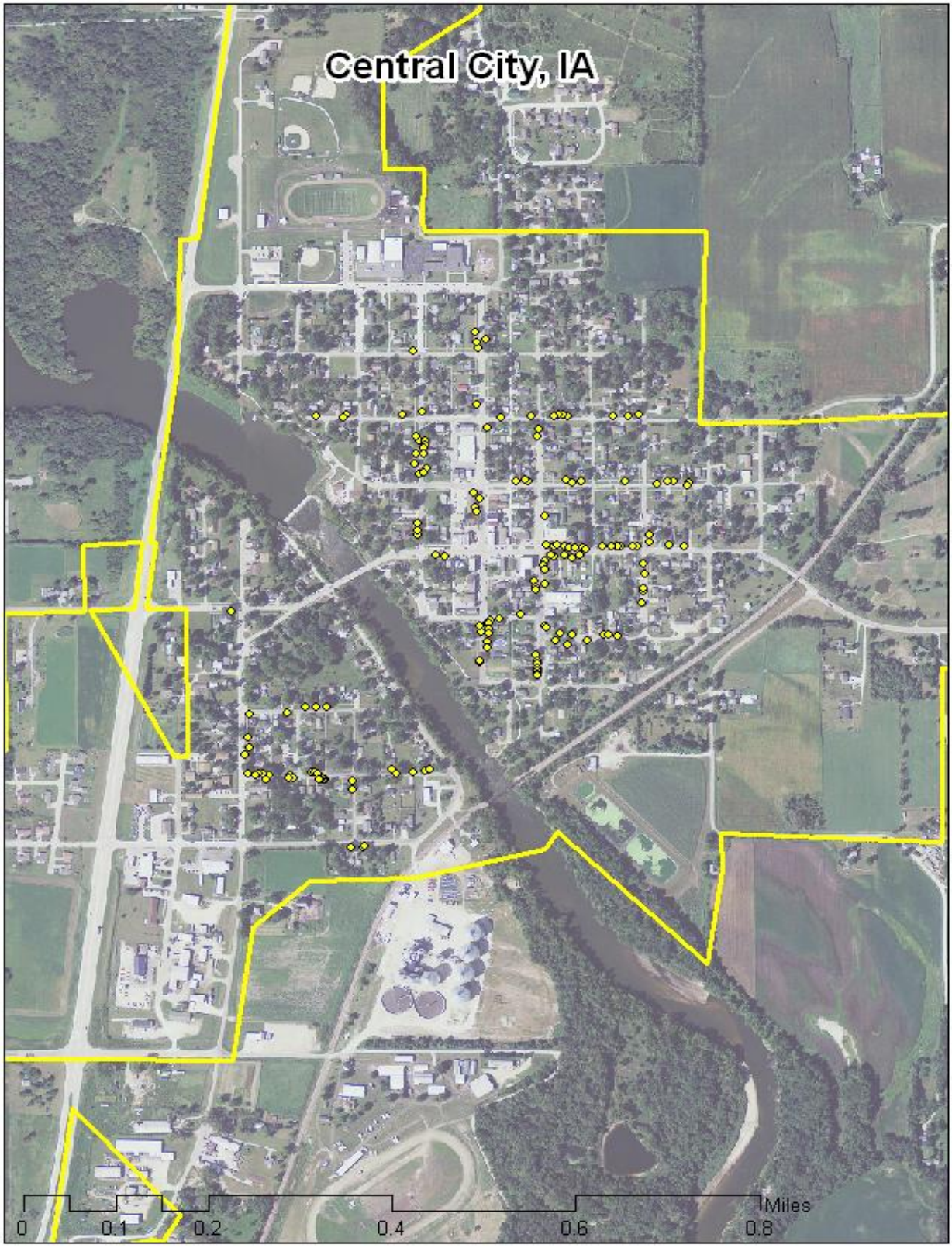
Central City, IA

2011 Community Street Tree Management Plan

Prepared by Mark A. Vitosh
Bureau of Forestry, Iowa DNR



Trees inventoried in fall 2011

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Executive Summary

Overview

This plan was developed to assist Central 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) 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 ~13 % of Central City's city owned street trees (ash-21) 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 50% of Central City's 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, 63% (100) of Central City's 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 trees in the community. Below are some key findings of the 157 street trees inventoried.

