2015 COMMUNITY TREE MANAGEMENT PLAN

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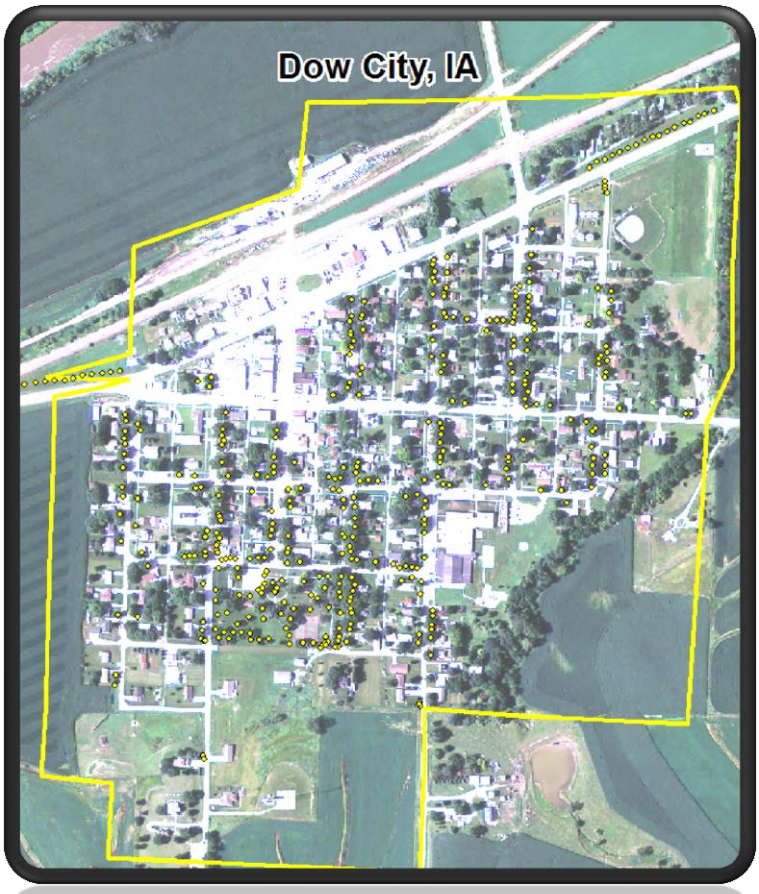

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Executive Summary

Overview

This plan was developed to assist the City of Dow 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 communities 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 possibility that 17.8% of your municipally managed trees 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 2015, a tree inventory was conducted using Global Positioning System (GPS) data collectors. The inventory was a complete inventory of street right of way and park trees. Below are some key findings of the 388 trees inventoried.

- Each of Dow City's municipal trees provides $209 worth of benefits to the community each year
- There are over 35 species of trees
- The top three genus are: Maple – 42.5%, Ash – 17.8%, Hackberry – 10.1%
- 7% of trees are in need of some type of management
- 16 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 findings:

- Of the 16 trees needing removal, fourteen (14) should be addressed as soon as possible in the next 2-3 years. Of the 16 removals, 13 trees are over 18" in diameter. *City ownership of the trees recommended for removal should be verified prior to any removal*
- 5 of the 69 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 two years.
- To remove and replace all right of way and city park ash (69 total ash trees, one up for removal right now = 68) would cost an estimated $46,240 using contracted labor. Community tree grants can help offset the estimated $12,240 in replacement tree costs. Budgeting ~ $4,600 per year for contracted work or in-kind municipal time for the next 10 years should allow you to adequately be prepared for the repercussions of a potential EAB outbreak.

Introduction

This plan was developed to assist Dow 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 Dow 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 Dow 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 Dow City and future generations through good urban forestry management.

Good urban tree 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 Dow City's urban forestry goals.

Inventory

In 2015, a tree inventory was conducted that included 100% of the city owned street right of way and park 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. Your community tree information is available for your use on a web-based GIS program. This GIS website, in addition to the fact sheet on how to operate the website, can be found at: http://www.iowadnr.gov/Conservation/Forestry/Urban-Forestry/Community-Tree-Inventories.
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 388 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. Findings

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Dow City's trees reduce energy related costs by approximately $20,573 annually (Appendix A, Table 1). These savings are both in Electricity (98.1 MWh) and in Natural Gas (13,398 Therms).

Annual Stormwater Benefits

Dow City's trees intercept about 1,168,104 gallons of rainfall or snow melt each year (Appendix A, Table 2). This interception provides $31,656 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 Dow City, it is estimated that trees remove 1286.4 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 $3,625 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere. In Dow City, trees sequester about 250,379 lbs of carbon a year with an associated value of $1,878 (Appendix A, Table 5). In addition, the trees store 4,390,277 lbs of carbon, with a yearly benefit of $32,927 (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. Dow City receives $23,488 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, Dow City's trees provide $81,218 of benefits annually. Benefits of individual trees vary based on size, species, health and

location, but on average each of the 388 trees in Dow City provide approximately $209 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Dow City has over 45 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genus is as follows:

Dow City Trees by Genus (% total)		
Maple	165	42.5%
Ash	69	17.8%
Hackberry	39	10.1%
Spruce	23	5.9%
Apple	21	5.4%
Oak	18	4.6%
Linden	11	2.8%
Elm	11	2.8%
Pear	7	1.8%
Juniper	5	1.3%
Birch	4	1.0%
Broadleaf Deciduous	2	0.5%
Honey Locust	2	0.5%
Magnolia	2	0.5%
Pine	2	0.5%
Cherry or Plum	2	0.5%
Mt. Ash	2	0.5%
Conifer/evergreen	1	0.3%
Walnut	1	0.3%
Sycamore	1	0.3%
Total	**388**	**100%**

Age Class

21% of Dow City's trees fall between 24-30 inches in diameter. Another 20% of the tree population lies in the diameter range of 6-12 inches. For age, a Bell Curve is preferred and should show the highest amount of trees around 18 inches in diameter at 4.5 ft. Dow City's size curve shows two waves, an intermediate wave up upcoming mature trees, and a second wave of maturing trees. Continue to plant trees, as feasible, to continue balancing out the maturing tree population in your community forest.

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 Dow City indicate that 98% of the trees were in good or fair health in 2015, with only 2% of the sampled trees in poor or dead/dying foliar health (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 93% of Dow City's trees are in good or fair health for wood condition (appendix A, Figure 4 & Appendix B, Figure 3). Wood condition that is in poor health is about 7% of the population. This 7% is an estimate of trees that need management/follow up.

Management Needs

The following outlines the specific management needs of the street and park trees by number of trees and percent of canopy (Appendix A, Figures 8 & 9).

TASK	**Number of Trees**	**% of Total trees**
Cleaning	88	22.7%
Removal	16	4.1 %
Stake/train	8	2%
Crown Raising	2	<1%
Treat pest/disease	3	<1%

Canopy Cover

The estimated canopy cover for the entire town of Dow City is approximately 32.35 acres (as calculated by the Iowa DNR). The canopy cover estimated by i-tree for the inventoried right of way and park trees is 11.9 acres (Appendix A, Figure 5). According to the 2010 census, Dow City occupies 204.51 acres. Thus the canopy cover on city parks and right of way areas is about 5.8%, and over the entire community is 15.8%.

Land Use and Location

The majority of Dow City's city and park trees are in planting strips and front yards 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.

<u>Land Use</u>	
Single Family Residential	76.5%
Park/Vacant/Other	22%
Multi-family Residential	1.5%

<u>Location</u>	
Planting strip	68%
Front yard	31%
Median	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

Dow City has 3 critical concern trees that need immediate cleaning. These trees can be seen on the Location of Trees with Recommended Maintenance map (Appendix B, Figures 4 and 5). In addition, there are 14 trees identified as needing removal in the next 1-3 years, and 2 trees in the next 5 years (see Figure 4 – Mature Tree Immediate and mature tree routine map points). There are 3 mature trees that needs follow-up due to a forest health issue. Finally, there are 85 trees suggested for cleaning (20 trees of which need cleaning in the next 1-3 years), and 2 trees suggested for a crown raising. These recommendations are summarized on the following table.

PRIORITY TASK	CRITICAL CONCERN	MATURE TREE IMMEDIATE	MATURE TREE ROUTINE	YOUNG TREE IMMEDIATE	YOUNG TREE ROUTINE	TOTAL
NONE:			233		38	**271**
STAKE/TRAIN			2		6	**8**
CLEAN	3	20	65			**88**
RAISE		1	1			**2**
REDUCE						
REMOVE		14	2			**16**
TREAT PEST/DISEASE		2	1			**3**
TOTAL	**3**	**37**	**304**		**44**	**388**

Poor tree species

After the removal of the critical concern and immediate concern trees, ash trees in poor health should be assessed for removal (Appendix B, Figure 1 & Appendix B, Figure 3). Of the 16 removals, 1 is an ash tree. There are a total of 69 ash trees, and 5 trees have signs and symptoms that have been associated with EAB. In addition, there are 3 ash trees that are in poor health or dead/dying. EAB symptomatic trees should be examined as soon as possible. *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 five main maintenance issues to be addressed: routine pruning, crown cleaning, crown raising, crown reduction, and treat pest/disease. 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. Treat pest/disease trees showed indications of foliar or structural decline due to insect, disease, or rot. These trees should be investigated further by a certified arborist who can look into the integrity of the tree. It is recommended that all trees be pruned on a routine schedule every five to seven years.

Planting

It is suggested that for every tree removed, a replanting rate of 1.2 should be used, since survival rates will not be 100%. 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 canopy cover in Dow City.

It is important to plant a diverse mix of species in Dow City 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, Dow City is heavily planted with Maple (42.5%) and Ash (17.8%) (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, Chinese elm, willow or black walnut, as outlined in section 151.02 of the city ordinance (Appendix C). All trees planted must meet the restrictions in city ordinance 151.02 (Appendix C).

Sycamore, bur oak, chinkapin oak, white oak, red oak, Kentucky coffee tree, American linden (basswood), thornless honey locust, and hackberry are all suited to Dow City's silt loam bottomland soils – and are presently underutilized. In addition, ironwood (*Ostrya virginiana*) and serviceberry (*Amalanchier arborea*) would make great alternatives to low growing trees for right of ways.

