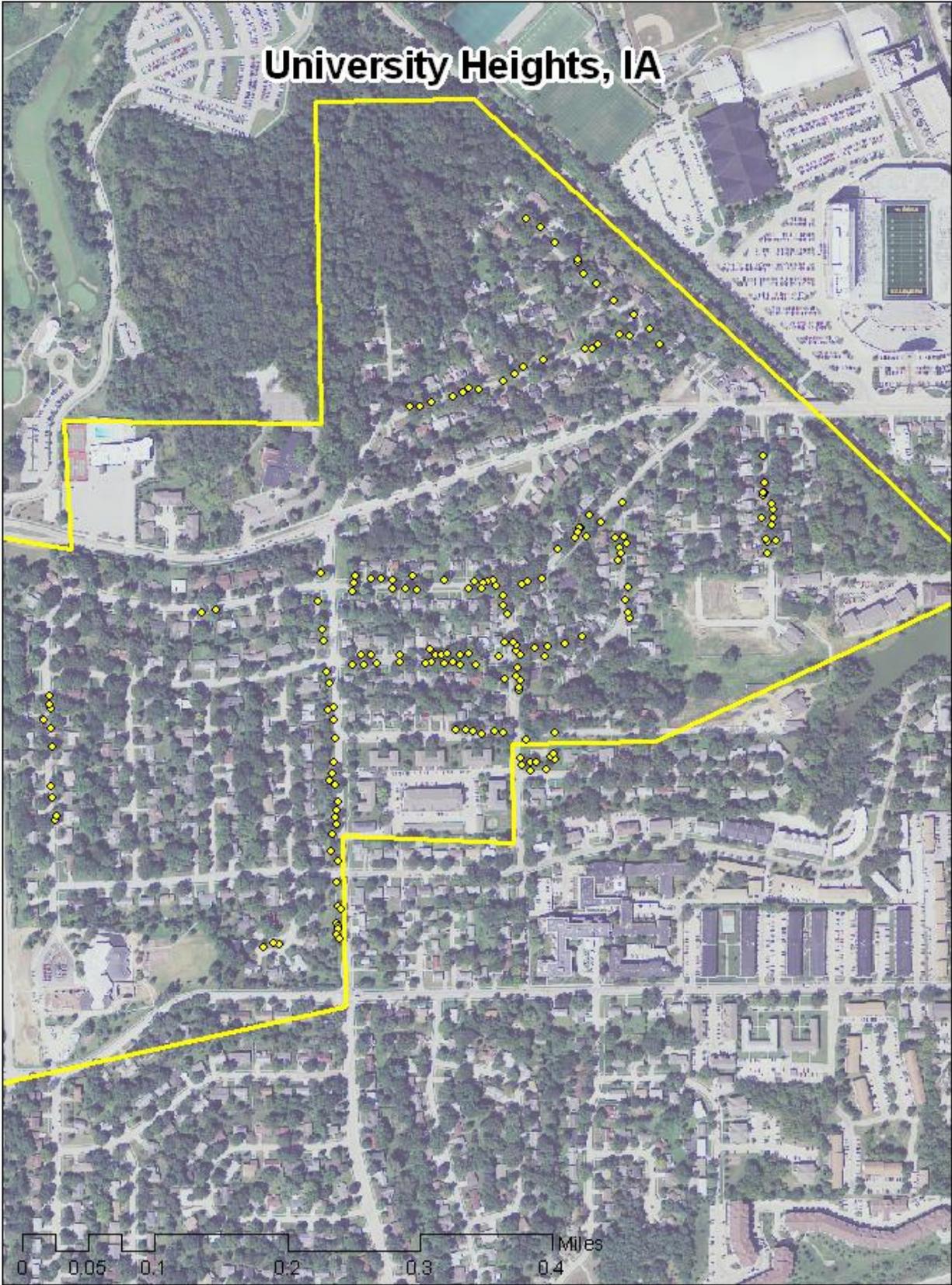


# University Heights, IA



2011 Community Street & Park Tree Management Plan  
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Bureau of Forestry, Iowa DNR





Trees inventoried in fall 2011

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# Executive Summary

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## Overview

This plan was developed to assist University Heights 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) and gypsy moth. 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). **This pest was found in Iowa in the spring of 2010 in northeast Iowa, but has not been found in this area at this point in time.** There is a strong possibility that ~12 % of University Heights' city owned trees (ash-22) 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. Another concern is that 44% of University Heights' city owned trees are some type of (maple-79), so if any type of insect or disease starts to threaten the health of maples in the community this could have a significant impact on the community tree population. There is a pest called Asian Long-Horned beetle that has recently been found in Ohio that does attack a number of different maple species. Basically, 56% (100) of University Heights' city owned trees are either maple or ash.