- Central City's street trees provide $25,115 of benefits annually, an average of $160 a tree
- There are ~25 species of trees along the streets
- The top four genus are: Maple 50%, Ash 13%, Hackberry 12%, and Oak 6%
- 17% of street 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
- 5 street trees are recommended for removal consideration,1 of the removals has been classified as critical a concern, and there is one other tree situation that that is not a removal that is classified as critical and needs immediate attention/evaluation
- There are 14 trees outlined in a 9/27/2011 letter to the City Administrator 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 5 street trees to be considered for removal, and one of these trees is an ash. *City ownership of the trees recommended for removal should always be verified prior to any removal*
- Attempt to prune all park trees and street trees if community responsibility 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
- EAB could potentially kill all ash trees within 4 to 10 years of its arrival to Central City. If removal costs range from $600 to $1,000 per tree, total estimated costs to remove all 21 ash in the community would be between $12,600 and $21,000.

Introduction

This plan was developed to assist Central 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 Central 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 Central 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 Central 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 Central City's urban forestry goals.

Inventory

In the fall of 2011, a tree inventory was conducted that included 100% of the city owned street trees. The tree data was collected using a handheld Global Positioning System (GPS) receiver.

The data collector gives Geographic Information Systems (GIS) coordinates with an accuracy of 3 meters, which can be used in Arc GIS as an active GIS data layer.
Because the inventory is a digital document the data can be updated with new information and become a working document.

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

To quantify the urban forest structure and benefits, specific data is collected for each tree. This data includes: location, land use, species, diameter at 4.5 ft, recommended maintenance, 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 157 city street 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. Central City's street trees reduce energy related costs by approximately $7,036 annually (Appendix A, Table 1 attached to document). These savings are both in Electricity (34.1 MWh) and in Natural Gas (4542 Therms).

Annual Stormwater Benefits

Central City's street trees intercept about 303,182 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides $8,217 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 Central City, it is estimated that street trees remove 410.5 lbs of air pollution (ozone (O_3), particulate matter less than 10 microns (PM10), carbon monoxide (CO), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2) per year with a net value of $1,147 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Central City, street trees sequester about 75,447 lbs of carbon a year with an associated value of $959 (Appendix A, Table 5). In addition, the street trees store 975,736 lbs of carbon, with a yearly benefit of $7,318 (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. Central City receives $7,756 in annual social benefits from street trees (Appendix A, Table 6).

Financial Summary of all Benefits

According to the USDA Forest Service i-Tree STRATUM analysis, Central City's trees provide $25,115 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 157 street trees in Central City provide approximately $160 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Central City has 25 different tree species along city streets (Appendix A, Figure 1).
The distribution of trees by genus is as follows:

Maple	79	50% (Sugar, Silver, Norway, and Red)
Ash	21	13% (Green & White)
Hackberry	18	11%
Oak	10	6% (Pin, Red, & Swamp White)
Siberian Elm		Species 3% or less or below
Linden (Little Leaf Linden & American)		
Callery Pear		
Black Walnut		
Honeylocust		
Apple (Crabapple)		
Spruce		
Redbud		
Catalpa		
Hickory		
Birch		
Mountain Ash		

Size Class

In Central City (28.6%) of the street trees are 12 inches or less in diameter at 4.5 ft, (35%) are between 12 and 18 inches, and (36.4%) are 18 inches and greater.

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 Central City indicate that 93% of the street trees are in good health, with only 1% of the foliage identified as poor (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 57% of Central 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 is about 8%, 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 street 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.
  There are 5 street 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 Central City's street trees are in areas of single-family residential homes (91.7 %), and are planted within planting strips (89.9 %). (Appendix A, Figure 5 & Figure 6).

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 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

Central City has 5 street 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 14 trees outlined in a 9/27/2011 letter to the City Administrator 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 14 trees that need to be looked at:

Trees Needing Evaluation

- 141 3rd Street very large silver maple with poor structure and decay in the stem along with a severe crack near the base of the tree on the sidewalk side. This tree should be evaluated for removal.