Recommended Species to plant in Western Iowa:

COMMON NAME	SCIENTIFIC NAME	CULTIVARS / SELECTIONS
LARGE SHADE TREES – Plant 35 feet apart and away from overhead power lines.		
White Oak	*Quercus alba*	
Bur Oak	*Quercus macrocarpa*	
Red Oak	*Quercus rubra*	
Black Oak	*Quercus veluntina*	
Chinkapin Oak	*Quercus muehlenbergii*	
American Basswood (Linden)	*Tilia Americana*	Boulevard, Front Yard, Legend, Redmond

Thornless Honeylocust	*Gleditsia triacanthos var. inermis*	Shademaster, Skyline
American elm	*Ulmus Americana*	Independence, New harmony, Valley Forge
Cottonwood (seedless) - ***Not recommended for planting near any homes or structures	*Populous deltoides*	Siouxland
Sycamore	*Plantanus occidentalis*	
Gingko	*Gingko biloba*	Male only – Shangri-La, Princeton sentry, Emperor
Kentucky coffee tree	*Gymnocladus diocius*	Expresso
Black Cherry	*Prunus serotina*	
Hackberry	*Celtis occidentalis*	Chicagoland, Prairie Pride, Windy City
LOW GROWING TREES (less than 30 feet tall) planted as close as 12 feet.		
Eastern redbud	*Cercis Canadensis*	
Downy Hawthorn	*Crataegus mollis*	
Ironwood (hop hornbeam)	*Ostrya virginiana*	
American hornbeam	*Carpinus caroliniana*	
Serviceberry	*Amalanchier arborea*	Autumn brilliance, Cumulus, Princess Diana
Flowering crabapple	*Malus*	Prairiefire, Adams, Sentinel, Snowdrift
Red mulberry	*Morus rubra*	
American (wild) plum	*Prunus americana*	
EVERGREEN TREES – planted 25 feet apart and away from overhead power lines.		
Eastern White Pine	*Pinus strobes*	
Jack pine	*Pinus banksiana*	
Juniper (Eastern red cedar)	*Juniperus virginiana*	
Norway spruce	*Picea abies*	
Concolor fir	*Abies concolor*	
Bald cypress	*Taxodium distichum*	
Arborvitae (Northern White cedar)	*Thuja occidentalis*	Techny, Brandon, Holmstrup

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.

Emerald Ash Borer Plan

Ash Tree Removal

Tree removal should be prioritized with dead, dying, hazardous trees to be removed first (Appendix B, Figure 3). Next will be all ash in poor condition and displaying signs and symptoms of EAB (Appendix B, Figure 1 & Appendix B, Figure 2). *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. The entire state of Iowa is under USDA quarantine for EAB.

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.

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? 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.

Canopy Replacement

As budget permits, all removed ash trees should be replaced. All trees should meet the restrictions in city ordinance 151.02 (Appendix C). The new plantings should 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 genus other than ash should 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 suggested that private property owners monitor the condition of their privately managed trees. There are numerous options available to them, including: removal and replanting, treating with insecticides, and monitoring until an issue arises. These options are spelled out in: https://store.extension.iastate.edu/Product/Emerald-Ash-Borer-Management-Options. Check your city tree ordinance to be sure additional actions are not required for these private trees.

Treating for EAB

Many landowners will want to treat their ash trees with insecticides to prolong the life of their ash trees. This is only recommended by Iowa State University Extension when EAB has been found within 15 miles of the tree in question. The closest known population of EAB to Dow City is in Boone.

Insecticidal injections or drenches can have serious environmental side effects when improperly applied. Some insecticides have application limits – like only treating 3 trees per acre, for instance. Encourage your residents to report ash treatments with the city or their neighbors – in order to prevent over-application of these insecticides. Please contact me if you have any questions. I would be more than happy to host an informational meeting on EAB and its effects on community ash trees.

My suggestion would be to start increasing the city tree budget for removals and replacements now. I would place all efforts and finances on replanting trees – and removing declining trees and EAB casualty trees as they arise. Your community should put heavy thought and consideration into your emerald ash borer plan. For instance, it may be more economical to budget for ash removals as they come, than it would be to treat each city-managed ash tree for the next 5 to 10 years.

Maintenance Plan and Budget

The following tasks are placed in order of yearly priority. These tasks should be fulfilled as your budget or personnel time allows. Critical concern trees should be treated immediately, and immediate mature tree tasks should be completed within 2-3 years (which is their expected lifetime before they become critical concern trees). Mature tree routine trees should be

followed up on within 5 years. If you are interested in creating a scheduled maintenance and replanting plan, based on a set budget, please contact me. For now, a priority list looks like this:

2016: Clean the 3 critical concern trees.

Consider organizing public meetings to discuss EAB

Discuss increasing tree removal and replacement time or financial budgets with city staff

Look into tree planting grants for community entities (Trees for Kids, Trees Forever grants)

2016-2018: Complete 14 mature tree immediate removals. Clean remaining 20 mature immediate trees (if time allows), raise the 1 mature tree immediate tree, and follow-up with the two trees labeled as having a treat pest/disease issue.

Determine how much money can be budgeted over the next 10 years for potential forest health issues.

Start replanting trees that you have removed, as time and finances permit. 19 trees should be replanted to replace the 16 hazard trees removed. 82 trees will be needed to replace all 68 remaining ash if an EAB infestation occurs. Plan on budgeting or requesting $150/tree for replanting and maintenance costs.

Monitor for suspicious ash trees.

2018-2020:

Complete remaining 2 removals, and stake/train the 8 trees identified as such.

Consider implementing a routine trimming (cleaning) regimen for the remaining city trees. Ideally, routine trimming should be done to 1/3 of the city's trees every 2 years. In other words, all public and right of way trees should be trimmed once every 6 years.

Also – consider evaluating Dow City's street trees again for hazards by 2020 (if not before).

Monitor for tree health issues – all species.

<u>Proposed Budget Increase</u>

Emerald Ash Borer could potentially kill all ash trees in Dow City within 4 years of its arrival. To remove and replace all 69 inventoried ash trees (1 ash tree is recommended for immediate hazard removal), you would need to budget an estimated $46,240 (calculated using $500/tree

removal price and $150/tree replacement price). If municipal crews usually take down right of way and park trees, the removal costs will undoubtedly be much less than this figure. However, if you rely on contractors to remove and replant your city trees – you will want to be budgeting for at least $4,600 for the next 10 years.

It is recommended that Dow 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. The Trees for Kids Grant will be a great option for your community to use for tree planting projects on public lands. Trees Forever may also have community improvement grants that can assist with replanting expenses.

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Dow City

Annual Energy Benefits of Public Trees

12/7/2015

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Silver maple	32.8	2,486	4,310.5	4,224	6,711	(N/A)	24.0	32.6	72.16
Green ash	17.2	1,303	2,328.0	2,281	3,585	(N/A)	17.0	17.4	54.32
Maple	5.0	379	718.3	704	1,083	(N/A)	10.6	5.3	26.42
Northern hackberry	14.6	1,108	2,062.7	2,021	3,130	(N/A)	10.1	15.2	80.24
Blue spruce	2.5	187	335.2	329	515	(N/A)	5.9	2.5	22.41
Apple	1.4	104	216.8	212	317	(N/A)	5.4	1.5	15.09
Norway maple	4.5	343	658.9	646	988	(N/A)	4.4	4.8	58.15
Sugar maple	1.7	128	223.6	219	347	(N/A)	2.3	1.7	38.59
Pin oak	3.0	229	406.3	398	628	(N/A)	2.3	3.1	69.74
Siberian elm	3.2	242	427.7	419	662	(N/A)	2.1	3.2	82.69
Callery pear	0.7	51	98.6	97	147	(N/A)	1.8	0.7	21.02
Littleleaf linden	0.8	62	116.9	115	176	(N/A)	1.5	0.9	29.41
Black walnut	1.8	134	247.9	243	377	(N/A)	1.3	1.8	75.35
American basswood	1.8	138	252.2	247	385	(N/A)	1.3	1.9	76.96
Birch	0.9	68	123.3	121	189	(N/A)	1.0	0.9	47.22
Northern red oak	0.3	26	44.1	43	69	(N/A)	1.0	0.3	17.19
Amur maple	0.5	40	82.0	80	121	(N/A)	1.0	0.6	30.16
Elm	1.3	99	175.8	172	272	(N/A)	0.8	1.3	90.56
Bur oak	0.6	45	77.5	76	121	(N/A)	0.8	0.6	40.32
White ash	0.2	14	26.7	26	40	(N/A)	0.5	0.2	20.10
Honeylocust	0.7	56	94.8	93	149	(N/A)	0.5	0.7	74.28
Mountain ash	0.3	21	44.5	44	64	(N/A)	0.5	0.3	32.17
Broadleaf Deciduous Large	0.8	63	112.7	110	173	(N/A)	0.5	0.8	86.52
Southern magnolia	0.0	2	5.7	6	8	(N/A)	0.5	0.0	3.94
Black cherry	0.1	6	12.8	13	18	(N/A)	0.3	0.1	18.19
Cherry plum	0.0	2	3.8	4	5	(N/A)	0.3	0.0	5.40
Conifer Evergreen Large	0.2	14	24.6	24	38	(N/A)	0.3	0.2	38.17
American sycamore	0.4	29	53.7	53	82	(N/A)	0.3	0.4	82.02
Eastern white pine	0.2	14	24.6	24	38	(N/A)	0.3	0.2	38.17
White oak	0.0	0	0.5	0	1	(N/A)	0.3	0.0	0.66
Swamp white oak	0.0	0	0.8	1	1	(N/A)	0.3	0.0	1.10
Ash	0.1	8	16.9	17	24	(N/A)	0.3	0.1	24.47
Eastern red cedar	0.1	8	16.4	16	25	(N/A)	0.3	0.1	24.57
Red maple	0.3	19	30.1	29	49	(N/A)	0.3	0.2	48.95
Austrian pine	0.2	13	23.3	23	35	(N/A)	0.3	0.2	35.47
Total	98.1	7,443	13,398.0	13,130	20,573	(N/A)	100.0	100.0	53.02

