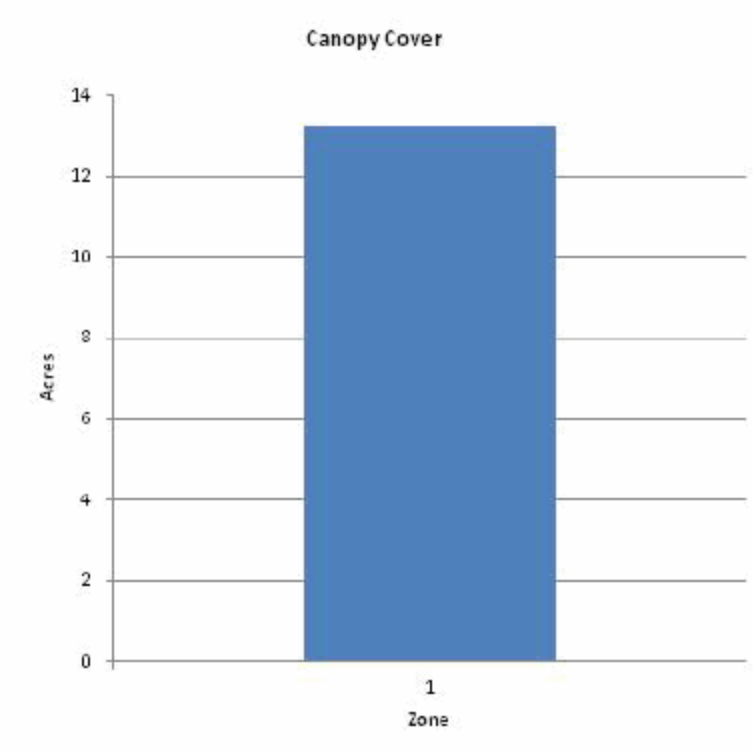


Figure 4: Wood Condition

Canopy Cover of Public Trees (Acres)