## Inventory and Results

In the fall of 2011 a tree inventory was conducted using Global Positioning System (GPS) data collectors. The inventory was a complete inventory of street and park trees in the community. Below are some key findings of the 181 trees inventoried.

- University Heights' trees provide \$32,833 of benefits annually, an average of \$181 a tree
- There are ~25 species of trees
- The top four genus are: Maple 44%, Crabapple 13%, Ash 12%, and Oak 9%
- 17% of trees are in need of some type of management, the majority of the management is pruning such as raising above streets and sidewalks for safety or cleaning out dead material
- 4 trees are recommended for removal consideration, 2 of the removals have been classified as critical concerns ( I believe one of these trees has already been removed), and there are 2 other tree situations that are not removals that are classified as critical and need immediate attention/evaluation (Tree #1704 White Pine-Removal of dead branches and stubs, #1673 Pin Oak Removal of dead branches on attached map)
- There are 18 trees outlined in a 9/16/2011 letter to Josiah Bilskemper/Shive Hattery Architecture-Engineering and the Mayor from the Iowa DNR District Forester that need to be inspected to see what action (s) is/are needed

## 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.

- There are 4 trees to be considered for removal, and one of these trees is a larger (18 to 24 inch ash tree). **\*City ownership of the trees recommended for removal should always be verified prior to any removal\***
- There are 4 of the 22 ash trees in need of follow up at this point, and two should be considered for removal.
- Attempt to prune all park trees on a routine schedule, and any new trees planted should have good developmental pruning in the first 5 to 15 years to develop quality trees.
- Plant a diverse mix of trees that do not include: ash, maple, cottonwood, poplar, boxelder, Chinese elm, willow, black walnut, or evergreen species as street trees. Evergreen species such as Norway spruce, Serbian spruce, white spruce, Eastern white pine, Eastern redcedar, concolor fir, or arborvitae can be considered for park plantings.
- Check ash trees with a visual survey yearly
- **With the current budget (\$5,000 for contract work) it could take 2.6 to 4.4 years to remove the existing ash if they were to die at an estimated removal cost of \$600 to \$1,000/tree**

## Introduction

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

Trees are an important component of University Heights' 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 University Heights 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 University Heights' urban forestry goals.

## Inventory

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In the fall of 2011, a tree inventory was conducted that included 100% of the city owned trees on both streets and parks. The tree data was collected using a handheld Global Positioning System (GPS) receiver. The data collector gives Geographic Information Systems (GIS) coordinates with an accuracy of 3 meters, which can be used in Arc GIS as an active GIS data layer. Because the inventory is a digital document the data can be updated with new information and become a working document.

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

To quantify the urban forest structure and benefits, specific data is collected for each tree. This data includes: location, land use, species, diameter at 4.5 ft, recommended maintenance, priority of that maintenance, leaf health, and wood condition. Additionally, signs and symptoms 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

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The data collected for the 181 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. University Heights' trees reduce energy related costs by approximately \$8,683 annually (Appendix A, Table 1 attached to document). These savings are both in Electricity (41.1 MWh) and in Natural Gas (5,676.4 Therms).

#### Annual Stormwater Benefits

University Heights' trees intercept about 434,460 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides \$11,775 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 University Heights, it is estimated that trees remove 494.1 lbs of air pollution (ozone (O<sub>3</sub>), particulate matter less than 10 microns (PM<sub>10</sub>), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), and sulfur dioxide (SO<sub>2</sub>)) per year with a net value of \$1,363 (Appendix A, Table 3).

## Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In University Heights, trees sequester about 104,493 lbs of carbon a year with an associated value of \$1,247 (Appendix A, Table 4). In addition, the trees store 1,485,507 lbs of carbon, with a yearly benefit of \$11,141 (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. University Heights' receives \$9,765 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, University Heights' trees provide \$32,833 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 181 trees in University Heights provide approximately \$181 annually (Appendix A, Table 7).

## **Forest Structure**

### Species Distribution

University Heights has 25 different tree species along city streets and parks (Appendix A, Figure 1).