Table 2: Annual Stormwater Benefits

Dow City

Annual Stormwater Benefits of Public Trees

12/7/2015

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Silver maple	486,769	13,191	(N/A)	24.0	41.7	141.84
Green ash	186,719	5,060	(N/A)	17.0	16.0	76.67
Maple	29,838	809	(N/A)	10.6	2.6	19.72
Northern hackberry	150,172	4,070	(N/A)	10.1	12.9	104.35
Blue spruce	36,634	993	(N/A)	5.9	3.1	43.16
Apple	4,888	132	(N/A)	5.4	0.4	6.31
Norway maple	43,469	1,178	(N/A)	4.4	3.7	69.30
Sugar maple	15,700	425	(N/A)	2.3	1.3	47.27
Pin oak	32,966	893	(N/A)	2.3	2.8	99.26
Siberian elm	38,131	1,033	(N/A)	2.1	3.3	129.17
Callery pear	3,655	99	(N/A)	1.8	0.3	14.15
Littleleaf linden	6,920	188	(N/A)	1.5	0.6	31.26
Black walnut	22,810	618	(N/A)	1.3	2.0	123.63
American basswood	25,747	698	(N/A)	1.3	2.2	139.55
Birch	7,168	194	(N/A)	1.0	0.6	48.57
Northern red oak	1,908	52	(N/A)	1.0	0.2	12.93
Amur maple	2,370	64	(N/A)	1.0	0.2	16.05
Elm	19,968	541	(N/A)	0.8	1.7	180.38
Bur oak	5,580	151	(N/A)	0.8	0.5	50.41
White ash	1,227	33	(N/A)	0.5	0.1	16.63
Honeylocust	9,370	254	(N/A)	0.5	0.8	126.96
Mountain ash	1,439	39	(N/A)	0.5	0.1	19.49
Broadleaf Deciduous Large	12,729	345	(N/A)	0.5	1.1	172.48
Southern magnolia	113	3	(N/A)	0.5	0.0	1.53
Black cherry	264	7	(N/A)	0.3	0.0	7.17
Cherry plum	69	2	(N/A)	0.3	0.0	1.86
Conifer Evergreen Large	4,605	125	(N/A)	0.3	0.4	124.79
American sycamore	5,491	149	(N/A)	0.3	0.5	148.79
Eastern white pine	4,605	125	(N/A)	0.3	0.4	124.79
White oak	18	0	(N/A)	0.3	0.0	0.48
Swamp white oak	12	0	(N/A)	0.3	0.0	0.33
Ash	586	16	(N/A)	0.3	0.1	15.88
Eastern red cedar	1,635	44	(N/A)	0.3	0.1	44.30
Red maple	1,604	43	(N/A)	0.3	0.1	43.46
Austrian pine	2,925	79	(N/A)	0.3	0.3	79.26
Citywide total	1,168,104	31,656	(N/A)	100.0	100.0	81.59

Table 3: Annual Air Quality Benefits

Dow City

Annual Air Quality Benefits of Public Trees

12/7/2015

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								
Silver maple	86.6	14.7	42.2	3.8	466	154.4	22.6	21.6	148.2	966	-44.6	-167	449.5	1,265	(N/A)	24.0	13.60
Green ash	23.7	3.8	11.3	1.1	126	81.8	11.9	11.4	77.8	510	0.0	0	222.8	636	(N/A)	17.0	9.64
Maple	4.5	0.8	2.4	0.2	25	24.1	3.5	3.3	22.6	150	-1.8	-7	59.6	167	(N/A)	10.6	4.08
Northern hackberry	24.4	4.2	12.2	1.1	133	70.4	10.2	9.7	66.2	437	0.0	0	198.5	570	(N/A)	10.1	14.60
Blue spruce	5.5	1.1	4.5	0.7	36	11.7	1.7	1.6	11.1	73	-13.7	-51	24.3	58	(N/A)	5.9	2.51
Apple	1.1	0.2	0.6	0.0	6	6.8	1.0	0.9	6.2	42	0.0	0	16.8	48	(N/A)	5.4	2.28
Norway maple	9.0	1.5	4.4	0.4	48	22.0	3.2	3.0	20.5	136	-2.1	-8	61.8	176	(N/A)	4.4	10.38
Sugar maple	1.9	0.3	1.0	0.1	10	8.0	1.2	1.1	7.6	50	-1.5	-6	19.7	55	(N/A)	2.3	6.07
Pin oak	5.7	1.0	2.9	0.3	31	14.4	2.1	2.0	13.7	90	-10.6	-40	31.4	81	(N/A)	2.3	9.01
Siberian elm	7.1	1.2	3.4	0.3	38	15.2	2.2	2.1	14.5	95	0.0	0	46.0	133	(N/A)	2.1	16.59
Callery pear	0.4	0.1	0.3	0.0	2	3.3	0.5	0.4	3.0	20	-0.1	0	7.8	22	(N/A)	1.8	3.14
Littleleaf linden	1.0	0.2	0.5	0.0	6	3.9	0.6	0.5	3.7	24	-0.5	-2	10.0	28	(N/A)	1.5	4.67
Black walnut	3.1	0.5	1.4	0.1	16	8.5	1.2	1.2	8.0	53	0.0	0	24.0	69	(N/A)	1.3	13.77
American basswood	4.1	0.7	1.9	0.2	22	8.7	1.3	1.2	8.2	54	-3.3	-12	23.0	63	(N/A)	1.3	12.69
Birch	1.4	0.2	0.7	0.1	7	4.3	0.6	0.6	4.1	27	-0.3	-1	11.6	33	(N/A)	1.0	8.22
Northern red oak	0.3	0.0	0.2	0.0	2	1.6	0.2	0.2	1.5	10	-0.4	-2	3.7	10	(N/A)	1.0	2.51
Amur maple	0.7	0.1	0.3	0.0	4	2.6	0.4	0.4	2.4	16	0.0	0	7.0	20	(N/A)	1.0	5.00
Elm	3.5	0.6	1.6	0.2	18	6.2	0.9	0.9	5.9	39	0.0	0	19.8	57	(N/A)	0.8	19.10
Bur oak	0.6	0.1	0.3	0.0	3	2.8	0.4	0.4	2.7	18	0.0	0	7.3	21	(N/A)	0.8	6.92
White ash	0.0	0.0	0.0	0.0	0	0.9	0.1	0.1	0.8	6	0.0	0	2.1	6	(N/A)	0.5	2.91
Honeylocust	1.9	0.3	0.8	0.1	10	3.4	0.5	0.5	3.3	22	-1.5	-6	9.3	26	(N/A)	0.5	12.87
Mountain ash	0.5	0.1	0.2	0.0	3	1.4	0.2	0.2	1.2	8	0.0	0	3.8	11	(N/A)	0.5	5.45
Broadleaf Deciduous Large	2.0	0.3	0.9	0.1	10	3.9	0.6	0.5	3.7	25	0.0	0	12.0	35	(N/A)	0.5	17.37
Southern magnolia	0.0	0.0	0.0	0.0	0	0.2	0.0	0.0	0.1	1	0.0	0	0.3	1	(N/A)	0.5	0.47
Black cherry	0.0	0.0	0.0	0.0	0	0.4	0.1	0.1	0.3	2	0.0	0	0.9	3	(N/A)	0.3	2.55
Cherry plum	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	0.0	0	0.3	1	(N/A)	0.3	0.71
Conifer Evergreen Large	0.6	0.1	0.4	0.1	4	0.9	0.1	0.1	0.8	5	-2.9	-11	0.3	-2	(N/A)	0.3	-1.58
American sycamore	0.8	0.1	0.4	0.0	4	1.9	0.3	0.3	1.8	12	0.0	0	5.5	16	(N/A)	0.3	15.71
Eastern white pine	0.6	0.1	0.4	0.1	4	0.9	0.1	0.1	0.8	5	-2.9	-11	0.3	-2	(N/A)	0.3	-1.58
White oak	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0	(N/A)	0.3	0.08
Swamp white oak	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0	(N/A)	0.3	0.14
Ash	0.1	0.0	0.0	0.0	0	0.5	0.1	0.1	0.5	3	0.0	0	1.2	3	(N/A)	0.3	3.47
Eastern red cedar	0.3	0.1	0.3	0.0	2	0.5	0.1	0.1	0.5	3	-0.9	-3	1.0	2	(N/A)	0.3	2.19
Red maple	0.3	0.1	0.2	0.0	2	1.2	0.2	0.2	1.2	7	-0.1	0	3.1	9	(N/A)	0.3	8.75
Austrian pine	0.5	0.1	0.4	0.1	3	0.8	0.1	0.1	0.8	5	-1.1	-4	1.8	4	(N/A)	0.3	4.16

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								
Citywide total	192.1	32.6	96.3	9.1	1,043	467.5	68.1	64.9	444.1	2,913	-88.5	-332	1,286.4	3,625	(N/A)	100.0	9.34

Table 4: Annual Carbon Stored

Dow City

Stored CO2 Benefits of Public Trees

12/7/2015

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Silver maple	1,978,980	14,842	(N/A)	24.0	45.1	159.60
Green ash	780,208	5,852	(N/A)	17.0	17.8	88.66
Maple	57,778	433	(N/A)	10.6	1.3	10.57
Northern hackberry	372,599	2,794	(N/A)	10.1	8.5	71.65
Blue spruce	42,551	319	(N/A)	5.9	1.0	13.88
Apple	18,793	141	(N/A)	5.4	0.4	6.71
Norway maple	146,936	1,102	(N/A)	4.4	3.3	64.82
Sugar maple	54,918	412	(N/A)	2.3	1.3	45.76
Pin oak	147,624	1,107	(N/A)	2.3	3.4	123.02
Siberian elm	171,733	1,288	(N/A)	2.1	3.9	161.00
Callery pear	7,582	57	(N/A)	1.8	0.2	8.12
Littleleaf linden	22,093	166	(N/A)	1.5	0.5	27.62
Black walnut	99,205	744	(N/A)	1.3	2.3	148.81
American basswood	157,245	1,179	(N/A)	1.3	3.6	235.87
Birch	22,629	170	(N/A)	1.0	0.5	42.43
Northern red oak	4,819	36	(N/A)	1.0	0.1	9.04
Amur maple	11,596	87	(N/A)	1.0	0.3	21.74
Elm	121,184	909	(N/A)	0.8	2.8	302.96
Bur oak	19,630	147	(N/A)	0.8	0.4	49.08
White ash	2,069	16	(N/A)	0.5	0.0	7.76
Honeylocust	24,490	184	(N/A)	0.5	0.6	91.84
Mountain ash	7,651	57	(N/A)	0.5	0.2	28.69
Broadleaf Deciduous	65,202	489	(N/A)	0.5	1.5	244.51
Southern magnolia	6	0	(N/A)	0.5	0.0	0.02
Black cherry	908	7	(N/A)	0.3	0.0	6.81
Cherry plum	178	1	(N/A)	0.3	0.0	1.33
Conifer Evergreen La	7,490	56	(N/A)	0.3	0.2	56.18
American sycamore	25,943	195	(N/A)	0.3	0.6	194.57
Eastern white pine	7,490	56	(N/A)	0.3	0.2	56.18
White oak	12	0	(N/A)	0.3	0.0	0.09
Swamp white oak	17	0	(N/A)	0.3	0.0	0.13
Ash	1,101	8	(N/A)	0.3	0.0	8.26
Eastern red cedar	1,102	8	(N/A)	0.3	0.0	8.27
Red maple	3,624	27	(N/A)	0.3	0.1	27.18
Austrian pine	4,893	37	(N/A)	0.3	0.1	36.70
Citywide total	4,390,277	32,927	(N/A)	100.0	100.0	84.86

