New Hampton, IA

Urban Forestry Management Plan

SUMMER 2022

JEO CONSULTING GROUP

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Executive Summary

EXECUTIVE SUMMARY

Overview

This plan was developed to assist the City of New Hampton in managing its urban forest, including budgeting and future planning. Trees bring numerous benefits to a community, and sound management helps leaders take advantage of these benefits. Management is especially important now considering the serious threats posed by forest pests like 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 except mountain ash. There is a strong possibility that 15% of New Hampton's city-owned trees will die once EAB becomes established in the community, unless local leaders begin preventative treatment. 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 2022, JEO conducted a tree inventory 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 1,562 trees inventoried.

- New Hampton trees provide $252,803 of benefits annually, an average of $162 per tree
- There are over 42 species of trees
- The top three genera are: Maple 43%, Cedar 18%, and Ash 15%
- 19% of trees need some type of management
- 190 trees should be removed

Recommendations

We detail our core recommendations in the Recommendations Section. In the Emerald Ash Borer Plan, we include management recommendations. Below are some key recommendations.

- Out of the 190 trees needing removal, 78 trees are over 24 inches in diameter at 4.5 ft and must be addressed immediately. *City ownership of the trees recommended for removal should be verified prior to any removal*
- 104 of the 238 ash trees should be carefully examined, as they 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 yearly with a visual survey.
- With the current budget it could take 24 years to remove ash. We suggest that city officials request a budget increase to $14,000 annually and apply for grants to plant replacement trees.

Introduction

INTRODUCTION

This plan was developed to assist New Hampton with managing, budgeting, and future planning of their urban forest. Across the state, forestry budgets continue to decrease as a higher percentage of the budgets are devoted to 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, treatment, and replacement planting. With proper planning and management of the current canopy in New Hampton, these costs can be spread out over the years and public safety issues from dead and dying ash trees can be mitigated.

Trees are an important part of New Hampton's infrastructure and one of the city's greatest assets. The benefits of trees are immense. Trees improve air quality, intercept stormwater runoff, conserve energy, lower traffic speeds, increase property values, reduce crime, improve mental health, and create a desirable place to live, to name just a few. Good urban forestry management will maintain these important benefits for the people of New Hampton and future generations.

Urban forestry management sets goals and develops management strategies to achieve them. To develop management strategies, a comprehensive public tree inventory must be conducted. The inventory informs maintenance, removal schedules, tree planting, and budgeting. Aligning management actions with the tree inventory results will help meet New Hampton's urban forestry goals.

Assist New Hampton with Managing its Urban Forest

Inform on the Benefits of a Healthy Urban Forest

Establish Preventative Treatment for Emerald Ash Borer

Develop Efficient City Tree Management Techniques

Mitigate Public Safety Issues

Findings

INVENTORY

In 2022, JEO conducted a tree inventory that included 100% of the city-owned trees on both streets and parks. The team collected tree data 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 data collectors' programming 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, for all ash trees, the team notes signs and symptoms associated with EAB including canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

INVENTORY RESULTS

JEO entered the data collected for the 1,562 city trees into the USDA Forest service program Street Tree Resource Analysis Tool for Urban forestry Management as part of the i-Tree suite. Following are results from the i-Tree STREETS analysis.

ANNUAL BENEFITS

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. New Hampton's trees reduce energy-related costs by approximately $65,248 annually (Appendix A, Table 1). These savings are both in electricity (309.5 MWh) and in natural gas (42,608.1 Therms).

Annual Stormwater Benefits

New Hampton's trees intercept about 3,514,575 gallons of rainfall or snow melt per year (Appendix A, Table 2). This interception provides $95,245 in benefit 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 lessens emissions of volatile organic matter (ozone). In New Hampton, it is estimated that trees remove 3,790 lbs of air pollution (ozone (O3), particulate matter less than 10 microns (PM10), carbon monoxide (CO), nitrogen dioxide (NO2), and sulfur dioxide (SO2)) per year with a net value of $10,475 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In New Hampton, trees sequester about 717,126 lbs of carbon per year with an associated value of $8,834 (Appendix A, Table 5). In addition, the trees store 11,417,338 lbs of carbon, with a yearly benefit of $85,630 (Appendix A, Table 4).

Annual Aesthetics Benefits

The social benefits of trees are hard to capture. The i-Tree 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. New Hampton receives $73,002 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, New Hampton's trees provide $252,803 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 1,562 trees in New Hampton provide approximately $162 annually (Appendix A, Table 7).

ENERGY	STORMWATER	AIR QUALITY	CARBON	AESTHETICS	SUMMARY
• Reduce energy cost by **$65,248**	• Intercept 3,514,575 **gallons** • Provides **$95,245** benefit	• Remove 3,790 **lbs** of pollution • Net value of **$10,475**	• Sequester 717,126 **lbs** • Value of **$8,834** • Store 11,417,338 **lbs** • Value of **$85,630**	• **$73,002** in social benefits	• **$252,803** annual benefits • Each tree provides **$162** annually

FOREST STRUCTURE

Species Distribution

New Hampton has over 42 different tree species along city streets and parks (Appendix A, Figure 1).

The distribution of trees by genera is as follows:

Maple	668	43%	Elm	9	1%
Cedar	275	18%	Birch	8	<1%
Ash	238	15%	Walnut	5	<1%
Spruce	120	8%	Pear	3	<1%
Oak	43	3%	Hackberry	3	<1%
Apple	42	3%	Catalpa	3	<1%
Pine	36	2%	Buckeye	2	<1%
Locust	33	2%	Mulberry	2	<1%
Basswood/Linden	30	2%	Ginkgo	1	<1%
Cottonwood	29	2%	Locust	1	<1%
Boxelder	10	1%	Willow	1	<1%

Age Class

Most of New Hampton's trees (46%) are between 6 and 18 inches in diameter at 4.5 ft (Appendix A, Figure 2).

To prepare for natural mortality and to maintain canopy cover, most trees should be in the smallest size category (a downward slope), indicating youth. New Hampton's size curve is on the smaller side, indicating a younger than average stand.

Condition: Wood and Foliage

Both wood condition and leaf condition are good indicators of the urban forest's overall health. The foliage condition results for New Hampton indicate that 86% of the trees are in good health, with 12% of the foliage in poor health, dead, or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 74% of New Hampton's trees are in good health for wood condition (Appendix A, Figure 4 & Appendix B, Figure 3). Fourteen percent of the tree population's wood

condition is in poor health, dead, or dying. This 14% 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).

Action	Number of Trees	Percentage
Tree Removal	190	12%
Crown Cleaning	98	6%
Crown Reduction	9	1%
Crown Raising	6	<1%
Tree Staking	0	0%

Canopy Cover

The total canopy with both private and public trees is 242 acres or 12% cover. The canopy cover included in the New Hampton inventory includes approximately 34 acres (Appendix A, Figure 4). The city's canopy goal is to increase canopy by 5% in 30 years. To achieve this goal it is estimated that 22 trees need to be planted annually on public and private lands.

Land Use and Location

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

Land Use	Percentage
Single Family Residential	60%
Park/Vacant/Other	37%
Industrial/Large Commercial	2%
Small Commercial	<1%
Multifamily Residential	<1%

Recommendations

RECOMMENDATIONS

Risk Management

Hazardous trees can be a significant threat to both people and property. Trees that are dead, dying, or have large issues such as trunk cracks longer than 18 inches should be removed. Broken branches and branches that interfere with motorists' vision of pedestrians, vehicles, traffic signs and signals should be removed.

HAZARDOUS TREES

New Hampton has 118 critical concern trees that need immediate removal. These trees can be seen on the Location of Trees with Recommended Maintenance Map (Appendix B, Figure 4). We recommend starting with the large-diameter, critical concern trees first. There are 35 trees over 24 inches in diameter at 4.5 ft that should be addressed immediately. Please refer to the Six-Year Maintenance Plan at the end of this section. After all of the critical concern trees are addressed, there should be follow up on the trees marked as needing maintenance. There are a total of 303 trees with maintenance needs.

POOR TREE SPECIES

After removing the critical concern trees, ash trees in poor health should be assessed for removal (Appendix B, Figure 3 & Appendix B, Figure 4). Of the 190 removals, 182 are ash trees. There are a total of 238 ash trees, and 104 of those have signs and symptoms that have been associated with EAB. In addition, there are 84 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 removes lower branches that are two inches in diameter or larger to provide clearance for pedestrians or vehicles. Crown reduction removes individual limbs from structures or utility wires. We recommend 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 five years will replace the trees that are removed. We recommend planting 1.2 trees for every tree removed, 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 forest in New Hampton.

It is important to plant a diverse mix of species in the urban forest to maintain canopy health, since most insects and diseases target a genus (ash) or species (green ash) of trees. Current diversity recommendations advise that a genus (i.e. maple, oak) not make up more than 20% of the urban forest and a single species (i.e. silver maple, sugar maple, white oak, bur oak) not make up more than 10% of the total urban forest. Presently, the forest is heavily planted with maple (43%) (Appendix A, Figure 1). Maples should not be planted until this percentage can be lowered. 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: crabapple, Japanese Lilac, serviceberry, oak (red, white), hackberry, linden, elm (disease resistant), cork, London plane, ironwood hornbeam as outlined in section 66.4 of the city ordinance (Appendix C). All trees planted must meet the restrictions in city ordinance 66.4 (Appendix C).

Continual Monitoring

Due to the threat of EAB, it is important to continuously check the health of ash trees. We recommend 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.

EMERALD ASH BORER PLAN

Ash Tree Removal

Tree removal will be prioritized by first removing dead, dying, hazardous trees (Appendix B, Figure 4). Next will be all ash in poor condition that display EAB signs and symptoms (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 providing 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 for your county.

Wood Disposal

A very important aspect of planning is determining how wood infested with EAB will be handled, keeping in mind that quarantines will restrict its movement. Consider who will cut and haul the dead and dying trees? Is there an accessible, secured site big enough to store and sort the hundreds of trees and the associated brush and chips? How will wood be disposed of or utilized? Do you have equipment capable of handling the amount and size of ash trees your tree inventory has identified? Once your county is under quarantine for EAB, contact USDA-APHIS-PPQ at 515-251-4083 or visit the website http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/regulatory.shtml. Wood waste can be normally disposed of if your county is not part of a quarantine.

Canopy Replacement

As budget permits, all removed trees will be replaced. All trees will meet the restrictions in city ordinance 66.4 (Appendix C). The new plantings will be a diverse mix and will not include crabapple, Japanese Lilac, serviceberry, oak (red, white), hackberry, linden, elm (disease resistant), cork, London plane, ironwood hornbeam.

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.