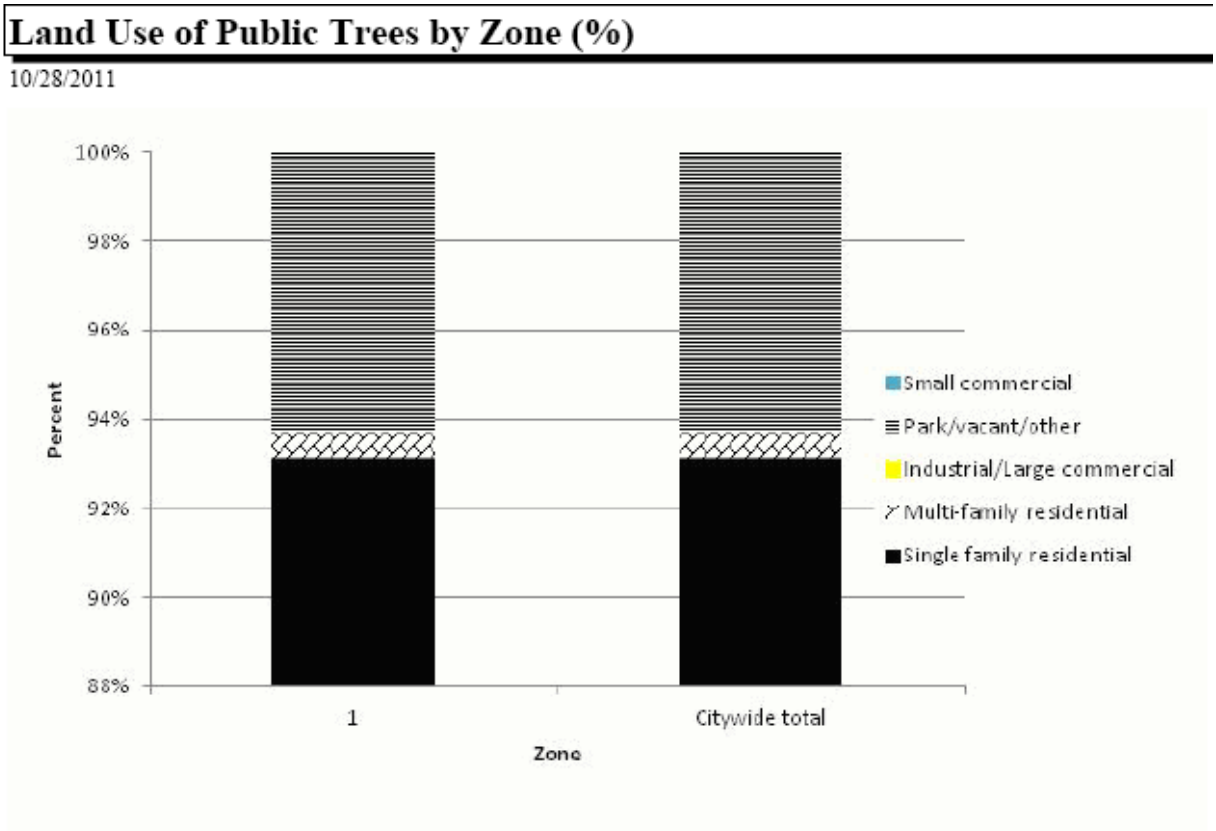
10/28/2011



Zone	Acres	% of Total Canopy Cover
1	13	100.0
Citywide total	13	100.0

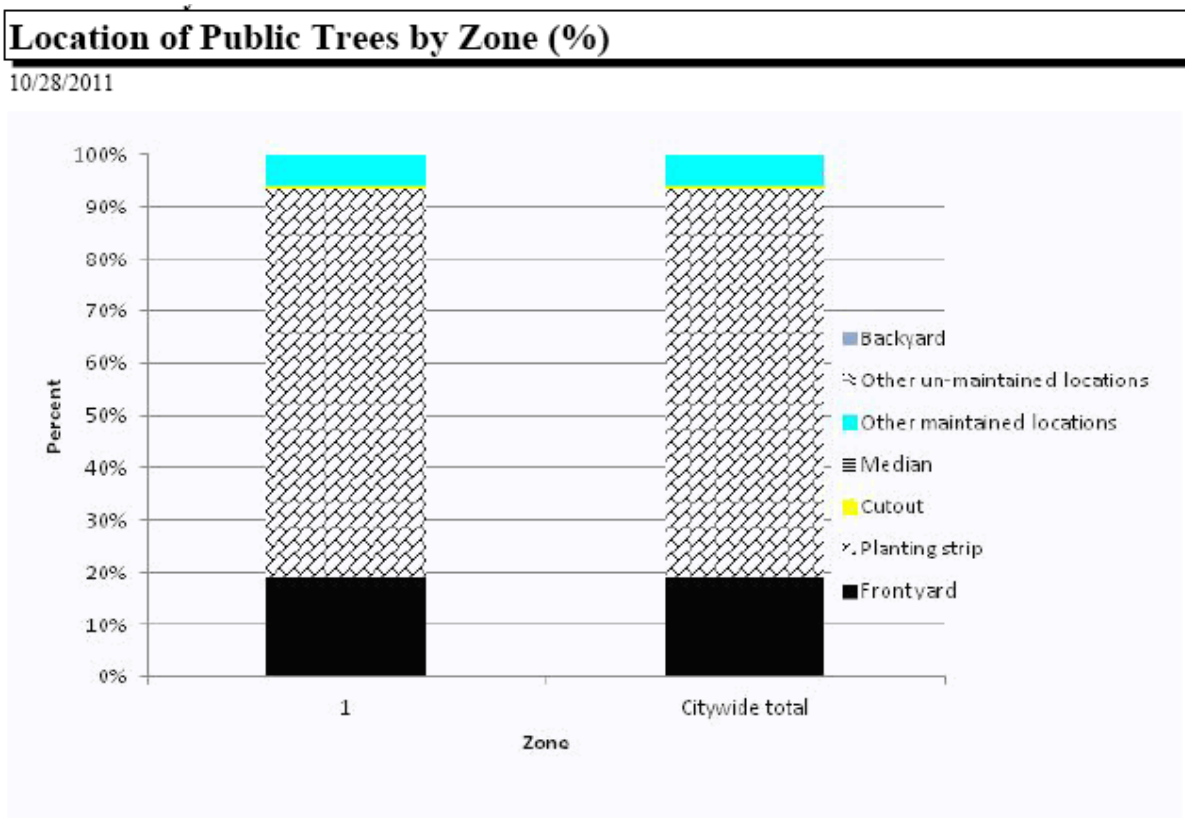
	Total Land Area	Total Street and Sidewalk Area	Total Canopy Cover	Canopy Cover as % of Total Land Area	Canopy Cover as % of Total Streets and Sidewalks
Citywide	0	0	13		

Figure 5: Canopy Cover in Acres



Zone	Single family residential	Multi-family residential	Industrial/ Large commercial	Park/vacant/ other	Small commercial
1	93.1	0.6	0.0	6.3	0.0
Citywide total	93.1	0.6	0.0	6.3	0.0

