Oakland Acres, IA

2016 Urban Forest Management Plan
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Trees inventoried in Fall 2015

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Executive Summary

Overview

This plan was developed to assist the City of Oakland Acres 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 16% of Oakland Acres' city owned trees (ash) will die once EAB becomes established in the community, unless preventative treatment is used. With proper planning and management, the costs of removing dead and dying trees can be extended over years, mitigating public safety issues.

Inventory and Results

In 2015, a tree inventory was conducted by Matt Brewer, Iowa DNR, 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 32 trees inventoried.

- Oakland Acres' trees provide $5,172 of benefits annually, an average of $162 a tree
- There are over 9 species of trees
- The top three genera are: Oak 34%, Pine 31%, and Ash 16%
- 3% of trees are in need of some type of management
- 1 tree is 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.

- 0 of the 5 ash trees have one or more symptoms that could be related to an EAB infestation
- All trees should be pruned on a routine schedule- one third of the city every other year
- Plant a diverse mix of trees that do not include: ash, maple, cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut
- Check ash trees with a visual survey yearly
- Budget impacts from ash removal – Suggestion: request a budget increase to at least $350-$750 annually and apply for grants to plant replacement trees

Introduction

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

Trees are an important component of Oakland Acres' 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 Oakland Acres 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 Oakland Acres' urban forestry goals.

Inventory

In 2015, a tree inventory was conducted by Matt Brewer, Iowa DNR, 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 associated with EAB were noted for all ash trees. The signs and symptoms noted

were canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

Inventory Results

The data collected for the 32 city trees was entered into the USDA Forest Service program i-Tree Streets, part of the i-Tree suite. The following are results from the i-Tree Streets analysis.

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Oakland Acres' trees reduce energy related costs by approximately $1,286 annually (Appendix A, Table 1). These savings are both in Electricity (6.2 MWh) and in Natural Gas (835.1 Therms).

Annual Stormwater Benefits

Oakland Acres' trees intercept about 68,429 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides $1,854 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 Oakland Acres, it is estimated that trees remove 65.7 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 $173 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Oakland Acres, trees sequester about 15,119 lbs of carbon a year with an associated value of $113 (Appendix A, Table 4). In addition, the trees store 176,927 lbs of carbon, with a yearly benefit of $1,327 (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. Oakland Acres receives $1,675 in annual social benefits from trees (Appendix A, Table 6).

Financial Summary of all Benefits

According to the USDA Forest Service i-Tree Streets analysis, Oakland Acres' trees provide $5,172 of benefits annually. Benefits of individual trees vary based on size, species, health and

location, but on average each of the 32 trees in Oakland Acres provides approximately $162 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Oakland Acres has over 9 different tree species along city streets and parks (Appendix A, Figure 1).
The distribution of trees by genera is as follows:

Oak	11	34%
Pine	10	31%
Ash	5	16%
Maple	4	13%
Honeylocust	1	3%
Aspen/Cottonwood	1	3%

Age Class

Almost half of Oakland Acres' trees (47%) are between 18 and 36 inches in diameter at 4.5 ft (Appendix A, Figure 2). For age, it is preferred that a large number of trees are in the smallest size categories (a downward slope) to prepare for natural mortality and to maintain canopy cover. Oakland Acres will have an aging tree population as this 47% matures, and should consider new plantings (currently only 3% are under 6 inches in diameter) to develop the next generation of trees.

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 Oakland Acres indicate that 84% 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, 88% of Oakland Acres' 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 3% of the population. This 3% 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).

Tree Removal	1	3%

Canopy Cover

The total canopy with both private and public trees is 24% (47 acres). The canopy cover included in the Oakland Acres inventory includes approximately 1 acre (Appendix A, Figure 4).

Land Use and Location

The majority of Oakland Acres' city and park trees are in yard settings in parks (Appendix A, Figure 6 & Appendix A, Figure7). The following describes the land use and locations for the street and park trees.

Land Use	
Park/vacant/other	100%

Location	
Front yard	100%

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

Oakland Acres has 0 critical concern trees, but 1 tree that needs removal and 1 that needs cleaning as soon as is practical. These trees can be seen on the Location of Trees with Recommended Maintenance map (Appendix B, Figure 4). Please refer to the six year maintenance plan at the end of this section. There should be follow up on the trees marked as needing maintenance. There are a total of 2 trees with these needs.

Poor tree species

Ash trees in poor health should be assessed for removal (Appendix B, Figure 3 & Appendix B, Figure 4). There are a total of 5 ash trees, and 0 of those have signs and symptoms that have been associated with EAB. In addition, there are 0 ash 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.