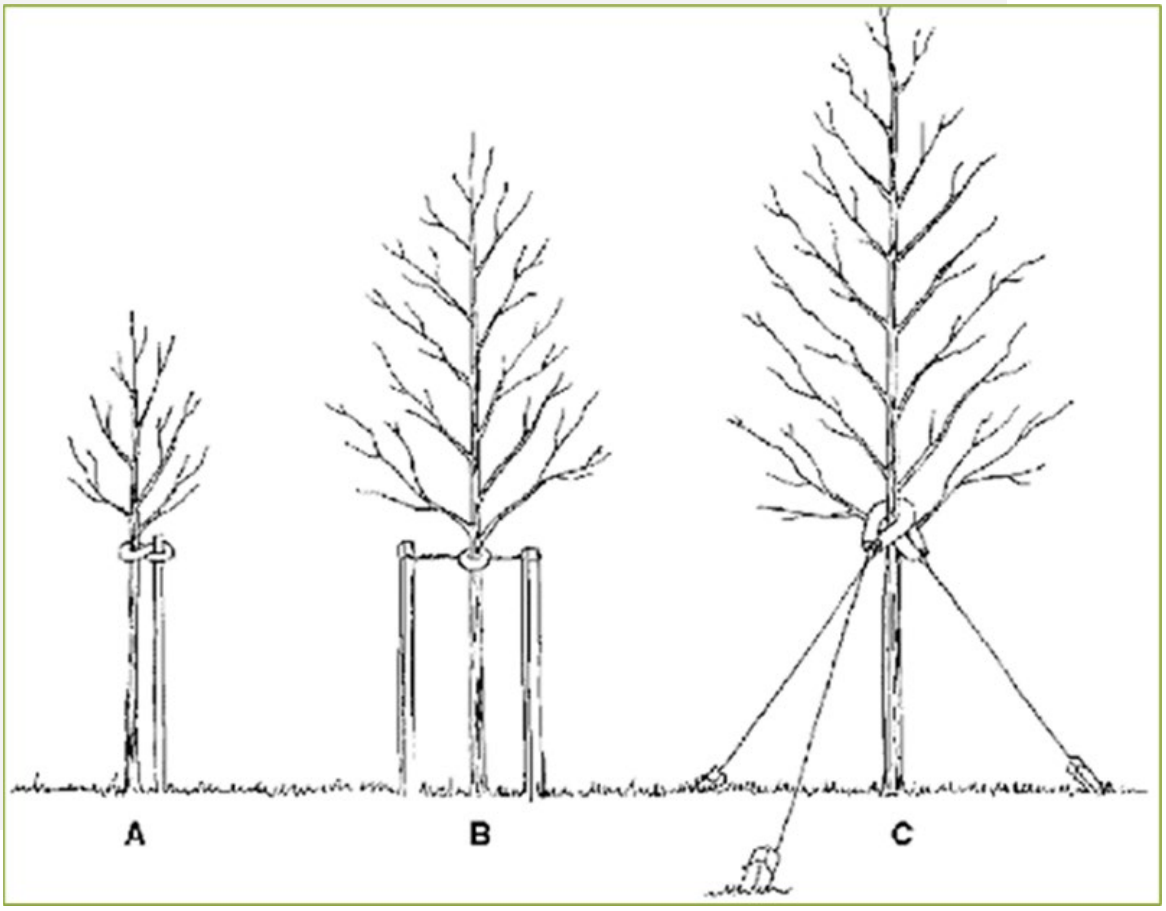
Monitoring

It is recommended that ash trees be checked with a visual survey every year for tree death and for EAB signs and symptoms including 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 preventative treatments are not being used. City Code 66.8 states “A property owner may remove a tree that is on personal property as long as the property owner does the actual work. Otherwise, the property owner must hire a licensed tree surgeon to remove the tree.”

Schedule & Budget



PROPOSED WORK SCHEDULE & BUDGET

Budget Allowance of $7,000/Year – (Based off $2/Resident Estimation)

YEAR 1	Est. Cost
Remove 5 trees recommended for immediate removal	$3,500
Remove 3 ash tree in poor condition	$2,100
Plant 9 trees in open locations	$1,350
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$6,950**

YEAR 2	Est. Cost
Remove 3 tree recommended for immediate removal	$2,100
Plant 6 trees in open locations	$900
Prune 1/6 of city owned trees	$3,905
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$6,905**

YEAR 3	Est. Cost
Remove 3 tree recommended for immediate removal	$2,100
Remove 5 ash trees in poor condition	$3,500
Plant 9 trees in open locations	$1,350
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$6,950**

YEAR 4	Est. Cost
Remove 3 ash trees	$2,100
Plant 6 trees in open locations	$900
Prune 1/6 of city owned trees	$3,905
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$6,905**

YEAR 5	Est. Cost
Remove 8 trees recommended for removal	$5,600
Plant 9 trees in open locations	$1,350
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$6,950**

YEAR 6	Est. Cost
Remove 3 ash tree	$2,100
Plant 6 trees in open locations	$900
Prune 1/6 of city owned trees	$3,905
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$6,905**

Estimated costs based on average costs of $700/tree for removal, $150/tree for planting and maintenance, and $15/tree for pruning.

***To remove all ash trees within 6 years alone, the budget would need to be $28,000 a year. If the budget were increased to $14,000 a year all ash could be removed in 12 years.*

PROPOSED WORK SCHEDULE WITH INCREASED BUDGET

Budget Allowance of $14,000/Year – (Budget Increase Suggested to Best Manage City Trees)

YEAR 1	Est. Cost
Remove 6 trees recommended for immediate removal	$4,200
Remove 10 ash trees in poor condition	$7,000
Plant 18 trees in open locations	$2,700
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$13,900**

YEAR 2	Est. Cost
Remove 12 ash trees in poor condition	$8,400
Plant 11 trees in open locations	$1,650
Prune 1/6 of city owned trees	$3,905
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$13,955**

YEAR 3	Est. Cost
Remove 15 ash trees	$10,500
Plant 22 trees in open locations	$3,300
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$13,800**

YEAR 4	Est. Cost
Remove 11 ash trees	$7,700
Plant 14 trees in open locations	$2,100
Prune 1/6 of city owned trees	$3,905
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$13,705**

YEAR 5	Est. Cost
Remove 14 ash trees	$9,800
Plant 28 trees in open locations	$4,200
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$14,000**

YEAR 6	Est. Cost
Remove 11 trees recommended for removal	$7,700
Plant 15 trees in open locations	$2,250
Prune 1/6 of city owned trees	$3,905
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$13,855**

Purposed Budget Increase

EAB could potentially kill all ash trees in New Hampton within four years of its arrival. To remove all ash trees within six years, the budget would need to be increased to $28,000 a year. If the budget were increased to $14,000 per year all ash could be removed within 12 years. Additionally, we recommend that New Hampton 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 considered by many communities is treating 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 removal all at once. Trunk injection is administered every two years for the life of the tree. If treatment is discontinued, the tree dies. For instance, in this treatment scenario, the average ash diameter is 20 inches and at $15 per inch, about 6 trees could be treated per year (every other year treatment). Twelve trees would be selected for treatment, and New Hampton would still need to find $158,200 for removal. Alternatively, if there are 16 treatable trees, it would cost approximately $2,400 a year for treatment and leave $4,600 for removal. 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 New Hampton. We suggest considering an increased budget to plan for this.

WORKS CITED

Census Bureau. 2010. http://censtats.census.gov/data/IA/1601964290.pdf(April, 2013)

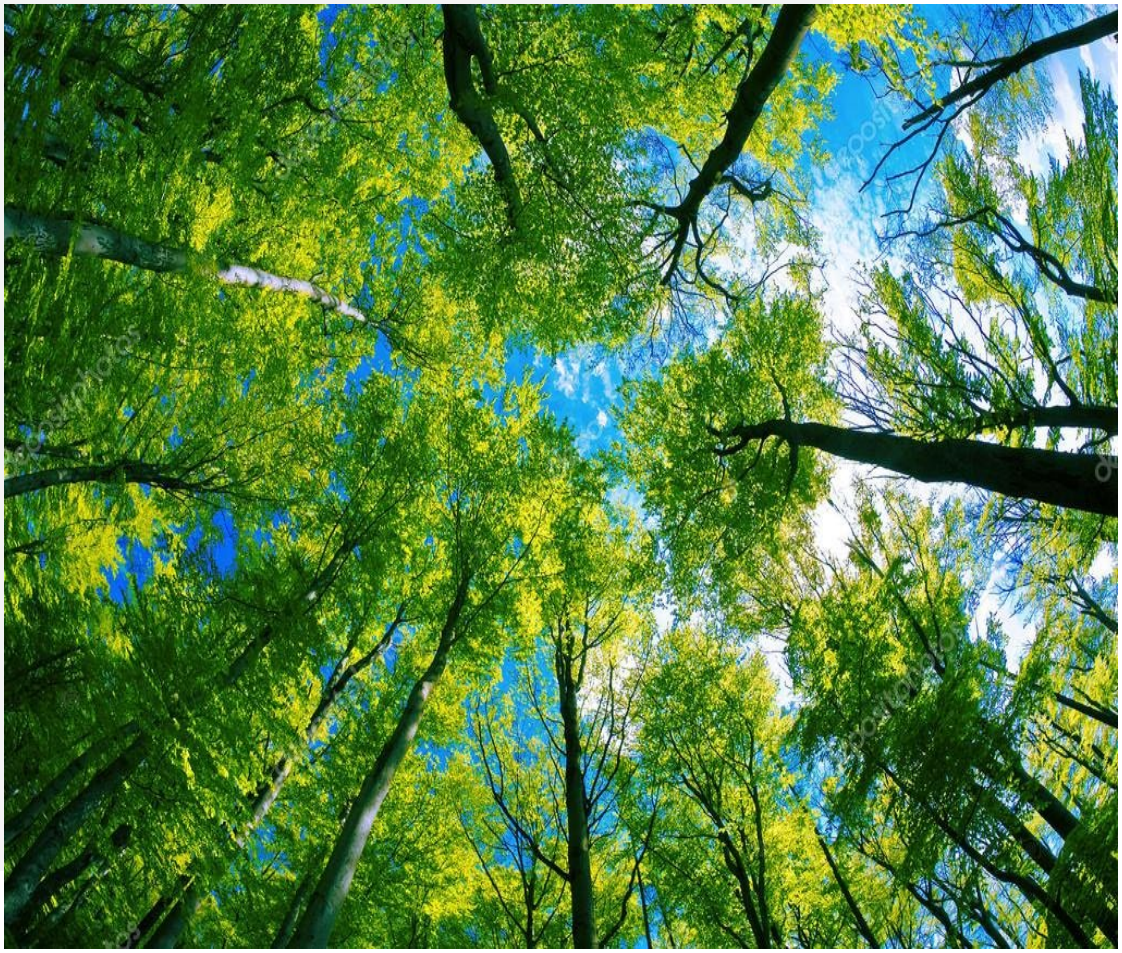
USDA Forest Service, et al. 2006. i-Tree Software Suite v1.0 User's Manual. Pp. 27-40.

McPherson EG, Simpson JR, Peper PJ, Gardner SL, Vargas KE, Ho J, Maco S, Xiao Q. 2005b. City of Charleston, South Carolina, municipal forest resource analysis. Internal Tech Rep. Davis, CA: U.S. Department of Agriculture, Center for Urban Forest Research. p. 57

Nowak, DJ and JF Dwyer. 2007. Understanding the benefits and costs of urban forest ecosystems. In: Kuser, J. (ed.) Urban and Community Forestry in the Northeast. New York: Springer. Pp. 25-46.

Peper, Paula J; McPherson, E Gregory; Simpson, James R; Vargas, Kelaine E; Xiao, Qingfu 2009. Lower Midwest community tree guide: benefits, costs, and strategic planting. Gen. Tech. Rep. PSW-GTR-219. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. p.115