- 254 Grove Street 12 inch Norway maple with severe storm damage and structure. This tree should be evaluated for removal.
- 309 E Main Street large black walnut with crack in trunk needs to be evaluated.
- 30 7th Avenue south of address large hackberry with severe stem decay next to utility line needs to be evaluated.
- 632 Commercial Street large hackberry with 8 to 9 inch diameter dead branch over the sidewalk.
- 746 Commercial Street large sugar maple next to drive with several large branches over the walk and drive.
- 106 4th Street South 17 inch diameter green ash with significant storm damage on trunk. This tree should be evaluated for removal.
- 129 4th Street South, south of address large tree with stem decay and old storm damage on stem. This tree needs to be evaluated for removal.
- 111 4th Street 12 inch diameter Norway maple with 3 to 4 inch dead branch over sidewalk.
- 111 4th Street South red maple with severe dieback. This tree should be evaluated for removal.
- 536 State Street large hackberry with decay on main stem and large branch needs closer evaluation.
- 230 Marion Road South large sugar maple with significant trunk damage and some decay needs closer evaluation.
- 126 North Avenue birch tree with one dead stem and one with dead branches.
- 126 North Ave. 10 inch diameter hackberry with 3 to 4 inch dead branches in top of tree.

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. There are a number of trees along the streets that are in conflict with overhead wires, so I would not recommend re-planting when trees get removed in these specific areas.

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 street tree population has 50% 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

At the time of writing this plan I had not received the budget information questionnaire I left with the community in the fall, so the following are general guidelines that will be influenced by the available budget and community goals.

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 areas or parks
Visual Survey for signs and symptoms of EAB
Routine trimming: Prune a portion of park (s) trees (@$20 to $200/tree) and street trees if community responsibility

Year 2

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 areas or parks
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) trees (@$20 to $200/tree) and street trees if community responsibility
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
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
Planting and Replacement: 10 trees (@ $50 to $150/tree) planted in open locations within the public parking areas or parks
Routine trimming: Prune a portion of park (s) trees (@$20 to $200/tree) and street trees if community responsibility
Visual Survey for signs and symptoms of EAB

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 areas or parks
Visual Survey for signs and symptoms of EAB

EAB could potentially kill all ash trees within 4 to 10 years of its arrival to Central City. If removal costs range from $600 to $1,000 per tree, total estimated costs to remove all 21 ash in the community would be between $12,600 and $21,000.

Emerald Ash Borer Plan

Ash Tree Removal

There is one ash tree to be evaluated for removal at this point. 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. 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. If there is currently nothing in the city code for the removal of dead and dying trees consider something like the following: "**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.

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

EAB could potentially kill all ash trees within 4 to 10 years of its arrival to Central City. If removal costs range from $600 to $1,000 per tree, total estimated costs to remove all 21 ash in the community would be between $12,600 and $21,000.

Works Cited

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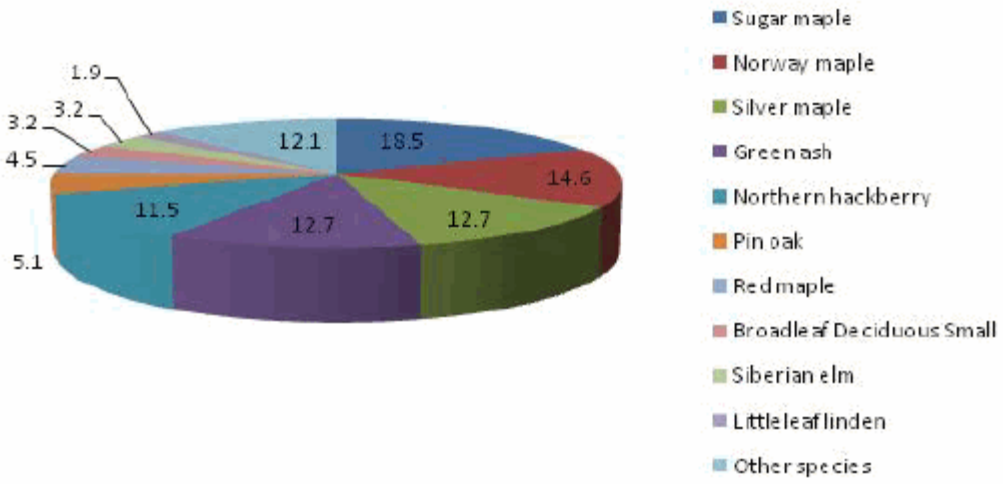
Appendix A: i-Tree Data