The distribution of trees by genus is as follows:

Maple	79	44% (Silver, Sugar, Norway, Red, and Amur)
Apple (crabapple)	23	13%
Ash	22	12% (Green & White)
Oak	17	9% (Pin, Red, & Bur)
Sycamore		Species 4% or less or below
Norway spruce		
Hackberry, American Basswood (Linden)		
White Pine, Ginkgo		
Honeylocust, Black Walnut		
Callery Pear, Siberian Elm		
Eastern Redcedar		

## Size Class

Over half of University Heights' public trees (59.7 %) are 18 inches or greater in diameter at 4.5 ft (Appendix A, Figure 2). This data indicates that there are a significant amount of larger and most likely older trees in the public tree population. The remaining portion of the trees (16%) are between 12 and 18 inches, and (24.4 %) are 12 inches and less. There are only (7.8%) of the trees that are 6 inches in diameter or less (14 trees), which indicates there has been very little re-planting of trees on public property in a number of years.

## 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 University Heights indicate that 94% of the trees are in good health, with only 1% of the foliage identified as poor (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 68% of University Heights' trees are in good health for wood condition (Appendix A, Figure 4 & Appendix B, Figure 3). Wood condition that is in poor health is about 6%, and dead and dying is 1% of the population.

## Management Needs

- In (Appendix B, Figure 4) the specific management needs of the inventoried trees are identified. Management practices needed include crown cleaning, crown raising, crown reduction, and some potential removal. Seventeen percent of the inventoried trees are in need of some type of management, the majority of the management is pruning such as raising above streets and sidewalks for safety or cleaning out dead material. City Ordinance [#52, Section 3](#) assigns the responsibility to trim over the street and the sidewalk to the adjoining private property owner. There are 4 trees on the map listed for possible removal that should be evaluated as soon as possible to decide if they need to be removed and when. [\\*City ownership of the trees recommended for removal should be verified prior to any removal\\*](#)

## Land Use and Location

The majority of University Heights' city trees are in areas of single-family residential homes (93.9 %), and are planted within planting strips (98.9 %). (Appendix A, Figure 5 & Figure 6).

# Recommendations

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## 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 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

University Heights has 4 trees that need to be considered for removal as soon as possible. These trees can be seen on the Location of Trees with Recommended Maintenance map (Appendix B, Figure 5). There are 18 trees outlined in a 9/16/2011 letter to Josiah Bilskemper/Shive Hattery Architecture-Engineering and the Mayor from the Iowa DNR District Forester that need to be inspected to see what action (s) is/are needed. Below is the list of those 18 trees that need to be looked at:

- Large American linden tree adjacent to 140 Highland on the east side of George. This tree is completely hollow and it has a significant stem crack where the tree is leaning toward the street and an adjacent house. This tree should be evaluated immediately for removal. \*I believe this tree has been removed.
- Green ash adjacent to 140 Highland on the east side of George. The trunk on this tree is split and it should be evaluated for removal.
- 200 Marietta large Norway maple with significant sized dead limb, plus tree should be evaluated for removal.
- 210 Marietta Norway maple with dead branches over the street.
- 216 Marietta large sugar maple with multiple 3 to 4 inch dead branches over street/walk/drive along with some stem decay.
- 211 Highland Drive large sugar maple with branches showing significant decay in top of tree.
- 140 Highland Drive large pin oak with a couple 3 to 5 inch diameter dead branches hanging of the street and walk.
- 205 Koser large red oak actually on George with 3 to 5 inch dead branches over the street.
- 209 Koser large silver maple with 3 to 4 inch dead branches over the sidewalk.
- 247 Koser large ash with severe stem decay needs evaluation.
- 620 Sunset large hackberry with trunk split is cabled but should be evaluated on a regular basis.
- 620 Sunset small crabapple is mostly dead, so consider removal.
- 125 Golfview immediately across from this address there is a large white pine with a number of 5 to 7 inch diameter dead branches over the sidewalk. There is some decay in the trunk that also needs to be evaluated.
- 27 Olive Court large Norway maple tree with poor structure and stem decay needs evaluation.

- 1409 Grand Ave. Across from this address is a large green ash with 8 to 10 inch decayed branch over sidewalk.
- 1480 Grand Ave. large Norway maple with multiple 3 to 5 inch dead branches over the sidewalk.
- Tower Court Park large red oak next to slide has a few 3 to 4 inch dead branches over picnic table.
- Tower Court Park crabapple immediately adjacent to park bench that is hollow.

### 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 in the park (s) be pruned on a routine schedule every five to seven years, and any new trees planted should have good developmental pruning in the first 5 to 15 years to develop quality trees. Please refer to the six year maintenance plan for further information.