Table 5: Annual Carbon Sequestered

Dow City

Annual CO Benefits of Public Trees

12/7/2015

Species	Sequestered (lb)	Sequestered ($)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released ($)	Avoided (lb)	Avoided ($)	Net Total (lb)	Total ($) Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Silver maple	141,791	1,063	-9,499	-367	-3	0	0	131,925	989 (N/A)	24.0	52.7	10.64
Green ash	39,353	295	-3,745	-180	-1	0	0	35,428	266 (N/A)	17.0	14.1	4.03
Maple	8,235	62	-277	-51	0	0	0	7,907	59 (N/A)	10.6	3.2	1.45
Northern hackberry	19,242	144	-1,788	-139	-1	0	0	17,314	130 (N/A)	10.1	6.9	3.33
Blue spruce	2,265	17	-204	-46	0	0	0	2,015	15 (N/A)	5.9	0.8	0.66
Apple	2,099	16	-90	-20	0	0	0	1,988	15 (N/A)	5.4	0.8	0.71
Norway maple	6,621	50	-705	-47	0	0	0	5,869	44 (N/A)	4.4	2.3	2.59
Sugar maple	3,324	25	-265	-18	0	0	0	3,041	23 (N/A)	2.3	1.2	2.53
Pin oak	13,905	104	-709	-32	0	0	0	13,165	99 (N/A)	2.3	5.3	10.97
Siberian elm	6,402	48	-824	-35	0	0	0	5,542	42 (N/A)	2.1	2.2	5.20
Callery pear	1,345	10	-38	-7	0	0	0	1,299	10 (N/A)	1.8	0.5	1.39
Littleleaf linden	2,558	19	-106	-10	0	0	0	2,441	18 (N/A)	1.5	1.0	3.05
Black walnut	4,490	34	-476	-19	0	0	0	3,995	30 (N/A)	1.3	1.6	5.99
American basswood	8,135	61	-755	-22	0	0	0	7,358	55 (N/A)	1.3	2.9	11.04
Birch	996	7	-109	-9	0	0	0	878	7 (N/A)	1.0	0.4	1.65
Northern red oak	489	4	-23	-4	0	0	0	462	3 (N/A)	1.0	0.2	0.87
Amur maple	974	7	-56	-7	0	0	0	911	7 (N/A)	1.0	0.4	1.71
Elm	2,351	18	-582	-15	0	0	0	1,754	13 (N/A)	0.8	0.7	4.38
Bur oak	1,376	10	-94	-6	0	0	0	1,276	10 (N/A)	0.8	0.5	3.19
White ash	364	3	-10	-2	0	0	0	352	3 (N/A)	0.5	0.1	1.32
Honeylocust	1,486	11	-118	-5	0	0	0	1,363	10 (N/A)	0.5	0.5	5.11
Mountain ash	592	4	-37	-4	0	0	0	552	4 (N/A)	0.5	0.2	2.07
Broadleaf Deciduous Large	1,872	14	-313	-9	0	0	0	1,549	12 (N/A)	0.5	0.6	5.81
Southern magnolia	3	0	0	0	0	0	0	2	0 (N/A)	0.5	0.0	0.01
Black cherry	114	1	-4	-1	0	0	0	108	1 (N/A)	0.3	0.0	0.81
Cherry plum	38	0	-1	-1	0	0	0	37	0 (N/A)	0.3	0.0	0.27
Conifer Evergreen Large	256	2	-36	-4	0	0	0	217	2 (N/A)	0.3	0.1	1.62
American sycamore	960	7	-125	-4	0	0	0	831	6 (N/A)	0.3	0.3	6.23
Eastern white pine	0	0	-36	-4	0	0	0	-40	0 (N/A)	0.3	0.0	-0.30
White oak	3	0	0	0	0	0	0	2	0 (N/A)	0.3	0.0	0.02
Swamp white oak	5	0	0	0	0	0	0	5	0 (N/A)	0.3	0.0	0.04
Ash	224	2	-5	-1	0	0	0	217	2 (N/A)	0.3	0.1	1.63
Eastern red cedar	0	0	-5	-2	0	0	0	-7	0 (N/A)	0.3	0.0	-0.05
Red maple	483	4	-17	-2	0	0	0	464	3 (N/A)	0.3	0.2	3.48
Austrian pine	189	1	-23	-4	0	0	0	162	1 (N/A)	0.3	0.1	1.21
Citywide total	272,536	2,044	-21,077	-1,079	-8	0	0	250,379	1,878 (N/A)	100.0	100.0	4.84

Table 6: Annual Social and Aesthetic Benefits

Dow City

Annual Aesthetic/Other Benefits of Public Trees

12/7/2015

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Silver maple	10,761	(N/A)	24.0	45.8	115.71
Green ash	3,330	(N/A)	17.0	14.2	50.45
Maple	1,366	(N/A)	10.6	5.8	33.31
Northern hackberry	2,446	(N/A)	10.1	10.4	62.73
Blue spruce	409	(N/A)	5.9	1.7	17.77
Apple	117	(N/A)	5.4	0.5	5.56
Norway maple	614	(N/A)	4.4	2.6	36.12
Sugar maple	368	(N/A)	2.3	1.6	40.93
Pin oak	1,067	(N/A)	2.3	4.5	118.58
Siberian elm	405	(N/A)	2.1	1.7	50.57
Callery pear	156	(N/A)	1.8	0.7	22.35
Littleleaf linden	283	(N/A)	1.5	1.2	47.20
Black walnut	330	(N/A)	1.3	1.4	65.99
American basswood	515	(N/A)	1.3	2.2	102.98
Birch	105	(N/A)	1.0	0.4	26.14
Northern red oak	49	(N/A)	1.0	0.2	12.27
Amur maple	57	(N/A)	1.0	0.2	14.27
Elm	154	(N/A)	0.8	0.7	51.17
Bur oak	126	(N/A)	0.8	0.5	42.06
White ash	67	(N/A)	0.5	0.3	33.42
Honeylocust	389	(N/A)	0.5	1.7	194.45
Mountain ash	35	(N/A)	0.5	0.1	17.60
Broadleaf Deciduous Large	125	(N/A)	0.5	0.5	62.47
Southern magnolia	0	(N/A)	0.5	0.0	0.01
Black cherry	6	(N/A)	0.3	0.0	6.40
Cherry plum	2	(N/A)	0.3	0.0	2.06
Conifer Evergreen Large	26	(N/A)	0.3	0.1	26.25
American sycamore	67	(N/A)	0.3	0.3	66.60
Eastern white pine	0	(N/A)	0.3	0.0	0.00
White oak	5	(N/A)	0.3	0.0	5.26
Swamp white oak	3	(N/A)	0.3	0.0	2.74
Ash	26	(N/A)	0.3	0.1	26.22
Eastern red cedar	0	(N/A)	0.3	0.0	0.00
Red maple	66	(N/A)	0.3	0.3	65.89
Austrian pine	13	(N/A)	0.3	0.1	12.81
Citywide total	23,488	(N/A)	100.0	100.0	60.54

Table 7: Summary of Benefits in Dollars

Dow City

Total Annual Benefits of Public Trees by Species ($)

12/7/2015

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Silver maple	6,711	989	1,265	13,191	10,761	32,918	(N/A)	40.5
Green ash	3,585	266	636	5,060	3,330	12,876	(N/A)	15.9
Maple	1,083	59	167	809	1,366	3,484	(N/A)	4.3
Northern hackberry	3,130	130	570	4,070	2,446	10,345	(N/A)	12.7
Blue spruce	515	15	58	993	409	1,990	(N/A)	2.4
Apple	317	15	48	132	117	629	(N/A)	0.8
Norway maple	988	44	176	1,178	614	3,001	(N/A)	3.7
Sugar maple	347	23	55	425	368	1,219	(N/A)	1.5
Pin oak	628	99	81	893	1,067	2,768	(N/A)	3.4
Siberian elm	662	42	133	1,033	405	2,274	(N/A)	2.8
Callery pear	147	10	22	99	156	434	(N/A)	0.5
Littleleaf linden	176	18	28	188	283	694	(N/A)	0.9
Black walnut	377	30	69	618	330	1,424	(N/A)	1.8
American basswood	385	55	63	698	515	1,716	(N/A)	2.1
Birch	189	7	33	194	105	527	(N/A)	0.6
Northern red oak	69	3	10	52	49	183	(N/A)	0.2
Amur maple	121	7	20	64	57	269	(N/A)	0.3
Elm	272	13	57	541	154	1,037	(N/A)	1.3
Bur oak	121	10	21	151	126	429	(N/A)	0.5
White ash	40	3	6	33	67	149	(N/A)	0.2
Honeylocust	149	10	26	254	389	827	(N/A)	1.0
Mountain ash	64	4	11	39	35	154	(N/A)	0.2
Broadleaf Deciduous La	173	12	35	345	125	689	(N/A)	0.8
Southern magnolia	8	0	1	3	0	12	(N/A)	0.0
Black cherry	18	1	3	7	6	35	(N/A)	0.0
Cherry plum	5	0	1	2	2	10	(N/A)	0.0
Conifer Evergreen Large	38	2	-2	125	26	189	(N/A)	0.2
American sycamore	82	6	16	149	67	319	(N/A)	0.4
Eastern white pine	38	0	-2	125	0	161	(N/A)	0.2
White oak	1	0	0	0	5	7	(N/A)	0.0
Swamp white oak	1	0	0	0	3	4	(N/A)	0.0
Ash	24	2	3	16	26	72	(N/A)	0.1
Eastern red cedar	25	0	2	44	0	71	(N/A)	0.1
Red maple	49	3	9	43	66	171	(N/A)	0.2
Austrian pine	35	1	4	79	13	133	(N/A)	0.2
Citywide Total	20,573	1,878	3,625	31,656	23,488	81,218	(N/A)	100.0