Species Distribution of Public Trees (%)

10/24/2011

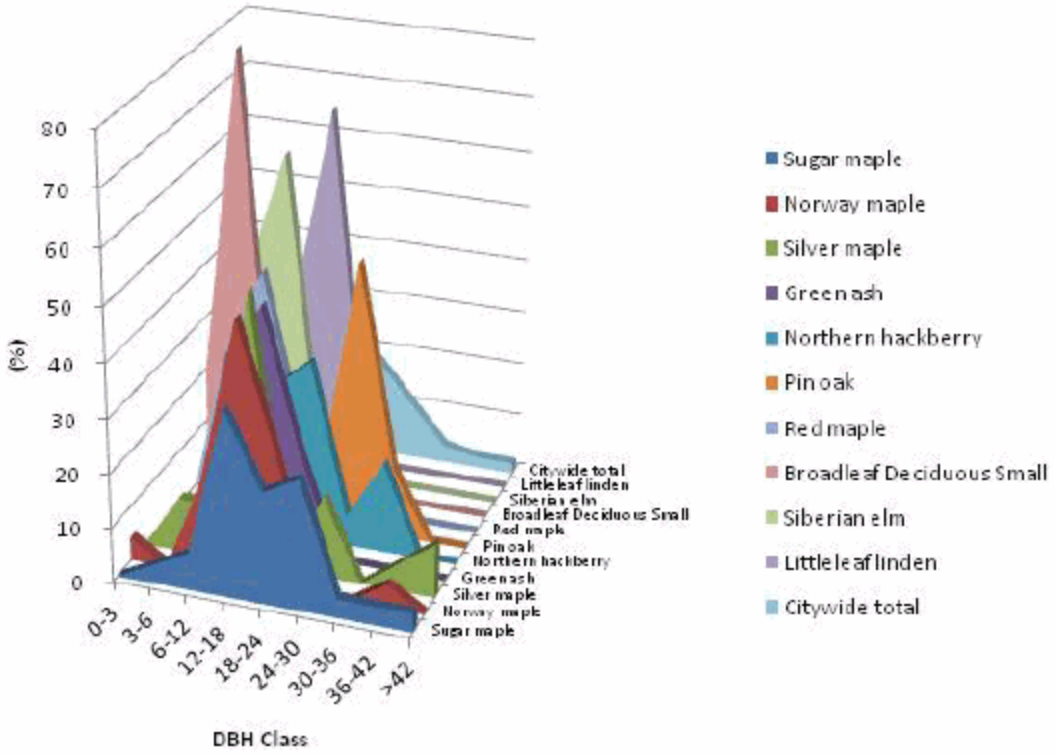


Species	Percent
Sugar maple	18.5
Norway maple	14.6
Silver maple	12.7
Green ash	12.7
Northern hackberry	11.5
Pin oak	5.1
Red maple	4.5
Broadleaf Deciduous	3.2
Siberian elm	3.2
Littleleaf linden	1.9
Other species	12.1
Total	100.0

Figure 1: Species Distribution

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

10/24/2011



	DBH class (in)								
Species	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42
Sugar maple	0.0	3.4	6.9	34.5	20.7	24.1	3.4	3.4	3.4
Norway maple	4.3	0.0	17.4	47.8	26.1	0.0	0.0	4.3	0.0
Silver maple	0.0	10.0	10.0	50.0	0.0	15.0	0.0	5.0	10.0
Green ash	0.0	0.0	35.0	45.0	20.0	0.0	0.0	0.0	0.0
Northern hackberry	0.0	0.0	16.7	27.8	33.3	5.6	16.7	0.0	0.0
Pin oak	0.0	0.0	12.5	12.5	12.5	50.0	12.5	0.0	0.0
Red maple	0.0	28.6	42.9	14.3	14.3	0.0	0.0	0.0	0.0
Broadleaf Deciduous	20.0	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Siberian elm	0.0	40.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0
Littleleaf linden	0.0	0.0	33.3	66.7	0.0	0.0	0.0	0.0	0.0
Citywide total	2.5	8.9	17.2	35.0	18.5	10.8	3.2	1.9	1.9