### Planting

If some trees are removed in the next few years consider replacing these trees at a minimum. It is recommended to plant 1 to 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 University Heights.

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 15 to 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 has 44% maple and for this reason consider not planting maple on public property until this percentage becomes lower. Also, ash trees have not been recommended since 2002, due to the threat of EAB.

Species to avoid because they can be public nuisances include: cottonwood, poplar, boxelder, Chinese elm, evergreens as street trees, 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. With many new potential tree health threats on the horizon attempt to monitor the health of all city owned trees on a regular basis.

## Six Year Maintenance Plan

The current University Heights' tree management budget is ~\$5,000.

### Year 1

Removal: 4 trees (@ estimate \$600 to \$1,000/tree) with the highest concern that have been identified

Planting and Replacement: 10 trees (@ \$50 to \$150/tree) planted in open locations within the public parking area

Visual Survey for signs and symptoms of EAB

Routine trimming: Prune a portion of park (s) trees (@\$20 to \$200/tree)

### Year 2

Removal: Removal of any new critical concern trees and ash in poor health as budget permits

Planting and Replacement: 5 to 10 trees planted in open locations within the public parking area

Visual Survey for signs and symptoms of EAB

### Year 3

Removal: Removal of any new critical concern trees and ash in poor health as budget permits

Routine trimming: Prune a portion of park (s) (@\$20 to \$200/tree)

Visual Survey for signs and symptoms of EAB

### Year 4

Removal: Removal of any new critical concern trees and ash in poor health as budget permits

Planting and Replacement: 5 to 10 trees planted in open locations (@ \$50 to \$150/tree)

Visual Survey for signs and symptoms of EAB

### Year 5

Removal: Removal of any new critical concern trees and ash in poor health as budget permits  
Visual Survey for signs and symptoms of EAB

Routine trimming: Prune a portion of park (s) trees (@\$20 to \$200/tree)

### Year 6

Removal: Removal of any new critical concern trees and ash in poor health as budget permits  
Planting and Replacement: 10 trees (@ \$50 to \$150/tree) planted in open locations within the public parking area

Visual Survey for signs and symptoms of EAB

EAB could potentially kill all ash trees within 4 to 10 years of its arrival to University Heights. If removal costs range from \$600 to \$1,000 per tree, total estimated costs to remove all 22 ash in the community would be between \$13,200 and \$22,000. At the current \$5,000 tree budget for contract work it would take 2.6 to 4.4 years to have all ash trees removed if needed.

## Emerald Ash Borer Plan

### Ash Tree Removal

There are two ash trees to be evaluated for removal at this point based on the 9/16/2011 letter to Josiah Bilskemper/Shive Hattery Architecture-Engineering and the Mayor from the Iowa DNR District Forester. Any tree removal that occurs will be prioritized with hazardous, dead, and dying trees to be removed first. *\*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 ash 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](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 should be replaced. New plantings will be a diverse mix and will not include ash, maple at this time, cottonwood, poplar, bur oak, box elder, Chinese elm, evergreens along the streets, 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. City Code #71 Section III discusses nuisances such as dead and diseased trees and their removal and City Code #31 specifically talks about trees infected with Dutch Elm disease. Some of these codes are older so the community may want to consider revising their tree related codes. As far as a broader code related to dead and dying trees no matter the cause consider something like: **“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.**

### **151.10 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. ”**

## Budget

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EAB could potentially kill all ash trees within 4 to 10 years of its arrival to University Heights. If removal costs range from \$600 to \$1,000 per tree, total estimated costs to remove all 22 ash in the community would be between \$13,200 and \$22,000. At the current \$5,000 tree budget for contract work it would take 2.6 to 4.4 years to have all ash trees removed if needed.