Table 8: Recommended Maintenance by diameter class

Dow City, IA

Recommended Maintenance for Public Trees (None)

12/7/2015

DBH Class (in)

Zone	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42	Total
1	0	0	0	0	0	0	0	0	0	0
Citywide total	0	0	0	0	0	0	0	0	0	0

DBH Class (in)

Maintenance Type	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42	Total	% of Total Population
None	0	0	0	0	0	0	0	0	0	0	0.00
Young tree (routine)	12	23	7	2	0	0	0	0	0	44	11.34
Young tree (immediate)	0	0	0	0	0	0	0	0	0	0	0.00
Mature tree (routine)	0	0	68	49	34	74	51	17	11	304	78.35
Mature tree (immediate)	0	0	1	2	7	8	9	7	3	37	9.54
Critical concern (public safety)	0	0	0	0	0	0	1	0	2	3	0.77
Citywide total	12	23	76	53	41	82	61	24	16	388	100.00

Table 9: Recommended Maintenance Task by diameter class

Dow City, IA

Priority Task Summary for Public Trees (None)

12/7/2015

DBH Class (in)

Zone	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42	Total
1	9	20	69	41	19	48	44	13	8	271
Citywide total	9	20	69	41	19	48	44	13	8	271

DBH Class (in)

Maintenance Type	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42	Total	% of Total Population
None	9	20	69	41	19	48	44	13	8	271	69.85
Stake/Train	3	3	1	0	0	1	0	0	0	8	2.06
Clean	0	0	4	10	17	29	14	7	7	88	22.68
Raise	0	0	0	0	0	1	1	0	0	2	0.52
Reduce	0	0	0	0	0	0	0	0	0	0	0.00
Remove	0	0	1	2	5	2	2	3	1	16	4.12
Treat pest/disease	0	0	1	0	0	1	0	1	0	3	0.77
Citywide total	12	23	76	53	41	82	61	24	16	388	100.00