Figure 2: Relative Age Class

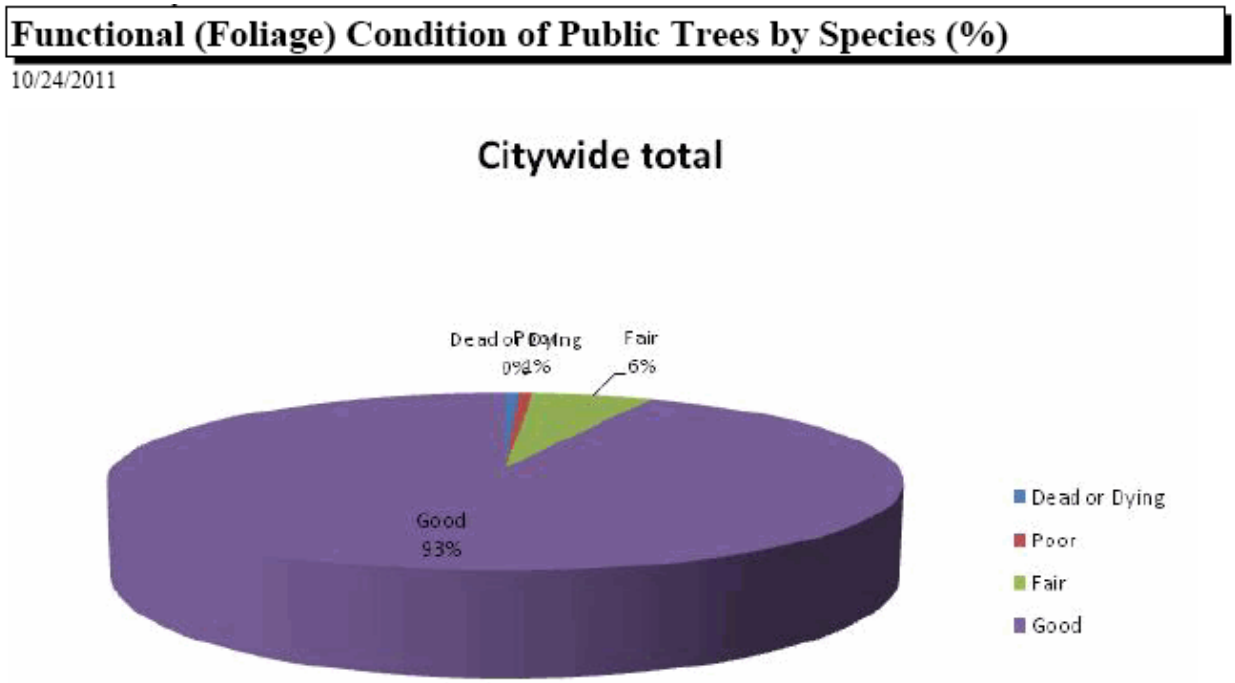