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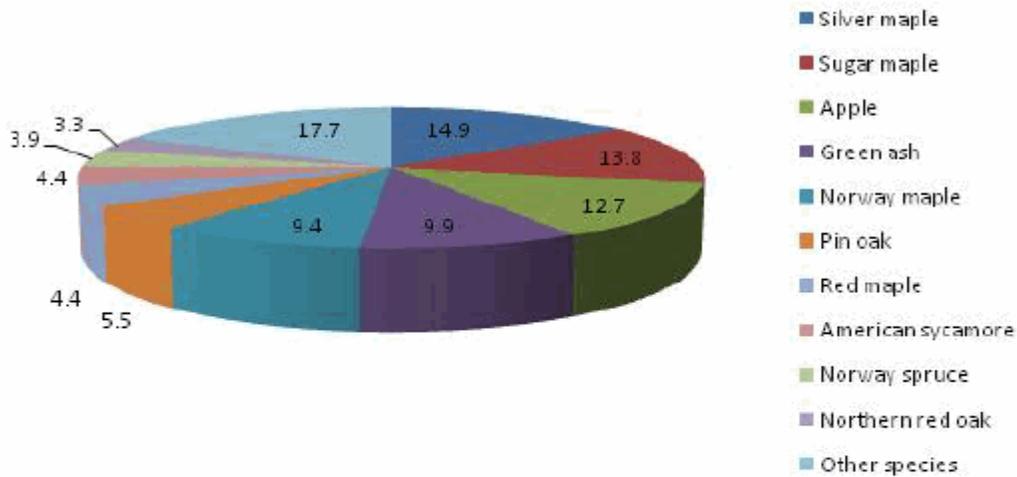
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## Appendix A: i-Tree Data

### Species Distribution of Public Trees (%)

10/24/2011

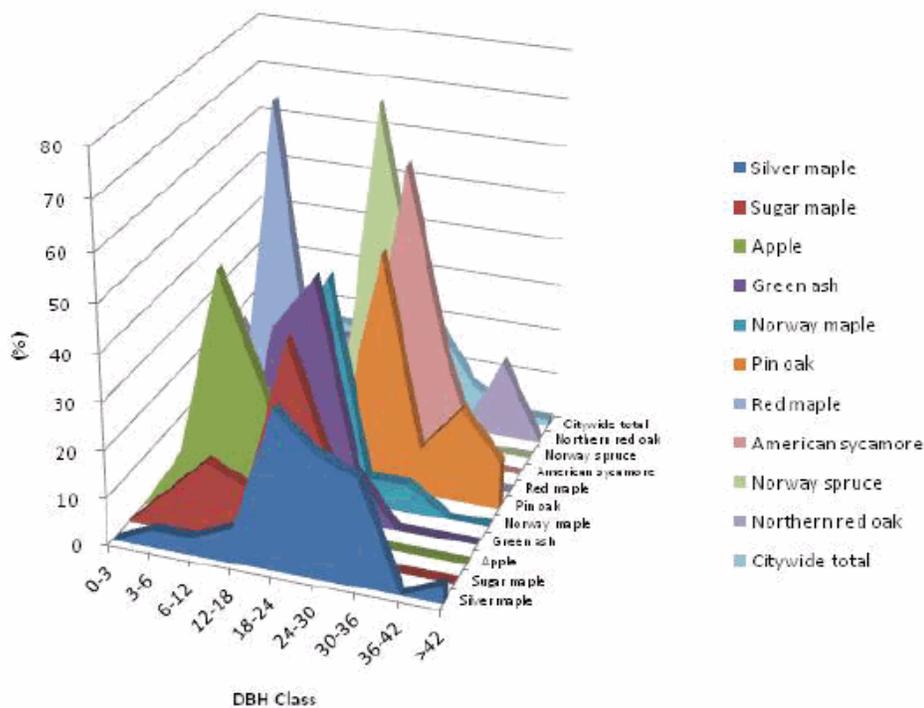


Species	Percent
Silver maple	14.9
Sugar maple	13.8
Apple	12.7
Green ash	9.9
Norway maple	9.4
Pin oak	5.5
Red maple	4.4
American sycamore	4.4
Norway spruce	3.9
Northern red oak	3.3
Other species	17.7
Total	100.0

Figure 1: Species Distribution

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

10/24/2011



Species	DBH class (in)								
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42
Silver maple	0.0	3.7	3.7	7.4	33.3	25.9	22.2	0.0	3.7
Sugar maple	0.0	8.0	16.0	12.0	44.0	20.0	0.0	0.0	0.0
Apple	0.0	13.0	52.2	30.4	4.3	0.0	0.0	0.0	0.0
Green ash	0.0	0.0	0.0	38.9	50.0	11.1	0.0	0.0	0.0
Norway maple	0.0	0.0	11.8	29.4	47.1	5.9	5.9	0.0	0.0
Pin oak	0.0	0.0	0.0	0.0	10.0	50.0	10.0	20.0	10.0
Red maple	0.0	0.0	75.0	12.5	12.5	0.0	0.0	0.0	0.0
American sycamore	0.0	0.0	0.0	0.0	12.5	62.5	25.0	0.0	0.0
Norway spruce	0.0	0.0	0.0	0.0	71.4	28.6	0.0	0.0	0.0
Northern red oak	16.7	0.0	16.7	16.7	16.7	16.7	0.0	16.7	0.0
Citywide total	1.7	6.1	16.6	16.0	30.4	19.3	6.6	1.7	1.7