Appendices



APPENDIX A: i-TREE DATA

Table 1: Annual Energy Benefits

New Hampton

Annual Energy Benefits of Public Trees

2/7/2023

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	58.5	4,441	8,436.4	8,268	12,709	(N/A)	16.8	19.5	48.51
Green ash	61.1	4,637	8,400.0	8,232	12,869	(N/A)	14.7	19.7	55.95
Northern white cedar	10.5	800	1,705.9	1,672	2,472	(N/A)	10.8	3.8	14.63
Silver maple	55.0	4,172	7,239.2	7,094	11,266	(N/A)	10.6	17.3	67.87
Sugar maple	40.3	3,058	5,379.8	5,272	8,330	(N/A)	9.5	12.8	55.91
Spruce	14.3	1,084	1,802.4	1,766	2,850	(N/A)	7.6	4.4	23.95
Eastern red cedar	7.9	602	1,214.9	1,191	1,792	(N/A)	6.8	2.7	16.91
Maple	4.0	300	548.0	537	837	(N/A)	2.9	1.3	18.61
Apple	3.3	254	524.7	514	768	(N/A)	2.7	1.2	18.29
Red maple	2.8	211	381.7	374	585	(N/A)	2.4	0.9	15.39
Honeylocust	10.1	768	1,315.3	1,289	2,057	(N/A)	2.1	3.2	62.32
Eastern white pine	4.4	334	579.1	568	901	(N/A)	1.9	1.4	31.08
Cottonwood	7.6	578	1,024.8	1,004	1,582	(N/A)	1.9	2.4	54.55
Pin oak	4.9	375	661.6	648	1,023	(N/A)	1.2	1.6	56.86
Littleleaf linden	3.3	250	455.7	447	697	(N/A)	1.1	1.1	40.98
Northern red oak	2.3	172	304.4	298	470	(N/A)	0.8	0.7	36.17
American basswood	4.2	318	607.1	595	913	(N/A)	0.8	1.4	70.22
Boxelder	1.9	146	254.1	249	395	(N/A)	0.6	0.6	39.48
Black maple	0.8	64	113.5	111	175	(N/A)	0.5	0.3	21.93
White ash	1.5	115	173.9	170	286	(N/A)	0.4	0.4	47.59
Oak	1.8	138	252.5	247	385	(N/A)	0.4	0.6	64.20
Bur oak	0.9	66	119.1	117	183	(N/A)	0.3	0.3	36.61
Paper birch	0.6	47	83.0	81	129	(N/A)	0.3	0.2	25.73
Black walnut	1.2	90	163.8	161	250	(N/A)	0.3	0.4	50.08
Siberian elm	1.7	127	226.5	222	349	(N/A)	0.3	0.5	69.77
Red pine	0.5	38	63.4	62	100	(N/A)	0.3	0.2	25.01
Elm	0.7	52	99.2	97	150	(N/A)	0.3	0.2	37.38
Pear	0.1	5	11.4	11	16	(N/A)	0.2	0.0	5.40
Northern hackberry	0.2	13	26.7	26	39	(N/A)	0.2	0.1	12.91
Catalpa	1.3	96	171.6	168	264	(N/A)	0.2	0.4	88.02
Scotch pine	0.4	28	49.2	48	76	(N/A)	0.1	0.1	38.17
Ohio buckeye	0.2	16	33.7	33	49	(N/A)	0.1	0.1	24.47
Birch	0.4	27	53.6	53	80	(N/A)	0.1	0.1	39.91
Mulberry	0.0	3	7.6	7	11	(N/A)	0.1	0.0	5.40
Mountain ash	0.4	28	49.3	48	76	(N/A)	0.1	0.1	38.13
Blue spruce	0.1	11	19.5	19	30	(N/A)	0.1	0.0	29.65
Conifer Evergreen Large	0.1	10	14.6	14	24	(N/A)	0.1	0.0	24.14
Ginkgo	0.0	0	0.4	0	1	(N/A)	0.1	0.0	0.57
Quaking aspen	0.0	0	0.5	0	1	(N/A)	0.1	0.0	0.66
Black locust	0.0	3	6.2	6	9	(N/A)	0.1	0.0	8.99
Willow	0.1	8	16.9	17	24	(N/A)	0.1	0.0	24.47
Swamp white oak	0.1	8	16.9	17	24	(N/A)	0.1	0.0	24.47
Total	309.5	23,492	42,608.1	41,756	65,248	(N/A)	100.0	100.0	41.77

Table 2: Annual Stormwater Benefits

New Hampton

Annual Stormwater Benefits of Public Trees

2/7/2023

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	527,872	14,305	(N/A)	16.8	15.0	54.60
Green ash	643,011	17,426	(N/A)	14.7	18.3	75.76
Northern white cedar	125,760	3,408	(N/A)	10.8	3.6	20.17
Silver maple	795,400	21,555	(N/A)	10.6	22.6	129.85
Sugar maple	444,560	12,048	(N/A)	9.5	12.6	80.86
Spruce	220,704	5,981	(N/A)	7.6	6.3	50.26
Eastern red cedar	112,791	3,057	(N/A)	6.8	3.2	28.84
Maple	27,297	740	(N/A)	2.9	0.8	16.44
Apple	13,720	372	(N/A)	2.7	0.4	8.85
Red maple	15,669	425	(N/A)	2.4	0.4	11.17
Honeylocust	102,609	2,781	(N/A)	2.1	2.9	84.26
Eastern white pine	93,094	2,523	(N/A)	1.9	2.6	86.99
Cottonwood	84,722	2,296	(N/A)	1.9	2.4	79.17
Pin oak	45,457	1,232	(N/A)	1.2	1.3	68.44
Littleleaf linden	30,172	818	(N/A)	1.1	0.9	48.10
Northern red oak	20,177	547	(N/A)	0.8	0.6	42.06
American basswood	50,201	1,360	(N/A)	0.8	1.4	104.65
Boxelder	17,053	462	(N/A)	0.6	0.5	46.21
Black maple	7,396	200	(N/A)	0.5	0.2	25.05
White ash	14,097	382	(N/A)	0.4	0.4	63.67
Oak	19,828	537	(N/A)	0.4	0.6	89.56
Bur oak	10,627	288	(N/A)	0.3	0.3	57.60
Paper birch	4,854	132	(N/A)	0.3	0.1	26.31
Black walnut	11,198	303	(N/A)	0.3	0.3	60.69
Siberian elm	18,890	512	(N/A)	0.3	0.5	102.38
Red pine	8,277	224	(N/A)	0.3	0.2	56.08
Elm	7,159	194	(N/A)	0.3	0.2	48.50
Pear	206	6	(N/A)	0.2	0.0	1.86
Northern hackberry	817	22	(N/A)	0.2	0.0	7.38
Catalpa	19,968	541	(N/A)	0.2	0.6	180.38
Scotch pine	9,209	250	(N/A)	0.1	0.3	124.79
Ohio buckeye	1,172	32	(N/A)	0.1	0.0	15.88
Birch	3,927	106	(N/A)	0.1	0.1	53.21
Mulberry	137	4	(N/A)	0.1	0.0	1.86
Mountain ash	1,333	36	(N/A)	0.1	0.0	18.06
Blue spruce	2,312	63	(N/A)	0.1	0.1	62.66
Conifer Evergreen Large	1,539	42	(N/A)	0.1	0.0	41.70
Ginkgo	7	0	(N/A)	0.1	0.0	0.19
Quaking aspen	18	0	(N/A)	0.1	0.0	0.48
Black locust	163	4	(N/A)	0.1	0.0	4.41
Willow	586	16	(N/A)	0.1	0.0	15.88
Swamp white oak	586	16	(N/A)	0.1	0.0	15.88
Citywide total	3,514,575	95,245	(N/A)	100.0	100.0	60.98

Table 3: Annual Air Quality Benefits

New Hampton

Annual Air Quality Benefits of Public Trees

2/7/2023

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								
Norway maple	105.4	18.2	52.2	4.7	571	283.7	41.0	39.0	265.5	1,757	-24.9	-94	784.7	2,234	(N/A)	16.8	8.53
Green ash	75.1	12.0	36.7	3.4	402	292.0	42.5	40.5	276.9	1,818	0.0	0	779.0	2,220	(N/A)	14.7	9.65
Northern white cedar	11.8	2.3	11.6	1.5	83	52.6	7.5	7.1	47.7	322	-43.1	-162	99.0	243	(N/A)	10.8	1.44
Silver maple	137.7	23.3	67.5	6.1	742	259.1	37.9	36.2	248.6	1,621	-70.9	-266	745.6	2,097	(N/A)	10.6	12.63
Sugar maple	58.7	10.0	29.3	2.6	318	190.9	27.9	26.6	182.5	1,193	-46.1	-173	482.5	1,338	(N/A)	9.5	8.98
Spruce	24.8	4.9	20.9	3.1	165	66.6	9.8	9.4	64.7	419	-94.2	-353	110.0	230	(N/A)	7.6	1.94
Eastern red cedar	19.0	3.8	15.5	2.3	125	38.9	5.6	5.3	35.9	240	-61.4	-230	64.9	134	(N/A)	6.8	1.27
Maple	5.4	0.9	2.7	0.2	29	18.9	2.8	2.6	17.9	118	-1.9	-7	49.5	140	(N/A)	2.9	3.10
Apple	3.8	0.6	1.8	0.2	20	16.6	2.4	2.2	15.2	102	0.0	0	42.7	122	(N/A)	2.7	2.90
Red maple	2.4	0.4	1.3	0.1	13	13.2	1.9	1.8	12.6	82	-1.0	-4	32.8	92	(N/A)	2.4	2.42
Honeylocust	19.7	3.3	9.1	0.9	104	47.6	7.0	6.7	45.8	298	-14.9	-56	125.0	346	(N/A)	2.1	10.50
Eastern white pine	11.1	2.2	9.0	1.4	73	20.7	3.0	2.9	19.9	130	-51.5	-193	18.8	10	(N/A)	1.9	0.33
Cottonwood	11.1	1.8	5.3	0.5	59	36.2	5.3	5.0	34.5	226	0.0	0	99.6	285	(N/A)	1.9	9.82
Pin oak	7.1	1.2	3.8	0.3	39	23.4	3.4	3.3	22.4	146	-13.6	-51	51.3	135	(N/A)	1.2	7.47
Littleleaf linden	4.8	0.8	2.4	0.2	26	15.8	2.3	2.2	15.0	98	-2.4	-9	41.1	116	(N/A)	1.1	6.79
Northern red oak	4.1	0.7	2.0	0.2	22	10.7	1.6	1.5	10.3	67	-5.8	-22	25.2	67	(N/A)	0.8	5.18
American basswood	7.1	1.2	3.4	0.3	38	20.3	2.9	2.8	19.0	126	-5.9	-22	51.2	142	(N/A)	0.8	10.90
Boxelder	1.9	0.3	1.0	0.1	10	9.1	1.3	1.3	8.7	57	-0.9	-3	22.8	64	(N/A)	0.6	6.40
Black maple	1.8	0.3	0.8	0.1	10	4.0	0.6	0.6	3.8	25	-0.6	-2	11.4	32	(N/A)	0.5	4.06
White ash	2.3	0.4	1.1	0.1	12	6.9	1.0	1.0	6.9	44	0.0	0	19.7	56	(N/A)	0.4	9.36
Oak	2.4	0.4	1.1	0.1	13	8.7	1.3	1.2	8.2	54	0.0	0	23.4	67	(N/A)	0.4	11.11
Bur oak	1.9	0.3	0.9	0.1	10	4.2	0.6	0.6	4.0	26	0.0	0	12.4	36	(N/A)	0.3	7.17
Paper birch	0.4	0.1	0.2	0.0	2	3.0	0.4	0.4	2.8	18	0.0	0	7.3	21	(N/A)	0.3	4.14
Black walnut	1.2	0.2	0.6	0.1	6	5.7	0.8	0.8	5.4	35	0.0	0	14.6	42	(N/A)	0.3	8.31
Siberian elm	3.3	0.6	1.6	0.1	18	8.0	1.2	1.1	7.6	50	0.0	0	23.4	67	(N/A)	0.3	13.49
Red pine	1.0	0.2	0.8	0.1	6	2.3	0.3	0.3	2.3	15	-4.1	-15	3.2	6	(N/A)	0.3	1.39
Elm	0.8	0.1	0.4	0.0	4	3.3	0.5	0.5	3.1	21	0.0	0	8.7	25	(N/A)	0.3	6.22
Pear	0.0	0.0	0.0	0.0	0	0.3	0.0	0.0	0.3	2	0.0	0	0.8	2	(N/A)	0.2	0.71
Northern hackberry	0.0	0.0	0.0	0.0	0	0.8	0.1	0.1	0.7	5	0.0	0	1.9	5	(N/A)	0.2	1.77
Catalpa	3.1	0.5	1.4	0.1	16	6.0	0.9	0.8	5.7	38	0.0	0	18.6	54	(N/A)	0.2	17.93
Scotch pine	1.1	0.2	0.9	0.1	7	1.8	0.3	0.2	1.7	11	-5.7	-21	0.6	-3	(N/A)	0.1	-1.58
Ohio buckeye	0.1	0.0	0.1	0.0	1	1.0	0.1	0.1	1.0	6	0.0	0	2.5	7	(N/A)	0.1	3.47
Birch	0.9	0.2	0.4	0.0	5	1.8	0.3	0.2	1.6	11	-0.2	-1	5.2	15	(N/A)	0.1	7.40
Mulberry	0.0	0.0	0.0	0.0	0	0.2	0.0	0.0	0.2	1	0.0	0	0.5	1	(N/A)	0.1	0.71