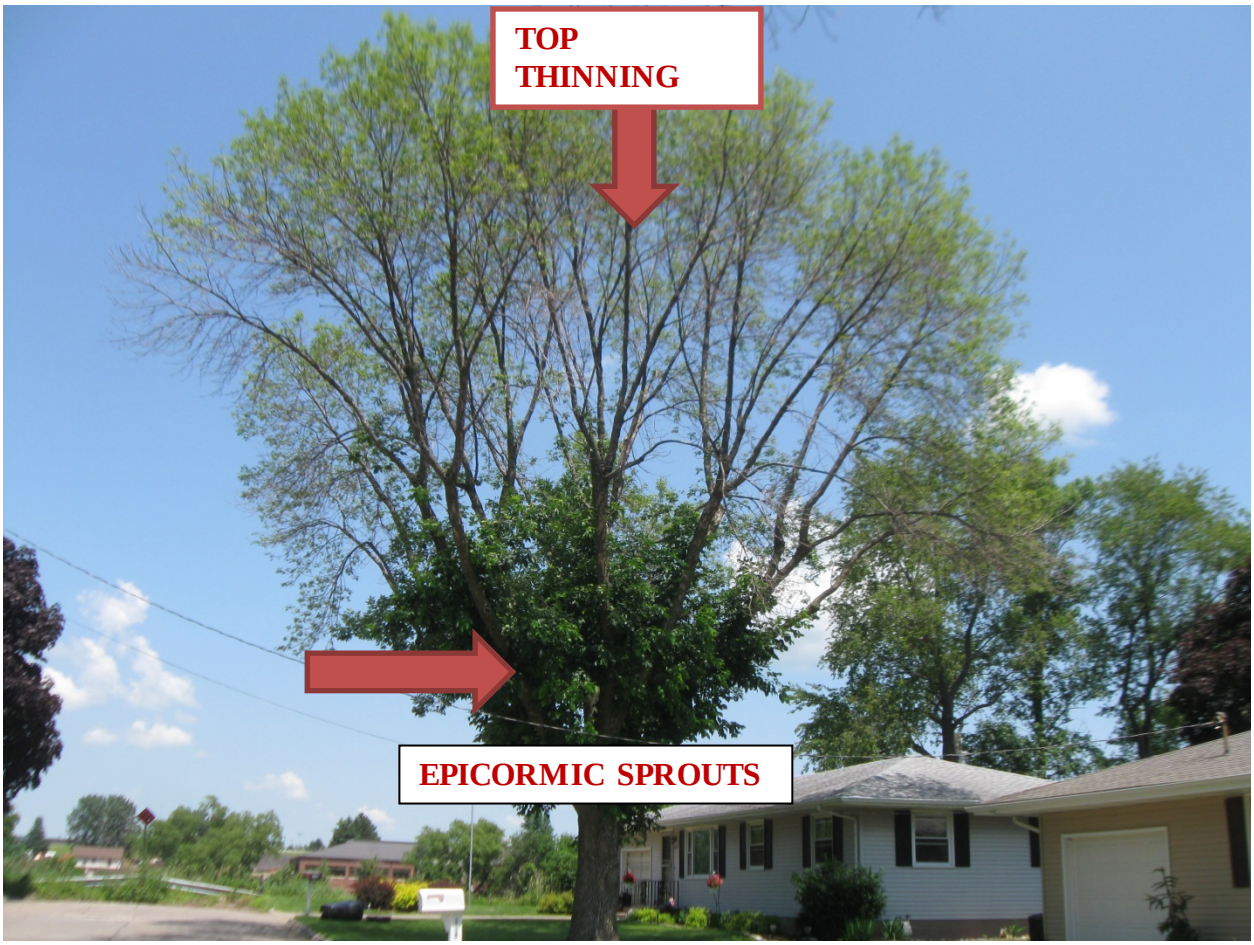
Planting

Most of the planting over the next 5 years will replace the trees that are removed. It is recommended to plant at least 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 or greater number of trees helps ensure continuation of the benefits of the existing forest in Oakland Acres.

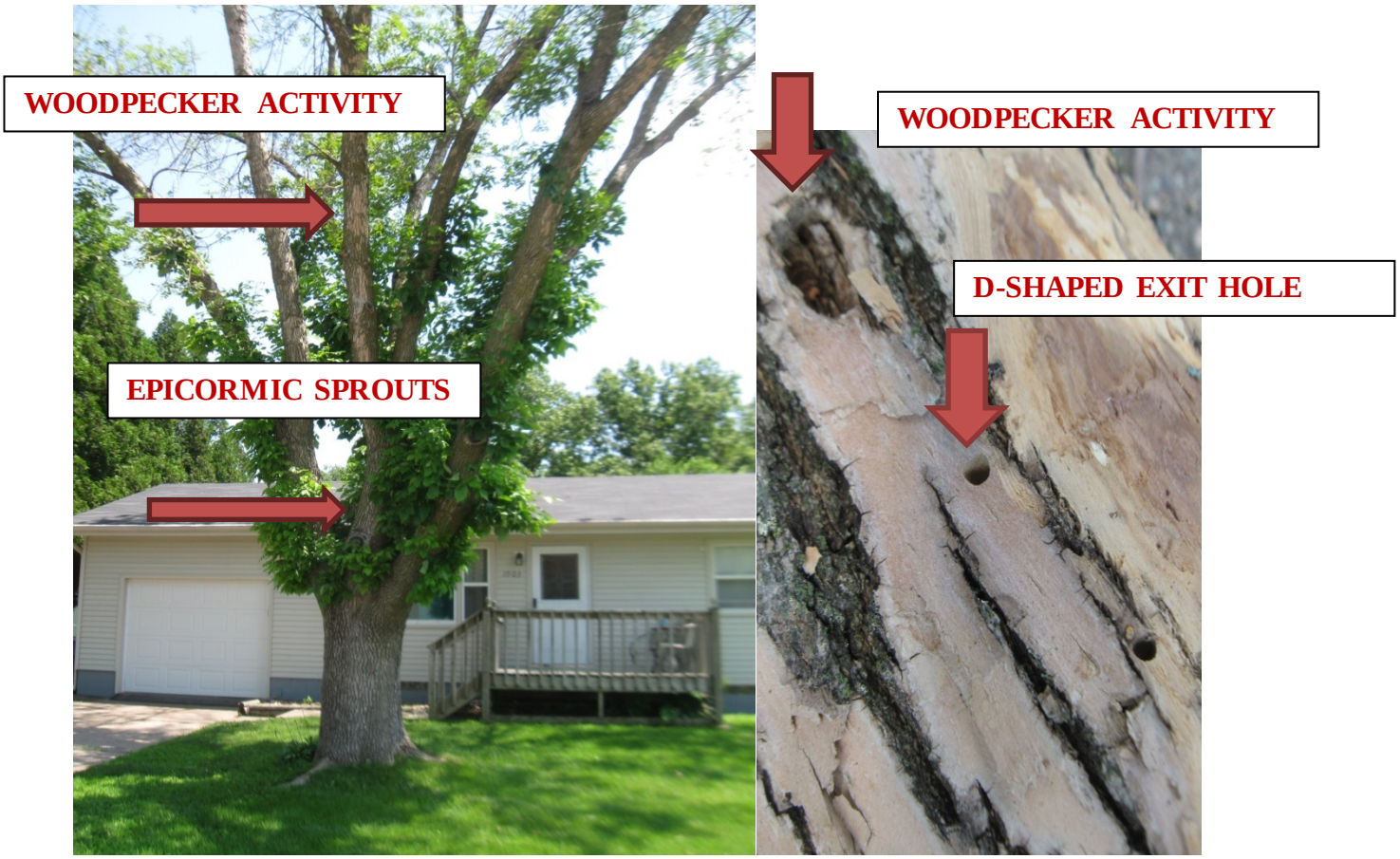
It is important to plant a diverse mix of species in the urban forest to maintain canopy health, since most insects and diseases target a genus (ash) or species (green ash) of trees. Current diversity recommendations advise that a genus (i.e. maple, oak) not make up more than 10% of the urban forest and a single species (i.e. silver maple, sugar maple, white oak, bur oak) not make up more than 5-10% of the total urban forest. Presently, the forest is heavily planted with maple (13%) (Appendix A, Figure 1). Maples should not be planted until this percentage can be lowered. Also, ash trees have not been recommended since 2002, due to the threat of EAB. Other species to avoid because they are public nuisances include: cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut.