Figure 3: Foliage Condition

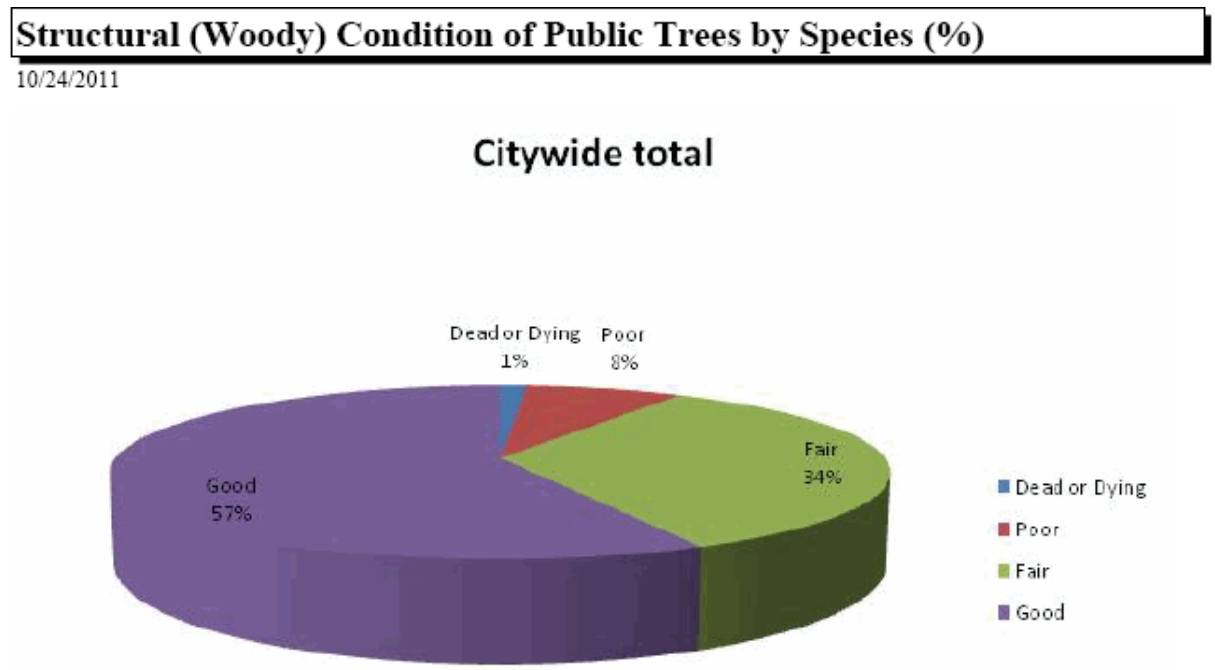