Figure 6: Land Use of city/park trees



Zone	Front yard	Planting strip	Cutout	Median	Other maintained locations	Other un-maintained locations	Backyard
1	19.0	74.3	0.6	0.0	6.1	0.0	0.0
Citywide total	19.0	74.3	0.6	0.0	6.1	0.0	0.0

Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping

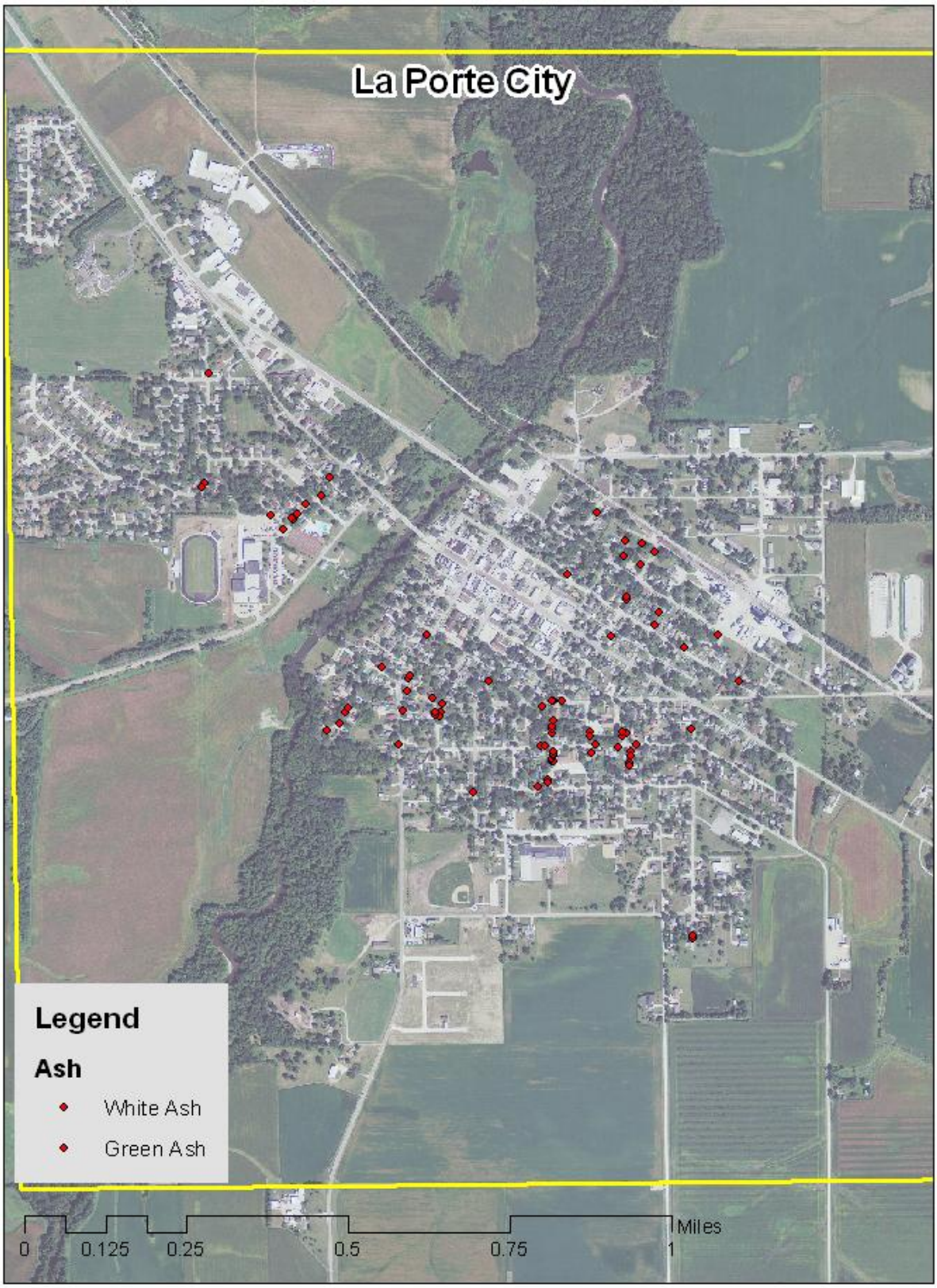


Figure 1: Location of Ash Trees

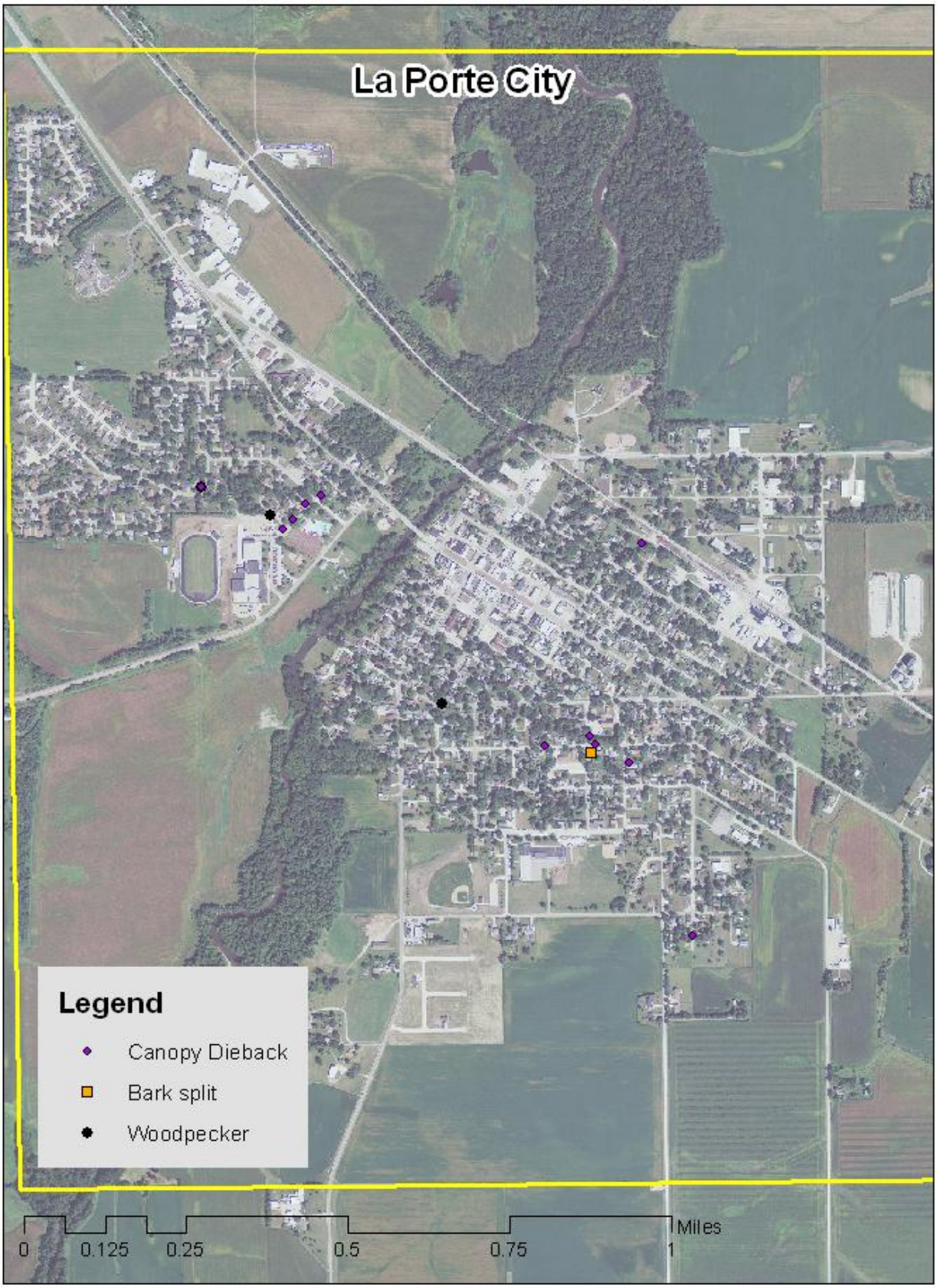


Figure 2: Location of EAB symptoms

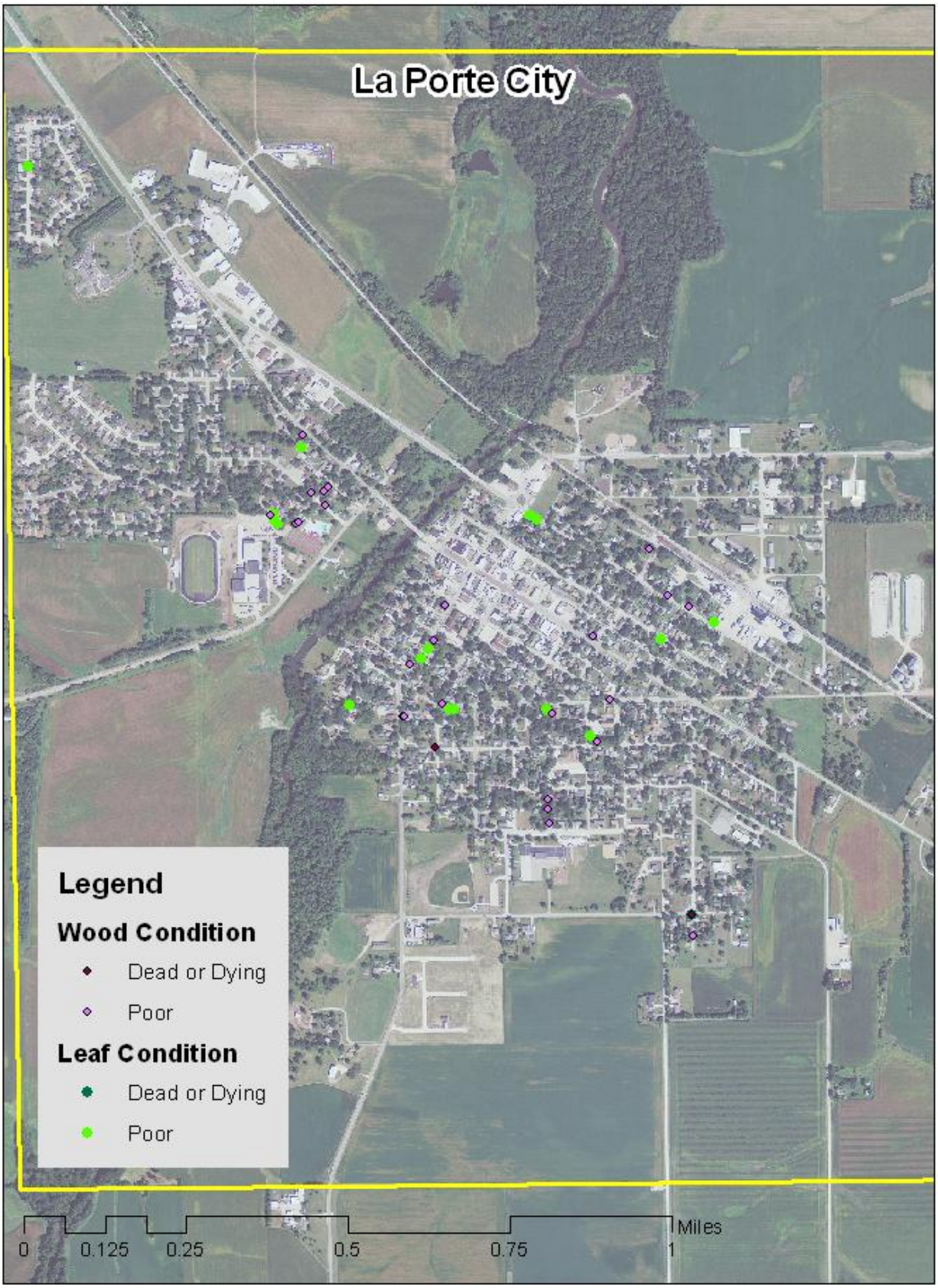


Figure 3: Location of Poor Condition Trees

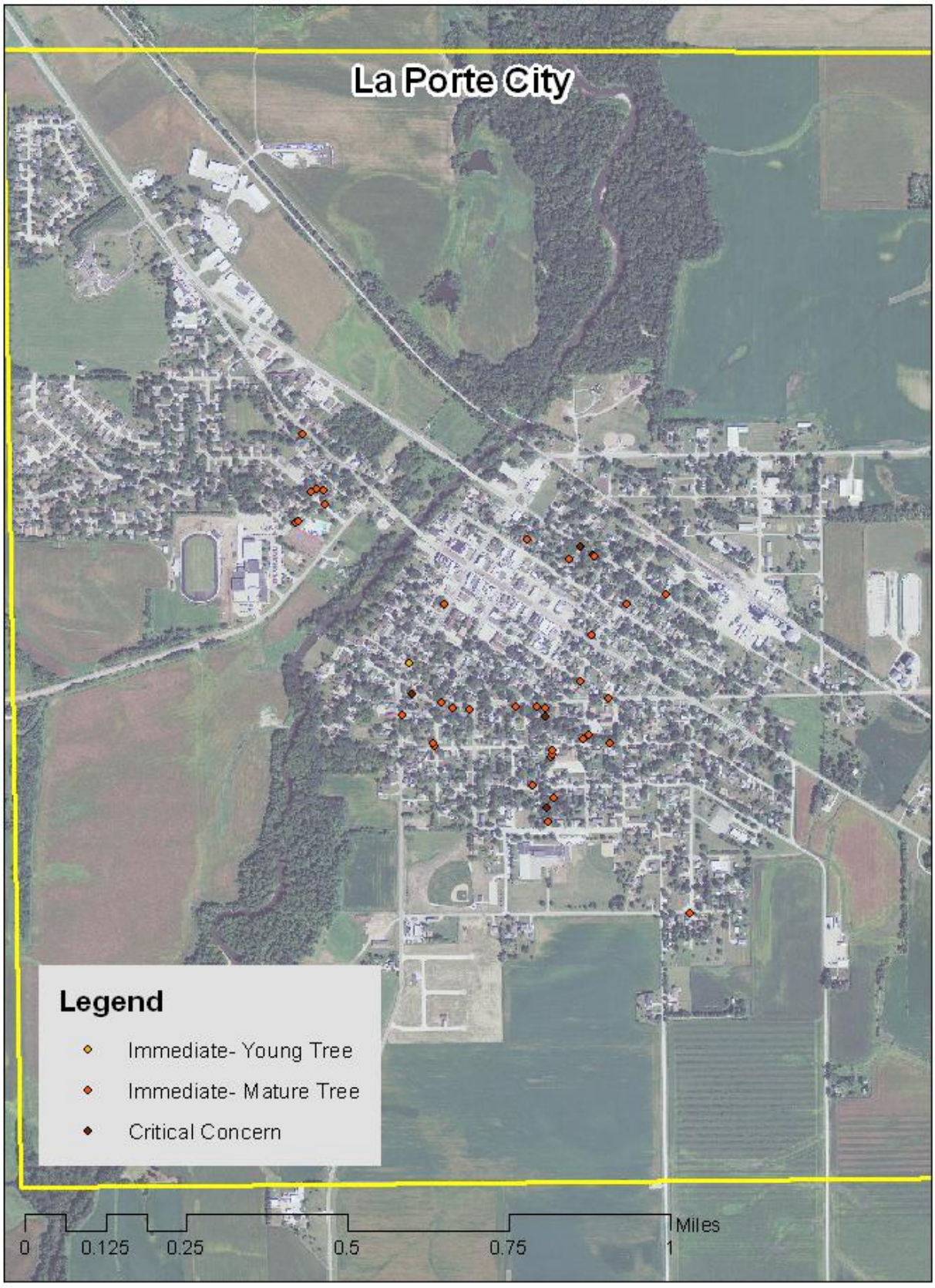


Figure 4: Location of Trees with Recommended Maintenance

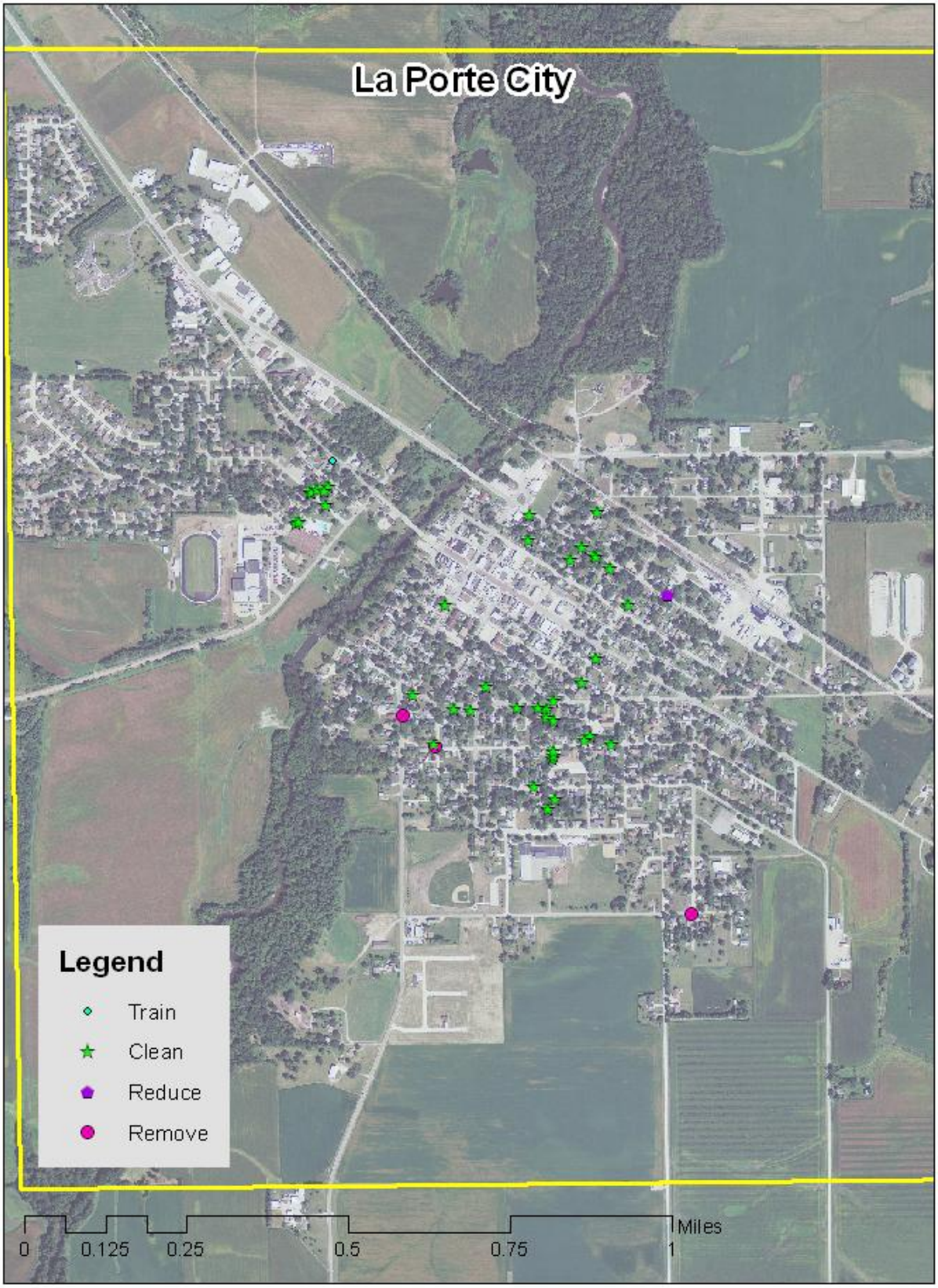


Figure 5: Maintenance Tasks ***City ownership of the trees recommended for removal should be verified prior to any removal***