Figure 2: Relative Age Class

# Functional (Foliage) Condition of Public Trees by Species (%)

10/24/2011

## Citywide total

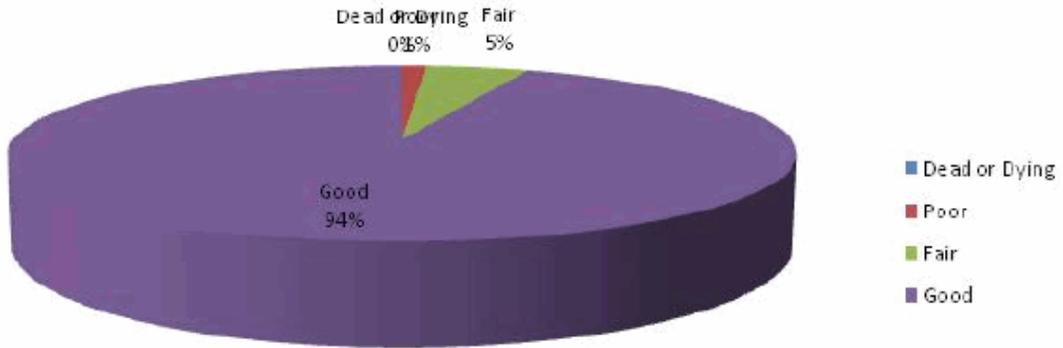


Figure 3: Foliage Condition

# Structural (Woody) Condition of Public Trees by Species (%)

10/24/2011