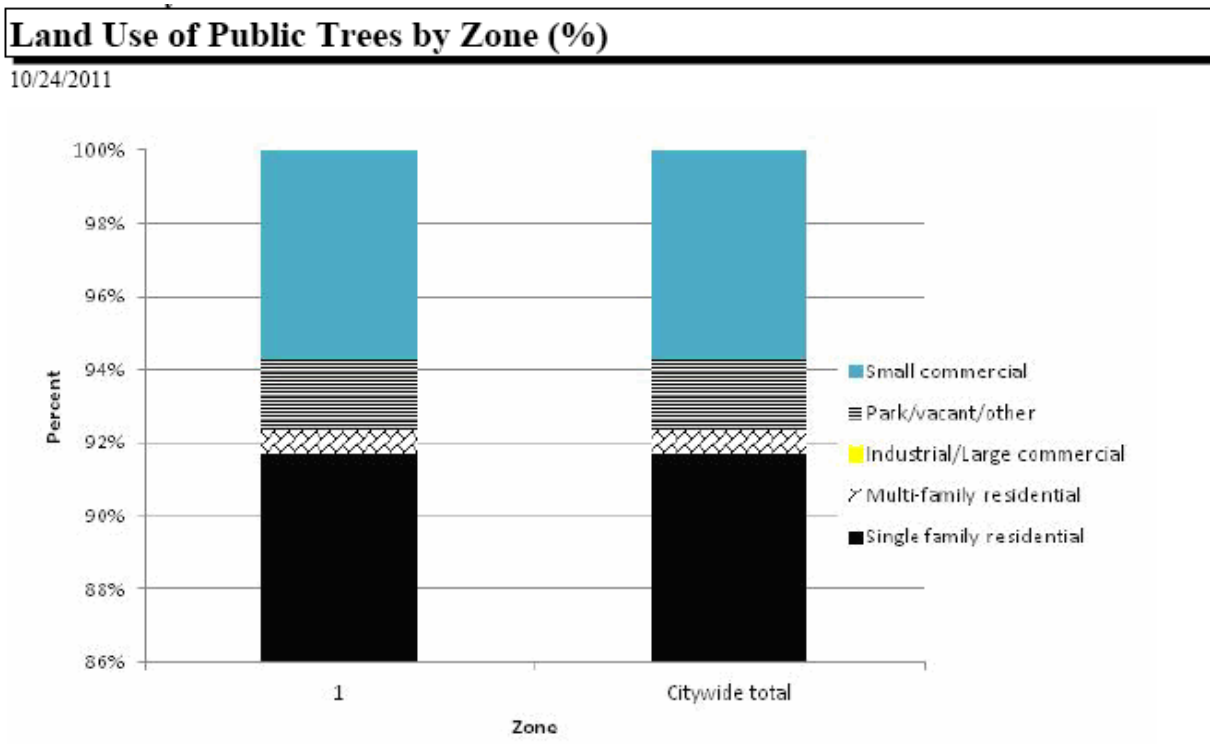
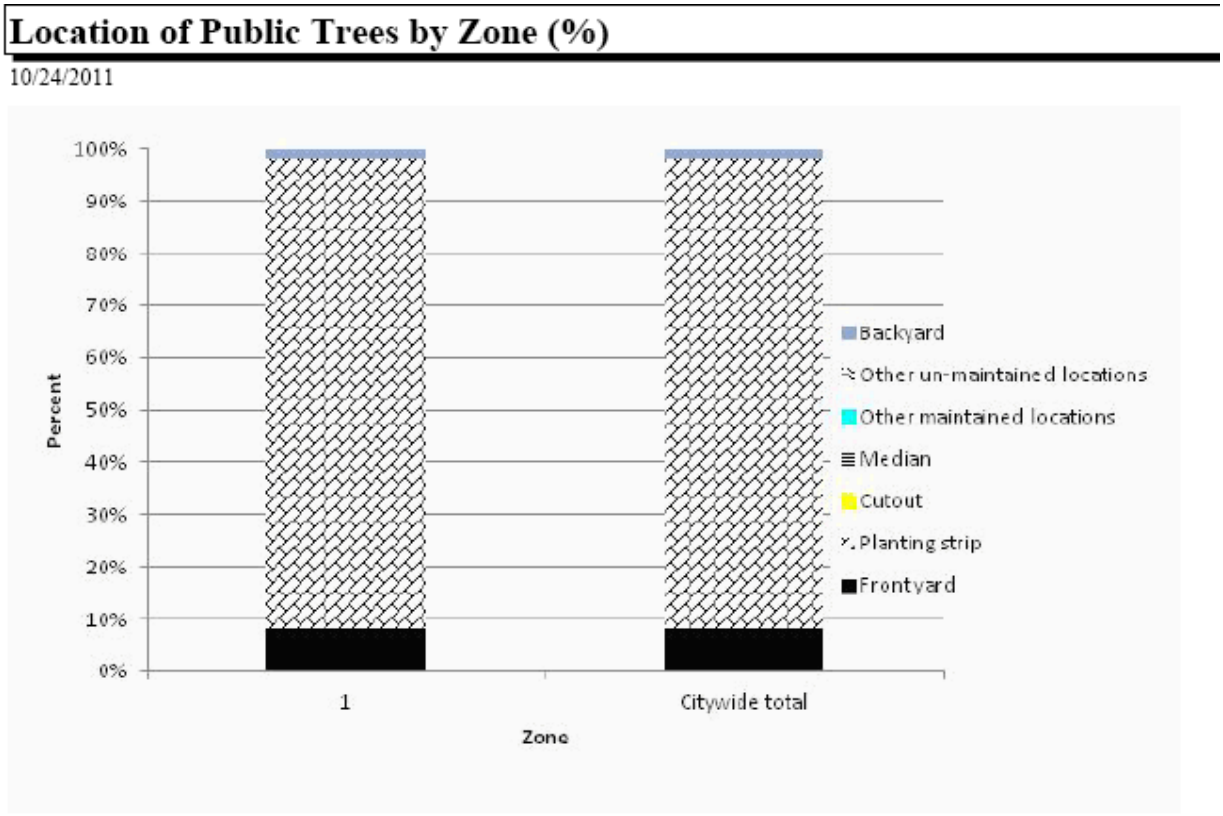