Appendix C: La Porte City Tree Ordinances

CHAPTER 151 TREES

151.01 PURPOSE. The purpose of this chapter is to beautify and preserve the appearance of the City by requiring street trees to be maintained. The primary responsibility for maintaining street trees is placed upon the abutting property owner or said owner's agent, but the Public Works Director shall personally supervise any cutting or trimming of said trees. If the abutting property owner does not maintain or remove trees within a reasonable time after receiving notice from the City to do so, the City may perform maintenance on or removal of the tree(s) and assess the cost against the abutting property for collection in the same manner as a property tax.

151.02 DEFINITIONS. For use in this chapter, 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. "Property owner" means a person owning private property in the City as shown on theCountyAuditor's plats of the City.

3. "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.

151.03 PLANTING. It shall be unlawful for any person, firm or corporation to plant or cause to be planted any tree, shrub or other planting, excluding grasses and flowers within the public right-of-way of any public street.

1. In instances where no sidewalk and/or curb exist to define the public right-of-way, the Public Works Director and the La Porte City Utilities shall estimate the line(s) where such curb and/or sidewalk would lie if such curb and/or sidewalk were to be constructed.

2. It shall be the duty of the abutting property owner to trim or maintain any existing trees, shrubbery, grass or other plant growth and to destroy weeds within the public right-of-way of any public street.

(Ord. 439 – Jan. 10 Supp.)

151.04 TRIMMING OR PRUNING. Trimming or pruning of trees currently located in the parking shall be done in accordance with the following:

1. Cuts. All cuts are to be made sufficiently close to the parent stem so that healing can readily start under normal conditions.

2. Dead Wood Removed. All dead and diseased wood shall be removed.

3. Large Limbs and Branches. All limbs one inch in diameter or more must be pre-cut to prevent splitting. All branches in danger of injuring the tree in falling shall be lowered by ropes.

4. Crossed or Rubbing Branches. A crossed or rubbing branch shall be removed where practicable, but removal shall not leave large holes in the general outline of the tree. Crossed or rubbing branches may be cabled apart.

5. Cuts Dressed. All cuts, old or new, one inch in diameter or more, shall be painted with an approved tree wound dressing. On old wounds care shall be taken to paint exposed wood only.

6. Tools Disinfected. Where there is a known danger of transmitting disease by tools, said tools shall be disinfected with alcohol before being used on another tree.

7. Scars Treated. Improperly healed scars, where callous growth is not established, are to be traced and painted, unless the Public Works Superintendent designates other treatment.