## Citywide total

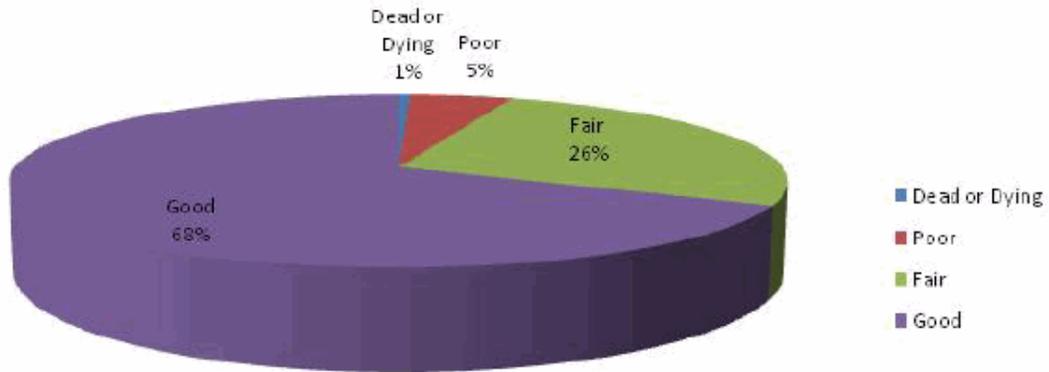


Figure 4: Wood Condition

## Land Use of Public Trees by Zone (%)

10/24/2011

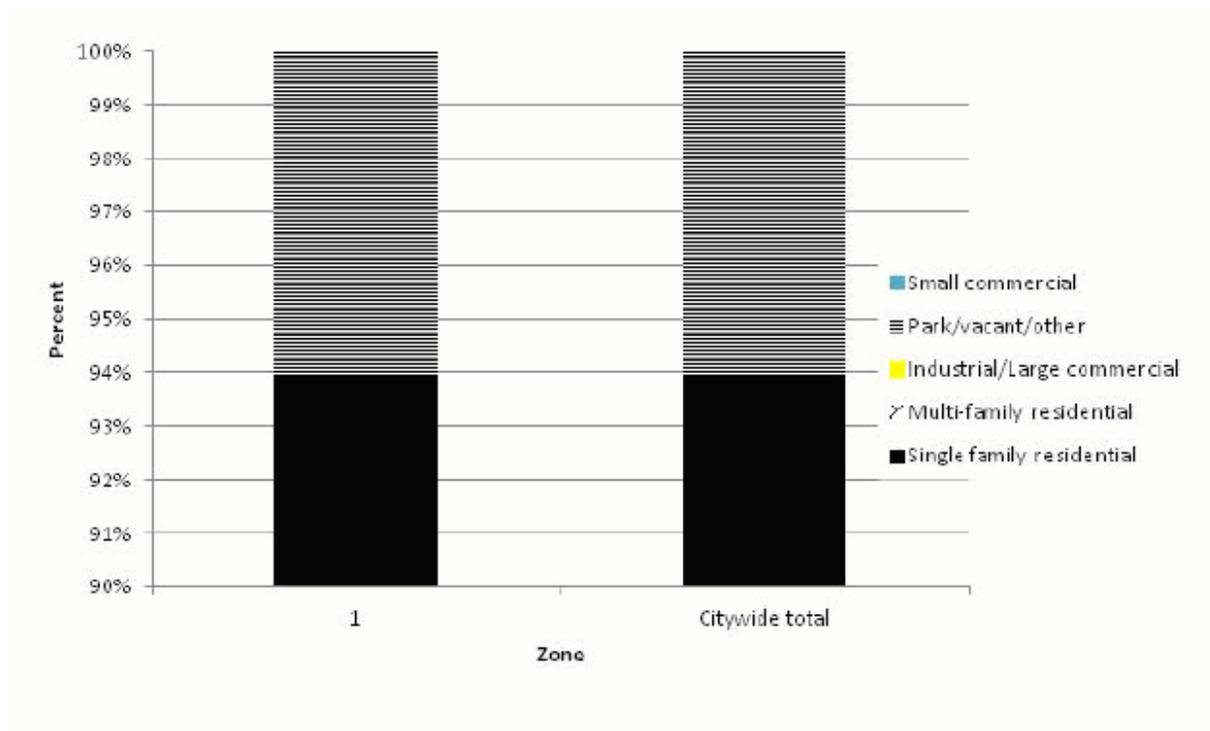
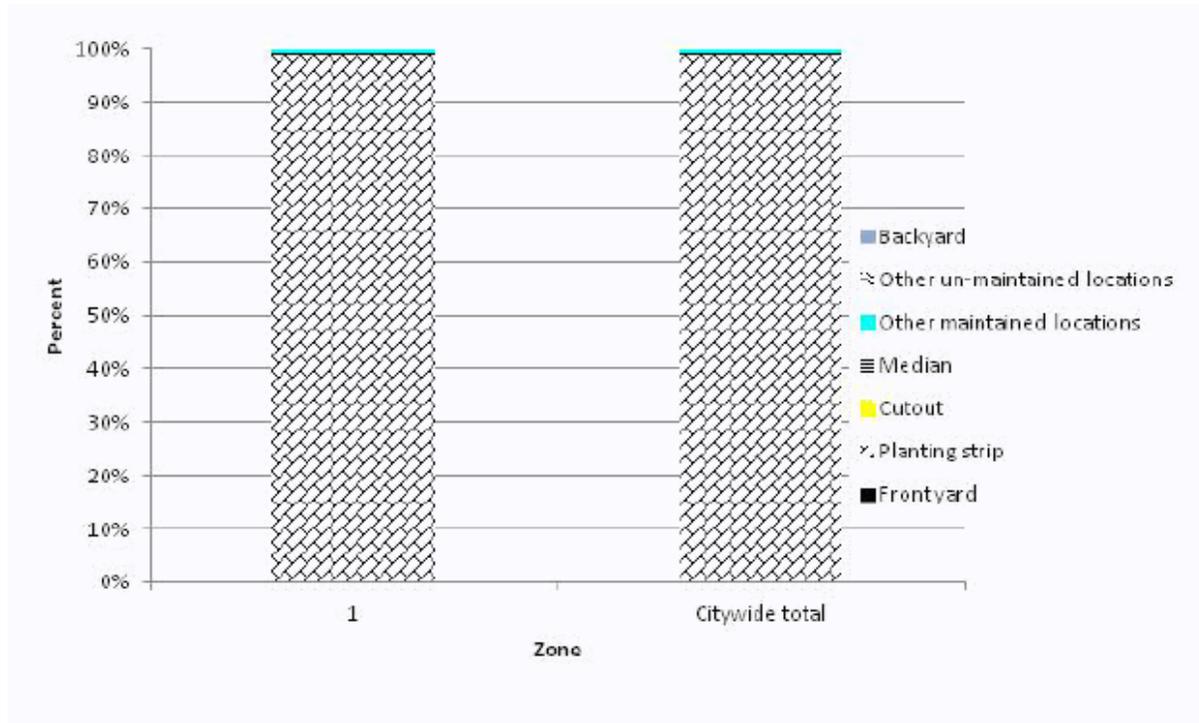