New Hampton

Annual Air Quality Benefits of Public Trees

2/7/2023

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								
Mountain ash	0.4	0.1	0.2	0.0	2	1.7	0.3	0.2	1.7	11	0.0	0	4.6	13	(N/A)	0.1	6.56
Blue spruce	0.4	0.1	0.3	0.0	2	0.7	0.1	0.1	0.6	4	-0.9	-3	1.3	3	(N/A)	0.1	3.10
Conifer Evergreen Large	0.2	0.0	0.1	0.0	1	0.6	0.1	0.1	0.6	4	-0.5	-2	1.2	3	(N/A)	0.1	2.82
Ginkgo	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)	0.1	0.07
Quaking aspen	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)	0.1	0.08
Black locust	0.0	0.0	0.0	0.0	0	0.2	0.0	0.0	0.2	1	0.0	0	0.4	1	(N/A)	0.1	1.21
Willow	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)	0.1	3.47
Swamp white oak	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)	0.1	3.47
Citywide total	532.3	91.6	286.4	29.1	2,957	1,478.8	215.2	205.1	1,402.3	9,208	-450.8	-1,691	3,790.0	10,475	(N/A)	100.0	6.71

Table 4: Annual Carbon Stored

New Hampton

Stored CO2 Benefits of Public Trees

2/7/2023

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	1,743,482	13,076	(N/A)	16.8	15.3	49.91
Green ash	2,434,731	18,260	(N/A)	14.7	21.3	79.39
Northern white cedar	82,837	621	(N/A)	10.8	0.7	3.68
Silver maple	3,083,200	23,124	(N/A)	10.6	27.0	139.30
Sugar maple	1,681,796	12,613	(N/A)	9.5	14.7	84.65
Spruce	219,315	1,645	(N/A)	7.6	1.9	13.82
Eastern red cedar	65,672	493	(N/A)	6.8	0.6	4.65
Maple	62,604	470	(N/A)	2.9	0.5	10.43
Apple	61,745	463	(N/A)	2.7	0.5	11.03
Red maple	30,570	229	(N/A)	2.4	0.3	6.03
Honeylocust	251,099	1,883	(N/A)	2.1	2.2	57.07
Eastern white pine	130,737	981	(N/A)	1.9	1.1	33.81
Cottonwood	370,542	2,779	(N/A)	1.9	3.2	95.83
Pin oak	179,288	1,345	(N/A)	1.2	1.6	74.70
Littleleaf linden	103,418	776	(N/A)	1.1	0.9	45.63
Northern red oak	85,802	644	(N/A)	0.8	0.8	49.50
American basswood	260,355	1,953	(N/A)	0.8	2.3	150.20
Boxelder	54,814	411	(N/A)	0.6	0.5	41.11
Black maple	19,599	147	(N/A)	0.5	0.2	18.37
White ash	39,028	293	(N/A)	0.4	0.3	48.78
Oak	75,221	564	(N/A)	0.4	0.7	94.03
Bur oak	65,672	493	(N/A)	0.3	0.6	98.51
Paper birch	13,362	100	(N/A)	0.3	0.1	20.04
Black walnut	37,394	280	(N/A)	0.3	0.3	56.09
Siberian elm	79,820	599	(N/A)	0.3	0.7	119.73
Red pine	10,087	76	(N/A)	0.3	0.1	18.91
Elm	25,277	190	(N/A)	0.3	0.2	47.39
Pear	533	4	(N/A)	0.2	0.0	1.33
Northern hackberry	499	4	(N/A)	0.2	0.0	1.25
Catalpa	104,460	783	(N/A)	0.2	0.9	261.15
Scotch pine	14,981	112	(N/A)	0.1	0.1	56.18
Ohio buckeye	2,201	17	(N/A)	0.1	0.0	8.26
Birch	14,499	109	(N/A)	0.1	0.1	54.37
Mulberry	356	3	(N/A)	0.1	0.0	1.33
Mountain ash	6,074	46	(N/A)	0.1	0.1	22.78
Blue spruce	2,661	20	(N/A)	0.1	0.0	19.96
Conifer Evergreen La	1,170	9	(N/A)	0.1	0.0	8.78
Ginkgo	5	0	(N/A)	0.1	0.0	0.03
Quaking aspen	12	0	(N/A)	0.1	0.0	0.09
Black locust	218	2	(N/A)	0.1	0.0	1.64
Willow	1,101	8	(N/A)	0.1	0.0	8.26
Swamp white oak	1,101	8	(N/A)	0.1	0.0	8.26
Citywide total	11,417,338	85,630	(N/A)	100.0	100.0	54.82

The value of stored carbon dioxide is calculated as the total amount of carbon dioxide sequestered annually over the life of each tree, summed for the population. This value should not be added to the Replacement Value or double-counting of the carbon dioxide storage benefit will occur.

Table 5: Annual Carbon Sequestered

New Hampton

Annual CO $_2$ Benefits of Public Trees

2/7/2023

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
Norway maple	84,331	632	-8,377	-610	-67	98,147	736	173,491	1,301 (N/A)	16.8	14.7	4.97
Green ash	146,285	1,097	-11,687	-631	-92	102,472	769	236,438	1,773 (N/A)	14.7	20.1	7.71
Northern white cedar	10,001	75	-398	-214	-5	17,679	133	27,068	203 (N/A)	10.8	2.3	1.20
Silver maple	229,462	1,721	-14,803	-608	-116	92,199	691	306,250	2,297 (N/A)	10.6	26.0	13.84
Sugar maple	89,114	668	-8,078	-431	-64	67,579	507	148,184	1,111 (N/A)	9.5	12.6	7.46
Spruce	14,593	109	-1,053	-245	-10	23,952	180	37,247	279 (N/A)	7.6	3.2	2.35
Eastern red cedar	4,357	33	-315	-158	-4	13,302	100	17,185	129 (N/A)	6.8	1.5	1.22
Maple	6,283	47	-301	-42	-3	6,635	50	12,575	94 (N/A)	2.9	1.1	2.10
Apple	4,367	33	-297	-51	-3	5,614	42	9,633	72 (N/A)	2.7	0.8	1.72
Red maple	4,392	33	-147	-30	-1	4,654	35	8,868	67 (N/A)	2.4	0.8	1.75
Honeylocust	25,100	188	-1,206	-79	-10	16,966	127	40,781	306 (N/A)	2.1	3.5	9.27
Eastern white pine	5,563	42	-628	-81	-5	7,379	55	12,234	92 (N/A)	1.9	1.0	3.16
Cottonwood	16,756	126	-1,779	-80	-14	12,766	96	27,663	207 (N/A)	1.9	2.3	7.15
Pin oak	17,950	135	-861	-49	-7	8,289	62	25,329	190 (N/A)	1.2	2.2	10.55
Littleleaf linden	9,404	71	-496	-38	-4	5,527	41	14,396	108 (N/A)	1.1	1.2	6.35
Northern red oak	3,341	25	-412	-28	-3	3,798	28	6,700	50 (N/A)	0.8	0.6	3.87
American basswood	14,763	111	-1,250	-50	-10	7,028	53	20,491	154 (N/A)	0.8	1.7	11.82
Boxelder	5,156	39	-263	-22	-2	3,222	24	8,094	61 (N/A)	0.6	0.7	6.07
Black maple	497	4	-94	-8	-1	1,419	11	1,813	14 (N/A)	0.5	0.2	1.70
White ash	3,768	28	-187	-12	-1	2,543	19	6,111	46 (N/A)	0.4	0.5	7.64
Oak	4,533	34	-361	-19	-3	3,043	23	7,196	54 (N/A)	0.4	0.6	9.00
Bur oak	1,424	11	-315	-11	-2	1,466	11	2,564	19 (N/A)	0.3	0.2	3.85
Paper birch	1,391	10	-64	-7	-1	1,046	8	2,366	18 (N/A)	0.3	0.2	3.55
Black walnut	2,830	21	-179	-12	-1	1,987	15	4,625	35 (N/A)	0.3	0.4	6.94
Siberian elm	3,347	25	-383	-18	-3	2,805	21	5,751	43 (N/A)	0.3	0.5	8.63
Red pine	540	4	-48	-9	0	838	6	1,321	10 (N/A)	0.3	0.1	2.48
Elm	1,728	13	-121	-8	-1	1,157	9	2,756	21 (N/A)	0.3	0.2	5.17
Pear	114	1	-3	-2	0	112	1	221	2 (N/A)	0.2	0.0	0.55
Northern hackberry	107	1	-3	-2	0	277	2	379	3 (N/A)	0.2	0.0	0.95
Catalpa	2,784	21	-501	-14	-4	2,119	16	4,387	33 (N/A)	0.2	0.4	10.97
Scotch pine	512	4	-72	-7	-1	622	5	1,055	8 (N/A)	0.1	0.1	3.96

Annual CO $_2$ Benefits of Public Trees

2/7/2023

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
Ohio buckeye	448	3	-11	-2	0	352	3	787	6 (N/A)	0.1	0.1	2.95
Birch	466	3	-70	-4	-1	603	5	994	7 (N/A)	0.1	0.1	3.73
Mulberry	76	1	-2	-1	0	74	1	147	1 (N/A)	0.1	0.0	0.55
Mountain ash	535	4	-29	-4	0	617	5	1,119	8 (N/A)	0.1	0.1	4.20
Blue spruce	147	1	-13	-3	0	233	2	364	3 (N/A)	0.1	0.0	2.73
Conifer Evergreen Large	116	1	-6	-2	0	216	2	324	2 (N/A)	0.1	0.0	2.43
Ginkgo	2	0	0	0	0	4	0	6	0 (N/A)	0.1	0.0	0.04
Quaking aspen	3	0	0	0	0	4	0	7	0 (N/A)	0.1	0.0	0.05
Black locust	96	1	-2	-1	0	65	0	158	1 (N/A)	0.1	0.0	1.18
Willow	224	2	-5	-1	0	176	1	393	3 (N/A)	0.1	0.0	2.95
Swamp white oak	224	2	-5	-1	0	176	1	393	3 (N/A)	0.1	0.0	2.95
Citywide total	717,126	5,378	-54,826	-3,594	-438	519,160	3,894	1,177,866	8,834 (N/A)	100.0	100.0	5.66

Table 6: Annual Social and Aesthetic Benefits

New Hampton

Annual Aesthetic/Other Benefits of Public Trees

2/7/2023

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	8,204	(N/A)	16.8	11.2	31.31
Green ash	12,423	(N/A)	14.7	17.0	54.01
Northern white cedar	2,763	(N/A)	10.8	3.8	16.35
Silver maple	17,803	(N/A)	10.6	24.4	107.25
Sugar maple	9,292	(N/A)	9.5	12.7	62.37
Spruce	3,793	(N/A)	7.6	5.2	31.87
Eastern red cedar	1,925	(N/A)	6.8	2.6	18.16
Maple	928	(N/A)	2.9	1.3	20.63
Apple	247	(N/A)	2.7	0.3	5.88
Red maple	703	(N/A)	2.4	1.0	18.50
Honeylocust	5,887	(N/A)	2.1	8.1	178.39
Eastern white pine	926	(N/A)	1.9	1.3	31.92
Cottonwood	1,424	(N/A)	1.9	2.0	49.10
Pin oak	1,522	(N/A)	1.2	2.1	84.56
Littleleaf linden	991	(N/A)	1.1	1.4	58.27
Northern red oak	260	(N/A)	0.8	0.4	20.03
American basswood	1,038	(N/A)	0.8	1.4	79.85
Boxelder	432	(N/A)	0.6	0.6	43.20
Black maple	66	(N/A)	0.5	0.1	8.26
White ash	443	(N/A)	0.4	0.6	73.78
Oak	366	(N/A)	0.4	0.5	60.98
Bur oak	135	(N/A)	0.3	0.2	26.96
Paper birch	152	(N/A)	0.3	0.2	30.42
Black walnut	255	(N/A)	0.3	0.3	51.08
Siberian elm	225	(N/A)	0.3	0.3	44.95
Red pine	106	(N/A)	0.3	0.1	26.58
Elm	157	(N/A)	0.3	0.2	39.27
Pear	6	(N/A)	0.2	0.0	2.06
Northern hackberry	39	(N/A)	0.2	0.1	12.96
Catalpa	183	(N/A)	0.2	0.3	61.09
Scotch pine	53	(N/A)	0.1	0.1	26.25
Ohio buckeye	52	(N/A)	0.1	0.1	26.22
Birch	44	(N/A)	0.1	0.1	22.17
Mulberry	4	(N/A)	0.1	0.0	2.06
Mountain ash	31	(N/A)	0.1	0.0	15.48
Blue spruce	20	(N/A)	0.1	0.0	19.97
Conifer Evergreen Large	32	(N/A)	0.1	0.0	32.32
Ginkgo	0	(N/A)	0.1	0.0	0.37
Quaking aspen	5	(N/A)	0.1	0.0	5.26
Black locust	13	(N/A)	0.1	0.0	12.89
Willow	26	(N/A)	0.1	0.0	26.22
Swamp white oak	26	(N/A)	0.1	0.0	26.22
Citywide total	73,002	(N/A)	100.0	100.0	46.74