Continual Monitoring For EAB

Due to the threat of EAB, it is important to continuously check the health of ash trees. It is recommended that ash trees be checked with a visual survey every year for tree decline and for the following signs and symptoms: canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage (See examples below). Once EAB arrives in Oakland Acres, it could potentially kill all ash within 4 to 10 years of its arrival.



EAB infested tree in Muscatine with top thinning and many new green epicormic sprouts



EAB infested tree in Muscatine with sprouting, wood pecker activity, and D-shaped exit holes

Emerald Ash Borer Plan

Ash Tree Removal

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

Treatment of Ash Trees

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

EAB Quarantines

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

A regulated article under the USDA's quarantine includes any of the following items:

- emerald ash borer
- firewood of all hardwood species (for example ash, oak, maple and hickory)
- nursery stock and green lumber of ash
- any other ash material, whether living, dead, cut or fallen, including logs, stumps, roots, branches, as well as composted and not composted chips of the genus ash (Mountain ash is not included)

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

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? The entire state of Iowa is under quarantine, so regulated articles may not be moved into non-quarantined states. For more information, please visit http://www.emeraldashborer.info/.

Canopy Replacement

As budget permits, all removed trees will be replaced. The new plantings will be a diverse mix and will not include ash, maple, cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut.

Postponed Work

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

Monitoring

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

Private Ash Trees

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

Six Year Maintenance Plan and Cost Estimates

Year 1 (FY 2016)

Remove 1 tree	$900
Maintain 1 tree (cleaning)	$300
Plant and Maintain 10 trees in open locations (pursue grants)	$1,000
Ash tree treatment (if elected), 1 tree in good condition, average 24–30"	avg. $405/tree
-$15 per inch, treated every two years, see note	
*Or saving for future ash removal	
Visual Survey for signs and symptoms of EAB	

Year 2 (FY 2017)

Remove any new critical concern trees and ash in poor health	$900/tree
Plant and Maintain 10 trees in open locations (pursue grants)	$1,000
Ash tree treatment (if elected) or saving for future ash removal	
Routine trimming: Contract to trim 1/3 of the city trees (~$300 per tree)	
Visual Survey for signs and symptoms of EAB	

Year 3 (FY 2018)

Remove any new critical concern trees and ash in poor health	$900/tree
Plant and Maintain 10 trees in open locations (pursue grants)	$1,000
Ash tree treatment (if elected) or saving for future ash removal	
Visual Survey for signs and symptoms of EAB	

Year 4 (FY 2019)

Remove any new critical concern trees and ash in poor health	$900/tree
Plant and Maintain 10 trees in open locations (pursue grants)	$1,000
Ash tree treatment (if elected) or saving for future ash removal	
Routine trimming: Contract to trim 1/3 of the city trees (~$300 per tree)	
Visual Survey for signs and symptoms of EAB	

Year 5 (FY 2020)

Remove any new critical concern trees and ash in poor health	$900/tree
Plant and Maintain 10 trees in open locations (pursue grants)	$1,000
Ash tree treatment (if elected) or saving for future ash removal	
Visual Survey for signs and symptoms of EAB	

Year 6 (FY 2021)

Remove any new critical concern trees and ash in poor health	$900/tree
Plant and Maintain 10 trees in open locations (pursue grants)	$1,000
Ash tree treatment (if elected) or saving for future ash removal	
Routine trimming: Contract to trim 1/3 of the city trees (~$300 per tree)	
Visual Survey for signs and symptoms of EAB	

*****Reduction of ash in poor health will reduce exposure to Emerald Ash Borer over time. EAB could potentially kill all ash within 4-15 years of its arrival.
******Assuming a cost of $900 per tree for removal, the budget would need to be increased to $750 a year to remove all ash trees within 6 years.
*******Suggest a future (post ash removal and replacement) budget of at least $2 per capita (population 160). Currently, this amount would cover about 43% of what would be needed to remove EAB infested trees over a six year period. Suggest setting aside additional funds to prepare for the expected arrival of EAB. Planting would be at least partially dependent on receiving grant funds annually.

Proposed Budget Increase

EAB could potentially kill all ash trees in Oakland Acres within 4-15 years of its arrival. To remove all ash trees within 6 years the budget would need to be increased to $750 a year. If the budget were increased to $350 a year all ash could be removed within 13 years. Additionally, it is recommended that Oakland Acres 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.

Another option being considered by many communities is treating a number of selected trees, either to maintain those trees in the landscape or to delay their removal – to spread out the costs and number of trees needing removed all at once. Trunk injection is administered every two years for the life of the tree. If treatment is discontinued, the tree dies. For an example, if the average ash diameter is 20 inches and treatment costs $15 per inch, then treating 10 trees would cost about $3,000 (every other year treatment). This would be 10 trees selected for treatment, and Oakland Acres would still need to find $900 per tree for removal. Alternatively, if there are 15 treatable trees, it would cost approximately $4,500 every two years for treatment and leave five less trees for removal (for at least two more years). These are alternatives to straight removal of ash trees. However, whether or not the treatment option is selected, there will be an increased cost of dealing with ash trees if EAB is found in Oakland Acres. It is suggested to consider increasing the budget to plan for this.