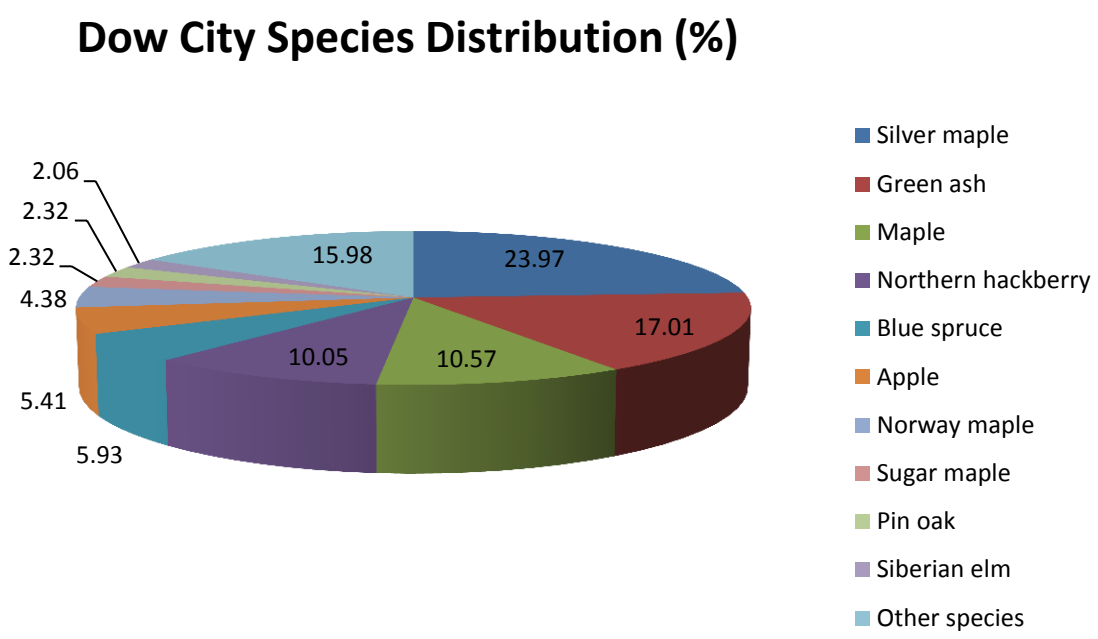

Figure 1: Species Distribution

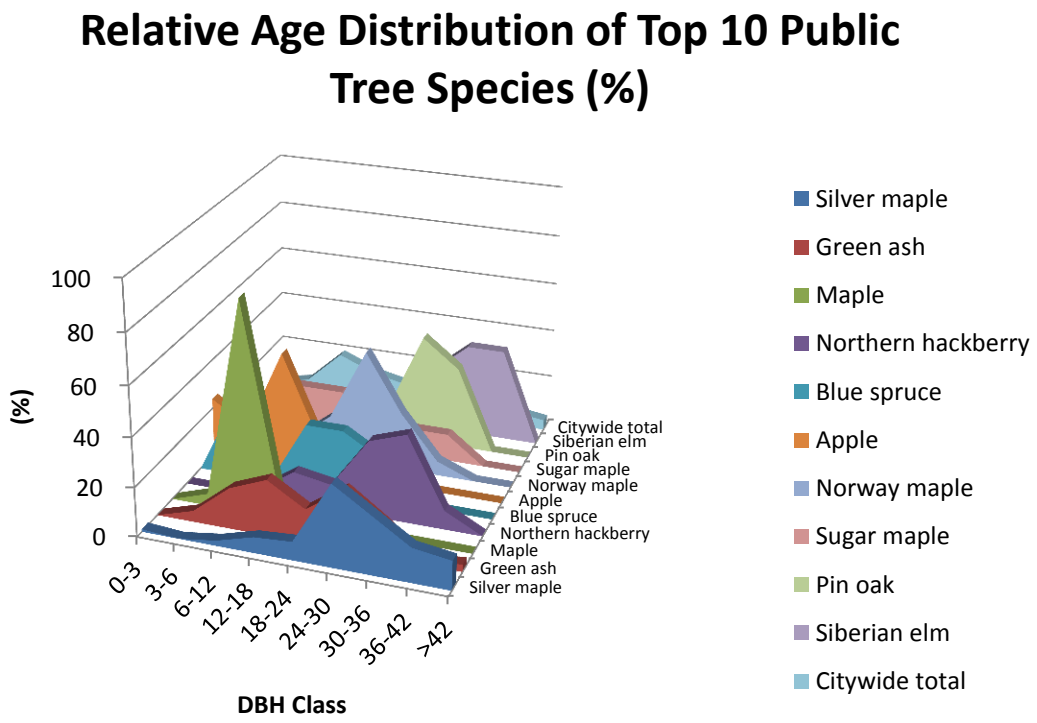

Figure 2: Relative Age Class

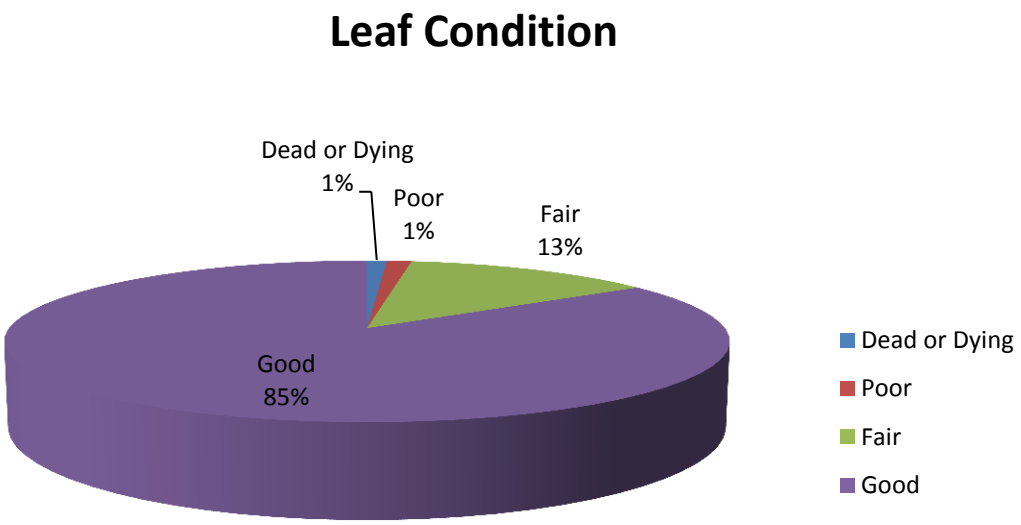

Figure 3: Foliage Condition

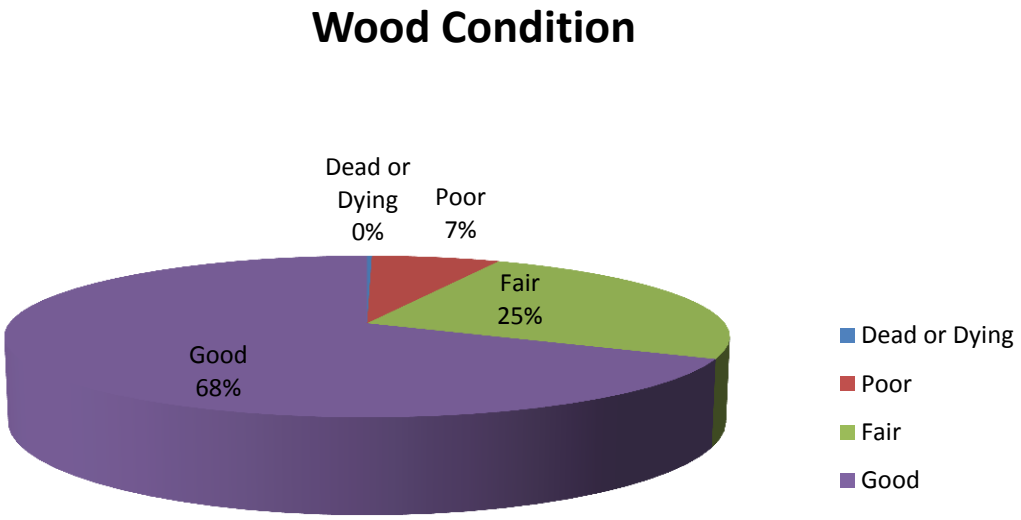

Figure 4: Wood Condition

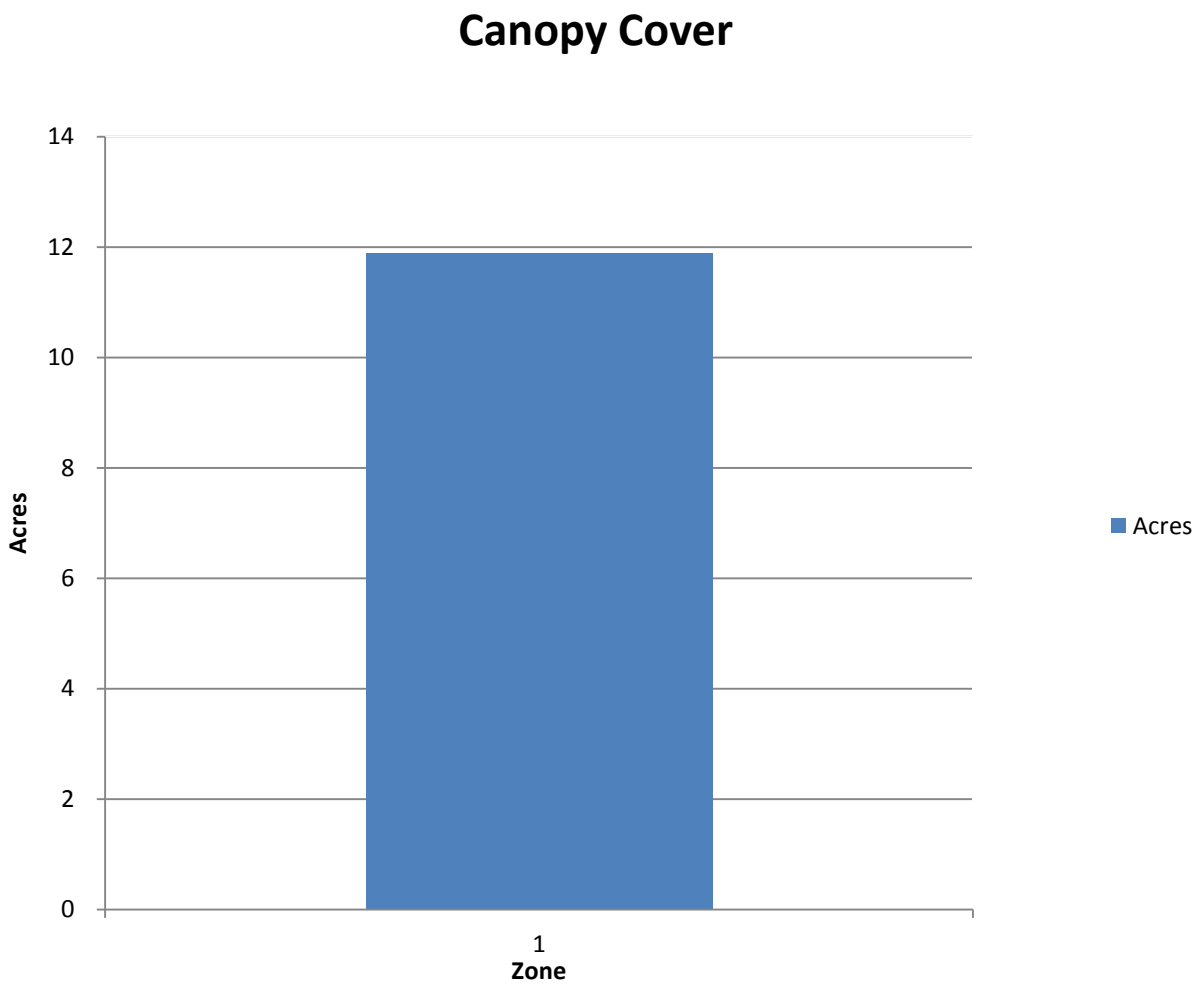

Figure 5: Canopy Cover in Acres

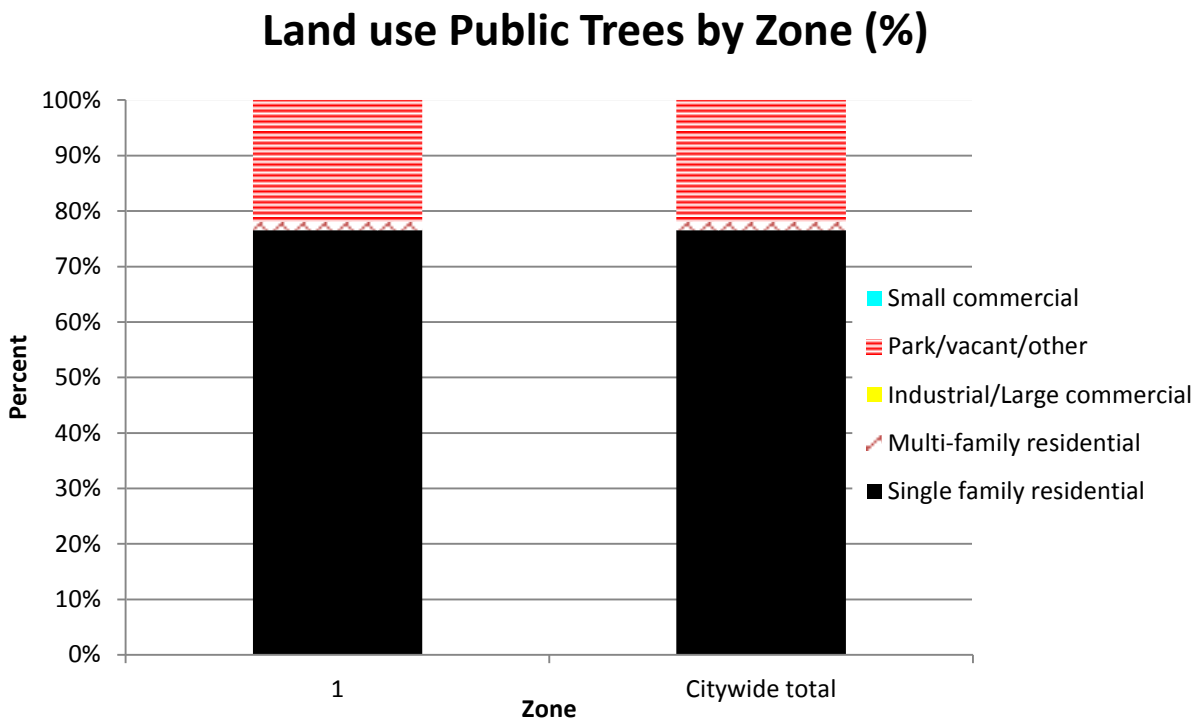

Figure 6: Land Use of city/park trees

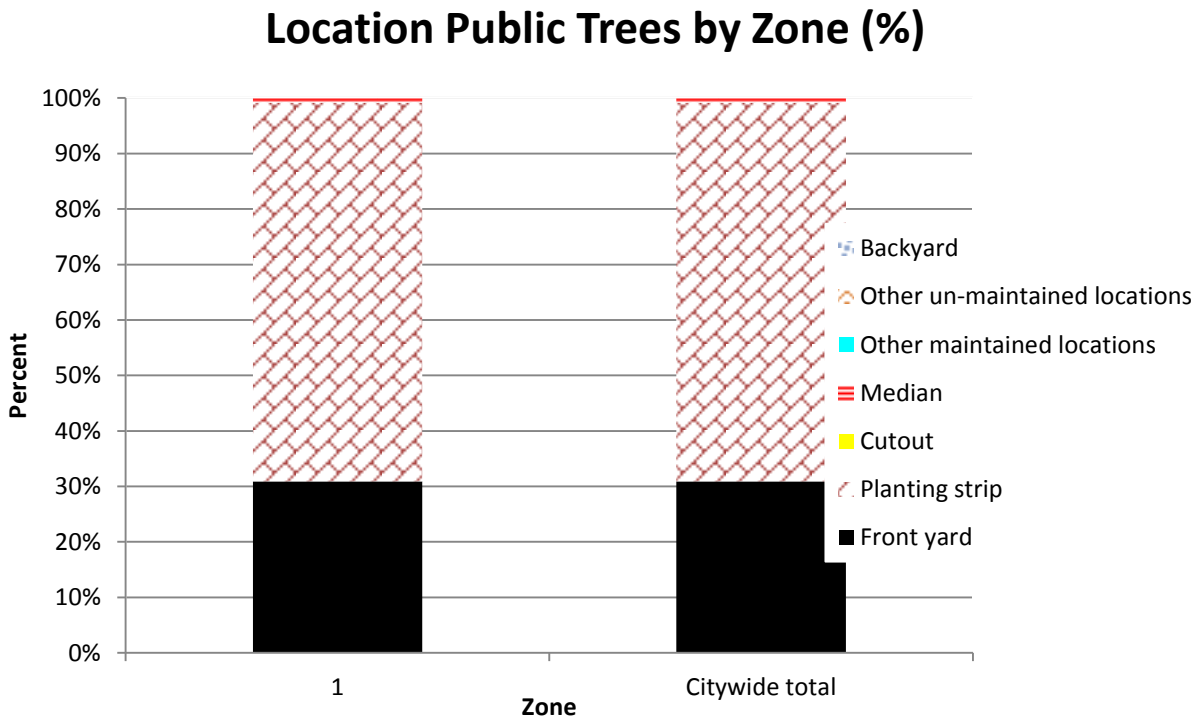

Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping

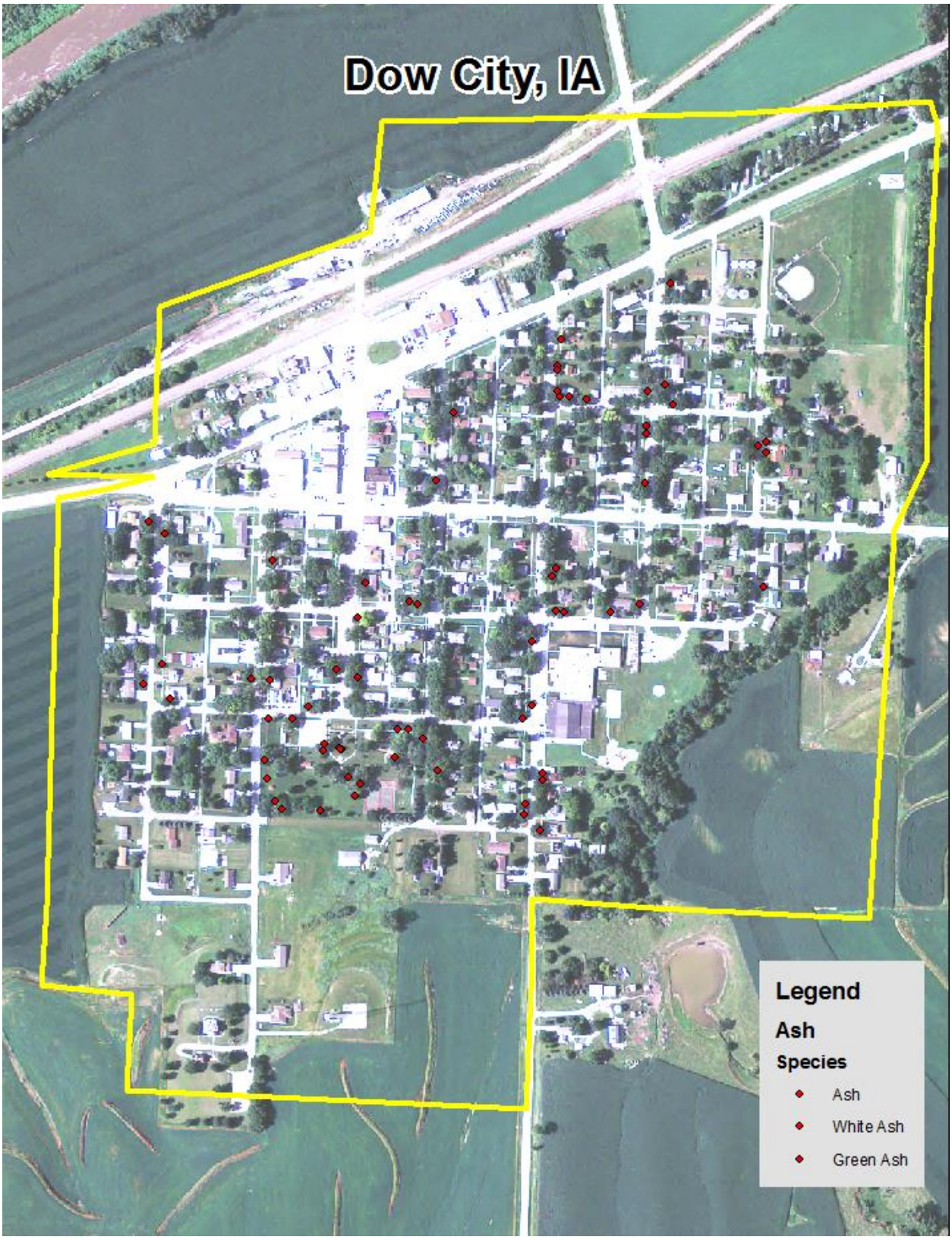

Figure 1: Location of Ash Trees

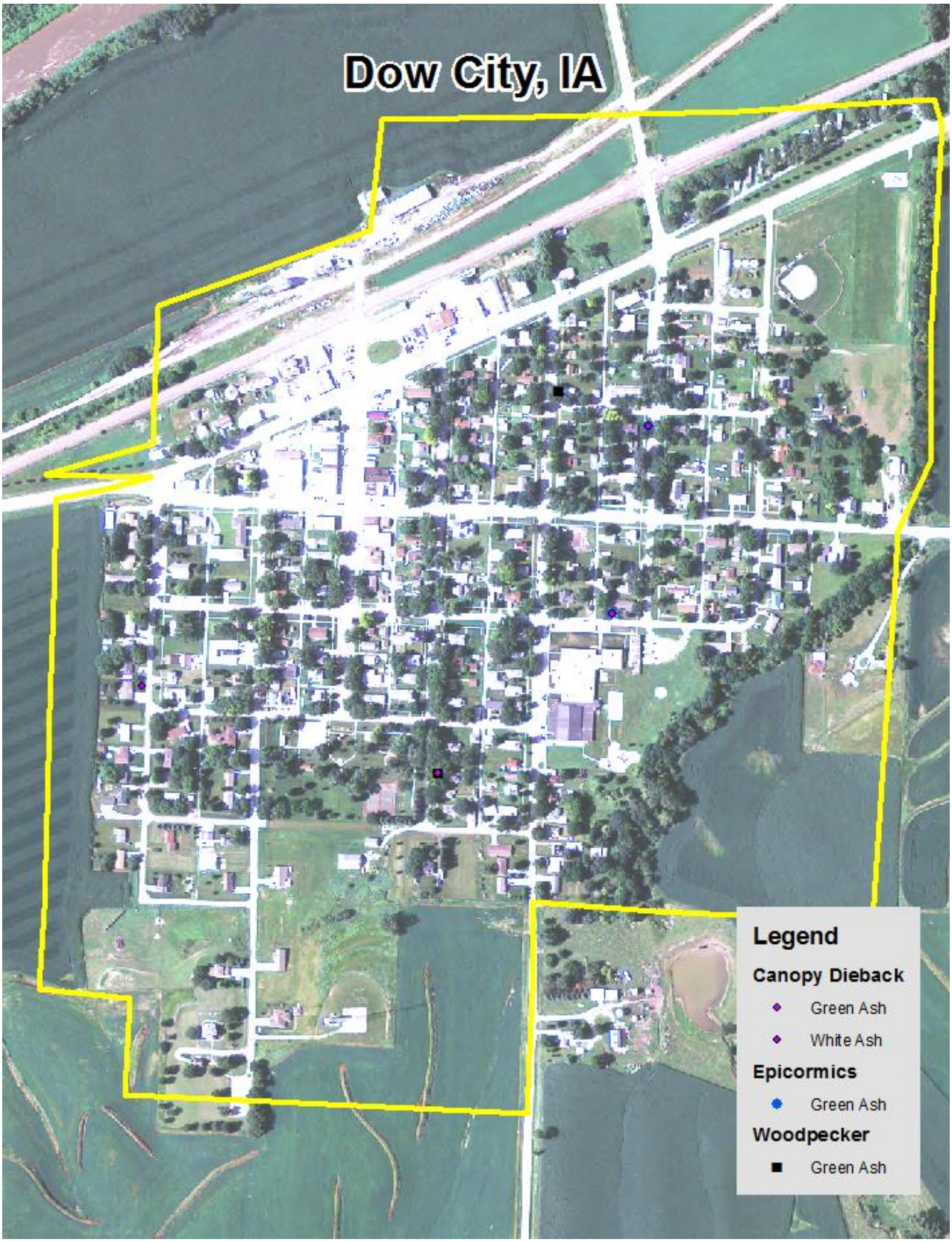

Figure 2: Location of EAB symptoms

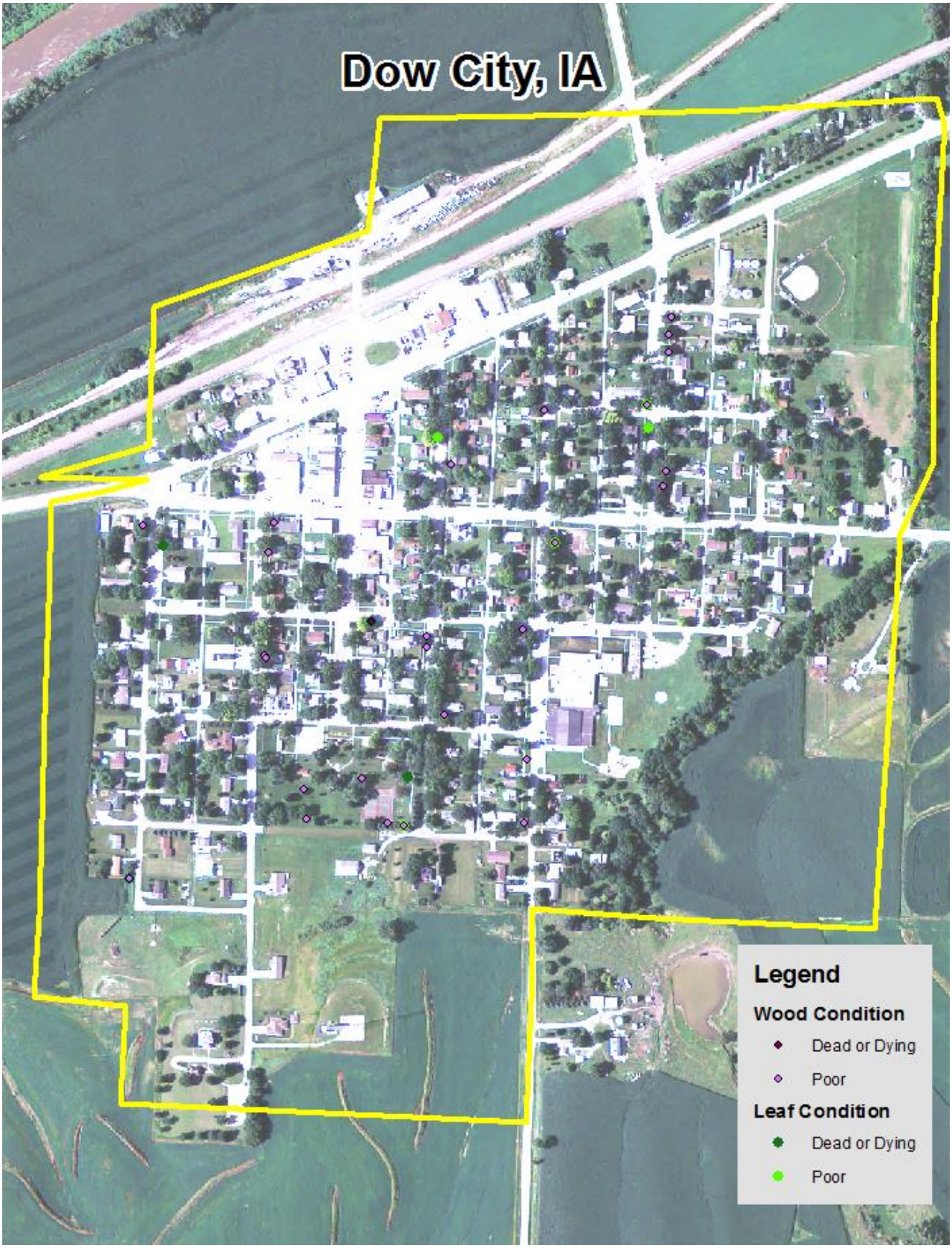

Figure 3: Location of Poor Condition Trees

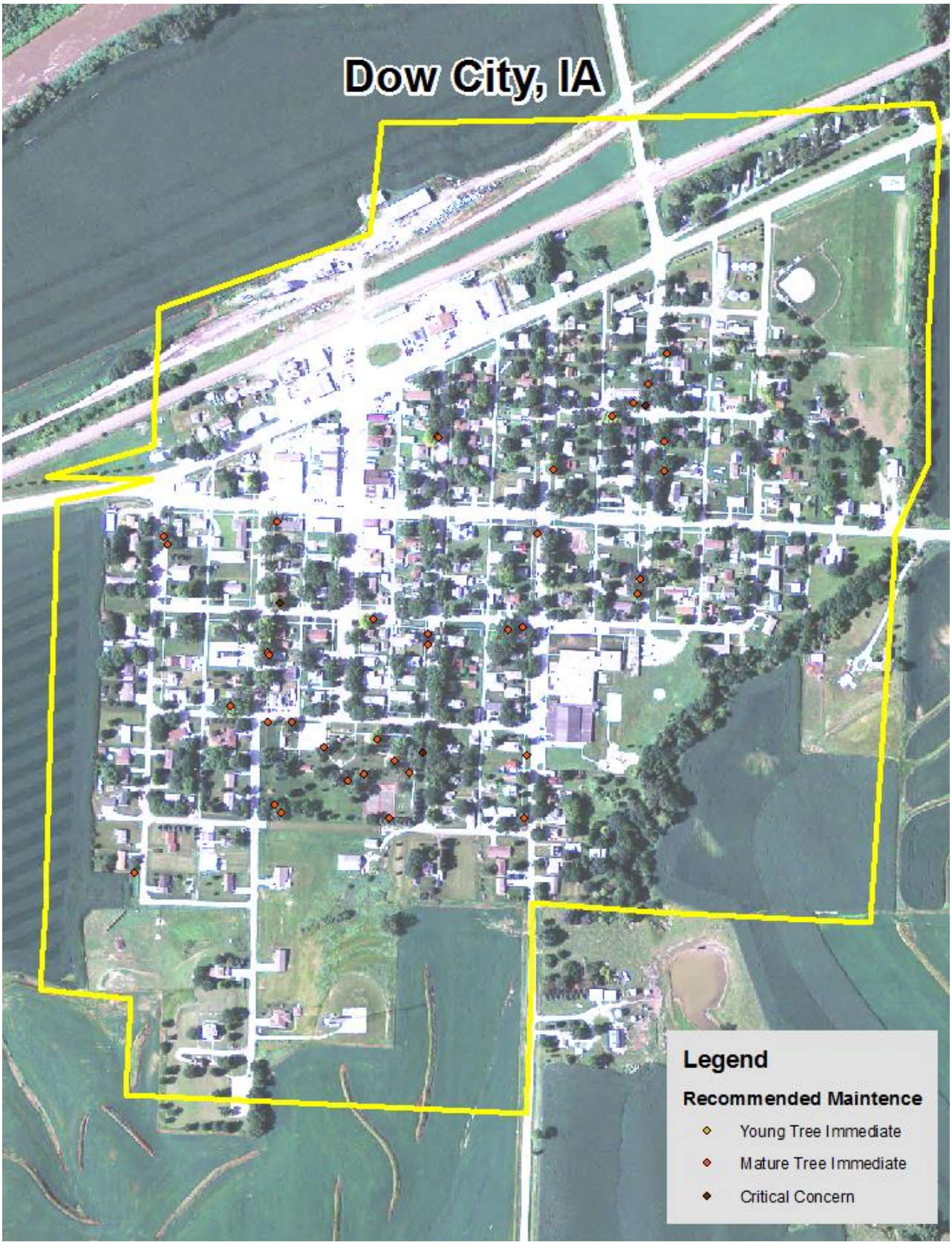

Figure 4: Location of Trees with Recommended Maintenance

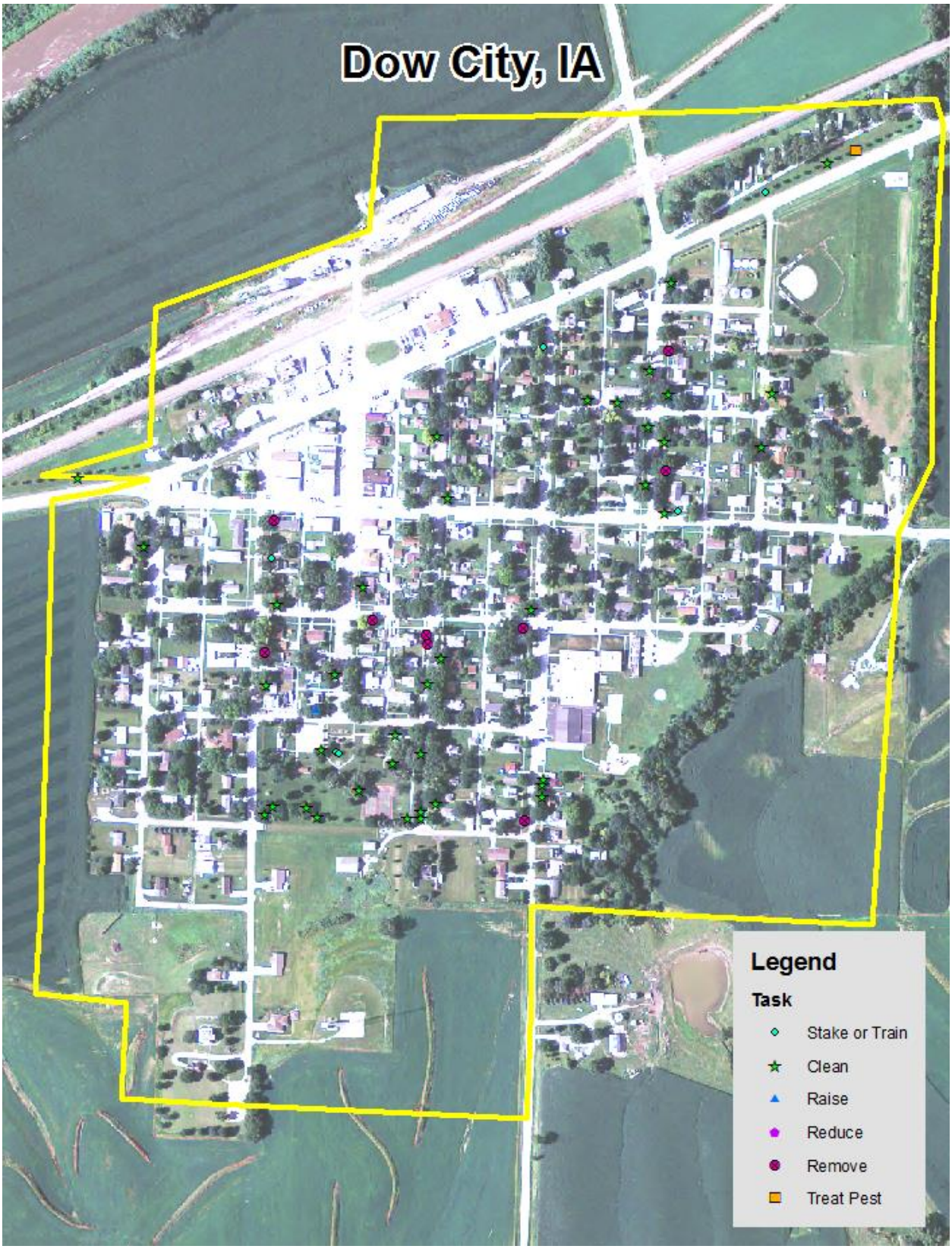

Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*

Appendix C: Example Tree Ordinance

CHAPTER 151
TREES AND GRASS

151.01 DEFINITION. For use in this chapter, "boulevard" means that part of the street, avenue or highway in the City not covered by sidewalk and lying between the lot line and the curb line; or, on unpaved streets, that part of the street, avenue or highway lying between the lot line and that portion of the street usually traveled by vehicular traffic.

151.02 PLANTING RESTRICTIONS. No tree shall be planted in any boulevard or street except in accordance with the following:
1. Alignment. All tress planted in any street shall be planted in the boulevard midway between the outer line of the sidewalk and the curb. In the event a curb line is not established, trees shall be planted on a line ten (10) feet from the property line.