8. Topping or Dehorning. No topping or dehorning of trees shall be permitted except by special written permission of the Public Works Superintendent. Trees becoming stag-headed may have the dead portions removed back to sound green wood, with a proper forty-five (45) degree cut only.

9. Elm Wood. Elm wood trimmed, pruned or removed shall not be used for any purpose, but shall be disposed of immediately by burning or burying.

151.05 INSPECTION AND REMOVAL. The Council shall inspect or cause to be inspected any trees or shrubs in the City reported or suspected to be dead, diseased or damaged, and such trees and shrubs shall be subject to the following:

1. City Property. If it is determined that any such condition exists on any public property, including the strip between the curb and the lot line of private property, the Council may cause such condition to be corrected by treatment or removal. The Council may also order the removal of any trees on the streets of the City which interfere with the making of improvements or with travel thereon.

2. Private Property. If it is determined with reasonable certainty that any such condition exists on private property and that danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Council shall notify by certified mail the owner,

occupant or person in charge of such property to correct such condition by treatment or removal within 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 condition to be corrected and the cost assessed against the property.

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

151.06 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.

151.07 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 thirteen (13) feet above the surface of the street and nine (9) feet above the sidewalks.

(Code ofIowa, Sec. 364.12[2c])

151.08 TRIMMING OF TREES UNDER SUPERVISION OF PUBLIC WORKS DIRECTOR. Except as allowed in Section 151.07, no person may trim or cut any tree in a street or public place unless the work is done under the personal supervision of the Public Works Director.

Appendix C: Suggested Planting List

La Porte City - ACCEPTABLE TREE LIST			
	Common Name	**Scientific Name**	**Cultivars/ Selections**
SHADE TREES	River Birch	*Betula nigra*	Heritage
	White-barked Birch	*Betula populifolia*	Whitespire Sr.
	American Elm	*Ulmus Americana*	Jefferson, Prairie Expedition (Lewis and Clark), Princeton
	Hackberry	*Celtis occidentalis*	Chicagoland, Prairie Pride, Windy City
	Yellowwood	*Cladrastis kentuckea*	
	Ginkgo (male only)	*Ginkgo biloba*	Autumn Gold, Golden Colonnade, Halka, Magyar, Presidential Gold, Princeton Sentry
	Thornless Honeylocust	*Gleditisia triacanthos*	Northern Acclaim, Skyline, Shademaster
	Kentucky Coffeetree	*Gymnocladus dioicus*	
	Larch	*Larix decidua*	
	Tuliptree	*Liriodendron tulipifera*	
	American Hophornbeam	*Ostrya virginiana*	
	London Planetree	*Platanus x acerfolia*	Bloodgood, Exclamation
	White Oak	*Quercus alba*	
	Swamp White Oak	*Quercus bicolor*	
	Shingle Oak	*Quercus imbricaria*	
	Bur Oak	*Quercus macrocarpa*	
	Chinkapin Oak	*Quercus muehlenbergii*	
	Pin Oak	*Quercus Palustris*	
	Northern Red Oak	*Quercus rubra*	
	Bald Cypress	*Taxodium distichum*	
	American Linden	*Tilia americana*	Boulevard, Front Yard, Legend, American Sentry
	Silver Linden	*Tilia tomemtosa*	
	Littleleaf Linden	*Tilia Cordata*	Glenleven
	Serviceberry	*Amelanchier spp.*	Autumn Brilliance, Cole's Select, Cumulus, Princess Diana, Strata
	American Hornbeam	*Carpinus caroliniana*	

	Eastern Redbud	*Cercis canadensis*	
LOW-GROWING TREES	Pagoda Dogwood	*Cornus alternifolia*	
	Flowering Crabapple	*Malus spp.*	Adirondack, Cardinal, David, Donald Wyman, Doublooms, Florbunda, Golden Raindrops, Harvest Gold, Indian Magic, Louisa, Mary Potter, Purple Prince, Red Jewel, Royal Fountain, Royal Raindrops, Sugar Tyme
	American Plum	*Prunus americana*	
	Japanese Tree Lilac	*Syringa reticulata*	Ivory Silk, Summer Snow
	White Fir	*Abies concolor*	
	Norway Spruce	*Picea abies*	
	Black Hills Spruce	*Picea glauca var. densata*	
CONIFERS- PARKS ONLY	Serbian Spruce	*Picea omorika*	
	White Pine	*Pinus strobus*	
	Arborvitae	*Thuja occidentalis*	
	Eastern Hemlock	*Tsuga canadensis*	

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If you need accommodations because of disability to access the services of this Agency, please contact the Director at 515-281-5918.