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Annual Energy Benefits of Public Trees

1/7/2016

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Eastern white pine	1.4	104	171.3	168	272	(N/A)	31.3	21.1	27.15
Northern red oak	0.5	39	76.3	75	114	(N/A)	18.8	8.8	18.97
Pin oak	1.4	105	192.3	188	294	(N/A)	15.6	22.8	58.71
Green ash	1.1	85	161.2	158	243	(N/A)	12.5	18.9	60.72
Red maple	0.5	36	63.1	62	98	(N/A)	9.4	7.6	32.70
Honeylocust	0.3	23	42.3	41	65	(N/A)	3.1	5.0	64.79
Eastern cottonwood	0.3	25	46.9	46	71	(N/A)	3.1	5.5	70.91
White ash	0.4	32	54.5	53	85	(N/A)	3.1	6.6	85.27
Silver maple	0.2	19	27.3	27	45	(N/A)	3.1	3.5	45.40
Total	6.2	468	835.1	818	1,286	(N/A)	100.0	100.0	40.20

Table 2: Annual Stormwater Benefits

Annual Stormwater Benefits of Public Trees

1/7/2016

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Eastern white pine	23,436	635	(N/A)	31.3	34.2	63.51
Northern red oak	2,811	76	(N/A)	18.8	4.1	12.70
Pin oak	13,747	373	(N/A)	15.6	20.1	74.51
Green ash	11,715	317	(N/A)	12.5	17.1	79.37
Red maple	2,854	77	(N/A)	9.4	4.2	25.79
Honeylocust	2,905	79	(N/A)	3.1	4.2	78.73
Eastern cottonwood	3,943	107	(N/A)	3.1	5.8	106.85
White ash	5,299	144	(N/A)	3.1	7.7	143.62
Silver maple	1,718	47	(N/A)	3.1	2.5	46.55
Citywide total	68,429	1,854	(N/A)	100.0	100.0	57.95

Table 3: Annual Air Quality Benefits

Annual Air Quality Benefits of Public Trees

1/7/2016

Species	Deposition (lb)				Total Depos. ($)	Avoided (lb)				Total Avoided ($)	BVOC Emissions (lb)	BVOC Emissions ($)	Total (lb)	Total ($)	Standard Error	% of Total Trees	Avg. $/tree
	O_3	NO_2	PM_{10}	SO_2		NO_2	PM_{10}	VOC	SO_2								
Eastern white pine	2.7	0.5	2.2	0.3	18	6.4	0.9	0.9	6.2	40	-11.4	-43	8.8	15	(N/A)	31.3	1.53
Northern red oak	0.3	0.1	0.2	0.0	2	2.5	0.4	0.3	2.3	15	-0.5	-2	5.7	16	(N/A)	18.8	2.60
Pin oak	2.2	0.4	1.2	0.1	12	6.6	1.0	0.9	6.3	41	-4.2	-16	14.5	38	(N/A)	15.6	7.54
Green ash	1.3	0.2	0.6	0.1	7	5.4	0.8	0.7	5.1	34	0.0	0	14.2	40	(N/A)	12.5	10.12
Red maple	0.5	0.1	0.2	0.0	3	2.3	0.3	0.3	2.2	14	-0.2	-1	5.7	16	(N/A)	9.4	5.34
Honeylocust	0.5	0.1	0.3	0.0	3	1.5	0.2	0.2	1.4	9	-0.4	-1	3.8	11	(N/A)	3.1	10.61
Eastern cottonwood	0.5	0.1	0.2	0.0	3	1.6	0.2	0.2	1.5	10	0.0	0	4.4	12	(N/A)	3.1	12.48
White ash	0.9	0.1	0.4	0.0	5	2.0	0.3	0.3	1.9	12	0.0	0	6.0	17	(N/A)	3.1	17.19
Silver maple	0.1	0.0	0.1	0.0	1	1.1	0.2	0.2	1.1	7	-0.1	0	2.7	7	(N/A)	3.1	7.44
Citywide total	9.1	1.6	5.5	0.6	53	29.3	4.3	4.1	27.9	183	-16.7	-63	65.7	173	(N/A)	100.0	5.40

Table 4: Annual Carbon Stored

Stored CO2 Benefits of Public Trees

1/7/2016

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Eastern white pine	27,774	208	(N/A)	31.3	15.7	20.83
Northern red oak	5,310	40	(N/A)	18.8	3.0	6.64
Pin oak	54,959	412	(N/A)	15.6	31.1	82.44
Green ash	41,146	309	(N/A)	12.5	23.3	77.15
Red maple	5,825	44	(N/A)	9.4	3.3	14.56
Honeylocust	6,743	51	(N/A)	3.1	3.8	50.57
Eastern cottonwood	15,773	118	(N/A)	3.1	8.9	118.30
White ash	15,773	118	(N/A)	3.1	8.9	118.30
Silver maple	3,624	27	(N/A)	3.1	2.0	27.18
Citywide total	176,927	1,327	(N/A)	100.0	100.0	41.47

Table 5: Annual Carbon Sequestered

Annual CO_2 Benefits of Public Trees

1/7/2016

Species	Sequestered (lb)	Sequestered ($)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released ($)	Avoided (lb)	Avoided ($)	Net Total (lb)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Eastern white pine	1,517	11	-133	-23	-1	2,292	17	3,652	27	(N/A)	31.3	14.9	2.74
Northern red oak	792	6	-25	-6	0	864	6	1,624	12	(N/A)	18.8	6.6	2.03
Pin oak	5,517	41	-264	-14	-2	2,323	17	7,562	57	(N/A)	15.6	30.8	11.34
Green ash	2,836	21	-197	-12	-2	1,876	14	4,503	34	(N/A)	12.5	18.4	8.44
Red maple	814	6	-28	-4	0	802	6	1,583	12	(N/A)	9.4	6.5	3.96
Honeylocust	936	7	-32	-3	0	515	4	1,417	11	(N/A)	3.1	5.8	10.62
Eastern cottonwood	857	6	-76	-4	-1	552	4	1,330	10	(N/A)	3.1	5.4	9.97
White ash	1,315	10	-76	-4	-1	704	5	1,940	15	(N/A)	3.1	7.9	14.55
Silver maple	534	4	-17	-2	0	411	3	926	7	(N/A)	3.1	3.8	6.94
Citywide total	15,119	113	-849	-72	-7	10,340	78	24,537	184	(N/A)	100.0	100.0	5.75