2. Spacing. Trees shall not be planted on any boulevard which is less than nine (9) feet in width, or contains less than eighty-one (81) square feet of exposed soil surface per tree. Trees shall not be planted closer than twenty (20) feet from street intersections (property lines extended) and ten (10) feet from driveways. If it is at all possible trees should be planted inside the property lines and not between the sidewalk and the curb.
3. Prohibited Trees. No person shall plant in any street any fruit-bearing tree or any tree of the kinds commonly known as cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut.

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

151.04 TRIMMING TREES TO BE SUPERVISED. Except as allowed in Section 151.03, it is unlawful for any person to trim or cut any tree in a street or public place unless the work is done under the supervision of the City.

151.05 DISEASE CONTROL. Any dead, diseased or damaged tree or shrub which may harbor serious insect or disease pests or disease injurious to other trees is hereby declared to be a nuisance.

151.06 INSPECTION AND REMOVAL. The Council shall inspect or cause to be inspected any trees or shrubs in the City reported or suspected to be infected with or damaged by any disease or insect or disease pests, and such trees and shrubs shall be subject to removal as follows:
1. City Property. If it is determined that any such condition exists on any public property, including the strip between the curb and the lot line of private property, the Council may cause such condition to be corrected by treatment or removal. The Council may also order the removal of any trees on the streets of the City which interfere with the making of improvements or with travel thereon.
2. Private Property. If it is determined with reasonable certainty that any such condition exists on private property and that the danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Council shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days of said notification. If such owner, occupant or person in charge of said property fails to comply within 14 days of receipt of notice, the Council may cause the condition to be corrected and the cost assessed against the property.
(Code of Iowa, Sec. 364.12[3b & h])

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

The State of Iowa is an Equal Opportunity Employer and provider of ADA services.

Federal law prohibits employment discrimination on the basis of race, color, age, religion, national origin, sex or disability. State law prohibits employment discrimination on the basis of race, color, creed, age, sex, sexual orientation, gender identity, national origin, religion, pregnancy, or disability. State law also prohibits public accommodation (such as access to services or physical facilities) discrimination on the basis of race, color, creed, religion, sex, sexual orientation, gender identity, religion, national origin, or disability. If you believe you have been discriminated against in any program, activity or facility as described above, or if you desire further information, please contact the Iowa Civil Rights Commission, 1-800-457-4416, or write to the Iowa Department of Natural Resources, Wallace State Office Bldg., 502 E. 9th St., Des Moines, IA 50319.

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