Figure 4: Wood Condition



Zone	Single family residential	Multi-family residential	Industrial/ Large commercial	Park/vacant/ other	Small commercial
1	91.7	0.6	0.0	1.9	5.7
Citywide total	91.7	0.6	0.0	1.9	5.7

Figure 5: Land Use of city/park trees



Zone	Front yard	Planting strip	Cutout	Median	Other maintained locations	Other un-maintained locations	Backyard
1	8.3	89.8	0.0	0.0	0.0	0.0	1.9
Citywide total	8.3	89.8	0.0	0.0	0.0	0.0	1.9

Figure 6: Location of city/park trees

Appendix B: ArcGIS Mapping

Figure 1: Location of Ash Trees

NO SIGNS OR SYMPTOM OF EAB

Figure 2: Location of EAB symptoms

Figure 3: Location of Poor Condition Trees

Figure 4: Location of Trees with Recommended Maintenance

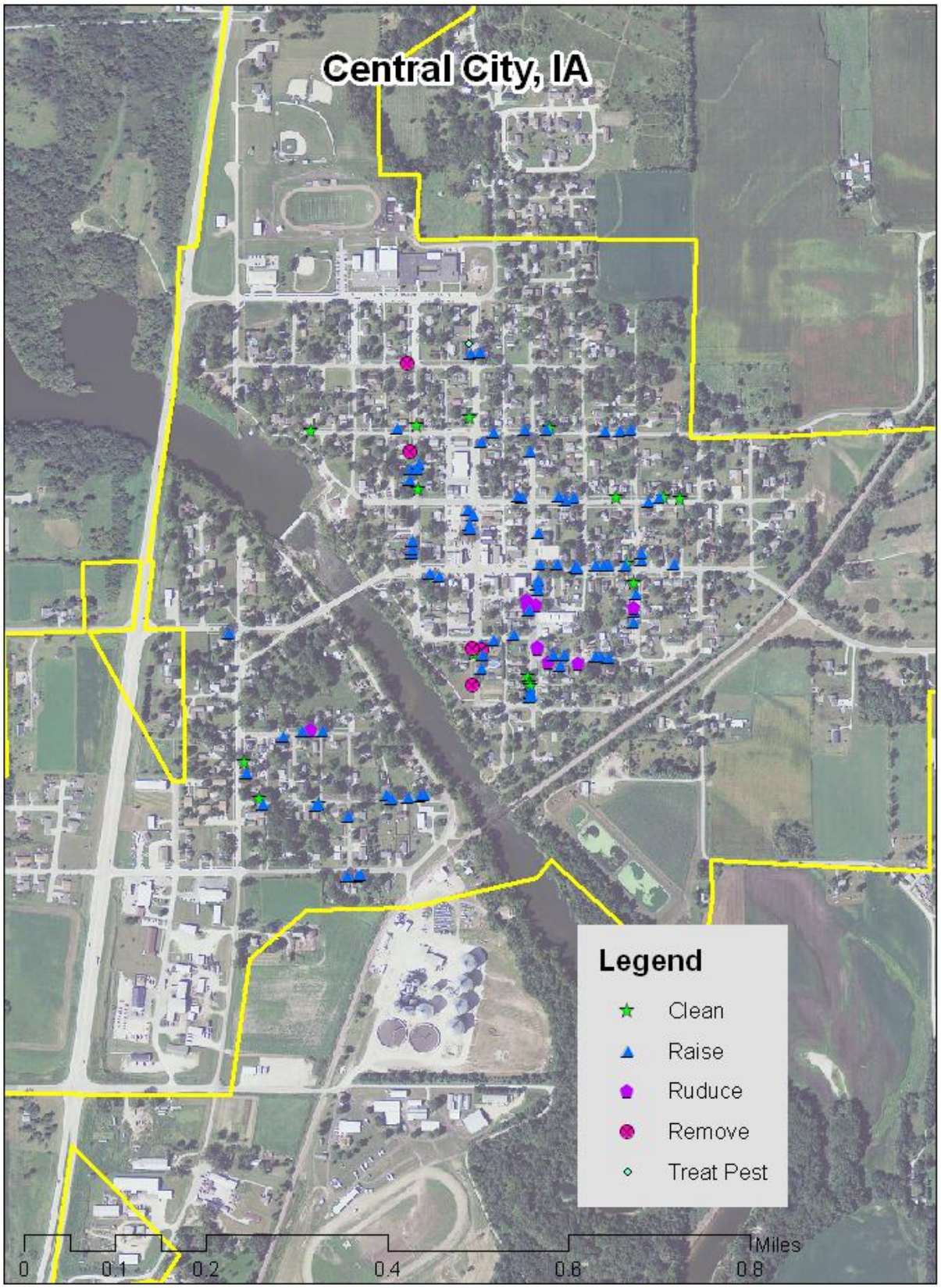


Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*

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