Table 6: Annual Social and Aesthetic Benefits

Annual Aesthetic/Other Benefits of Public Trees

1/7/2016

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Eastern white pine	324	(N/A)	31.3	19.3	32.37
Northern red oak	88	(N/A)	18.8	5.3	14.74
Pin oak	455	(N/A)	15.6	27.2	91.08
Green ash	239	(N/A)	12.5	14.3	59.66
Red maple	126	(N/A)	9.4	7.5	41.85
Honeylocust	195	(N/A)	3.1	11.6	194.60
Eastern cottonwood	66	(N/A)	3.1	3.9	65.59
White ash	126	(N/A)	3.1	7.5	126.36
Silver maple	56	(N/A)	3.1	3.4	56.34
Citywide total	1,675	(N/A)	100.0	100.0	52.33

Table 7: Summary of Benefits in Dollars

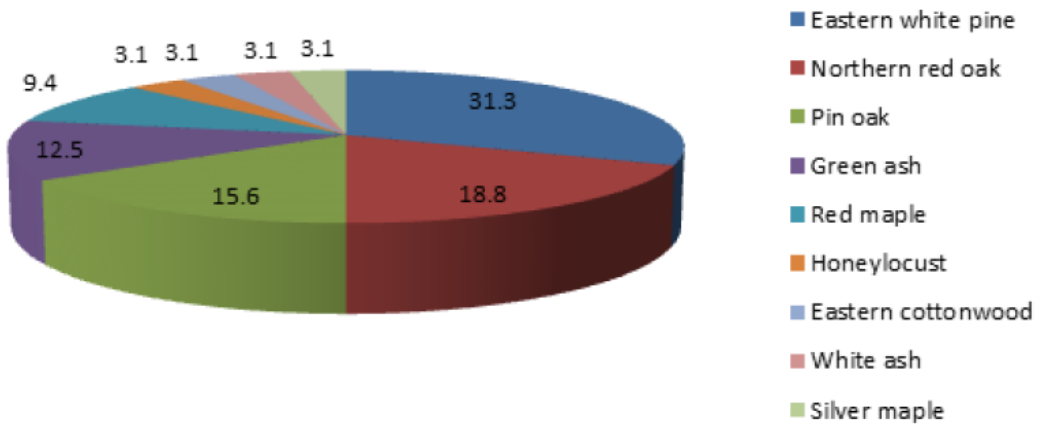
Total Annual Benefits of Public Trees by Species ($)

1/7/2016

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Eastern white pine	272	27	15	635	324	1,273	(N/A)	24.6
Northern red oak	114	12	16	76	88	306	(N/A)	5.9
Pin oak	294	57	38	373	455	1,216	(N/A)	23.5
Green ash	243	34	40	317	239	873	(N/A)	16.9
Red maple	98	12	16	77	126	329	(N/A)	6.4
Honeylocust	65	11	11	79	195	359	(N/A)	6.9
Eastern cottonwood	71	10	12	107	66	266	(N/A)	5.1
White ash	85	15	17	144	126	387	(N/A)	7.5
Silver maple	45	7	7	47	56	163	(N/A)	3.1
Citywide Total	1,286	184	173	1,854	1,675	5,172	(N/A)	100.0

Species Distribution of Public Trees

1/7/2016

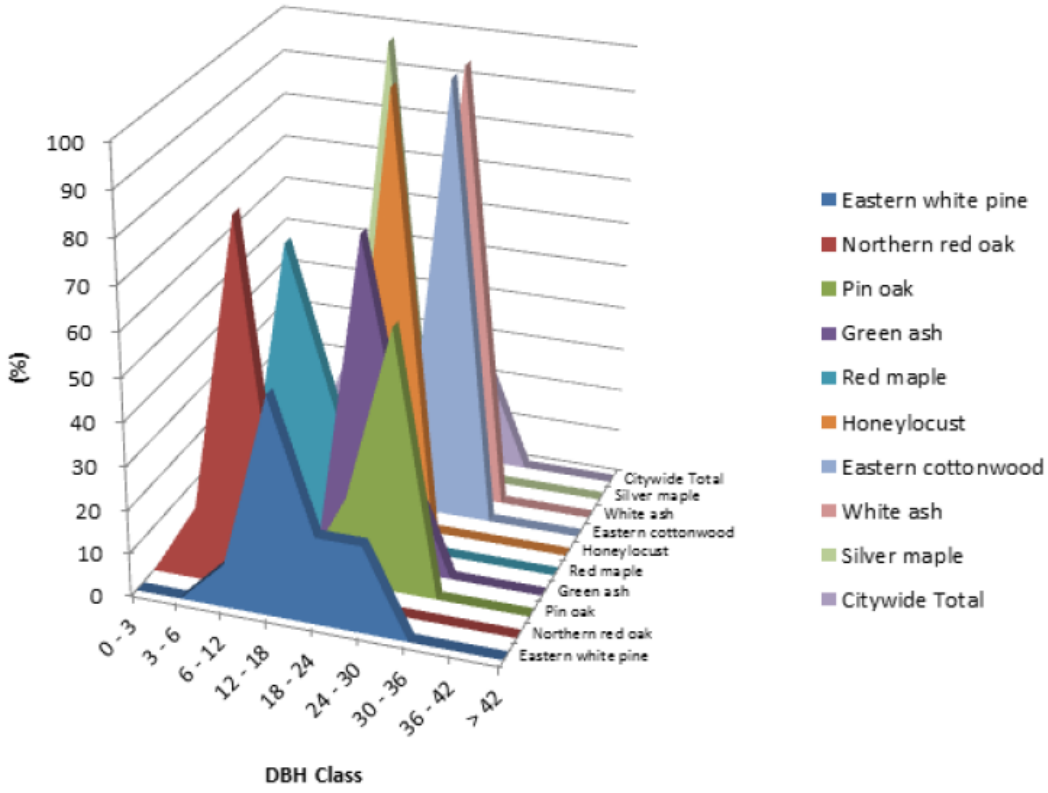


Species	Percent
Eastern white pine	31.3
Northern red oak	18.8
Pin oak	15.6
Green ash	12.5
Red maple	9.4
Honeylocust	3.1
Eastern cottonwood	3.1
White ash	3.1
Silver maple	3.1
Total	100.0