Table 7: Summary of Benefits in Dollars

New Hampton

Total Annual Benefits, Net Benefits, and Costs for Public Trees

2/7/2023

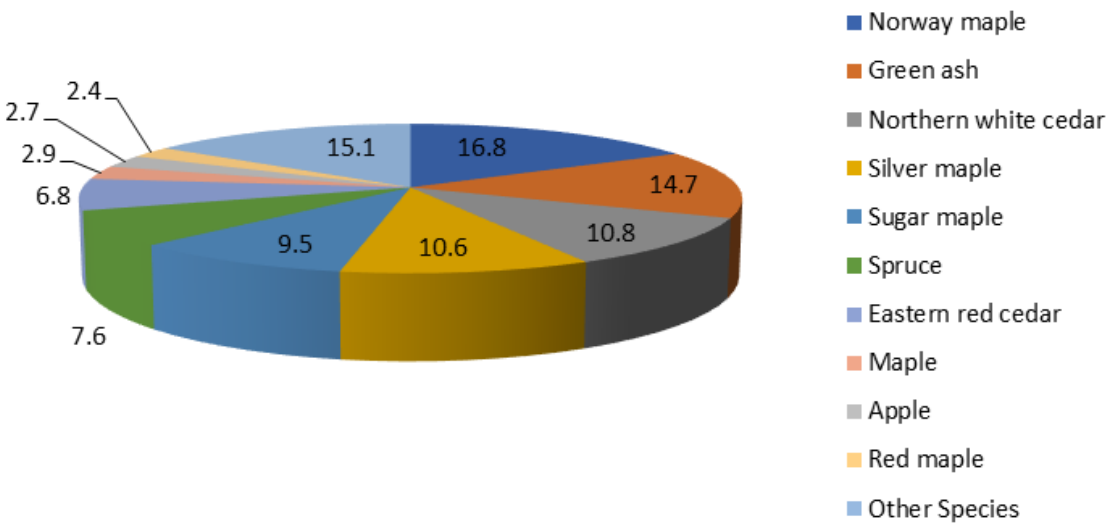
Benefits	Total ($)	Standard Error	$/tree	Standard Error	$/capita	Standard Error
Energy	65,248	(N/A)	41.77	(N/A)	18.67	(N/A)
CO2	8,834	(N/A)	5.66	(N/A)	2.53	(N/A)
Air Quality	10,475	(N/A)	6.71	(N/A)	3.00	(N/A)
Stormwater	95,245	(N/A)	60.98	(N/A)	27.26	(N/A)
Aesthetic/Other	73,002	(N/A)	46.74	(N/A)	20.89	(N/A)
Total Benefits	252,803	(N/A)	161.85	(N/A)	72.35	(N/A)
Costs						
Planting	0		0.00		0.00	
Contract Pruning	0		0.00		0.00	
Pest Management	0		0.00		0.00	
Irrigation	0		0.00		0.00	
Removal	0		0.00		0.00	
Administration	0		0.00		0.00	
Inspection/Service	0		0.00		0.00	
Infrastructure Repairs	0		0.00		0.00	
Litter Clean-up	0		0.00		0.00	
Liability/Claims	0		0.00		0.00	
Other Costs	0		0.00		0.00	
Total Costs	0		0.00		0.00	
Net Benefits	252,803	(N/A)	161.85	(N/A)	72.35	(N/A)
Benefit-cost ratio	0.00	(N/A)				

Figure 1: Species Distribution

New Hampton

Species Distribution of Public Trees

2/7/2023



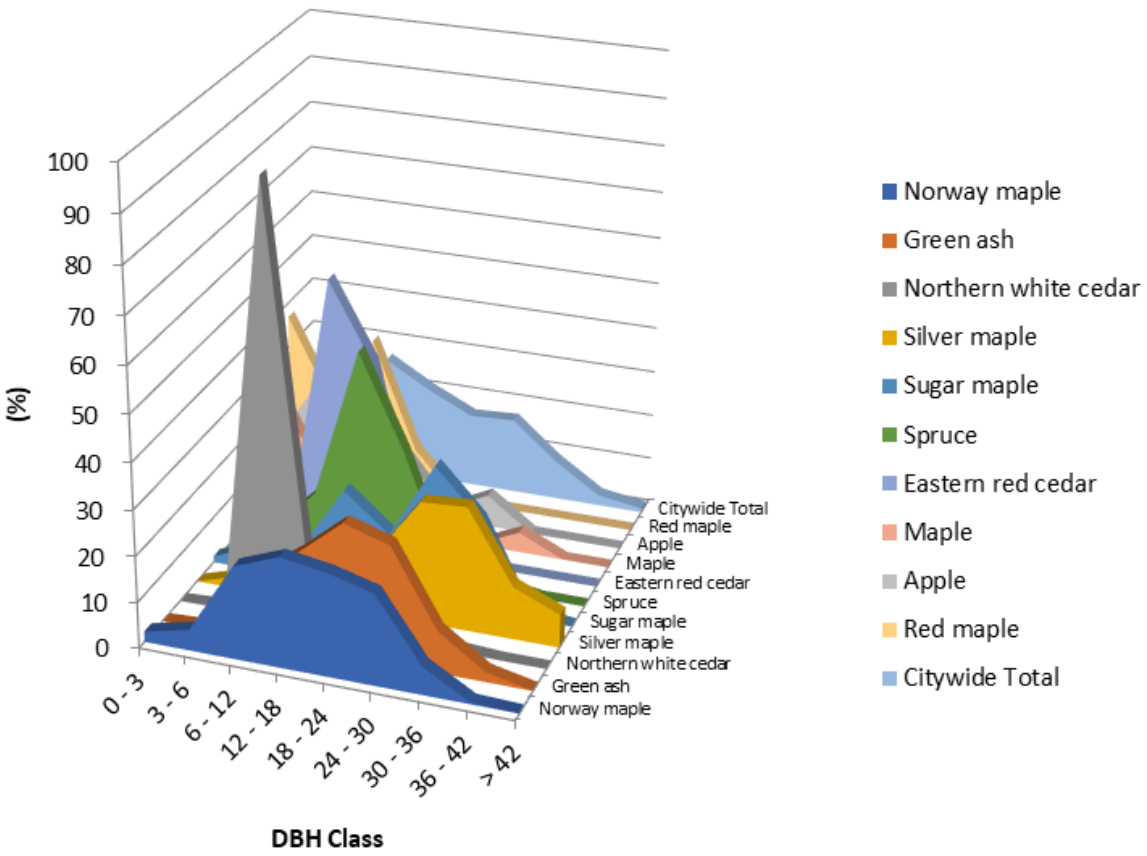
Species	Percent
Norway maple	16.8
Green ash	14.7
Northern white cedar	10.8
Silver maple	10.6
Sugar maple	9.5
Spruce	7.6
Eastern red cedar	6.8
Maple	2.9
Apple	2.7
Red maple	2.4
Other Species	15.1
Total	100.0

Figure 2: Relative Age Class

New Hampton

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

2/7/2023



	DBH class (in)								
Species	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	> 42
Norway maple	2.29	4.58	20.23	24.05	22.52	19.85	6.11	0.38	0.00
Green ash	0.00	0.43	13.48	20.43	28.70	25.65	9.13	2.17	0.00
Northern white cedar	0.00	0.59	92.90	2.96	1.18	1.78	0.59	0.00	0.00
Silver maple	0.00	3.01	4.82	6.63	13.25	26.51	27.11	11.45	7.23
Sugar maple	1.34	5.37	6.71	21.48	13.42	30.20	20.13	1.34	0.00
Spruce	0.00	5.04	15.13	47.90	27.73	2.52	1.68	0.00	0.00
Eastern red cedar	0.00	0.00	58.49	41.51	0.00	0.00	0.00	0.00	0.00
Maple	35.56	17.78	28.89	8.89	4.44	0.00	4.44	0.00	0.00
Apple	11.90	26.19	38.10	14.29	2.38	7.14	0.00	0.00	0.00
Red maple	36.84	18.42	34.21	10.53	0.00	0.00	0.00	0.00	0.00
Citywide Total	3.65	4.61	26.25	20.74	16.20	16.71	8.64	2.30	0.90