Figure 5: Land Use of city/park trees

## Location of Public Trees by Zone (%)

10/24/2011



Zone	Front yard	Planting strip	Cutout	Median	Other maintained locations	Other un-maintained locations	Backyard
1	0.0	98.9	0.0	0.6	0.6	0.0	0.0
Citywide total	0.0	98.9	0.0	0.6	0.6	0.0	0.0

Figure 6: Location of city/park trees

## Appendix B: ArcGIS Mapping



Figure 1: Location of Ash Trees



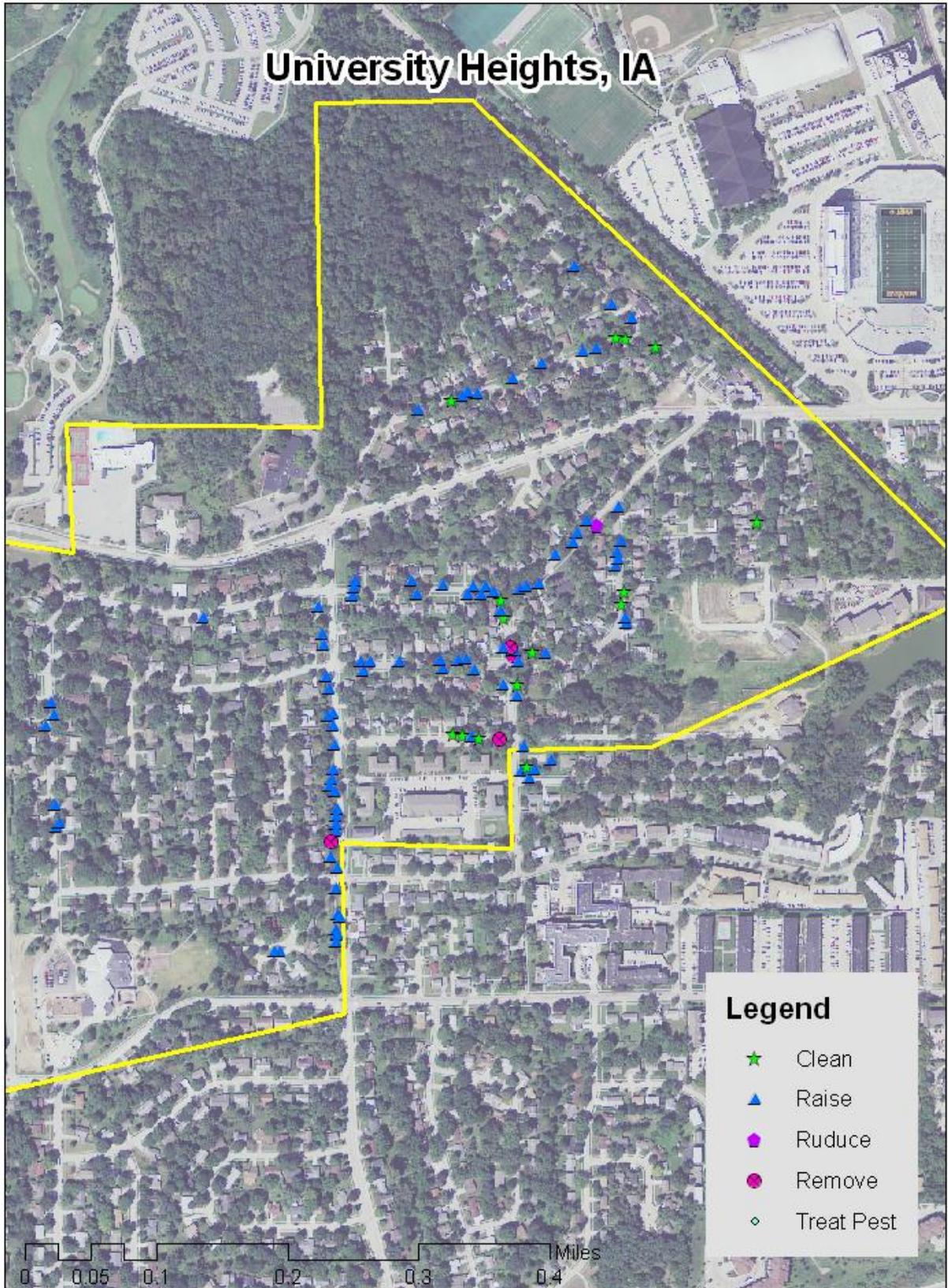
**Figure 2: Location of EAB symptoms**



**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\*

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