Figure 1: Species Distribution

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

1/7/2016



	DBH class (in)								
Species	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	> 42
Eastern white pine	0.00	0.00	10.00	50.00	20.00	20.00	0.00	0.00	0.00
Northern red oak	0.00	16.67	83.33	0.00	0.00	0.00	0.00	0.00	0.00
Pin oak	0.00	0.00	20.00	0.00	20.00	60.00	0.00	0.00	0.00
Green ash	0.00	0.00	0.00	0.00	75.00	25.00	0.00	0.00	0.00
Red maple	0.00	0.00	66.67	33.33	0.00	0.00	0.00	0.00	0.00
Honeylocust	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00
Eastern cottonwood	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00
White ash	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00
Silver maple	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00
Citywide Total	0.00	3.13	28.13	21.88	21.88	25.00	0.00	0.00	0.00

Figure 2: Relative Age Class

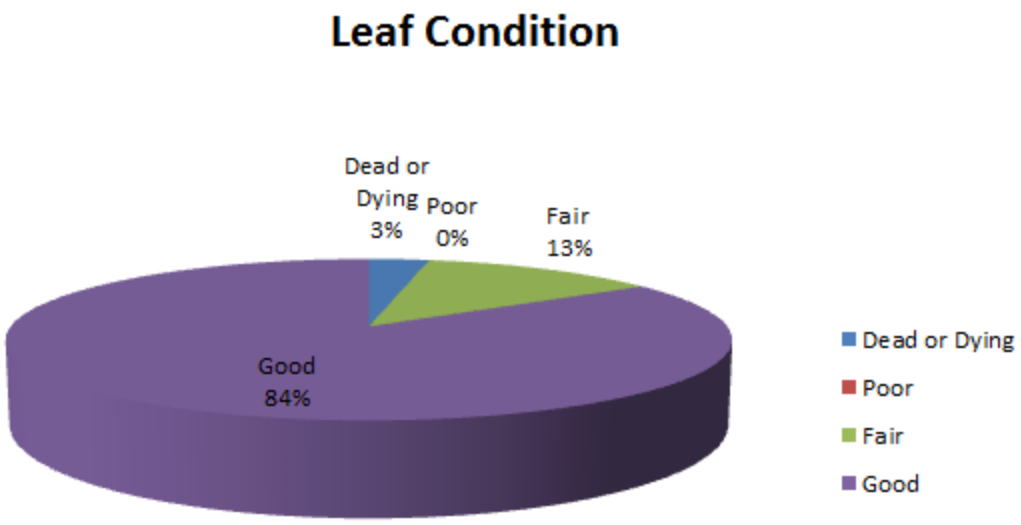


Figure 3: Foliage Condition

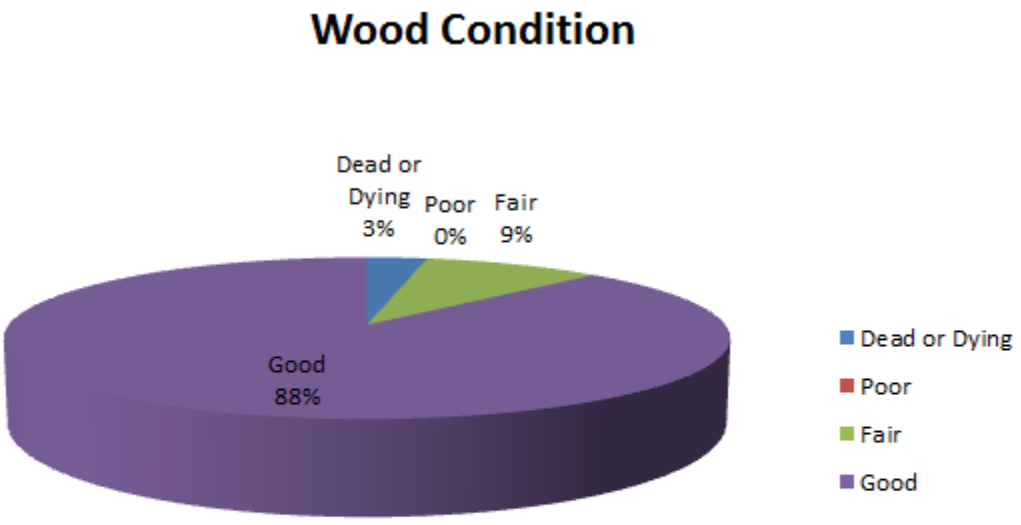
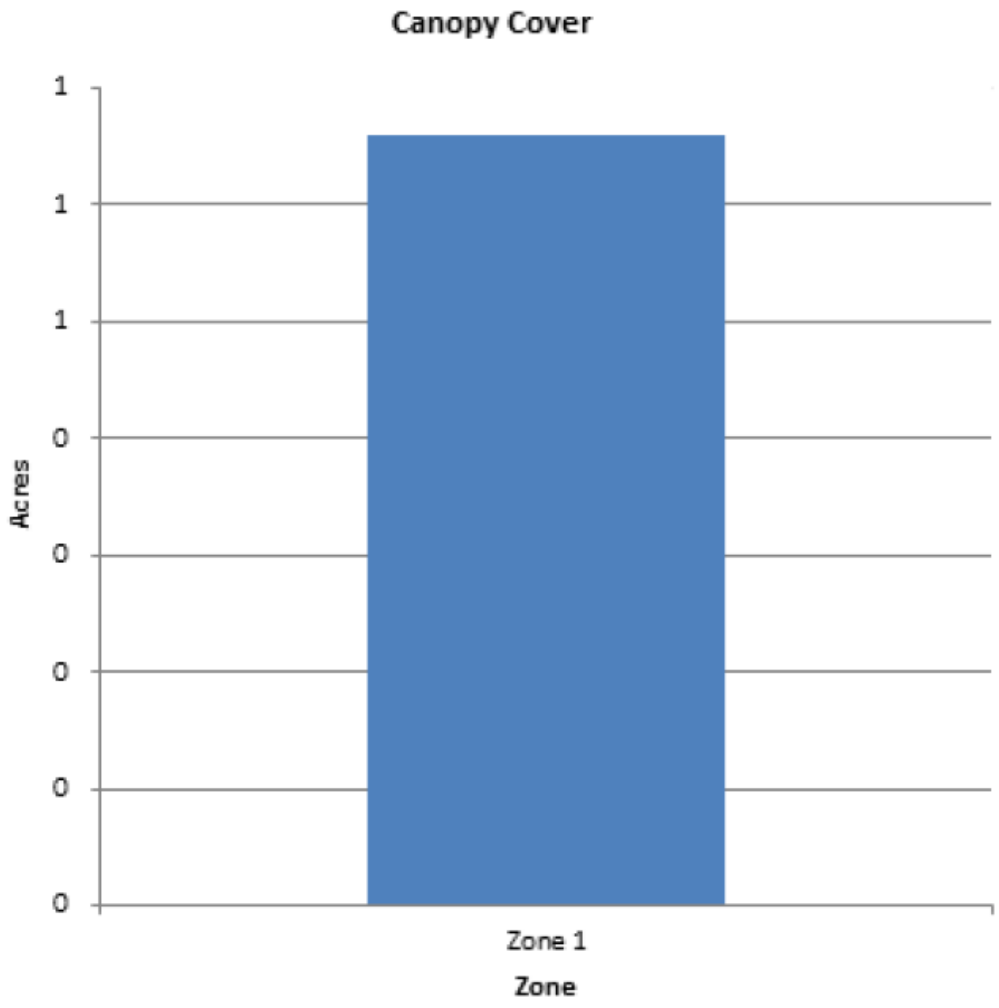