Figure 3: Foliage Condition

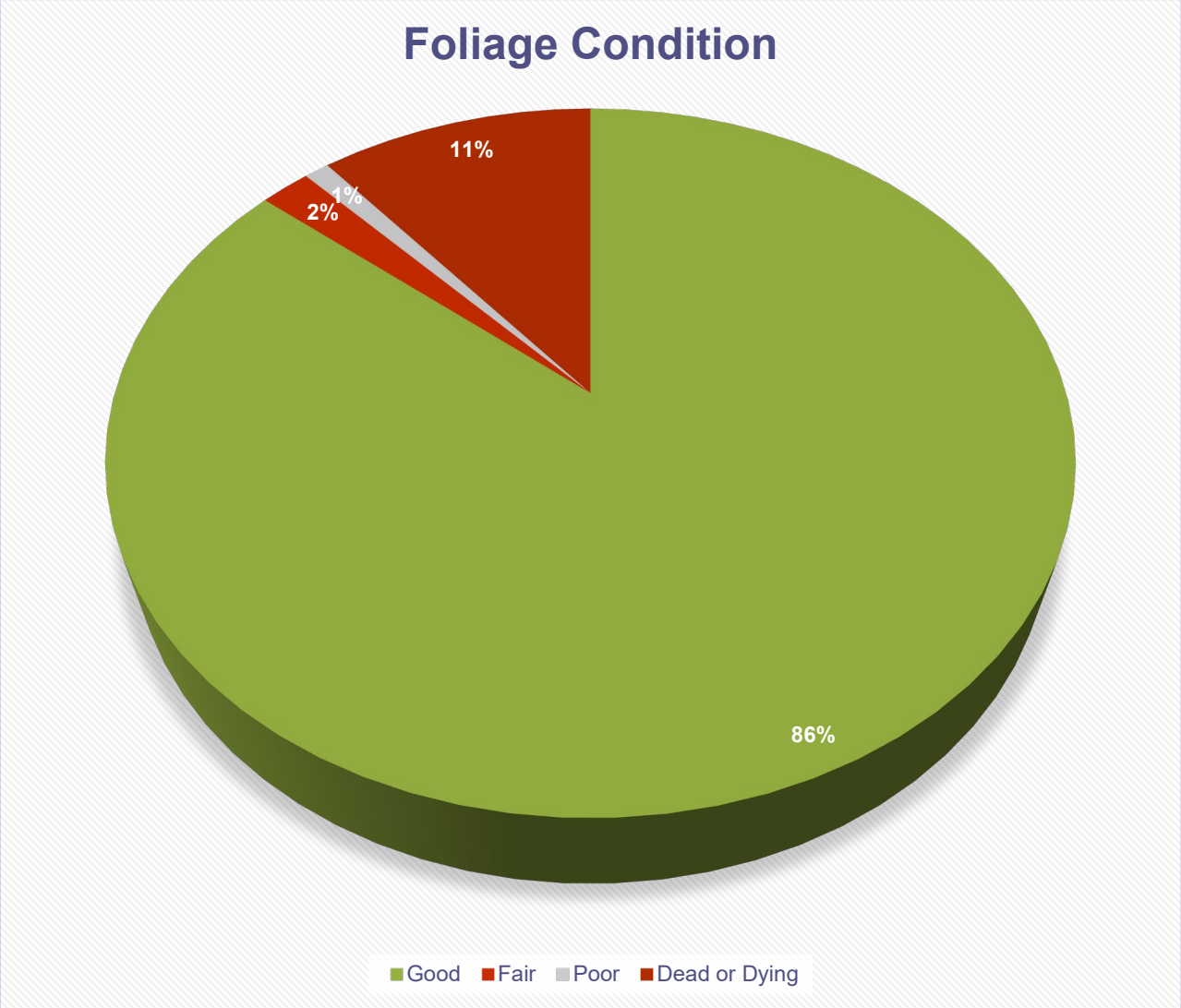


Figure 4: Wood Condition

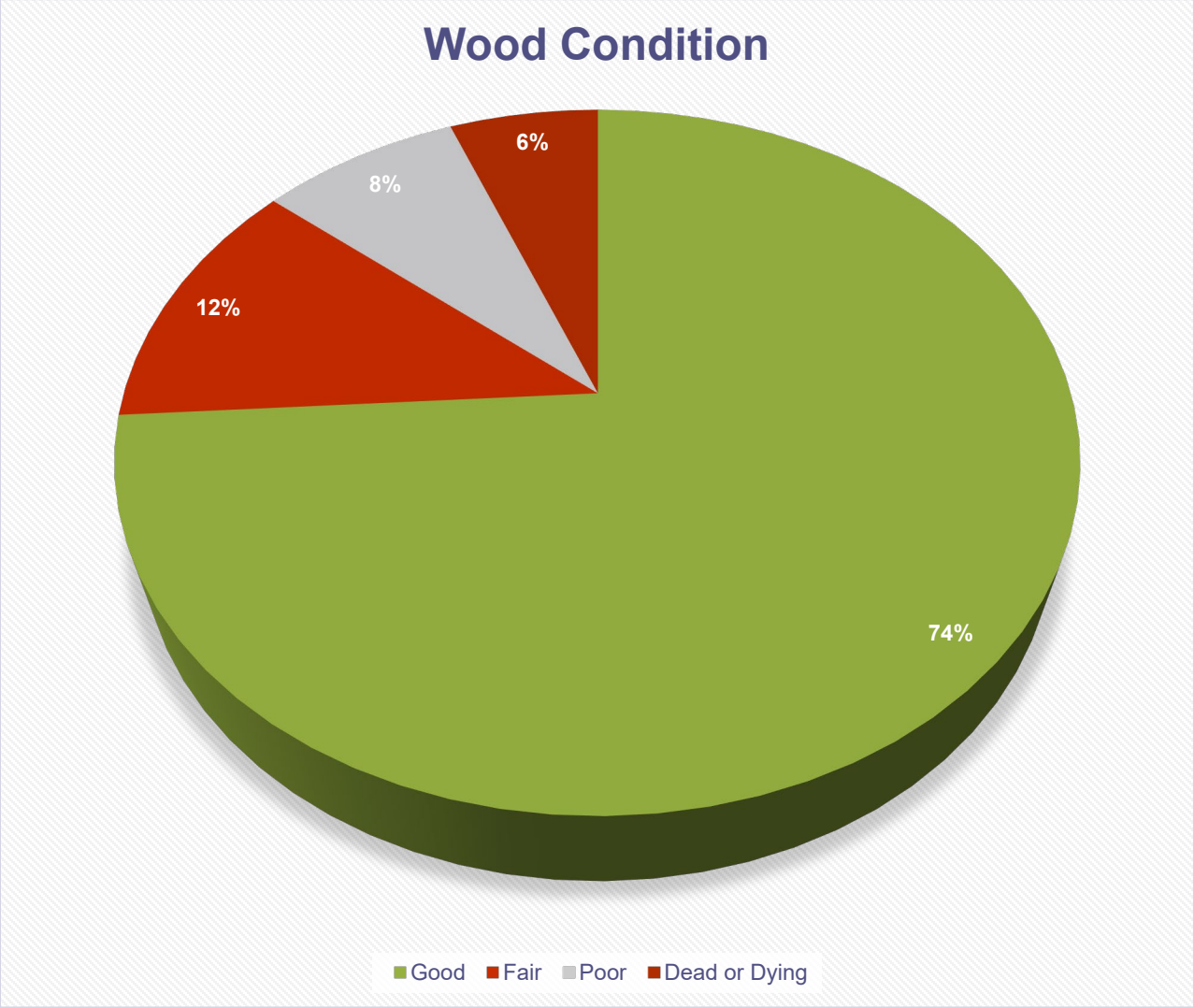
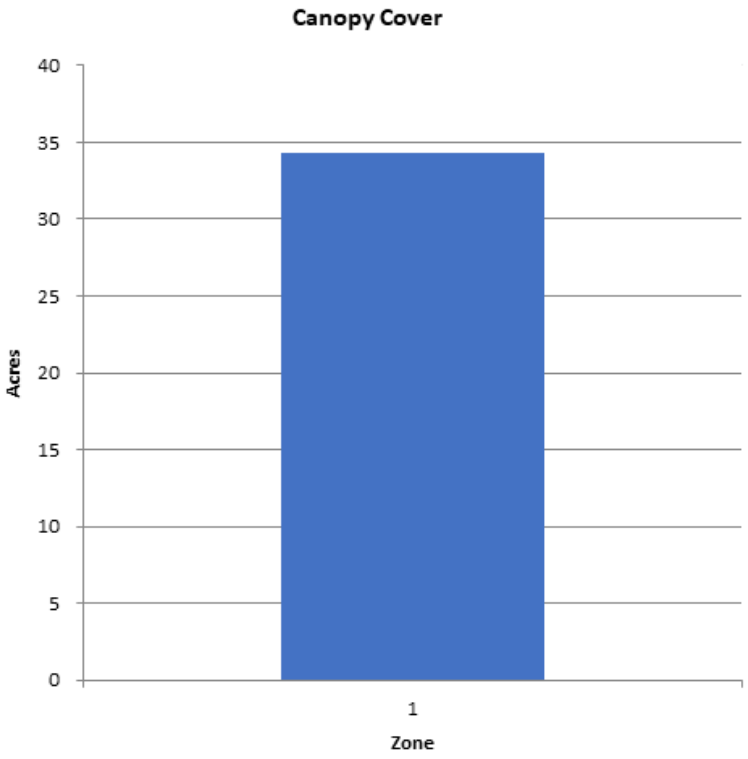


Figure 5: Canopy Cover in Acres

New Hampton

Canopy Cover of Public Trees (Acres)

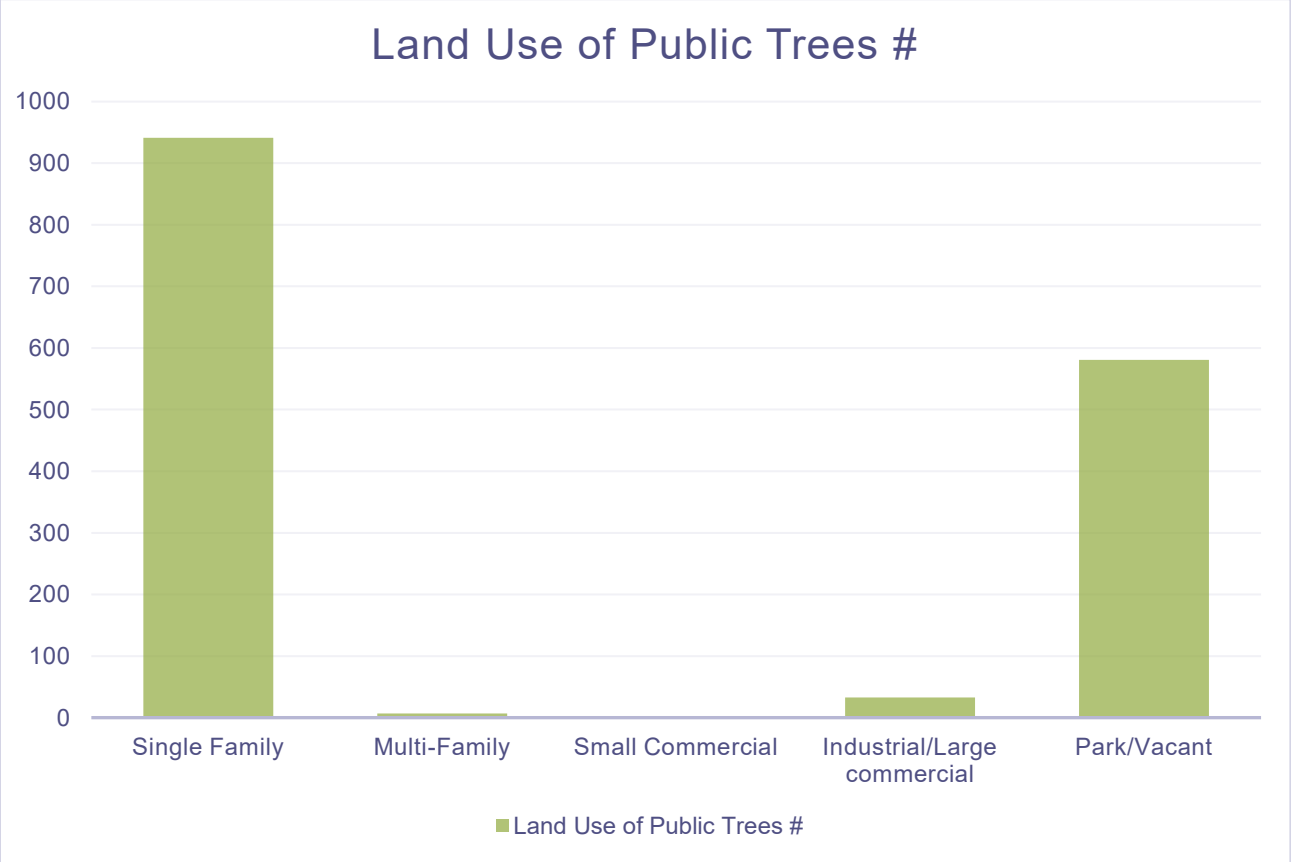
2/7/2023



Zone	Acres	% of Total Canopy Cover
1	34	100.0
Citywide total	34	100.0

	Total Land Area	Total Street and Sidewalk Area	Total Canopy Cover	Canopy Cover as % of Total Land Area	Canopy Cover as % of Total Streets and Sidewalks
Citywide Total	0	0	34	0.00	0.00