Figure 4: Wood Condition

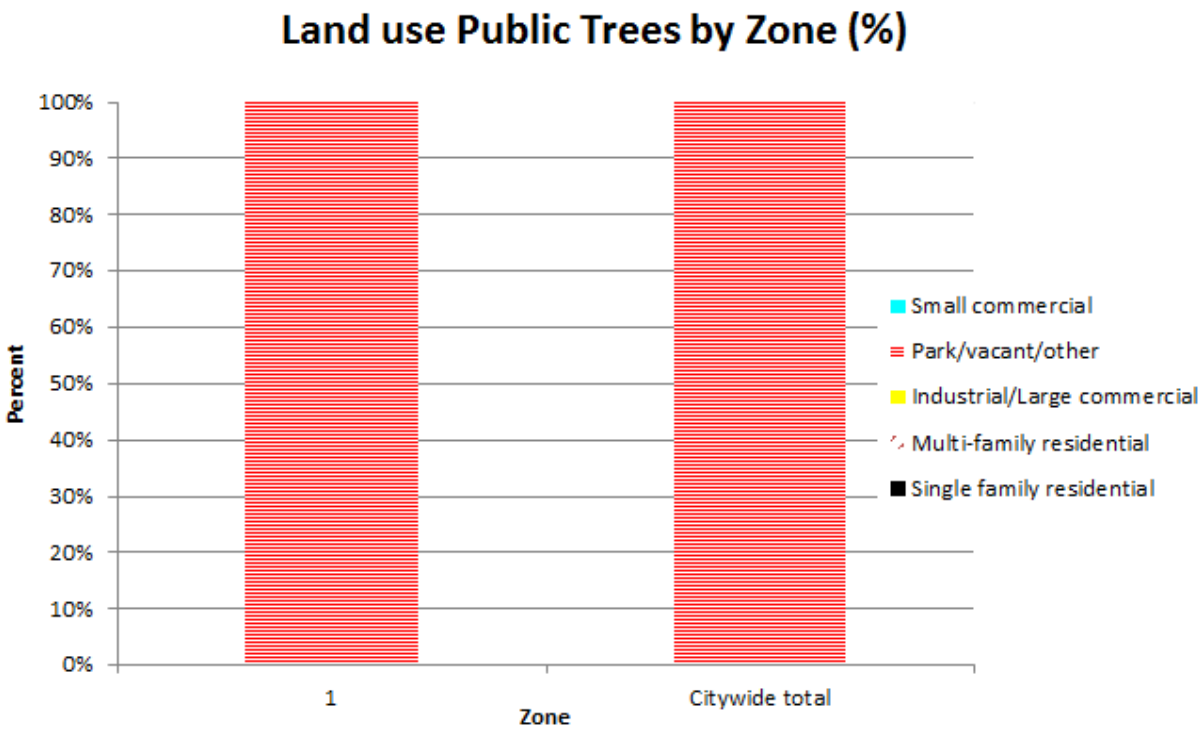
Canopy Cover of Public Trees (Acres)

1/7/2016



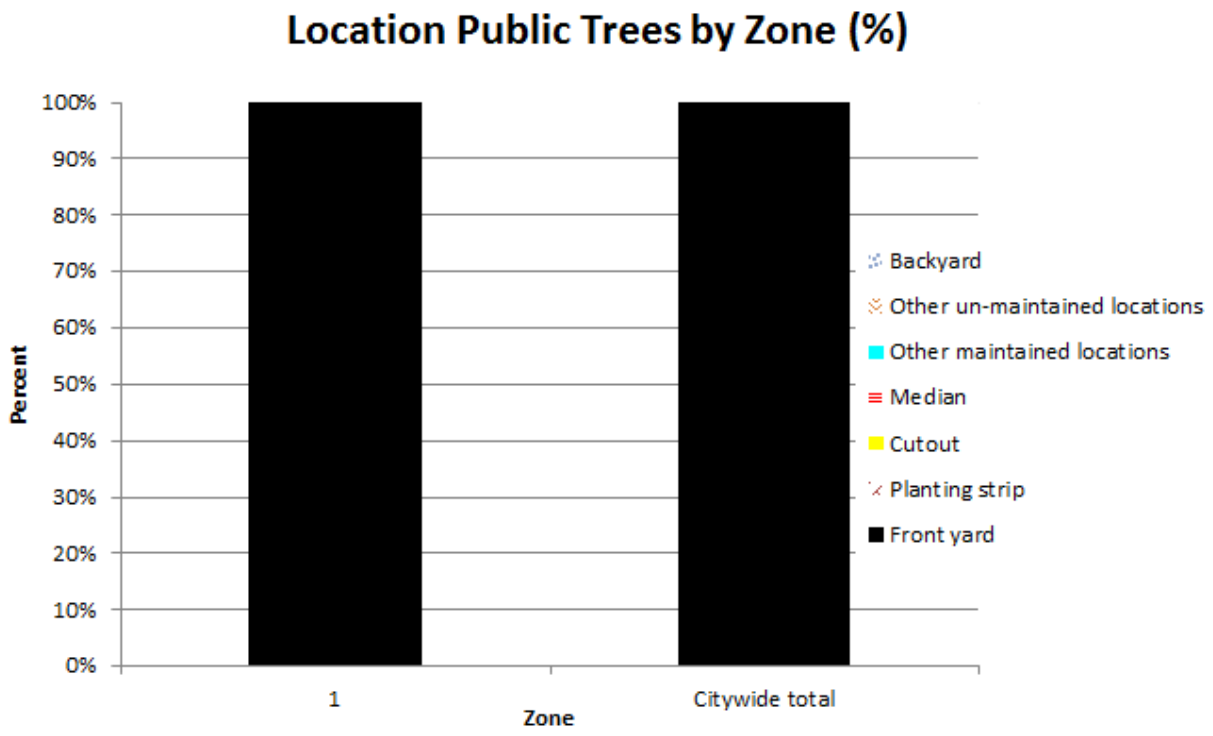
Zone	Acres	% of Total Canopy Cover
Zone 1	1	100.0
Citywide total	1	100.0

Figure 5: Canopy Cover in Acres



Zone	Single family residential	Multi-family residential	Industrial/Large commercial	Park/vacant/other	Small commercial
1	0.00	0.00	0.00	100.00	0.00
Citywide total	0.00	0.00	0.00	100.00	0.00

Figure 6: Land Use of city/park trees



Zone	Front yard	Planting strip	Cutout	Median	Other maintained locations	Other un-maintained locations	Backyard
1	100.00	0.00	0.00	0.00	0.00	0.00	0.00
Citywide total	100.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping

Figure 1: Location of Ash Trees

Figure 2: Location of EAB symptoms
There were no trees found to be showing symptoms of Emerald Ash Borer.

Figure 3: Location of Poor Condition Trees

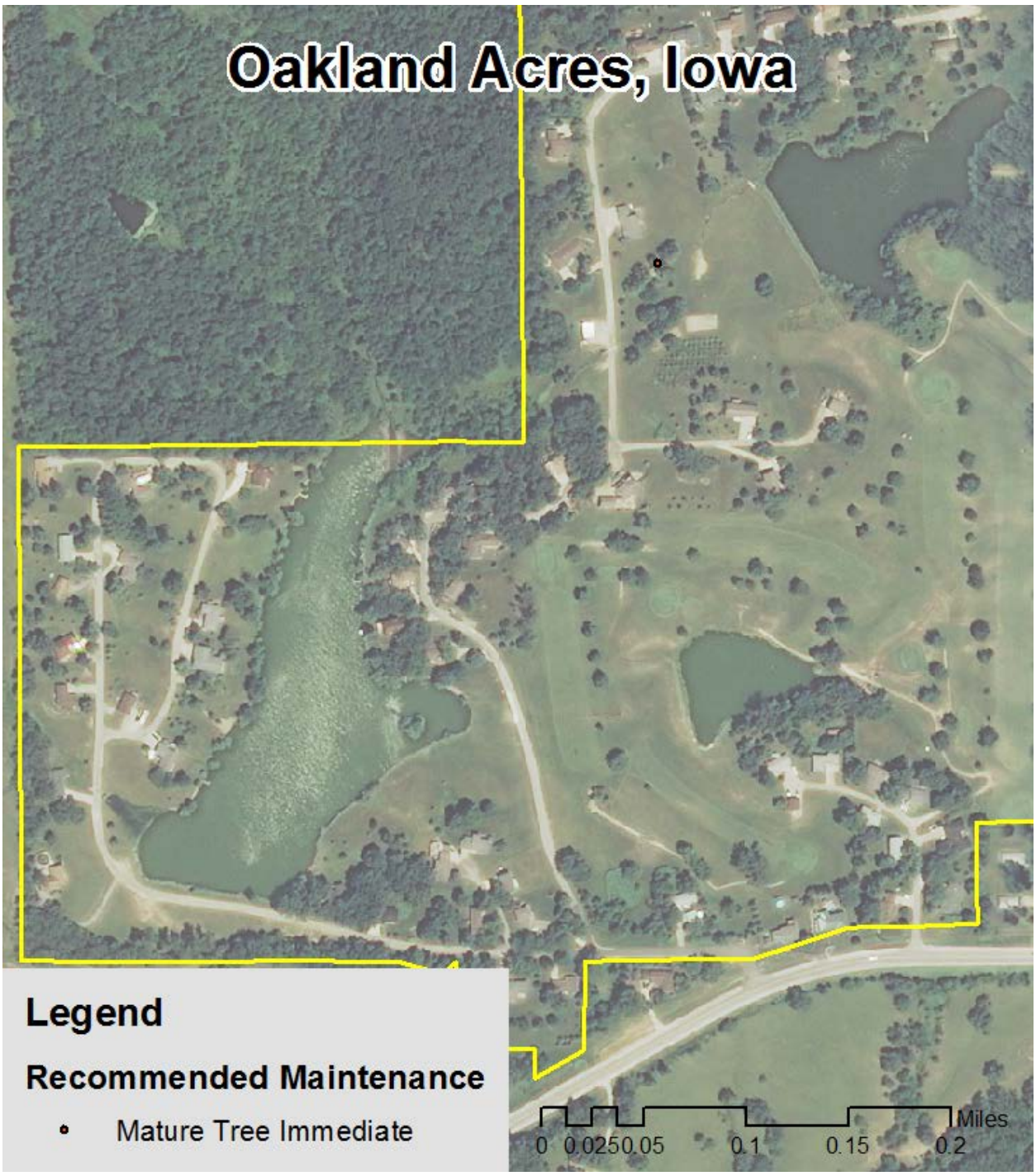


Figure 4: Location of Trees with Recommended Maintenance

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

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