Figure 6: Land Use of City/Park Trees



APPENDIX B: ArcGIS MAPPING

Figure 1: Location of Ash Trees

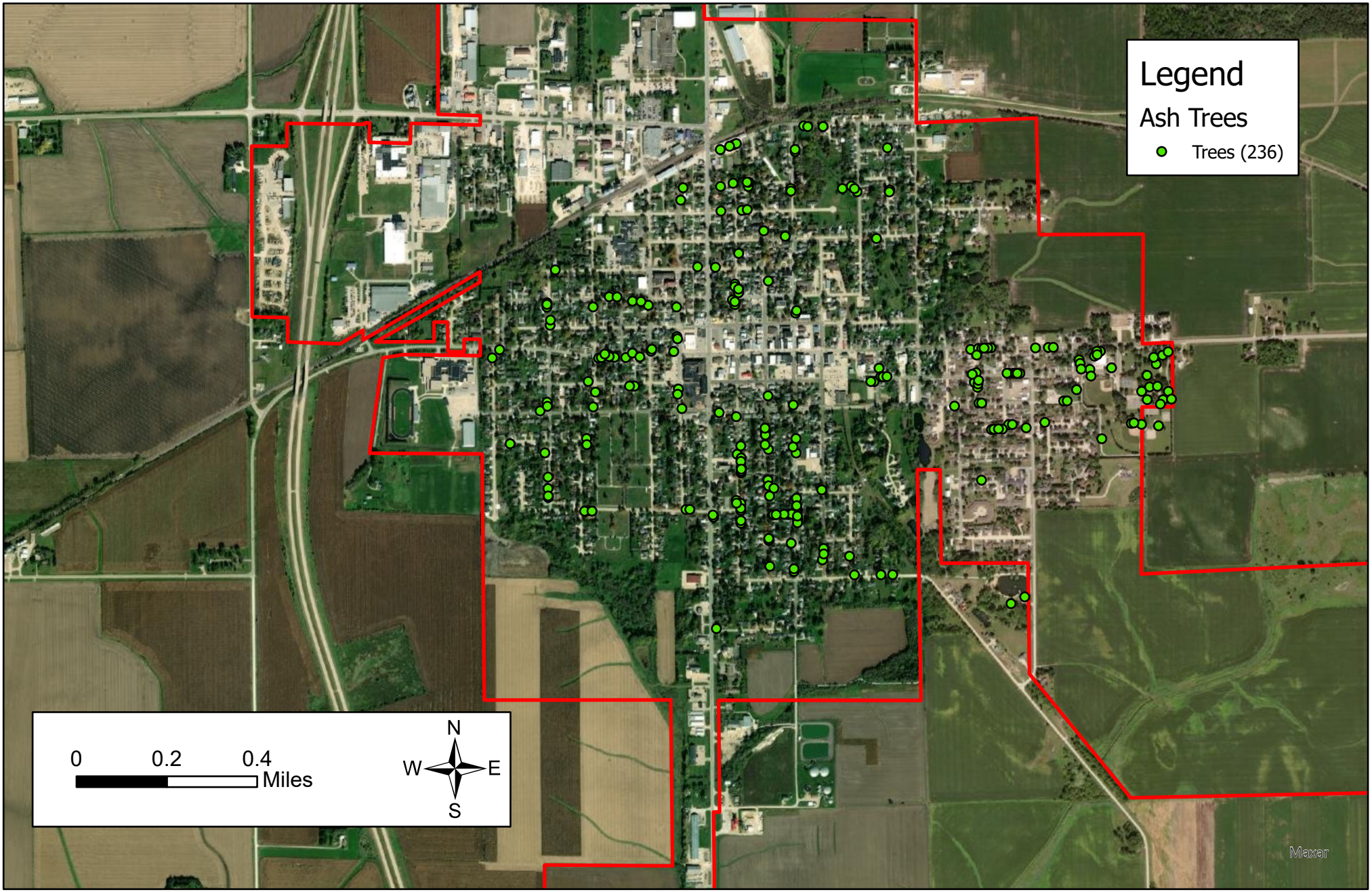
Figure 2: Location of EAB Symptoms

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



Created By: D. Genereux
Date: 1/26/2023
Software: ArcGIS Pro 3.0.3
File: 2022 IDNR Tree Inventory.aprx

2022 IDNR Tree Inventory

Figure 1 - Ash Tree Location
New Hampton, Iowa

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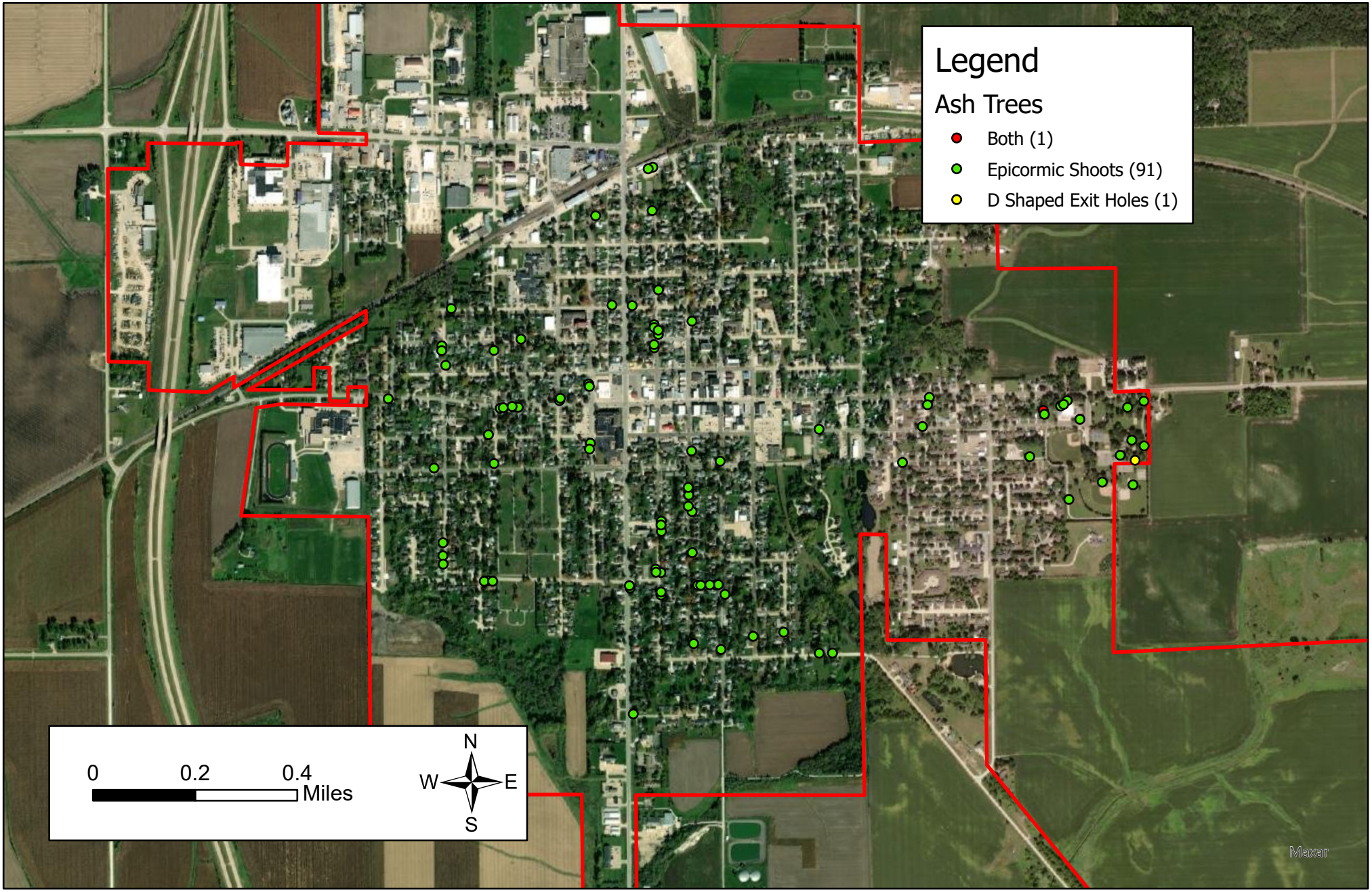

Created By: D. Genereux
Date: 1/26/2023
Software: ArcGIS Pro 3.0.3
File: 2022 IDNR Tree Inventory.aprx

2022 IDNR Tree Inventory

Figure 2 - EAB Symptoms
New Hampton, Iowa

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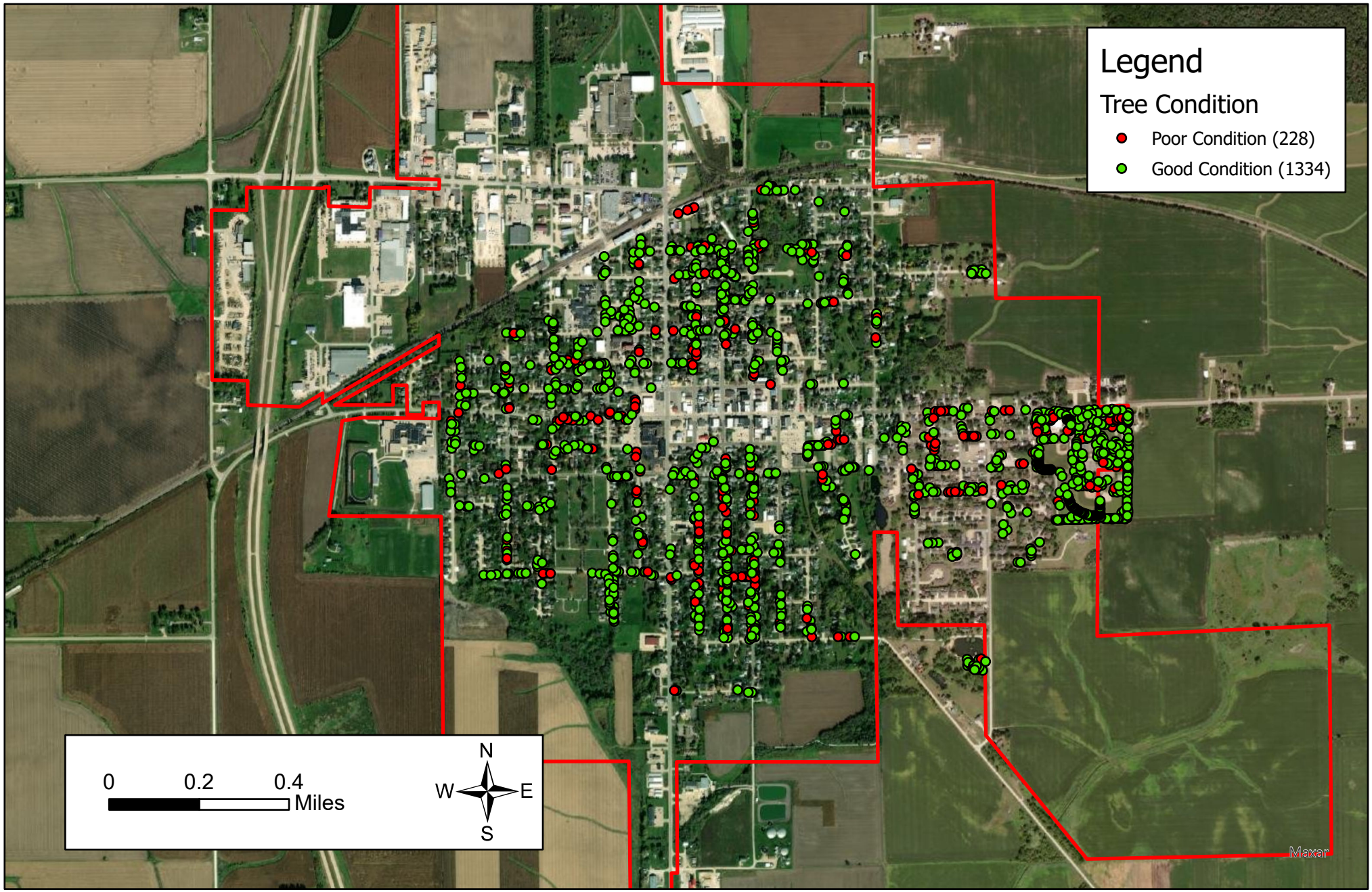

Created By: D. Genereux
Date: 1/26/2023
Software: ArcGIS Pro 3.0.3
File: 2022 IDNR Tree Inventory.aprx

2022 IDNR Tree Inventory

Figure 3 - Poor Condition Trees
New Hampton, Iowa

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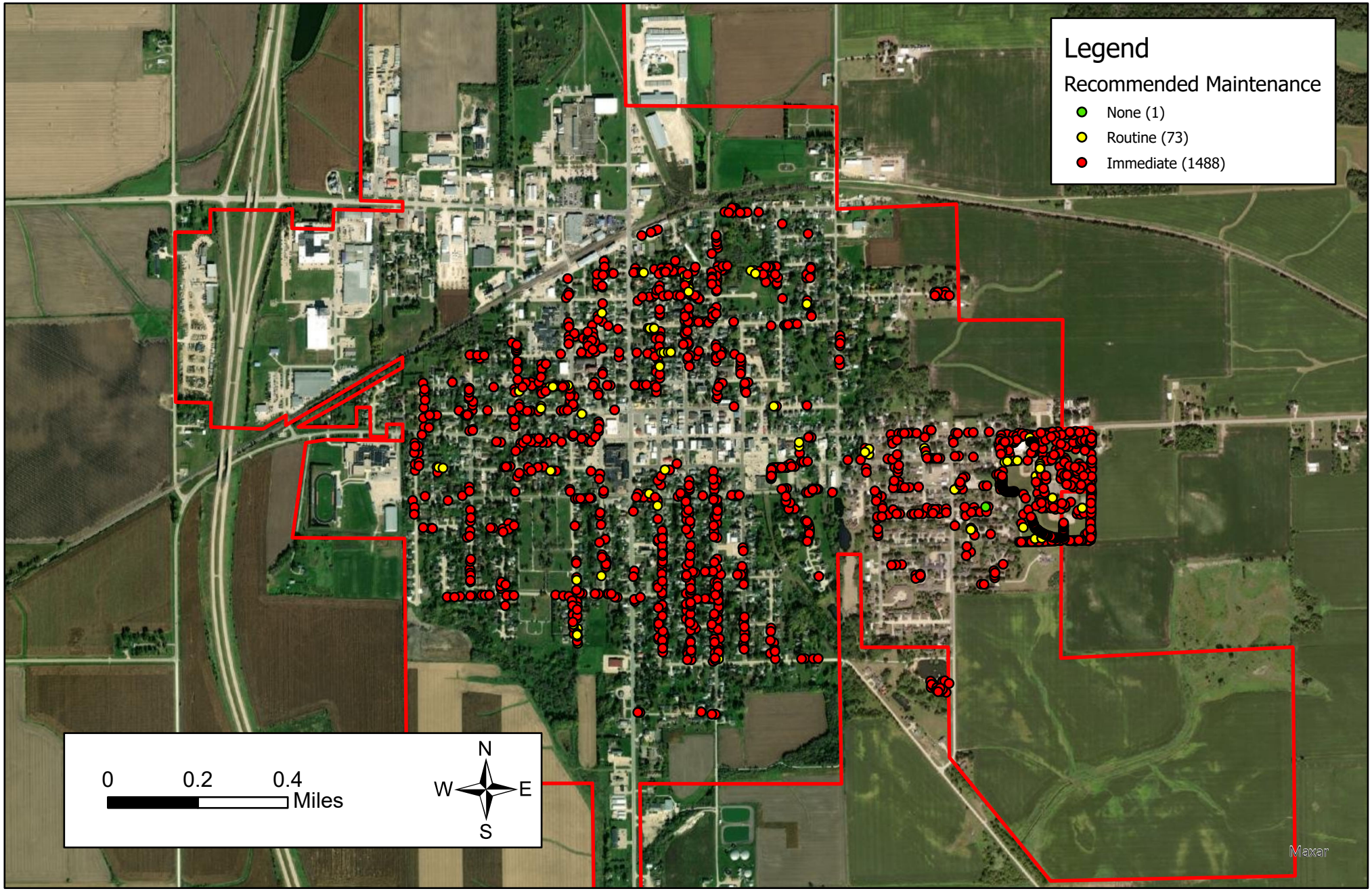

Created By: D. Genereux
Date: 1/26/2023
Software: ArcGIS Pro 3.0.3
File: 2022 IDNR Tree Inventory.aprx

2022 IDNR Tree Inventory

Figure 4 - Recommended Maintenance
New Hampton, Iowa

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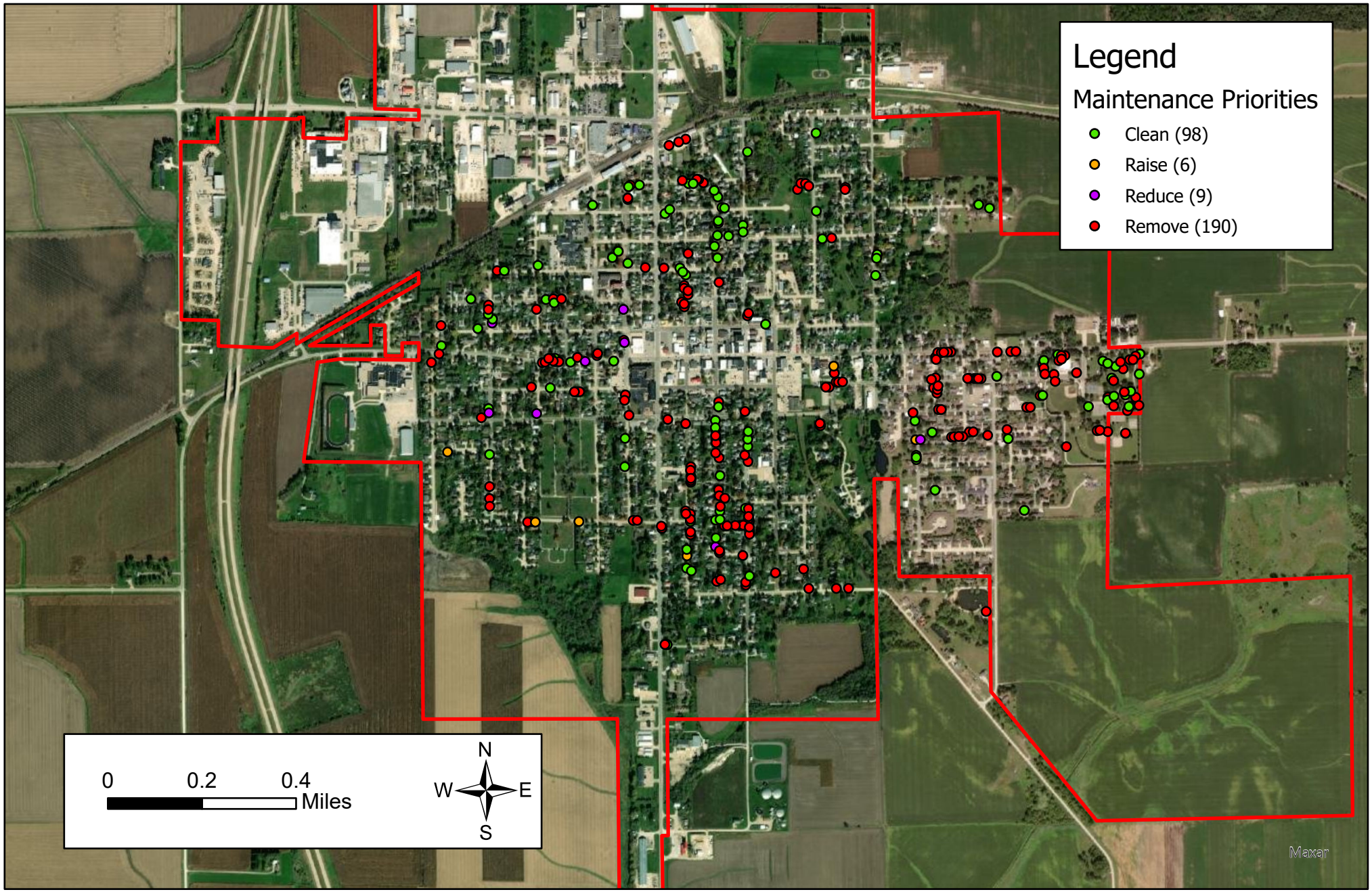

Created By: D. Genereux
Date: 1/26/2023
Software: ArcGIS Pro 3.0.3
File: 2022 IDNR Tree Inventory.aprx

2022 IDNR Tree Inventory

Figure 5 - Maintenance Priorities
New Hampton, Iowa

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APPENDIX C: NEW HAMPTON TREE ORDINANCES

ARTICLE 6

TREES

66.1 PURPOSE. The purpose of this chapter is to beautify and preserve the appearance of

the city by regulating and providing for the planting, care and removal of trees.

66.2 DEFINITIONS. For use in this chapter, the following terms are defined:

1. "Parking": shall mean that part of the street, avenue or highway in the city not covered by sidewalk and lying between the lot line and the curb line; or, on unpaved streets, that part of the street, avenue or highway lying between the lot line and that portion of the street usually traveled by vehicular traffic.

2. "Superintendent": shall mean the director of public works, City Tree Board, or such other person as may be designated by the council.

66.3 TREES IN PARKING. The owners of all lots or parcels of land are hereby granted the right and privilege of planting and maintaining trees, on the parking in front of and beside their property, except as hereinafter provided, and upon the express condition that

the right is reserved to the city at any time to use the same for street or sidewalk purposes

and to remove all trees therefrom, or other things growing thereon; and providing further that all trees, shall be planted and maintained in accordance with the requirements of this

chapter.

66.4 PLANTING RESTRICTIONS. No tree shall be planted in any street or parking except in accordance with the following:

1. Alignment. All trees hereafter planted in any street shall be planted in the parking 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. Except as hereafter set forth, trees shall not be planted on the parking if it 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-five (25) feet to street intersections (property lines extended) and ten (10) feet to driveways. Trees shall be planted not less than thirty (30) feet apart. If it is at all possible trees should be planted inside the property lines and not between the sidewalk and the curb or within the City right-of-way.

3. Prohibited Trees. No person shall hereafter plant in any parking, any fruit-bearing tree or any tree of the kinds commonly known as cottonwood, poplar, boxelder, evergreens, soft maple or willow.

4. Linn Avenue and Milwaukee Street. From the date of enactment of this ordinance, no trees shall be planted in the parking on Linn Avenue and on West Milwaukee Street from Linn Avenue west to the corporate limits.

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66.5 VISION. No tree shall be maintained upon the parking in such a manner as to interfere with the clear vision of drivers of vehicles, nor within twenty-five (25) feet of any intersection, and any trees existing contrary to the provisions hereof, may be removed by the superintendent without compensation to the abutting property owners.

66.6 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 fifteen (15) feet above the surface of the street and eight (8) feet above the sidewalks, and do not interfere with or obscure utility wires or street lights. [Code of Iowa, 2017 §364.12(2c)]

66.7 MAINTENANCE. It shall be the duty of the owner and occupant of the abutting or adjacent property to remove all dead, damaged and broken limbs and all limbs which are

or may become dangerous to travel upon the public street.

66.8 ASSESSMENT. If the abutting property owner fails to trim or maintain the trees as required in this chapter, the City shall serve notice on the abutting property owner requiring them to do so within thirty (30) days. If the owner fails to trim or maintain the trees within that time, the City of its agent shall 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, 2017, §364.12 (2d & e)]

66.9 REMOVAL OF TREES. The superintendent shall remove, on the order of the council, any tree on the streets of the city which interferes with the making of improvements or with travel thereon. The superintendent shall additionally remove any trees on the street, not on private property, which have become diseased, or which constitute a danger to the public, or which may otherwise be declared a nuisance. [Code of Iowa, 1999, §364.12 (2c) & 372.13(4)]

66.10 TREES SUBJECT TO REMOVAL. The council having determined that the health of the trees within the city is threatened by fatal epidemic diseases and hereby declares the following shall be removed: [Code of Iowa, 1999, §364.12(3b)]
1. Living or Standing Trees. Any living or standing tree or part thereof infected with the fatal epidemic disease.
2. Dead Trees. Any dead tree or part thereof including logs, branches, stumps, firewood or other material from which the bark has not been removed and burned or sprayed with an effective insecticide.

66.11 DUTY TO REMOVE. No person, firm or corporation shall permit any tree or material as defined in this article to remain on the premises owned, controlled or occupied by him within the city. [Code of Iowa, 1999, §364.12 (3b)]

66.12 INSPECTION. The City Tree Board shall inspect or cause to be inspected all premises and places within the city to determine whether any condition as defined in this 205 article exists thereon, and shall also inspect or cause to be inspected any trees reported or suspected to be infected.

66.13 REMOVAL FROM CITY PROPERTY. If the City Tree Board upon inspection or examination, in person or by some qualified person acting for the Board, determines that a tree in or upon any public street, alley, park or any public place, including the public right-of-way, within the City is so diseased, damaged, or deteriorated so that there is an imminent threat of harm to other trees or property, the Board shall immediately cause said tree to be removed or otherwise correct the same in such manner as to prevent as fully as possible the spread of disease or the threat of harm or damages to the residents of the City or their property.

66.14 REMOVAL FROM PRIVATE PROPERTY. If the City Tree Board upon inspection or examination, in person or by some qualified person acting for the Board, shall determine with reasonable certainty that disease, damage, or deterioration exists in a tree on private property and that the condition creates an imminent threat of harm or damage to other trees, neighboring property, or to the public at large, the Board shall immediately notify by certified mail the owner, occupant, or person in charge of said property to remedy and correct such situation within thirty (30) days of said notification. If such owner, occupant, or person in charge of said property fails to do so within thirty (30) days of receipt thereof, the Board or its agent may cause the threat to be remedied, including by removal of the tree and the costs thereof shall be assessed against the property as provided for in Article 5 of Title VI of the City Code. [Code of Iowa, 2017, §364.12 (3b & h)]

If the City Tree Board is unable to determine with reasonable certainty whether or not a tree in or upon private premises is infected with disease, the Board is authorized to remove or cut specimens from said tree, and obtain a diagnosis of such specimens.
If the City Tree Board is unable to determine with reasonable certainty whether or not a tree in or upon private premises is infected with disease, it is authorized to remove or cut specimens from said tree, and obtain a diagnosis of such specimens.